

MacDon[®]

**R113/R116
Pull-Type Rotary Disc Mower
Conditioner**

Operator's Manual

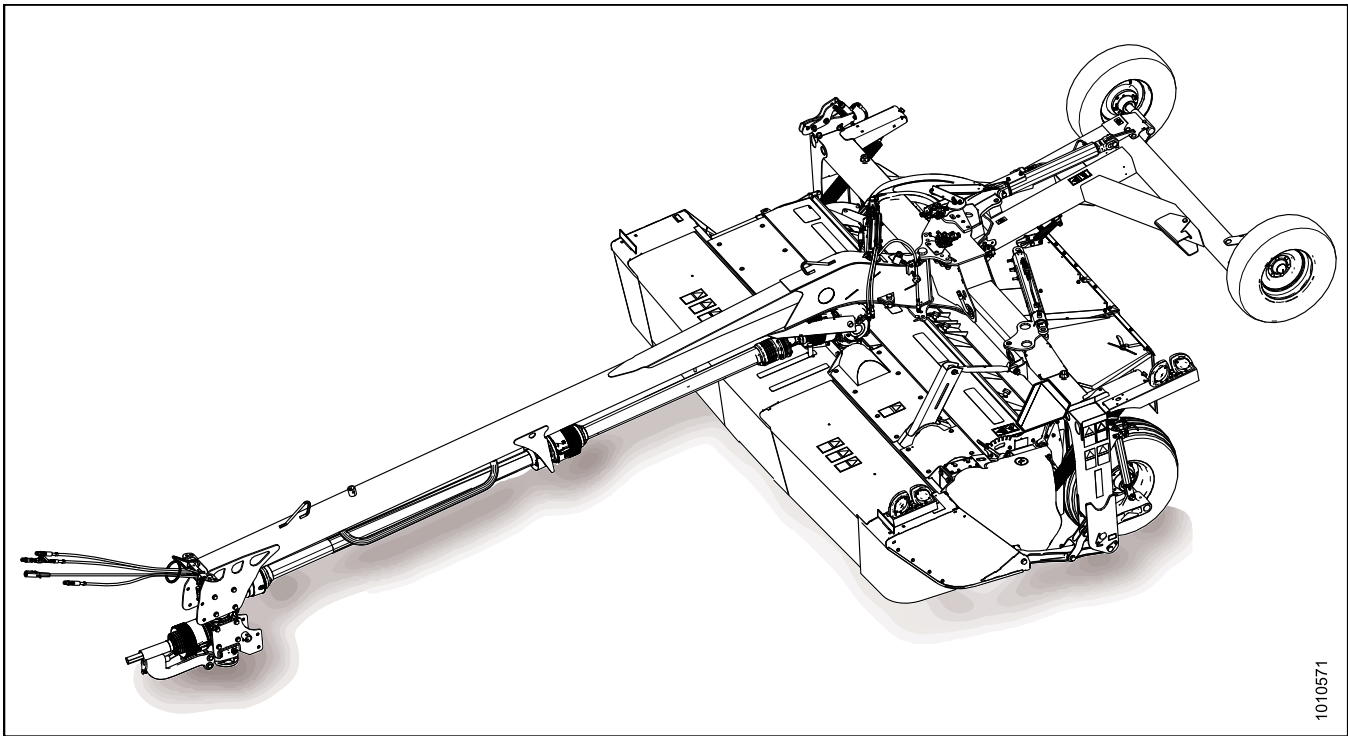
214018 Revision A

Model Year 2017

Original Instruction

The harvesting specialists.


R113/R116 Pull-Type Rotary Disc Mower Conditioner



1010571

Published: July, 2016

Declaration of Conformity

		<h2 style="text-align: center;">EC Declaration of Conformity</h2>	
<p>[1] MacDon MacDon Industries Ltd. 680 Moray Street, Winnipeg, Manitoba, Canada R3J 3S3</p>		<p>[4] As Per Shipping Document</p>	
<p>[2] Rotary Disc Mower</p>		<p>[5] June 24, 2016</p>	
<p>[3] MacDon R113/R116</p>		<p>[6] _____ Christoph Martens Product Integrity</p>	

EN	BG	CZ	DA
<p>We, [1] Declare, that the product: Machine Type: [2] Name & Model: [3] Serial Number(s): [4] fulfills all the relevant provisions of the Directive 2006/42/EC. Harmonized standards used, as referred to in Article 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Place and date of declaration: [5] Identity and signature of the person empowered to draw up the declaration: [6] Name and address of the person authorized to constitute the technical file: Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Germany) hartmut.hartmann@prodoku.com</p>	<p>Ние, [1] декларираме, че следният продукт: Тип машина: [2] Наименование и модел: [3] Серийен номер(а) [4] отговаря на всички приложими разпоредби на директива 2006/42/ЕО. Използвани са следните хармонизирани стандарти според чл. 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Място и дата на декларацията: [5] Име и подпис на лицето, упълномощено да изготви декларацията: [6] Име и адрес на лицето, упълномощено да състави техническия файл: Хартмут Хартман Wersener Holz 2a D-49504 Lotte (Германия) hartmut.hartmann@prodoku.com</p>	<p>My, [1] Prohláším, že produkt: Typ zařízení: [2] Název a model: [3] Sériové(á) číslo(a): [4] splňuje všechna relevantní ustanovení směrnice 2006/42/EC. Byly použity harmonizované standardy, jak je uvedeno v článku 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Místo a datum prohlášení: [5] Identita a podpis osoby oprávněné k vydání prohlášení: [6] Jméno a adresa osoby oprávněné k vyplnění technického souboru: Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Německo) hartmut.hartmann@prodoku.com</p>	<p>Vi, [1] erklærer, at produktet: Maskintype [2] Navn og model: [3] Serienummer (-numre): [4] Opfylder alle bestemmelser i direktiv 2006/42/EF. Anvendte harmoniserede standarder, som henviser til i paragraf 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Sted og dato for erklæringen: [5] Identitet på og underskrift fra den person, som er bemyndiget til at udarbejde erklæringen: [6] Navn og adresse på den person, som er bemyndiget til at udarbejde den tekniske fil: Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Tyskland) hartmut.hartmann@prodoku.com</p>
DE	ES	ET	FR
<p>Wir, [1] Erklären hiermit, dass das Produkt: Maschinentyp: [2] Name & Modell: [3] Seriennummer (n): [4] alle relevanten Vorschriften der Richtlinie 2006/42/EG erfüllt. Harmonisierte Standards wurden, wie in folgenden Artikeln angegeben, verwendet 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Ort und Datum der Erklärung: [5] Name und Unterschrift der Person, die dazu befugt ist, die Erklärung auszustellen: [6] Name und Anschrift der Person, die dazu berechtigt ist, die technischen Unterlagen zu erstellen: Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Deutschland) hartmut.hartmann@prodoku.com</p>	<p>Nosotros [1] declaramos que el producto: Tipo de máquina: [2] Nombre y modelo: [3] Números de serie: [4] cumple con todas las disposiciones pertinentes de la directriz 2006/42/EC. Se utilizaron normas armonizadas, según lo dispuesto en el artículo 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Lugar y fecha de la declaración: [5] Identidad y firma de la persona facultada para draw redactar la declaración: [6] Nombre y dirección de la persona autorizada para elaborar el expediente técnico: Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Germany) hartmut.hartmann@prodoku.com</p>	<p>Meie, [1] deklareerime, et toode Seadme tüüp: [2] Nimi ja mudel: [3] Seerianumbrid: [4] vastab kõigile direktiivi 2006/42/EÜ asjakohastele sätetele. Kasutatud on järgnevalt harmoniseeritud standardeid, millele on viidatud ka punktis 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Deklaratsiooni koht ja kuupäev: [5] Deklaratsiooni koostamiseks volitatud isiku nimi ja allkiri: [6] Tehnilise dokumendi koostamiseks volitatud isiku nimi ja aadress: Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Saksamaa) hartmut.hartmann@prodoku.com</p>	<p>Nous soussignés, [1] Déclarons que le produit : Type de machine : [2] Nom et modèle : [3] Numéro(s) de série : [4] Est conforme à toutes les dispositions pertinentes de la directive 2006/42/EC. Utilisation des normes harmonisées, comme indiqué dans l'Article 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009 Lieu et date de la déclaration : [5] Identité et signature de la personne ayant reçu le pouvoir de rédiger cette déclaration : [6] Nom et adresse de la personne autorisée à constituer le dossier technique : Hartmut Hartmann Wersener Holz 2a D-49504 Lotte (Allemagne) hartmut.hartmann@prodoku.com</p>

The Harvesting Specialists

MacDon

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Figure 1: EC Declaration of Conformity

EC Declaration of Conformity

IT	HU	LT	LV
<p>Noi, [1] Dichiaro che il prodotto: Tipo di macchina: [2] Nome e modello: [3] Numero(i) di serie: [4] soddisfa tutte le disposizioni rilevanti della direttiva 2006/42/CE.</p> <p>Utilizzo degli standard armonizzati, come indicato nell'Articolo 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Luogo e data della dichiarazione: [5] Nome e firma della persona autorizzata a redigere la dichiarazione: [6] Nome e persona autorizzata a compilare il file tecnico: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Germania) hartmut.hartmann@prodoku.com</p>	<p>Mi, [1] Ezennel kijelentjük, hogy a következő termék: Gép típusa: [2] Név és modell: [3] Szériaszám(ok): [4] teljesíti a következő irányelv összes vonatkozó előírásait: 2006/42/EK.</p> <p>Az alábbi harmonizált szabványok kerültek alkalmazásra a 7(2) cikkely szerint: EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>A nyilatkozattétel ideje és helye: [5] Azon személy kiléte és aláírása, aki jogosult a nyilatkozat elkészítésére: [6] Azon személy neve és aláírása, aki felhatalmazott a műszaki dokumentáció összeállítására: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Németország) hartmut.hartmann@prodoku.com</p>	<p>Mes, [1] Pareiškiamo, kad šis produktas: Mašinos tipas: [2] Pavadinimas ir modelis: [3] Serijos numeris (-iai): [4] atitinka taikomos reikalavimus pagal Direktyvą 2006/42/EB.</p> <p>Naudojami harmonizuoti standartai, kai nurodoma straipsnyje 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Deklaracijos vieta ir data: [5] Asmens tapatybės duomenys ir parašas asmens, įgalioto sudaryti šią deklaraciją: [6] Vardas ir pavardė asmens, kuris įgaliotas sudaryti šį techninį failą: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Vokietija) hartmut.hartmann@prodoku.com</p>	<p>Mēs, [1] Deklarējam, ka produkts: Mašīnas tips: [2] Nosaukums un modelis: [3] Sērijas numurs(-i): [4] Atbilst visām būtiskajām Direktīvas 2006/42/EK prasībām.</p> <p>Piemēroti šādi saskaņotie standarti, kā minēts 7. panta 2. punktā: EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Deklarācijas parakstīšanas vieta un datums: [5] Tās personas vārds, uzvārds un paraksts, kas ir pilnvarota sagatavot šo deklarāciju: [6] Tās personas vārds, uzvārds un adrese, kas ir pilnvarota sastādīt tehnisko dokumentāciju: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Vācija) hartmut.hartmann@prodoku.com</p>
<p>Wij, [1] Verklaren dat het product: Machinetype: [2] Naam en model: [3] Serienummer(s): [4] voldoet aan alle relevante bepalingen van de Richtlijn 2006/42/EC.</p> <p>Geharmoniseerde normen toegepast, zoals vermeld in Artikel 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Plaats en datum van verklaring: [5] Naam en handtekening van de bevoegde persoon om de verklaring op te stellen: [6] Naam en adres van de geautoriseerde persoon om het technisch dossier samen te stellen: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Duitsland) hartmut.hartmann@prodoku.com</p>	<p>My niżej podpisani, [1] Oświadczamy, że produkt: Typ urządzenia: [2] Nazwa i model: [3] Numer seryjny/numery seryjne: [4] spełnia wszystkie odpowiednie przepisy dyrektywy 2006/42/WE.</p> <p>Zastosowaliśmy następujące (zharmonizowane) normy zgodnie z artykułem 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Data i miejsce oświadczenia: [5] Imię i nazwisko oraz podpis osoby upoważnionej do przygotowania deklaracji: [6] Imię i nazwisko oraz adres osoby upoważnionej do przygotowania dokumentacji technicznej: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Niemcy) hartmut.hartmann@prodoku.com</p>	<p>Nós, [1] Declaramos, que o produto: Tipo de máquina: [2] Nome e Modelo: [3] Número(s) de Série: [4] cumpre todas as disposições relevantes da Directiva 2006/42/CE.</p> <p>Normas harmonizadas aplicadas, conforme referido no Artigo 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Local e data da declaração: [5] Identidade e assinatura da pessoa autorizada a elaborar a declaração: [6] Nome e endereço da pessoa autorizada a compilar o ficheiro técnico: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Alemanha) hartmut.hartmann@prodoku.com</p>	<p>Noi, [1] Declarăm, că următorul produs: Tipul mașinii: [2] Denumirea și modelul: [3] Număr (numere) serie: [4] corespunde tuturor dispozițiilor esențiale ale directivei 2006/42/CE.</p> <p>Au fost aplicate următoarele standarde armonizate conform articolului 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Data și locul declarației: [5] Identitatea și semnătura persoanei împuternicite pentru întocmirea declarației: [6] Numele și semnătura persoanei autorizate pentru întocmirea cărții tehnice: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Germania) hartmut.hartmann@prodoku.com</p>
<p>Mi, [1] izjavljujemo da proizvod Tip mašine: [2] Naziv i model: [3] Serijski broj(ovi): [4] Ispunjava sve relevantne odredbe direktive 2006/42/EC.</p> <p>Korišćeni su usklađeni standardi kao što je navedeno u članku 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Datum i mesto izdavanja deklaracije: [5] Identitet i potpis lica ovlašćenog za sastavljanje deklaracije: [6] Ime i adresa osobe ovlašćene za sastavljanje tehničke datoteke: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Nemačka) hartmut.hartmann@prodoku.com</p>	<p>Vi, [1] Intygar att produkten: Maskintyp: [2] Namn och modell: [3] Serienummer: [4] uppfyller alla relevanta villkor i direktivet 2006/42/EG.</p> <p>Harmonierade standarder används, såsom anges i artikel 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Plats och datum för intyget: [5] Identitet och signatur för person med befogenhet att upprätta intyget: [6] Namn och adress för person behörig att upprätta den tekniska dokumentationen: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Tyskland) hartmut.hartmann@prodoku.com</p>	<p>Mi, [1] izjavljamo, da izdelek: Vrsta stroja: [2] Ime in model: [3] Serijska/-e številka/-e: [4] ustreza vsem zadevnim določbam Direktive 2006/42/ES.</p> <p>Uporabljeni usklajeni standardi, kot je navedeno v členu 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Kraj in datum izjave: [5] Istovetnost in podpis osebe, pooblaščenega za pripravo izjave: [6] Ime in naslov osebe, pooblaščenega za pripravo tehnične datoteke: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Nemčija) hartmut.hartmann@prodoku.com</p>	<p>My, [1] týmto prehlasujeme, že tento výrobok: Typ zariadenia: [2] Názov a model: [3] Výrobné číslo: [4] splňa príslušné ustanovenia a základné požiadavky smernice č. 2006/42/ES.</p> <p>Použité harmonizované normy, ktoré sa uvádzajú v článku 7(2): EN ISO 4254-1:2013 EN ISO 4254-7:2009</p> <p>Miesto a dátum prehlásenia: [5] Meno a podpis osoby oprávnenej vypracovať toto prehlásenie: [6] Meno a adresa osoby oprávnenej zostaviť technický súbor: Hartmut Hartmann Wersener Holz Za D-49504 Lotte (Nemecko) hartmut.hartmann@prodoku.com</p>

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Figure 2: EC Declaration of Conformity

Introduction

This instructional manual contains operating and maintenance procedures for the MacDon R113 13-Foot and R116 16-Foot Pull-Type Rotary Disc Mower Conditioners. Your new mower conditioner is designed to cut, condition, and lay a wide variety of grasses and hay crops in windrows.

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

Use this manual as your first source of information about the machine. If you follow the instructions provided in this manual, your mower conditioner will work well for many years. A parts catalog also is supplied with your new mower conditioner. If you require more detailed service information, a technical manual is available from your Dealer.

Use the Table of Contents and the Index to guide you to specific topics. Study the Table of Contents to familiarize yourself with how the material is organized. Keep this manual handy for frequent reference and to pass on to new Operators or Owners. Call your Dealer if you need assistance, information, or additional copies of this manual.

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

MacDon provides warranty for Customers who operate and maintain their equipment as described in this manual. A copy of MacDon Industries Limited Warranty Policy, which explains this warranty, should have been provided to you by your Dealer.

Damage resulting from accident, misuse, improper maintenance, abuse, neglect, or from other than normal and ordinary use of the machine, and damage resulting from failure to use the machine, equipment, component or part in accordance with MacDon or the manufacturer's instructions will void this warranty.

Store the operator's manual and the parts catalog in the plastic manual case (A) at the right side of the mower conditioner.

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).

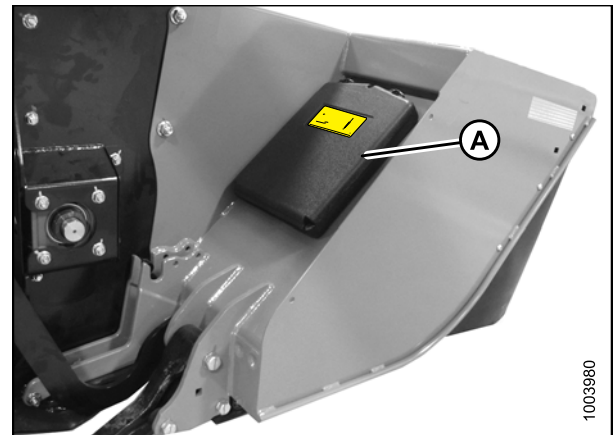


Figure 3: Manual Storage Case

List of Revisions

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

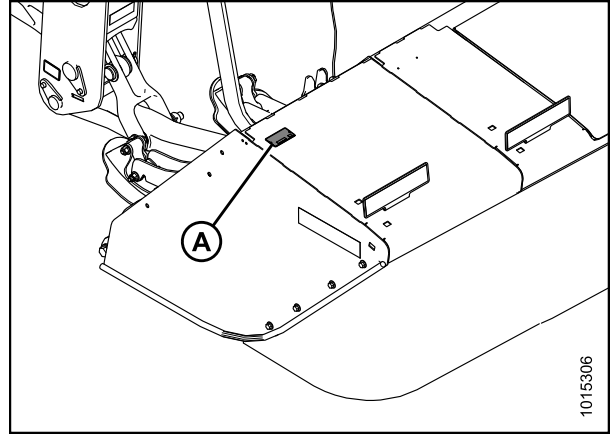
Summary of Change	Location
Updated the part number and model year.	Front Cover
Added a statement about following the recommended machine settings in all MacDon publications. Added warranty information.	<i>Introduction, page iii</i>
Added Declaration of Conformity.	<i>Declaration of Conformity, page i</i>
Updated Component Identification—updated image to show new hydraulic tilt option (MD #281096).	<i>2.2 Component Identification, page 25</i>
Added reference to adapter (MD #281094) used with Road Friendly Transport system.	<i>3.7.4 Connecting Electrical Wiring Harness, page 49</i>
Added reference to transport hitch.	<i>3.14.5 Converting from Transport to Field Mode (without Optional Road Friendly Transport™ System), page 71</i>
Updated hydraulic tilt image.	<i>Adjusting Cutterbar Angle: Hydraulic, page 84</i>
Updated roll gap adjustment instructions.	<ul style="list-style-type: none"> • <i>Adjusting Roll Gap: Steel Rolls, page 87</i> • <i>Adjusting Roll Gap: Polyurethane Rolls, page 88</i>
Inserted CAUTION statement regarding damaged or loose cutterblades and attachment hardware.	<i>Inspecting Cutterblades, page 147</i> and <i>Inspecting Cutterblade Hardware, page 149</i>
Updated instructions for separating center-link from anchor. Updated illustration.	<i>Separating Header from Carrier, page 234</i>
Updated instructions for attaching center-link. Updated illustration.	<i>Assembling Header and Carrier, page 243</i>
Updated Hydraulic Center-Link kit bundle number. Updated image.	<i>5.1.2 Hydraulic Center-Link Kit, page 251</i>

Serial Numbers

Record the serial numbers of the mower conditioner, the hitch, and the Road Friendly Transport option (if equipped) in the spaces provided below.

Mower conditioner
serial number (A)

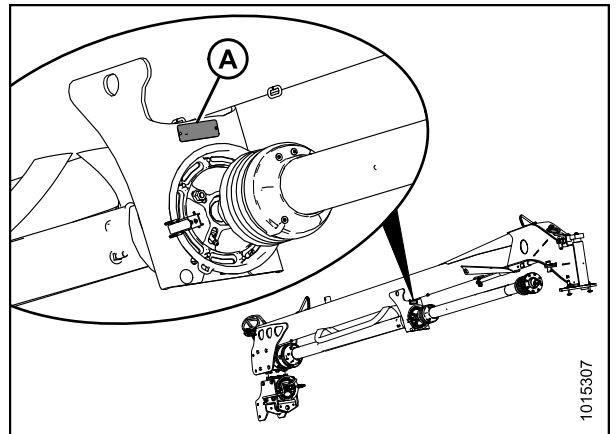
Model year



1015306

Figure 4: Mower Conditioner Serial Number Location

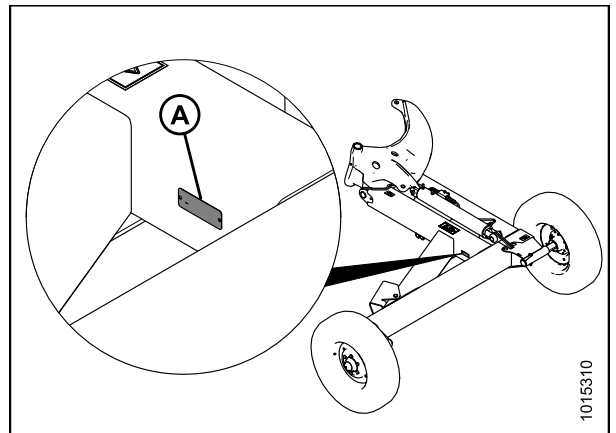
Hitch serial number (A)



1015307

Figure 5: Hitch Serial Number Location (13-Ft Shown, 16-Ft Similar)

Optional transport system
serial number (A)



1015310

Figure 6: Road Friendly Transport (Optional) Serial Number Location

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1 Safety

1.1 Safety Alert Symbols

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

This symbol means:

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

Carefully read and follow the safety message accompanying this symbol.

Why is safety important to you?

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



Figure 1.1: Safety Symbol

1.2 Signal Words

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

DANGER

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

WARNING

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

CAUTION

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

1.3 General Safety

CAUTION

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

Protect yourself.

- When assembling, operating, and servicing machinery, wear all the 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
- Be aware that exposure to loud noises can cause hearing impairment or loss. Wear suitable hearing protection devices such as ear muffs or ear plugs to help protect against objectionable or loud noises.

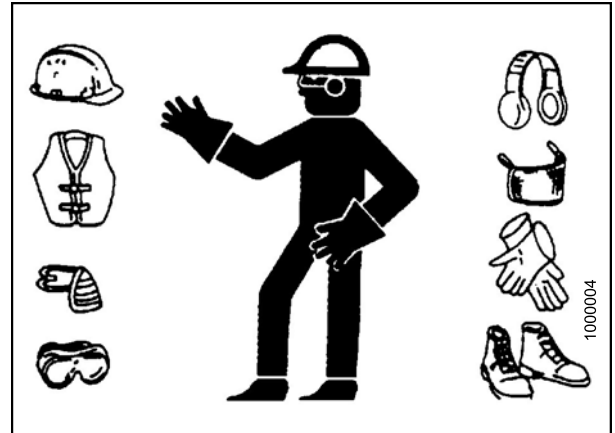


Figure 1.2: Safety Equipment



Figure 1.3: Safety Equipment

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

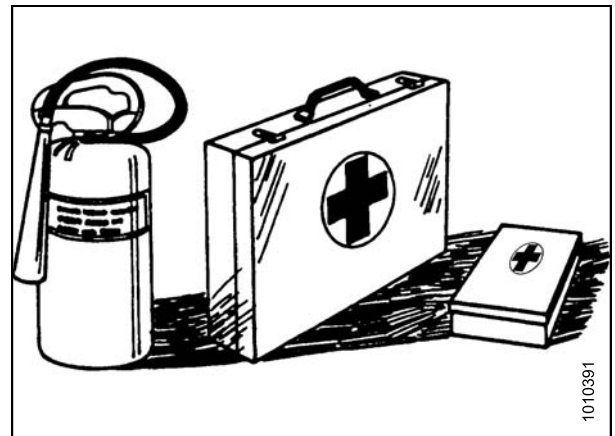


Figure 1.4: Safety Equipment

SAFETY

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



Figure 1.5: Safety around Equipment

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

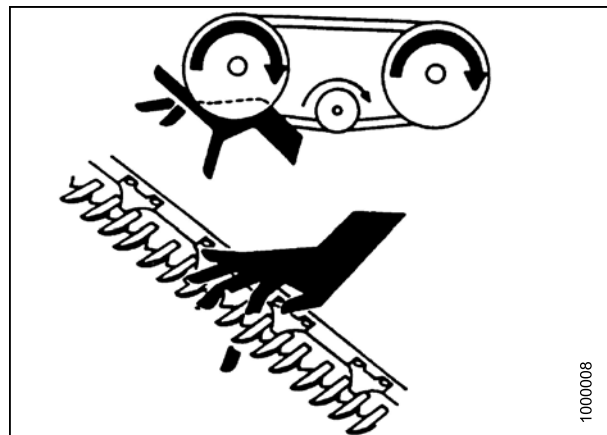


Figure 1.6: Safety around Equipment

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



Figure 1.7: Safety around Equipment

1.4 Maintenance Safety

To ensure your safety while maintaining the machine:

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



Figure 1.8: Safety around Equipment

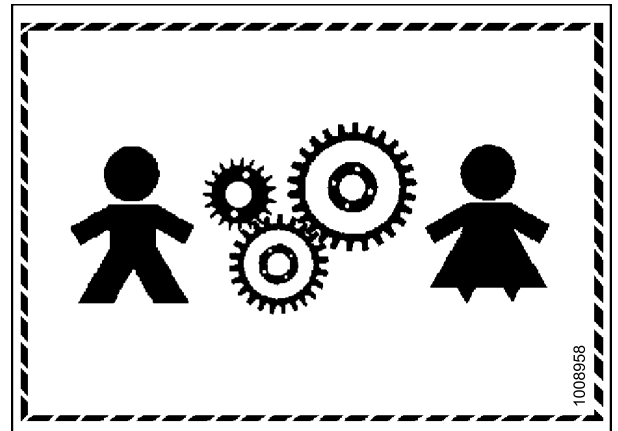


Figure 1.9: Equipment NOT Safe for Children

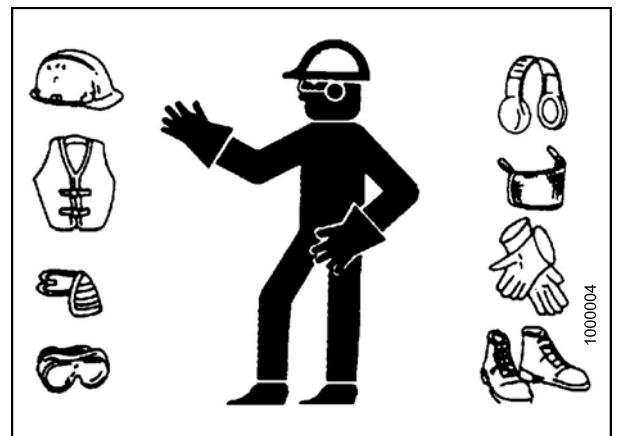


Figure 1.10: Safety Equipment

1.5 Hydraulic Safety

- Always place all hydraulic controls in Neutral before dismounting.
- Make sure that all components in 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 the hydraulic lines, fittings, or hoses by using tapes, clamps, cements, or welding. The hydraulic system operates under extremely high pressure. Makeshift repairs will fail suddenly and create hazardous and unsafe conditions.

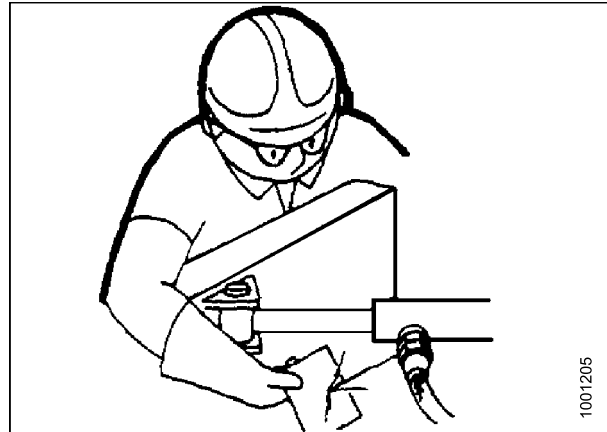


Figure 1.11: Testing for Hydraulic Leaks

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



Figure 1.12: Hydraulic Pressure Hazard

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

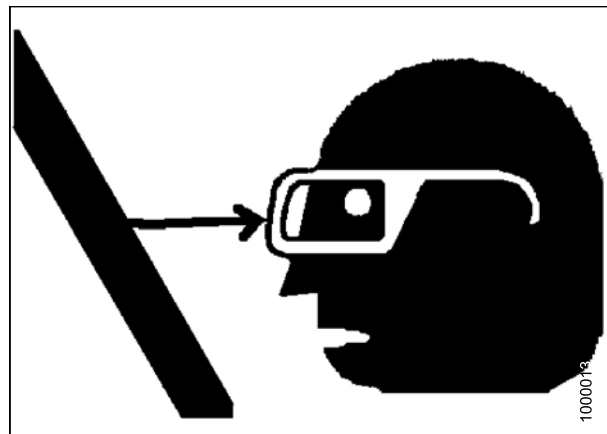


Figure 1.13: Safety around Equipment

1.6 Tire Safety

WARNING

- Service tires safely.
- A tire can explode during inflation which could cause serious injury or death.
- Follow proper procedures when mounting a tire on a wheel or rim. Failure to do so can produce an explosion that may result in serious injury or death.

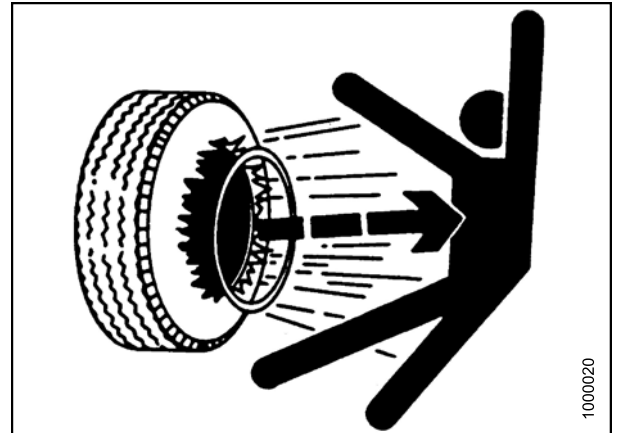


Figure 1.14: Overinflated Tire

WARNING

- Do NOT stand over tire. Use a clip-on chuck and extension hose.
- Never exceed air pressure of 241 kPa (35 psi) for field tires and 276 kPa (40 psi) for transport tires when seating the bead on the rim.
- Do NOT exceed maximum inflation pressure indicated on tire label.
- Replace tires that have defects.
- Replace wheel rims that are cracked, worn, or severely rusted.
- Never weld a wheel rim.
- Never use force on an inflated or partially inflated tire.
- Make sure the tire is correctly seated before inflating to operating pressure.
- If the tire is not correctly positioned on the rim or is overinflated, the tire bead can loosen on one side causing air to escape at high speed and with great force. An air leak of this nature can thrust the tire in any direction endangering anyone in the area.
- Make sure all the air is removed from the tire before removing the tire from the rim.
- Do NOT remove, install, or repair a tire on a rim unless you have the proper equipment and experience to perform the job.
- Take the tire and rim to a qualified tire repair shop.

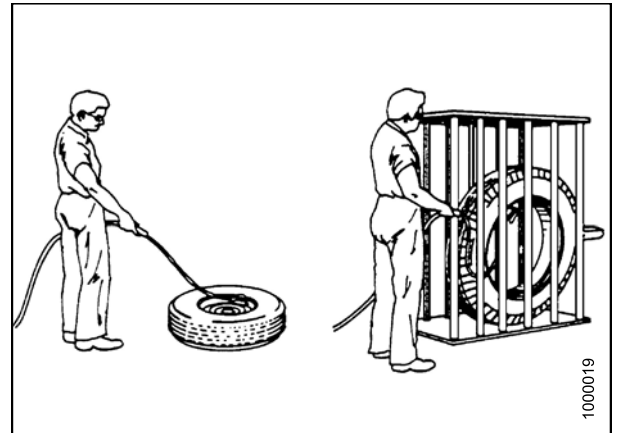


Figure 1.15: Safely Filling a Tire with Air

1.7 Safety Signs

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

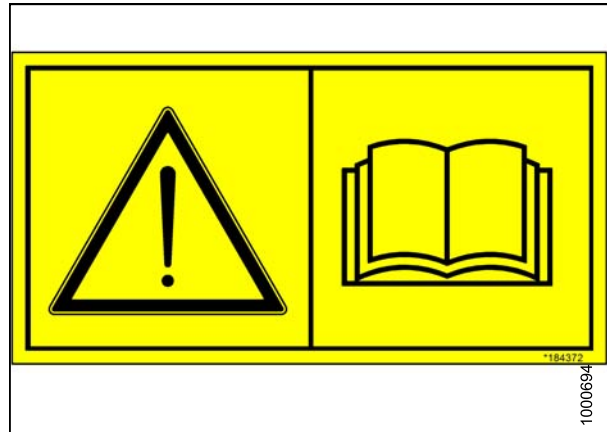
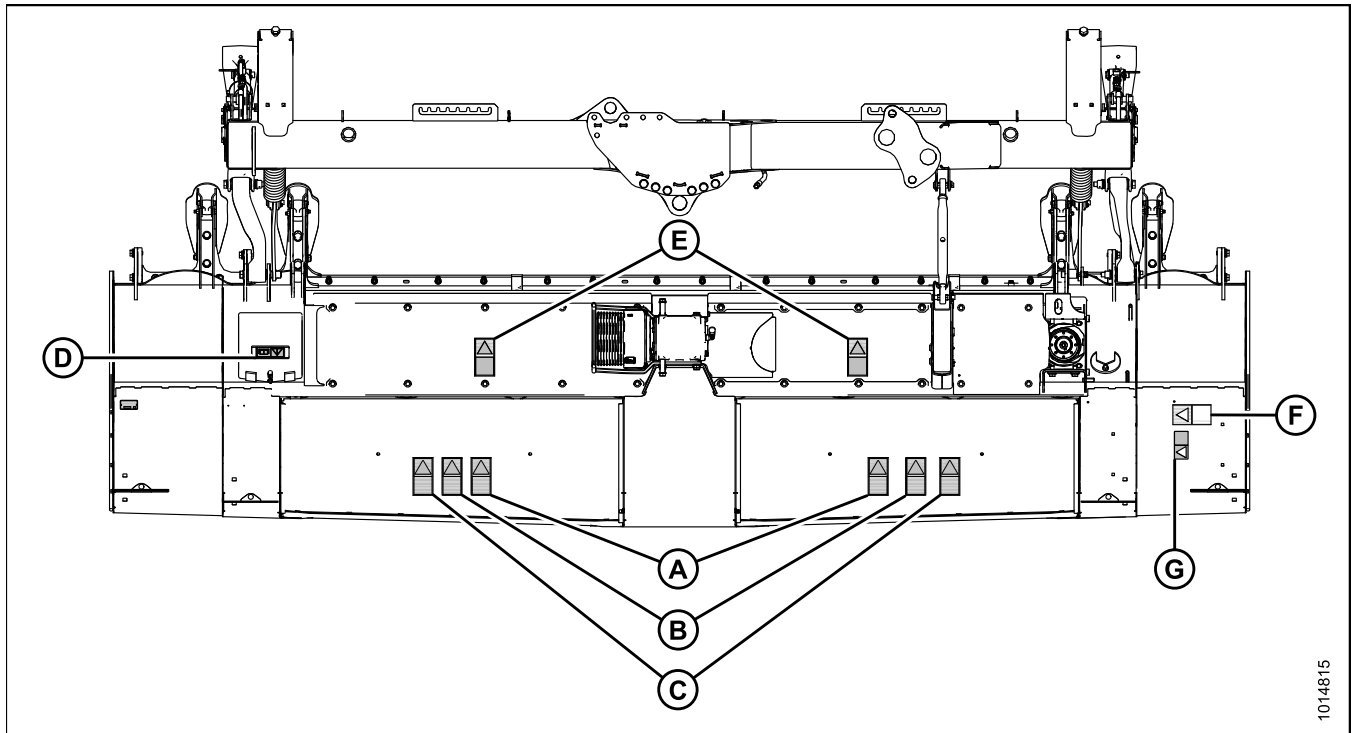


Figure 1.16: Operator's Manual Decal

1.7.1 Installing Safety Decals

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

1.8 Locating Safety Sign Decals



1014815

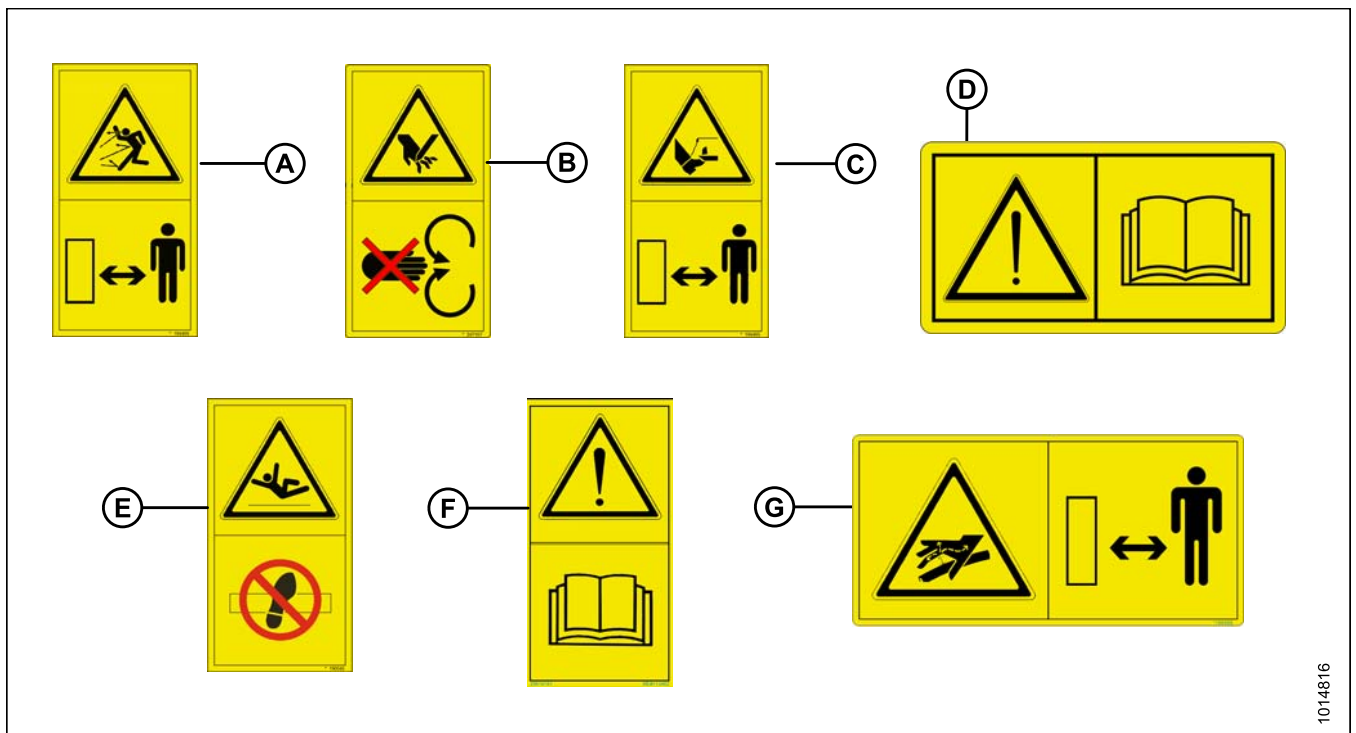
Figure 1.17: Safety Sign Decal Locations Top View

A - MD #194466
E - MD #190546

B - MD #247167
F - MD #113482

C - MD #194465
G - MD #166466

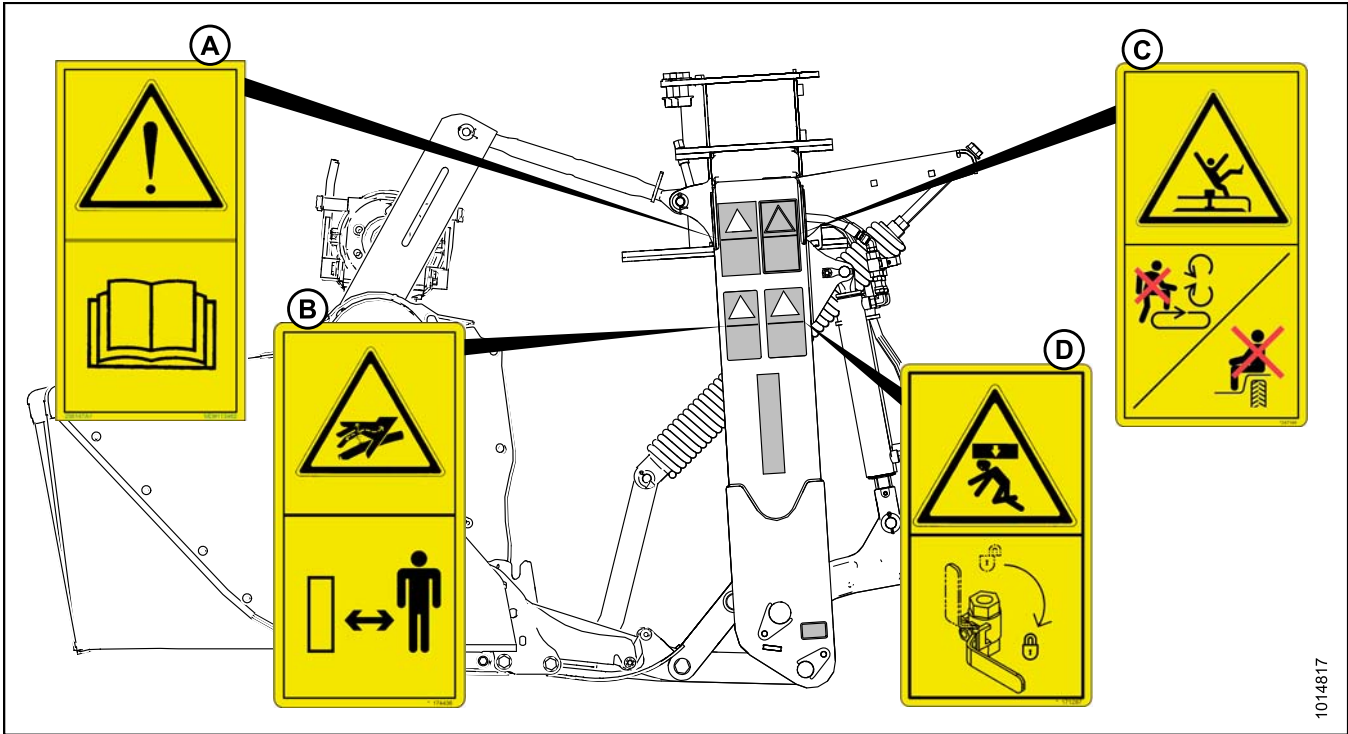
D - MD #184372



1014816

Figure 1.18: Safety Sign Decals

SAFETY



1014817

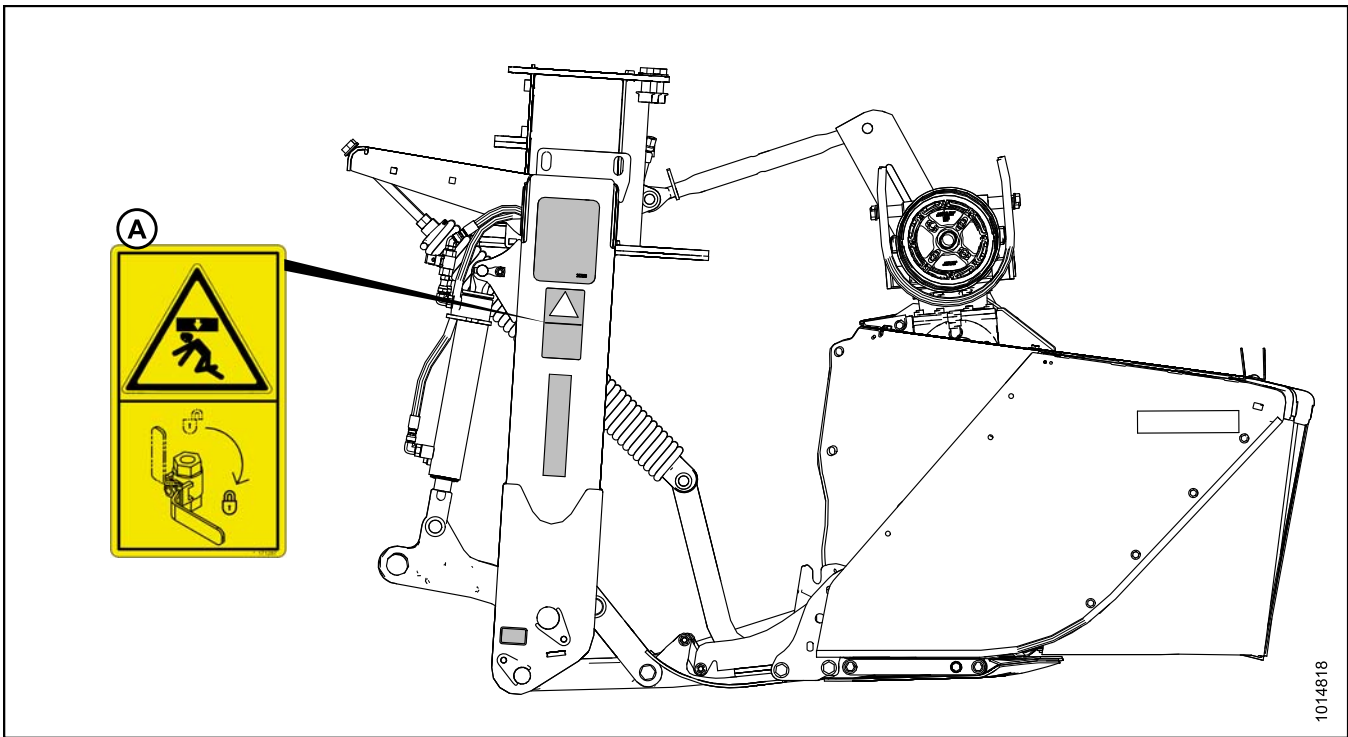
Figure 1.19: Safety Sign Decal Locations Left Side

A - MD #113482

B - MD #174436

C - MD #247166

D - MD #171287



1014818

Figure 1.20: Safety Sign Decal Locations Right Side

A - MD #171287

SAFETY

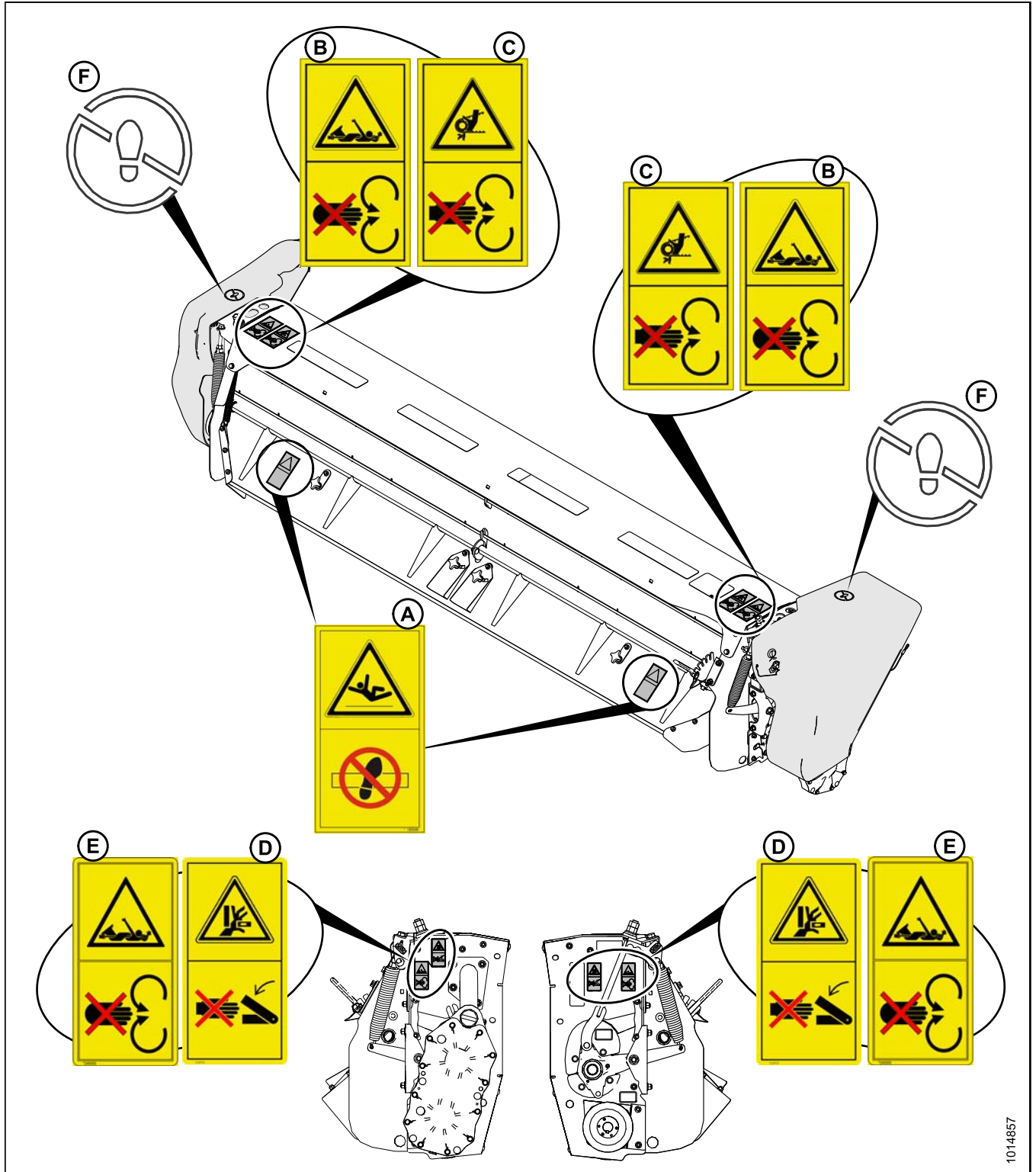


Figure 1.21: Safety Sign Decal Locations Roll Conditioner

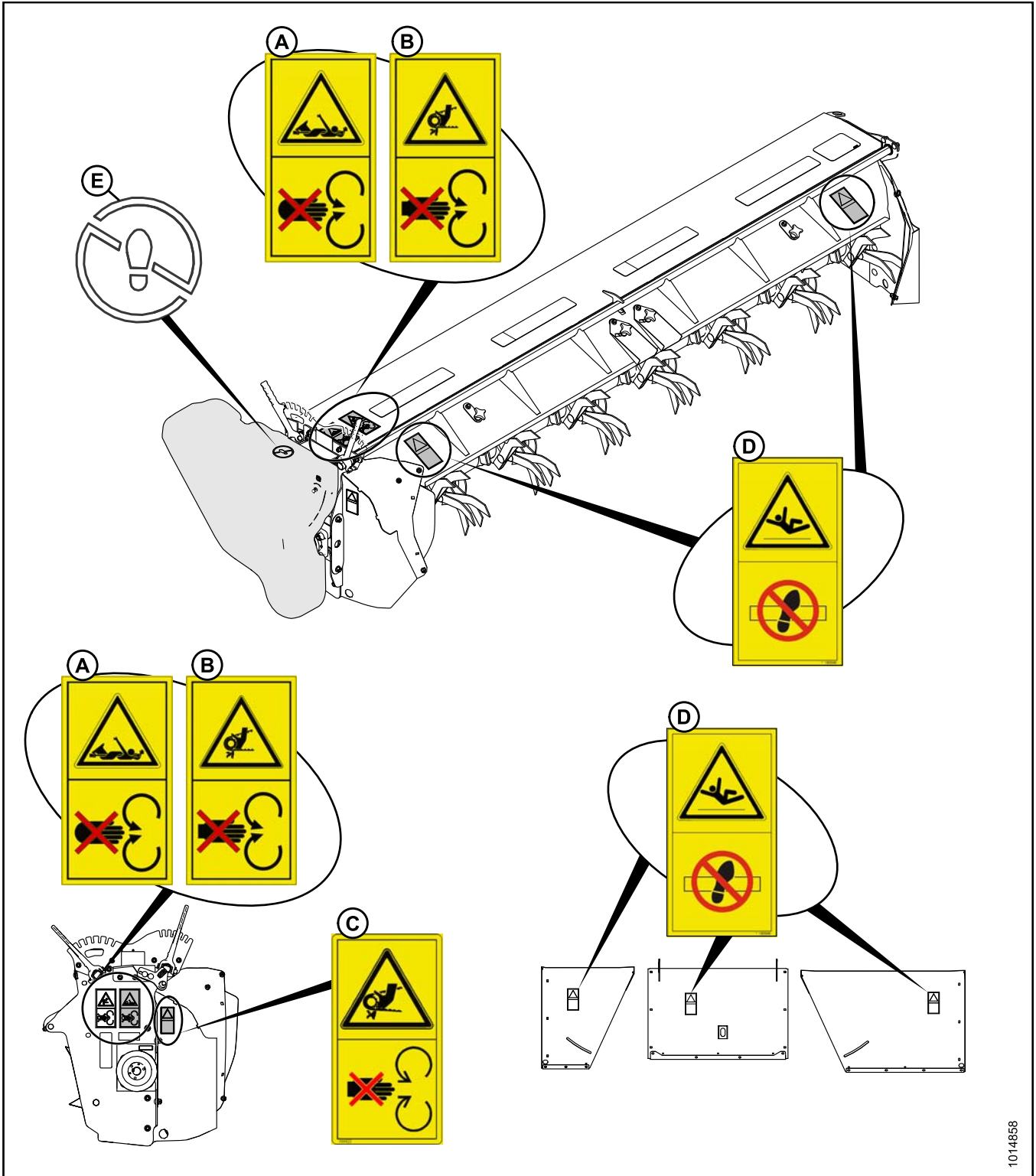
A - MD #190546
D - MD #246959

B - MD #184385
E - MD #246956

C - MD #184371
F - NO STEP Symbol (Imprinted on Shield)

1014857

SAFETY



1014858

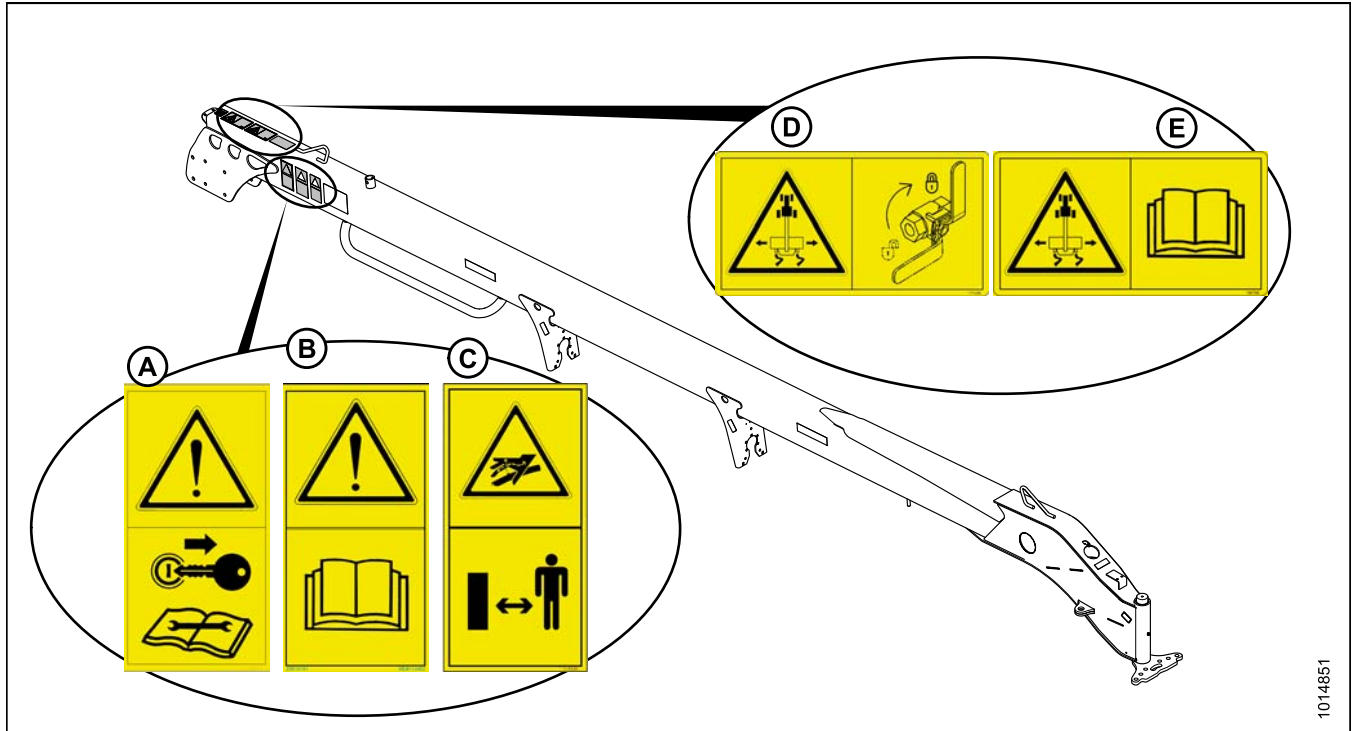
Figure 1.22: Safety Sign Decal Locations Finger Conditioner

A - MD #184385
D - MD #190546

B - MD #184371
E - NO STEP Symbol (Imprinted in Shield)

C - MD #184422

SAFETY



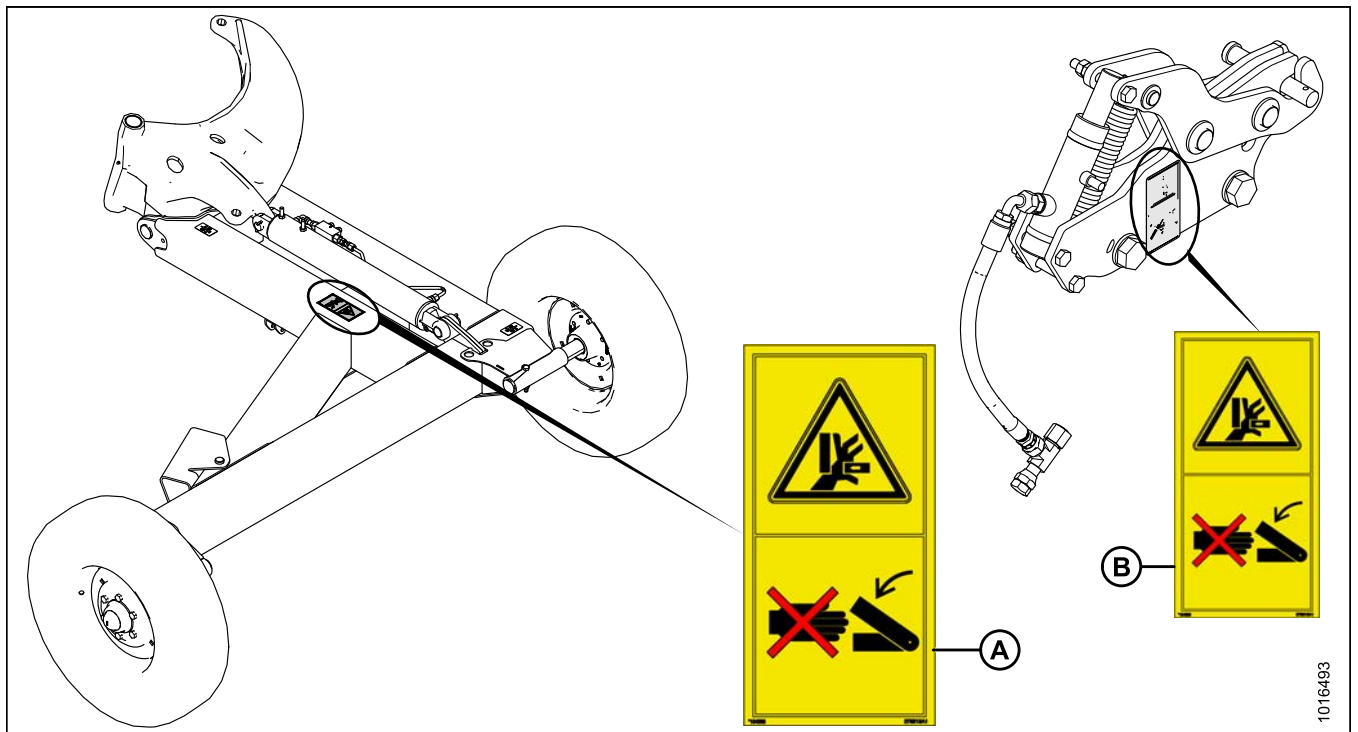
1014851

Figure 1.23: Safety Sign Decal Locations Hitch

A - MD #194464
D - MD #171286

B - MD #113482
E - MD #247165

C - MD #174436



1016493

Figure 1.24: Safety Sign Decal Locations Transport

A - MD #184386

B - MD #246959

1.9 Understanding Safety Signs

NOTE:

This is a general list of safety sign definitions, and every decal may not necessarily be applied to your machine.

MD #113482

General hazard pertaining to machine operation and servicing.

CAUTION

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



Figure 1.25: MD #113482

MD #166466

Hydraulic pressure oil hazard

CAUTION

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



Figure 1.26: MD #166466

SAFETY

MD #171286

Lock pull-type (PT) hydraulic for transport

WARNING

- Charge cylinder with oil before towing.
- Rotate valve handle to lock in transport position.
- Maximum towing speed 32 km/h (20 mph).
- Failure to comply could result in death or serious injury.

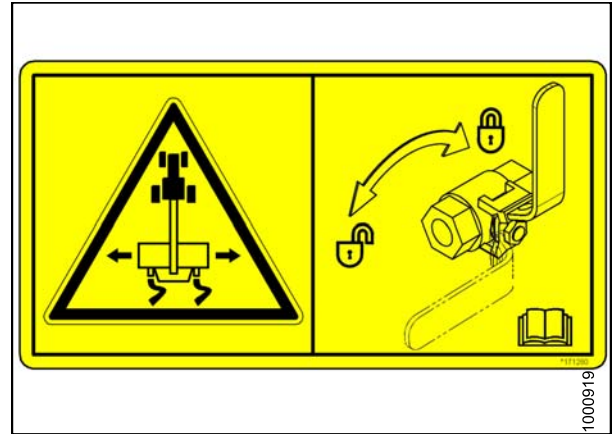


Figure 1.27: MD #171286

MD #171287

Engage lock

WARNING

- Engage safety lock before going under unit.
- Failure to comply could result in death or serious injury.



Figure 1.28: MD #171287

MD #174436

High pressure oil hazard

CAUTION

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



Figure 1.29: MD #174436

SAFETY

MD #184371

Open drive hazard

WARNING

- Guard missing. Do not operate.
- Keep all shields in place.

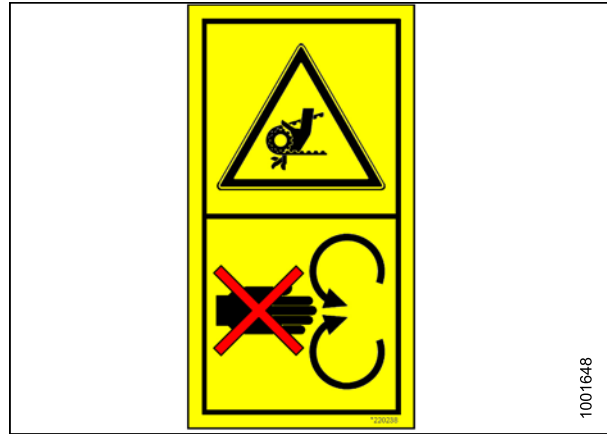


Figure 1.30: MD #184371

MD #184372

General hazard pertaining to machine operation and servicing.

CAUTION

- Read the operator's manual, and follow all safety instructions. If you do not have a manual, obtain one from your Dealer.
- Do not allow untrained persons to operate the machine.
- Review safety instructions with all Operators annually.

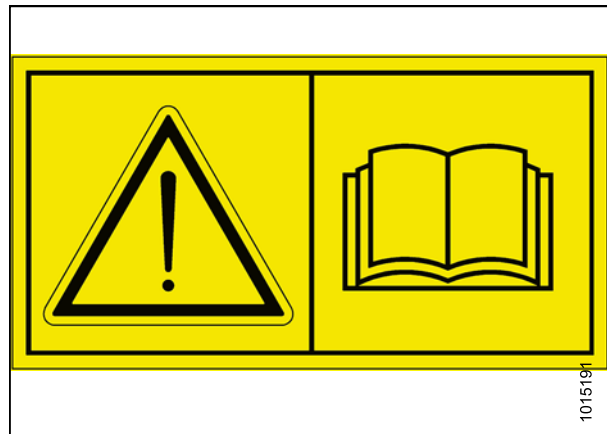


Figure 1.31: MD #184372

MD #184385

Entanglement hazard

CAUTION

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



Figure 1.32: MD #184385

SAFETY

MD #184386

Pinch hazard

WARNING—KEEP AWAY

- Failure to comply could result in death or serious injury.

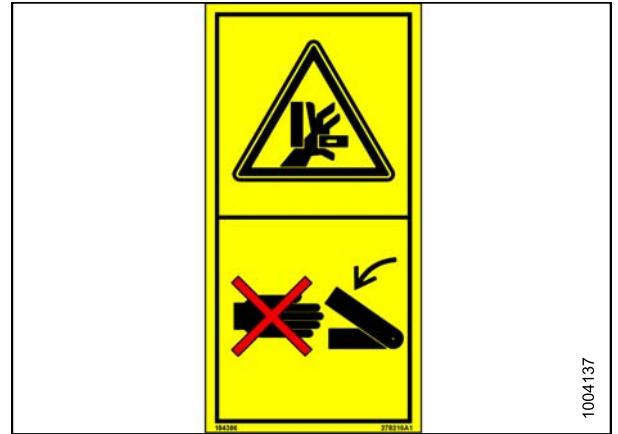


Figure 1.33: MD #184386

MD #184422

Open drive hazard

WARNING

- Guard missing. Do not operate.
- Keep all shields in place.



Figure 1.34: MD #184422

MD #190546

Slippery surface

WARNING—DON'T PLACE FOOT

- Do not use this area as a step or platform.
- Failure to comply could result in serious injury or death.



Figure 1.35: MD #190546

SAFETY

MD #194464

Shut down for service

WARNING

- Remove key from ignition.
- Read the mower conditioner and tractor manufacturer's manuals for inspection and maintenance instructions.

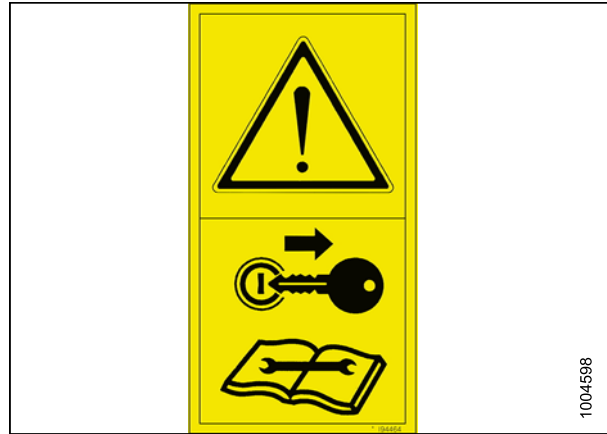


Figure 1.36: MD #194464

MD #194465

Rotating cutters

WARNING—STAND CLEAR

- Contact with blades or thrown objects can result in serious injury or death.
- Do not stand on or near machine when in operation.
- Do not operate with covers or curtains open or removed.
- Shut off tractor and remove key before opening covers.



Figure 1.37: MD #194465

MD #194466

Rotating fingers under hood

WARNING—STAND CLEAR

- Crop materials exiting at high speed.
- Stop machine, look, listen, and wait for all movement to stop before approaching.
- Failure to comply could result in death or serious injury.



Figure 1.38: MD #194466

SAFETY

MD #246956

Moving into working/transport position hazard

WARNING

- To avoid injury, read the tractor and mower manufacturer's manuals before moving into either transport or working position.

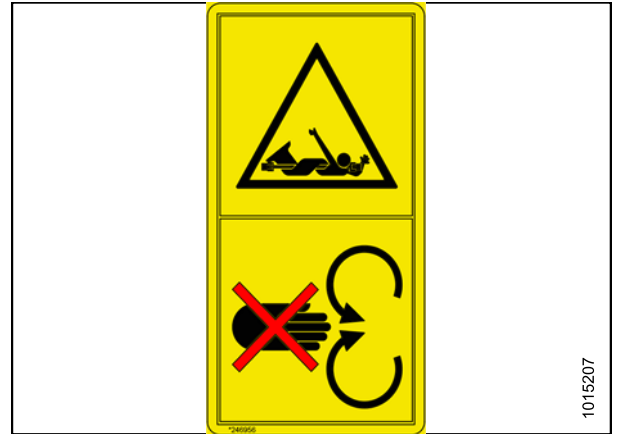


Figure 1.39: MD #246956

MD #246959

Pinch hazard

WARNING—KEEP AWAY

- Failure to comply could result in death or serious injury.



Figure 1.40: MD #246959

MD #247165

Moving into working/transport position hazard

WARNING

- To avoid injury, read the tractor and mower manufacturer's manual before moving into transport or working position.

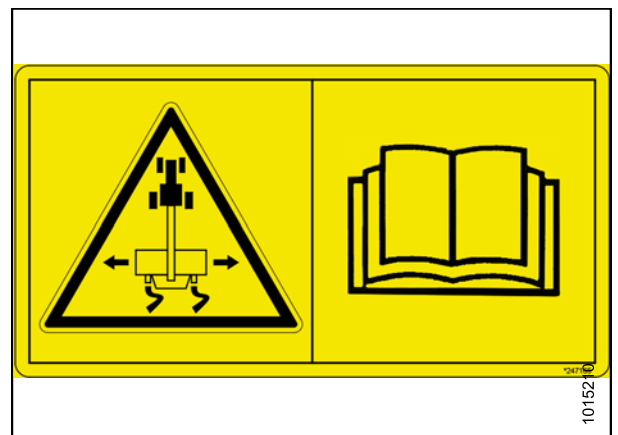


Figure 1.41: MD #247165

SAFETY

MD #247166

Moving implement hazard

WARNING

- To avoid injury, do not mount or ride machine while the machine is in motion.



Figure 1.42: MD #247166

MD #247167

Rotating blades

WARNING

- Disengage power take-off, shut off tractor, and remove key before opening covers.
- Listen and look for evidence of rotation before lifting cover.
- Rotating cutters may continue to rotate after power is shut off due to inertia.

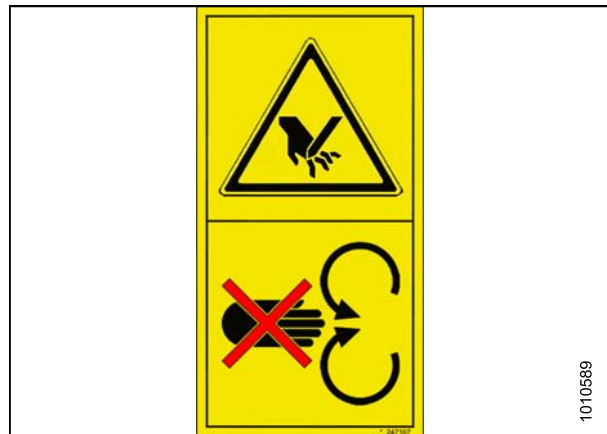


Figure 1.43: MD #247167

1.10 Operational Safety

CAUTION

Follow these safety precautions:

- Follow all safety and operational instructions provided in your operator's manuals.
- Never attempt to start the engine or operate the machine except from the seat.
- Check the operation of all controls in a safe and clear area before starting work.
- Do NOT allow riders on the equipment.

CAUTION

- Never start or move the machine until you are sure all bystanders have cleared the area.
- Avoid travelling over loose fill, rocks, ditches, or holes.
- Drive slowly through gates and doorways.
- If possible, travel uphill or downhill when working on inclines. Be sure to keep transmission in gear while travelling downhill.
- Never attempt to get on or off a moving machine.
- Do NOT get off the tractor while the mower conditioner is in operation—stop forward movement of the tractor, and stop the power take-off.
- To avoid bodily injury or death from unexpected startup of machine, always stop tractor engine, and remove key before adjusting or removing plugged material from the machine.
- Check for excessive vibration and unusual noises. If there is any indication of trouble, shut down and inspect the machine. Follow proper shutdown procedure shown in [3.12 Shutdown Procedure, page 60](#).
- Operate only in daylight or good artificial light.

CAUTION

- Keep everyone several hundred feet away from your operation. Ensure bystanders are never in line with the front or rear of the machine. Stones or other foreign objects can be ejected with force from either end.



Figure 1.44: MD #194466

1.11 Owner/Operator Responsibilities

CAUTION

- It is your responsibility to read and understand this manual completely before operating the mower conditioner. Contact your MacDon Dealer if an instruction is not clear to you.
- Follow all safety messages in the manual and on safety decals on the machine.
- Remember that YOU are the key to safety. Good safety practices protect you and the people around you.
- Before allowing others to operate the mower conditioner, for however short a time or distance, make sure they have been instructed in its safe and proper use.
- Review the manual and all safety related items with all Operators annually.
- Be alert for other Operators not using recommended procedures or not following safety precautions. Immediately correct mistakes to prevent accidents.
- Do NOT modify the machine. Unauthorized modifications may impair function and/or safety and affect machine life.
- The safety information given in this manual does not replace safety codes, insurance needs, or laws governing your area. Be sure your machine meets the standards set by these regulations.
- Ensure that the tractor is properly equipped to safely operate the mower conditioner. This may include adding ballast according to tractor operator's manual requirements for attachments of this size and mass.

2 Product Overview

2.1 Definitions

The following terms and abbreviations may be used in this manual:

Term	Definition
API	American Petroleum Institute
APT	Articulated power turn
ASTM	American Society of Testing and Materials
Bolt	A headed and externally threaded fastener that is designed to be paired with a nut
Center-link	A hydraulic cylinder or turnbuckle type link between the mower conditioner and the carrier frame that tilts the mower conditioner
CGVW	Combined gross vehicle weight
Export mower conditioner	Machine configuration typical outside North America
Finger tight	Finger tight is a reference position where sealing surfaces or components are making contact with each other and the fitting has been tightened to a point where the fitting is no longer loose.
FFFT	Flats from finger tight
GVW	Gross vehicle weight
Hard joint	A joint made with using a fastener where joining materials are highly incompressible
Hex key	A hex key or Allen key (also known by various other synonyms) is a tool of hexagonal cross-section used to drive bolts and screws that have a hexagonal socket in the head (internal-wrenching hexagon drive).
hp	Horsepower
JIC	Joint Industrial Council: a standards body that developed the sizing and shape for the original 37° flared fitting.
Mower conditioner	A machine that cuts and conditions hay, and is pulled by an agricultural tractor
n/a	Not applicable
North American mower conditioner	Machine configuration typical in North America
NPT	National Pipe Thread: A style of fitting used for low pressure port openings. Threads on NPT fittings are uniquely tapered for an interference fit.
Nut	An internally threaded fastener that is designed to be paired with a bolt
ORB	O-ring boss: A style of fitting commonly used in port opening on manifolds, pumps, and motors.

PRODUCT OVERVIEW

ORFS	O-ring face seal: A style of fitting commonly used for connecting hoses and tubes. This style of fitting also is commonly called ORS, which stands for O-ring seal.
PTO	Power take-off
Road Friendly Transport system	Kit available as a Dealer installed option that allows the mower conditioner to be towed on roadways while remaining within the legal width restrictions on most roads and highways
Rotary mower conditioner	The part of the mower conditioner that cuts and conditions the crop.
rpm	Revolutions per minute
RoHS	Reduction of hazardous substances: a directive of the European Union to restrict the use of certain hazardous substances (such as hexavalent chromium used in some yellow zinc platings).
SAE	Society of Automotive Engineers
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread in one of the mating parts.
Soft joint	A joint made using a fastener where the joining materials are compressible or experience a relaxation period over time.
Tension	An axial load placed on a bolt or screw, usually measured in pounds (lb.) or Newtons (N)
TFFT	Turns from finger tight
Torque	The product of a force X lever arm length, usually measured in foot-pounds (ft·lbf) or Newton-meters (N·m).
Torque angle	A tightening procedure where the fitting is assembled to a precondition (finger tight) and then the nut is turned further a number of degrees or a number of flats to achieve its final position.
Torque-tension	The relationship between the assembly torque applied to a piece of hardware and the axial load it induces in the bolt or screw.
Tractor	Agricultural type tractor.
Truck	A four-wheel highway/road vehicle weighing no less than 3,400 kg (7,500 lb.).
Washer	A thin cylinder with a hole or slot located in the center and is to be used as a spacer, load distribution element, or a locking mechanism.

2.2 Component Identification

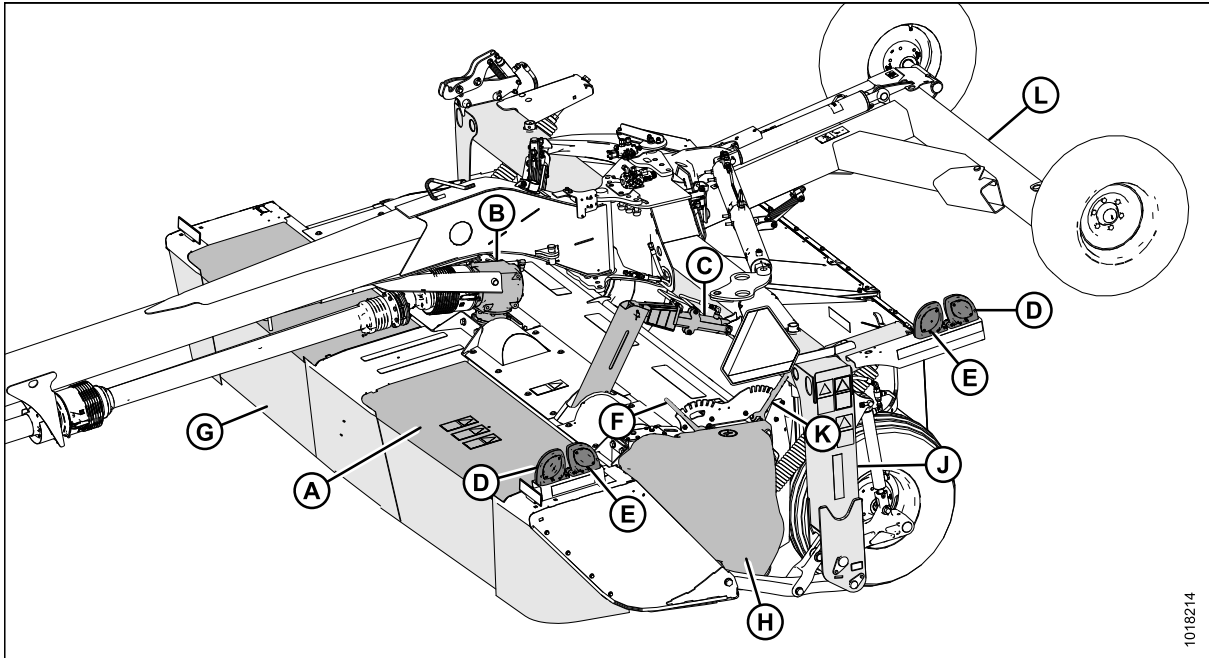


Figure 2.1: Mower with Finger Conditioner

- | | | |
|---|--|----------------------------|
| A - Cutterbar Door | B - Rear Swivel Gearbox | C - Center-Link |
| D - Amber Hazard/Turn Signal Light (x2) | E - Red Tail/Brake Light (x2) | F - Forward Baffle Control |
| G - Front Curtains | H - Driveshield | J - Carrier Frame |
| K - Rear Deflector Control | L - Optional Road Friendly Transport™ System | |

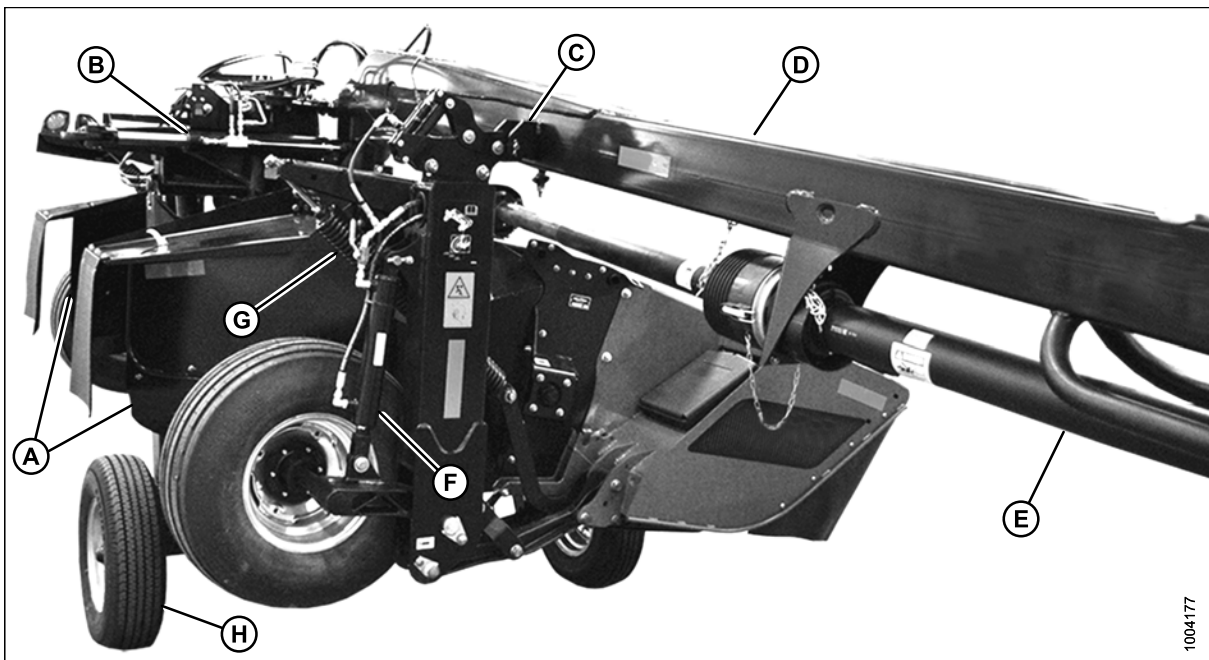


Figure 2.2: Mower with Finger Conditioner

- | | | |
|--|---------------------------------------|---------------------|
| A - Side Deflector | B - Hitch Swing Cylinder | C - Transport Latch |
| D - Articulated Power Turn (APT) Hitch | E - Driveline | F - Lift Cylinder |
| G - Float Spring | H - Optional Road Friendly Transport™ | |

PRODUCT OVERVIEW

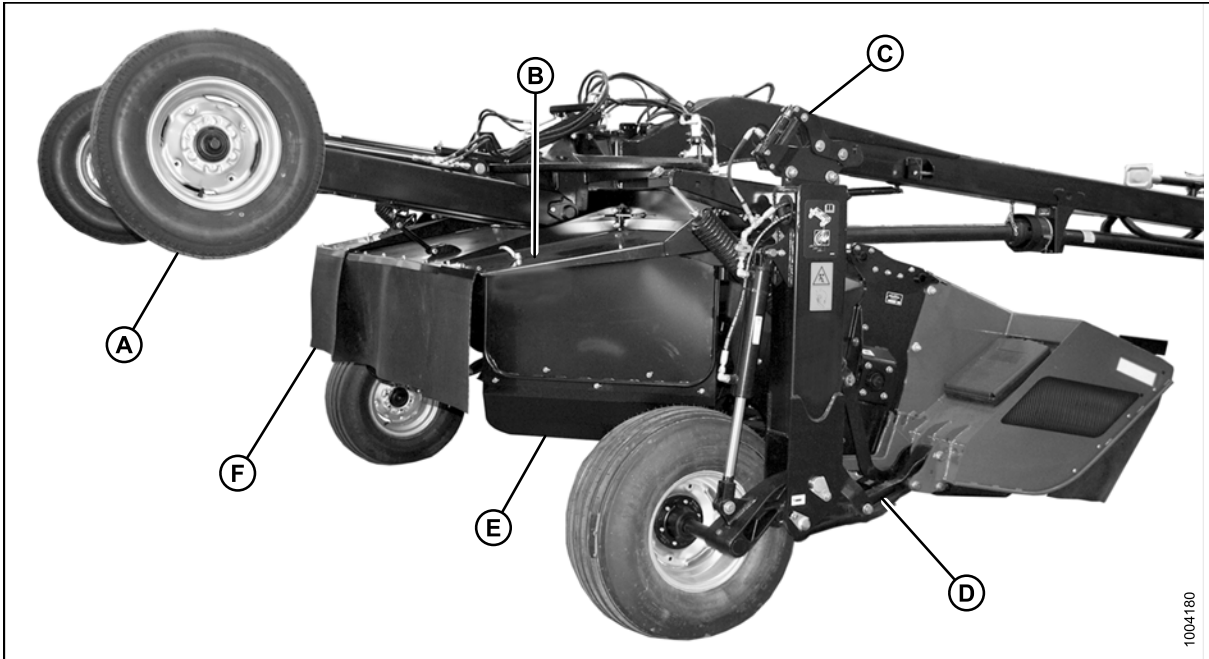


Figure 2.3: Mower with Finger Conditioner

A - Optional Road Friendly Transport™
D - Skid Shoe

B - Forming Shield Cover
E - Side Deflector

C - Road Friendly Transport™ Locking Cylinder
F - Rear Curtain

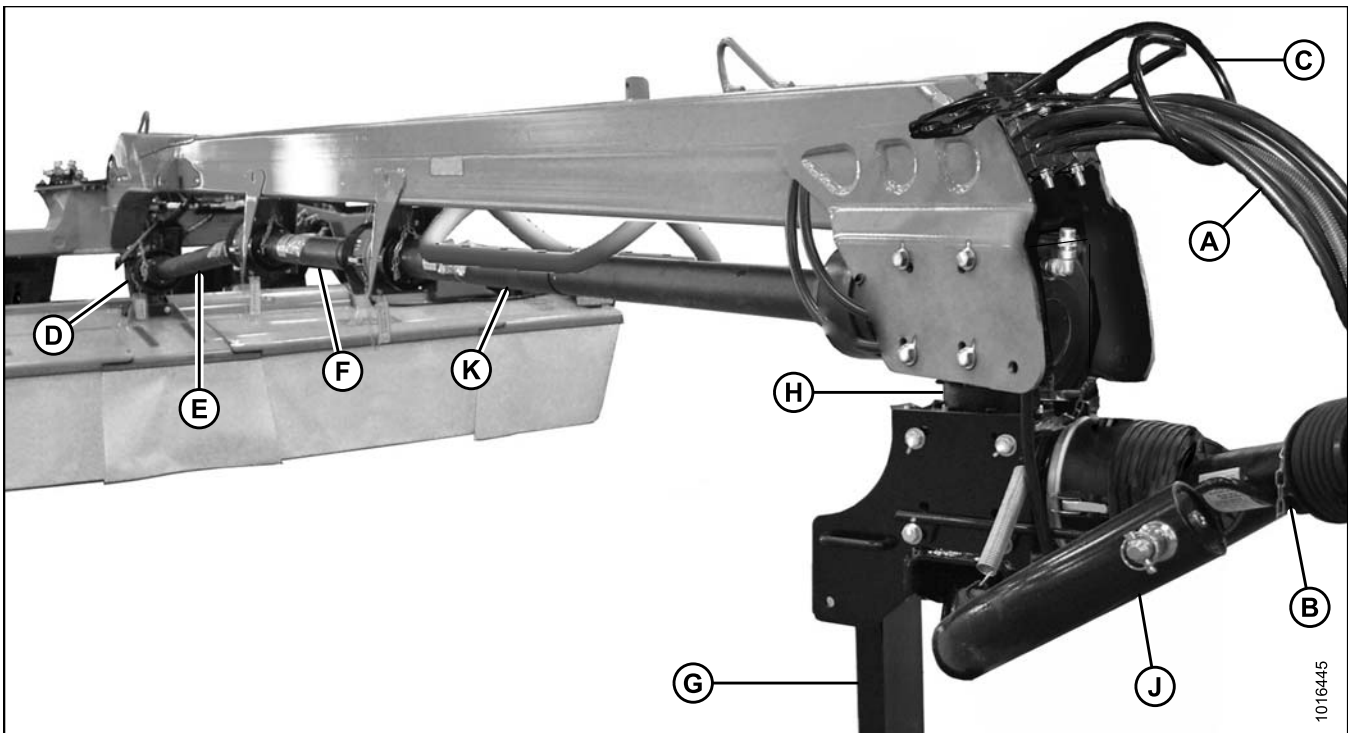


Figure 2.4: Hitch and Driveline

A - Control Hoses
F - Middle Driveline

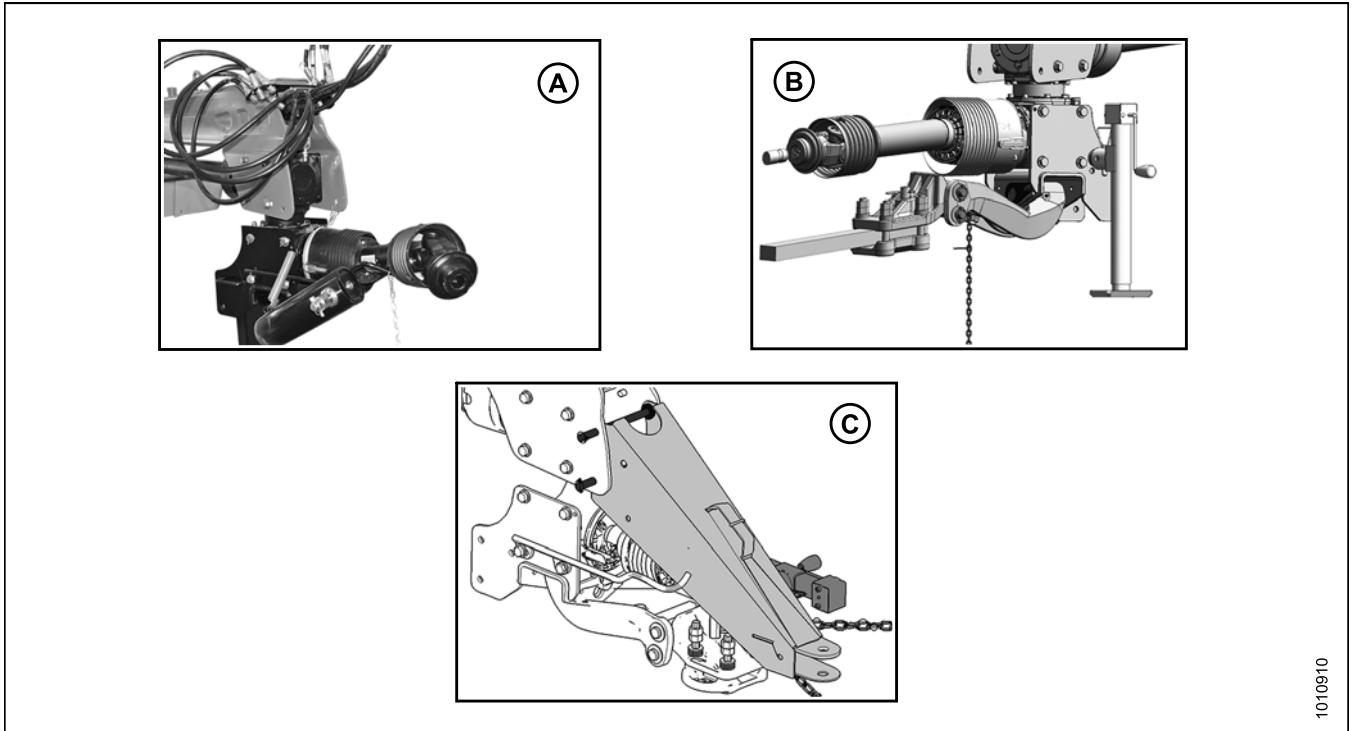
B - Primary Driveline
G - Hitch Stand

C - Hose Support
H - Forward Swivel Gearbox

D - Rear Swivel Gearbox
J - Two-Point Hitch

E - Clutch Driveline
K - Front Driveline

PRODUCT OVERVIEW



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Figure 2.5: Hitch Options

A - Tractor Two-Point Hitch Adapter

B - Tractor Drawbar Hitch Adapter

C - Truck Transport Hitch Adapter

PRODUCT OVERVIEW

2.3 Product Specifications

NOTE:

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

Table 2.1 Mower Conditioner Specifications

Components		13-Foot	16-Foot
Frame and Structure			
Transport width	without RFT ¹	4063 mm (13 ft.-4 in.)	5027 mm (16 ft.-6 in.)
	with RFT ²	2743 mm (8 ft.-9 in.)	
Transport length	without RFT	7117 mm (23 ft.-4 in.)	8580 mm (28 ft.-2 in.)
	with RFT	8407 mm (27 ft.-7 in.)	9856 mm (32 ft.-4 in.)
Estimated weight (with steel roll conditioner)	without RFT	2404 kg (5300 lb.)	2740 kg (6040 lb.)
	with RFT	3084 kg (6800 lb.)	3420 kg (7540 lb.)
Carrier		Pull-type	
Lighting		Two red tail-lights and two amber signal/hazard lights	
Tires	Carrier	15 in. / 31 x 13.5–15 NHS 8 ply field tires	
	RFT	ST235/80 R16 LR E	
Tread width	without RFT	3682 mm (12 ft.-1 in.)	
	with RFT	2413 mm (7 ft.-11 in.)	
Manual storage		Plastic case on mower conditioner right end backsheet	
Cutterbar			
Quantity of cutting discs		8	10
Blades per disc		Two 11 degrees bevel down reversible	
Disc speed		2652 rpm	
Blade tip speed range		84.7 m/s (188 mph)	
Effective cutting width		3978 mm (156-5/8 in.)	4942 mm (194-5/8 in.)
Cutting height		27 mm (1-1/16 in.)	
Cutting angle range		0–7 degrees below horizontal	
Skid shoes		Two adjustable	Four adjustable
Geartrain protection		Shearable disc spindles	
Deflectors		Two drum-type converging	Four drum-type converging
Drives			
Tractor PTO		35 mm (1-3/8 in.) dia. 21 spline, or 44 mm (1-3/4 in.) dia. 20 spline	
Mechanical		Gearbox and driveline	
Conditioner: Roll Type			

1. Road Friendly Transport™ Option
2. Without crop dividers

PRODUCT OVERVIEW

Components	13-Foot	16-Foot
Drive	4HB belt driven enclosed timing gearbox and driveline	
Conditioner system	Intermeshing rolls (steel or polyurethane)	
Conditioner speed	900 rpm	
Length of rolls	3275 mm (10 ft.-9 in.)	
Roll diameter		
Intermeshing steel bars	229 mm (9 in.) / 179 mm (7 in.) tube	
Intermeshing polyurethane bars	254 mm (10 in.) / 203 mm (8 in.) tube	
Swath width	915–2896 mm (36–114 in.)	
Forming shields	Carrier mounted assembly with adjustable side deflectors	
Conditioner: Finger Type		
Drive	4HB belt driven	
Conditioner system	V-shaped tines on rotating drum	
Conditioner speed	896 ³ rpm	
Rotor length	3275 mm (10 ft.-9 in.)	
Rotor diameter	648 mm (25-1/2 in.) / 152 mm (6 in.) tube	
Swath width	915–2896 mm (36–114 in.)	
Forming shields	Carrier mounted assembly with adjustable side deflectors	
Ground Speed		
Recommended cutting	8–15 km/h (5–10 mph)	
Recommended transport	30 km/h (20 mph)	
Tractor Requirements		
PTO power - minimum	74 kW (100 hp)	93 kW (125 hp)
Hydraulics ⁴	Pressure	13.71 MPa (2000 psi)
	Controls	Two double-acting / one single-acting ⁵
Hitch	Draw bar, two-point, or quick attach	

NOTE:

Tractor must be equipped with a cab.

