

R85
Rotary Disc 13-Foot Header for
Self-Propelled Windrower

Operator's Manual

147757 Revision B

Model Year 2016

Original Instruction


R85 Rotary Disc 13-Foot Header for Self-Propelled Windrower



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Declaration of Conformity

 <h2 style="margin: 0;">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>[5] June 20, 2016</p>
<p>[2] Rotary Disc Windrower Header</p> <p>[3] MacDon R85</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 compile 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>
<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 järgnevald 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 soussigné(s), [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>

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Figure 1: EC Declaration of Conformity, Page 1

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):</p> <p style="text-align: center;">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 2a 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:</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a D-49504 Lotte (Vokietija) hartmut.hartmann@prodoku.com</p>	<p>Mēs, [1] Deklarēju, 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:</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a 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>Zastosowałam/y następujące (zharmonizowane) normy zgodnie z artykułem 7(2):</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a D-49504 Lotte (Nemačka) hartmut.hartmann@prodoku.com</p>	<p>Mi, [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):</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a 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):</p> <p style="text-align: center;">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 2a D-49504 Lotte (Nemecko) hartmut.hartmann@prodoku.com</p>

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Figure 2: EC Declaration of Conformity, Page 2

Noise Levels

The A-weighted sound pressure level inside the operator's station of a typical self-propelled vehicle (e.g., M205), when operated in conjunction with this R85 rotary disc header, **is 79 dBA**. This measurement was taken in accordance with ISO 5131. The sound pressure level depends upon the rotary disc speed, crop conditions, as well the exact type of self-propelled vehicle used to power the R85.

Introduction

This manual describes operating and maintenance procedures for the MacDon R85 Rotary Disc 13-Foot Self-Propelled Windrower Header.

Your new 13-foot rotary header can be attached to MacDon M150, M155, M155E4, M200 and M205 Self-Propelled Windrowers and is designed to cut, condition, and lay in windrows a wide variety of grasses and hay crops.

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

Use this manual as your first source of information for the machine.

A parts catalog is also supplied with your new header. If you require more detailed service information, contact your MacDon Dealer.

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

Use the Table of Contents and the Index to guide you to specific areas. 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.

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).

Store the operator's manual and the parts catalog in the plastic manual case (A) located at the right-hand side of the header.

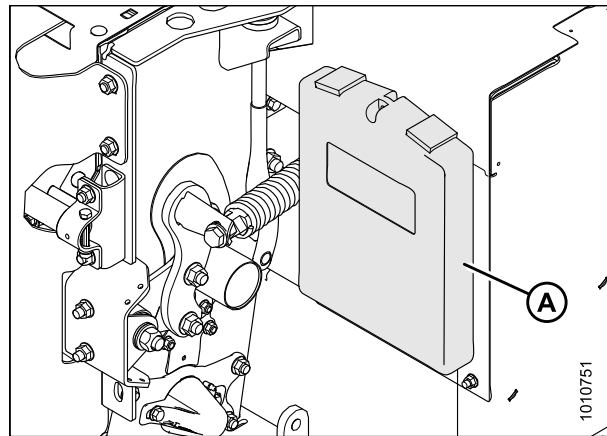


Figure 3: Manual Storage Case

Serial Number(s)

Record the serial number of the header in the space provided.

Header Serial No: _____

Serial Number Plate (A) is located on the top cover at the right side of the header.

