MacDon

HC20
Hay Conditioner

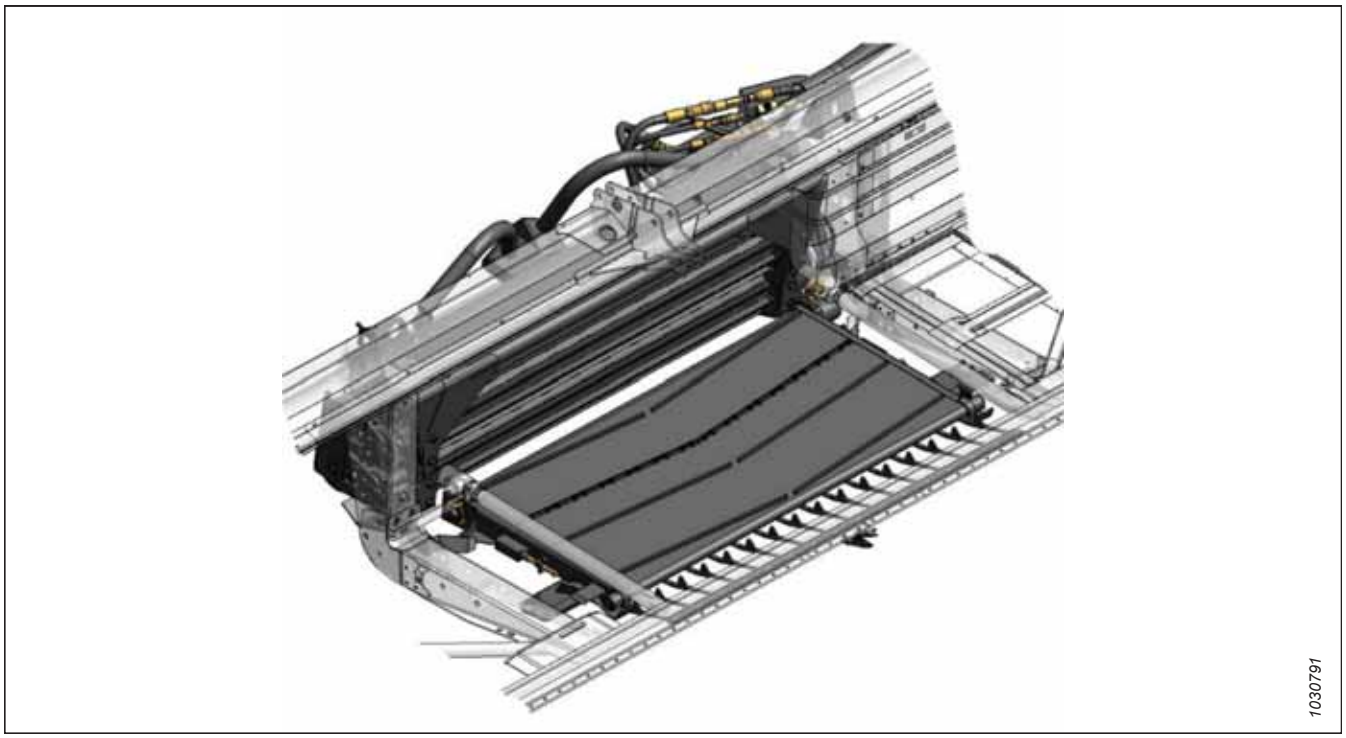
Setup, Operation, and Parts Manual

262400 Revision A

Original Instruction

The Harvesting Specialists.

MacDon HC20 Hay Conditioner



Published November 2023

Introduction

This manual contains safety information, setup instructions, operating and maintenance procedures, and a parts catalog for the MacDon HC20 Hay Conditioner.

Your machine

A hay conditioner crimps and crushes cut hay so that it can dry faster. When paired with a MacDon M1 or M2 Series Windrowers and D2 SP Series Draper Header equipped with a timed double-knife drive, the HC20 lays conditioned crop into uniform, fluffy windrows.

NOTE:

The HC20 is compatible **ONLY** with D2 SP Series Headers that are 4.6–9.1 m (15–30 ft.) in length and equipped with a timed double-knife. To ensure the best performance, the HC20 Hay Conditioner should **NOT** be attached to single-knife drive headers.

Your manual

Carefully read all of the material provided before attempting to maintain, service, or use the machine.

To set up the machine or make adjustments to it, follow the recommended machine settings in all relevant MacDon publications. Failure to do so may compromise the functionality of the hay conditioner and reduce its service life, and may result in a hazardous situation.

If the shipment is damaged or is missing parts, contact shortageanddamage@macdon.com.

Carefully read this manual prior to unloading, assembling, or using the hay conditioner.

Use this manual as your first source of information about the machine. If the instructions provided in this manual are followed, the hay conditioner will work well for many years. Use this manual in conjunction with the windrower and draper header manuals.

Use the Table of Contents and Index to locate specific topics. Review the Table of Contents to understand how this manual is organized.

Keep this manual handy for frequent reference and to pass on to new Operators or Owners. Call the MacDon Dealer if assistance, information, or additional copies of this manual are needed.

Your Warranty

MacDon provides warranty for Customers who operate and maintain their equipment according to the instructions provided 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

The following conventions are used in this document:

- Right and left are determined from the operator's position. The front of the header and of the hay conditioner is the side that faces the crop; the back is the side that connects to the windrower.
- Unless other instructions are provided in a particular procedure, use the standard torque values provided in this book. Refer to *7.1 Torque Specifications, page 139*.

NOTE:

This document is available in English only.

Summary of Changes

MacDon is continually improving its products. Sometimes, those improvements affect the documentation of those products. A list of the major changes made to this document since the last version was published is provided below.

Section	Summary of Change	Internal Use Only
Various	Added M2 Series Windrower content.	Technical Publications
3.2 Installing Rock Grate, page 19	Added parts list and illustration.	Technical Publications
3.6 Assembling Forming Shield, page 34	Corrected the bundle numbers, added parts list, and illustration.	Technical Publications
3.9 Attaching Header to M1 Series Windrower, page 40	Revised topic.	Technical Publications
3.10 Attaching Header to M2 Series Windrower, page 47	Added topic.	Technical Publications
4.4.2 Detaching Hay Conditioner – Lifting Method, page 71	Added step.	Technical Publications
4.4.3 Detaching Hay Conditioner – Windrower Method, page 73	Added step.	Technical Publications
3.13 Lubricating Conditioner, page 60	Added grease decal 242484.	ECN 64533
7.1.4 O-Ring Boss Hydraulic Fittings – Non-Adjustable, page 143	Updated torque values in the table.	ECN 64539
7.1.3 O-Ring Boss Hydraulic Fittings – Adjustable, page 142	Updated torque values in the table.	ECN 64539
7.1.5 O-Ring Face Seal Hydraulic Fittings, page 144	Minor corrections in the table of torque values: • Size -6: rounded lbf-ft from 29 up to 30. • Size -24: corrected "Thread Size" from 1-2 to 2	Technical Publications

Serial Numbers

Serial numbers help MacDon representatives provide the correct information for your hay conditioner.

Record the serial number of the hay conditioner in the space below.

Hay Conditioner Serial Number: _____

Serial number plate (A) is located on the rear cover of the conditioner frame.

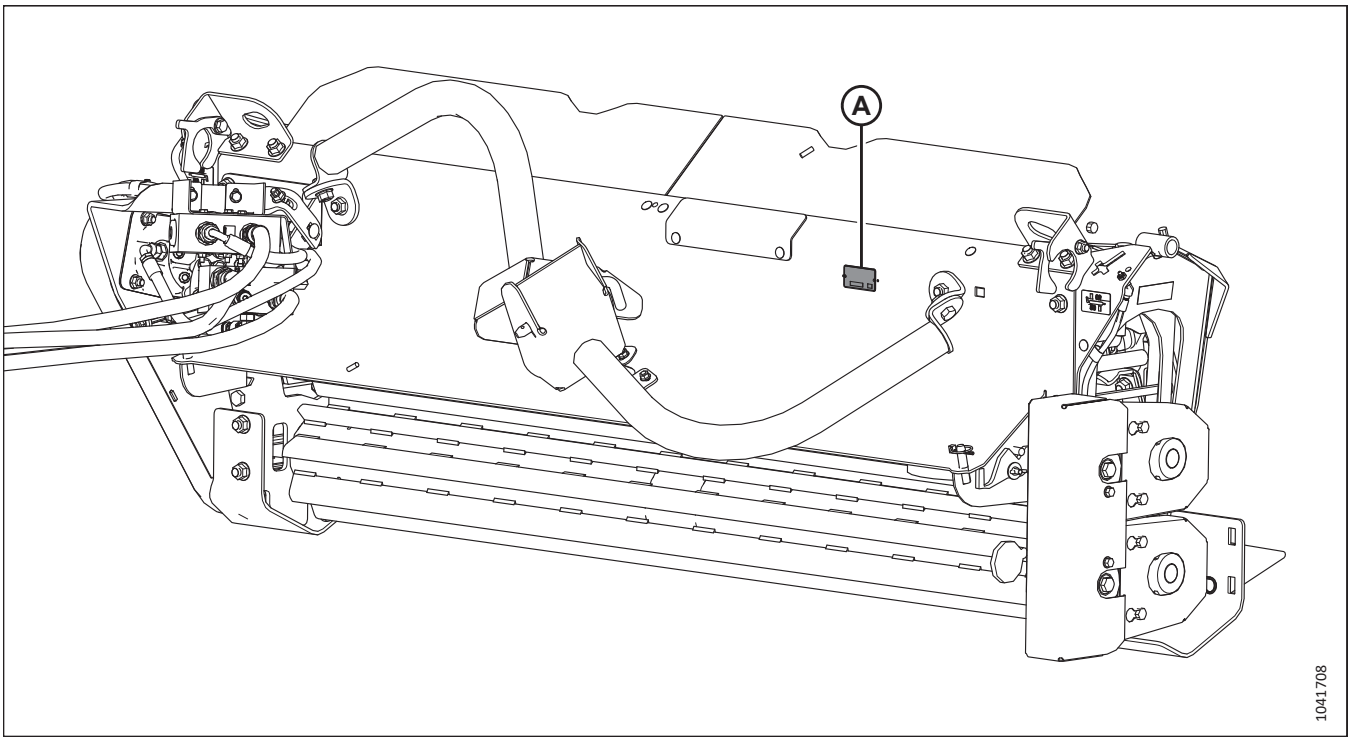


Figure 1: Serial Number Plate

Chapter 1: Safety

Understanding and consistently following these safety procedures will help to ensure the safety of those operating the machine and of bystanders.

1.1 Safety Alert Symbols

The 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. Two signal words, **IMPORTANT** and **NOTE**, identify non-safety related information.

Signal words are selected using the following guidelines:

DANGER

Indicates an imminently hazardous situation that, if it is not prevented, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation that, if it is not prevented, could result in death or serious injury. It may also be used to alert you to unsafe practices.

CAUTION

Indicates a potentially hazardous situation that, if it is not prevented, may result in minor or moderate injury. It may also be used to alert you to unsafe practices.

IMPORTANT:

Indicates a situation that, if not prevented, could result in a malfunction or damage to the machine.

NOTE:

Provides additional information or advice.

1.3 General Safety

Operating, servicing, and assembling machinery presents several safety risks. These risks can be reduced or eliminated by following the relevant safety procedures and wearing the appropriate personal protective equipment.

CAUTION

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

Wear all protective clothing and personal safety devices that could be necessary for the 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

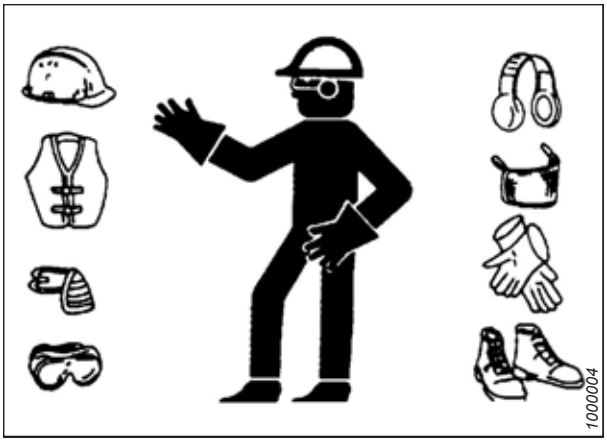


Figure 1.2: Safety Equipment

In addition, take the following precautions:

- Be aware that exposure to loud noises can cause hearing impairment. Wear suitable hearing protection devices such as earmuffs or earplugs to help protect against loud noises.

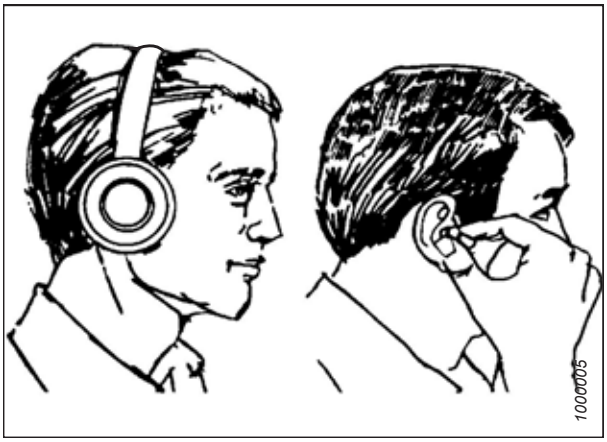


Figure 1.3: Safety Equipment

- Provide a first aid kit in case of emergencies.
- Keep a properly maintained fire extinguisher on the machine. Familiarize yourself with its use.
- Keep young children away from machinery at all times.
- Be aware that accidents often happen when Operators are fatigued or in a hurry. Take time to consider the safest way to accomplish a task. **NEVER** ignore the signs of fatigue.

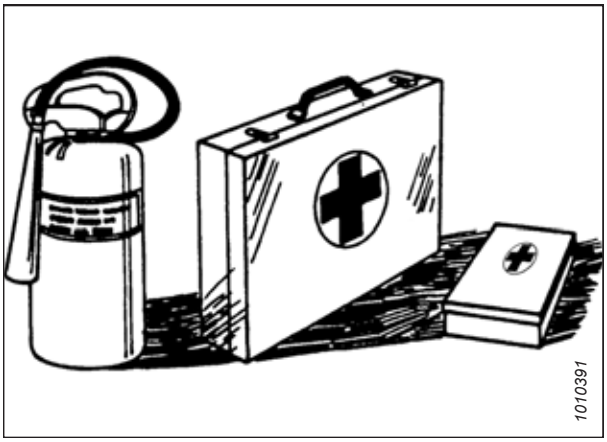


Figure 1.4: Safety Equipment

- Wear close-fitting clothing and cover long hair. **NEVER** wear dangling items such as hoodies, scarves, or bracelets.
- Keep all shields in place. **NEVER** alter or remove safety equipment. Ensure that the driveline guards can rotate independently of their shaft, and that they can telescope freely.
- Use only service and repair parts made or approved by the equipment manufacturer. Parts from other manufacturers may not meet the correct 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 the engine is running.
- Do **NOT** modify the machine. Unauthorized modifications may impair the functionality and/or safety of the machine. It may also shorten the machine's service life.
- To avoid injury or death from the unexpected startup of the machine, **ALWAYS** stop the engine and remove the key from the ignition before leaving the operator's seat for any reason.

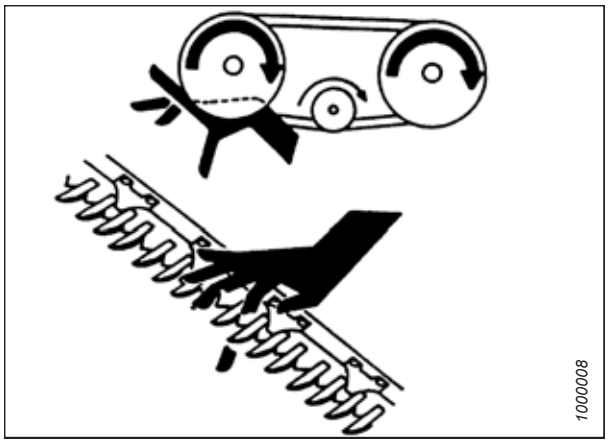


Figure 1.6: Safety around Equipment

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

Figure 1.7: Safety around Equipment

1.4 Hydraulic Safety

Because hydraulic fluid is under extreme pressure, hydraulic fluid leaks can be very dangerous. Follow the proper safety procedures when inspecting hydraulic fluid leaks and servicing hydraulic equipment.

- Always place all hydraulic controls in **NEUTRAL** before leaving the operator's seat.
- Ensure that all of the components in the 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 can fail suddenly and create hazardous conditions.

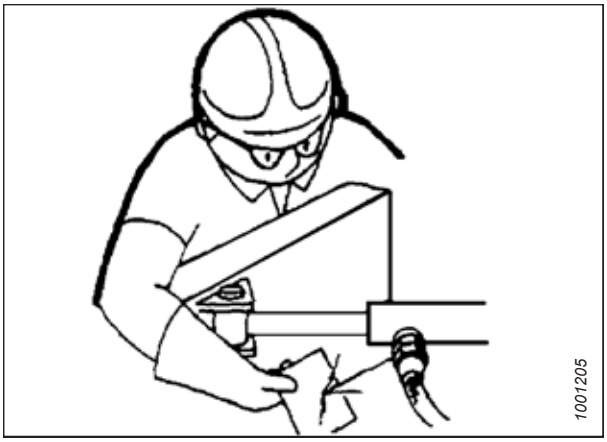


Figure 1.8: Testing for Hydraulic Leaks

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

Figure 1.9: Hydraulic Pressure Hazard

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

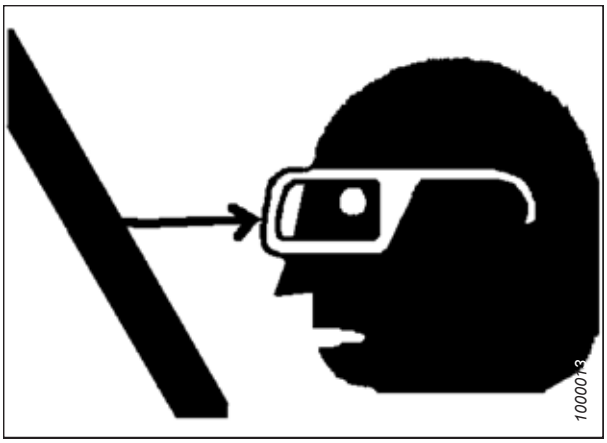


Figure 1.10: Safety around Equipment

1.5 Decommissioning and Disposing of Agricultural Equipment

When agricultural equipment is no longer serviceable and needs to be decommissioned and disposed of, recyclable materials including ferrous and non-ferrous metals, rubber, and plastics; fluids such as lubricants, refrigerants, and fuels; and hazardous materials found in batteries, some light bulbs, and electronic equipment must be handled safely and not introduced into the environment.

Comply with local regulations and authorities.

Products with symbol (A) should **NOT** be disposed of with domestic waste.

Figure 1.11: Symbol for Do NOT Dispose with Domestic Waste

Materials with symbol (B) should be recycled as labelled.

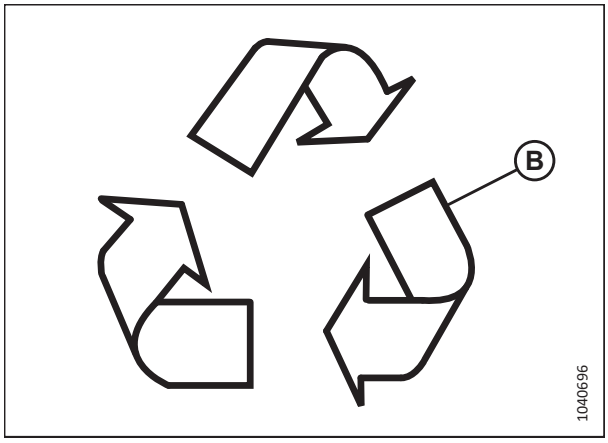


Figure 1.12: Symbol for Recycle as Labelled

- Use appropriate personal protective equipment when removing and handling objects and materials.
- Use appropriate personal protective equipment when handling objects with residue from pesticides, fertilizers, or other agricultural chemicals. Follow local regulations when handling and disposing of these objects.
- Safely release stored energy from suspension components, springs, hydraulic, and electrical systems.
- Recycle or reuse packaging material.
- Recycle or reuse plastics that are labelled with specifications for a material such as PP TV 20. Do **NOT** dispose of them with domestic waste.
- Return batteries to the vendor or take them to a collection point. Batteries contain hazardous substances. Do **NOT** dispose of batteries with domestic waste.
- Follow local regulations to correctly dispose of hazardous materials such as oils, hydraulic fluids, brake fluids, and fuels.
- Take refrigerants to qualified people at specialized facilities for disposal. Refrigerants must **NEVER** be released into the atmosphere.

1.6 Safety Signs

Safety signs are decals placed on the machine where there is a risk of personal injury, or where the Operator should take extra precautions before operating the controls. They are usually yellow.

- Keep safety signs clean and legible at all times.
- Replace safety signs that are missing or illegible.
- If the original part on which a safety sign was installed is replaced, ensure that the repair part displays the current safety sign.
- Replacement safety signs are available from your Dealer.

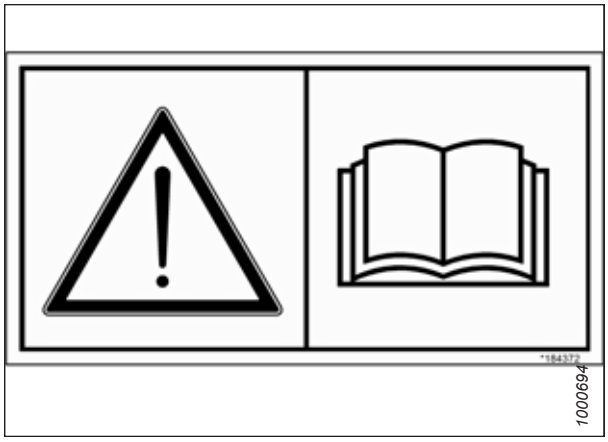


Figure 1.13: Operator's Manual Decal

1.6.1 Installing Safety Decals

Worn or damaged safety decals will need to be removed and replaced.

1. Decide exactly where you are going to place the decal.
2. Clean and dry the installation area.
3. Remove the smaller portion of the split backing paper.
4. Place the decal in position and slowly peel back the remaining paper, smoothing the decal as it is applied.
5. Prick small air pockets with a pin and smooth them out.

1.7 Safety Decal Locations

Safety signs are usually yellow decals, and are placed on the machine where there is a risk of personal injury, or where the operator has to take extra precaution before operating controls.

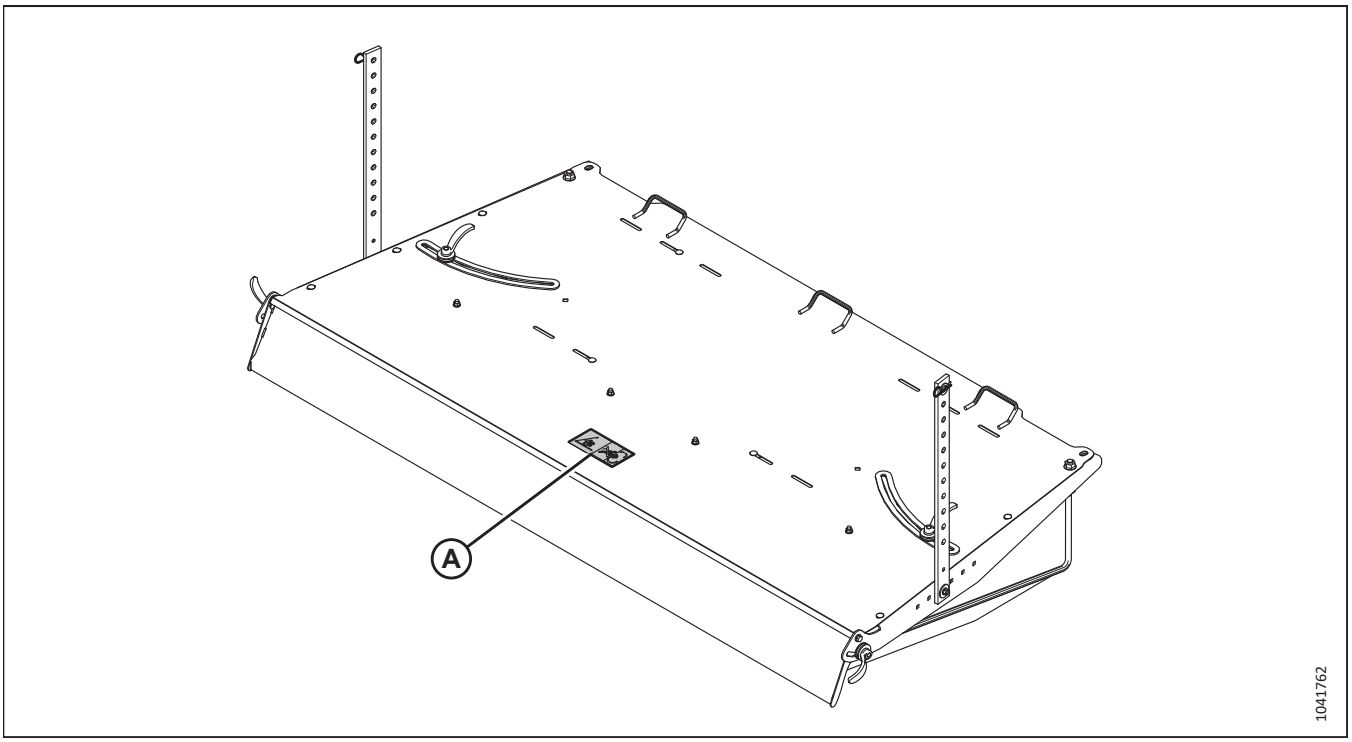


Figure 1.14: Forming Shield Safety Decal Location

A - MD #320514 – Conditioning Devices Entanglement Hazard

1.8 Understanding Safety Signs

Safety sign decals use illustrations to convey important safety or equipment maintenance information.

MD #320514

Conditioning devices entanglement hazard

DANGER

To prevent injury:

- Stop the engine and remove the key from the ignition before servicing.
- Do **NOT** reach into moving parts while machine is running.

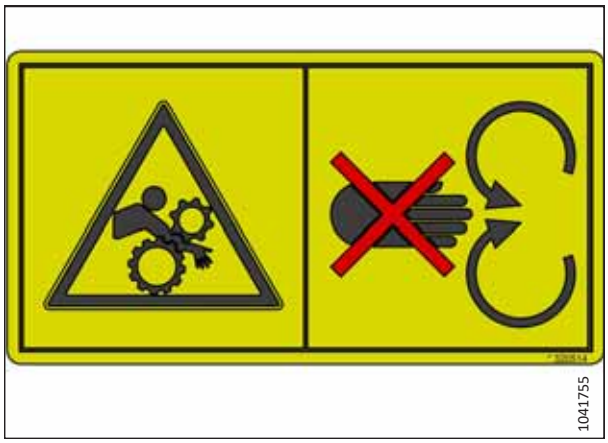


Figure 1.15: MD #320514

Chapter 2: Product Overview

Refer to this section to learn the definitions of the technical terms used in this manual, the machine's specifications, and the locations of key components.

2.1 Definitions

The following terms, abbreviations, and acronyms are used in this instructionmanual.

Table 2.1 Definitions

Term	Definition
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
Bolt	A headed and externally threaded fastener designed to be paired with a nut
D2 SP Series Draper Header	MacDon D215, D220, D225, D230, D235, and D241 Draper Headers for Windrowers
FFFT	Flats from finger tight
Finger tight	A reference position in which the given sealing surfaces or components are making contact with each other. The fitting has been tightened by hand to a point where the fitting is no longer loose and cannot be tightened further by hand
JIC	Joint Industrial Council: A standards body that developed standard sizing and shape for the original 37° flared fitting
M1 Series Windrowers	MacDon M1170, M1170*NT*, M1170*NT5*, and M1240 Windrowers
M2 Series Windrowers	MacDon M2170, M2170NT, and M2260 Windrowers
n/a	Not applicable
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
Nut	An internally threaded fastener designed to be paired with a bolt
ORB	O-ring boss: A style of fitting commonly used in port openings 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
SAE	Society of Automotive Engineers
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread when it is inserted into a mating part.
Tension	An axial load placed on a bolt or screw, usually measured in Newtons (N) or pounds (lb.). This term can also be used to describe the force a belt exerts on a pulley or sprocket
TFFT	Turns from finger tight
Torque	The product of a force * the length of a lever arm, usually measured in Newton-meters (Nm), foot-pounds (lbf·ft), or inch-pounds (lbf·in)
Torque angle	A tightening procedure in which a fitting is assembled to a specified tightness (usually finger tight) and then the nut is turned farther by a specified number of degrees until it achieves its final position
Torque-tension	The relationship between the assembly torque applied to a piece of hardware and the axial load it induces in a bolt or screw
Washer	A thin cylinder with a hole or a slot located in the center, used as a spacer, a load distribution element, or a locking mechanism

2.2 Specifications

Consult this section to learn about the physical characteristics of and the equipment specifications for the hay conditioner.

NOTE:

Specifications and design are subject to change without notice or obligation to revise previously sold units.

Item		Specification		
Frame and Structure				
Total weight (estimated)		635 kg (1400 lb.)		
Carrier		MacDon M1 and M2 Series Windrowers		
Header		MacDon double-knife (timed only) drive D215, D220, D225, and D230 Draper Headers		
Manual storage		In windrower cab		
Drives				
Main conditioner		80 cc (4.9 cu in.) hydraulic motor		
Feed deck		65 cc (4.0 cu in.) hydraulic motor with 921 psi relief		
Connections		Flat-faced quick attach couplers – connect under pressure		
Normal operating pressure	Conditioner	17.0–20.7 MPa (2500–3000 psi)		
	Feed deck	4.1 MPa (600 psi)		
Conditioner				
Drive		Hydraulic motor to belt-driven roll to open timing gear system		
Header size		4.6 m (15 ft.)	6.1 m (20 ft.) and 7.6 m (25 ft.)	9.1 m (30 ft.)[1]
Roll speed		772–977 rpm	720–874 rpm	695–927 rpm
Feed draper speed		437–553 fpm	407–495 fpm	393–525 fpm
Roll type		Intermeshing steel bars		
Roll diameter		233 mm (9.17 in.) / 168.4 mm (6.63 in.) OD tube		
Roll length		1830 mm (72 in.)		
Swath width		915–2540 mm (36–102 in.)		
Forming shields		Header-mounted tractor-supported adjustable forming shield system		

IMPORTANT:

The HC20 Hay Conditioner should **NOT** be attached to single-knife drive headers.

1. The HC20 Hay Conditioner should **NOT** be used with 9.1 m (30 ft.) draper headers in heavy crop conditions.

2.3 Component Identification

Knowing the location and the identity of key hay conditioner components is critical to operating and properly maintaining the machine.

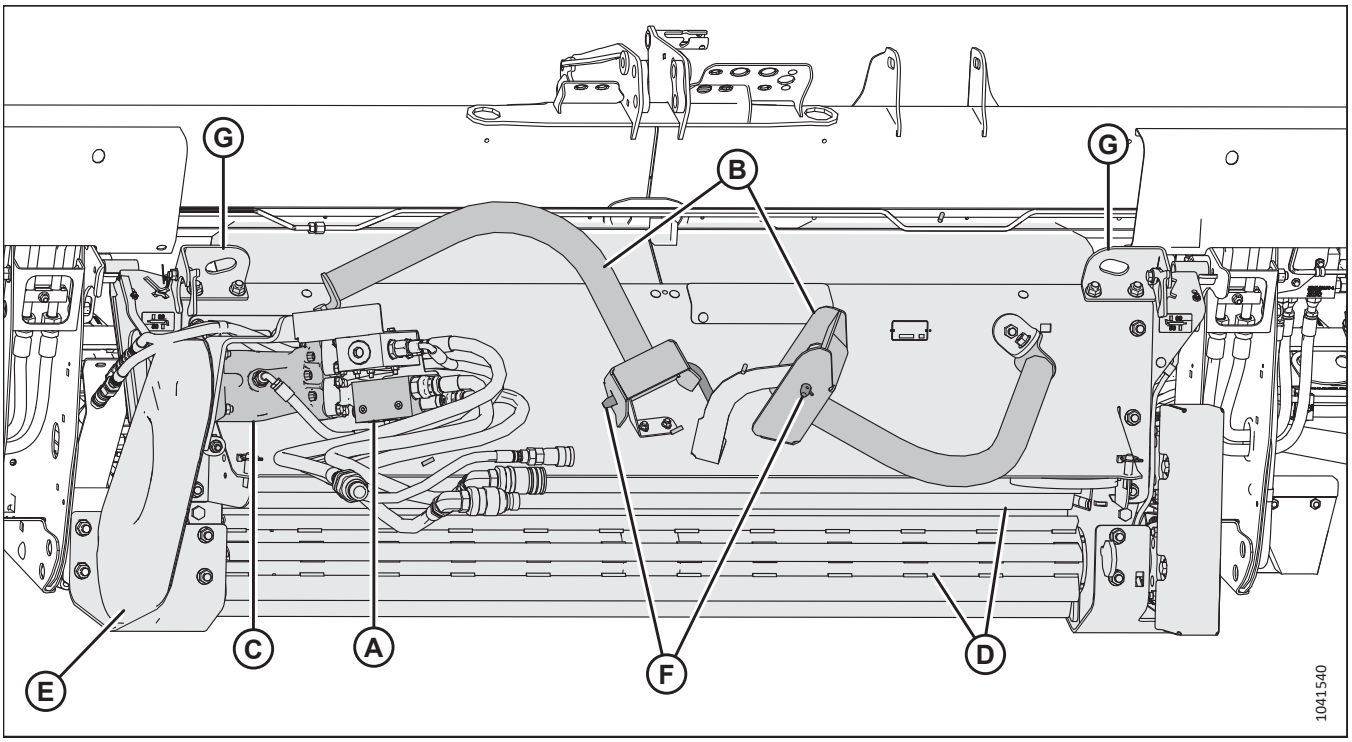


Figure 2.1: Back View of Hay Conditioner Installed in Header

A - Hydraulics to Header
B - Lift Arms
C - Hydraulic Motor
D - Rolls
E - Drive Belt Shield
F - L-Pins
G - Lifting Lugs

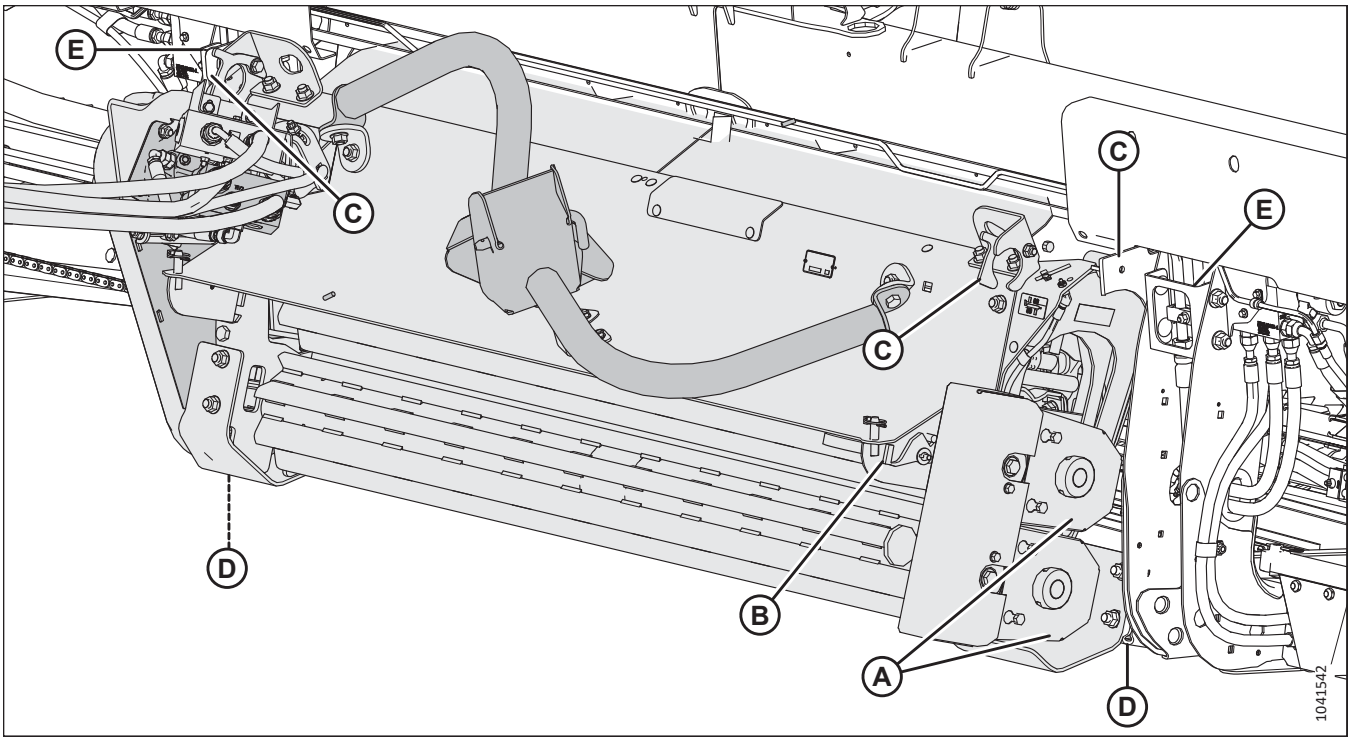


Figure 2.2: Back View of Hay Conditioner Installed in Header

A - Timing Gears
B - Roll Timing Tool
C - Mounting Brackets
D - Lower Supports
E - Spacers

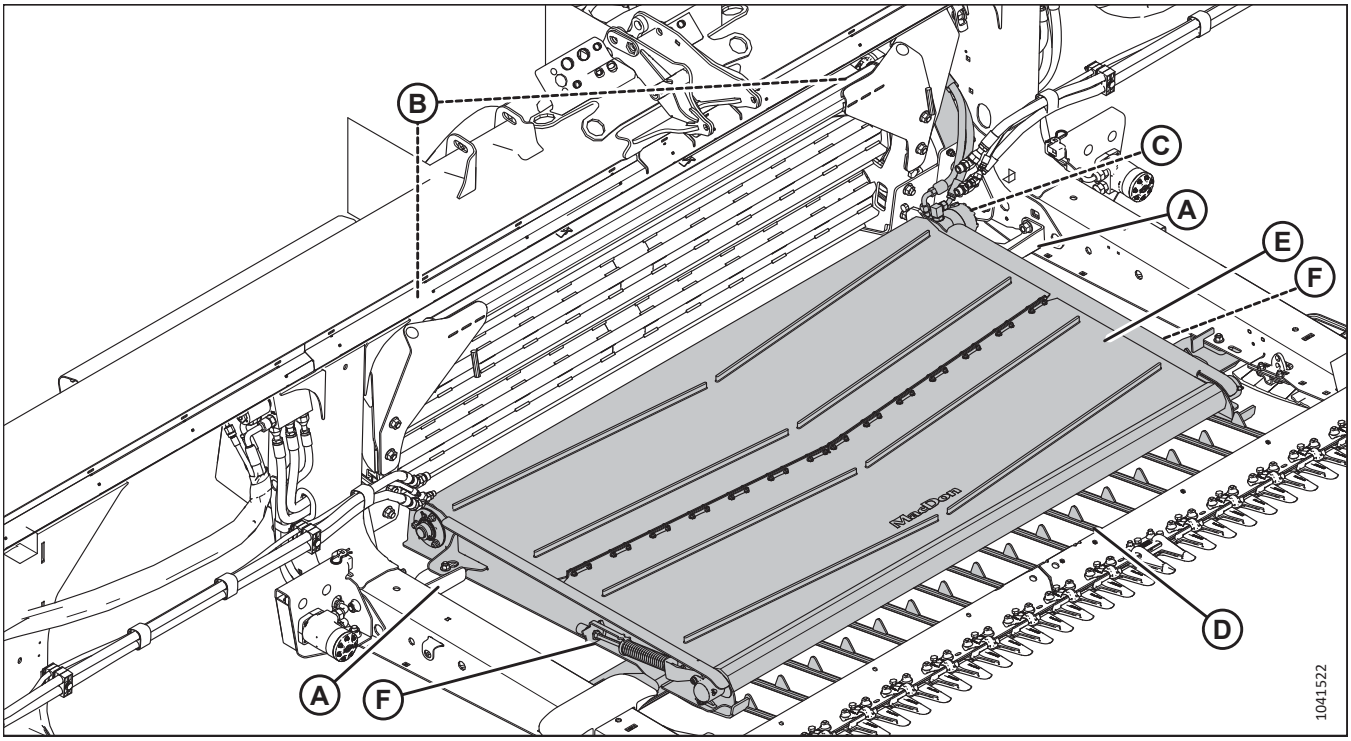


Figure 2.3: Front View of Hay Conditioner Installed in Header

A - Mounting Bracket
B - Roll Gap Adjusters
C - Feed Deck Motor
D - Rock Grate
E - Feed Deck
F - Draper Tension Adjusters

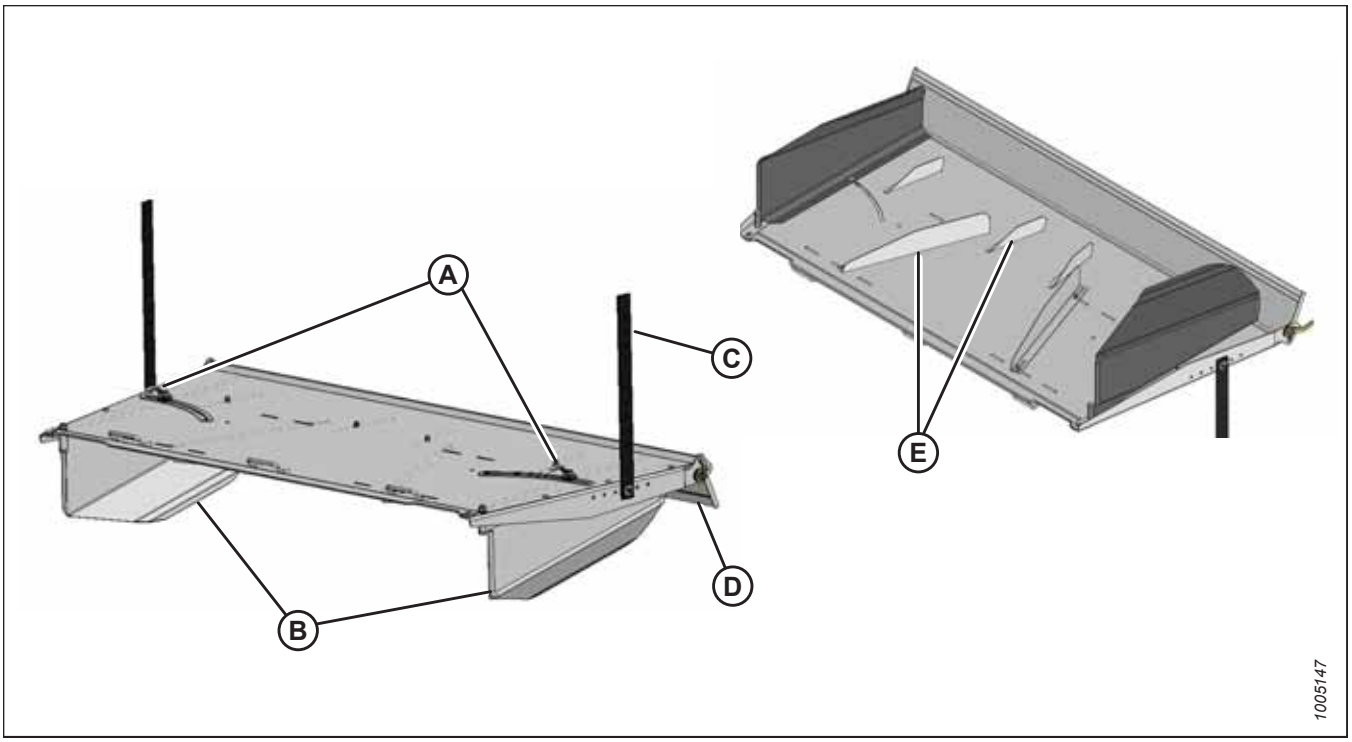


Figure 2.4: Swath Forming Shield

A - Side Deflector Adjusters
B - Side Deflectors
C - Height Adjust Strap
D - Fluffer Shield
E - Deflector Fins

Chapter 3: Unloading and Assembly

To unload and assemble an HC20 Hay Conditioner, follow the procedures provided in this chapter in the order in which they appear.

3.1 Unloading Hay Conditioner

The hay conditioner will need to be unloaded before it can be assembled.

DANGER

Do not allow bystanders in the unloading and assembly area.

DANGER

The equipment used to unload the hay conditioner must meet or exceed the specifications listed below. Using inadequate equipment may result in damage to the equipment or personal injury.

Table 3.1 Lifting Vehicle Requirements

Minimum lifting capacity[2]	908 kg (2000 lb.)
Minimum fork length	1524 mm (60 in.)

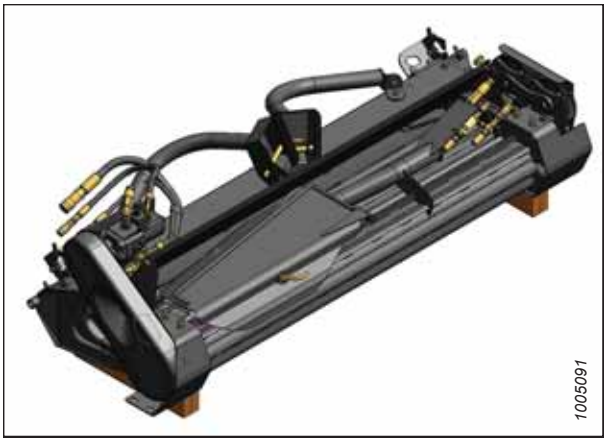


Figure 3.1: Hay Conditioner Bundle (B7477)

IMPORTANT:

Typically, forklifts are rated for a load located 610 mm (24 in.) ahead of the back of the forks. Check with your forklift distributor to learn the capacity of the forklift when the load is positioned 1220 mm (48 in.) ahead of the back of the forks.

WARNING

Ensure that the load is secure on the forks.

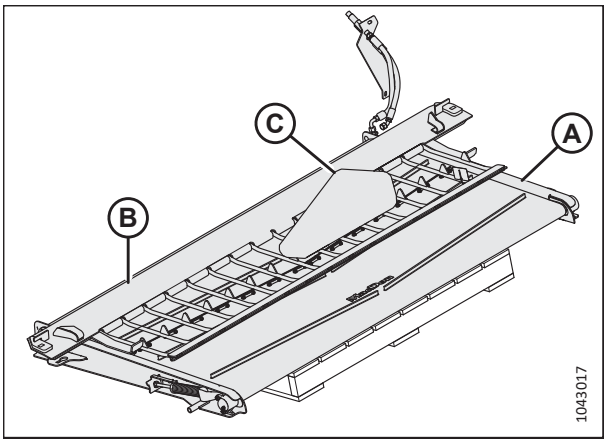


Figure 3.2: Feed Deck / Rock Grate Bundle (B7478)

A - Feed Deck Assembly (MD #242401)

B - Rock Grate Assembly (MD #242417)

C - Loose Parts Package (MD #242469)

2. When the load is positioned 1220 mm (48 in.) from the back of the forks.

1. Remove the tie down straps and chains securing the hay conditioner.
2. Use the forklift to lift the first of the three pallets of components off of the trailer deck.
3. Back the forklift up until the forks and pallet clear the trailer. Slowly lower the pallet until it is 150 mm (6 in.) above the ground.
4. Take the pallet to the storage or setup area.
5. Set the pallet down on level ground.
6. Repeat Steps *2, page 18* to *5, page 18* to remove the remaining pallets.
7. Check the shipment for damage and missing parts.