3. Can be set to 600 rpm by interchanging the pulleys.
4. Road Friendly Transport™ system option uses same hydraulic circuit as hitch swing.
5. Single-acting header lift circuit is converted to double-acting when Road Friendly Transport™ system option is installed.

3 Operation

3.1 Lift Cylinder Lock-Out Valves

Engaging lift cylinder lock-out valves before servicing, repairing, or unplugging your machine will prevent unintentional raising or lowering of the mower conditioner. The lift cylinder lock-out valves are located on the lift cylinders at the back of the mower conditioner.

3.1.1 Engaging Locks

WARNING

To avoid bodily injury or death from fall of raised machine, always lock out lift cylinders before going under mower conditioner for any reason.

IMPORTANT:

Connect hoses so that moving the cylinder control lever backward raises the mower conditioner, and moving the cylinder control lever forward lowers the mower conditioner. Refer to [3.7.3 Connecting Hydraulics, page 47](#) for more information.

1. Move cylinder control lever (A) backward to position (B) to fully raise machine.

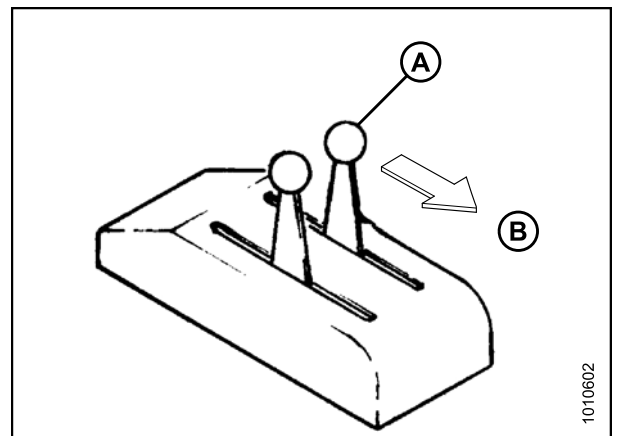


Figure 3.1: Tractor Cylinder Control Lever

2. Close the lock-out valve (A) on each lift cylinder by turning the handle to the horizontal position.



Figure 3.2: Lift Cylinder Lock-Out Valve

3.1.2 Disengaging Locks

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

1. Open the lock-out valve (A) on each lift cylinder by turning the handle to the vertical position.

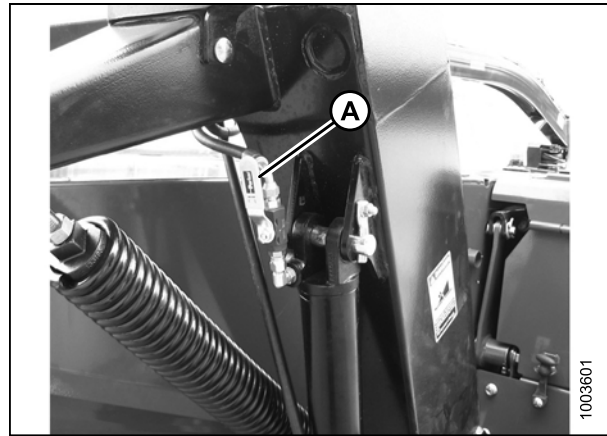


Figure 3.3: Lift Cylinder Lock-Out Valve

2. Move cylinder control lever (A) forward to position (B) to lower machine.

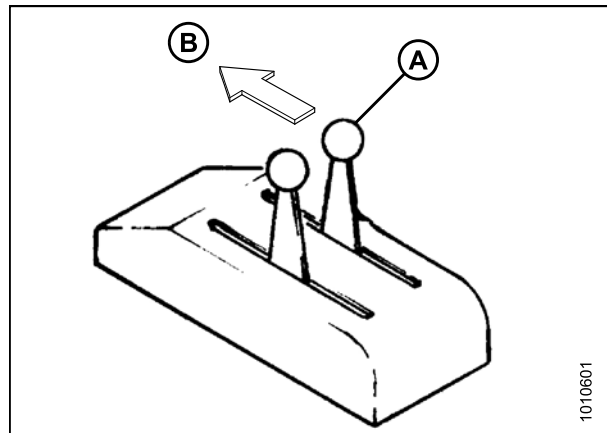


Figure 3.4: Tractor Cylinder Control Lever

3.2 Driveshields

3.2.1 Opening Driveshields

CAUTION

Do NOT operate the machine without the driveshields in place and secured.

NOTE:

Images shown are for left side driveshield—right side driveshield is similar.



Figure 3.5: Left-Hand Driveshield

1. Remove linch pin (A) and tool (B) from pin (C).

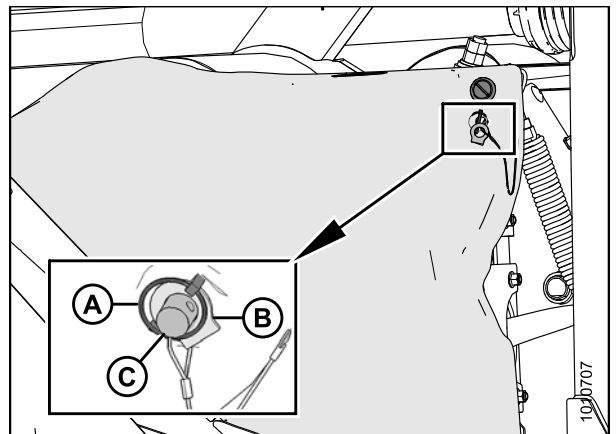


Figure 3.6: Driveshield

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

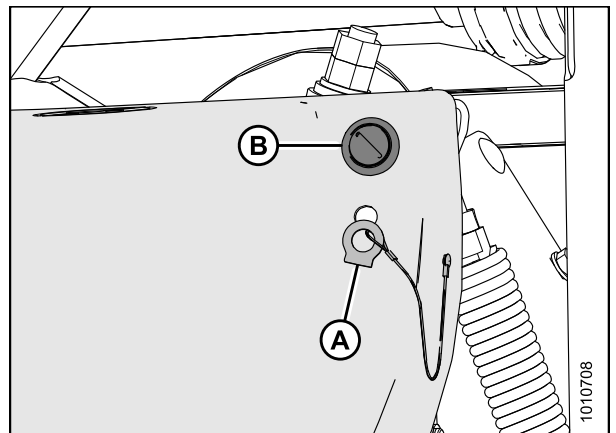


Figure 3.7: Driveshield Latch

OPERATION

3. Pull top of driveshield (A) away from mower conditioner to open.

NOTE:

For improved access, lift driveshield off the pins at the base of the shield, and lay the shield on the mower conditioner.

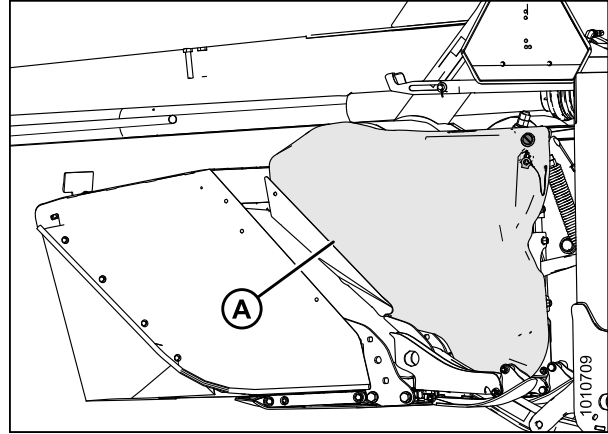


Figure 3.8: Driveshield

3.2.2 Closing Driveshields

⚠ CAUTION

Do NOT operate the machine without the driveshields in place and secured.

NOTE:

Images shown are for left side driveshield—right side driveshield is similar.

1. Position driveshield onto pins at base of driveshield (if necessary).
2. Push driveshield (A) to engage latch (B).
3. Check that driveshield is properly secured.

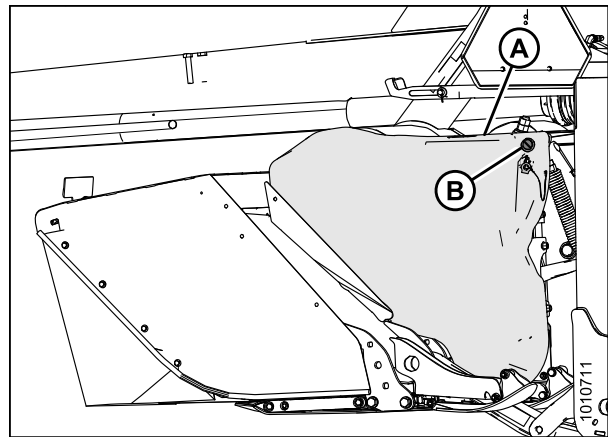


Figure 3.9: Driveshield and Latch

OPERATION

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

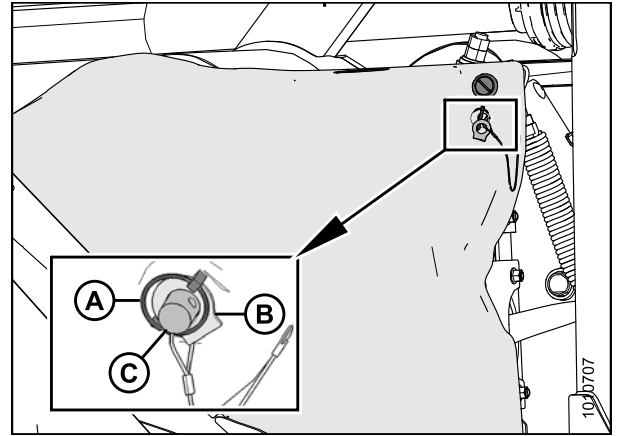


Figure 3.10: Tool to Unlock Driveshield

3.3 Cutterbar Doors

⚠ WARNING

Do NOT operate the machine without all the cutterbar doors down or without curtains installed and in good condition.

There are two doors complete with rubber curtains (A) that provide access to the cutterbar area.

Rubber outboard curtains (B) are attached to each front corner, and an inboard curtain (C) is installed at the center fixed cover location. Always keep these curtains down when operating the mower conditioner.

IMPORTANT:

Replace curtains if they become worn or damaged. Refer to [4.4.7 Curtains, page 154](#) or contact your Dealer for replacement instructions.

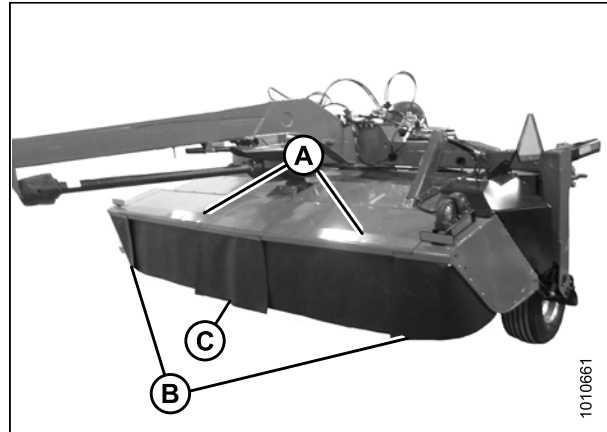


Figure 3.11: Cutterbar Doors and Curtains

3.3.1 Opening Cutterbar Doors

To open cutterbar doors on a mower conditioner with export latches, refer to [3.3.2 Opening Cutterbar Doors: Export Latches, page 36](#).

1. Center mower conditioner beneath hitch to open both doors.
2. Lift door (A) at front to move to open position.

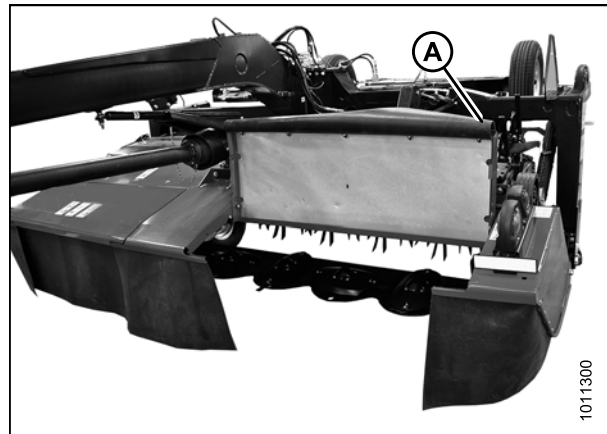


Figure 3.12: LH Cutterbar Door Open

3.3.2 Opening Cutterbar Doors: Export Latches

Mower conditioners sold outside North America require a tool operated latch on the cutterbar doors. Follow these steps to open cutterbar doors with export latches:

⚠ DANGER

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

OPERATION

1. Center mower conditioner beneath hitch to open both doors.
2. Locate the latch access holes (A) for each door.

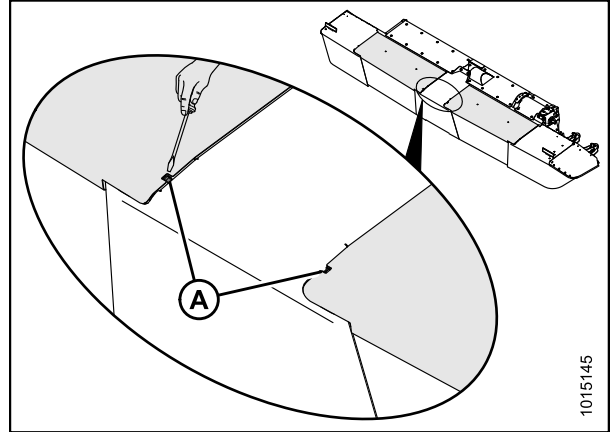


Figure 3.13: Cutterbar Door Latch Access Hole (Export Only)

3. Use a rod or screwdriver to press down on the latch (A) and release the cutterbar door.

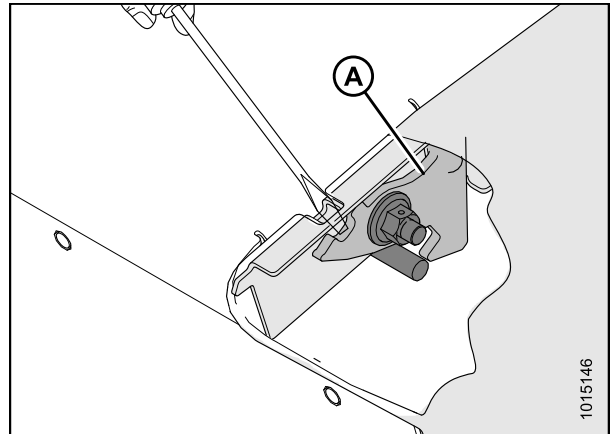


Figure 3.14: Cutterbar Door Latch (Cut Away View)

4. Lift up on door (A) while pressing down on latch.

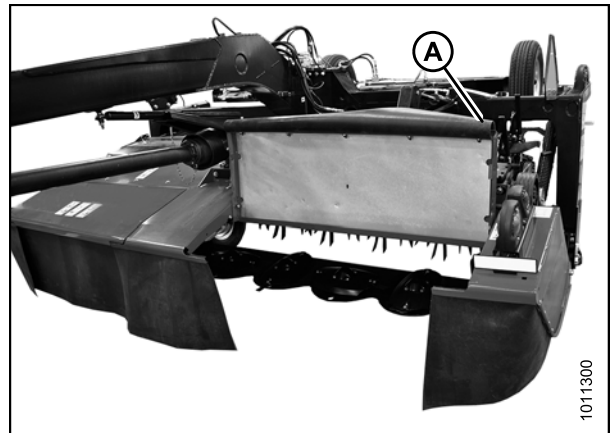


Figure 3.15: LH Cutterbar Door Open

3.3.3 Closing Cutterbar Doors

CAUTION

To avoid injury, keep hands and fingers away from corners of doors when closing.

1. Pull door (A) at top to move to closed position.

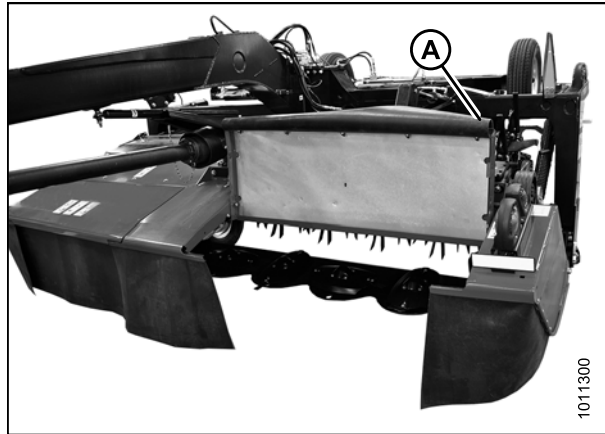


Figure 3.16: LH Cutterbar Door Open

2. Ensure that curtains hang properly and completely enclose cutterbar area.

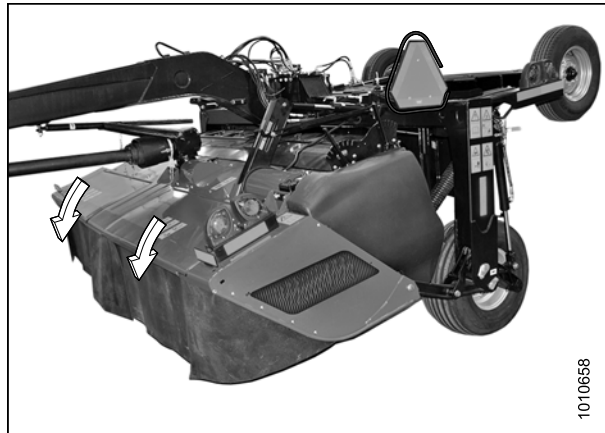


Figure 3.17: Cutterbar Doors in Closed Position

3.4 Daily Startup Check

Perform the following checks each day before startup:

CAUTION

- Ensure tractor and mower conditioner are properly attached, all controls are in neutral, and tractor brakes are engaged.
- Clear the area of other persons, pets etc. Keep children away from machinery. Walk around the mower conditioner to make sure no one is under, on, or close to it.
- Wear close fitting clothing and protective shoes with slip resistant soles. As well, carry with you any protective clothing and personal safety devices that could be necessary throughout the day. Don't take chances.
- Remove foreign objects from the machine and surrounding area.

Protect yourself. You may need the following:

- A hard hat
- Protective footwear with slip resistant soles
- Protective glasses or goggles
- Heavy gloves
- Wet weather gear
- A respirator or filter mask

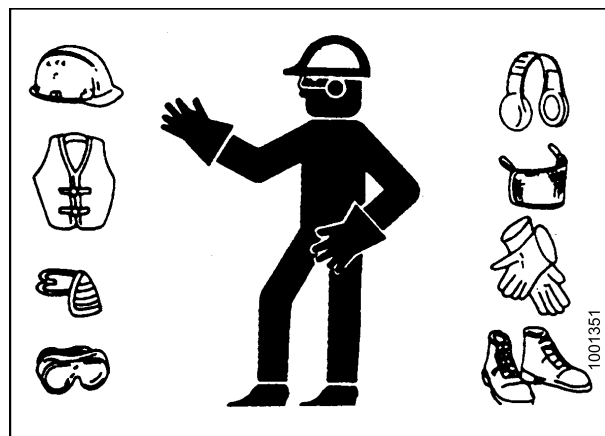


Figure 3.18: Safety Equipment

Use proper hearing protection

- Be aware that exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protection devices such as ear muffs or ear plugs to help protect against objectionable or loud noises.



Figure 3.19: Safety Equipment

OPERATION

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

NOTE:

Use proper procedure when searching for pressurized fluid leaks. Refer to [4.6.1 Hydraulic Hoses and Lines, page 224](#).

2. Clean all lights and reflective surfaces on the machine, and check lights for proper operation.
3. Perform all daily maintenance. Refer to [4.3.1 Maintenance Schedule/Record, page 113](#).

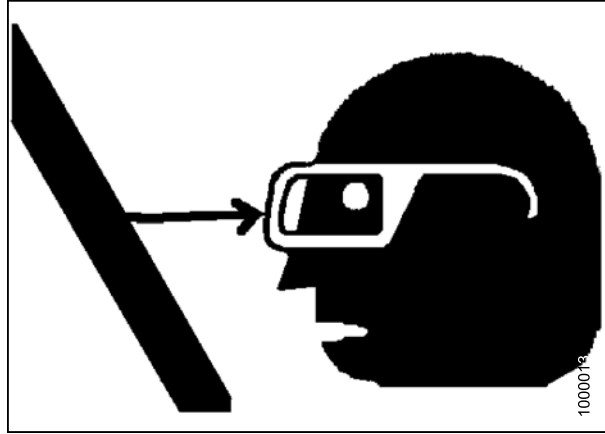


Figure 3.20: Safety around Equipment

3.5 Preparing Tractor for Mower Conditioner

3.5.1 Tractor Requirements

The tractor used to pull the mower conditioner must meet the requirements outlined in the following table.

Table 3.1 Tractor Requirements

Mower Width	Minimum Power	Minimum Drawbar Capacity	Minimum Hydraulics
13-Foot	75 kW (100 hp)	In accordance with ASAE	13.7 MPa (2000 psi)
16-Foot	93 kW (125 hp)		

NOTE:

Tractor must be equipped with a seven-terminal outlet to supply power to the mower conditioner's hazard lights.

NOTE:

Static vertical load on drawbar is 907 kg (2000 lb.).

3.5.2 Adjusting the Drawbar

⚠ CAUTION

Shut off tractor, engage parking brake, and remove key before working around hitch.

1. Adjust tractor drawbar to meet the specifications listed in [Table 3.2 ASAE Standard A482 Specifications, page 41](#).
2. Secure the tractor drawbar so the hitch pin hole is directly below the driveline.

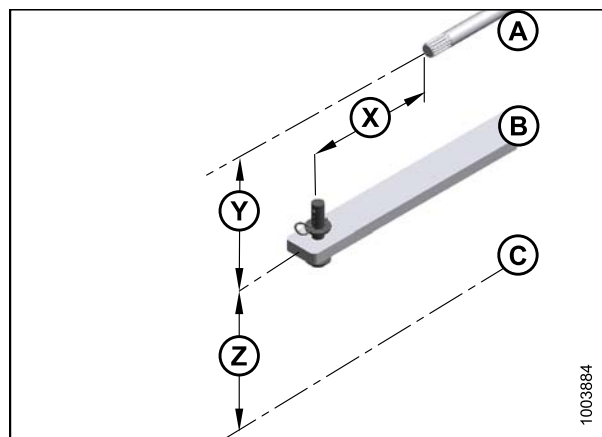


Figure 3.21: Tractor Drawbar Adjustments

A - PTO B - Tractor Drawbar C - Ground
 X - Dimension X Y - Dimension Y Z - Dimension Z

Table 3.2 ASAE Standard A482 Specifications

Dimension	1000 rpm Power Take-Off	
	1-3/8 in. Diameter	1-3/4 in. Diameter
X	406 mm (16 in.)	508 mm (20 in.)
Y	200–350 mm (7-7/8–13-3/4 in.) 203 mm (8 in.) recommended	
Z	330–432 mm (13–17 in.) 406 mm (16 in.) recommended	

3.6 Setting up the Mower Conditioner Hitch

MacDon R113 and R116 pull type mower conditioners are shipped from the factory fitted for either a drawbar or two-point hitch. Your Dealer will have installed the proper hitch adapter for your tractor.

3.6.1 Installing Drawbar Hitch Adapter

⚠ CAUTION

Shut off tractor, engage parking brake, and remove key before working around hitch.

1. Remove hairpin (A) and pin (B).
2. If necessary, loosen four jam nuts (C), and then loosen four nuts (D) so that hitch adapter (E) will slide onto tractor drawbar (F).
3. Align hole in adapter (E) with hole in drawbar (F) and install pin (B). Secure with hairpin (A).
4. Gradually tighten the four nuts (D) to 540 N·m (400 ft·lbf).

NOTE:

Ensure hardened washers, and Class 10 nuts (supplied with adapter) are used.

5. Tighten four jam nuts (C).

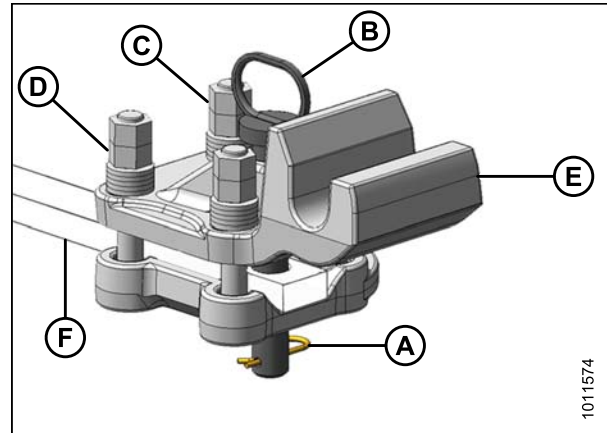


Figure 3.22: Drawbar Hitch Adapter

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3.7 Attaching Mower Conditioner to the Tractor

Depending on tractor configuration, refer to the applicable attaching procedure:

- [3.7.1 Attaching with Drawbar Hitch, page 43](#)
- [3.7.2 Attaching with Two-Point Hitch, page 45](#)

3.7.1 Attaching with Drawbar Hitch

CAUTION

Shut off tractor, engage parking brake, and remove key before working around hitch.

1. Remove lynch pin (A) from clevis pin (B), and remove clevis pin from mower conditioner hitch.

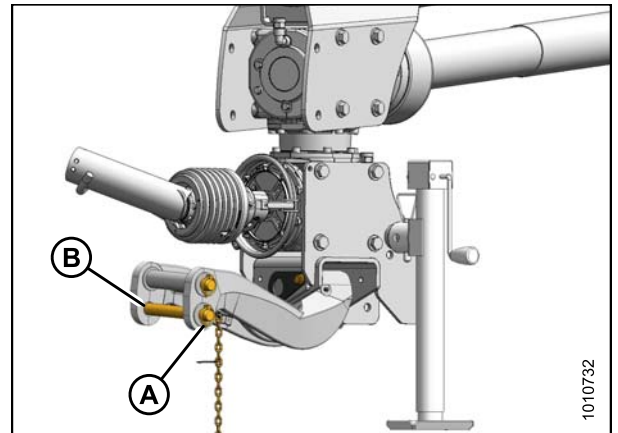


Figure 3.23: Mower Conditioner Hitch

2. Move tractor to position drawbar hitch adapter (A) under pin (B) in mower conditioner hitch. Adjust height as necessary with jack (C).
3. Shut down tractor and remove key from ignition.

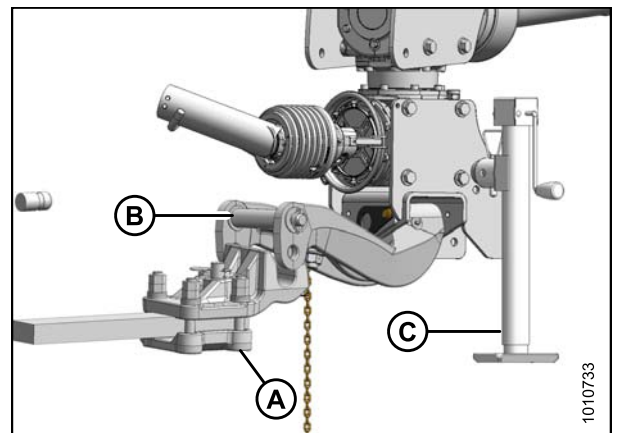


Figure 3.24: Mower Conditioner Hitch

OPERATION

- Lower hitch with jack (A) so that pin (B) engages drawbar hitch adapter (C).
- Install clevis pin (D) and secure with lynch pin (E).

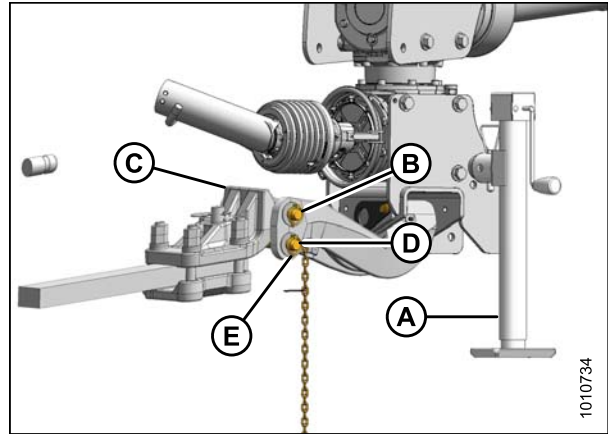


Figure 3.25: Mower Conditioner Hitch

- Position driveline (A) onto tractor power take-off (PTO).
- Pull back collar (B) on driveline (A), and push driveline until it locks. Release collar.
- Route safety chain (C) from mower conditioner through chain support (D) on drawbar hitch adapter and around tractor drawbar support. Lock hook on chain.

IMPORTANT:

If the tractor has a three-point hitch, lift the links as far as possible to prevent damage to the hitch.

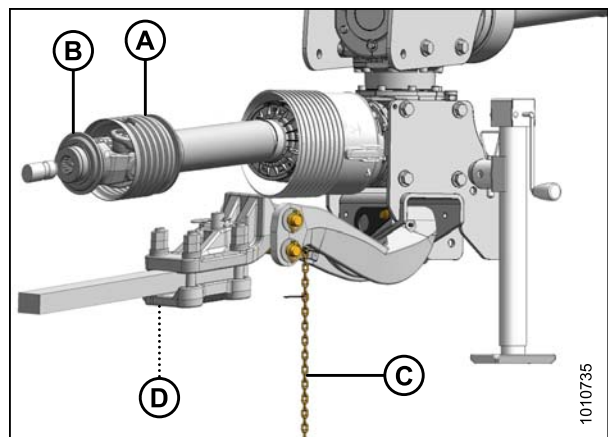


Figure 3.26: PTO Driveline

- Raise jack (A), and remove pin (B).

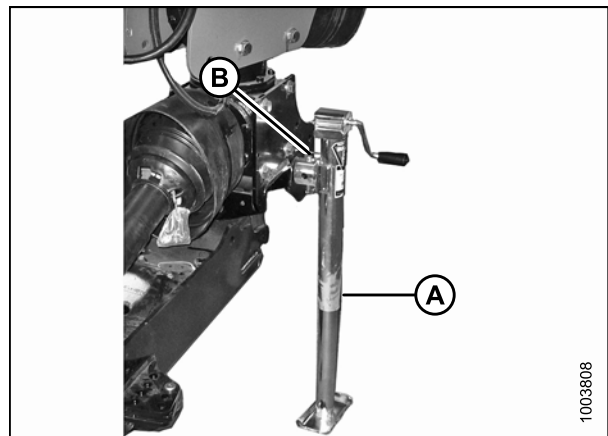


Figure 3.27: Hitch Jack

OPERATION

10. Move jack (A) to storage position on top of hitch, and secure with pin (B).
11. Proceed to [3.7.3 Connecting Hydraulics, page 47](#).

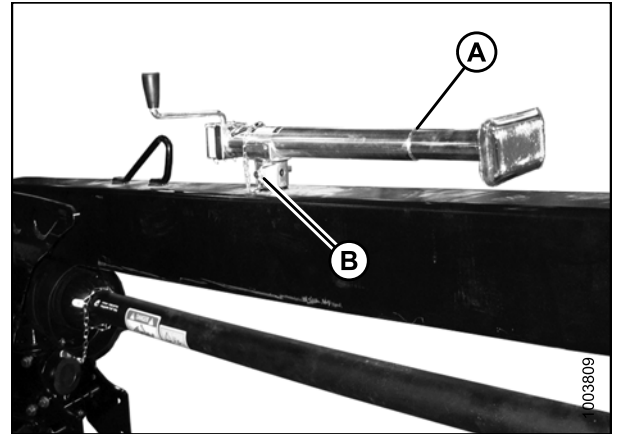


Figure 3.28: Jack Storage

3.7.2 Attaching with Two-Point Hitch

Follow these steps to attach Category II, IIIN, and III two-point hitches:

CAUTION

Shut off tractor, engage parking brake, and remove key before working around hitch.

1. Position tractor and align tractor hitch arms (A) with hitch adapter (B).
2. Shut off tractor and remove key.
3. Remove lynch pins (C) and washers from hitch adapter.

IMPORTANT:

If tractor is equipped with a Category III hitch, use a bushing (MD #224322) on each hitch pin (D).

4. Secure arms (A) onto adapter pins (D) with lynch pins (C).
5. Install anti-sway bars (not shown) on tractor hitch to stabilize lateral movement of hitch arms (A). Refer to your tractor operator's manual.

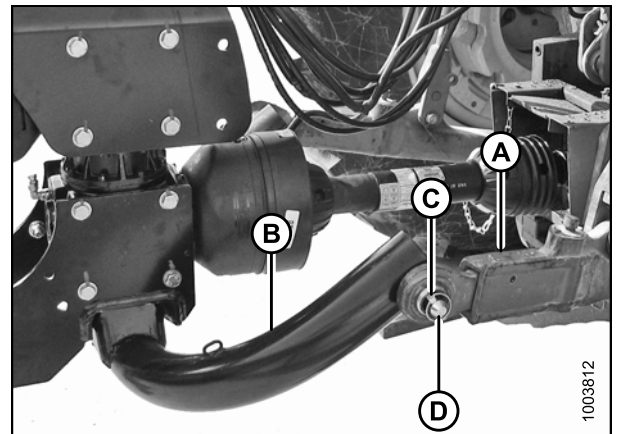


Figure 3.29: Two-Point Hitch Configuration

OPERATION

6. Check distance (C) between tractor power take-off (PTO) shaft (A) and mower conditioner hitch gearbox shaft (B) (without the front half of the driveline attached).
7. Ensure that measurement does NOT exceed the dimensions listed in Table 3.3 *Distance between Hitch Gearbox and Tractor PTO*, page 46.

Table 3.3 Distance between Hitch Gearbox and Tractor PTO

Driveline Shaft Size	Distance (C)
34 mm (1-3/8 in.)	750 mm (27 in.)
43 mm (1-3/4 in.)	800 mm (31 in.)

8. Position driveline (A) onto tractor PTO shaft making sure that driveline is approximately level.
9. Pull back collar on driveline (A) and push driveline until it locks. Release collar.

10. Start tractor and raise hitch so that stand (A) is off the ground. Shut down tractor and remove key from ignition.
11. Remove inner hairpin (B) and pull lock (C) to release stand.

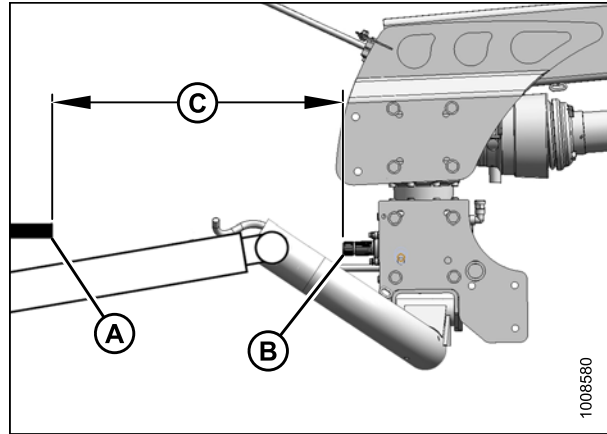


Figure 3.30: Allowable Driveline Length

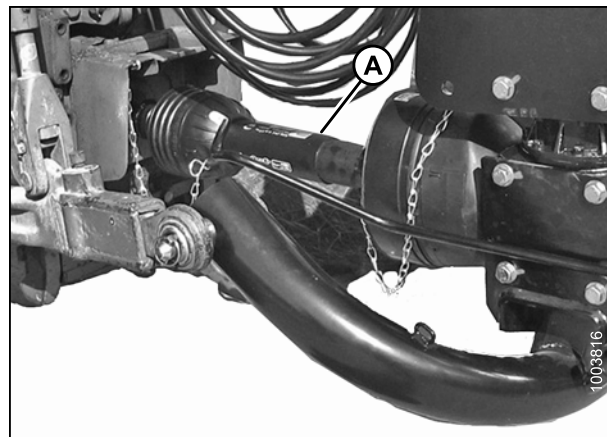


Figure 3.31: Mower Conditioner Driveline Attached to Tractor PTO

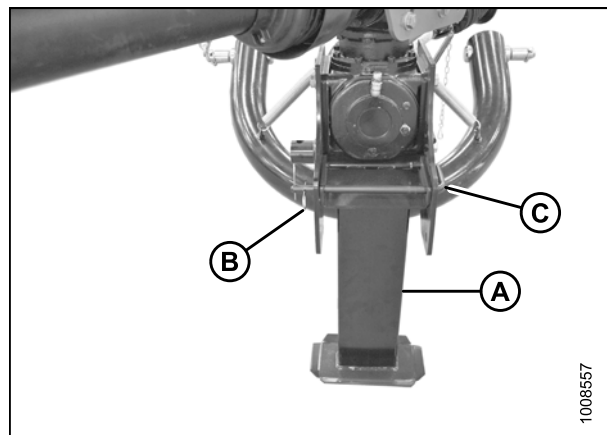


Figure 3.32: Hitch Stand

OPERATION

12. Raise stand (A), rotate lock (B) clockwise to vertical position, and re-engage lock (B) to hold the stand in the storage location.

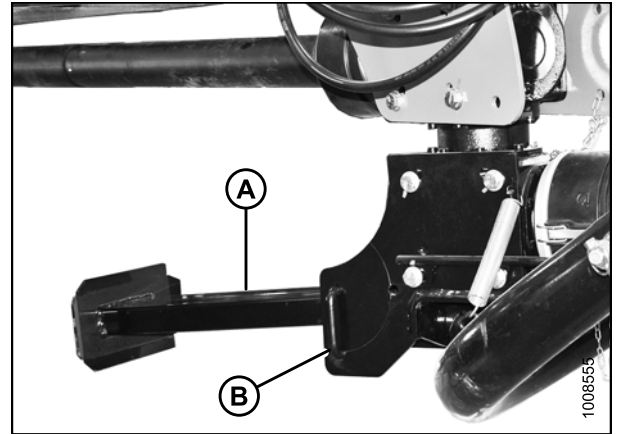


Figure 3.33: Hitch Stand

13. Secure lock with lynch pin (A).

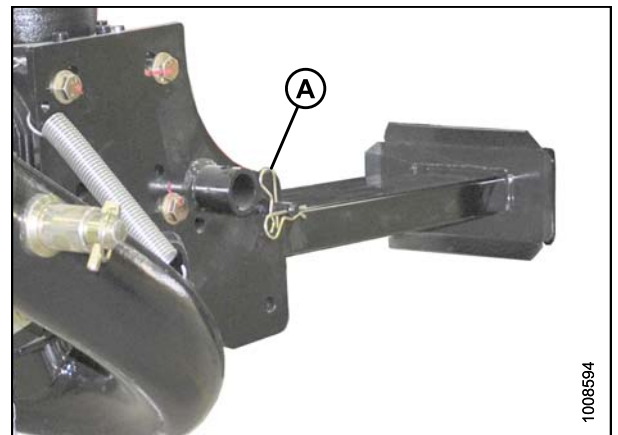


Figure 3.34: Hitch Stand

3.7.3 Connecting Hydraulics

WARNING

Do NOT use remote hydraulic system pressures over 20,684 kPa (3000 psi). Check your tractor operator's manual for remote system pressure.

NOTE:

Refer to numbered/colored bands on hoses to identify lift, swing/transport, and tilt hose sets.

OPERATION

Table 3.4 Hydraulic System Hoses

System	Hose Identification	Tractor Hydraulics
Lift (A)	Red #1 - pressure Blue #1 - return (only with Road Friendly Transport™ system installed)	Control 1
Swing/ Transport (B)	Red #2 - pressure Blue #2 - return	Control 2
Tilt (C) ⁶	Red #3 - pressure Blue #3 - return	Control 3

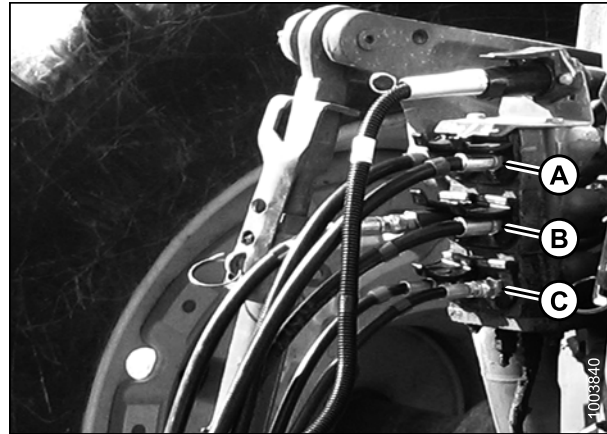


Figure 3.35: Hydraulic Connections

1. Connect the lift cylinder hose (red label with #1) to the tractor's hydraulic receptacle. The second hose (blue #1) is required only when the Road Friendly Transport™ system installed. Refer to Table [3.5 Lift System, page 48](#).

Table 3.5 Lift System

Control Lever Position	Cylinder Movement	Mower Conditioner Movement
Forward	Retract	Lower
Backward	Extend	Raise

2. Connect the two hitch swing cylinder hoses (labelled #2) to the tractor hydraulic receptacles. Refer to Table [3.6 Hitch Swing and Transport System, page 48](#).

Table 3.6 Hitch Swing and Transport System

Control Lever Position	Cylinder Movement	Mower Conditioner Direction
Forward	Extend	Right
Backward	Retract	Left

3. Connect the two mower conditioner tilt cylinder hoses (labelled #3) to the tractor hydraulic receptacles. Refer to Table [3.7 Mower Conditioner Tilt System, page 48](#). (Not required with mechanical center-link.)

Table 3.7 Mower Conditioner Tilt System

Control Lever Position	Cylinder Movement	Mower Conditioner Movement
Forward	Retract	Lower
Backward	Extend	Raise

6. Available with hydraulic tilt option installed.

3.7.4 Connecting Electrical Wiring Harness

1. Ensure that Pin #4 (A) in the tractor receptacle is **NOT** continuously energized (refer to your tractor operator's manual). If necessary, remove the appropriate fuse.

IMPORTANT:

Older model tractors may have Pin #4 (A) energized as an accessory circuit; however, pin position (B) is used to supply power to the mower conditioner's brake lights.

2. Connect the mower conditioner wiring harness connector (C) to the tractor receptacle.

NOTE:

The connector is designed to fit tractors equipped with a round seven-pin receptacle (SAE J560).

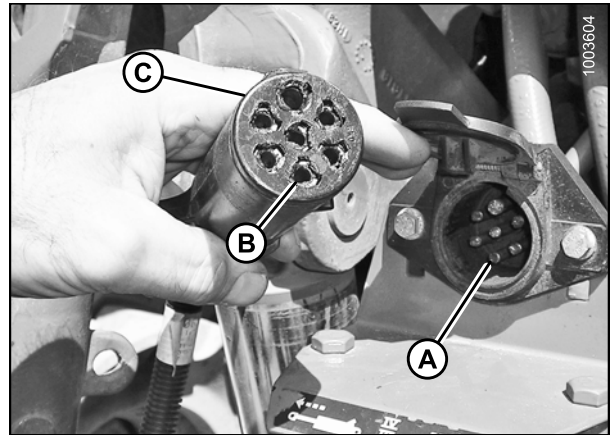


Figure 3.36: Electrical Wiring Harness and Receptacle

If equipped with the Road Friendly Transport™ system:

3. Retrieve Road Friendly Transport™ system control box (A) and place in tractor cab. Route harness through hose support.

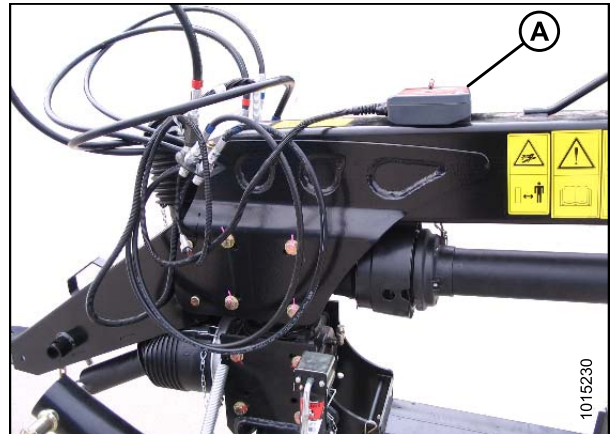


Figure 3.37: Remote Control

4. Locate the connector (C) that branches off the seven pole trailer plug (A) and attach it to the remote wiring harness (B).

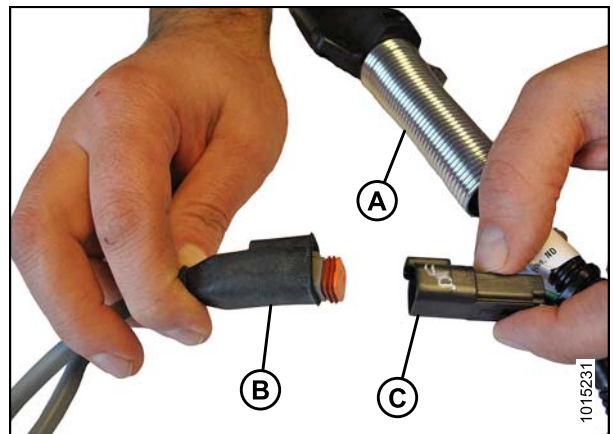


Figure 3.38: Transport Harness

OPERATION

If your tractor has a 3-pin auxiliary power connection (A):

5. Connect the two wires (B) from the 3-pin auxiliary connector to the power wires (C) on the remote control, wrap connections with electrical tape, and skip to Step 7., page 50.

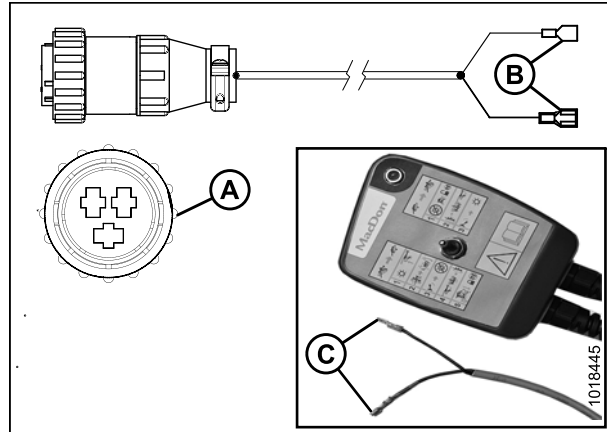


Figure 3.39: Three-Pin Auxiliary Connector

If your tractor does NOT have a 3-pin auxiliary power connection:

6. Connect the remote control power wire (B) to the tractor's power supply.
 - Connect wire (D) with the red tag to tractor power
 - Connect wire (C) with no tag to tractor ground

NOTE:

If the red tag is missing, identify the power by locating the wire with the number one printed on it. The ground wire has a number two printed on it.

7. Place the remote control inside the tractor cab.

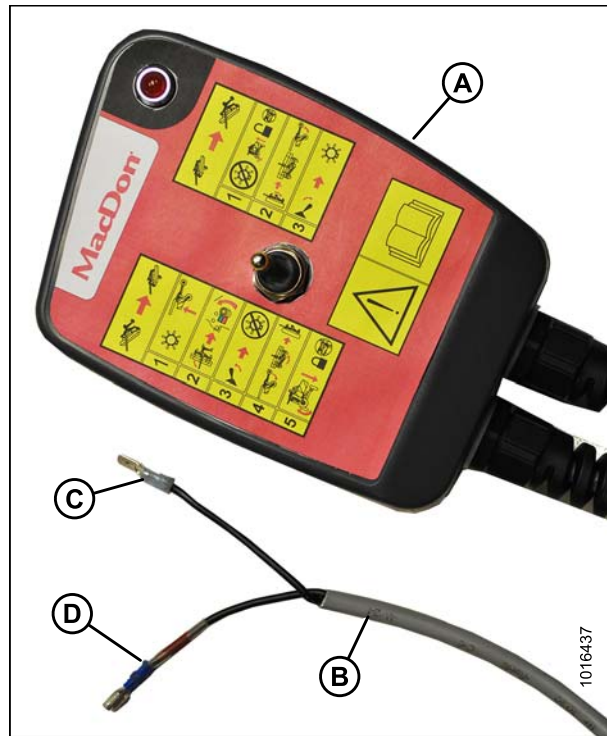


Figure 3.40: Remote Control

3.8 Detaching Mower Conditioner from Tractor

3.8.1 Detaching from Drawbar

CAUTION

- To prevent accidental movement of tractor, shut off engine, engage parking brake, and remove key.
- To maintain stability, always lower the machine completely. Block mower conditioner wheels before detaching from tractor.

1. Park machine on flat, level surface.
2. Lower mower conditioner onto blocks or leave mower conditioner raised.

IMPORTANT:

If leaving mower conditioner in raised position, close lift cylinder lock-out valves.

3. Shut off engine and remove key.
4. Move remote cylinder control valve lever back and forth to relieve stored hydraulic pressure.

If Road Friendly Transport™ is installed:

5. Disconnect the power wires (C and D) from the remote control (A).
6. Roll up cable (B) and attach the remote control (A) to the hitch with the magnet on the back of the remote control box.

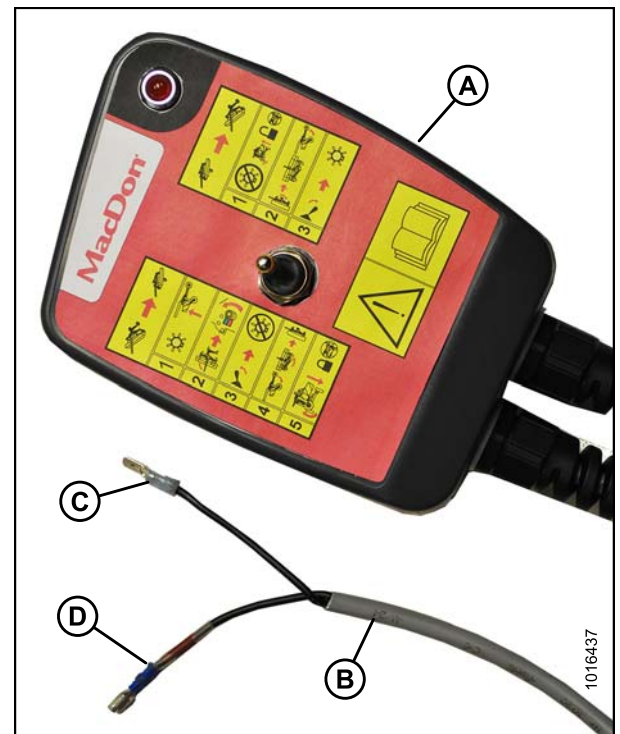


Figure 3.41: Remote Control

OPERATION

7. Disconnect hydraulic hoses and electrical harness from the tractor and store hose ends and electrical connector in hose support (A) at front of hitch as shown.

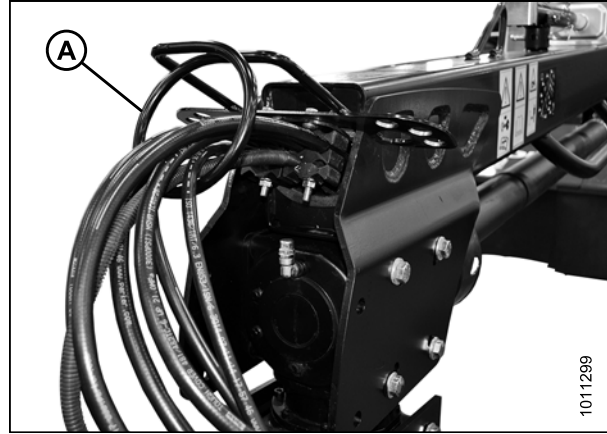


Figure 3.42: Hose Support

8. Pull pin (B) securing jack (A) at storage location.

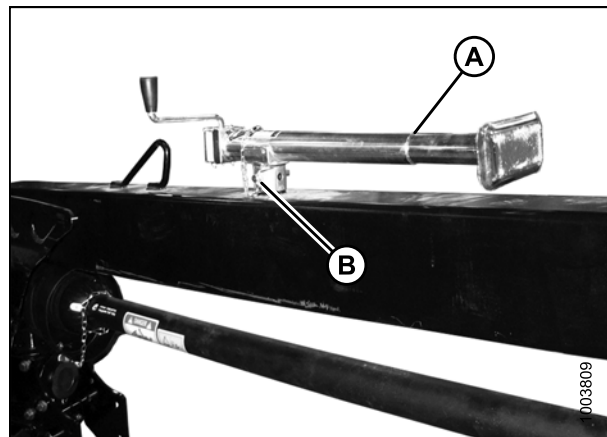


Figure 3.43: Jack Storage

9. Move jack (A) to working position at front of hitch and secure with pin (B).
10. Lower jack to take weight off tractor drawbar.
11. Disconnect safety chain (C) from drawbar and store on mower conditioner hitch.
12. Pull back collar (D) on driveline, slide coupler off tractor power take-off shaft, and rest driveline on hook (not shown).

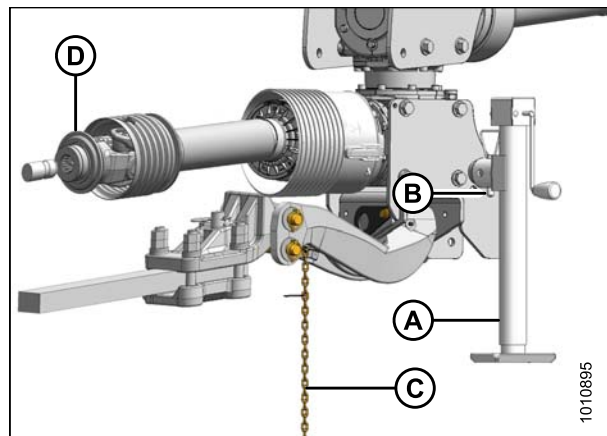


Figure 3.44: Driveline and Jack

OPERATION

13. Remove lynch pin (E), and remove clevis pin (D).
14. Raise mower conditioner hitch using jack (A) until pin (B) disengages and clears drawbar hitch adapter (C).

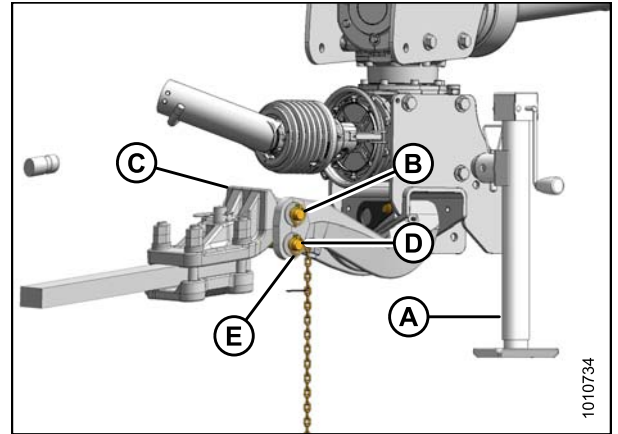


Figure 3.45: Mower Conditioner Hitch

15. Replace clevis pin (B) and secure with lynch pin (A).

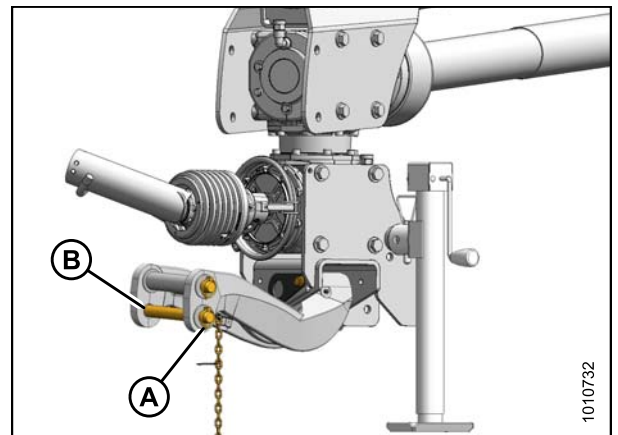


Figure 3.46: Mower Conditioner Hitch

3.8.2 Detaching from Two-Point Hitch

⚠ CAUTION

- To prevent accidental movement of tractor, shut off engine, engage parking brake, and remove key.
- To maintain stability, always lower the machine completely. Block mower conditioner wheels before detaching from tractor.

1. Park machine on flat level surface.
2. Lower mower conditioner onto blocks or leave mower conditioner raised.

IMPORTANT:

If leaving mower conditioner in raised position, engage lift cylinder lock-out valves.

3. Shut off engine and remove key.
4. Move remote cylinder control valve lever back and forth to relieve stored hydraulic pressure.

If Road Friendly Transport™ is installed:

5. Disconnect the power wires from the remote control (A).
6. Roll up cable (B) and attach the remote control (A) to the hitch with the magnet on the back of the remote control box.

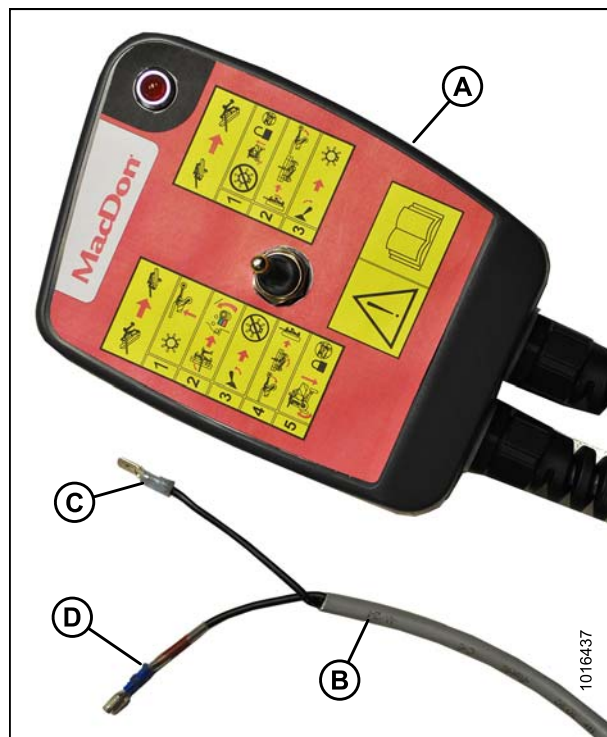


Figure 3.47: Remote Control

OPERATION

7. Disconnect hydraulic hoses and electrical harness. Store hose ends and electrical connector in hose support (A) at front of hitch as shown.

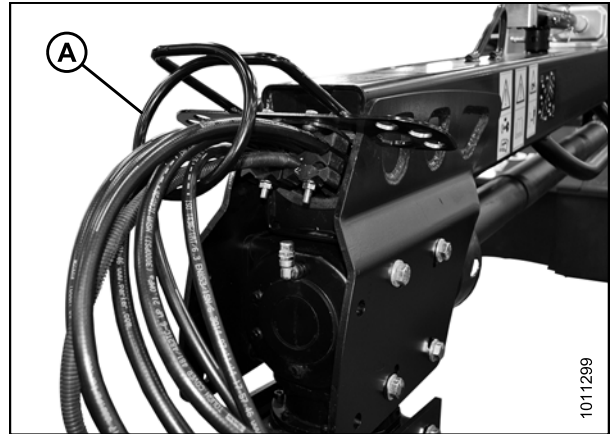


Figure 3.48: Hose Support

8. Pull back collar (A) on driveline, slide coupler off tractor power take-off shaft, and rest driveline on hook (not shown).

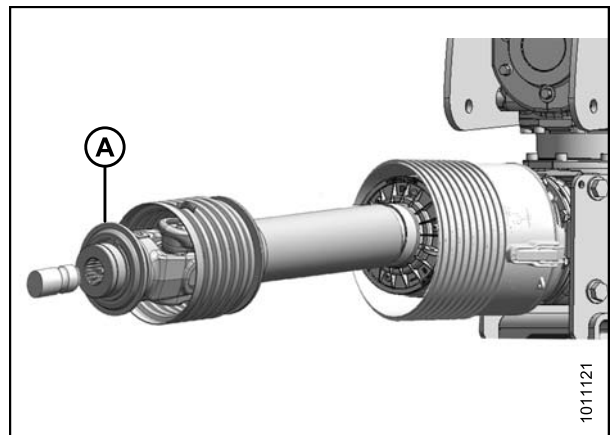


Figure 3.49: Driveline

9. Remove inboard hairpin (A) from lock.

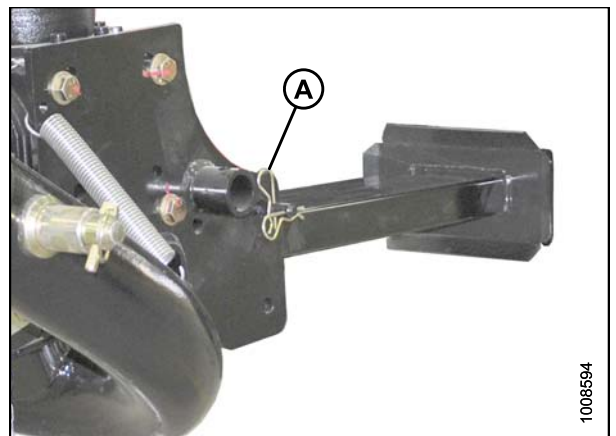


Figure 3.50: Inboard Hairpin

OPERATION

10. Hold stand (A), and pull lock (B) to disengage stand.

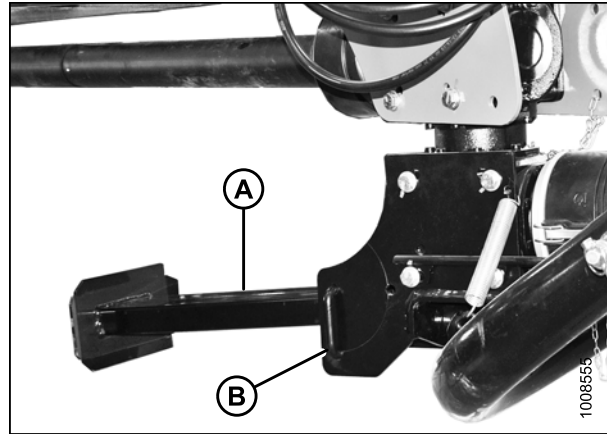


Figure 3.51: Hitch Stand and Lock

11. Lower stand (A), rotate lock (C) counterclockwise to horizontal position, and push to engage stand.
12. Check that stand (A) is locked.
13. Secure lock (C) with hair pin (B).
14. Start tractor and lower hitch to take weight off tractor hitch points.
15. Shut down tractor and remove key from ignition.

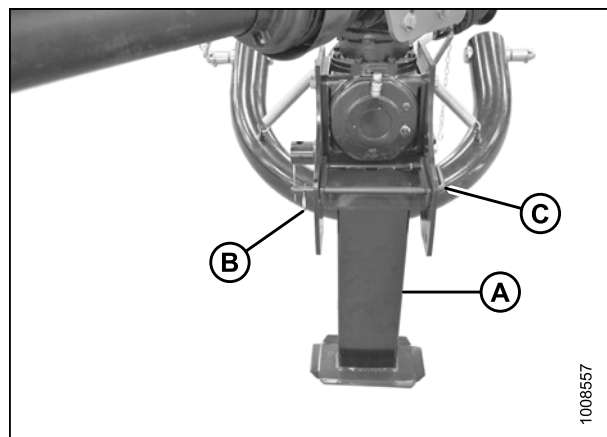


Figure 3.52: Hitch Stand in Lowered Position

16. Remove lynch pins (A) and washers and swing tractor arms (B) away from hitch adapter.

NOTE:

If tractor is equipped with a quick hitch system, it is **NOT** necessary to remove pins (A).

17. Replace lynch pins (A) and washers in mower conditioner hitch.
18. Slowly drive tractor away from mower conditioner.

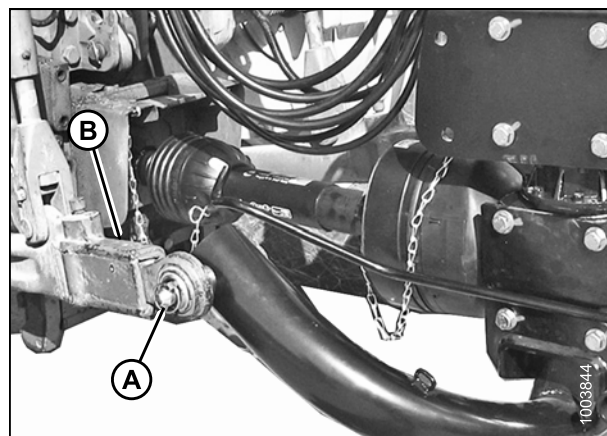


Figure 3.53: Lynch Pins and Tractor Arms

3.9 Breaking In the Mower Conditioner

After attaching the mower conditioner to the tractor for the first time, operate the machine at low speed for five minutes while watching and listening **from the operator's seat** for binding or interfering parts.

IMPORTANT:

Be especially alert until you become familiar with the sound and feel of your new mower conditioner.

 **CAUTION**

Before investigating an unusual sound or attempting to correct a problem, shut off tractor, engage parking brake, and remove key.

NOTE:

Refer to [4.3.2 Break-In Inspections, page 115](#) to determine the service interval for your mower conditioner, and complete the scheduled break-in inspection procedures.

3.10 Engaging the Power Take-Off (PTO)

 **DANGER**

Be sure all bystanders are clear of the machine before engaging the PTO. Never leave tractor seat with the PTO engaged.

1. Move the mower conditioner up to the standing crop, and slowly engage the PTO.
2. Ensure tractor PTO is running at 1000 rpm before starting to cut.
3. Disengage the PTO when not operating the mower conditioner.

3.11 Raising and Lowering Mower Conditioner

3.11.1 Lift Cylinders

Two hydraulic cylinders (A), one at each end of the carrier, raise or lower the mower conditioner when the tractor's cylinder control lever is activated.

The lift system is equipped with a lock-out valve (B) at each cylinder which prevents the cylinder from extending or retracting due to accidental movement of the lift control. Refer to [3.1.1 Engaging Locks](#), page 31.

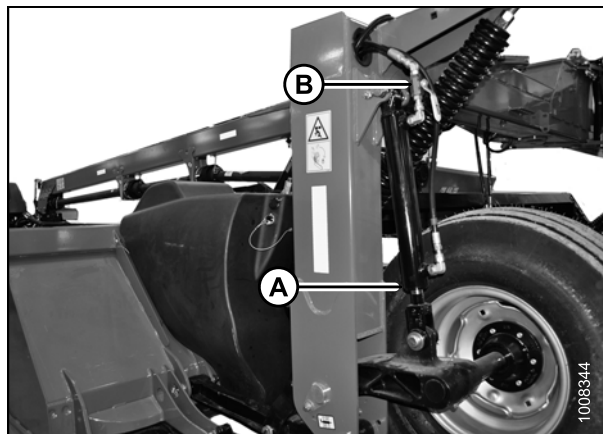


Figure 3.54: Lift Cylinder

3.11.2 Lift Control

The mower conditioner raise/lower control is not normally used to control cutting height because cutting is usually performed with the cutterbar on the ground. This control is used to raise the mower conditioner to clear obstacles and windrows during field operation, to adjust the mower conditioner height for maintenance, and to raise the mower conditioner for storage or for transport behind a tractor.

DANGER

Be sure all bystanders are clear of the machine before raising or lowering mower conditioner.

1. Activate the cylinder control lever (A) to raise or lower the mower conditioner.
 - a. To lower mower conditioner, move lever forward to position (B).
 - b. To raise mower conditioner, move lever backward to position (C).

IMPORTANT:

Connect hydraulic hoses so that moving control lever (A) backward raises the mower conditioner. Refer to [3.7.3 Connecting Hydraulics](#), page 47 for more information.

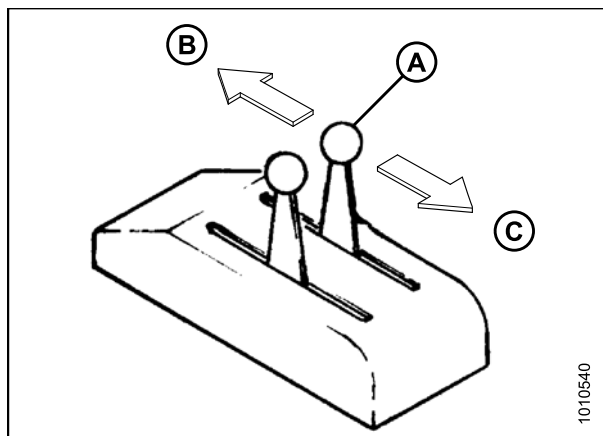


Figure 3.55: Tractor Cylinder Control Lever

3.12 Shutdown Procedure

CAUTION

Before leaving the tractor seat for any reason:

- Disengage the power take-off.
- Park on level ground if possible.
- Lower the mower conditioner fully.
- Place all controls in NEUTRAL or PARK.
- Engage the park brake.
- Stop engine and remove key from ignition.
- Wait for all movement to stop.
- Lock tractor's anti-vandalism covers and closures when leaving the machine unattended.

3.13 Maneuvering/Steering the Mower Conditioner

IMPORTANT:

The valve (A) on the steering line must be in the open position (handle in line with hose) for the steering system to operate.

Steering is controlled by the tractor's remote hydraulic system. The hitch provides the ability to do the following:

- Move the mower conditioner into field position
- Make right angle turns in either direction
- Steer around objects on both sides
- Perform straight-line field cutting on either side of the tractor

1. Activate steering control lever (A) to maneuver mower conditioner into the desired path of travel.
 - a. Move lever **forward** to position (B) to steer the mower conditioner to the right.
 - b. Move lever **backward** to position (C) to steer the mower conditioner to the left.

IMPORTANT:

Operate the steering control lever (A) only briefly, and return it to the NEUTRAL or OFF position as soon as the mower conditioner reaches the desired path of travel.

IMPORTANT:

Connect hydraulic hoses so that moving the steering control lever (A) backward steers the mower conditioner to the left and moving lever forward steers the mower conditioner to the right. Refer to [3.7.3 Connecting Hydraulics, page 47](#) for more information.

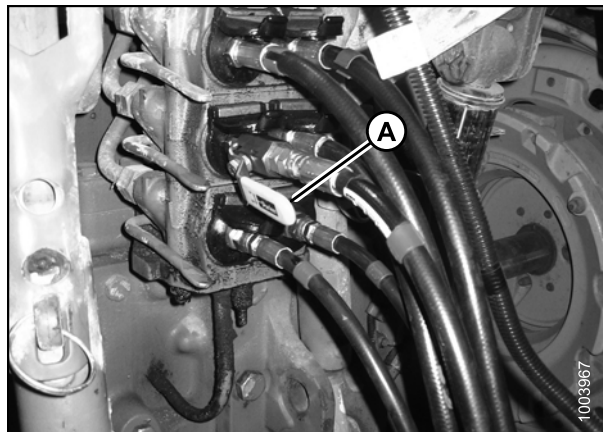


Figure 3.56: Steering Line Valve in Working (Open) Position

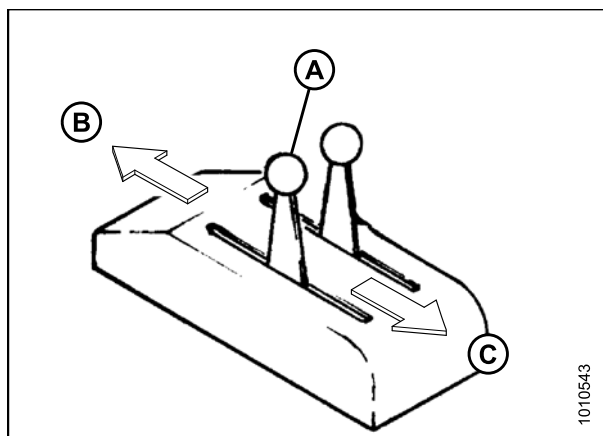


Figure 3.57: Tractor Steering Control Lever Positions

OPERATION

3.13.1 Operating Right-Side

Follow the step below to steer the mower conditioner to the right side of the tractor.

1. Move steering control lever (A) forward to position (B) until the mower conditioner reaches the desired path of travel on the right side of the tractor.

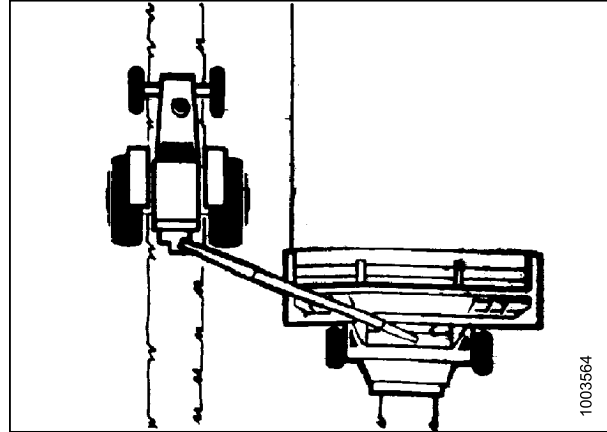


Figure 3.58: Right-Side Operation

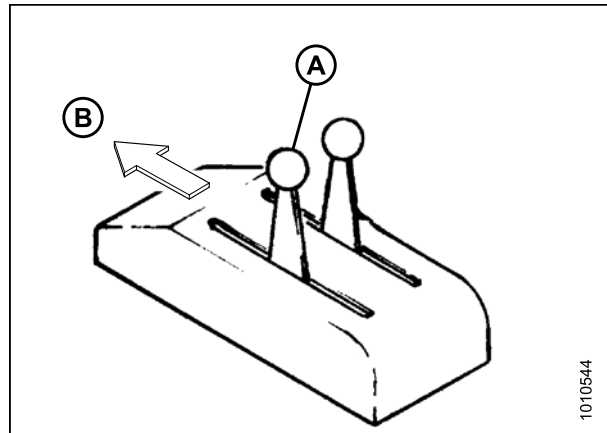


Figure 3.59: Tractor Steering Control Lever

3.13.2 Operating Left-Side

Follow the step below to steer the mower conditioner to the left side of the tractor.

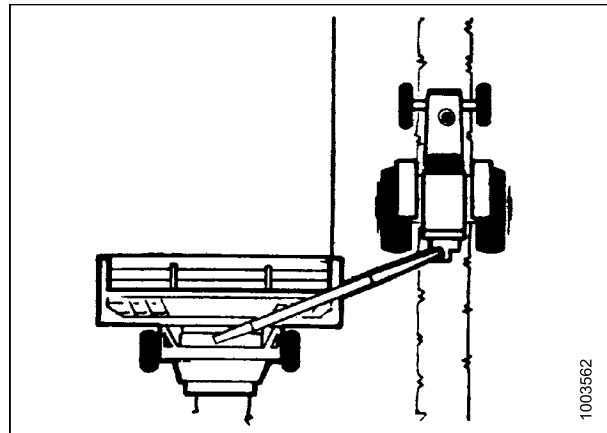


Figure 3.60: Left-Side Operation

OPERATION

1. Move steering control lever (A) backward to position (B) until the mower conditioner reaches the desired path of travel on the left side of the tractor.

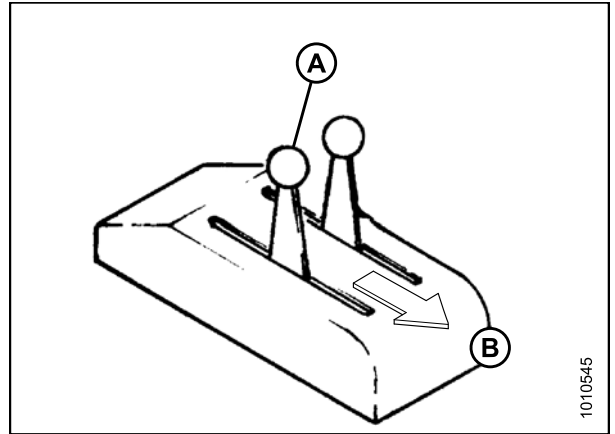


Figure 3.61: Tractor Steering Control Lever

3.13.3 Avoiding Obstacles

Follow the steps below to steer the mower conditioner around an obstacle.

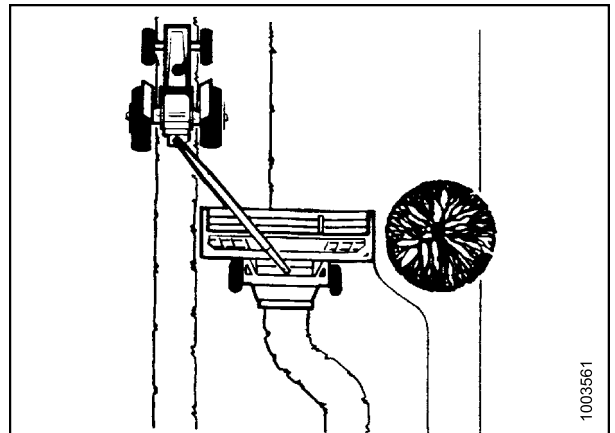


Figure 3.62: Mower Conditioner Steered around Obstacle

1. Activate steering control lever (A) to maneuver mower conditioner into the desired path of travel.
 - a. Move lever **forward** to position (B) to steer the mower conditioner to the right.
 - b. Move lever **backward** to position (C) to steer the mower conditioner to the left.

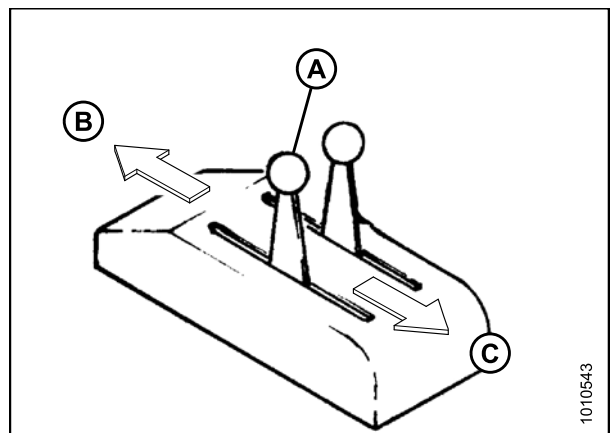


Figure 3.63: Tractor Steering Control Lever

OPERATION

3.13.4 Turning Square Corners

The following procedure is intended as a guide for developing a turning procedure for your tractor and mower conditioner. Specific distances are not given due to the differing maneuverability of various tractors.

1. Steer the tractor sharply away from the crop when approaching a corner. Steer the mower conditioner to maintain a straight cut as the tractor moves away from the crop.
2. Ensure the mower conditioner cuts past where the new corner will begin, and immediately raise the mower conditioner until the skid shoes clear the ground. Steer the mower conditioner as sharply as possible away from the uncut crop.
3. Drive past the corner, and steer the tractor sharply back towards the uncut crop.

IMPORTANT:

Ensure that the inside tractor tire does **NOT** contact the mower conditioner's hitch.

4. Position the tractor so it is straddling the last cut windrow. As the mower conditioner finishes turning, steer it back towards the uncut crop, align the mower conditioner with the crop edge, and lower mower conditioner to cutting height.

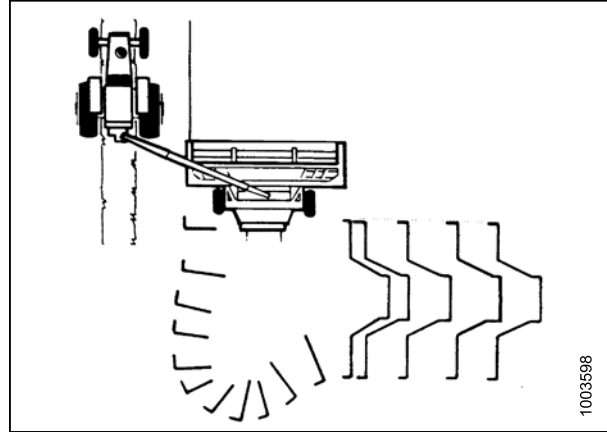


Figure 3.64: Square Corners

3.13.5 Turning 180-Degrees

NOTE:

When cutting back and forth on one side of the field, approximately 15 m (50 ft.) is required at each end of the field to make a 180-degree turn-around.

OPERATION

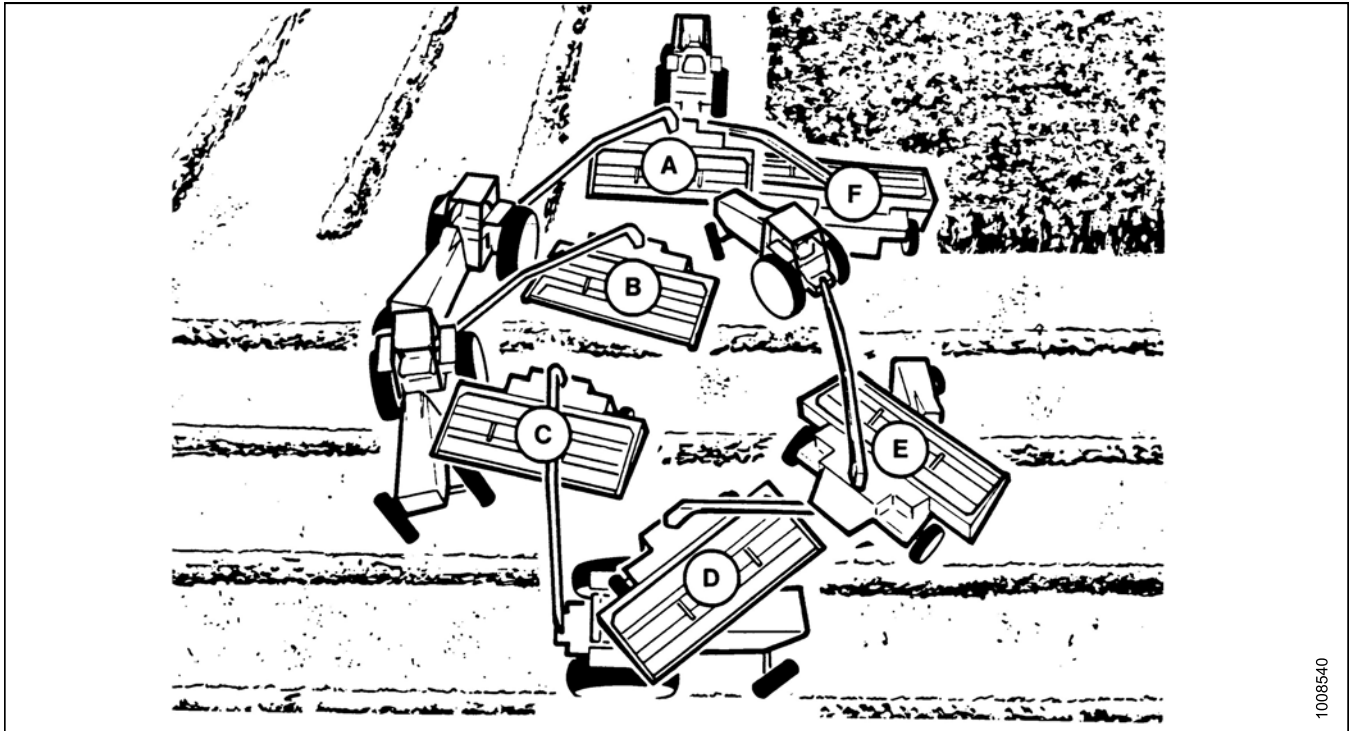


Figure 3.65: 180-Degree Turn

1. Steer the tractor away from the uncut crop beginning at position (A) while steering the mower conditioner in a straight line until it cuts through the end of the row.
2. Ensure the mower conditioner cuts past the end of the row, and immediately raise the mower conditioner until the skid shoes clear the ground. Steer the mower conditioner as sharply as possible away from the uncut crop.

NOTE:

For ease of operation, both steering control levers can be activated with one hand and held until the steering cylinder completes its stroke.

3. Proceed to position (B), and start turning the tractor back towards the uncut crop.

IMPORTANT:

Ensure that the inside tractor tire does **NOT** contact the mower conditioner's hitch.