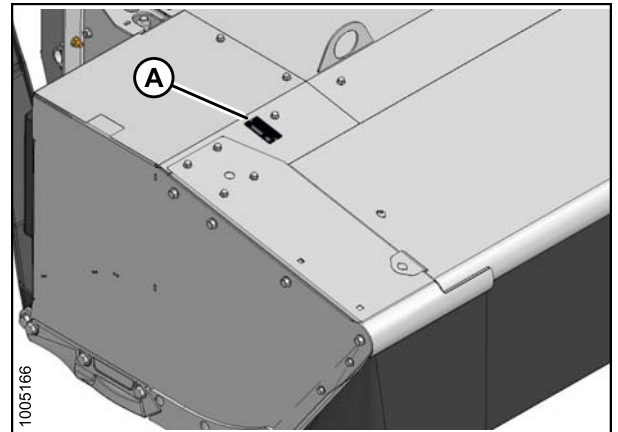


Figure 4: Serial Number Location – Self Propelled

List of Revisions

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

Summary of Change	Location
Inserted EC Declaration of Conformity document.	<i>Declaration of Conformity, page i</i>
Inserted topic.	<i>Noise Levels, page iii</i>
Added a statement about following the recommended machine settings in all MacDon publications.	<i>Introduction, page iv</i>
Removed decal 166833. Not used on this machine.	<i>1.7 Safety Decal Locations, page 8</i>
Revised topic title and replaced one of the illustrations.	<i>3.3 Engaging/Disengaging the Header Safety Props, page 26</i>
Inserted CAUTION statement regarding damage or loose cutter blades and attachment hardware.	<i>Inspecting Cutterblades, page 119</i>
	<i>Inspecting Cutterblade Hardware, page 121</i>
Inserted topic.	<i>8.1.8 Tapered Pipe Thread Fittings, page 169</i>

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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.

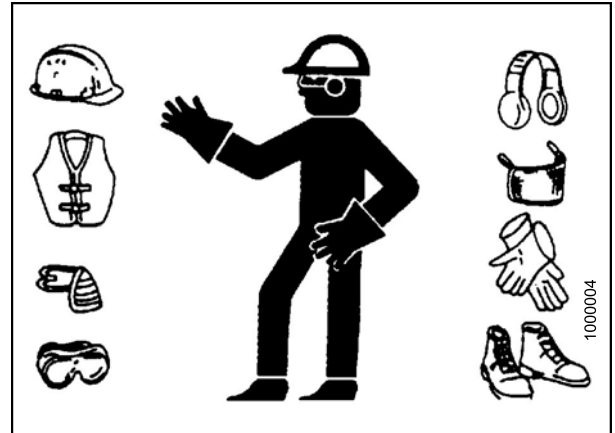


Figure 1.2: Safety Equipment



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.

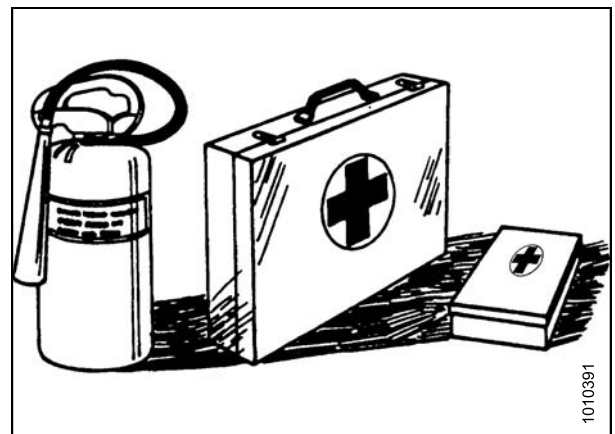


Figure 1.4: Safety Equipment

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.