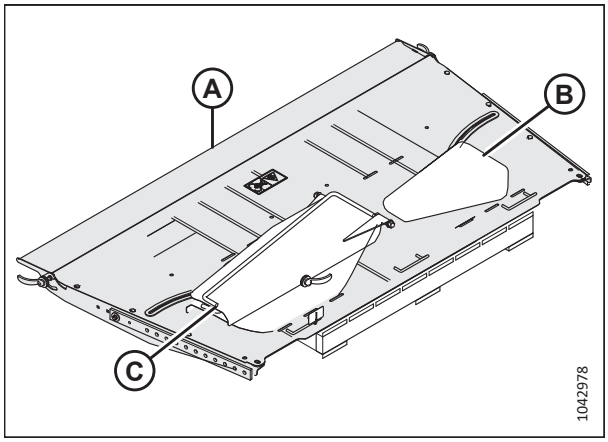


Figure 3.3: Forming Shield Bundle (B7479)

A - Forming Shield Shipping Assembly (MD #242474)

B - Fin and Hardware Package (MD #242473)

C - Side Shield Shipping Assembly (MD #242475)

3.2 Installing Rock Grate

The rock grate prevents rocks from being fed into the conditioner rolls. It will need to be installed before the hay conditioner can be attached to the header.

1. Unpack the feed deck / rock grate bundle (B7478).

   Feed deck assembly (A) includes:

   - Feed deck with hydraulic assembly, idler roller, drive roller, draper, and hardware attached

   Rock grate assembly (B)

   Loose parts package (C) includes:

   - Twelve M16 x 35 bolts (MD #252638)
   - One rear deck support (right side) (MD #242440)
   - One rear deck support (left side) (MD #242439)
   - Two spacer brackets (MD #242434)
   - One conditioner support (right side) (MD #242432)
   - One conditioner support (left side) (MD #242431)
   - One conditioner lower support (right side) (MD #242428)
   - One conditioner lower support (left side) (MD #242427)
   - Two M12 x 30 round head bolts (MD #184667)
   - Four M12 x 30 round head bolts (MD #152702)
   - Twelve M16 hex flange nuts (MD #136440)
   - Eight M12 hex nuts (MD #136431)
   - Two M12 x 40 round head bolts (MD #135900)

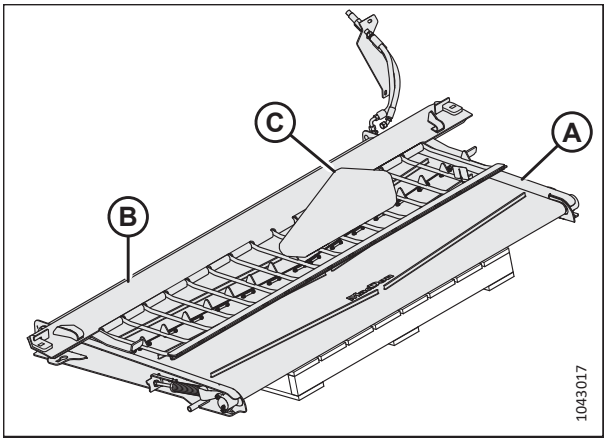


Figure 3.4: Feed Deck / Rock Grate Bundle (B7478)

A - Feed Deck Assembly (MD #242401)

B - Rock Grate Assembly (MD #242417)

C - Loose Parts Package (MD #242469)

2. Loosen hardware (A), securing the knife hold-downs to the cutterbar plate, enough to create a gap for the rock grate front channel to slide onto the cutterbar plate.

3. Position rock grate (B) (MD #242417) diagonally between the header legs as shown.

   NOTE:

   Some parts removed for clarity.

4. Lift one end of the rock grate and position support tab (C) onto the header leg flange.

5. Lift the other end and position the other support tab onto the header leg flange.

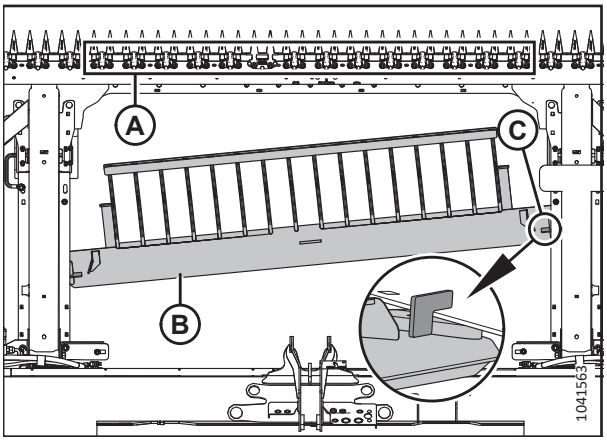


Figure 3.5: Rock Grate – View from Above

6. Slide rock grate (A) forward, and set the rock grate in between wearplates (B) and cutterbar support (C). Push the rock grate forward onto the cutterbar.

7. Retrieve two M12 hex nuts (MD #136431) and two M12 x 40 round head bolts (MD #135900) from the loose parts package shipped with B7478.

8. Secure the rock grate with two M12 round head bolts (D) (MD #136431) inserted from below the rock grate and two M12 hex nuts (MD #136431). Tighten nuts.

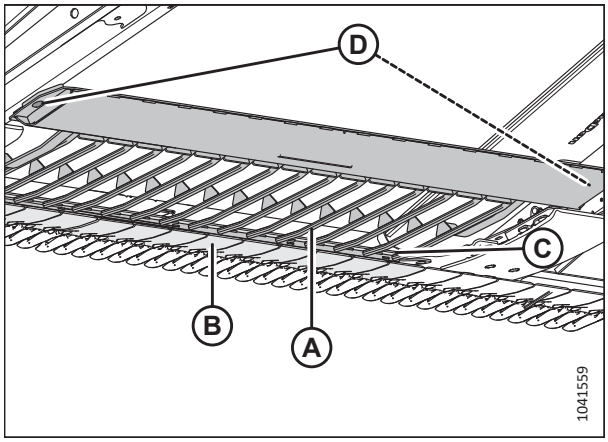


Figure 3.6: Rock Grate – View from Below

9. Check the clearance between hold-down (A) and knife section (B) as follows:

   a. Open the header endshield.

   b. Rotate the flywheel attached to the knife drive box to manually stroke the knife to position knife section under hold-down.

   c. Push down on knife section with approximately 44 N (10 lbf) of force.

   d. Use a peeler gauge to measure the clearance between hold-down and knife section. Ensure there is a clearance of 0.1–0.5 mm (0.004–0.020 in.)

10. If adjustment is required, do the following:

    a. To lower the front of hold-down (A) and decrease clearance, turn adjuster bolt (C) clockwise.

    b. To raise the front of hold-down (A) and increase clearance, turn adjuster bolt (C) counterclockwise.

    c. Recheck the hold-down clearance. Refer to Step *9, page 20*.

    d. After adjustment, retighten nuts (D) to 85 Nm (63 lbf·ft).

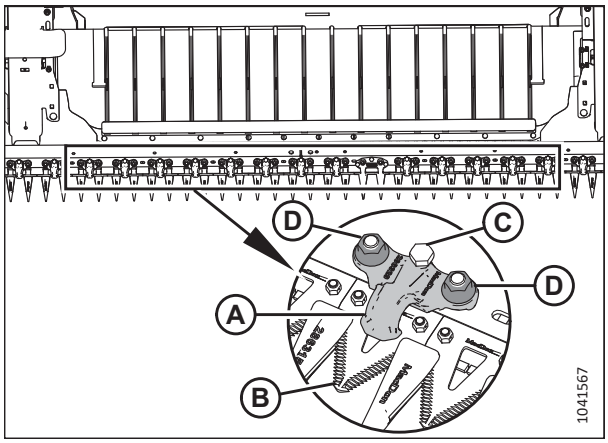


Figure 3.7: Rock Grate – View from Above

3.3 Installing Mounting Brackets

Bolt-on mounting brackets are required to connect the hay conditioner to D215, D220, D225, D230, and D235 SP Draper Headers.

1. Retrieve the following parts from the loose parts package shipped with B7478:
   - One left lower bracket (MD #242427)
   - One right lower bracket (MD #242428)
   - Four M12 hex nuts (MD #136431)
   - Four M12 x 30 round head bolts (MD #152702)
   - One right upper bracket (MD #242432)
   - One left upper bracket (MD #242431)
   - Two spacers (MD #242434)
   - Eight M16 hex flange nuts (MD #136440)
   - Eight M16 x 35 round head bolts (MD #252638)
2. Position right lower bracket (A) (MD #242428) onto the inboard side of the right center header leg. Secure the bracket with two M12 x 30 round head bolts (B) (MD #152702) and M12 hex nuts (MD #136431).
3. Repeat Step *2, page 21* at the opposite side.
4. Install spacer (C) and bracket (F) on headers without hydraulic deck shift (HDS) installed as follows:
   a. Position spacer (C) (MD #242434) as shown, and loosely secure with two M16 round head bolts (D) (MD #252638) and two M16 hex flange nuts (E) (MD #136440) at the outboard side of the right center leg.
   b. Position right upper bracket (F) (MD #242432) on the inboard side of the right center leg as shown. Secure spacer and bracket with two M16 round head bolts (G) (MD #252638) and two M16 hex flange nuts (MD #136440).
   c. Tighten hardware.
5. Repeat Step *4, page 21* at the opposite end.

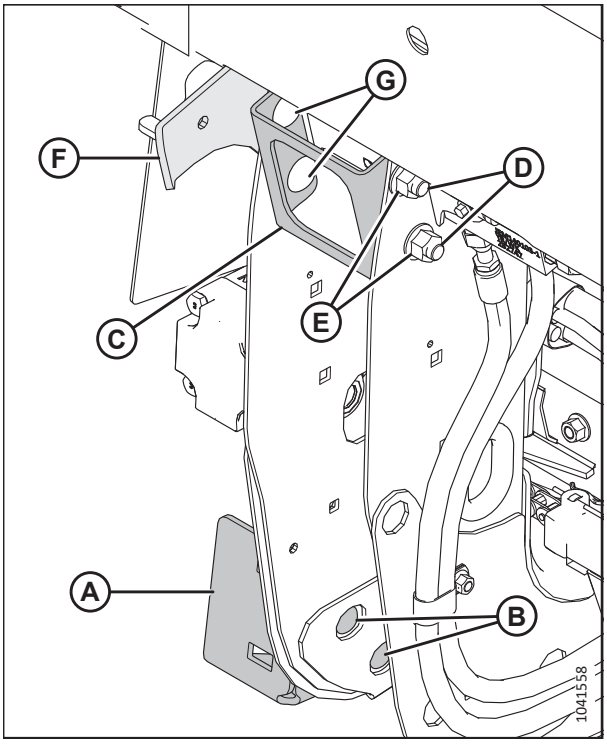


Figure 3.8: Center Header Leg without HDS Installed – Right Side

6. Install spacer (C) and bracket (F) on headers with hydraulic deck shift (HDS) installed as follows:

   a. Remove bolt, nut (A) and clamps (B) securing two hydraulic lines (G).

   b. Grip two hydraulic lines (G) together to create enough room to install hardware.

   c. Position spacer (C) (MD #242434) as shown, and loosely secure with two M16 round head bolts (D) (MD #252638) and two M16 hex flange nuts (MD #136440) at the outboard side of the right center leg.

   d. Position right upper bracket (E) (MD #242432) on the inboard side of the right center leg as shown. Secure spacer and bracket with two M16 round head bolts (F) (MD #252638) and two M16 hex flange nuts (MD #136440).

   e. Tighten hardware.

   f. Reinstall clamps (B) securing the two hydraulic lines (G) using bolt and nut (A).

7. Repeat Step *6, page 22* at the opposite side.

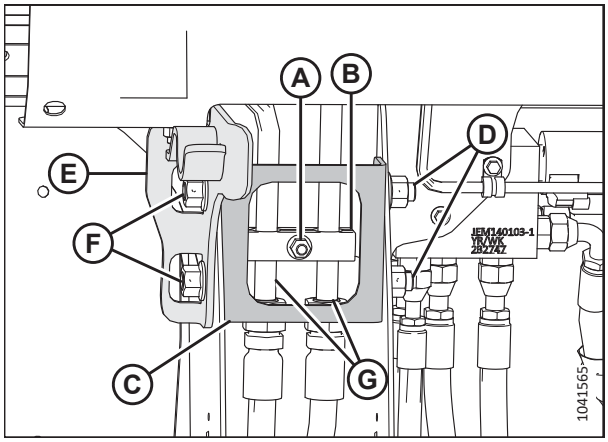


Figure 3.9: Center Header Leg with HDS Installed – Right Side

3.4 Installing Feed Draper Deck

The feed draper deck conveys crop from the side drapers to the conditioner rolls. It will need to be installed before the hay conditioner can be attached to the header.

1. Retrieve feed deck assembly (A) from B7478.
2. Slide feed deck (A) under the header opening from the rear.

   NOTE:

   The deck drive motor faces aft.
3. Set the front of deck onto rock grate (B).

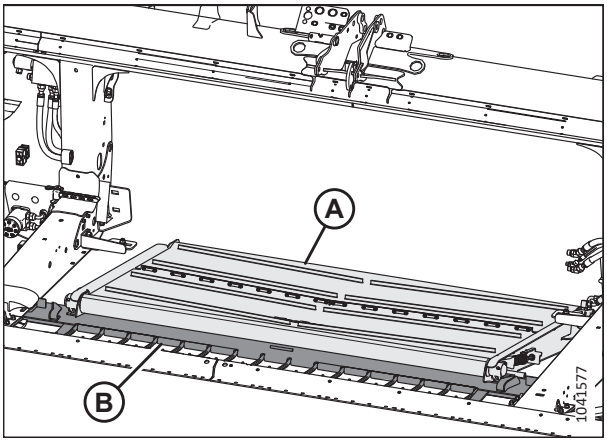


Figure 3.10: Feed Deck

4. Lift the rear of the feed deck (A) so that the mounts on the deck clear the brackets (B) on the leg. Slide the deck forward until the mounting pins (C) are fully positioned inside the pockets on the rock grate.

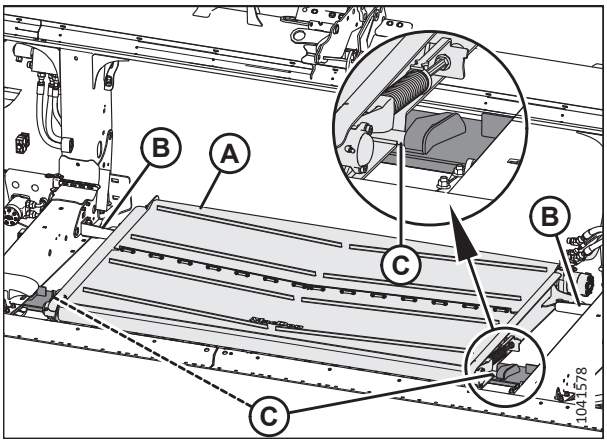


Figure 3.11: Feed Deck

5. Remove and retain two bolts (A) and nuts from coupler mount bracket (B).

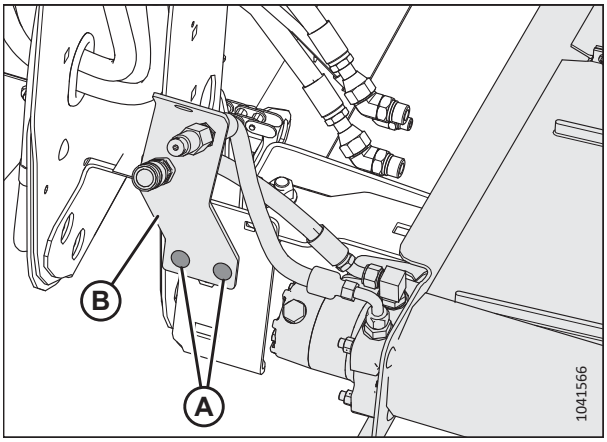


Figure 3.12: Coupler Mount Bracket – Rear Left of Feed Deck Draper

6. Position coupler mount bracket (A) in front of left lower support bracket (B), align their holes, and secure with the removed bolts (C) and nuts.

7. Retrieve the following parts from the loose parts package shipped with B7478:

   - Two M12 hex nut (MD #136431)
   - Two M12 x 30 round head bolt (MD #184667)

8. Install one M12 hex nut (D) (MD #136431) and one M12 x 30 round head bolt (MD #184667) to secure the feed draper deck (E) to the left rear deck support (F).

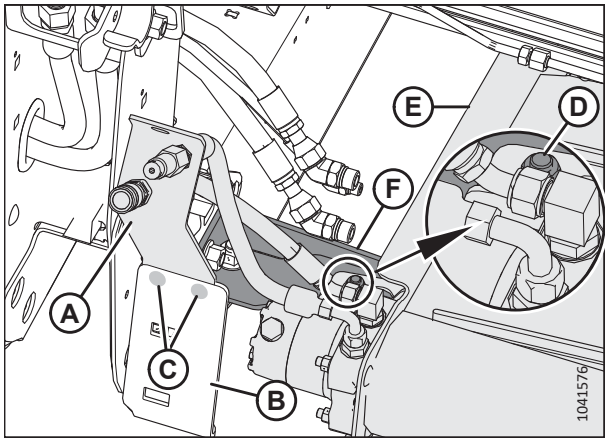


Figure 3.13: Feed Deck – Left Side

9. Install one M12 hex nut (A) (MD #136431) and one M12 x 30 round head bolt (MD #184667) to secure the feed draper deck (B) to the right rear deck support (C).

10. Adjust the header side drapers so that they overlap the feed deck by 65–75 mm (2 1/2–3 in.). Refer to the header operator's manual for instructions.

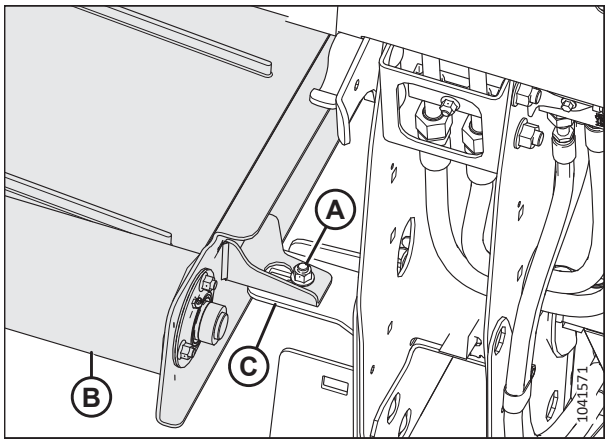


Figure 3.14: Feed Deck – Rear Right Side

3.5 Installing Conditioner

Once the hay conditioner has been prepared, it can be attached to the header. A lifting device will be needed to position the hay conditioner.

There are two methods for installing the conditioner. Proceed to the relevant procedure:

- To install the hay conditioner using the lifting method, proceed to *3.5.1 Installing Conditioner – Lifting Method, page 25*
- To install the hay conditioner using the windrower method, proceed to *3.5.2 Installing Conditioner – Windrower Method, page 28*

3.5.1 Installing Conditioner – Lifting Method

The hay conditioner can be installed on the header by using a forklift and chains.

DANGER

The equipment used to support the hay conditioner must meet or exceed the specifications listed below. Using inadequate equipment may result in damage to the equipment or personal injury.

Table 3.2 Lifting Vehicle Requirements

Minimum lifting capacity[3]	908 kg (2000 lb.)
Minimum fork length	1524 mm (60 in.)

IMPORTANT:

Typically, forklifts are rated for a load located 610 mm (24 in.) ahead of the back of the forks. Check with your forklift distributor to learn the capacity of the forklift when the load is positioned 1220 mm (48 in.) ahead of the back of the forks.

Table 3.3 Lifting Chain Requirements

Chain type	Overhead lifting quality (1/2 in.)
Minimum working load	2270 kg (5000 lb.)

To install the conditioner using the lifting method, follow these steps:

1. Retrieve the following parts shipped with B7477:
   - Support (MD #159352)
   - Hairpin (MD #13125)

3. When the load is positioned 1220 mm (48 in.) from the back of the forks.

2. Attach a chain to lifting brackets (A) on the conditioner. Drape the chain over forks (B) of the forklift as shown.
3. Lift the conditioner off of the shipping pallet.
4. Lower the conditioner to the ground in the upright position.

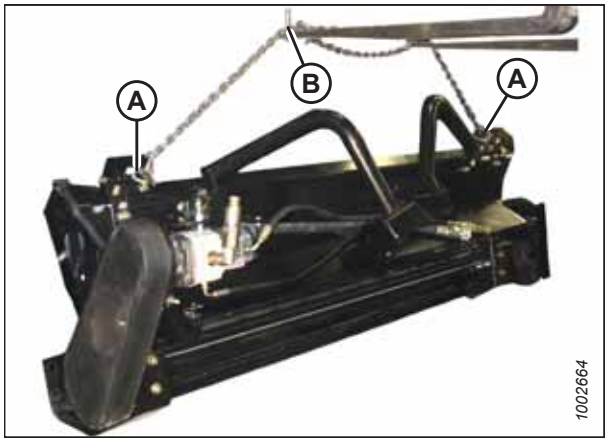


Figure 3.15: Conditioner and Lifting Brackets

5. Position support (A) (MD #159352) in the skid shoe (B) as shown. Secure the support with hairpin (C) (MD #13125).
6. Remove the shipping blocks from the base of the conditioner (if these are present).

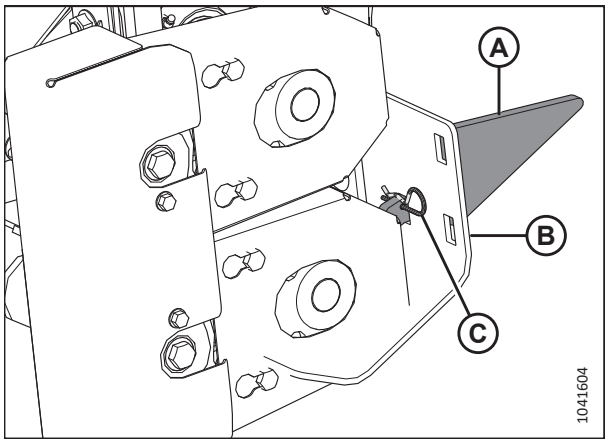


Figure 3.16: Skid Shoe and Support

7. **For D215 or D220 SP headers ONLY:** Remove right top feed cover (A) and rear cover plate (D) as follows:
   a. Slowly lower the conditioner until support (B) is seated on the ground.
   b. Remove two 3/8 bolts (C), nuts, and rear cover plate (D).

      NOTE:

      These parts can be retained for future use.

   c. Remove two 3/8 bolts (E), nuts, and right top feed cover (A).

      NOTE:

      These parts can be retained for future use.
8. Lift and insert the conditioner into the header's rear opening.

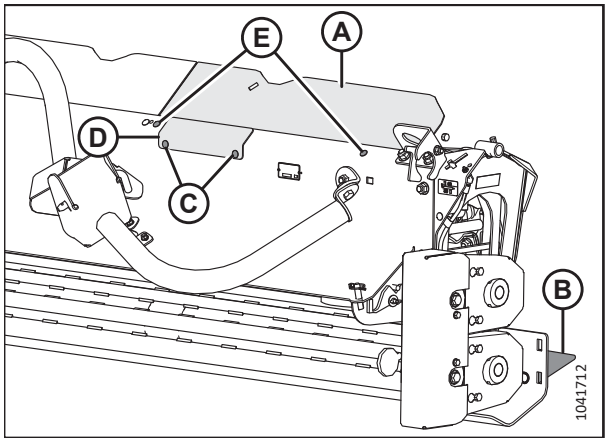


Figure 3.17: Hay Conditioner – Right Side Shown

9. Carefully lower the conditioner between the windrower lift legs until lugs (A) on the conditioner are seated in conditioner support brackets (B) on the header.

10. Ensure that the conditioner is seated properly in the brackets. Remove the chain.

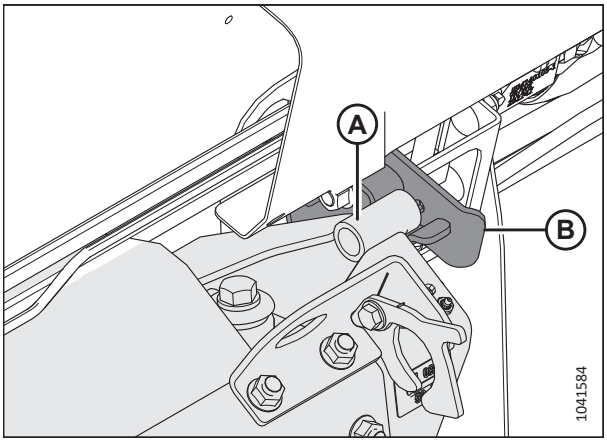


Figure 3.18: Conditioner Lug – Right Side Shown

11. Retrieve the following parts from the loose parts package shipped with B7478:
    - Four 5/8 in. flange nuts (MD #50225)
    - Four 5/8 x 1 1/2 in. round head bolts (MD #18523)

12. Secure conditioner to the header by attaching skid shoe (A) to conditioner lower support (B) using two bolts (MD #18523) and two nuts (C) (MD #50225).

13. Repeat Step *12, page 27* at the opposite side.

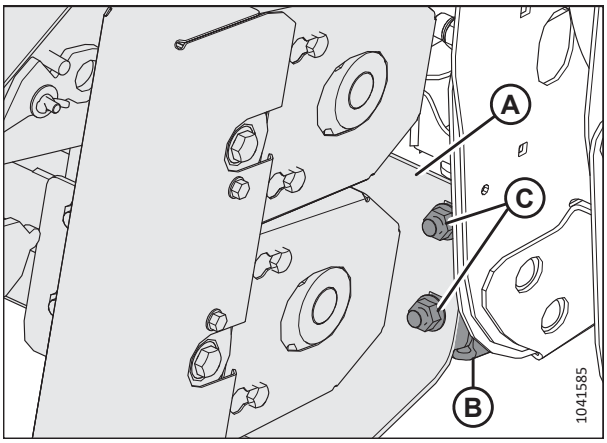


Figure 3.19: Conditioner – Right Side

14. Connect hose (A) coming from manifold block (B) to female coupler (C) at the bottom of mount bracket (D).
15. Connect hose (E) coming from flow divider hydraulic valve (F) to the male coupler (G) at the top of mount bracket (D).

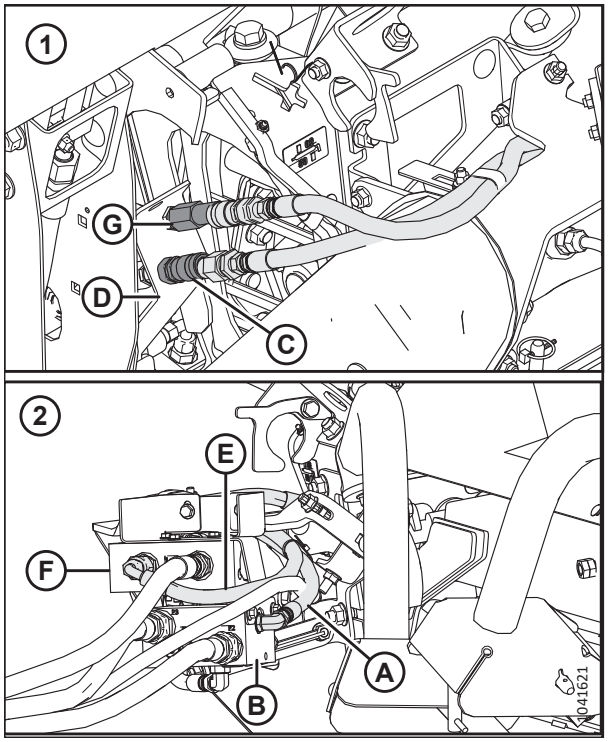


Figure 3.20: Feed Deck Hydraulic Connections

1 - Left Outboard Side of Hay Conditioner

2 - Left Inboard Side of Hay Conditioner

3.5.2 Installing Conditioner – Windrower Method

The hay conditioner can be installed on the header by using a windrower.

DANGER

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

DANGER

Never start or move the machine until you are sure all bystanders have cleared the area.

1. Retrieve the following parts shipped with B7477:
   - Support (MD #159352)
   - Hairpin (MD #13125)

2. Attach a chain to lifting brackets (A) on the conditioner. Drape the chain over forks (B) of the forklift as shown.
3. Lift the conditioner off of the shipping pallet.
4. Lower the conditioner to the ground in the upright position.

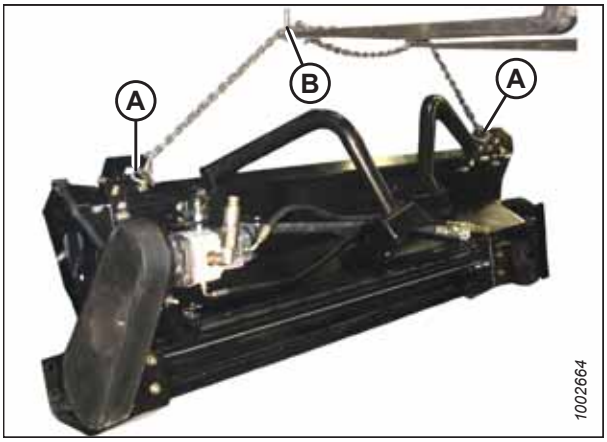


Figure 3.21: Conditioner and Lifting Brackets

5. Position support (A) (MD #159352) in the skid shoe (B) as shown. Secure the support with hairpin (C) (MD #13125).
6. Remove the shipping blocks from the base of the conditioner (if these are present).

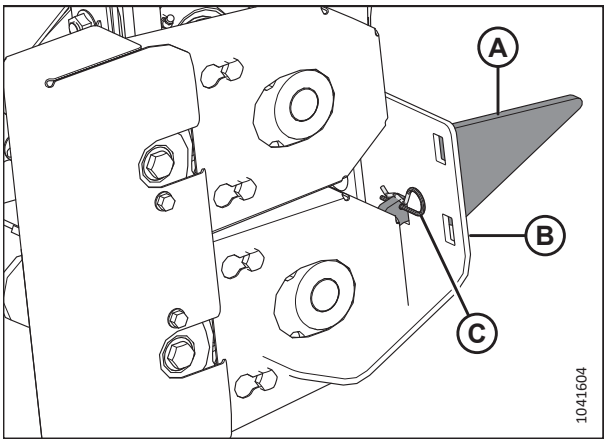


Figure 3.22: Skid Shoe and Support

7. **For D215 or D220 SP headers ONLY:** Remove right top feed cover (A) and rear cover plate (D) as follows:
   a. Slowly lower the conditioner until support (B) is seated on the ground.
   b. Remove two 3/8 bolts (C), nuts, and rear cover plate (D).

      NOTE:

      These parts can be retained for future use.

   c. Remove two 3/8 bolts (E), nuts, and right top feed cover (A).

      NOTE:

      These parts can be retained for future use.

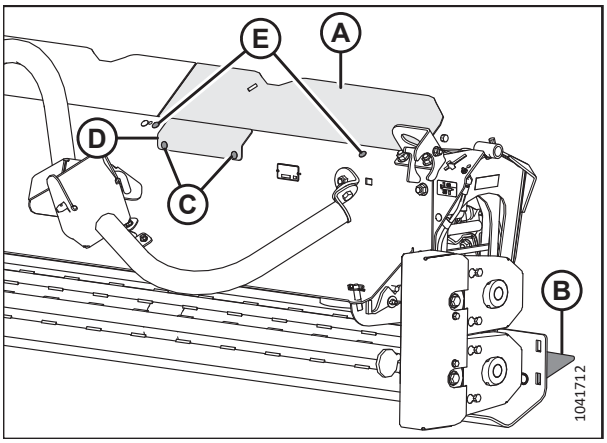


Figure 3.23: Hay Conditioner – Right Side Shown

8. Loosen nuts (A) enough to pivot lift arm (B) and bracket (C) to the outboard side of the conditioner.
9. Remove and retain L-pin (D) securing the other end of lift arm (B) to the support bracket (E) on the conditioner.

   NOTE:

   Rotate L-pin to align on the keyhole slot.

   NOTE:

   The support bracket on the left is different from the support bracket on the right.
10. Hold the lift arm while swinging it to the left.

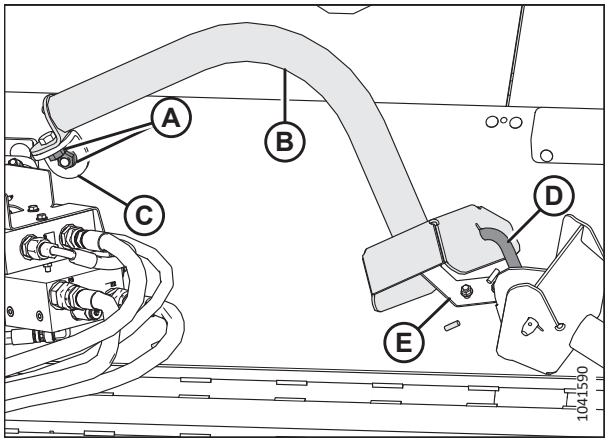


Figure 3.24: Lift Arm – Left Side

11. Position left lift arm (A) in bracket (B) as shown, and secure the lift arm in place with latch (C).
12. Tighten nuts (D) to secure lift arm (A) and bracket (E) to the conditioner.
13. Repeat Step *8, page 30* to Step *12, page 30* to the right lift arm.
14. Remove the chain from the conditioner.

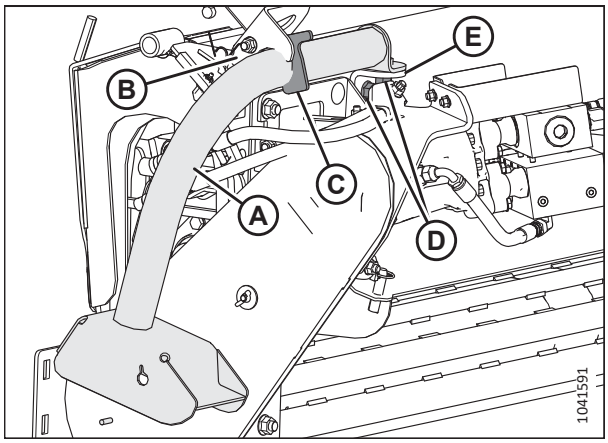


Figure 3.25: Conditioner – Left Side

15. Start the windrower and drive slowly until windrower lift linkage enter the lift arm pocket of the conditioner.
16. Shut down the engine, and remove the key from the ignition.
17. Engage the header safety props. For instructions, refer to the windrower operator's manual.
18. Insert L-pins (A) to secure the conditioner to the windrower.
19. Start the engine and lift the conditioner.
20. Position the hay conditioner in the header opening.

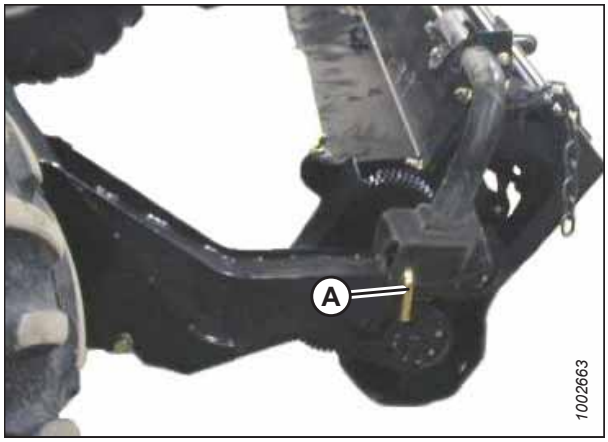


Figure 3.26: Windrower Arms

21. Carefully lower the conditioner between the windrower lift legs until lugs (A) on the conditioner are seated in conditioner support brackets (B) on the header.

22. Ensure that the conditioner is seated properly in the brackets.

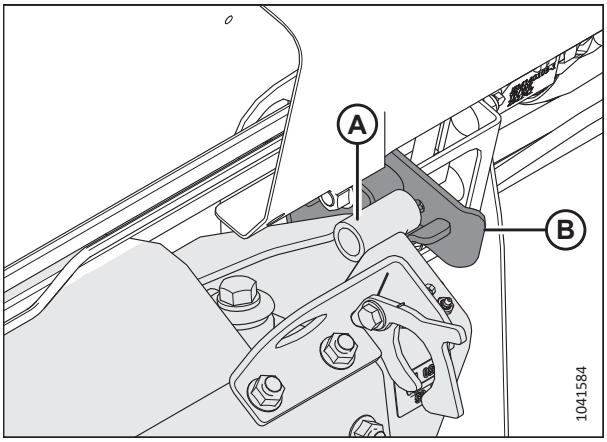


Figure 3.27: Conditioner Lug – Right Side Shown

23. Remove and retain L-pin (A).

24. Back the windrower slowly away from the hay conditioner.

25. Shut down the engine, and remove the key from the ignition.

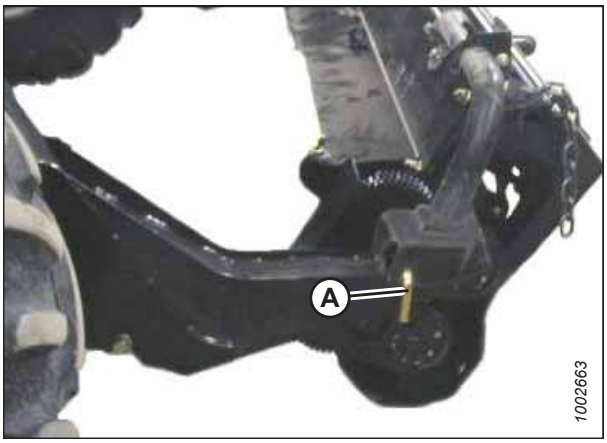


Figure 3.28: Windrower Arms

26. Retrieve the following parts from the loose parts package shipped with B7478:

    - Four 5/8 in. flange nuts (MD #50225)
    - Four 5/8 x 1 1/2 in. round head bolts (MD #18523)

27. Secure conditioner to the header by attaching skid shoe (A) to conditioner lower support (B) using two bolts (C) (MD #18523) and two nuts (MD #50225).

28. Repeat Step *27, page 31* at the opposite side.

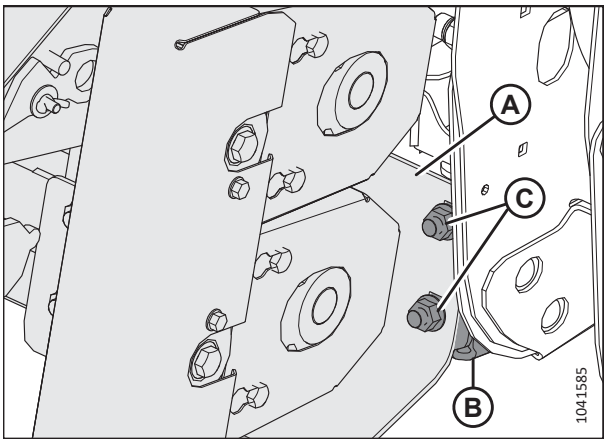


Figure 3.29: Conditioner – Right Side

29. Loosen bolts (D) enough to pivot lift arm (A) and bracket (E) to the inboard side of the conditioner.
30. Remove left lift arm (A) from bracket (B) by lifting latch (C).
31. Hold the lift arm and swing it to the right.

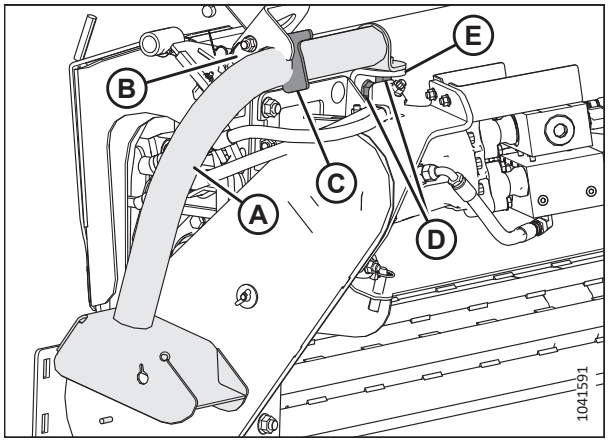


Figure 3.30: Conditioner – Left Side

32. Secure the other end of lift arm (B) to bracket (E) using L-pin (D).
33. Tighten nuts (A) to secure the lift arm to the conditioner.
34. Repeat Step *29, page 32* to Step *33, page 32* at the opposite side.

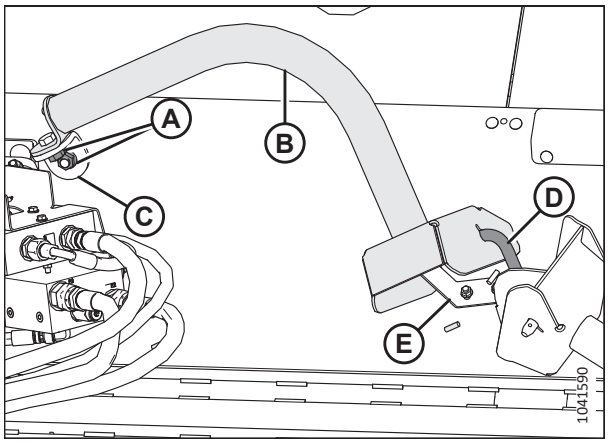


Figure 3.31: Lift Arm – Left Side

35. Connect hose (A) coming from manifold block (B) to female coupler (C) at the bottom of mount bracket (D).

36. Connect hose (E) coming from flow divider hydraulic valve (F) to the male coupler (G) at the top of mount bracket (D).

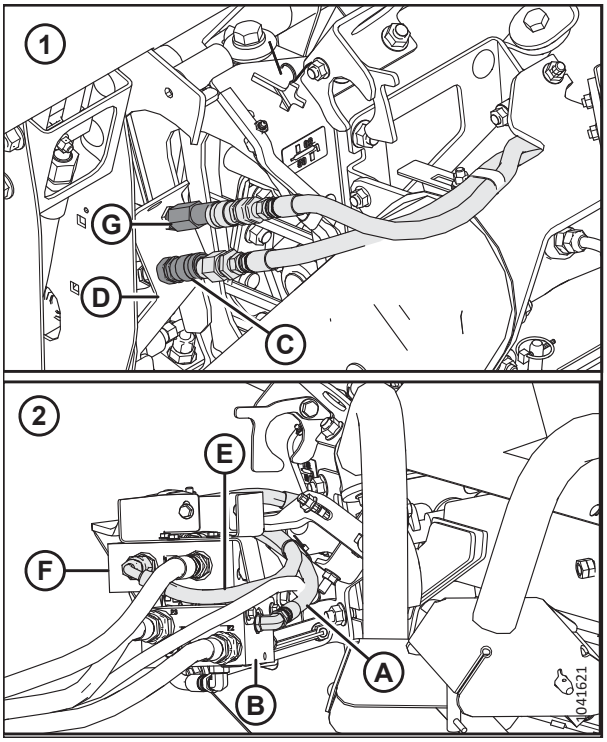


Figure 3.32: Feed Deck Hydraulic Connections

1 - Left Outboard Side of Hay Conditioner

2 - Left Inboard Side of Hay Conditioner

3.6 Assembling Forming Shield

The forming shield shapes and controls the distribution of conditioned crop. It will need to be assembled before it can be installed on the hay conditioner.

1. Retrieve and unpack forming shield bundle (B7479).

   Forming shield (A) includes:

   - Forming shield with baffle, struts, and hardware attached

   Fins and hardware shipping package (B) includes:

   - One forming shield hanging bracket (MD #159599)
   - One deflector fin (right side) (MD #130906)
   - One deflector fin (left side) (MD #130905)
   - Four deflector fins (MD #130548)
   - Eight 3/8 x 3/4 in. carriage bolts (MD #21863)
   - Eight 3/8 in. flange nuts (MD #30228)
   - One flat washer 21/32 ID x 15/16 OD

   Side Shield Shipping Package (C) includes:

   - Forming shield deflectors with hardware attached

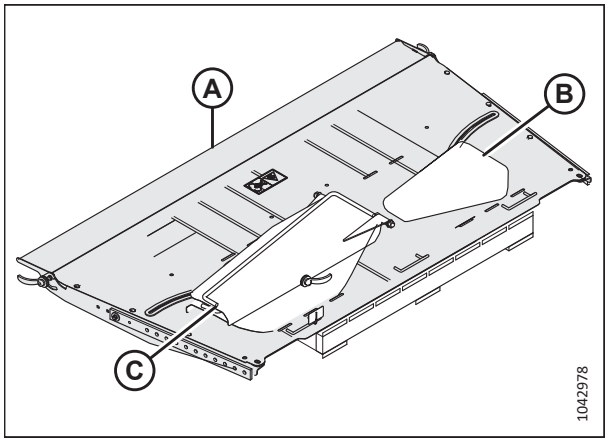


Figure 3.33: Forming Shield Bundle (B7479)

A - Forming Shield (MD #242474)

B - Fins and Hardware Shipping Package (MD #242473)

C - Side Shield Shipping Package (MD #242475)

2. Lay forming shield (A) upside down on a flat surface.

   NOTE:

   The side support flanges should face up.

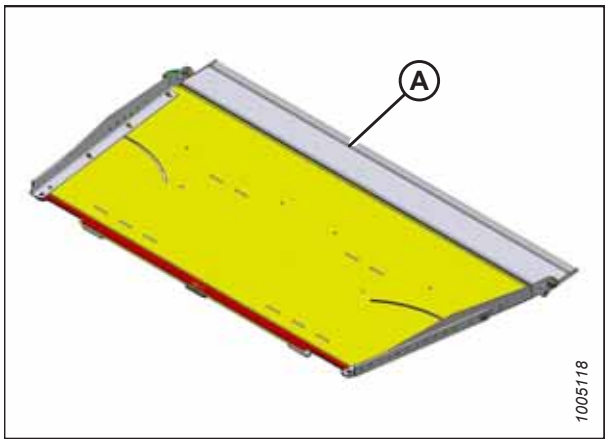


Figure 3.34: Forming Shield Cover

3. Attach short fins (A) and long fins (B) to the shield using two 3/8 x 3/4 in. carriage bolts and two 3/8 in. flange nuts per fin:

   - Attach short fins (A) to the bottom of the shield as shown using the hardware provided.
   - Install two long fins (B) so that the bolts are on the outboard side of the fin and the nuts are against the fins.

   NOTE:

   The fins are only effective for windrows wider than 1778 mm (70 in.), or if the shape of the windrow is unsatisfactory.