4. Continue turning towards the uncut crop as shown in positions (C) and (D) while steering the mower conditioner towards the outside of the turning circle. Maintain hitch-to-tire clearance throughout the turn.
5. Complete the tractor turn as shown in position (E), and position the tractor so it is straddling the last cut windrow. Align the mower conditioner with the edge of the uncut crop.
6. Proceed to position (F), lower mower conditioner to cutting height, and begin a new cut through the field.

3.14 Transporting the Mower Conditioner

You can tow the mower conditioner on public roads in either normal field mode or Road Friendly Transport™ mode.

- To prepare a mower conditioner for towing with a tractor or a truck without using the Road Friendly Transport™ option, refer to [3.14.1 Preparing Mower Conditioner for Transport, page 66](#).
- To prepare a mower conditioner for towing with the Road Friendly Transport™ option, refer to [Converting from Field to Transport Mode, page 73](#).

CAUTION

- Obey all highway traffic regulations in your area when transporting on public roads. Use flashing amber lights unless prohibited by law
- Be aware of roadside obstructions, oncoming traffic, and bridges.
- Travel at safe speeds to ensure complete machine control and stability at all times. Do NOT exceed 32 km/h (20 mph). Reduce speed for corners and slippery conditions.
- Use tractor lights and mower conditioner flashing amber and red taillights when transporting on roads in order to provide adequate warning to operators of other vehicles.
- Do NOT transport the mower conditioner on a road or highway at night or in reduced visibility conditions such as rain or fog.
- Ensure that hitch on transporting vehicle is capable of handling a 907 kg (2000 lb.) static vertical load.

3.14.1 Preparing Mower Conditioner for Transport

Follow these instructions to prepare the mower conditioner for transport without deploying the optional Road Friendly Transport™ system.

DANGER

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

WARNING

Do NOT tow unless the hitch swing cylinder is fully charged. If hitch swing cylinder is not fully charged, loss of control, injury, or death could result.

1. Connect the mower conditioner hitch to the tractor. Refer to [3.7 Attaching Mower Conditioner to the Tractor, page 43](#).
2. Move jack (A) to storage position on side of hitch, and secure with pin (B).

NOTE:

If unit is equipped with a two-point hitch, rotate the hitch stand to the storage position.

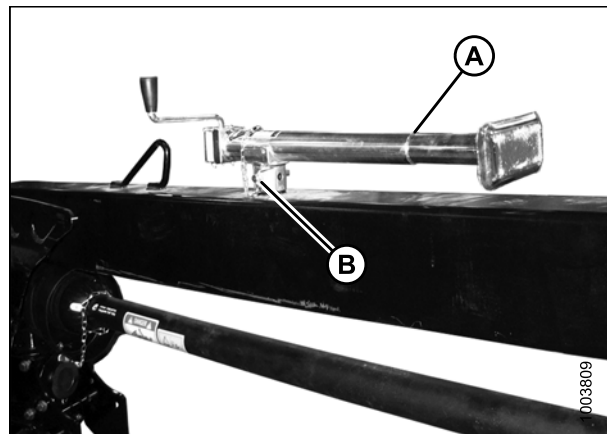


Figure 3.66: Jack in Storage Position

OPERATION

3. Connect the hitch swing cylinder hoses (labelled red #2 and blue #2) to the tractor's hydraulic circuit (A). Refer to [3.7.3 Connecting Hydraulics, page 47](#).
4. Swing the mower conditioner completely to the left, then completely to the right. Repeat three or four times to charge the hitch swing circuit.
5. Swing the mower conditioner so that it is centered behind the towing vehicle.

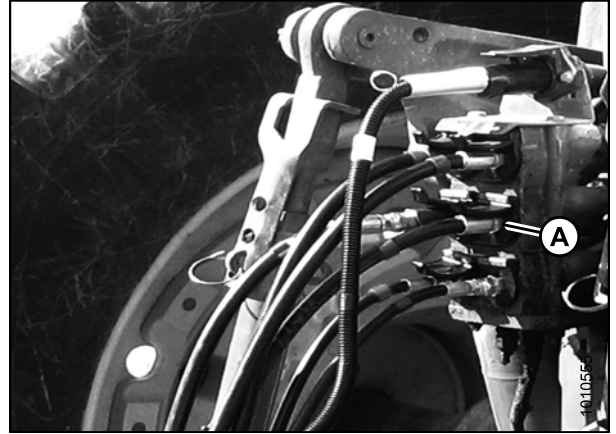


Figure 3.67: Hydraulic Connection

6. Close the hitch swing lock-out valve (A) by turning the handle to the closed (vertical) position.

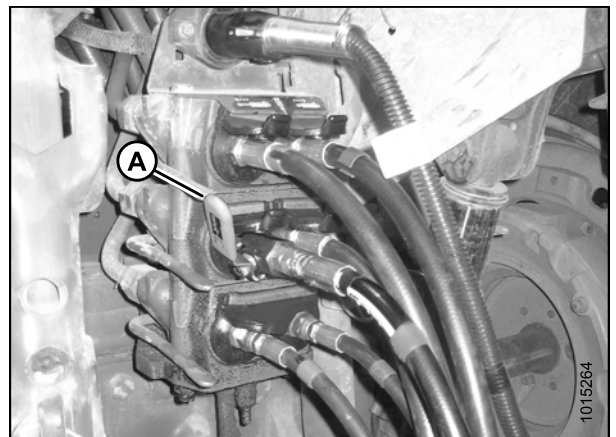


Figure 3.68: Hitch Swing Lock-Out Valve Shown in Closed Position

7. Raise the mower conditioner fully and close the lift cylinder lock-out valve (A) on each lift cylinder by turning the handle to the closed position.
8. Ensure tires are properly inflated.
9. Ensure the slow moving vehicle (SMV) sign, reflectors, and lights are clean and visible at rear of mower conditioner.

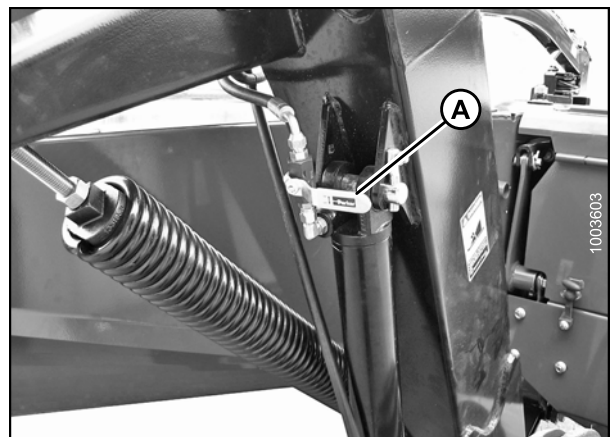


Figure 3.69: Cylinder Lock-Out Valve

10. Proceed to the procedure relevant to your equipment.
 - If towing the mower conditioner with a tractor, refer to [3.14.2 Transporting with a Tractor, page 68](#).
 - If towing the mower conditioner with a truck, refer to [3.14.3 Transporting with a Truck, page 68](#).

OPERATION

3.14.2 Transporting with a Tractor

If towing endwise with the optional Road Friendly Transport™ system, refer to [Converting from Field to Transport Mode, page 73](#).

1. Before proceeding to transport the mower conditioner with a tractor, ensure the machine is prepared for transport. Refer to [3.14.1 Preparing Mower Conditioner for Transport, page 66](#).
2. Ensure that hitch safety chain is properly attached to towing tractor. Provide only enough slack in chain to permit turning.
3. Move jack (A) to storage position on side of hitch, and secure with pin (B).

NOTE:

If unit is equipped with a two-point hitch, rotate the stand to the storage position.

4. Keep the slow moving vehicle (SMV) sign, reflectors, and lights clean and visible at rear of mower conditioner.
5. Ensure tires are properly inflated.
6. Do NOT exceed 32 km/h (20 mph).

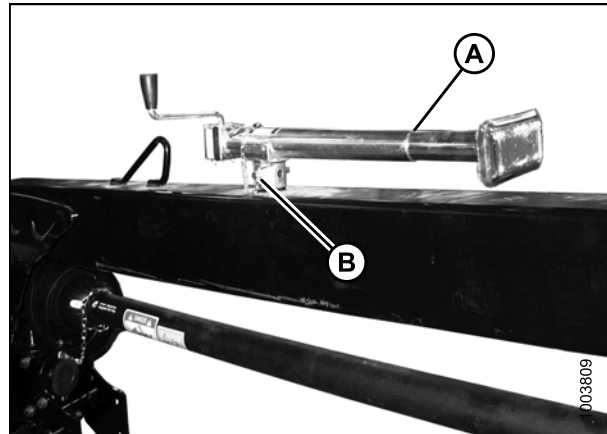


Figure 3.70: Jack in Storage Position

3.14.3 Transporting with a Truck

Follow these instructions if the machine will be transported with a truck.

⚠ CAUTION

Do NOT tow with a vehicle weighing less than 3400 kg (7500 lb.). Ensure that the capacity of the towing vehicle is sufficient to maintain control.

If towing endwise with the optional Road Friendly Transport™ system, refer to [Converting from Transport to Field Mode, page 77](#).

1. Before proceeding to transport the mower conditioner with a truck, ensure the machine is prepared for transport. Refer to [3.14.1 Preparing Mower Conditioner for Transport, page 66](#).

OPERATION

2. Ensure the hydraulic hoses (A) are securely stored on the hitch.

NOTE:

Hydraulic hoses do not need to be attached to the tractor for towing.

3. Remove the forward half (B) of driveline and store in the cab for transport.
4. Store driveline (C) on hook (D) (if power take-off [PTO] driveline is not attached).

NOTE:

The PTO driveline (C) does not need to be attached for towing purposes.

5. Remove pins (A) from transport hitch (B).

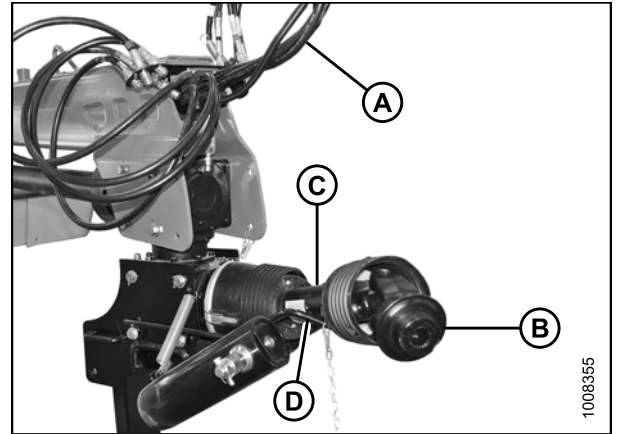


Figure 3.71: Mower Conditioner Hitch

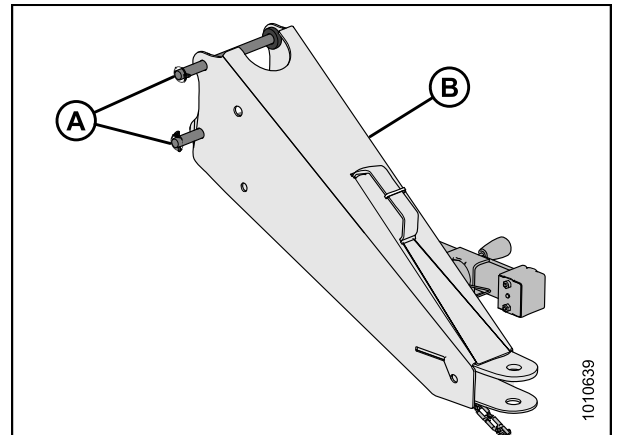


Figure 3.72: Transport Hitch

6. Position transport hitch (A) on mower conditioner hitch, install pins (B), and secure with lynch pins.
7. Lift the mower conditioner hitch with jack (C) and attach mower conditioner to truck.

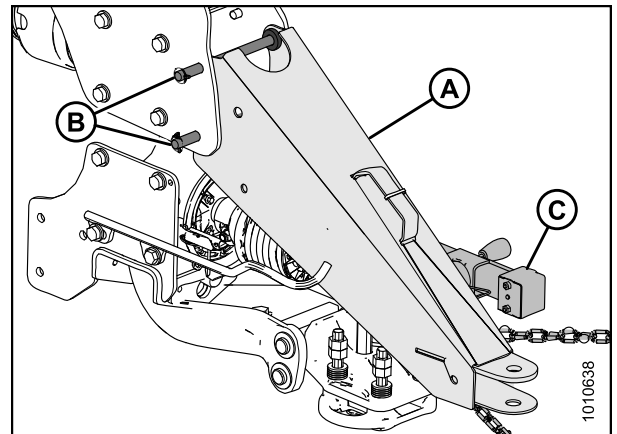


Figure 3.73: Transport Hitch Installed

OPERATION

8. Move jack (A) to storage position on side of hitch, and secure with pin (B).

NOTE:

If unit is equipped with a two-point hitch, rotate the stand to the storage position.

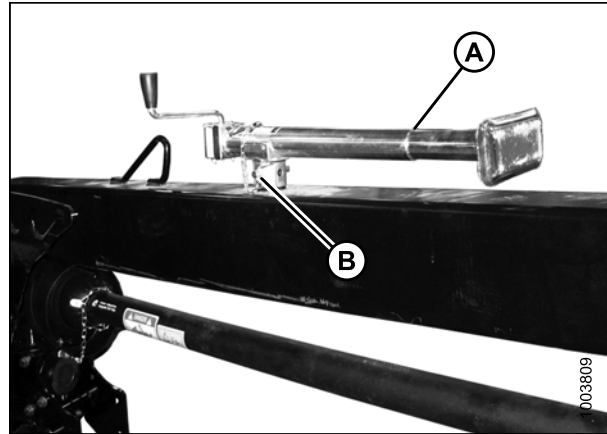


Figure 3.74: Jack in Storage Position

9. Wrap safety chain (A) around hitch and attach to truck frame. Provide only enough slack in chain to permit turning.
10. Connect electrical harness (B).
11. Keep the slow moving vehicle (SMV) sign, reflectors, and lights clean and visible at rear of mower conditioner.
12. Ensure tires are properly inflated.
13. Do NOT exceed 32 km/h (20 mph).

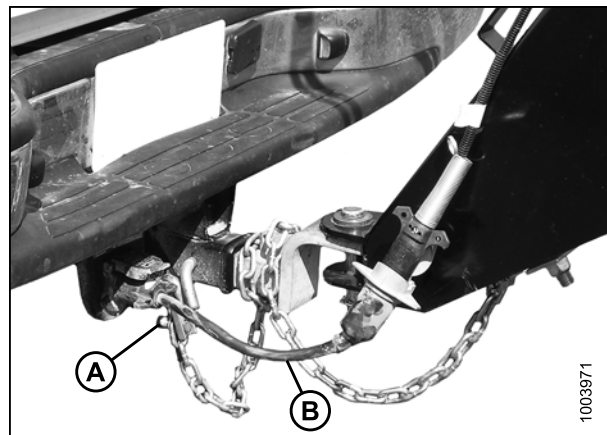


Figure 3.75: Safety Chain and Electrical Harness

3.14.4 Transport Lighting

The position of the lighting depends on the transport configuration.

- If the mower conditioner includes the Road Friendly Transport system, refer to [Lighting: With Road Friendly Transport™ Option, page 71](#).
- If the mower conditioner does NOT include the Road Friendly Transport system, refer to [Lighting: Without Road Friendly Transport™ System Option, page 71](#).

OPERATION

Lighting: With Road Friendly Transport™ Option

The mower conditioner is equipped with two bidirectional amber lights (A) located on the outboard edges of the carrier frame that function as flashing hazard lights and turn signals.

The red lights (B) located on the inboard side of the amber lights function as both tail and brake lights. Refer to [3.7.4 Connecting Electrical Wiring Harness, page 49](#) for information about connecting the mower conditioner's electrical harness to the tractor.

Amber reflective tape is applied to various locations on the front and sides of the mower conditioner, hitch, and carrier frame. Red reflective tape is applied to the rear of the mower conditioner.

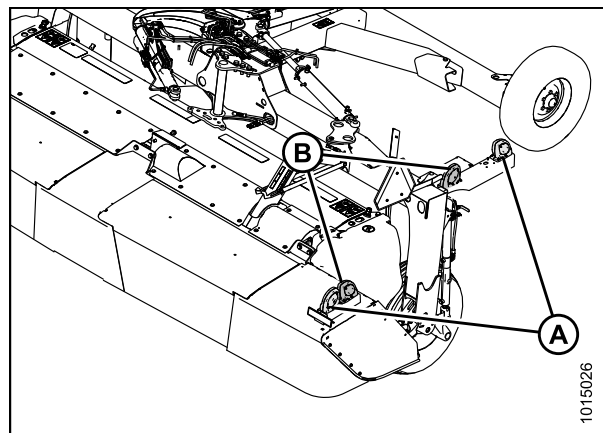


Figure 3.76: Lighting Locations (with Road Friendly Transport™ System)

Lighting: Without Road Friendly Transport™ System Option

The mower conditioner is equipped with two bidirectional amber lights (A) located on the outboard edges of the carrier frame that function as flashing hazard lights and turn signals.

The red lights (B) located on the inboard side of the amber lights function as both tail and brake lights. Refer to [3.7.4 Connecting Electrical Wiring Harness, page 49](#) for information about connecting the mower conditioner's electrical harness to the tractor.

Amber reflective tape is applied to various locations on the front and sides of the mower conditioner, hitch, and carrier frame. Red reflective tape is applied to various locations on the mower conditioner.

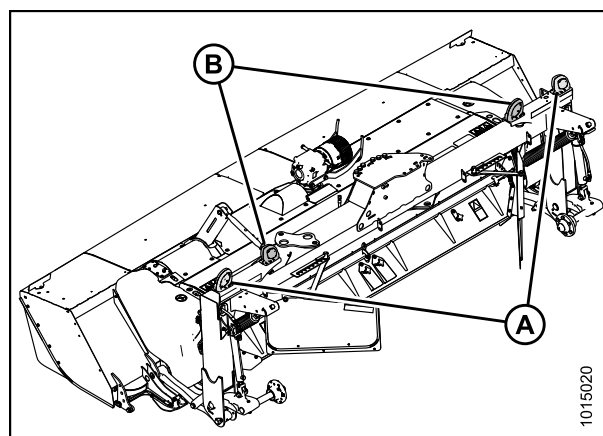


Figure 3.77: Lighting Locations

3.14.5 Converting from Transport to Field Mode (without Optional Road Friendly Transport™ System)

⚠ DANGER

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

1. Stop engine and remove key from ignition.

OPERATION

2. If converting to field mode after towing with a truck, remove pins (A) and disconnect mower conditioner from transport hitch (B).
3. Connect all hydraulic hoses (refer to [3.7.3 Connecting Hydraulics, page 47](#)), and connect electrical wiring harness.

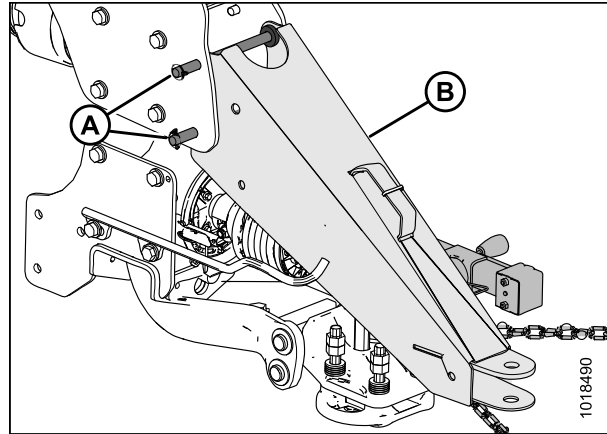


Figure 3.78: Transport Hitch

4. Open the steering lock-out valve by turning the handle (A) to the horizontal position.

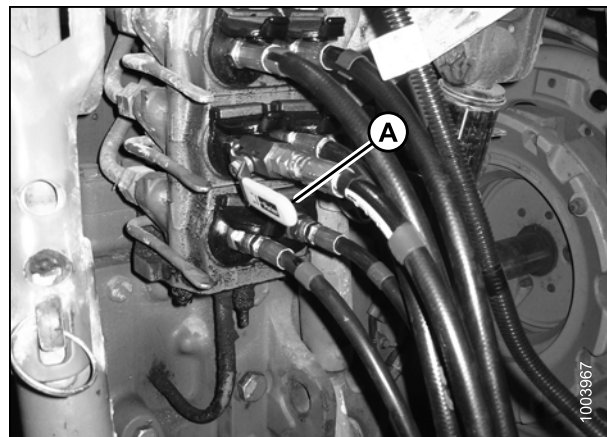


Figure 3.79: Steering Lock-Out Valve in Open Position

5. Open the lock-out valve (A) on each lift cylinder by turning the handle to the vertical position.

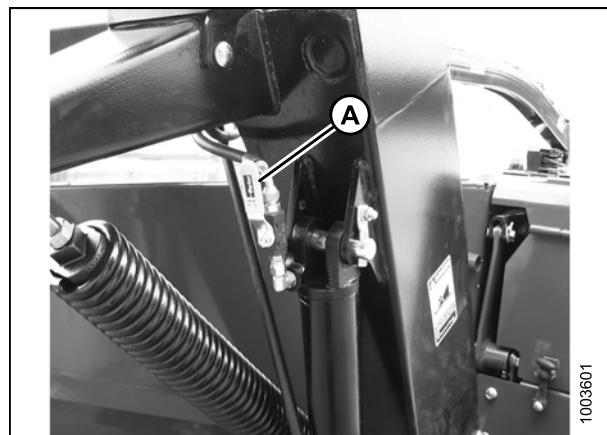


Figure 3.80: Lift Cylinder Lock-Out Valve

3.14.6 Road Friendly Transport™ Option

The optional Road Friendly Transport™ system allows the mower conditioner to be towed while remaining within the legal width restrictions on most roads and highways.

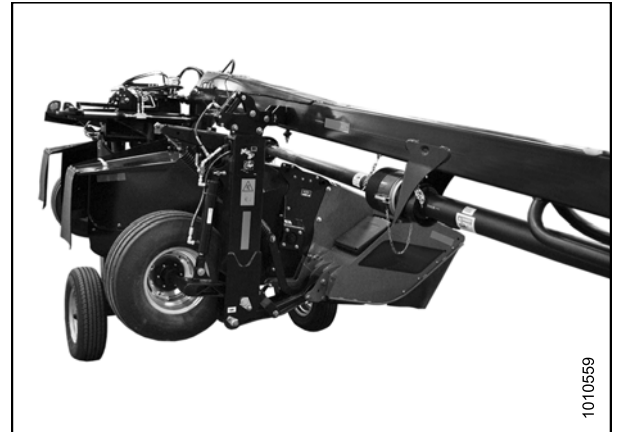


Figure 3.81: Road Friendly Transport™ System

Converting from Field to Transport Mode

⚠ DANGER

Do not convert the machine into, or from, transport mode until you are certain that all people, animals, and objects are clear of the unit's rotational range.

⚠ DANGER

Stop the power take-off (PTO) before converting the unit into transport mode. The cutting discs continue to spin after the drive is turned off.

⚠ WARNING

Ensure cutterbar doors are properly closed before converting the machine from field to transport mode to prevent equipment damage.

OPERATION

1. Start tractor if not running. Do **NOT** operate the mower conditioner.
2. Following the field to transport decal (A), move transport switch to the lower position (C) and ensure that light (B) is illuminated.



Figure 3.82: Remote Control

3. While light is illuminated, raise the mower conditioner fully.

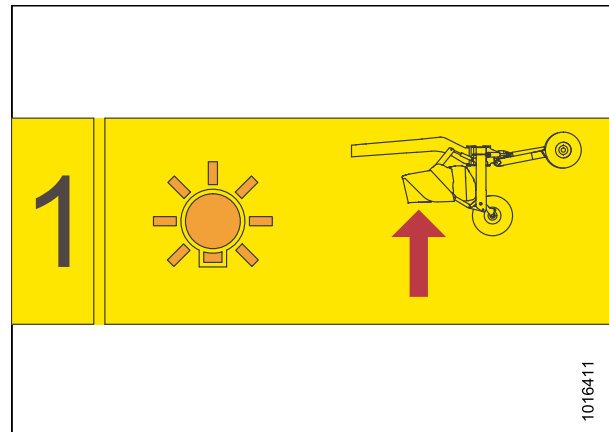


Figure 3.83: Raising Mower Conditioner

OPERATION

4. Operate the hitch swing control lever to rotate the mower conditioner to the right until cam bearing nut is aligned with the green section of the transport alignment gauge decal.

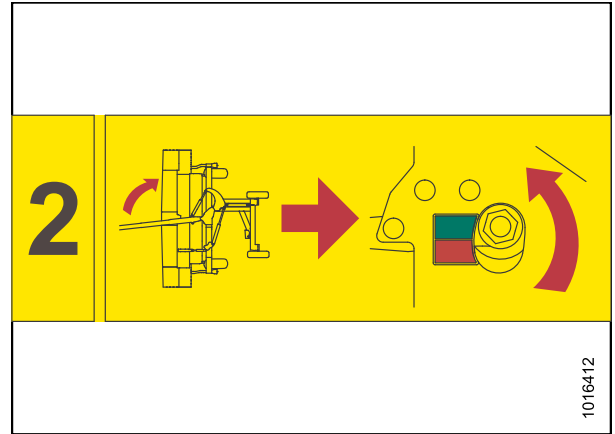


Figure 3.84: Mower Conditioner Rotation

5. Move transport switch to the upper position and ensure that the light is **NOT** illuminated. The hitch swing circuit is now deactivated and the transport circuit is active.

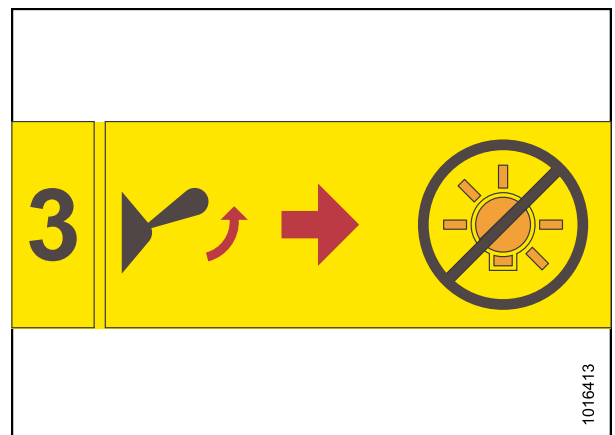


Figure 3.85: Transport Switch

6. Operate hitch swing control lever to lower transport wheels (A) and hold lever until mower conditioner is lifted off the ground.
7. Continue to hold the hitch swing control lever so that the mower conditioner (B) rotates to the left and under the hitch.
8. Release hitch swing control lever when mower conditioner (C) stops rotating.

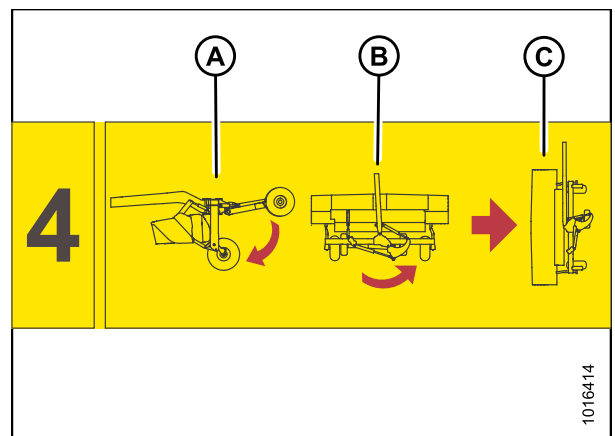


Figure 3.86: Transport Assembly Rotation

OPERATION

9. Operate the lift control lever to lower the mower conditioner onto the transport assembly, to raise the field wheels, and to engage transport latch onto hitch.

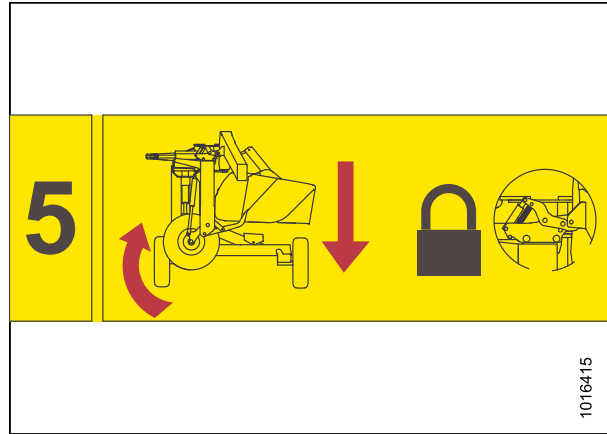


Figure 3.87: Transport Assembly Lowering

10. Operate the hitch swing control lever to ensure the carrier frame (A) and hitch (B) are locked together.
11. Activate the hazard lights (C) on the mower conditioner. Check that all lights are working.
12. Ensure that the slow moving vehicle sign (D) is visible from behind the mower conditioner.

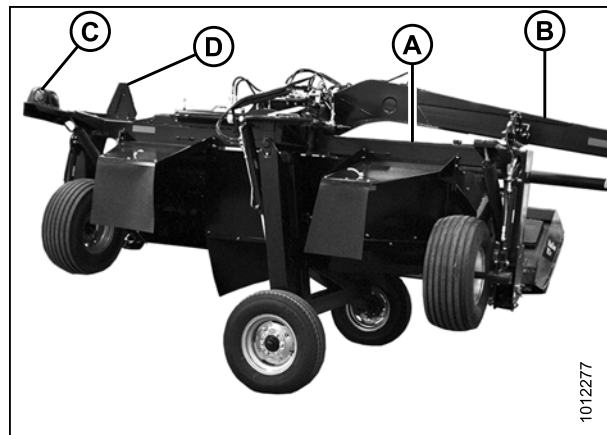


Figure 3.88: Transport Mode

OPERATION

- Once the field to transport conversion (A) is complete, leave the switch in the upper position (C). Ensure that light (B) is **NOT** illuminated.

To review the remote control decal, refer to [7.4 Converting Road Friendly Transport™ Decal](#), page 274.



Figure 3.89: Remote Control

Converting from Transport to Field Mode

⚠ DANGER

Do not convert the machine into, or from, transport mode until you are certain that all people, animals, and objects are clear of the unit's rotational range.

⚠ WARNING

Ensure cutterbar doors are properly closed before converting the machine from field to transport mode to prevent equipment damage.

OPERATION

1. Following the transport to field decal (A), move transport switch to the upper position (C) and ensure that light (B) is **NOT** illuminated.



Figure 3.90: Remote Control

2. While the light is **NOT** illuminated, operate the lift control lever (as if raising the mower conditioner) to fully extend the lift cylinders and raise the cutterbar off the transport assembly support. The carrier frame latch will automatically open.

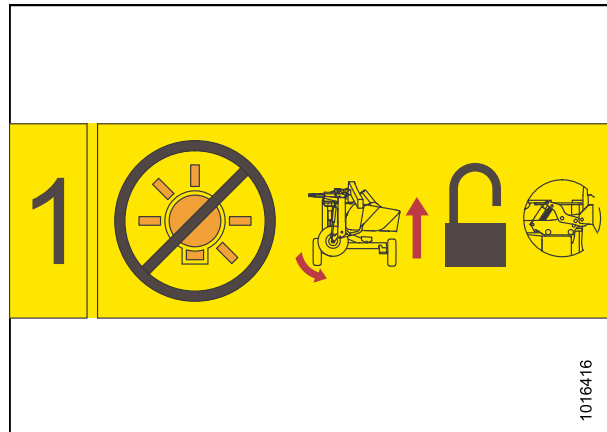


Figure 3.91: Raising Mower Conditioner

OPERATION

3. Operate the hitch swing control lever to rotate the mower conditioner to the right. The mower conditioner will stop when it reaches operating position.

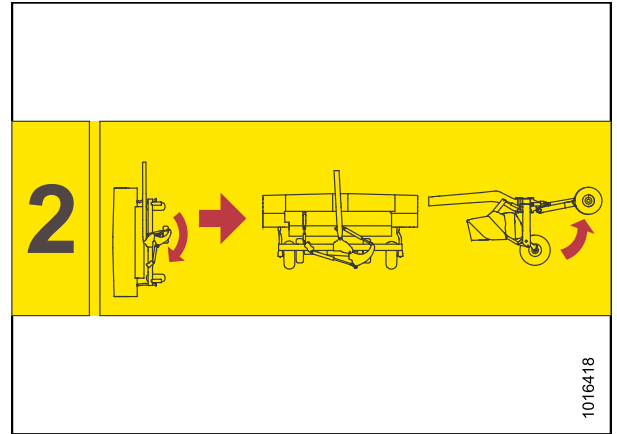


Figure 3.92: Mower Conditioner Rotation

4. Continue operating the hitch swing control lever to fully raise the transport assembly and lower the mower conditioner onto the field wheels.
5. Move transport switch to the lower position and ensure that the light on the remote control is illuminated. Transport conversion is now complete and the hitch swing circuit is active.

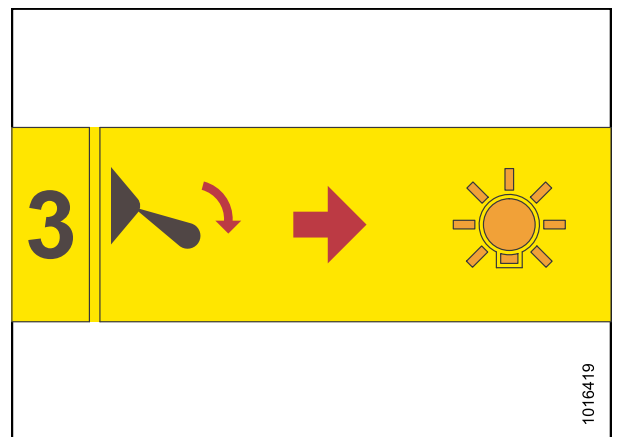


Figure 3.93: Transport Switch

OPERATION

6. Once the transport to field conversion (A) is complete, leave the switch in lower position (C). Ensure that light (B) is illuminated.

To review the remote control decal, refer to [7.4 Converting Road Friendly Transport™ Decal](#), page 274.



Figure 3.94: Remote Control

3.15 Operating the Mower Conditioner

Satisfactory operation of the mower conditioner in all situations requires making proper adjustments to suit various crops and conditions.

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

The variables listed in Table [3.8 Mower Conditioner Performance Variables, page 81](#) and detailed on the following pages will affect the performance of your mower conditioner. You will quickly become adept at adjusting your machine to produce the desired results. Although most of the adjustments have been set at the factory, the settings can be changed to suit your crop conditions.

Table 3.8 Mower Conditioner Performance Variables

Variable	Refer to
Mower Conditioner Float	3.15.1 Mower Conditioner Float, page 81
Mower Conditioner Angle	3.15.2 Cutterbar Angle, page 83
Cutting Height	3.15.3 Cutting Height, page 84
Ground Speed	3.15.4 Ground Speed, page 85
Conditioning: Roll Type	3.15.5 Conditioning: Roll Type, page 86
Conditioning: Finger Type	3.15.10 Conditioning: Finger-Type, page 94

3.15.1 Mower Conditioner Float

Mower conditioner float springs are normally set so a force of approximately 43–47 kg (95–105 lb.) is required to lift either end of the mower conditioner just off the ground when the hitch is centered.

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

NOTE:

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

Adjusting mower conditioner Float

The mower conditioner float setting (or lifting force) changes depending on the conditioner type and options. The setting must be equal at both ends of the mower conditioner. Follow these steps to adjust float:



WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine: stop engine, remove key, and engage lift cylinder lock-out valves before going under machine.

NOTE:

Changes to the mower conditioner operating position can affect the float settings. After adjusting cutting height or the cutting angle, check float and adjust as necessary.

OPERATION

1. Center the mower conditioner directly behind the tractor.

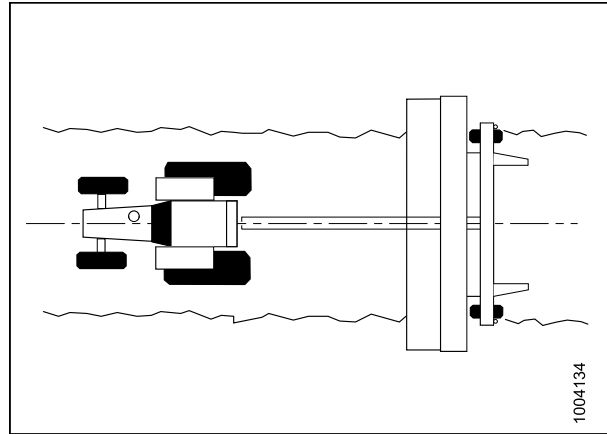


Figure 3.95: Mower Conditioner Centered behind Tractor

2. Raise the mower conditioner fully, shut off engine, and remove key.
3. Close the mower conditioner's lift cylinder lock-out valve (A) on each lift cylinder by turning the handle to the horizontal position.
4. Loosen jam nut (B) away from the spring.
5. Turn the adjuster bolt (C) to achieve the recommended measurement (D) for the conditioner type.
 - Turn bolt clockwise (towards spring) to increase float
 - Turn bolt counterclockwise (away from spring) to decrease float
6. Tighten jam nut (B) against spring.
7. Measure the length of exposed thread (D) on the float spring tension bolts. Refer to [Table 3.9 Starting Point Float Settings, page 82](#).
8. Repeat Steps [4., page 82](#) to [7., page 82](#) on the opposite side of the mower conditioner.
9. To check float, lower the header to cutting position, grasp the front corner of mower conditioner and lift; the weight should feel like 43–47 kg (95–105 lb.) at both ends.
10. Open the cylinder lock-out valve (A) on each lift cylinder by turning the handle to the vertical position.

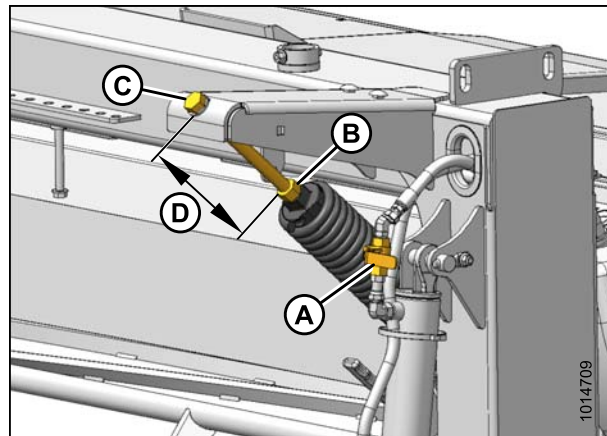


Figure 3.96: Lift Cylinder Lock-Out Valve, Jam Nut, and Adjuster Bolt

Table 3.9 Starting Point Float Settings

Header Size	Conditioner Type	Length of Exposed Thread
13 foot	No conditioner	280–290 mm (11–11-5/32 in.)
	Roll conditioner	120–130 mm (4-3/4–5-1/8 in.)
	Finger conditioner	Right side: 145–155 mm (5-3/4–6-1/8 in.)
		Left side: 15–125 mm (4-1/2–4-15/16 in.)

OPERATION

Header Size	Conditioner Type	Length of Exposed Thread
16 foot	No conditioner	230–240 mm (9–9-1/2 in.)
	Roll conditioner	70–80 mm (2-3/4–3-1/8 in.)
	Finger conditioner	Right side: 95–105 mm (3-3/4–4-1/8 in.)
		Left side: 65–75 mm (2-1/2–3 in.)

3.15.2 Cutterbar Angle

The cutterbar angle adjustment can range from 0–5 degrees below horizontal using the mechanical center-link and from 0–7 degrees below horizontal using the hydraulic center-link. Choose an angle that maximizes performance for your crop and field conditions. A flatter angle provides better clearance in stony conditions, whereas a steeper angle is required in down crops for better lifting action.

Adjusting Cutterbar Angle: Mechanical

DANGER

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

1. Lower mower conditioner so that cutterbar is resting on the ground.
2. Loosen nut (A).
3. Rotate the turnbuckle sleeve (B) so that the turnbuckle decreases in length in order to **decrease** (flatten) cutterbar angle.
4. Rotate the turnbuckle sleeve (B) so that the turnbuckle increases in length in order to **increase** (steepen) cutterbar angle.
5. Tighten nut (A) but do NOT overtighten. A slight tap with a small hammer is sufficient.
6. Check cutting height and adjust if required.
7. Check mower conditioner float and adjust if required. Refer to [3.15.1 Mower Conditioner Float, page 81](#).

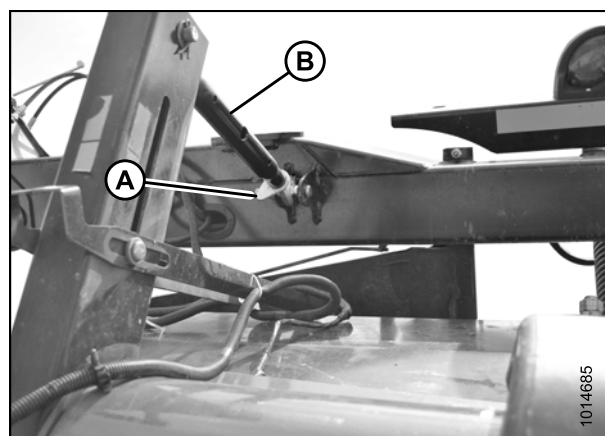


Figure 3.97: Mechanical Center-Link

OPERATION

Adjusting Cutterbar Angle: Hydraulic

NOTE:

The cutterbar angle can be adjusted from the tractor without shutting down the mower conditioner.

1. Operate the tractor hydraulic control so that cylinder (C) retracts and moves gauge (D) toward the green zone (A) in order to **decrease** (flatten) cutterbar angle.
2. Operate the tractor hydraulic control so that cylinder (C) extends and moves gauge (D) toward the red zone (B) in order to **increase** (steepen) cutterbar angle.

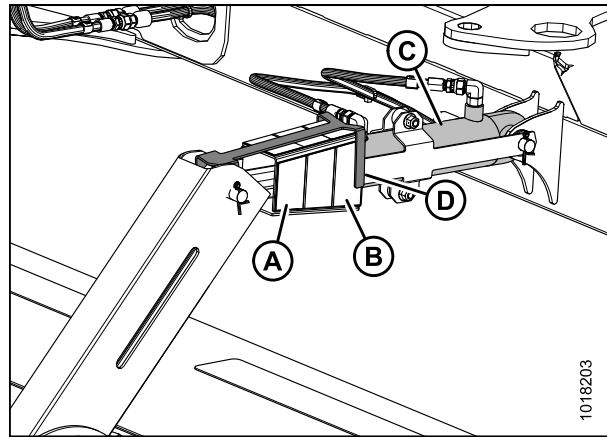


Figure 3.98: Hydraulic Center-Link

3.15.3 Cutting Height

Cutting height is determined by a combination of the cutterbar/mower conditioner angle and skid shoe settings. Adjust cutting height for optimum cutting performance while preventing excessive build-up of mud and soil inside the mower conditioner that can lead to poor crop flow and increased wear on cutting components.

To choose an angle that maximizes performance for your crop and field conditions, refer to [3.15.2 Cutterbar Angle, page 83](#).

- Lowering the skid shoes and decreasing mower conditioner angle increases the cutting height resulting in longer stubble lengths that helps material dry faster. This may be desirable in stony conditions to help reduce damage to cutting components.
- Raising the skid shoes and increasing mower conditioner angle decreases the cutting height resulting in a shorter stubble height.

To minimize cutterbar damage, scooping soil, or soil build-up at the cutterbar in damp conditions, mower conditioner float should be set as light as possible without causing excessive bouncing.

NOTE:

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

Adjusting Cutting Height

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

OPERATION

1. Raise mower conditioner fully, stop engine, and remove key.
2. Loosen bolts (C).
3. Remove bolts, nuts, and washers (D).
4. Raise or lower skid shoe.

NOTE:

Skid shoes have two adjustment settings: fully raised (A) or fully lowered (B).

5. Install bolts, nuts, and washers (D) and tighten.
6. Tighten bolts (C).

NOTE:

13-foot mower conditioners have one skid shoe per side. 16-foot mower conditioners have two skid shoes per side.

7. Check mower conditioner float. Refer to [Adjusting mower conditioner Float, page 81](#).
8. Adjust mower conditioner angle to desired working position using the mower conditioner angle controls. If angle is not critical, set it to mid-position. Refer to [3.15.2 Cutterbar Angle, page 83](#).

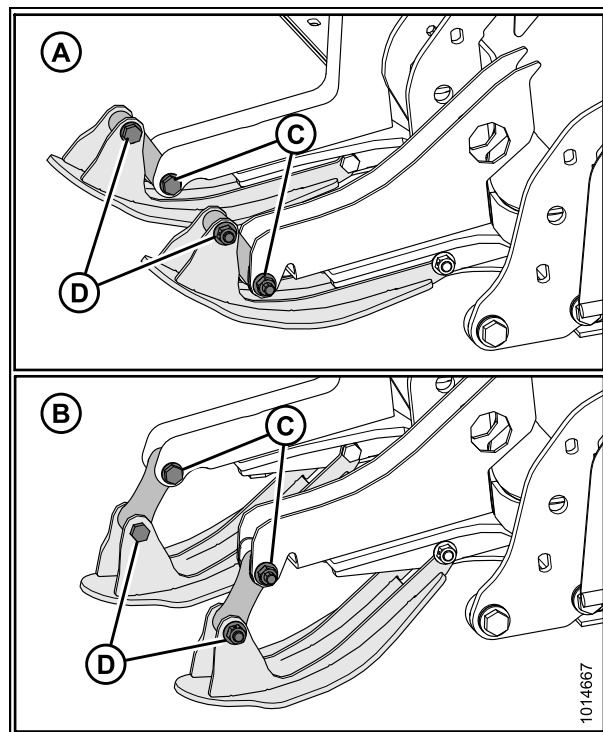


Figure 3.99: Skid Shoes (16-Foot Shown)

3.15.4 Ground Speed

Choose a ground speed that allows the cutterbar and conditioner to cut the crop smoothly and evenly. Try different combinations of mower conditioner speed and ground speed to suit your specific crop. Refer to your tractor operator's manual for changing ground speed.

CAUTION

Reduce speed when turning, crossing slopes, or travelling over rough ground.

In tough cutting conditions (such as native grasses), set the disc speed to MAXIMUM.

In light crops, reduce the mower conditioner's disc speed while maintaining ground speed.

NOTE:

Operating the mower conditioner at the minimum disc speed will extend the wear life of cutting components.

The example shown in [Figure 3.100: Ground Speed for 13-Foot Mower Conditioner, page 86](#) illustrates the relationship between ground speed and area cut for a 13-foot mower conditioner. The chart demonstrates that a ground speed of 21 km/h (13 mph) would produce an area cut of approximately 8 hectares (20 acres) per hour.

OPERATION

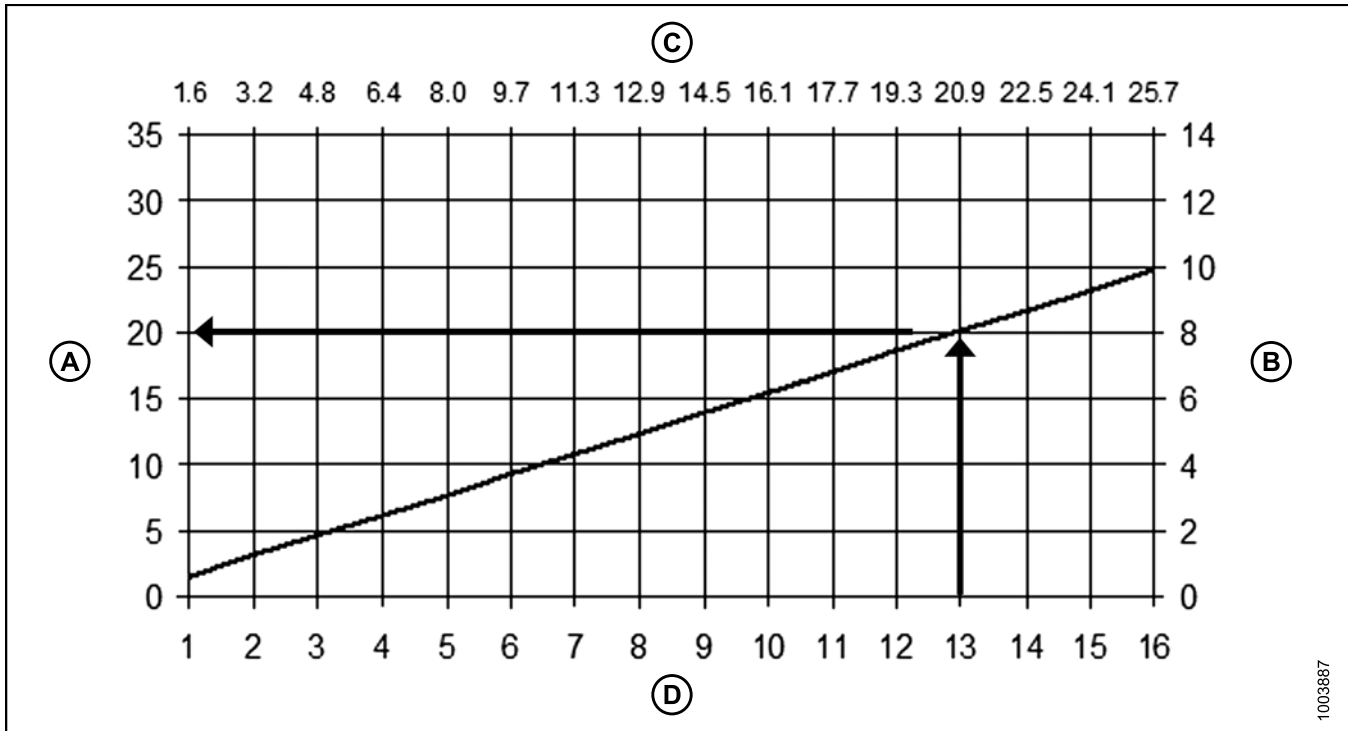


Figure 3.100: Ground Speed for 13-Foot Mower Conditioner

A - Acres/Hour

B - Hectares/Hour

C - Kilometers/Hour

D - Miles/Hour

3.15.5 Conditioning: Roll Type

Rolls condition the crop by crimping and crushing the stem in several places allowing the release of moisture resulting in faster drying times. Both steel and polyurethane conditioner rolls are available.

3.15.6 Roll Gap

The degree to which the crop is conditioned as it passes through the rolls is controlled by the roll gap which is factory-set at 6 mm (1/4 in.) for steel rolls, and approximately 3 mm (1/8 in.) for polyurethane rolls.

Correct conditioning of alfalfa, clover, and other legumes is achieved when 90% of the stems show cracking, but no more than 5% of the leaves are damaged. Set roll gap to produce these results. Polyurethane rolls are better suited for crushing stems while providing less crimping and are recommended for these types of crops.

A larger gap (up to 25 mm [1 in.]) may be desirable in thick stemmed cane-type crops; however, too large a gap may cause feeding problems. Steel rolls are recommended for these types of situations.

Grass type crops may require less gap for proper feeding and conditioning.

IMPORTANT:

If using settings below the factory setting, visually inspect the roll gap.

OPERATION

Checking Roll Gap: Polyurethane Rolls

DANGER

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

1. Lower mower conditioner fully.
2. Stop engine and remove key.
3. Insert a feeler gauge through the inspection hole in the conditioner endsheet to check roll gap on **polyurethane** roll conditioners.

NOTE:

For information about roll gap on **steel** roll conditioners, refer to [Adjusting Roll Gap: Steel Rolls, page 87](#).

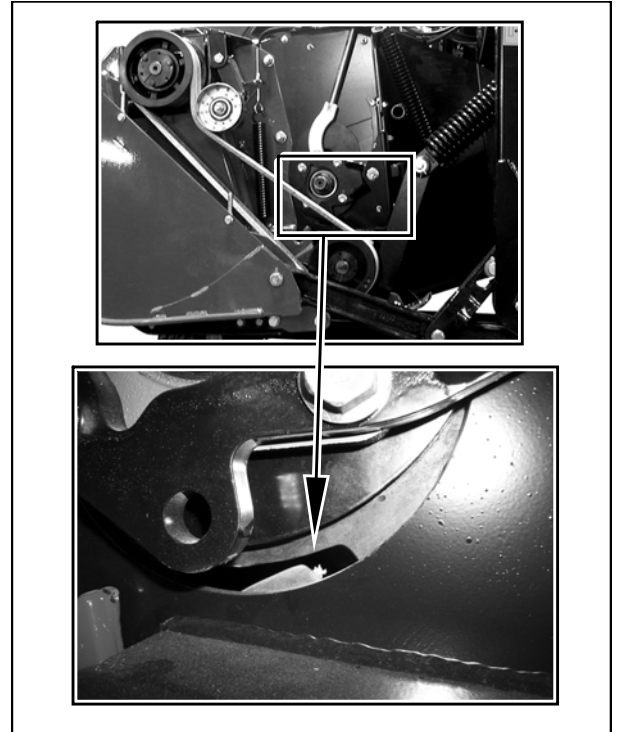


Figure 3.101: Polyurethane Roll Conditioner

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 roll gap is at the factory setting, follow the procedure below.

DANGER

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

1. Lower mower conditioner fully.
2. Stop engine and remove key.

OPERATION

3. Loosen upper jam nut (A) on both sides of conditioner.
4. Turn lower nut (B) counterclockwise until upper roll rests on lower roll. Ensure both 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 header.

NOTE:

Make further adjustments to roll gap based on mower performance and crop conditions.

7. If further adjustment to roll gap is required:
 - Turn lower nut (B) clockwise to increase roll gap.
 - Turn lower nut (B) counterclockwise to decrease roll gap.

IMPORTANT:

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

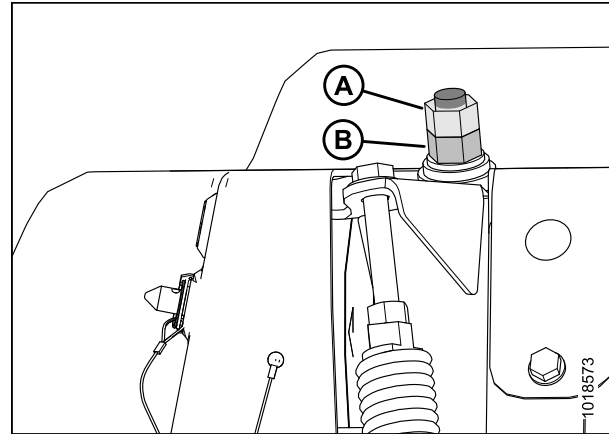


Figure 3.102: Jam Nut, Adjusting Nut, and Roll Gap

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. To return roll gap to the factory setting, follow the procedure below.

DANGER

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

1. Lower mower conditioner fully.
2. Stop engine and remove key.

OPERATION

3. Loosen upper jam nut (A) on both sides of conditioner.
4. Turn lower nut (B) counterclockwise until upper roll rests on lower roll. Ensure both rolls intermesh.
5. Turn lower nut (B) two full turns 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 header.
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 (5/64 in.) and no more than 4 mm (5/32 in.).
8. If further adjustment to roll gap is required:
 - Turn lower nut (B) clockwise to increase roll gap.
 - Turn lower nut (B) counterclockwise to decrease roll gap.

IMPORTANT:

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

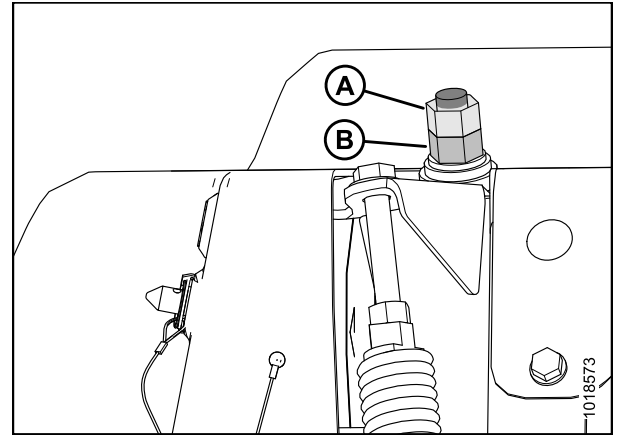


Figure 3.103: Jam Nut, Adjusting Nut, and Roll Gap

3.15.7 Roll Tension

Roll tension (the pressure holding the rolls together) is factory-set to maximum and is adjustable.

Heavy crops or tough forage can cause the rolls to separate; therefore, maximum roll tension is required to ensure that materials are sufficiently crimped.

To prevent over-conditioning of light alfalfa and short grasses, apply less roll tension.

Adjusting Roll Tension

Roll tension is factory-set to maximum and can be adjusted as follows:

⚠ DANGER

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

OPERATION

1. Lower mower conditioner fully.
2. Stop engine and remove key.
3. Loosen jam nut (A) on both sides of conditioner.
4. Turn the spring drawbolt (B) clockwise to tighten spring (C) and **increase** roll tension.
5. Turn the spring drawbolt (B) counterclockwise to loosen spring (C) and **decrease** roll tension.
6. Measure the amount of exposed thread on the spring drawbolt (B) at each end of the conditioner. The measurement (D) should be 12–15 mm (1/2–9/16 in.) for both polyurethane and steel roll conditioners.

IMPORTANT:

Turn each bolt equal amounts. Each turn of the bolt changes the roll tension by approximately 32 N (7.2 lbf).

7. Tighten jam nuts (A) on both sides.

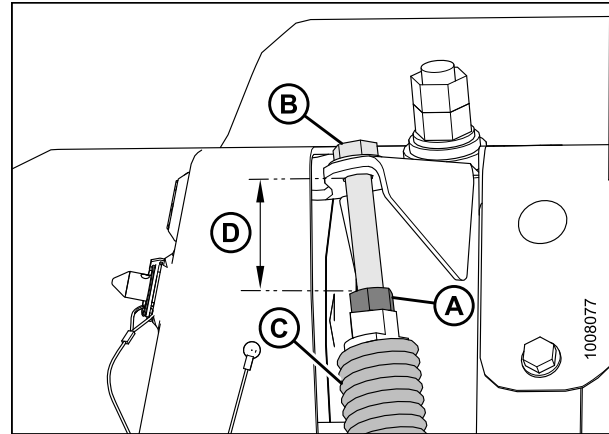


Figure 3.104: Left Side Shown – Right Side Opposite

3.15.8 Roll Timing

For proper conditioning, the rolls must be properly timed with the bar on one roll centered between two bars on the other roll. The factory setting should be suitable for most crop conditions.

IMPORTANT:

Roll timing on is critical when the roll gap is decreased because conditioning is affected, and the bars may contact each other.

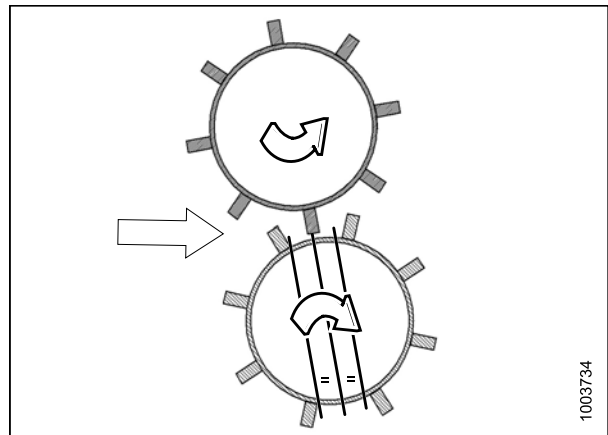


Figure 3.105: Properly Timed Rolls

Checking Roll Timing

Roll timing should be checked if there is excessive noise coming from the conditioner rolls.

DANGER

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

Roll timing is factory set and should not require adjustment. If there is excessive noise being generated from the conditioner, the roll timing will need to be adjusted. Refer to [Adjusting Roll Timing, page 91](#).

OPERATION

Adjusting Roll Timing

1. Loosen four bolts (A) in slots of yoke plate (B) on upper roll universal shaft.

NOTE:

Only three bolts shown in the illustration.

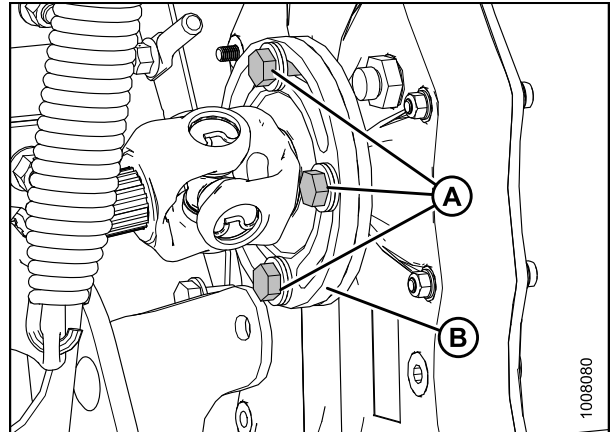


Figure 3.106: Bolts in Slots of Yoke Plate

2. Secure bottom roll (A).
3. Manually rotate the upper roll (B) in a counterclockwise direction until it stops.
4. Make a mark (C) across the yoke (D) and gearbox (E) flange.

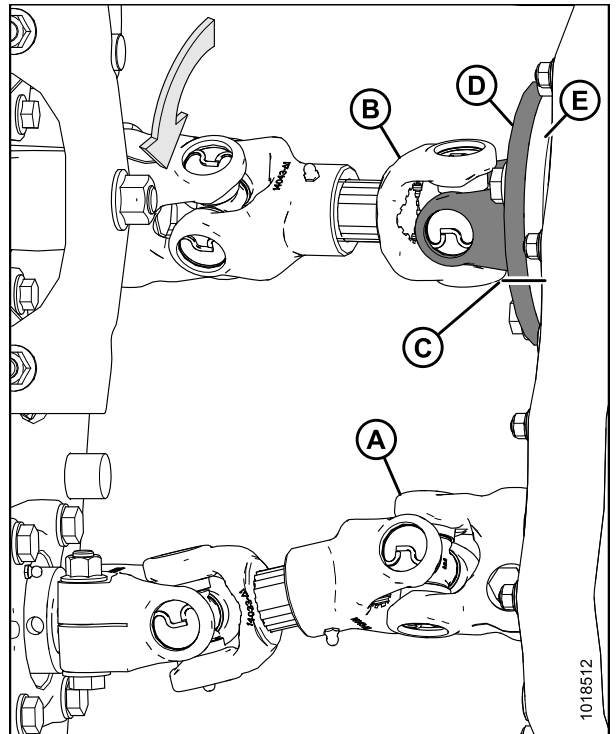


Figure 3.107: Roller Rotation

OPERATION

5. Manually rotate upper roll (A) in a clockwise direction until it stops. Make a second mark (B) on the yoke flange, align it with the mark on the gearbox flange.

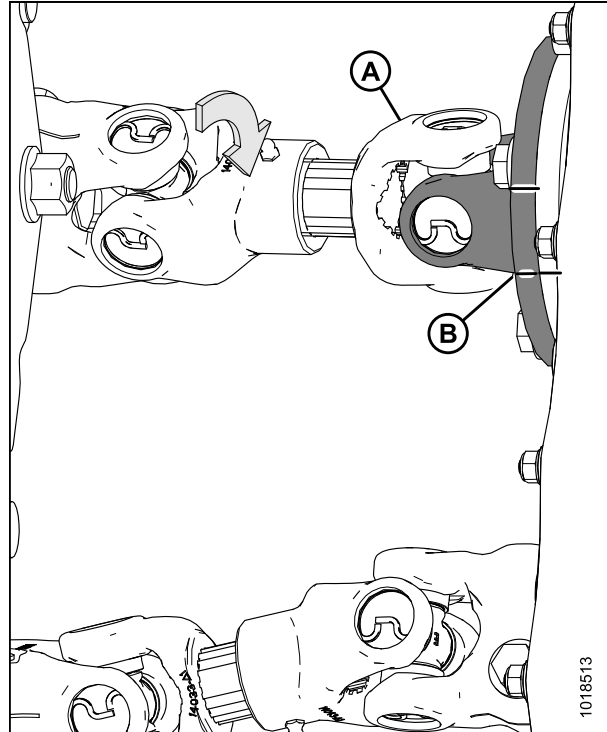


Figure 3.108: Roller Rotation

6. Determine the center point (A) between the two marks on the yoke plate and place a third mark.
7. Rotate the upper roll (B) in the counterclockwise direction until the bolt lines up with the third (center) mark.

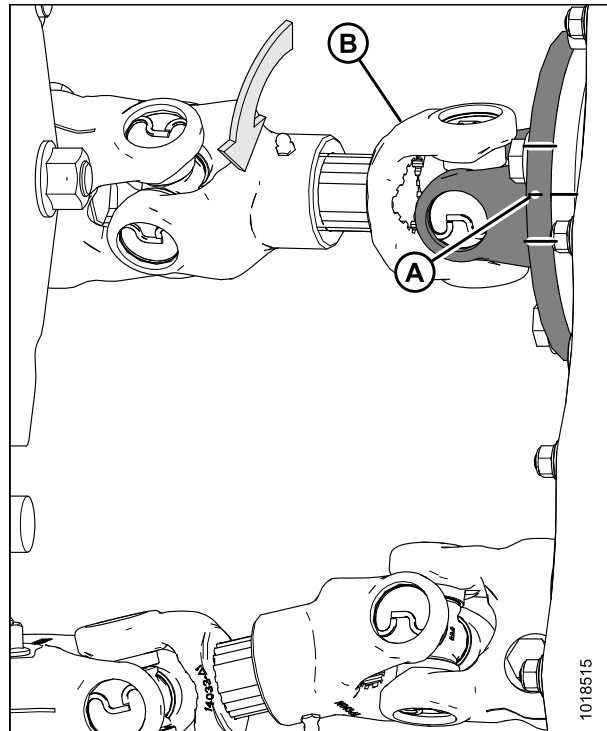


Figure 3.109: Roller Rotation

OPERATION

8. Ensure threads on bolts (A) are clean and free of lubricant.
9. Apply Loctite® Blue, and tighten bolts (A) to secure the position. Torque to 95 N·m (70 ft·lbf).

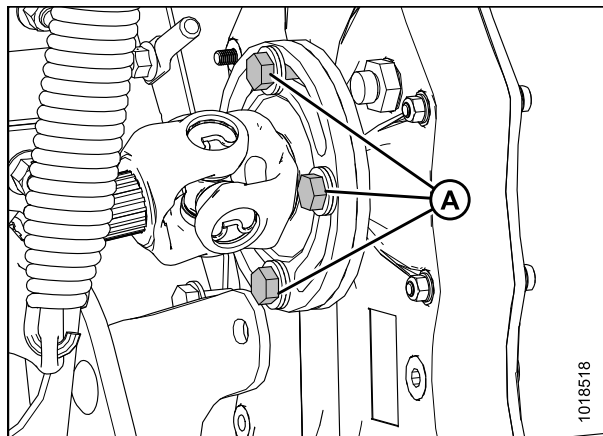


Figure 3.110: Bolts in Slots of Yoke Plate

3.15.9 Forming Shields: Roll Conditioner

WARNING

Keep everyone several hundred feet away from your operation. Ensure bystanders are never in line with the front or rear of the machine. Stones or other foreign objects can be ejected from either end with force.

A wider windrow will generally dry faster and more evenly resulting in less protein loss. Fast drying is especially important in areas where the weather allows only a few days to cut and bale. A narrower windrow may be preferable for ease of pick-up and when drying is not critical (for example, when cutting for silage or green-feed).

The position of the forming shields controls the width and placement of the windrow. Deciding which forming shield position to use is based on the following factors:

- Weather conditions (rain, sun, humidity, wind)
- Type and yield of crop
- Available drying time
- Method of processing (bales, silage, green-feed)

Positioning Side Deflectors: Roll Conditioner

The position of the side deflectors controls the width and placement of the windrow. To ensure windrow placement is centered with respect to the carrier wheels, set both side deflectors to the same position.

DANGER

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

OPERATION

1. Loosen the locking handle (A).
2. Slide the adjuster bar (B) along adjuster plate (C) to the desired deflector position and engage the bar (B) into a notch in the adjuster plate.
3. Tighten locking handle (A).
4. Repeat for other side.

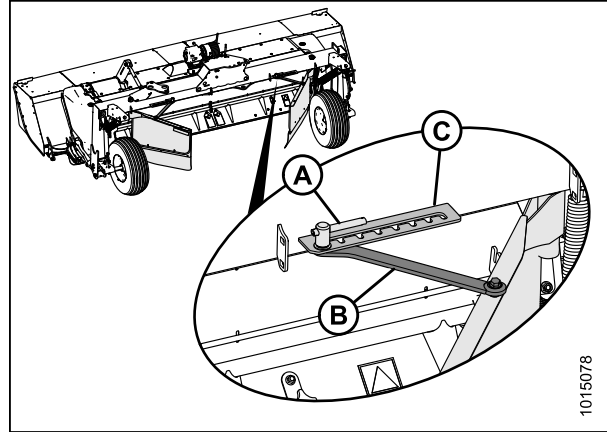


Figure 3.111: Side Deflector and Adjuster Bar

Positioning Rear Baffle: Roll Conditioner

DANGER

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

The rear baffle primarily determines the height of the windrow, but can also affect the width. It is located immediately behind and above the conditioning rolls and can be positioned to do the following:

- Direct the crop flow into the forming shield for narrow and moderate width windrows
- Direct crop downward to form a wide swath
- Assist with even material distribution across windrows by using adjustable crop fins mounted to the rear baffle

1. Remove lynch pin (A) securing rear baffle adjustment lever (B) to bracket (C).
2. Pull rear baffle adjustment lever (B) in inboard direction to disengage from bracket (C).
3. Position rear baffle adjustment lever (B) as follows:
 - Move lever forward to **raise** baffle
 - Move lever backward to **lower** baffle
4. Release rear baffle adjustment lever (B) so that tab engages hole in bracket (C).
5. Secure baffle adjustment with lynch pin (A).

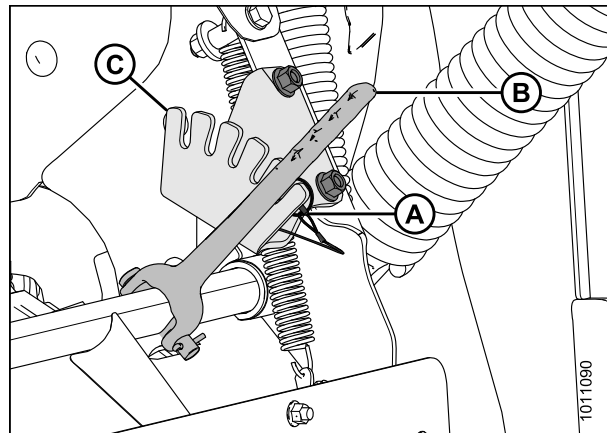


Figure 3.112: Right Side of Conditioner

3.15.10 Conditioning: Finger-Type

The finger type conditioner is most commonly used to harvest grass crops. The finger type rotor moves the crop across the conditioning baffle which strips away the waxy coating from the plants.

The degree to which the crop is conditioned as it passes through the conditioner is controlled by the clearance between the finger and the internal intensity baffle and by the rotational speed of the fingers (refer to [Changing Finger Rotor Speed, page 95](#)).

OPERATION

Internal Intensity Baffle

Conditioning intensity is controlled by adjusting clearance (X) between the rotor and the baffle.

There are seven clearance positions from 8–71 mm (5/16–2-3/4 in.). The setting chosen depends on crop volume and the desired level of conditioning.

The highest clearance setting is recommended for heavy crops, and the lowest clearance setting should be used for maximum conditioning in average crops.

The baffle is located immediately in front of and above the finger rotor and can be positioned as follows:

- To reduce clearance for more conditioning.
- To increase clearance for less conditioning.

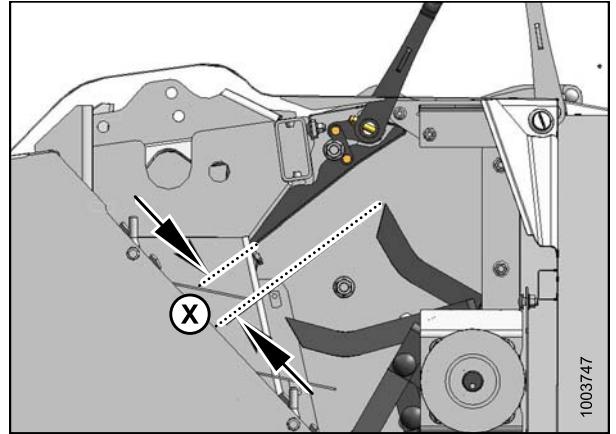


Figure 3.113: Internal Intensity Baffle

Adjusting Internal Intensity Baffle Clearance

DANGER

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

1. Pull internal intensity baffle adjustment lever (A) in the outboard direction to disengage tab from adjustment plate (B).
2. Move lever (A) forward to **lower** baffle and decrease clearance.
3. Move lever (A) rearward to **raise** baffle and increase clearance.
4. Release internal intensity baffle adjustment lever (A) so that tab engages hole in adjustment plate (B).

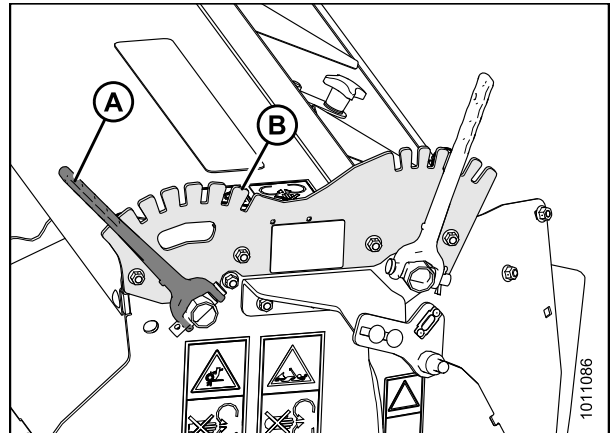


Figure 3.114: Internal Intensity Baffle Adjustment Lever

Finger Rotor Speed

The finger rotor is set to 900 rpm at the factory, but it can be changed to 600 rpm depending on crop conditions, crop volume, and the desired amount of conditioning.

In sensitive crops, 600 rpm may be a suitable speed to minimize crop damage. In light crops and dry grasses, 900 rpm may be a more effective speed. At 900 rpm, crop damage can occur and power consumption will increase.

Changing Finger Rotor Speed

DANGER

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

OPERATION

NOTE:

For **900 rpm**, mount the larger pulley to the conditioner drive gearbox and the smaller pulley to the input shaft of the conditioner assembly.

For **600 rpm**, mount the smaller pulley to the conditioner drive gearbox, and the larger pulley to the input shaft of the conditioner assembly.

1. Turn jam nut (A) counterclockwise to unlock tension adjustment.
2. Turn jam nut (A) and adjuster nut (B) counterclockwise to fully collapse tensioner spring (C) and release the tension from conditioner drive belt (D).
3. Remove drive belt (D).

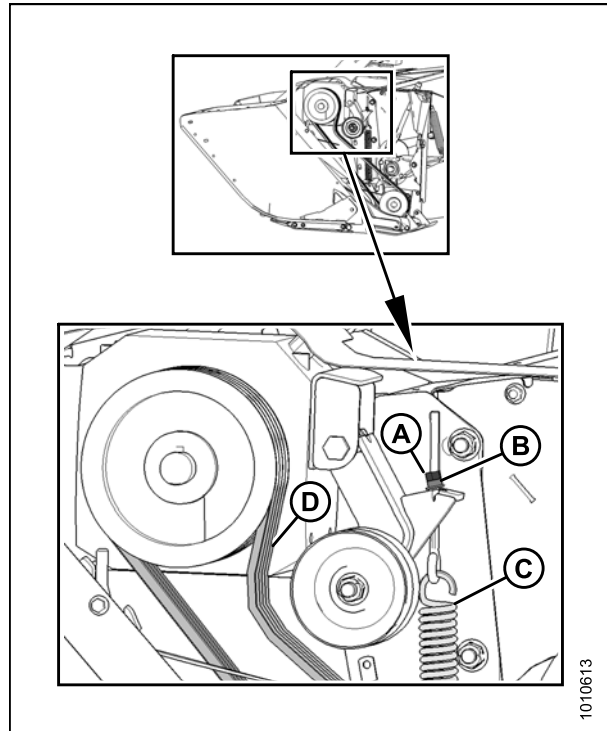


Figure 3.115: Drive Belt and Pulleys on Left Side of Conditioner

4. Measure and record the distance from the shaft end to the taper lock bushing face (A) on both pulleys.
5. Remove three bolts (B) and insert them into the three threaded bores.
6. Apply uniform pressure to the taper lock bushing by slightly tightening each bolt in a circular pattern until the taper lock bushing comes free.
7. Repeat Step 5., [page 96](#) and Step 6., [page 96](#) on the second pulley.
8. Swap the pulleys.

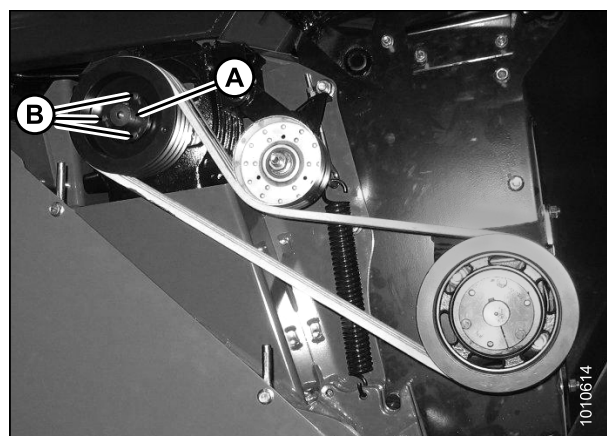


Figure 3.116: Drive Belt and Pulleys on Left Side of Conditioner

OPERATION

9. Slip the taper lock bushing (A) onto the shaft at the same depth measurement recorded in Step 4., page 96. Pulley will be drawn into taper lock when tightening.
10. Repeat Step 9., page 97 for the second pulley.
11. Verify pulley face alignment by using a long straight edge (verified straight), and bridge both faces to a tolerance of 5 mm (3/16 in.).

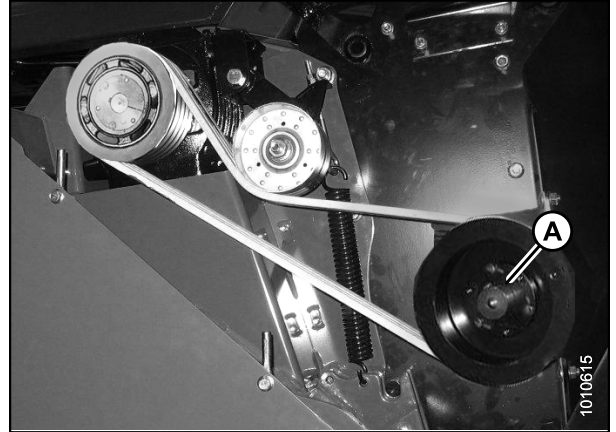


Figure 3.117: Drive Belt and Pulleys on Left Side of Conditioner

12. Install drive belts (A).
13. Remove jam nut (B).
14. Turn adjuster nut (C) to remove all slack from tensioner.

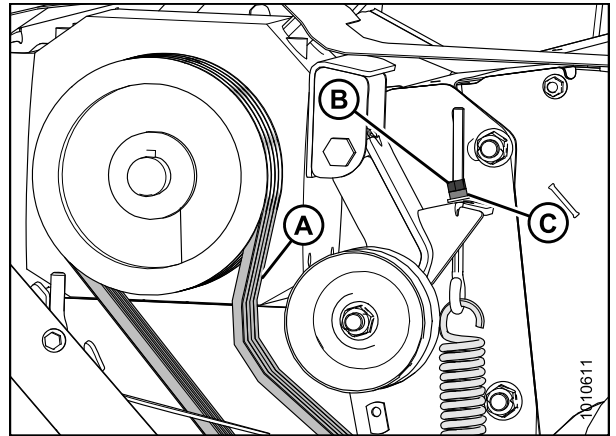


Figure 3.118: Jam Nut and Adjuster Nut on Left Side of Conditioner

OPERATION

15. Measure the length of tensioner spring (A), and turn adjuster nut (B) to adjust spring length to 36.5 cm (14-3/8 in.) to conform with spring tension decal (C).

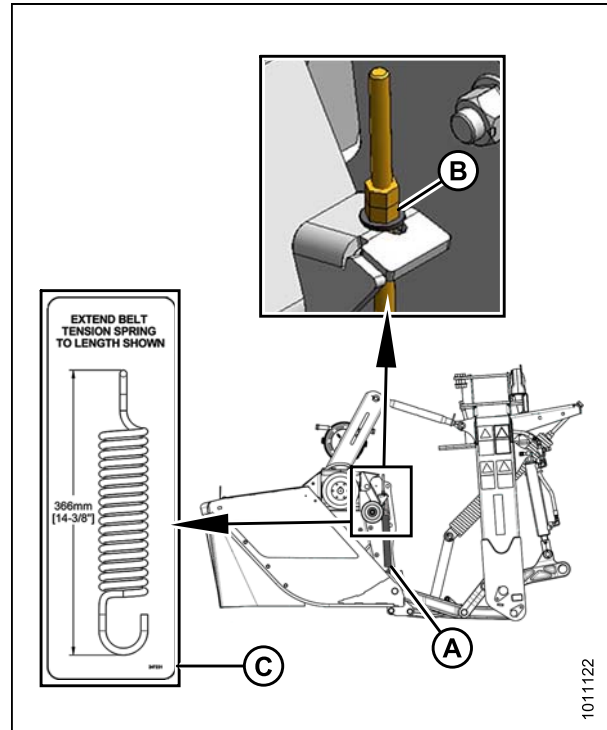


Figure 3.119: Spring Tension Decal

16. Install jam nut (A).
17. Hold a wrench on adjuster nut (B) and turn jam nut (A) clockwise into adjuster nut to lock tension adjustment.
18. Verify that pulleys run true and if any of the pulleys wobble, proceed to Step 1., page 96 and repeat procedure to reinstall taper locks on the affected pulleys.

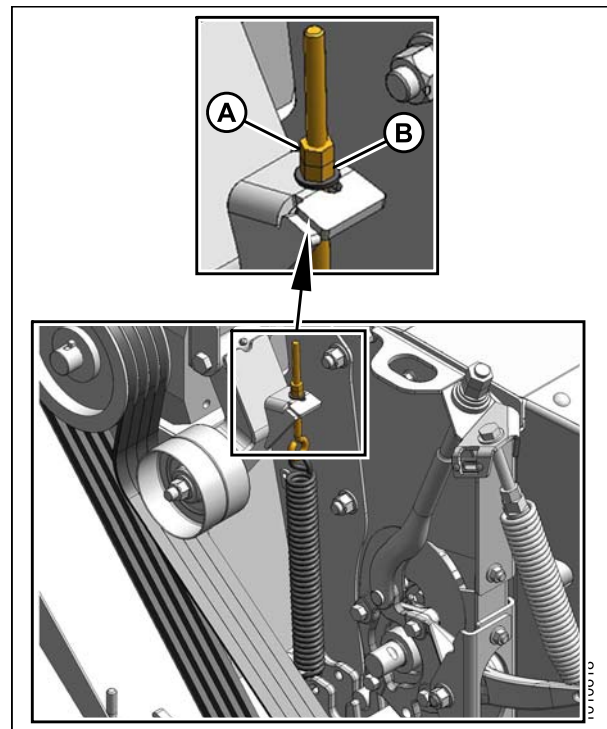


Figure 3.120: Conditioner Drive

OPERATION

Forming Shields: Finger Conditioner

The position of the forming shields controls the width and placement of the windrow. Deciding which forming shield position to use is based on the following factors:

- Weather conditions (rain, sun, humidity, wind)
- Type and yield of crop
- Available drying time
- Method of processing (bales, silage, green-feed)

A wider windrow will generally dry faster and more evenly resulting in less protein loss. Fast drying is especially important in areas where the weather allows only a few days to cut and bale. For more information, refer to [3.16 Haying Tips, page 105](#).

A narrower windrow may be preferable for ease of pick-up and when drying is not critical (for example, when cutting for silage or green-feed).

Positioning Side Deflectors: Finger Conditioner

DANGER

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

The position of the side deflectors controls the width and placement of the windrow. To ensure windrow placement is centered with respect to the carrier wheels, adjust both side deflectors to the same position.

1. Loosen handle (A) on top cover.
2. Move side deflector (B) to desired position.
3. Tighten the handle.
4. Repeat for other side.

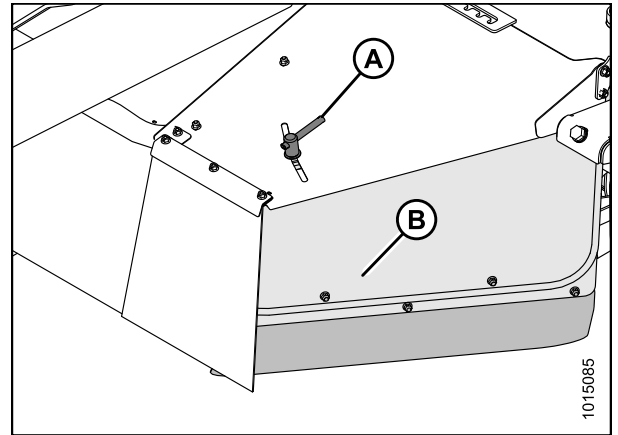


Figure 3.121: Right Side Shown – Left Side Opposite

Positioning Rear Baffle: Finger Conditioner

DANGER

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

OPERATION

The rear baffle (A) is located immediately behind and above the finger conditioner. The baffle (A) can be used to direct crop into the forming shields for narrow and moderate width windrows or to direct crop downward to form a wide swath.

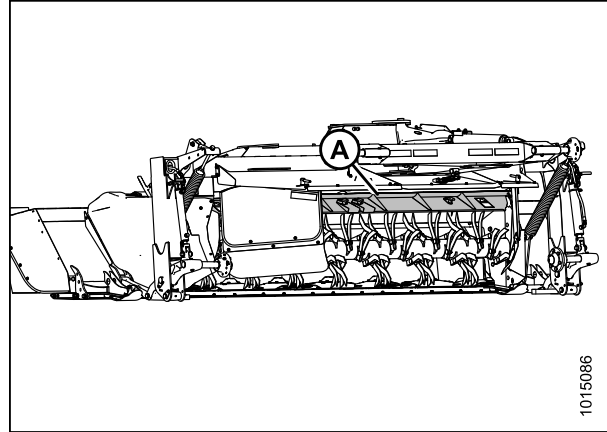


Figure 3.122: Rear Baffle Finger Conditioner

1. Pull rear baffle adjustment lever (A) in the outboard direction to disengage tab from adjustment plate (B).
2. Position rear baffle adjustment lever (A) as follows:
 - a. To raise baffle, move lever forward.
 - b. To lower baffle, move lever backward.
3. Release rear baffle adjustment lever (A) so that tab engages hole in adjustment plate (B).

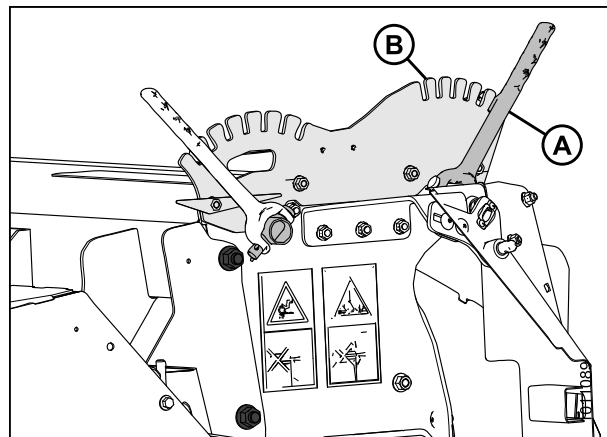


Figure 3.123: Rear Baffle Adjustment Lever

3.15.11 Cutterbar Deflectors

Cutterbar deflectors attach to the cutterbar just below the conditioner rolls and provide improved feeding into the conditioner rollers by preventing crop from feeding under the rolls when cutting heavy crops with long stems. Cutterbar deflectors may not be well-suited for all environments, such as sandy conditions, and are easily removed or installed in the field.

Removing Cutterbar Deflectors

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

OPERATION

1. Raise mower conditioner fully, shut down tractor, and remove key from ignition.
2. Close lift cylinder lock-out valves.
3. Clean debris from deflectors and deflector area.

IMPORTANT:

Do **NOT** remove plug (B).

4. Remove three bolts (C) securing deflector (A) to cutterbar using an 8 mm hex key and a 16 mm socket and remove deflector.
5. Repeat for other deflector.
6. Store deflectors and hardware in a safe place.

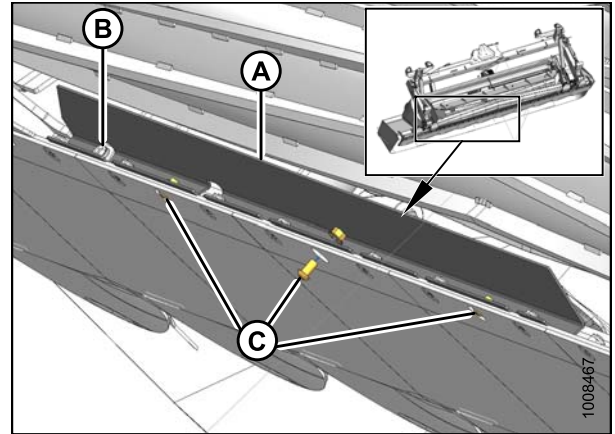


Figure 3.124: Left Cutterbar Deflector Viewed from Underside of Cutterbar

Installing Cutterbar Deflectors

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

1. Raise mower conditioner fully, shut down tractor, and remove key from ignition.
2. Close lift cylinder lock-out valves.
3. Clean debris from ledge and the six mounting holes along aft edge of cutterbar.
4. Position left deflector (A) (with cut-out for cutterbar drain plug [B]) on top of ledge along the aft end of the cutterbar, and align existing fasteners and cutterbar plug with slots in deflector (A).
5. Install three button hex head socket M10 bolts (C) with lock nuts in the holes with the heads facing down.

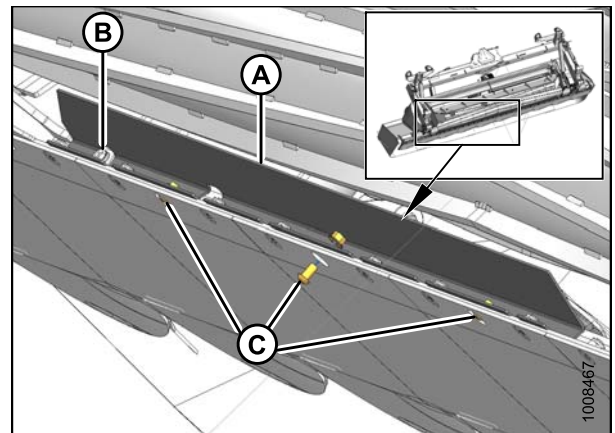


Figure 3.125: Left Cutterbar Deflector Viewed from Underside of Cutterbar

OPERATION

- Repeat Steps [3., page 101](#) through Step [5., page 101](#) to install right deflector (A).
- Align deflectors at position (B) and tighten bolts (C) to specified torque with a 16 mm socket and an 8 mm hex key.