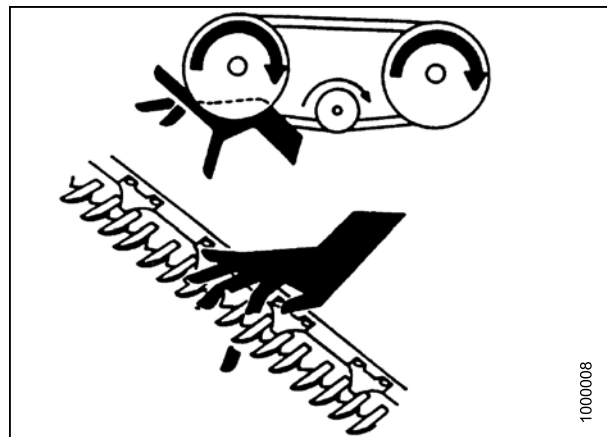


Figure 1.6: Safety around Equipment

- 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

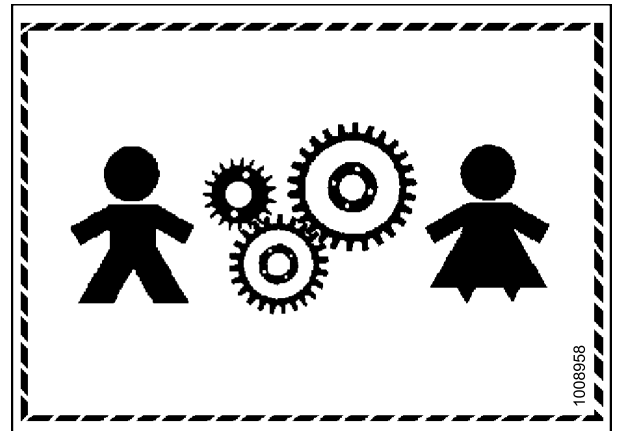


Figure 1.9: Equipment NOT Safe for Children

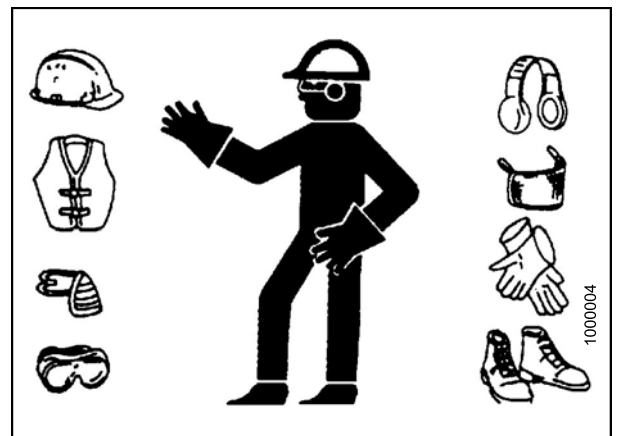


Figure 1.10: Safety Equipment

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.

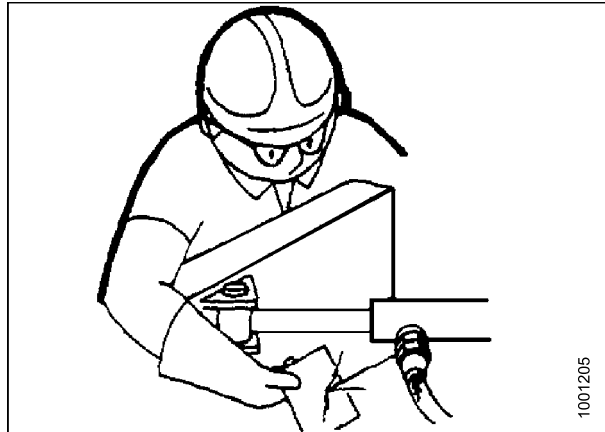


Figure 1.11: Testing for Hydraulic Leaks

- 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.

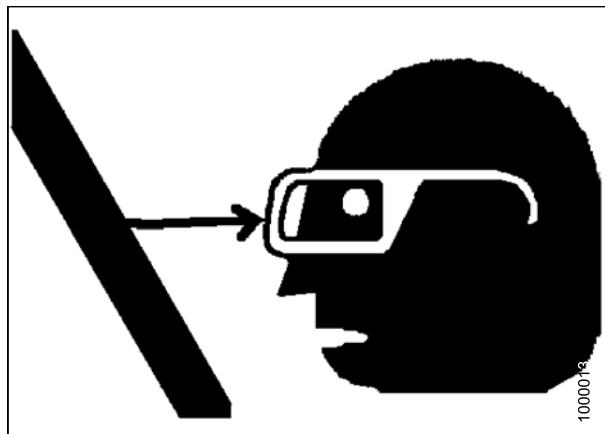


Figure 1.13: Safety around Equipment

1.6 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.