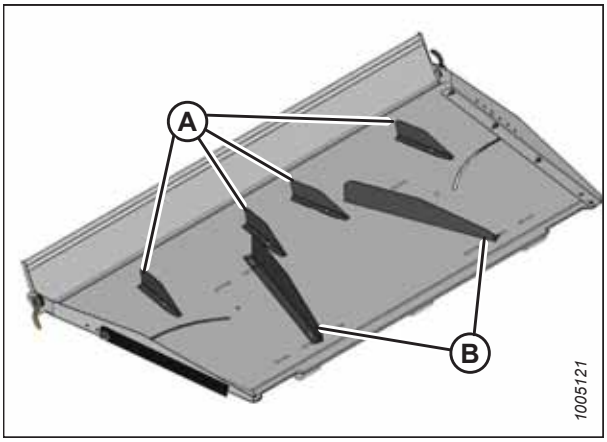


Figure 3.35: Deflector Fins

4. Position the fins approximately as shown. Tighten the hardware.

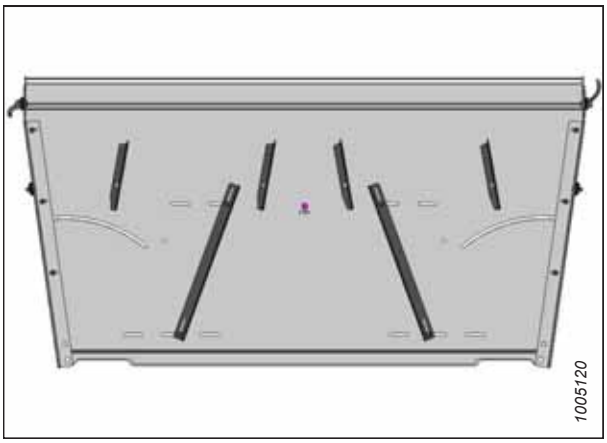


Figure 3.36: Deflector Fins

5. Remove hardware (A) from side deflectors (B).

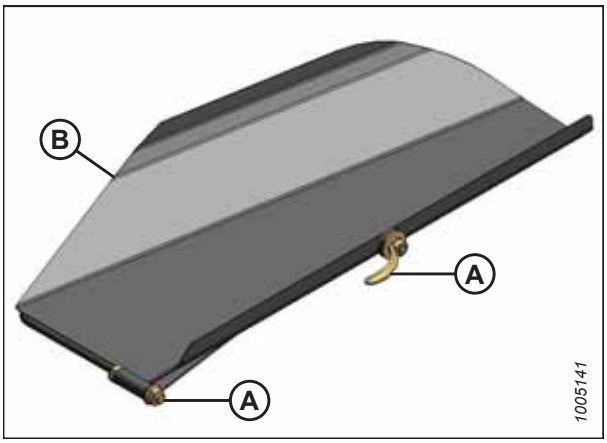


Figure 3.37: Side Deflector

6. Position deflector (A) on the cover as shown. Secure the deflector with hex bolt (B) and the flange nut removed in the previous step.

7. Tighten the flange nut enough so that it holds deflector (A) in position, but still allows the deflector to be adjusted.

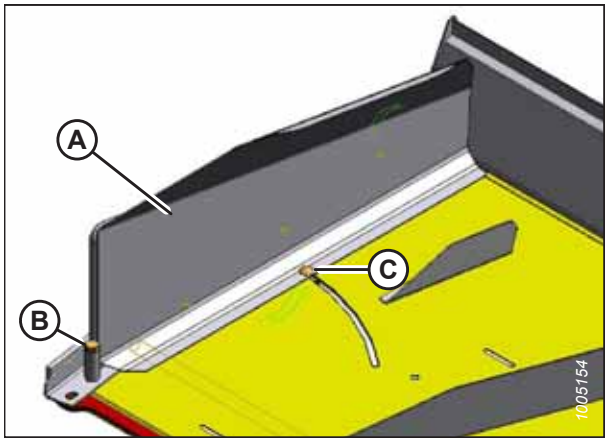


Figure 3.38: Side Deflector – Left

A - Side Deflector **B - Hex Bolt**
C - Bolt (referred to in next step)

8. Install bolt, washers, and handle nut (A) as shown. Rubber washer (B) must be positioned between metal washers (C).

9. Tighten handle nut (A) against the cover to lock the deflector in the desired position.

10. Repeat Steps *6, page 36* to *9, page 36* to position the other deflector.

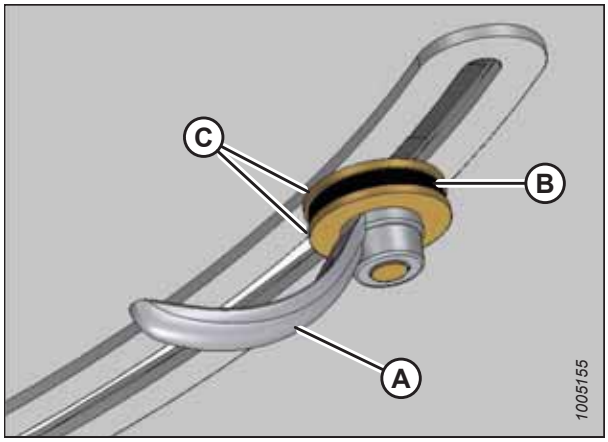


Figure 3.39: Handle – Left

11. Invert the forming shield to the installation position as shown.

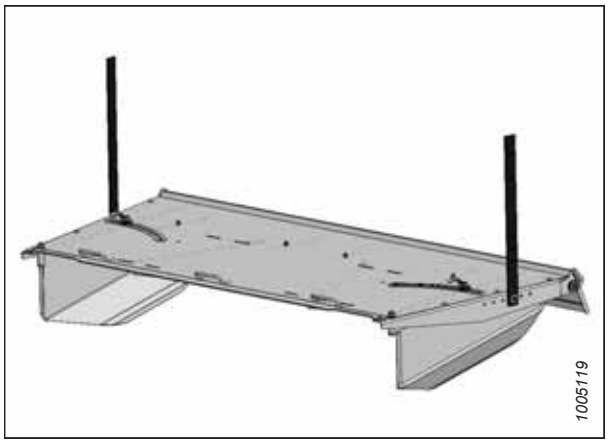


Figure 3.40: Forming Shield

3.7 Installing Forming Shield on Hay Conditioner

Once the forming shield has been assembled, it can be installed on the hay conditioner.

1. Position the forward end of forming shield (A) onto two pins (B) on the rear cover of the conditioner.

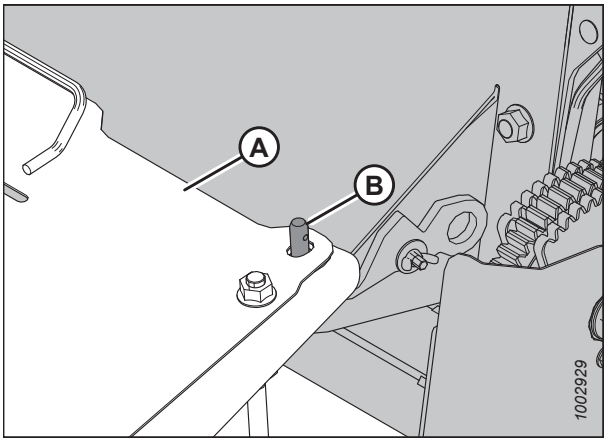


Figure 3.41: Forming Shield

2. Insert lynch pins (A) to secure the forming shield to the hay conditioner.

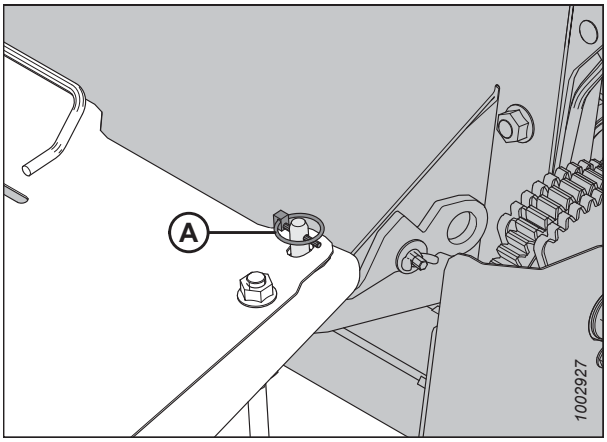


Figure 3.42: Lynch Pin

3. Set the forming shield side deflectors to the desired width by loosening handle (A) and moving deflector (B). Set deflectors on both sides to approximately the same position.
4. Tighten handles (A).
5. Loosen handles (C). Adjust fluffer shield (D) to the middle position.
6. Tighten handles (C).

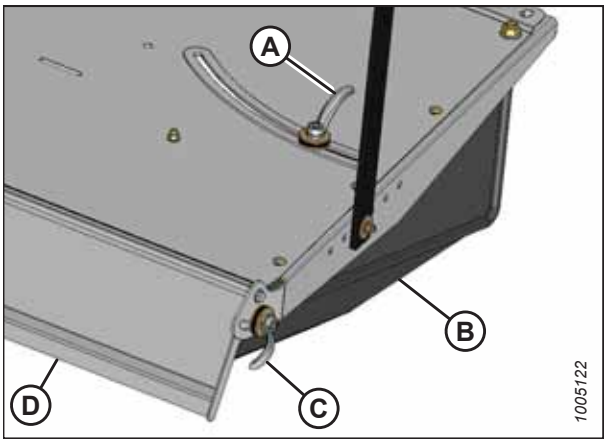


Figure 3.43: Forming Shield

3.8 Preparing M1 Series Windrower

The center-link mounting support on the M1 Series Windrower needs to be drilled to be able to transport the forming shield when needed.

DANGER

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

DANGER

Never start or move the machine until you are sure all bystanders have cleared the area.

1. Park windrower on a level surface. Stop the engine, and remove the key from the ignition.
2. Locate center-link mounting support (A) on the windrower.

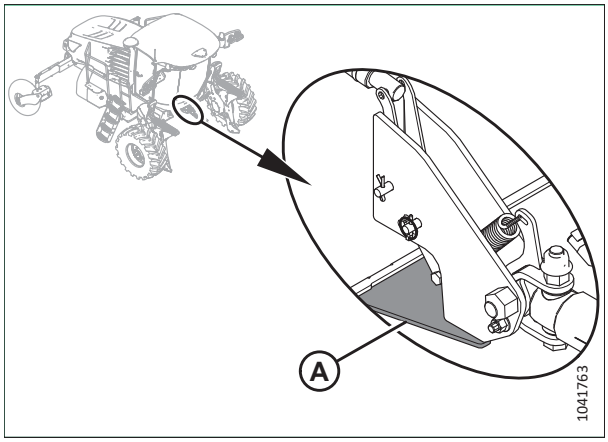


Figure 3.44: Center-Link Mounting Support

3. Drill two 10 mm (3/8 in.) holes (A) and (B) on the center-link mounting support as follows:
   a. Measure a distance of 20 mm (13/16 in.) (C) from the center front of mounting support as shown. Mark location (A) and drill.
   b. From the first drilled hole, measure a distance of 60 mm (2 23/64 in.) (D) rearward as shown. Mark location (B) and drill.

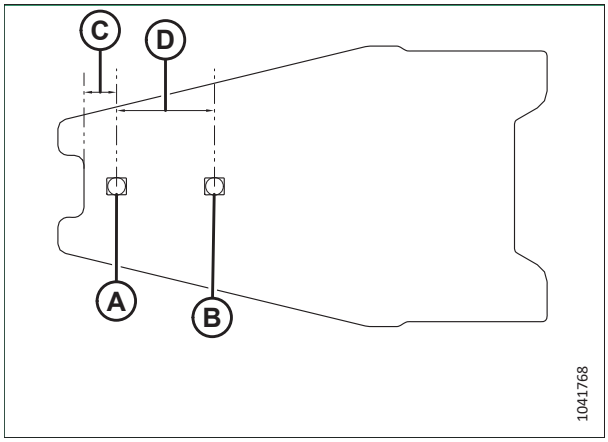


Figure 3.45: Center-Link Mounting Support

4. Retrieve the following parts from the finishing package shipped with B7479:
   - Shield transport support assembly with hardware attached

5. Install shield transport support (A) on the windrower frame with two 3/8 x 1.0 in. carriage bolts and nuts (B).

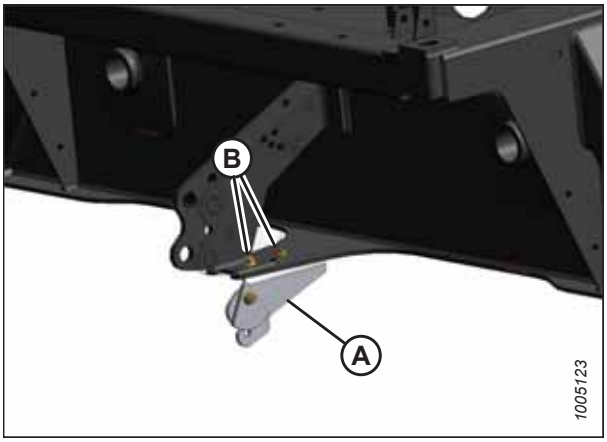


Figure 3.46: Shield Transport Support on Windrower

3.9 Attaching Header to M1 Series Windrower

The windrower's lift linkage and center-link will need to be connected to the draper header. The windrower may be equipped with an optional self-aligning hydraulic center-link, which allows control over the vertical position of the center-link from the cab.

DANGER

To prevent bodily injury or death from the unexpected startup of the machine, always stop the engine and remove the key from the ignition before leaving the operator's seat for any reason.

1. Shut down the engine, and remove the key from the ignition.
2. Extend the windrower transport into field mode. For instructions, refer to the windrower operator's manual.
3. **Windrowers without the self-aligning center-link kit:** Relocate pin (A) in the frame linkage as needed to raise center-link (B) until the hook is above the attachment pin on the header.

   IMPORTANT:

   Ensure that the center-link is positioned high enough that it does not contact the header as the windrower approaches the header.

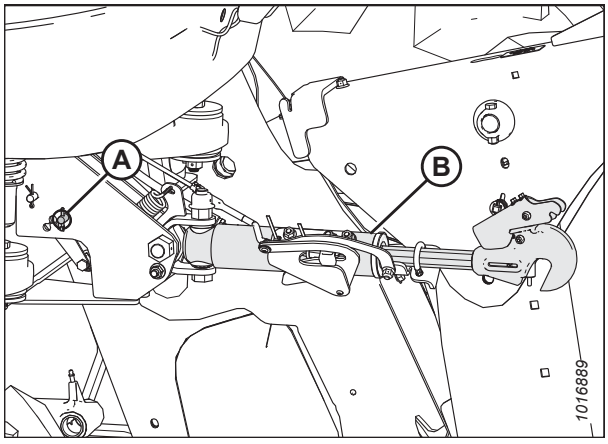


Figure 3.47: Center-Link without Self-Alignment

4. Rotate left signal light placard (A) to the up (vertical) position before connecting the windrower to the header.

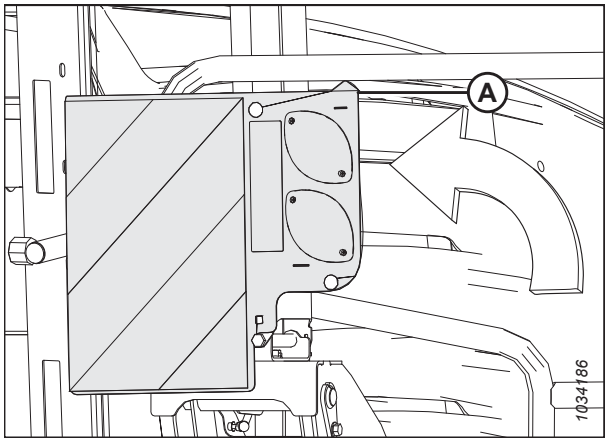


Figure 3.48: Left Signal Light Placard

5. **If reattaching the header to the windrower:** Remove and retain hair pin (A) and clevis pin (B) from header support (C). Repeat this step on the opposite side.

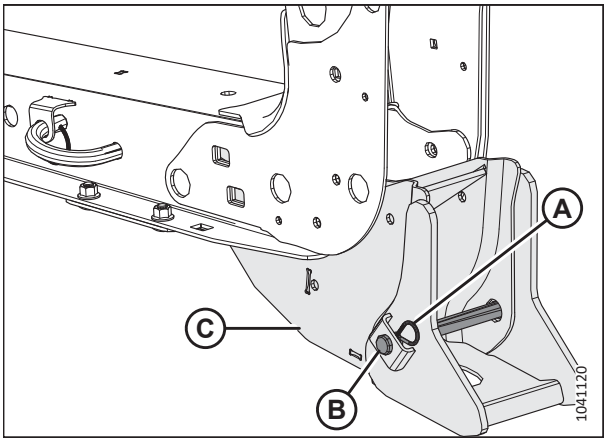


Figure 3.49: Header Support — Left Side Shown

6. **If attaching the header to the windrower for the first time:** Remove ring (A) from pin (B), and remove the pin from the header leg. Repeat this step on the opposite side.

DANGER

Ensure that all bystanders have cleared the area.

7. Start the engine.

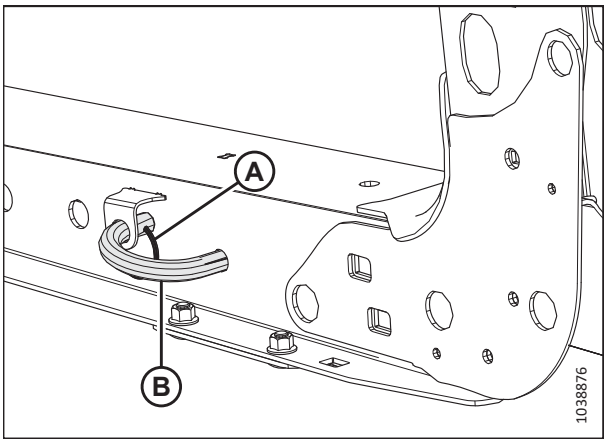


Figure 3.50: Header Leg

8. **If the header lift legs will be lowered WITH a header or weight box attached**, proceed to Step *12, page 42*.

   If the header lift legs will be lowered WITHOUT a header or weight box attached to the windrower, fully release the tension in header float springs (A):

   - If the Harvest Performance Tracker (HPT) displays a message saying that the float should be removed, then remove the float and proceed to Step *12, page 42*.
   - If the Harvest Performance Tracker (HPT) does **NOT** display a message saying that the float should be removed, then proceed to Step *9, page 42* to remove the float manually.

   IMPORTANT:

   To lower the header lift legs without a header or weight box attached to the windrower, ensure that the tension on the float springs is fully released. This will prevent damage to the header lift linkages.

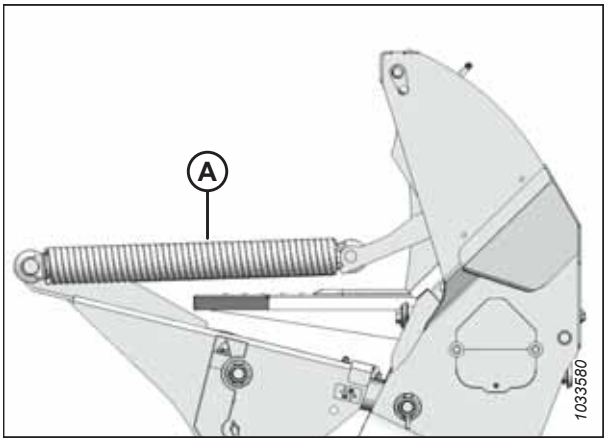


Figure 3.51: Header Float Springs

9. In the windrower cab, press scroll knob (A) to display the QuickMenu page.

10. Rotate scroll knob (A) to highlight HEADER FLOAT symbol (B) and press the scroll knob to select it.

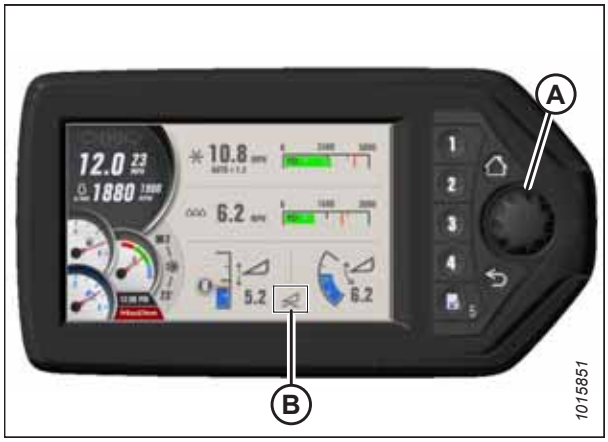


Figure 3.52: HPT Display

11. On the FLOAT ADJUST page, press soft key 3 (A) to disable the float.

Figure 3.53: HPT Display

12. **Windrowers equipped with the self-aligning center-link kit:**

    a. Press HEADER DOWN switch (E) on the ground speed lever (GSL) to fully retract the header lift cylinders.

    b. Press REEL UP switch (B) on the GSL to raise the center-link until the hook is above the attachment pin on the header.

    IMPORTANT:

    If the center-link is too low, it may contact the header as the windrower approaches the header.

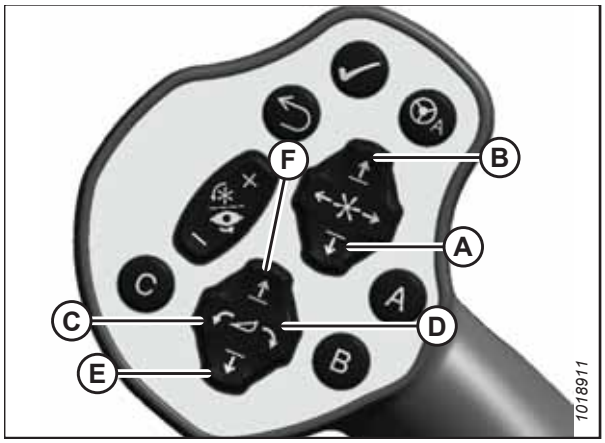


Figure 3.54: GSL Switches

A - Reel Down
B - Reel Up
C - Header Tilt Down
D - Header Tilt Up
E - Header Down
F - Header Up

13. **If reattaching the header to the windrower:** Slowly drive the windrower forward until windrower lift linkage (A) enter header supports (B). Continue driving slowly forward until the lift linkages contact the header supports in the header legs and the header nudges forward.

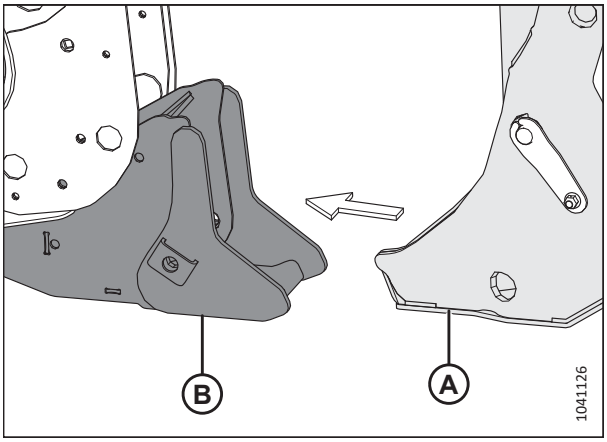


Figure 3.55: Header Leg and Support

14. **If attaching the header to the windrower for the first time:** Slowly drive the windrower forward until header supports (A) enter header legs (B). Continue driving slowly forward until the header supports contact the support plates in the header legs and the header nudges forward.

15. Ensure that the lift linkages are properly engaged in the header legs and are in contact with the support plates.

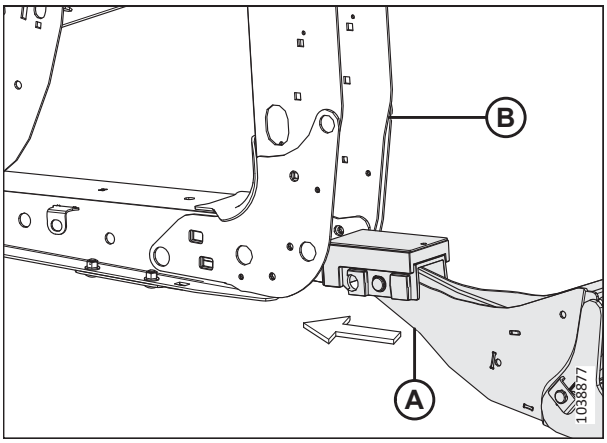


Figure 3.56: Header Leg and Support

16. **Windrowers equipped with the self-aligning center-link kit:**

    a. Adjust the position of center-link cylinder (A) with the switches on the GSL until hook (B) is above the header attachment pin.

    IMPORTANT:

    Hook release (C) must be down to enable the self-locking mechanism to function.

    b. If hook release (C) is open (in the up position), shut down the engine, and remove the key from the ignition. Manually push hook release (C) down after the hook engages the header pin.

    c. Lower center-link (A) onto the header with the REEL DOWN switch on the GSL until the center-link locks into position and hook release (C) is down.

    d. Check that the center-link is locked onto the header by pressing the REEL UP switch on the GSL.

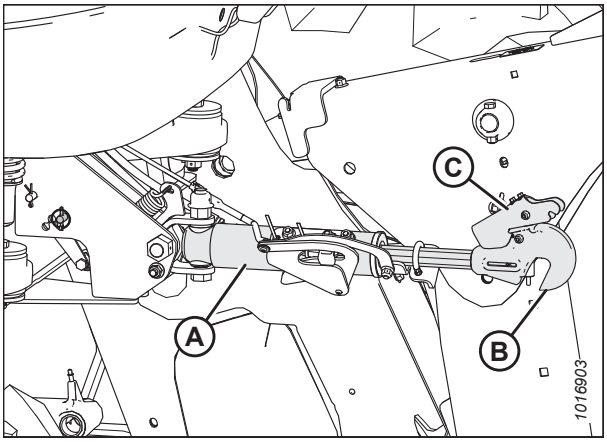


Figure 3.57: Hydraulic Center-Link

17. **Windrowers without the self-aligning center-link kit:**

    a. Press the HEADER TILT UP or HEADER TILT DOWN cylinder switches on the GSL to extend or retract the center-link cylinder until the hook is aligned with the header attachment pin.

    b. Shut down the engine, and remove the key from the ignition.

    c. Push down on rod end (B) of the link cylinder until the hook engages and locks onto the header pin.

    IMPORTANT:

    The hook release must be down to enable the self-locking mechanism to function. If the hook release is open (in the up position), manually push it down after the hook engages the pin.

    d. Check that center-link (A) is locked onto the header by pulling upward on rod end (B) of the cylinder.

    e. Start the engine.

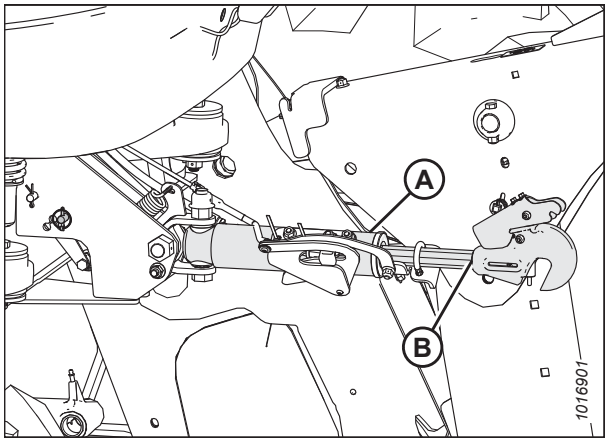


Figure 3.58: Hydraulic Center-Link

18. Press HEADER UP switch (A) to raise the header to its maximum height.

19. Shut down the engine, and remove the key from the ignition.

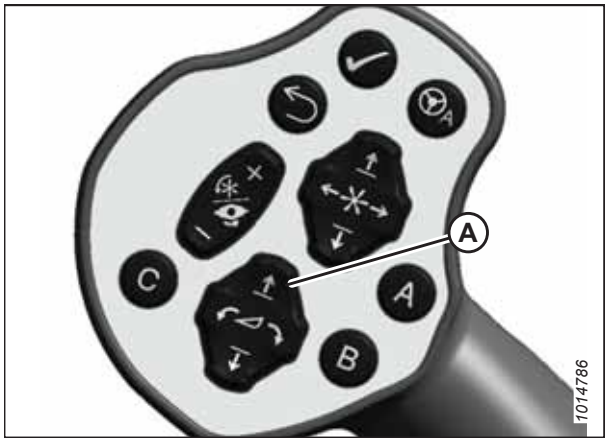


Figure 3.59: GSL

20. Engage the safety props on both lift cylinders as follows:

    a. Pull lever (A) toward you to release it, then rotate it toward the header to lower the safety prop onto the cylinder.

    b. Repeat the previous step for the opposite lift cylinder.

    IMPORTANT:

    Ensure that the safety props engage over the cylinder piston rods. If the safety prop does **NOT** engage properly, raise the header until the safety prop fits over the rod.

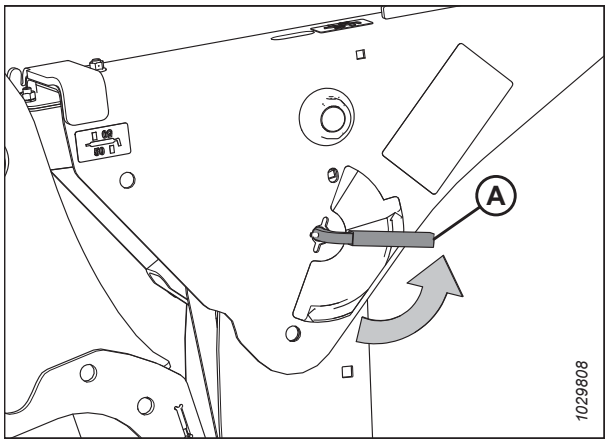


Figure 3.60: Safety Prop Lever

21. **If reattaching the header to the windrower:** Secure windrower lift linkage (A) to header supports (B) using clevis pin (C) and hair pin (D). Repeat this step on the opposite side of the header leg.

    NOTE:

    To ensure that the pin doesn't snag the windrow, install the clevis pin on the outboard side of the draper header support.

    NOTE:

    Some parts have been removed from the illustration for clarity.

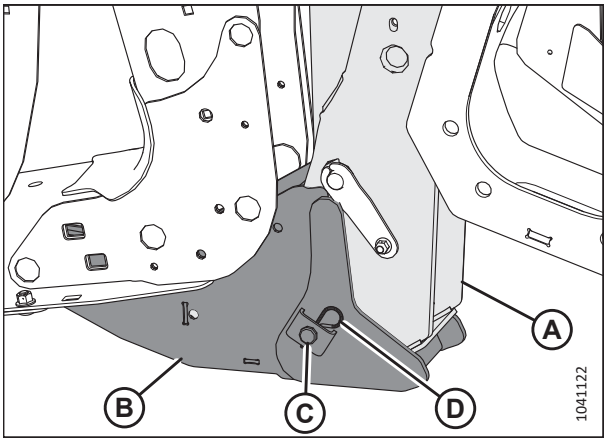


Figure 3.61: Windrower Lift Linkage and Header Leg

22. **If attaching the header to the windrower for the first time:** Install pin (B) through the header leg, engaging the header support in the lift linkage. Secure the pin with ring (A). Repeat this step on the opposite side of the header leg.

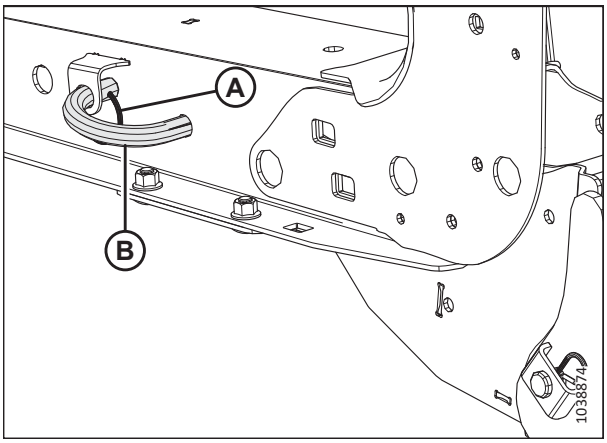


Figure 3.62: Header Leg

23. Disengage the safety props on both lift cylinders as follows:

    a. Turn lever (A) away from the header to raise the safety prop until the lever locks into the vertical position.

    b. Repeat the previous step for the opposite cylinder.

    NOTE:

    If the safety prop will **NOT** disengage, raise the header to release the prop.

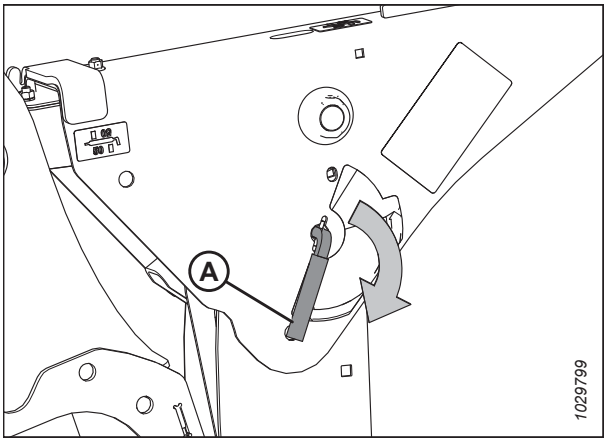


Figure 3.63: Safety Prop Lever

24. Start the engine.
25. Press HEADER DOWN switch (A) on the GSL to fully lower the header.
26. Shut down the engine, and remove the key from the ignition.

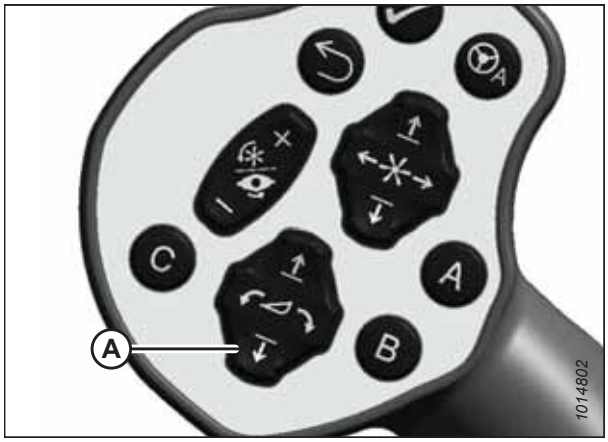


Figure 3.64: GSL

27. Press rotary scroll knob (A) on the HPT to highlight the QuickMenu options.
28. Rotate scroll knob (A) to highlight HEADER FLOAT symbol (B) and press the scroll knob to select it.

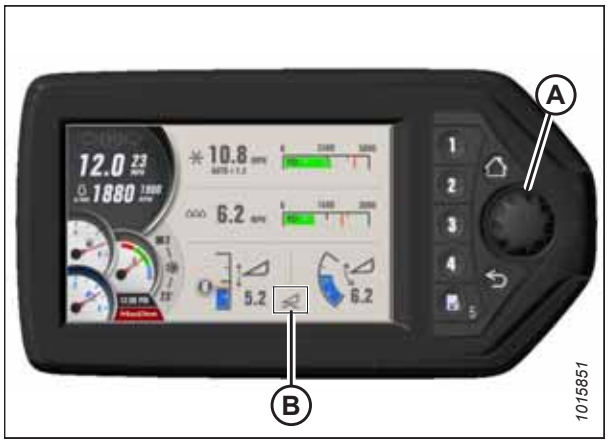


Figure 3.65: HPT Display

29. Turn scroll knob (A) to highlight left float (B) or right float (C). Press knob (A) to activate the selection.
30. Rotate scroll knob (A) to adjust the float setting. Press the knob to confirm the setting.

    IMPORTANT:

    Adjusting the float by increments of 1.0 (out of 10) changes the header weight at the cutterbar by approximately 91 kg (200 lb.). Adjust the float in increments of 0.05 to fine-tune the header's performance.
31. Shut down the engine, and remove the key from the ignition.
32. Grasp one end of the draper header and lift it. The lifting force should be 357 N (80 lbf). Repeat this step on the other side of the header.
33. Connect the header hydraulics and electrical to the windrower. For instructions, refer to the windrower operator's manual.

Figure 3.66: HPT Display

3.10 Attaching Header to M2 Series Windrower

The windrower's lift linkage and center-link will need to be connected to the header.

DANGER

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

DANGER

Ensure that all bystanders have cleared the area.

1. Shut down the engine, and remove the key from the ignition.
2. Before beginning this procedure, ensure draper header supports (A) are either:
   - (B) Installed on the windrower lift linkages, or
   - (C) Installed in the header legs

   For instructions on installing the header supports onto the windrower, refer to the windrower operator's manual. Header supports are typically left installed in the header legs when the header is detached from the windrower.

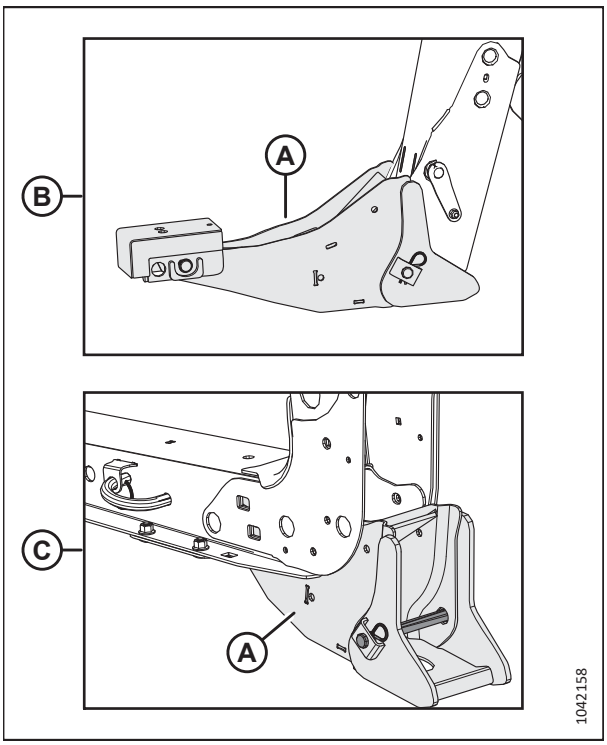


Figure 3.67: Header Supports Installed

3. Extend the windrower wheels from narrow transport into field mode. For instructions, refer to the windrower operator's manual.

4. Rotate left signal light placard (A) to the up (vertical) position before connecting the windrower to the header.

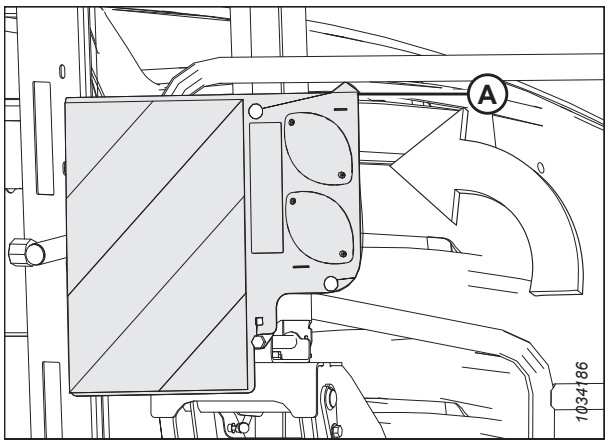


Figure 3.68: Left Signal Light Placard

5. Prepare the header as follows:

   - **If the header supports are installed on the windrower:** Remove ring (A) and pin (B) from the header leg.
   - **If the header supports are installed in the header:** Remove hairpin (C) and clevis pin (D) from the header support.

   Repeat this step on the other header leg.

6. Start the engine.

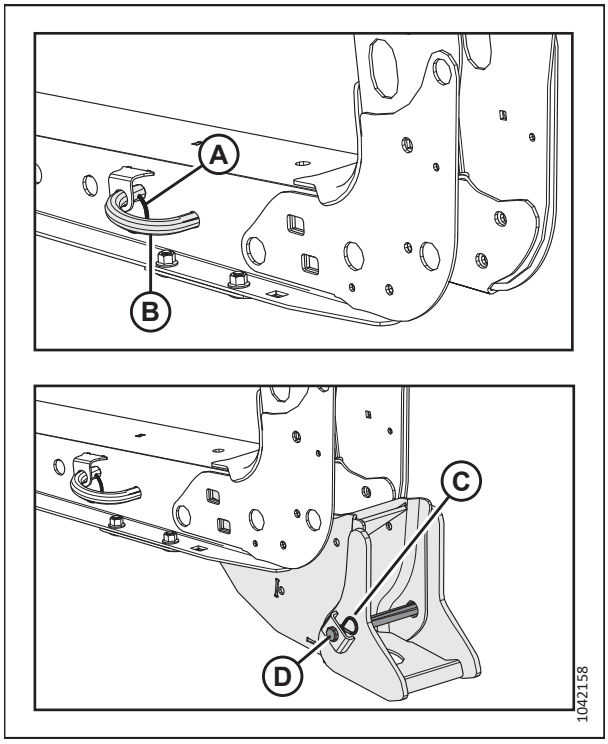


Figure 3.69: Header Leg — Left Side Shown

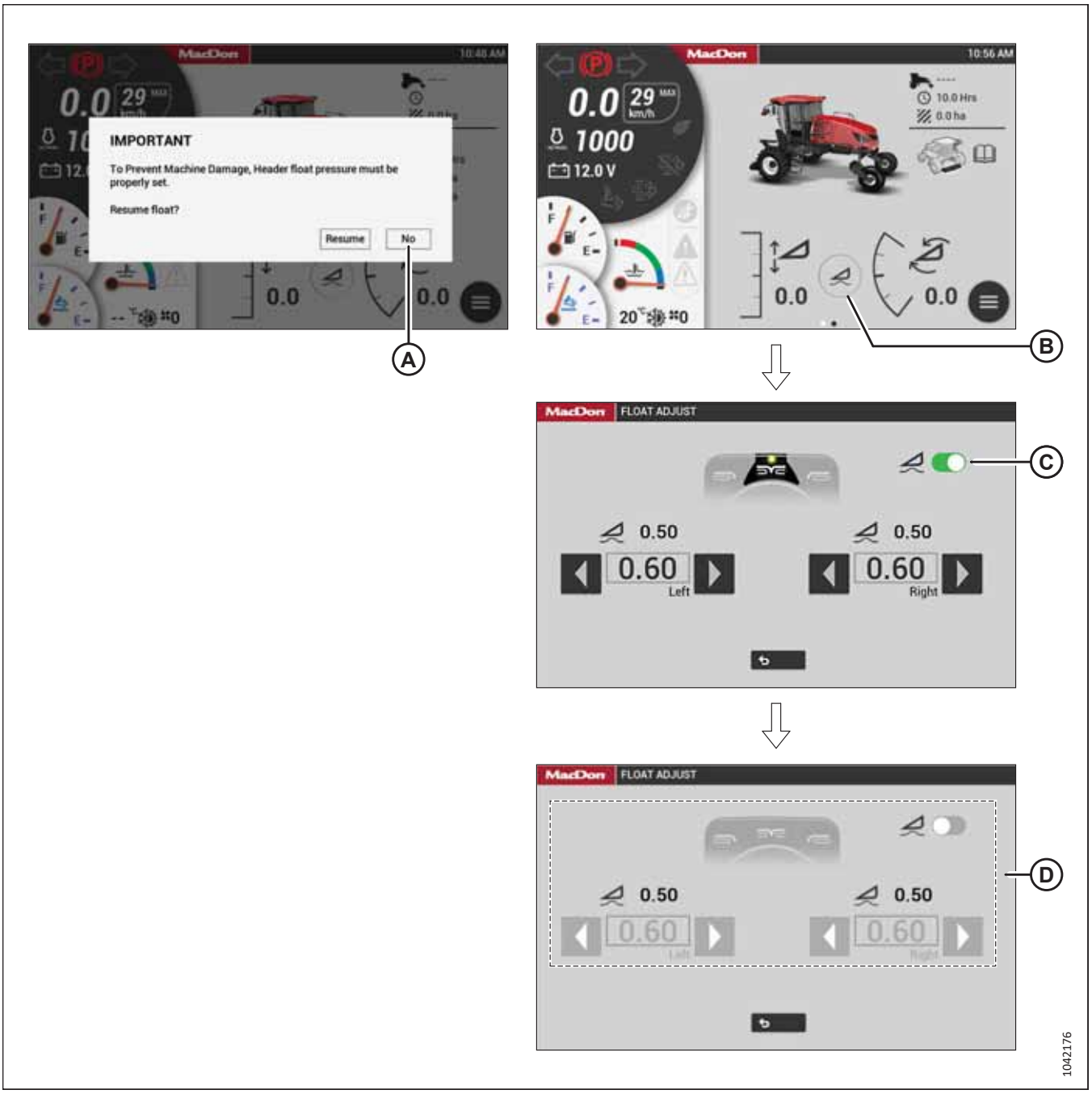


Figure 3.70: Float Removal

7. Remove the float as follows:

   - If the HarvestTouch™ Display shows the message “Resume Float?”, then select NO (A).
   - If the HarvestTouch™ Display does **NOT** show the message, then select FLOAT ADJUST (B), select switch (C), and confirm the switch and float settings (D) are grayed out.

   IMPORTANT:

   Removing the float will release the tension in the float springs. This will prevent damage to the header lift linkages when lowering the legs without a header or weight box attached to the windrower.

8. Prepare the center-link as follows:

   - **If not equipped with the Center-Link Alignment kit:** Relocate pin (A) in the frame linkage as needed to raise center-link (B) until the hook is above the attachment pin on the header.
   - **If equipped with the Center-Link Alignment kit:** Press REEL UP switch (D) on the ground speed lever (GSL) to raise the center-link until the hook is above the attachment pin on the header.

   IMPORTANT:

   Ensure that the center-link is positioned high enough that it does not contact the header as the windrower approaches the header.

9. Press HEADER DOWN switch (C) on the GSL until the windrower lift linkages are fully lowered.

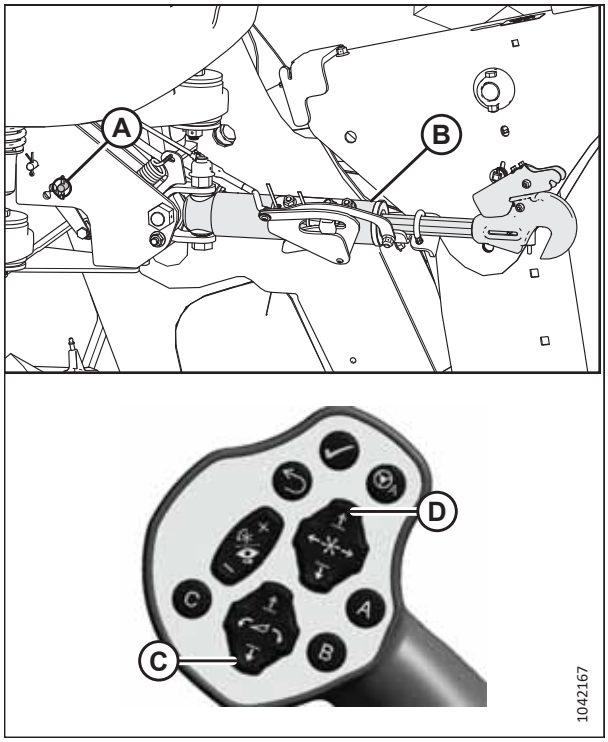


Figure 3.71: Center-Link without Self-Alignment

10. Proceed as follows:

    - **If the header supports are installed on the windrower:** Drive the windrower slowly forward until header supports (A) enter header legs (B).
    - **If the header supports are installed in the header:** Drive the windrower slowly forward until windrower lift linkages (C) enter header supports (D) in the header legs.

    Continue driving slowly forward until the header is nudged forward.