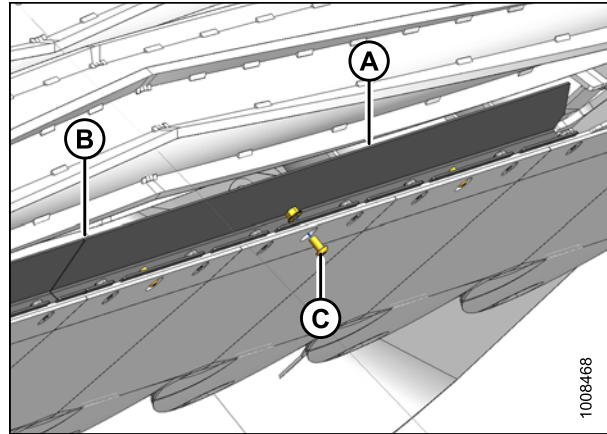


Figure 3.126: Right Cutterbar Deflector Viewed from Underside of Cutterbar

3.15.12 Tall Crop Divider Option

Removing Tall Crop Divider

⚠ DANGER

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

- Lower mower conditioner fully, shut down tractor and mower conditioner, and remove key.
- Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

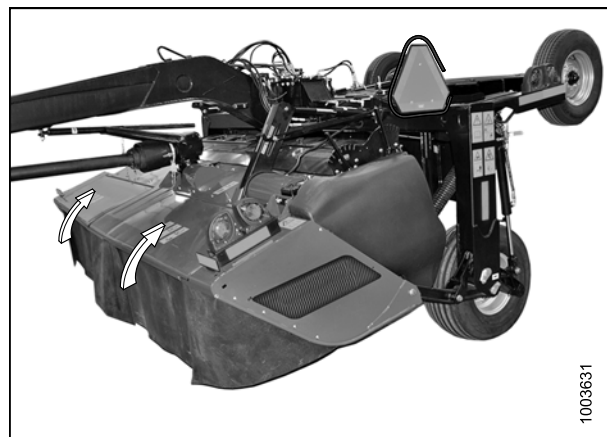


Figure 3.127: Cutterbar Doors

OPERATION

3. Remove three bolts (A), and remove deflector (B).
4. Reinstall three bolts (A).
5. Repeat for opposite side.
6. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

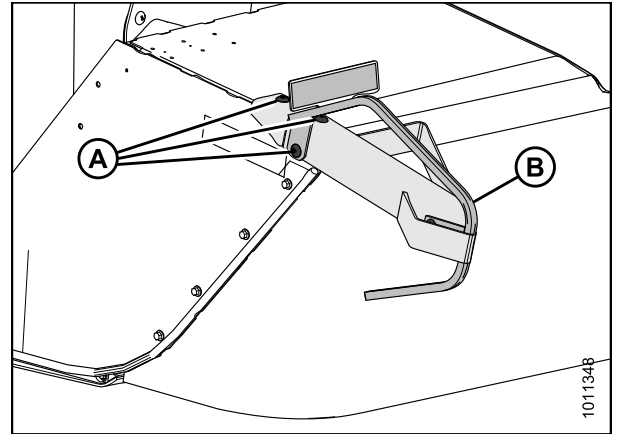


Figure 3.128: Deflector and Hardware

OPERATION

Installing Tall Crop Divider

DANGER

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

IMPORTANT:

If mower conditioner will be transported on public roads in the Road Friendly Transport™ mode, do not install the tall crop dividers. Keep these instructions and install the dividers after the machine is delivered to the customer.

1. Lower the mower conditioner fully.
2. Shut down the tractor and mower conditioner and remove key.
3. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

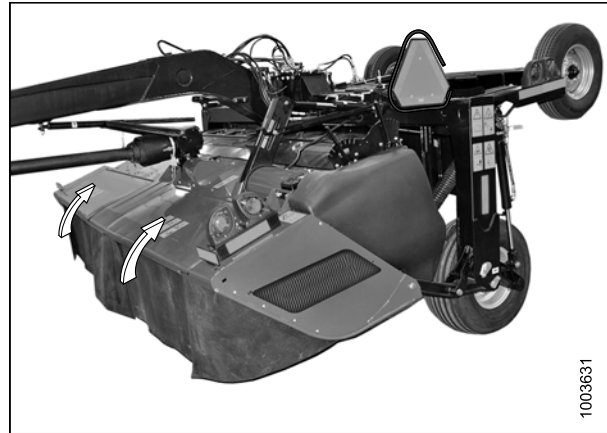


Figure 3.129: Cutterbar Doors

4. Remove three bolts (A) and nuts where the divider (B) will be mounted.
5. Position the divider (B) on mower conditioner, and reinstall three bolts (A) and nuts. Tighten nuts.
6. Repeat for opposite side.
7. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors, page 38](#).

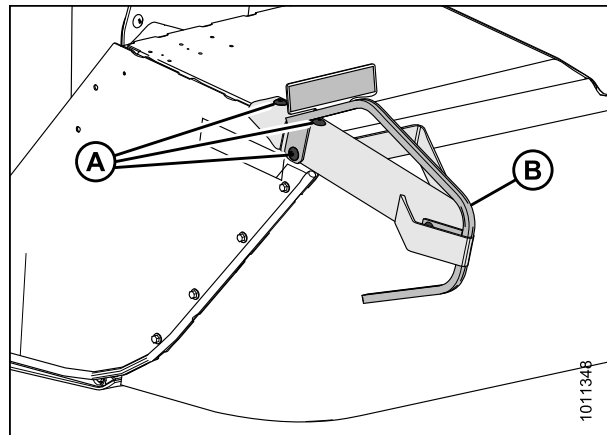


Figure 3.130: Divider and Hardware

3.16 Haying Tips

3.16.1 Curing

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

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

3.16.2 Topsoil Moisture

Table 3.10 Topsoil Moisture Levels

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

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

3.16.3 Weather and Topography

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

3.16.4 Windrow Characteristics

Producing windrows with the recommended characteristics will achieve the greatest results. Refer to [3.15 Operating the Mower Conditioner, page 81](#) for instructions on adjusting the mower conditioner.

OPERATION

Table 3.11 Recommended Windrow Characteristics

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

3.16.5 Driving on Windrow

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

NOTE:

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

3.16.6 Raking and Tedding

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

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

3.16.7 Using Chemical Drying Agents

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

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

3.17 Leveling the Mower Conditioner

The support linkages are factory-set to provide the proper level for the mower conditioner and should not normally require adjustment. The float springs are **NOT** used to level the mower conditioner.

If the mower conditioner is **NOT** level, check the tire pressure and ensure proper inflation. Refer to [Inflating Tires, page 223](#).

Component damage in the mower conditioner support system may occur if the mower conditioner cannot be leveled. Contact your MacDon Dealer.

3.18 Unplugging the Mower Conditioner

⚠ DANGER

To avoid bodily injury or death from unexpected startup of machine, always stop tractor engine and remove key before removing plugged material from mower conditioner.

1. Stop forward movement of the tractor and stop the power take-off (PTO).
2. Raise the mower conditioner fully, shut down the tractor engine, and remove the key.
3. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).

⚠ WARNING

Wear heavy gloves when working around cutterbar.

4. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).
5. Clean off cutterbar or rolls by hand.

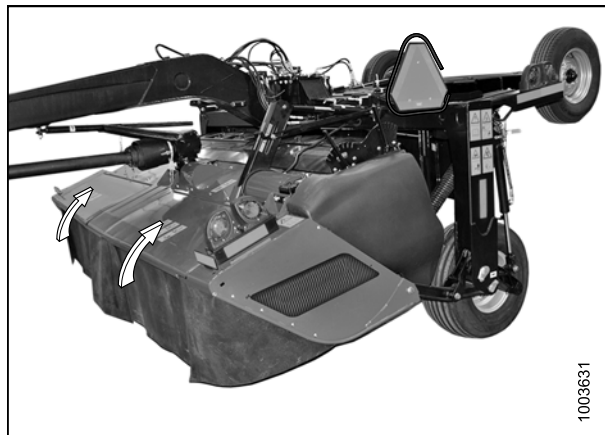


Figure 3.131: Cutterbar Doors

4 Maintenance and Servicing

The following instructions provide information about routine mower conditioner service. Detailed maintenance and service information is contained in the technical manual that is available from your Dealer. A parts catalog is located in a plastic case at the right end of the mower conditioner.

Log hours of operation and use the maintenance record provided (refer to [4.3.1 Maintenance Schedule/Record, page 113](#)) to keep track of your scheduled maintenance.

4.1 Preparing Machine for Servicing

CAUTION

To avoid personal injury, perform the following procedures before servicing mower conditioner or opening drive covers:

1. Lower the mower conditioner fully. If necessary to service in the raised position, always close lift cylinder lock-out valves. Refer to [3.1 Lift Cylinder Lock-Out Valves , page 31](#).
2. Disengage power take-off (PTO).
3. Stop engine and remove key.
4. Engage park brake.
5. Wait for all moving parts to stop.

4.2 Recommended Safety Procedures

- Park on level surface when possible. Securely block wheels if mower conditioner is parked on an incline. Follow all recommendations in your tractor operator's manual.
- Wear close-fitting clothing and cover long hair. Never wear dangling items such as scarves or bracelets.



Figure 4.1: Safety Around Equipment

- Wear protective shoes with slip-resistant soles, a hard hat, protective glasses or goggles, and heavy gloves.

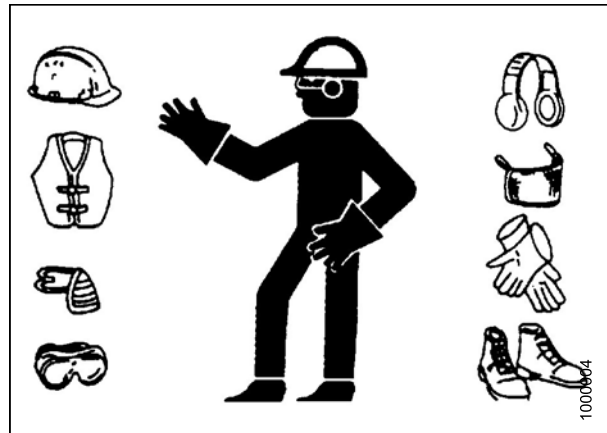


Figure 4.2: Safety Equipment

- Be aware that if more than one person is servicing the machine at the same time, rotating a driveline or other mechanically driven component by hand (for example, to access a lube fitting) will cause drive components in other areas (belts, pulleys, and discs) to move. Stay clear of driven components at all times.

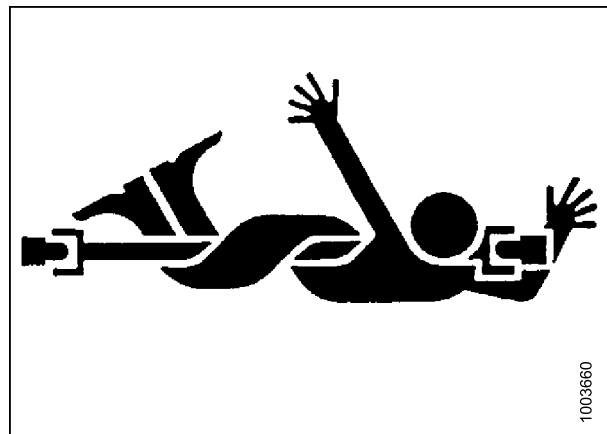


Figure 4.3: Safety Around Equipment

MAINTENANCE AND SERVICING

- Be prepared if an accident should occur. Know where the first aid kits and fire extinguishers are located, and know how to use them.

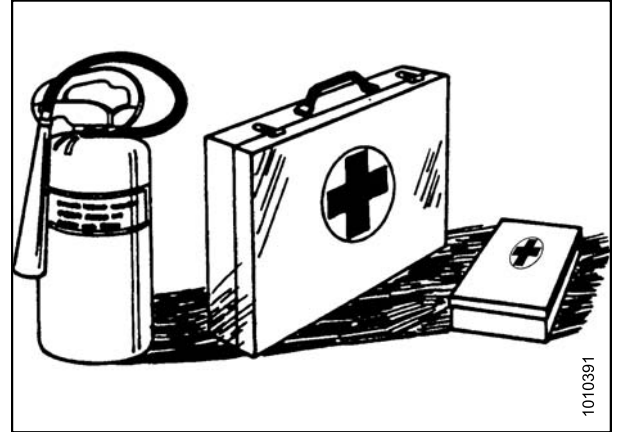


Figure 4.4: Safety Equipment

- Keep the service area clean and dry. Wet or oily floors are slippery. Wet spots can be dangerous when working with electrical equipment. Be sure all electrical outlets and tools are properly grounded.



Figure 4.5: Safety Around Equipment

- Use adequate light for the job at hand.
- Replace all shields removed or opened for service.
- Use only service and repair parts made or approved by the equipment manufacturer. Substituted parts may not meet strength, design, or safety requirements.
- Keep machinery clean. Never use gasoline, naphtha, or any volatile material for cleaning purposes. These materials may be toxic and/or flammable.

4.3 Maintenance Requirements

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

Periodic maintenance requirements are organized according to service intervals.

When servicing the machine, refer to the specific headings in this section and use only fluids and lubricants specified in [7.1 Recommended Lubricants, page 259](#).

Log hours of operation, use the maintenance record, and keep copies of your maintenance records. Refer to [4.3.1 Maintenance Schedule/Record, page 113](#).

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

IMPORTANT:

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






CAUTION

Carefully follow all safety messages. Refer to [4.2 Recommended Safety Procedures, page 110](#).

MAINTENANCE AND SERVICING

4.3.1 Maintenance Schedule/Record

Action:		✓ - Check				◆ - Lubricate				▲ - Change			
	Hour meter reading												
	Service date												
	Serviced by												
First Use		Refer to 4.3.2 Break-In Inspections, page 115											
100 Hours or Annually		Refer to 4.3.3 Preseason Servicing, page 116 . Annual maintenance should be done before the start of the operating season.											
✓	Wheel bolt torque - Refer to Checking Wheel Bolts, page 221												
◆	Wheel hub bearings - Refer to 4.3.1 Maintenance Schedule/Record, page 113												
✓	Conditioner drive belt - Refer to 4.5.8 Conditioner Drive Belt, page 208												
✓	Roll conditioner drive gearbox - Refer to 4.5.9 Conditioner Drive Gearbox (MD #221748), page 212												
✓	Mower conditioner drive gearbox lube level - Refer to 4.5.10 Mower Conditioner Drive Gearbox (T-Gearbox) (MD #224211), page 214												
✓	Driveline gearboxes (4) lube levels - Refer to 4.5.11 Swivel Gearbox, page 219												
✓	Driveline taper pin torque - Refer to 4.5.6 Inspecting Driveline Taper Pins, page 203												
End of Season		Refer to 4.3.4 End-of-Season Servicing, page 116											
10 Hours or Daily													

MAINTENANCE AND SERVICING

◆	Hydraulic hoses and lines - Refer to 4.6.1 Hydraulic Hoses and Lines, page 224	<p>NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine. Daily maintenance records are not required to meet normal warranty conditions.</p>													
◆	Cutter blades, deflectors and discs - Refer to 4.4 Cutterbar, page 129														
▲	Tire pressure - Refer to Inflating Tires, page 223														
25 Hours															
◆	Lower link pivots - Refer to 4.3.5 Lubricating the Mower Conditioner, page 117	<p>NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine. Daily maintenance records are not required to meet normal warranty conditions.</p>													
◆	Hitch pivot - Refer to 4.3.5 Lubricating the Mower Conditioner, page 117														
▲	Roll conditioner drive gearbox - Refer to 4.5.9 Conditioner Drive Gearbox (MD #221748), page 212														
◆	Drive belt tensioner - Refer to 4.5.8 Conditioner Drive Belt, page 208														
◆	Roll/finger shaft bearings - Refer to 4.3.5 Lubricating the Mower Conditioner, page 117														
50 Hours															
◆	Cutterbar lube (first 50 and then every 250 hours) - Refer to Checking Lubricant Level, page 129														
◆	Roll universal shafts - Refer to 4.3.5 Lubricating the Mower Conditioner, page 117														
◆	Hitch driveline universals - Refer to 4.3.5 Lubricating the Mower Conditioner, page 117														
◆	PTO shaft and universals - Refer to 4.3.5 Lubricating the Mower Conditioner, page 117														

MAINTENANCE AND SERVICING

▲	Mower conditioner drive gearbox lube (first 50 and then every 250 hours) - Refer to 4.5.10 Mower Conditioner Drive Gearbox (T-Gearbox) (MD #224211), page 214																					
▲	Driveline gearboxes (4) lube (first 50 and then every 250 hours) - Refer to 4.5.11 Swivel Gearbox, page 219																					
250 Hours																						
▲	Cutterbar lube - Refer to Checking Lubricant Level, page 129																					
▲	Roll conditioner drive gearbox - Refer to 4.5.9 Conditioner Drive Gearbox (MD #221748), page 212																					
▲	Mower conditioner drive gearbox lube - Refer to 4.5.10 Mower Conditioner Drive Gearbox (T-Gearbox) (MD #224211), page 214																					
▲	Driveline gearboxes (4) lube - Refer to 4.5.11 Swivel Gearbox, page 219																					

4.3.2 Break-In Inspections

Table 4.1 Break-In Inspection Schedule

Inspection Interval	Item	Refer to
1 Hour	Wheel bolts	Checking Wheel Bolts, page 221
5 Hours	Check for loose hardware and tighten to required torque	7.2 Torque Specifications, page 260
	Check drive belt tension	Inspecting Conditioner Drive Belt, page 208
25 Hours	Check drive belt tension	Inspecting Conditioner Drive Belt, page 208
	Check driveline taper pin torque	4.5.6 Inspecting Driveline Taper Pins, page 203

MAINTENANCE AND SERVICING

Inspection Interval	Item	Refer to
50 Hours	Check drive belt tension	Inspecting Conditioner Drive Belt, page 208
	Change cutterbar lubricant	4.4.1 Cutterbar Lubrication, page 129 Use only specified amount. Do NOT overfill.
	Change roll conditioner drive gearbox lubricant	4.5.9 Conditioner Drive Gearbox (MD #221748), page 212
	Change swivel gearbox (4) lubricant	4.5.11 Swivel Gearbox, page 219
	Change mower conditioner drive gearbox lubricant	4.5.10 Mower Conditioner Drive Gearbox (T-Gearbox) (MD #224211), page 214
250 Hours	Change cutterbar lubricant	4.4.1 Cutterbar Lubrication, page 129
	Change swivel gearbox (4) lubricant	4.5.11 Swivel Gearbox, page 219
	Change mower conditioner drive gearbox lubricant	4.5.10 Mower Conditioner Drive Gearbox (T-Gearbox) (MD #224211), page 214

4.3.3 Preseason Servicing

CAUTION

- Review the operator's manual to refresh your memory on safety and operating recommendations.
- Review all safety signs and other decals on the mower conditioner and note hazard areas.
- Ensure all shields and guards are properly installed and secured. Never alter or remove safety equipment.
- Make certain you understand and have practiced safe use of all controls. Know the capacity and the operating characteristics of the machine.
- Check the first aid kit and fire extinguisher. Know where they are and how to use them.

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

1. Lubricate machine completely. Refer to [4.4.1 Cutterbar Lubrication, page 129](#).
2. Check tire pressure and adjust as required. Refer to [Inflating Tires, page 223](#).
3. Perform all annual maintenance. Refer to [4.3.1 Maintenance Schedule/Record, page 113](#).

4.3.4 End-of-Season Servicing

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

CAUTION

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

CAUTION

Cover cutterbar to prevent injury from accidental contact.

1. Clean the mower conditioner thoroughly.

MAINTENANCE AND SERVICING

2. Store in a dry, protected place if possible. If stored outside, always cover mower conditioner with a waterproof canvas or other protective material.
3. Raise mower conditioner and engage lift cylinder lock-out valves.
4. Use blocks to take the weight off the mower conditioner's tires if possible.
5. Repaint all worn or chipped painted surfaces to prevent rust.
6. Loosen drive belt.
7. Lubricate the mower conditioner thoroughly leaving excess grease on fittings to keep moisture out of bearings.
8. Apply grease to exposed threads, cylinder rods, and sliding surfaces of components.
9. Oil cutterbar components to prevent rust.
10. Check for worn components and repair as necessary.
11. Check for broken components and order replacements from your Dealer. Immediate repair of these items will save time and effort at beginning of next season.
12. Replace or tighten any missing or loose hardware. Refer to [7.2 Torque Specifications, page 260](#).
13. Remove divider rods (if equipped) to reduce space required for inside storage.

4.3.5 Lubricating the Mower Conditioner

WARNING

To avoid personal injury, before servicing mower conditioner or opening drive covers, refer to [4.1 Preparing Machine for Servicing, page 109](#).

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

Log hours of operation and use the maintenance schedule provided to keep a record of scheduled maintenance. Refer to [4.3.1 Maintenance Schedule/Record, page 113](#).

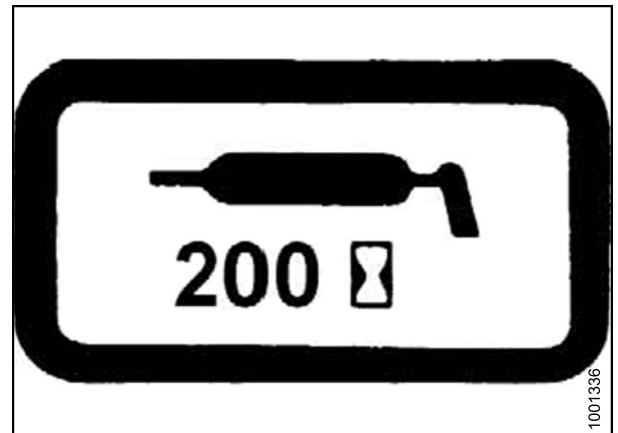


Figure 4.6: Grease Interval Decal

Greasing Procedure

CAUTION

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

1. Open driveshields at ends of mower conditioner to access greasing points. Refer to [3.2.1 Opening Driveshields, page 33](#).
2. Use only recommended lubricants specified in this manual. Refer to [7.1 Recommended Lubricants, page 259](#).

MAINTENANCE AND SERVICING

3. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.
4. Inject grease through fitting with grease gun until grease overflows fitting (except where noted).
5. Leave excess grease on fitting to keep out dirt.
6. Replace any loose or broken fittings immediately.
7. Remove and thoroughly clean any fitting that will not take grease. Also clean lubricant passageway. Replace fitting if necessary.
8. Use clean high temperature extreme pressure grease only.

MAINTENANCE AND SERVICING

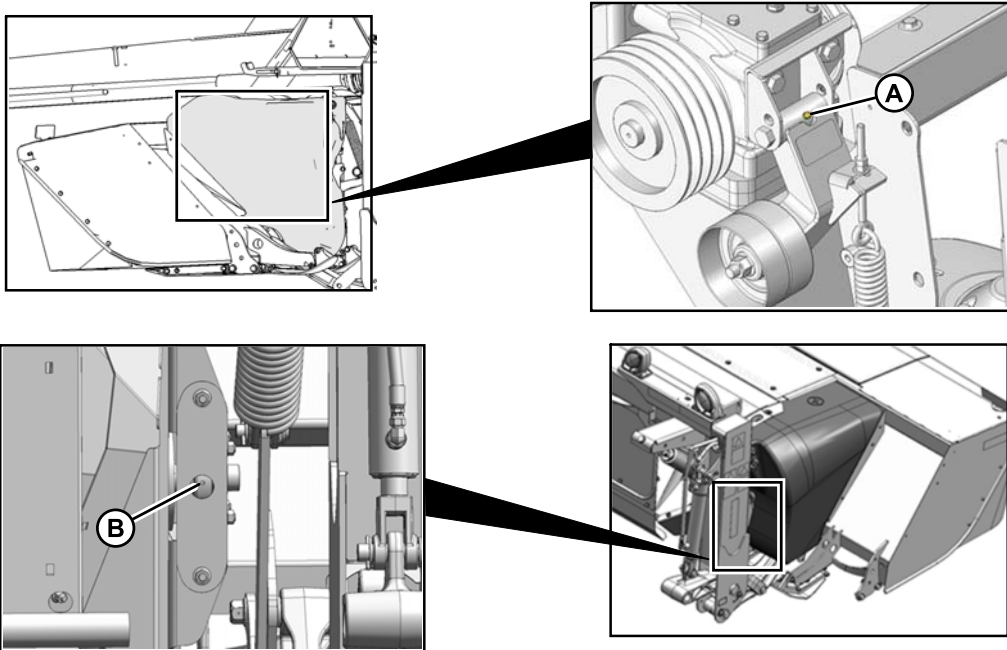
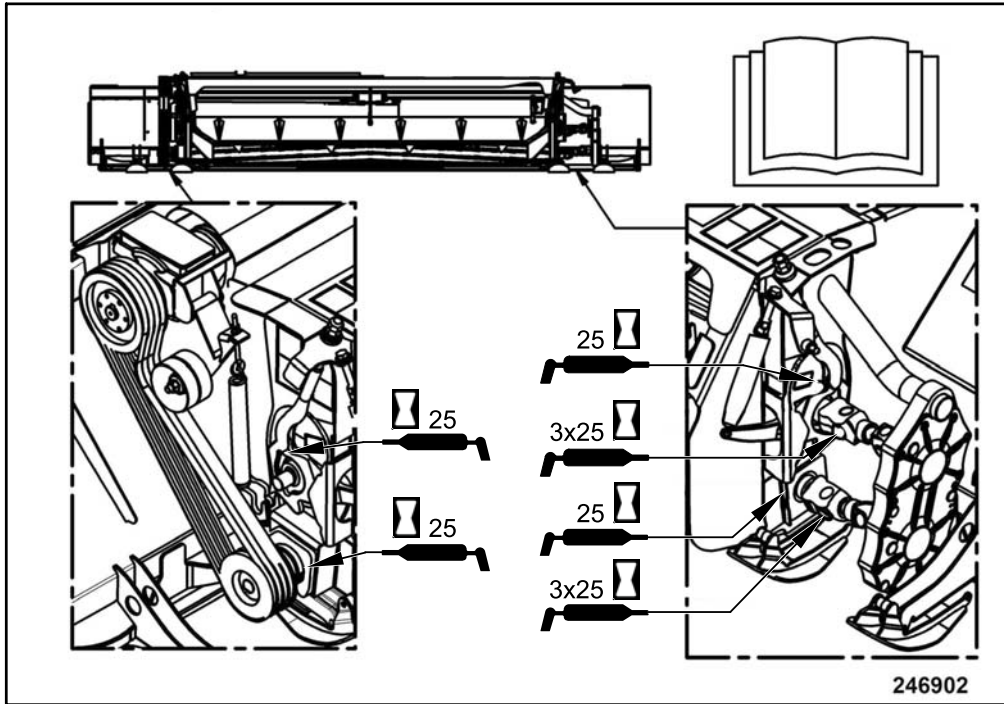
Service Intervals

NOTE:

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

MAINTENANCE AND SERVICING

Every 25 Hours



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Figure 4.7: Every 25 Hours

A - Conditioner Drive Idler

B - Bearing for Finger-Type Conditioner

MAINTENANCE AND SERVICING

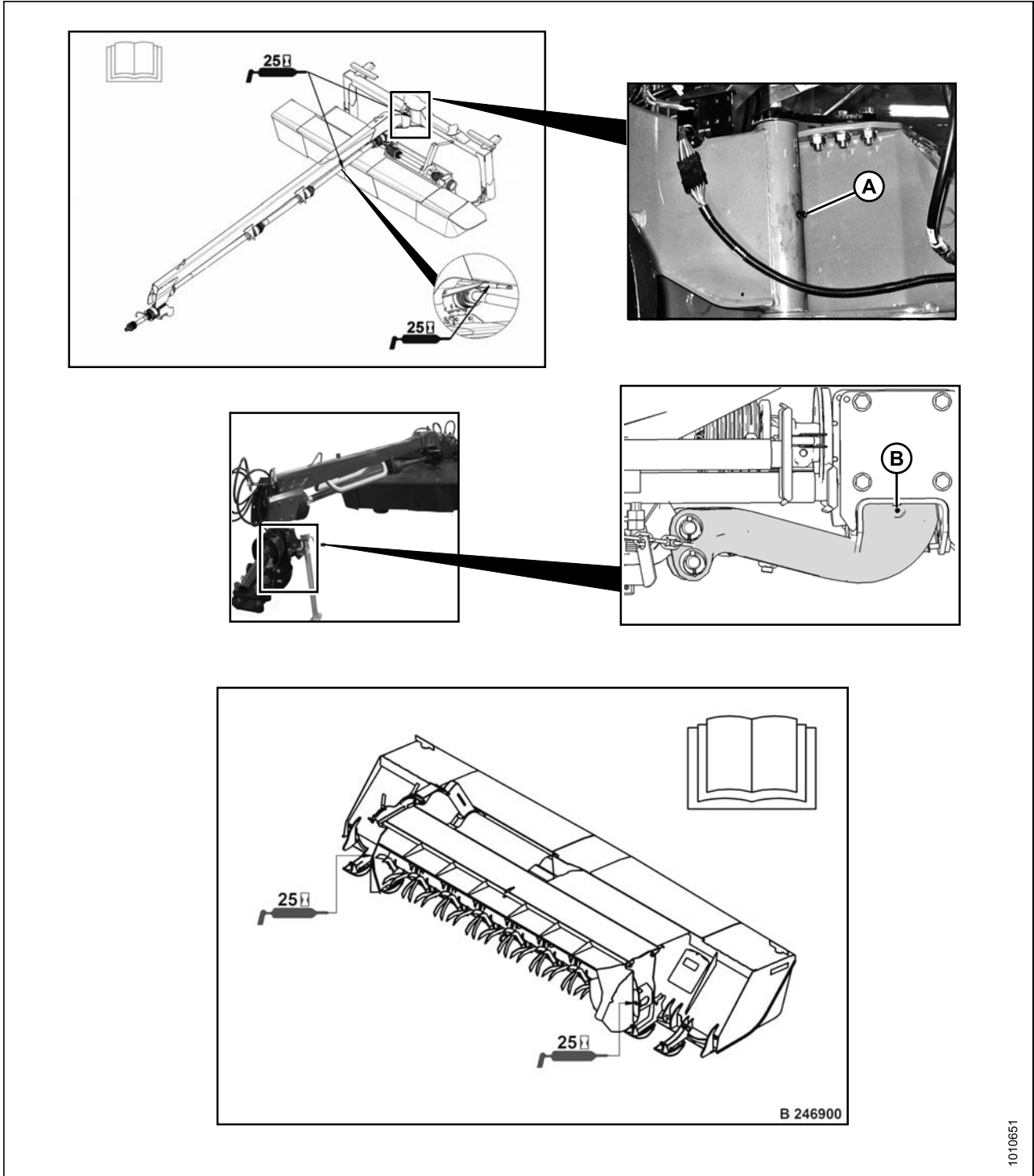


Figure 4.8: Every 25 Hours

A - Hitch Steering Pivot

B - Tractor Hitch Pivot

MAINTENANCE AND SERVICING

NOTE:

It may be necessary to remove and replace the driveline shield cones during the greasing procedure. Refer to [4.5.1 Driveline Shield Cone, page 185](#) for more information.

NOTE:

Use high temperature extreme pressure (EP2) performance with 10% max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

1. Apply grease to driveline slip-joint grease zerks.

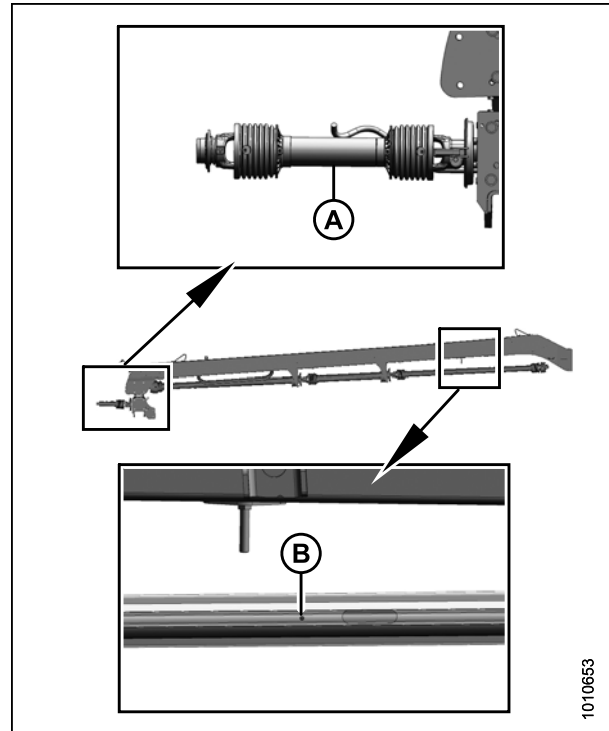


Figure 4.9: Every 25 Hours

A - Primary Driveline Slip-Joint B - Driveline Slip-Joint

MAINTENANCE AND SERVICING

NOTE:

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

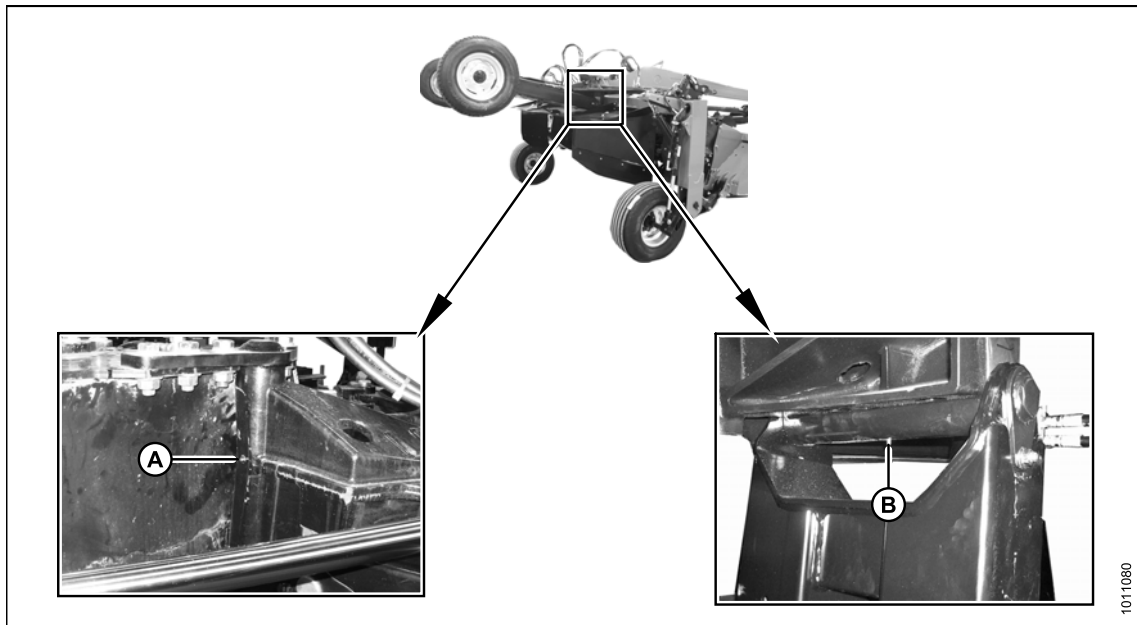


Figure 4.10: Every 25 Hours

A - Road Friendly Transport™ Casting Pivot

B - Road Friendly Transport™ Wheel Frame Pivot

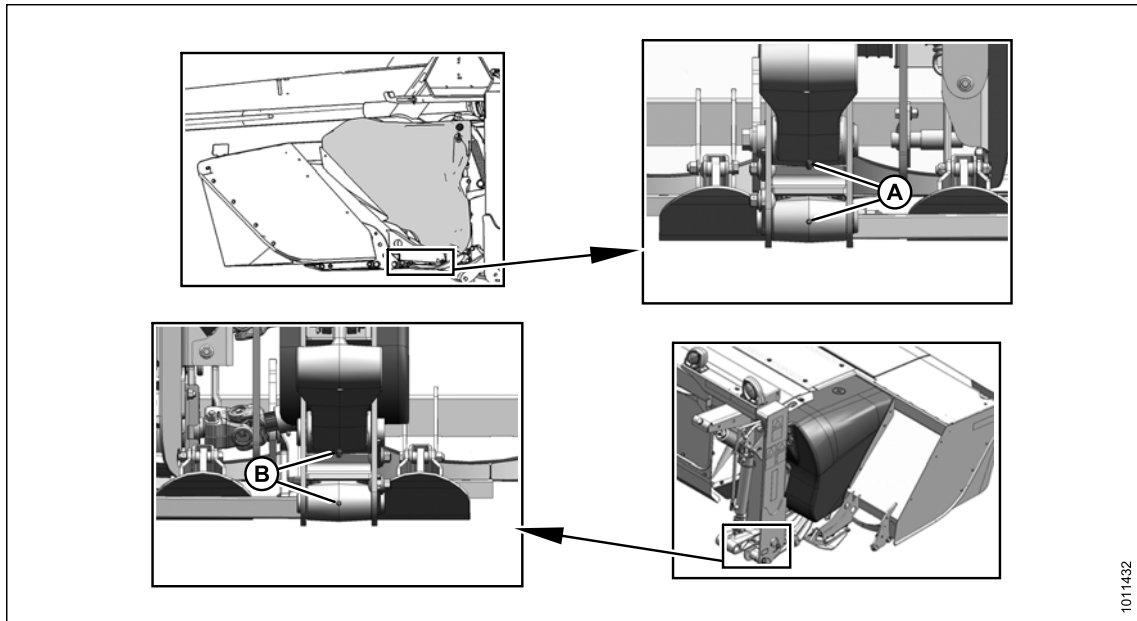


Figure 4.11: Every 25 Hours

A - Mower Conditioner Lift Linkage – Left

B - Mower Conditioner Lift Linkage – Right

MAINTENANCE AND SERVICING

Every 50 Hours

NOTE:

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

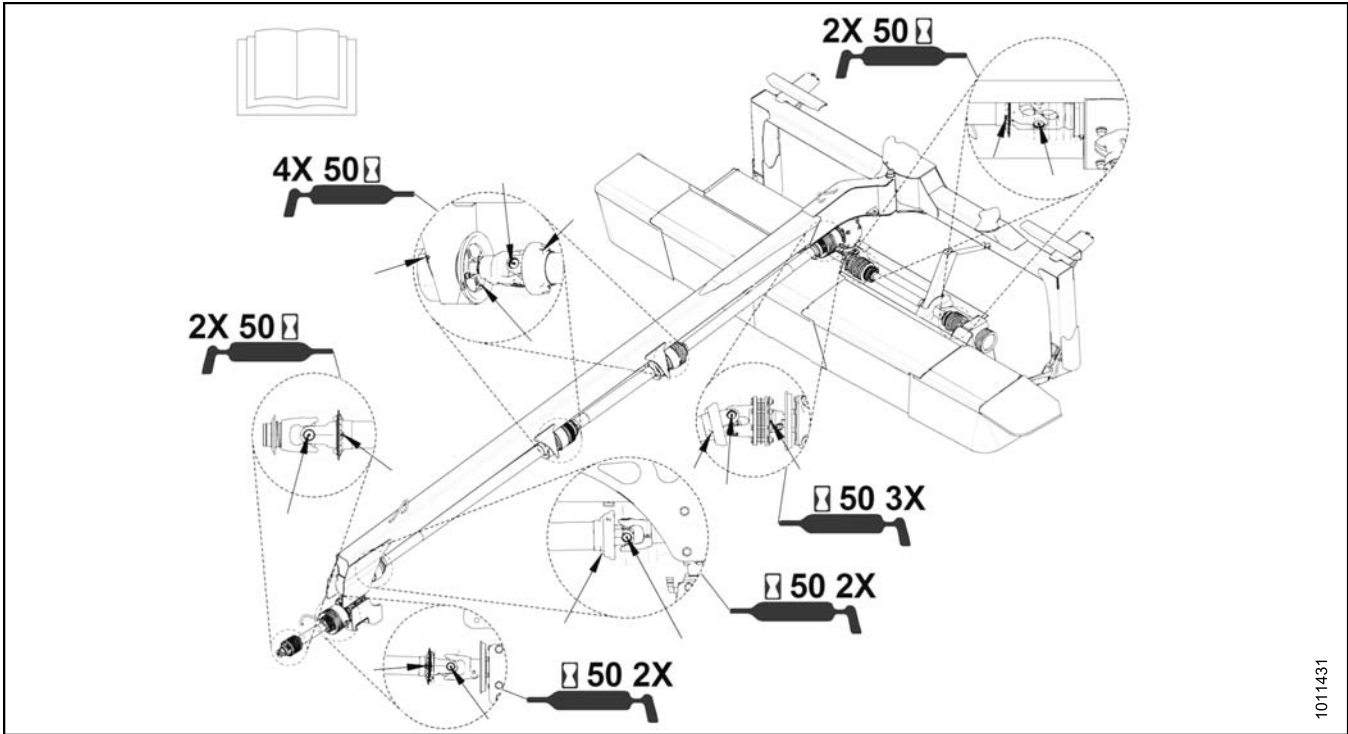
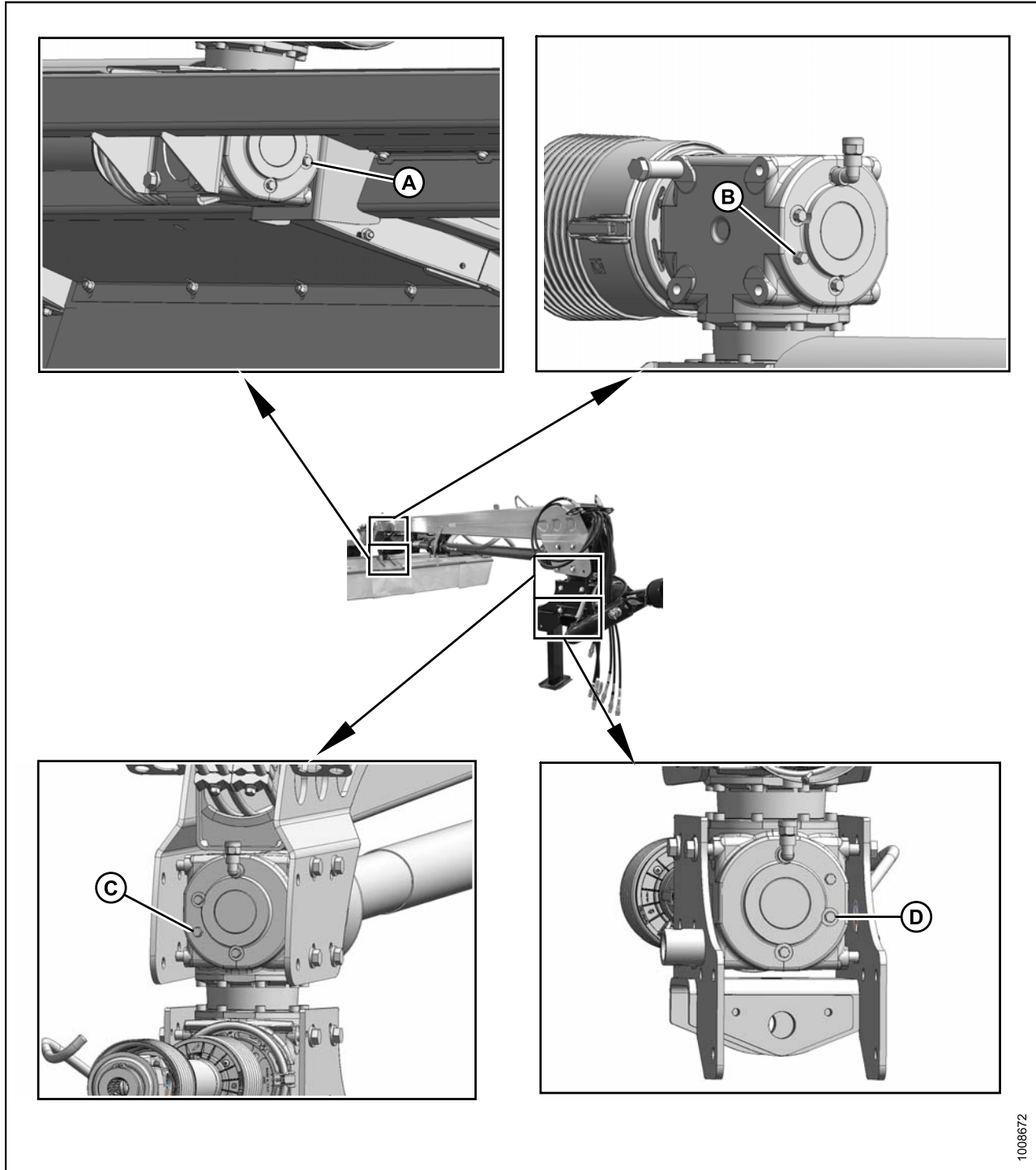


Figure 4.12: Every 50 Hours

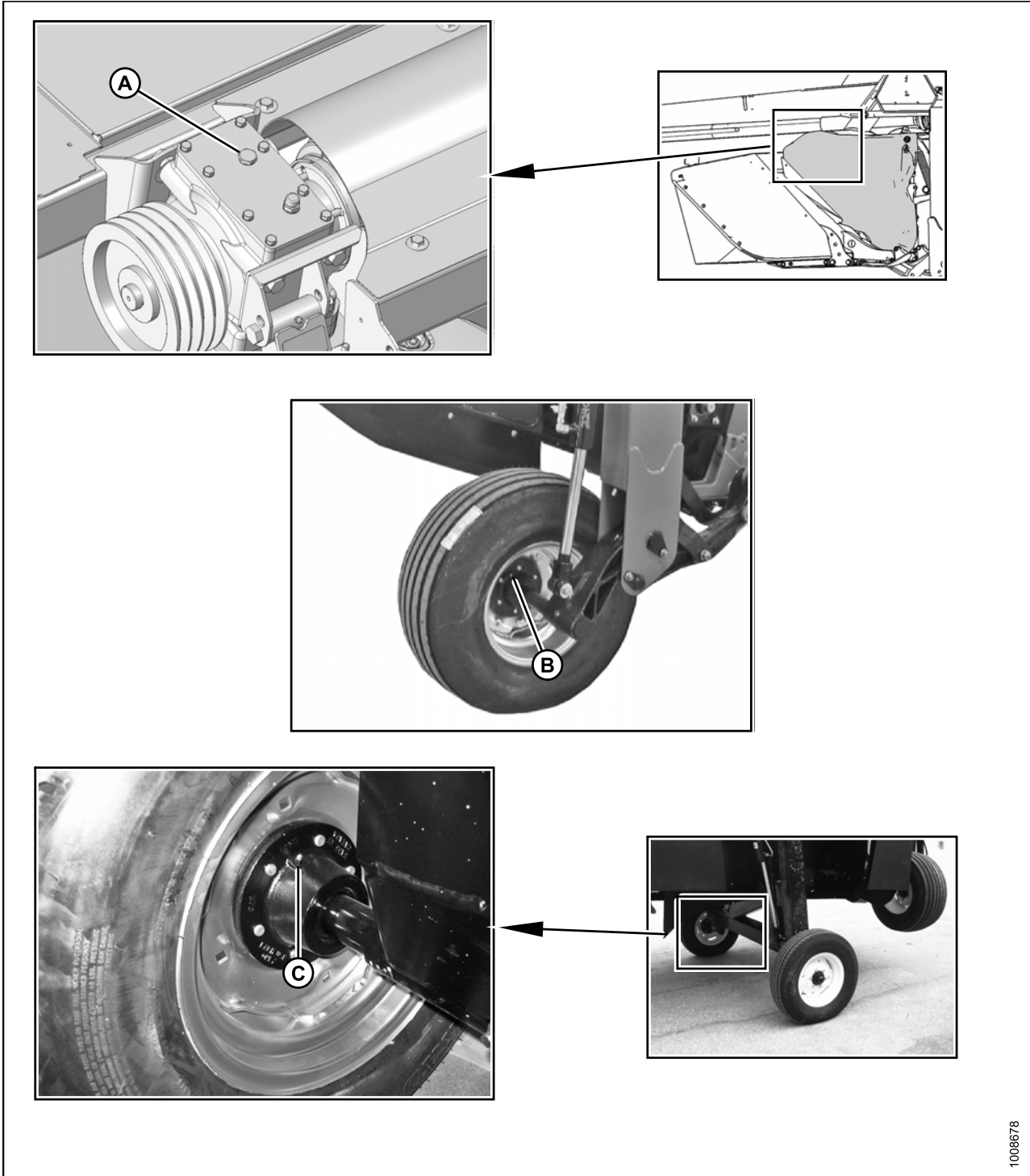
MAINTENANCE AND SERVICING

Every 100 Hours

1. Ensure top of hitch and mower conditioner are horizontal, remove check plug from swivel gearbox, and verify that oil slightly runs out when removed.



MAINTENANCE AND SERVICING



1008678

Figure 4.14: Every 100 Hours

A - Check Plug - Mower Conditioner Drive Gearbox⁷
C - Bearing - Road Friendly Transport Option (2 Places)

B - Bearing - Field Wheel (2 Places)⁸

7. Remove check plug from conditioner drive gearbox as shown and check oil level.
8. Use high temperature extreme pressure (EP2) performance with 1% max molybdenum disulphide (NLGI grade 2) lithium base

MAINTENANCE AND SERVICING

Every 250 Hours

1. Change lubricant in locations (A), (B), and (C). Refer to the following sections for more information:
 - [4.4.1 Cutterbar Lubrication, page 129.](#)
 - [Checking and Changing Conditioner Gearbox Oil, page 212.](#)

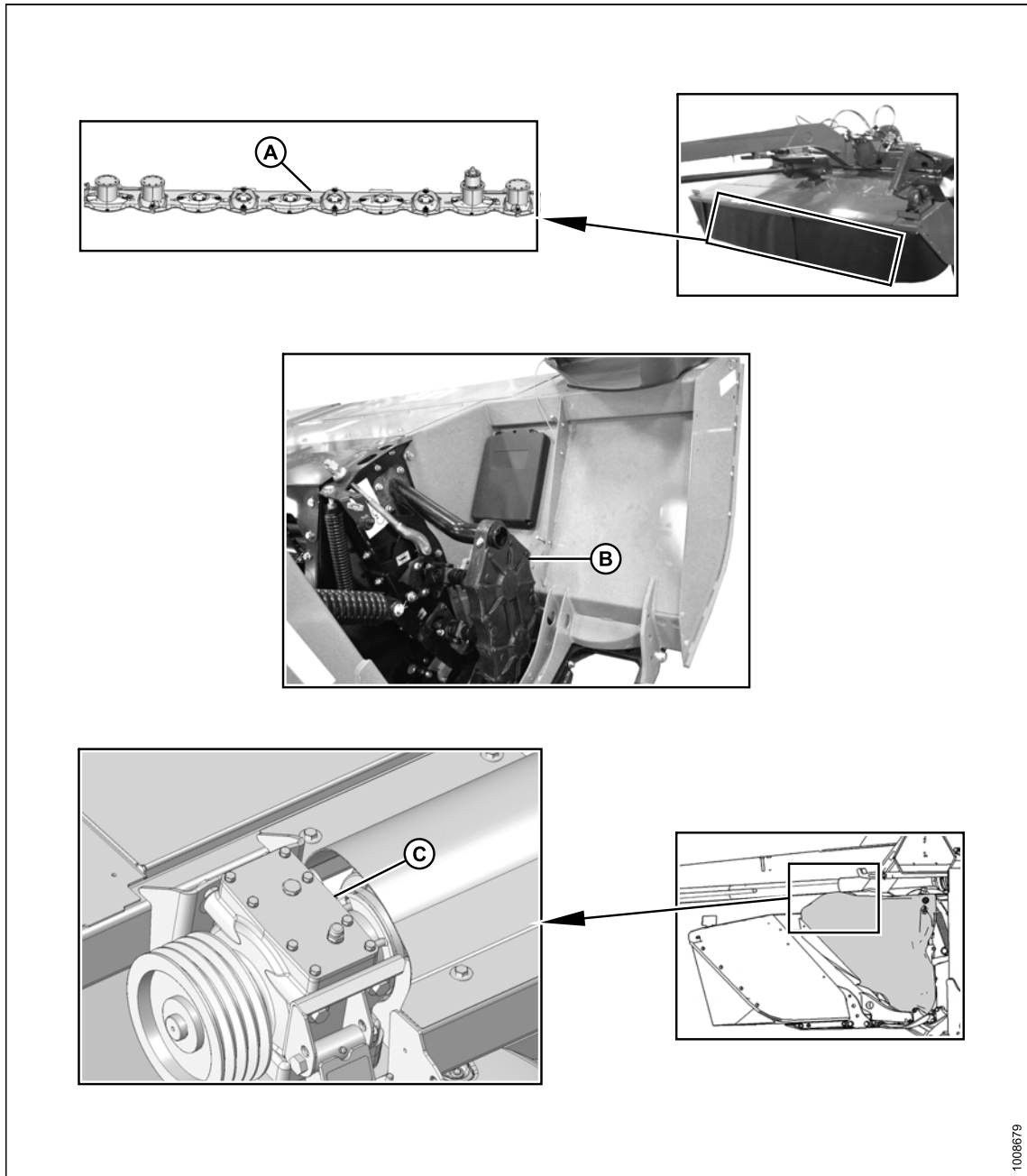


Figure 4.15: Every 250 Hours

A - Cutterbar Lubrication Location

B - Conditioner Drive Gearbox

C - Mower Conditioner Drive Gearbox

MAINTENANCE AND SERVICING

2. Change lubricant in hitch swivel gearboxes (A), (B), (C), and (D). Refer to [4.5.11 Swivel Gearbox, page 219](#).

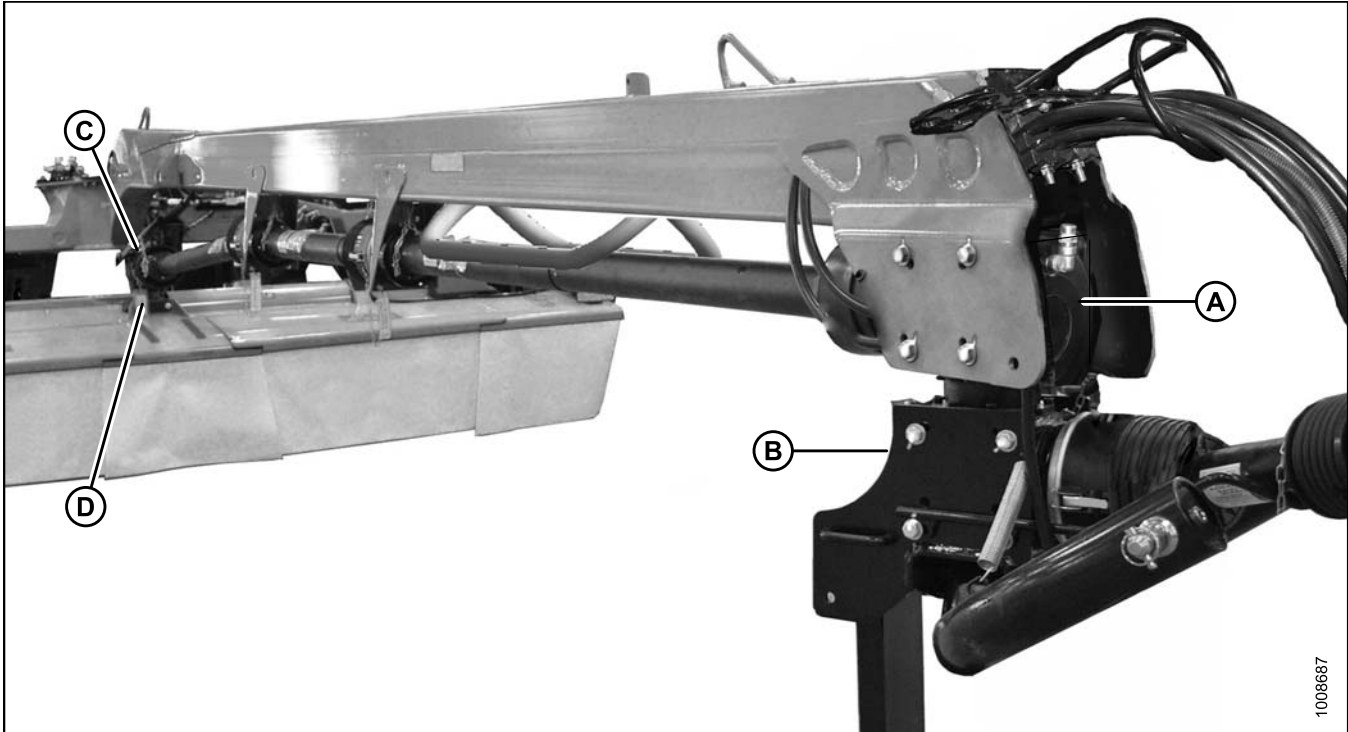


Figure 4.16: Every 250 Hours

A - Upper Forward Gearbox

B - Lower Forward Gearbox

C - Upper Rear Gearbox

D - Lower Rear Gearbox

4.4 Cutterbar

The cutterbar does not require regular maintenance other than checking and changing the lubricant at regular intervals. Refer to [4.3.1 Maintenance Schedule/Record](#), page 113.

IMPORTANT:

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

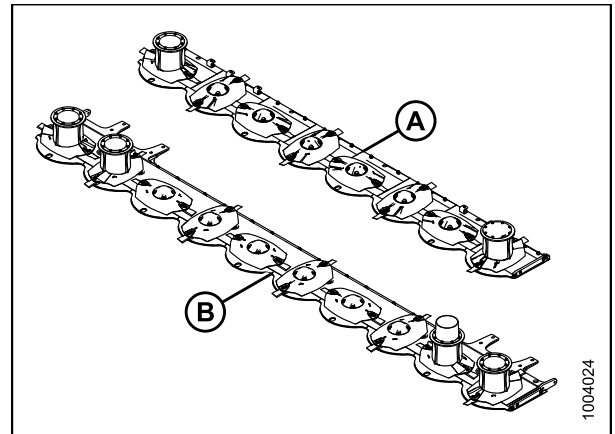


Figure 4.17: 13- and 16-Foot Cutterbars

A - 13-Foot Cutterbar

B - 16-Foot Cutterbar

4.4.1 Cutterbar Lubrication

Checking Lubricant Level



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

1. Park the mower conditioner on level ground.
2. Position mower conditioner so that the cutterbar is approximately level.
3. Shut down the mower conditioner and remove key.
4. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors](#), page 36.

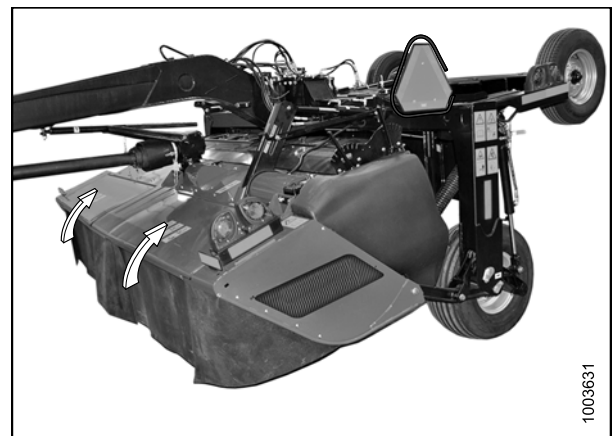


Figure 4.18: Cutterbar Doors

⚠ CAUTION

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

5. Use a level to ensure the cutterbar is level in both directions. Raise or lower mower conditioner accordingly.

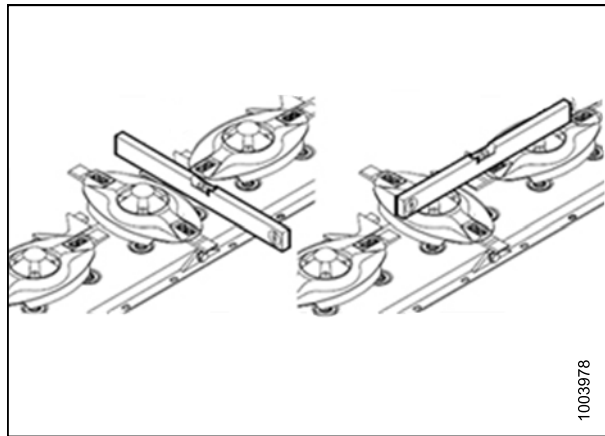


Figure 4.19: Spirit Level on Cutterbar

6. Remove oil level inspection plug (A) and O-ring (B) from cutterbar.
7. Add SAE 80W-90 lubricant if required (oil level must be up to the bore). Refer to [Filling Cutterbar, page 132](#).
8. Check O-ring (B) for breaks or cracks and replace if necessary.
9. Install plug (A) and O-ring (B). Tighten securely.

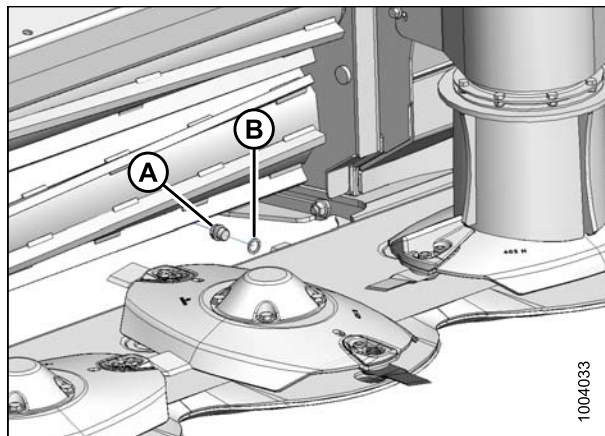


Figure 4.20: Inspection Plug and O-ring

Draining Cutterbar

⚠ DANGER

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

1. Start engine and raise mower conditioner.
2. Place a block under each side of the mower conditioner so the right end (with the M18 cutterbar plug) is lower than the end with the M18 cutterbar breather.

IMPORTANT:

Always drain lubricant from the M18 right-hand end of the cutterbar plug (A) on the right side. Draining lubricant from the left end of the cutterbar with the M18 cutterbar breather may lead to breather contamination or failure.

3. Lower mower conditioner onto blocks, shut down mower conditioner, and remove key.
4. Place a suitably sized container under lower end of cutterbar, clean area around M18 cutterbar plug (A), and remove plug.

IMPORTANT:

Do NOT remove M10 hex head bolts (B) securing cutterbar end plate (C) to cutterbar or lubricant leaks could result.

5. Allow sufficient time for lubricant to drain, and install M18 cutterbar plug (A).

NOTE:

Do NOT flush the cutterbar.

6. Dispose of lubricant safely.

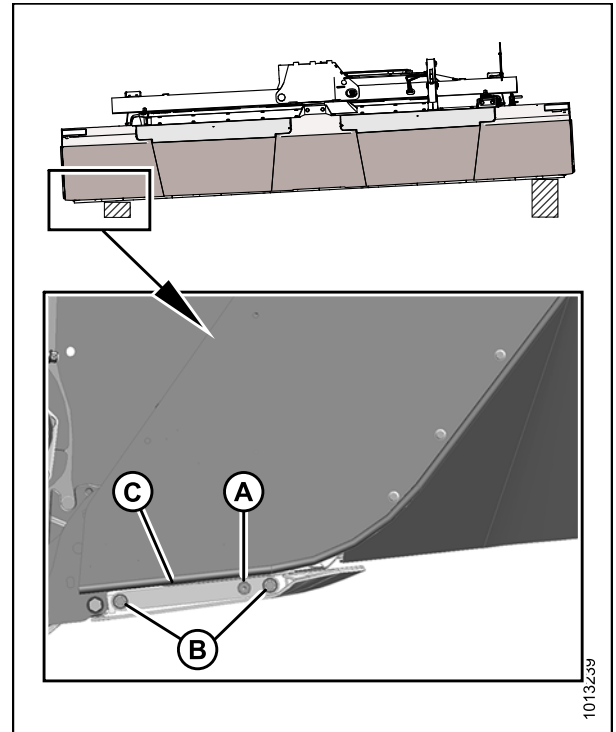


Figure 4.21: Right Side Shown – Left Side Similar

Filling Cutterbar

1. Remove M18 cutterbar breather (A) from the raised end of cutterbar and add the exact quantity of SAE 80W-90 lubricant specified for the cutterbar. Refer to [4.2 Cutterbar Lubricant Capacities, page 132](#).

Table 4.2 Cutterbar Lubricant Capacities

8 disc cutterbar	8 liters (8-1/2 quarts [US])
10 disc cutterbar	10 liters (10-1/2 quarts [US])

IMPORTANT:

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

IMPORTANT:

Do NOT remove M10 hex head bolts securing cutterbar end plate to cutterbar or lubricant leaks could result.

2. Install M18 cutterbar breather (A).
3. Start engine and raise mower conditioner.
4. Stop engine, remove key, and engage mower conditioner lift cylinder lock-out valves.
5. Remove blocks.
6. Check lubricant level. Refer to [Checking Lubricant Level, page 129](#).

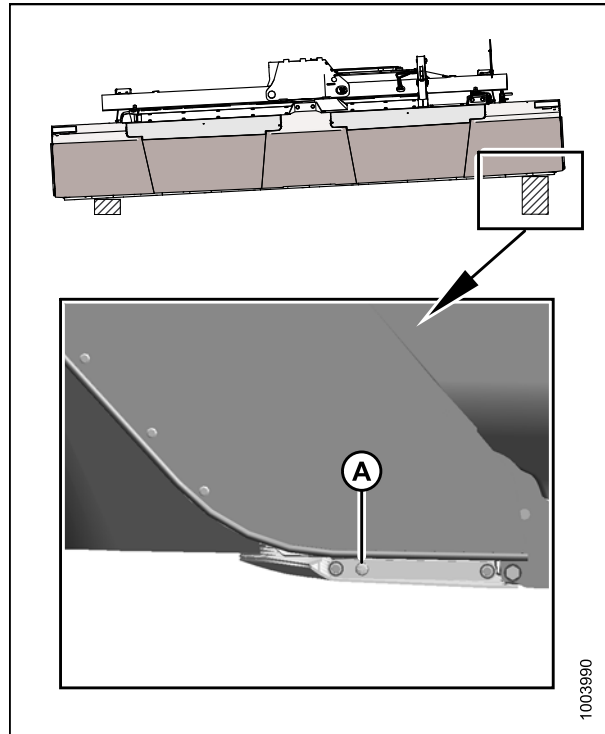


Figure 4.22: Left Side Shown – Right Side Similar

4.4.2 Cutterbar Disc Maintenance

Inspecting Cutterbar Discs

! DANGER

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

! CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

! CAUTION

Damaged blades may damage the cutterbar and result in poor cutting performance. Replace damaged blades at earliest possible opportunity.

MAINTENANCE AND SERVICING

1. Ensure that the cutterblade fasteners (A) are securely attached to the cutterbar disc and that nut shields (B) are present and undamaged. Replace as required.
2. Check that the cutterbar disc bolts (C) are securely attached to the spindles. Tighten as required.
3. Inspect the cutterbar disc surface (D) for cracks, excessive wear, and disc distortion. Replace as required.
4. Inspect the cutterbar disc edges (E) for cracks, excessive wear, and edge distortion. Replace as required.

NOTE:

Cutterbar discs are NOT repairable and must be replaced if damaged.

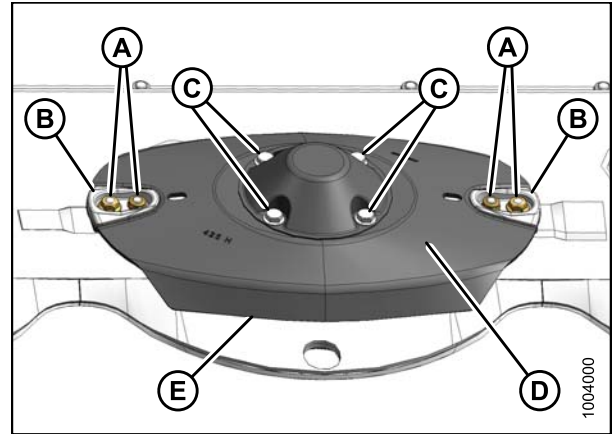


Figure 4.23: Cutterbar Disc

Removing Cutterbar Discs

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

1. Raise mower conditioner fully, shut off engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

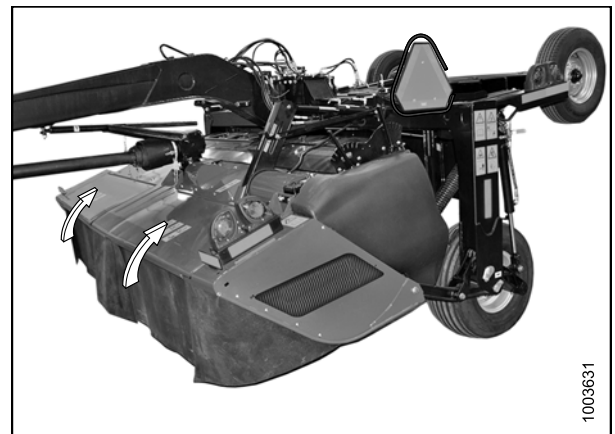


Figure 4.24: Cutterbar Doors

MAINTENANCE AND SERVICING

4. Place a pin (or equivalent) in the front hole of the rock guard (B) to prevent disc rotation while loosening bolts.
5. Remove four M12 bolts (A) and washers.

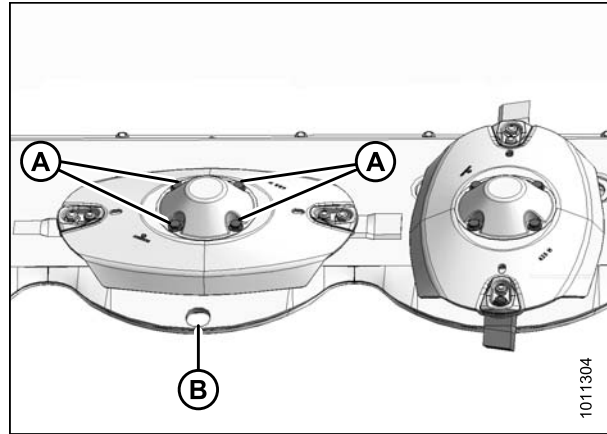


Figure 4.25: Cutterbar Disc Bolts

6. Remove cutterbar disc cap (A).
7. Remove cutterbar disc (B).

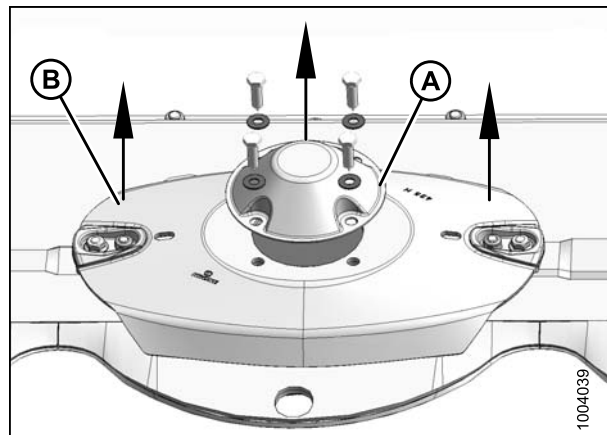


Figure 4.26: Cutterbar Disc and Cap

Installing Cutterbar Discs

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

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

MAINTENANCE AND SERVICING

1. Install spacer plate (A) on spindle.

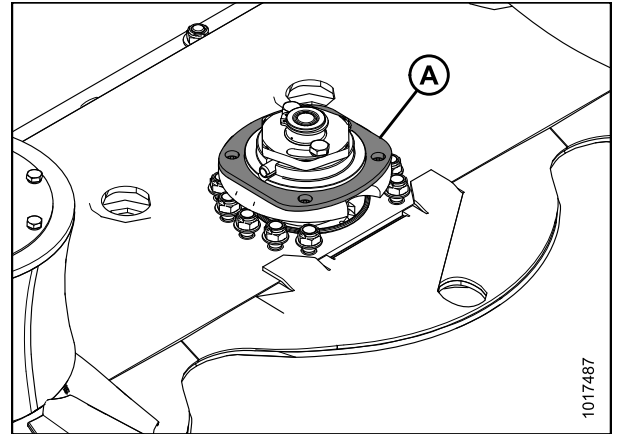


Figure 4.27: Cutterbar Disc and Cap

2. Place a pin (or equivalent) in the front hole of the rock guard (D) to prevent disc rotation while tightening bolts.
3. Position new disc (A) on spindle ensuring that it is positioned at a 90 degree angle in relation to the adjacent discs.
4. Install cutter disc cap (B), and secure assembly with four M12 bolts and washers (C). Torque bolts to 85 N·m (63 ft·lbf).

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

5. Remove pin (or equivalent) from front hole of rock guard.
6. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

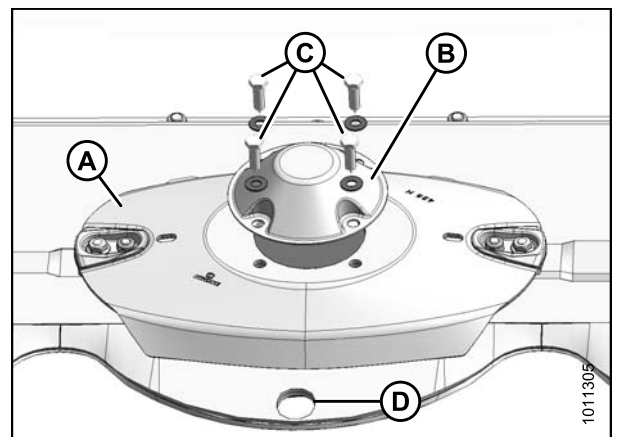


Figure 4.28: Cutterbar Disc and Cap

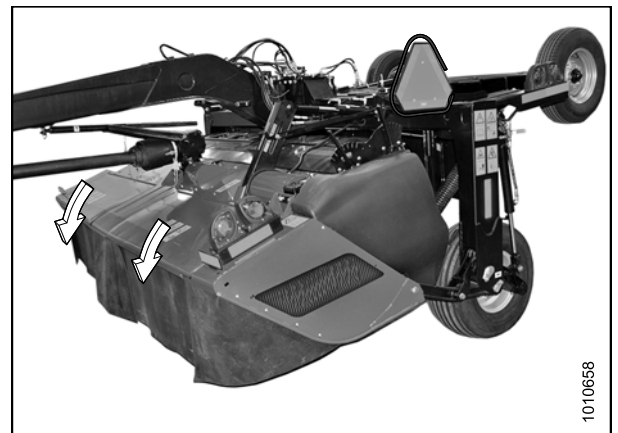


Figure 4.29: Cutterbar Doors in Closed Position

4.4.3 Cutterbar Spindles

Discs are factory installed to produce a three crop stream, but disc rotation patterns can be changed to suit crop conditions.

To prevent damage to the cutterbar and drive systems, each disc is attached to a spindle containing a shear pin (A). If the disc contacts a large object such as a stone or stump, the pins will shear and the disc will stop rotating and move upwards while remaining attached to the spindle with a snap ring (B). Refer to [4.4.11 Cutterbar Spindle Shear Pin, page 179](#) to replace shear pin.

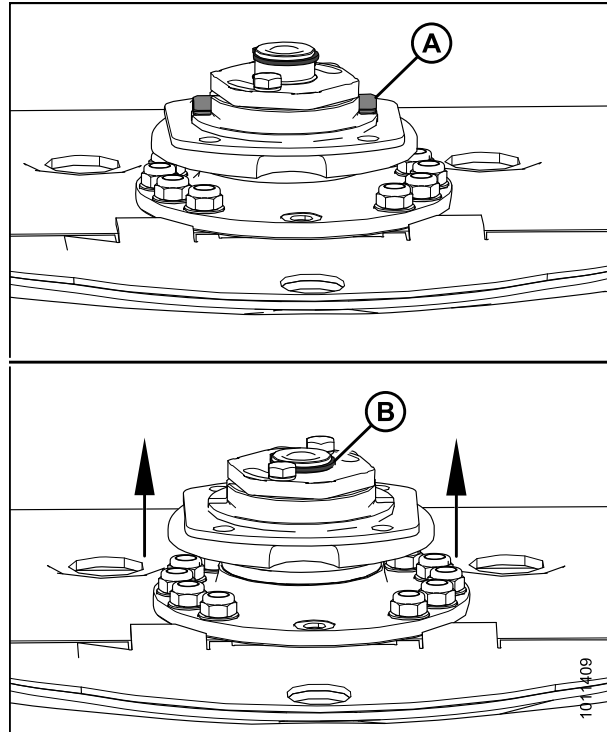


Figure 4.30: Cutterbar Spindles

IMPORTANT:

- Spindles that rotate clockwise have right-handed threading and a smooth top on the spindle gear shaft (A).
- Spindles that rotate counterclockwise have left-handed threading and machined grooves on the spindle gear shaft (B) and nut (C).
- If spindle position in cutterbar has changed, the rotational direction of that spindle **MUST** remain the same (i.e., a clockwise spindle must maintain its clockwise rotation).
- Failure to maintain rotation pattern can result in damage to spindle and/or cutterbar components.

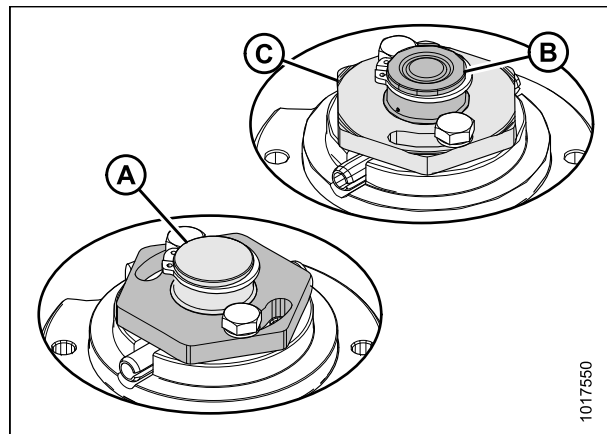


Figure 4.31: Cutterbar Spindles

Removing Cutterbar Spindles

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

1. Lower mower conditioner fully, shut off engine, and remove key.

NOTE:

Ensure mower conditioner is on a flat, level surface and is tilted all the way back before removing spindles to prevent oil from spilling from the cutterbar.

2. Open cutterbar door(s).

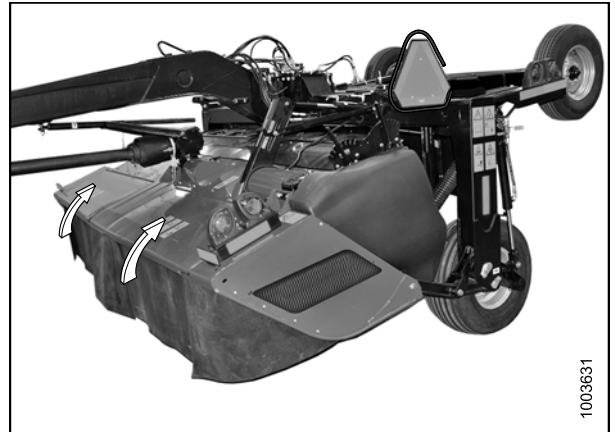


Figure 4.32: Cutterbar Doors

3. Place a pin (or equivalent) in the front hole of the rock guard (B) to prevent disc rotation while loosening bolts.
4. Remove four M12 bolts (A) and washers.

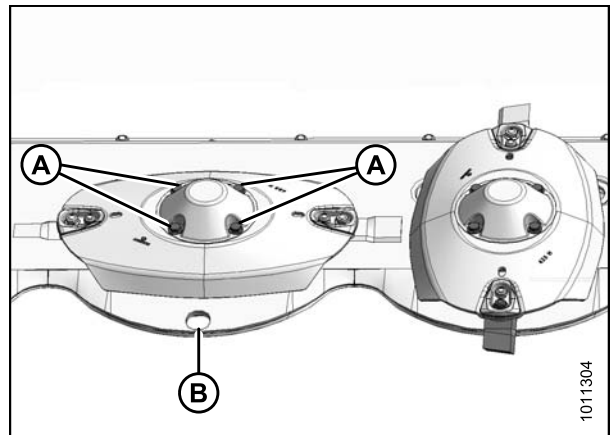


Figure 4.33: Cutterbar Disc Bolts

5. Remove cutterbar disc cap (A).
6. Remove cutterbar disc (B).

IMPORTANT:

Blades are rotation specific. It is necessary to switch entire disc when swapping spindles.

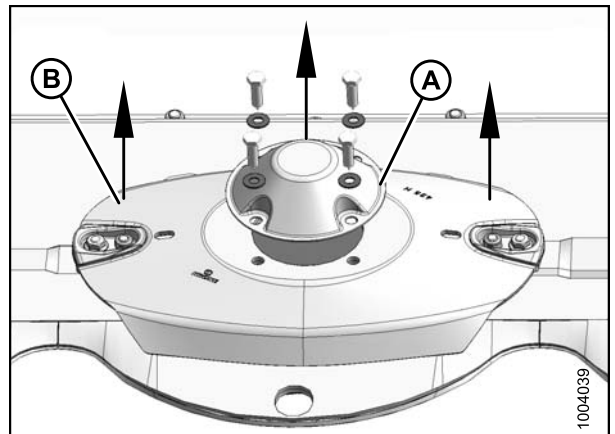


Figure 4.34: Cutterbar Disc and Cap

MAINTENANCE AND SERVICING

- Remove spacer plate (A).

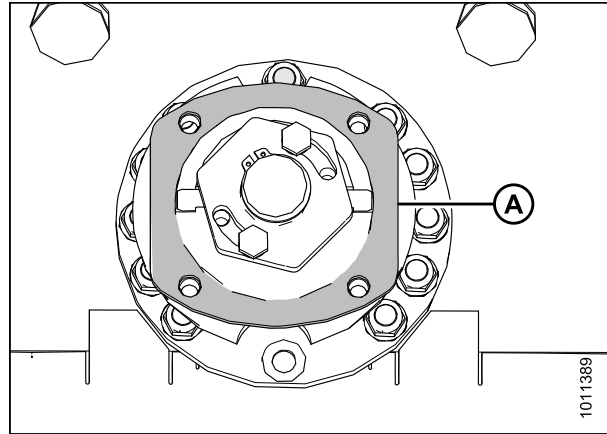


Figure 4.35: Spacer Plate

- Rotate spindle hub (A) to access nuts, and remove 11 M12 lock nuts (B) and washers.

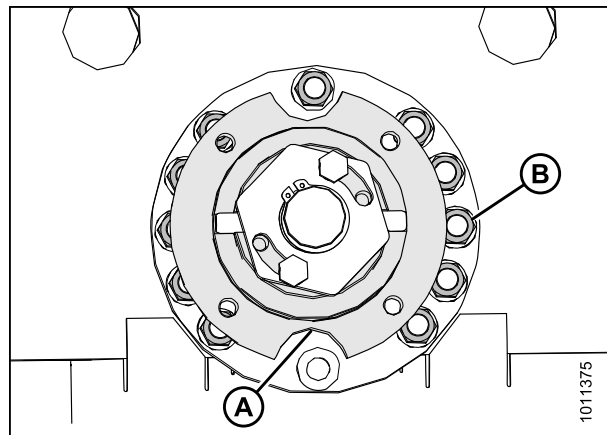


Figure 4.36: Left-Hand Spindle Hub and Hardware

- Remove spindle (A) from cutterbar.

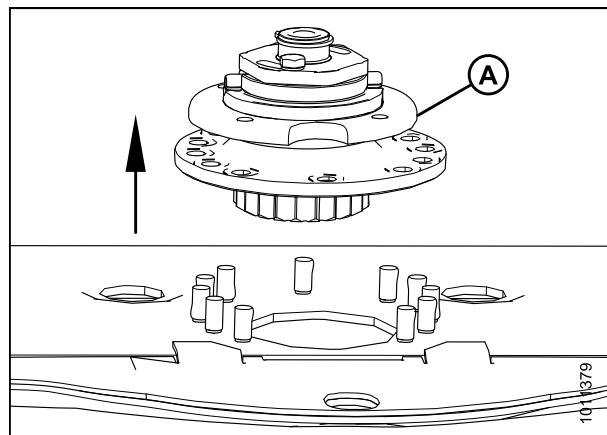


Figure 4.37: Left-Hand Spindle

Installing Cutterbar Spindles

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

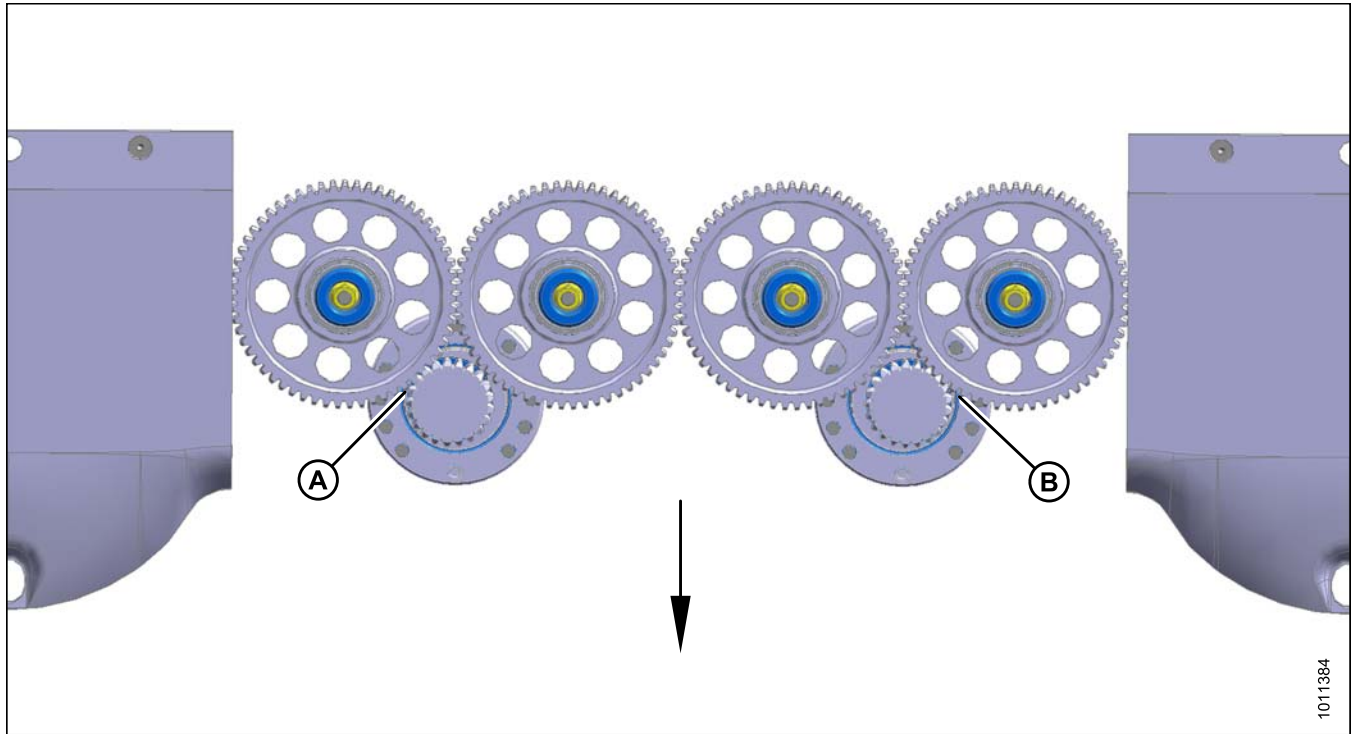


Figure 4.38: Underside of Cutterbar Spindles Installed in Cutterbar

IMPORTANT:

Right-hand discs (A) and left-hand discs (B) are timed and must be at 90° when reinstalled. Misaligned discs could result in the following:

- Cutterblades of co-rotating discs hitting each other
- Cutterblades of diverging discs will hitting adjacent discs

Check clearance before tightening spindle to the cutterbar. Turn disc by hand to ensure cutterblades do not contact each other or adjacent discs. If contact occurs, remove spindle, rotate 90°, and reinstall. Remove and reinstall spindles as many times as necessary to achieve proper alignment.

NOTE:

Right-hand discs (A) and left-hand discs (B) are slightly offset as shown depending on which idler gear the spindle is turning.

- Spindles that rotate clockwise have left-handed threading
- Spindles that rotate counterclockwise have right-handed threading

MAINTENANCE AND SERVICING

1. Lower mower conditioner fully, shut off engine, and remove key.

NOTE:

Ensure mower conditioner is on a flat, level surface and is tilted all the way back while installing spindles to prevent oil from spilling from the cutterbar.