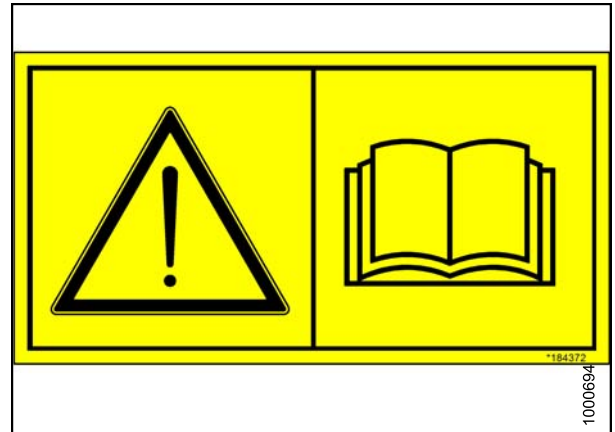


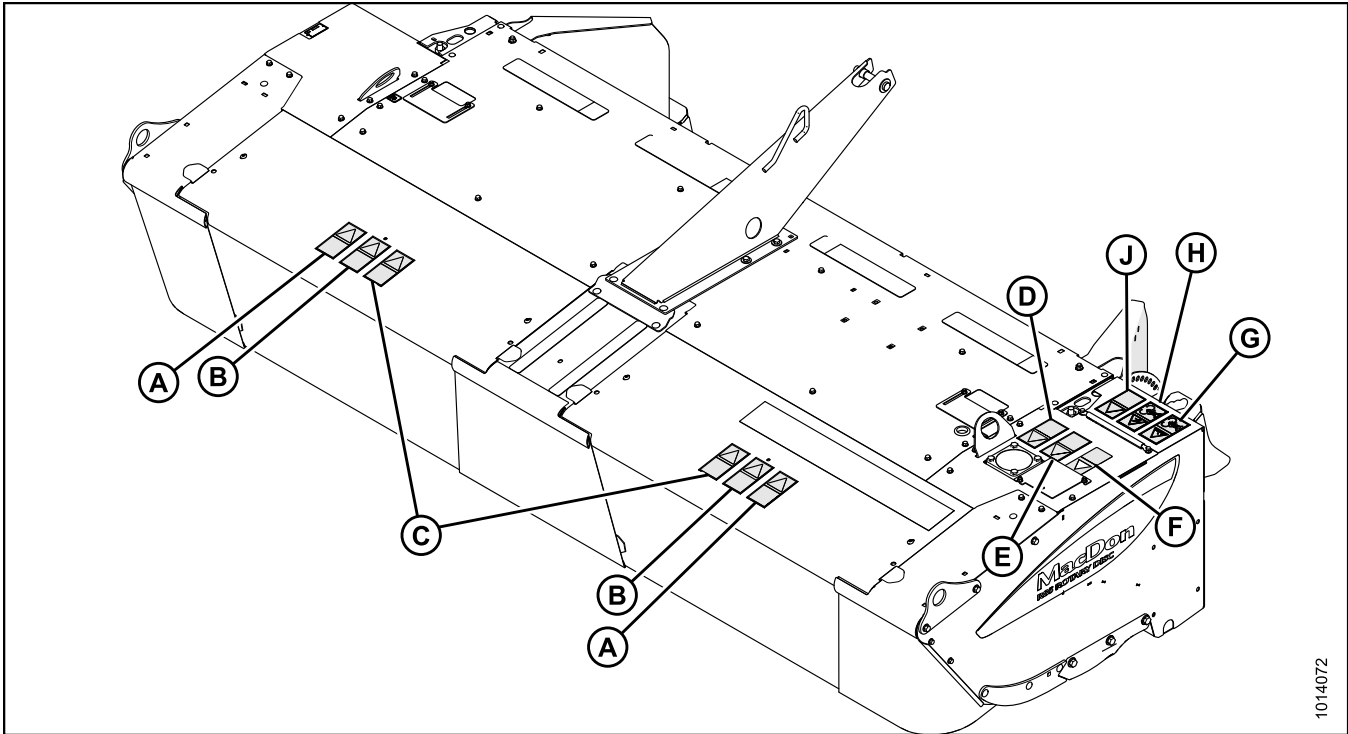
Figure 1.14: Operator's Manual Decal

1.6.1 Installing Safety Decals

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