11. Ensure that the lift linkages are properly engaged in the header legs and are in contact with the support plates.

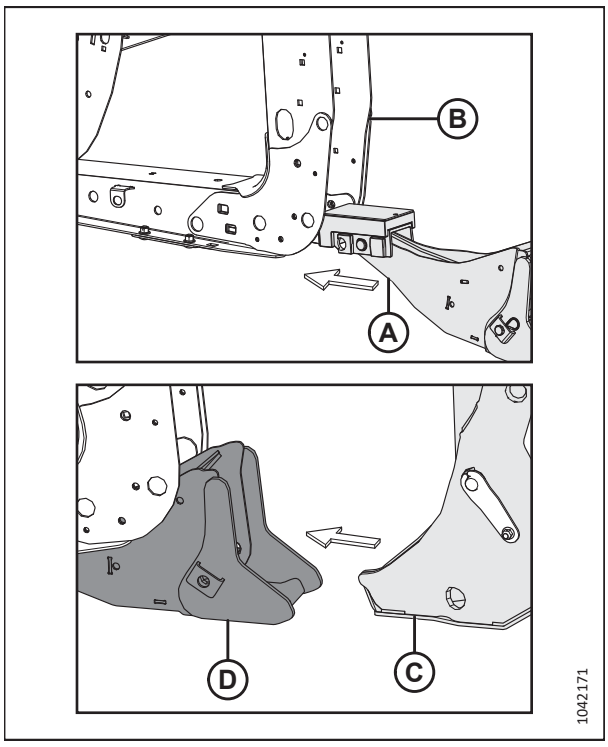


Figure 3.72: Header Leg and Support

12. **Windrowers equipped with the Center-Link Alignment kit:**

    a. Press HEADER TILT UP (A) or HEADER TILT DOWN (B) switches on the GSL to extend or retract the center-link cylinder until hook (C) is aligned with the header attachment pin.

    b. Lower the center-link onto the header with REEL DOWN (D) switch on the GSL until the center-link locks into position and hook release (E) is down.

    IMPORTANT:

    The hook release must be down to enable the self-locking mechanism. If the hook release is open (in the up position), manually push it down after the hook engages the pin.

    c. Check that the center-link is locked onto the header by pressing REEL UP (F) switch on the GSL.

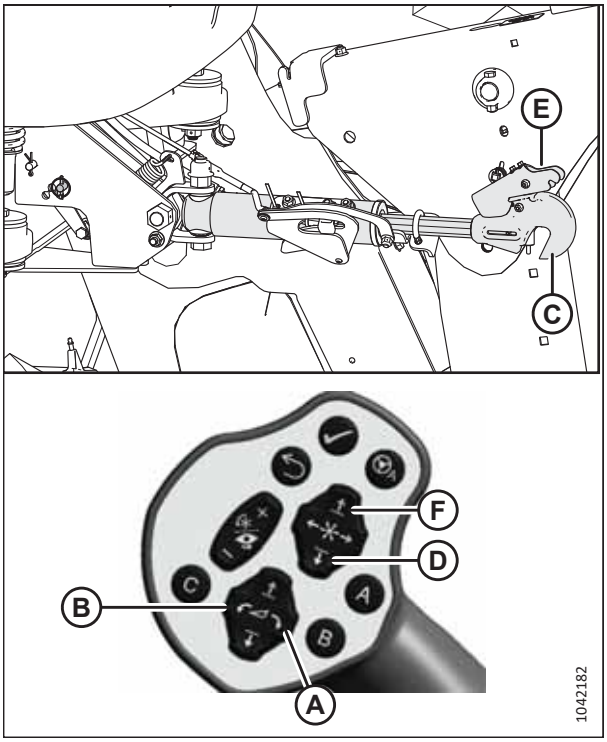


Figure 3.73: Hydraulic Center-Link

13. **Windrowers without the Center-Link Alignment kit:**

    a. Press HEADER TILT UP (A) or HEADER TILT DOWN (B) switches on the GSL to extend or retract the center-link cylinder until the hook is aligned with the header attachment pin.

    b. Shut down the engine, and remove the key from the ignition.

    c. Push down on rod end (C) of the link cylinder until hook (D) engages and locks onto the header pin.

    IMPORTANT:

    Hook release (E) must be down to enable the self-locking mechanism. If the hook release is open (in the up position), manually push it down after the hook engages the pin.

    d. Check that the center-link is locked onto the header by pulling upward on rod end (C) of the cylinder.

    e. Start the engine.

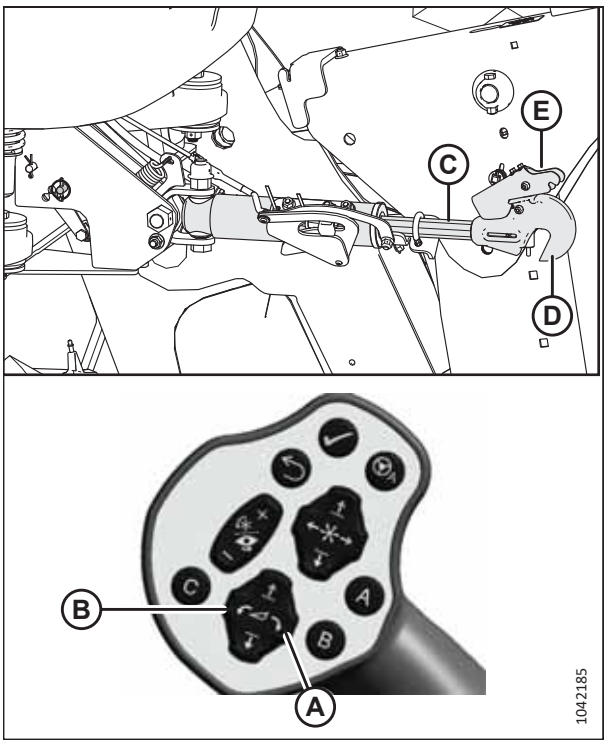


Figure 3.74: Hydraulic Center-Link

14. Press HEADER UP switch (A) to raise the header to its maximum height.

    NOTE:

    If one end of the header does **NOT** fully rise, rephase the lift cylinders as follows:

    a. Press and hold HEADER UP switch (A) until both cylinders stop moving.

    b. Continue to hold the switch for 3–4 seconds. The cylinders are now phased.

15. Shut down the engine, and remove the key from the ignition.

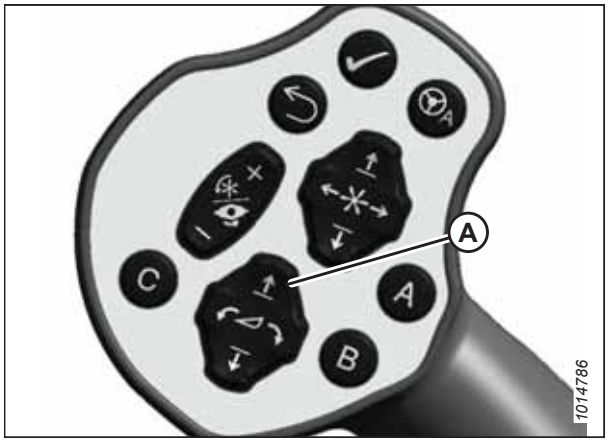


Figure 3.75: Ground Speed Lever (GSL)

16. Engage the safety props on both lift cylinders as follows:

    a. Pull lever (A) toward you to release it, then rotate it toward the header to lower the safety prop onto the cylinder.

    b. Repeat the previous step for the opposite lift cylinder.

    IMPORTANT:

    Ensure that the safety props engage over the cylinder piston rods. If the safety prop does **NOT** engage properly, raise the header until the safety prop fits over the rod.

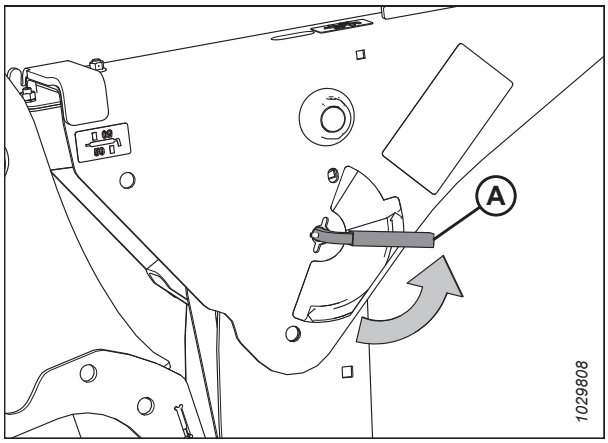


Figure 3.76: Safety Prop Lever

17. Proceed as follows:

    - **If the header supports are installed on the windrower:** Install pin (B) through the header leg, engaging the header support in the lift linkage. Secure the pin with ring (A).
    - **If the header supports are installed in the header:** Secure windrower lift linkage (C) to header supports (D) using clevis pin (E) and hairpin (F).

      NOTE:

      To ensure that the pin doesn't snag the windrow, install the clevis pin on the outboard side of the draper header support.

    Repeat this step on the other header leg.

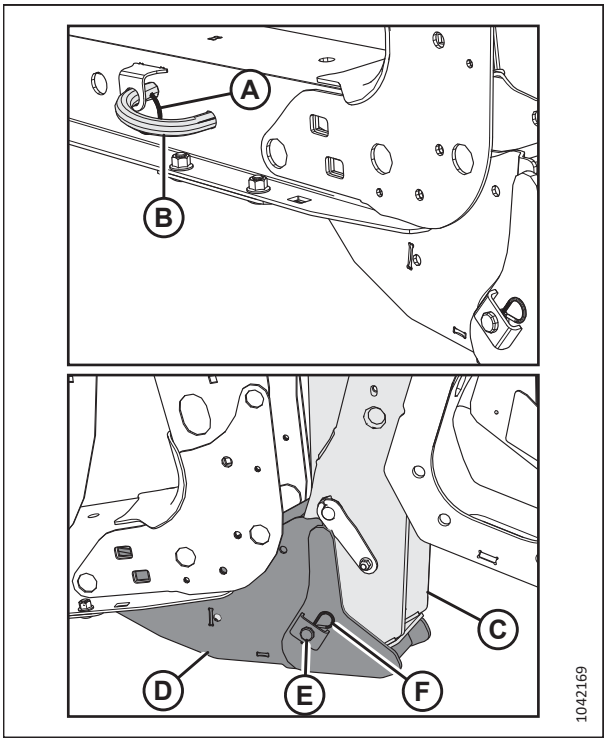


Figure 3.77: Windrower Lift Linkage and Header Leg

18. Disengage the safety props on both lift cylinders as follows:

    a. Turn lever (A) away from the header to raise the safety prop until the lever locks into the vertical position.

    b. Repeat the previous step for the opposite cylinder.

    NOTE:

    If the safety prop will **NOT** disengage, raise the header to release the prop.

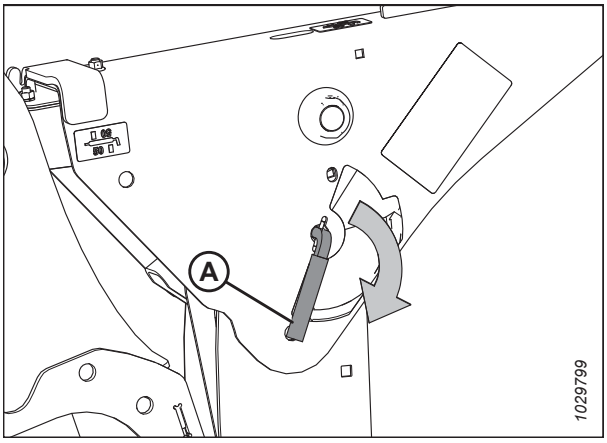


Figure 3.78: Safety Prop Lever

19. Start the engine.

20. Press HEADER DOWN switch (A) on the GSL to fully lower the header.

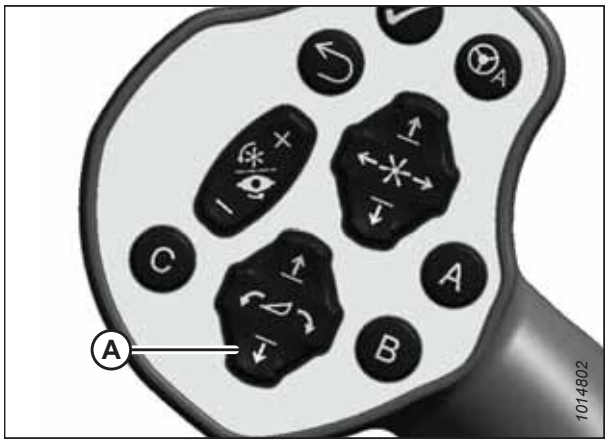


Figure 3.79: Ground Speed Lever (GSL)

21. Select FLOAT ADJUST (A).

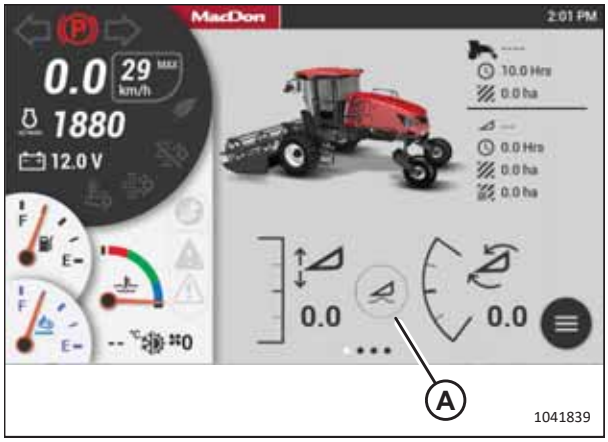


Figure 3.80: HarvestTouch™ Display

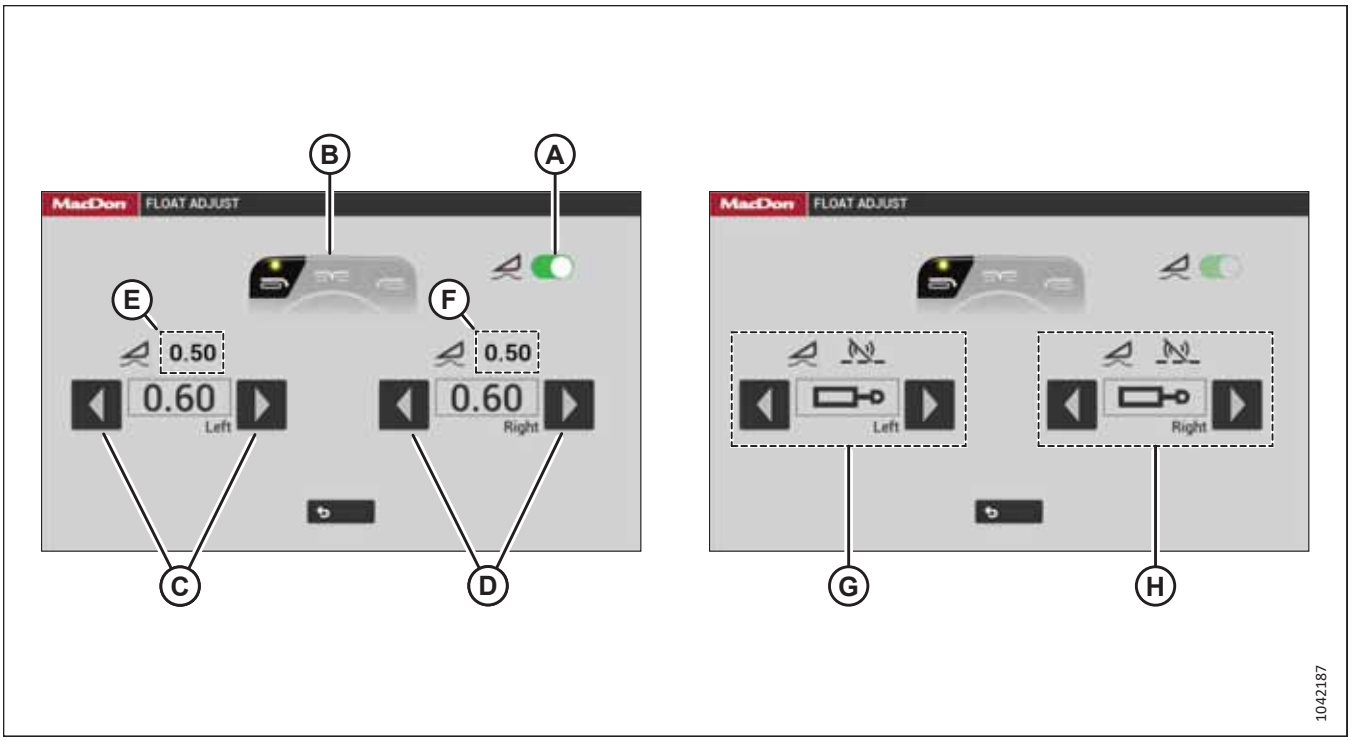


Figure 3.81: Float Adjustment

22. Select switch (A), so that it turns green, to activate the float.

23. If the float is not already set up, set the float as follows:

    a. The float preset, which is selected using the operator's console, is displayed at location (B). Confirm if the desired preset is selected.

    b. Select arrows (C) to set the target float for the left side of the header. Value (E) is the actual amount of float (measured by the left float sensor).

    c. Select arrows (D) to set the target float for the right side of the header. Value (F) is the actual amount of float (measured by the left float sensor).

    NOTE:

    Adjusting the float by increments of 1.0 (out of 10) changes the header weight at the cutterbar by approximately 91 kg (200 lb.). Adjust the float in increments of 0.05 to fine-tune the header's performance.

    NOTE:

    Symbols (G) and (H) mean the left and right float sensors are not working. You can still manually set the float, but you should first check if the sensors were disabled through the HarvestTouch™ Display (refer to MENU > SETUP > HEADER > SENSORS), or if another problem is causing the sensors to fail.

24. Shut down the engine, and remove the key from the ignition.

25. Check the float as follows:

    a. Grasp one end of the draper header and lift it. The lifting force should be 335–380 N (75–85 lbf) (with stabilizer/transport wheels raised, if equipped).

    b. Repeat this step on the other side of the header.

26. Connect the header hydraulics and electrical to the windrower. For instructions, refer to the windrower operator's manual.

3.11 Attaching Forming Shield to Windrower

Once the windrower is attached to the header, the forming shield should be secured to the windrower.

1. Retrieve the following parts from the hardware bag shipped with B7479:
   - Two 21/32 (I.D.) x 1 5/16 in. (O.D.) flat washers (MD #18600)
   - Two hairpins (MD #13125)
2. Lift the aft end of the forming shield. Attach straps (B) to pins (A) on the windrower frame. Use the middle hole and adjust the forming shield to a height suitable for the crop.
3. Secure each strap (B) with one washer (C) (MD #18600) and hairpin (D) (MD #13125).

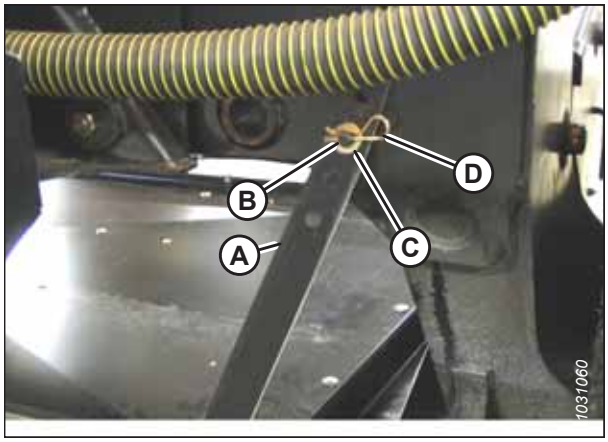


Figure 3.82: Rubber Strap

3.12 Connecting Hydraulics to Windrower

Once the hay conditioner has been installed in the header and the header attached to the windrower, the hydraulics can be connected.

To prevent contamination of the hydraulic system, use a clean rag to remove dirt and moisture from all hydraulic couplers.

1. Approach platform (A) on the left cab-forward side of the windrower. Ensure that the cab door is closed.

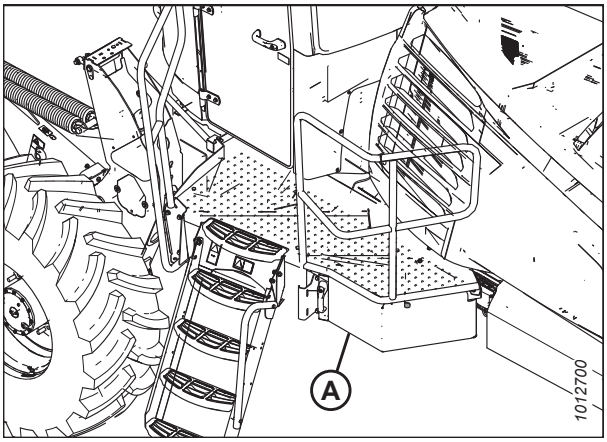


Figure 3.83: Left Cab-Forward Platform of Windrower

2. Push latch (A) to unlock platform (B).
3. Pull platform (B) toward the walking beam until it stops and latch engages.

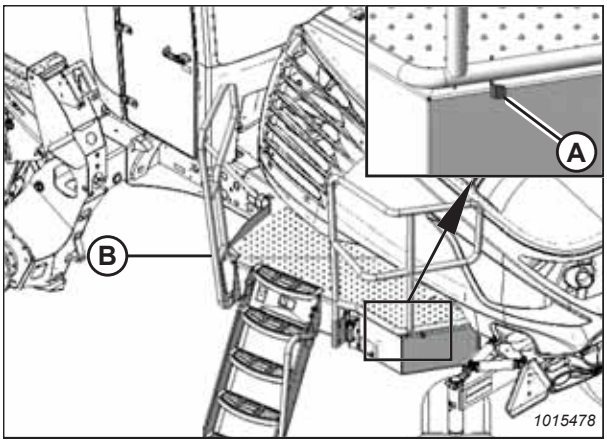


Figure 3.84: Left Cab-Forward Platform of Windrower

4. Connect the following hydraulic hoses from hay conditioner to the windrower.
   a. Hose (A) coming from Port P2 (B) of the manifold block (C) to female fitting (D) on the windrower.
   b. Hose (E) coming from Port P3 (F) of the manifold block (C) to male fitting (G) on the windrower.
   c. Hose (H) coming from hydraulic motor (J) of the HC20 to 1/2 in. male coupler (K) on the windrower.
   d. Remove hose (L) from coupler mounting bracket (M), and connect hose (N) from flow divider hydraulic valve (P).
5. To connect the header hydraulics to the windrower, refer to the header or windrower operator's manual.

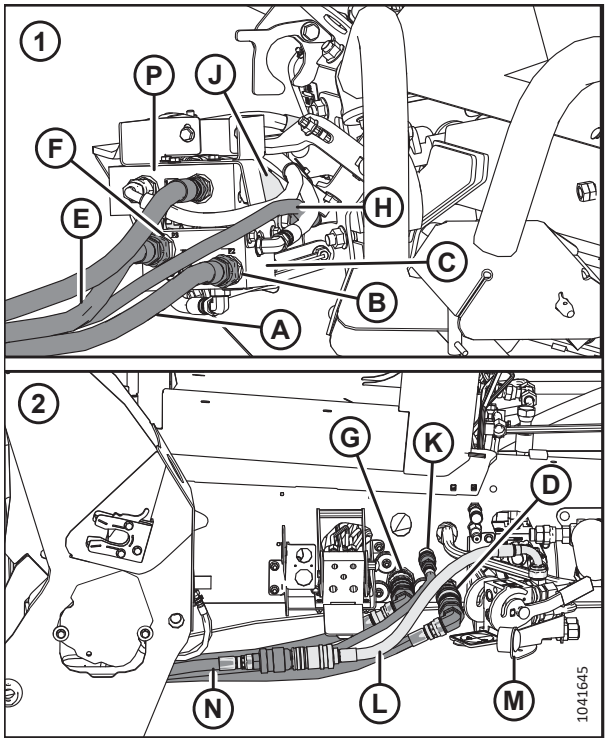


Figure 3.85: Hydraulic Connections

1 - Hay Conditioner Side **2 - Windrower Side**

6. Push latch (A) to unlock platform (B).

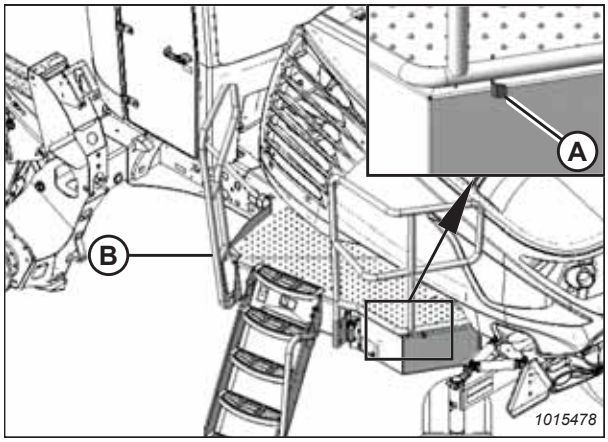


Figure 3.86: Left Cab-Forward Platform of Windrower

7. Push platform (A) towards the cab until it stops and the latch engaged.

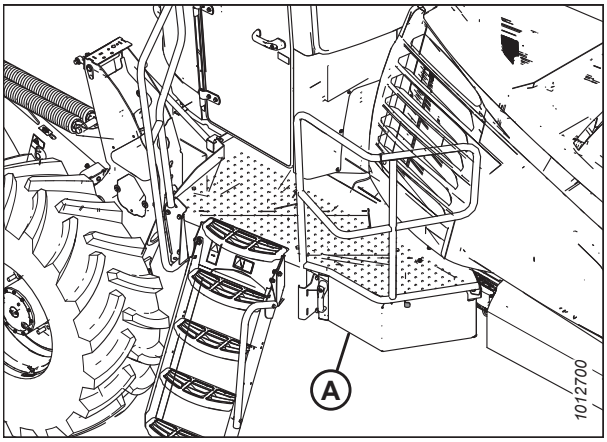


Figure 3.87: Left Cab-Forward Platform of Windrower

3.13 Lubricating Conditioner

The hay conditioner will need to be greased before it can be delivered to the customer.

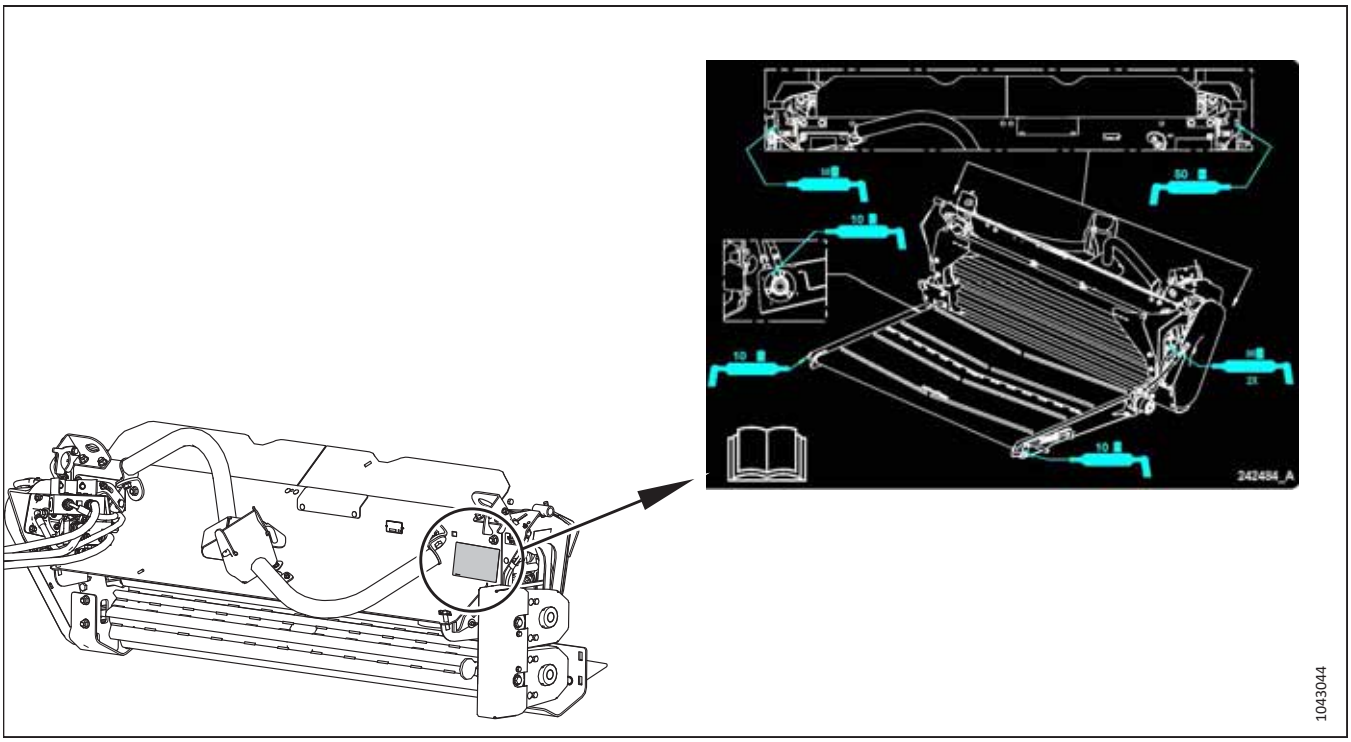


Figure 3.88: Grease Point Decal

1. Prepare the hay conditioner for service. For instructions, refer to *5.1 Preparing Hay Conditioner for Servicing, page 91*.
2. Add grease to each of the fittings listed in Figures *3.89, page 61* and *3.90, page 62*. To add grease to a fitting, follow this procedure:
   a. Wipe the grease fitting with a clean cloth.
   b. Inject grease through the fitting with grease gun until grease overflows the fitting. For more information, refer to *5.5 Lubrication, page 96*. Leave a blob of excess grease on the fitting.
   c. If a fitting does not accept grease, then tighten, clean, or replace it as needed. For parts information, refer to *6 Repair Parts, page 111*.

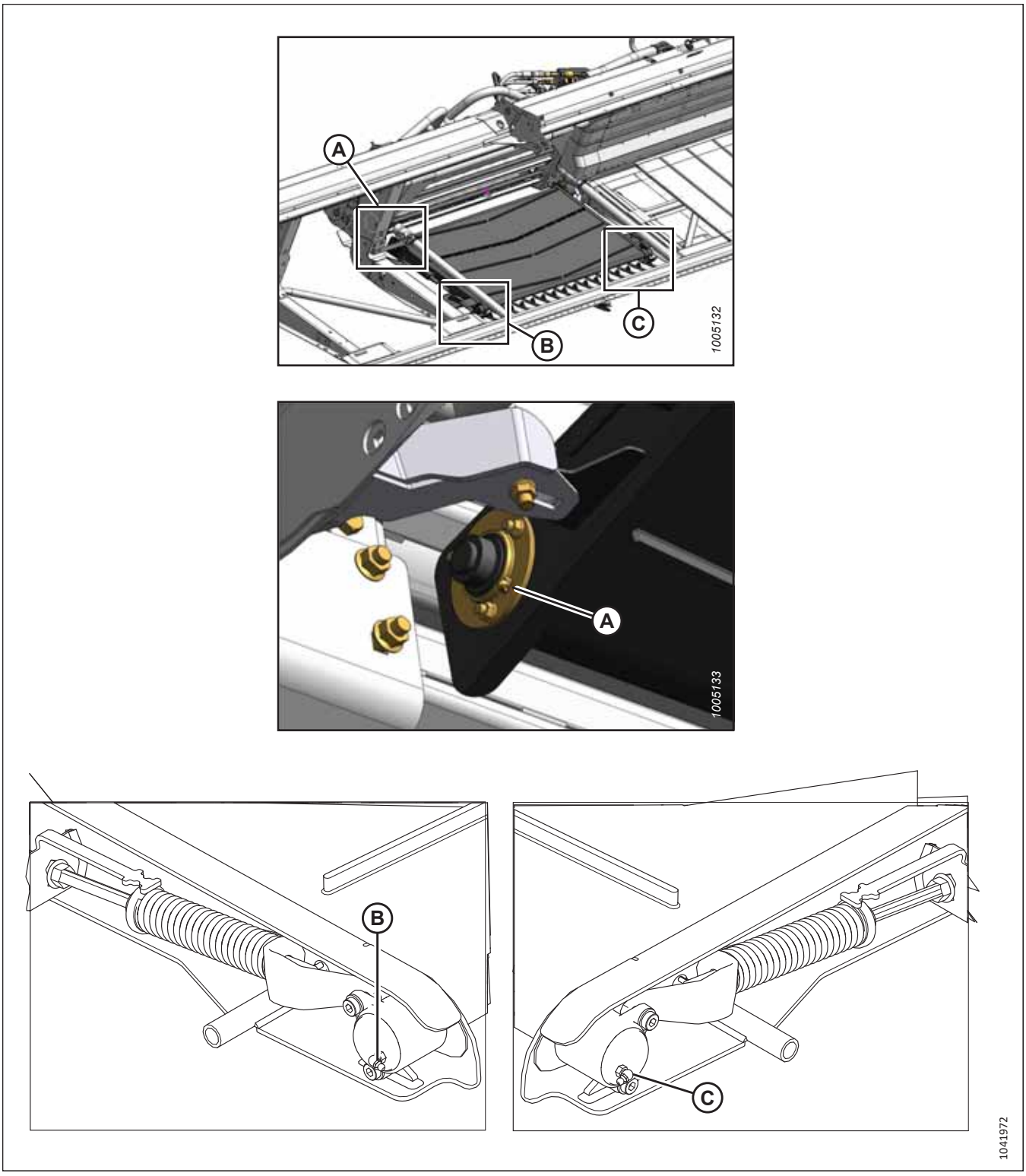


Figure 3.89: Lubrication Points

A - Drive Roller Bearing Lubrication Point

B - Idler Roller Bearing Lubrication Point

C - Idler Roller Bearing Lubrication Point

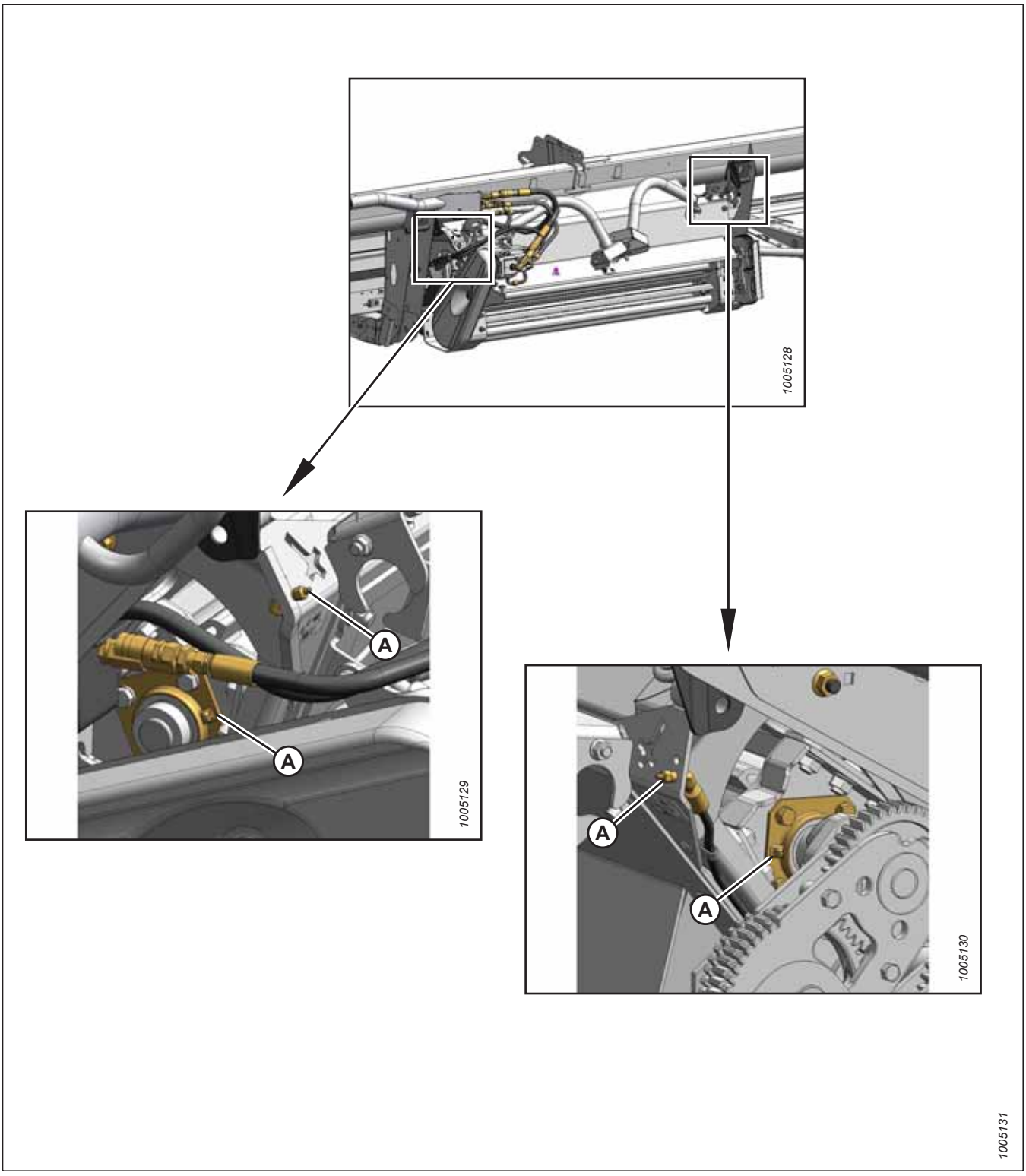


Figure 3.90: Lubrication Points

A - Roll Shaft Bearing Lubrication Points (Four Places)

3.14 Predelivery Checks

Predelivery checks ensure that the hay conditioner is ready for the field.

Perform the final checks and adjustments listed on the yellow Predelivery Checklist found at the end of this manual: *Predelivery Checklist, page 157*.

Ensure that the completed checklist is retained by the Operator or the Dealer.

3.14.1 Checking Roll Drive Belt Tension

The tension on the hay conditioner's drive belt must be set correctly in order for the conditioner drive to function.

1. Locate the drive cover on the right side of the hay conditioner. Remove wing nut and washer (A). Remove drive cover (B).

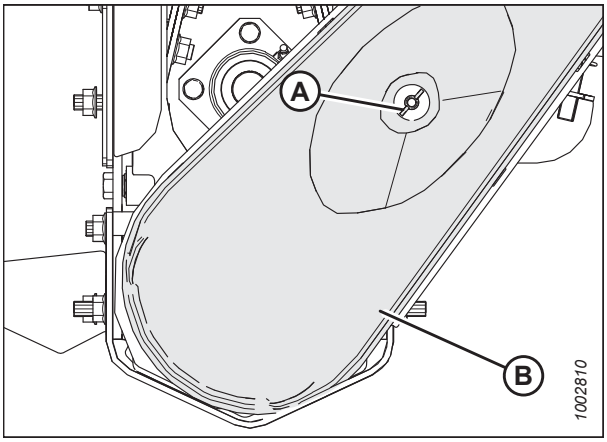


Figure 3.91: Drive Cover

2. Check the deflection of belt (A). Belt (A) should deflect 7.9 mm (5/16 in.) when a force of 22–49 N (5–11 lbf) is applied at the center of the span. Adjust the tension, if necessary. For instructions, refer to *5.8.1 Adjusting Drive Belt Tension, page 102*.

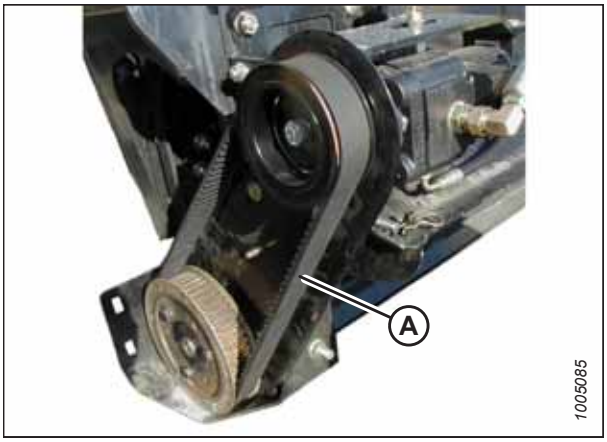


Figure 3.92: Drive Belt

3. Position cover (B) as shown. Secure the cover with wingnut (A).

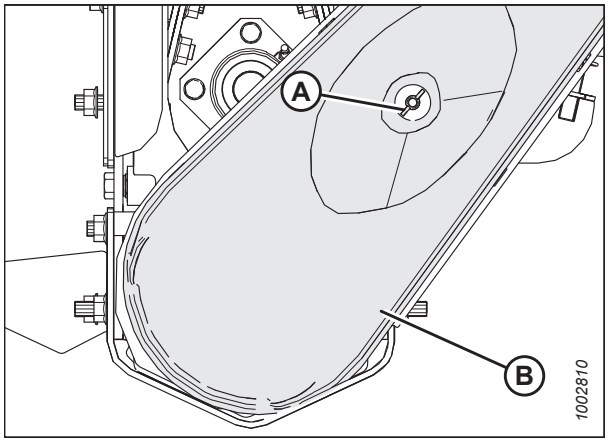


Figure 3.93: Drive Cover

3.14.2 Checking Roll Gap

The gap between the hay conditioner's conditioner rolls determines the degree to which crop is conditioned as it passes through the rolls. The roll gap is set at the factory, but it should be inspected before the hay conditioner is used.

1. Ensure that the roll gap is set to the factory setting using either method below:
   - Refer to Figure *3.94, page 64*: Ensure that roll gap (B) is 20 mm (3/4 in.).
   - Refer to Figure *3.95, page 64*: Ensure that the roll gap is at 1.5 line (A).

   NOTE:

   These measurements should be identical at each end of the rolls.
2. If necessary, adjust the roll gap. For instructions, refer to *4.9.2 Roll Gap, page 82*.

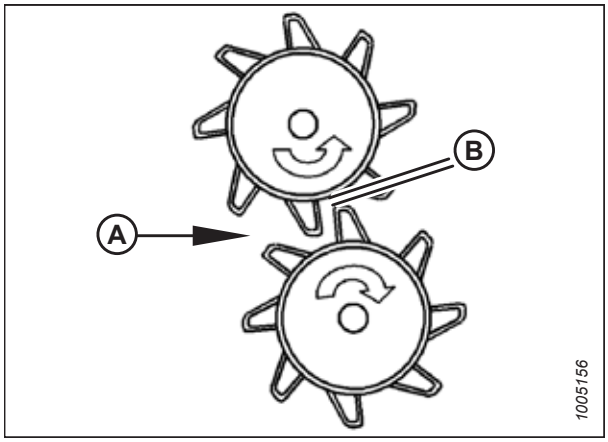


Figure 3.94: Roll Gap

A - Crop direction **B - Roll gap**

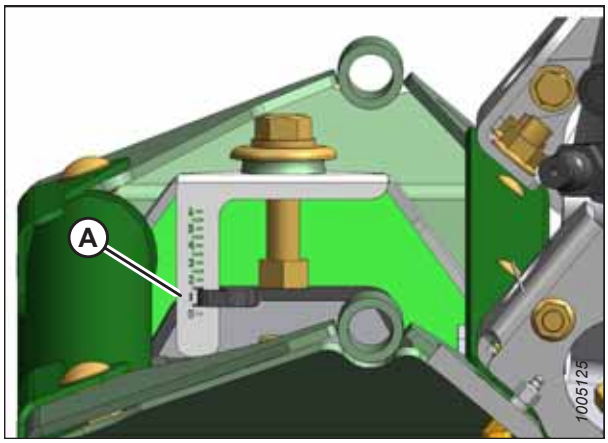


Figure 3.95: Roll Gap Gauge

3.14.3 Checking Roll Timing

The bars on one of the hay conditioner's conditioner rolls must intermesh with the bars on the other roll. Although the roll timing is set at the factory, it should be inspected before the hay conditioner is used in the field.

1. On the right end of the conditioner, remove wing nut and washer (A). Remove timing tool (B) from the panel.

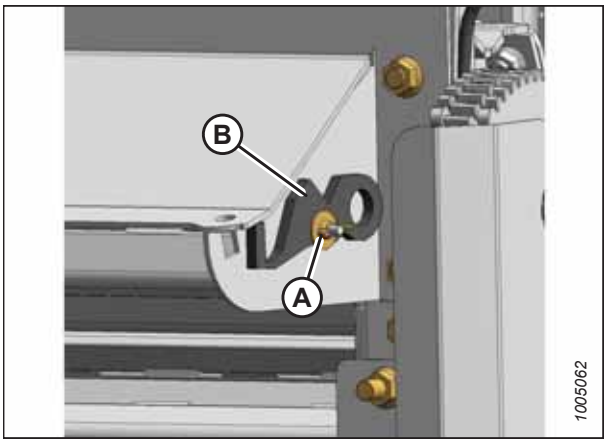


Figure 3.96: Roll Timing Tool in Storage Position

2. From the rear of the conditioner, position the timing tool at the center of rolls (A) as shown. Manually turn the rolls to the limits of tool (B). If the timing is correct, the rolls will engage the timing tool.
3. Manually turn the rolls to release the timing tool.
4. If necessary, adjust the roll timing. For instructions, refer to *4.9.3 Adjusting Roll Timing, page 83*.

Figure 3.97: Roll Timing Tool Positions

A - Start Position **B - Gauge Position**

5. Return timing tool (B) the storage location on the right end of the conditioner. Secure the tool with wing nut (A).

   IMPORTANT:

   Ensure that the timing tool is removed from the rolls and replaced in the storage position. The timing tool will damage the rolls if it is not removed before the hay conditioner is engaged.

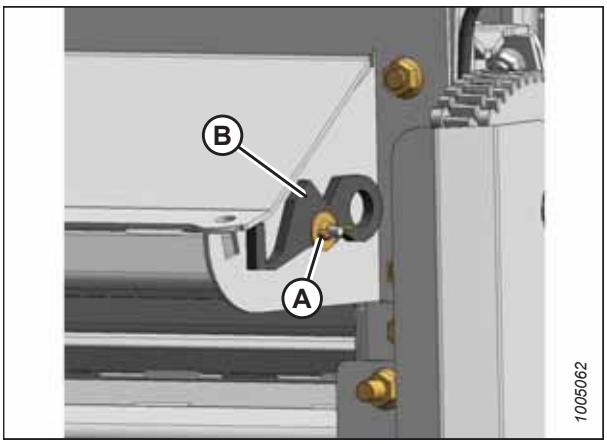


Figure 3.98: Roll Timing Tool in Storage Position

3.14.4 Running up Conditioner

Running up the conditioner ensures that the machine is functioning properly.

DANGER

Do not start the machine's engine or move it until all bystanders have cleared the area.

DANGER

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

1. Start the windrower.
2. Engage the header. Refer to the windrower's unloading and assembly instructions or the operator's manual for instructions on operating the windrower.
3. Operate the conditioner slowly for 5 minutes. From the windrower's operator's seat, watch and listen for binding or interfering parts. If any problem occurs, disengage the header, shut down the engine and remove the key from the ignition, and investigate the source of the problem.
4. Increase the speed of the conditioner. Allow the conditioner to run for 15 minutes. If any problem occurs, disengage the header, shut down the engine and remove the key from the ignition, and investigate the source of the problem.
5. Perform the header's run-up check to ensure that the machine is field-ready. Refer to the header's unloading and assembly instructions.
6. Shut down the engine, and remove the key from the ignition.

3.14.5 Storing Manual

The hay conditioner's manual should be placed in the manual storage case when it is not in use.

Place this manual in storage case (A) in the windrower. The Predelivery Checklist (the yellow sheet attached to this instruction—refer to *Predelivery Checklist, page 157*) should be retained by the Dealer or the Operator.