2. Open cutterbar door(s).

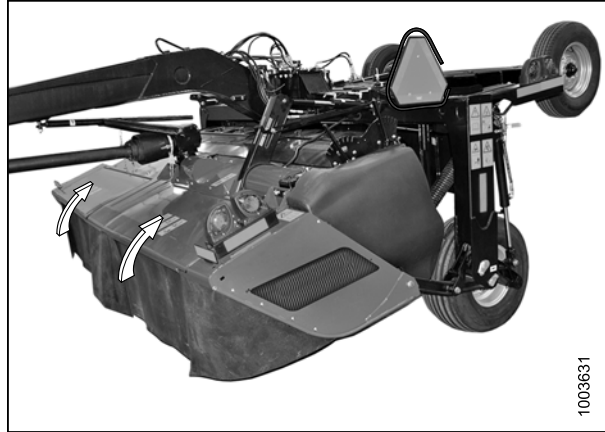


Figure 4.39: Cutterbar Doors

3. Determine suitable spindle rotation pattern for crop conditions. Refer to [4.4.3 Cutterbar Spindles](#), page 136.

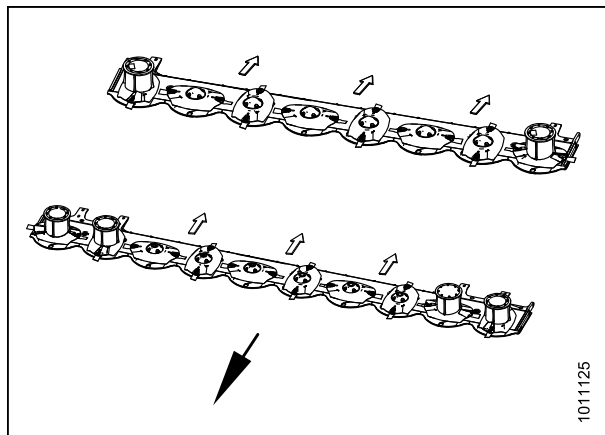


Figure 4.40: 13- and 16-Foot Cutterbars

4. Ensure that spindle O-ring (A) is properly seated, cleaned, and undamaged.

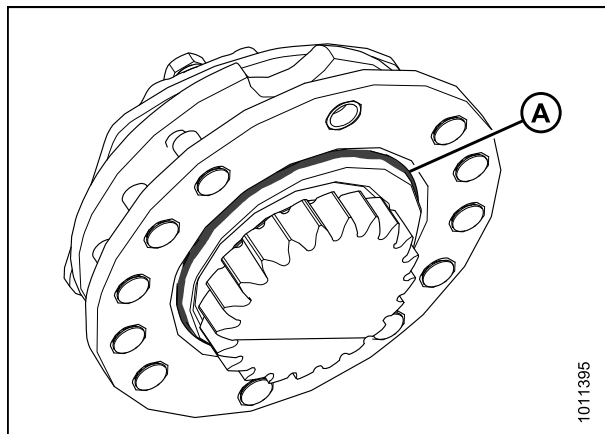


Figure 4.41: Left-Hand Spindle O-Ring

MAINTENANCE AND SERVICING

5. Insert spindle (A) into cutterbar.

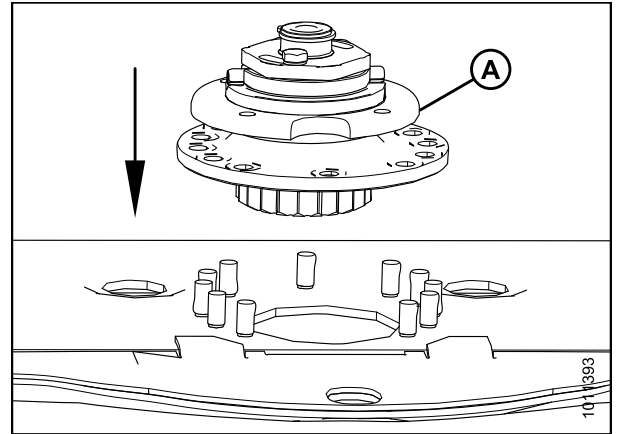


Figure 4.42: Left-Hand Spindle

6. Insert studs (A) into spindle as shown.

NOTE:

Plugs are factory installed as shown in position (B) but may come loose over time. Ensure studs are inserted into proper location.

IMPORTANT:

Ensure clockwise spindles rotate clockwise and counterclockwise spindles (with machined grooves) rotate counterclockwise.

NOTE:

The offset gear design makes it possible to install spindles having an opposite rotation of what is intended. This will prevent discs from spinning up after impact, resulting in cutterbar component damage.

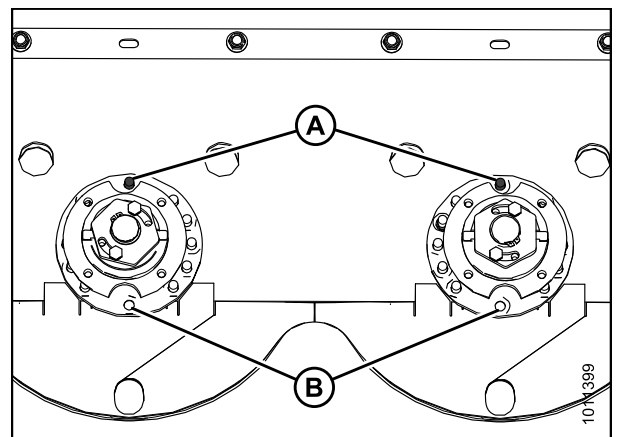


Figure 4.43: Spindle Orientation

7. Rotate spindle hub (A) to access studs, and install eleven M12 lock nuts (B) and washers.

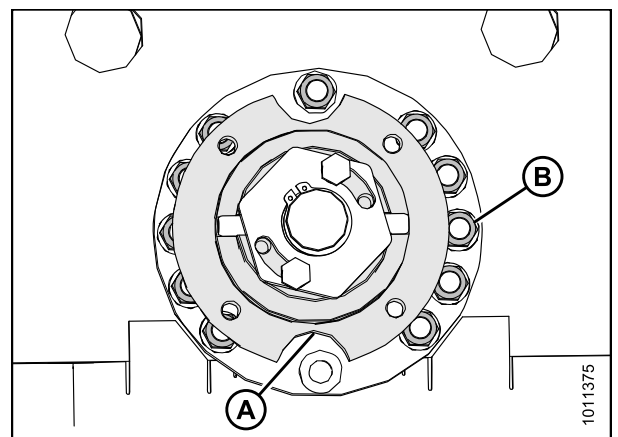


Figure 4.44: Left-Hand Spindle Hub and Hardware

MAINTENANCE AND SERVICING

- Torque bolts to 50 N·m (37 ft·lbf) following the tightening pattern shown at right.

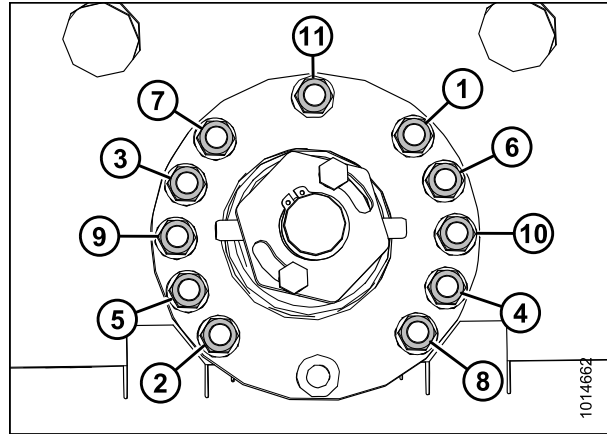


Figure 4.45: Tightening Pattern (Hub Removed for Clarity)

- Install spacer plate (A).

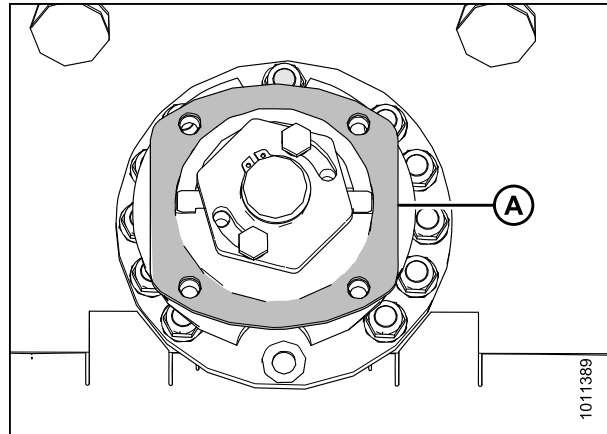


Figure 4.46: Spacer Plate

- Place a pin (or equivalent) in the front hole of the rock guard (D) to prevent disc rotation while tightening bolts.

IMPORTANT:

Blades are rotation specific. It is necessary to switch entire disc when swapping spindles.

- Position disc (A) on spindle ensuring that it is positioned at a 90° angle in relation to the adjacent discs.

NOTE:

Turn disc (A) by hand to ensure cutterblades do not contact each other or adjacent discs.

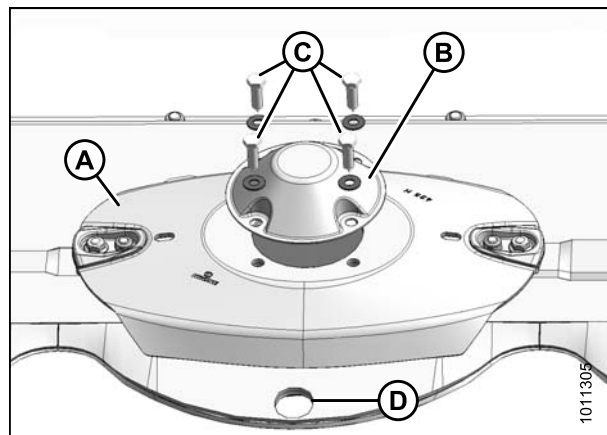


Figure 4.47: Cutterbar Disc and Cap

- Install cutter disc cap (B) and secure assembly with four M12 bolts and washers (C). Torque bolts to 85 N·m (63 ft·lbf).

⚠ WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

13. Remove pin (or equivalent) from front hole of rock guard.
14. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

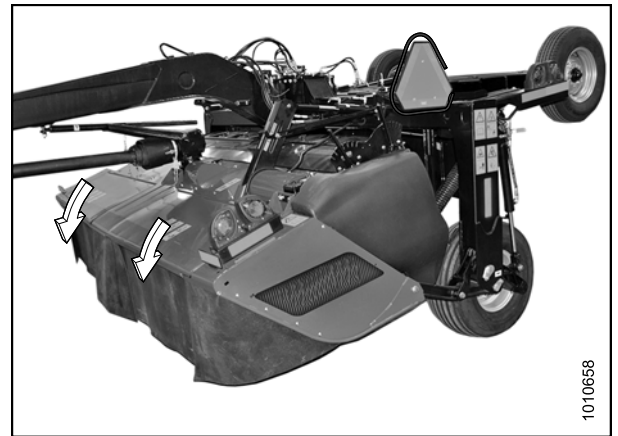


Figure 4.48: Cutterbar Doors in Closed Position

4.4.4 Cutterbar Crop Stream Configuration

Discs are factory installed to produce three crop streams, but disc rotation pattern can be changed by substitution of spindle and corresponding disc to suit crop conditions. A spindle and disc are rotation specific and must be changed as sets when altering crop flows.

Reducing or increasing the number of crop streams will produce the following results:

- Reducing the number of crop streams will result in narrower windrows.
- Increasing the number of crop streams will result in smoother, wider windrows.

NOTE:

Increasing the number of crop streams will also increase the number of diverging disc pairs which may negatively affect cut quality in certain conditions.

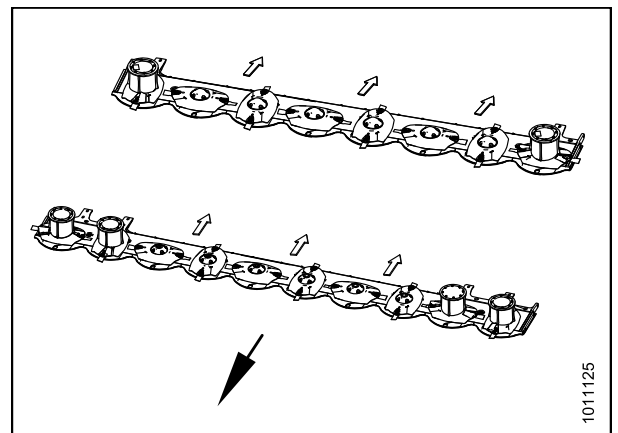
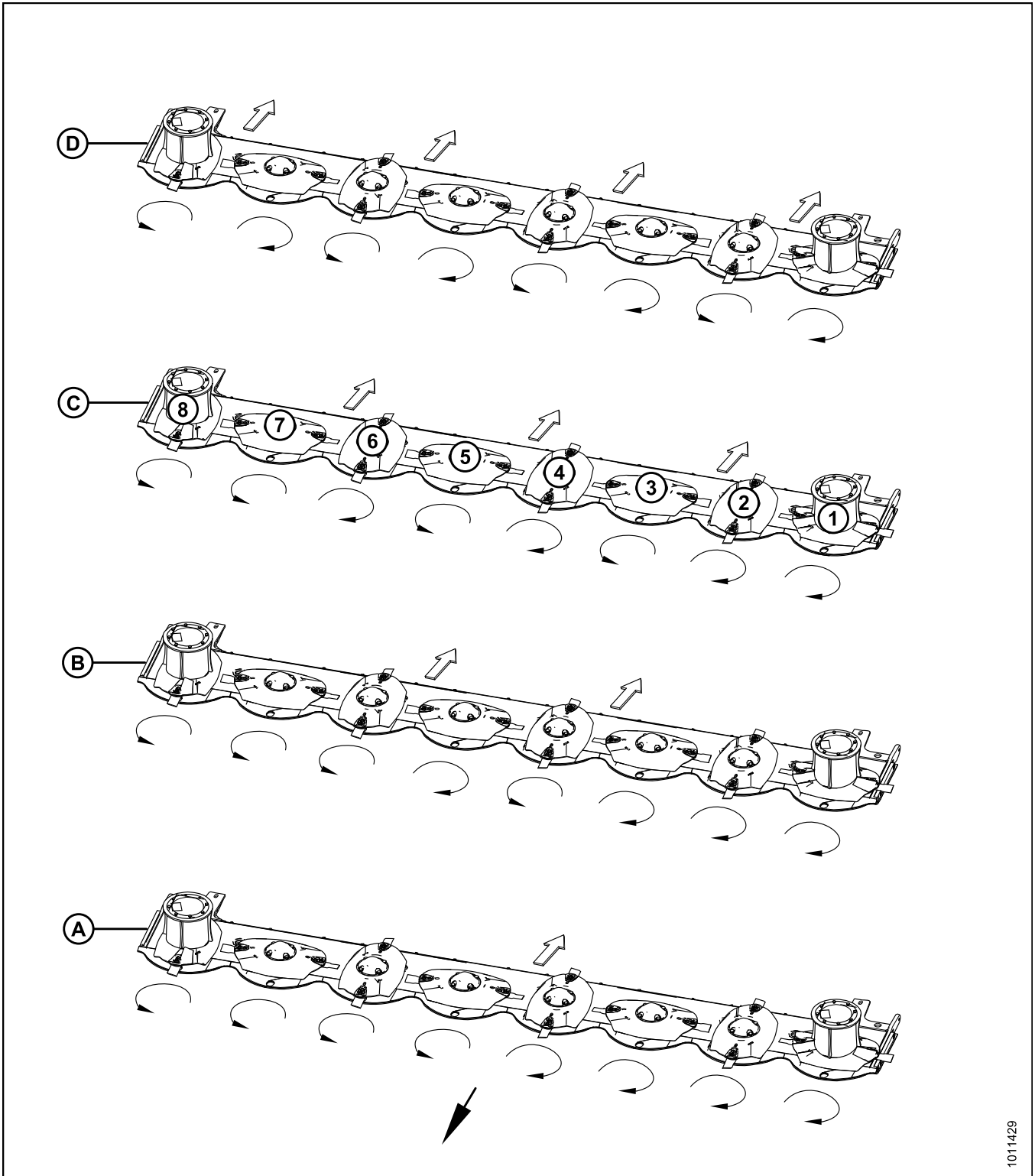


Figure 4.49: 13- and 16-Foot Cutterbars

Changing 13-Footer Cutterbar Crop Stream Configuration



1011429

Figure 4.50: 13-Footer (8 Disc) Spindle Rotation Pattern and Crop Streams

A - One Crop Stream

B - Two Crop Streams

C - Three Crop Streams

D - Four Crop Streams

MAINTENANCE AND SERVICING

NOTE:

Refer to [Removing Cutterbar Spindles, page 136](#) and [Installing Cutterbar Spindles, page 138](#).

Change 13-foot (8 disc) spindle rotation from three crop-streams (C) to one crop stream (A).

1. Swap disc/spindle (3) with disc/spindle (6).

Change 13-foot (8 disc) spindle rotation from three crop-streams (C) to two crop streams (B).

1. Swap disc/spindle (3) with disc/spindle (4).
2. Swap disc/spindle (5) with disc/spindle (6).

Change 13-foot (8 disc) spindle rotation from three crop-streams (C) to four crop streams (D).

1. Swap disc/spindle (2) with disc/spindle (3).
2. Swap disc/spindle (4) with disc/spindle (5).
3. Swap disc/spindle (6) with disc/spindle (7).

MAINTENANCE AND SERVICING

Changing 16-Footer Cutterbar Crop Stream Configuration

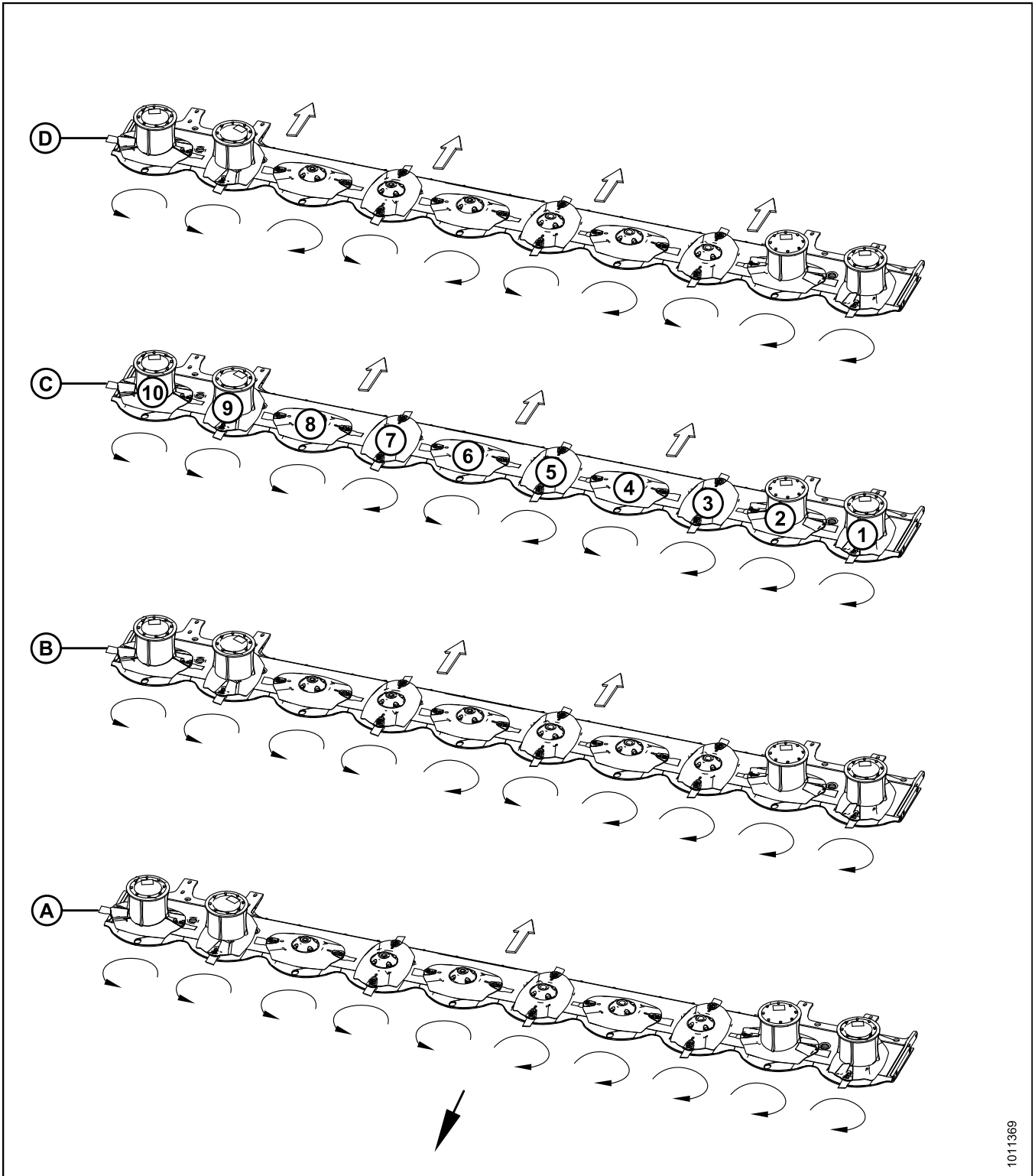


Figure 4.51: 16-Footer (10 Disc) Spindle Rotation Pattern and Crop Streams

A - One Crop Stream

B - Two Crop Streams

C - Three Crop Streams

D - Four Crop Streams

NOTE:

Refer to [Removing Cutterbar Spindles, page 136](#) and [Installing Cutterbar Spindles, page 138](#).

Change 16-foot (10 disc) spindle rotation from three crop-streams (C) to one crop stream (A).

1. Swap disc/spindle (4) with disc/spindle (7).

Change 16-foot (10 disc) spindle rotation from three crop-streams (C) to two crop streams (B).

1. Swap disc/spindle (4) with disc/spindle (5).
2. Swap disc/spindle (6) with disc/spindle (7).

Change 16-foot (10 disc) spindle rotation from three crop-streams (C) to four crop streams (D).

1. Swap disc/spindle (3) with disc/spindle (4).
2. Swap disc/spindle (5) with disc/spindle (6).
3. Swap disc/spindle (7) with disc/spindle (8).

4.4.5 Cutterblades

Each disc has two cutterblades (A) attached at opposite ends that are free to rotate horizontally on a specially designed shoulder bolt.

The blade (A) has two cutting edges and can be flipped over so that the blade does not need replacing as often.

The blades are NOT repairable and must be replaced if severely worn or damaged.

IMPORTANT:

Always use factory replacement parts.

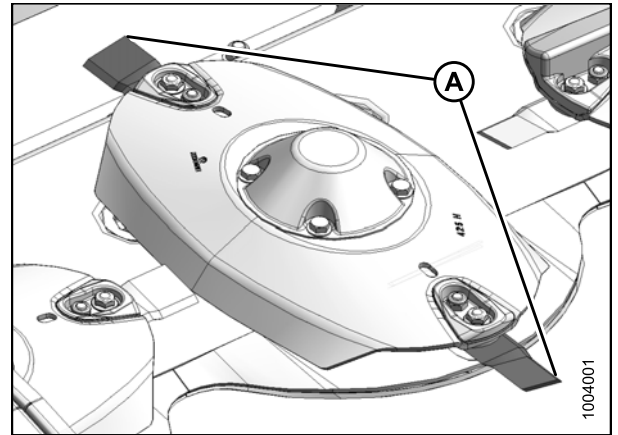


Figure 4.52: Cutterblades

Inspecting Cutterblades

DANGER

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

CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

CAUTION

Damaged blades may damage the cutterbar and result in poor cutting performance. Replace damaged blades at earliest possible opportunity.

CAUTION

Damaged or loose cutterblades or blade attachment hardware can be ejected during machine operation and may cause personal injury or machine damage.

MAINTENANCE AND SERVICING

1. Check daily that the cutterblades are securely attached to the disc.
2. Inspect blades for cracks, wear beyond safe operating limits (C), and distortion.
3. Replace blades immediately if any problems occur.

IMPORTANT:

Blades should be replaced in pairs, or the disc may become unbalanced and cause damage to the cutterbar.

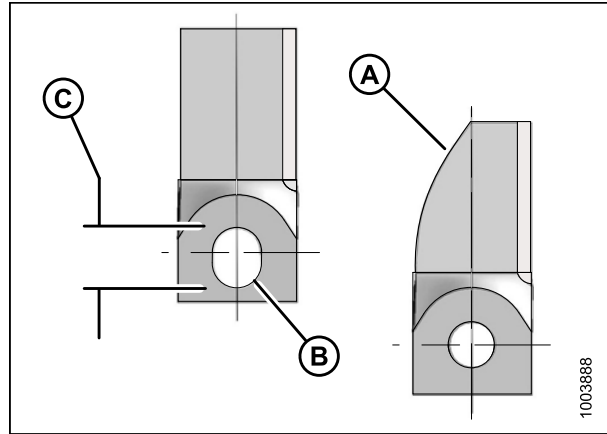


Figure 4.53: Cutterblades

A - Blade Wear to Center Line

B - Elongated Hole

C - Maximum Elongation 21 mm (13/16 in.)

IMPORTANT:

The cutterblades have cutting edges on both sides so the blades can be turned over and reused. The twist in each blade determines the cutting direction. If you are unsure which direction the spindles rotate, refer to [4.4.4 Cutterbar Crop Stream Configuration, page 143](#).

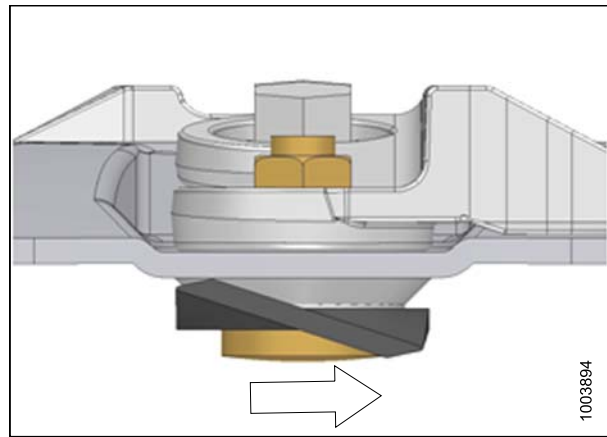


Figure 4.54: Counterclockwise Disc Rotation Direction

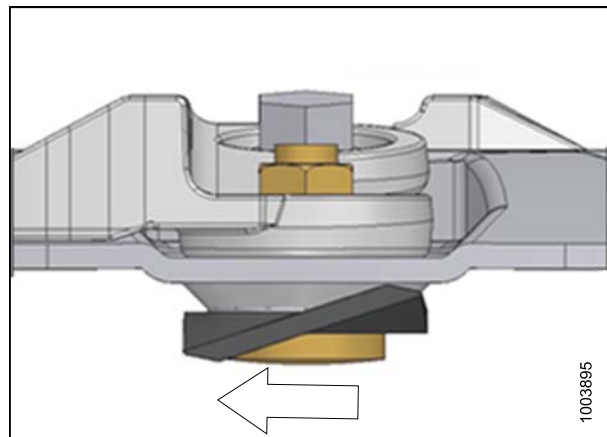


Figure 4.55: Clockwise Disc Rotation Direction

MAINTENANCE AND SERVICING

Inspecting Cutterblade Hardware

CAUTION

Damaged or loose cutterblades or blade attachment hardware can be ejected during machine operation and may cause personal injury or machine damage.

MAINTENANCE AND SERVICING

Inspect blade attachment hardware each time blades are changed.

1. Check and replace bolts under the following conditions:
 - Bolt has been removed and reinstalled five times.
 - Head (A) is worn flush with bearing surface of blade.
 - Diameter of bolt neck is worn (B) to 3 mm (1/8 in.) or less.
 - Bolt is cracked (C).
 - Bolt is visibly distorted (D).
 - Bolt shows evidence of interference (E) with adjacent parts.

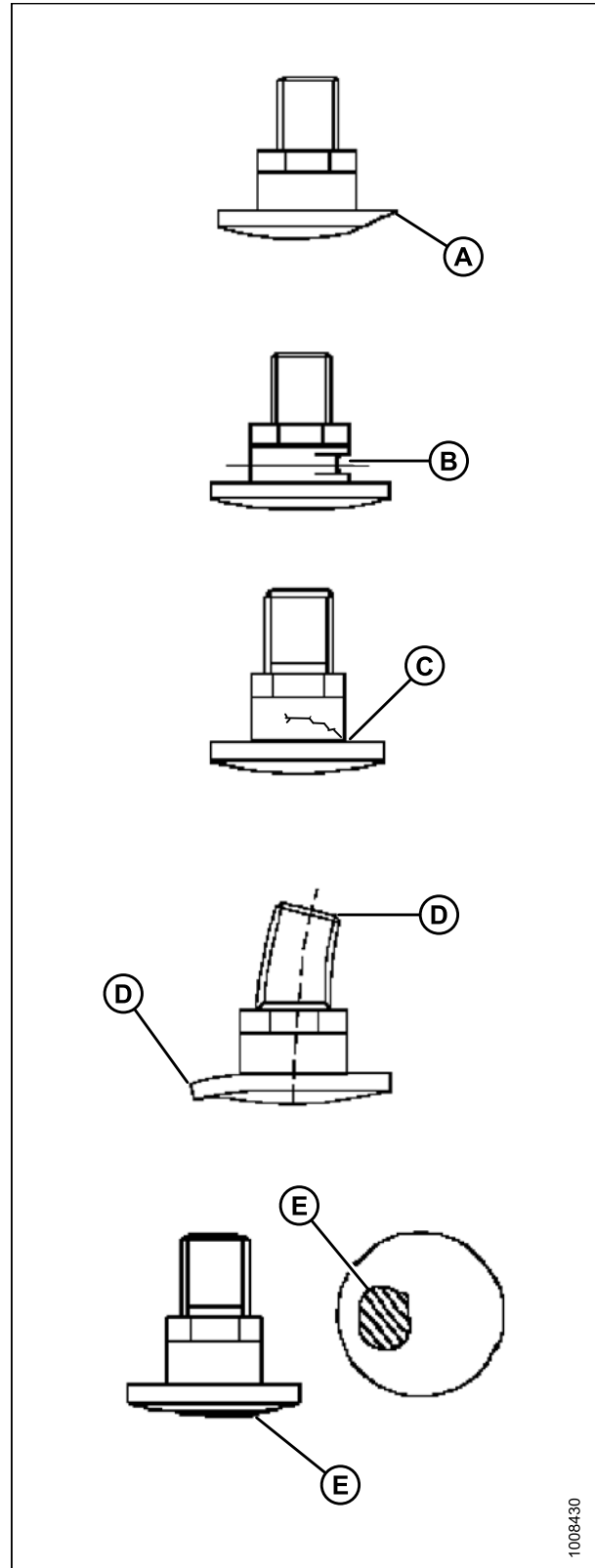


Figure 4.56: Cutterblade Bolts

MAINTENANCE AND SERVICING

2. Check and replace nuts under the following conditions:
 - Nut has been previously installed—nuts are one-time-use only.
 - Nut shows signs of wear (A) that is more than half the original height (B).
 - Nut is cracked.

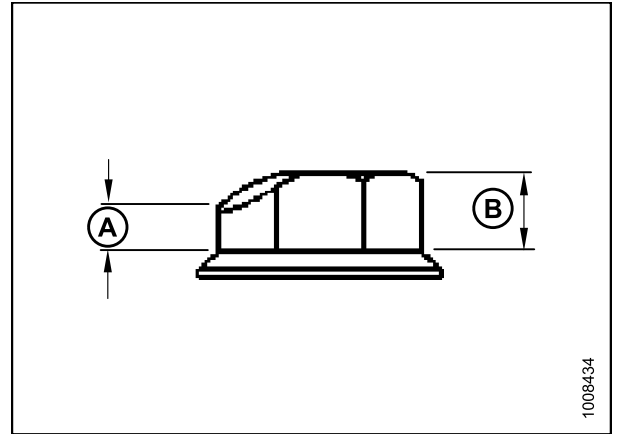


Figure 4.57: Cutterblade Nut

Removing Cutterblades

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

1. Raise mower conditioner fully, shut off engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Open cutterbar door(s).

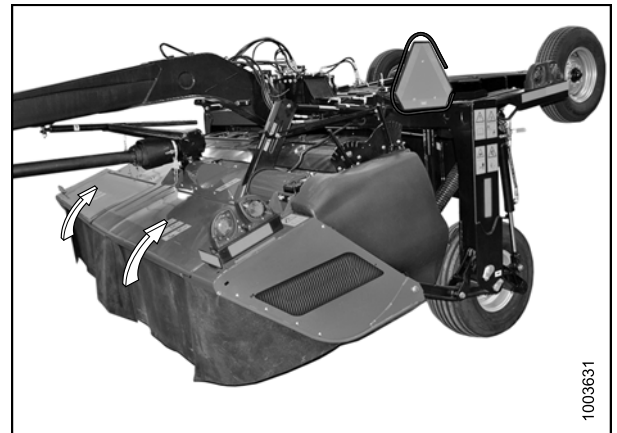


Figure 4.58: Cutterbar Doors

MAINTENANCE AND SERVICING

4. Rotate disc (A) so that blade (B) faces forward and lines up with hole (C) in rock guard.

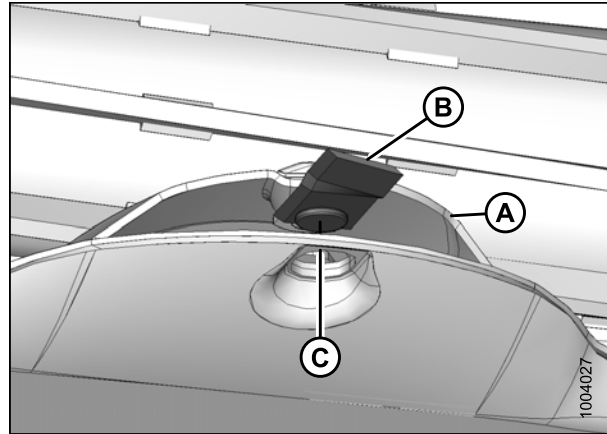


Figure 4.59: Cutterblade Aligned with Hole in Rock Guard

5. Place a pin (or equivalent) in the front hole of the rock guard to prevent disc rotation while loosening blade bolts.
6. Clean debris from blade attachment area.
7. Remove nut (A) and discard.

IMPORTANT:

Nuts are one-time-use only. When flipping or changing a blade, replace using a new nut only.

8. Remove shoulder bolt (B) and blade (C).

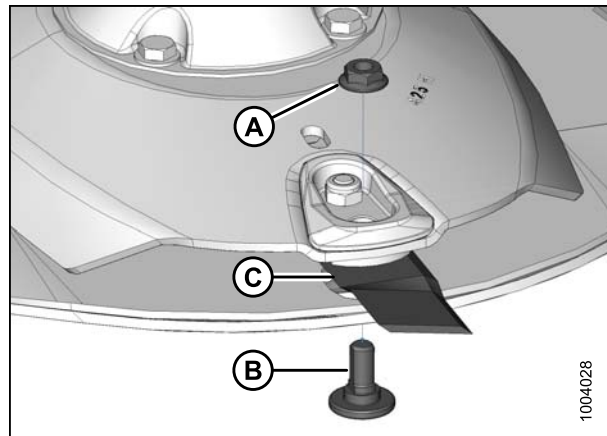


Figure 4.60: Nut, Shoulder Bolt, and Cutter Blade

Installing Cutterblades

CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

IMPORTANT:

If you are unsure which direction the spindles rotate, refer to [4.4.4 Cutterbar Crop Stream Configuration, page 143](#).

MAINTENANCE AND SERVICING

1. Place a pin (or equivalent) in the front hole of the rock guard to prevent disc rotation while tightening blade bolts.
2. Install new or reversed blade (A) with shoulder bolt (B) onto disc (C).

IMPORTANT:

Nuts are one-time-use only. When flipping or changing a blade, replace using a **new** nut only.

3. Install new nut (D) and torque to 125 N·m (92 ft·lbf).

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

4. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

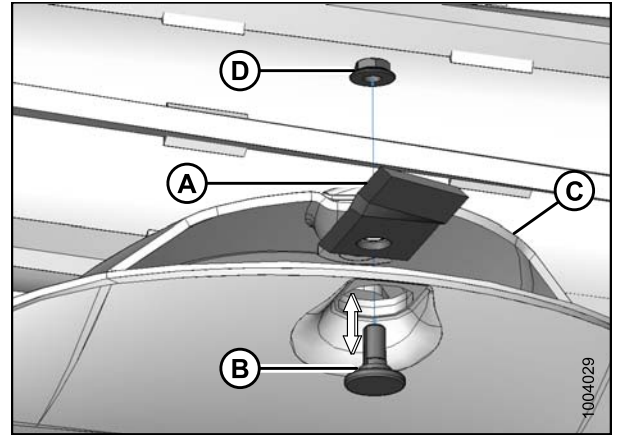


Figure 4.61: Nut, Shoulder Bolt, and Cutter Blade

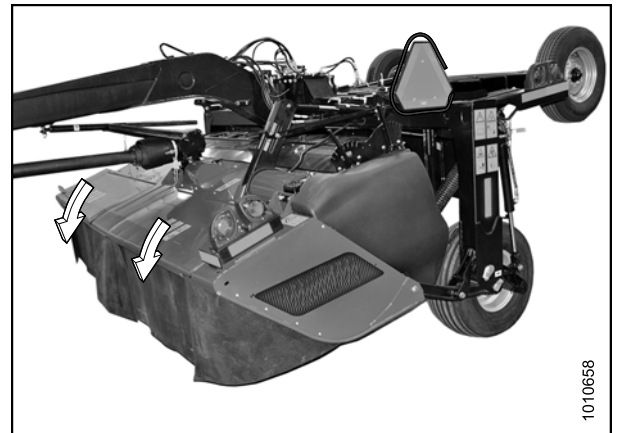


Figure 4.62: Cutterbar Doors in Closed Position

4.4.6 Cutterbar Doors

WARNING

Do NOT operate the machine without all the cutterbar doors down or without curtains installed and in good condition.

MAINTENANCE AND SERVICING

There are two doors complete with rubber curtains (A) that provide access to the cutterbar area.

Rubber outboard curtains (B) are attached to each front corner, and an inboard curtain (C) is installed at the center fixed cover location. Always keep these curtains down when operating the mower conditioner.

IMPORTANT:

Replace curtains if they become worn or damaged. Refer to [4.4.7 Curtains, page 154](#) or contact your Dealer for replacement instructions.

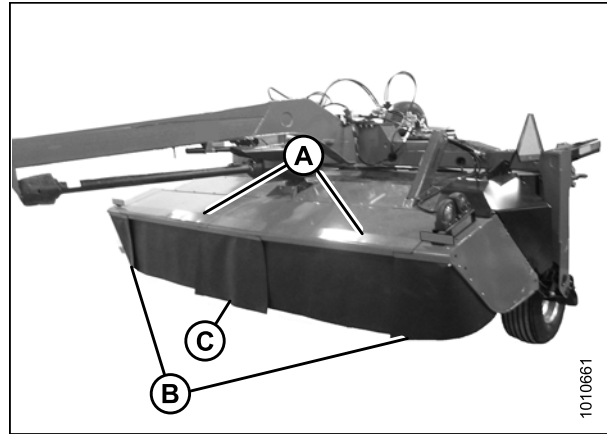


Figure 4.63: Cutterbar Doors and Curtains

Inspecting Cutterbar Doors

1. Ensure that door operates smoothly and lies flat when closed. Adjust if necessary.
2. Inspect hinge pin bolts (A) and tighten if loose.
3. Check door for cracks and repair if required.
4. Check for exposed metal surfaces and surface rust. Repair and repaint if necessary.
5. Check shield/curtain bolts (B) and replace if missing or tighten if loose.

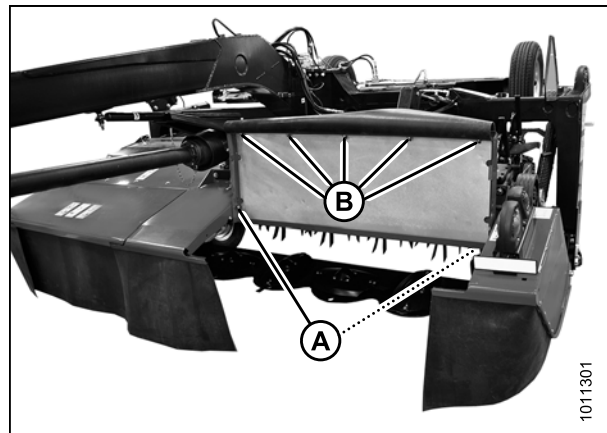


Figure 4.64: Cutterbar Door

4.4.7 Curtains

Rubber curtains are installed at the following locations:

- Inboard curtain (A) attached to the center fixed cover.
- Door curtains (B) attached to each cutterbar door.
- Outboard curtains (C) attached to each front corner.
- Top cover (not shown) on finger conditioners only.

The curtains form a barrier that minimizes the risk of thrown objects being ejected from the cutterbar area. Always keep curtains down during operation.

Replace the curtains if they become worn or damaged.

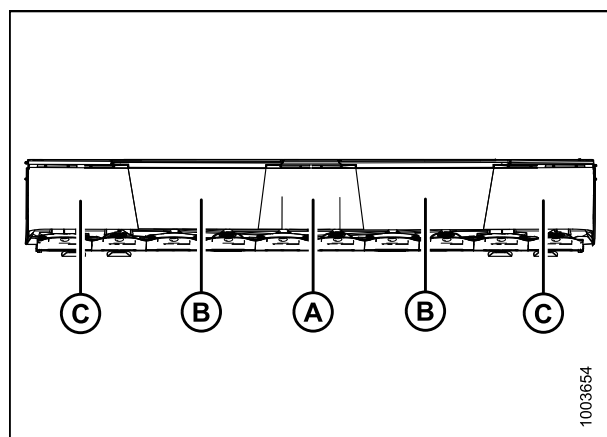


Figure 4.65: Cutterbar Curtains

Inspecting Curtains

The cutterbar curtains are very important to reduce the potential for thrown objects. Always keep these curtains down when operating the mower conditioner.

⚠ WARNING

Do NOT operate the machine without all the cutterbar doors down or without curtains installed and in good condition.

⚠ CAUTION

To avoid injury, keep hands and fingers away from corners of doors when closing.

Check cutterbar curtains for the following conditions:

- Rips and tears: Replace curtain.
- Cracking: While the curtain may look whole, this is an indicator that failure is imminent—replace curtain.
- Missing bolts: Replace missing hardware before operating.

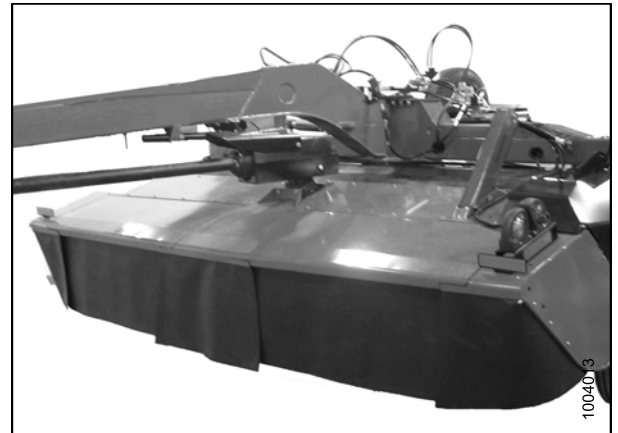


Figure 4.66: Cutterbar Curtains

Removing Cutterbar Door Curtains

The procedure for removing cutterbar door curtains is the same for both doors.

1. Open cutterbar door. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

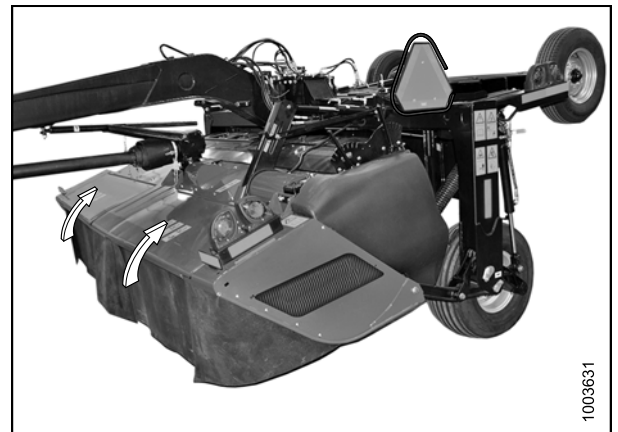


Figure 4.67: Cutterbar Doors

MAINTENANCE AND SERVICING

2. Remove five nuts (A) from the bolt studs.
3. Remove shield panel (B).
4. Remove curtain (C).

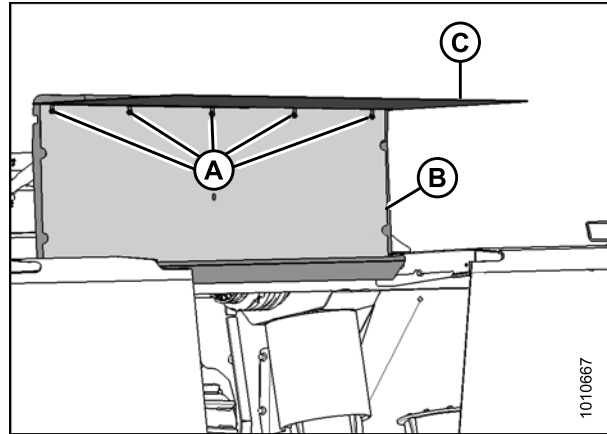


Figure 4.68: Nuts Securing Shield Panel and Curtain to Cutterbar Door

Installing Cutterbar Door Curtains

The procedure for installing cutterbar door curtains is the same for both sides.

1. Insert the cutterbar door bolts into the precut curtain holes (A).

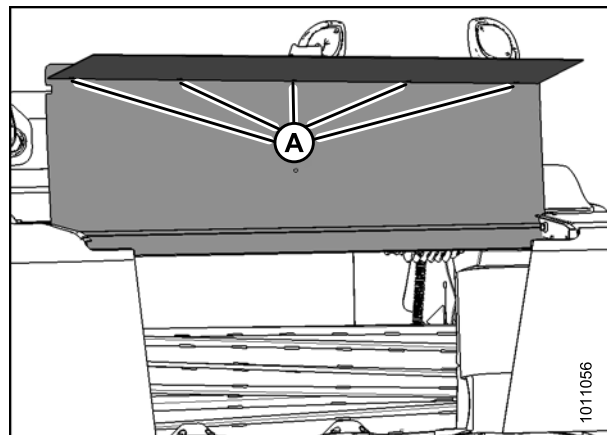


Figure 4.69: Curtain Installed onto Bolts

2. Install shield panel (A).
3. Install five nuts (B) onto bolt studs and torque to 32 N·m (23 ft·lbf).

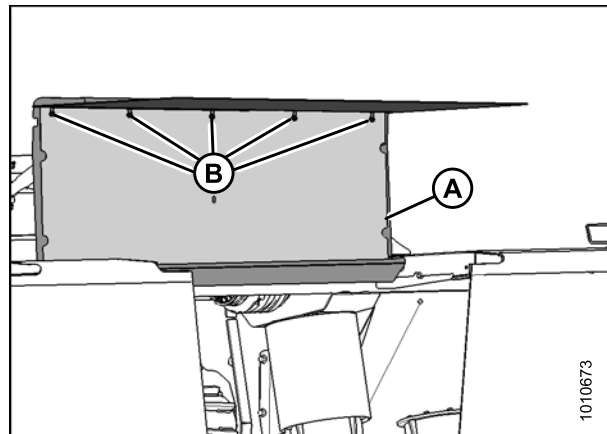


Figure 4.70: Shield Panel Installed with Nuts

MAINTENANCE AND SERVICING

4. Close cutterbar door. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.



Figure 4.71: Cutterbar Doors in Closed Position

Removing Cutterbar Inboard Curtain

1. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors](#), page 36.

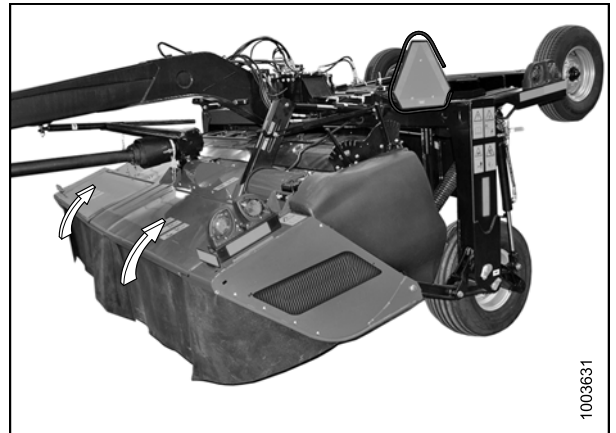


Figure 4.72: Cutterbar Doors

2. Remove two M10 carriage head bolts (A) and nuts securing curtain assembly (B) to the mower conditioner, and remove curtain assembly.

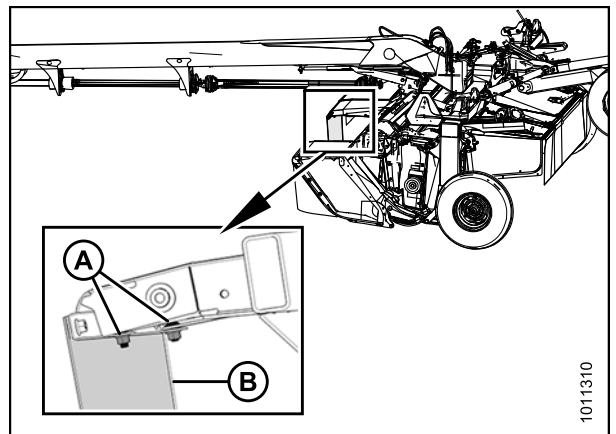


Figure 4.73: Inboard Curtain

MAINTENANCE AND SERVICING

3. Remove four nuts (A) from weld studs on center shield, remove two curtain brackets (B), and remove curtain.

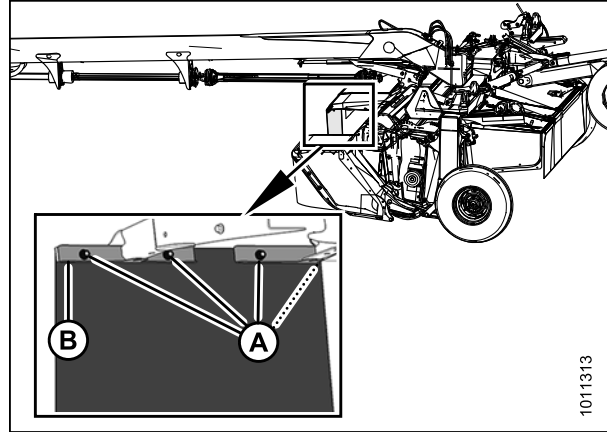


Figure 4.74: Inboard Curtain, Nuts, and Brackets

Installing Cutterbar Inboard Curtain

1. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

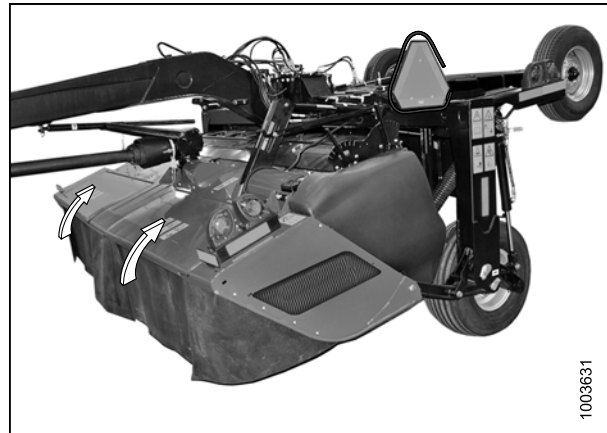


Figure 4.75: Cutterbar Doors

2. Install curtain onto weld studs on center shield, install two curtain brackets (B), and secure with four nuts (A).

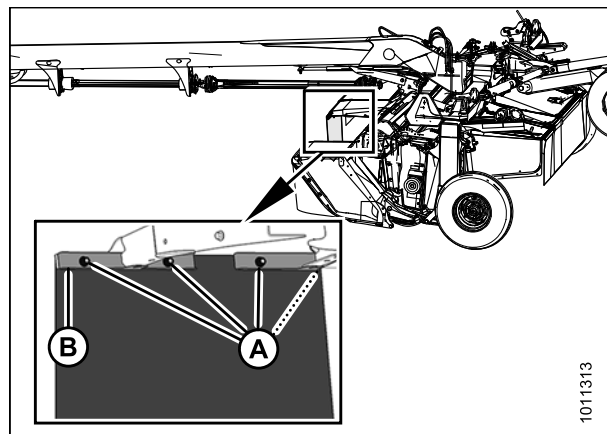


Figure 4.76: Inboard Curtain and Brackets

MAINTENANCE AND SERVICING

3. Secure two curtain brackets (A) to center shield using two M10 carriage head bolts (B) and nuts.
4. Torque bolts (A) to 40 N·m (30 ft·lbf).

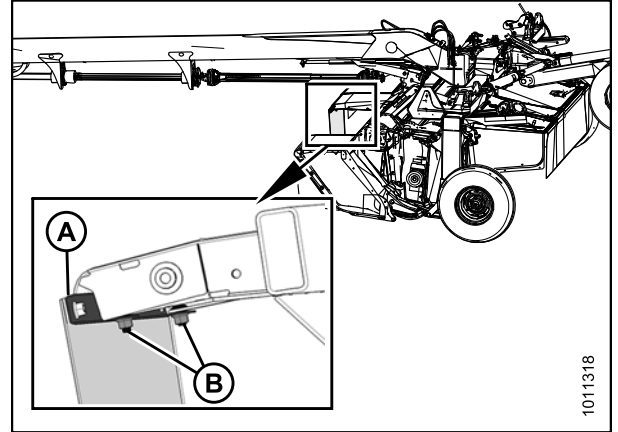


Figure 4.77: Inboard Curtain Attached to Mower Conditioner

Removing Outboard Curtains

The procedure for removing outboard curtains is the same for both sides.

1. Open cutterbar door. Refer to [3.3.1 Opening Cutterbar Doors](#), page 36.

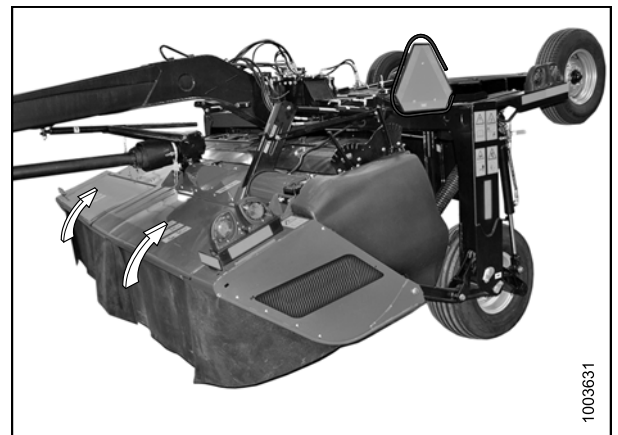


Figure 4.78: Cutterbar Doors

2. Remove four cap screws (A), nuts, and large washers securing outboard curtain to endsheet.

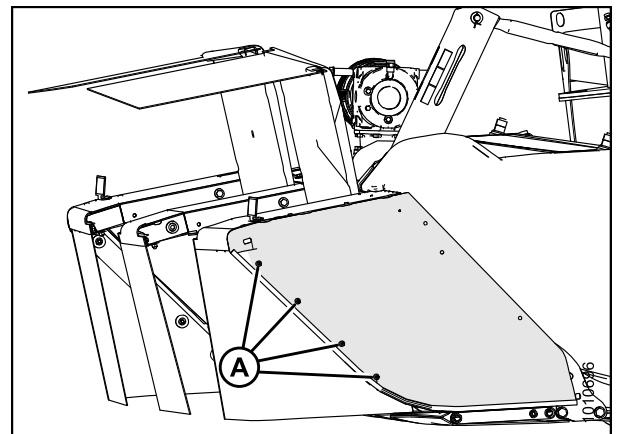


Figure 4.79: Left Side Endsheets

MAINTENANCE AND SERVICING

3. Remove two nuts (A) from bolt studs.
4. Remove the square neck carriage head bolt (B), slide out the bracket, and remove curtain (C).

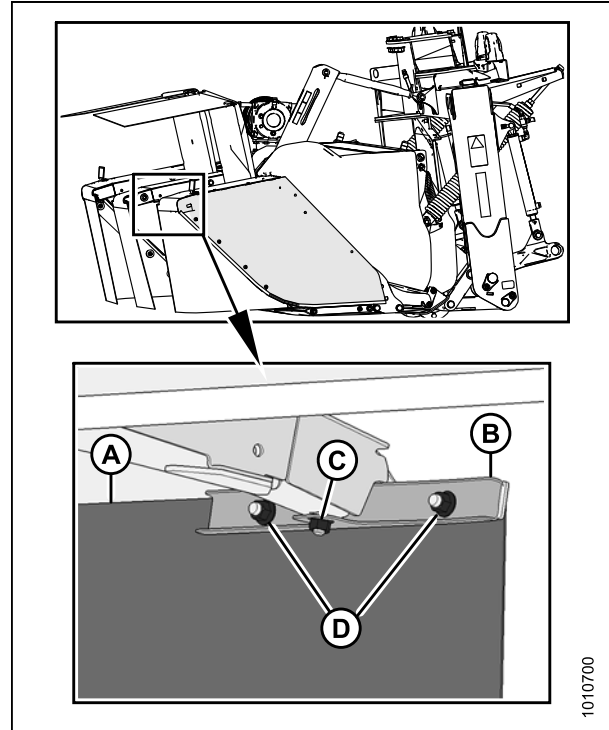


Figure 4.80: Outboard Curtain

Installing Outboard Curtains

The procedure for installing outboard curtains is the same for both sides.

1. Open cutterbar door. Refer to [3.3.1 Opening Cutterbar Doors](#), page 36.

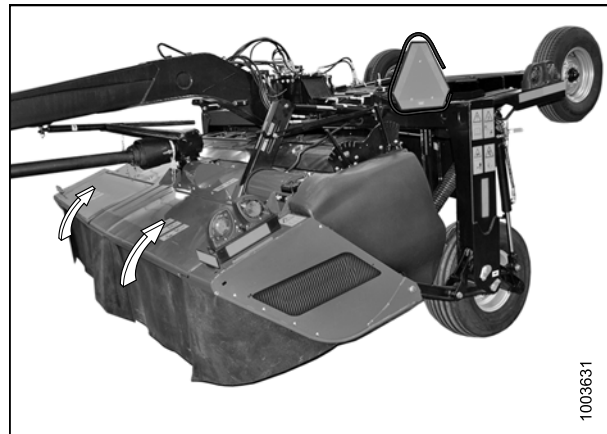


Figure 4.81: Cutterbar Doors

MAINTENANCE AND SERVICING

2. Install curtain (A) into bracket (B).
3. Install two nuts (D) and tighten.
4. Slide bracket (B) into position, and install the square neck carriage head bolt and flange nut (C).
5. Torque flange nut (C) to 40 N·m (30 ft·lbf).

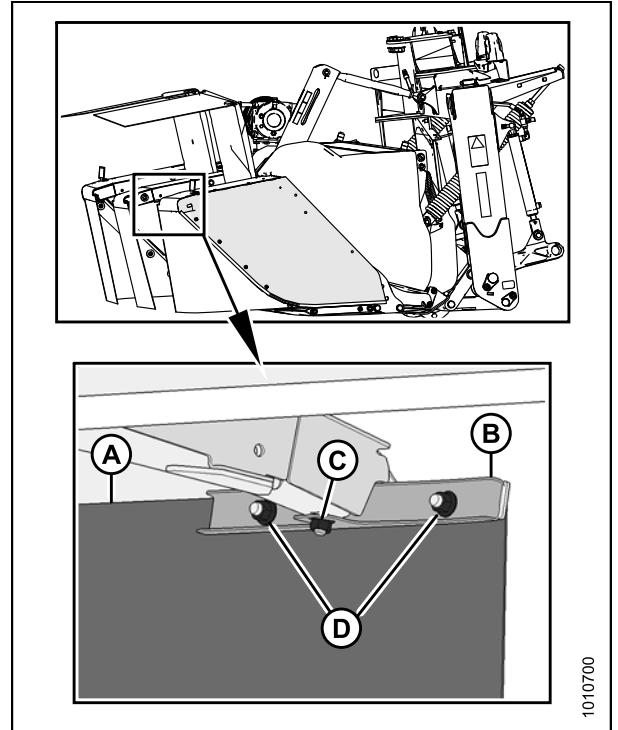


Figure 4.82: Outboard Curtain

6. Install four cap screws (A), nuts, and large washers to secure outboard curtain to endsheet.

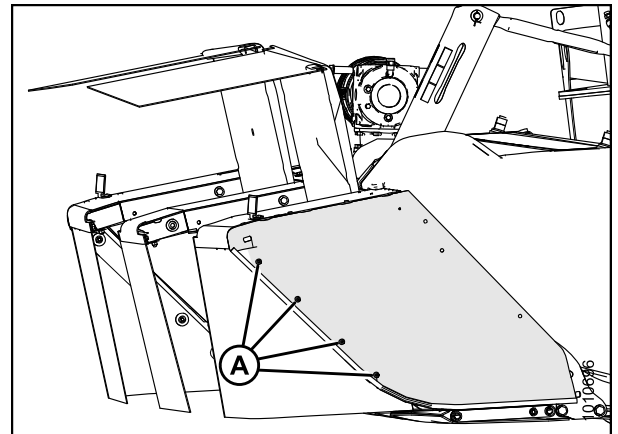


Figure 4.83: Left Side Endsheet

4.4.8 Accelerators

Accelerators (A) are mounted on each outboard disc and are designed to quickly move cut material off the disc and into the conditioner.

One pair of accelerators is installed at each outboard end of a 13-foot mower conditioner, whereas a 16-foot mower conditioner has two pairs.

Periodically inspect accelerators for damage and loose or missing fasteners and replace as necessary.

IMPORTANT:

Always replace accelerators in pairs to ensure proper disc balance.

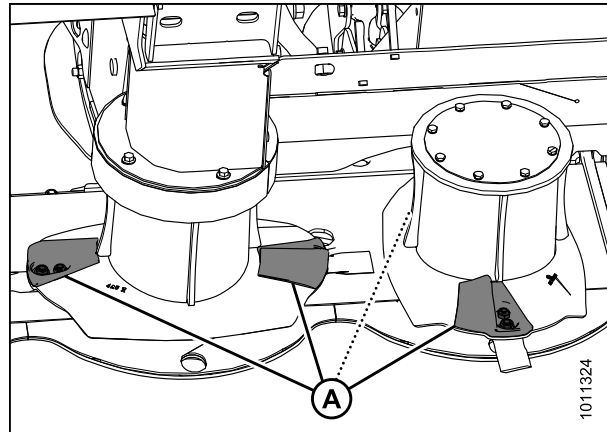


Figure 4.84: 16-Foot Mower Conditioner

Inspecting Accelerators

⚠ DANGER

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

1. Raise mower conditioner fully, stop engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

⚠ CAUTION

Cutter blades have two cutting edges. Exercise caution when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

4. Inspect accelerators for damage and wear, and replace if worn to 50% or more of their original height or if they are no longer effectively moving crop.
5. Check for loose or missing fasteners and tighten or replace missing fasteners.

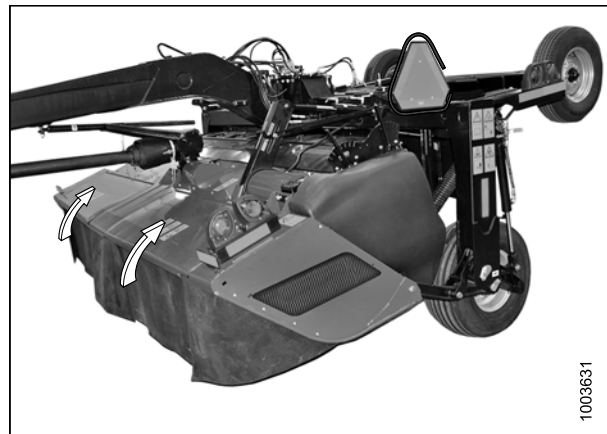


Figure 4.85: Cutterbar Doors

Removing Accelerators

IMPORTANT:

Always replace accelerators in pairs to ensure proper disc balance.

MAINTENANCE AND SERVICING

1. Raise mower conditioner fully, shut off engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Remove nut (A), flange bolt (B), and cutterblade (C) from disc. Discard nut.

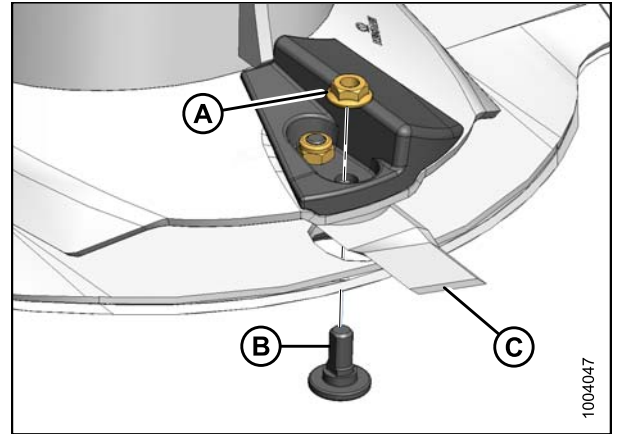


Figure 4.86: Cutterblade and Disc

4. Remove lock nut (A), accelerator (B), blade holder (C), and hex-socket bolt (D).
5. Repeat the removal procedure for the second accelerator.

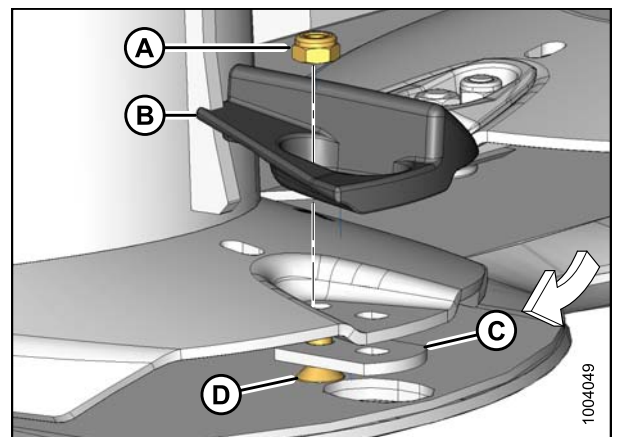


Figure 4.87: Accelerator and Hardware

Installing Accelerators

IMPORTANT:

Always replace accelerators in pairs to ensure proper disc balance.

1. Place a wooden block between two cutterbar discs to prevent disc rotation while tightening blade bolts.

IMPORTANT:

Accelerators can operate in a clockwise or counterclockwise direction. Verify the direction of the disc before installing accelerators. If you are unsure which direction the spindle rotates, refer to [4.4.3 Cutterbar Spindles, page 136](#).

2. Install lock nut (A), accelerator (B), blade holder (C) and hex-socket bolt (D). Do **NOT** tighten at this time.

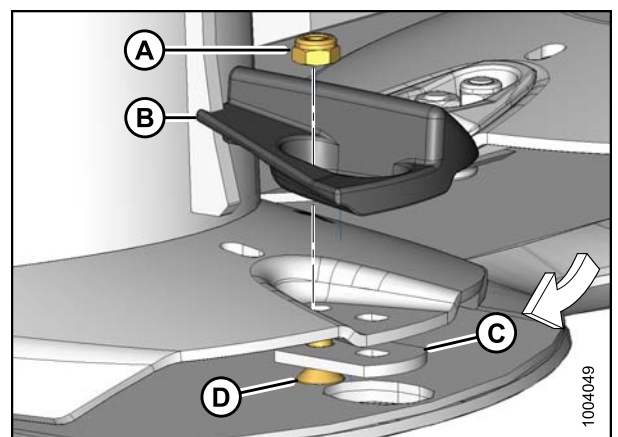


Figure 4.88: Accelerator and Hardware

MAINTENANCE AND SERVICING

3. Install new nut (A), flange bolt (B), and cutterblade (C) onto disc.

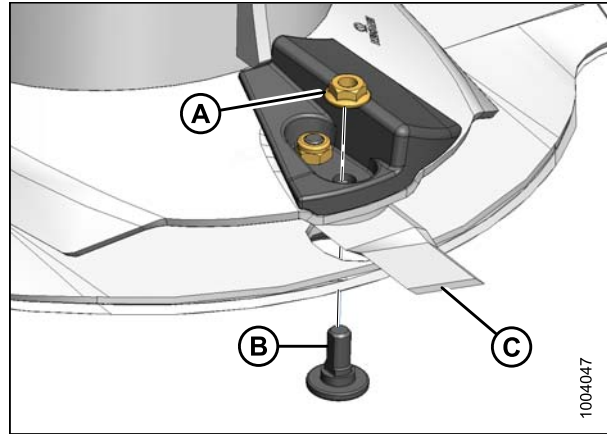


Figure 4.89: Cutterblade and Disc

4. Torque the inside nut (A) to 58 N·m (43 ft·lbf).
5. Torque the outside nut (B), closest to the blade, to 125 N·m (92 ft·lbf).
6. Repeat the installation procedure for the second accelerator.

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

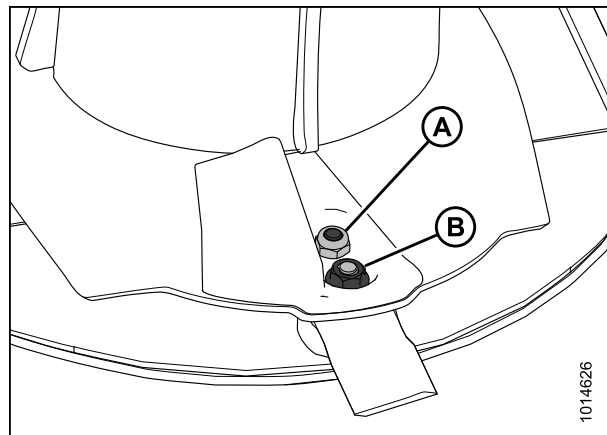


Figure 4.90: Cutterblade and Disc

7. Remove wooden block.
8. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

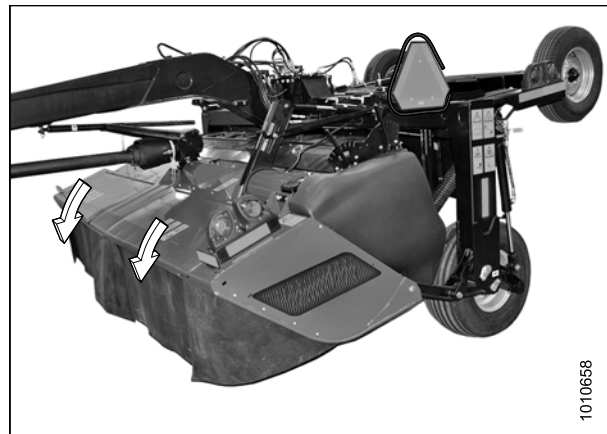


Figure 4.91: Cutterbar Doors in Closed Position

4.4.9 Rock Guards

The machine is equipped with rock guards at each cutting disc location. Rock guards prevent the cutterbar from digging into the ground and protect the disc from coming in contact with stones and other debris.

Inspecting Rock Guards

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

CAUTION

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

1. Raise mower conditioner fully, stop engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Inspect rock guards for severe damage, wear, and distortion, and replace if worn to 75% or more of their original thickness.
4. Check for loose or missing fasteners and tighten or replace missing fasteners.

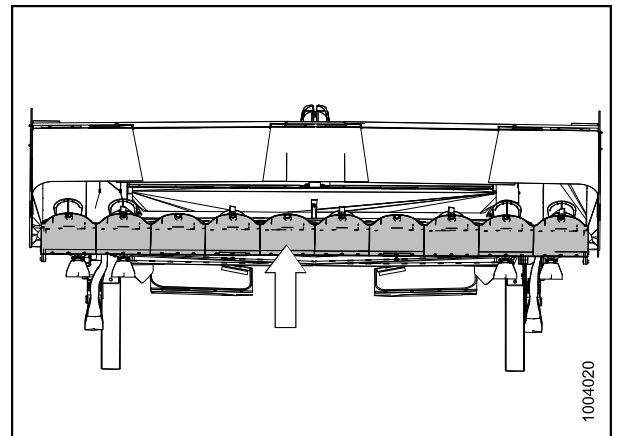


Figure 4.92: Rock Guards

Removing Rock Guards

1. Remove two hex head screws, washers, and lock nuts (A).

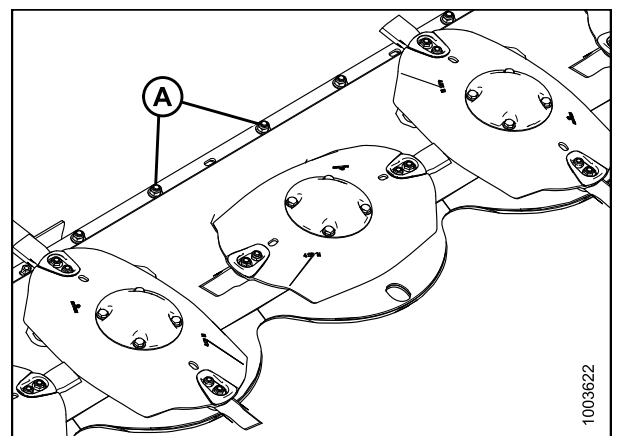


Figure 4.93: Rock Guard Hardware

MAINTENANCE AND SERVICING

- Slide rock guard (A) forward in the direction of arrow (B) and remove.

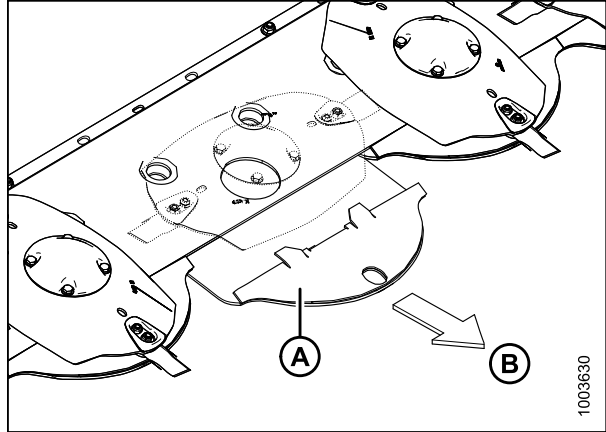


Figure 4.94: Rock Guard Removed from Cutterbar

Installing Rock Guards

- Guide rock guard onto cutterbar until tabs (A) sit on top of the cutterbar while bottom back bolt holes line up.

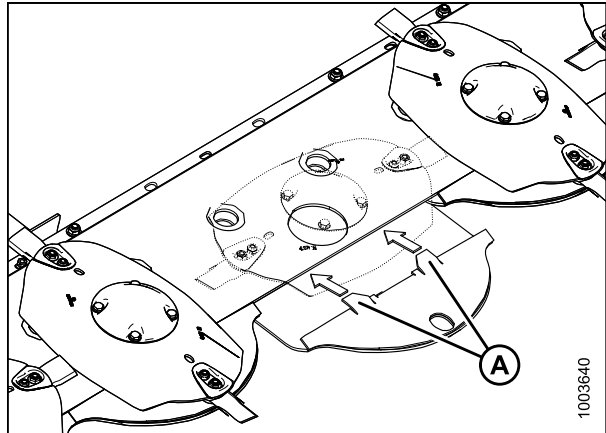


Figure 4.95: Rock Guard Installed on Cutterbar

- Install two hex head screws, washers, and lock nuts (A). Torque to 68 N·m (50 ft·lbf).

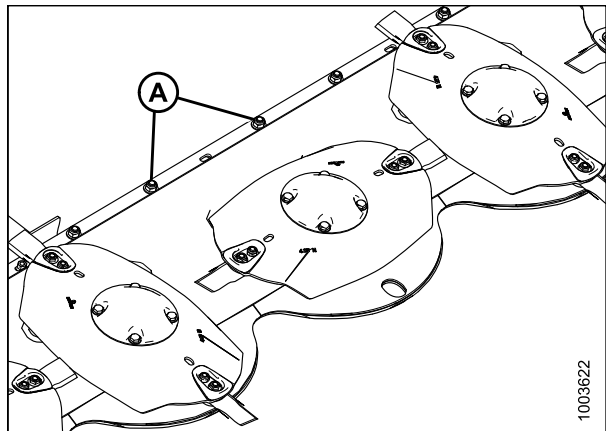


Figure 4.96: Rock Guard Hardware

4.4.10 Rotary Deflectors

The rotary deflectors are designed to deliver cut material from the ends of the cutterbar and help maintain an even flow of crop into the conditioner. Rotary deflectors are attached to only the two outboard discs at each end of the cutterbar.

IMPORTANT:

The outboard deflectors (B) are approximately 23 mm (29/32 in.) smaller in diameter than the inboard deflectors (A).

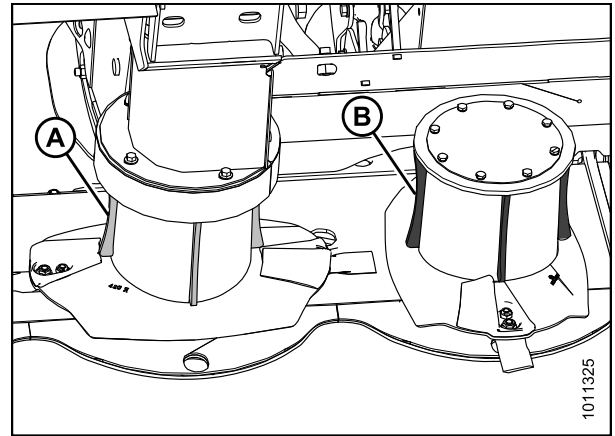


Figure 4.97: Rotary Deflectors

A - Driven Rotary Deflector B - Non-Driven Rotary Deflector

Inspecting Rotary Deflectors

Inspect rotary deflectors daily for signs of damage or wear.

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

1. Lower mower conditioner fully, shut off engine, and remove key.
2. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

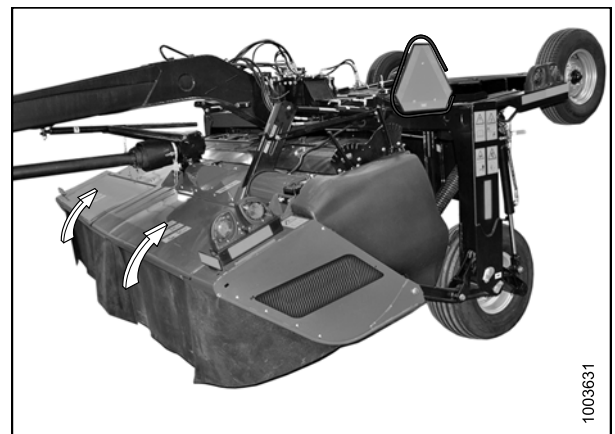


Figure 4.98: Cutterbar Doors

MAINTENANCE AND SERVICING

3. Inspect deflectors (A) and (B) for damage and wear, and replace if deflectors are worn at the center to 50% or more of their original thickness. Do **NOT** repair deflectors.
4. Examine drums for large dents. Replace dented drums to prevent an imbalance in the cutterbar.
5. Tighten or replace loose or missing fasteners.

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

6. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors, page 38](#).

Removing Driven Rotary Deflectors and Driveline

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

CAUTION

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

NOTE:

Images shown are for left side rotary deflector and driveline—right side rotary deflector and driveline is similar.

1. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

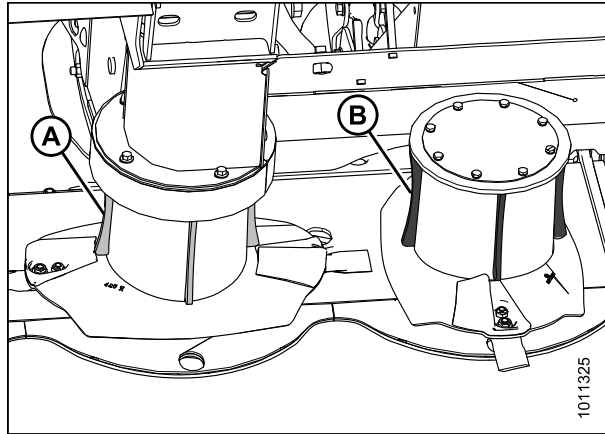


Figure 4.99: Rotary Deflectors

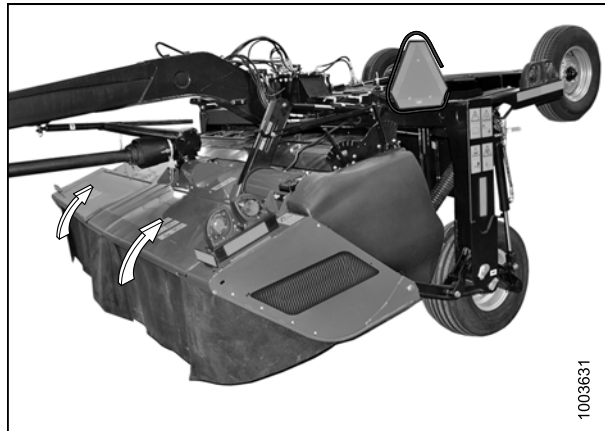


Figure 4.100: Cutterbar Doors

MAINTENANCE AND SERVICING

2. Remove four M10 hex flange head bolts (A) and remove vertical drive shield (B).

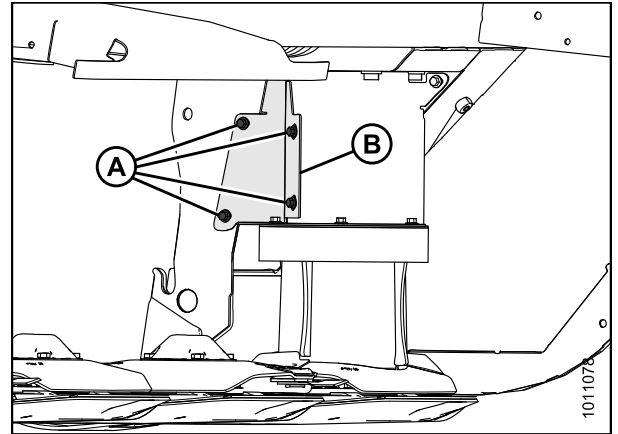


Figure 4.101: Vertical Drive Shield

3. Remove two M10 hex flange head bolts (A) and remove cover plate (B).

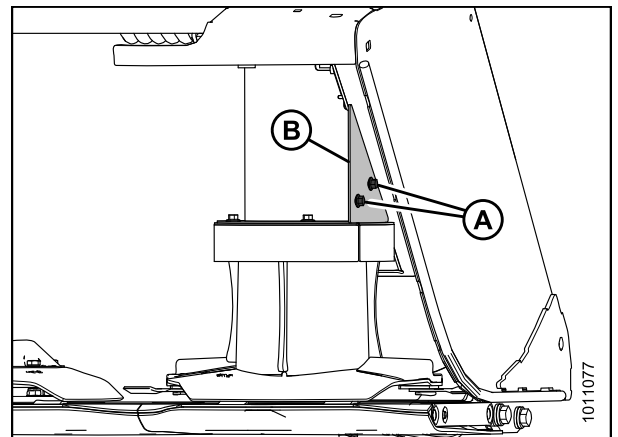


Figure 4.102: Cover Plate

4. Remove four M10 hex flange head bolts (A), and remove top plate (B) and drum top (C).

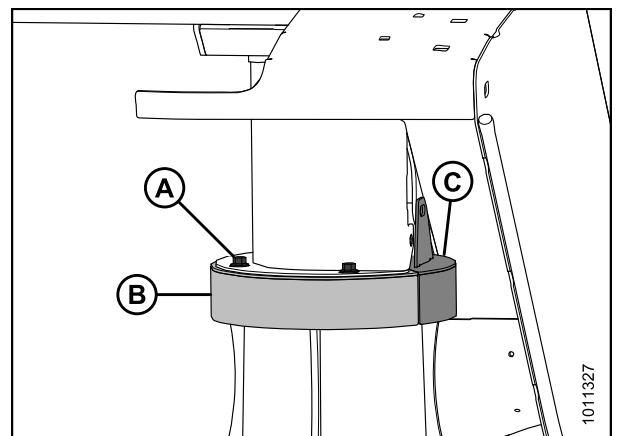


Figure 4.103: Top Plate and Drum Top

MAINTENANCE AND SERVICING

5. Remove M10 hex flange head bolt (A) and remove vertical shield (B).

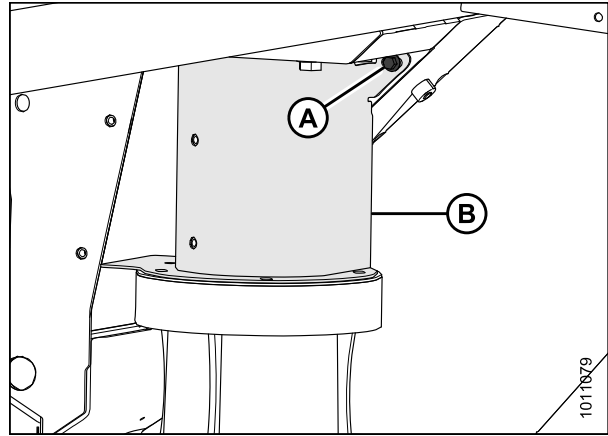


Figure 4.104: Vertical Shield

6. Remove eight M8 hex flange head bolts (A), and remove two drum shields (B).

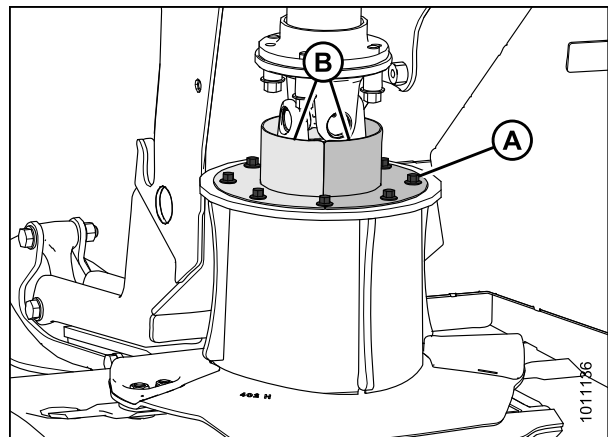


Figure 4.105: Drum Shields

7. Remove four M12 hex flange head bolts (A) and spacers securing driveline assembly (B) to hub drive (C).

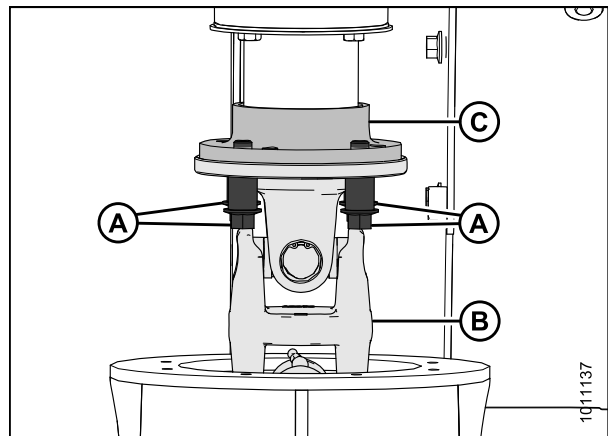


Figure 4.106: Driveline Hardware

MAINTENANCE AND SERVICING

- Slide driveline (A) downwards, tilt to the side, and pull driveline up and out of drum (cutaway view of drum and tube shield shown for improved clarity).

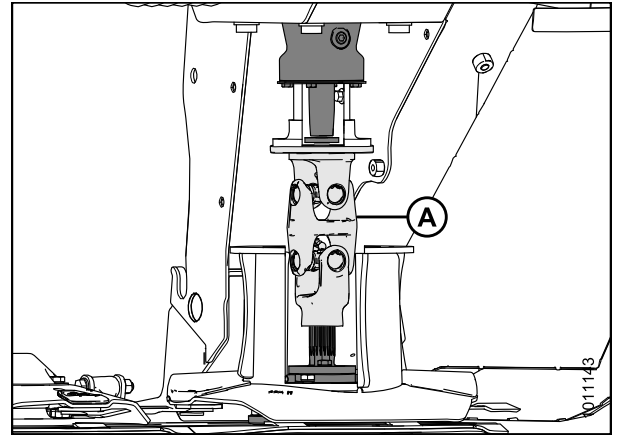


Figure 4.107: Vertical Driveline (Cutaway View Shown)

- Look down into the rotary deflector, and use a 305 mm (12 in.) extension and 16 mm deep socket to remove the four M12 bolts (A) and washers holding the deflector disc in place.
- Remove deflector disc assembly.

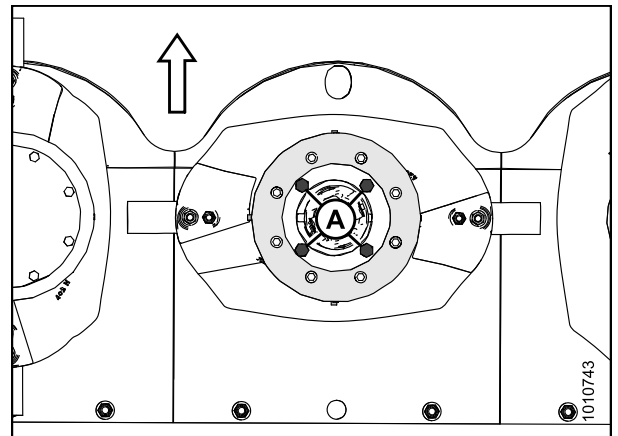


Figure 4.108: Driven Rotary Deflector (Top View)

Installing Driven Rotary Deflectors and Driveline

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

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

NOTE:

Images shown are for left side rotary deflector and driveline—right side rotary deflector and driveline is similar.

MAINTENANCE AND SERVICING

NOTE:

Arrow indicates forward direction.

1. Position the rotary deflector disc assembly as shown.
2. Use a 305 mm (12 in.) extension and 16 mm deep socket to install the four M12 bolts (A) and washers that hold the deflector disc in place. Torque to 85 N·m (63 ft·lbf).

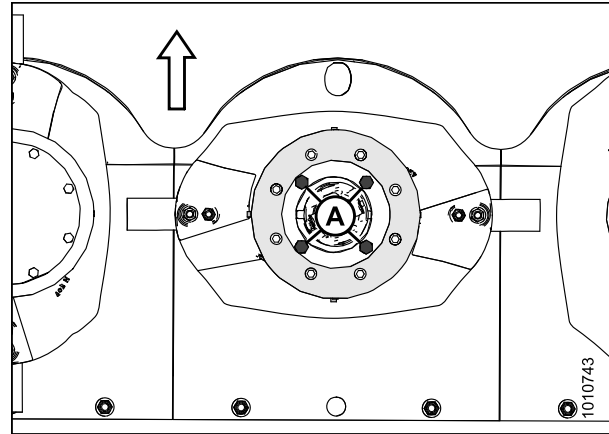


Figure 4.109: Driven Rotary Deflector (Top View)

3. Lubricate spindle splines (A) with high temperature extreme pressure (EP2) performance with 10% max. Molybdenum Disulphide (NLGI Grade 2) lithium base grease (cutaway view of drum and tube shield shown for improved clarity).

NOTE:

Do **NOT** use this grease for bearings.

4. Insert driveline (B) at an angle and guide it past hub drive (C) and drum (D).
5. Insert splined spindle end (A) into splined bore of driveline (B).

