MacDon

R1 FR Series
Front Mount Rotary Disc

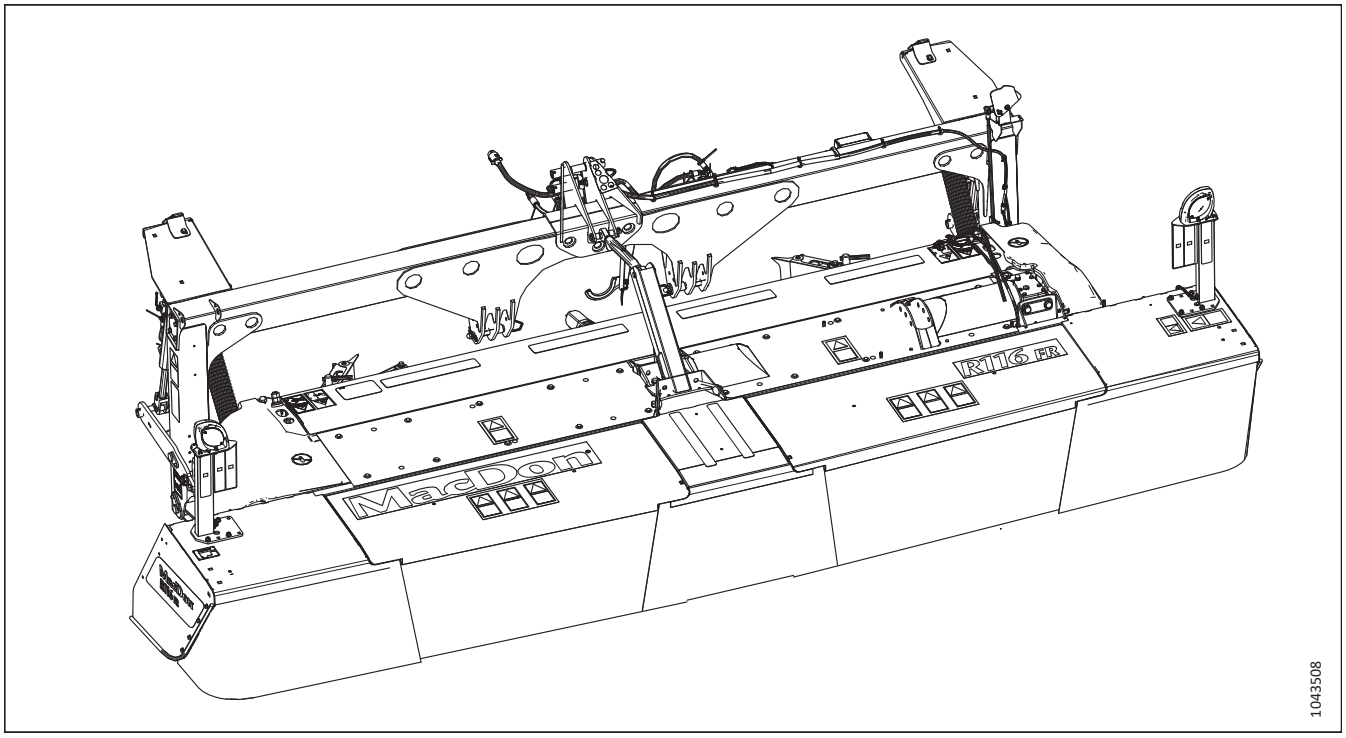
Unloading and Assembly Instructions

262820 Revision A

Original Instruction

The Harvesting Specialists.

R1 FR Series Front-Mount Rotary Disc



Published December 2024

Introduction

This instruction describes the unloading, setup, and predelivery requirements for the MacDon R1 FR Series Front Mount Rotary Disc.

To ensure that the customer receives all of the performance and safety benefits from this product, carefully follow the unloading and assembly procedure from the beginning through to completion.

Carefully read all the material provided before attempting to unload, assemble, or use the machine.

Retain this instruction for future reference.

If the shipment is damaged or is missing parts, contact the following according to your region:

- North America: *shortageanddamage@macdon.com*
- Australia: *service@macdon.com.au*
- Brazil: *garantia-brasil@macdon.com*
- Europe: *ShortageandDamageEU@MacDon.com*
- All other export markets: *shortageanddamage@macdon.com*

Conventions

The following conventions are followed in this document:

- Right and left are determined from the operator's position, facing the direction of travel.
- Unless otherwise noted, use the standard torque values provided in this manual. When torque values of 30 Nm or less are listed, their equivalents will be provided in both foot-pounds (lbf·ft) and inch-pounds (lbf·in).

NOTE:

Keep your MacDon publications up-to-date. The most current version can be downloaded from our website (*www.macdon.com*) or from our Dealer-only site (*https://portal.macdon.com*) (login required).

This instruction is currently available in English only.

Summary of Changes

At MacDon, we're continually making improvements; occasionally these improvements affect product documentation. The following list provides an account of major changes from the previous version of this document.

Section	Summary of Change	Internal Use Only
2 Unloading Truck Shipment, page 7	Added missing step to remove hauler's tie-down straps and chains.	Publications
3.1 Removing Rotary Disc from Shipping Pallet, page 9	Added notes to adjust the rear deflectors before lifting and to add blocks between the forks and conditioner roll to prevent the rotary disc from rocking backward when lifting. Added step to lower the machine onto blocks instead of straight onto the ground.	Product Support, Engineering
3.2 Installing Hydraulic Center-Link – Optional, page 9	Moved the hydraulic center-link installation to after the rotary disc is removed from the shipping pallet and lowered onto blocks.	Engineering, Product Support
4.1 Confirming Correct Gearbox Rotation, page 11	Added topic.	Publications
4.2 Connecting Tractor to Front Mount Rotary Disc, page 11	Added step to join the driveline halves before connecting the three-point hitch. Added step to rotate the storage bracket into storage position.	Engineering, Product Support
	Reordered steps so that the lift lock pins get removed before the lower link arms on the three-point hitch get adjusted.	Engineering
	Clarified that the lower linkage dimension is measured from the center of the lift arm pins to the ground. Changed the measurement to 5.5 in. (was 7.25 in.).	Engineering, Product Support
	Added steps to fill the lift cylinders while in manual mode to make sure the cylinders don't retract before the system is primed, which can cause damage to the components.	Engineering
	Changed hydraulic channel setting from "ON" to "CONTINUOUS".	Engineering
	Changed hydraulic flow setting to 20–30% (was 15–20%).	Engineering
—	Removed section: *Shortening the Power Take-Off Primary Driveline*.	Engineering, Product Support
5.2 Installing Tall Crop Divider – Optional, page 18	Moved the tall crop divider installation to after the curtains are unpacked.	Product Support, Engineering
7.2 Checking Cutting Angle, page 25	Revised illustration to show R1 FR Series; an R1 PT was previously shown.	Engineering
	Added illustration of the hydraulic center-link option.	Publications
7.4 Checking Sensors, page 26	Removed final step that said to check sensors at the opposite end of the machine, as the lift sensors are only on the left side.	Product Support

Section	Summary of Change	Internal Use Only
7.5 Checking Float, page 28	Added illustration of the float indicator.	Publications
7.6 Checking Auxiliary Lift System, page 32	Changed hydraulic flow setting to 20–30% (was 15–20%).	Engineering
7.9 Checking and Adding Lubricant – Conditioner Roll Timing Gearbox, page 35	Moved the sight glass to the opposite side of the gearbox.	ECN 65369
7.10 Checking and Adding Lubricant – Header Drive Gearbox , page 35	Added current instructions from the operator's manual.	Publications
7.11 Checking and Adding Lubricant – Cutterbar / Conditioner Drive Gearbox, page 36	Removed steps to open/close the left driveshield; the dipstick is accessible without removing the shield.	Product Support
7.13 Checking Roll Gap, page 39	Added polyurethane roll information	ECN 65903
7.13.2 Adjusting Roll Gap – Polyurethane Rolls, page 40	Added topic.	ECN 65903
7.14.1 Adjusting Roll Timing, page 41	Added topic.	Product Support
7.7 Positioning Forming Shield Side Deflectors – Roll Conditioner, page 33	Added topic. This was listed on the predelivery checklist but was missing the information in the instructions.	Publications
7.8 Adjusting Conditioner Baffle Position, page 34	Added steps to remove/install the lynch pin that secures the lever to the adjustment plate. Revised illustrations to show the correct lever and correct three-position plate.	Product Support, Publications
	Added missing step to make the same adjustment on the opposite side.	Product Support
8.8 Disconnecting Tractor from Front Mount Rotary Disc, page 53	Added step to rotate the driveline storage hook back to the holding position.	Product Support
8.9 Reversing Gearbox Driveshaft Rotation – Header Drive Gearbox, page 56	Added topic.	Product Support
• *8.12 Removing Cross Driveline, page 61* • *8.13 Installing Cross Driveline, page 62*	Added topics, which are required if the header gearbox driveshaft rotation needs to be reversed.	Publications
Predelivery Checklist, page 75	Clarified there are two different drive gearboxes to check.	Product Support
Inside Back Cover	Corrected header drive gearbox capacity to 2.0 US quarts.	Engineering
	Moved Lubricants table to inside the back cover.	Publications

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

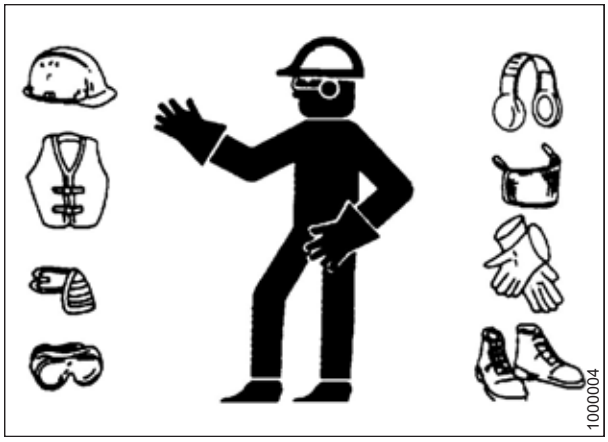


Figure 1.2: Safety Equipment

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.

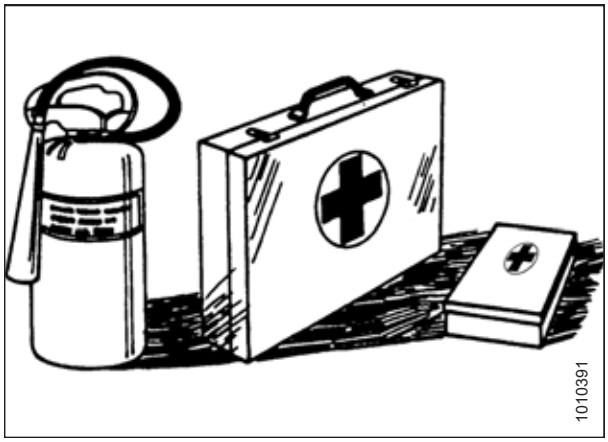


Figure 1.4: Safety Equipment

- 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.

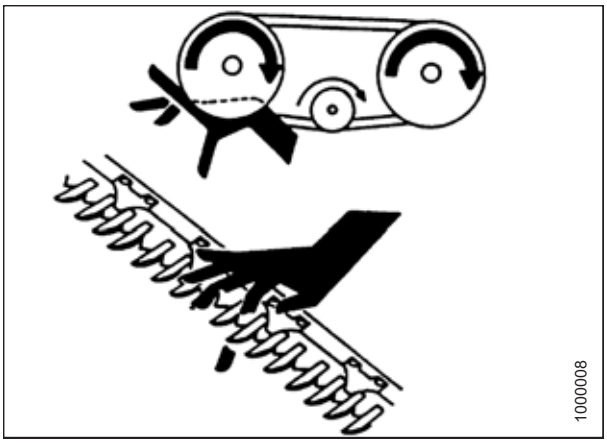


Figure 1.6: Safety around Equipment

- 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.

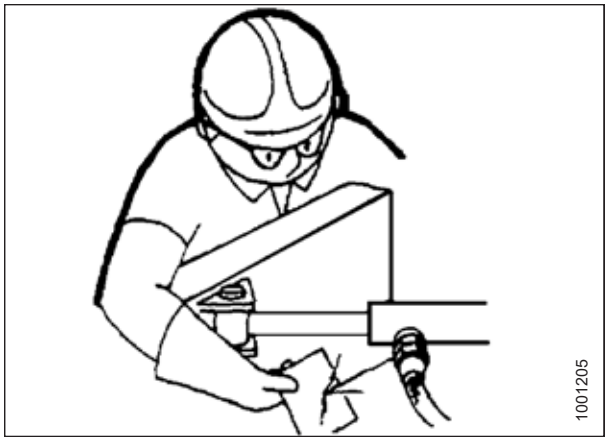


Figure 1.8: Testing for Hydraulic Leaks

- 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.

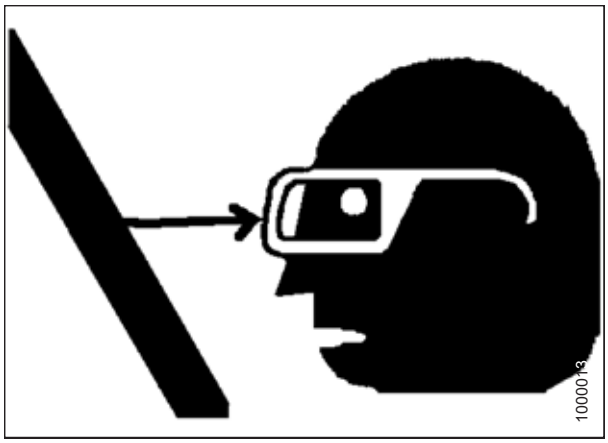


Figure 1.10: Safety around Equipment

1.5 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.

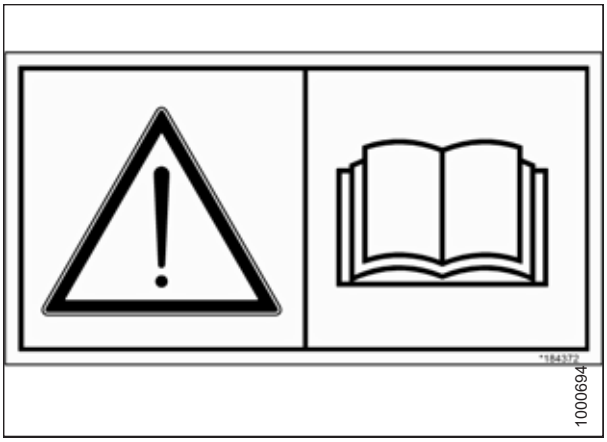


Figure 1.11: Operator's Manual Decal

Chapter 2: Unloading Truck Shipment

To unload machines from a truck shipment safely and without damage, understand the weights and lifting requirements, and familiarize yourself with the procedure.

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.

DANGER

The equipment used for loading or unloading a machine must meet or exceed the requirements specified in this document. Using inadequate equipment may result in chain breakage, vehicle tipping, machine damage, and bodily harm to operators or bystanders.

DANGER

Ensure that all bystanders have cleared the area.

Lifting Vehicle Requirements	
Minimum capacity	3630 kg (8000 lb.)
Minimum height	4.5 m (15 ft.)

Chain Requirements	
Overhead lifting quality 12.7 mm (1/2 in.)	2270 kg (5000 lb.) minimum working load

1. Remove hauler's tie-down straps and chains.
2. Approach front mount rotary disc (A) from the back with forklift (B) as shown, and slide the forks as far as possible into the pallet.

   NOTE:

   The pallet is designed to be lifted from the backside only.
3. Raise the rotary disc off the deck.

   IMPORTANT:

   If the load is two-machines wide, take care not to contact the other machine.
4. Back up until the machine clears the trailer, and slowly lower the machine to 150 mm (6 in.) from the ground.
5. Take the machine to a storage or set-up area, and set the machine down securely on level ground.

   NOTE:

   When possible, approach the machine from the back to minimize the potential for contacting the unit.

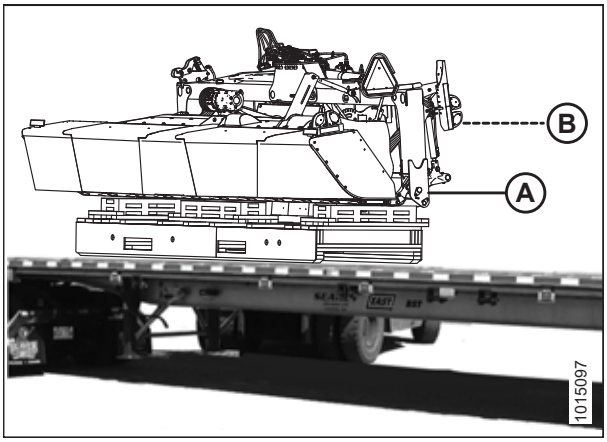


Figure 2.1: Unloading Front Mount Rotary Disc

6. Repeat Step *1, page 7* to Step *5, page 7* for the second rotary disc (if required).
7. Check for shipping damage and missing parts.

   IMPORTANT:
   Do **NOT** remove the machine from the pallet until instructed.
8. Unload the remaining pallets and boxes, and take them to the assembly area.

Chapter 3: Assembling R1 Front Mount Rotary Disc

Perform the following procedures in the order provided to assemble the R1 FR Series Front Mount Rotary Disc.

3.1 Removing Rotary Disc from Shipping Pallet

A shipping pallet is strapped to the front mount rotary disc and must be removed before delivery to the customer.

1. Cut strapping (A) securing the cutterbar to pallet (B).
2. Place the forks (C) from the lifting device within openings, and spread the forks as wide apart as possible to balance the load.

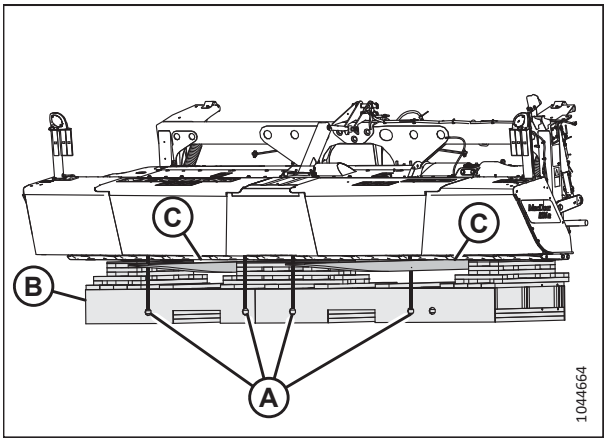


Figure 3.1: Strapping – R116 FR Shown; R113 FR Similar

IMPORTANT:

Make sure the rear deflectors (A) are positioned so that they will avoid contact with the forks, as the rotary disc will roll back slightly when lifted.

NOTE:

Placing a block between each fork and the conditioner roll can prevent the rotary disc from rocking backwards when lifting it.

3. To adjust a rear deflector (A), loosen locking handle (B), then slide the adjuster bar to the desired position and engage the bar into a notch in the adjuster plate. Retighten locking handle (B).
4. Lift the rotary disc high enough that the pallet can be removed.
5. Use a chain or a forklift to remove shipping pallet (B) from underneath the machine.
6. Place blocks under each end, or just inside each end, of the cutterbar.
7. Lower the rotary disc onto the blocks.

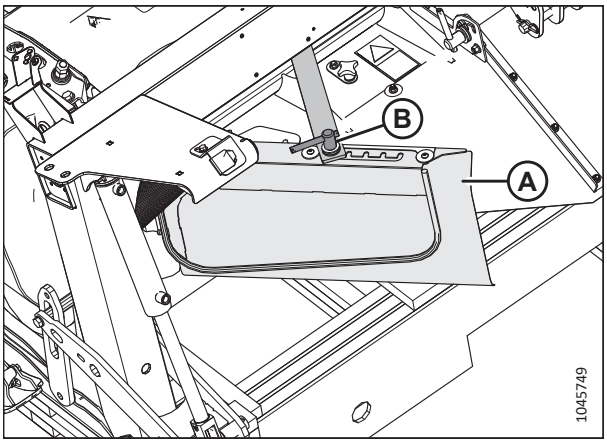


Figure 3.2: Adjusting Rear Deflectors

3.2 Installing Hydraulic Center-Link – Optional

The hydraulic center-link option is supplied in a separate shipment. For instructions, refer to the installation instructions supplied with the kit.

Chapter 4: Connecting Tractor to Front Mount Rotary Disc

Connecting the front mount rotary disc to the tractor involves connecting the hydraulic and electrical systems, and the tractor's three-point hitch.

4.1 Confirming Correct Gearbox Rotation

The header drive gearbox is factory-set for counterclockwise power take-off (PTO) rotation. If the tractor has clockwise PTO rotation, the gearbox needs to be rotated 180°.

1. Confirm the PTO's direction of rotation as indicated by arrow (A) near the PTO shaft.
2. If you need to reverse the header drive gearbox rotation, refer to *8.9 Reversing Gearbox Driveshaft Rotation – Header Drive Gearbox, page 56* for instructions.

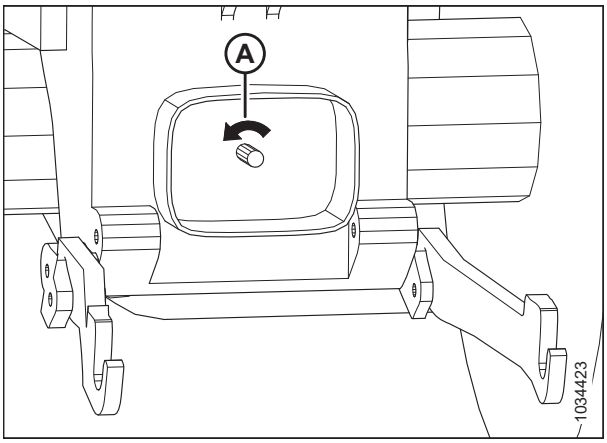


Figure 4.1: Tractor PTO

4.2 Connecting Tractor to Front Mount Rotary Disc

Connecting the machine to the tractor involves connecting the hydraulic and electrical systems. The R1 FR Series can attach to three-point hitch categories 2, 3, and 3N.

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.

DANGER

Ensure that all bystanders have cleared the area.

1. Ensure the machine is set on a flat, level surface.

2. Retrieve driveline half (A) from the shipping location and install it onto driveline half (B) that is connected to the header drive gearbox.