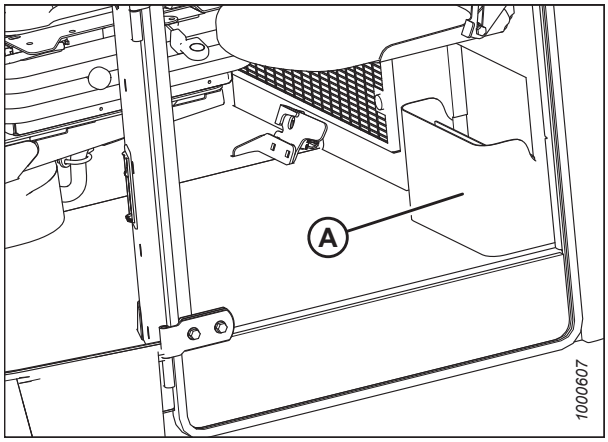


Figure 3.99: Manual Storage Case

Chapter 4: Operation

Safely operating your machine requires familiarizing yourself with its capabilities.

4.1 Owner/Operator Responsibilities

Owning and operating heavy equipment comes with certain duties.

CAUTION

- **It is your responsibility to read and understand this manual completely before operating the header. Contact your Dealer if an instruction is not clear to you.**
- **Follow all safety messages in the manual and on safety decals applied to 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 that they have been instructed in its safe and proper use.**
- **Review the manual and all safety-related items with all Operators of this machine annually.**
- **Be alert for other Operators not using the recommended procedures or not following safety precautions. Immediately correct improper use of this machine to prevent accidents.**
- **Do NOT modify the machine. Unauthorized modifications may impair the function and/or safety of this machine and affect its service life.**
- **The safety information given in this manual does NOT replace the safety codes, the requirements of insurance policies, or the laws governing your area. It is your responsibility to ensure that you operate your machine in compliance with these standards.**

4.2 Operational Safety

Safely operating the hay conditioner requires following these guidelines.

CAUTION

Follow these safety precautions:

- **Follow all safety and operational instructions provided in the windrower and header operator's manuals. If you do not have a windrower and/or header manual, get one from your Dealer.**
- **Do not start or move the machine until all bystanders have cleared the area.**
- **Stop the engine and remove the key from the ignition prior to adjusting or removing plugged material from the machine.**
- **Check the hay conditioner for excessive vibration and unusual noises. If there is any indication of trouble, shut down the engine, remove the key from the ignition, and inspect the machine. For instructions on shutting down the machine, refer to *4.2.1 Shutting down Machine, page 68*.**
- **Operate the hay conditioner only in the presence of daylight or good artificial light.**

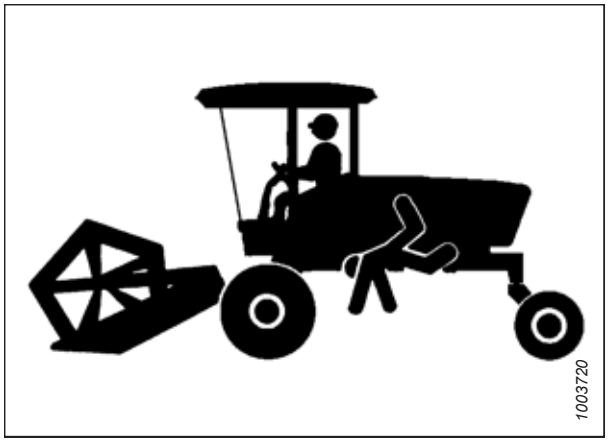


Figure 4.1: Safety around Windrower

4.2.1 Shutting down Machine

Before the machine can be inspected, it must be shut down safely.

1. Return the ground speed lever (GSL) to N-DETENT/PARK.
2. Center the steering wheel to lock it.
3. Disengage the header drive.
4. Shut down the engine, and remove the key from the ignition.
5. Wait for the header and the windrower to stop moving.
6. If necessary, engage the windrower’s safety props.

4.3 Attaching Hay Conditioner to Header and Windrower

If the hay conditioner was removed from the header and disconnected from the windrower, it can be reinstalled and connected by following these procedures.

To install the hay conditioner on a D2 Series Draper Header and to connect to M1 or M2 Series Windrower, follow these procedures:

- *3.2 Installing Rock Grate, page 19*
- *3.3 Installing Mounting Brackets, page 21*
- *3.4 Installing Feed Draper Deck, page 23*
- *3.5 Installing Conditioner, page 25*
- *3.7 Installing Forming Shield on Hay Conditioner, page 37*
- *3.9 Attaching Header to M1 Series Windrower, page 40* or *3.10 Attaching Header to M2 Series Windrower, page 47*
- *3.11 Attaching Forming Shield to Windrower, page 56*
- *3.12 Connecting Hydraulics to Windrower, page 57*

4.4 Detaching Hay Conditioner from Header

The hay conditioner can be detached from the header by using a windrower or a suitable lifting device.

4.4.1 Disconnecting Hydraulics from Windrower

The hay conditioner hydraulics must be disconnected from the windrower before detaching the header from the windrower.

To prevent contamination of the hydraulic system, cap the hoses once disconnected.

1. Approach platform (A) on the left cab-forward side of the windrower. Ensure that the cab door is closed.

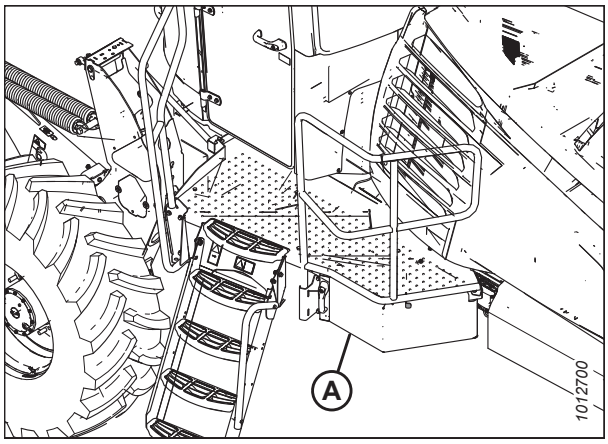


Figure 4.2: Left Cab-Forward Platform of Windrower

2. Push latch (A) to unlock platform (B).
3. Pull platform (B) toward the walking beam until it stops and latch engages.

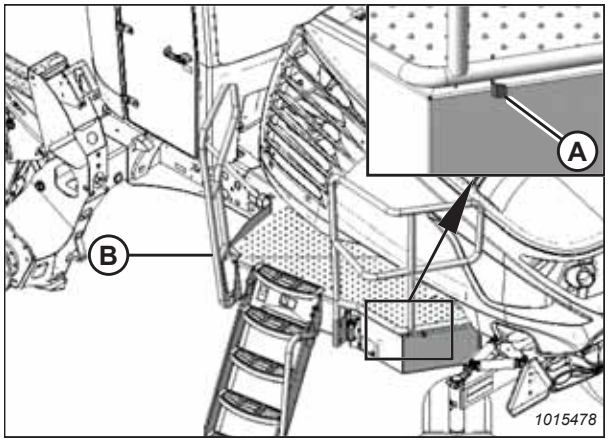


Figure 4.3: Left Cab-Forward Platform of Windrower

4. Disconnect and cap the following hydraulic hoses:
   a. Hose (A) from female fitting (B) on the windrower.
   b. Hose (C) from male fitting (D) on the windrower.
   c. Hose (E) from 1/2 in. male coupler (F) on the windrower.
   d. Hose (G) from hose (H).

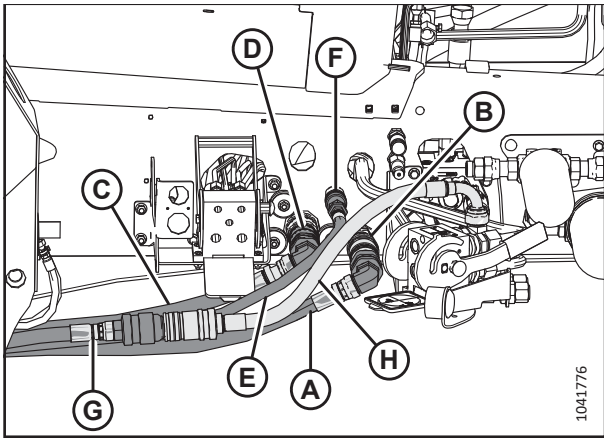


Figure 4.4: Hydraulic Connections

5. Secure hose (A) on the coupler mounting bracket (B).
6. Secure the hay conditioner hydraulic hoses to the hay conditioner.
7. Disconnect the header hydraulics from the windrower, refer to the windrower operator's manual.

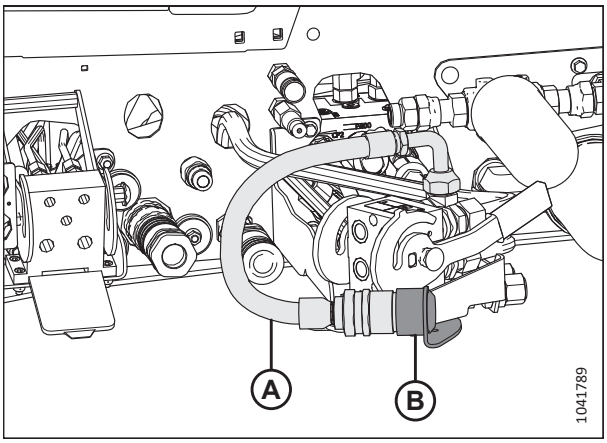


Figure 4.5: Hydraulic Connections

4.4.2 Detaching Hay Conditioner – Lifting Method

A forklift or another suitable lifting device can be used to lift the HC20 away from the header.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Disconnect HC20 hydraulics from windrower. For instructions, refer to *4.4.1 Disconnecting Hydraulics from Windrower, page 70*
3. Disconnect header hydraulics from windrower. For instructions, refer to windrower operator's manual.

4. Disconnect strap (A) from the windrower frame. Repeat at the opposite side.

5. Detach the header from the windrower. For instructions, refer to the windrower operator's manual.

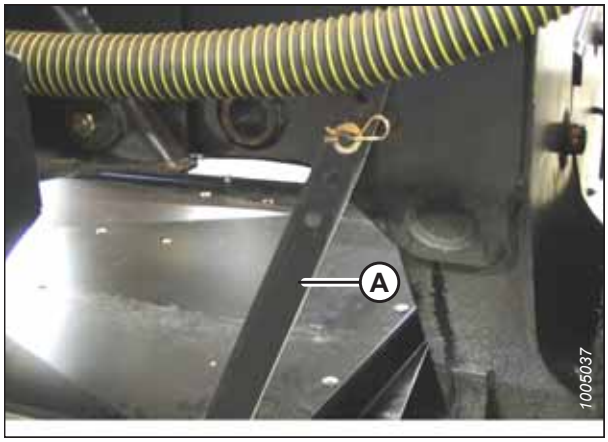


Figure 4.6: Forming Shield Strap at Wheel Leg

6. Remove two lynch pins (A) securing the forming shield to the header pins. Remove the forming shield.

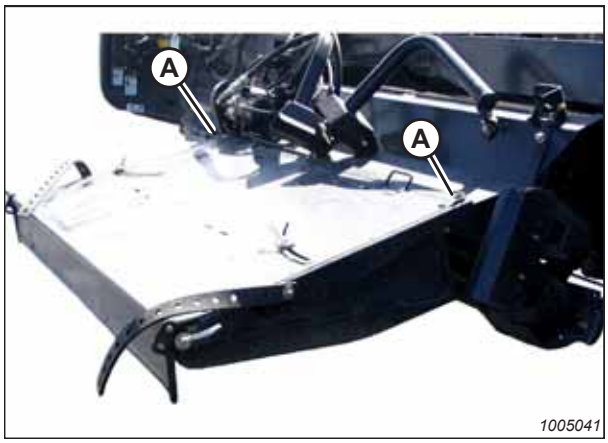


Figure 4.7: Forming Shield

7. Disconnect two hydraulic hoses (A) from the feed deck mount bracket.

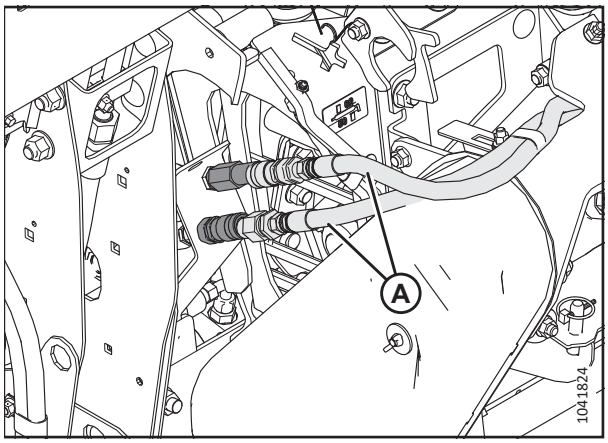


Figure 4.8: Feed Deck Hydraulic Connections

8. Remove two bolts (C) and nuts securing conditioner (A) to lower support (B). Repeat at the opposite side.

   NOTE:

   Retain hardware for future use.

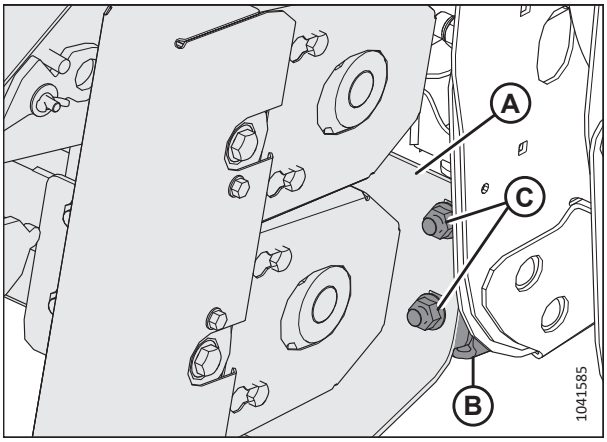


Figure 4.9: Conditioner – Right Side

9. Attach a chain to lifting brackets (A) on the conditioner. Drape the chain over forks (B) of a forklift as shown.
10. Carefully raise the lifting device until lugs (A) on the conditioner is clear off of support brackets (B) on the header.
11. Slowly back the lifting vehicle and hay conditioner away from the header.
12. Lower the conditioner to the ground.
13. Detach the chains from the hay conditioner.

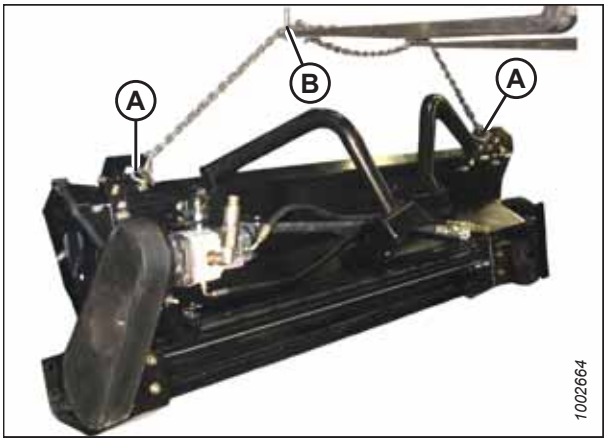


Figure 4.10: Conditioner and Lifting Brackets

4.4.3 Detaching Hay Conditioner – Windrower Method

The windrower can be used to lift the HC20 away from the header.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Disconnect HC20 hydraulics from windrower. For instructions, refer to *4.4.1 Disconnecting Hydraulics from Windrower, page 70*
3. Disconnect header hydraulics from windrower. For instructions, refer to windrower operator's manual.

4. Disconnect strap (A) from the windrower frame. Repeat at the opposite side.

5. Detach the header from the windrower. For instructions, refer to the windrower operator's manual.

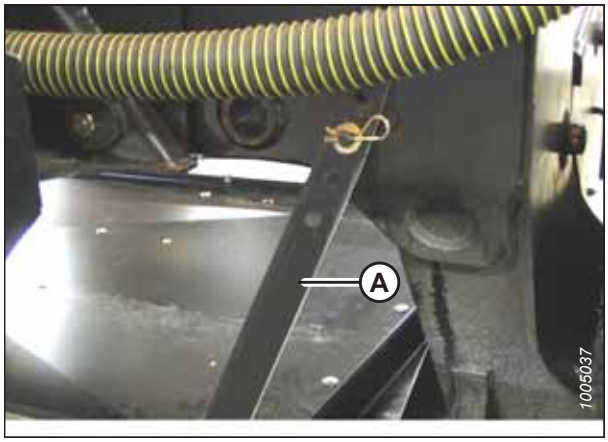


Figure 4.11: Forming Shield Strap at Wheel Leg

6. Remove two lynch pins (A) securing the forming shield to the header pins. Remove the forming shield.

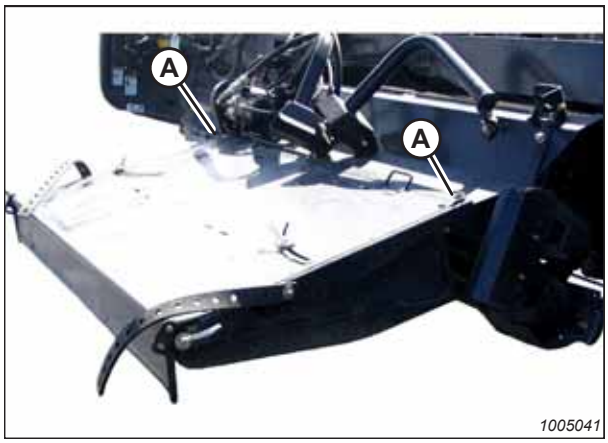


Figure 4.12: Forming Shield

7. Disconnect two hydraulic hoses (A) from the feed deck mount bracket.

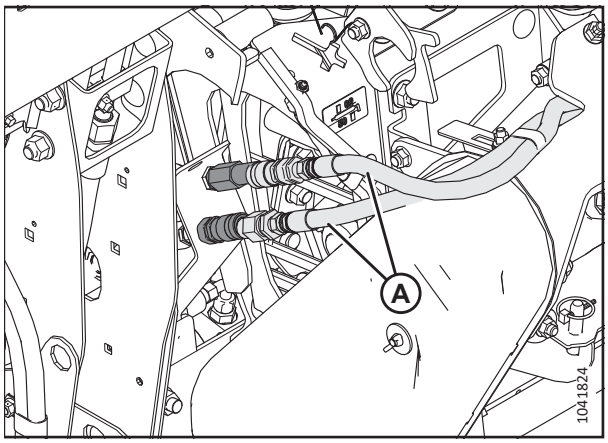


Figure 4.13: Feed Deck Hydraulic Connections

8. Loosen nuts (A) enough for lift arm (B) and bracket (C) to pivot.
9. Remove and retain L-pin (D) securing the other end of lift arm (B) to the support bracket (E) on the conditioner.

   NOTE:

   Rotate L-pin to align on the keyhole slot.

   NOTE:

   The support bracket on the left is different from the support bracket on the right.
10. Hold the lift arm while swinging it to the left.

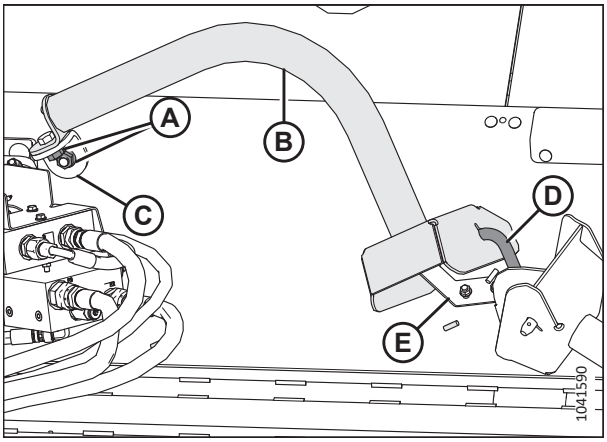


Figure 4.14: Lift Arm – Left Side

11. Position left lift arm (A) in bracket (B) as shown, and secure the lift arm in place with latch (C).
12. Tighten nuts (D) to secure lift arm (A) and bracket (E) to the conditioner.
13. Repeat Step *8, page 75* to Step *12, page 75*.

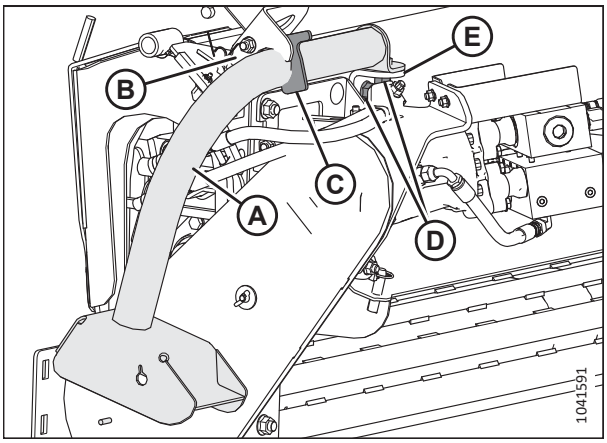


Figure 4.15: Conditioner – Left Side

14. Remove two bolts (C) and nuts securing conditioner (A) to lower support (B). Repeat at the opposite side.

    NOTE:

    Retain hardware for future use.

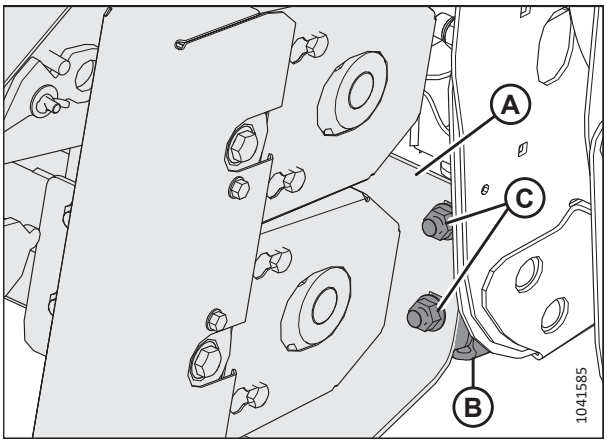


Figure 4.16: Conditioner – Right Side

15. Position the windrower arms in lift arm pockets (A). Insert the L-pins.

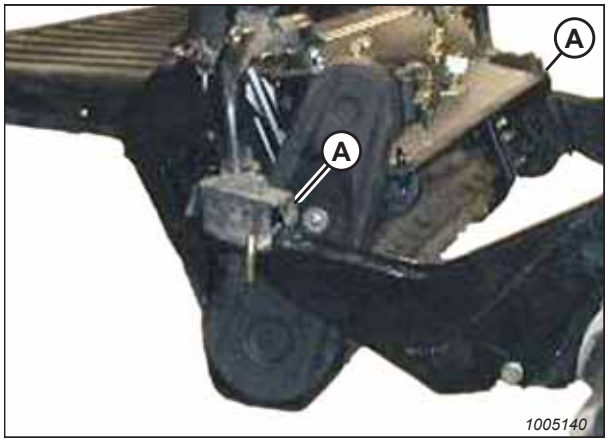


Figure 4.17: Lift Arm Pockets

16. Carefully raise the windrower lift legs until lugs (A) on conditioner clear U-shaped brackets (B) on the header.
17. Slowly back the windrower away from the header.
18. Lower the conditioner to the ground.

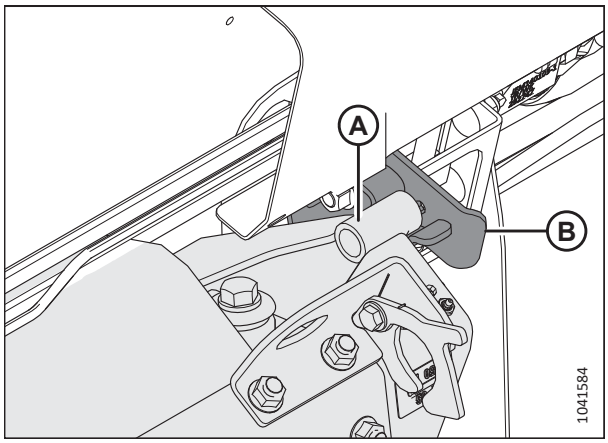


Figure 4.18: Conditioner Lug

19. Remove L-pins (A) from the lift arms.
20. Back the windrower away from the hay conditioner.
21. Reattach the L-pins in the conditioner lift arms.

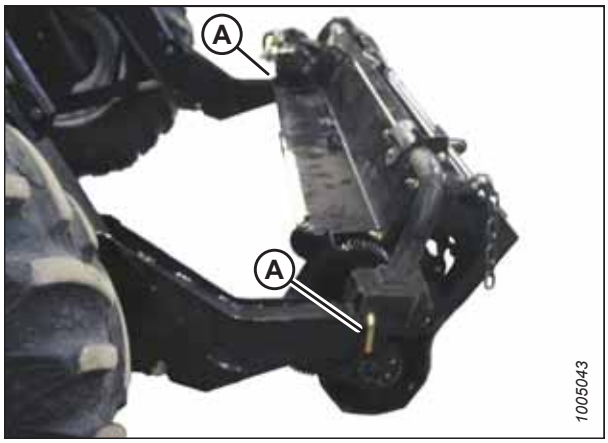


Figure 4.19: L-Pins

4.5 Detaching Feed Draper Deck and Rock Grate

The feed draper deck and rock grate can be removed from the hay conditioner for service, replacement, or to gain access to other components.

1. Remove bolt and nut (A) securing the feed draper deck (B) to the right rear deck support (C).

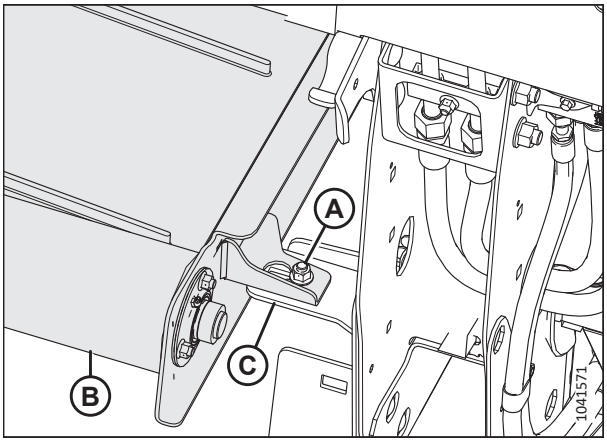


Figure 4.20: Feed Deck – Rear Right Side

2. Remove bolts (C) and nuts securing the coupler mount bracket (A) to the lower support bracket (B). Lay the hoses with the coupler mount bracket on the feed deck.

   NOTE:

   Bolts (C) and nuts can be reattach to the coupler mount bracket (A) for safe keeping.

3. Remove bolt (D) and nut securing feed draper deck (E) to the left rear deck support (F).

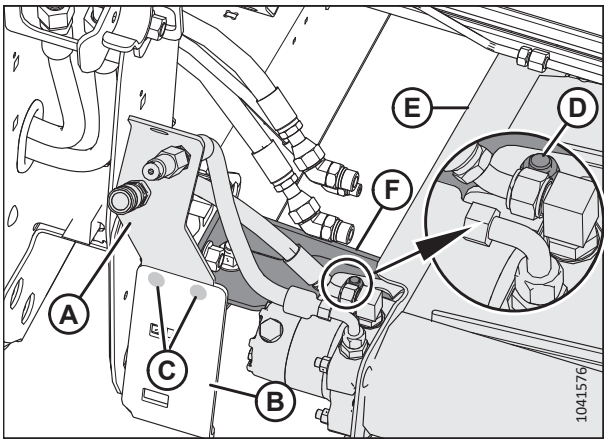


Figure 4.21: Feed Deck – Left Side

4. Lift the rear of the feed deck (A) so that the mounts on the deck clear the brackets (B) on the leg. Slide the deck backward until the mounting pins (C) are free from the pockets on the rock grate.

5. Continue sliding the deck back until the deck drops free of the rock grate. Set the deck aside.

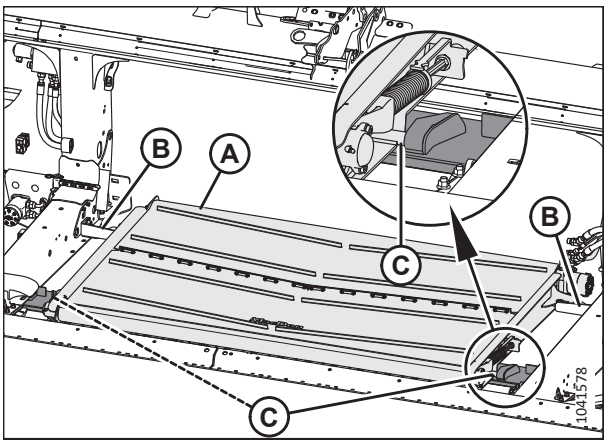


Figure 4.22: Feed Deck

6. Remove two bolts (D) and nuts securing rock grate (A) to the header legs.
7. Loosen hardware securing the knife hold-downs to the cutterbar plates (B).
8. Slide rock grate (A) backward, away from wearplates (B) and cutterbar support (C).

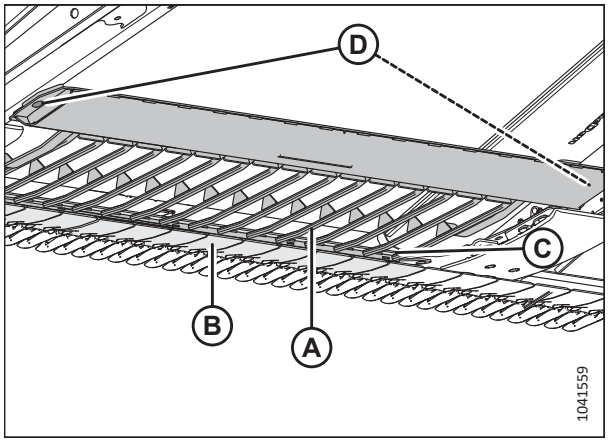


Figure 4.23: Rock Grate – View from Below

9. If necessary, remove lower bracket (A) and spacer (B), and upper bracket (C) from the header legs. Store these with the feed deck.

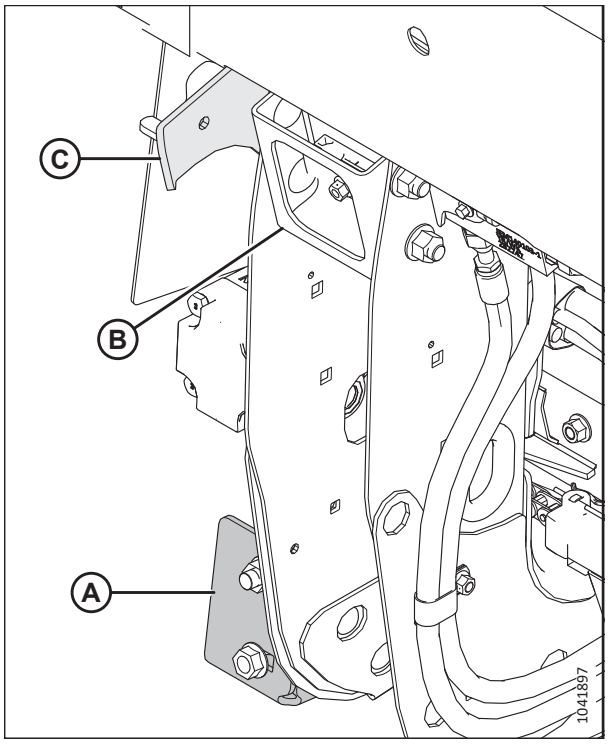


Figure 4.24: Conditioner Attachment Brackets — Right Side Shown

4.6 Break-in Period

The break-in period refers to the hay conditioner's first 5 hours of operation. During this time, the hay conditioner should be observed carefully to ensure that it is working correctly.

DANGER

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

Operate the hay conditioner slowly for 5 minutes when it is operated for the first time. Watch and listen from the operator's seat for binding or interfering parts.

NOTE:

The hay conditioner will **NOT** operate until oil flow fills the lines.

NOTE:

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

After the first 5 hours of operation:

- Tighten any loose hardware.
- Adjust the tension of the roll drive belt. For instructions, refer to *5.8.1 Adjusting Drive Belt Tension, page 102*. Continue to check the belt tension periodically for the first 50 operating hours.

4.7 Preseason Check

Performing initial inspections before the harvest season begins ensures that the machine will perform well when needed.

CAUTION

- **Review the operator's manual to refresh your memory on the safety and operating recommendations.**
- **Review all of the safety signs and other decals on the header. Note any hazard areas.**
- **Ensure that all shields and guards are properly installed on the conditioner and secured. Never alter or remove any safety equipment.**
- **Understand and practice the safe use of the hay conditioner's controls. Know the capacities and the operating characteristics of the machine.**
- **Ensure that the first aid kit and fire extinguisher are present and in working order. Know where they are and how to use them.**

Before you begin the operating season, perform all annual maintenance. For instructions, refer to *5.2 Maintenance Schedule, page 92*.

4.8 Daily Startup Check

Perform the daily startup check before operating the hay conditioner.

CAUTION

- **Clear the area of bystanders.**
- **Wear close-fitting clothing and protective shoes with slip-resistant soles.**
- **Remove any foreign objects from the machine and the 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 yourself from noise. Wear a suitable hearing protection device such as earmuffs or earplugs to shield your ears from loud noises.**

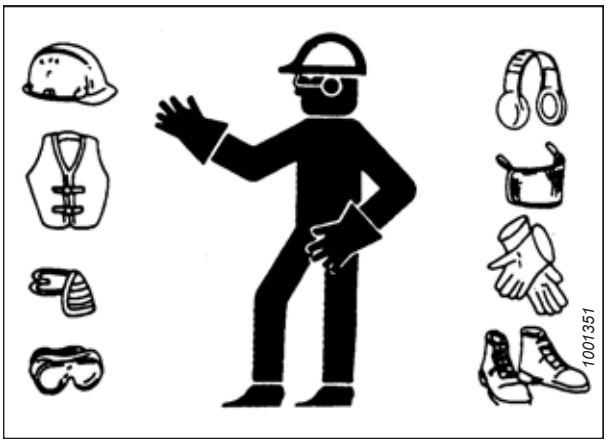


Figure 4.25: Protective Clothing and Personal Safety Devices

Complete the following tasks each day before start-up:

1. Check the machine for leaks and for missing or damaged parts.

   NOTE:

   Use the proper procedure to search for pressurized fluid leaks. For instructions, refer to *5.6 Hydraulic System, page 99*.

2. Clean all lights and reflective surfaces on the machine.
3. Perform all daily maintenance. Refer to *5.2 Maintenance Schedule, page 92*.

4.9 Conditioner Operation

The hay conditioner is equipped with two intermeshing steel rolls, which condition the crop by crimping and crushing the stem. The hay conditioner will need to be configured differently for different crops.

WARNING

Keep hands and feet away from the discharge opening. Ensure that bystanders are at least 100 meters (330 ft.) away from the header when it is operating. Never direct the discharge toward any living thing; stones or other foreign objects can be ejected with great force.

WARNING

To prevent bodily injury or death from the unexpected start-up of the header, stop the windrower's engine and remove the key from the ignition before adjusting the conditioner rolls.

4.9.1 Roll and Feed Draper Speed

The roll and feed draper speeds change whenever the header knife speed is changed since the drives use the same hydraulic circuit. The roll and feed draper speeds therefore vary directly with the speed of the header's knife drive and cannot be adjusted independently.

4.9.2 Roll Gap

The degree to which the crop is conditioned as it passes through the hay conditioner's rolls is determined by the gap between the conditioner rolls.

Intermeshing steel rolls condition the crop by crimping and crushing the stem in several places, which causes the cut crop to dry faster. The degree to which the crop is conditioned as it passes through rolls (A) is determined by roll gap (B). The gap is factory-set to 20 mm (3/4 in.) or at the 1.5 line on the roll gap gauge, as shown in Figure *4.27, page 83*. The gauge readings should be the same at both ends of the roll.

Alfalfa, clover, and other legumes are considered to be fully conditioned when 90% of the stems show cracking, but no more than 5% of the leaves are damaged. Use the smallest roll gap possible to achieve this result.

Grass type crops may require a smaller roll gap.

Thick-stemmed cane-type crops may require a larger roll gap, up to 25 mm (1 in.). However, too large a gap may cause feeding problems.

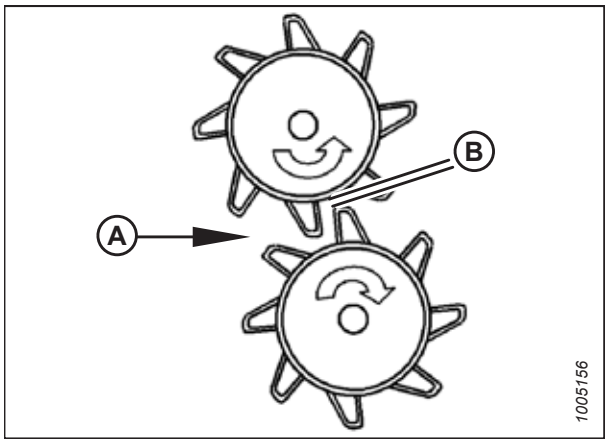


Figure 4.26: Roll Gap

A - Crop Direction **B - Roll Gap**

If necessary, the roll gap can be adjusted by loosening nut (A) and turning adjuster (B). Retighten nut (A) after the adjustment has been made.

IMPORTANT:

To ensure that the conditioner rolls intermesh, roll gap gauge (C) must show the same measurement on both sides of the conditioner roll.

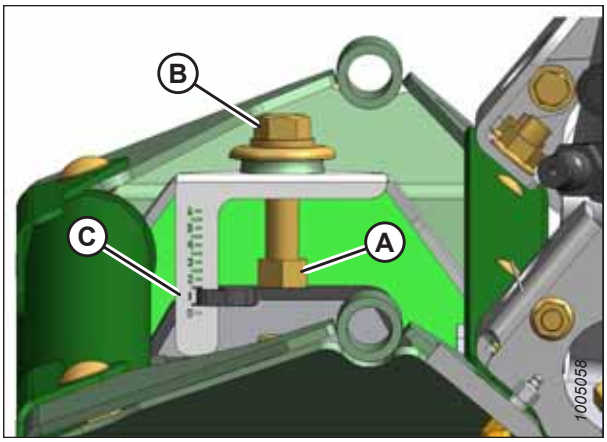


Figure 4.27: Roll Gap Gauge

4.9.3 Adjusting Roll Timing

To fully condition cut crop, the hay conditioner's rolls must be properly timed and aligned.

Each steel bar (A) on one roll must be centered between two bars (B) on the other roll as shown. The factory setting should be suitable for most crop conditions.

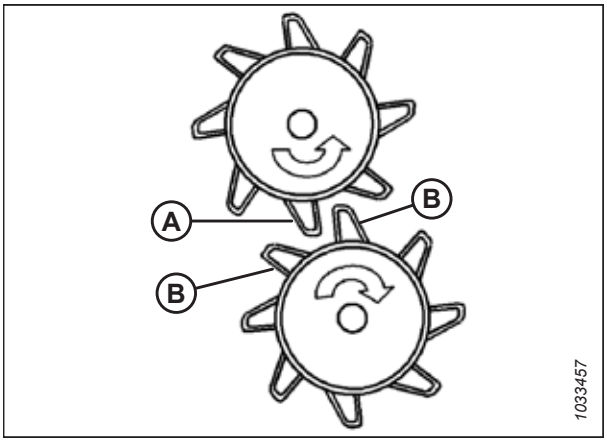


Figure 4.28: Conditioner Roll Timing

To adjust the roll timing, do the following:

1. Retrieve the roll timing tool. Use it to check the roll timing. For instructions, refer to *3.14.3 Checking Roll Timing, page 65*.

2. Loosen four bolts (A) on one of the small timing gears.

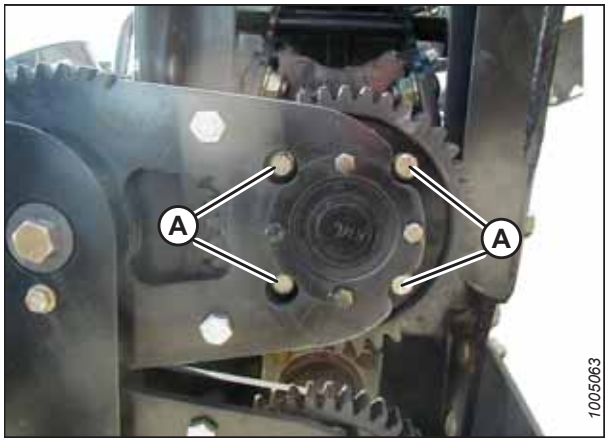


Figure 4.29: Timing Gear

3. Insert tool (A). Allow the rolls to adjust to the tool.
4. Tighten the bolts on the timing gear.
5. Return the roll timing tool to its storage location on the right end of the conditioner. Secure it with a washer and wing nut.

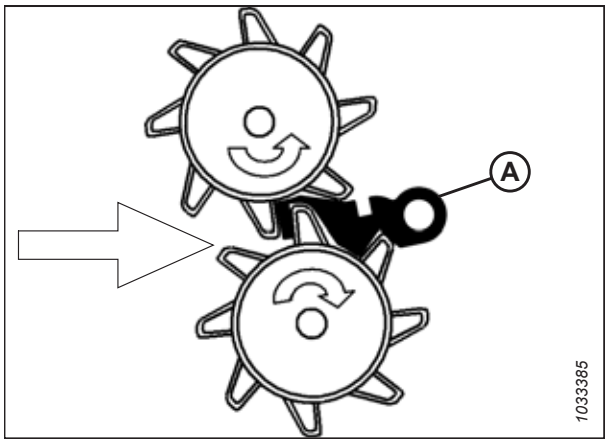


Figure 4.30: Roll Timing Tool

4.9.4 Adjusting Conditioner Roll Tension

The tension on the conditioner roll is maintained by two tension springs. The tension springs also allow the rolls to open to allow small solid objects to pass through the rolls without damaging them.

DANGER

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

1. Lower the header to the ground.
2. Shut down the engine, and remove the key from the ignition.

3. Locate adjustment nuts (B) on top of the conditioner channel.
4. Loosen jam nuts (A).
5. Turn adjusting nut (B) clockwise to increase the tension on the rolls, and counterclockwise to decrease the tension.
6. Adjust nuts (B) on both sides of the conditioner by equal amounts.
7. Tighten jam nuts (A).

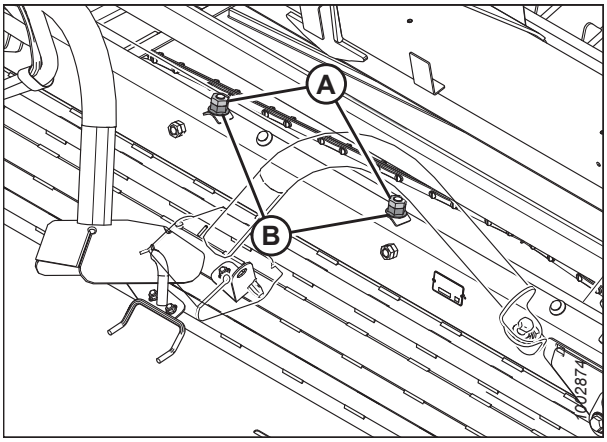


Figure 4.31: Conditioner Channel

4.9.5 Forming Shields

The position of the forming shields determines the width and placement of the windrow.

Position the forming shields according to the following factors:

- Weather conditions (precipitation, cloud cover, humidity, wind)
- Type and volume of crop
- Drying time available
- Method of processing (bales, silage, green-feed)

A wider windrow will generally dry faster and more evenly, which preserves the feed value of the hay. Fast drying is especially important in areas where the weather allows only a few days to cut and bale hay.

Where weather conditions permit, or when drying is not critical (for example, when cutting silage or green-feed), a narrower windrow may be preferred for ease of pick-up.

Adjusting Forming Shield Height

The height of the forming shield affects the shape and consistency of the windrow. A heavy crop requires the forming shield to be set near the highest position; a lighter crop requires that the forming shield be set to a lower position.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.

2. Remove hairpins (A) securing straps (B) to the pins on the windrower frame.
3. Support the aft end of the forming shield. Adjust the shield height using the holes in the straps.
4. Secure the straps with the hairpins.

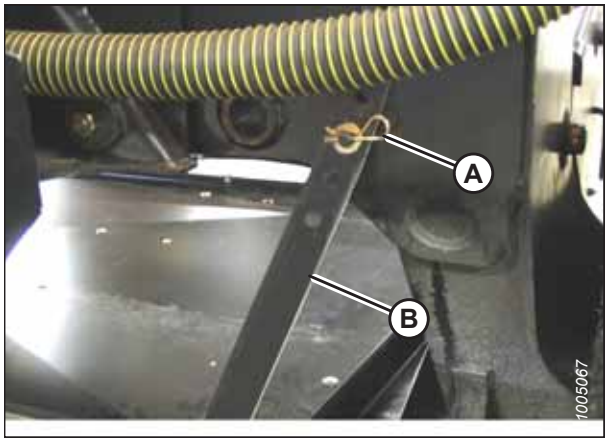


Figure 4.32: Forming Shield Strap at Wheel Leg

Adjusting Side Deflectors

The position of the hay conditioner's side deflectors affects the width and placement of the windrow.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Set side deflectors (A) to the desired width by loosening handle (B) and moving deflector (A). Tighten the handle. Repeat this step on the opposite side of the hay conditioner. Set both deflectors to approximately the same position.

   IMPORTANT:

   To ensure that the windrow placement is centered with respect to the windrower's wheels, adjust both side deflectors to the same position. That is, the adjuster handles must be in the same location on both sides of the hay conditioner.
3. If the side deflector attachment is too tight or too loose, tighten or loosen nut (C) as needed.

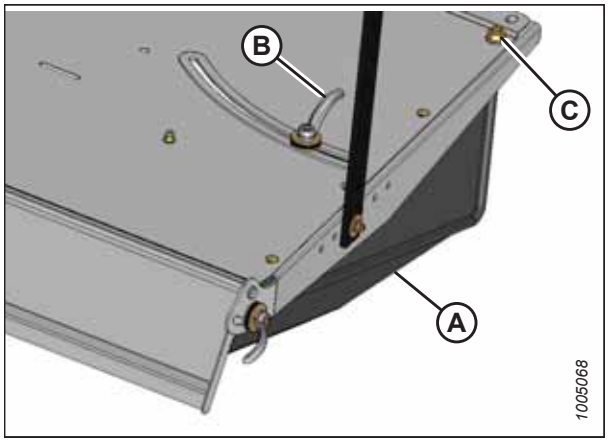


Figure 4.33: Side Deflector – Right

Adjusting Rear Deflector

The rear deflector, also known as the fluffer shield, slows the crop as it exits the conditioner rolls, directs the flow downward, and fluffs the material.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.

2. **For lighter crops:** Lower rear deflector (A) by pushing on one side of the deflector and then on the other side. Locking bolts (B) are located at both ends of the deflector and may need to be be loosened slightly.

3. **For heavier crops:** Raise the deflector by pulling up on one side of the deflector and then on the other side.

   NOTE:

   For even windrow formation, ensure that the deflector is not twisted.

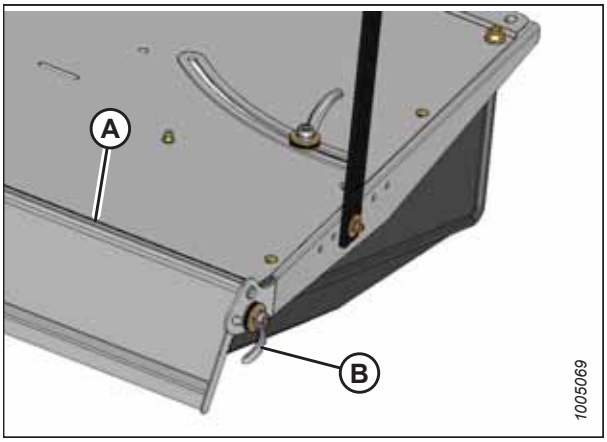


Figure 4.34: Rear Deflector

Adjusting Deflector Fins

The deflector fins on the hay conditioner can be adjusted to change the width of the windrow and the distribution of crop across the windrow.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.