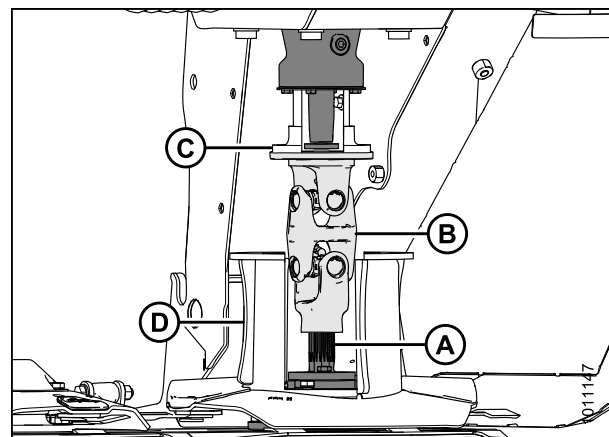


Figure 4.110: Vertical Driveline (Cutaway View Shown)

6. Place a bead of Loctite® 242 around threads, and install four M12 hex flange head bolts (A) and spacers to secure driveline assembly (B) to hub drive (C). Torque bolts to 95 N·m (70 ft·lbf).

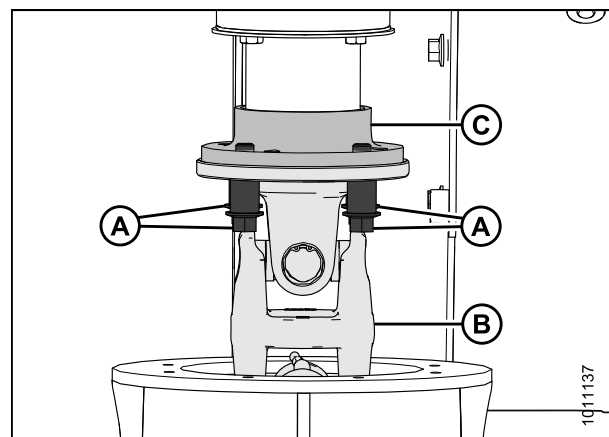


Figure 4.111: Driveline Hardware

MAINTENANCE AND SERVICING

7. Position two drum shields (B) as shown, and secure with eight M8 hex flange head bolts (A).

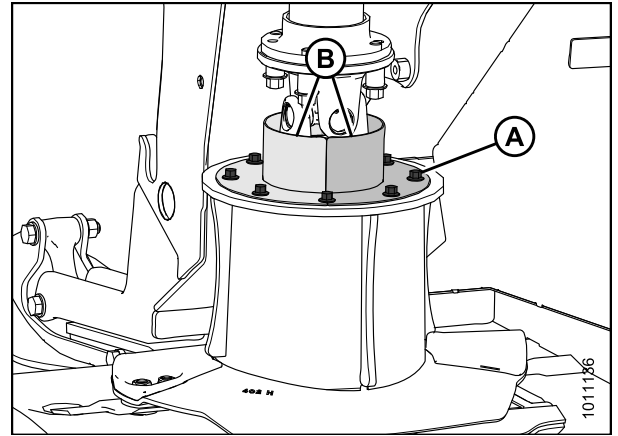


Figure 4.112: Drum Shields

8. Position vertical shield (B) as shown, and install M10 hex flange head bolt (A).

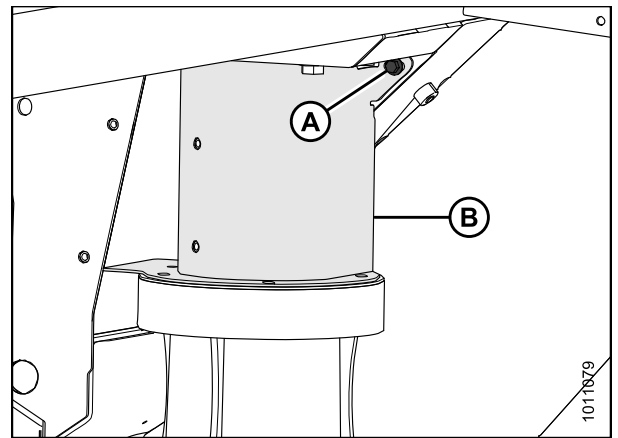


Figure 4.113: Vertical Shield

9. Position top plate (B) and drum top (C) onto drum as shown, and secure with four M10 hex flange head bolts (A).

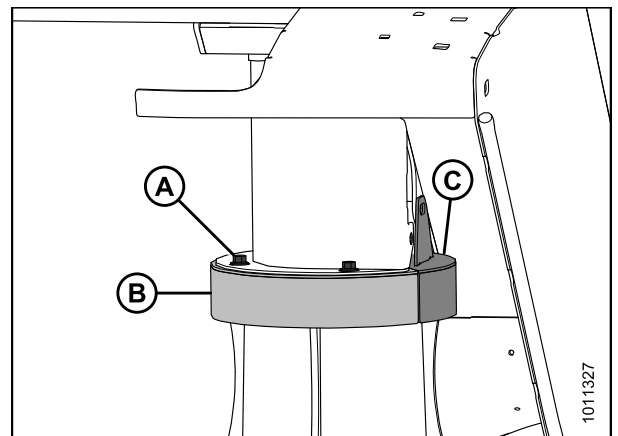


Figure 4.114: Top Plate and Drum Top

MAINTENANCE AND SERVICING

10. Install top M10 hex flange head bolt (B) through cover plate (A) and top plate (C).
11. Install lower M10 hex flange head bolt (D) through cover plate (A) and vertical shield (E).
12. Tighten bolts (B and D).

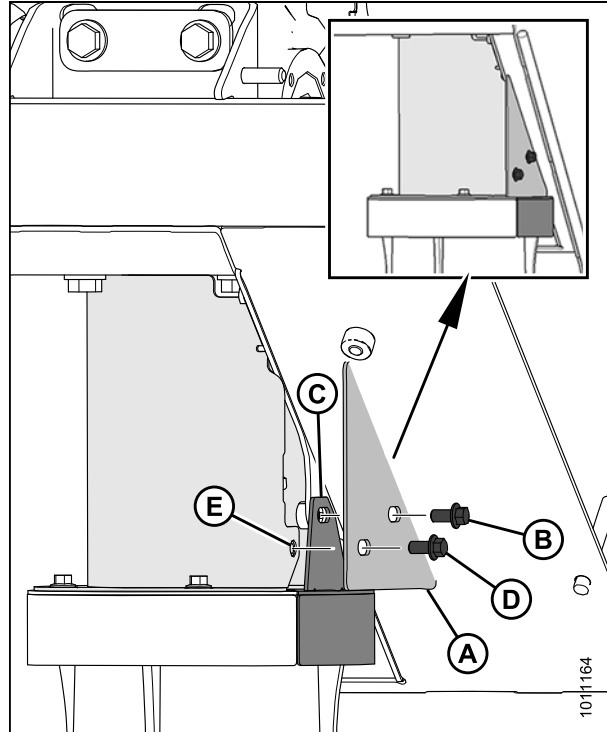


Figure 4.115: Cover Plate

13. Install vertical drive shield (B) using four M10 hex flange head bolts (A).

⚠ WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

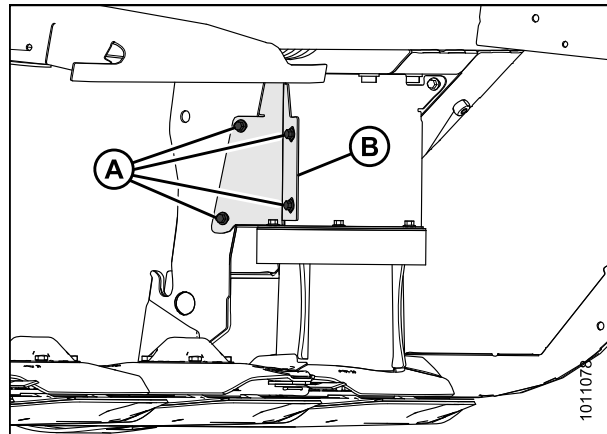


Figure 4.116: Vertical Drive Shield

MAINTENANCE AND SERVICING

14. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors, page 38](#).



Figure 4.117: Cutterbar Doors in Closed Position

Removing Non-Driven Rotary Deflectors

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

CAUTION

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

1. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

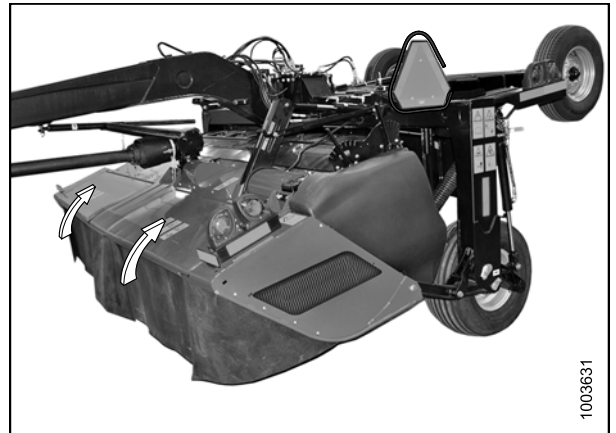


Figure 4.118: Cutterbar Doors

MAINTENANCE AND SERVICING

NOTE:

Arrow indicates forward direction.

2. Place a wooden block between two cutterbar discs to prevent disc rotation while loosening blade bolts.
3. Remove eight M8 bolts (A) and washers securing the cover to the non-driven rotary deflector.

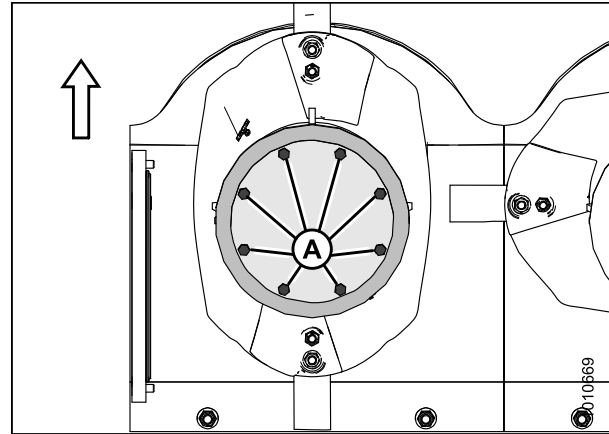


Figure 4.119: Non-Driven Rotary Deflector Cover (Top View)

4. Remove the four M10 bolts inside the deflector drum using a 305 mm (12 in.) extension and 16 mm socket.
5. Remove wooden block.
6. Remove rotary deflector.

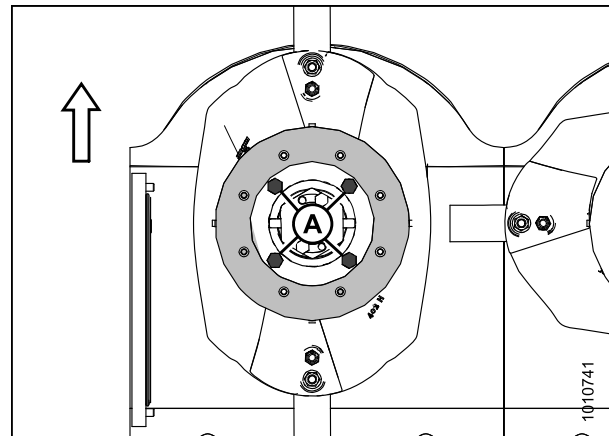


Figure 4.120: Non-Driven Rotary Deflector (Top View)

Installing Non-Driven Rotary Deflectors

DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

CAUTION

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

MAINTENANCE AND SERVICING

NOTE:

Arrow indicates forward direction.

1. Orient each disc at a 90 degree angle relative to the neighboring discs.

IMPORTANT:

Discs are direction-specific. Ensure proper disc orientation.

2. Install spacer on spindle.

3. Position the non-driven rotary deflector.
4. Use a 305 mm (12 in.) extension and 16 mm deep socket to install the four M10 bolts (A) and washers that hold the deflector disc in place. Torque to 55 N·m (40 ft·lbf).

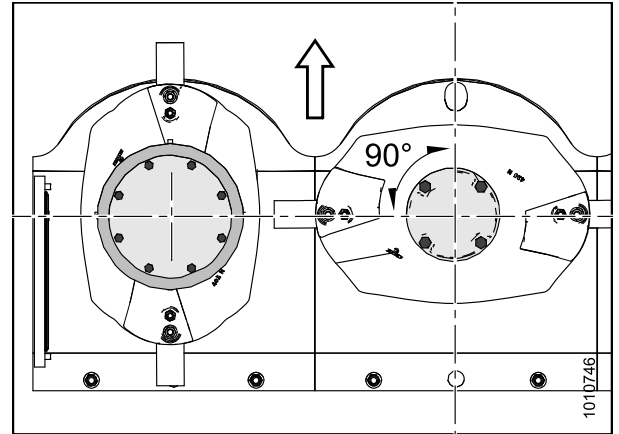


Figure 4.121: Cutterbar Discs (Top View)

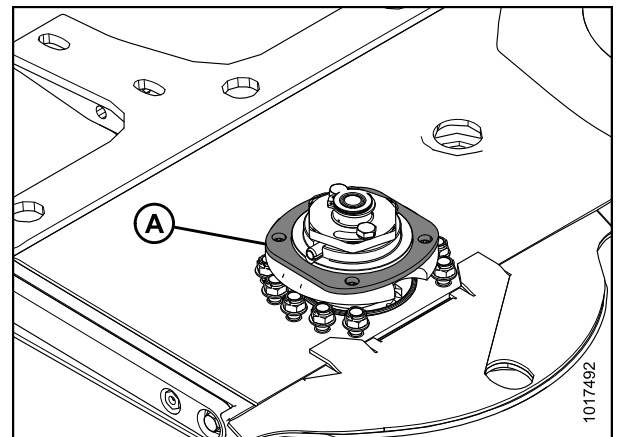


Figure 4.122: Non-Driven Rotary Deflector

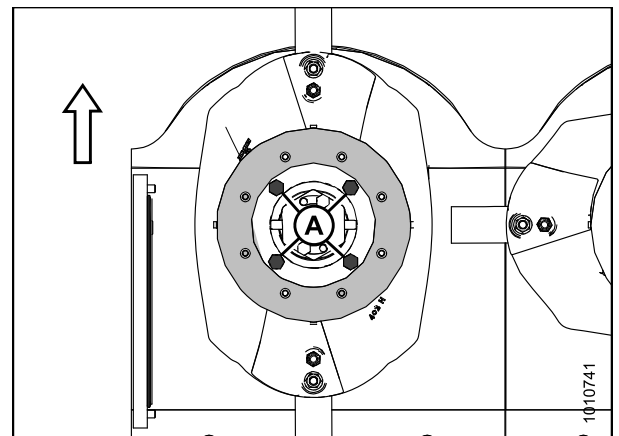


Figure 4.123: Non-Driven Rotary Deflector (Top View)

MAINTENANCE AND SERVICING

5. Install eight M8 bolts (A) and washers to secure the cover to the non-driven rotary deflector, and torque to 28 N·m (20 ft·lbf).

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

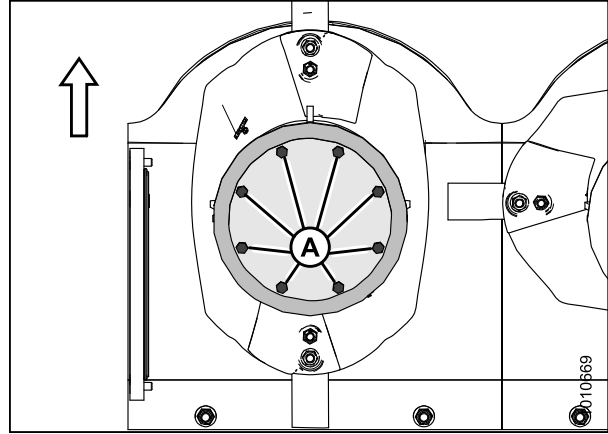


Figure 4.124: Non-Driven Rotary Deflector Cover (Top View)

6. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

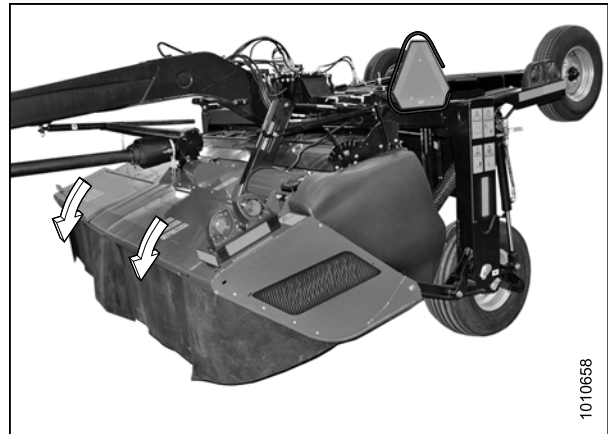


Figure 4.125: Cutterbar Doors in Closed Position

4.4.11 Cutterbar Spindle Shear Pin

To prevent damage to the cutterbar and drive systems, each disc is attached to a spindle containing a shear pin (A).

If the disc contacts a large object such as a stone or stump, the pins will shear and the disc will stop rotating and move upwards while remaining attached to the spindle with a snap ring (B).

IMPORTANT:

- Ensure correct orientation of the shear pins during replacement.
- Spindles that rotate clockwise have left-handed threading.
- Spindles that rotate counterclockwise have right-handed threading.

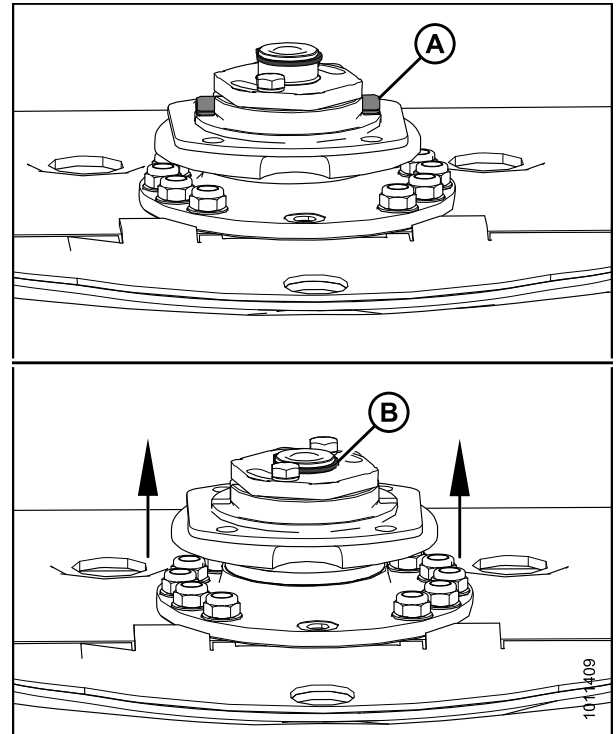


Figure 4.126: Cutterbar Spindles

Removing Cutterbar Spindle Shear Pin

⚠ DANGER

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

1. Raise mower conditioner fully, shut off engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).
4. Clean debris from work area.

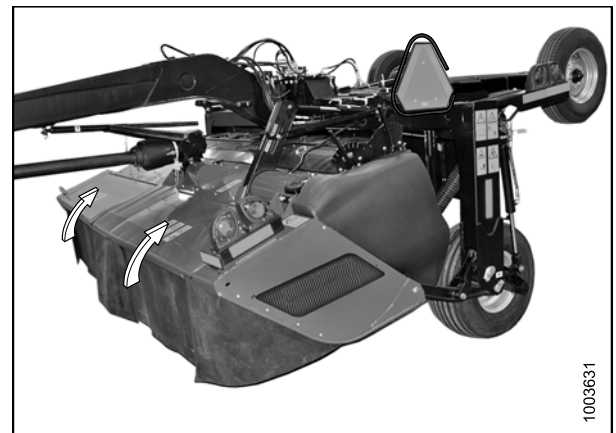


Figure 4.127: Cutterbar Doors

MAINTENANCE AND SERVICING

5. Remove cutterbar disc (A). Refer to [Removing Cutterbar Discs, page 133](#).
6. Remove driven rotary deflector (B). Refer to [Removing Driven Rotary Deflectors and Driveline, page 168](#).
7. Remove non-driven rotary deflector (C). Refer to [Removing Non-Driven Rotary Deflectors, page 175](#).

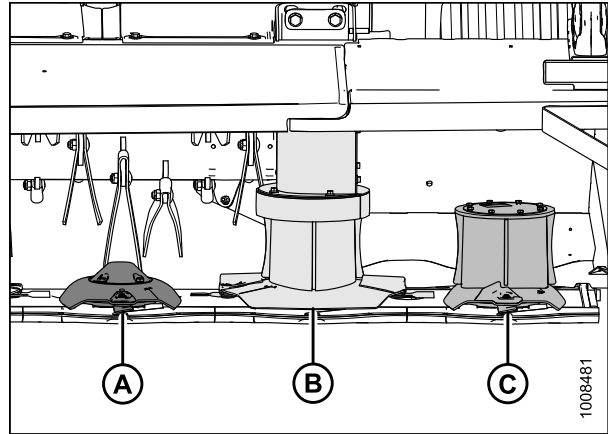


Figure 4.128: Cutterbar Disc Assemblies

8. Remove retaining ring (A).

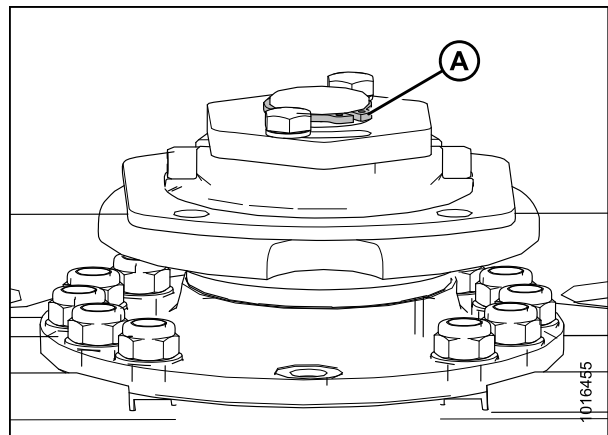


Figure 4.129: Cutterbar Spindle

9. Remove M12 bolt and remove safecut spindle-nut wrench (A) from left side shield plate.

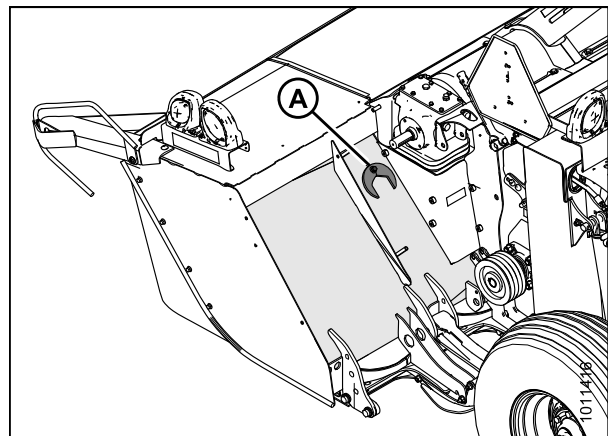


Figure 4.130: Safecut Spindle-Nut Wrench Location

MAINTENANCE AND SERVICING

10. Identify left-hand or right-hand markings on spindle nut.

IMPORTANT:

Distinguish between left-hand and right-hand markings as follows:

- Left-hand spindle nuts (A) have distinctive grooved bevels (C) on the corners—right-hand spindle nuts (B) do not.
- Left-hand pinion shafts (D) have distinctive grooves on the face—right-hand pinions (E) do not.

IMPORTANT:

Turn left-hand threads counterclockwise to tighten, and turn right-hand threads clockwise to tighten.

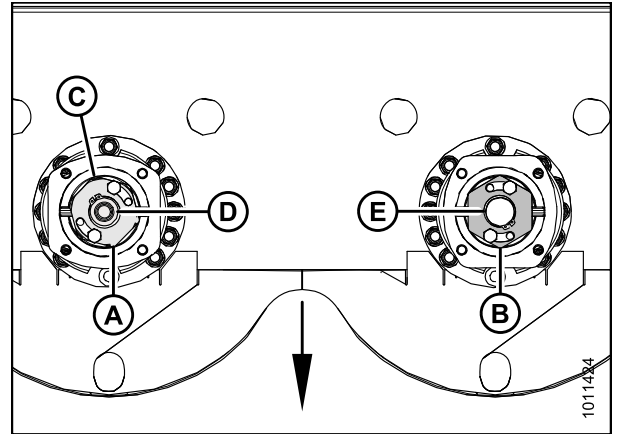


Figure 4.131: Left-Hand and Right-Hand Markings

11. Remove two M10 bolts (A) and washers.

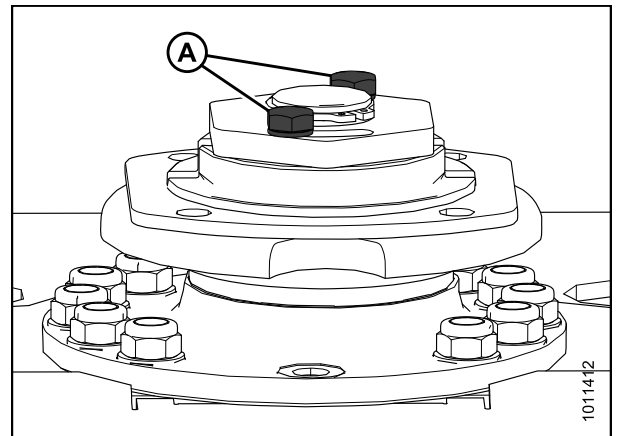


Figure 4.132: Cutterbar Spindle

12. Use the safecut spindle-nut wrench and remove nut (A).

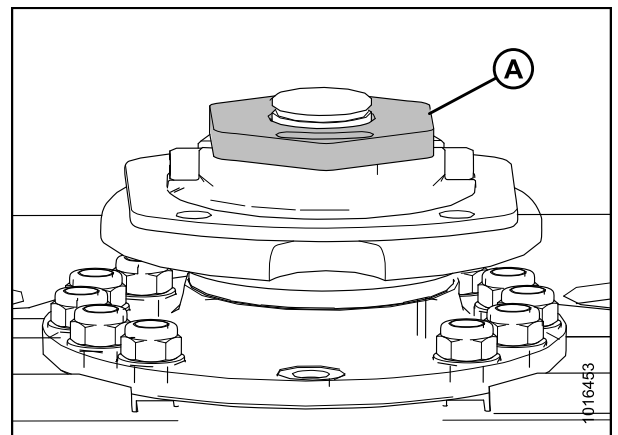


Figure 4.133: Cutterbar Spindle

MAINTENANCE AND SERVICING

13. Remove the hub (A).
14. Remove shear pins (B). Do NOT damage the pin bore on the pinion.

NOTE:

Check the nut and hub for damage. Replace if necessary.

15. Refer to [Installing Cutterbar Spindle Shear Pin](#), page 182.

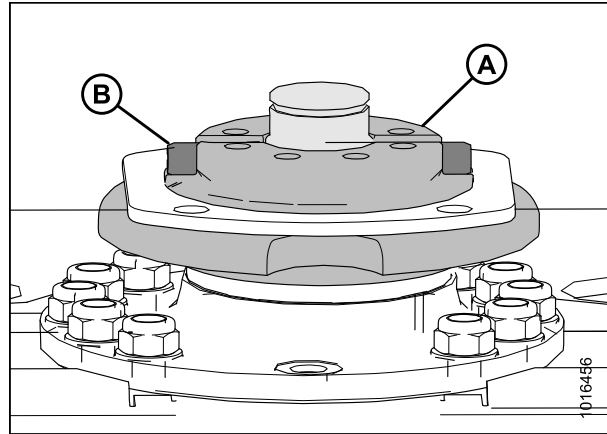


Figure 4.134: Cutterbar Spindle

Installing Cutterbar Spindle Shear Pin

⚠ DANGER

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

1. Fill the space above the bearing with grease.
2. Place the hub (A) on the spindle (C).
3. Install shear pins (B).

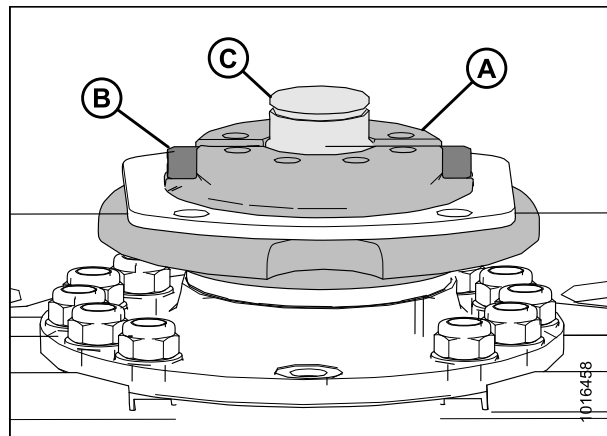


Figure 4.135: Cutterbar Spindle

4. Observe orientation of groove in shear pin (A).

IMPORTANT:

The correct shear pin orientation is critical. Both shear pin grooves (A) must be facing the same direction and parallel to the cutterbar.

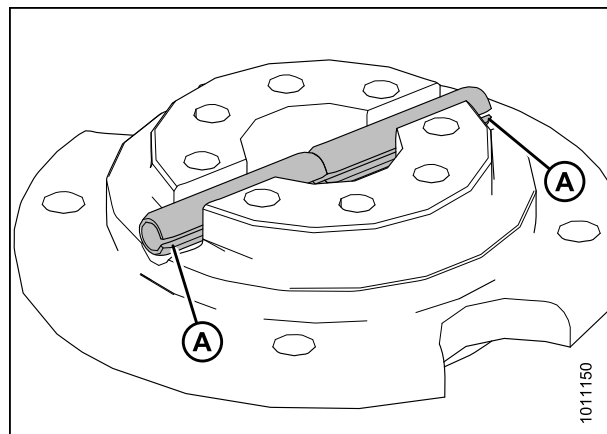


Figure 4.136: Shear Pin Orientation (Shaft Not Shown)

MAINTENANCE AND SERVICING

5. Install nut (A).

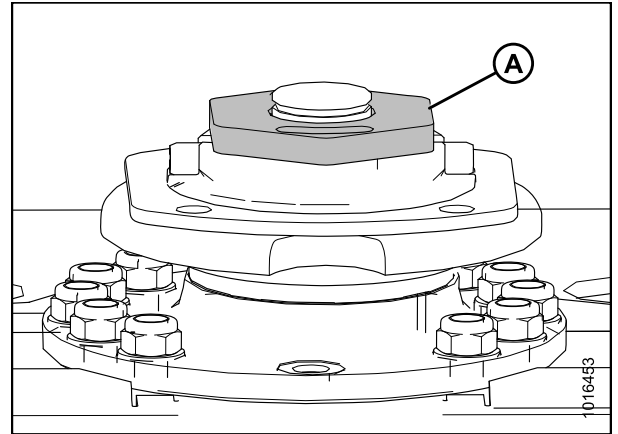


Figure 4.137: Cutterbar Spindle

NOTE:

Use the safecut spindle-nut wrench (B) 90 degrees (D) to the torque wrench (A).

6. Use safecut spindle-nut wrench (B) and torque spindle nut (C) to 300 N·m (221 ft·lbf).
7. Return safecut spindle-nut wrench to left side shield plate.

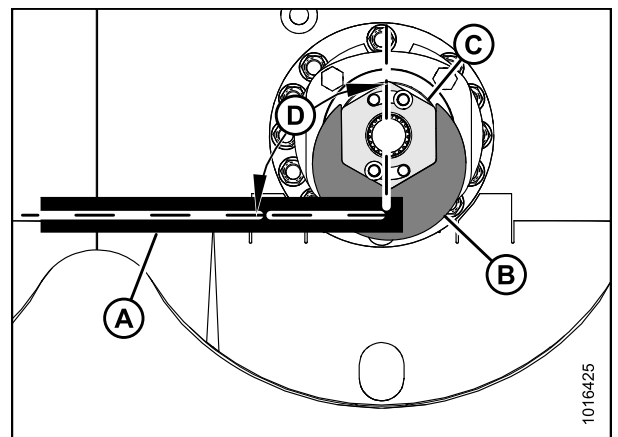


Figure 4.138: Spindle Nut

8. Install two M10 bolts (A) and washers. Torque to 55 N·m (40 ft·lbf).

NOTE:

Inspect bolt threads and replace if damaged.

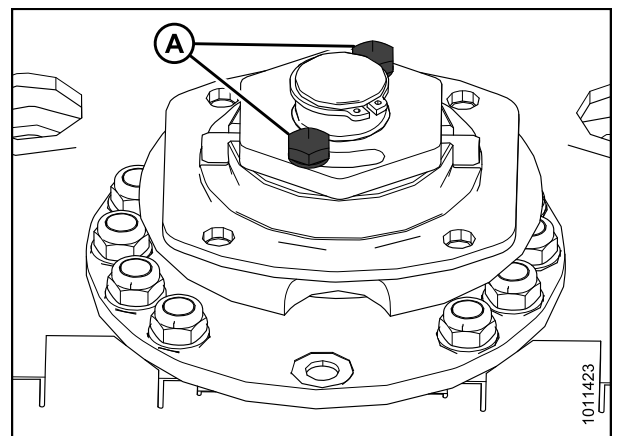


Figure 4.139: Cutterbar Spindle

MAINTENANCE AND SERVICING

9. Install retaining ring (A).

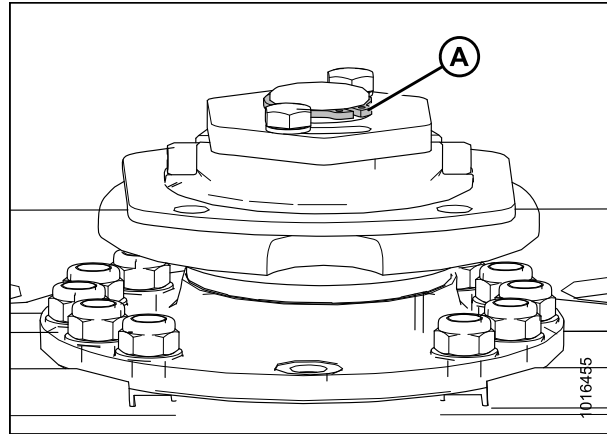


Figure 4.140: Cutterbar Spindle

10. Install cutterbar disc (A). Refer to [Installing Cutterbar Discs, page 134](#).
11. Install driven rotary deflector (B). Refer to [Installing Driven Rotary Deflectors and Driveline, page 171](#).
12. Install non-driven rotary deflector (C). Refer to [Installing Non-Driven Rotary Deflectors, page 176](#).

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

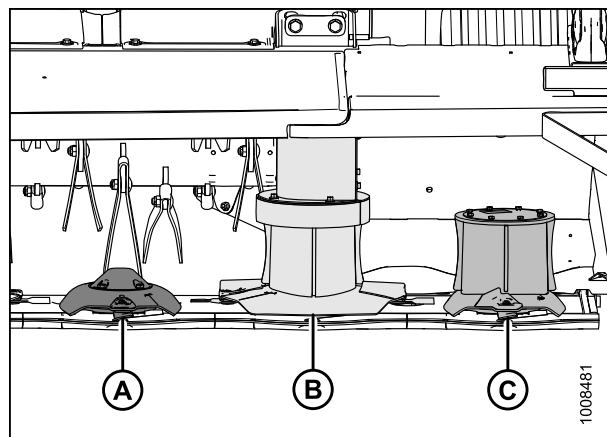


Figure 4.141: Cutterbar Disc Assemblies

13. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors, page 38](#).

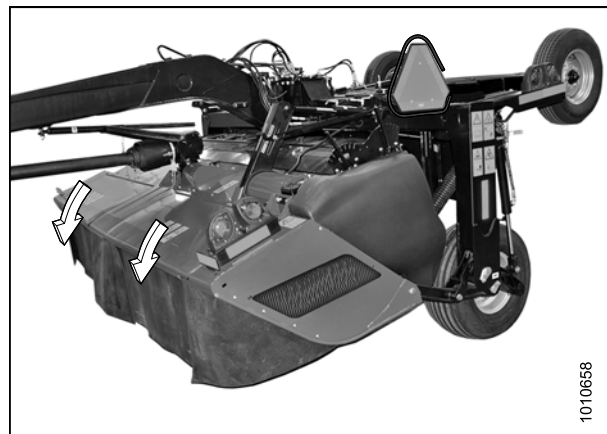


Figure 4.142: Cutterbar Doors in Closed Position

4.5 Drive Systems

4.5.1 Driveline Shield Cone

Removing Driveline Shield Cone

WARNING

Do NOT operate the machine without the driveline shield cones in place and the lever clamps securely fastened.

1. Release two lever clamps (A) using a screwdriver or similar prying tool.
2. Unhook safety chain (B) from hitch, and ensure that chain is secured to the shield cone and metal plate.

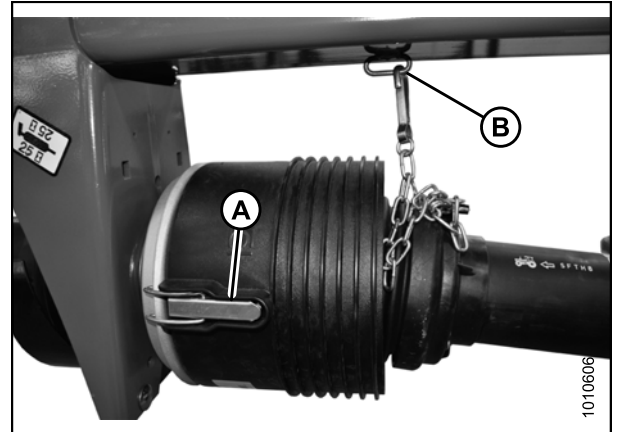


Figure 4.143: Driveline Shield Cone and Lever Clamp

3. Remove shield cone from metal plate (A) and slide cone along drive shaft.

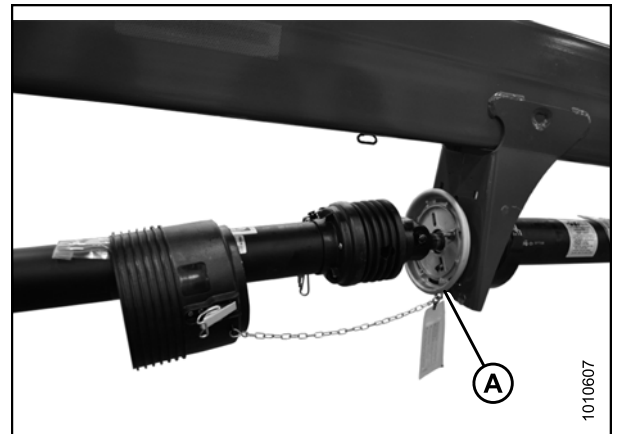


Figure 4.144: Driveline Shield Cone Removed from Metal Plate

Installing Driveline Shield Cone

WARNING

Do NOT operate the machine without the driveline shield cones in place and the lever clamps securely fastened.

MAINTENANCE AND SERVICING

1. Slide shield cone along drive shaft until it is seated in metal plate (A).

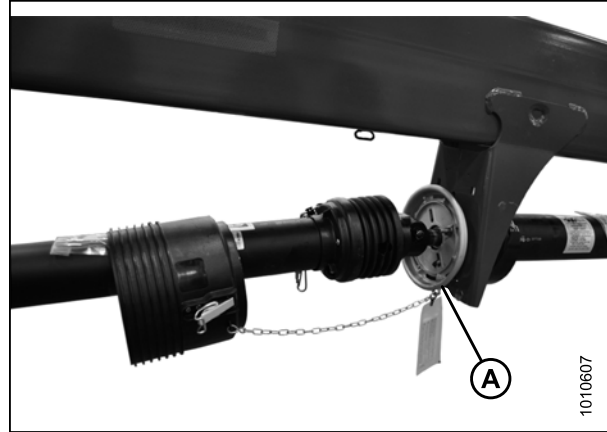


Figure 4.145: Driveline Shield Cone Removed from Metal Plate

2. Securely fasten two lever clamps (A) to metal plate (B).
3. Attach safety chain (C) to hitch, and ensure that chain is secured to the shield cone and metal plate.

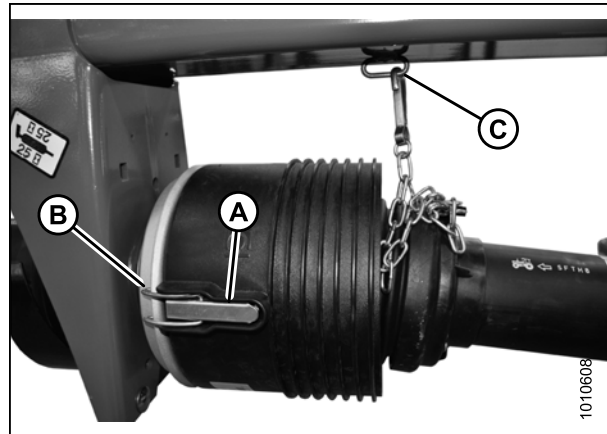


Figure 4.146: Driveline Shield Cone and Lever Clamp

4.5.2 Primary Driveline

The primary driveline transfers power from the tractor's power take-off (PTO) to the mower conditioner's forward swivel gearbox. Follow regular lubrication procedures and ensure all driveline taper pins are torqued as instructed. Refer to [4.4.1 Cutterbar Lubrication, page 129](#).

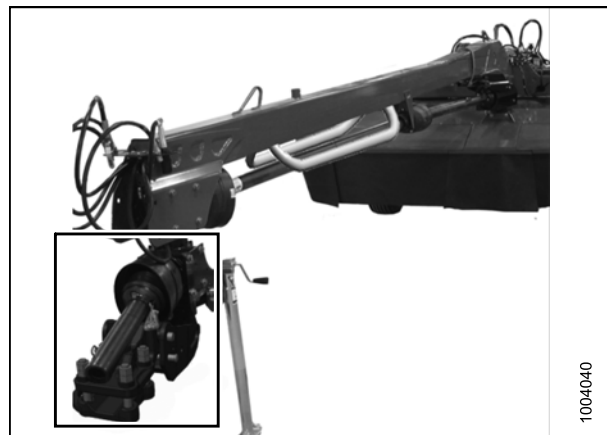


Figure 4.147: Primary Driveline

Removing Primary Driveline

DANGER

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

1. Stop engine, and remove key from ignition.
2. Unhook unit from the tractor. Refer to [3.8 Detaching Mower Conditioner from Tractor, page 51](#).
3. Release two lever clamps (A) using a screwdriver or similar prying tool.



Figure 4.148: Driveline Shield Cone and Lever Clamp

4. Slide driveline shield cone away from gearbox.
5. Loosen nut (A) so that taper pin threads are recessed inside the nut.
6. Tap nut (A) with a hammer to loosen the taper pin and release driveline yoke from the shaft.
7. Pull driveline off gearbox.
8. Remove driveline guard if necessary. Refer to [Removing Driveline Guard, page 204](#).

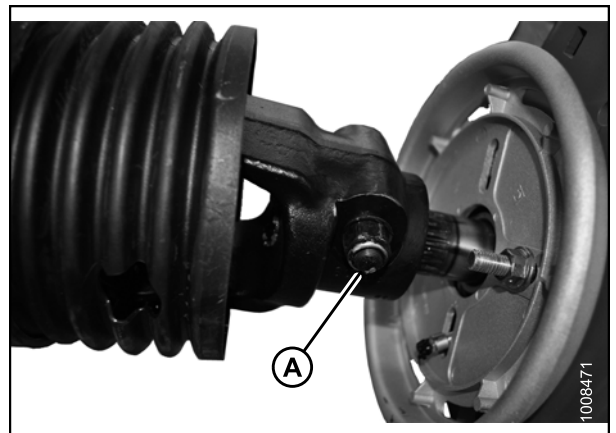


Figure 4.149: Bolt Securing Driveline to Gearbox

Installing Primary Driveline

DANGER

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

MAINTENANCE AND SERVICING

1. Stop engine and remove the key from ignition.
2. Install driveline guard onto driveline (if previously removed). Refer to [Installing Driveline Guard, page 206](#).
3. Position driveline as shown, and install taper pin so groove on pin is aligned with groove on shaft.
4. Ensure there is no grease on taper pin threads after installing into yoke.
5. Torque the taper pin nut (A) to 150 N·m (110 ft·lbf). Pin must be recessed 9–11 mm (3/8–7/16 in.) inside the yoke.

IMPORTANT:

Do NOT use an impact tool to install or torque nut.

IMPORTANT:

Check taper pin torque every 25 hours until it stops moving, then check before every season.

6. Slide shield cone towards the gearbox, and fasten the two lever clamps (A) to the metal plate.

7. Attach the male half (A) of the driveline to the female half, and position onto storage hook (B) or connect to tractor power take-off (PTO). To attach unit to tractor, refer to [3.7 Attaching Mower Conditioner to the Tractor, page 43](#).

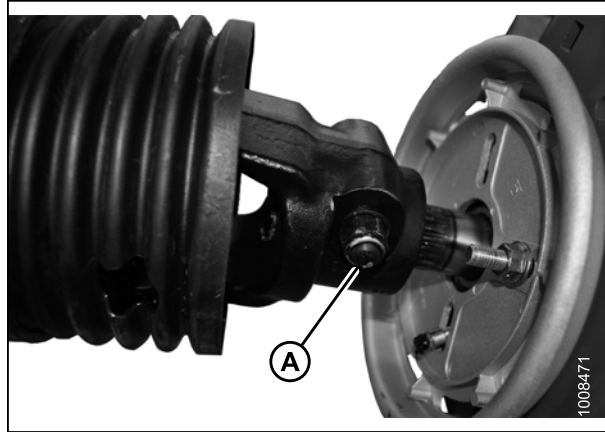


Figure 4.150: Taper Pin Installed in Yoke



Figure 4.151: Shield Clipped to Driveline

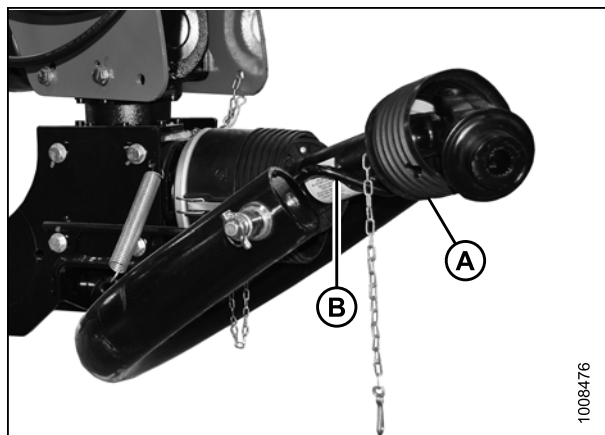


Figure 4.152: Primary Driveline

4.5.3 Hitch Driveline

The hitch driveline is a solid shaft that connects the forward swivel gearbox to the clutch driveline. The hitch driveline is supported by a bearing at the approximate midpoint of the hitch. Replace the driveline if there are signs of damage, vibration, or excessive noise.

No maintenance is required other than regular lubrication. Refer to [4.4.1 Cutterbar Lubrication, page 129](#).

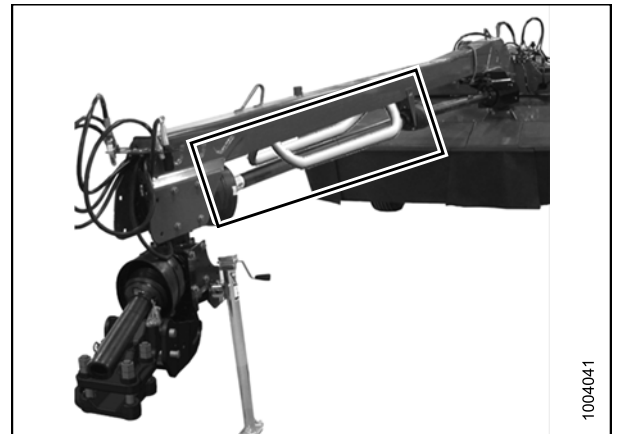


Figure 4.153: Hitch Driveline

Removing Hitch Driveline

DANGER

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

1. Stop engine, and remove key from ignition.
2. Disconnect clutch driveline (A) at the center support. Do not remove entire driveline. Refer to [Removing Clutch Driveline, page 196](#).

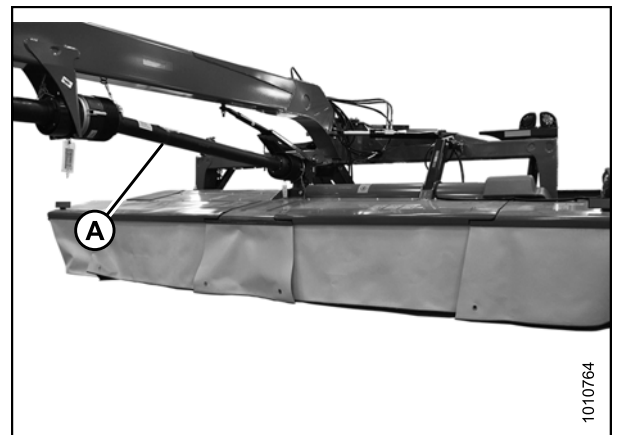


Figure 4.154: Clutch Driveline

MAINTENANCE AND SERVICING

3. Remove three screws (A) from driveshield cover, and slide driveline away from center support.
4. Remove two bolts (B), and slide the metal shield (C) away from center support.

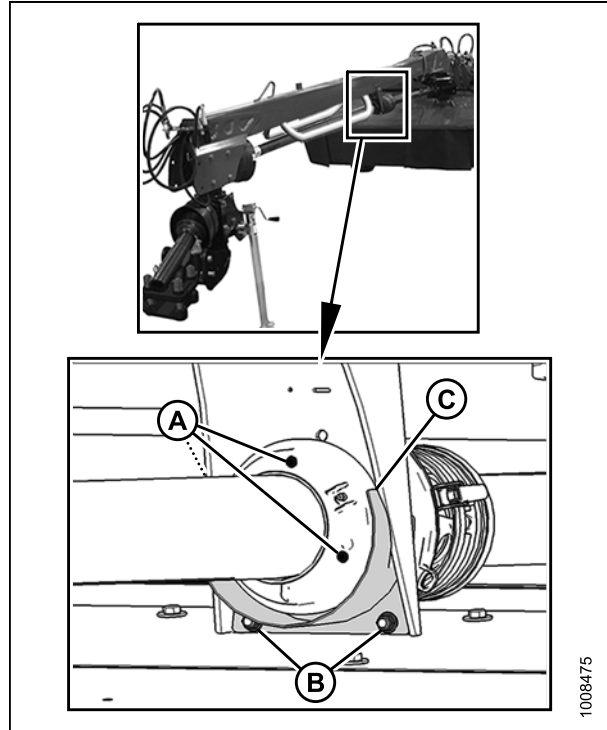


Figure 4.155: Driveline Cover and Shield Installed at Center Support

5. Remove mid-drive yoke from hitch drive shaft.

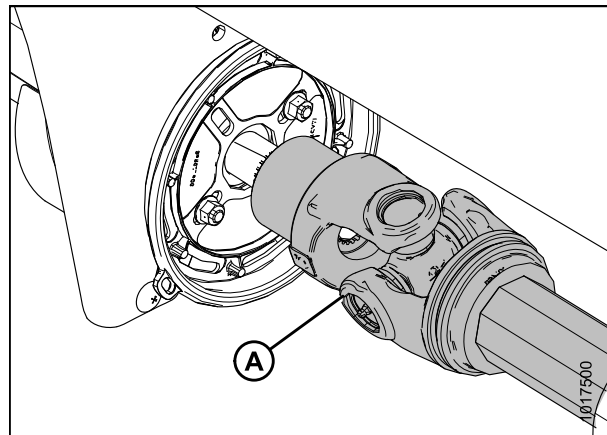


Figure 4.156: Mid-Drive Shaft Yoke

MAINTENANCE AND SERVICING

6. Remove two bolts (A) that secure metal plate (B) to the center support.

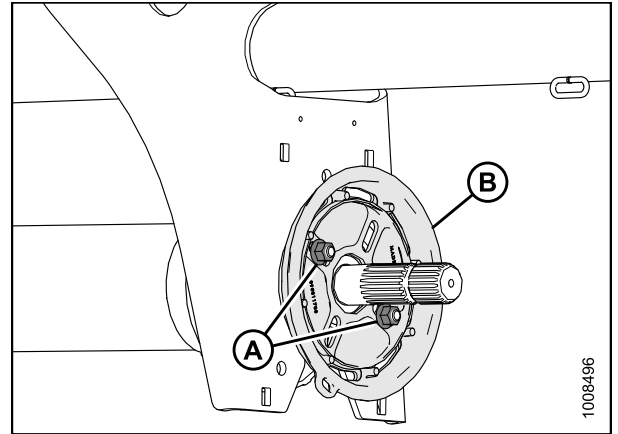


Figure 4.157: Metal Plate

7. Remove spacer (A).

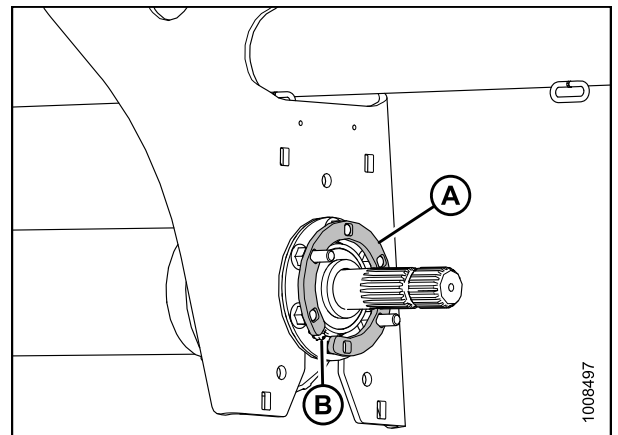


Figure 4.158: Spacer

8. Support driveline and remove five nuts (A), flange with grease fitting (B), ball bearing (C), flange (D), and unlock bearing lock collar.

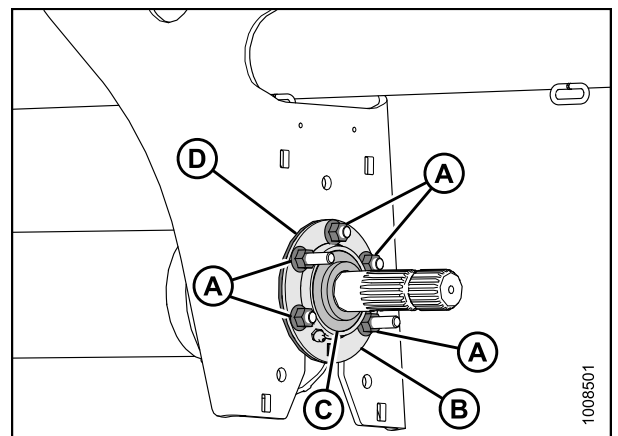


Figure 4.159: Ball Bearing and Flanges

MAINTENANCE AND SERVICING

- Unlock the bearing lock collar (A) by rotating it in the direction opposite to the rotation of the shaft.
- Slide the bearing lock collar off the driveline shaft.
- Lower the driveline from the center support.

NOTE:

Bolts may or may not be removed. If removing bolts, note position of the long (B) and short (C) bolts.

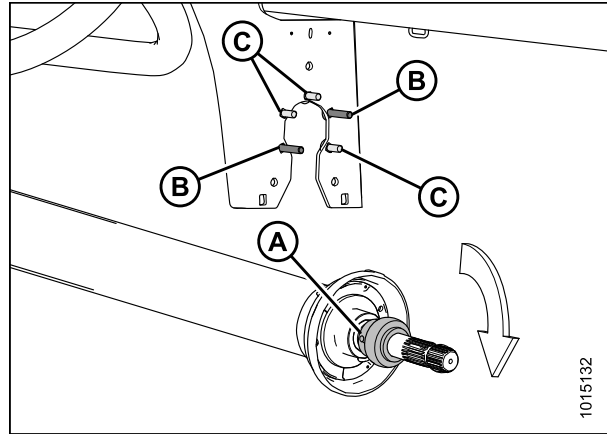


Figure 4.160: Bearing Lock Collar

- Slide forward end of hitch driveline (A) away from swivel gearbox shaft.

NOTE:

There are two hitch drivelines installed on 16-foot mower conditioners.

- Remove driveline guard if necessary. Refer to [Removing Driveline Guard, page 204](#).

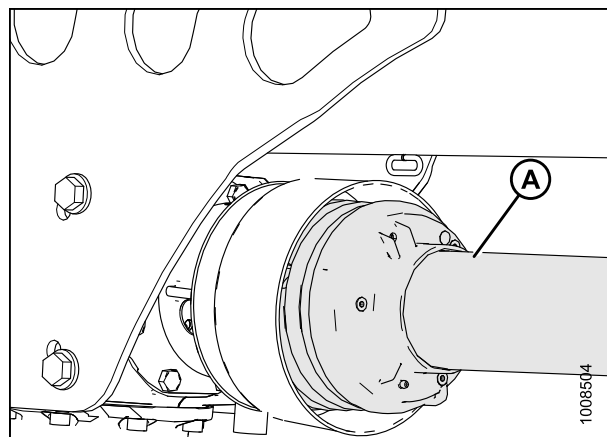


Figure 4.161: Forward End of Hitch

Installing Hitch Driveline

DANGER

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

- Install driveline guard onto driveline (if previously removed). Refer to [Installing Driveline Guard, page 206](#).
- Position forward end of hitch driveline (A) onto forward swivel gearbox shaft and push onto shaft.

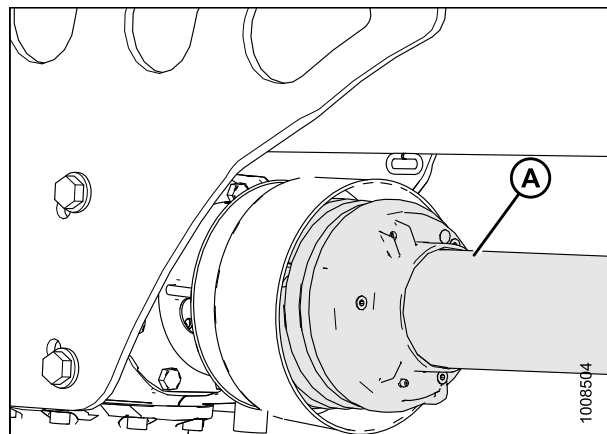


Figure 4.162: Forward End of Hitch

MAINTENANCE AND SERVICING

- Slide lock collar (A) on shaft.
- Position shaft end of the driveline onto the hitch support bracket, and support the driveline to hold it in place.

IMPORTANT:

Ensure the locking collar (A) is on the backside of the support bracket.

- Install two long bolts (B) and three short bolts (C) exactly as shown.

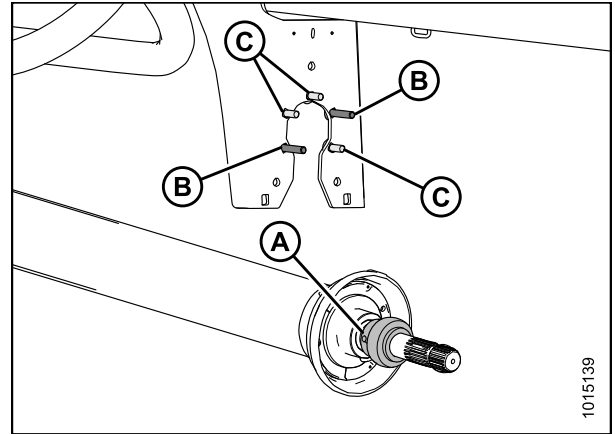


Figure 4.163: Long and Short Bolts

- Install flange (A).
- Ensure distance (B) between the tip of the shaft and the front face of the center support is 136–144 mm (5-3/8 – 5-11/16 in.).

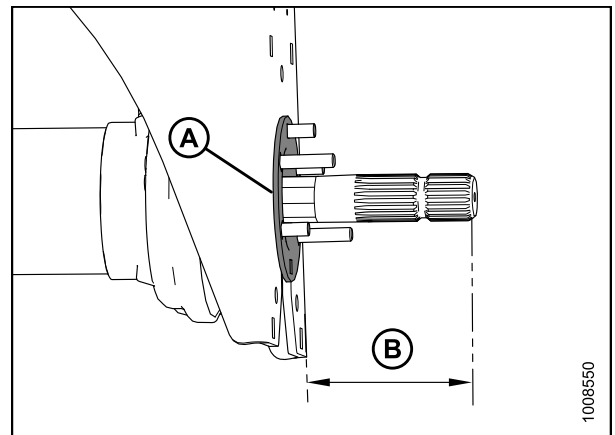


Figure 4.164: Flange Installed at Center Support

- Install the ball bearing (C).
- Tighten the locking collar in the direction of the shaft rotation.
- Install flange (B) with grease fitting (D), and five nuts (A).

IMPORTANT:

Grease fitting (D) must be positioned 90 degrees from long bolts as shown.

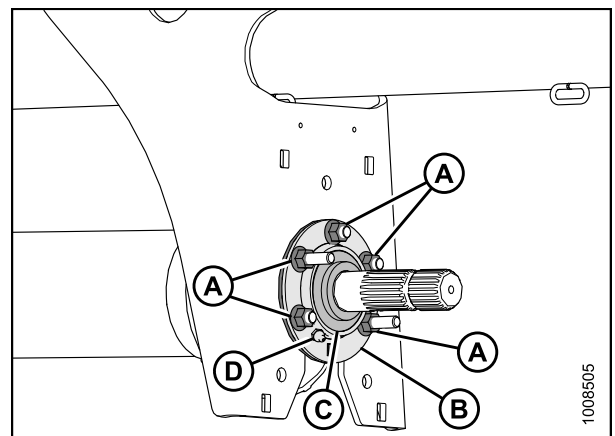


Figure 4.165: Flange

MAINTENANCE AND SERVICING

11. Install spacer (A) with cutout in spacer aligned with grease fitting (B).

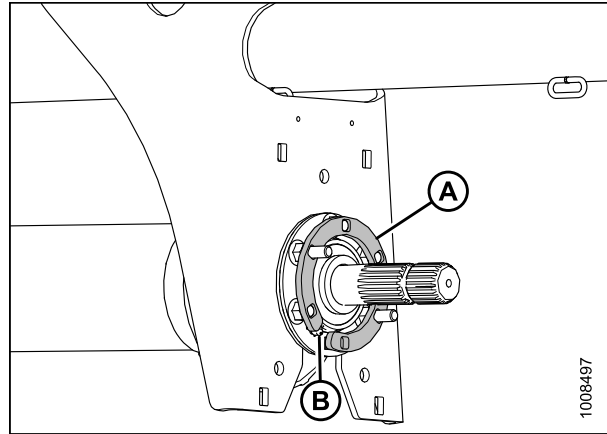


Figure 4.166: Spacer Installed at Center Support

12. Position metal plate (B) on center support.
13. Apply Loctite® 243 and secure metal plate (B) using two nuts (A) while ensuring loop (C) on metal plate is positioned on lower side as shown.
14. Torque nuts (A) to 20 N·m (15 ft·lbf).

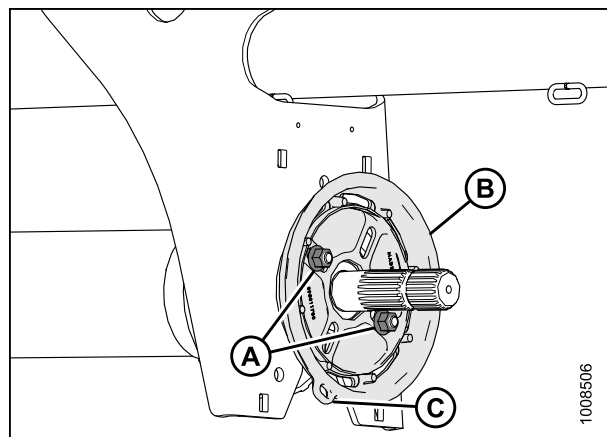


Figure 4.167: Metal Plate Attached to Center Support

MAINTENANCE AND SERVICING

15. Position driveshield cover on center support and secure with three screws (A).
16. Install metal shield (C) with two bolts (B).

NOTE:

There are three hitch drivelines for installation on 16-foot mower conditioners.

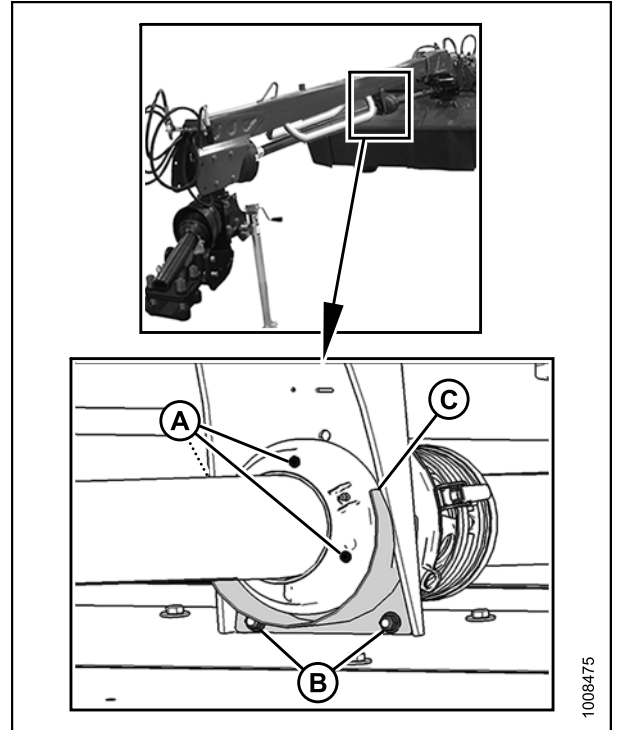


Figure 4.168: Driveline Cover and Shield Installed at Center Support

17. Install clutch driveline (A) at center support. Refer to [Installing Clutch Driveline, page 198](#).

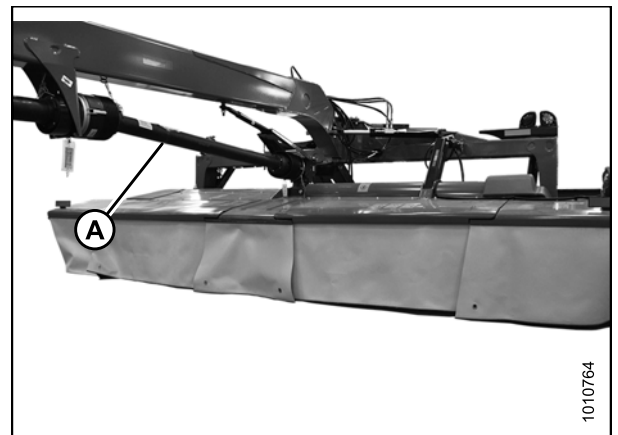


Figure 4.169: Clutch Driveline Installed at Center Support

4.5.4 Clutch Driveline

The clutch driveline (A) transfers power from the hitch driveline to the rear swivel gearbox through a clutch mechanism.

Replace the driveline if there are signs of damage, vibration, excessive noise, or if the clutch needs replacing.

Follow regular lubrication procedures and ensure all driveline taper pins are torqued as instructed. Refer to [4.4.1 Cutterbar Lubrication, page 129](#) and [4.5.6 Inspecting Driveline Taper Pins, page 203](#).

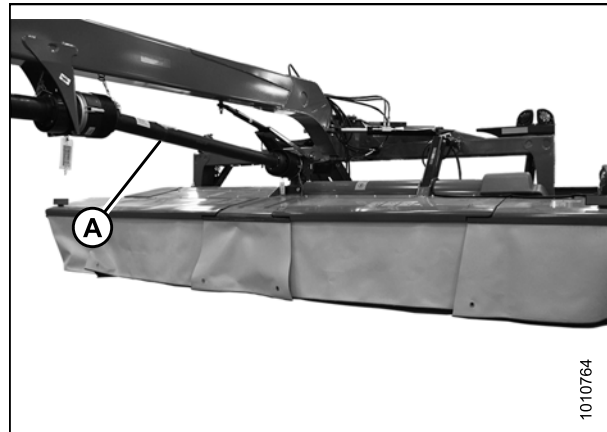


Figure 4.170: Clutch Driveline

Removing Clutch Driveline

⚠ DANGER

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

1. Stop engine, and remove key from ignition.
2. Release two lever clamps (A) using a screwdriver or similar prying tool.
3. Unhook safety chain (B) from hitch, and ensure that chain is secured to the shield cone and metal plate (C).

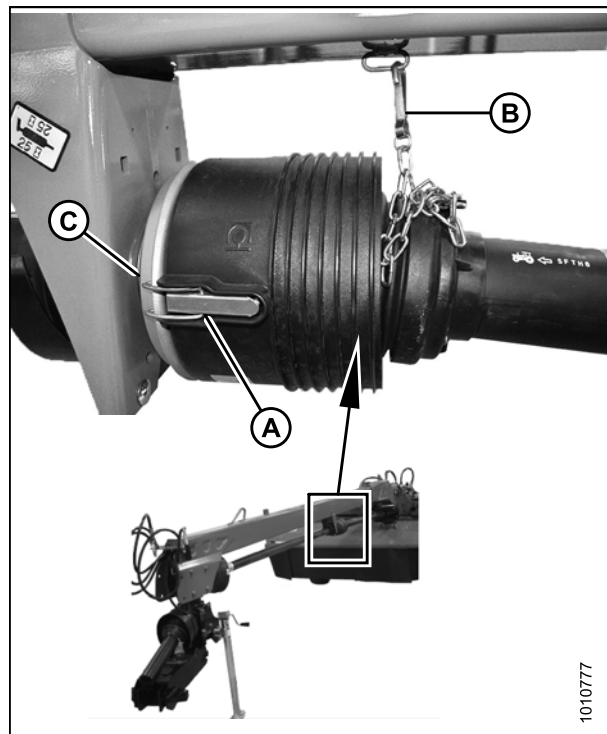


Figure 4.171: Driveline Shield Cone

MAINTENANCE AND SERVICING

4. Remove driveline shield cone from metal plate, and slide driveline shield cone (A) away from center support.
5. Loosen nut (B) and use a hammer to release yoke from taper pin lock.

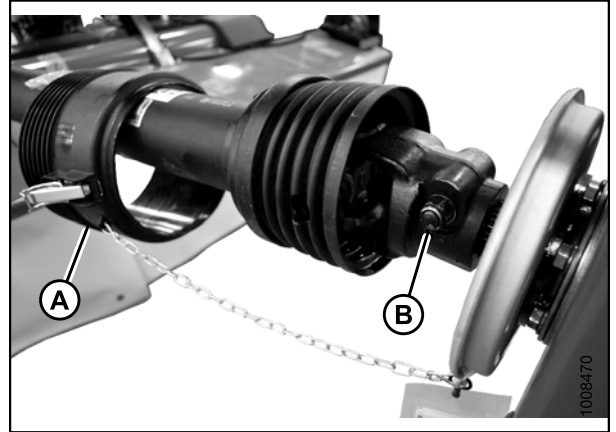


Figure 4.172: U-Joint

6. Slide clutch driveline (A) off hitch driveline.
7. Separate the driveline (A).

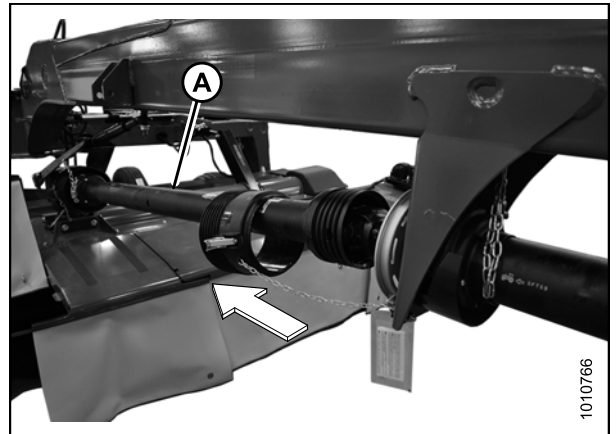


Figure 4.173: Driveline

8. Release two lever clamps (A) on the shield cone installed at the rear swivel gearbox.
9. Remove driveline guard if necessary. Refer to [Removing Driveline Guard, page 204](#).

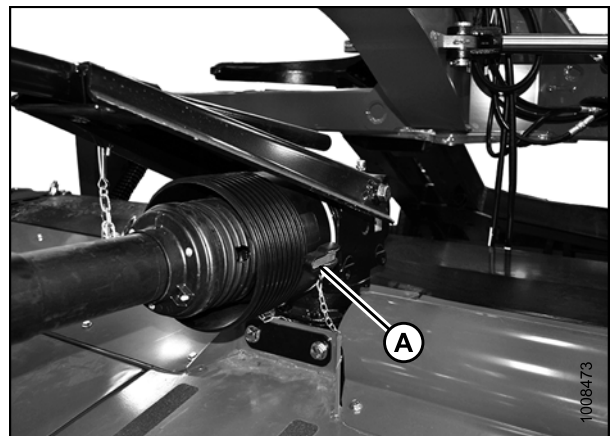


Figure 4.174: Driveline Shield Cone

MAINTENANCE AND SERVICING

10. Slide shield away from gearbox.
11. Loosen nut (A), use a hammer to release driveline from taper pin lock, and pull driveline off gearbox shaft.

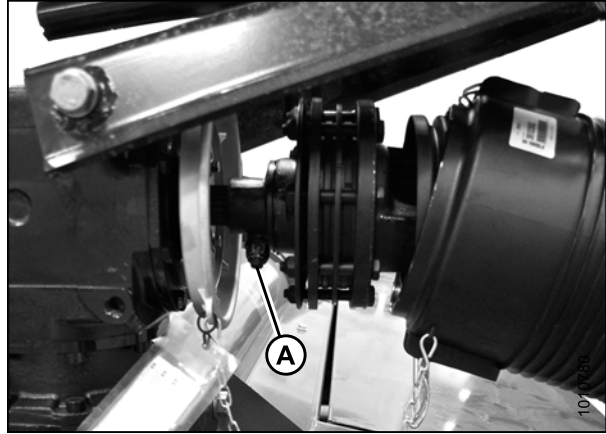


Figure 4.175: Driveline and Gearbox

Installing Clutch Driveline

DANGER

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

1. Stop engine and remove key from ignition.
2. Install driveline guard onto driveline (if previously removed). Refer to [Installing Driveline Guard, page 206](#).
3. Position driveline onto the gearbox shaft as shown.
4. Clean the taper pin threads.
5. Install taper pin into yoke with groove on pin aligned with groove in shaft. Ensure there is no grease on threads after inserting pin through yoke.
6. Secure pin with nut (A). Torque to 150 N·m (110 ft·lbf). Pin should be flush with yoke.

IMPORTANT:

Check taper pin torque every 25 hours until it stops moving, then check before every season.

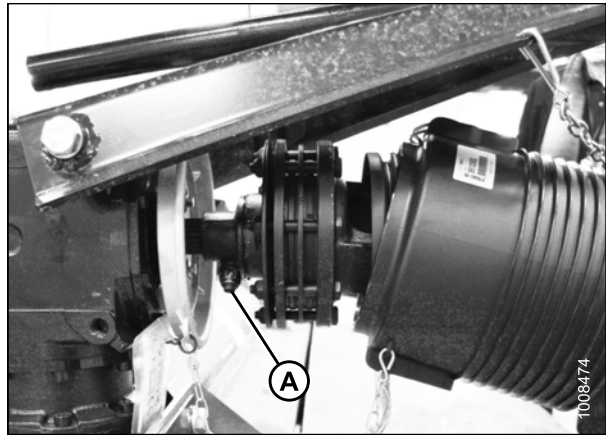


Figure 4.176: Driveline and Gearbox

MAINTENANCE AND SERVICING

- Slide the shield cone to the gearbox and secure with the two lever clamps (A).

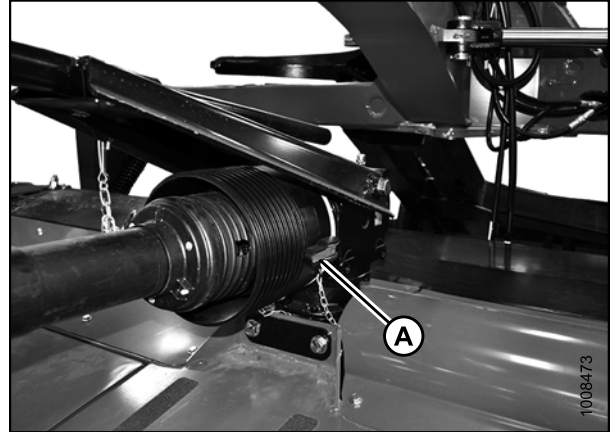


Figure 4.177: Driveline Shield Cone

- Assemble forward half (A) of clutch driveline onto female half and attach to shaft on hitch driveline (B).

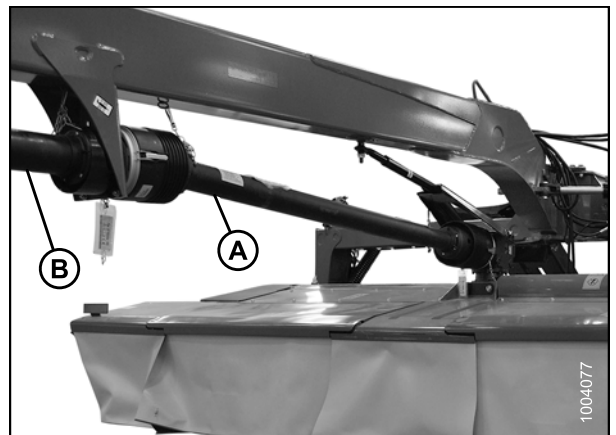


Figure 4.178: Clutch Driveline Attached to Hitch Driveline

- Move the shield cone (A) to expose the U-joint.
- Clean the taper pin threads.
- Install taper pin so groove on pin is aligned with groove on shaft. Ensure there is no grease on taper pin threads after installing into yoke.
- Torque the taper pin nut (B) to 150 N·m (110 ft·lbf). Pin should be recessed 9–11 mm (3/8–7/16 in.) into yoke.

IMPORTANT:

Check taper pin torque every 25 hours until it stops moving, then check before every season.

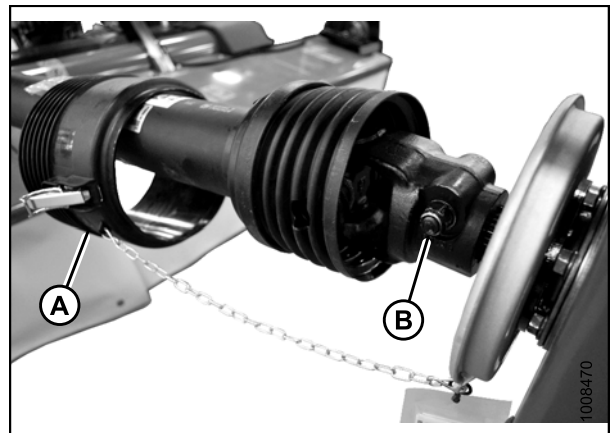


Figure 4.179: U-Joint

MAINTENANCE AND SERVICING

- Slide shield cone onto metal plate (C) attached to center support, secure with two lever clamps (A), and hook safety chain (B) to hitch.

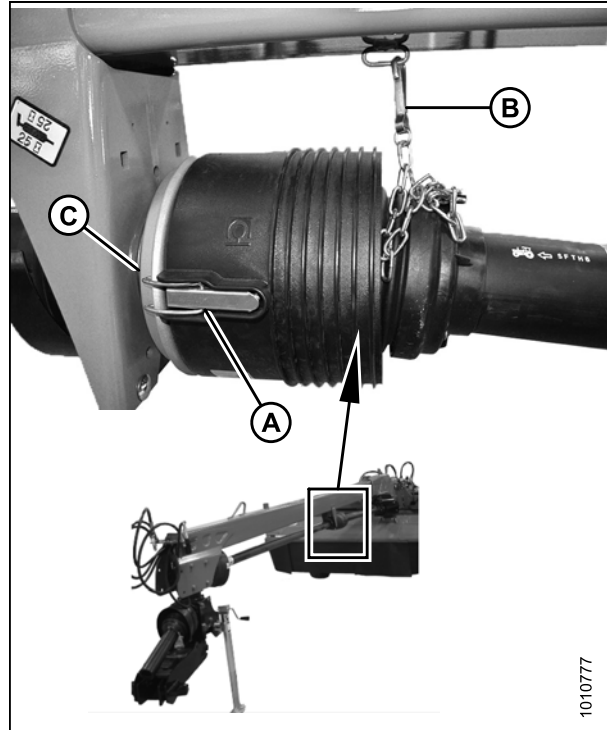


Figure 4.180: Driveline Shield Cone

4.5.5 Cross Driveline

The cross driveline (A) transfers power from the tractor's power take-off (PTO) to the mower conditioner drive gearbox. Follow the regular lubrication schedule for this component. Refer to [4.3.5 Lubricating the Mower Conditioner](#), page 117.

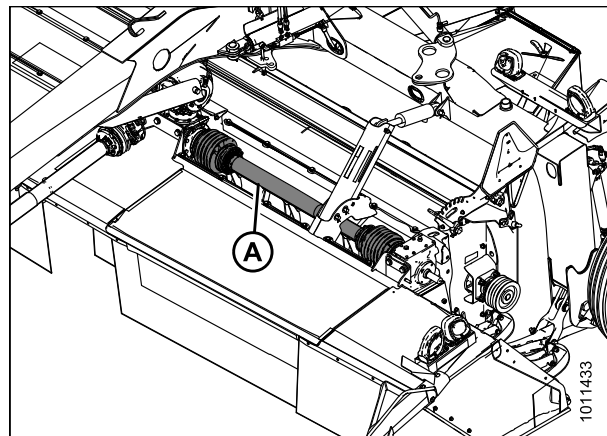


Figure 4.181: Cross Driveline

Removing Cross Driveline

DANGER

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

MAINTENANCE AND SERVICING

1. Stop engine and remove key from ignition.
2. Open the cutterbar doors to access the cross driveline (A) from inside the mower conditioner. Refer to [3.3.1 Opening Cutterbar Doors](#), page 36.

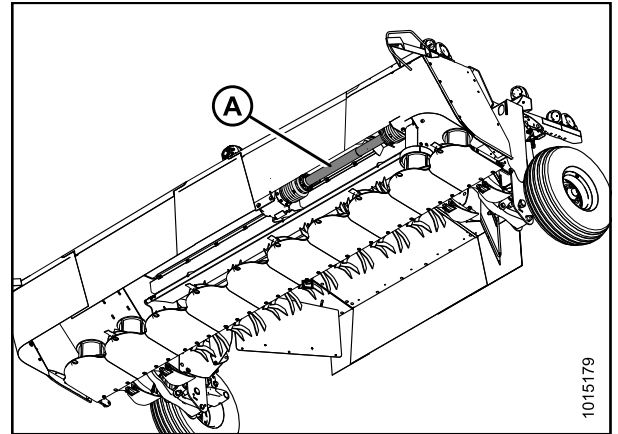


Figure 4.182: Lower Left View of Mower Conditioner

3. Loosen clamp (A) and slide the driveline shield (B) away from the yoke.
4. Repeat for the opposite end of the driveline.

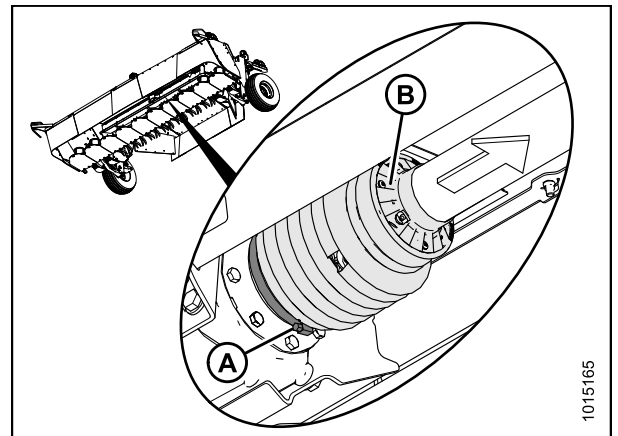


Figure 4.183: Cross Driveline Shield

5. Loosen nut (A) so that taper pin threads are recessed inside the nut.
6. Tap nut (A) with a hammer to loosen the taper pin and release driveline yoke (B) from the shaft.
7. Repeat for the opposite end of the driveline.
8. Remove the cross driveline shaft.

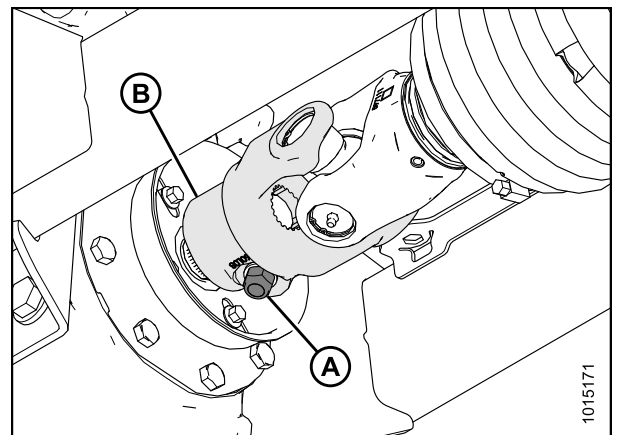


Figure 4.184: Cross Driveline

Installing Cross Driveline

DANGER

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

MAINTENANCE AND SERVICING

1. Stop engine and remove key from ignition.
2. Open the cutterbar doors to install the cross driveline (A) from inside the mower conditioner. Refer to [3.3.1 Opening Cutterbar Doors](#), page 36.

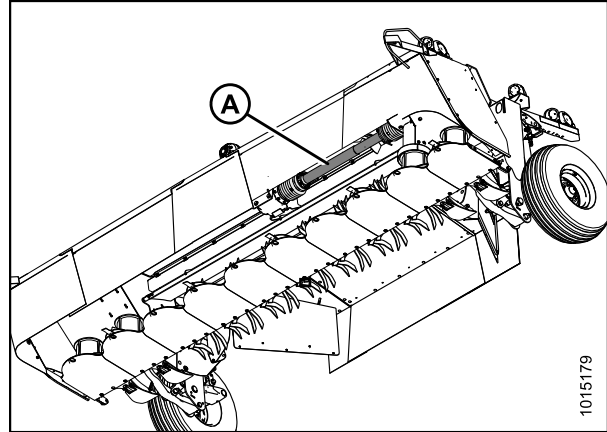


Figure 4.185: Lower Left View of Mower Conditioner

3. Position driveline yoke (B) as shown on both ends of the cross driveline.
4. Install taper pin so groove on pin is aligned with groove on shaft.
5. Install nut (A) onto taper pin and torque to 150 N·m (110 ft·lbf). Pin must be recessed 9–11 mm (3/8–7/16 in.) inside the yoke.

IMPORTANT:

Check taper pin torque every 25 hours until it stops moving, then check before every season.

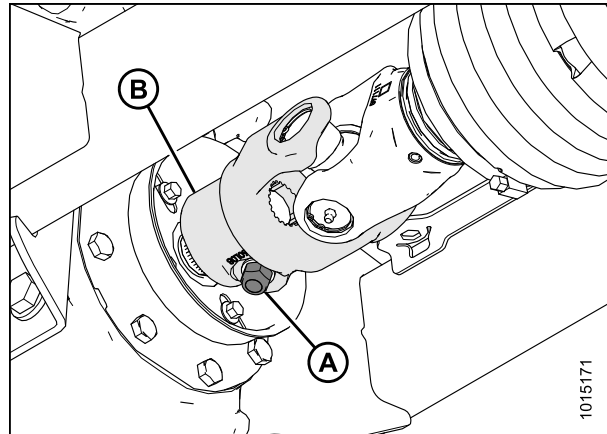


Figure 4.186: Cross Driveline yoke

6. Slide the driveline shields (B) over the yokes at both ends of the driveline, and secure them with clamps (A).
7. Close the cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

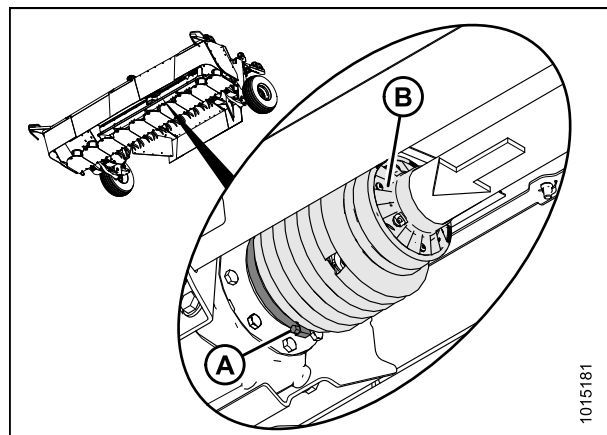


Figure 4.187: Cross Driveline Shield

4.5.6 Inspecting Driveline Taper Pins

Taper pins are located at three places (A) along the hitch drive shaft. Torque each pin to 150 N·m (110 ft·lbf) every 25 hours until it no longer moves, and then check at the beginning of every season.

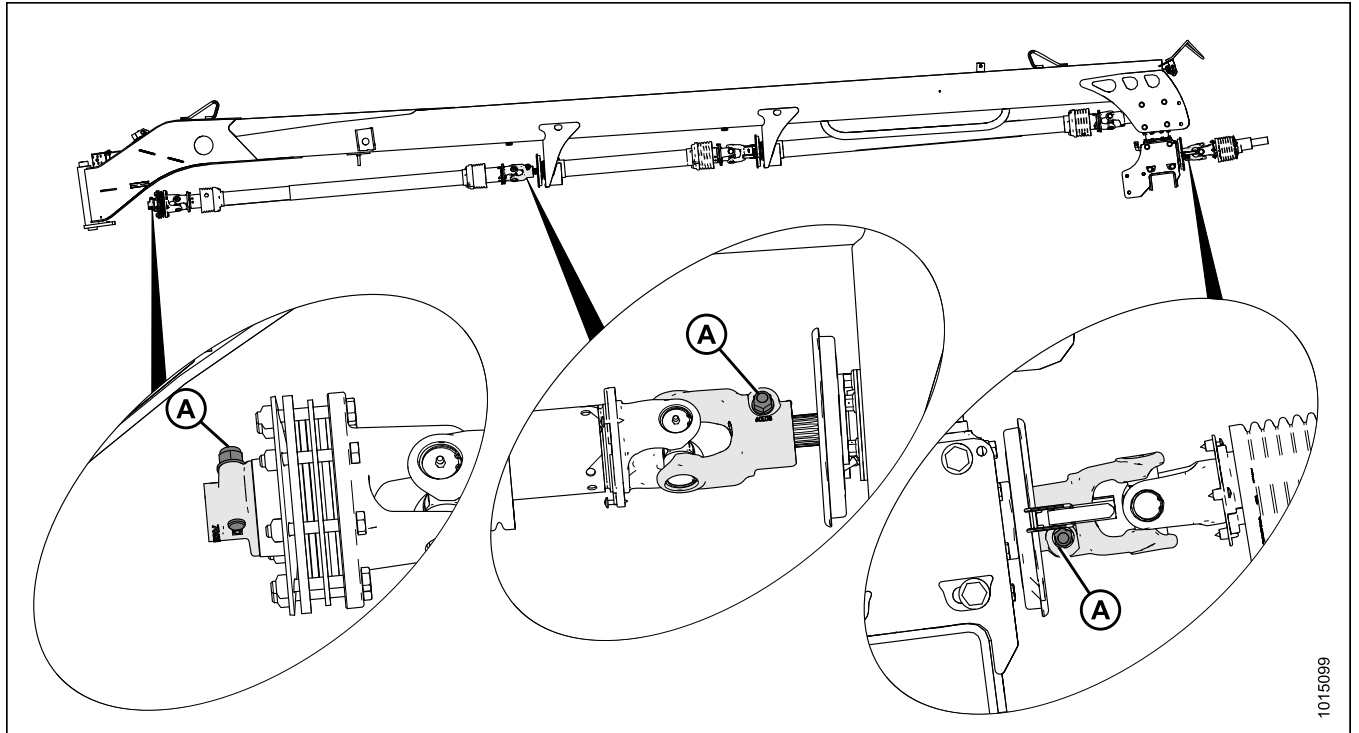


Figure 4.188: Hitch Taper Pin Locations

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MAINTENANCE AND SERVICING

Taper pins are located at two places (B) on the cross shaft driveline. Torque each pin to 150 N·m (110 ft·lbf) every 25 hours until it no longer moves, and then check at the beginning of every season.