SAFETY

1.7 Safety Decal Locations



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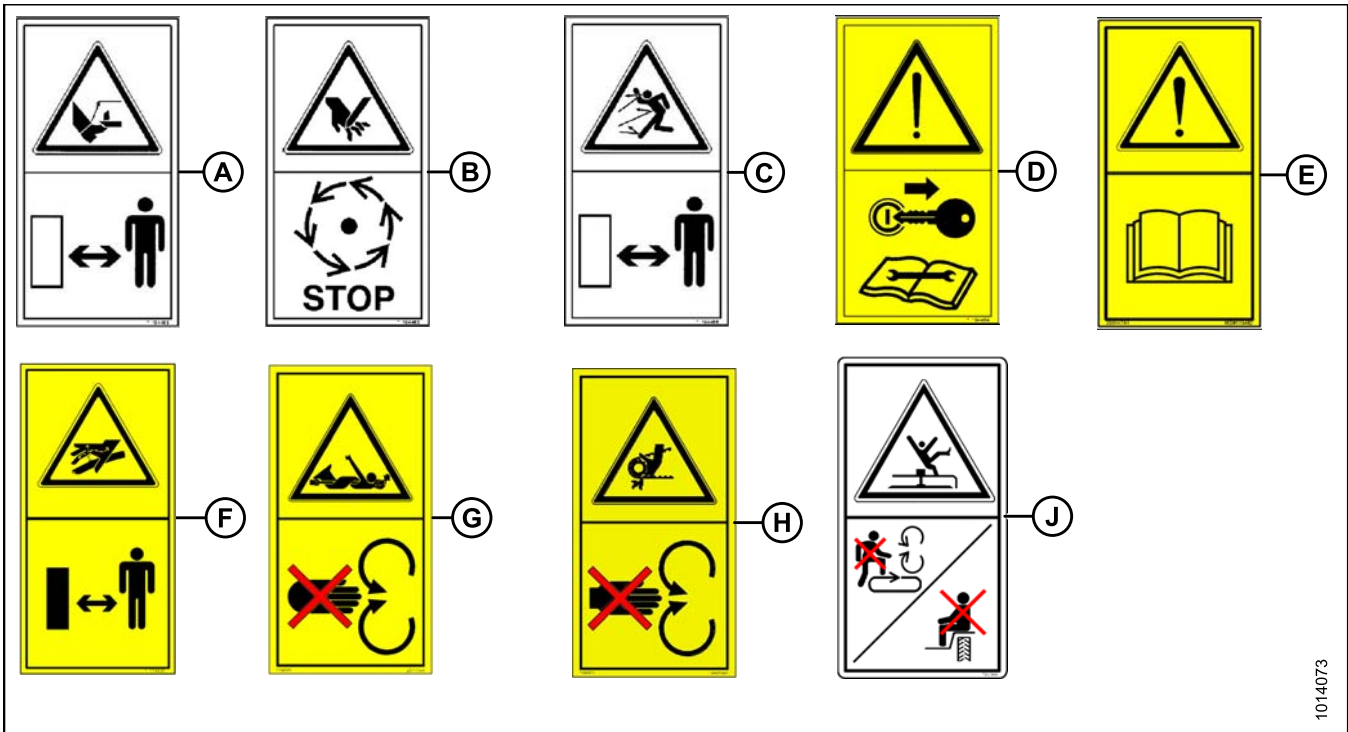
Figure 1.15: Safety Decal Locations