2. The positions of short fins (A) can be adjusted by loosening the mounting bolts and rotating the fins as needed. Long fins (B) can be adjusted using the slots in the cover.

3. To create a wide windrow, set the fins so that they are approximately parallel to the side deflectors; adjust the fins as needed to ensure an even distribution of crop across the windrow. To create a narrow windrow (less than 1780 mm [70 in.] in width), remove the deflector fins.

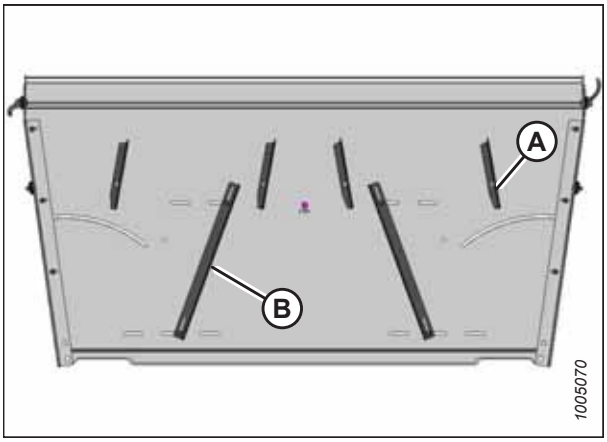


Figure 4.35: Deflector Fins

4.9.6 Unplugging Conditioner

If the hay conditioner becomes plugged with crop material, it will need to be unplugged.

To unplug the conditioner, reverse the header drive. For instructions, refer to the windrower operator's manual.

4.10 Storing Hay Conditioner

Performing maintenance at the end of each operating season ensures that the hay conditioner is ready for the next operating season.

WARNING

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

- Clean the hay conditioner thoroughly.
- Inspect the hay conditioner for worn or broken components. Order replacement parts as needed from your Dealer.
- Replace or tighten any missing or loose hardware. For more information, refer to *6 Repair Parts, page 111*.
- Repaint all worn or chipped painted surfaces to prevent rust.
- Lubricate the conditioner thoroughly; leave excess grease on the grease fittings. Apply grease to the exposed threads of fasteners and to the sliding surfaces of components.
- Loosen the drive belt.
- Store the hay conditioner in a dry, protected place if possible. If the hay conditioner will be stored outside, cover the conditioner with a waterproof canvas or other protective material.

4.11 Transporting Forming Shield

The forming shield can be transported using the center-link mounting support on the M1 or M2 Series Windrower.

DANGER

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

DANGER

Never start or move the machine until you are sure all bystanders have cleared the area.

1. Park windrower on a level surface. Stop the engine, and remove the key from the ignition.
2. Engage the header safety props.
3. Position forming shield (B) under the windrower.
4. Lift forming shield to latch center handle (A) to shield transport support (C) on the windrower frame.

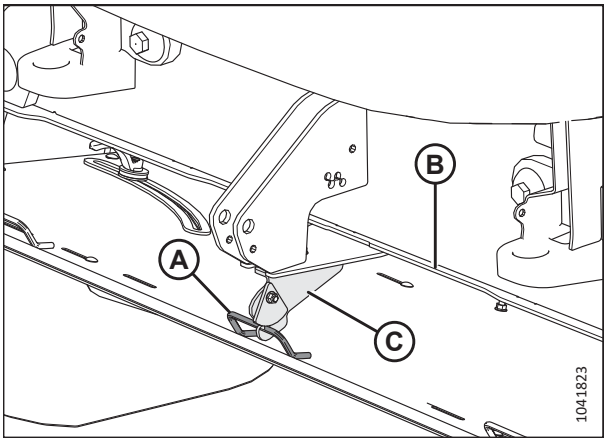


Figure 4.36: Forming Shield and Windrower

Chapter 5: Maintenance and Servicing

This chapter contains the information necessary to perform routine maintenance and occasional servicing tasks on your machine. The word “maintenance” refers to scheduled tasks that help your machine operate safely and effectively; “service” refers to tasks that must be performed when a part needs to be repaired or replaced. For advanced service procedures, contact your Dealer.

5.1 Preparing Hay Conditioner for Servicing

Before the hay conditioner can be serviced, a few preliminary tasks must be completed.

DANGER

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

1. Fully lower the header.
2. Wait for all moving parts to stop.
3. Engage the windrower’s parking brake.
4. Shut down the engine, and remove the key from the ignition.
5. Engage the safety props if the header is in the raised position.

5.2 Maintenance Schedule

The maintenance program is organized according to the hay conditioner's operating hours. This system depends on keeping accurate operating logs.

The maintenance schedule specifies the recommended periodic maintenance procedures and service intervals. Regular maintenance is the best insurance against early wear and untimely breakdowns. Follow this schedule to maximize the service life of the hay conditioner. For detailed instructions, refer to the specific headings in this manual. Use the lubricant specified in *5.5.1 Lubricants, page 96*.

Service intervals: The recommended service intervals are specified in terms of hay conditioner hours of operation. Where a service interval is given in more than one time frame, for example, 100 hours or annually, service the machine at whichever interval is reached first.

IMPORTANT:

The recommended service intervals are based on typical operating conditions. Service the machine more often if it is being operated under adverse conditions (for example: severe dust, handling extra-heavy loads).

CAUTION

Carefully follow all of the safety messages provided in *5.1 Preparing Hay Conditioner for Servicing, page 91* and *5.3 Recommended Safety Procedures, page 94*.

Table 5.1 Service Intervals

Interval	Service
First use	Perform the break-in procedures. For instructions, refer to *4.6 Break-in Period, page 79*.
10 hours or daily	Check the hydraulic hoses and lines.
50 hours	Grease the roll shaft bearings. Grease the feed deck drive and the idler roller bearings.
100 hours or annually[4]	Check the tension on the roll drive belt.
End of season	Perform the end-of-season maintenance. For instructions, refer to *4.10 Storing Hay Conditioner, page 88*.

4. It is recommended that annual maintenance be done prior to the start of the operating season.

Table 5.2 Maintenance Record

	Action:	✓ – Check										♦ – Lubricate										
	Hour meter reading																					
	Date																					
	Serviced by																					
	First use	Refer to *4.6 Break-in Period, page 79* for checklist.																				
	10 hours or daily																					
✓	Inspect the hydraulic hoses and lines	**NOTE:** A record of daily maintenance is not normally required; it is maintained at the Owner/Operator's discretion.																				
	50 hours																					
♦	Grease the roll shaft bearings																					
♦	Grease the feed deck roller bearings																					
	100 hours or annually																					
✓	Check the tension on the roll drive belt																					

5.3 Recommended Safety Procedures

The hay conditioner must be serviced safely.

Follow these recommended safety procedures to service the hay conditioner:

- Park the windrower on a level surface, if possible. If the windrower is parked on an incline, block the wheels.
- Follow all of the recommendations in the header and windrower operator's manuals.
- Follow all of the safety procedures in this manual. For more information, refer to *1 Safety, page 1*.

5.4 Removing and Installing Driveshields

Driveshields protect bystanders from fast-moving parts. They may need to be removed so that the hay conditioner can be serviced.

CAUTION

- **Keep all driveshields in place when the hay conditioner is operating. Never alter or remove safety equipment.**
- **Do NOT operate the machine when the driveshield has been removed.**

1. To remove the driveshield, undo wing nut (B) and remove the washer. Remove driveshield (A).
2. To install the driveshield, position driveshield (A) over the drive pulleys. Secure the driveshield with washer and wing nut (B).

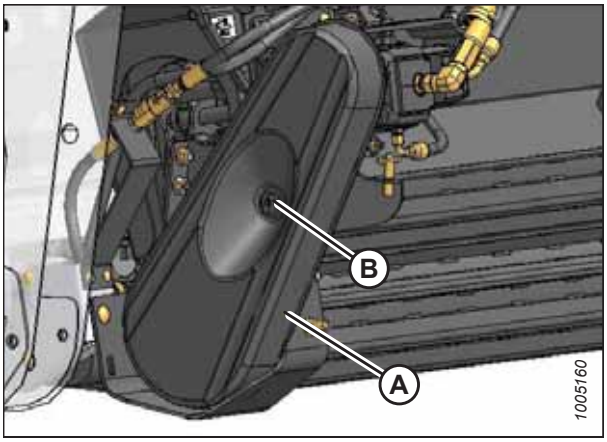


Figure 5.1: Driveshield

5.5 Lubrication

Certain components on the hay conditioner require regular lubrication.

5.5.1 Lubricants

Only specified lubricants can be used to lubricate the hay conditioner.

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

Refer to the table below for information on the type of lubricant to use to lubricate the hay conditioner:

Table 5.3 Recommended Lubricants for Hay Conditioner

Lubricant	Spec.	Description	Use
Grease	SAE multi-purpose	High temperature, extreme pressure (EP) 0–1% max; molybdenum disulphide (NLGI Grade 2) lithium complex, base oil viscosity of 190–250 CST @ 40°C	As needed, unless the procedure provides different instructions.

5.5.2 Greasing Procedure

Following the recommended greasing intervals and procedures will help extend the performance of bearings.

1. Prepare the hay conditioner for service. For instructions, refer to *5.1 Preparing Hay Conditioner for Servicing, page 91*.
2. Add grease to the fitting. To add grease to a fitting, follow this procedure:
   a. Wipe the grease fitting with a clean cloth.
   b. Inject grease through the fitting with grease gun until grease overflows the fitting. For information on the recommended lubricant, refer to *5.5 Lubrication, page 96*. Leave a blob of excess grease on the fitting.
   c. If the fitting will not accept grease, then tighten, clean, or replace the fitting as needed. For parts information, refer to *6 Repair Parts, page 111*.

5.5.3 Greasing Points

Greasing points that have greasing intervals of 50 hours or less are marked on the machine by decals showing a grease gun.

Greasing points that have greasing intervals of 50 hours or less are marked on the machine by decals showing a grease gun (A) and grease interval (B) in hours of operation.

Log hours of operation and use the Maintenance Checklist provided to keep a record of the maintenance performed. Refer to *5.2 Maintenance Schedule, page 92*.

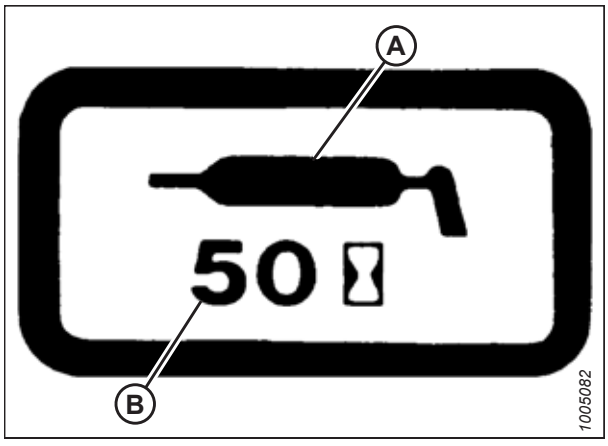


Figure 5.2: Grease Decal – 50 Hours

The following points on the hay conditioner require regular lubrication:

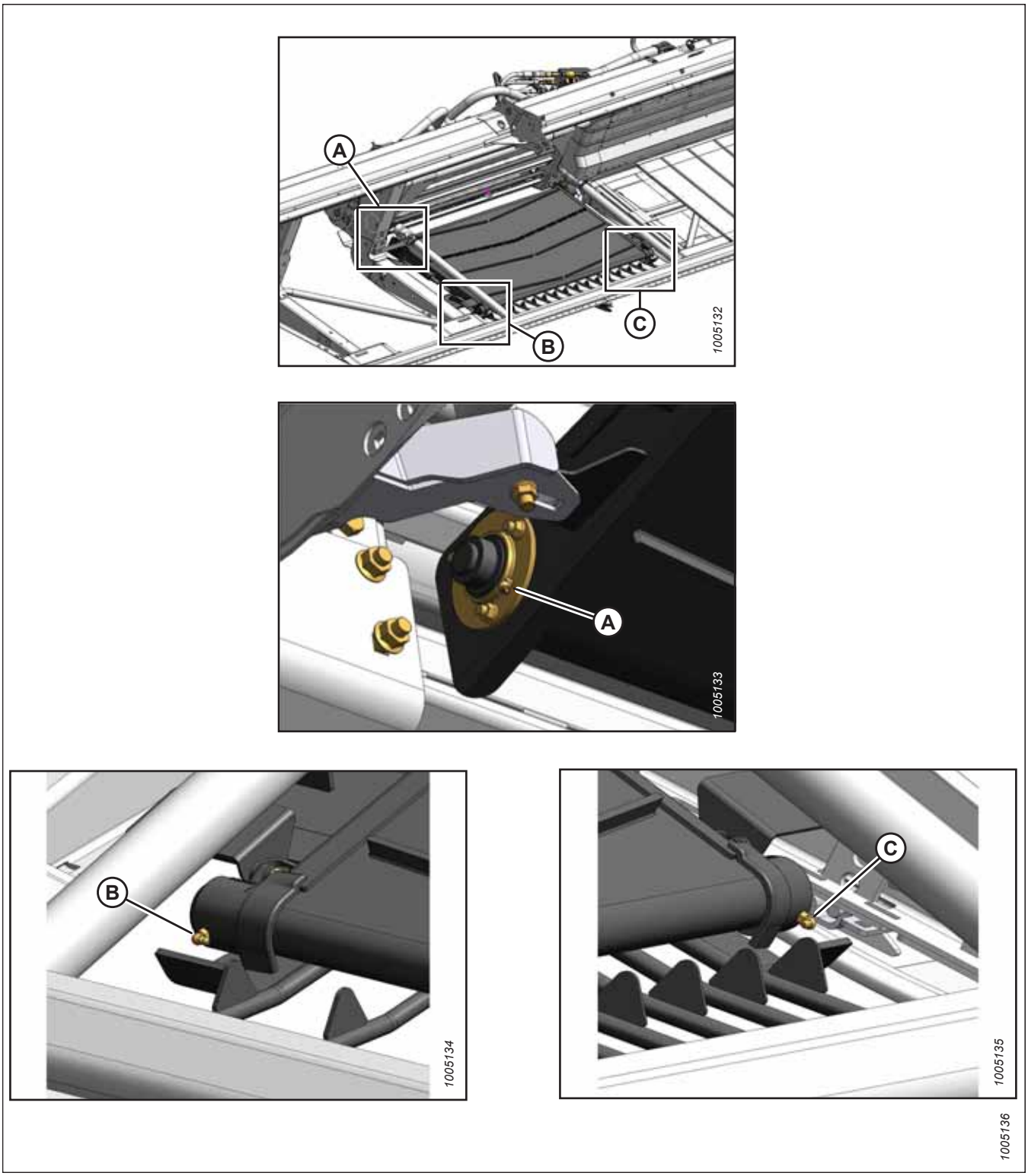


Figure 5.3: Lubrication Points

A - Drive Roller Bearing Lubrication Point **B - Idler Roller Bearing Lubrication Point** **C - Idler Roller Bearing Lubrication Point**

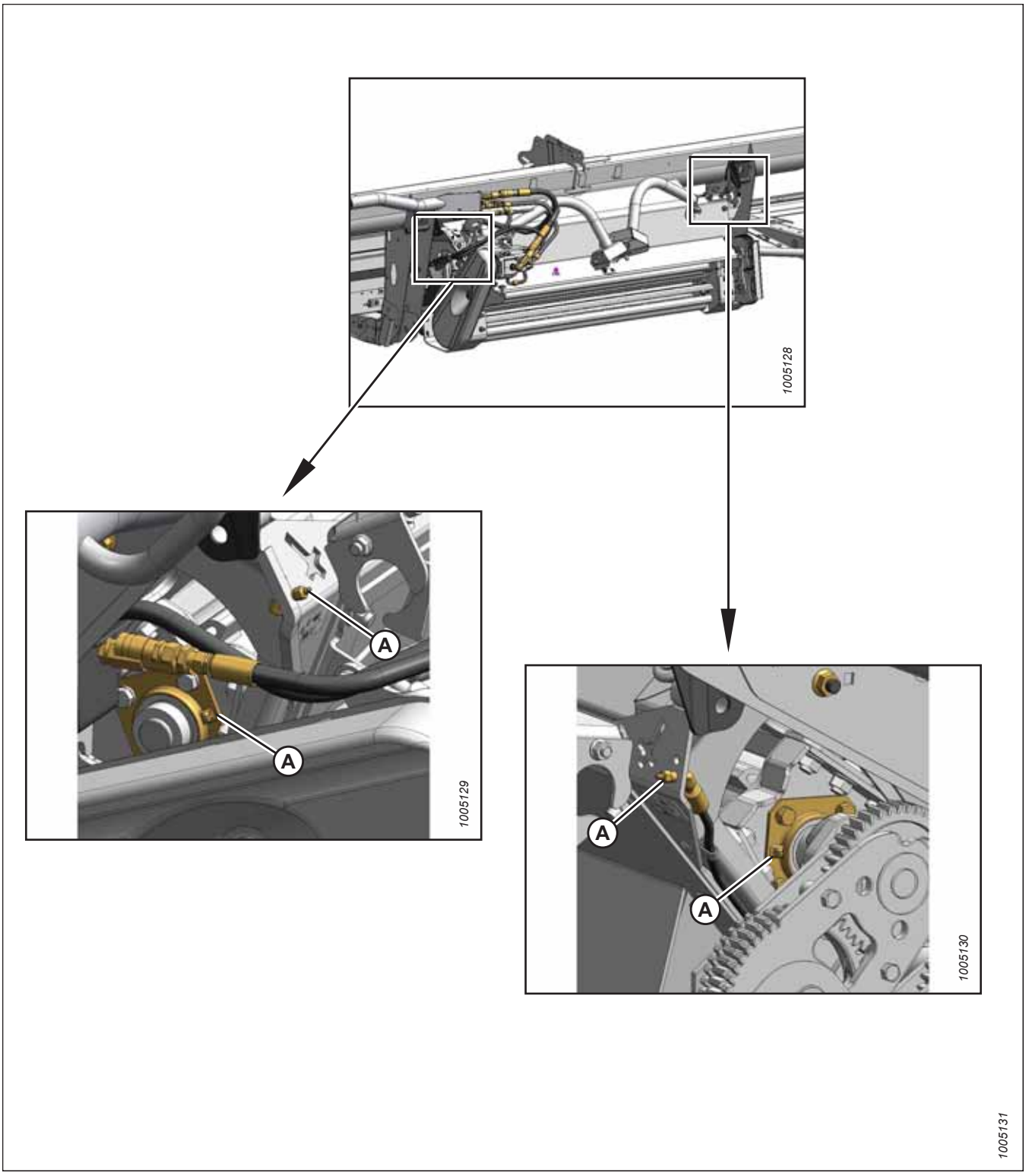


Figure 5.4: Lubrication Points

A - Roll Shaft Bearing Lubrication Points (Four Places)

5.6 Hydraulic System

Refer to this chapter for information on the hay conditioner's hydraulic system.

5.6.1 Hydraulic Hoses and Lines

Hydraulic hoses and lines should be inspected regularly for leaks.

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 the pressure in the hydraulic system before disconnecting any hydraulic lines. Tighten all of the connections before pressurizing the hydraulic system.**
- **Keep away from pin holes and nozzles in hydraulic lines; these can eject high-pressure fluids, which can penetrate the skin.**
- **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.**

Figure 5.5: Hydraulic Pressure Hazard

IMPORTANT:

Keep hydraulic coupler tips and connectors clean. Dust, dirt, water, and foreign material are the major causes of hydraulic system damage. The hydraulic system's components are manufactured with a great degree of precision, and have been assembled in sanitary conditions at the factory. Do **NOT** attempt to service these components in the field.

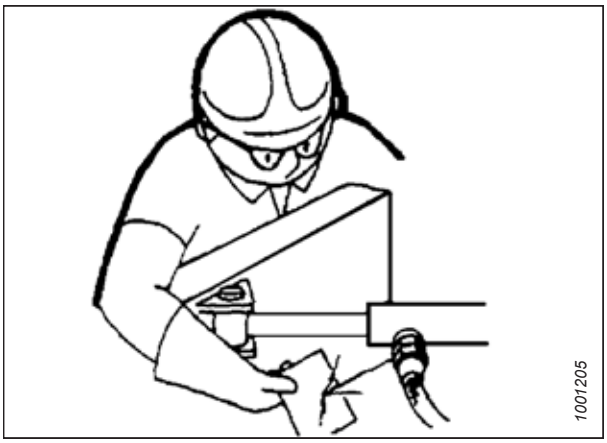


Figure 5.6: Safety Equipment

5.6.2 Hydraulic Schematics

Schematics which show the hydraulic connections between the hay conditioner and the header are provided.

For detailed hydraulic schematics, refer to *8.1 Hydraulic Schematics, page 149*

5.7 Feed Draper

The feed draper delivers cut crop to the conditioner rolls.

5.7.1 Checking and Adjusting Feed Draper Tension

In order for the draper to operate correctly, it must be tensioned properly. Inspect the tension on the draper and if necessary, adjust it.

DANGER

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

DANGER

Ensure that all bystanders have cleared the area.

NOTE:

The illustrations in this procedure show the left side of the header; the right side of the header is similar.

1. Start the engine.
2. Raise the header fully.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the header safety props. For instructions, refer to the windrower operator's manual.

Checking the feed draper tension

5. Ensure that the draper guide (the rubber track on the underside of the draper) is properly engaged in the groove on the drive roller and that the idler roller is between the guides.
6. Check the position of spring retainer disc (A). If the feed draper tracks properly and the spring retainers on both sides of the draper are correctly positioned, then no adjustment is necessary.

   NOTE:

   The starting position of spring retainer disc (A) is centered within the U shape on indicator (B); however, the position of disc (A) will vary after the draper tracking is adjusted.
7. If adjustment is necessary, proceed to Step *8, page 101*.

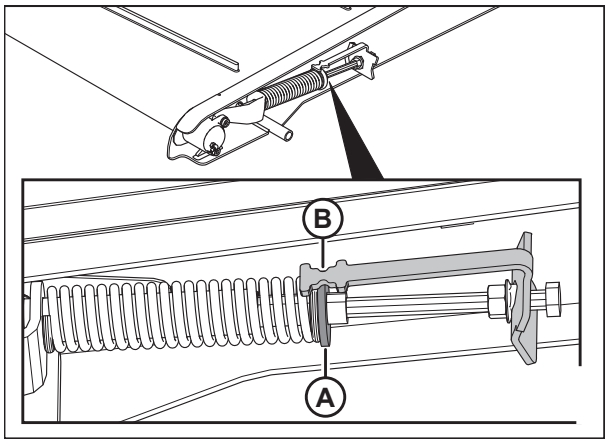


Figure 5.7: Feed Draper Tensioner

Adjusting the feed draper tension

8. Adjust the draper tension by loosening jam nut (A) and turning bolt (B) clockwise to increase the tension on the draper (or counterclockwise to decrease the tension on the draper). Retainer disc (C) should be in the middle of indicator (D).

   IMPORTANT:

   For small tension adjustments, only one side of the draper needs to be adjusted. To prevent uneven draper tracking for larger tension adjustments, both sides of the draper will need to be adjusted.

9. If the draper is not tracking properly, adjust retainer disc (C) so that it is **NOT** in the middle of indicator (D), but within the following range:

   - When loosened to 3 mm (1/8 in.), retainer disc (C) will move toward the front of the deck from center of indicator (D).
   - When tightened to 6 mm (1/4 in.), retainer disc (C) will move toward the back of the deck from the center of indicator (D).

10. Tighten jam nut (A). Ensure that flange nut (E) is tight against the indicator bracket.

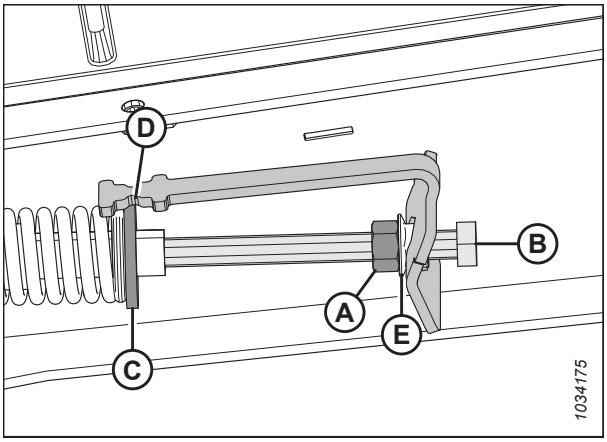


Figure 5.8: Feed Draper Tensioner – Left Side

5.8 Drive Belt

The hay conditioner's drive belt transfers rotational force from the motor to the gears and roll coupling assembly.

5.8.1 Adjusting Drive Belt Tension

The tension on the hay conditioner's drive belt may need to be inspected and adjusted from time to time.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Engage the header safety props. For instructions, refer to the windrower operator's manual.
3. Remove wing nut and washer (A). Remove drive belt cover (B).

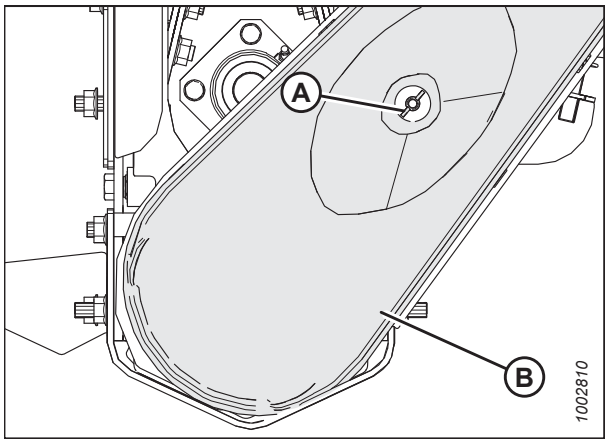


Figure 5.9: Drive Belt Cover

Adjusting drive belt tension

4. Ensure that belt (A) deflects 8 mm (5/16 in.) when a force of 22–49 N (5–11 lbf) is applied at the center of the span. If the belt deflects by a greater or lesser amount, the tension on the belt requires adjustment.

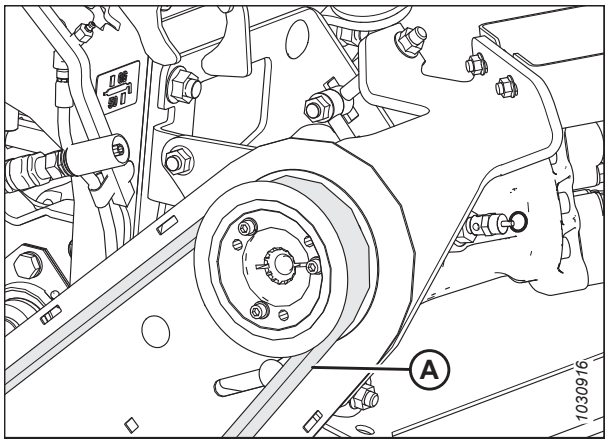


Figure 5.10: Drive Pulley – Conditioner Drive Motor

5. Loosen three motor mount nuts (A).
6. Turn tensioning nut (B) clockwise to tighten the belt, or counterclockwise to loosen it.
7. Tighten three motor mount nuts (A).
8. Measure the tension on belt (C). Continue adjusting the tension as needed.
9. If the drive pulley is loose, was removed, or was replaced, tighten three bolts (D).

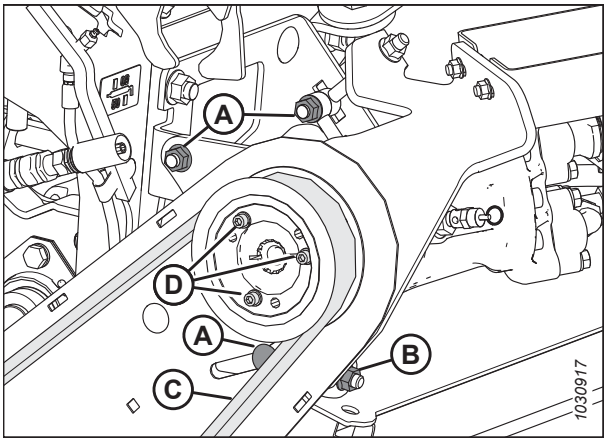


Figure 5.11: Drive Pulley – Conditioner Drive Motor

10. Reinstall cover (B). Secure the cover with washer and wing nut (A).
11. **Newly installed belts**: check the tension on the belt again after a short run-in period (about 5 operating hours).

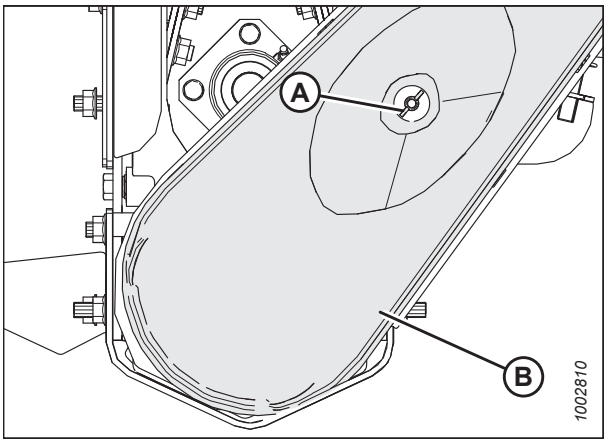


Figure 5.12: Drive Belt Cover

5.8.2 Adjusting Drive Belt Pulley Alignment

The hay conditioner's drive and driven pulleys must be aligned for the drive belt to track correctly.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Engage the header safety props. For instructions, refer to the windrower operator's manual.

3. Remove wing nut and washer (A). Remove drive cover (B).

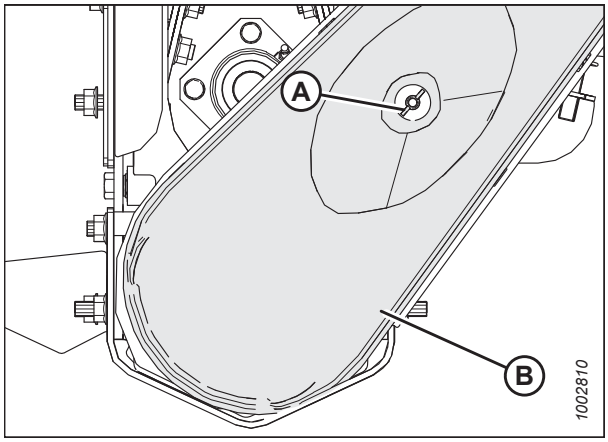


Figure 5.13: Drive Belt Cover

4. Loosen nut (A).
5. Adjust nuts (B) to align the drive pulley horizontally.
6. Adjust nuts (C) to align the drive pulley vertically.
7. If the drive pulley is loose, was removed, or was replaced, tighten three bolts (D).
8. Tighten nut (A).

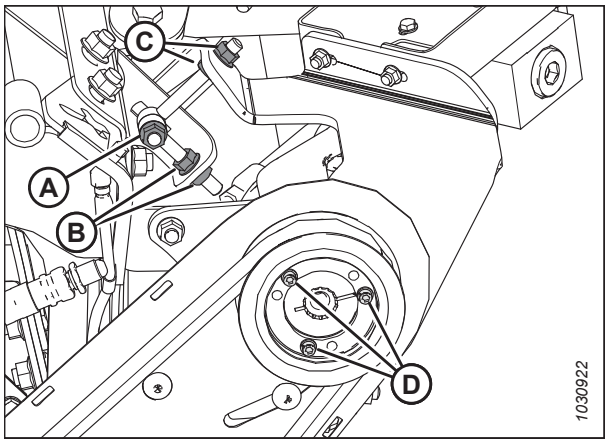


Figure 5.14: Drive Pulley – Conditioner Drive Motor

9. Replace cover (B). Secure the cover with washer and wing nut (A).

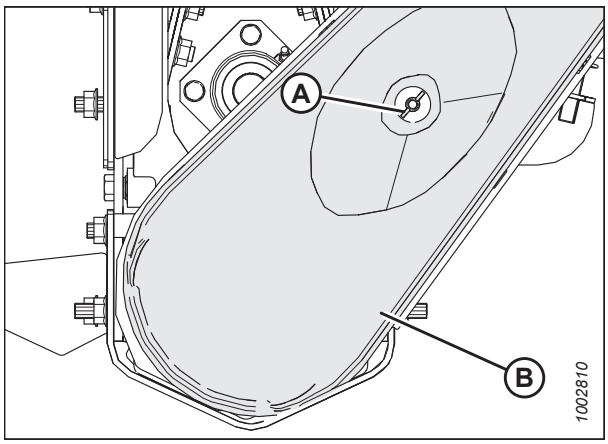


Figure 5.15: Drive Belt Cover

5.8.3 Checking and Adjusting Drive Belt Tracking

Proper tracking of the belt ensures there is no rubbing of the belt on either pulley.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Engage the header safety props. For instructions, refer to the windrower operator's manual.
3. Remove wing nut and washer (A). Remove drive belt cover (B).

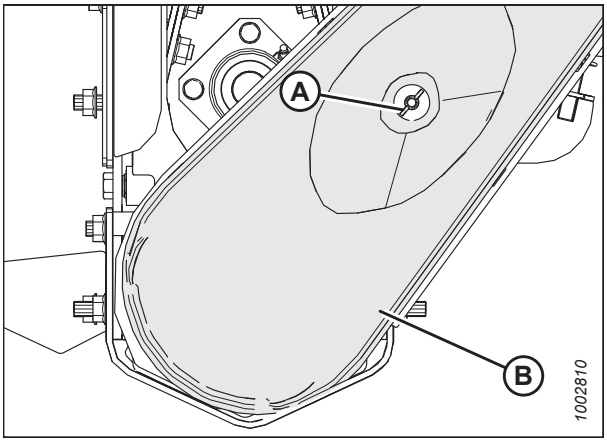


Figure 5.16: Drive Belt Cover

Checking and Adjusting drive belt tracking

4. Inspect belt and both pulleys (A) for evidence of the belt rubbing.

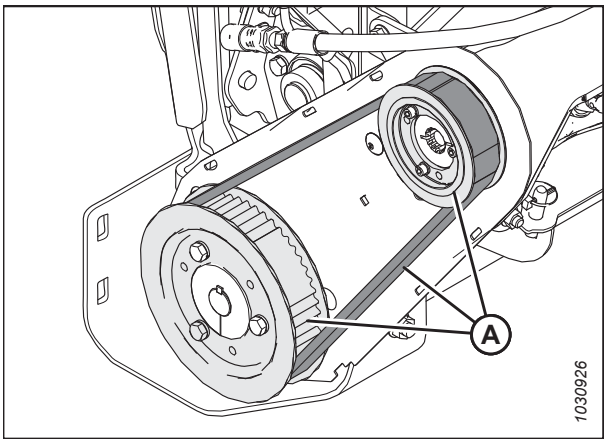


Figure 5.17: Drive Belt and Pulleys – Conditioner Drive Motor

5. Place straight edge (A) across the face of the driving and driven pulleys. Ensure that the pulleys are aligned.

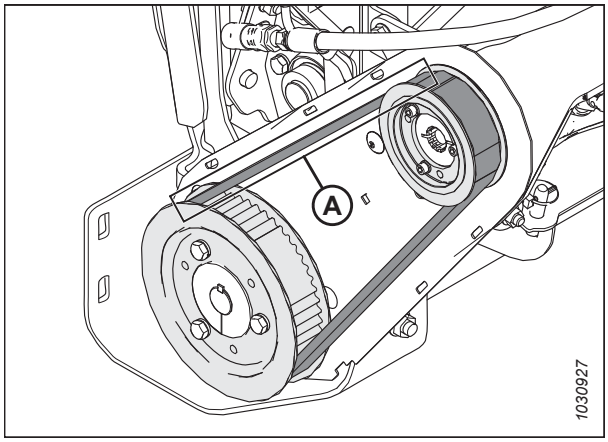


Figure 5.18: Drive Belt and Pulleys – Conditioner Drive Motor

6. Adjust the drive pulley by loosening nut (A).
7. Adjust nuts (B) to align the drive pulley horizontally. If the belt is tracking to the outside of the pulley, turn jam nuts (B) clockwise.
8. Adjust nuts (C) to align the drive pulley vertically. If the belt tracks to the inside of the pulley, turn jam nuts (C) counterclockwise.
9. If the drive pulley is loose, was removed, or was replaced, tighten three bolts (D).
10. Tighten nut (A).

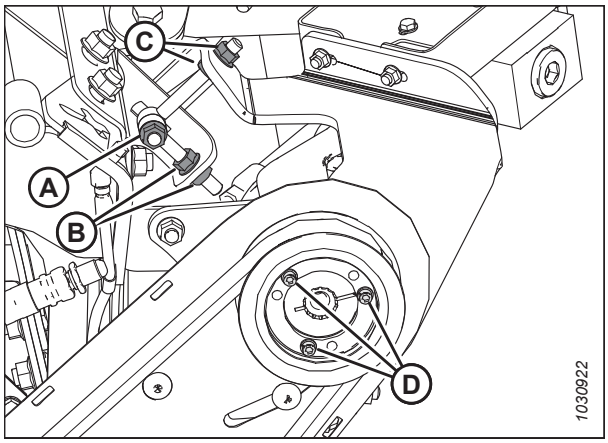


Figure 5.19: Drive Pulley – Conditioner Drive Motor

11. Operate the hay conditioner to verify the belt is tracking correctly. If the belt is not tracking correctly, repeat this procedure as needed.
12. Reinstall cover (B). Secure the cover with washer and wing nut (A).

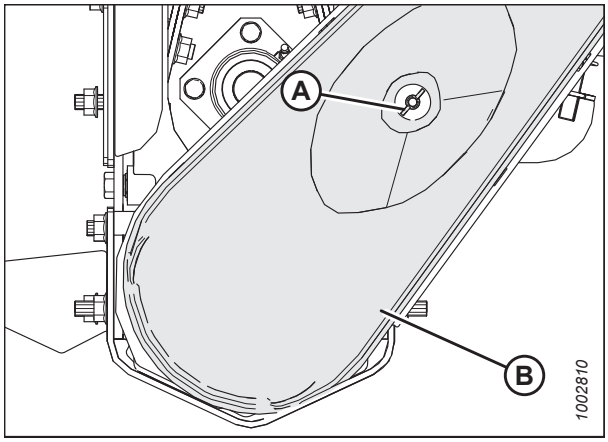


Figure 5.20: Drive Belt Cover

5.8.4 Removing Drive Belt

The drive belt may need to be removed from the hay conditioner for replacement, or to access other components.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Engage the header safety props. For instructions, refer to the windrower operator's manual.
3. On the left side of the conditioner, remove wing nut and washer (A). Remove drive belt cover (B).

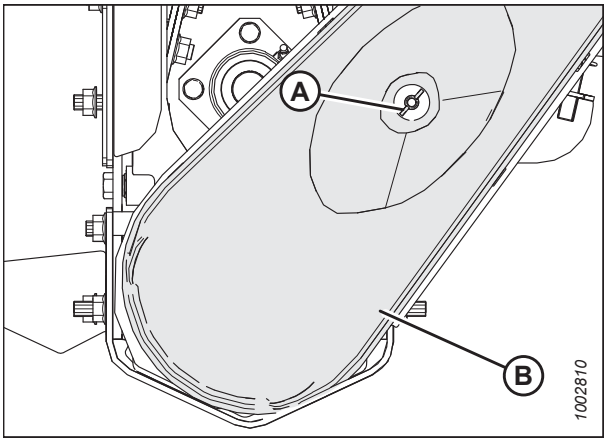


Figure 5.21: Drive Belt Cover

4. Turn tensioning nut (A) counterclockwise.
5. Remove belt (B).
6. If the drive pulley is loose, was removed, or was replaced for any reason, tighten three bolts (C).

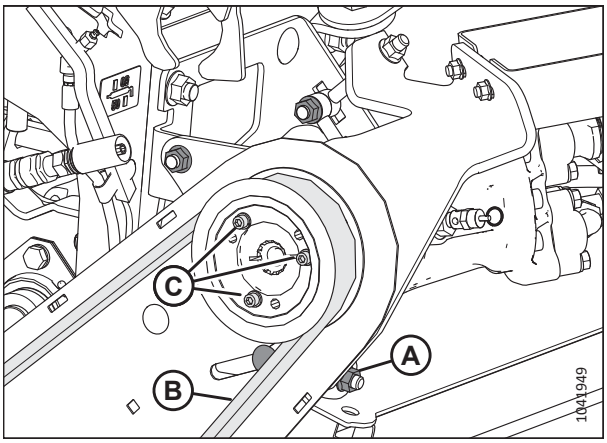


Figure 5.22: Drive Pulley – Conditioner Drive Motor

5.8.5 Installing Drive Belt

The drive belt connects the drive pulley to the roll coupling assembly.

DANGER

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

NOTE:

Before replacing the drive belt, determine the reason for the failure of the old belt. If the old belt failed due to abrasion damage, correct the drive belt tracking. For instructions, refer to *5.8.3 Checking and Adjusting Drive Belt Tracking, page 105* to check possible cause of failure.

1. Shut down the engine, and remove the key from the ignition.
2. Engage the header safety props. For instructions, refer to the windrower operator's manual.
3. Install belt (A) onto the pulleys.

   NOTE:

   Never force the belt onto the pulleys. Ensure that the tensioning device is fully loosened.

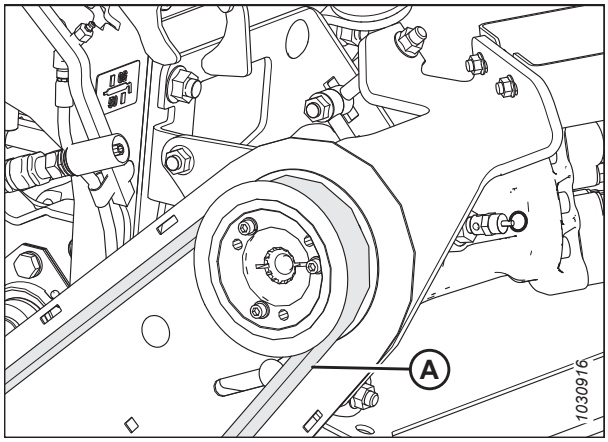


Figure 5.23: Drive Pulley – Conditioner Drive Motor

4. Loosen three motor mount nuts (A).
5. Turn tensioning nut (B) clockwise to tighten the belt, or counterclockwise to loosen it.
6. Tighten three motor mount nuts (A).
7. Measure the tension on belt (C). Continue adjusting the tension as needed.
8. If the drive pulley is loose, was removed, or was replaced, tighten three bolts (D).

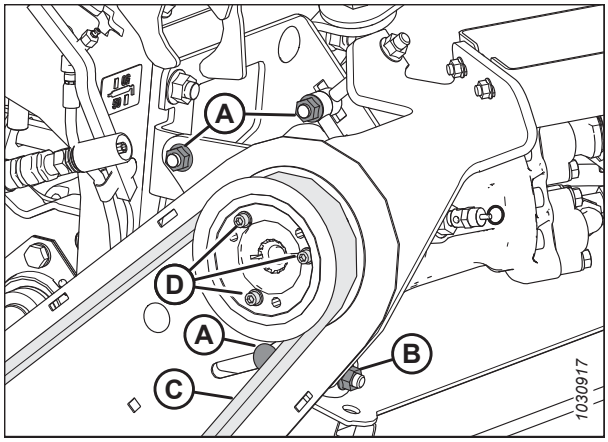


Figure 5.24: Drive Pulley – Conditioner Drive Motor

9. Reinstall cover (B). Secure the cover with washer and wing nut (A).

10. **Newly installed belts**: check the tension on the belt again after a short run-in period (about 5 operating hours).

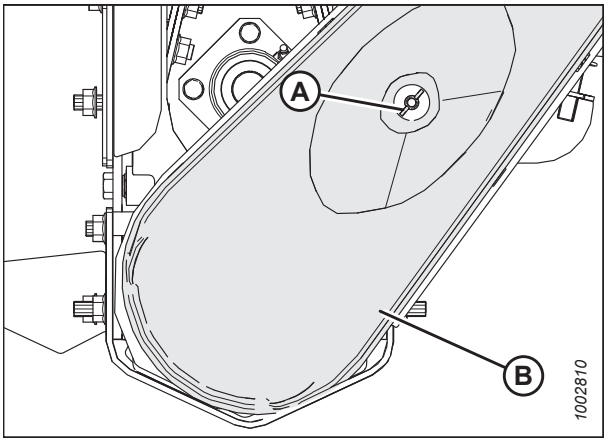


Figure 5.25: Drive Belt Cover

5.9 Troubleshooting

Refer to the table below for instructions on diagnosing and resolving any problems which arise while the hay conditioner is operating.

Problem	Solution	Section
Symptom: Hay conditioner rolls will not turn		
There is an obstruction in the conditioner rolls	Turn the mechanism in reverse to remove the obstruction	*4.9.6 Unplugging Conditioner, page 87*
Drive belt is broken	Replace the drive belt	*5.8.4 Removing Drive Belt, page 107* and *5.8.5 Installing Drive Belt, page 107*
Drive belt is too loose	Tighten or replace the conditioner drive belt	*5.8.4 Removing Drive Belt, page 107* and *5.8.5 Installing Drive Belt, page 107*
Symptom: Crop is over-conditioned		
Roll gap is too small	Increase the roll gap	*4.9.2 Roll Gap, page 82*
Roll timing is off	Adjust the roll timing	*4.9.3 Adjusting Roll Timing, page 83*
Symptom: Crop is under-conditioned		
Roll gap is too large	Reduce the roll gap	*4.9.2 Roll Gap, page 82*
Roll timing is off	Adjust the roll timing	*4.9.3 Adjusting Roll Timing, page 83*
Symptom: Windrow is too wide		
Forming shield side deflectors are too far apart	Position deflectors closer together	*Adjusting Side Deflectors, page 86*
Symptom: Windrow is too narrow		
Forming shield side deflectors are too close together	Position the deflectors farther apart	*Adjusting Side Deflectors, page 86*
Deflector fins inside the forming shield are improperly adjusted	Adjust the fins	*Adjusting Deflector Fins, page 87*
Symptom: Windrow is uneven		
Forming shield is too low	Raise the forming shield	*Adjusting Forming Shield Height, page 85*
Deflector fins inside the forming shield are improperly adjusted	Adjust the fins	*Adjusting Deflector Fins, page 87*
Overlap of side drapers and feed deck is inadequate	Adjust the overlap	*3.4 Installing Feed Draper Deck, page 23*
Symptom: Windrow lacks shape		
Forming shield is too high	Lower the forming shield	*Adjusting Forming Shield Height, page 85*
Deflector fins inside forming shield are improperly adjusted	Adjust the fins	*Adjusting Deflector Fins, page 87*
Symptom: Feed draper is not tracking properly		
Feed draper tensioners are improperly adjusted	Check the feed draper tension and adjust it as needed	*5.7.1 Checking and Adjusting Feed Draper Tension, page 100*
Symptom: Side draper is backfeeding		
Overlap of side drapers and feed deck is inadequate	Adjust the overlap	*3.4 Installing Feed Draper Deck, page 23*

Chapter 6: Repair Parts

Refer to this chapter for information on the replacement parts that can be ordered for a MacDon HC20 Hay Conditioner.