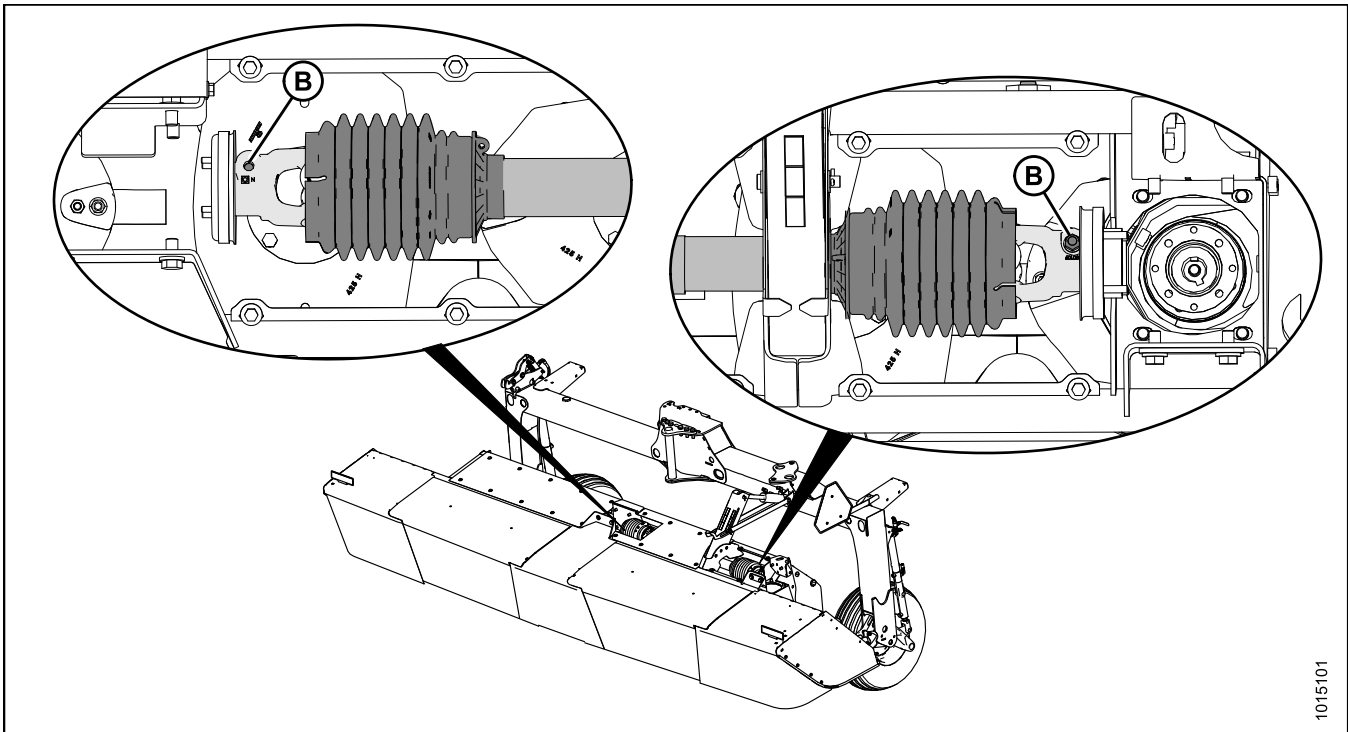


Figure 4.189: Cross Shaft Driveline Taper Pin Locations

4.5.7 Driveline Guards

Removing Driveline Guard

⚠ WARNING

Do NOT operate the machine without the driveline guards in place and securely fastened.

⚠ DANGER

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

MAINTENANCE AND SERVICING

1. Stop engine and remove key from ignition.
2. Remove driveline shield cone (A). Refer to [Removing Driveline Guard, page 204](#).
3. Remove primary driveline. Refer to [Removing Primary Driveline, page 187](#).
4. Remove hitch driveline. Refer to [Removing Hitch Driveline, page 189](#).
5. Remove clutch driveline. Refer to [Removing Clutch Driveline, page 196](#).

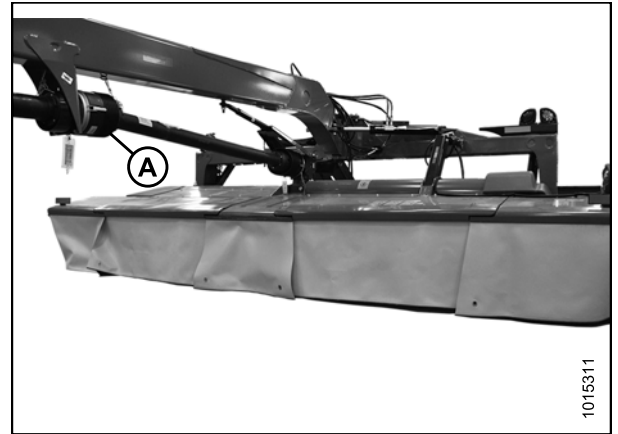


Figure 4.190: Driveline and Driveline Shield Cone

6. Remove three self-tapping Phillips head screws (A) from base cone (B).

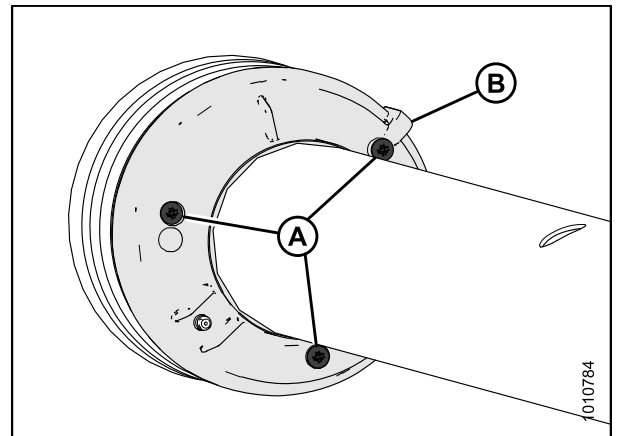


Figure 4.191: Phillips Head Screws Installed in Base Cone

7. Remove base cone (A) and shield tube (B) from driveline (not shown) and outer cone (C).

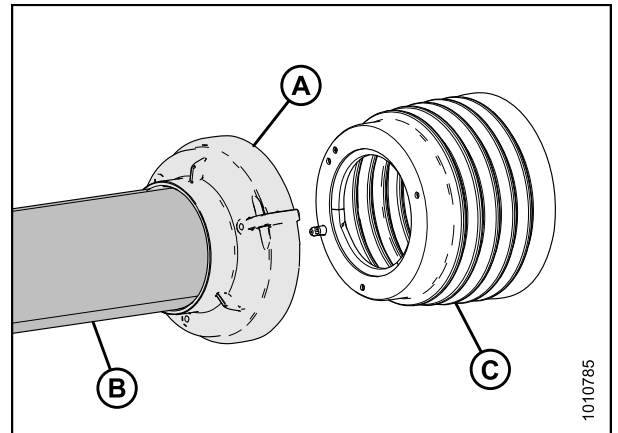


Figure 4.192: Base Cone and Shield Tube Removed from Outer Cone

MAINTENANCE AND SERVICING

8. Remove shield support (A) from outer cone (B).

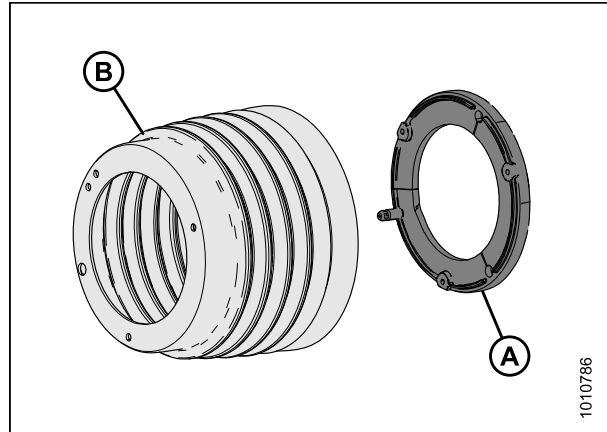


Figure 4.193: Shield Support Removed from Outer Cone

Installing Driveline Guard

DANGER

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

WARNING

Do NOT operate the machine without the driveline guards in place and securely fastened.

1. Stop engine, and remove key from ignition.
2. Grease the bearing groove (A) on the inner yokes.
3. Fit shield support (B) to the bearing groove (A), and ensure that grease fitting (C) faces the drive tube.

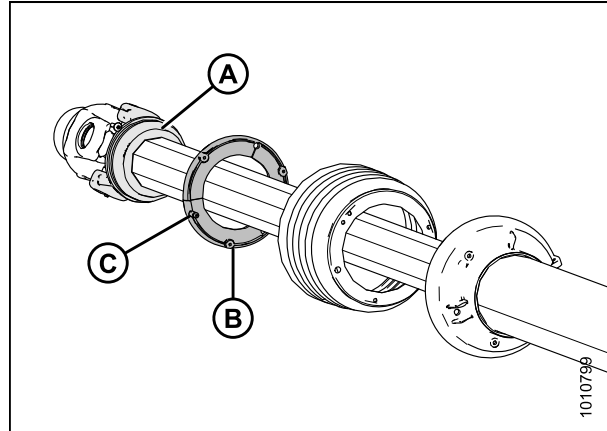


Figure 4.194: Inner Yoke and Shield Support

MAINTENANCE AND SERVICING

4. Install shield support (A) into outer cone (B), and ensure that grease fitting (C) is inserted into the proper hole.

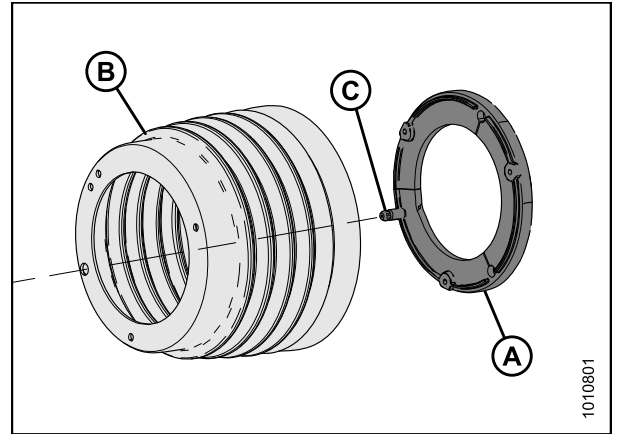


Figure 4.195: Shield Support and Outer Cone

5. Attach the base cone (A) and shield tube (B) to the outer cone (C).

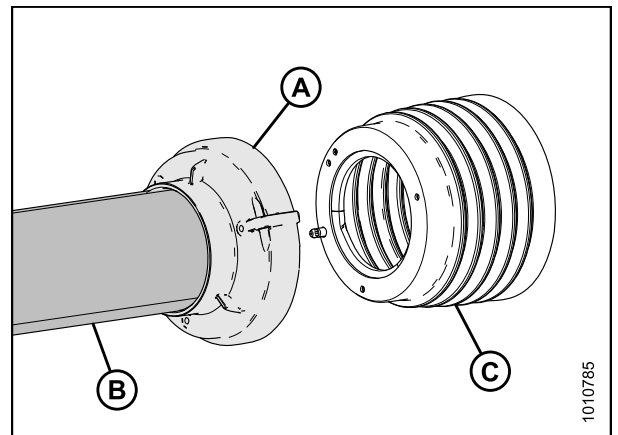


Figure 4.196: Base Cone, Shield Tube, and Outer Cone

6. Install three self-tapping Phillips head screws (A) into base cone (B).

NOTE:

Hand-tighten only using an appropriate screw driver.
Do NOT use a powered tool to tighten screws.

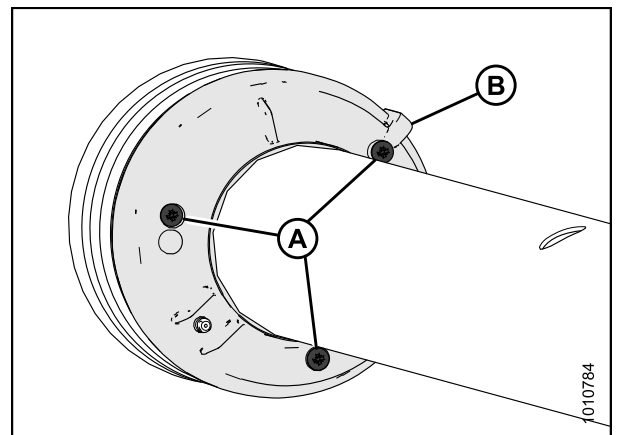


Figure 4.197: Phillips Head Screws Installed in Base Cone

MAINTENANCE AND SERVICING

7. Install clutch driveline. Refer to [Installing Clutch Driveline, page 198](#).
8. Install hitch driveline. Refer to [Installing Hitch Driveline, page 192](#).
9. Install primary driveline. Refer to [Installing Primary Driveline, page 187](#).
10. Install driveline shield cone (A). Refer to [Installing Driveline Guard, page 206](#).

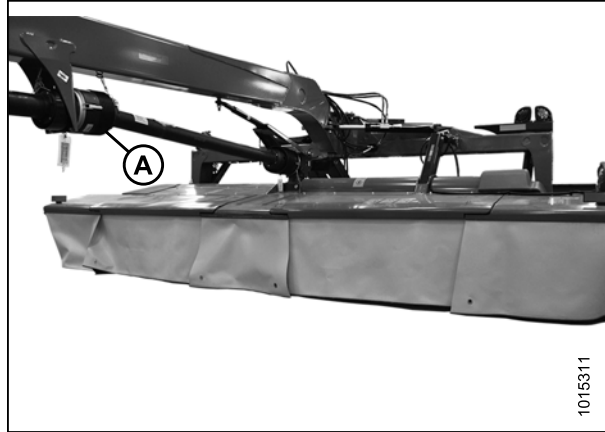


Figure 4.198: Driveline

4.5.8 Conditioner Drive Belt

The conditioner drive belt is located inside the left driveshield and is tensioned with a spring tensioner. The tension is factory-set and should not require adjustment.

Inspecting Conditioner Drive Belt

Check the belt tension and inspect for damage or wear every 100 hours or annually (preferably before the start of the cutting season).

⚠ DANGER

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

1. Lower mower conditioner fully, turn off engine, and remove key.
2. Open the left side driveshield (A). Refer to [4.8.1 Removing Driveshields, page 227](#).

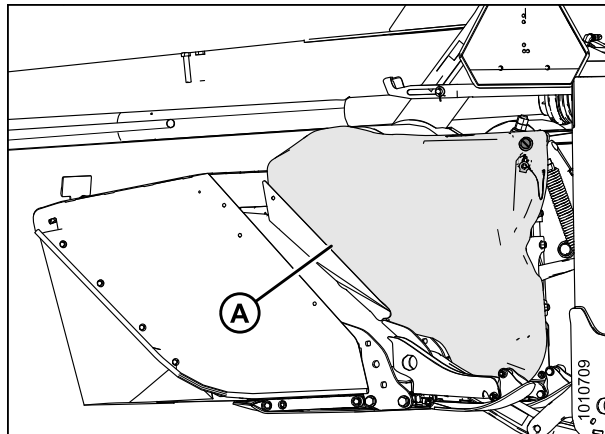


Figure 4.199: Left Side Driveshield

MAINTENANCE AND SERVICING

3. Inspect drive belt (A) and replace if damaged or cracked.
4. Check that jam nut (B) and adjuster nut (C) are tight.

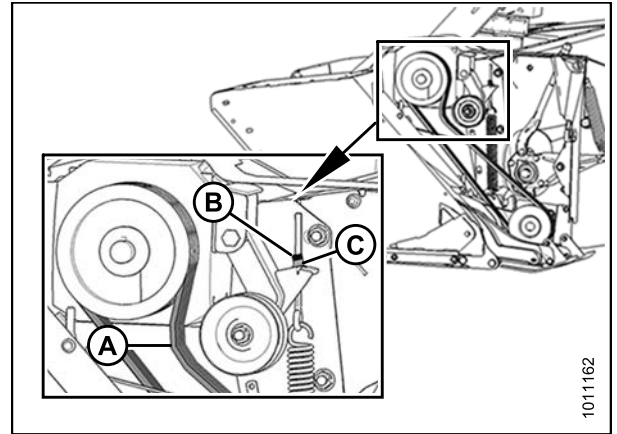


Figure 4.200: Conditioner Drive

5. Measure the length of tensioner spring (A), and ensure spring length is 366 mm (14-3/8 in.) in accordance with spring tension decal (B). If spring length requires adjustment, refer to [Installing Conditioner Drive Belt, page 210](#).
6. Close driveshield. Refer to [3.2.2 Closing Driveshields, page 34](#).

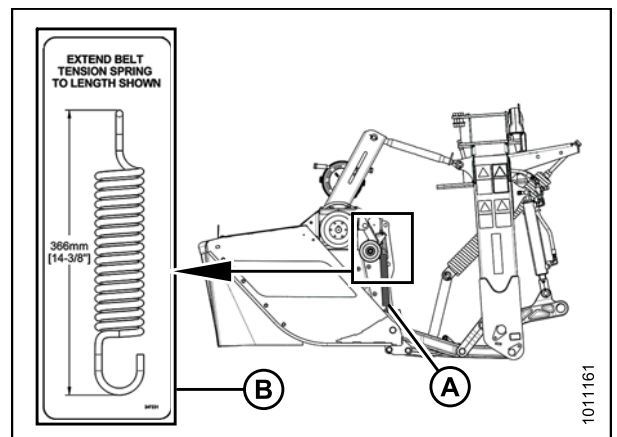


Figure 4.201: Spring Tension Decal

Removing Conditioner Drive Belt

DANGER

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

1. Lower mower conditioner fully, turn off engine, and remove key.
2. Remove the left driveshield (A). Refer to [4.8.1 Removing Driveshields, page 227](#).

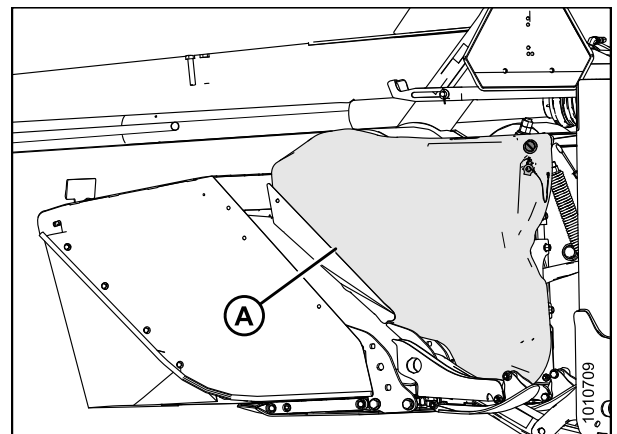


Figure 4.202: Left Driveshield

MAINTENANCE AND SERVICING

3. Turn jam nut (A) counterclockwise to unlock tension adjustment.
4. Turn jam nut (A) and adjuster nut (B) counterclockwise to fully collapse tensioner spring (C) and release the tension from conditioner drive belt (D).
5. Remove drive belt (D).

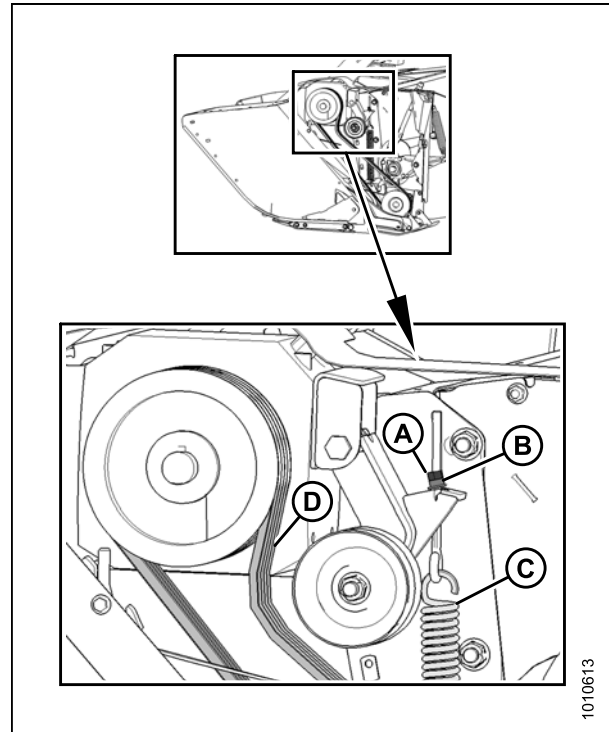


Figure 4.203: Conditioner Drive

Installing Conditioner Drive Belt

DANGER

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

1. Lower mower conditioner fully, turn off engine, and remove key.
2. Install drive belt (A) onto driven pulley (C) first, and then onto drive pulley (B) ensuring that the belt is in the pulley grooves.

NOTE:

If necessary, loosen jam nut and adjuster nut to relieve spring tension.

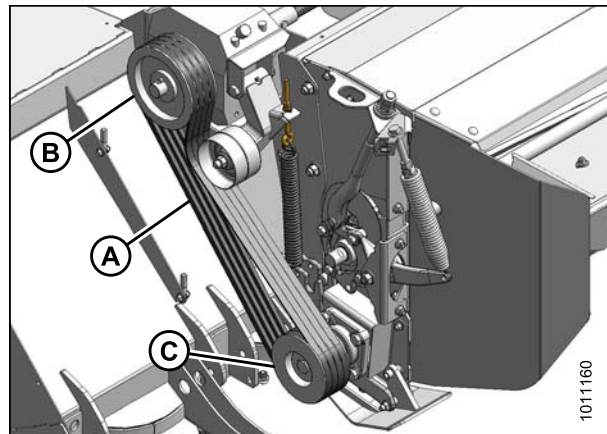


Figure 4.204: Conditioner Drive

MAINTENANCE AND SERVICING

3. Measure the length of tensioner spring (A), and adjust spring length to 366 mm (14-3/8 in.) to conform with spring tension decal (B).

NOTE:

Tensioner springs hook into different locations on different types of conditioners.

4. Increase spring length (tension) by turning adjuster nut (D) clockwise.
5. Once correct spring measurement has been achieved, hold adjuster nut (D) and tighten jam nut (C) against it.

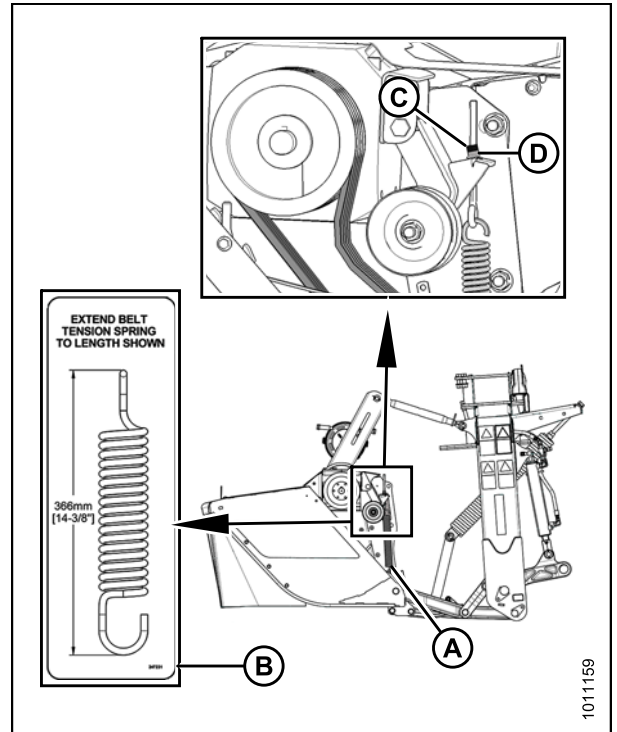


Figure 4.205: Spring Tension Decal

6. Install left driveshield (A). Refer to [4.8.2 Installing Driveshields, page 228](#).

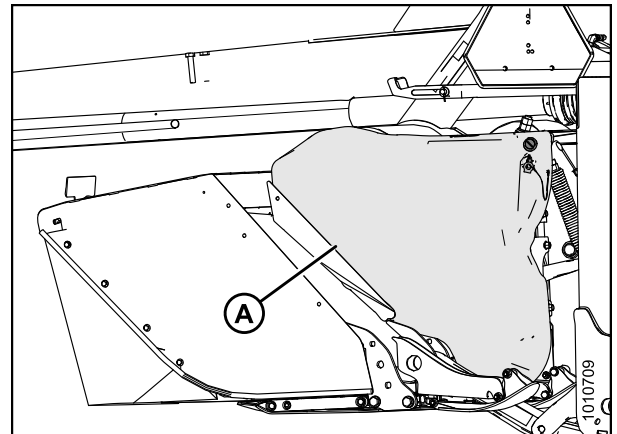


Figure 4.206: Left Driveshield

4.5.9 Conditioner Drive Gearbox (MD #221748)

The conditioner drive gearbox, located inside the drive compartment at the right side of the mower conditioner, transfers power from the gearbox to the conditioner rolls.

The gearbox (A) does not require routine maintenance or service other than checking and changing the oil.

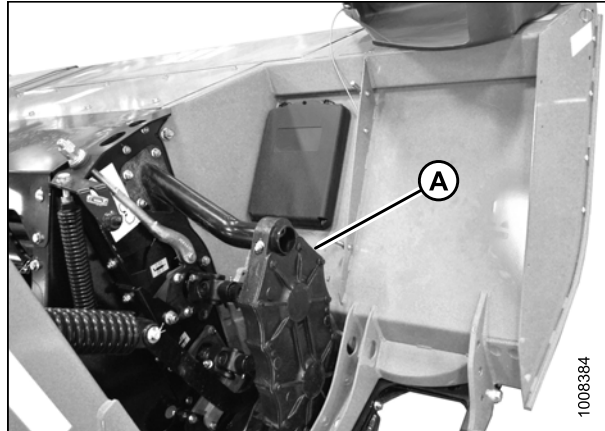


Figure 4.207: Conditioner Drive Gearbox

Checking and Changing Conditioner Gearbox Oil

Change oil after the first 50 hours of operation. Perform subsequent oil changes every 100 hours or annually (preferably before the start of the cutting season).

DANGER

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

IMPORTANT:

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

1. Lower mower conditioner fully, turn off engine, and remove key.
2. Remove the right driveshield (A). Refer to [4.8.1 Removing Driveshields, page 227](#).

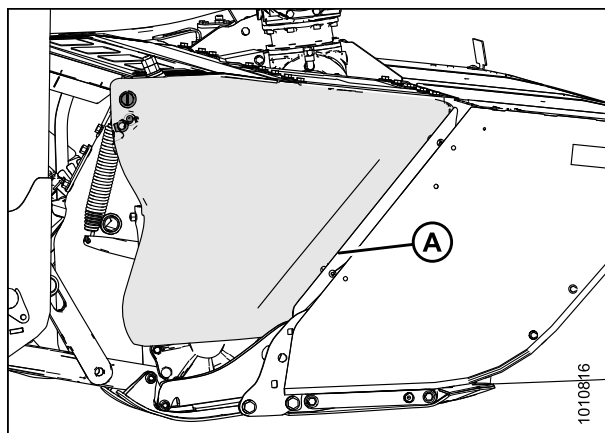


Figure 4.208: Right Driveshield

MAINTENANCE AND SERVICING

Checking Conditioner Gearbox Oil Level

3. Clean around oil level plug (A) on inboard side of gearbox.
4. Remove oil level plug (A), and check that oil level is even with the hole.
5. Top up oil level with SAE 85W-140 gear oil if necessary.
6. Replace oil level plug (A) and tighten.

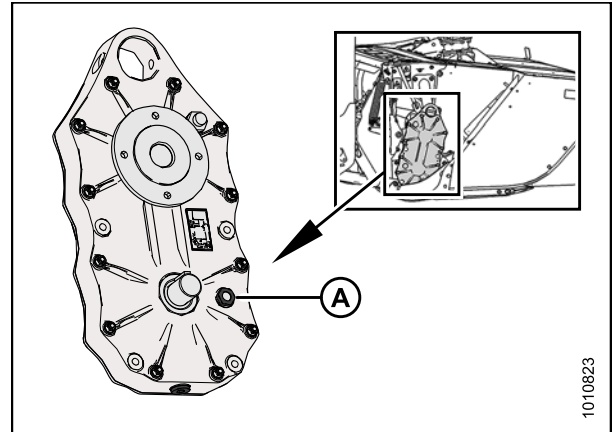


Figure 4.209: Oil Level Plug

Changing Conditioner Gearbox Oil

WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine: stop engine, remove key, and engage lift cylinder lock-out valves before going under machine.

7. Raise mower conditioner to provide sufficient access to oil drain plug (A), shut off engine, and remove key.
8. Close the cylinder lock-out valve on each lift cylinder by turning the handle to the horizontal position. Refer to [3.11.1 Lift Cylinders, page 59](#).
9. Clean around oil drain plug (A) on bottom of gearbox and around oil level plug (B) on inboard side of gearbox.
10. Place a suitably sized container underneath conditioner gearbox.
11. Remove oil drain plug (A) using a hex key.
12. Allow sufficient time for oil to drain, replace oil drain plug (A), and tighten.
13. Remove oil level plug (B) and fill with SAE 85W-140 gear oil until the oil level is even with the bore hole.
14. Replace oil level plug (B) and tighten.
15. Properly dispose of oil.

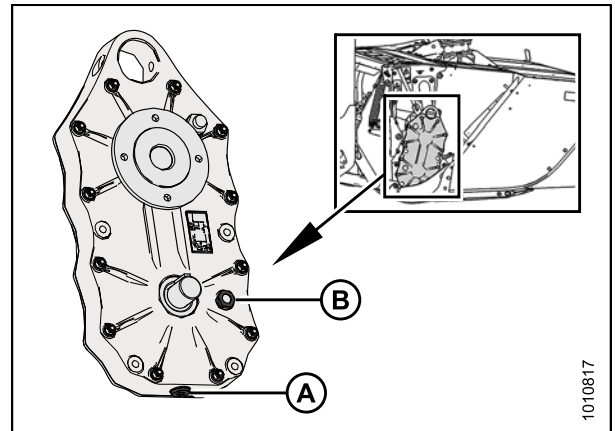


Figure 4.210: Oil Level and Drain Plug

4.5.10 Mower Conditioner Drive Gearbox (T-Gearbox) (MD #224211)

The mower conditioner drive gearbox, located inside the drive compartment at the left side of the mower conditioner, transfers power from the rear swivel gearbox to the conditioner and cutterbar.

If the gearbox requires repair, remove it and have it serviced at your MacDon Dealer.

For service intervals, refer to [4.3.1 Maintenance Schedule/Record, page 113](#).

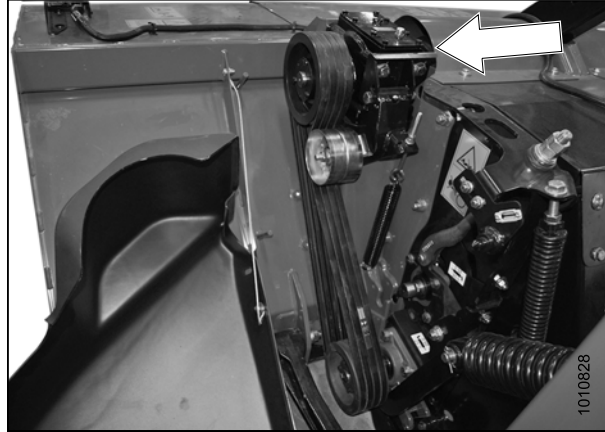


Figure 4.211: Left Side of Mower Conditioner

Checking and Adding Lubricant

The mower conditioner drive gearbox is located inside the drive compartment at the left side of the mower conditioner.

⚠ DANGER

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

1. Retract the center-link completely.
2. Lower mower conditioner, turn off engine, and remove key.
3. Detach the tractor from the hitch. Refer to [3.8 Detaching Mower Conditioner from Tractor, page 51](#).
4. Open the left driveshield (A). Refer to [3.2.1 Opening Driveshields, page 33](#).
5. Adjust the hitch jack (A) until the drive gearbox is parallel to the ground.

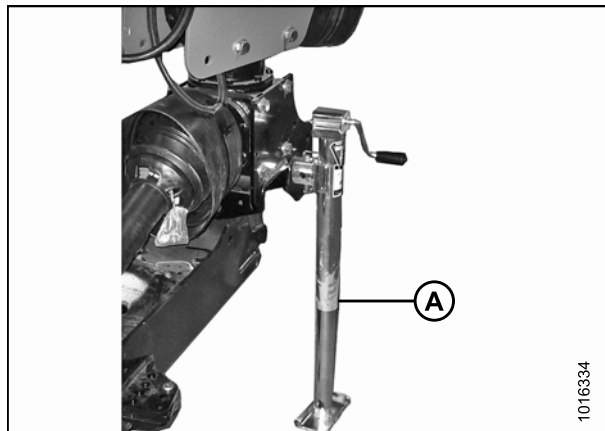


Figure 4.212: Hitch Jack

MAINTENANCE AND SERVICING

6. Clean area around dipstick (A).
7. Remove dipstick (A) using a 22 mm socket.
8. Ensure lubricant level is to the line on dipstick.
9. Add gear lubricant to gearbox through dipstick hole (A). For lubricant capacities, refer to [7.1 Recommended Lubricants, page 259](#).
10. Reinstall dipstick and tighten.
11. Close left driveshield. Refer to [3.2.2 Closing Driveshields, page 34](#).

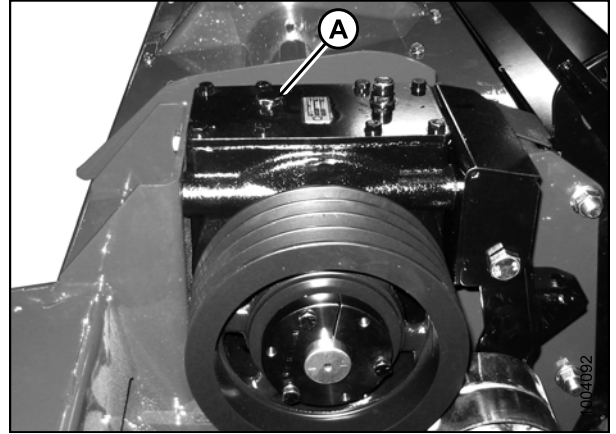


Figure 4.213: Left Side of Mower Conditioner

Draining Lubricant

DANGER

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

IMPORTANT:

Drain the gearbox lubricant when the lubricant is warm. If the lubricant is cold, idle the machine for approximately 10 minutes prior to draining.

1. Lower mower conditioner fully, stop engine, and remove key from ignition.
2. Open left side cutterbar door. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

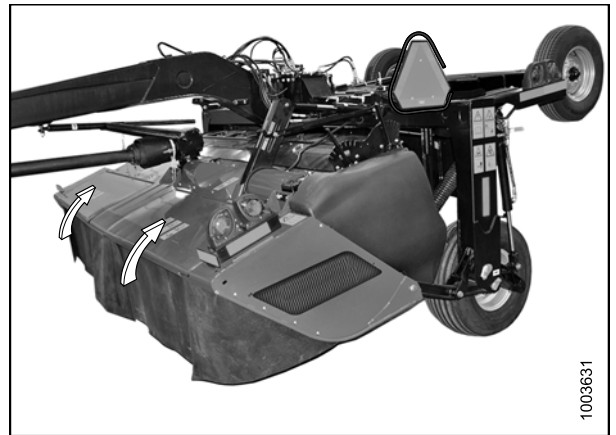


Figure 4.214: Cutterbar Doors

MAINTENANCE AND SERVICING

3. Remove four M10 hex flange head bolts (A) and remove vertical drive shield (B).

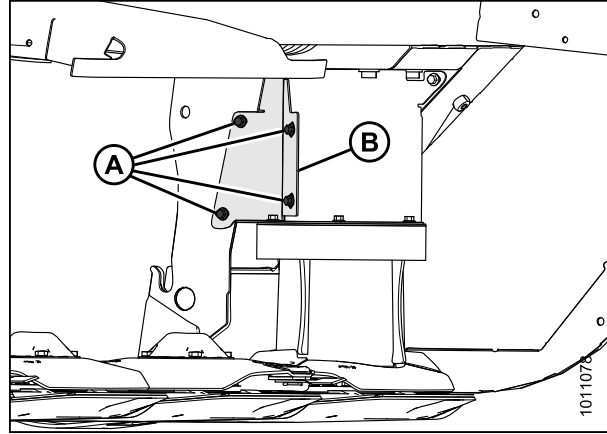


Figure 4.215: Vertical Drive Shield

4. Remove two M10 hex flange head bolts (A) and remove cover plate (B).

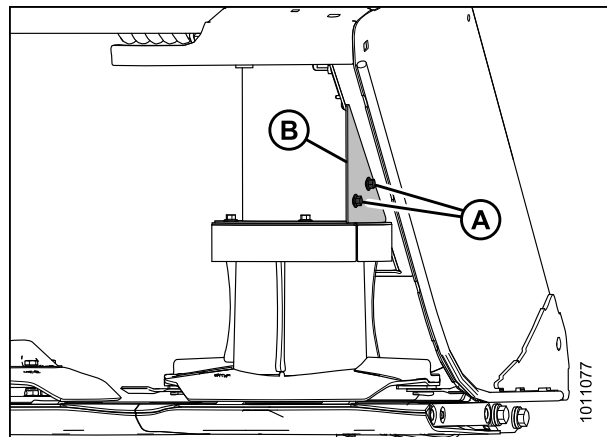


Figure 4.216: Cover Plate

5. Remove four M10 hex flange head bolts (A), and remove top plate (B) and drum top (C).

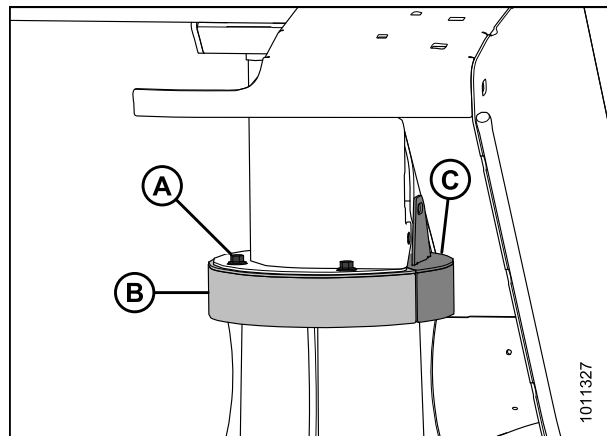


Figure 4.217: Top Plate and Drum Top

MAINTENANCE AND SERVICING

6. Remove M10 hex flange head bolt (A) and remove vertical shield (B).

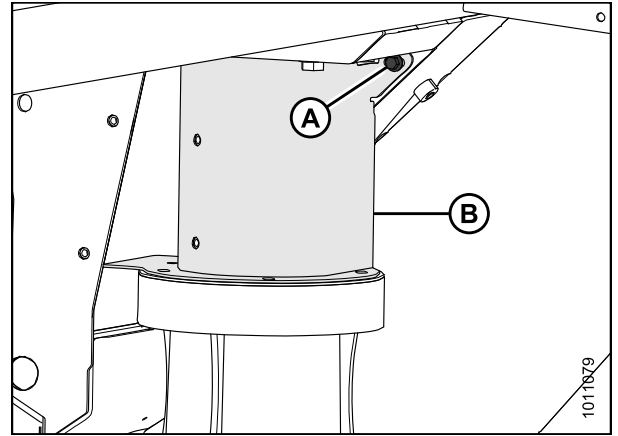


Figure 4.218: Vertical Shield

7. Place a suitably sized container under drain plug (A), and remove plug using a 17 mm socket.
8. Allow sufficient time for lubricant to drain, replace drain plug (A), and tighten.
9. Properly dispose of oil.

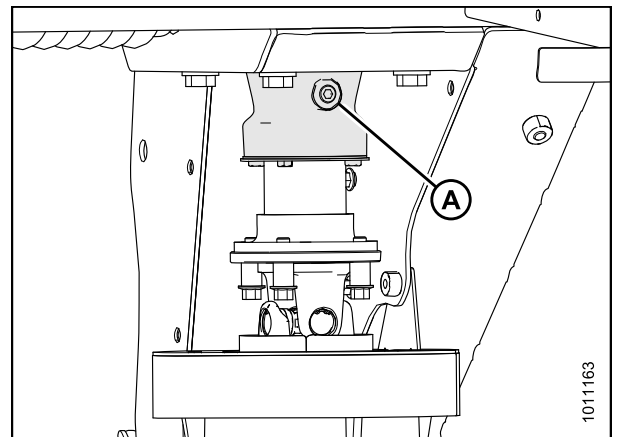


Figure 4.219: Mower Conditioner Drive Gearbox Drain Plug

10. Position vertical shield (B) as shown, and install an M10 hex flange head bolt (A).

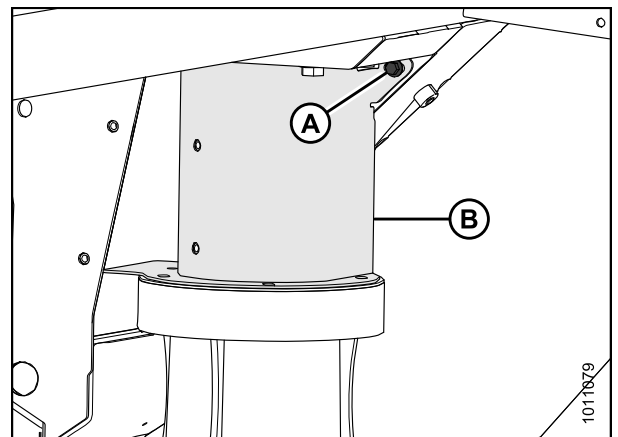


Figure 4.220: Vertical Shield

MAINTENANCE AND SERVICING

11. Position top plate (B) and drum top (C) onto drum as shown, and secure with four M10 hex flange head bolts (A).

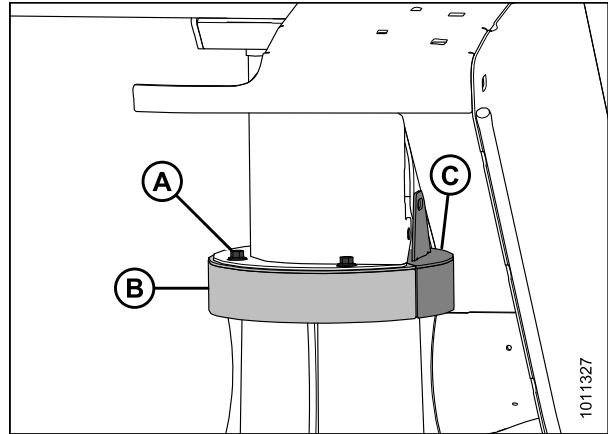


Figure 4.221: Top Plate and Drum Top

12. Install top M10 hex flange head bolt (B) through cover plate (A) and top plate (C).
13. Install lower M10 hex flange head bolt (D) through cover plate (A) and vertical shield (E).
14. Tighten bolts (B and D).

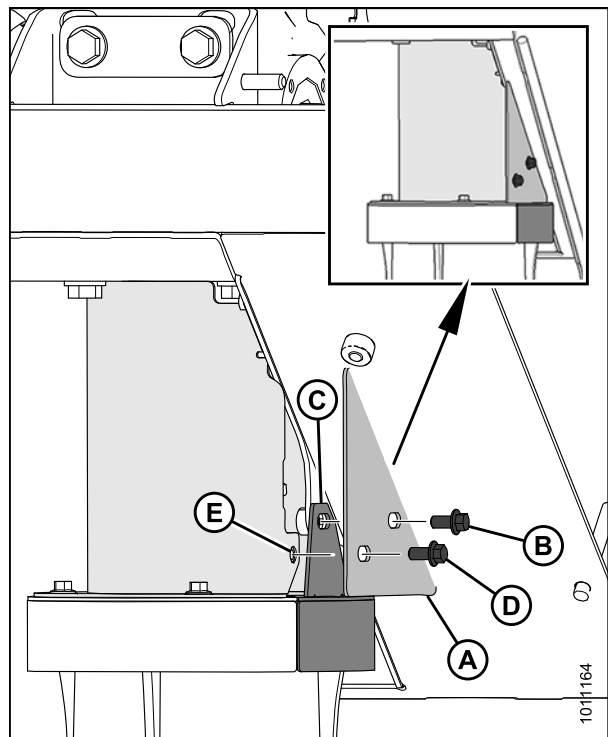


Figure 4.222: Cover Plate

MAINTENANCE AND SERVICING

15. Install vertical drive shield (B) using four M10 hex flange head bolts (A).

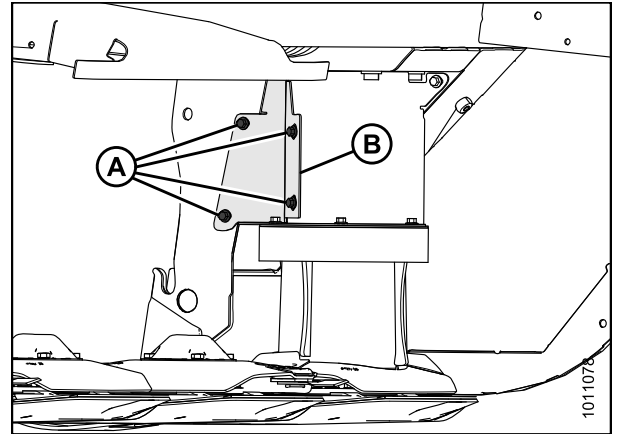


Figure 4.223: Vertical Drive Shield

16. Close cutterbar doors. Refer to [3.3.3 Closing Cutterbar Doors](#), page 38.

WARNING

Ensure cutterbar is completely clear of foreign objects. Foreign objects can be ejected with considerable force when the machine is started and may result in serious injury or machine damage.

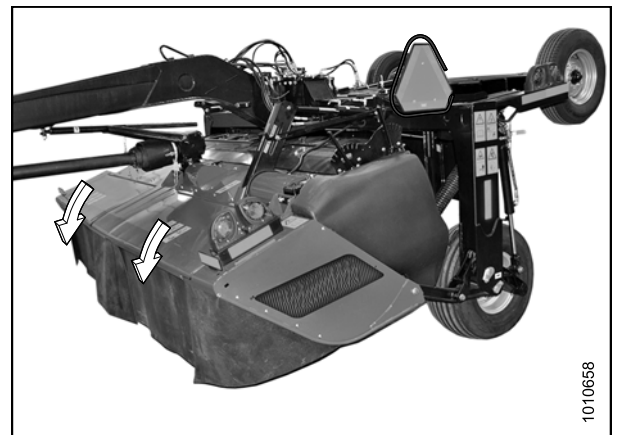


Figure 4.224: Cutterbar Doors in Closed Position

4.5.11 Swivel Gearbox

There are two swivel gearboxes located on the mower conditioner. The swivel gearbox consists of an upper and lower gearbox. The hitch swivel gearbox (MD #146784) transfers power from the tractor to the header swivel gearbox (MD #146783). The header swivel gearbox (MD #146783) transfers power to the mower conditioner cutterbar and conditioner drive gearbox.

If either of the gearboxes requires repair, remove it and have it serviced at your MacDon Dealer.

For service intervals, refer to [4.3.1 Maintenance Schedule/Record](#), page 113.

Checking Lubricant

Check plugs are located at the same position on each gearbox and need to be removed in order to check the lubricant level. Check lubricant level while lubricant is warm. The lubricant should be visible or slightly draining from the port if filled to the correct level. Refer to [4.3.1 Maintenance Schedule/Record](#), page 113 for required service intervals.

DANGER

To avoid bodily injury or death from 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.

MAINTENANCE AND SERVICING

NOTE:

This procedure is the same for both swivel gearboxes (MD #146783 and MD #146784) and must be done on both upper and lower gearboxes.

1. Clean area around check plug (A).
2. Remove plug using a 15 mm socket. Check lubricant level and ensure lubricant is visible or slightly draining from the port.
3. If lubricant is low, you will need to add some. Refer to [Adding Lubricant, page 220](#).
4. Reinstall check plug (A) and tighten.

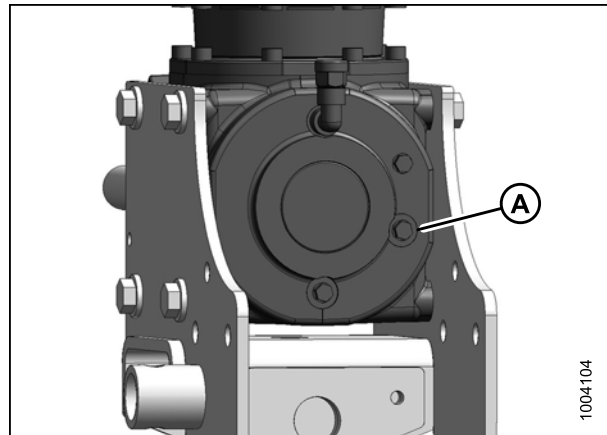


Figure 4.225: Swivel Gearbox Check Plug

Draining Lubricant

DANGER

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

NOTE:

This procedure is the same for both swivel gearboxes (MD #146783 and MD #146784) and must be done on both upper and lower gearboxes.

1. Place a suitably sized container under drain plug (A), and remove plug using a 17 mm socket.

NOTE:

Removing check plug (B) will contribute to faster draining.

2. Allow sufficient time for lubricant to drain, replace drain plug (A), check plug (B) (if removed), and tighten plugs.
3. Properly dispose of used lubricant and clean up any spills.

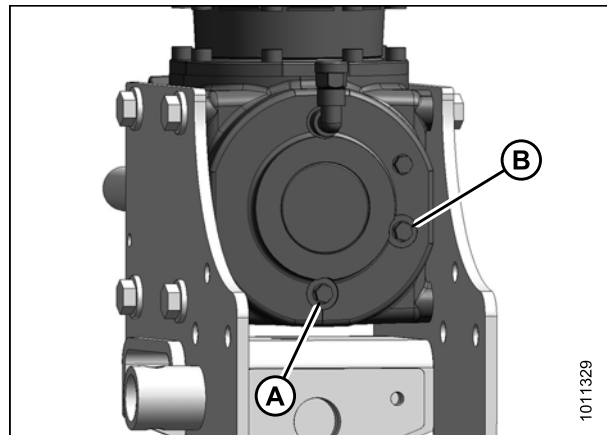


Figure 4.226: Swivel Gearbox Drain Plug

Adding Lubricant

NOTE:

This procedure is the same for both swivel gearboxes (MD #146783 and MD #146784) and must be done on both upper and lower gearboxes.

MAINTENANCE AND SERVICING

1. Clean area around check plug (A) and breather/filler plug (B).
2. Remove check plug (A) and breather/filler plug (B).
3. Ensure lubricant level is visible or begins to drain through check port (A), and add gear lubricant to gearbox through port (B) as required. Refer to [7.1 Recommended Lubricants, page 259](#) for capacity of gearbox.
4. Reinstall check plug (A) and breather/filler plug (B) and tighten.

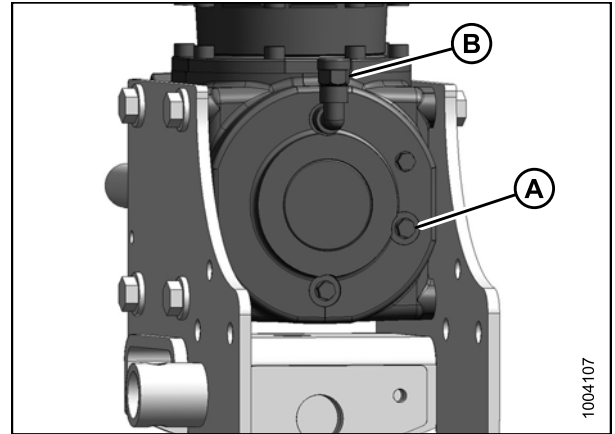


Figure 4.227: Swivel Gearbox

4.5.12 Wheels and Tires

Checking Wheel Bolts

DANGER

To avoid bodily injury or death from 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.

IMPORTANT:

Check and tighten field wheel bolts and transport system wheel bolts (if installed) after the first hour of operation and every 100 hours thereafter.

1. Torque wheel bolts to 160 N·m (120 ft·lbf) using the tightening sequence shown.

IMPORTANT:

Whenever a wheel is installed, check torque after one hour of operation.

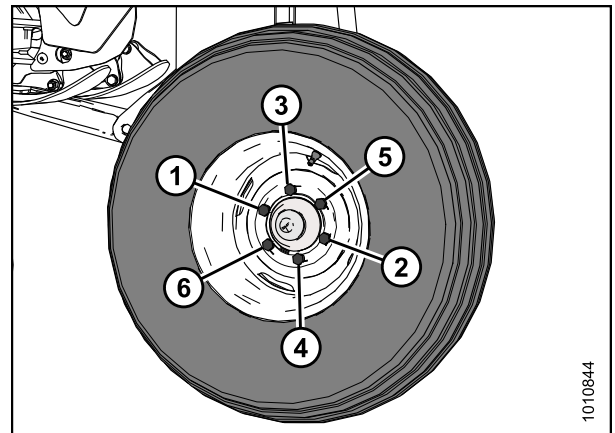


Figure 4.228: Tightening Sequence

Removing Wheels

DANGER

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

MAINTENANCE AND SERVICING

1. Place blocks (A) under opposite wheel to prevent machine from moving if mower conditioner is not attached to towing vehicle.
2. Position jack under frame leg (B).
3. Loosen wheel bolts slightly.
4. Operate jack to raise wheel off ground.
5. Place blocks or a stand under frame leg.
6. Remove wheel bolts and remove wheel.

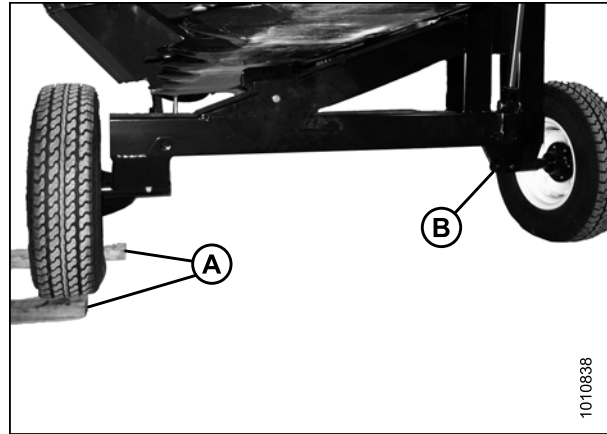


Figure 4.229: Transport Wheel



Figure 4.230: Field Wheel

Installing Field Wheels

CAUTION

When installing wheel, be sure to match countersunk holes with bolt head profiles. Holes that are not countersunk do NOT correctly seat the bolts.

1. Position wheel (A) on spindle, install bolts (B), and partially tighten.

IMPORTANT:

Be sure valve stem (C) points away from wheel support.

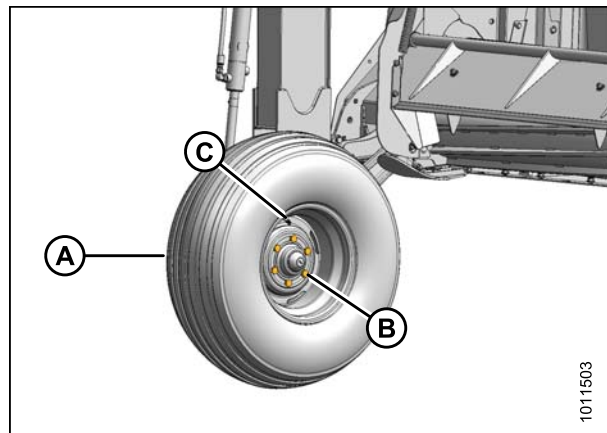


Figure 4.231: Installing Wheel Bolts

MAINTENANCE AND SERVICING

- Lower wheels to the ground and torque wheel bolts to 160 N·m (120 ft·lbf) using the tightening sequence shown.

IMPORTANT:

Whenever a wheel is installed, check torque after one hour of operation.

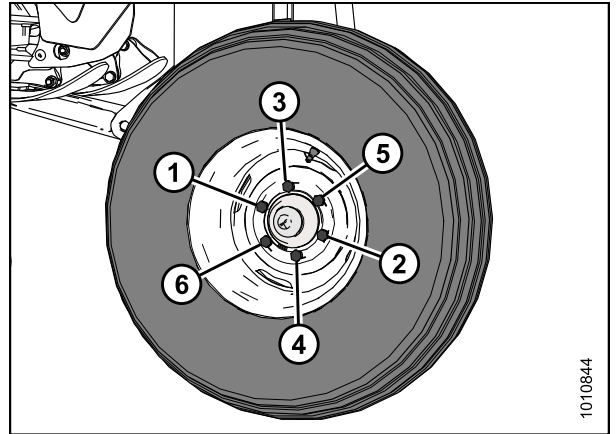


Figure 4.232: Tightening Sequence

Inflating Tires

WARNING

- Service tires safely.
- A tire can explode during inflation which could cause serious injury or death.

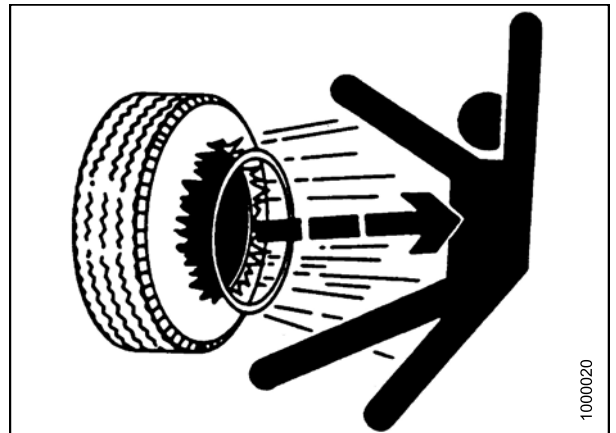


Figure 4.233: Overinflated Tire

1. Check tire pressure daily.
 - Maintain pressure at 207 kPa (30 psi) for field wheels (A)
 - Maintain pressure at 552 kPa (80 psi) for optional Road Friendly Transport wheels (B)

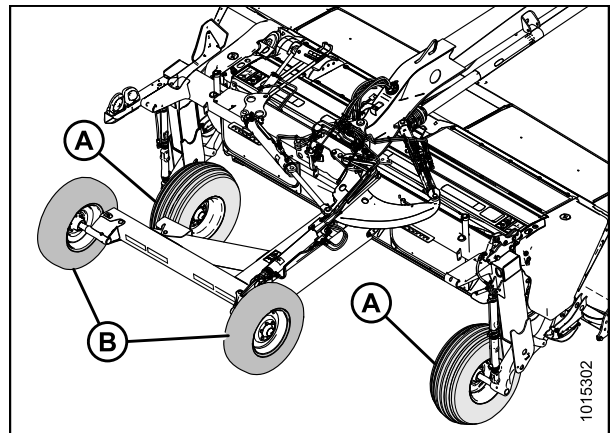


Figure 4.234: Field and Transport Wheels

4.6 Hydraulics

4.6.1 Hydraulic Hoses and Lines

Check hydraulic hoses and lines daily for signs of leaks.

WARNING

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

IMPORTANT:

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



Figure 4.235: Hydraulic Pressure Hazard

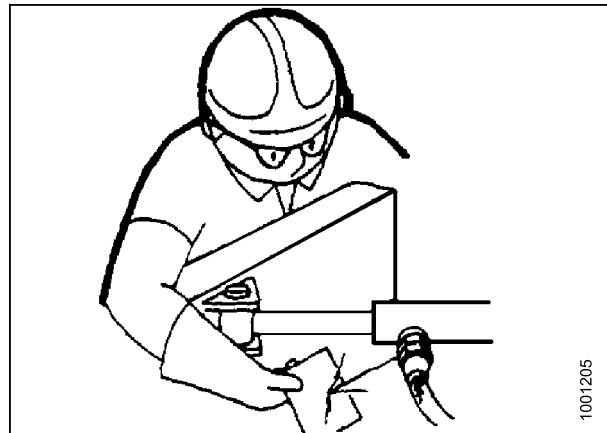


Figure 4.236: Testing for Hydraulic Leaks

4.6.2 Hydraulic Cylinders

The hydraulic cylinders do not require routine maintenance or service. Occasionally visually inspect cylinders for signs of leaks or damage. If repairs are required, remove them and have them serviced by your MacDon Dealer.

4.7 Electrical System

4.7.1 Maintaining Electrical System

1. Use electrical tape and cable ties as required to prevent wires from dragging or rubbing.
2. Keep lights clean and replace defective bulbs.

4.7.2 Servicing Amber Hazard/Signal Lights

Replacing Amber Hazard/Signal Bulb

1. Remove two Phillips screws (A) from fixture, and remove the plastic lens.
2. Replace bulb, and reinstall plastic lens and screws. Bulb—Trade #1157.

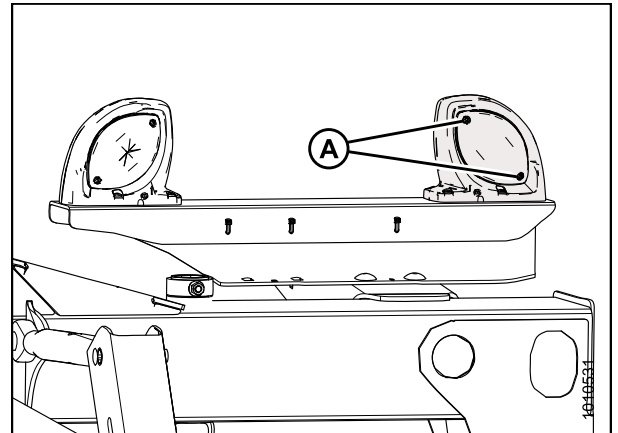


Figure 4.237: Plastic Lens and Screws

Replacing Amber Hazard/Signal Light Fixture

1. Cut cable ties (A) securing harness covering to light.
2. Retrieve connections from inside harness covering (approximately 150 mm [6 in.] from light) and disconnect wires (not shown). If necessary, remove tape.
3. Remove the four nuts (B) securing light to bracket and remove light. Pull wires through hole in bracket.
4. Feed connectors of new light (not shown) through hole in bracket, and position light onto bracket.
5. Install four nuts (B) and tighten.
6. Connect wires to connectors in harness, and secure harness covering with tape and cable ties (A) as required.

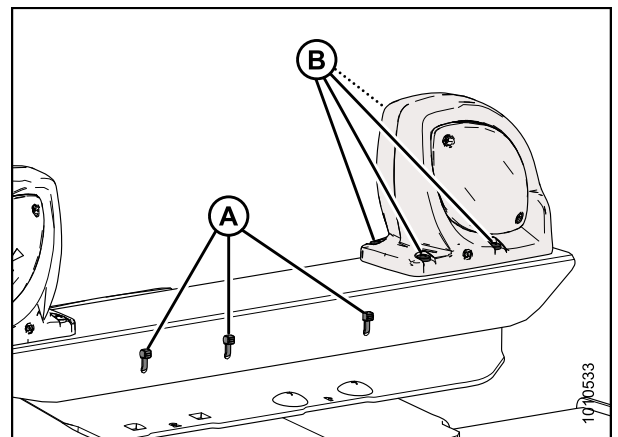


Figure 4.238: Amber Hazard Light and Mounting Bracket

4.7.3 Servicing Red Brake/Tail Lights

Replacing Red Brake/Tail Light Bulb

1. Remove two Phillips screws from fixture, and remove the plastic lens.
2. Replace bulb, and reinstall plastic lens and screws. Bulb—Trade #1157.

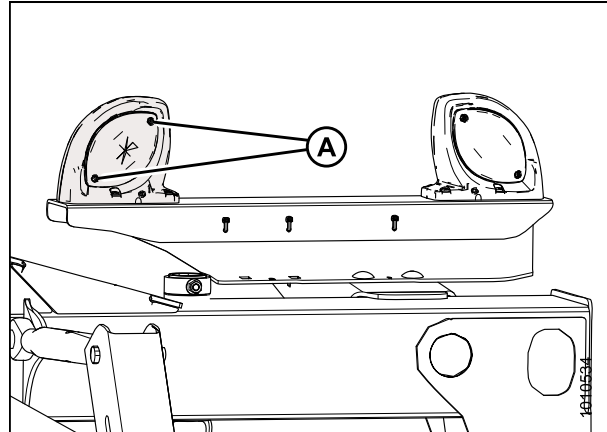


Figure 4.239: Plastic Lens and Screws

Replacing Red Brake/Tail Light Fixture

1. Cut cable ties (A) securing harness covering to light.
2. Retrieve connections from inside harness covering (approximately 150 mm [6 in.] from light) and disconnect wires (not shown). If necessary, remove tape.
3. Remove the four nuts (B) securing light to bracket and remove light. Pull wires through hole in bracket.
4. Feed connectors of new light (not shown) through hole in bracket, and position light onto bracket.
5. Install four nuts (B) and tighten.
6. Connect wires to connectors in harness, and secure harness covering with tape and cable ties (A) as required.

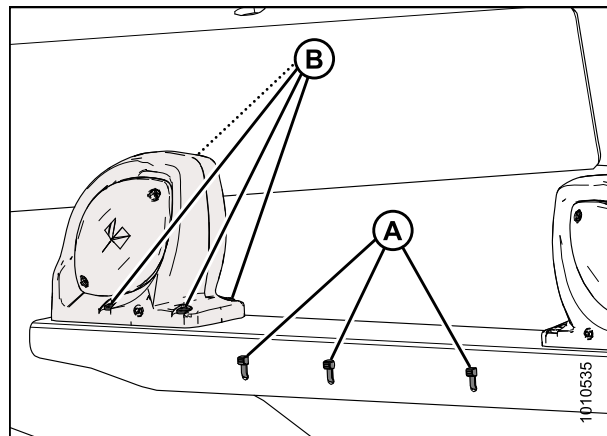


Figure 4.240: Red Hazard Light and Mounting Bracket

4.8 Driveshields

4.8.1 Removing Driveshields

CAUTION

Do NOT operate the machine without the driveshields in place and secured.

NOTE:

Images shown are for left side driveshield—right side driveshield is similar.

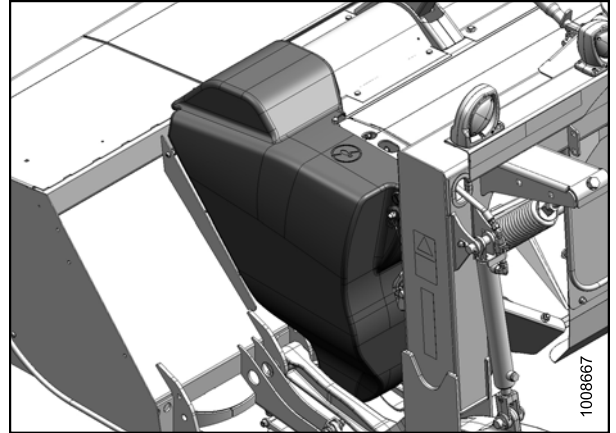


Figure 4.241: Left-Hand Driveshield

1. Remove lynch pin (A) and tool (B) from pin (C).

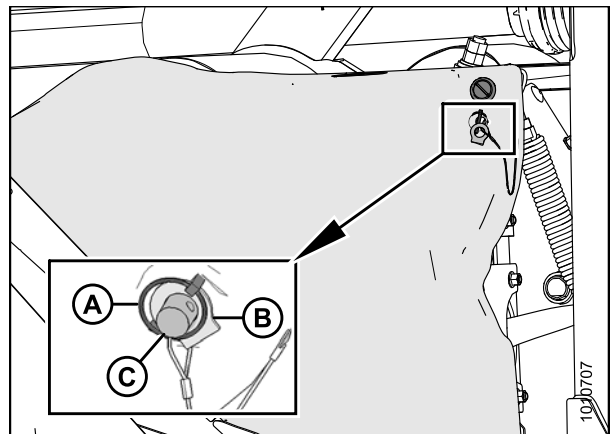


Figure 4.242: Tool to Unlock Driveshield

MAINTENANCE AND SERVICING

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

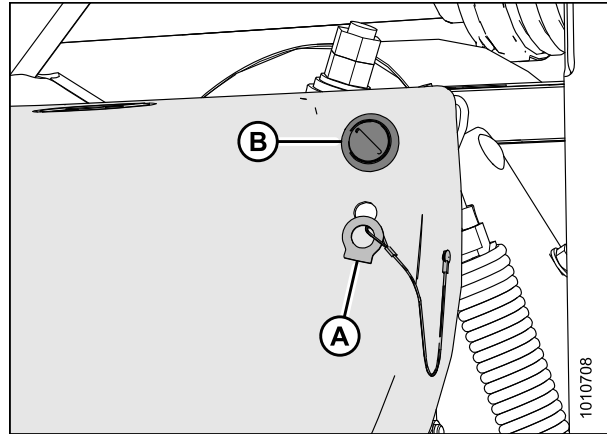


Figure 4.243: Tool to Unlock Driveshield and Latch

3. Pull top of driveshield (A) away from mower conditioner and lift off the pins at the base of the shield to remove.

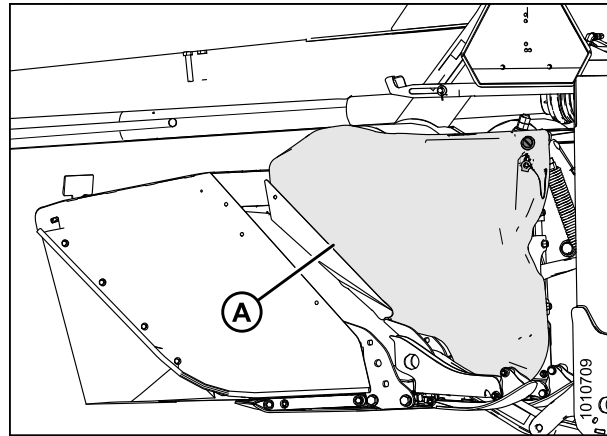


Figure 4.244: Driveshield

4.8.2 Installing Driveshields

CAUTION

Do NOT operate the machine without the driveshields in place and secured.

NOTE:

Images shown are for left side driveshield—right side driveshield is similar.

1. Position driveshield onto pins at base of driveshield.
2. Push driveshield (A) to engage latch (B).
3. Check that driveshield is properly secured.

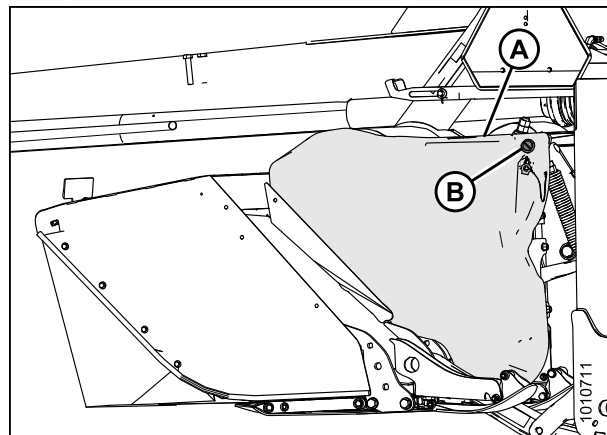


Figure 4.245: Driveshield and Latch

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

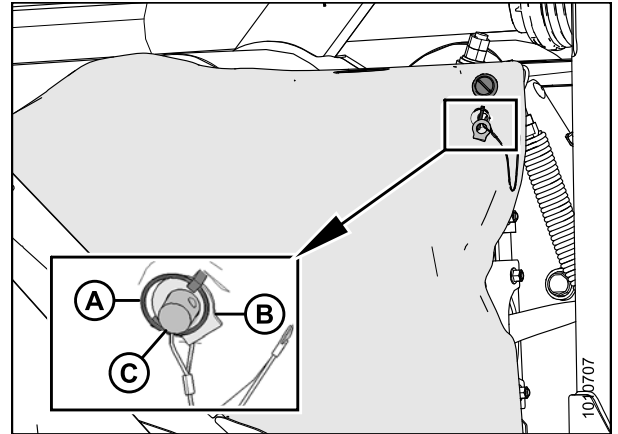


Figure 4.246: Tool to Unlock Driveshield

4.8.3 Replacing Driveshield Latch

CAUTION

Do NOT operate the machine without the driveshields in place and secured.

NOTE:

Images shown are for left side driveshield—right side driveshield is similar.

1. Remove driveshield (A). Refer to [4.8.1 Removing Driveshields, page 227](#).

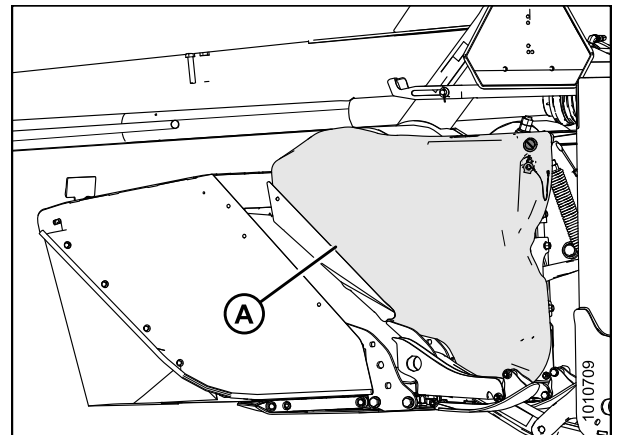


Figure 4.247: Driveshield

2. Remove hex nut (A) and flat washer securing latch to backside of driveshield, replace latch if worn or damaged, and reinstall nut and washer.

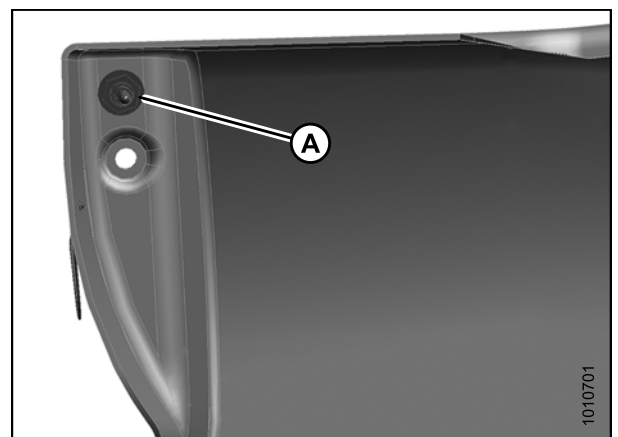


Figure 4.248: Backside of Driveshield

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3. Remove two carriage bolts (A), replace stud and clip assembly (B) if worn or damaged, and reinstall carriage bolts.
4. Install driveshield. Refer to [4.8.2 Installing Driveshields, page 228](#).

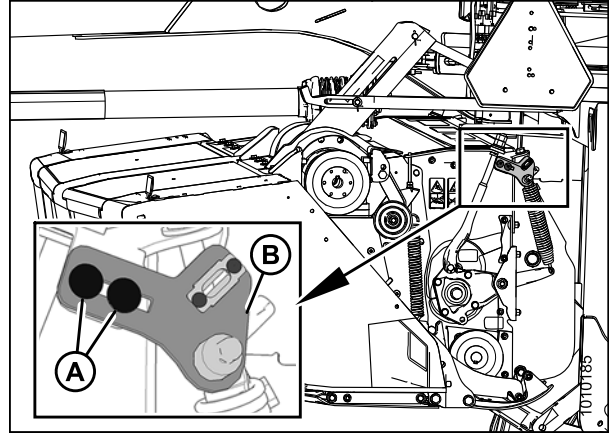


Figure 4.249: Stud and Clip Assembly

4.9 Conditioners

4.9.1 Roll Conditioner

Inspecting Roll Conditioner

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

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

1. Lower mower conditioner fully, stop engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Remove left and right driveshields (A). Refer to [4.8.1 Removing Driveshields, page 227](#).

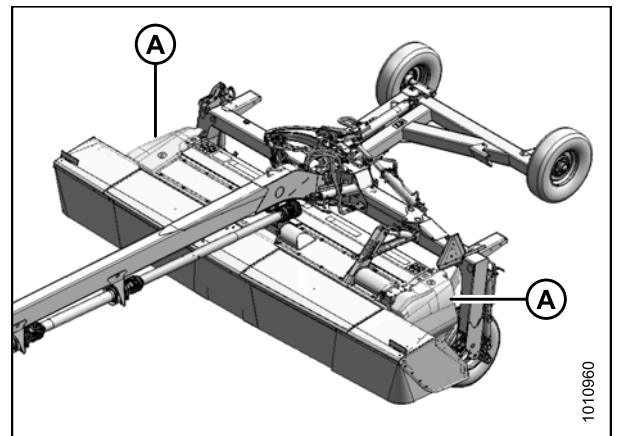


Figure 4.250: Driveshields

4. Inspect left side roll conditioner bearing (A) for signs of wear or damage.

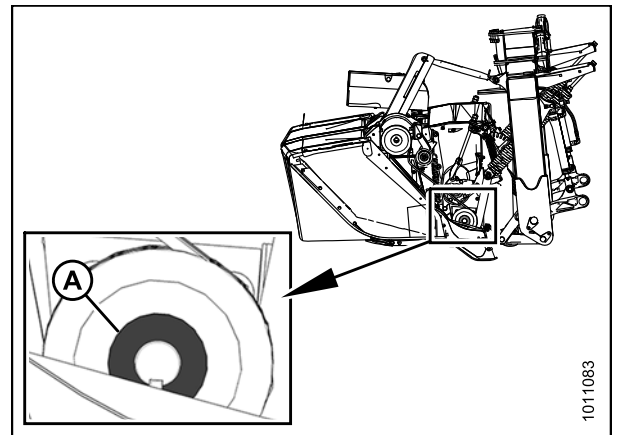


Figure 4.251: Left Side Roll Conditioner Bearing

MAINTENANCE AND SERVICING

5. Inspect right side roll conditioner U-joints (A) for signs of wear or damage.

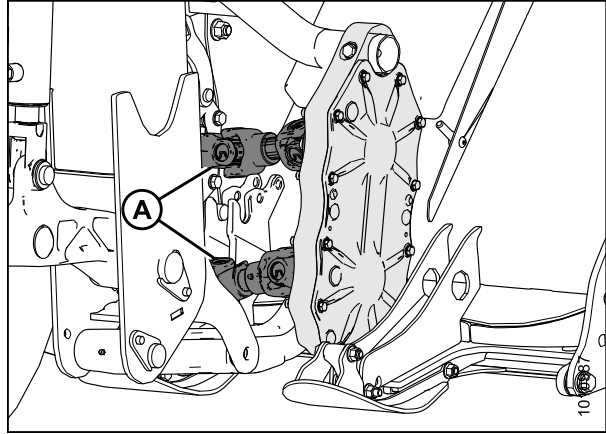


Figure 4.252: Right Side Roll Conditioner U-Joints

6. Inspect right side roll conditioner gearbox bearings (A) for signs of wear or damage.

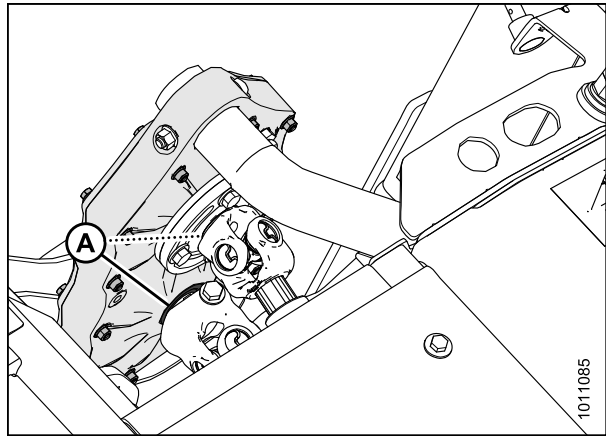


Figure 4.253: Right Side Roll Conditioner Gearbox Bearings

4.9.2 Finger Conditioner

Inspecting Finger Conditioner

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, stop engine, remove key, and engage header lift cylinder lock-out valves before going under machine for any reason.

⚠ CAUTION

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

MAINTENANCE AND SERVICING

1. Lower mower conditioner fully, stop engine, and remove key.
2. Engage lift cylinder lock-out valves. Refer to [3.1.1 Engaging Locks, page 31](#).
3. Remove left and right driveshields (A). Refer to [4.8.1 Removing Driveshields, page 227](#).

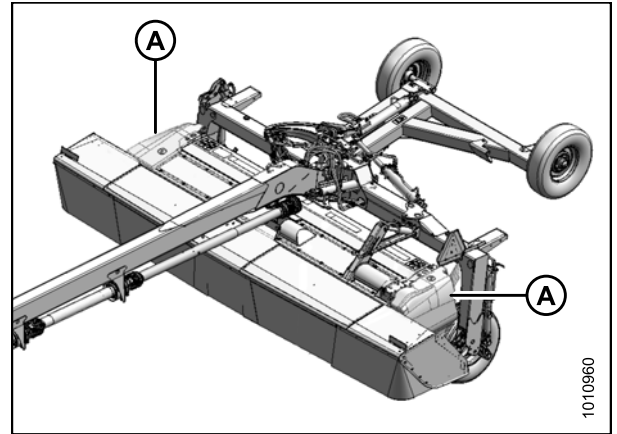


Figure 4.254: Driveshields

4. Open cutterbar doors. Refer to [3.3.1 Opening Cutterbar Doors, page 36](#).

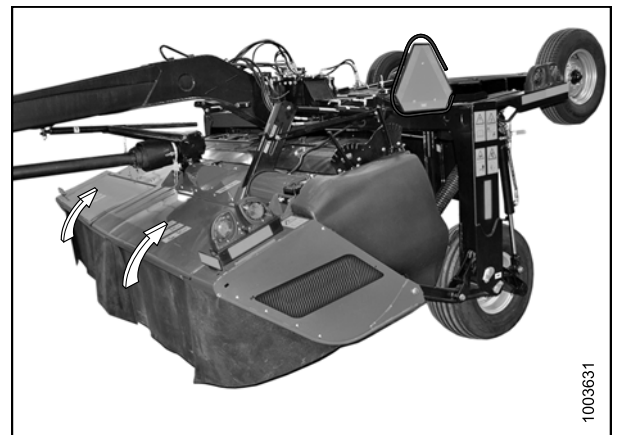


Figure 4.255: Cutterbar Doors

5. Check rotor fingers (A) for damage and replace any bent fingers to prevent rotor imbalance.

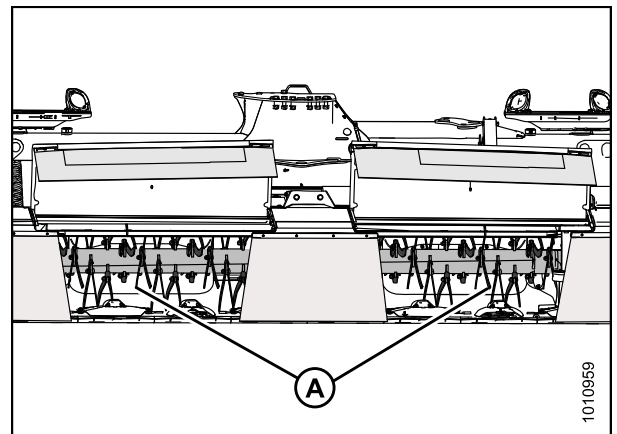


Figure 4.256: Rotor Fingers

MAINTENANCE AND SERVICING

6. Remove the left driveshield. Refer to [4.8.1 Removing Driveshields, page 227](#).
7. Inspect left side rotor bearing (A) for signs of wear or damage.

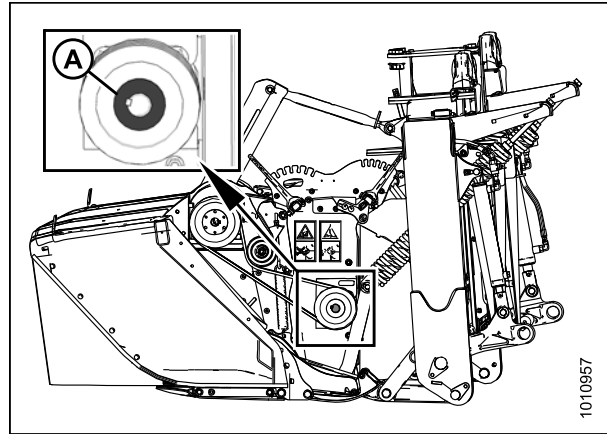


Figure 4.257: Left Rotor Bearing

8. Remove the right driveshield. Refer to [4.8.1 Removing Driveshields, page 227](#).
9. Inspect right side rotor bearing (A) for signs of wear or damage, and replace bearing if necessary.

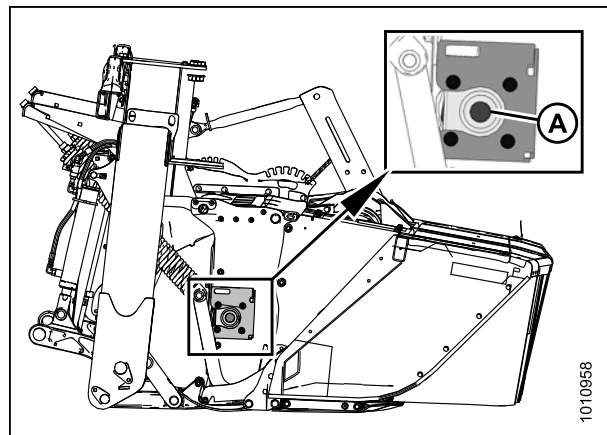


Figure 4.258: Right Side Rotor Bearing

4.9.3 Changing the Conditioner

R113/R116 Pull-Type Rotary Disc Mower Conditioners can be equipped with either a finger conditioner, a polyurethane roll conditioner, or a steel roll conditioner. Follow these instructions to change conditioners.

These instructions apply to all conditioners. Exceptions are identified where applicable.

Separating Header from Carrier

DANGER

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

The mower conditioner includes a header and conditioner attached to a carrier frame. Before removing or installing the conditioner, the mower conditioner and carrier must be separated

MAINTENANCE AND SERVICING

1. Connect the mower conditioner to the tractor. Refer to [3.7 Attaching Mower Conditioner to the Tractor, page 43](#).
2. Start tractor and center mower conditioner behind tractor.
3. Raise mower conditioner fully, set center-link to mid-position, and shut down the tractor. Remove key from ignition.

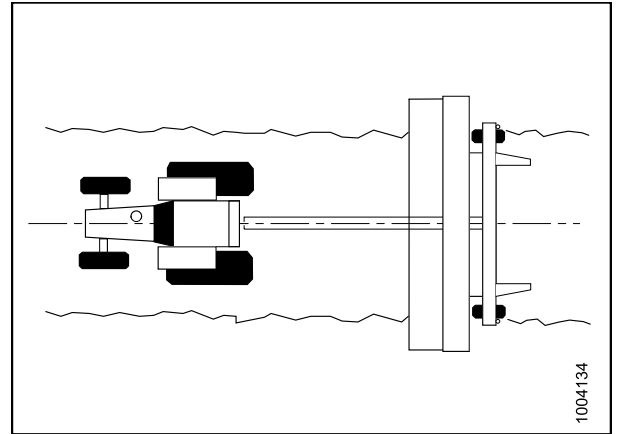


Figure 4.259: Hitch Aligned to Tractor

NOTE:

The float adjuster bolt is easier to turn when the mower conditioner is in the raised position.

4. Close mower conditioner lift cylinder lock-out valves (A).
5. Loosen jam nut (B) on adjuster bolt.
6. Turn out adjuster bolt (C) on each float spring until 400 mm (17-3/4 in.) of thread (D) is exposed.

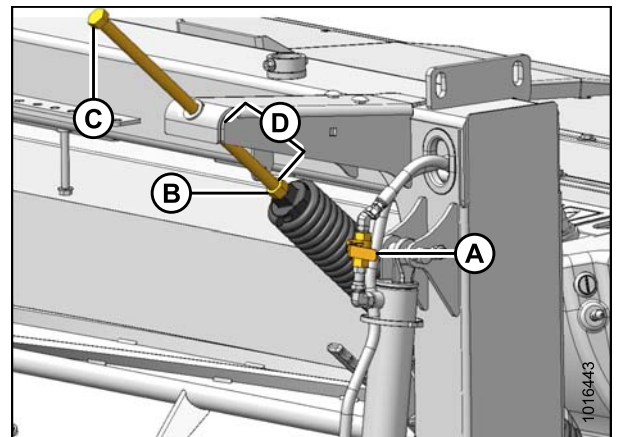


Figure 4.260: Right Side Float Adjuster – Left Side Similar

7. Open lift cylinder lock-out valves (A) (handle is vertical).
8. Start tractor and fully lower mower conditioner.
9. Shut down tractor and remove key from ignition.
10. Check that float adjuster bolts (B) are loose. Back off adjuster bolts as required.
11. Remove float adjuster bolt (B) from spring on **LEFT** side only. Keep spring from dropping when bolt is removed.