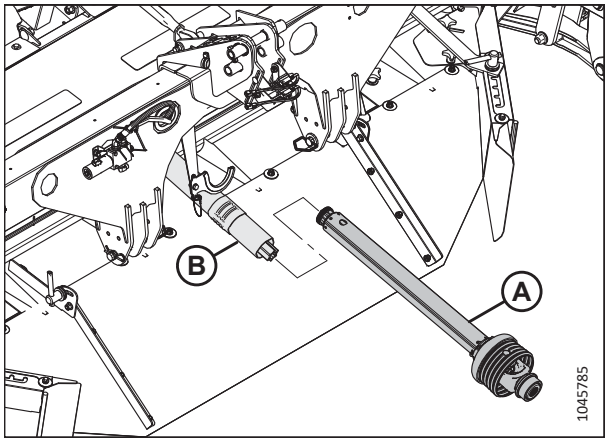


Figure 4.2: Installing Driveline Half

3. Place driveline (A) in storage bracket (B).

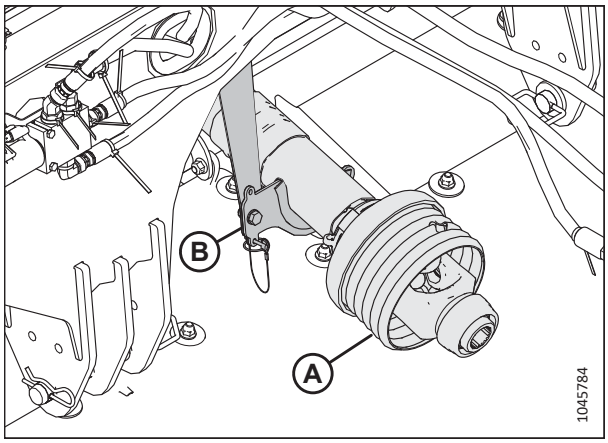


Figure 4.3: Driveline Storage Bracket

4. Connect your tractor's three-point hitch to the following locations on the carrier frame according to the hitch type.
   - Category 3: connect to upper linkage (A) and lower linkages (D).
   - Category 3N: connect to upper linkage (A) and lower linkages (C).
   - Category 2: connect upper linkage (B) and lower linkages (C).

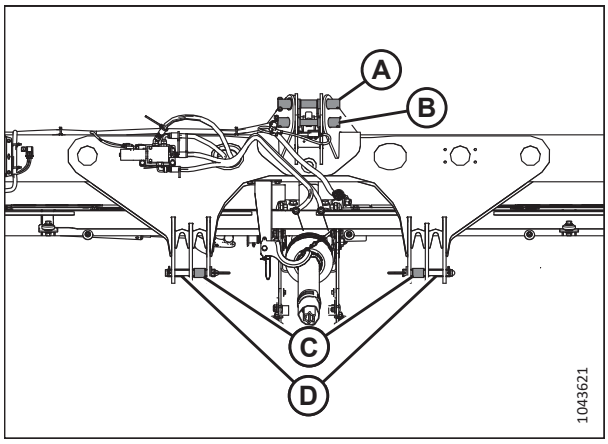


Figure 4.4: Front Linkage Connections

5. Attach three-point hitch (A) to carrier frame linkage (B). Refer to your tractor hitch instructions to properly secure the connections.
6. Lower the front mount rotary disc fully.
7. Shut down the engine, and remove the key from the ignition.

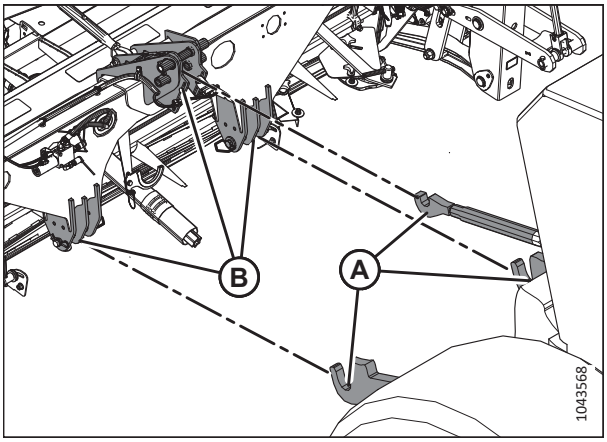


Figure 4.5: Alignment with Carrier Frame

8. Remove auxiliary lift lock straight pins (A) from holes in lift linkages on both sides of the machine. Store the auxiliary lift lock straight pins, washers, and lynch pins in storage location (B) on the left side of the carrier frame.

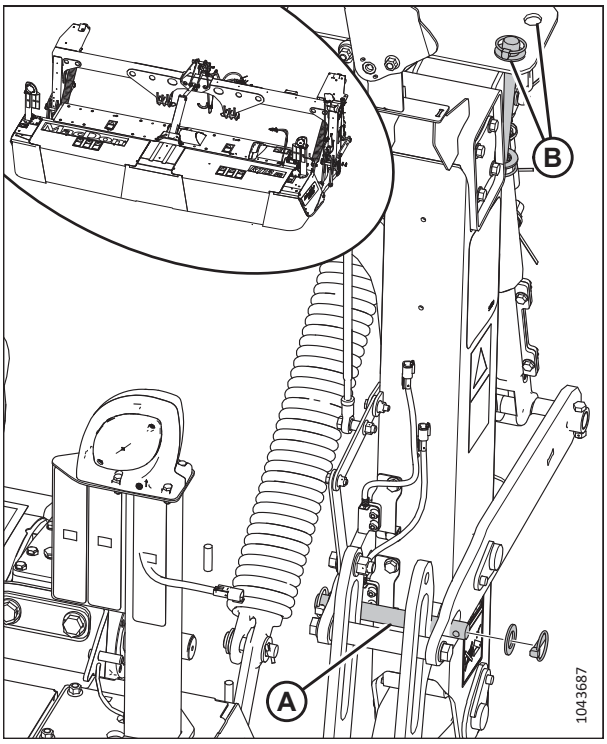


Figure 4.6: Auxiliary Lift Lock Pins – Left Side

9. Adjust lower link arms (A) on the three-point hitch until dimension (B) (from the center of the pin to the ground) is 140 mm (5 1/2 in.).

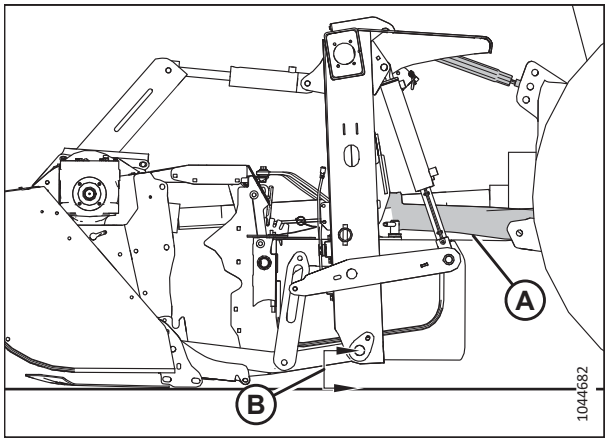


Figure 4.7: Alignment with Carrier Frame

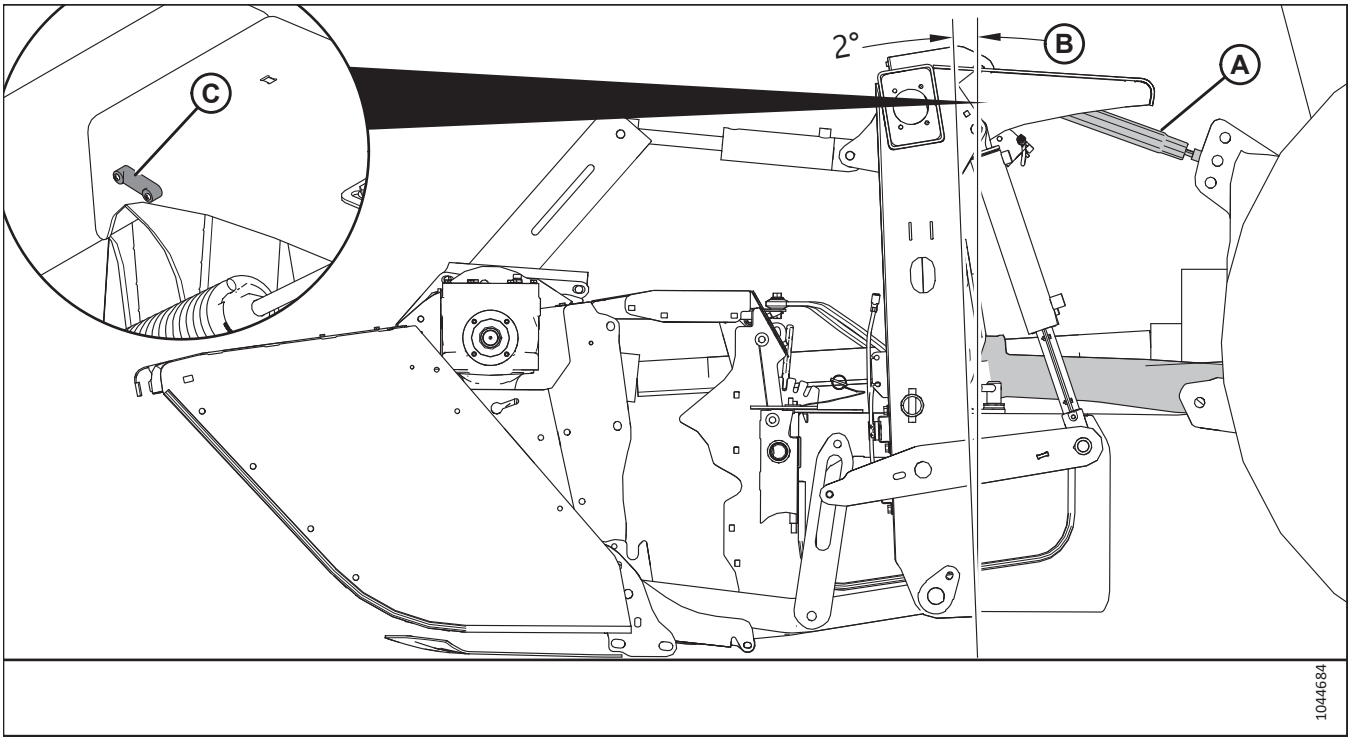


Figure 4.8: Alignment with Carrier Frame

10. Adjust the length of top-link (A) on the three-point hitch until carrier frame angle (B) is approximately 2° forward. Use bubble level (C), located on the right side of the carrier frame to set the angle.

11. Position the driveline onto the tractor's PTO shaft.
12. Pull back collar (A) on the driveline and push the driveline onto the PTO shaft until it locks. Release the collar.

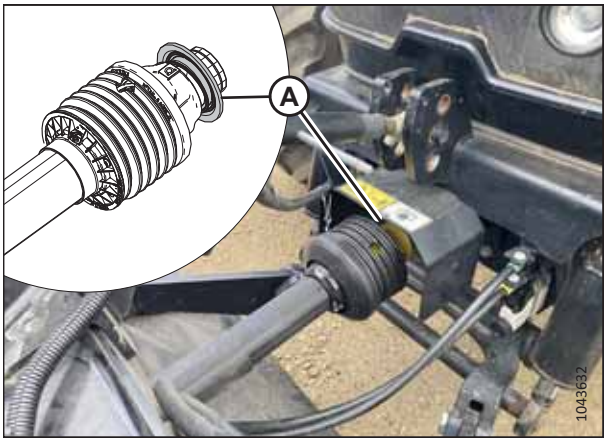


Figure 4.9: Tractor Front PTO Connection

13. Rotate storage bracket (A) into storage position and secure it with pin (B).

    IMPORTANT:

    If the bracket is not put into storage position, it can be damaged when lifting the machine.

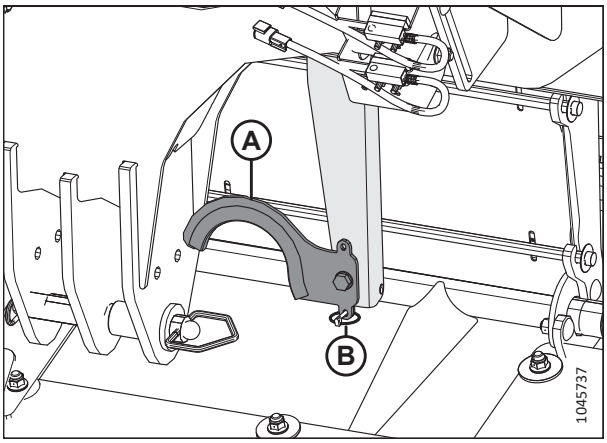


Figure 4.10: Driveline Storage Bracket in Storage Position

14. Locate pressure and return hoses (A):
    - Pressure (yellow tie)
    - Return (green tie)

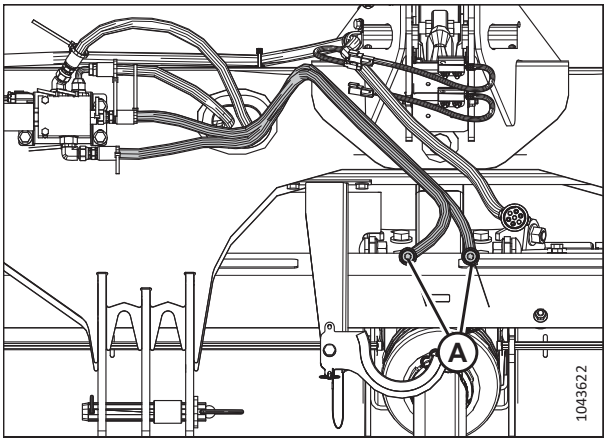


Figure 4.11: Hydraulic Control Hoses

15. Connect pressure hose (A) (yellow tie) and return hose (B) (green tie) to the tractor's front selective control valve.

    NOTE:

    Ensure that the hoses are connected to the same remote set.

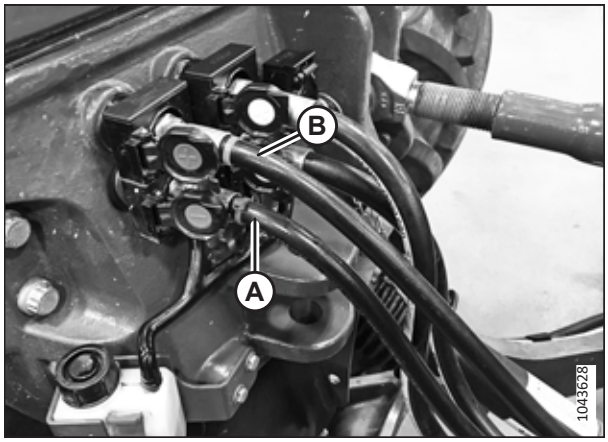


Figure 4.12: Hydraulic Connections

16. Connect the seven-pin electrical connector (A) on the rotary disc's main harness to the tractor's front electrical plug.

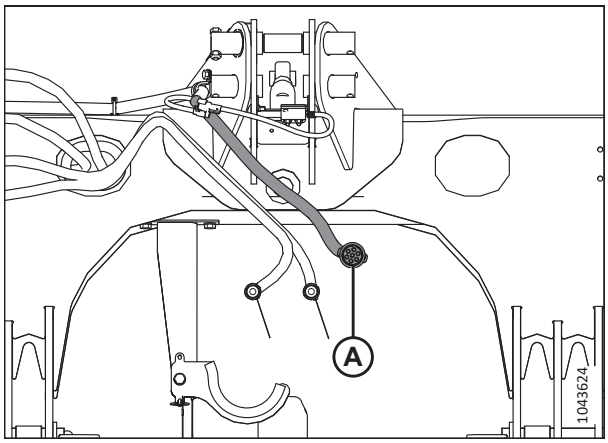


Figure 4.13: Main Electrical Harness

17. Locate the relay logic switch on the left side of the carrier frame at the back of the machine and set switch (A) to the manual "M" position.

18. Using the tractor's front hydraulic circuit controls, fully extend the auxiliary lift cylinders to fill them.

    IMPORTANT:

    Make sure you extend the cylinders first. Retracting the lift cylinders without the system primed can cause damage to the components.

19. Set switch (A) to the automatic "A" position for normal operation. In this mode, the auxiliary lift cylinders will extend or retract according to feedback from the position sensors.

20. Set the tractor's front hydraulic channel to CONTINUOUS, and adjust flow to 20–30 %. For instructions, refer to the tractor operator's manual.

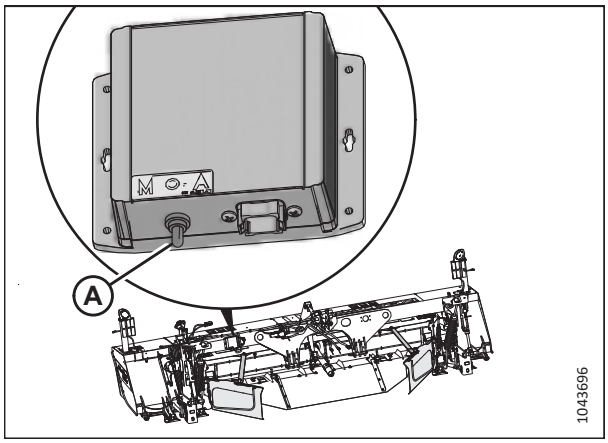


Figure 4.14: Relay Logic Assembly

Chapter 5: Completing Front Mount Rotary Disc Assembly

The front mount rotary disc has to be completely assembled before it can be operated.

5.1 Unpacking Curtains

Curtains provide protection from objects and debris thrown at high velocity from the cutterbar.

1. Remove two M10 hex head bolts (A) and the center lock flange nuts securing the cutterbar door supports to the center channel frame.

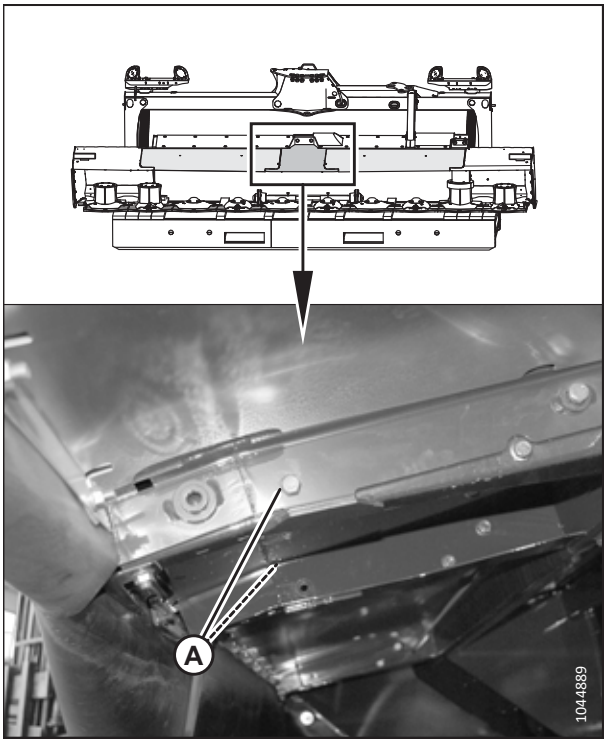


Figure 5.1: Underside of Cutterbar Doors

2. Remove shipping wire (A) from the cutterbar door curtains and forming shield covers, and pull the curtains down.

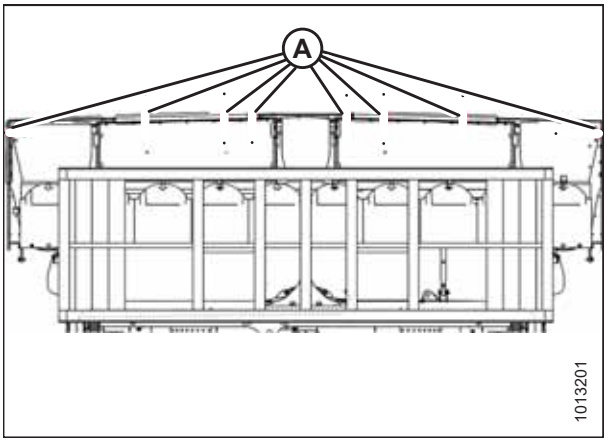


Figure 5.2: Underside of Machine

3. Straighten cutterbar door curtains (A) and remove any folds or creases.

   NOTE:

   Minor creases will eventually straighten out.

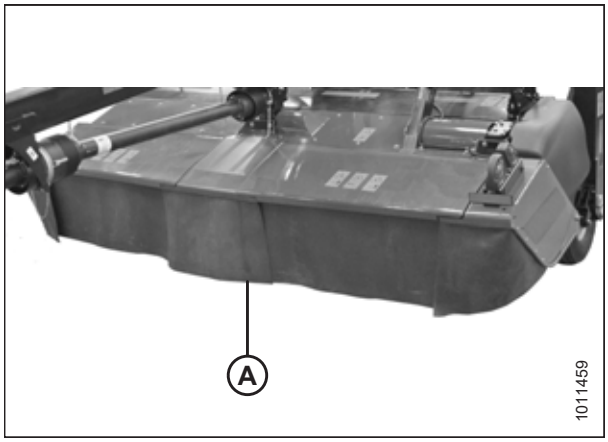


Figure 5.3: Cutterbar Door Curtains

4. Ensure the cutterbar door curtains and forming shield covers hang properly and completely enclose the cutterbar area.

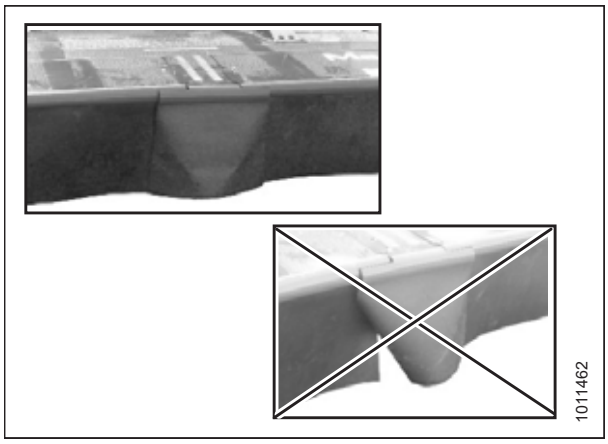


Figure 5.4: Cutterbar Door Curtains

5.2 Installing Tall Crop Divider – Optional

The tall crop divider is supplied in a separate shipment. For instructions, refer to the installation instructions supplied with the kit.

Chapter 6: Lubricating Front Mount Rotary Disc

The front mount rotary disc has been lubricated at the factory; however, you should lubricate the machine prior to delivery to offset the effects of weather during outside storage and transport.

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.

6.1 Lubrication Points

Lubrication should be performed to offset the effects of weather during outside storage and transport.

NOTE:

Unless otherwise specified, use high-temperature, extreme-pressure (EP2) performance grease with 1% max. molybdenum disulphide (NLGI grade 2) lithium base.