Bold text is used to indicate updates made at the current revision level. With each new revision of the manual, previously bolded text will appear in plain font again.

In this manual, right and left are determined from the operator's position, assuming that the Operator is facing forward while the windrower is in the cab-forward position. An arrow is sometimes used in illustrations to indicate the cab-forward front of the windrower.

6.1 Abbreviations

A/R – as required (quantity varies)	ASSY – assembly	BHRN – button head rib neck
BV – ball valve	CCW – counterclockwise	CON – conical (spring washer)
CSK – countersink	C/W – complete with	CW – clockwise
DBLE – double	DK – double knife	DR – double reel
DT – distorted thread	FLG – flange	GA – gauge
GR – grade	GS – grass seed	HD – head
HDR – header	HFA – hydraulic fore-aft	HH – hex head
HNBR – hydrogenated nitrile butadiene rubber	HYD – hydraulic	I.D. – inside diameter
IP – internal plus (torx plus)	KP – knife pressure	KR – knife return
LG – long	LH – left hand (determined from Operator's position, facing forward)	LK – lock
MACH – machine	MD – MacDon	MFA – manual fore-aft
MY – model year	NC – national coarse thread	NF – national fine thread
NSS – not sold separately	NT – narrow transport	O.D. – outside diameter
OPT – optional	PO – pilot operated	PT – pull-type (mower conditioner)
RC – roller chain	REF – reference, part number called up elsewhere in catalog	REG – regular
RH – right hand (determined from Operator's position, facing forward)	RHSN – round head, square neck or square neck carriage bolt	RHSSN – round head, short, square neck
RTD – rotating tine drum	SAE – Society of Automotive Engineers (part produced to comply with)	SD – side draper
SER – serrated	SK – single knife	SKT HD – socket head
SMTH – smooth	SMV – slow moving vehicle	SOCK – socket
SP – self-propelled (windrower) header	SPCL – special	SPH – spherical
SPI – serrations per inch (knife Sections)	SR – single reel	STL – steel (stainless)
STR – standard	STVR – Stover	TFL – thread full length
THD – thread	TR – triple reel	UCA – upper cross auger
UDK – untimed double knife	UNC – unified coarse thread	UNEF – unified extra fine thread
UNF – unified fine thread	UNS – unified special thread series	VK – veritcal knife
WF – wide frame	ZP – zinc plated	

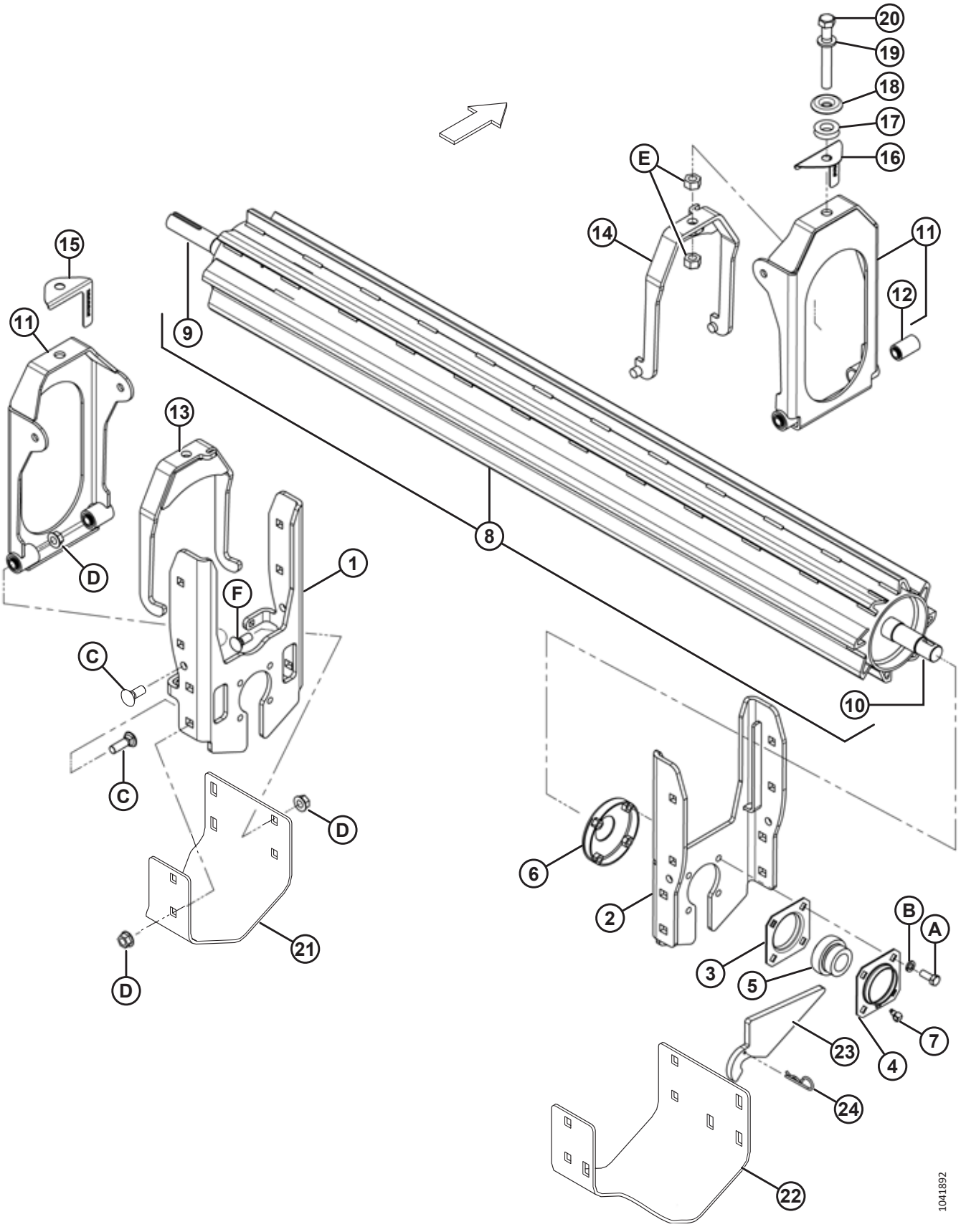
6.2 Serial Number Breaks

The side of the serial number on which the dash (–) appears determines whether the part is used "up to" or "after" the serial number given.

Example:

- –451189 Used on machines up to and including serial number 451189
- 451190– Used on machines including and after serial number 451190

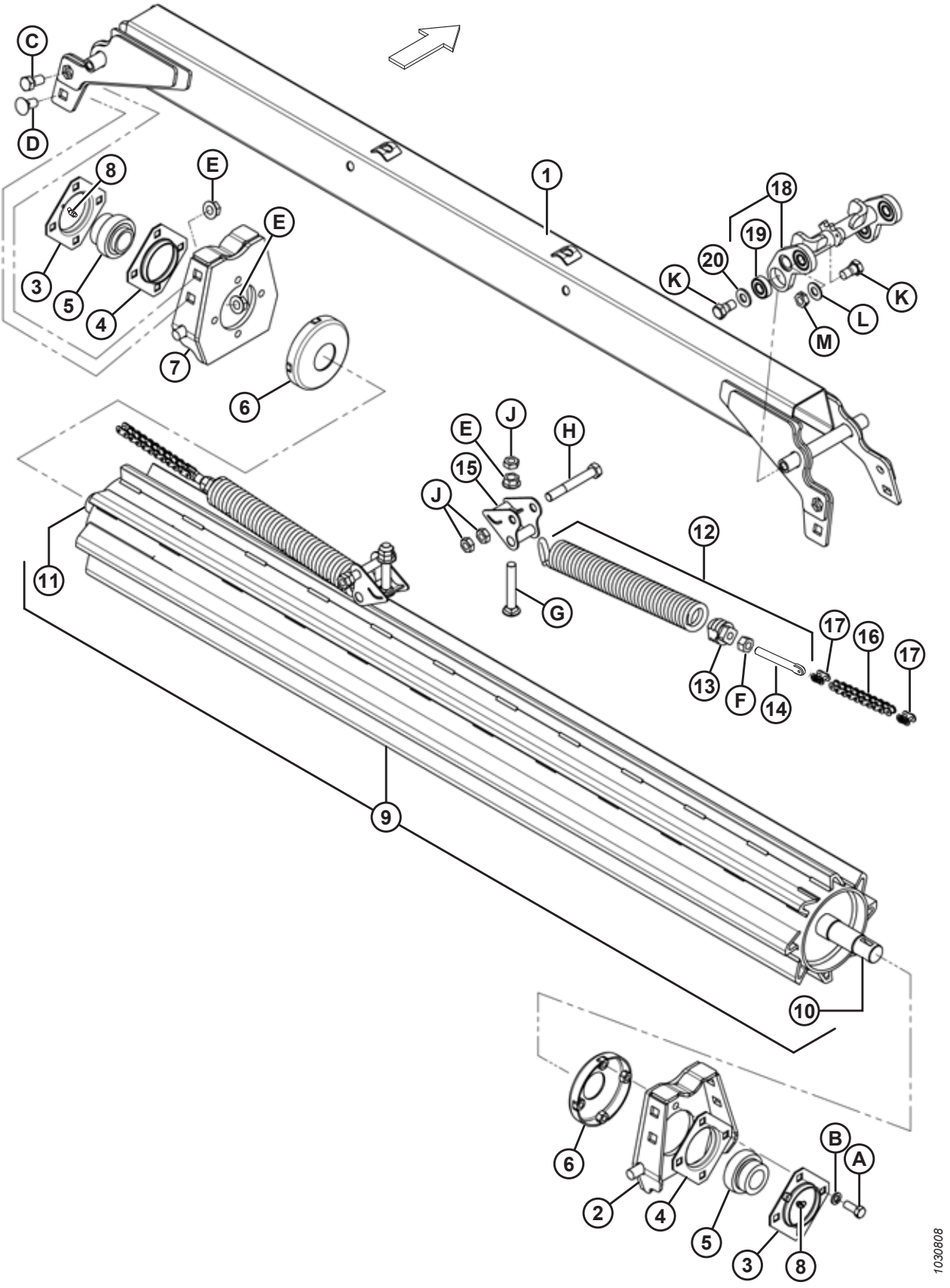
6.3 Lower Roll and Frame Assembly



Ref	Part Number	Description	Qty	Serial Number
1	159117	SUPPORT – LH	1	
2	159118	FRAME – RH LOWER WELDT	1	
3	30576	FLANGE	2	
4	50182	FLANGE	2	
5	30031	BEARING – SPH OD C/W COLLAR 1.5 IN BORE	2	
6	101173	DISC WELDT	2	
7	50187	FITTING – LUBE 90° ADAPTER [5]	2	
8	159750	ROLL – LOWER WELDT	1	
9	159749	SHAFT SPINDLE – LH LOWER ROLL (WELDED)	1	
10	159748	SHAFT SPINDLE – RH LOWER ROLL (WELDED)	1	
11	130476	CHANNEL – PIVOT C/W BUSHINGS	2	
12	13626	BUSHING – RUBBER	4	
13	130443	BRACKET – LH ADJUSTER WELDT	1	
14	130336	BRACKET – RH ADJUSTER WELDT	1	
15	130990	GAUGE – LH ROLL OPENING	1	
16	130994	GAUGE – RH ROLL OPENING	1	
17	47124	WASHER – RUBBER	2	
18	130532	WASHER – FORMED	2	
19	21540	WASHER – HARDENED	2	
20	135405	BOLT – HEXHD (MIN THD) 3/4 NC X 6.0 LG GR 5 ZP	2	
21	242466	SKID – LH CONDITIONER	1	
22	242456	SKID – RH CONDITIONER	1	
23	159352	SUPPORT	1	
24	13125	PIN – HAIR	1	
A	21491	BOLT – HEXHD 1/2 NC X 1.25 LG GR 5 ZP		
B	18638	WASHER – REG. LOCK 1/2 IN. NOM. I.D. ZP		
C	18523	BOLT – RHSN, 5/8 NC X 1.5 LG GR 5 ZP		
D	50225	NUT – FLANGE DT SMOOTH FACE .625-11 UNC		
E	18593	NUT – HEX 3/4-10 UNC GR 5 ZP		

5. Refer to Section *6.5 Cover and Supports, page 118* for information on the lubrication lines.

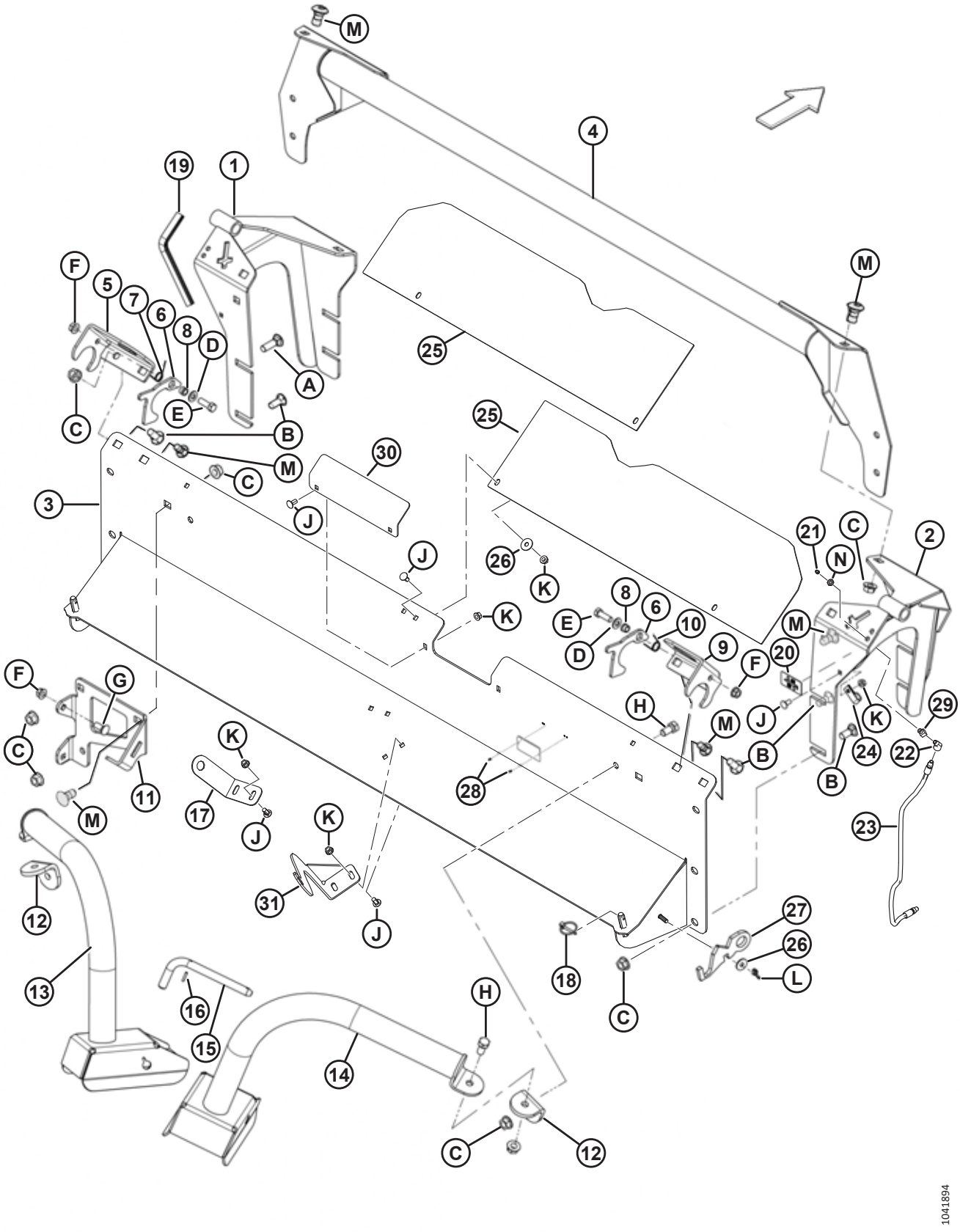
6.4 Upper Roll Assembly



Ref	Part Number	Description	Qty	Serial Number
1	130470	CHANNEL – CROSS WELDT	1	
2	130793	SUPPORT – RH WELDT	1	
3	50182	FLANGE	2	
4	30576	FLANGE	2	
5	30031	BEARING – SPH OD C/W COLLAR 1.5 IN. BORE	2	
6	101173	DISC WELDT	2	
7	130472	SUPPORT – LH WELDT	1	
8	21301	FITTING – LUBRICATION	2	
9	159751	ROLL – UPPER WELDMENT	1	
10	159748	SPINDLE – RH (WELDED)	1	
11	170332	SHAFT – STUB, LH (WELDED)	1	
12	159707	ASSEMBLY – SPRING [6]	2	
13	NSS	INSERT – MACHINED	2	
14	159706	STUD – THREADED	2	
15	130747	LEVER WELDT	2	
16	130645	CHAIN – #50 WO CONN (9 PITCHES)	2	
17	6634	LINK – CONNECTOR #50	4	
18	130450	TOGGLE ASSEMBLY C/W BEARINGS	2	
19	50185	BEARING – BALL CYL OD 17MM BORE	8	
20	30441	WASHER – HARDENED	4	
A	21491	BOLT – HEXHD 1/2 NC X 1.25 LG GR 5 ZP		
B	18638	WASHER – REG. LOCK 1/2 IN. NOM. I.D. ZP		
C	21585	BOLT – HEXHD 5/8 NC X 1.25 LG GR 5 ZP		
D	103562	BOLT – RHSN 5/8 NC X 1.25 GR 5 ZP		
E	50225	NUT – FLG DT SMTH FACE .625-11 UNC		
F	18592	NUT – HEX 5/8-11 UNC GR 5 ZP		
G	102658	BOLT – RHSN 5/8 NC X 4 TFL GR 5 ZP		
H	21720	BOLT – HEXHD 5/8 NC X 4.5 LG GR5 ZP		
J	21941	NUT – HEX LOCK JAM (DT) 5/8-11 UNC GR 5 ZP		
K	105141	BOLT – LOCKING SHOULDER		
L	18600	WASHER – SAE FLAT, 21/32 I.D. X 1-5/16 O.D. ZP		
M	105173	NUT – HEX JAM, CENTER LOCK		

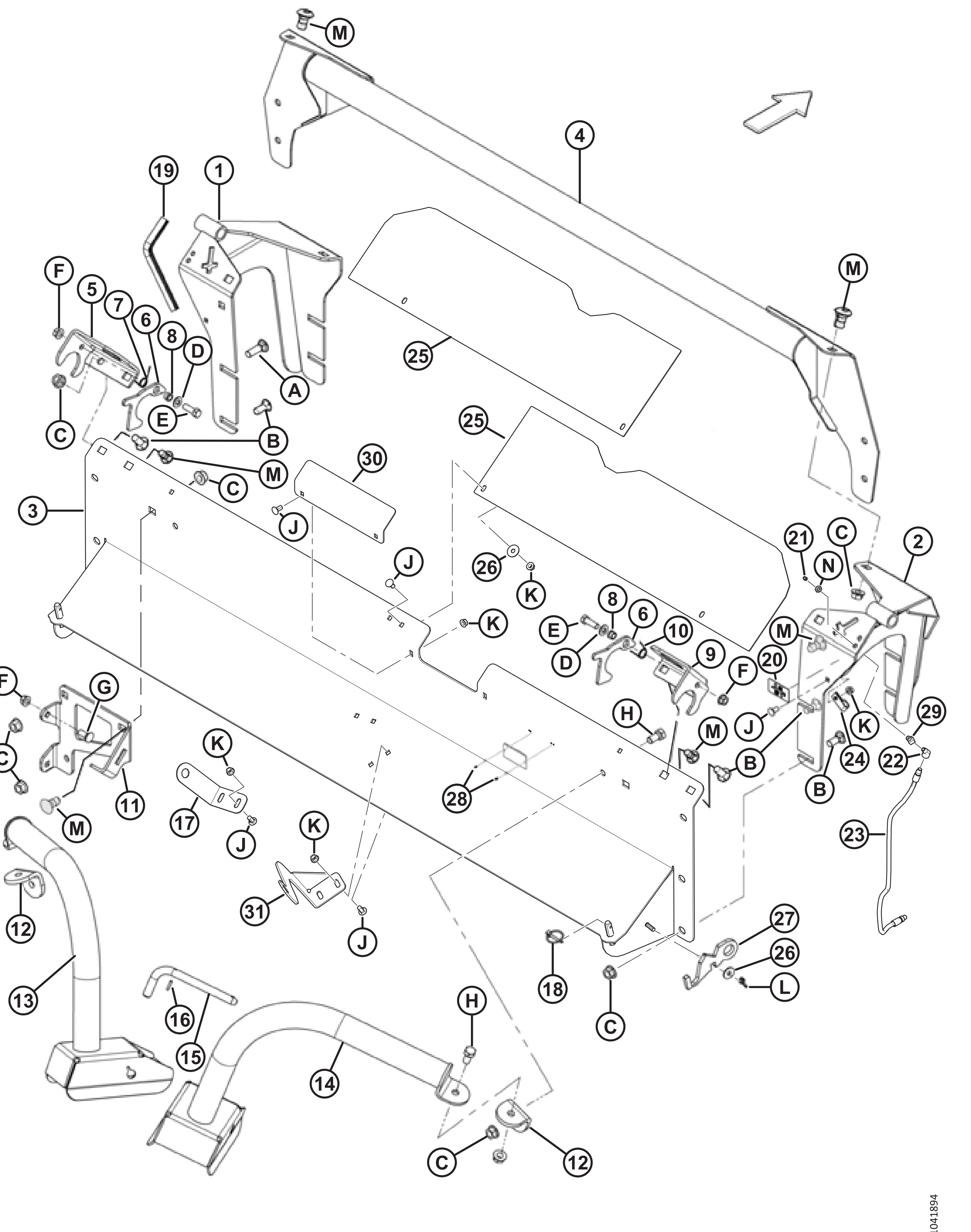
6. Includes spring and machined insert (NSS).

6.5 Cover and Supports



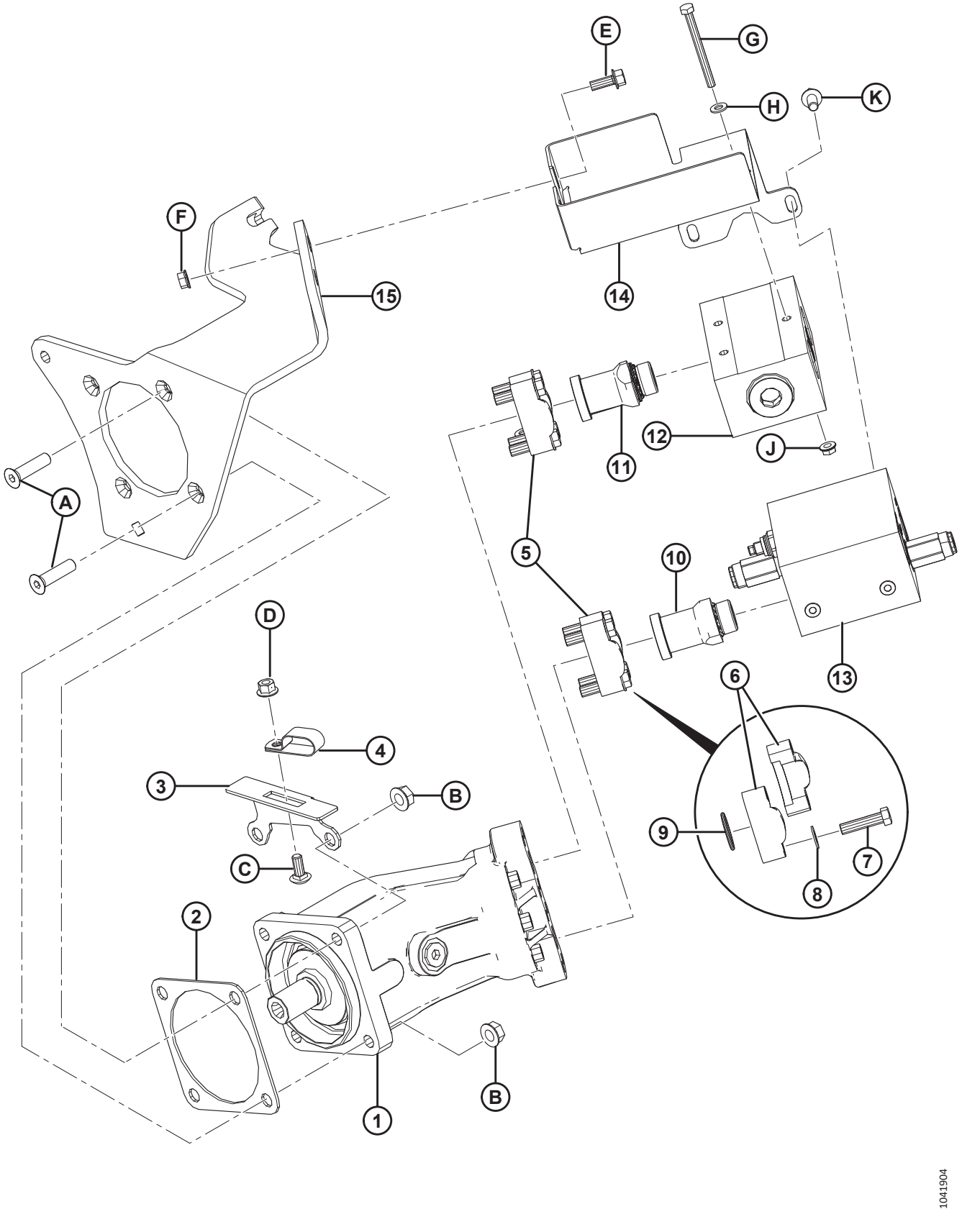
Ref	Part Number	Description	Qty	Serial Number
1	159231	SUPPORT WELDT – LH	1	
2	159582	SUPPORT WELDT – RH	1	
3	242476	COVER – TOP REAR WELDT	1	
4	130496	TUBE – CROSS WELDT	1	
5	159003	LATCH – WELDT, LH	1	
6	159001	LATCH	2	
7	159020	SPRING – TORSION	1	
8	159005	SPACER – 3/4 IN. O.D. X .120 WALL X 12 LONG [7]	2	
9	159007	LATCH – WELDT, RH	1	
10	144505	SPRING – TORSION	1	
11	REF	Refer to Section *6.6 Hydraulic Motor and Mounts, page 122*.	1	
12	130858	ANGLE	2	
13	159329	SUPPORT – WELDT, LIFT ARM, LH	1	
14	159333	SUPPORT – WELDT, LIFT ARM, RH	1	
15	144415	ASSY – L-PIN [8]	2	
16	16010	PIN – SPRING 3/16 DIA X 1.0 LG	2	
17	159002	ANGLE	2	
18	102264	PIN – LYNCH 3/16 X 1-9/16 IN.	2	
19	110737	MOULDING – FRAME (UNIGRIP)	1	
20	23165	DECAL – 50 HR LUBE	2	
21	18671	FITTING – LUBRICATION 1/4 – 28 UNF	2	
22	115677	FITTING – ELBOW 45° HYD	2	
23	159583	HOSE – GREASE, 1/8 IN. NPT	2	
24	135232	CLAMP – DOUBLE HOSE INSULATED	2	
25	242478	COVER – TOP FEED AUGER	2	
26	19685	WASHER – FLAT	4	
27	150572	PLATE – ROLL TIMING GAUGE	1	
28	14338	RIVET – BLIND 1/8 X .125	2	
29	301419	ADAPTER – BULKHEAD	1	
30	242479	PLATE – REAR COVER	1	
31	242482	SUPPORT – ARM WELDT	1	
A	18524	BOLT – RHSN 5/8 NC X 2.0 LG GR 5 ZP		
B	18523	BOLT – RHSN 5/8 NC X 1.5 GR 5 ZP		
C	50225	NUT – FLG DT SMTH FACE .625-11 UNC		
D	18599	WASHER – SAE FLAT 17/32 I.D. X 1-1/16 IN. O.D. ZP		
E	18723	BOLT – HEX HD 1/2 NC X 1.5 LG TFL GR 5 ZP		
F	50186	NUT – FLG LK SMTH FACE DT .500-13 UNC GR 5		
G	21471	BOLT – RHSN 1/2 NC X 1.25 GR 5 ZP		
H	21585	BOLT – HEX HD 5/8 NC X 1.25 LG GR5 ZP		
J	21863	BOLT – RHSSN 3/8 NC X 0.75 LG GR 5 ZP		

7. Stepped.
8. Includes spring pin (MD #16010).


M
4
19
1
M
F
5
7
6
8
D
25
A
C
E
B
C
25
B
M
30
3
C
J
J
21
C
2
26
N
K
K
8
E
6
10
M
D
9
20
F
F
G
H
J
K
C
M
B
24
29
22
B
11
K
28
M
17
23
J
K
12
31
J
27
26
18
L
13
16
H
C
15
14
C
12
1041894

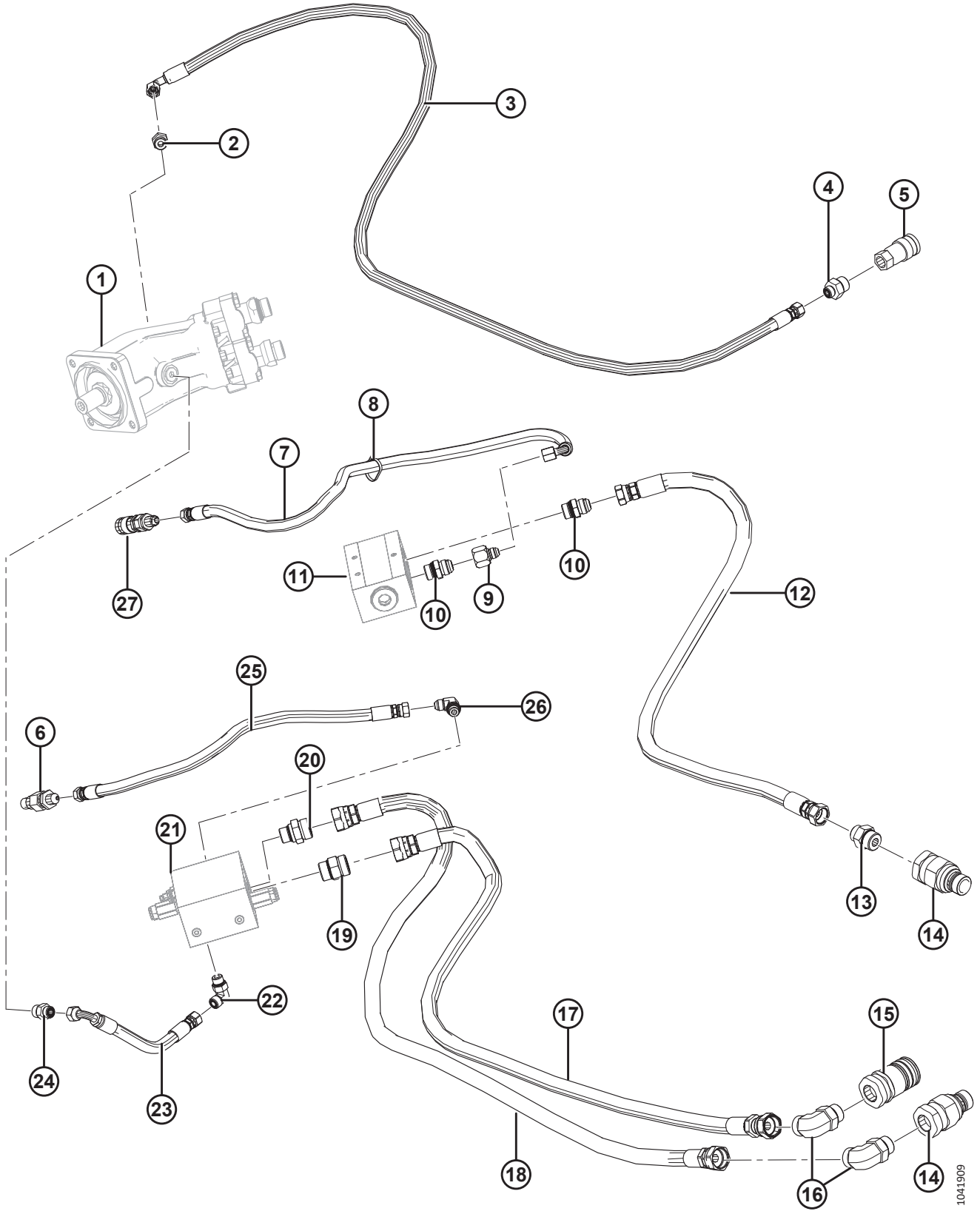
Ref	Part Number	Description	Qty	Serial Number
K	30228	NUT – FLG DT SMTH FACE .375-16 UNC		
L	21289	NUT – WING TYPE A 3/8 NC ZP		
M	103562	BOLT-RHSN 5/8-11X1.25-GR5-AA1J		
N	320259	NUT-HEX 1/8-27 NPSM-SPCL-GR2-ZINC		

6.6 Hydraulic Motor and Mounts



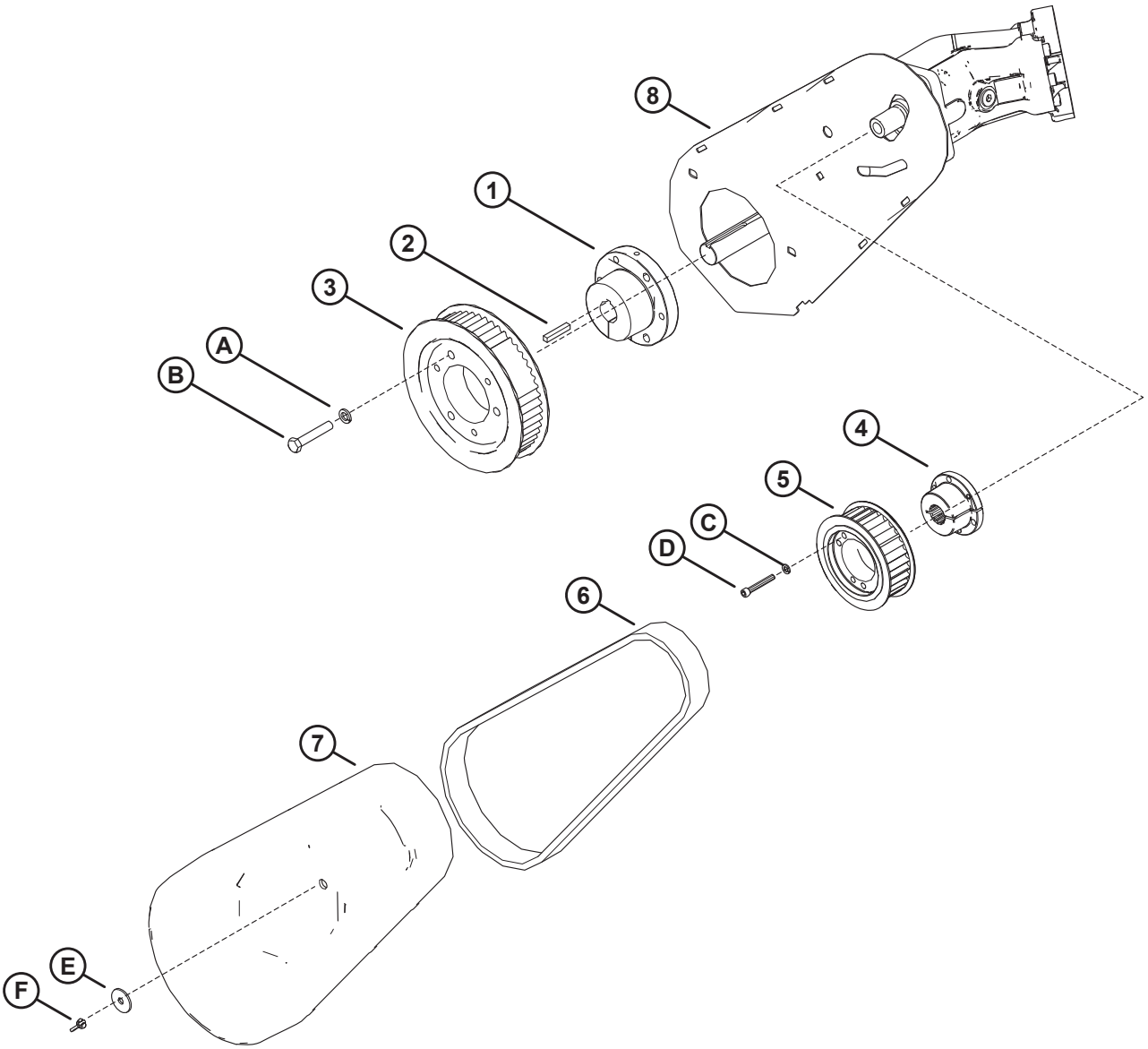
Ref	Part Number	Description	Qty	Serial Number
1	159661	MOTOR – HYD	1	
2	159716	SHIM – MOTOR	1	
3	159775	BRACKET – HOSE SUPPORT	1	
4	300577	CLAMP – DOUBLE INSULATED 3/4 IN.	1	
5	138127	KIT – SPLIT FLANGE, 1 IN. CD62	2	
6	194043	FLANGE – HALF SPLIT 1 IN.	4	
7	252643	BOLT – HEX HD 7/16-14 X 1.75 GR 8-AA3L	8	
8	18652	WASHER – REG. LOCK 7/16 IN. NOM. ID AA1J	2	
9	112868	O-RING 3.53 X 32.92	2	
10	136568	FITTING – ADAPTER HYD FLANGE ORB	1	
11	320093	FITTING – ADAPTER HYD FLANGE	1	
12	159719	VALVE – HYD, FLOW DIVIDER	1	
13	159779	MANIFOLD – HAY CONDITIONER	1	
14	242463	SUPPORT – VALVE MOUNT	1	
15	159665	SUPPORT – MOTOR	1	
A	320077	SCR – HEX SOC CSK HD 1/2 X 2		
B	050186	NUT – FLG LK DT 1/2-13 UNC GR5 AA1J		
C	136506	BOLT – RHSSN M10 X 1.5 X 25-8.8-AA1J		
D	135799	NUT – HEX FLG CTR LOC M10 X 1.5-10		
E	21975	BOLT – HEX FLG SER HD3/8-16 X 1.0 GR 5 - AA1J		
F	30228	NUT – FLG DT SM FACE 3/8-16UNC-GR5-AA1J		
G	30821	BOLT – HEX HD 5/16-18 X 3.5 GR5 - AA1J		
H	18597	WASHER – FLAT SAE11/32 ID X 11/16 OD AA1J		
J	30280	NUT – FLG LK SMFC 5/16-18 UNC GR5 AA1J		
K	152670	BOLT – HEX FLG HD M10 X 1.5 X 20-SPC-8.8-AA1J		

6.7 Hydraulic Motor and Hoses



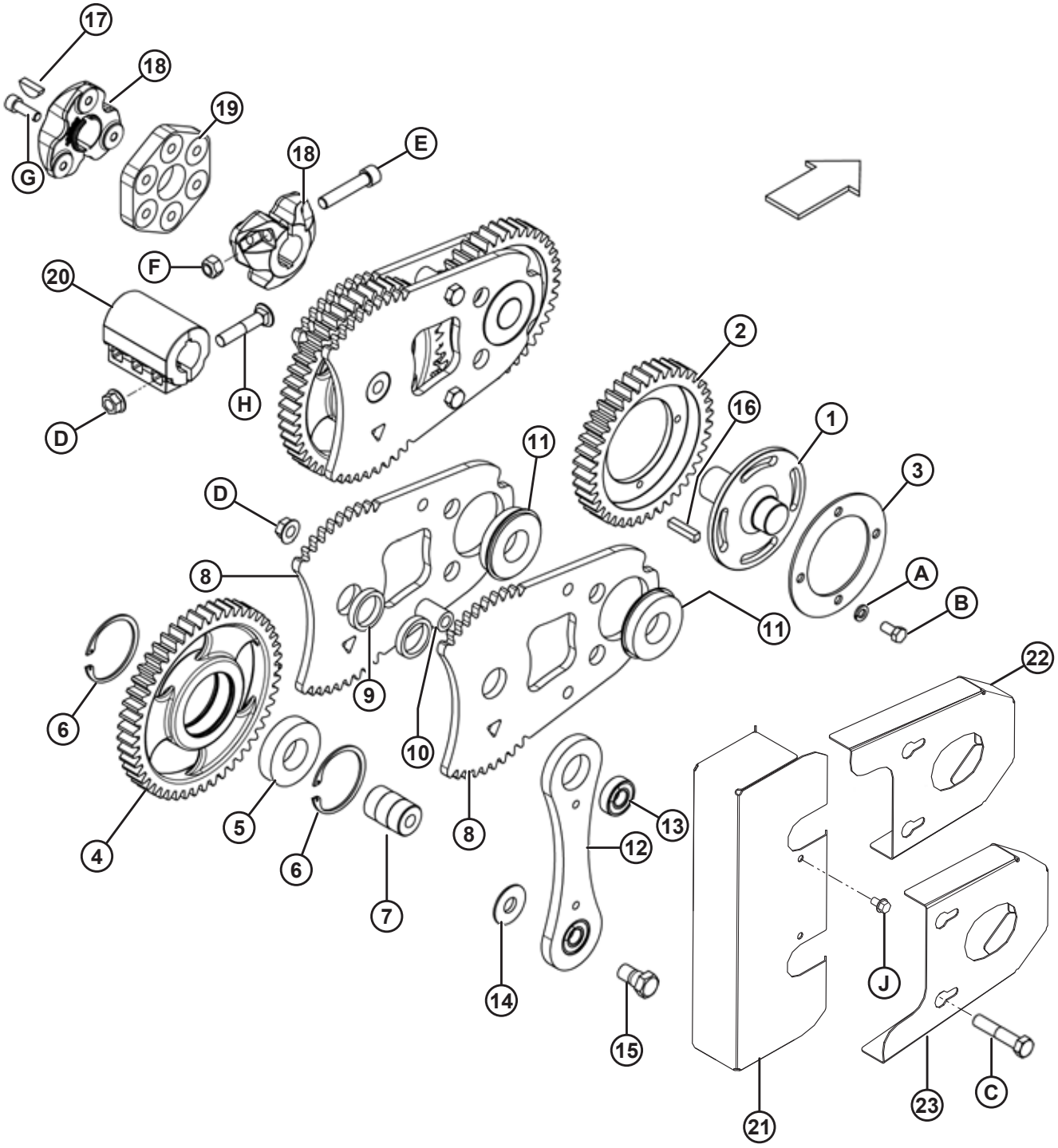
Ref	Part Number	Description	Qty	Serial Number
1	REF	MOTOR – HYDRAULIC (refer to *6.6 Hydraulic Motor and Mounts, page 122*)		
2	21881	FITTING – ADAPTER HYD	1	
3	159770	HOSE – HYD CASE DRAIN	1	
4	136194	FITTING – ADAPTER	1	
5	135474	COUPLER – HYDRAULIC, 1/2 IN FEMALE FF	1	
6	135237	COUPLER – MALE HYD. 3/8 IN. FLAT FACE BULKHEAD	1	
7	159028	HOSE	1	
8	21763	FASTENER – CABLE TIE BLACK	1	
9	136952	FITTING – ADAPTER REDUCER HYD	1	
10	320101	FITTING – ADAPTER STRMET JIC	2	
11	REF	VALVE – HYD, FLOW DIVIDER (refer to *6.6 Hydraulic Motor and Mounts, page 122*)		
12	159773	HOSE – HYD KNIFE PRESSURE	1	
13	135789	FITTING – ADAPTER	1	
14	136412	FITTING – COUPLING MALE 1 IN.	2	
15	136413	FITTING – COUPLING FEMALE 1 IN.	1	
16	135734	FITTING – ELBOW 90° HYD	2	
	050220	O-RING – 2.95 X 29.74		
	135554	O-RING – 1.78 X 23.52		
17	159783	HOSE – HYD COND PRESSURE	1	
18	159782	HOSE – HYD FEED DECKRETURN	1	
19	135791	FITTING – ADAPTER	1	
	050220	O-RING – 2.95 X 29.74		
	135554	O-RING – 1.78 X 23.52		
20	135790	FITTING – ADAPTER	1	
	030971	O-RING – 2.95 X 23.47		
	135554	O-RING – 1.78 X 23.52		
21	REF	MANIFOLD – HAY CONDITIONER (refer to *6.6 Hydraulic Motor and Mounts, page 122*)		
22	136220	FITTING – ELBOW 90° HYD	1	
	044209	O-RING – 2.21 X 16.36		
	135866	O-RING – 1.78 X 12.42		
23	159780	HOSE – HYD	1	
24	184463	FITTING – ADAPTER HYD	1	
	044210	O-RING – 2.46 X 19.18		
	135866	O-RING – 1.78 X 12.42		
25	159781	HOSE – HYD	1	
26	21076	FITTING – ELBOW HYD	1	
27	135213	COUPLING – FEM HYD 3/8 FFBLKHD	1	

6.8 Belt Drive and Shield



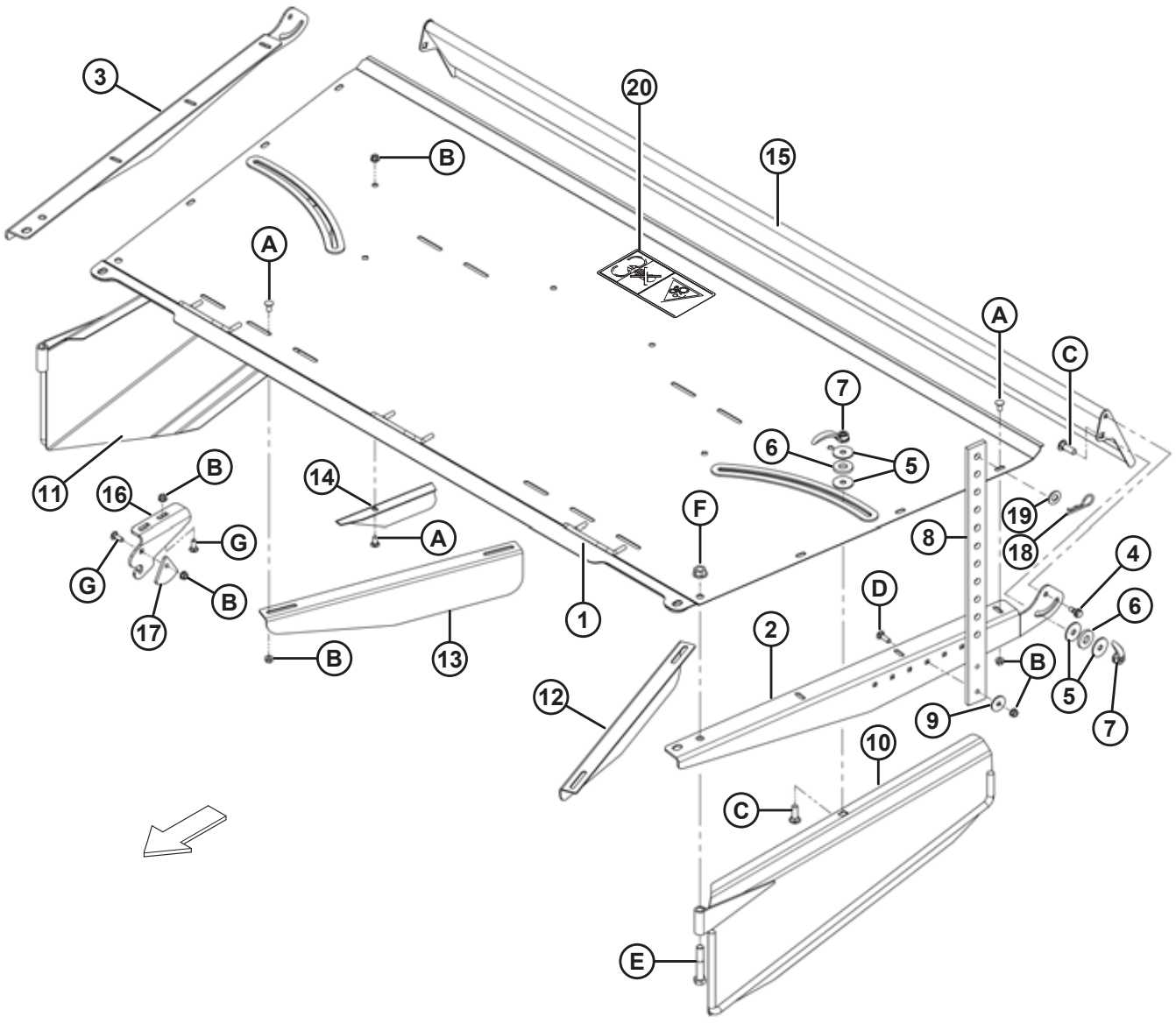
Ref	Part Number	Description	Qty	Serial Number
1	130880	BUSHING – SPLIT TAPER QD-E-1.375 BORE	1	
2	17194	KEY	1	
3	159215	SPROCKET – P52 14M 40	1	
4	159671	HUB – SPLINED	1	
5	159658	SPROCKET – TIMING	1	
6	130706	BELT – HTD 1610-14M-40	1	
7	159168	SHIELD – HT DRIVE	1	
8	REF	Refer to Section *6.6 Hydraulic Motor and Mounts, page 122*.		
A	18638	WASHER – REG. LOCK 1/2 IN. NOM. ID AA1J		
B	21880	BOLT – HEX HD 1/2-13 X 2.75 GR5 AA1J		
C	18636	WASHER – REG. LOCK 5/16 IN. NOM. ID AA1J		
D	320078	SCR – HEX SOC HD 5/16-18 X 2 1/8		
E	14887	WASHER – FLAT		
F	21289	NUT – WING TYPE A 3/8 NC ZP		