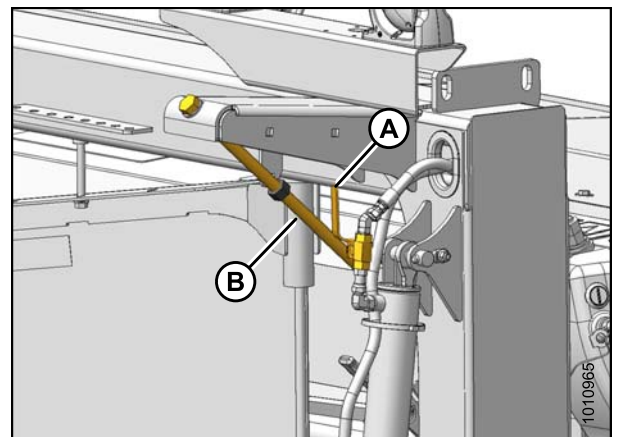


Figure 4.261: Right Side Float Adjuster – Left Side Similar

MAINTENANCE AND SERVICING

12. Remove left and right driveshields (A). Refer to [3.2.1 Opening Driveshields](#), page 33.

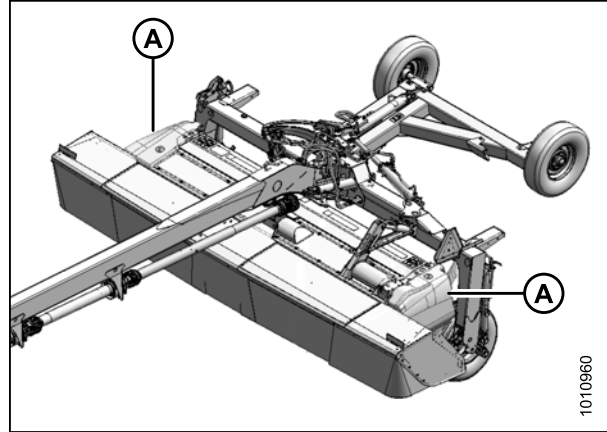


Figure 4.262: Driveshields

13. On the left-hand side of the mower conditioner, remove the conditioner drive belt as follows:
- Back off jam nut and tensioner nut (B) on belt idler until belts (A) are loose and can be removed.
 - Remove the four belts.

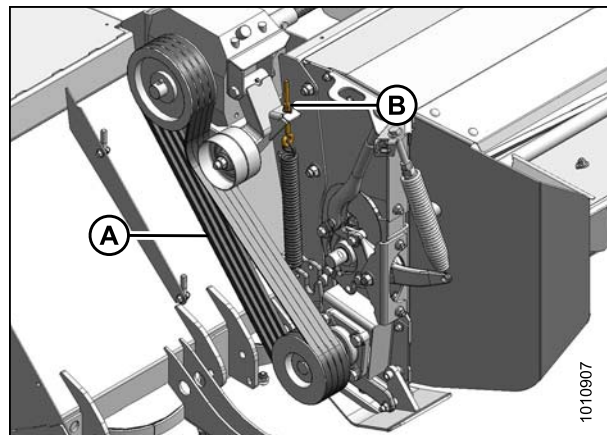


Figure 4.263: Conditioner Drive

14. On the right-hand side of the mower conditioner, remove the M20 nut (A), washers, and hex head bolt (B) securing the carrier leg (C) and float spring arm (D) to the mower conditioner.
15. Move float spring arm (D) clear of conditioner.

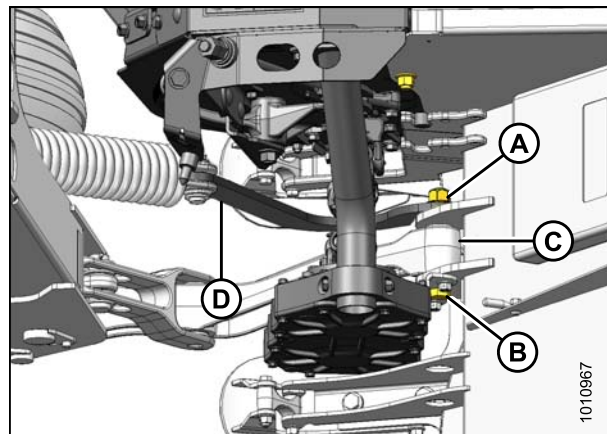


Figure 4.264: Right Side of Carrier

MAINTENANCE AND SERVICING

16. Remove the M20 nut (A), washers, and hex head bolt (B) securing carrier leg (C) to the left end of the mower conditioner.

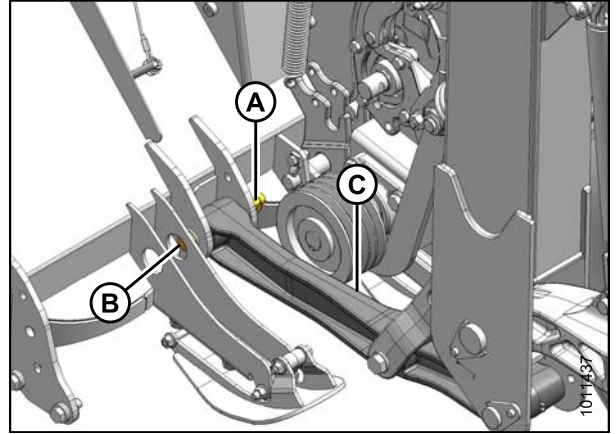


Figure 4.265: Left Side of Conditioner

17. Remove clevis pin (A) connecting center-link (B) to anchor (C) and separate center-link from anchor. Reinstall pin in anchor to store.
18. Secure center-link (B) and indicator (D) to carrier frame with a strap or wire to prevent them from contacting the mower conditioner during separation.

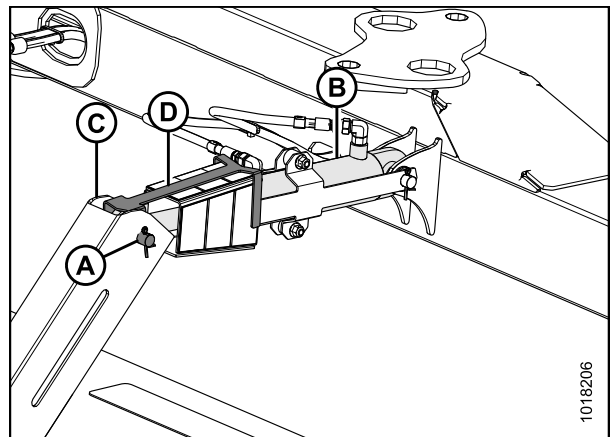


Figure 4.266: Center-Link and Indicator

19. Remove two hex head bolts (A) and spacers (B) securing steering arm (C) to gearbox.
20. Lift steering arm (C) off gearbox and secure arm to hitch (D) with a strap or wire.
21. Reinstall hex head bolts (A) and spacers (B) into gearbox.
22. Disconnect aft driveline (E) from header drive gearbox. Refer to [Removing Clutch Driveline, page 196](#).
23. Secure driveline (E) to hitch (D) with a strap or wire.

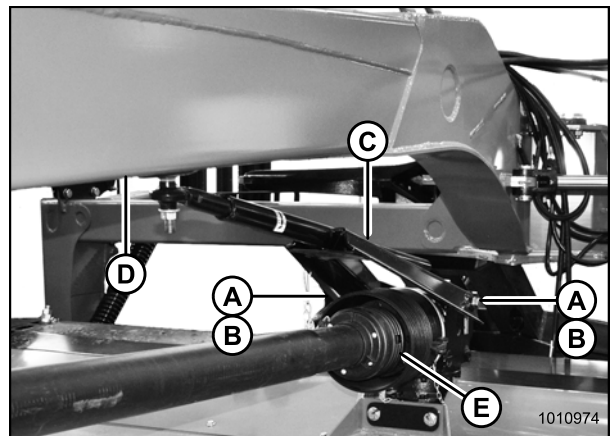


Figure 4.267: Aft Driveline and Hitch

MAINTENANCE AND SERVICING

24. If Road Friendly Transport™ system is installed, disconnect wiring harness (A) at light assembly (B).
25. Remove cable ties (E), clamp (D), and clips (C). Retain for reinstallation.
26. Temporarily attach harness to carrier.

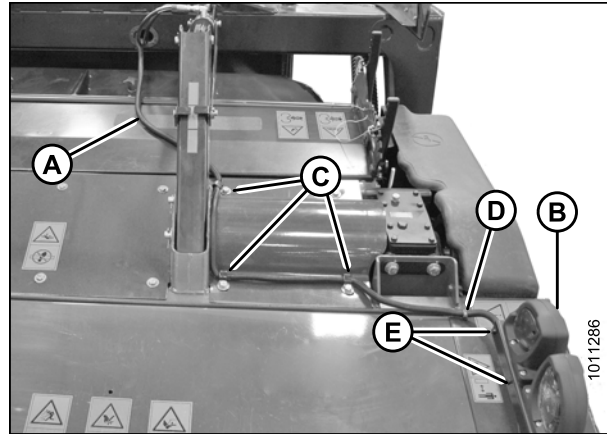


Figure 4.268: Electrical Harness

27. Start tractor, slowly back carrier (A) off header (B), and maneuver carrier away from header.

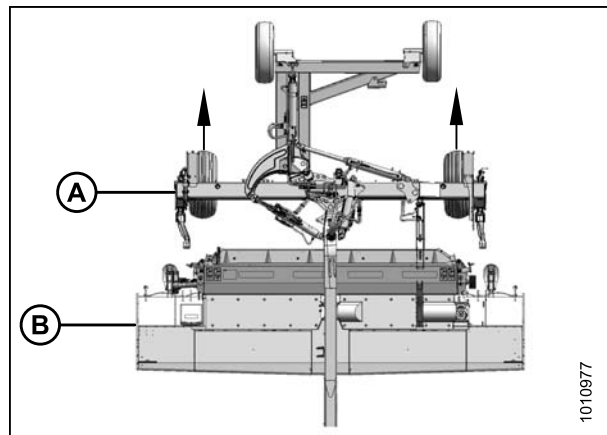


Figure 4.269: Carrier Removed from Header

Removing the Conditioner

CAUTION

Ensure spreader bar is secured to the forks so that it cannot slide off the forks or towards the mast while detaching the conditioner from the mower.

1. Attach a spreader bar (A) to a forklift or equivalent, and attach chains to lugs (B) on conditioner. Use a chain rated for overhead lifting with a minimum working load of 1135 kg (2500 lb.).

DANGER

To prevent the conditioner from falling backward, ensure lifting chains are secure and tight. Failure to do so may result in death or serious injury.

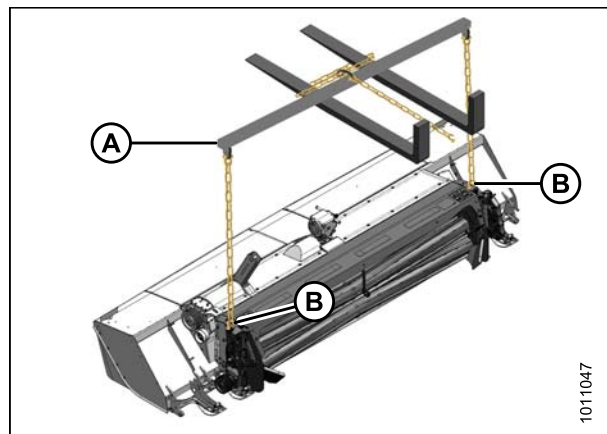


Figure 4.270: Spreader Bar

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2. Move forward baffle adjustment handle (A) to fully lowered position as shown.
3. Move rear baffle adjustment handle (B) to fully raised position as shown.

NOTE:

Access to upper bolts (C) is easiest from the rear of the conditioner.

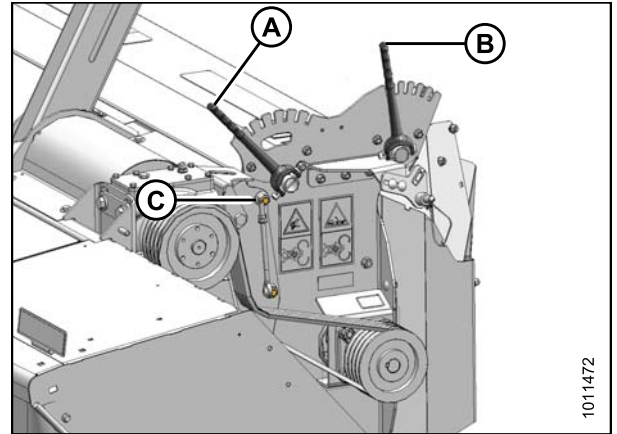


Figure 4.271: Left Side of Conditioner

4. Lift conditioner slightly forward to take load off bolts (A) and to hold the conditioner after the bolts are removed. Retain hardware for reinstallation.

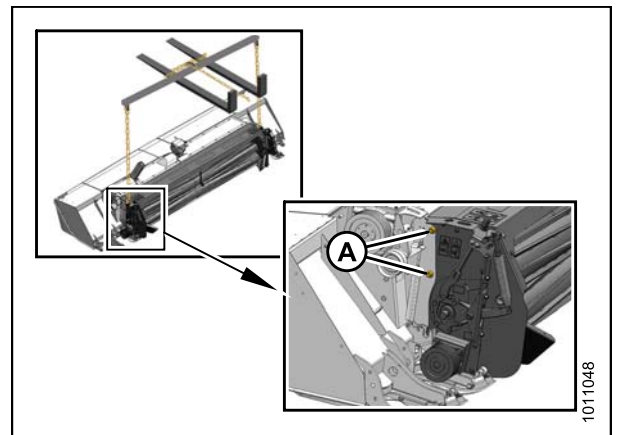


Figure 4.272: Left Side of Conditioner – Right Side Similar

5. Remove two M16 hex head bolts (A) from each side of conditioner that secure it to mower.

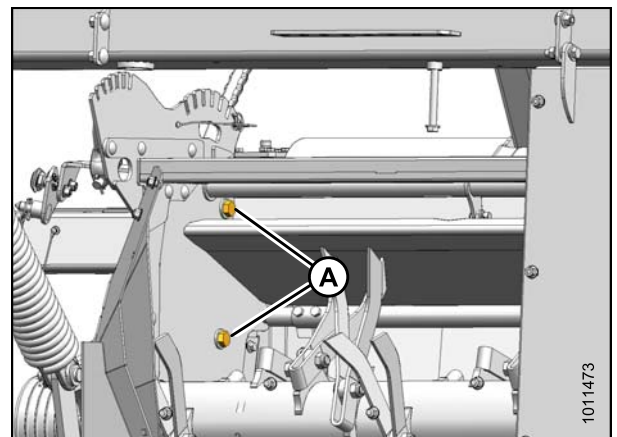


Figure 4.273: Left Side of Conditioner – Right Side Similar

CAUTION

Stand clear when detaching the conditioner.

6. Lift conditioner (A) off mower (B), and move it away from work area.

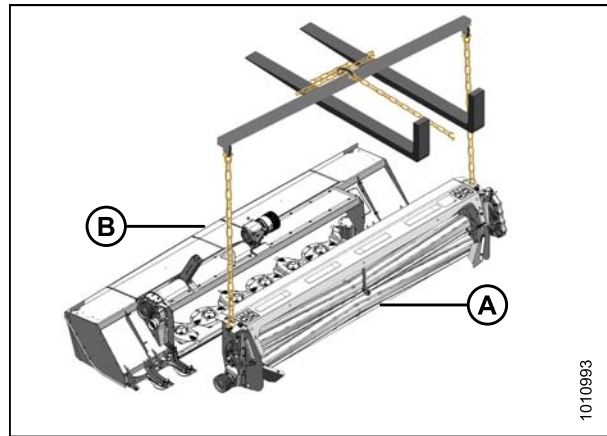


Figure 4.274: Conditioner Lift

Installing the Conditioner

CAUTION

Ensure spreader bar is secured to the forks so that it cannot slide off the forks or towards the mast while detaching the conditioner from the mower.

1. Attach a spreader bar (A) to a forklift or equivalent and attach chains to lugs (B) on conditioner. Use a chain rated for overhead lifting with a minimum working load of 1135 kg. (2500 lb.).
2. Lift conditioner (A) and position it into mower opening.

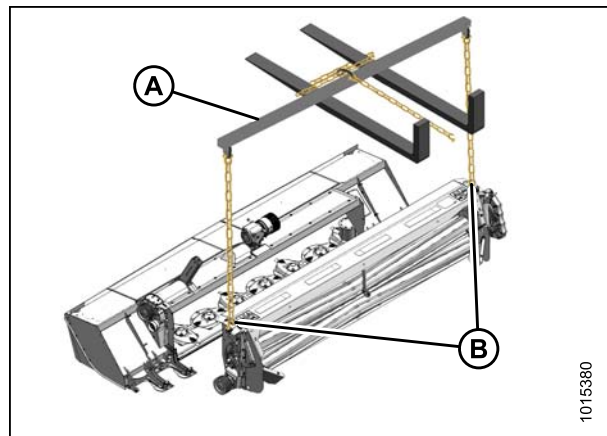


Figure 4.275: Conditioner Lift

3. Carefully align pin (A) at each end of conditioner with lug (B) on mower, and lower conditioner so that pins (A) engage lugs (B) on mower.

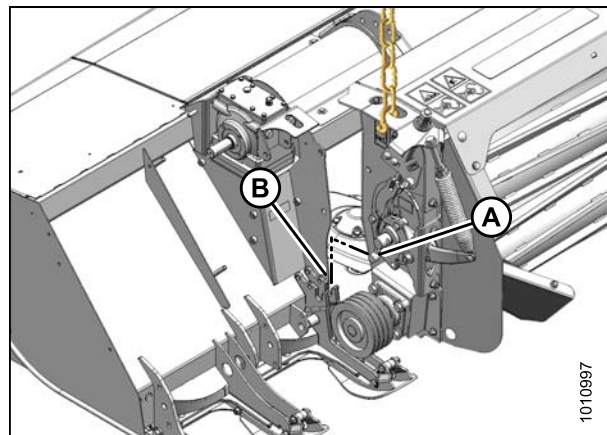


Figure 4.276: Conditioner Pins

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4. Align mounting holes and install four M16 x 40 hex head bolts (A) with heads facing inboard (two per side). Secure with M16 center lock flanged nuts and torque to 170 N·m (126 ft·lbf).
5. Remove lifting chains from conditioner and move lifting device clear of work area.
6. If necessary, install conditioner drive components. Refer to [Installing Conditioner Drive, page 241](#).

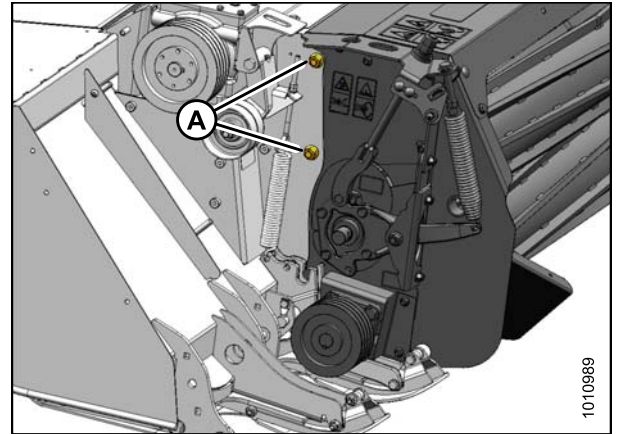


Figure 4.277: Left Side of Conditioner – Right Side Similar

Installing Conditioner Drive

This procedure describes the installation of conditioner drive components on a machine that was originally supplied with no conditioner.

1. Retrieve bag from conditioner shipment containing the following parts:
 - Shaft key
 - Pulley
 - Bushing with three M10 bolts
 - Tensioner assembly
 - M16 hex head bolt
 - M16 nut
 - Two M10 nuts
 - Eye bolt
 - Hardened washer
 - Spring
2. Remove two screws (A) from cover (B) and remove cover from gearbox shaft. Retain parts for future use.

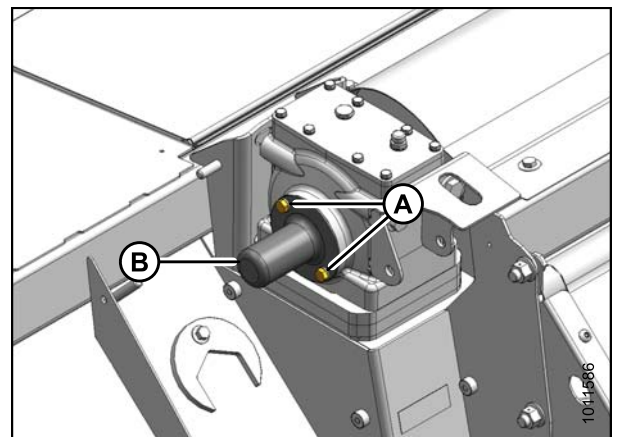


Figure 4.278: Shaft Cover

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3. Assemble pulley (A) and bushing (B) onto gearbox shaft with key (C).
4. Install three M10 hex head bolts (D) through bushing (B) into pulley (A).

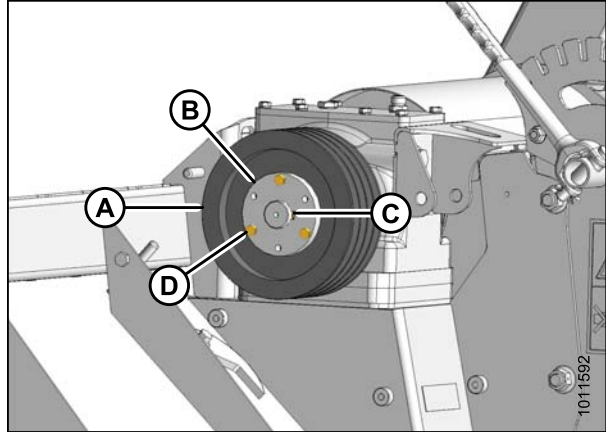


Figure 4.279: Drive Pulley

5. Tighten the three M10 bolts while maintaining 11 mm (7/16 in.) dimension (E) between pulley (A) and gearbox (F). Torque bolts to 34–39 N·m (25–29 ft·lbf).

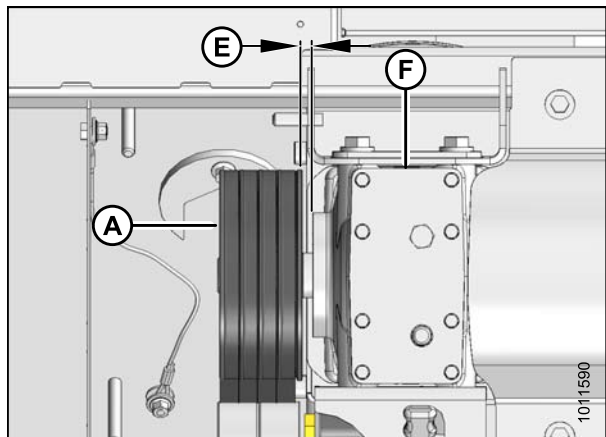


Figure 4.280: Drive Pulley

6. Position tensioner assembly (A) as shown and secure with M16 x 120 bolt (B) and nut (C). Torque nut to 47–54 N·m (35–40 ft·lbf).

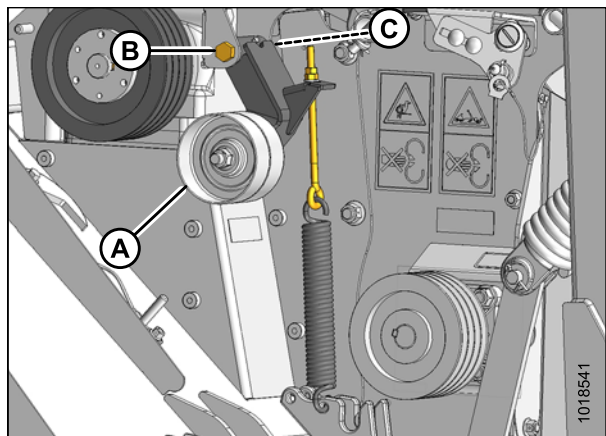


Figure 4.281: Tensioner

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7. Install spring (A) onto frame—rear hole (B) for finger conditioner, and forward hole (C) for roll conditioner.
8. Install eyebolt (D) onto tensioner (E) and spring (A). Secure eyebolt with hardened washer (F) and two M10 nuts (G).

NOTE:

Install conditioner drive belt after reattaching the carrier and header.

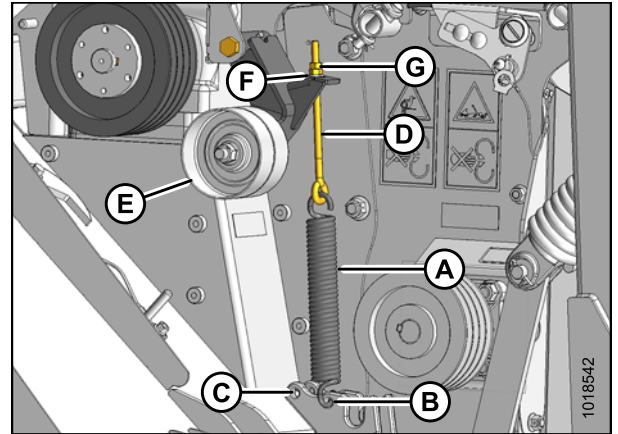


Figure 4.282: Tensioner

Assembling Header and Carrier

The carrier must be attached to a tractor for the header and carrier to be assembled.

⚠ DANGER

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

1. Start tractor and maneuver carrier (A) directly behind the mower conditioner (B) so carrier legs line up with the header attachment points.
2. Drive slowly forward to engage the carrier legs (C) into the header attachment brackets.

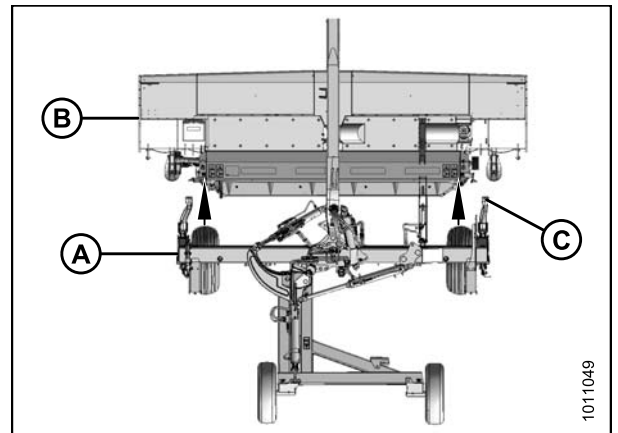


Figure 4.283: Carrier Aligned with Mower Conditioner

MAINTENANCE AND SERVICING

3. Inspect carrier leg (A) for excess gap between inner steel sleeve of the bushing and the header brackets. If there is a gap, install washer (MD #5113, 1.2 mm thick [0.047 in.]) to both sides of the carrier leg to minimize the gap.
4. Align left side carrier leg (A) with header brackets, and install M20 x 40 bolt (B) with hardened washer (C).
5. Install three hardened washers (D) and flanged lock nut (E) on bolt (B).
6. Torque bolt (B) to 339 N·m (250 ft·lbf).

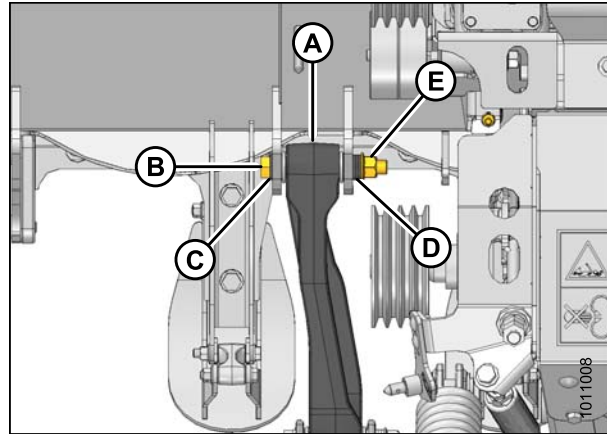


Figure 4.284: Left Leg

7. Inspect carrier leg (A) for excess gap between inner steel sleeve of the bushing and the header brackets. If there is a gap, install washer (MD #5113, 1.2 mm thick [0.047 in.]) to both sides of the carrier leg to minimize the gap.
8. Align right side carrier leg (A) with header brackets, and install M20 x 40 bolt (B) with hardened washer (C).
9. Install hardened washer (D), spacer (E), float tension arm (F), and flanged lock nut (G) on bolt (B).
10. Torque bolt (B) to 339 N·m (250 ft·lbf).

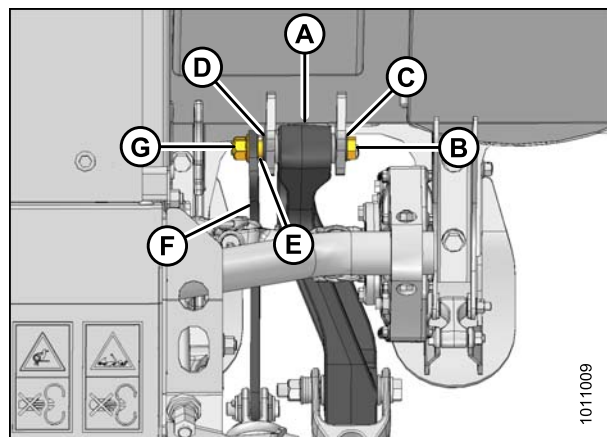


Figure 4.285: Right Leg

11. Undo strapping or wire supporting driveline to hitch (D), and connect driveline (E) to header drive gearbox. Refer to [Installing Clutch Driveline, page 198](#).
12. Remove hex head bolts (A) and spacers (B) from gearbox.
13. Undo strapping or wire supporting steering arm to hitch, and position steering arm weldment (C) on gearbox.
14. Secure steering arm to gearbox with spacers (B) and hex head bolts (A). Apply red Loctite® to front holes and torque bolts to 203 N·m (150 ft·lbf).

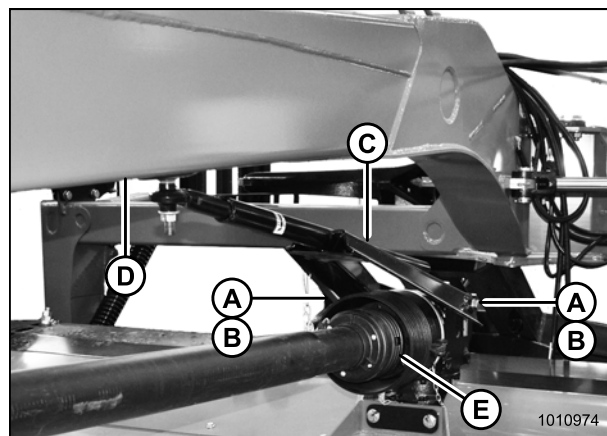


Figure 4.286: Aft Driveline and Steering Arm

MAINTENANCE AND SERVICING

15. Undo strapping or wire securing center-link (B) and indicator (D) to carrier frame.
16. Remove pins and hardware from anchor (C).
17. Attach center-link (B) and indicator (D) to anchor (C) with clevis pin (A) and secure with cotter pin.

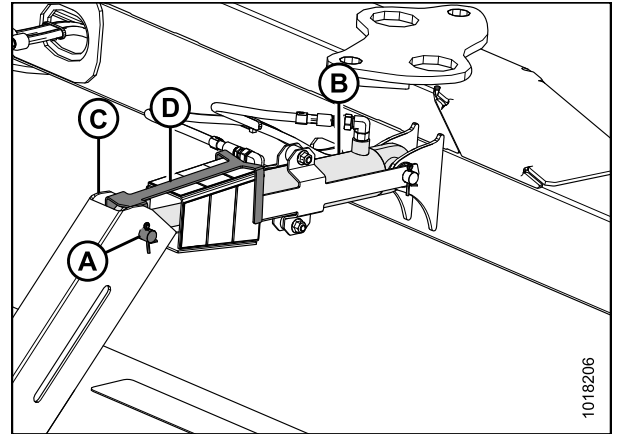


Figure 4.287: Center-Link and Indicator Links

NOTE:

Ensure proper pulley configuration installation—large pulley installed onto gearbox for roll conditioner, and small pulley installed onto gearbox for finger conditioner.

18. Install conditioner drive belts (A) onto pulleys.
19. Check that tensioner spring is installed at correct location:
 - Hole (D) for roll conditioner
 - Hole (E) for finger conditioner
20. Tighten idler tensioner nut (C) until spring length (B) measures 365 mm (14-3/8 in.).
21. Tighten jam nut.
22. Check that lift cylinder lock-out valves (A) are open.
23. Start tractor and fully raise header.
24. Shut down tractor and remove key from ignition.

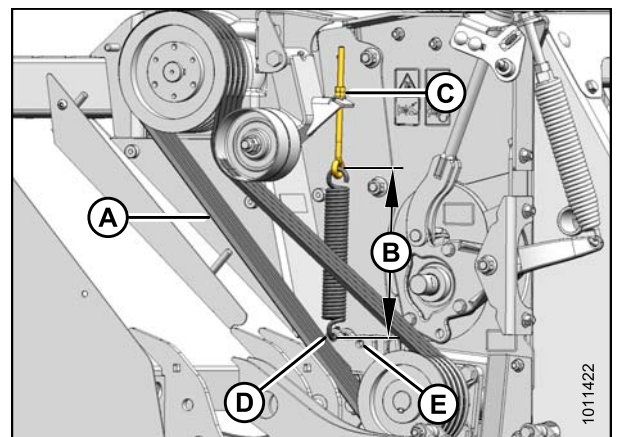


Figure 4.288: Conditioner Drive

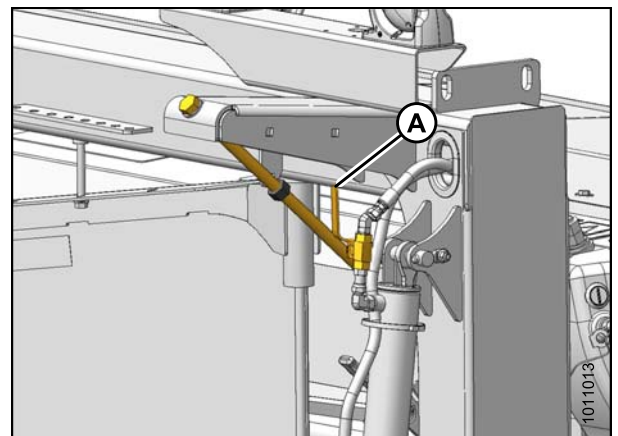


Figure 4.289: Lift Cylinder Lock-Out Valve

MAINTENANCE AND SERVICING

25. Close both lift cylinder lock-out valves (A).
26. At left side of carrier, install tensioner bolt (B) into spring.
27. Turn in both float spring tensioner bolts (B) to achieve the following exposed thread (C) measurements:
 - 145–155 mm (5-11/16 – 6-1/8 in.) for 13-foot
 - 95–105 mm (3-3/4 – 4-1/8 in.) for 16-foot
28. Replace the driveshields. Refer to [3.2.2 Closing Driveshields](#), page 34.

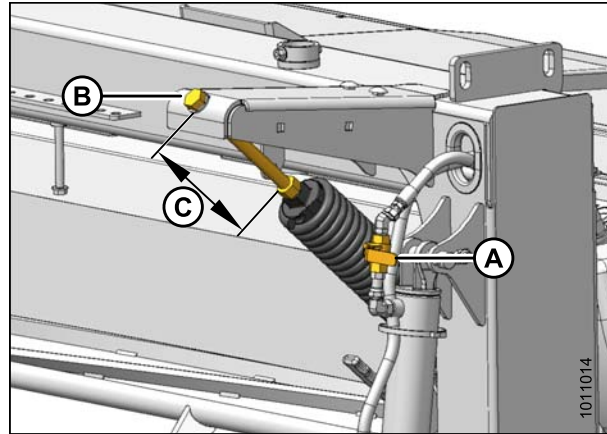


Figure 4.290: Right Side Shown – Left Side Similar

29. If Road Friendly Transport™ system is installed, reconnect electrical harness (A) to the lights (B) and secure harness to shielding using existing clips (C) and (D).
30. Secure harness to light bracket with cable ties (E).

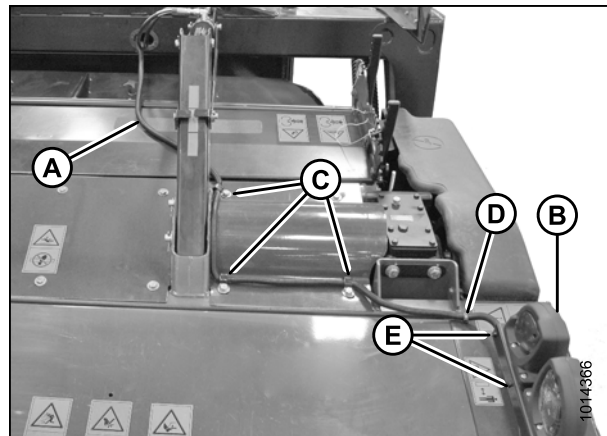


Figure 4.291: Electrical Harness

31. Tighten the four M10 hex head bolts (A) and flat washers. Torque to 27–30 N·m (20–22 ft·lbf).

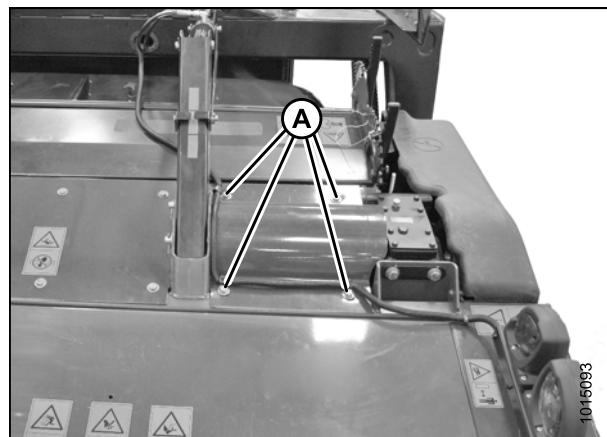


Figure 4.292: Electrical Harness

4.10 Shield (No Conditioner)

4.10.1 Removing Shield (No Conditioner)

Follow these steps to remove the shielding installed on a mower configured without a conditioner:

DANGER

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

1. Raise the mower fully and extend the center-link to maximize the space between the shield (A) and the carrier frame (B).

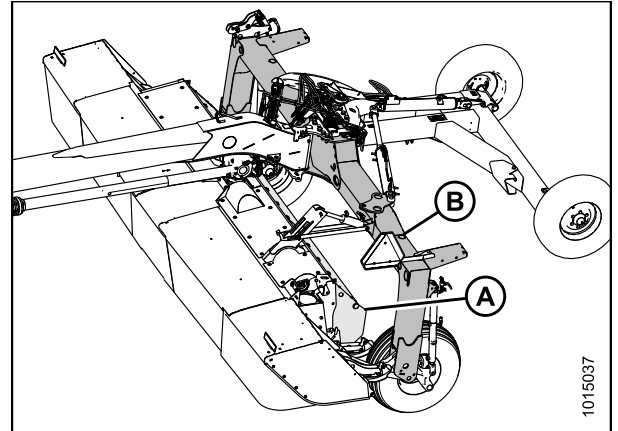


Figure 4.293: Mower with Transport

2. Close the lift cylinder lock-out valves (A) on both sides of the mower. Valve handles should be in the horizontal position.



Figure 4.294: Lift Cylinder Lock-Out Valves

MAINTENANCE AND SERVICING

3. Remove four M16 hex head bolts (A), nuts, and flat washers securing the shield (B) to the panel on mower (C).

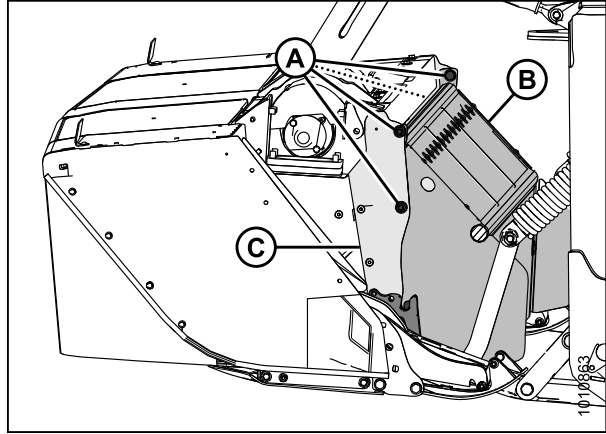


Figure 4.295: Mower (Left Side View)

4. Lift the shield (A) until pins (B) disengage from slots in support (C) and shield on panel (D).

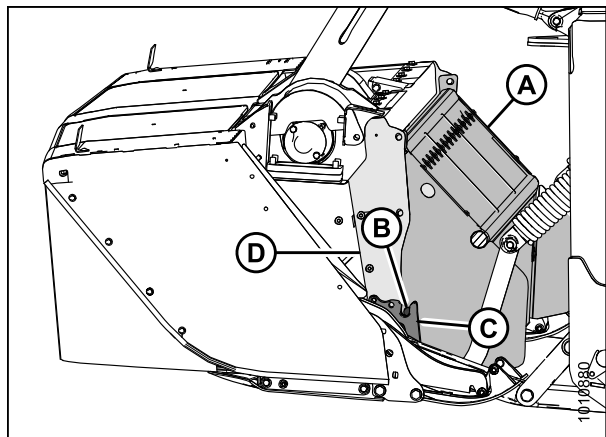


Figure 4.296: Mower (Left Side View)

5. Rotate the shield (A) 90 degrees and move it away from the carrier frame.

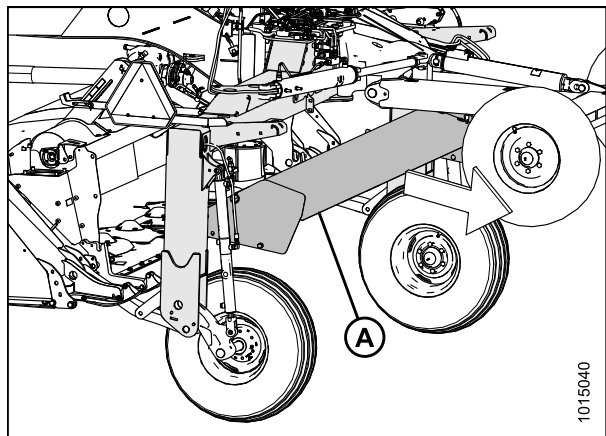


Figure 4.297: Shield Rotated

4.10.2 Installing Shield (No Conditioner)

Follow these steps to install the shielding on a mower configured without a conditioner:

⚠ DANGER

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

1. Raise the mower fully and extend the center-link to maximize the space between the field wheels (A) and the carrier frame (B).

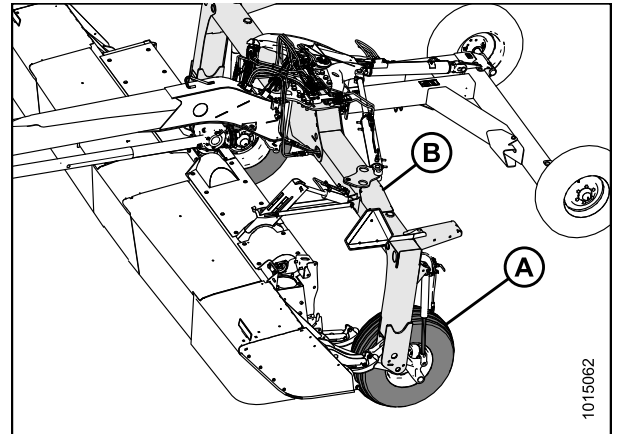


Figure 4.298: Mower with Transport

2. Close the lift cylinder lock-out valves (A) on both sides of the mower. Valve handles should be in the horizontal position.



Figure 4.299: Lift Cylinder Lock-Out Valves

3. Rotate the shield (A) and pass it between the field wheels and the carrier frame toward the mower.

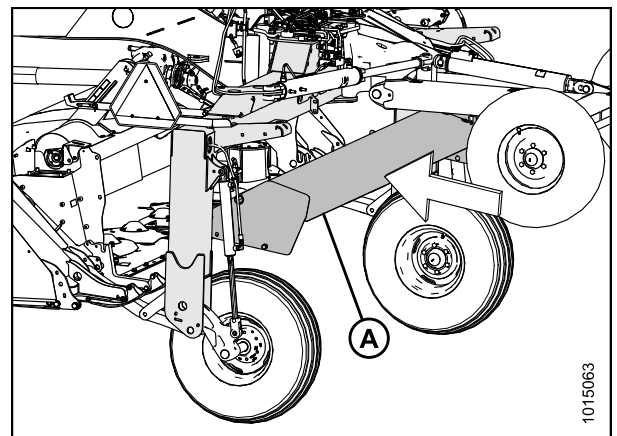


Figure 4.300: Shield Rotated

MAINTENANCE AND SERVICING

4. Position shielding (A) until pins (B) engage the slots in cutterbar support (C) and the bolt holes align with panel (D).

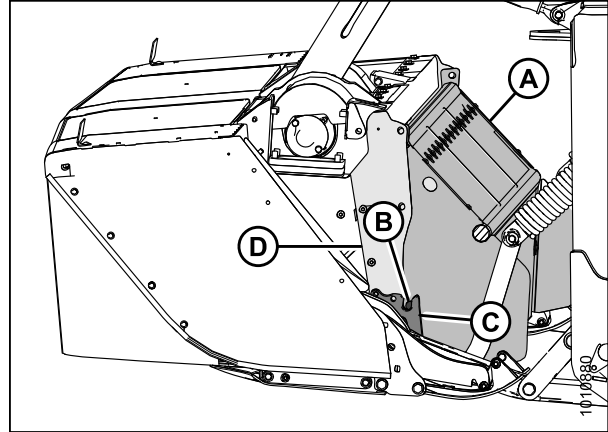


Figure 4.301: Positioning the Shield on Mower

5. Install four M16 hex head bolts (A), nuts, and flat washers to secure shield (B) to the panel (C). Ensure bolt heads face inboard.

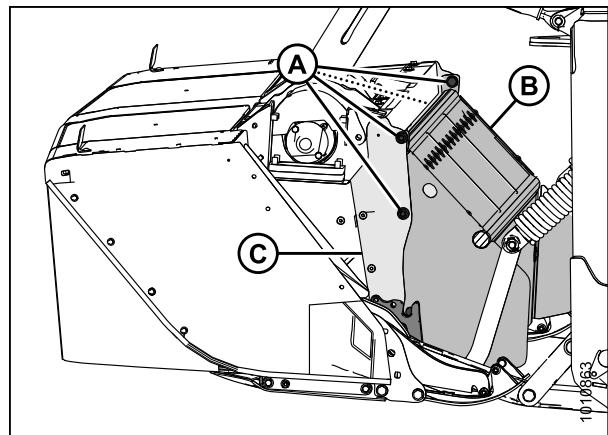


Figure 4.302: Shield (No Conditioner)

5 Options and Attachments

5.1 Optional Kits

The following kits are available through your MacDon Dealer. The Dealer will require the “B” number for pricing and availability.

5.1.1 Tall Crop Divider Kit

Tall crop dividers attach to the ends of the mower conditioner for clean crop dividing and cutterbar entry in tall crops. The kit includes left and right dividers and attachment hardware.

MD #B5800

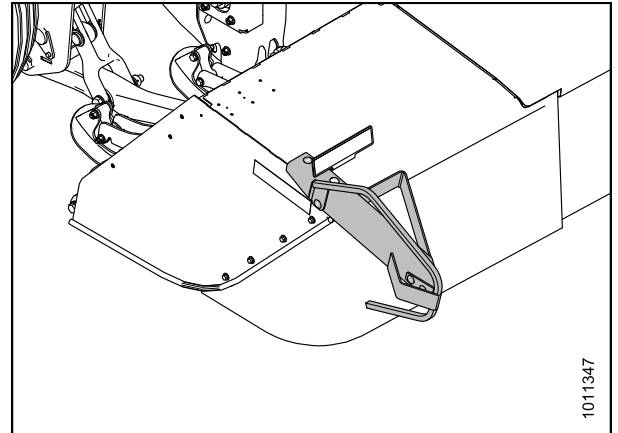


Figure 5.1: Right Side Tall Crop Divider

5.1.2 Hydraulic Center-Link Kit

The Hydraulic Center-Link kit replaces the standard mechanical link and uses a hydraulic cylinder and separate tractor hydraulic circuit to adjust mower conditioner angle. The kit includes installation instructions.

MD #B5810

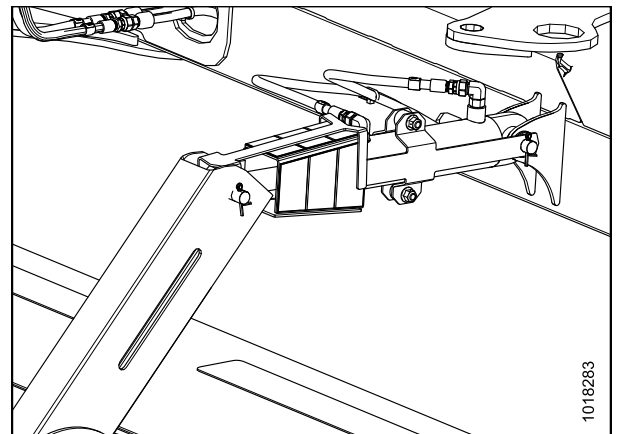


Figure 5.2: Hydraulic Center-Link

OPTIONS AND ATTACHMENTS

5.1.3 Truck Transport Hitch

The truck transport hitch connects the mower conditioner to a truck for towing on the road. The kit includes the transport hitch, attachment hardware, and safety chain.

MD #B5802

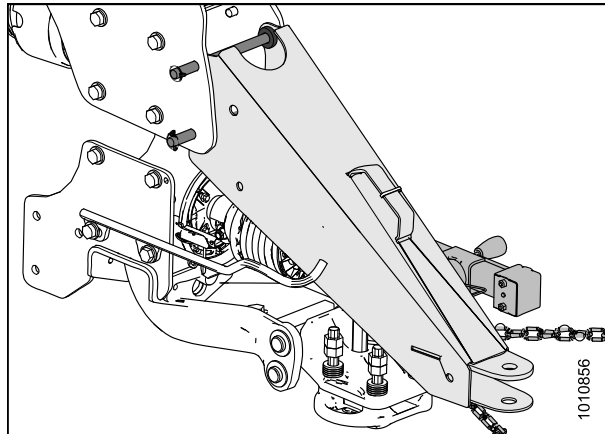


Figure 5.3: Truck Transport Hitch

5.1.4 Road Friendly Transport™ System

The Road Friendly Transport™ system allows the mower conditioner to be towed on roadways while remaining within the legal width restrictions on most roads and highways.

The kit is available as a Dealer-installed option and includes all hardware and installation instructions.

MD #B5759 and MD #B5949



Figure 5.4: Road Friendly Transport™ System

6 Troubleshooting

6.1 Troubleshooting Mower Performance

Symptom	Problem	Solution	Refer to
Cutterbar plugging	Dull, bent, or badly worn blades	Replace blades.	4.4.5 Cutterblades, page 147
	Build-up of dirt between rock guards	Decrease mower conditioner angle and increase flotation. In some conditions, it may be necessary to carry mower conditioner slightly with lower skid shoes.	3.15.3 Cutting Height, page 84
	Conditioner drive belt slipping	Adjust conditioner drive belt tension.	4.5.8 Conditioner Drive Belt, page 208
Ragged or uneven cutting of crop	Mower conditioner flotation too light, causing bouncing	Adjust to heavier float setting.	3.15.1 Mower Conditioner Float, page 81
	Excessive ground speed	Reduce ground speed.	3.15.4 Ground Speed, page 85
	Downed crop	Adjust mower conditioner angle to cut closer to ground.	3.15.2 Cutterbar Angle, page 83
Strips of uncut crop left on field	Bent or dull cutter blades	Replace blades.	4.4.5 Cutterblades, page 147
	Build-up of dirt between rock guards	Decrease mower conditioner angle and increase flotation.	3.15.2 Cutterbar Angle, page 83 , and 3.15.1 Mower Conditioner Float, page 81 .
	Ground speed too slow	Increase ground speed.	3.15.4 Ground Speed, page 85
	Foreign object on cutterbar	Disengage mower conditioner and stop engine. When all moving parts have completely stopped, remove foreign object.	3.18 Unplugging the Mower Conditioner, page 108

TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
Conditioner rolls plugging	Ground speed too fast	Reduce ground speed.	3.15.4 Ground Speed, page 85
	Roll gap too large for proper feeding	Decrease roll gap.	3.15.6 Roll Gap, page 86
	Roll gap too small in thick-stemmed cane-type crops	Increase roll gap.	3.15.6 Roll Gap, page 86
	Baffle set too low	Raise baffle.	Internal Intensity Baffle, page 95
	Foreign object between rolls	Disengage mower conditioner and stop engine. When all moving parts have completely stopped, remove foreign object.	3.18 Unplugging the Mower Conditioner, page 108
	Cutting height too low	Decrease mower conditioner angle to raise cutting height.	3.15.2 Cutterbar Angle, page 83
	Backing into windrow	Raise mower conditioner before backing up.	3.11 Raising and Lowering Mower Conditioner, page 59
	Rolls improperly timed	Adjust roll timing.	3.15.8 Roll Timing, page 90
Uneven formation and bunching of windrow	Rear deflector bypassing or dragging crop	Adjust rear deflector for proper crop control.	3.15.11 Cutterbar Deflectors, page 100
	Forming shields improperly adjusted	Adjust forming shields.	3.15.9 Forming Shields: Roll Conditioner, page 93 , or Forming Shields: Finger Conditioner, page 99
	Roll gap too large	Adjust roll gap.	3.15.6 Roll Gap, page 86
Cutting height varies from one side to the other	Float not properly balanced	Adjust mower conditioner float.	3.15.1 Mower Conditioner Float, page 81
Not cutting short enough in down crop	Broken, bent, or dull blades	Replace blades, or turn blades over.	4.4.5 Cutterblades, page 147
	Ground speed too fast	Reduce ground speed.	3.15.4 Ground Speed, page 85
	Cutting height too high	Adjust to steeper mower conditioner angle in order to lower cutting height if field conditions allow.	3.15.2 Cutterbar Angle, page 83
Material being pulled out by roots when cutting, tall crop leaning into machine	Crop in conditioner rolls before crop is cut	Increase roll gap.	3.15.6 Roll Gap, page 86
Damaged leaves and broken stems	Insufficient roll gap	Adjust roll spacing.	3.15.6 Roll Gap, page 86
	Roll timing off	Check roll timing and adjust if necessary.	3.15.8 Roll Timing, page 90

TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
Slow crop drying	Rolls not crimping crop sufficiently	Decrease roll gap.	3.15.6 Roll Gap, page 86
	Crop is bunched in windrow	Adjust forming shields/baffle.	3.15.9 Forming Shields: Roll Conditioner, page 93 , Forming Shields: Finger Conditioner, page 99 , and Internal Intensity Baffle, page 95 .
Excessive drying or bleaching of crop	Excessive crimping	Increase roll gap.	3.15.6 Roll Gap, page 86
	Crop is spread too wide in windrow	Adjust forming shields.	3.15.9 Forming Shields: Roll Conditioner, page 93 , or Forming Shields: Finger Conditioner, page 99 .
Plugging behind end rotary deflectors	Ground speed too slow	Increase ground speed.	3.15.4 Ground Speed, page 85
Poorly formed or bunchy windrows	Forming shields not properly adjusted	Adjust forming shields.	3.15.9 Forming Shields: Roll Conditioner, page 93 , or Forming Shields: Finger Conditioner, page 99 .
Windrow too wide (finger conditioner)	Crop not throwing far enough	Adjust internal intensity baffle, or adjust finger rotor speed.	Internal Intensity Baffle, page 95 , or Finger Rotor Speed, page 95 .

TROUBLESHOOTING

6.2 Troubleshooting Mechanical Issues

Symptom	Problem	Solution	Refer to
Excessive noise	Bent cutterblade	Replace blade.	4.4.5 Cutterblades, page 147
	Conditioner roll timing off	Check roll timing, and adjust if necessary.	3.15.8 Roll Timing, page 90
	Conditioner roll gap too small	Check roll gap, and adjust if necessary.	3.15.6 Roll Gap, page 86
Excessive vibration or noise in mower conditioner	Mud deposits on conditioner rolls	Clean rolls.	3.18 Unplugging the Mower Conditioner, page 108
	Conditioner rolls contacting each other	Increase roll gap.	3.15.6 Roll Gap, page 86
		Check roll timing.	3.15.8 Roll Timing, page 90
Excessive heat in cutterbar	Too much oil in cutterbar	Drain oil, and refill with specified amount.	4.4.1 Cutterbar Lubrication, page 129
Frequent blade damage	Mud on cutterbar	Remove mud from cutterbar. Do not allow mud to dry on cutterbar.	3.18 Unplugging the Mower Conditioner, page 108
	Material wrapped around spindle	Remove disc and remove material.	3.18 Unplugging the Mower Conditioner, page 108
	Cutting too low in rocky field conditions	Decrease mower conditioner angle. Increase flotation.	3.15.2 Cutterbar Angle, page 83 , and 3.15.1 Mower Conditioner Float, page 81
	Mower conditioner float set too heavy	Increase flotation.	3.15.1 Mower Conditioner Float, page 81
	Ground speed too high in rocky field conditions. At high ground speed, mower conditioner tends to dig rocks from ground instead of floating over them.	Reduce ground speed.	3.15.4 Ground Speed, page 85
	Blade incorrectly mounted	Check all blade mounting hardware, and ensure blades move freely.	4.4.5 Cutterblades, page 147
	Bevel-up blades more susceptible to damage	Switch to bevel-down blades.	4.4.5 Cutterblades, page 147

TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
Excessive wear of cutting components	Mower conditioner angle too steep	Reduce mower conditioner angle.	3.15.2 Cutterbar Angle, page 83
	Crop residue and dirt deposits on cutterbar	Clean cutterbar.	3.18 Unplugging the Mower Conditioner, page 108
	Mud on cutterbar	Remove mud from cutterbar. Do not allow mud to dry on cutterbar.	3.18 Unplugging the Mower Conditioner, page 108
Breakage of conditioner drive belt	Improper belt tension	Adjust conditioner drive belt tension.	4.5.8 Conditioner Drive Belt, page 208
	Belt not in proper groove in pulley	Move belt to proper groove.	4.5.8 Conditioner Drive Belt, page 208
	Foreign object between rolls	Disengage mower conditioner and stop engine. When all moving parts have completely stopped, remove foreign object.	3.18 Unplugging the Mower Conditioner, page 108
	Belt pulleys and idlers misaligned	Align pulleys and idler.	4.5.8 Conditioner Drive Belt, page 208
Machine pulling to one side	Mower conditioner dragging on one end and pulling to that side	Adjust mower conditioner flotation on both ends.	3.15.1 Mower Conditioner Float, page 81
	Low tire pressure on one side	Check and correct tire pressure (207 kPa [30 psi]).	4.5.12 Wheels and Tires, page 221
Disc does not start when engaging power take-off (PTO)	Mud on cutterbar	Remove mud from cutterbar. Do not allow mud to dry on cutterbar.	3.18 Unplugging the Mower Conditioner, page 108
	Primary driveline not connected.	Connect driveline.	4.5.2 Primary Driveline, page 186

7 Reference

7.1 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 cutterbar components.

Table 7.1 Recommended Lubricants

Lubricant	Specification	Description	Use	Capacities	
Grease	SAE Multipurpose	High temperature extreme pressure (EP) performance with 1% max. Molybdenum Disulphide (NLGI Grade 2) lithium base	As required unless otherwise specified	—	
		High temperature extreme pressure (EP) performance with 10% max. Molybdenum Disulphide (NLGI Grade 2) lithium base	Driveline slip-joints	—	
Gear Lubricant	SAE 80W-90	High thermal and oxidation stability API service class GL-5	Cutterbar	13-foot: 8 liters (8.5 qts [US])	
				16-foot: 10 liters (10.5 qts [US])	
	SAE 85W-140	Gear lubricant API service class GL-5	Conditioner drive gearbox	0.7 liters (0.75 qts [US])	
				Mower conditioner drive gearbox	1.8 liters (1.9 qts [US])
				Front and rear swivel gearbox	Upper: 1.3 liters (1.3 qts [US])
					Lower: 1.9 liters (2 qts [US])

REFERENCE

7.2 Torque Specifications

The following tables provide the correct torque values for various bolts, cap screws, and hydraulic fittings.

- Tighten all bolts to torque values specified in charts (unless otherwise noted throughout this manual).
- Replace hardware with same strength and grade of bolt.
- Use torque value tables as a guide and periodically check tightness of bolts.
- Understand torque categories for bolts and cap screws by using their identifying head markings.

7.2.1 SAE Bolt Torque Specifications

Torque values shown in the following tables are valid for non-greased, or non-oiled threads and heads; therefore, do **NOT** grease or oil bolts or cap screws unless otherwise specified in this manual.

Table 7.2 SAE Grade 5 Bolt and Grade 5 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	11.9	13.2	*106	*117
5/16-18	24.6	27.1	*218	*241
3/8-16	44	48	32	36
7/16-14	70	77	52	57
1/2-13	106	118	79	87
9/16-12	153	170	114	126
5/8-11	212	234	157	173
3/4-10	380	420	281	311
7/8-9	606	669	449	496
1-8	825	912	611	676

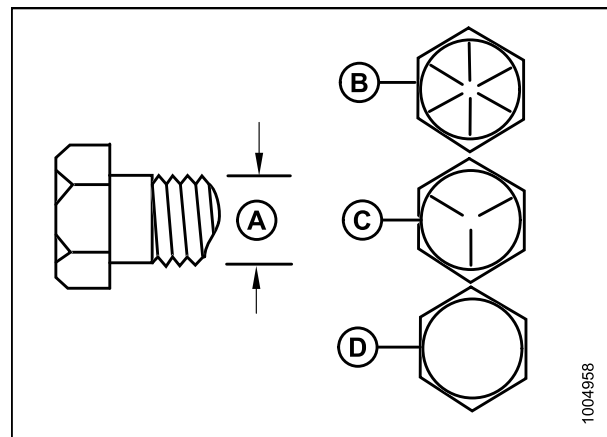


Figure 7.1: Bolt Grades

A - Nominal Size
C - SAE-5

B - SAE-8
D - SAE-2

REFERENCE

Table 7.3 SAE Grade 5 Bolt and Grade F Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	8.1	9	*72	*80
5/16-18	16.7	18.5	*149	*164
3/8-16	30	33	22	24
7/16-14	48	53	35	39
1/2-13	73	80	54	59
9/16-12	105	116	77	86
5/8-11	144	160	107	118
3/4-10	259	286	192	212
7/8-9	413	456	306	338
1-8	619	684	459	507

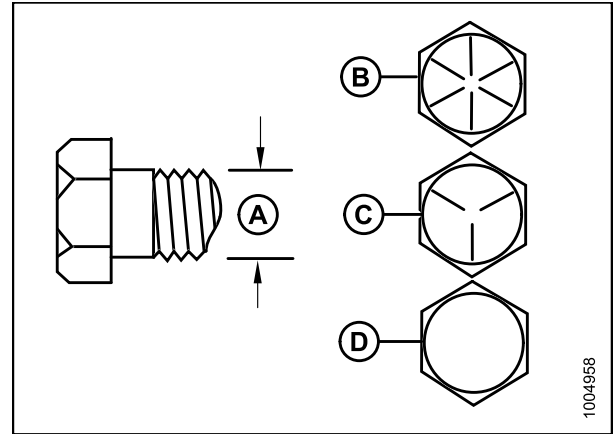


Figure 7.2: Bolt Grades

A - Nominal Size
 B - SAE-8
 C - SAE-5
 D - SAE-2

Table 7.4 SAE Grade 8 Bolt and Grade G Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	16.8	18.6	*150	*165
5/16-18	24	26	18	19
3/8-16	42	46	31	34
7/16-14	67	74	50	55
1/2-13	102	113	76	84
9/16-12	148	163	109	121
5/8-11	204	225	151	167
3/4-10	362	400	268	296
7/8-9	583	644	432	477
1-8	874	966	647	716

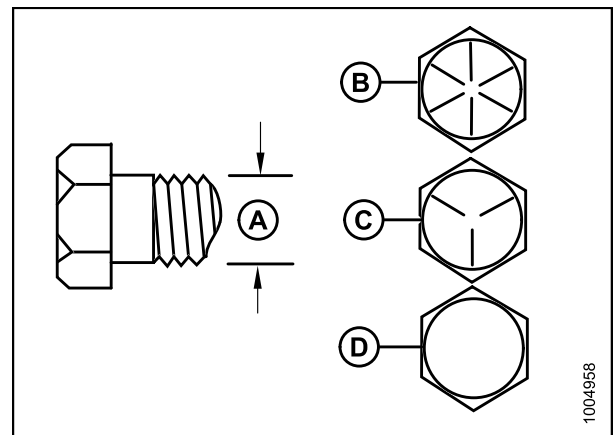


Figure 7.3: Bolt Grades

A - Nominal Size
 B - SAE-8
 C - SAE-5
 D - SAE-2

REFERENCE

Table 7.5 SAE Grade 8 Bolt and Grade 8 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	16.8	18.6	*150	*165
5/16-18	35	38	26	28
3/8-16	61	68	46	50
7/16-14	98	109	73	81
1/2-13	150	166	111	123
9/16-12	217	239	160	177
5/8-11	299	330	221	345
3/4-10	531	587	393	435
7/8-9	855	945	633	700
1-8	1165	1288	863	954

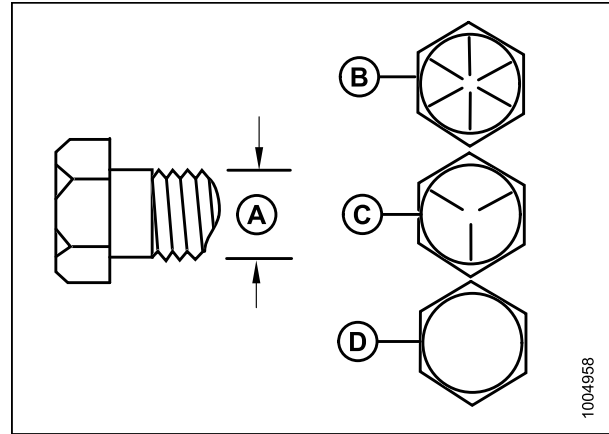


Figure 7.4: Bolt Grades

A - Nominal Size
 B - SAE-8
 C - SAE-5
 D - SAE-2

7.2.2 Metric Bolt Specifications

Table 7.6 Metric Class 8.8 Bolts and Class 9 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.4	1.6	*13	*14
3.5-0.6	2.2	2.5	*20	*22
4-0.7	3.3	3.7	*29	*32
5-0.8	6.7	7.4	*59	*66
6-1.0	11.4	12.6	*101	*112
8-1.25	28	30	20	23
10-1.5	55	60	40	45
12-1.75	95	105	70	78
14-2.0	152	168	113	124
16-2.0	236	261	175	193
20-2.5	460	509	341	377
24-3.0	796	879	589	651

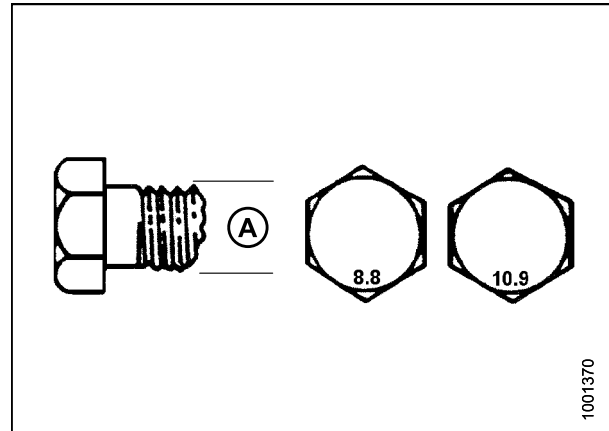


Figure 7.5: Bolt Grades

REFERENCE

Table 7.7 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1	1.1	*9	*10
3.5-0.6	1.5	1.7	*14	*15
4-0.7	2.3	2.5	*20	*22
5-0.8	4.5	5	*40	*45
6-1.0	7.7	8.6	*69	*76
8-1.25	18.8	20.8	*167	*185
10-1.5	37	41	28	30
12-1.75	65	72	48	53
14-2.0	104	115	77	85
16-2.0	161	178	119	132
20-2.5	314	347	233	257
24-3.0	543	600	402	444

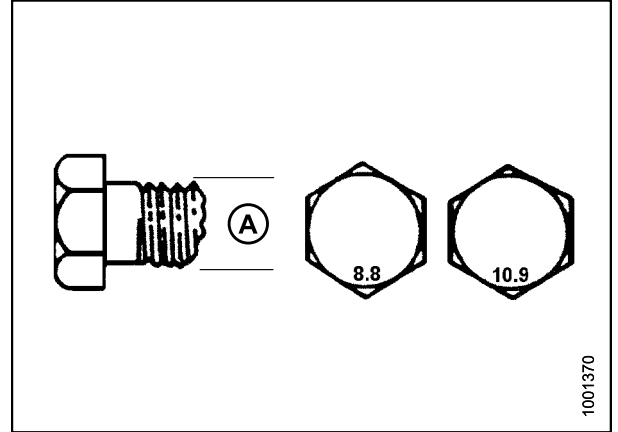


Figure 7.6: Bolt Grades

Table 7.8 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.8	2	*18	*19
3.5-0.6	2.8	3.1	*27	*30
4-0.7	4.2	4.6	*41	*45
5-0.8	8.4	9.3	*82	*91
6-1.0	14.3	15.8	*140	*154
8-1.25	38	42	28	31
10-1.5	75	83	56	62
12-1.75	132	145	97	108
14-2.0	210	232	156	172
16-2.0	326	360	242	267
20-2.5	637	704	472	521
24-3.0	1101	1217	815	901

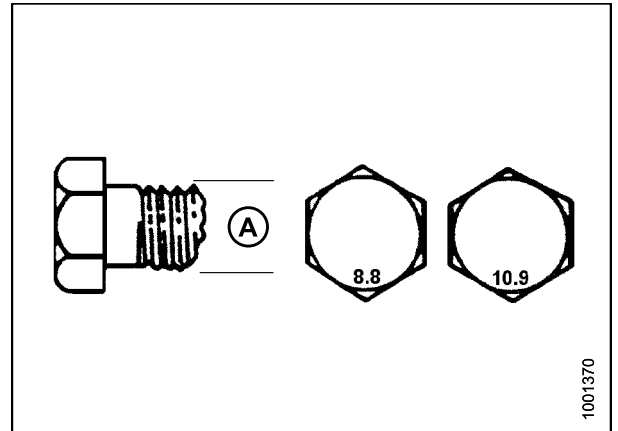


Figure 7.7: Bolt Grades

REFERENCE

Table 7.9 Metric Class 10.9 Bolts and Class 10 Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.3	1.5	*12	*13
3.5-0.6	2.1	2.3	*19	*21
4-0.7	3.1	3.4	*28	*31
5-0.8	6.3	7	*56	*62
6-1.0	10.7	11.8	*95	*105
8-1.25	26	29	19	21
10-1.5	51	57	38	42
12-1.75	90	99	66	73
14-2.0	143	158	106	117
16-2.0	222	246	165	182
20-2.5	434	480	322	356
24-3.0	750	829	556	614

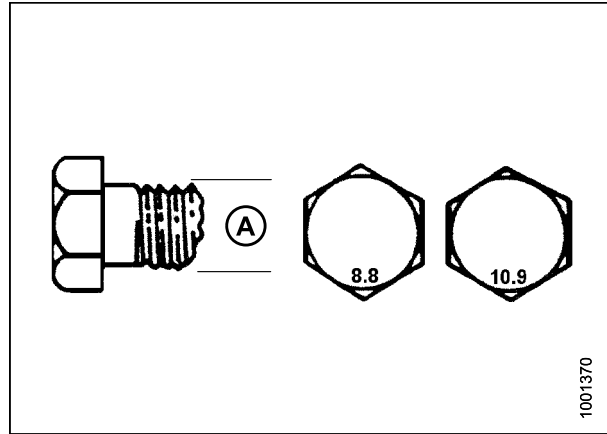


Figure 7.8: Bolt Grades

7.2.3 Metric Bolt Specifications Bolting into Cast Aluminum

Table 7.10 Metric Bolt Bolting into Cast Aluminum

Nominal Size (A)	Bolt Torque			
	8.8 (Cast Aluminum)		10.9 (Cast Aluminum)	
	N·m	ft·lbf	N·m	ft·lbf
M3	–	–	–	1
M4	–	–	4	2.6
M5	–	–	8	5.5
M6	9	6	12	9
M8	20	14	28	20
M10	40	28	55	40
M12	70	52	100	73
M14	–	–	–	–
M16	–	–	–	–

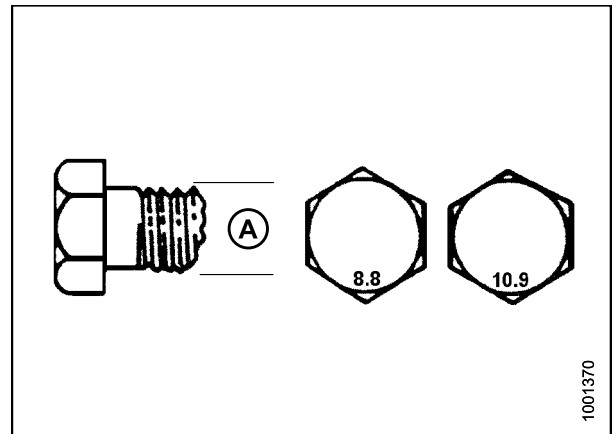


Figure 7.9: Bolt Grades

7.2.4 Flare-Type Hydraulic Fittings

1. Check flare (A) and flare seat (B) for defects that might cause leakage.
2. Align tube (C) with fitting (D) and thread nut (E) onto fitting without lubrication until contact has been made between flared surfaces.
3. Torque fitting nut (E) to specified number of flats from finger tight (FFFT) or to a given torque value in [Table 7.11 Flare-Type Hydraulic Tube Fittings, page 266](#).
4. Use two wrenches to prevent fitting (D) from rotating. Place one wrench on fitting body (D), and tighten nut (E) with other wrench to torque shown.
5. Assess final condition of connection.

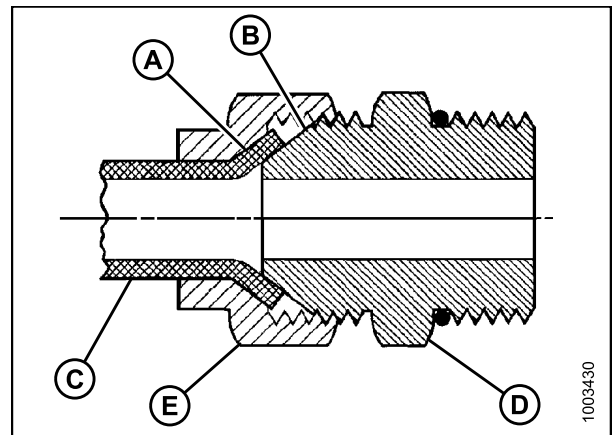


Figure 7.10: Hydraulic Fitting

REFERENCE

Table 7.11 Flare-Type Hydraulic Tube Fittings

SAE Dash Size	Thread Size (in.)	Torque Value ⁹		Flats from Finger Tight (FFFT)	
		N-m	ft-lbf	Tube	Swivel Nut or Hose
-2	5/16-24	4-5	3-4	—	—
-3	3/8-24	7-8	5-6	—	—
-4	7/16-20	18-19	13-14	2-1/2	2
-5	1/2-20	19-21	14-15	2	2
-6	9/16-18	30-33	22-24	2	1-1/2
-8	3/4-16	57-63	42-46	2	1-1/2
-10	7/8-14	81-89	60-66	1-1/2	1-1/2
-12	1-1/16-12	113-124	83-91	1-1/2	1-1/4
-14	1-3/16-12	136-149	100-110	1-1/2	1-1/4
-16	1-5/16-12	160-176	118-130	1-1/2	1
-20	1-5/8-12	228-250	168-184	1	1
-24	1-7/8-12	264-291	195-215	1	1
-32	2-1/2-12	359-395	265-291	1	1
-40	3-12	—	—	1	1

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

REFERENCE

7.2.5 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)

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

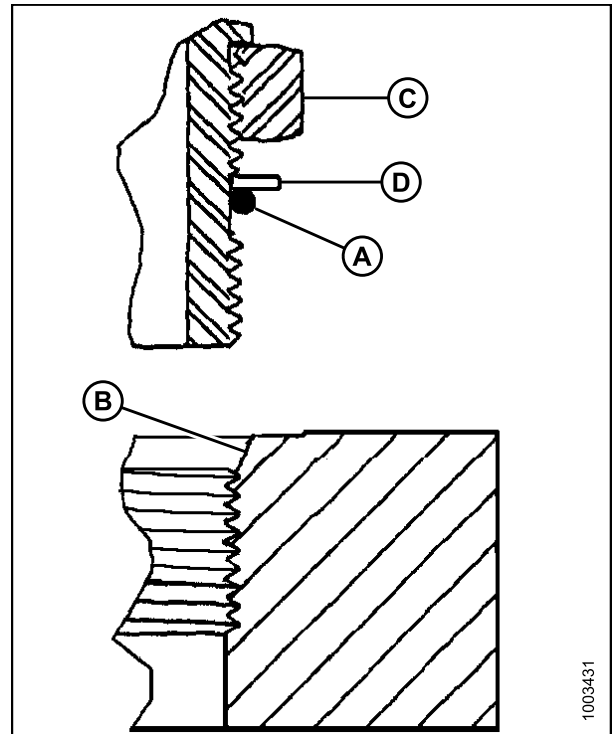


Figure 7.11: Hydraulic Fitting

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

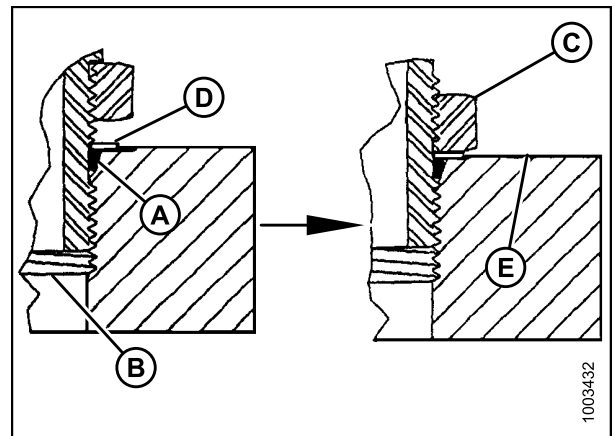


Figure 7.12: Hydraulic Fitting

REFERENCE

Table 7.12 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)

SAE Dash Size	Thread Size (in.)	Torque Value ¹⁰	
		N-m	ft·lbf (*in·lbf)
-2	5/16-24	6-7	*53-62
-3	3/8-24	12-13	*106-115
-4	7/16-20	19-21	14-15
-5	1/2-20	21-33	15-24
-6	9/16-18	26-29	19-21
-8	3/4-16	46-50	34-37
-10	7/8-14	75-82	55-60
-12	1-1/16-12	120-132	88-97
-14	1-3/8-12	153-168	113-124
-16	1-5/16-12	176-193	130-142
-20	1-5/8-12	221-243	163-179
-24	1-7/8-12	270-298	199-220
-32	2-1/2-12	332-365	245-269

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

REFERENCE

7.2.6 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Check that O-ring (A) is **NOT** on threads and adjust if necessary.
3. Apply hydraulic system oil to O-ring.
4. Install fitting (C) into port until fitting is hand tight.
5. Torque fitting (C) according to values in Table 7.13 *O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)*, page 269.
6. Check final condition of fitting.

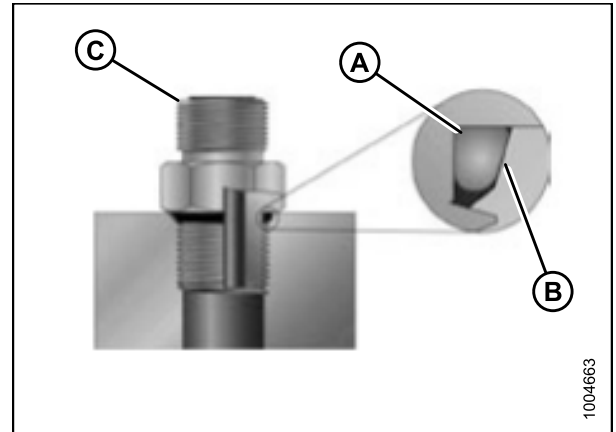


Figure 7.13: Hydraulic Fitting

Table 7.13 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)

SAE Dash Size	Thread Size (in.)	Torque Value ¹¹	
		N-m	ft·lbf (*in·lbf)
-2	5/16-24	6-7	*53-62
-3	3/8-24	12-13	*106-115
-4	7/16-20	19-21	14-15
-5	1/2-20	21-33	15-24
-6	9/16-18	26-29	19-21
-8	3/4-16	46-50	34-37
-10	7/8-14	75-82	55-60
-12	1-1/16-12	120-132	88-97
-14	1-3/8-12	153-168	113-124
-16	1-5/16-12	176-193	130-142
-20	1-5/8-12	221-243	163-179
-24	1-7/8-12	270-298	199-220
-32	2-1/2-12	332-365	245-269

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

7.2.7 O-Ring Face Seal (ORFS) Hydraulic Fittings

1. Check components to ensure that sealing surfaces and fitting threads are free of burrs, nicks, scratches, or any foreign material.



Figure 7.14: Hydraulic Fitting

2. Apply hydraulic system oil to O-ring (B).
3. Align tube or hose assembly so that flat face of sleeve (A) or (C) comes in full contact with O-ring (B).
4. Thread tube or hose nut (D) until hand-tight. The nut should turn freely until it is bottomed out.
5. Torque fittings according to values in Table 7.14 *O-Ring Face Seal (ORFS) Hydraulic Fittings, page 271*.

NOTE:

If applicable, hold hex on fitting body (E) to prevent rotation of fitting body and hose when tightening fitting nut (D).

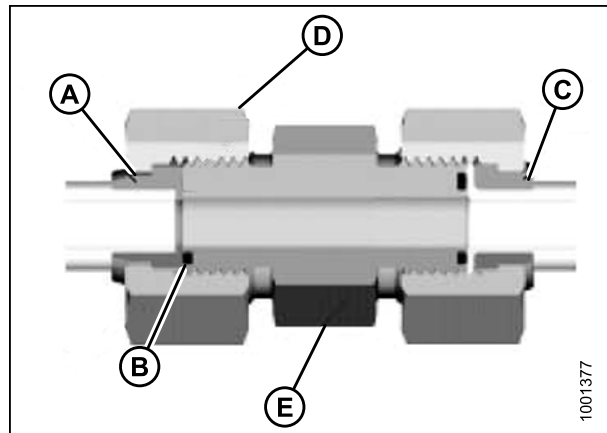


Figure 7.15: Hydraulic Fitting

6. Use three wrenches when assembling unions or joining two hoses together.
7. Check final condition of fitting.

REFERENCE

Table 7.14 O-Ring Face Seal (ORFS) Hydraulic Fittings

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value ¹²	
			N·m	ft·lbf
-3	Note ¹³	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note ¹³	5/16	–	–
-6	11/16	3/8	40–44	29–32
-8	13/16	1/2	55–61	41–45
-10	1	5/8	80–88	59–65
-12	1-3/16	3/4	115–127	85–94
-14	Note ¹³	7/8	–	–
-16	1-7/16	1	150–165	111–122
-20	1-11/16	1-1/4	205–226	151–167
-24	1–2	1-1/2	315–347	232–256
-32	2-1/2	2	510–561	376–414

12. Torque values and angles shown are based on lubricated connection as in reassembly.

13. O-ring face seal type end not defined for this tube size.

REFERENCE

7.2.8 Tapered Pipe Thread Fittings

Assemble pipe fittings as follows:

1. Check components to ensure that fitting and port threads are free of burrs, nicks and scratches, or any form of contamination.
2. Apply pipe thread sealant (paste type) to external pipe threads.
3. Thread fitting into port until hand-tight.
4. Torque connector to appropriate torque angle. The Turns From Finger Tight (TFFT) values are shown in Table [7.15 Hydraulic Fitting Pipe Thread, page 272](#). Make sure that tube end of a shaped connector (typically 45° or 90°) is aligned to receive incoming tube or hose assembly. Always finish alignment of fitting in tightening direction. Never back off (loosen) pipe threaded connectors to achieve alignment.
5. Clean all residue and any excess thread conditioner with appropriate cleaner.
6. Assess final condition of fitting. Pay special attention to possibility of cracks to port opening.
7. Mark final position of fitting. If a fitting leaks, disassemble fitting and check for damage.

NOTE:

Over-torque failure of fittings may not be evident until fittings are disassembled.

Table 7.15 Hydraulic Fitting Pipe Thread

Tapered Pipe Thread Size	Recommended T.F.F.T	Recommended F.F.F.T
1/8-27	2-3	12-18
1/4-18	2-3	12-18
3/8-18	2-3	12-18
1/2-14	2-3	12-18
3/4-14	1.5-2.5	12-18
1-11 1/2	1.5-2.5	9-15
1 1/4-11 1/2	1.5-2.5	9-15
1 1/2-11 1/2	1.5-2.5	9-15
2-11 1/2	1.5-2.5	9-15

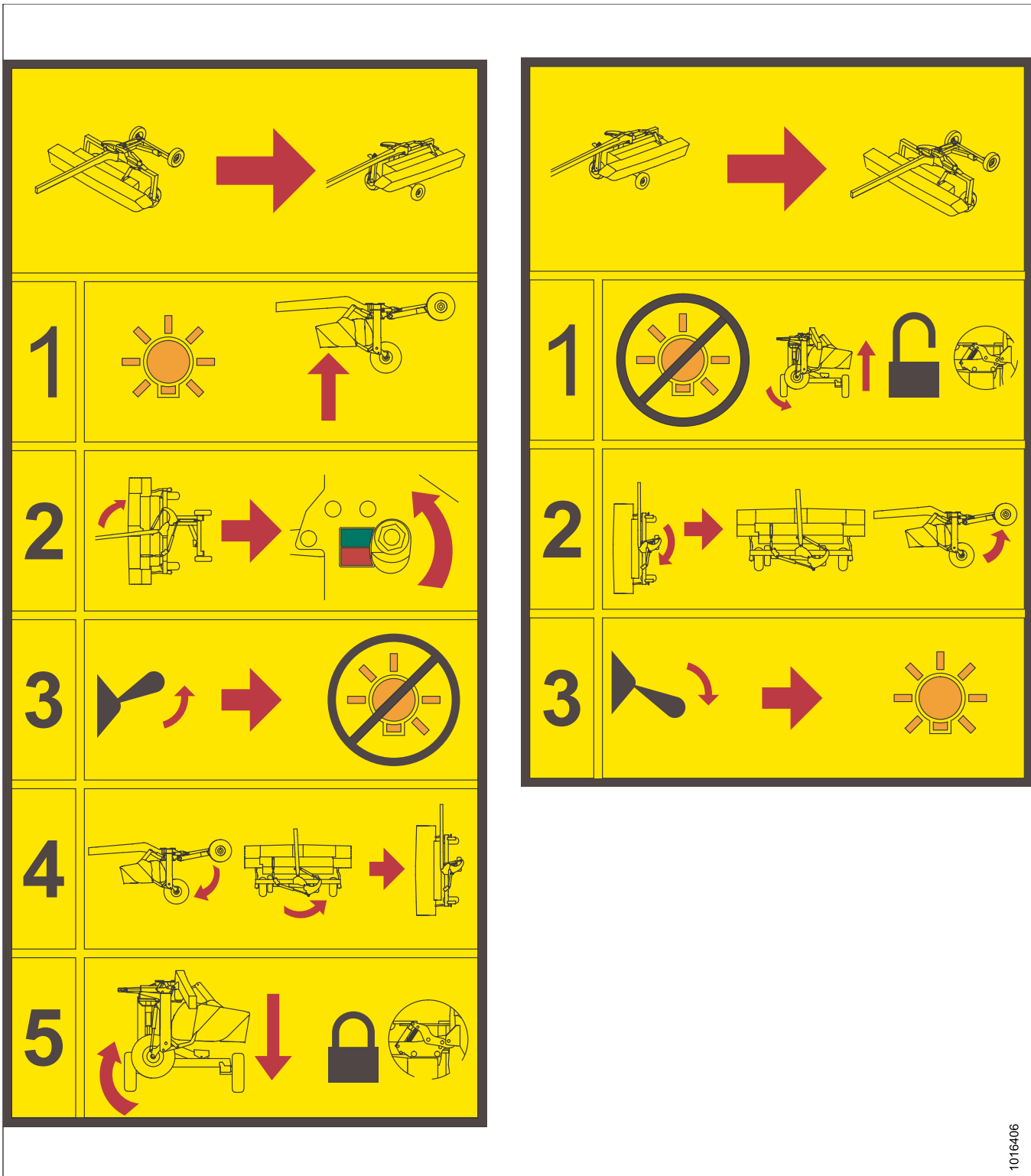
REFERENCE

7.3 Conversion Chart

Table 7.16 Conversion Chart

Quantity	SI Units (Metric)		Factor	Inch-Pound Units	
	Unit Name	Abbreviation		Unit Name	Abbreviation
Area	hectares	ha	$\times 0.4047 =$	acres	acres
Flow	liters per minute	L/min	$\times 3.7854 =$	US gallons per minute	gpm
Force	Newtons	N	$\times 4.4482 =$	pounds force	lbf
Length	millimeters	mm	$\times 25.4 =$	inch	in.
	meters	m	$\times 0.305 =$	foot	ft.
Power	kilowatts	kW	$\times 0.7457 =$	horsepower	hp
Pressure	kilopascals	kPa	$\times 6.8948 =$	pounds per square inch	psi
	megapascals	MPa	$\times .00689 =$		
	bar (Non-SI)	bar	$\div 14.5038 =$		
Torque	Newton meters	N·m	$\times 1.3558 =$	pound feet or foot pounds	ft·lbf
	Newton meters	N·m	$\times 0.1129 =$	pound inches or inch pounds	in·lbf
Temperature	Celsius	°C	$(^{\circ}\text{F}-32) \times 0.56 =$	degrees Fahrenheit	°F
Velocity	meters per minute	m/min	$\times 0.3048 =$	feet per minute	ft/min
	meters per second	m/s	$\times 0.3048 =$	feet per second	ft/s
	kilometers per hour	km/h	$\times 1.6063 =$	miles per hour	mph
Volume	liters	L	$\times 3.7854 =$	US gallons	US gal
	milliliters	ml	$\times 29.5735 =$	ounces	oz.
	cubic centimeters	cm ³ or cc	$\times 16.3871 =$	cubic inches	in. ³
Weight	kilograms	kg	$\times 0.4536 =$	pounds	lb.

7.4 Converting Road Friendly Transport™ Decal



1016406

Figure 7.16: Converting Road Friendly Transport™ Decal

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