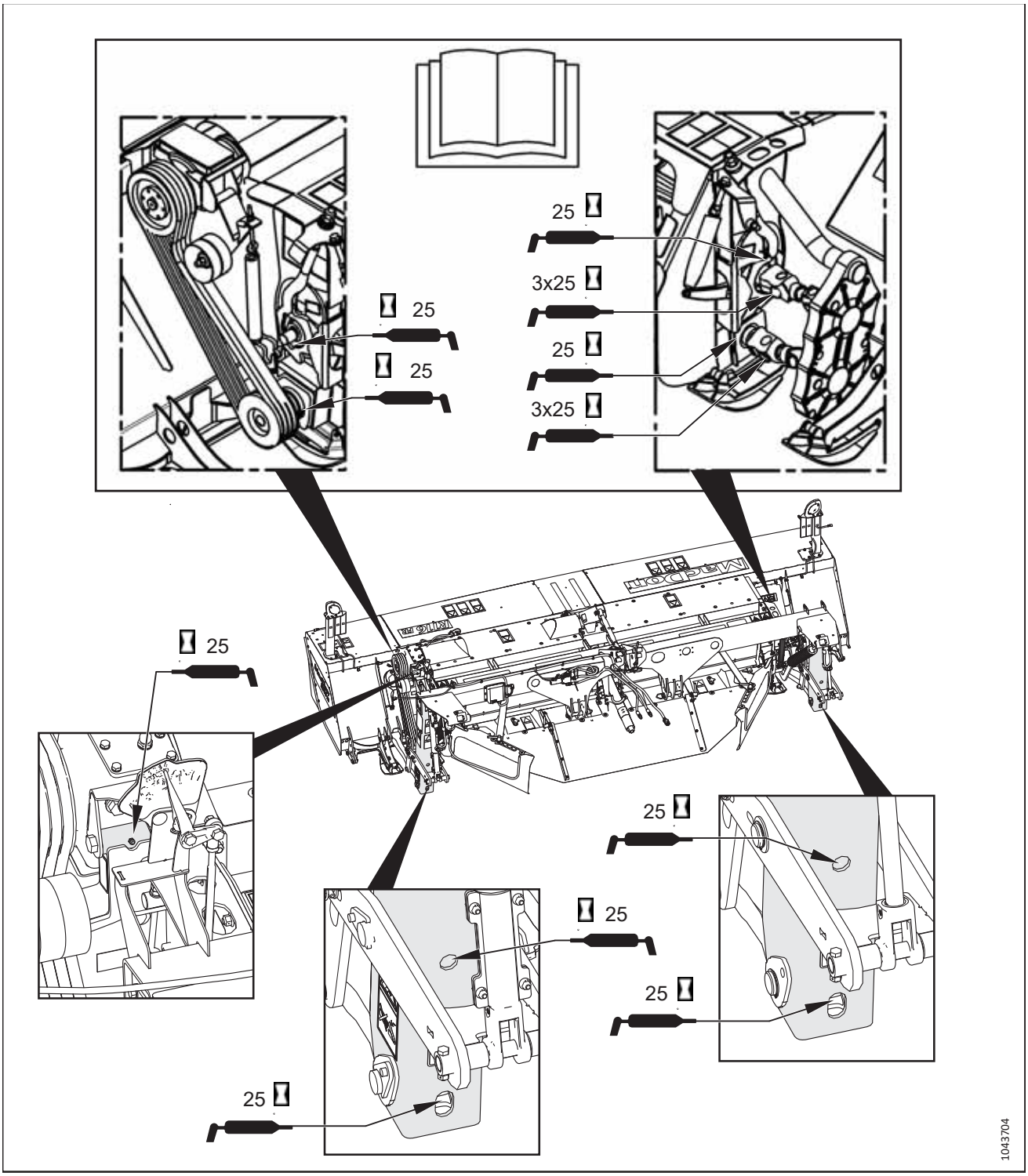


Figure 6.1: Grease Locations – Conditioner Drivelines and Pivot Points

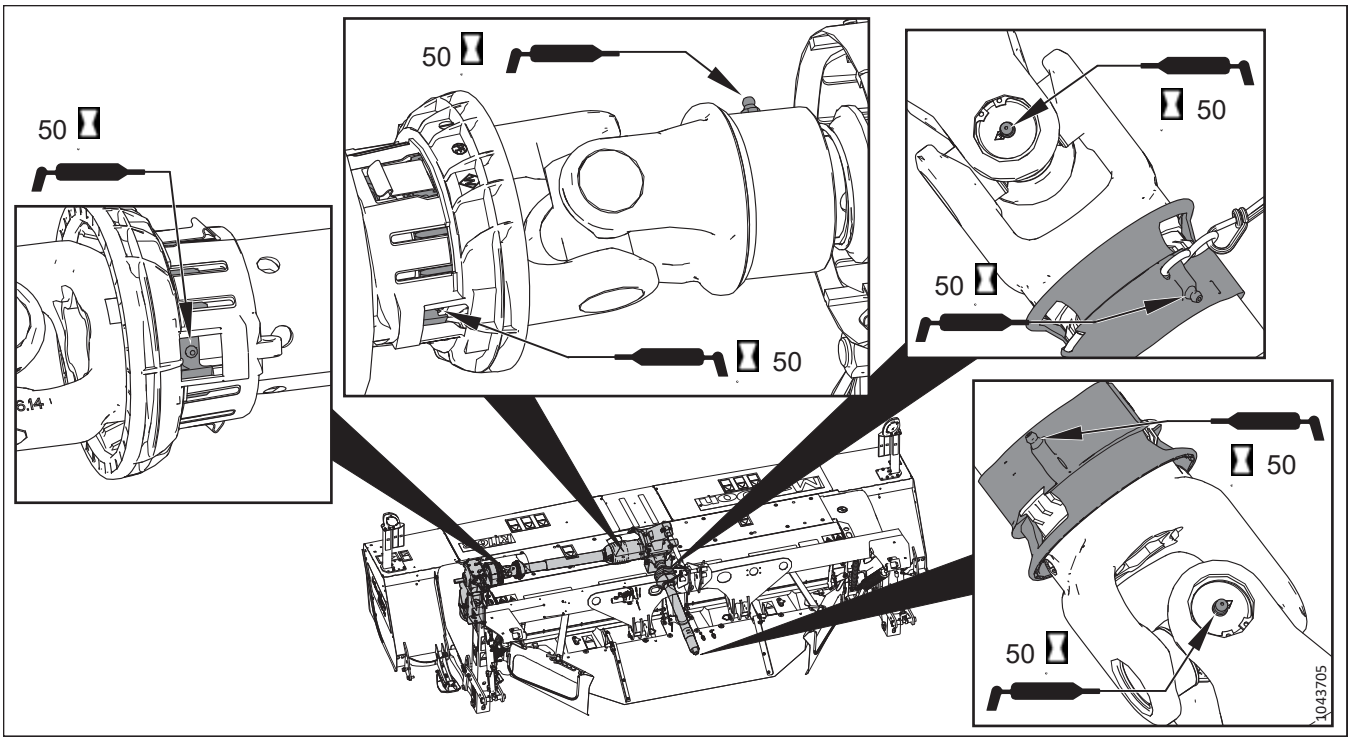


Figure 6.2: Grease Locations – Primary and Cross Drivelines

Chapter 7: Performing Predelivery Checks

Perform the final checks and adjustments as listed on the Predelivery Checklist (yellow sheet inside the back cover of this instruction) to ensure the machine is field-ready.

Refer to the following pages for detailed instructions as indicated on the *Predelivery Checklist, page 75*. The completed Checklist should be retained either by the Operator or the Dealer.

DANGER

Follow these safety guidelines during predelivery checks to prevent bodily injury or death:

- **Always shut off the engine and remove the key from the ignition before adjusting or inspecting the machine, or leaving the operator's seat for any reason.**
- **If the machine is raised, always place blocks under each end of the cutterbar, and close the lock-out valves. Never work on or beneath an unsupported machine.**
- **Block the machine wheels before detaching it from the tractor.**
- **Clear the area of bystanders.**

WARNING

Follow these safety guidelines during predelivery checks to prevent bodily injury or death:

- **Install all machine shields and covers before operating the machine.**
- **Wear close-fitting clothing and cover long hair. NEVER wear dangling items such as hoodies, scarves, or bracelets.**
- **Wait for shafts and other parts to stop moving before approaching them.**
- **Wear safety glasses and safety gloves when working near the cutterbar.**
- **Never exceed the maximum inflation pressure indicated on the tire label.**

IMPORTANT:

To avoid machine damage, check that no shipping dunnage has fallen into cutterbar.

IMPORTANT:

Set the hydraulic flow rate to between 20–30 % to provide optimal flow to the auxiliary lift cylinder control valve.

NOTE:

For recommended fluids and lubricants, refer to the chart on the inside back cover.

7.1 Checking Conditioner Drive Belt

Ensure that the conditioner drive belt tensioning spring is set at the correct length.

1. Open the left driveshield. For instructions, refer to *8.3 Opening Driveshields, page 48*.

2. Check that belt (A) is properly tensioned and positioned on pulleys (B).

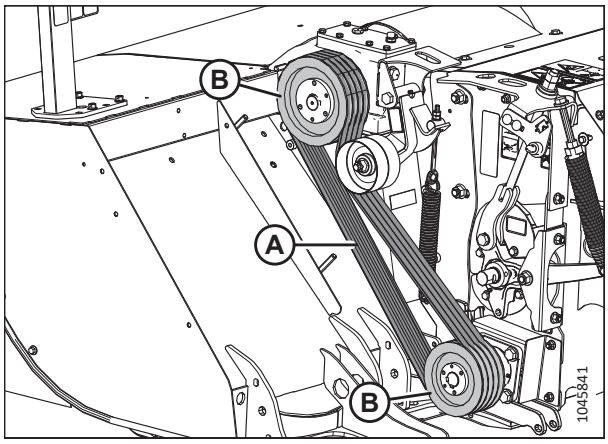


Figure 7.1: Conditioner Drive Belt

3. Ensure spring (A) is in forward hole (B).

4. Check that adjuster nuts (C) are tight.

5. Measure the length of spring (A). Spring length (D) should be 366 mm (14 3/8 in.).

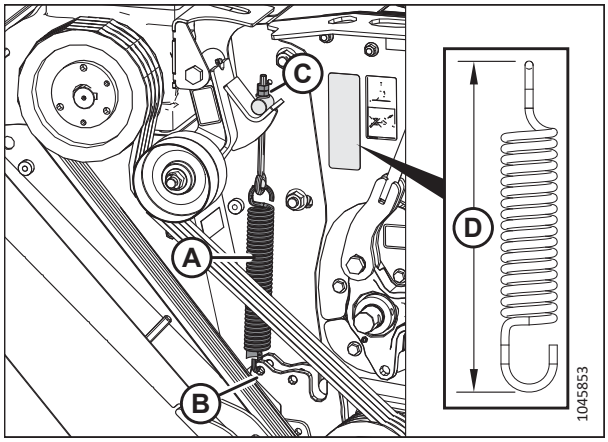


Figure 7.2: Belt Tensioner Spring

6. If the spring length requires adjustment:

   a. Turn jam nut (A) counterclockwise to unlock the tension adjustment.

   b. To increase the spring length (tension), turn adjuster nut (B) clockwise. To decrease the spring length (relax), turn adjuster nut (B) counterclockwise.

   c. Once the correct spring measurement has been achieved, hold adjuster nut (B) and tighten jam nut (A) against it.

7. Close the driveshield. For instructions, refer to *8.4 Closing Driveshields, page 49*.

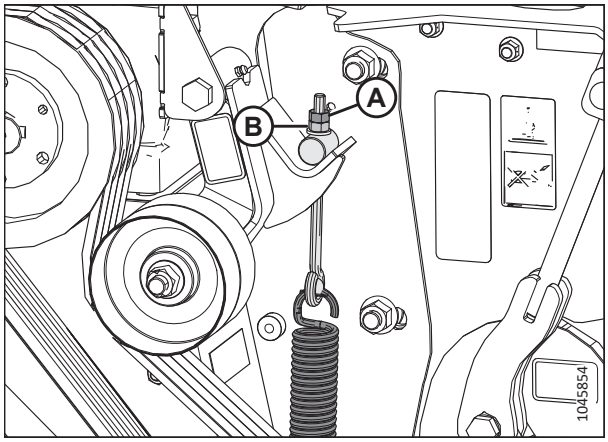


Figure 7.3: Belt Tensioner Spring

7.2 Checking Cutting Angle

Ensure the cutting angle is not set to an extreme position that could affect performance.

The mid-point for the cutting angle is the middle of the adjustment range on center-link (A).

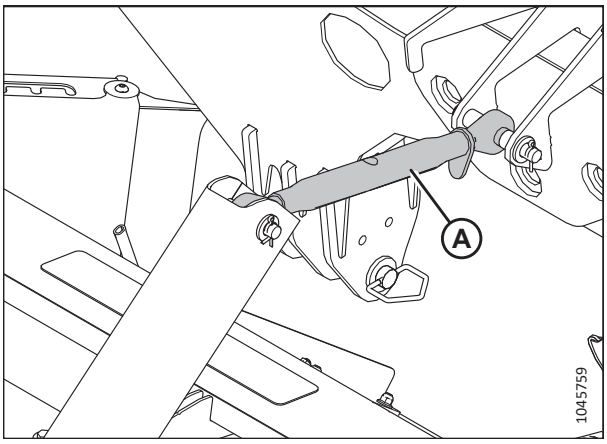


Figure 7.4: Mechanical Center-Link

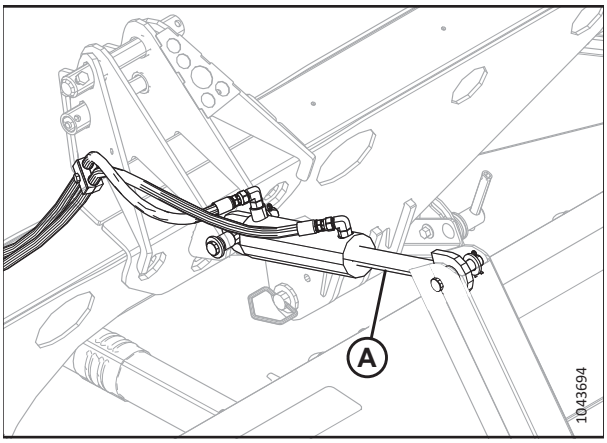


Figure 7.5: Hydraulic Center-Link

7.3 Checking Skid Shoes

The skid shoes are located on both sides of the machine.

All skid shoes (A) should be at the same position, either up (shown at right) or down.

NOTE:

The R113 is equipped with one skid shoe at each end; the R116 is equipped with two skid shoes at each end.

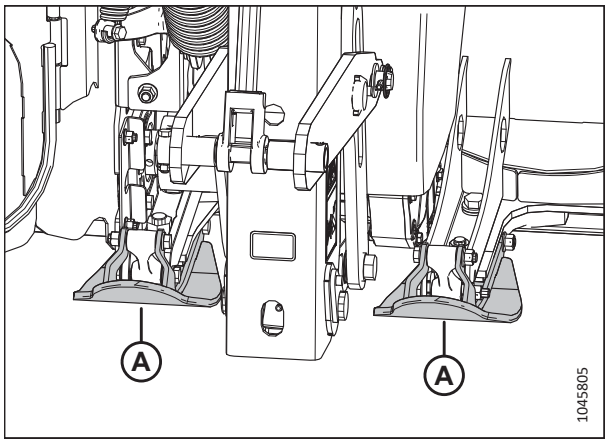


Figure 7.6: Skid Shoes – R116 FR

7.4 Checking Sensors

Functioning sensors will allow the front mount rotary disc to operate as intended.

1. Raise the rotary disc fully.
2. Shut down the engine, and remove the key from the ignition.
3. Close the auxiliary lift cylinder lock-out valve (A) on each lift cylinder by turning the handle to the horizontal position (90° to the hose). Repeat this step on the opposite side.

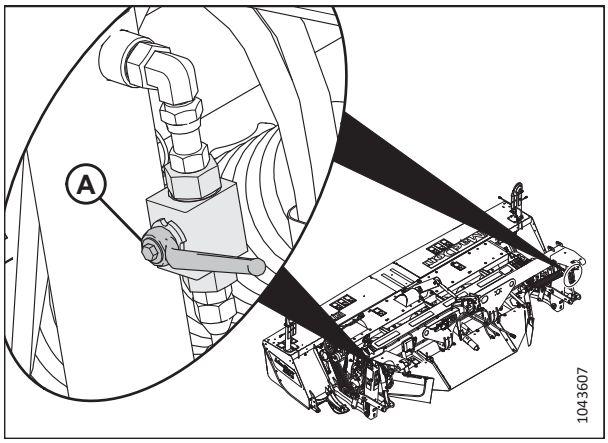


Figure 7.7: Cylinder Lock-Out Valve – Closed Position

NOTE:

When the three-point hitch is fully raised, top-link (A) moves to within 1–3 mm (1/32–1/8 in.) of upper proximity sensor (B) (inset).

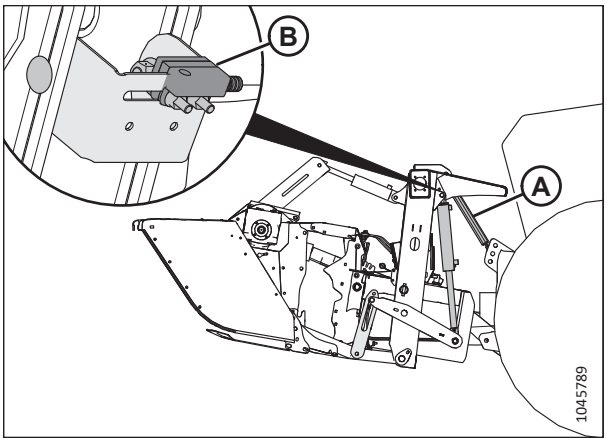


Figure 7.8: R1 FR – Fully Raised Position

4. Adjust the sensor by loosening bolts (B) and ensuring that sensor (A) is within 1–3 mm of the top-link arm. Retighten bolts (B).

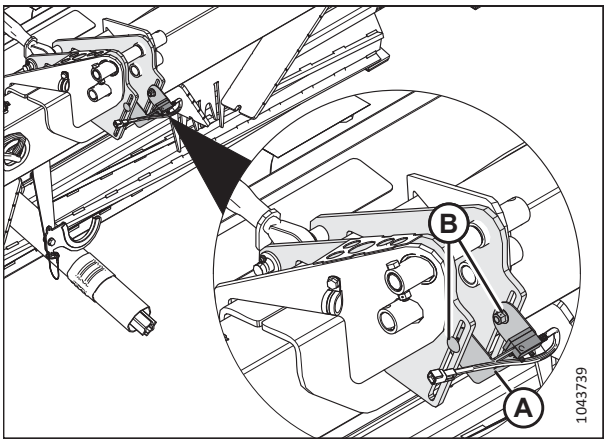


Figure 7.9: R1 FR – Top-Link Sensor

5. Check both auxiliary lift cylinder sensors (A) to see if they are within 1–3 mm of the linkage (B).

   NOTE:

   If sensors (A) are out of range, loosen the bracket bolts and slide the bracket and sensor within range of the linkage. Retighten the bolts.

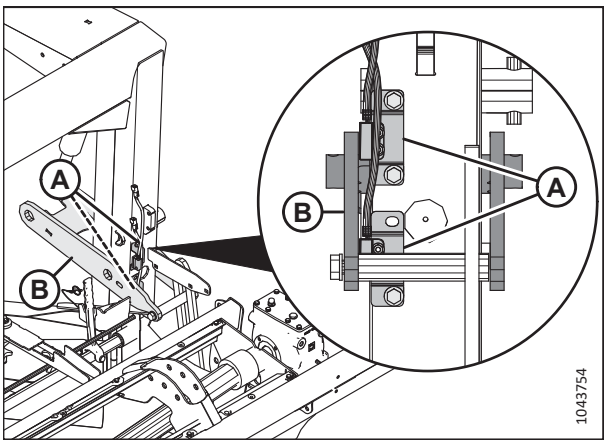


Figure 7.10: Auxiliary Lift Cylinder Sensors

7.5 Checking Float

Correct float ensures the cutterbar is able to closely follow ground contours.

1. Lower the front mount rotary disc until float indicator (A) is at position 2.
2. Shut down the engine, and remove the key from the ignition.
3. Grasp the front corner of the machine and lift; the weight should feel approximately like 45 kg (100 lb.) at both ends. If adjustment is required, refer to *7.5.1 Adjusting Float, page 28*.

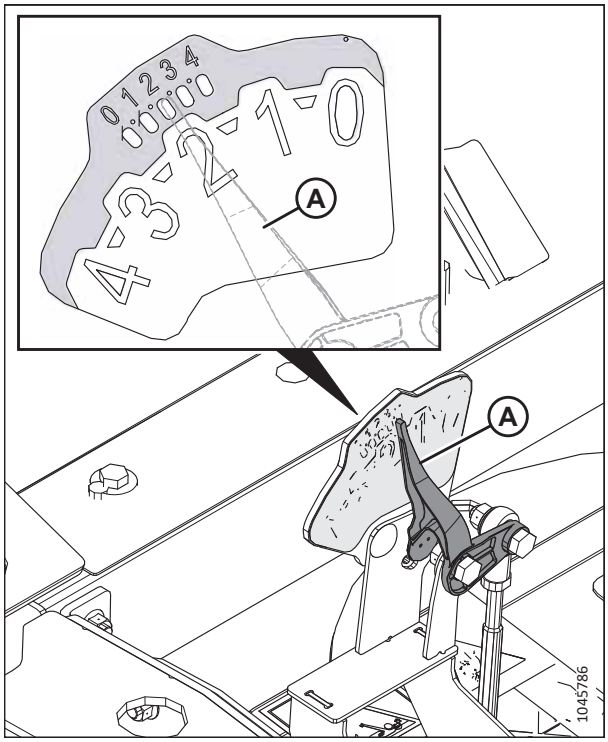


Figure 7.11: Float Indicator – Left Side

7.5.1 Adjusting Float

The float setting (or lifting force) changes depending on options. The setting must be the same at both ends of the front mount rotary disc.

NOTE:

Changing the machine's operating position can affect the float settings. After adjusting the cutting height or the cutterbar angle, check the float and adjust as necessary.

1. Raise the front mount rotary disc fully.
2. Shut down the engine, and remove the key from the ignition.

3. Close the auxiliary lift cylinder lock-out valve (A) on each lift cylinder by turning the handle to the horizontal position (90° to the hose). Repeat this step on the opposite side.