6.9 Gears and Roll Coupling Assembly



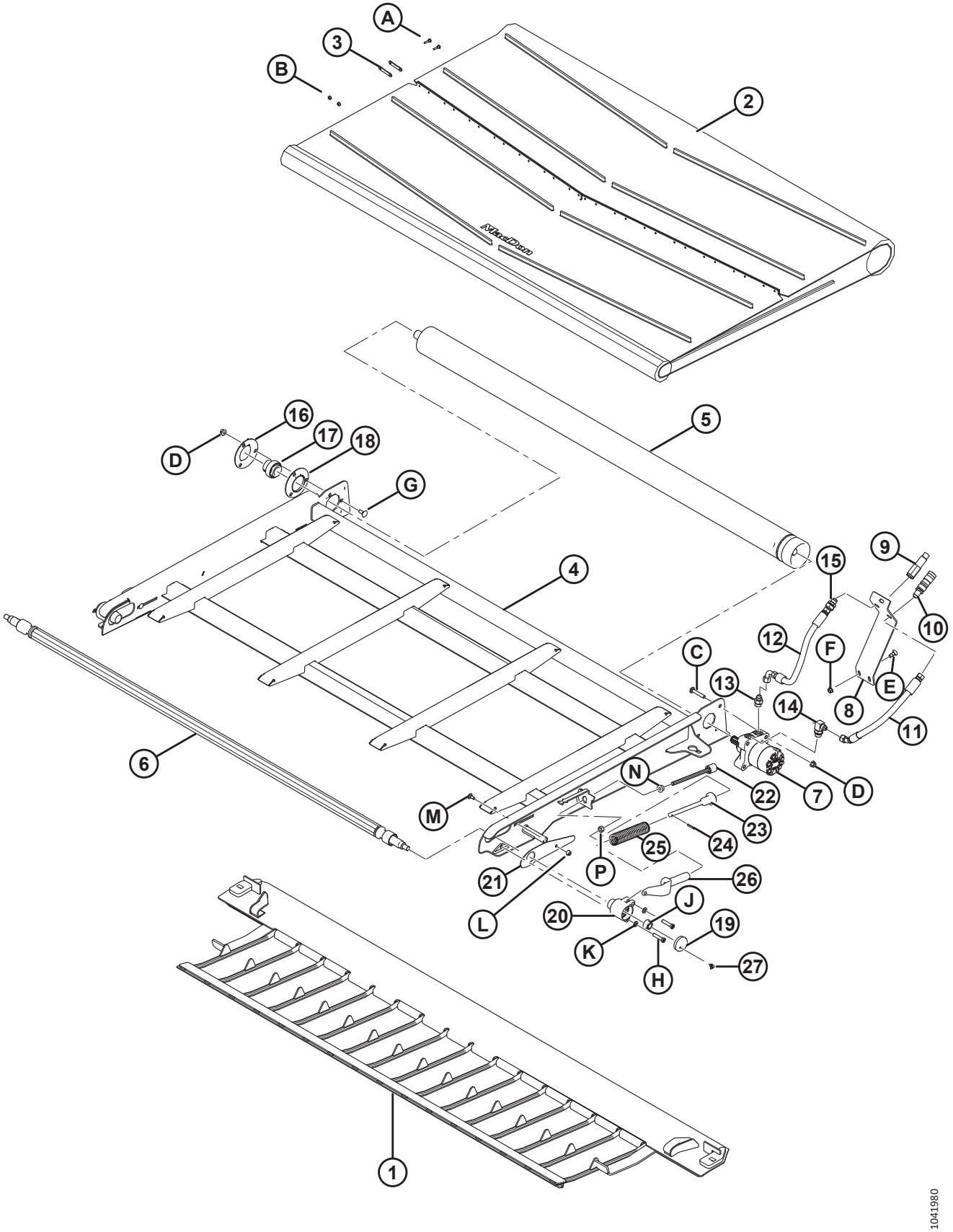
Ref	Part Number	Description	Qty	Serial Number
1	159550	HUB – MACHINING	2	
2	130680	GEAR – 40T	2	
3	129932	DISK	2	
4	130677	GEAR – 49T	2	
5	159474	BEARING – BALL CYL	2	
6	38854	RING – INT RETAINING	4	
7	130687	SHAFT – IDLER	2	
8	130685	PLATE, SIDE HEAT TREATMENT	4	
9	130689	SPACER	4	
10	130694	SPACER	4	
11	159478	BEARING – BALL CYL C3 WITH SNAP RING	4	
12	130691	SUB-ASSEMBLY – LINK	2	
13	50185	BEARING – BALL CYL OD 17 MM BORE	4	
14	30441	WASHER – HARDENED ASTM F436 5/8	4	
15	105141	BOLT – LOCKING SHOULDER	4	
16	26846	KEY – HUB TO COUPLING	2	
17	11142	KEY – WOODRUFF (5/16 X 1-1/8 NOM.)	2	
18	130936	COUPLING-FLEX – MACHINING, UPPER ROLL	2	
19	130736	DISC – FLEX, UPPER ROLL	1	
20	159130	COUPLING – MACHINING, LOWER ROLL	1	
21	242455	COVER - BACK GEAR WELDT	1	
22	242454	COVER - TOP GEAR WELDT	1	
23	242453	COVER - BOTTOM GEAR WELDT	1	
A	18637	WASHER – REG. LOCK 3/8 IN. NOM. I.D. ZP		
B	21567	BOLT – HEX HD .375-16 UNC X 0.75 LG		
C	21880	BOLT – HEX HD 1/2 NC X 2.75 LG GR 5 ZP		
D	50186	NUT – FLG LK SMTH FACE DT .500-13 UNC GR 5		
E	320501	SCR – HEX SOC M12 X 1.75 X 60 ZINC		
F	136759	NUT – HEX CTR LOC M12 X 1.75-8-AA1J		
G	135401	BOLT – HEX SKT HD M10 X 1.5 X 30 LG ZP		
H	21489	BOLT – RHSN 1/2 NC X 2.5 LG GR 5 ZP		
J	101898	SCREW – HEX WASH HD THD ROLLING 3/8 NC X 5/8		

6.10 Forming Shields

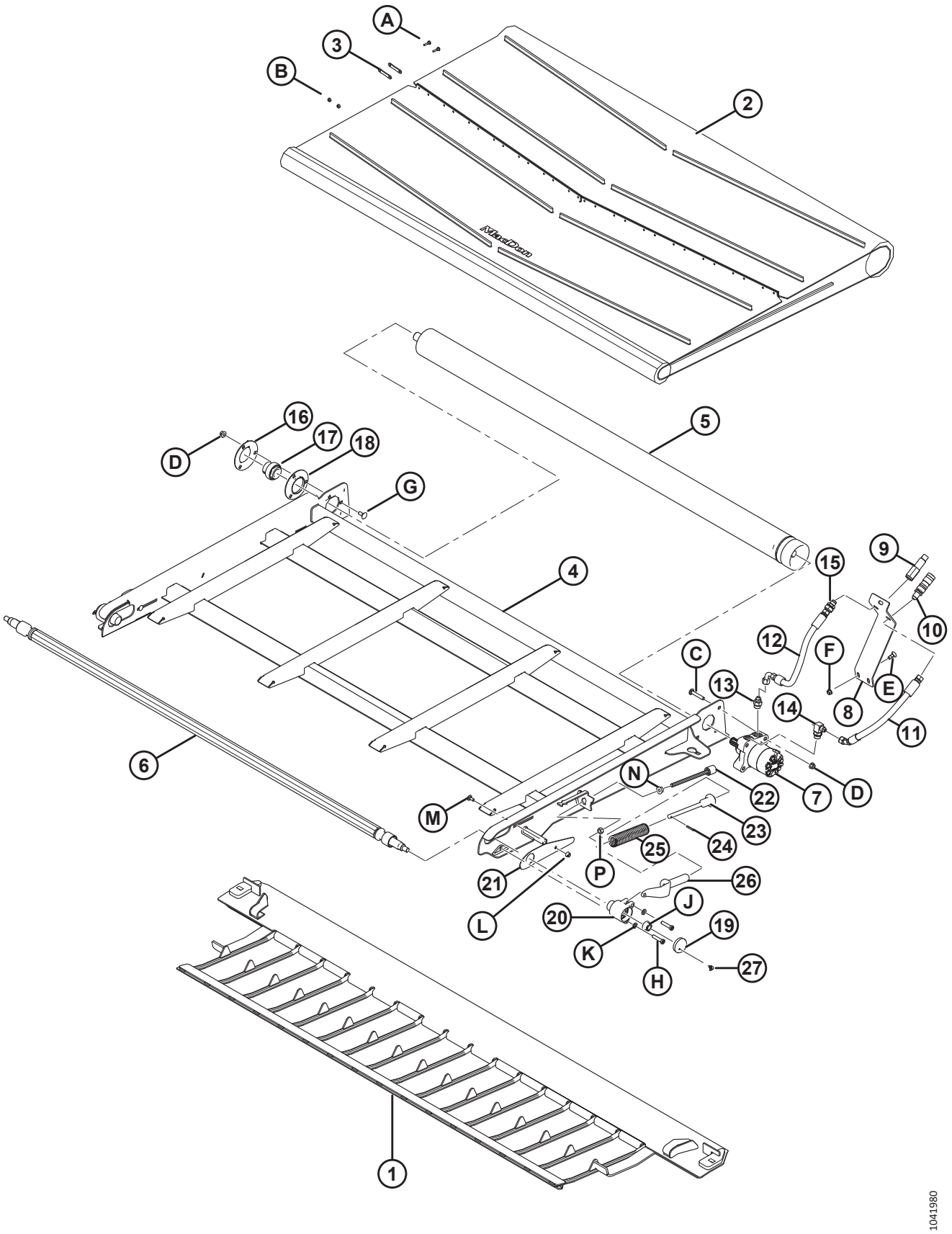


Ref	Part Number	Description	Qty	Serial Number
1	159204	COVER WELDT	1	
2	159206	SUPPORT – STRUT, LH	1	
3	159207	SUPPORT – STRUT, RH	1	
4	135001	BOLT – SHOULDER .375-16 UNC	2	
5	42592	WASHER – FLAT	8	
6	42045	WASHER – RUBBER	4	
7	149317	HANDLE	4	
8	159294	STRAP – RUBBER	2	
9	16652	WASHER – FLAT	2	
10	159220	DEFLECTOR WELDT, LH	1	
11	130911	DEFLECTOR WELDT, RH	1	
12	130905	DEFLECTOR – FIN, LH	1	
13	130906	DEFLECTOR – FIN, RH	1	
14	130548	DEFLECTOR – FIN	4	
15	130900	BAFFLE	1	
16	159598	SUPPORT – HANGER (TRACTOR MOUNTED)	1	
17	159325	SUPPORT – KEEPER	1	
18	13125	PIN – HAIR	2	
19	18600	WASHER – FLAT, 21/32 I.D. X 1-5/16 IN. O.D. ZP	2	
20	320514	DECAL – CONDITIONING DEVICES ENTANGLEMENT HAZARD	1	
A	21863	BOLT – RHSSN 3/8 NC X 0.75 LG GR 5 ZP		
B	30228	NUT – FLANGE DT SMOOTH FACE .375-16 UNC		
C	21469	BOLT – RHSN 1/2 NC X 1.5 LG GR 5 ZP		
D	19966	BOLT – RHSN 3/8 NC X 1.25 LG GR 5 ZP		
E	21406	BOLT – HEXHD 5/8 NC X 3.5 GR 5 ZP		
F	50225	NUT – FLANGE DT SMOOTH FACE .625-11 UNC		
G	19965	BOLT – RHSN 3/8 NC X 1.0 GR 5 ZP		

6.11 Feed Deck and Pan

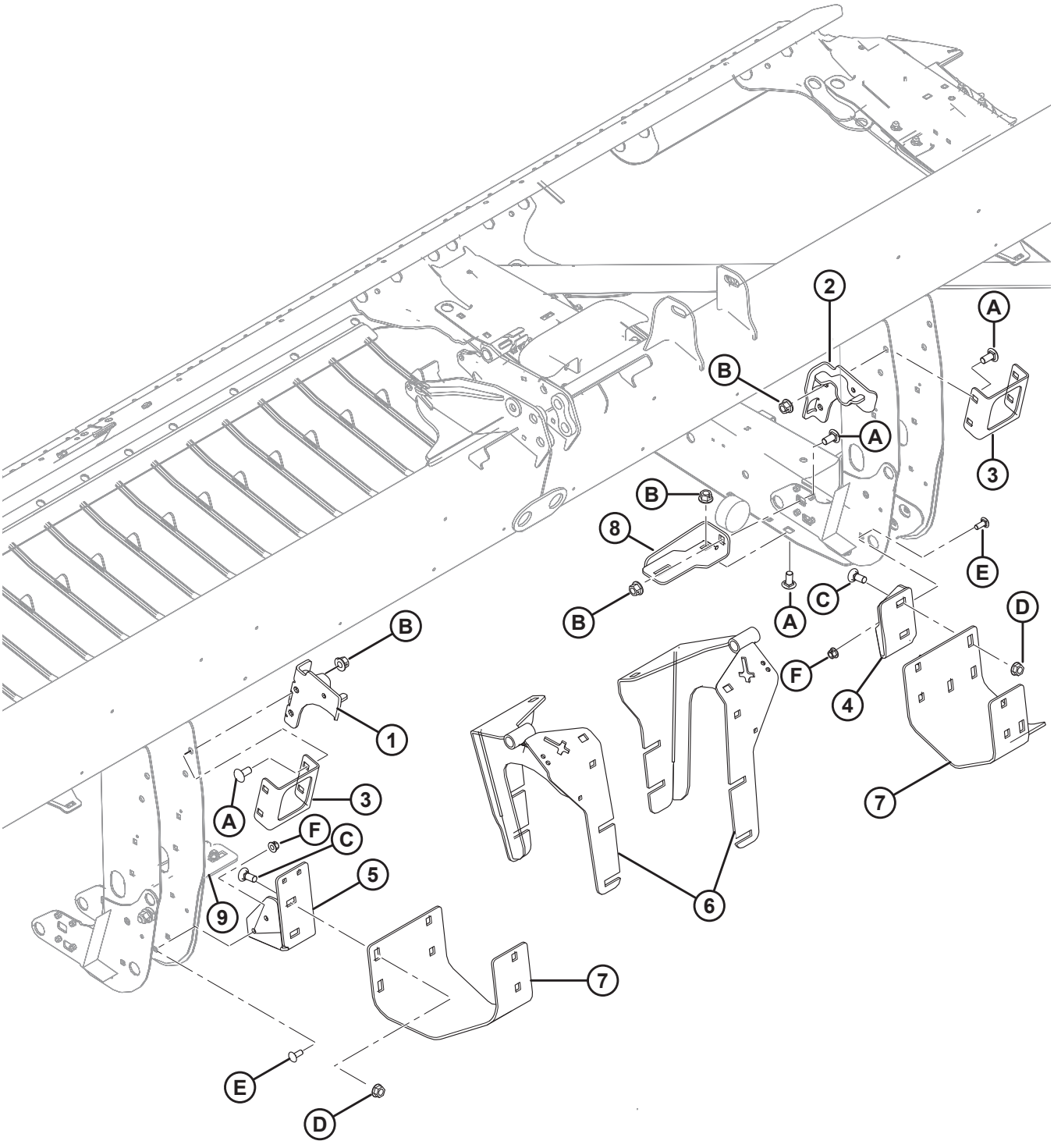


Ref	Part Number	Description	Qty	Serial Number
1	242417	ASSY – ROCK GRATE WELDT	1	
2	242407	DRAPER – 1850 WIDE X 2497 LG	1	
3	130283	STRAP – DRAPER CONN	28	
4	242402	FRAME – FEED DECK WELDT	1	
5	159704	ROLLER – DRIVE 4 IN WELDT	1	
6	242408	ROLLER – IDLER WELDT	1	
7	159197	MOTOR – HYD 4.0 CID 921PSIRLF	1	
	037181	SEAL KIT		
	159606	VALVE – RELIEF (921PSI)		
	159607	VALVE – RELIEF (1200 PSI)		
8	159776	BRACKET – COUPLER MOUNT	1	
9	135386	COUPLER – MALE HYD 3/8 IN.	1	
	111978	SEAL KIT – 3/8 MALE		
10	135213	COUPLING – FEM HYD 3/8 FFBLKHD	1	
11	159777	HOSE – HYD, FEED DECK	1	
12	159422	HOSE	1	
13	21881	FITTING – ADAPTER HYD	1	
14	21801	FITTING – ELBOW 90° HYD	1	
15	30819	FITTING – UNION HYD BLKHD1/2 IN.	1	
16	30661	FLANGE	1	
17	21859	BEARING – SPH OD EXT INNER RACE 1 3/16 BORE	1	
18	49306	FLANGE	1	
19	357230	ASSY – DUST CAP WITH FITTING	2	
20	335980	HOUSING – IDLER CUP ASSY	2	
21	295766	COVER – IDLER ROLLER	2	
22	252272	BOLT – HEX HD TFL M12 X 1.75 X 180-10.9-ZINC	2	
23	328143	SUPPORT – SPRING MACHINED	2	
24	13617	PIN – SPRING 3/16 DIA X 1.25 LG	2	
25	295407	SPRING – COMPRESSION	2	
26	328128	SUPPORT – DECK TENSION CASTING	2	
27	21010	FITTING – LUBE90 1/4 - 28 TAPERTHD	2	
A	49671	SCREW – BUTTON HD RIB NK		
B	30669	NUT – CSK CENTER LOCK		
C	252701	BOLT – RHSSN TFL M10 X 1.5 X 60-8.8-AA1J		
D	135799	NUT – HEX FLG CTR LOC M 10 X 1.5-10		
E	19965	BOLT – RHSN 3/8-16 X 1-GR5-AA1J		
F	30228	NUT – FLG DT SM FACE 3/8-16UNC-GR5-AA1J		
G	135785	BOLT – RHSN M10 X 1.5 X 25-8.8-AA1J		
H	320358	SCREW – HEX SOC HD M10 X 1.5 X 45-SPCL-8.8-ZINC		
J	152520	NUT – HEX FLG TECH LK M16 X 2-10-AA1J		
K	184711	WASHER – FLAT REG M10-200HV-AA1J		
L	135337	NUT – HEX FLG CTR LK M8 X 1.25-8-AA1J		
M	197171	BOLT – RHSN M8 X 1.25 X 20-8.8-ZINC		


A
3
B
2
5
16
17
18
D
G
4
6
15
9
10
12
F
C
13
14
8
E
11
N
22
7
D
M
23
24
25
P
21
26
L
20
J
19
K
H
27
1
1041980

Ref	Part Number	Description	Qty	Serial Number
N	136036	NUT – HEX SM FLG M12 X 1.75-8-AA1J		
P	184694	NUT – HEX M12 X 1.75-8-AA1J		

6.12 Mounting Brackets



Ref	Part Number	Description	Qty	Serial Number
1	242431	SUPPORT – LH WELDT COND	1	
2	242432	SUPPORT – RH WELDT COND	1	
3	242434	BRACKET – SPACER	2	
4	242428	SUPPORT – RH COND LOWER	1	
5	242427	SUPPORT – LH COND LOWER	1	
6	REF	SUPPORT WELDT – RH AND LH (Refer to Section *6.5 Cover and Supports, page 118*.)		
7	REF	SKID, RH AND LH – CONDITIONER (Refer to Section *6.3 Lower Roll and Frame Assembly, page 114*.)		
8	242440	SUPPORT – REAR DECK RH	1	
9	242439	SUPPORT – REAR DECK LH	1	
A	252638	BOLT – RHSSN M16 X 2 X 35-8.8-AA1J		
B	136440	NUT – HEX FLG CTR LK M16 X 2-10-AA1J		
C	18523	BOLT – RHSN 5/8-11 X 1.5-GR5-AA1J		
D	50225	NUT – FLG DT 5/8-11 UNC GR5 AA1J		
E	152702	BOLT – RHSSN M12 X 1.75 X 30-8.8-AA1J		
F	136431	NUT – HEX FLG CTR LOC M12 X 1.75-10		

Chapter 7: Reference

Refer to the contents of this chapter as needed.

7.1 Torque Specifications

The following tables provide torque values for various bolts, cap screws, and hydraulic fittings. Refer to these values only when no other torque value has been specified in a given procedure.

- Tighten all bolts to the torque values specified in the charts below, unless you are directed otherwise in this manual.
- Replace removed hardware with hardware of the same strength and grade.
- Refer to the torque value tables as a guide when periodically checking the tightness of bolts.
- Understand the torque categories for bolts and cap screws by reading the markings on their heads.

Jam nuts

Jam nuts require less torque than nuts used for other purposes. When applying torque to finished jam nuts, multiply the torque applied to regular nuts by 0.65 to obtain the modified torque value.

Self-tapping screws

Refer to the standard torque values when installing the self-tapping screws. Do **NOT** install the self-tapping screws on structural or otherwise critical joints.

7.1.1 Metric Bolt Specifications

Specifications are provided for the appropriate final torque values to secure various sizes of metric bolts.

NOTE:

The torque values provided in the following metric bolt torque tables apply to hardware installed dry; that is, hardware with no grease, oil, or threadlocker on the threads or heads. Do **NOT** add grease, oil, or threadlocker to bolts or cap screws unless you are directed to do so in this manual.

Table 7.1 Metric Class 8.8 Bolts and Class 9 Free Spinning Nut

Nominal Size (A)	Torque (Nm)		Torque (lbf·ft) (*lbf·in)	
	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

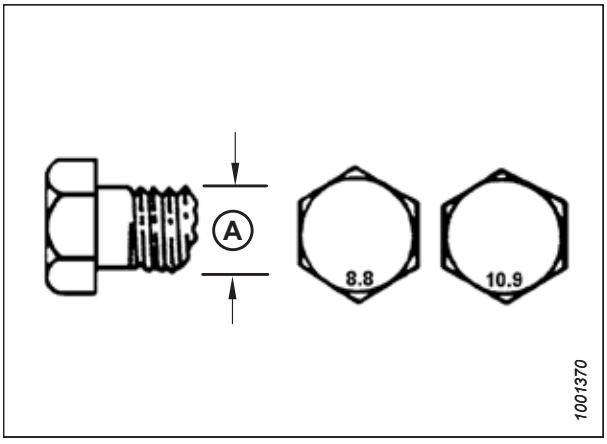


Figure 7.1: Bolt Grades

Table 7.2 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

Nominal Size (A)	Torque (Nm)		Torque (lbf·ft) (*lbf·in)	
	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

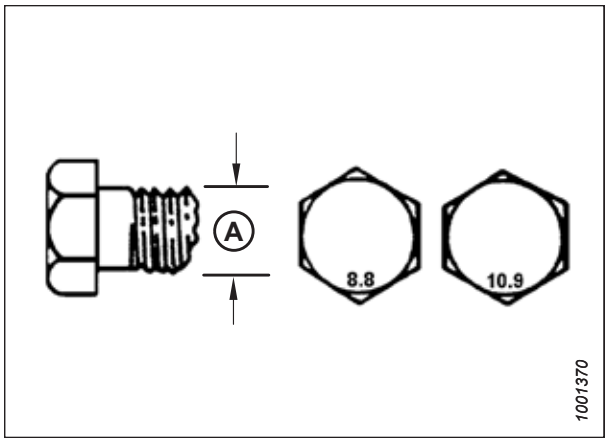


Figure 7.2: Bolt Grades

Table 7.3 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

Nominal Size (A)	Torque (Nm)		Torque (lbf·ft) (*lbf·in)	
	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

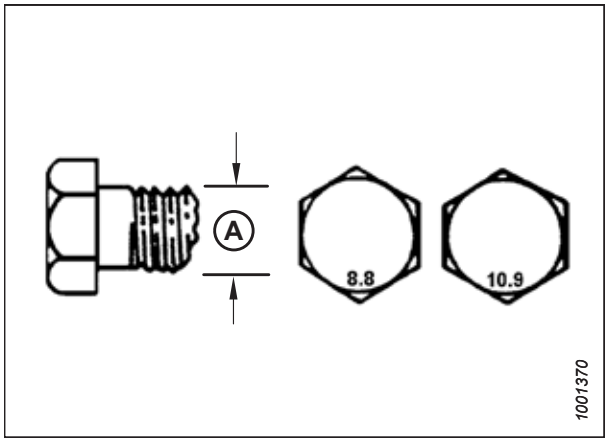


Figure 7.3: Bolt Grades

Table 7.4 Metric Class 10.9 Bolts and Class 10 Distorted Thread Nut

Nominal Size (A)	Torque (Nm)		Torque (lbf·ft) (*lbf·in)	
	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

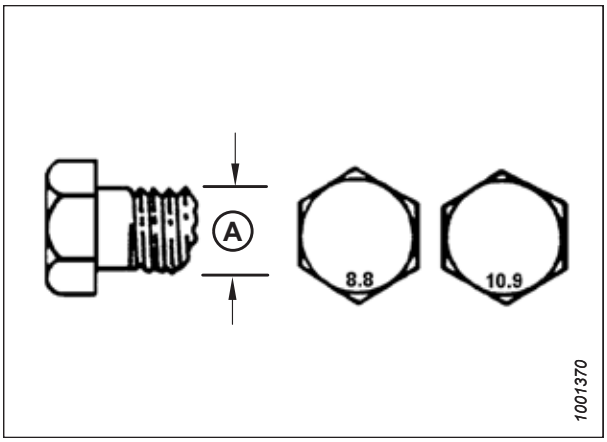


Figure 7.4: Bolt Grades

7.1.2 Metric Bolt Specifications – Cast Aluminum

Specifications are provided for the appropriate final torque values for various sizes of metric bolts in cast aluminum.

NOTE:

The torque values provided in the following metric bolt torque tables apply to hardware installed dry; that is, hardware with no grease, oil, or threadlocker on the threads or heads. Do **NOT** add grease, oil, or threadlocker to bolts or cap screws unless you are directed to do so in this manual.

Table 7.5 Metric Bolt Bolting into Cast Aluminum

Nominal Size (A)	Bolt Torque			
	8.8 (Cast Aluminum)		10.9 (Cast Aluminum)	
	Nm	lbf·ft	Nm	lbf·ft
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	–	–	–	–

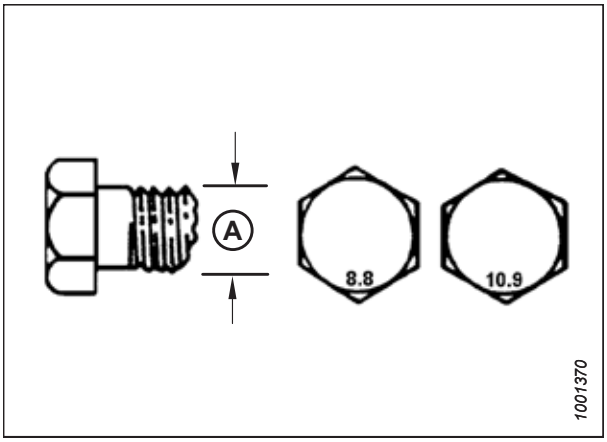


Figure 7.5: Bolt Grades

7.1.3 O-Ring Boss Hydraulic Fittings – Adjustable

The standard torque values are provided for adjustable hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, refer to the value specified in the procedure instead.

1. Inspect O-ring (A) and seat (B) for dirt or defects.
2. Back off lock nut (C) as far as possible. Ensure that washer (D) is loose and that it is pushed toward lock nut (C) as far as possible.
3. Ensure that O-ring (A) is **NOT** on the threads. Adjust O-ring (A) if necessary.
4. Apply hydraulic system oil to O-ring (A).

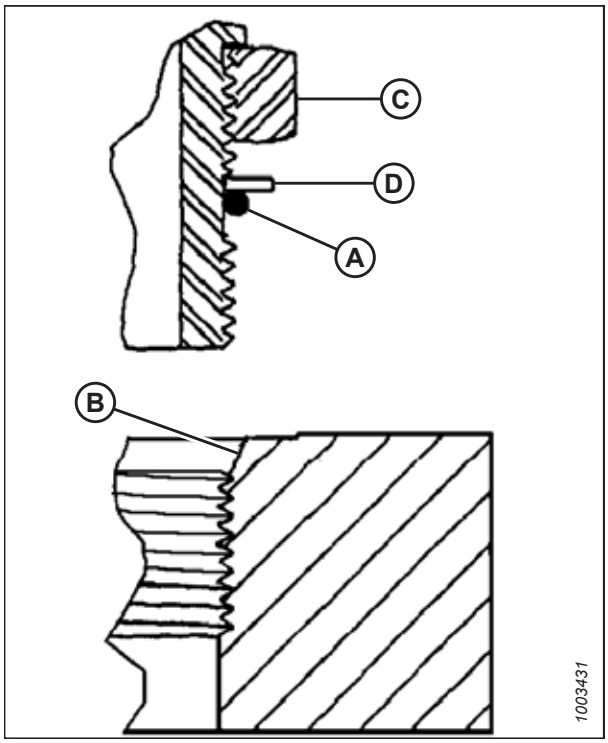


Figure 7.6: Hydraulic Fitting

5. Install fitting (B) into the port until backup washer (D) and O-ring (A) contact part face (E).
6. Position the angle fittings by unscrewing no more than one turn.
7. Turn lock nut (C) down to washer (D) and tighten it to the torque value indicated in the table. Use two wrenches, one on fitting (B) and the other on lock nut (C).
8. Verify the final condition of the fitting.

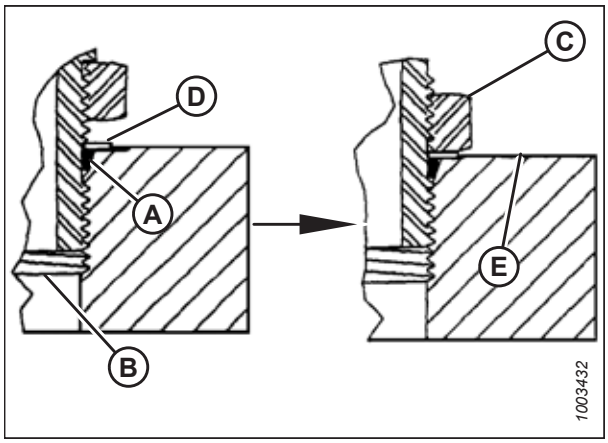


Figure 7.7: Hydraulic Fitting

Table 7.6 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable and Non-Adjustable

SAE Dash Size	Thread Size (in.)	Torque Value[9]	
		Nm	lbf·ft (*lbf·in)
-2	5/16–24	10–11	*89–97
-3	3/8–24	18–20	*159–177
-4	7/16–20	29–32	21–24
-5	1/2–20	32–35	24–26
-6	9/16–18	40–44	30–32
-8	3/4–16	70–77	52–57
-10	7/8–14	115–127	85–94
-12	1 1/16–12	183–201	135–148
-14	1 3/16–12	237–261	175–193
-16	1 5/16–12	271–298	200–220
-20	1 5/8–12	339–373	250–275
-24	1 7/8–12	414–455	305–336
-32	2 1/2–12	509–560	375–413

7.1.4 O-Ring Boss Hydraulic Fittings – Non-Adjustable

The standard torque values for non-adjustable hydraulic fittings are provided. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, use the value specified in the procedure instead.

1. Inspect O-ring (A) and seat (B) for dirt or defects.
2. Ensure that O-ring (A) is **NOT** on the threads. Adjust O-ring (A) if necessary.
3. Apply hydraulic system oil to the O-ring.
4. Install fitting (C) into the port until the fitting is hand-tight.
5. Torque fitting (C) according to values in Table *7.7, page 143*.
6. Verify the final condition of the fitting.

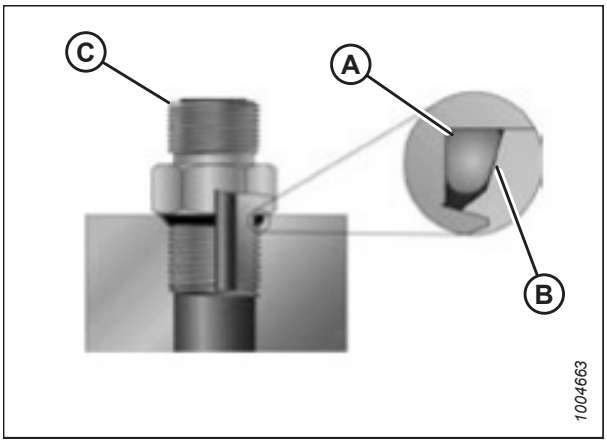


Figure 7.8: Hydraulic Fitting

Table 7.7 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable and Non-Adjustable

SAE Dash Size	Thread Size (in.)	Torque Value[9]	
		Nm	lbf·ft (*lbf·in)
-2	5/16–24	10–11	*89–97
-3	3/8–24	18–20	*159–177
-4	7/16–20	29–32	21–24
-5	1/2–20	32–35	24–26

9. Torque values shown are based on lubricated connections as in reassembly.

Table 7.7 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable and Non-Adjustable (continued)

SAE Dash Size	Thread Size (in.)	Torque Value[10]	
		Nm	lbf·ft (*lbf·in)
-6	9/16–18	40–44	30–32
-8	3/4–16	70–77	52–57
-10	7/8–14	115–127	85–94
-12	1 1/16–12	183–201	135–148
-14	1 3/16–12	237–261	175–193
-16	1 5/16–12	271–298	200–220
-20	1 5/8–12	339–373	250–275
-24	1 7/8–12	414–455	305–336
-32	2 1/2–12	509–560	375–413

7.1.5 O-Ring Face Seal Hydraulic Fittings

The standard torque values are provided for O-ring face seal hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, refer to the value specified in the procedure instead.

Torque values are shown in the Table *7.8, page 145*.

1. Ensure that the sealing surfaces and the fitting threads are free of burrs, nicks, scratches, and any foreign material.

Figure 7.9: Hydraulic Fitting

10. Torque values shown are based on lubricated connections as in reassembly.

2. Apply hydraulic system oil to O-ring (B).
3. Align the tube or hose assembly so that the flat face of sleeve (A) or (C) comes into full contact with O-ring (B).
4. Thread tube or hose nut (D) until it is hand-tight. The nut should turn freely until it bottoms out.
5. Torque the fittings according to values in Table *7.8, page 145*.

   NOTE:

   If applicable, hold the hex flange on fitting body (E) to prevent the rotation of the fitting body and the hose when tightening fitting nut (D).
6. Use three wrenches when assembling unions or joining two hoses together.
7. Verify the final condition of the fitting.

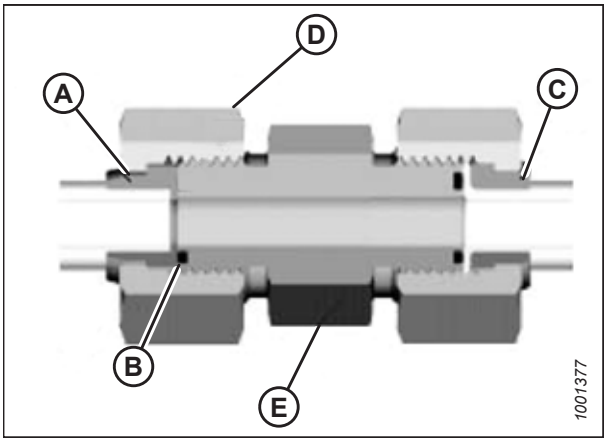


Figure 7.10: Hydraulic Fitting

Table 7.8 O-Ring Face Seal (ORFS) Hydraulic Fittings

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value[11]	
			Nm	lbf·ft
-3	Note[12]	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note[12]	5/16	–	–
-6	11/16	3/8	40–44	30–32
-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[12]	7/8	–	–
-16	1 7/16	1	150–165	111–122
-20	1 11/16	1 1/4	205–226	151–167
-24	2	1 1/2	315–347	232–256
-32	2 1/2	2	510–561	376–414

7.1.6 Tapered Pipe Thread Fittings

The standard torque values are provided for tapered pipe thread fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, refer to the value specified in the procedure instead.

Assemble pipe fittings as follows:

1. Ensure that the fitting and the port threads are free of burrs, nicks, scratches, and any other form of contamination.
2. Apply paste-type pipe thread sealant to the external pipe threads.
3. Thread the fitting into the port until it is hand-tight.

11. Torque values and angles shown are based on lubricated connection as in reassembly.
12. O-ring face seal type end not defined for this tube size.

4. Torque the connector to the appropriate torque angle. The turns from finger tight (TFFT) and flats from finger tight (FFFT) values are shown in Table *7.9, page 146*. Ensure that the tube end of a shaped connector (typically a 45° or 90° elbow) is aligned to receive the incoming tube or hose assembly. Always finish the alignment of the fitting in the direction of tightening. Never loosen the threaded connectors to achieve alignment.

5. Clean all residue and any excess thread conditioner with an appropriate cleaner.

6. Inspect the final condition of the fitting. Pay special attention to the possibility of cracks in the port opening.

7. Mark the final position of the fitting. If a fitting leaks, disassemble the fitting and check it for damage.

   NOTE:

   The failure of fittings due to over-torquing may not be evident until the fittings are disassembled and inspected.

Table 7.9 Hydraulic Fitting Pipe Thread

Tapered Pipe Thread Size	Recommended TFFT	Recommended FFFT
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

7.2 Conversion Chart

This manual uses both SI units (including metric) and US customary units (sometimes referred to as standard units) of measurement. A list of those units along with their abbreviations and conversion factors is provided here for your reference.

Table 7.10 Conversion Chart

Quantity	SI Units (Metric)		Factor	US Customary Units (Standard)	
	Unit Name	Abbreviation		Unit Name	Abbreviation
Area	hectare	ha	x 2.4710 =	acre	acres
Flow	liters per minute	L/min	x 0.2642 =	US gallons per minute	gpm
Force	Newton	N	x 0.2248 =	pound force	lbf
Length	millimeter	mm	x 0.0394 =	inch	in.
Length	meter	m	x 3.2808 =	foot	ft.
Power	kilowatt	kW	x 1.341 =	horsepower	hp
Pressure	kilopascal	kPa	x 0.145 =	pounds per square inch	psi
Pressure	megapascal	MPa	x 145.038 =	pounds per square inch	psi
Pressure	bar (Non-SI)	bar	x 14.5038 =	pounds per square inch	psi
Torque	Newton meter	Nm	x 0.7376 =	pound feet or foot pounds	lbf·ft
Torque	Newton meter	Nm	x 8.8507 =	pound inches or inch pounds	lbf·in
Temperature	degrees Celsius	°C	(°C x 1.8) + 32 =	degrees Fahrenheit	°F
Velocity	meters per minute	m/min	x 3.2808 =	feet per minute	ft/min
Velocity	meters per second	m/s	x 3.2808 =	feet per second	ft/s
Velocity	kilometers per hour	km/h	x 0.6214 =	miles per hour	mph
Volume	liter	L	x 0.2642 =	US gallon	US gal
Volume	milliliter	mL	x 0.0338 =	ounce	oz.
Volume	cubic centimeter	cm^3 or cc	x 0.061 =	cubic inch	$in.^3$
Weight	kilogram	kg	x 2.2046 =	pound	lb.

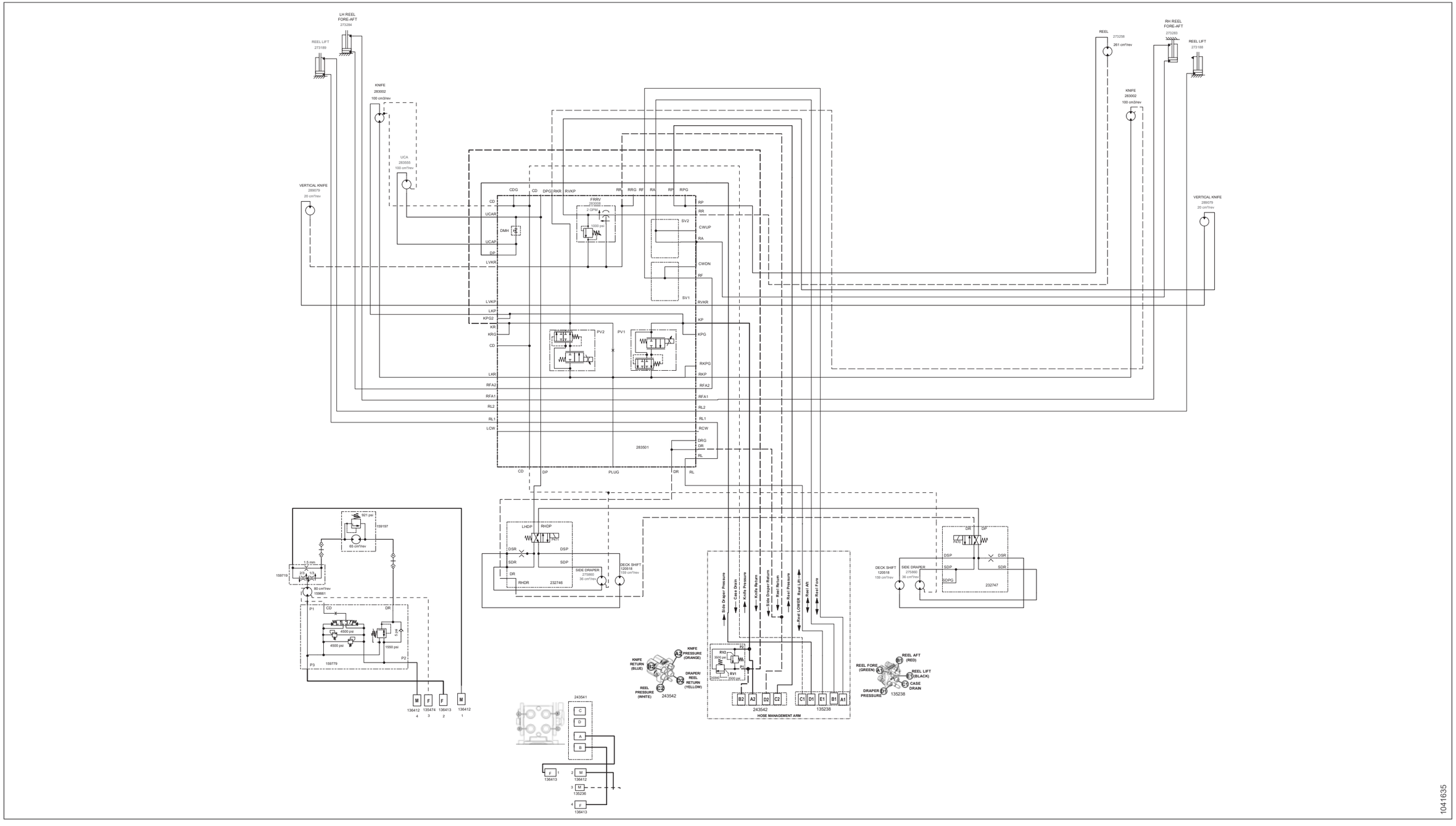
Chapter 8: Appendix – Hydraulics

Use this section for additional hydraulic information to help with diagnosing hydraulic issues.

8.1 Hydraulic Schematics

For an explanation of the acronyms used in this section, refer to *2.1 Definitions, page 11*.

Hydraulic Schematics



Index

A

B

C

D

F

G

H

L

M

O

P

R

S

T

U

W

Predelivery Checklist

Perform these checks and adjustments prior to delivery to your Customer. Refer to Unloading and Assembly Instructions for adjustment details. The completed checklist should be retained either by the Operator or the Dealer.

CAUTION

Carefully follow the instructions given. Be alert for safety-related messages, which bring your attention to hazards and unsafe practices.

Conditioner Serial Number: _____

Table .1 HC20 Hay Conditioner Predelivery Checklist

✓	Item	Reference
	Be sure all shipping material is removed.	—
	Check for shipping damage or missing parts.	shortageanddamage@macdon.com
	Check roll drive belt tension.	*3.14.1 Checking Roll Drive Belt Tension, page 63*
	Check conditioner roll gap, timing, and alignment.	*3.14.2 Checking Roll Gap, page 64* and *3.14.3 Checking Roll Timing, page 65*
	Check rear and side forming shields evenly set to desired position.	*3.7 Installing Forming Shield on Hay Conditioner, page 37*
	Grease all bearings.	*3.13 Lubricating Conditioner, page 60*
	Check roll intermesh hardware is securely tightened.	*4.9.2 Roll Gap, page 82*
	Check hydraulic hose routing.	*3.12 Connecting Hydraulics to Windrower, page 57*
	Run-up procedure	*3.14.4 Running up Conditioner, page 66*
	Check reverse operating mode.	Windrower manual
	Check hydraulic hose routing for clearance when raising or lowering header.	—
	Post run-up checks. Stop engine.	—
	Check for hydraulic leaks.	—
	Check belt drive for alignment and heated bearings.	*5.8 Drive Belt, page 102*
	Check manuals in windrower cab.	*3.14.5 Storing Manual, page 66*

Date checked:

Checked by:

Recommended 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: Recommended Lubricants

Lubricant	Specification	Description	Use	Capacities
Grease	SAE multi-purpose	High temperature extreme pressure (EP) performance with 1% max. molybdenum disulphide (NLGI Grade 2) lithium base	As required unless otherwise specified	—

MacDon

CUSTOMERS
MacDon.com

DEALERS
Portal.MacDon.com

Printed in Canada