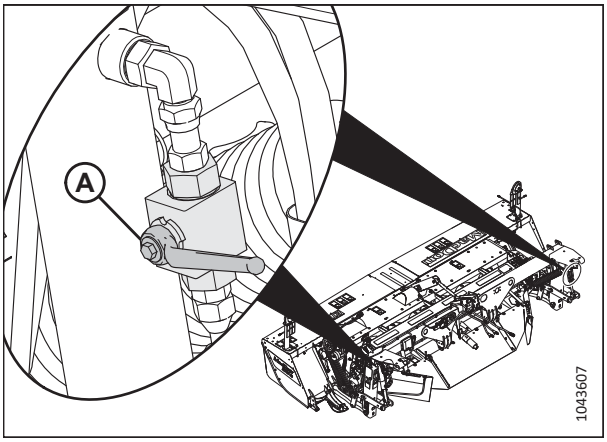


Figure 7.12: Cylinder Lock-Out Valve – Closed Position

4. Loosen retaining bolt (A) and rotate cover plate (B) away from float spring bolt (C). Repeat this step on the opposite side.

5. Fully loosen float spring bolt (C). Repeat this step on the opposite side.

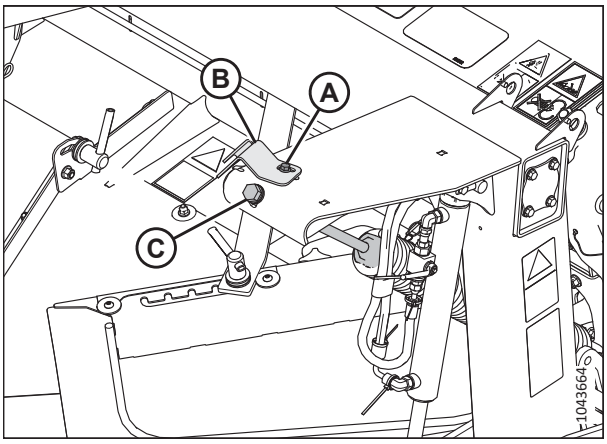


Figure 7.13: Float Spring – Right Side

6. Turn adjuster bolt (A) to achieve the recommended measurement (B) for the conditioner type. Refer to Table *7.1, page 30* for measurements.

   NOTE:

   Float settings indicated in the table are starting points. Float force should be checked with header float and cutting angle set as planned for use in the field.

   - Turn bolt (A) clockwise (towards the spring) to increase float.
   - Turn bolt (A) counterclockwise (away from the spring) to decrease float.

   Repeat this step on the opposite side.

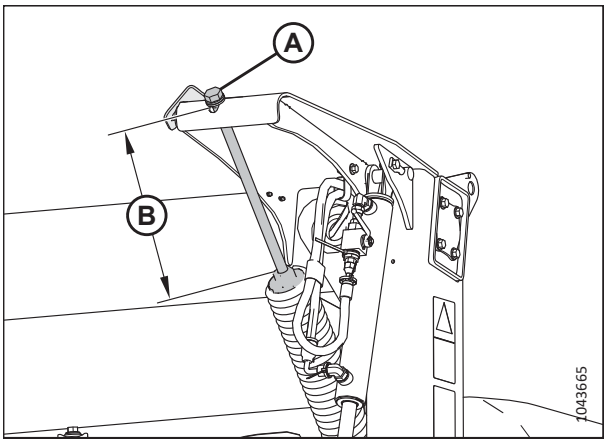


Figure 7.14: Adjuster Bolt

Table 7.1 Float Setting Starting Point

Model	Conditioner Type	Length of Exposed Thread
R113 FR	Roll	120–130 mm (4 3/4–5 1/8 in.)
R116 FR	Roll	70–80 mm (2 3/4–3 1/8 in.)

7. Reposition cover plate (A) over the float spring adjuster bolt as shown. Secure cover plate (A) by tightening bolt (B). Repeat this step on the opposite side.

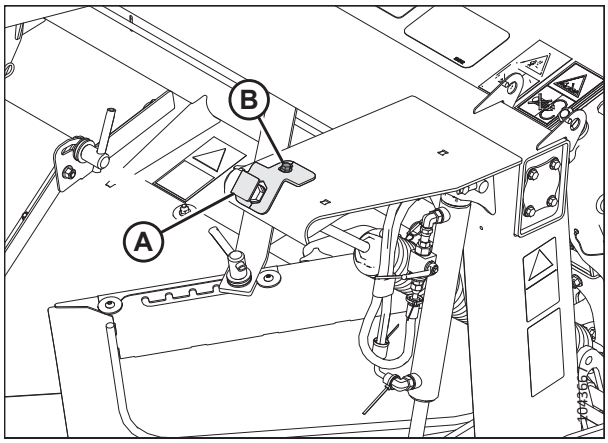


Figure 7.15: Adjuster Bolt Cover Plate

8. Open auxiliary lift cylinder lock-out valve (A) on each cylinder by turning the handle to the open position (in line with the hose).

9. Lower the rotary disc to cutting position, grasp the front corner of the machine, and lift; the weight should feel like approximately 45 kg (100 lb.) at both ends.

   NOTE:

   In rough or stony conditions, it may be preferable to apply less force in order to protect the cutting components.

   NOTE:

   When the float setting is light, it may be necessary to reduce the ground speed to prevent excessive bouncing and leaving a ragged cut.

10. Repeat the adjustment procedures until the desired weight is achieved at both ends of the machine.

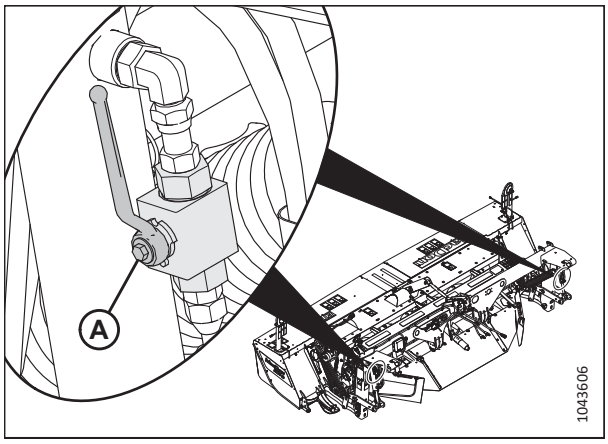


Figure 7.16: Lock-Out Valve – Open Position

11. With the rotary disc on level ground in cutting position, calibrate float indicator (A) by loosening jam nut (B), and turning the adjustable rod until the needle is centered on the number “2”.

    NOTE:

    The auxiliary lift cylinders should be fully retracted when calibrating the float indicator.

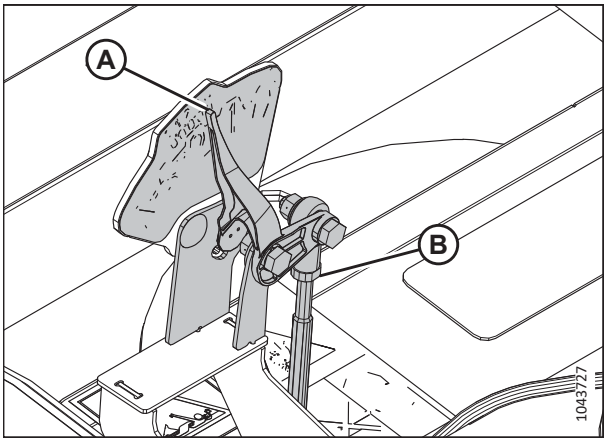


Figure 7.17: Float Indicator – Left Side

When calibrated properly, the float indicator pointer will react to ground pressure as follows:

- **Pointer centered on number 2 (A):** machine on level ground in cutting position, normal ground pressure
- **Pointer above number 2:** machine on ground, increased ground pressure
- **Pointer below number 2:** machine off the ground, decreased ground pressure

  NOTE:

  When the float indicator is calibrated properly, it is normal for the indicator needle to not read as low as zero when the machine is off the ground.

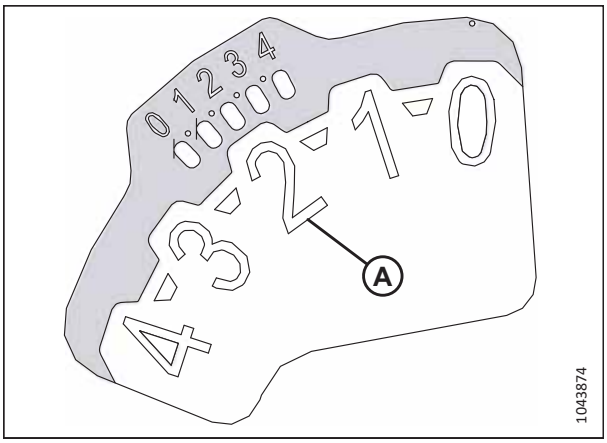


Figure 7.18: Float Indicator

7.6 Checking Auxiliary Lift System

Follow this procedure to ensure the auxiliary lift system is functioning properly.

1. Remove auxiliary lift lock straight pins (A) from holes in lift linkages on both sides of the machine. Store the auxiliary lift lock straight pins, washers, and lynch pins in storage location (B) on the left side of the carrier frame.

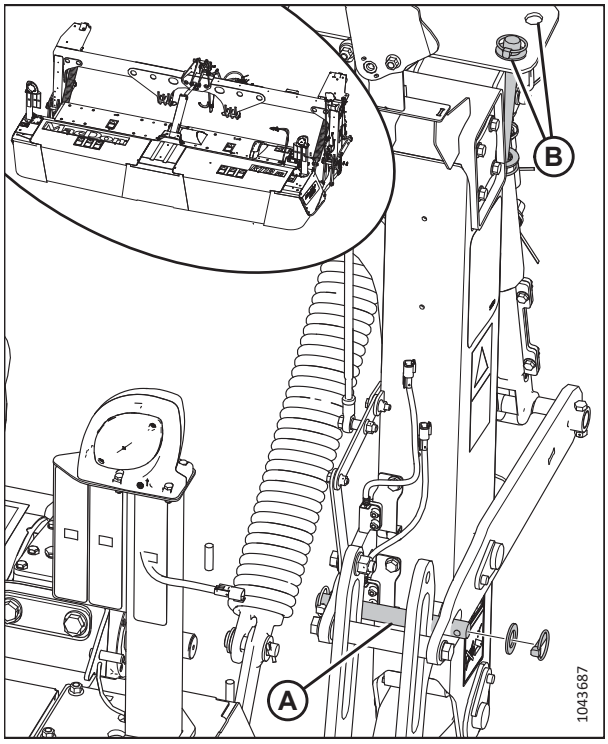


Figure 7.19: Auxiliary Lift Lock Pins – Left Side

2. Ensure the relay logic switch (A) is in the automatic “A” position for normal field operation.

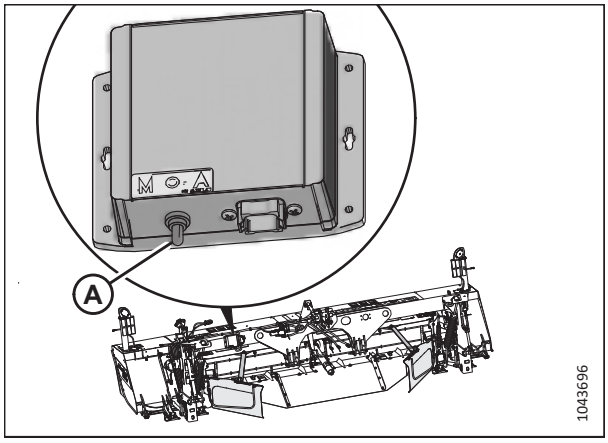


Figure 7.20: Relay Logic Assembly

3. Open auxiliary lift cylinder lock-out valve (A) on each cylinder by turning the handle to the open position (in line with the hose).

4. Set the tractor's front hydraulic channel to ON, and adjust the flow to 20–30 %. For instructions, refer to the tractor operator's manual.

5. Raise the rotary disc fully.

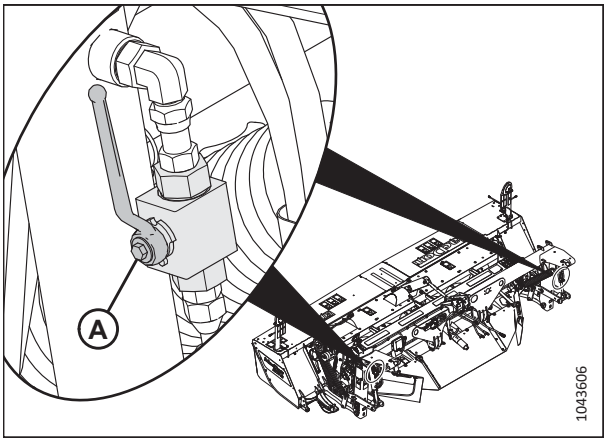


Figure 7.21: Lock-Out Valve – Open Position

6. When the tractor's three-point hitch is fully raised, and top-link (A) moves to within 1–3 mm (1/32–1/8 in.) of upper proximity sensor (B) (inset), ensure the auxiliary lift cylinders (C) extend to lift the rotary disc.

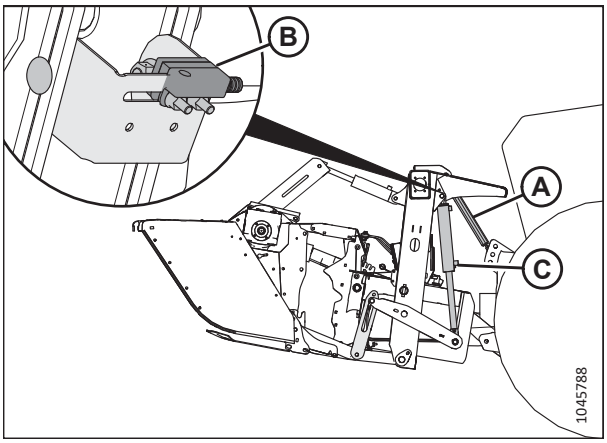


Figure 7.22: R1 FR – Fully Raised Position

7.7 Positioning Forming Shield Side Deflectors – Roll Conditioner

The position of the side deflectors controls the width and placement of the windrow. To ensure that windrow placement is centered between the tractor wheels, adjust the left and right deflectors to the same position.

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

2. Loosen locking handle (A).
3. Slide adjuster bar (B) along adjuster plate (C) to the desired deflector position and engage bar (B) into a notch in the adjuster plate.
4. Tighten locking handle (A).
5. Repeat Step *2, page 34* to Step *4, page 34* on the opposite side of the conditioner.

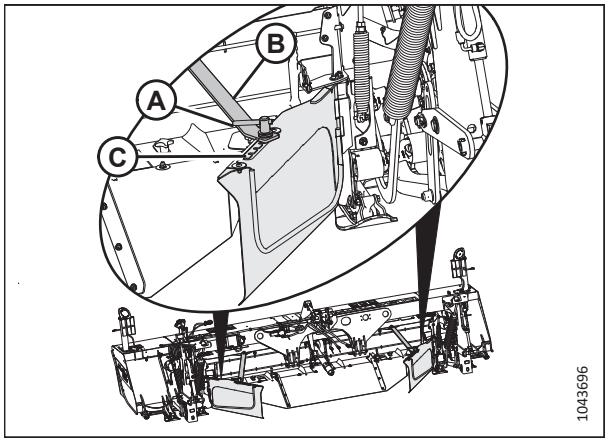


Figure 7.23: Side Deflector and Adjuster Bar

7.8 Adjusting Conditioner Baffle Position

The position of the adjustable conditioner baffle, along with the forming shields, determines the height and width of the windrow: raising the baffle produces a fluffier, narrower windrow; lowering the baffle produces a flatter, wider windrow.

1. Remove lynch pin (A) securing rear baffle adjustment lever (B) to the adjustment plate.
2. Release rear baffle adjustment lever (B) so that the tab engages the middle notch in bracket (C).

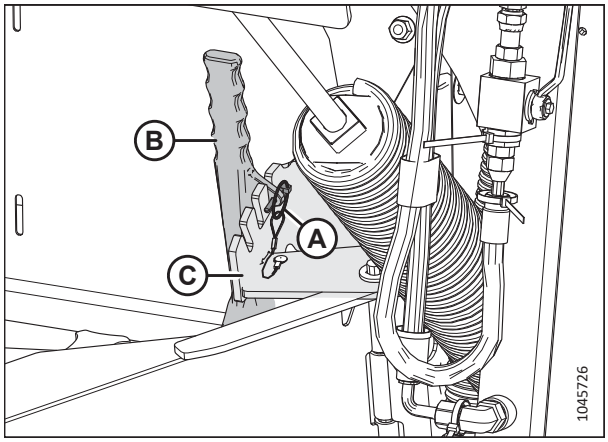


Figure 7.24: Baffle Adjuster – Roll Conditioners

3. Pull adjustment lever (B) inboard to disengage it from adjustment plate (A), and move the lever into the middle notch.
4. Secure lever (B) with the lynch pin.
5. Repeat this process on the opposite rear baffle adjustment lever.

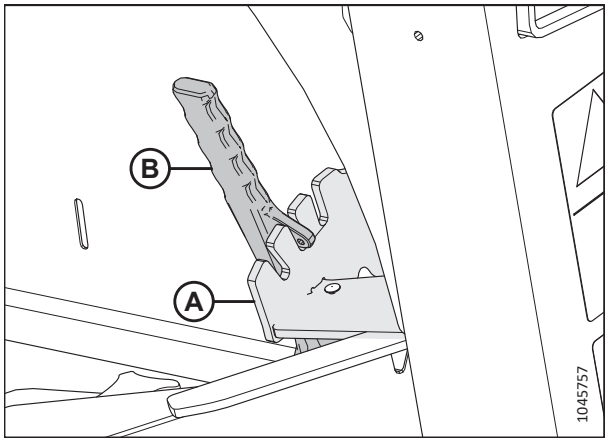


Figure 7.25: Baffle Adjuster – Roll Conditioners

7.9 Checking and Adding Lubricant – Conditioner Roll Timing Gearbox

The conditioner roll timing gearbox is located inside the drive compartment at the right side of the front mount rotary disc.

1. Lower the rotary disc to the ground.
2. Adjust the cutting angle with the center-link so that the cutterbar is level.
3. Shut down the engine, and remove the key from the ignition.
4. Use a spirit (bubble) level and check that cutterbar is level in fore-aft direction. Adjust the cutting angle as required.
5. Open the right driveshield. For instructions, refer to *8.3 Opening Driveshields, page 48*.
6. Clean around lubricant sight glass (A) and breather plug (B) on the conditioner roll timing gearbox.
7. Ensure that the lubricant level is at the top of the sight glass. If necessary, add lubricant through plug (B).

   NOTE:

   Refer to the inside back cover for lubricant information.
8. Replace plug (B) and tighten it.
9. Close the right driveshield. For instructions, refer to *8.4 Closing Driveshields, page 49*.

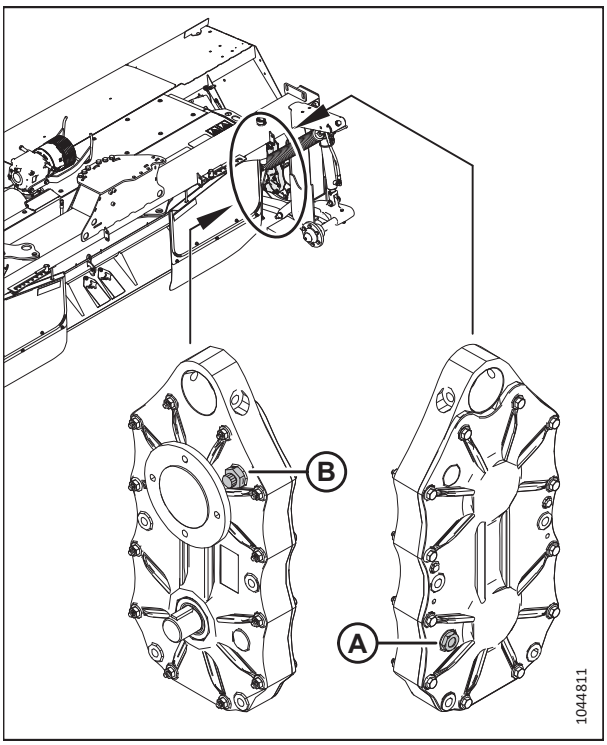


Figure 7.26: Roll Timing Gearbox

7.10 Checking and Adding Lubricant – Header Drive Gearbox

The header drive gearbox is located in the center of the machine and receives power from the tractor's PTO via the primary driveline.

1. Park the machine on a flat, level surface.
2. Lower the front mount rotary disc fully.
3. Adjust the machine so gearbox is level to ensure accurate oil level readings.
4. Shut down the engine, and remove the key from the ignition.
5. Open the cutterbar doors. For instructions, refer to *8.1 Opening Cutterbar Doors, page 47*.

6. Clean around check plug (A) on the forward-facing side of the gearbox.
7. Remove (lower) check plug (A). Lubricant should be level with or slightly dripping from the check port.
8. Install the check plug and tighten it. If the lubricant level is low, proceed to the next step.

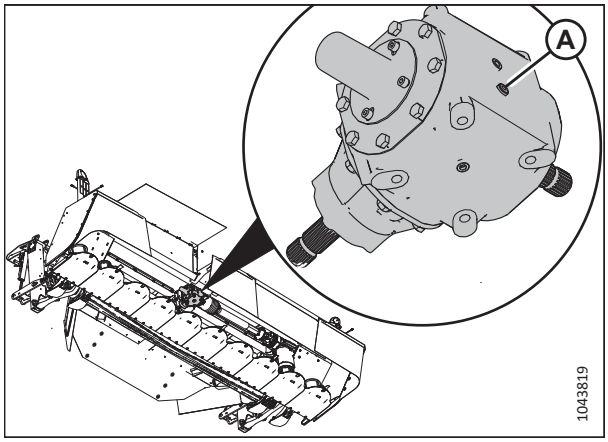


Figure 7.27: Drive Gearbox – Viewed from Below

9. Clean around breather port (A) on the top-facing side of the gearbox.
10. Use a 22 mm socket to remove the breather (A) and add lubricant into the breather port.

NOTE:

Refer to the inside back cover for lubrication specifications.

11. Repeat Step *7, page 36* to Step *8, page 36* until lubricant drips slightly from the check port.
12. Reinstall the breather into the top of the gearbox.
13. Clean up any spilled lubricant.

    IMPORTANT:

    Ensure no objects or tools are left on the cutterbar.

14. Close the cutterbar doors. For instructions, refer to *8.2 Closing Cutterbar Doors, page 47*.

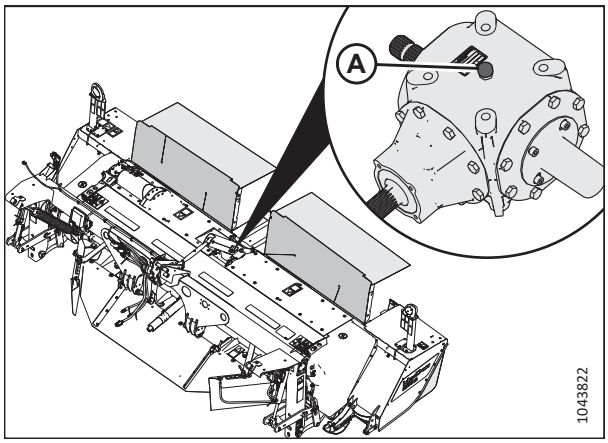


Figure 7.28: Drive Gearbox – Viewed from Above

7.11 Checking and Adding Lubricant – Cutterbar / Conditioner Drive Gearbox

The cutterbar/conditioner drive gearbox is located inside the drive compartment at the left side of the machine.

1. Lower the rotary disc onto flat, level ground.
2. Shut down the engine, and remove the key from the ignition.

3. **New gearboxes or gearboxes after an oil change:** To ensure that the gearbox oil level is accurate, rotate cutterbar drum (A) a few turns. This will allow the oil to run into all gearbox cavities, such as the bottom bearings.

   NOTE:

   A new gearbox is a gearbox that been filled with oil for the first time, but has not been operated yet.

4. Clean the area around dipstick (B).
5. Remove dipstick using a 22 mm socket.
6. Ensure the lubricant level is to the full line on the dipstick.
7. If necessary, add gear lubricant through dipstick hole (B). Refer to the manual's inside back cover for lubricant information.
8. Reinstall the dipstick and tighten it.

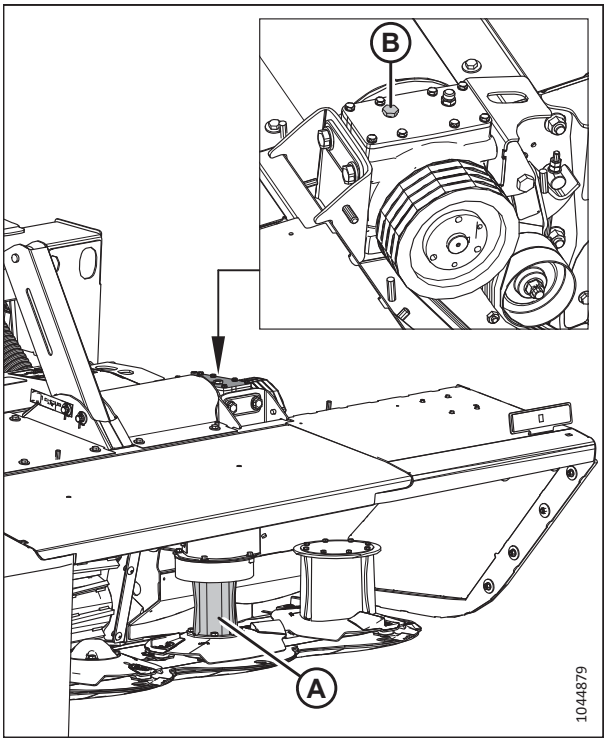


Figure 7.29: Left Side of Front Mount Rotary Disc

7.12 Checking and Adding Lubricant – Cutterbar

The correct lubricant levels are essential to the performance and longevity of the cutterbar.

IMPORTANT:

Check the cutterbar lubricant level when the lubricant is warm. If the lubricant is cold, idle the machine for approximately 10 minutes prior to checking.

1. Park the machine on a flat, level surface.
2. Shut down the engine, and remove the key from the ignition.
3. Place blocks under each end, or just inside each end, of the cutterbar.
4. Lower the headerthe front mount rotary disc onto the blocks.
5. Shut down the engine, and remove the key from the ignition.
6. Open the cutterbar doors. For instructions, refer to *8.1 Opening Cutterbar Doors, page 47*.

7. Use spirit level (A) to ensure that the cutterbar is level in both directions. Adjust the cutterbar position accordingly.

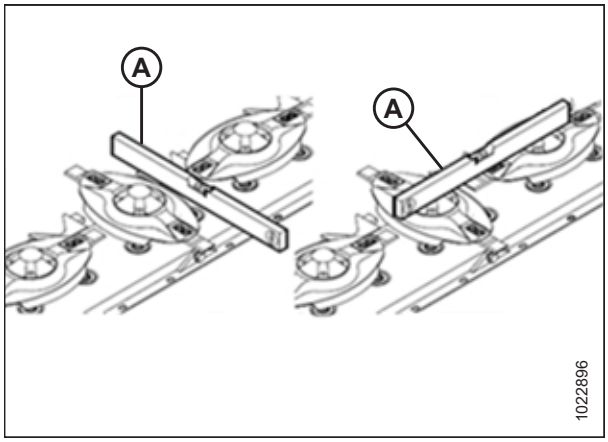


Figure 7.30: Spirit Level on Cutterbar

8. Clean the area around plug (A). Place a 5 liter (5.2 US qts) capacity container under the plug.
9. Remove plug (A) and O-ring (B) from the cutterbar. The oil level must be up to the inspection plug hole.
10. If the oil is up to the inspection plug hole, reinstall the plug and proceed to Step *16, page 39*. If the oil is **NOT** up to the inspection plug hole, proceed to the next step.

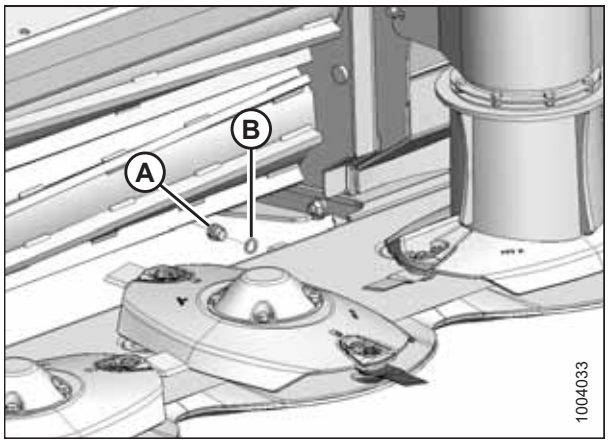


Figure 7.31: Cutterbar Oil Inspection Plug

11. Raise the rotary disc slightly.
12. Lower the rotary disc onto blocks so that the left end is slightly higher than the right end.
13. Shut down the engine, and remove the key from the ignition.
14. Add lubricant through the inspection hole that is used to check the oil level.

    IMPORTANT:

    Do **NOT** overfill the cutterbar. Overfilling can cause overheating, damage, and failure of cutterbar components.

    NOTE:

    Refer to the inside back cover of this manual for lubricant specifications.

15. Recheck the oil level.
16. Check O-ring (B) for breaks or cracks, and replace it if necessary.
17. Install plug (A) and O-ring (B).
18. Close the cutterbar doors. For instructions, refer to *8.2 Closing Cutterbar Doors, page 47*.

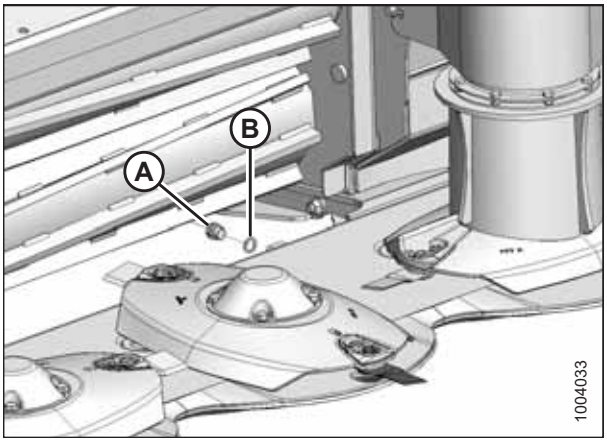


Figure 7.32: Cutterbar Oil Inspection Plug

7.13 Checking Roll Gap

The correct roll gap is required for proper conditioning. The setting is different for steel and polyurethane rolls.

1. Lower the rotary disc to the ground.
2. Shut down the engine, and remove the key from the ignition.
3. **Steel rolls:** The length of thread (A) extending above the jam nut on the adjustment rods can be used as an approximation of roll gap, but does **NOT** provide consistent roll gap measurements. To ensure that the roll gap is at the factory setting, refer to *7.13.1 Adjusting Roll Gap – Steel Rolls, page 39*.
4. **Polyurethane rolls:** Insert a feeler gauge between the rolls from either front or rear of header. The factory setting is 3 mm (1/8 in.). If adjustments are required, refer to *7.13.2 Adjusting Roll Gap – Polyurethane Rolls, page 40*.

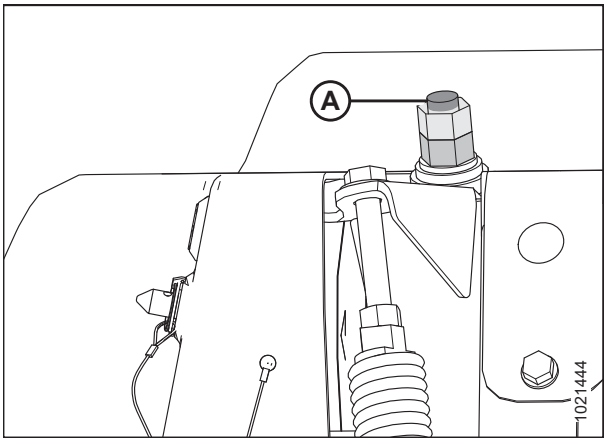


Figure 7.33: Roll Gap Adjustment

7.13.1 Adjusting Roll Gap – Steel Rolls

The length of thread extending above the jam nut on the adjustment rods can be used as an approximation of roll gap but does **NOT** provide consistent roll gap measurements.

To ensure the roll gap is at the factory setting, follow the procedure below:

1. Lower the front mount rotary disc fully.
2. Shut down the engine, and remove the key from the ignition.

3. Loosen jam nut (A) on both sides of the conditioner.
4. Turn lower nut (B) counterclockwise until the upper roll rests on the lower roll. Ensure the rolls intermesh.
5. Turn lower nut (B) two and a half full turns clockwise to raise the upper roll and achieve a 6 mm (1/4 in.) roll gap.
6. Hold nut (B) and tighten jam nut (A) on both sides of the conditioner.

   IMPORTANT:

   Make sure the roll gap adjustment nuts are adjusted equally on both sides to achieve a consistent gap across the rolls.

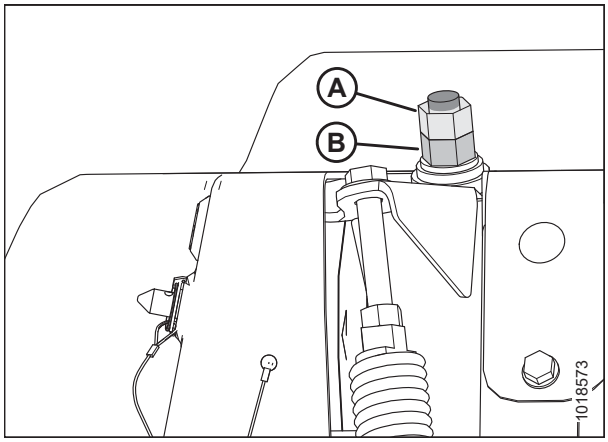


Figure 7.34: Roll Gap Adjustment

7.13.2 Adjusting Roll Gap – Polyurethane Rolls

Because polyurethane rolls operate at smaller gaps and the conditioning is less aggressive, the roll gap setting is more sensitive than on steel rolls.

1. Lower the front mount rotary disc fully.
2. Shut down the engine, and remove the key from the ignition.
3. Loosen upper jam nut (A) on both sides of the conditioner attachment.
4. Turn lower nut (B) counterclockwise until the upper roll rests on the lower roll.
5. Turn lower nut (B) one full turn clockwise to raise the upper roll and achieve a 3 mm (1/8 in.) roll gap.
6. Hold nut (B) and tighten jam nut (A) on both sides of the conditioner attachment.

   IMPORTANT:

   Make sure the roll gap adjustment nuts are adjusted equally on both sides to achieve a consistent gap across the rolls.

7. Rotate the rolls manually and use a feeler gauge at the ends of the rolls to check that the actual gap is no less than 2 mm (1/16 in.) and no more than 4 mm (5/32 in.).

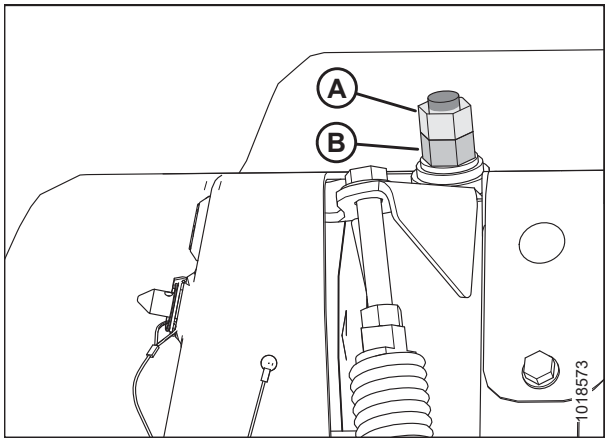


Figure 7.35: Roll Gap Adjustment

7.14 Checking Roll Timing

Check the roll timing if excessive noise is coming from the conditioner rolls.

The roll timing is factory-set and should not require adjustment; however, if there is excessive noise coming from the conditioner rolls, the timing will need to be adjusted.

Listen to the rollers. Excessive noise may come from dirt build-up, or the rollers being out of time (and would therefore require adjustment).

For instructions, refer to *7.14.1 Adjusting Roll Timing, page 41*.

7.14.1 Adjusting Roll Timing

The roll timing is factory-set and should not require adjustment; however, if there is excessive noise coming from the conditioner rolls, the timing will need to be adjusted.

1. Shut down the engine, and remove the key from the ignition.
2. On the upper roll, loosen four bolts (A) securing yoke plate (B).

   NOTE:

   Only three of the four bolts are shown in the illustration.

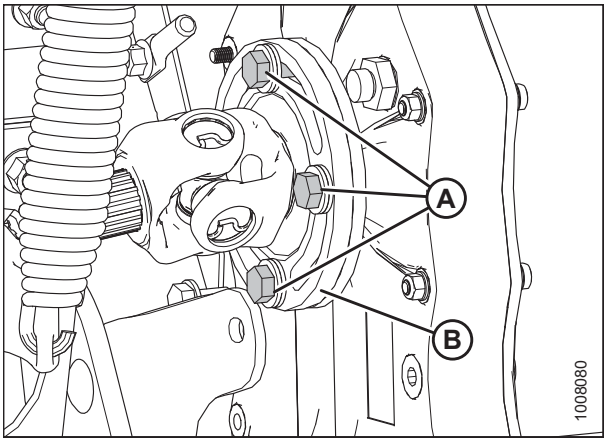


Figure 7.36: Conditioner Drive

3. Secure bottom roll (A).
4. Rotate upper roll (B) counterclockwise until it stops.
5. Make a mark (C) across yoke (D) and gearbox flange (E).

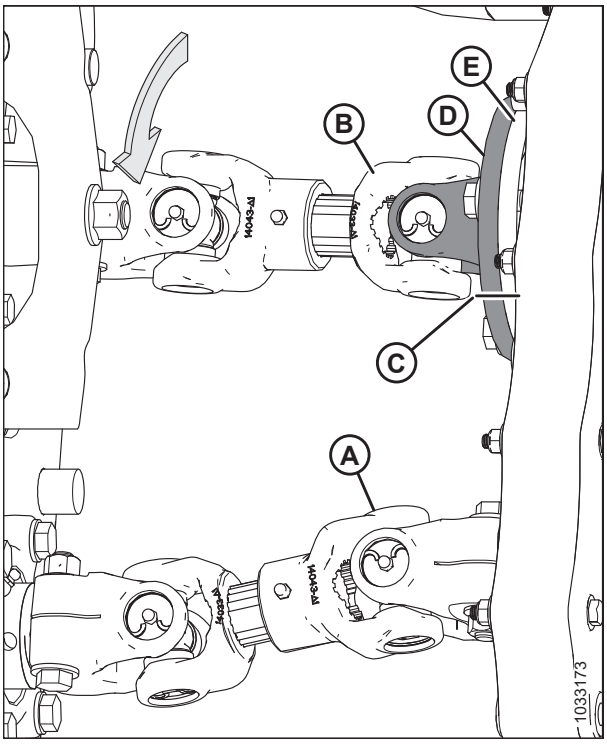


Figure 7.37: Conditioner Drive

6. Secure bottom roll (A).
7. Rotate upper roll (B) clockwise until it stops.
8. Make a mark (C) across yoke (D) and gearbox flange (E).

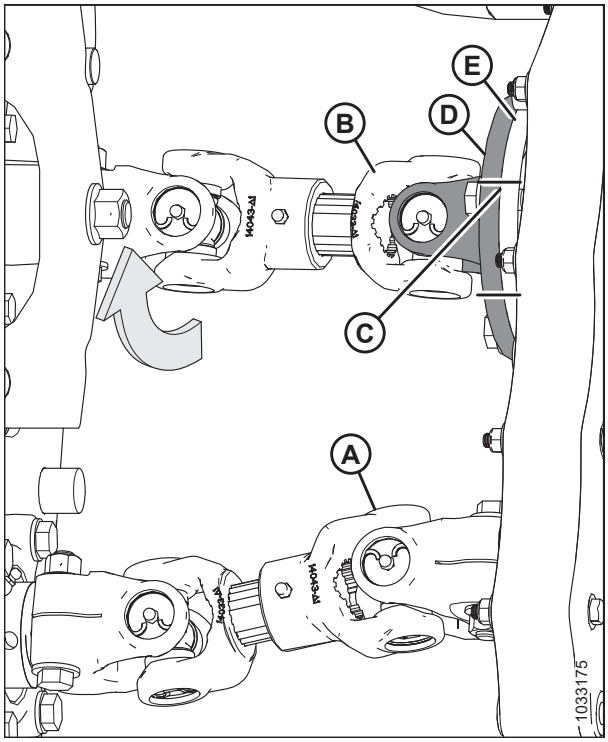


Figure 7.38: Conditioner Drive

9. Determine center point (A) between the two marks on the yoke plate, and place a third mark.
10. Rotate upper roll (B) counterclockwise until the mark on the gearbox flange lines up with the third (center) mark.

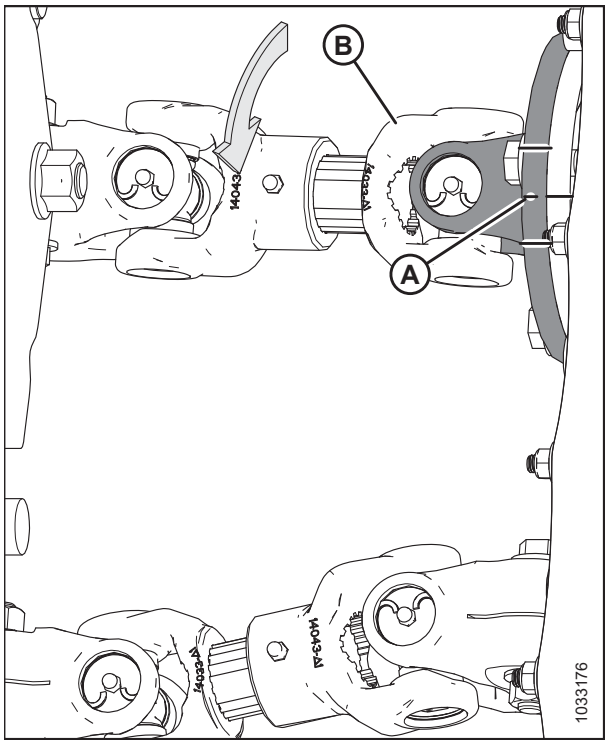


Figure 7.39: Conditioner Drive

11. Ensure that the threads on four bolts (A) are clean and free of lubricant.

    NOTE:

    Only three of the four bolts are shown in the illustration.

12. Apply medium-strength threadlocker (Loctite® 242 or equivalent) to bolts (A).

13. Torque the bolts to 95 Nm (70 lbf·ft).

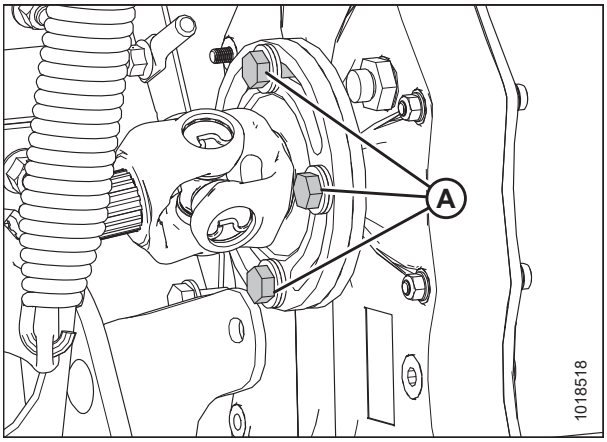


Figure 7.40: Conditioner Drive

7.15 Checking Roll Tension

Roll tension is indicated by the exposed thread on the roll tension adjuster bolt.

1. Measure the amount of exposed thread on the roll tension adjuster bolt (A) at each end of the conditioner. Measurement (B) should be 12–15 mm (1/2–9/16 in.) for steel roll conditioners.

2. If the tension requires adjusting, refer to *7.15.1 Adjusting Roll Tension, page 43*.

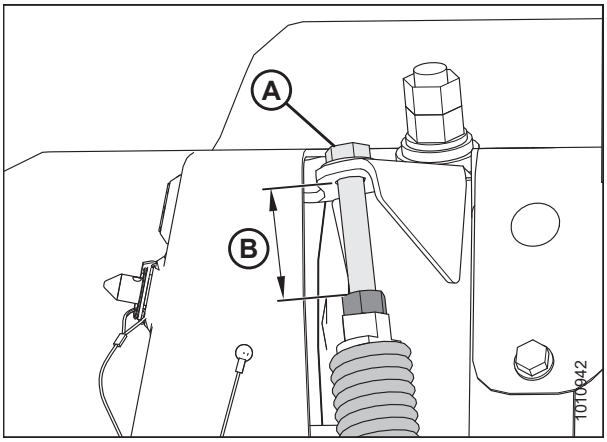


Figure 7.41: Roll Tension Adjuster

7.15.1 Adjusting Roll Tension

The amount of pressure that is applied to the crop as it passes through the roll conditioner is adjusted by changing the roll tension setting. Generally, maximum roll tension is desirable.

To adjust the roll tension back to the factory setting, follow these steps:

1. Lower the front mount rotary disc fully.

2. Loosen jam nut (A) on both sides of the conditioner.
3. Turn spring drawbolt (B) clockwise to tighten spring (C) and increase the roll tension.
4. Turn spring drawbolt (B) counterclockwise to loosen spring (C) and decrease the roll tension.
5. Measure the amount of exposed thread on spring drawbolt (B) at each end of the conditioner. Measurement (D) should be 12–15 mm (1/2–9/16 in.).

   IMPORTANT:

   Turn each bolt equally. Each turn of the bolt changes the roll tension by approximately 32 N (7.2 lbf).
6. Tighten jam nuts (A) on each end of the conditioner.

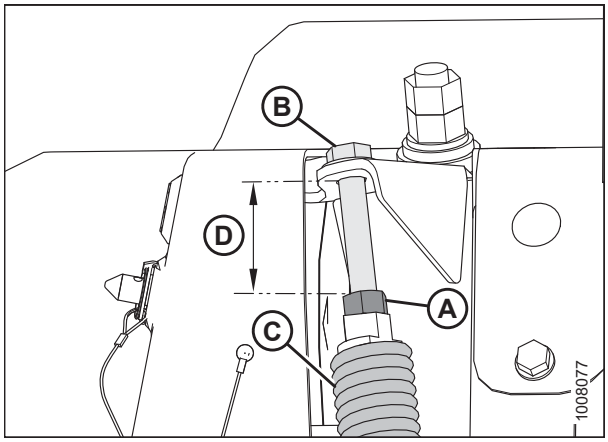


Figure 7.42: Adjusting Roll Tension

7.16 Checking Lights

Ensure all lights function correctly.

1. Check that lights (A) and are secure and not damaged.

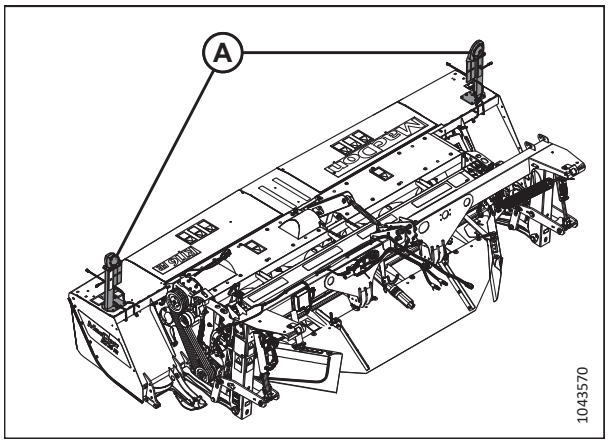


Figure 7.43: R1 FR Series Lights

7.17 Checking Manuals

Ensure that the manuals and quick card are stored in the manual case.

The following manuals should be stored in manual storage case (A) at the right end of the front mount rotary disc:

- R113/R116 FR Front Mount Rotary Disc Operator's Manual
- R113/R116 FR Front Mount Rotary Disc Parts Catalog
- R113/R116 FR Front Mount Rotary Disc Quick Card

Open the right driveshield to access the manual case. For instructions, refer to *8.3 Opening Driveshields, page 48*.

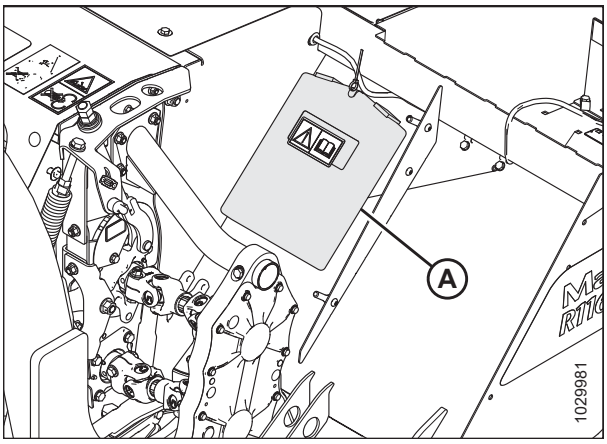


Figure 7.44: Manual Case

7.18 Checking Disc Timing Tool

Ensure that the disc timing tool is stored in place.

Disc timing tool (A) should be stored on the machine at the left end of the rotary disc.

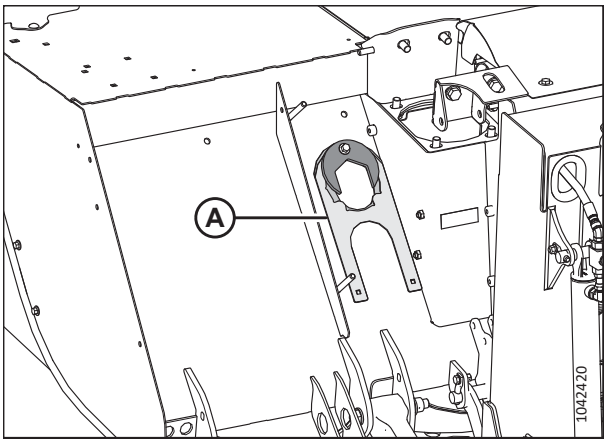


Figure 7.45: Disc Timing Tool

7.19 Running up Front Mount Rotary Disc

Run up the rotary disc to ensure that the machine is ready to deliver to the Customer.

WARNING

- **Ensure that bystanders remain at least 100 m (330 ft.) from the front mount rotary disc while it is operating. Stones and other objects can be ejected from the rotary disc with great force.**
- **Inspect the cutterbar area carefully for loose hardware. These objects can be ejected with great force when the front mount rotary disc is engaged, resulting in serious injury or damage.**
- **Cutterbar curtains reduce the potential for thrown objects. Always keep these curtains down when operating the rotary disc. Replace the curtains if they become worn or damaged.**
- **The cutterbar curtain mitigates the damage potential of thrown objects. Always keep the curtains down when operating the rotary disc. Replace the curtain if it becomes worn or is damaged.**

DANGER

Before investigating an unusual sound or attempting to correct a problem, shut down the engine, engage the parking brake, and remove the key from the ignition.

DANGER

Ensure that all bystanders have cleared the area.

NOTE:

A higher engine rpm may be required to engage the rotary disc. Do **NOT** exceed 1800 rpm.

1. Set the rotary disc 152–305 mm (6–12 in.) above the ground and adjust the center-link to mid-position.
2. Perform the run-up check as listed on the Predelivery Checklist (the yellow sheet inside the back cover of this instruction) to ensure that the machine is field-ready.
3. Shut down the engine, and remove the key from the ignition.
4. Retain the Predelivery Checklist and this instruction for future reference.

7.20 Checking and Removing Clear Vinyl Decal Protectors

Clear vinyl protectors prevent damage to the decals during the manufacturing and shipping process.

Remove the protective film during Pre-Delivery Inspection.

NOTE:

Remove the film when ambient temperature is 10°C (50°F) or higher. Lower temperatures may cause the film to become brittle, making it challenging to remove it in one piece.

Chapter 8: Reference

Additional information and commonly repeated procedures are included in the reference chapter.

8.1 Opening Cutterbar Doors

You will need to open the cutterbar doors to access the cutterbar.

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.

1. Shut down the engine, and remove the key from the ignition.
2. Lift up doors (A) at the front of the machine.

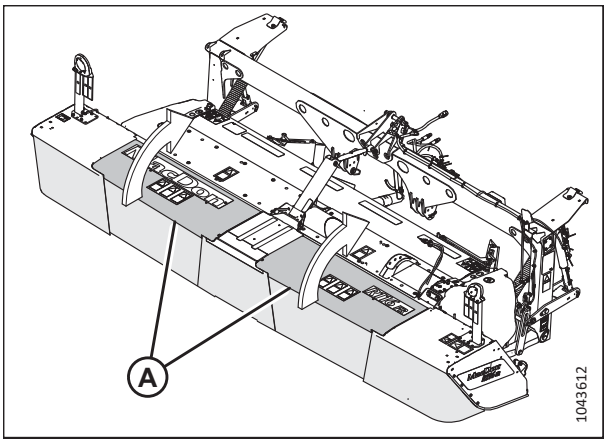


Figure 8.1: Cutterbar Doors and Curtains

8.2 Closing Cutterbar Doors

Do **NOT** operate the machine without closing the cutterbar doors.

CAUTION

Keep your hands and fingers away from the corners of the doors when you are closing them.

1. Pull down on door (A) from the top to close it.
2. Ensure that the curtains hang properly and completely enclose the cutterbar area.

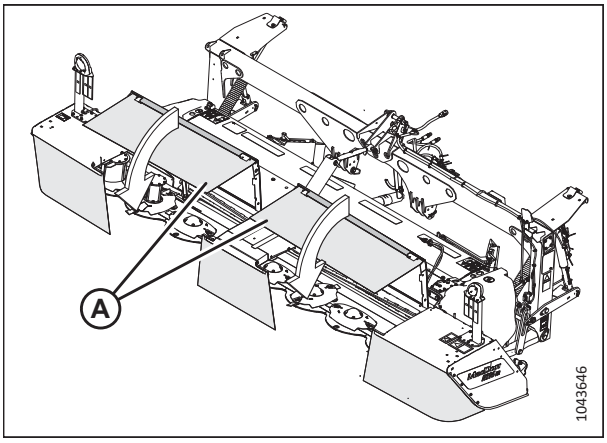


Figure 8.2: Cutterbar Doors and Curtains

8.3 Opening Driveshields

The driveshields offer protection from moving components. Open them only when you intend to service the machine.

DANGER

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

WARNING

To reduce the risk of personal injury, do NOT operate the machine without the driveshields in place and secured.

NOTE:

The illustrations in this procedure show left driveshield (A); the right driveshield is similar.

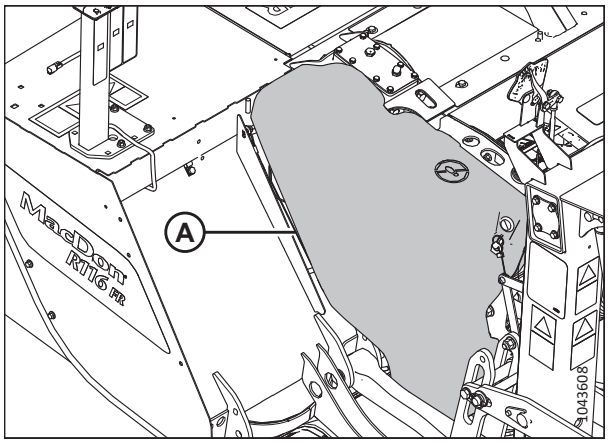


Figure 8.3: Left Driveshield

1. Shut down the engine, and remove the key from the ignition.
2. Remove lynch pin (A) and tool (B) from pin (C).

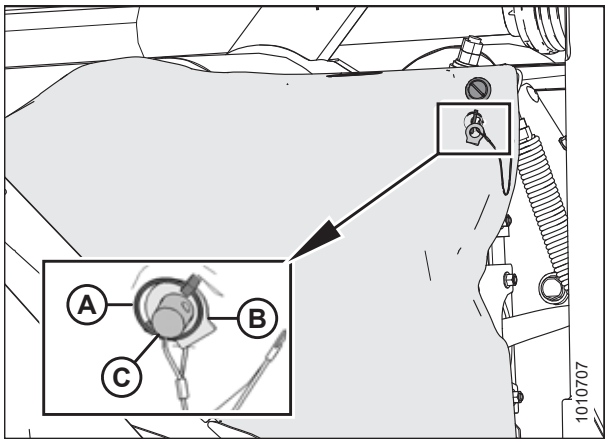


Figure 8.4: Left Driveshield

3. Insert the flat end of tool (A) into latch (B) and turn it counterclockwise to unlock the driveshield.

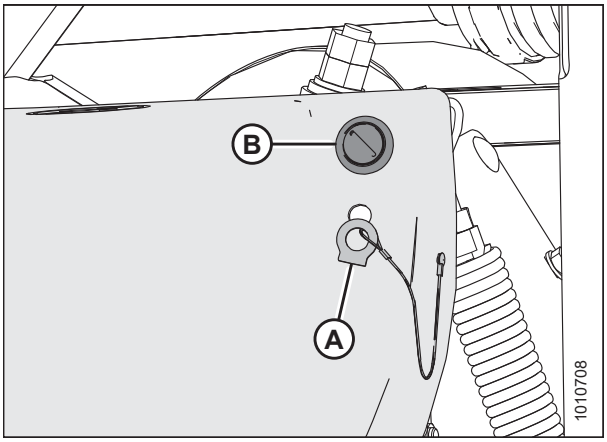


Figure 8.5: Driveshield Latch

4. Pull the top of driveshield (A) away from the machine to open it.

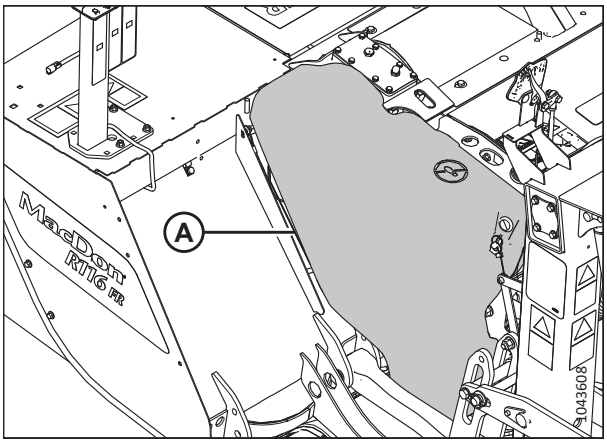


Figure 8.6: Left Driveshield

8.4 Closing Driveshields

Close the driveshields when your maintenance or repair tasks are complete.

WARNING

To reduce the risk of personal injury, do NOT operate the machine without the driveshields in place and secured.

NOTE:

The illustrations shown in this procedure apply to the left driveshield; the right driveshield is similar.

1. Position the driveshield onto the pins, if necessary.
2. Push driveshield (A) to engage latch (B).
3. Ensure that the driveshield is properly secured.

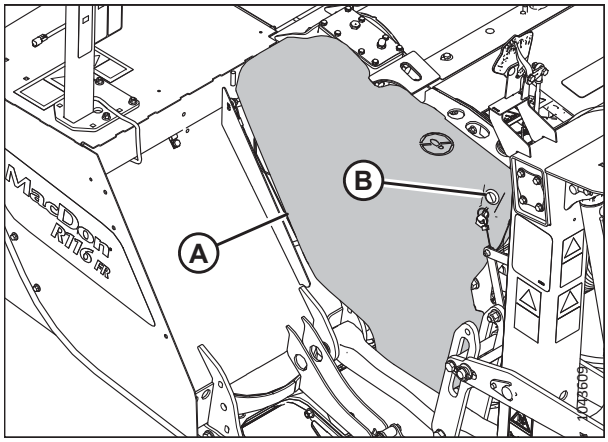


Figure 8.7: Left Driveshield

4. Replace tool (B) and lynch pin (A) onto pin (C).

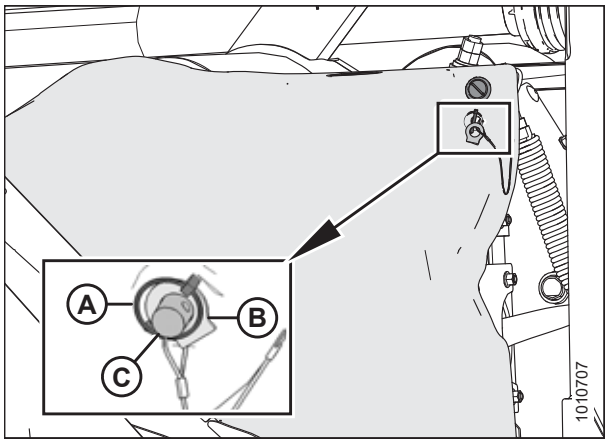


Figure 8.8: Left Driveshield

8.5 Installing Auxiliary Lift Lock Pins

Auxiliary lift linkage lock pins are used to lock the auxiliary lift linkage to prevent the carrier frame from moving when the machine is not attached to a tractor.

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.

DANGER

Before starting the machine, check to be sure all bystanders have cleared the area.

IMPORTANT:

Do **NOT** disconnect the front mount rotary disc from the tractor before installing the auxiliary lift lock pins. The pins prevent the carrier frame from moving when the machine is disconnected from a tractor.

1. Park the machine on a flat, level surface.
2. Lower the front mount rotary disc fully.

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

4. Retrieve the auxiliary lift lock straight pins, washers, and lynch pins from storage location (B) on the left side of the carrier frame, and install the straight pins into holes (A) in the auxiliary lift linkages on both sides of the machine.

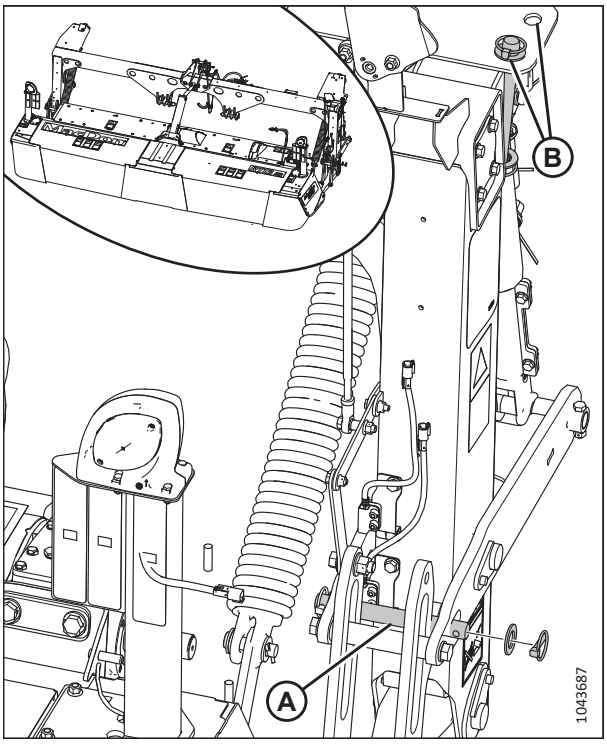


Figure 8.9: Auxiliary Lift Lock Pins – Left Side

8.6 Removing Auxiliary Lift Lock Pins

The auxiliary lift lock pins prevent the carrier frame from moving when the machine is not attached to a tractor.

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.

DANGER

Ensure that all bystanders have cleared the area.

1. Connect the tractor's three-point hitch to the front mount rotary disc. For instructions, refer to *4.2 Connecting Tractor to Front Mount Rotary Disc, page 11*.

   NOTE:

   The auxiliary lift lock pins should be removed before operating in the field. The float feature will **NOT** function correctly when the auxiliary lift system is locked.

2. Remove auxiliary lift lock straight pins (A) from the holes in the auxiliary lift linkages on both sides of the machine. Store the auxiliary lift lock straight pins, washers, and lynch pins in storage location (B) on the left side of the carrier frame.

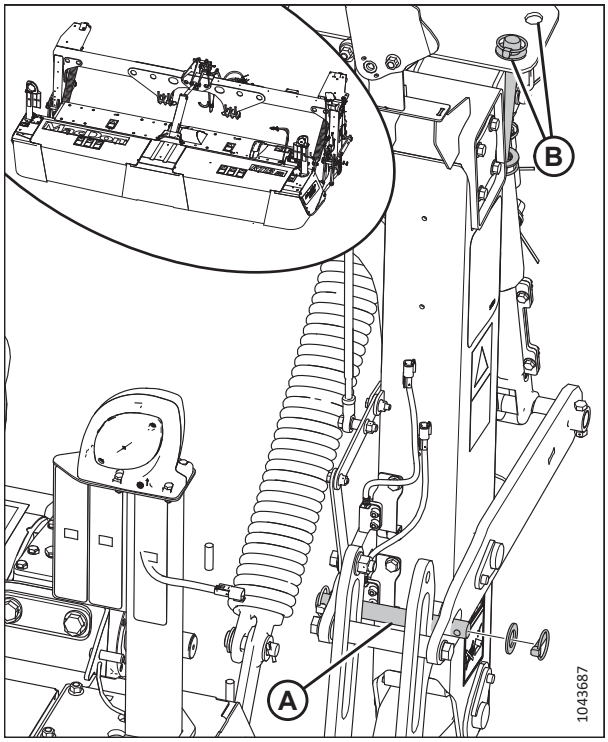


Figure 8.10: Auxiliary Lift Lock Pins – Left Side

8.7 Locking and Unlocking Auxiliary Lift Cylinders

The auxiliary lift cylinders provide additional lift range when raising the three-point hitch.

Auxiliary lift cylinders at both ends of the machine use a shut-off valve to prevent movement during transport, service, and when disconnecting from the tractor. When operating in the field, the shut-off valves must be open for machine raise and lower functions to work correctly.

1. **To unlock auxiliary lift cylinder (A)**, rotate lock-out valve (B) parallel with the cylinder. Repeat this step for the lock-out valve on the opposite side.

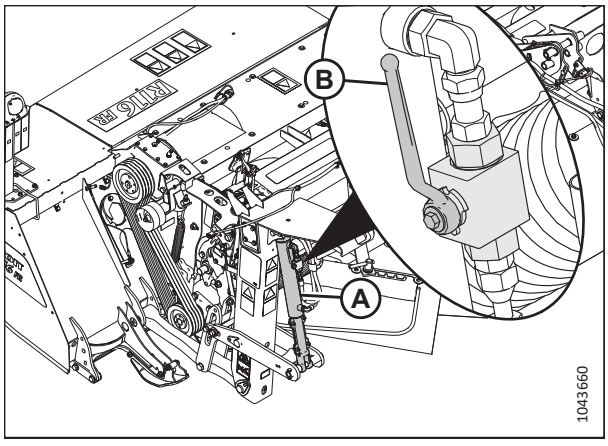


Figure 8.11: Auxiliary Lift Cylinders – Unlocked (Open)

2. **To lock auxiliary lift cylinder (A)**, rotate lock-out valve (B) perpendicular with the cylinder. Repeat this step for the lock-out valve on the opposite side.

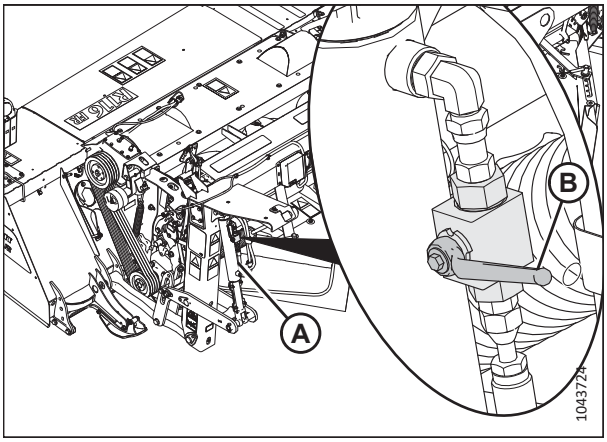


Figure 8.12: Auxiliary Lift Cylinders – Locked (Closed)

8.8 Disconnecting Tractor from Front Mount Rotary Disc

The following procedure explains how to disconnect the tractor from the front mount rotary disc.

DANGER

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

DANGER

Ensure that all bystanders have cleared the area.

1. Park the machine on a flat, level surface.
2. Shut down the engine, and remove the key from the ignition.
3. Place blocks under each end, or just inside each end, of the cutterbar.
4. Lower the rotary disc onto the blocks.
5. Ensure that the auxiliary lift cylinders are fully retracted.
6. Shut down the engine, and remove the key from the ignition.
7. Turn the auxiliary lift cylinder lock-out valves to the closed position. For instructions, refer to *8.7 Locking and Unlocking Auxiliary Lift Cylinders, page 52*.

8. Retrieve the lift lock straight pins, washers, and lynch pins from storage location (B) on the left side of the carrier frame, and install the straight pins into holes (A) in the lift linkages on both sides of the machine.

9. Secure the straight pins with washers and lynch pins (two per pin) on both sides of the front mount rotary disc carrier frame.

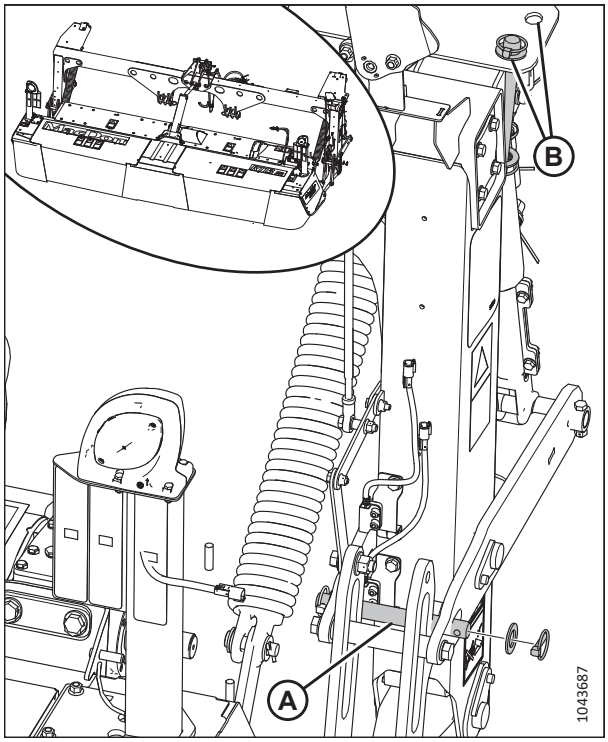


Figure 8.13: Auxiliary Lift Lock Pins – Left Side

10. Disconnect pressure hose (A) (yellow tie) and return hose (B) (green tie) from the tractor's front selective control valve and store the hoses on the front mount rotary disc.

    IMPORTANT:

    Install caps and plugs on open hydraulic hoses and lines to prevent buildup of dirt and debris while in storage.

    NOTE:

    Disconnect the hoses for the hydraulic center-link, if equipped.

11. Disconnect the power plug from the tractor's seven-pin outlet, and store the power cable on the machine.

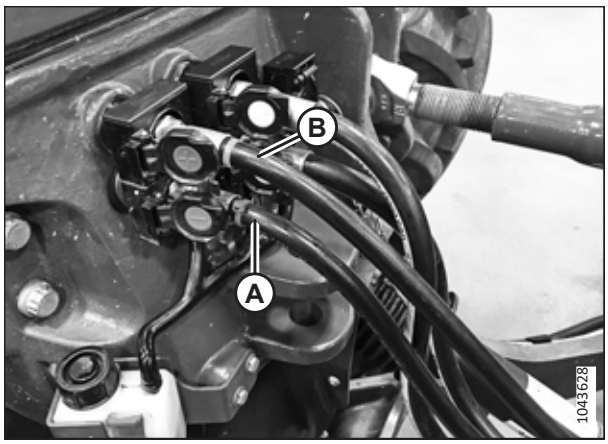


Figure 8.14: Hydraulic Connections

12. Disconnect the power take-off (PTO) driveline chain from the tractor.
13. Pull back on collar (A) and pull the driveline off the tractor's PTO shaft.

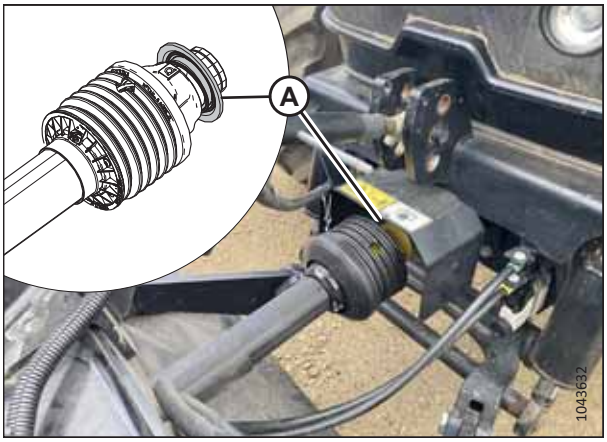


Figure 8.15: Tractor Front PTO Connection

14. Rotate storage bracket (C) back to the holding position.
15. Set the PTO driveline (A) on storage bracket and secure the driveline with chain and lynch pin (B).

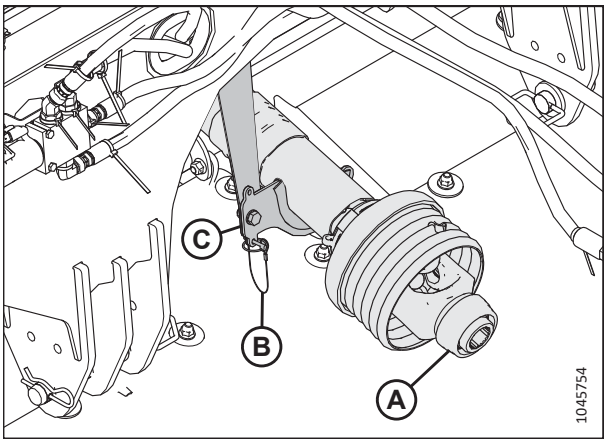


Figure 8.16: PTO Storage

16. Disconnect three-point hitch (A) from carrier frame linkage (B). Ensure all clevis and hair pins are stored securely on the front mount rotary disc frame.

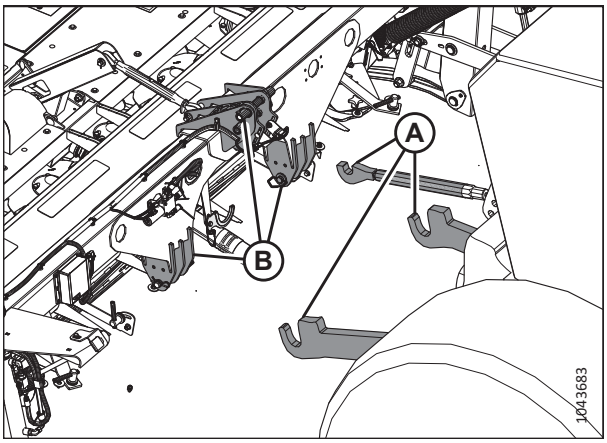


Figure 8.17: Tractor Alignment with Carrier Frame

8.9 Reversing Gearbox Driveshaft Rotation – Header Drive Gearbox

The header drive gearbox rotational direction can be changed to work with the tractor's PTO. Follow this procedure to change the header drive gearbox rotation.

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.

DANGER

Ensure that all bystanders have cleared the area.

WARNING

Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

1. Park the machine on a flat, level surface.
2. Lower the front mount rotary disc fully.
3. Adjust the machine so the gearbox is level.
4. Remove the primary driveline and cross driveline. For instructions, refer to *8.10 Removing Primary Driveline, page 59* and *8.12 Removing Cross Driveline, page 61*.
5. Remove and retain four bolts and washers (A).

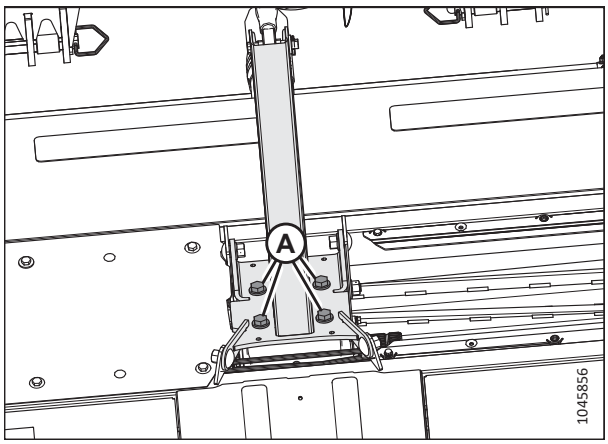


Figure 8.18: Header Drive Gearbox – Viewed from Above

6. Remove and retain two nuts and bolts (A).
7. Remove and retain two nuts and bolts (B), and set the gearbox on the ground.

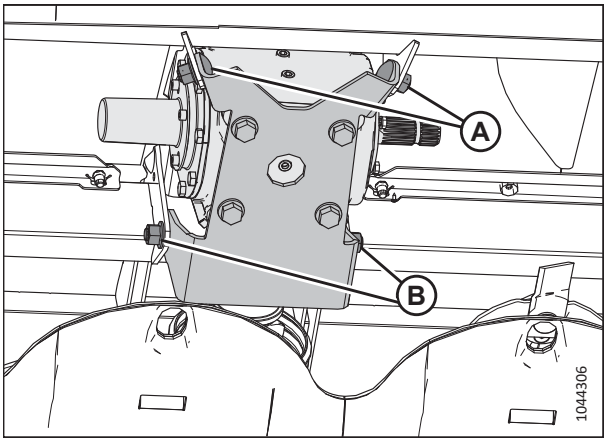


Figure 8.19: Header Drive Gearbox – Viewed from Below

8. Remove and retain bolts and washers (A) that secure the gearbox to mounting bracket (B).

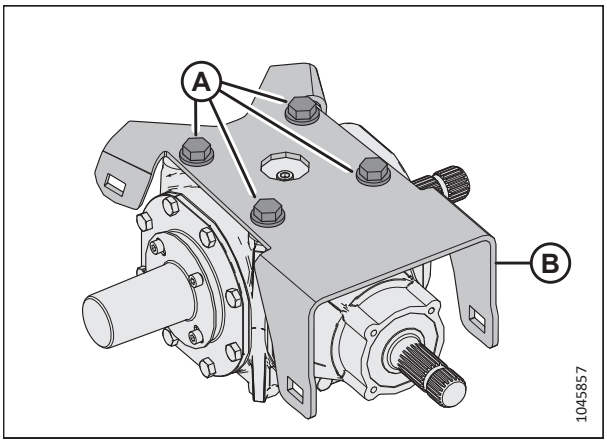


Figure 8.20: Header Drive Gearbox and Bracket

9. Position the gearbox with the primary driveshaft connection facing up to minimize lubricant loss when removing breather valve (A).
10. Remove breather valve (A) and swap it with drain plug (D) on the opposite side of the gearbox.

    IMPORTANT:

    Breather (A) must be facing up when the gearbox is installed.

11. Ensure that the header drive gearbox has the recommended amount of lubricant.

    NOTE:

    For lubricant specifications, refer to the inside back cover of this manual.

12. Clean up spilled lubricant.
13. Remove four screws (C) and spline shaft guard (B), and reinstall it on the opposite cross drive spline shaft.

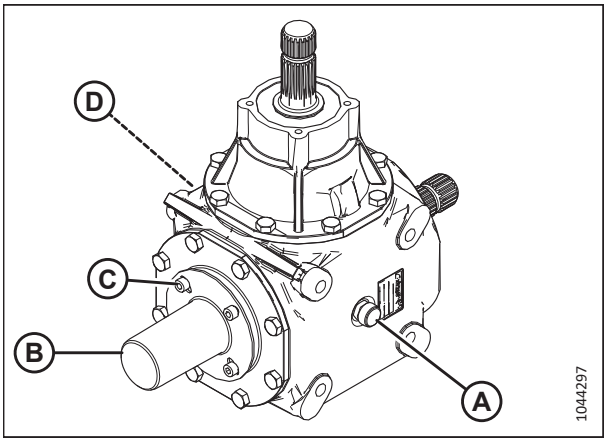


Figure 8.21: Header Drive Gearbox Breather Valve

14. With the four retained washers and M16 hex head bolts, install the bracket to the new bottom side of the header drive gearbox. Torque the bolts to 203 N (150 lbf·ft).

15. Reinstall the bracket with the header drive gearbox onto the machine using four retained M16 carriage bolts and center-lock flange nuts (A) and (B). Torque the nuts to 170 Nm (125 lbf·ft).

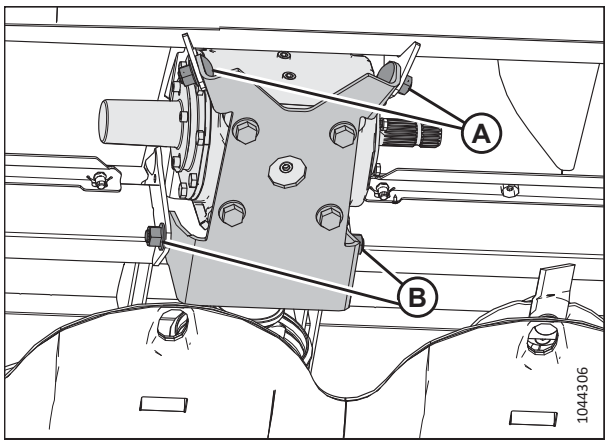


Figure 8.22: Header Drive Gearbox – Viewed from Below

16. Reinstall the four retained M16 hex head bolts and washers (A) that secure the header drive gearbox to the top of the machine. Torque the bolts to 203 Nm (150 lbf·ft).

    NOTE:

    Ensure that conditioner rolls are rotating in the correct direction to feed the cut crop behind the rotary disc.

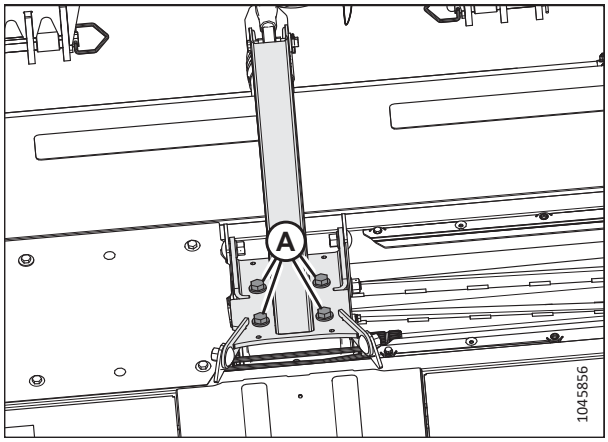


Figure 8.23: Header Drive Gearbox – Viewed from Above

17. Reinstall the primary, and cross drive shafts. For instructions, refer to *8.13 Installing Cross Driveline, page 62* and *8.11 Installing Primary Driveline, page 60*.

    IMPORTANT:

    Ensure that no objects or tools are left on the cutterbar.

8.10 Removing Primary Driveline

The primary driveline transfers power from the tractor's power take-off (PTO) to the header drive gearbox. These instructions describe the procedure for removing the driveline.

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.

WARNING

Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

1. Shut down the engine, and remove the key from the ignition.
2. Unhook the front mount rotary disc from the tractor. For instructions, refer to *8.8 Disconnecting Tractor from Front Mount Rotary Disc, page 53*.
3. Open the cutterbar doors. For instructions, refer to *8.1 Opening Cutterbar Doors, page 47*.
4. Disconnect driveline chain (A) from the rotary disc frame.
5. Remove the driveline guard.

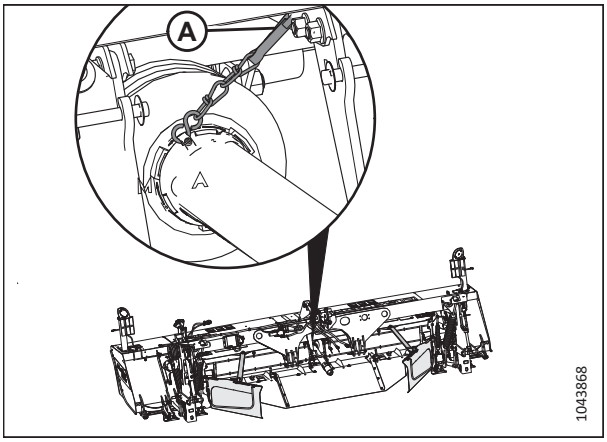


Figure 8.24: Primary Driveline

6. At the inboard end of primary driveline (A), pull back collar (B) while pulling driveline away from the splined shaft of the header drive gearbox.

   NOTE:

   The cutterbar and the drive gearbox support bracket are shown transparent in the illustration.

7. Lower primary driveline down and remove it from below the machine.

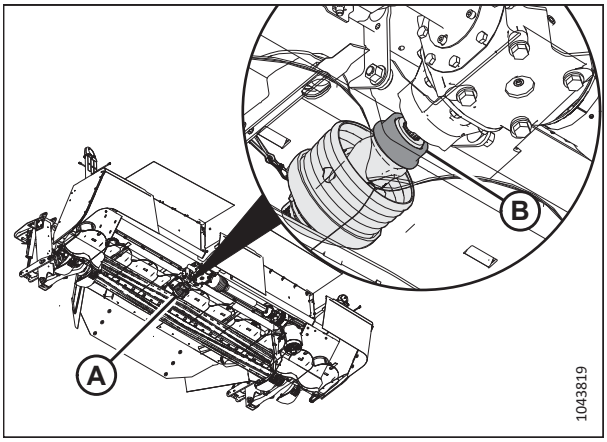


Figure 8.25: Primary Driveline – Viewed from Below

8.11 Installing Primary Driveline

The primary driveline transfers power from the tractor's power take-off (PTO) to the header drive gearbox. These instructions describe the procedure for installing the driveline.

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.

WARNING

Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

This procedure is continued from *8.10 Removing Primary Driveline, page 59* and assumes the front mount rotary disc is lowered to the ground and disconnected from the tractor.

1. Open the cutterbar doors. For instructions, refer to *8.1 Opening Cutterbar Doors, page 47*.

2. From below the machine, install primary driveline (A) onto the splined shaft of the header drive gearbox until collar (B) locks onto the shaft.

   NOTE:

   The cutterbar and the drive gearbox support bracket are shown transparent in the illustration.

3. Install the driveline guard.

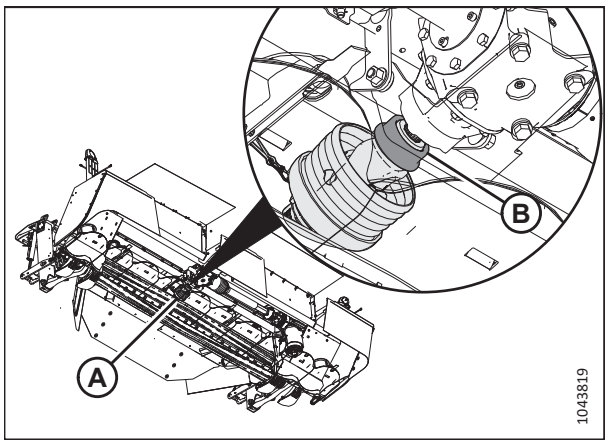


Figure 8.26: Primary Driveline – Viewed from Below

4. Reconnect driveline chain (A) to the frame.

   IMPORTANT:

   Ensure chain is short enough and does **NOT** wrap around the driveline guard.

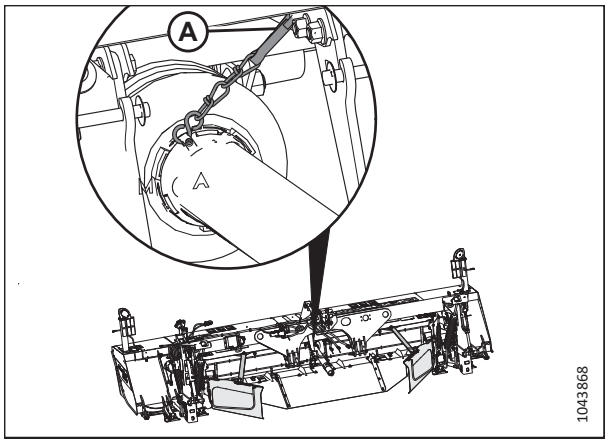


Figure 8.27: Primary Driveline Chain

8.12 Removing Cross Driveline

The cross driveline transfers power from the tractor's power take-off (PTO) to the cutterbar-conditioner drive gearbox (T-gearbox).

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.

1. Shut down the engine, and remove the key from the ignition.
2. Remove 10 bolts (B) securing top shield (A) and remove top shield to access the cross driveline. Retain bolts for installation.
3. Remove the driveline guards.

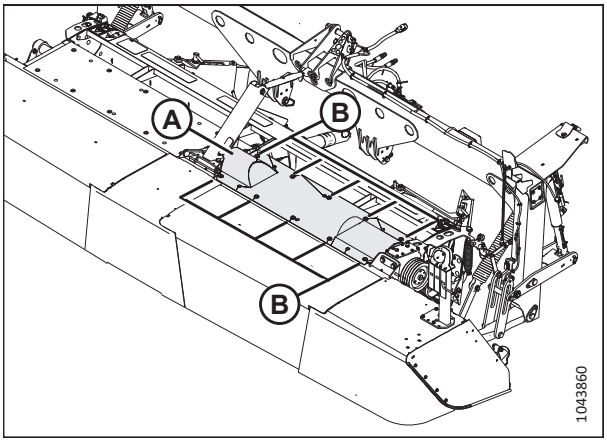


Figure 8.28: Top Shield – Left Side

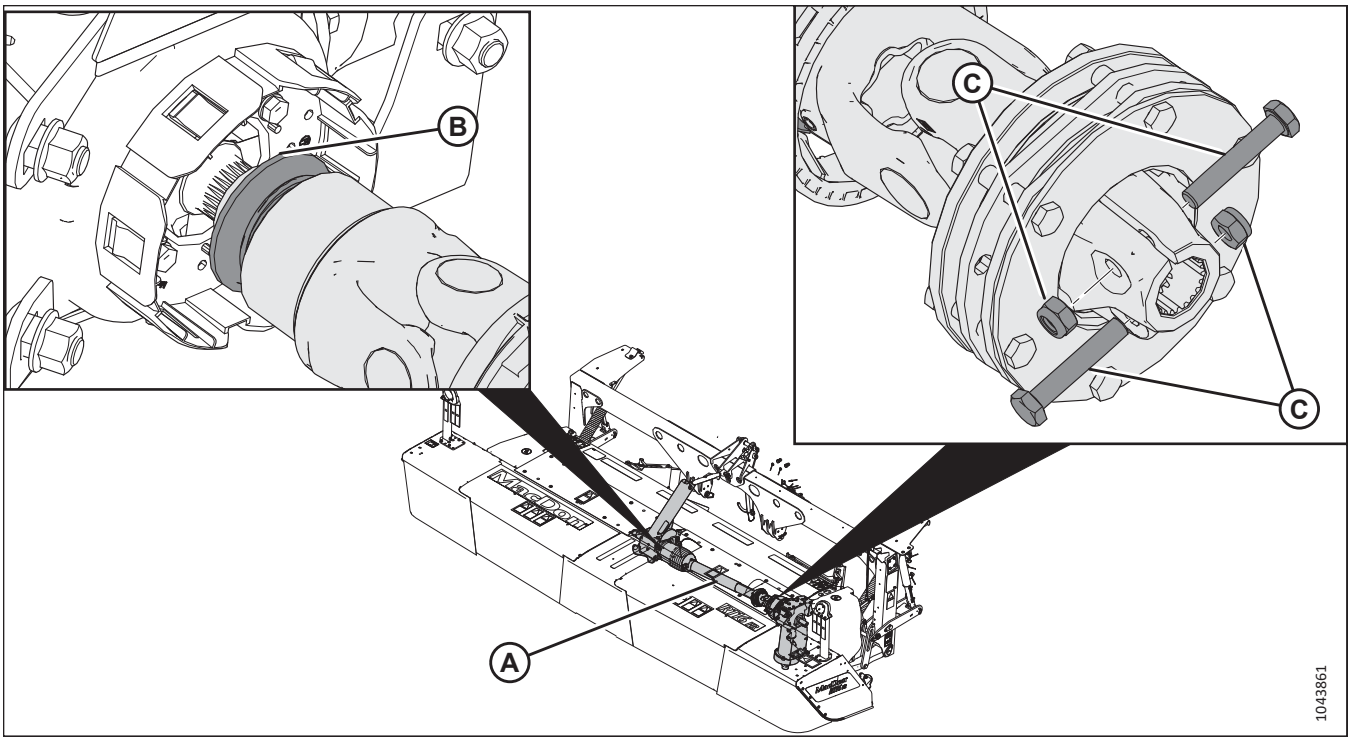


Figure 8.29: Cross Driveline

4. At the inboard end of cross driveline (A), pull back collar (B) while pulling driveline away from the splined shaft of the header drive gearbox.

5. At the outboard end of cross driveline (A), remove nuts (C) and bolts securing the driveline to the splined shaft of the cutterbar/conditioner drive gearbox. Retain nuts and bolts for installation.

6. Remove the cross driveline.

8.13 Installing Cross Driveline

The cross driveline transfers power from the tractor's power take-off (PTO) to the cutterbar-conditioner drive gearbox (T-gearbox).

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.

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

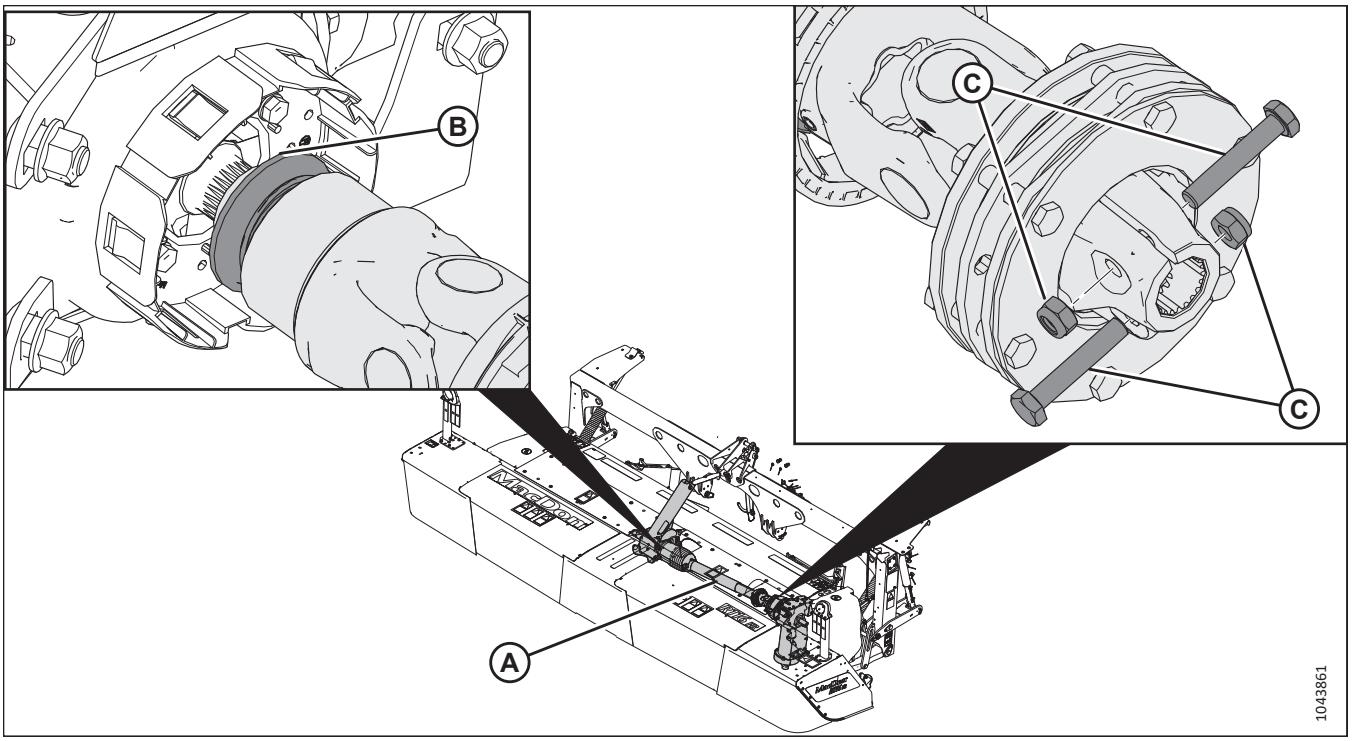


Figure 8.30: Cross Driveline

2. At the outboard end of cross driveline (A), install the driveline onto the splined shaft of the cutterbar/conditioner drive gearbox.

3. Secure the driveline to the splined shaft with existing nuts and bolts (C) configured as shown in Figure *8.30, page 63*. Torque the nuts to 88 Nm (65 lbf·ft).

4. At the inboard end of cross driveline (A), install the driveline onto the splined shaft of the gearbox until collar (B) engages the shaft.

5. Install the driveline guards.

6. Install top shield (A) and secure it with 10 bolts (B).

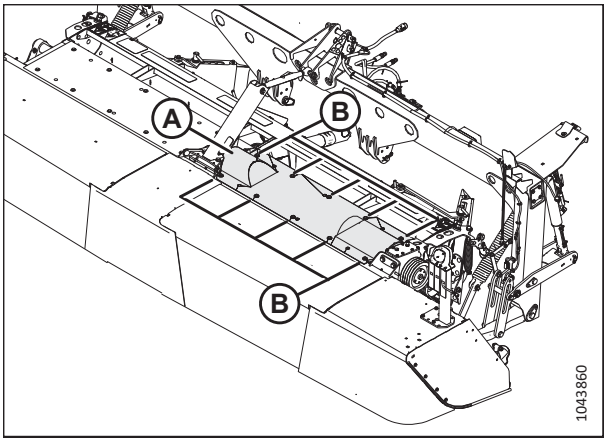


Figure 8.31: Top Shield – Left Side

8.14 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.

8.14.1 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 8.1 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

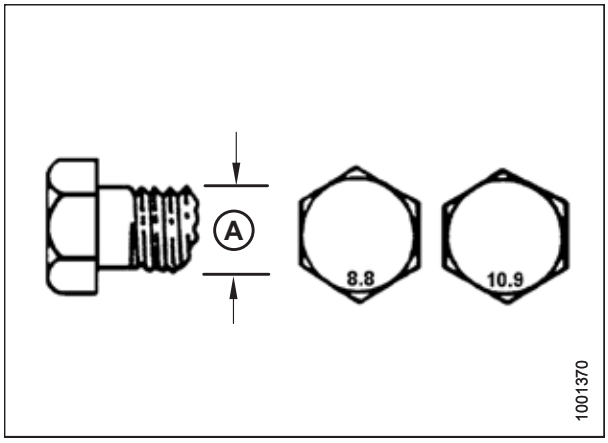


Figure 8.32: Bolt Grades

Table 8.2 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

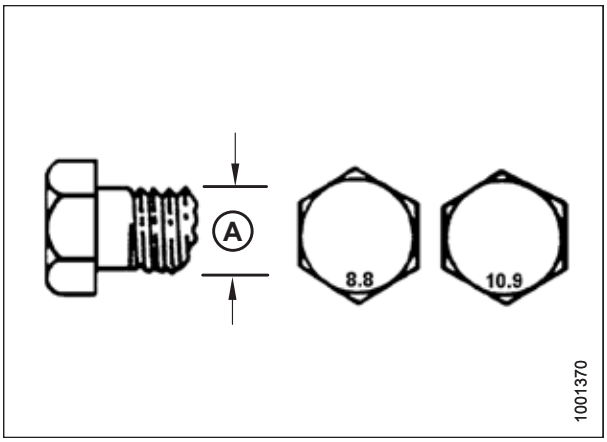


Figure 8.33: Bolt Grades

Table 8.3 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

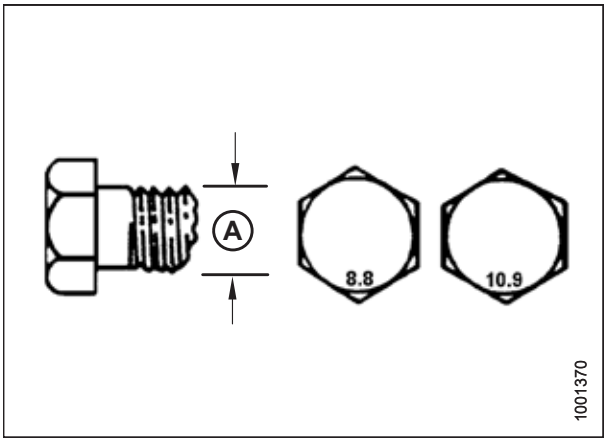


Figure 8.34: Bolt Grades

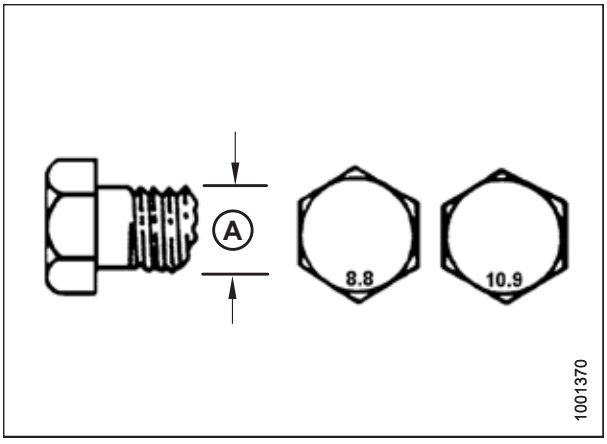


Figure 8.35: Bolt Grades

Table 8.4 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

8.14.2 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 8.5 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	–	–	–	–

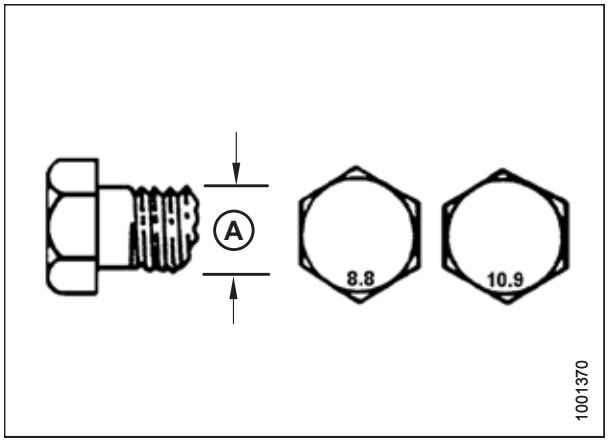


Figure 8.36: Bolt Grades

8.14.3 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).

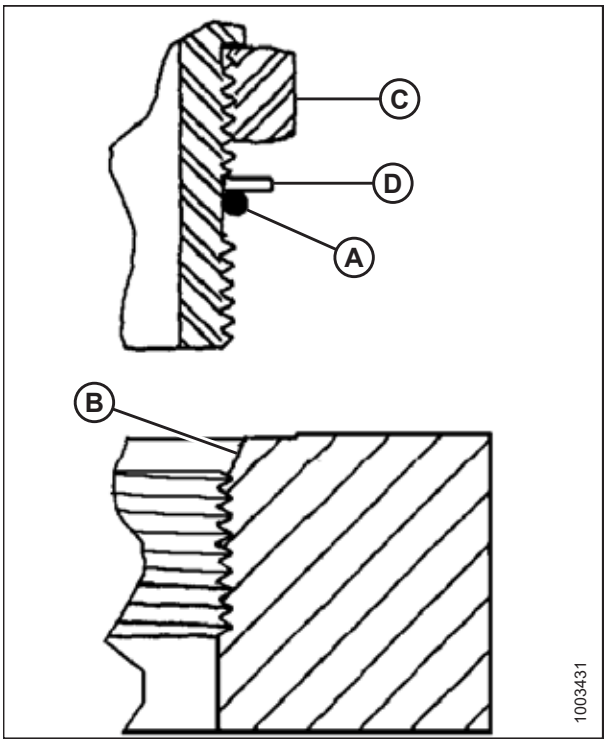


Figure 8.37: Hydraulic Fitting

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.

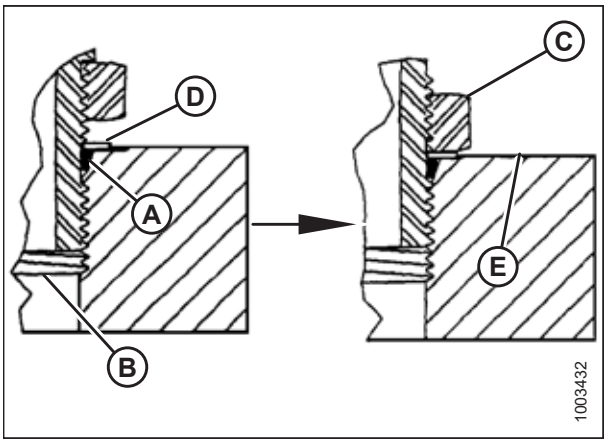


Figure 8.38: Hydraulic Fitting

Table 8.6 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable and Non-Adjustable

SAE Dash Size	Thread Size (in.)	Torque Value[1]	
		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

8.14.4 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 *8.7, page 68*.
6. Verify the final condition of the fitting.

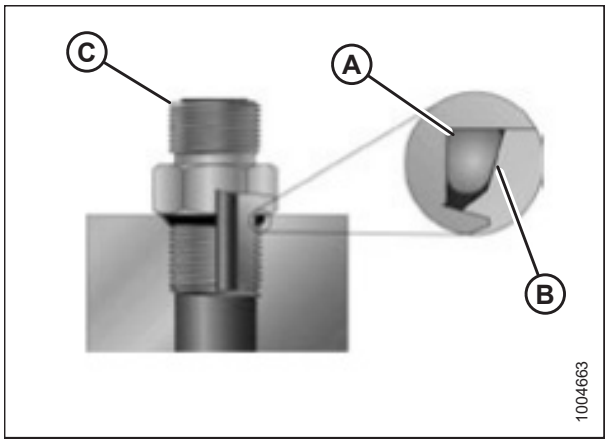


Figure 8.39: Hydraulic Fitting

Table 8.7 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable and Non-Adjustable

SAE Dash Size	Thread Size (in.)	Torque Value[1]	
		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

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

Table 8.7 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable and Non-Adjustable (continued)

SAE Dash Size	Thread Size (in.)	Torque Value[2]	
		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

8.14.5 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 *8.8, page 70*.

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

Figure 8.40: Hydraulic Fitting

2. 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 *8.8, page 70*.

   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.

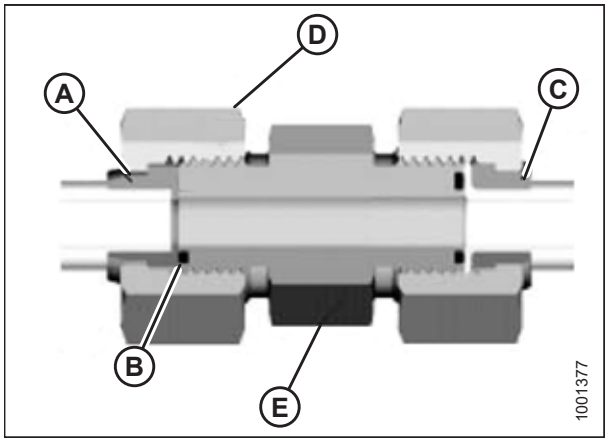


Figure 8.41: Hydraulic Fitting

Table 8.8 O-Ring Face Seal (ORFS) Hydraulic Fittings

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value[3]	
			Nm	lbf·ft
-3	Note[4]	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note[4]	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[4]	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

8.14.6 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.

3. Torque values and angles shown are based on lubricated connection as in reassembly.
4. 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 *8.9, page 71*. 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 8.9 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

8.15 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 8.10 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

Table 8.10 Conversion Chart (continued)

Quantity	SI Units (Metric)		Factor	US Customary Units (Standard)	
	Unit Name	Abbreviation		Unit Name	Abbreviation
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.

8.16 Definitions

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

Table 8.11 Definitions

Term	Definition
API	American Petroleum Institute
Bolt	A headed and externally threaded fastener designed to be paired with a nut
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
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
PTO	Power take-off
R1 FR Series	R113 and R116 Front Mount Rotary Disc for Agricultural Tractors
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

Table 8.11 Definitions (continued)

Term	Definition
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
Tractor	Agricultural-type power unit which provides motive force to a front mounted attachment
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

Predelivery Checklist

Perform these checks and adjustments before delivering the machine to your Customer. If adjustments are required, refer to the appropriate page number in this manual. The completed Checklist should be retained by either the Operator or the Dealer.

WARNING

Do NOT operate the machine with the driveshields open. High speed rotating components may throw debris and could result in death or serious injury.

CAUTION

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

Rotary Disc Header Serial Number:

✓	Item	Reference
	Check for shipping damage or missing parts. Be sure all shipping dunnage is removed.	—
	Check for loose hardware. Tighten to required torque if applicable.	*8.14 Torque Specifications, page 64*
	Check main drive belt tension.	*7.1 Checking Conditioner Drive Belt, page 24*
	Check cutterbar angle. Set center-link to middle of adjustment range.	*7.2 Checking Cutting Angle, page 25*
	Check float.	*7.5 Checking Float, page 28*
	Check side forming shields evenly set to desired position.	*7.7 Positioning Forming Shield Side Deflectors – Roll Conditioner, page 33*
	Check rear baffle is about mid-position (roll conditioner).	*7.8 Adjusting Conditioner Baffle Position, page 34*
	Check conditioner roll gap (roll conditioner).	*7.13 Checking Roll Gap, page 39*
	Check conditioner roll tension (roll conditioner).	*7.15.1 Adjusting Roll Tension, page 43*
	Check conditioner roll timing hardware is securely tightened (roll conditioner).	*7.14 Checking Roll Timing, page 40*
	Check that cutterbar doors are unbolted from center channel frame, shipping wire is removed from cutterbar curtains, and cutterbar curtains are hanging properly.	*5.1 Unpacking Curtains, page 17*
	Grease all bearings and drivelines.	*6.1 Lubrication Points, page 19*
	Check conditioner roll timing gearbox lubricant.	*7.9 Checking and Adding Lubricant – Conditioner Roll Timing Gearbox, page 35*
	Check header drive gearbox lubricant.	*7.10 Checking and Adding Lubricant – Header Drive Gearbox , page 35*
	Check cutterbar and conditioner drive gearbox lubricant.	*7.11 Checking and Adding Lubricant – Cutterbar / Conditioner Drive Gearbox, page 36*
	Check cutterbar lubricant.	*7.12 Checking and Adding Lubricant – Cutterbar, page 37*

✓	Item	Reference
	Check cutterbar area carefully for loose parts and hardware on the cutterbar. **WARNING** **These objects can be ejected with considerable force when the machine is started, and may result in serious injury or machine damage.**	—
Run-Up Procedure		*7.19 Running up Front Mount Rotary Disc, page 46*
	Check hydraulic hose and wiring harness routing to ensure adequate clearance when raising, lowering the machine.	—
	Check that the auxiliary lift system is functional.	*7.6 Checking Auxiliary Lift System, page 32*
	Check that the hazard lights are functional.	*7.16 Checking Lights, page 44*
Post Run-Up Check – Stop Engine		
	Check belt drive for proper idler alignment and overheating bearings.	*7.1 Checking Conditioner Drive Belt, page 24*
	Check for hydraulic leaks.	—
	Check that rotary disc manuals are in storage compartment.	*7.17 Checking Manuals, page 45*
	Check that the disc timing tool is in place.	*7.18 Checking Disc Timing Tool, page 45*
	Check and remove protective film on top surface of the machine.	*7.20 Checking and Removing Clear Vinyl Decal Protectors, page 46*

Date Checked: **Checked by:**

Recommended Lubricants

Keep your machine operating at top efficiency by using only clean lubricants and by ensuring the following:

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

IMPORTANT:

Do **NOT** overfill the cutterbar when adding lubricant. Overfilling could result in overheating and failure of the cutterbar components.

Specification	Description	Use	Capacities
Lubricant: Grease			
SAE Multipurpose	High temperature, extreme pressure (EP) performance with 1% max. molybdenum disulphide (NLGI Grade 2) lithium base	As required unless otherwise specified	—
SAE Multipurpose	High temperature, extreme pressure (EP) performance with 10% max. molybdenum disulphide (NLGI Grade 2) lithium base	Driveline slip-joints	—
Lubricant: Gear Lubricant			
SAE 80W-90	High thermal and oxidation stability API service class GL-5	R113 FR cutterbar	8 L (8.5 qts [US])
SAE 80W-90	High thermal and oxidation stability API service class GL-5	R116 FR cutterbar	10 L (10.5 qts [US])
SAE 85W-140	Gear lubricant API service class GL-5	Header drive gearbox	1.9 L (2.0 qts [US])
SAE 85W-140	Gear lubricant API service class GL-5	Conditioner roll timing gearbox	0.7 L (0.75 qts [US])
SAE 85W-140	Gear lubricant API service class GL-5	Cutterbar and conditioner drive gearbox	1.8 L (1.9 qts [US])

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