A - MD #194465
E - MD #113482
J - MD #247166

B - MD #194463
F - MD #174436

C - MD #194466
G - MD #184385

D - MD #194464
H - MD #184371



1014073

Figure 1.16: Safety Decals

SAFETY

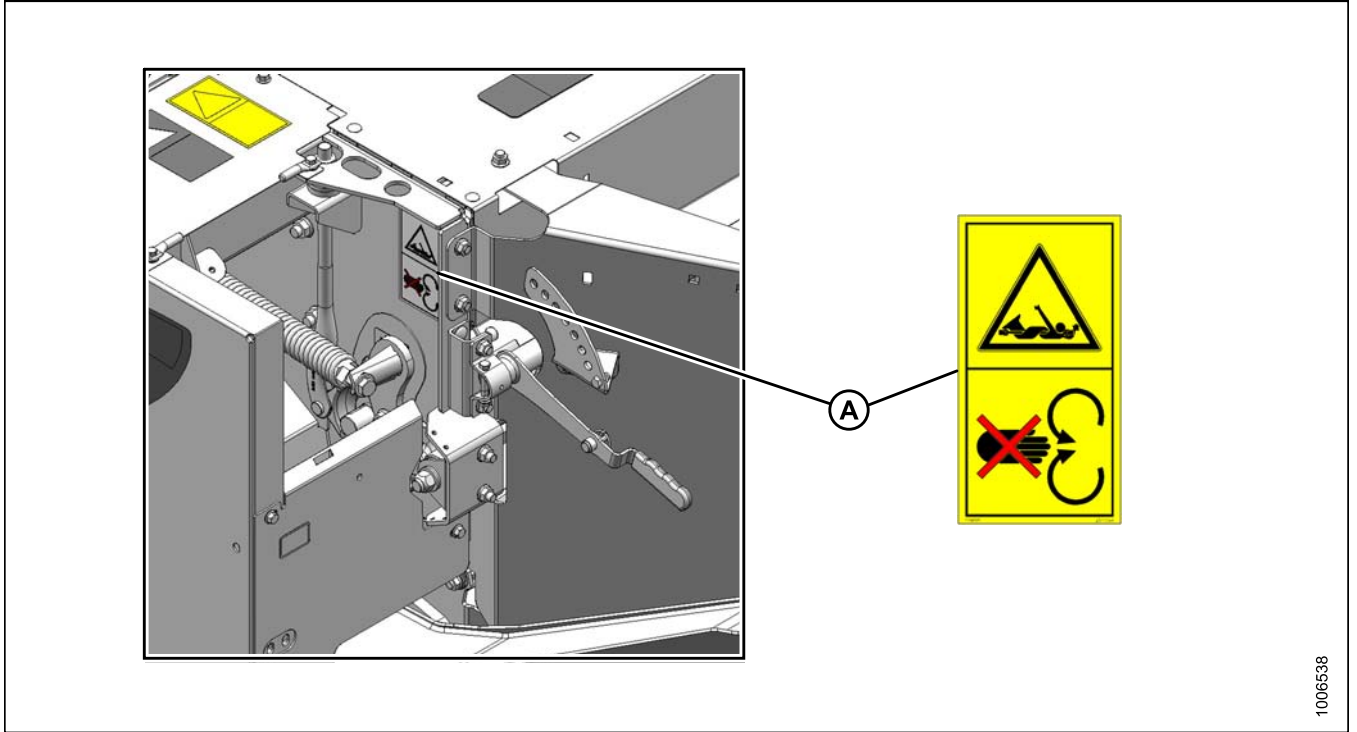


Figure 1.17: Safety Decal Locations

A - MD #184385

1006538

1.8 Understanding Safety Signs

MD #113482

General hazard pertaining to machine operation and servicing

CAUTION

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

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



Figure 1.18: MD #113482

MD #166466

High pressure oil hazard

WARNING

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



Figure 1.19: MD #166466

SAFETY

MD #174432

Reel hazard

WARNING

- To avoid injury from fall of raised reel; fully raise reel, stop the engine, remove the key, and engage mechanical lock on each reel support arm before working on or under reel.
- Refer to operator's manual.

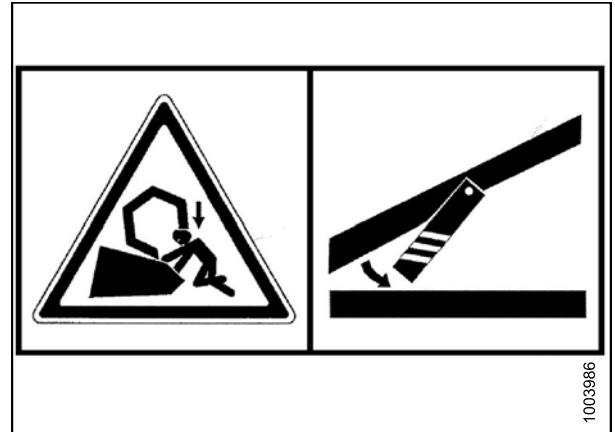


Figure 1.20: MD #174432

MD #174434

Header hazard

DANGER

- Rest header on ground or engage mechanical locks before going under unit.

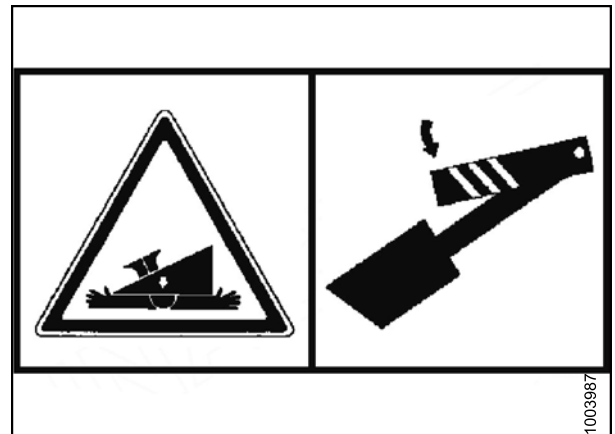


Figure 1.21: MD #174434

MD #184371

Open drive hazard

WARNING

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



Figure 1.22: MD #184371

SAFETY

MD #184422

Keep shields in place hazard

WARNING

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



Figure 1.23: MD #184422

MD #190546

Slippery surface

WARNING

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



Figure 1.24: MD #190546

MD #194463

Rotating blades

WARNING

- Stop engine and remove the key before opening the header covers.
- Listen and look for evidence of rotation before lifting cover.
- Rotating cutters may continue to rotate after power is shut off.



Figure 1.25: MD #194463

SAFETY

MD #194464

Shut down for service

WARNING

- Stop the engine and remove the key.
- Read tractor and mower manufacturer's manuals for inspection and maintenance instructions.
- Read the windrower and header manuals for inspection and maintenance instructions.

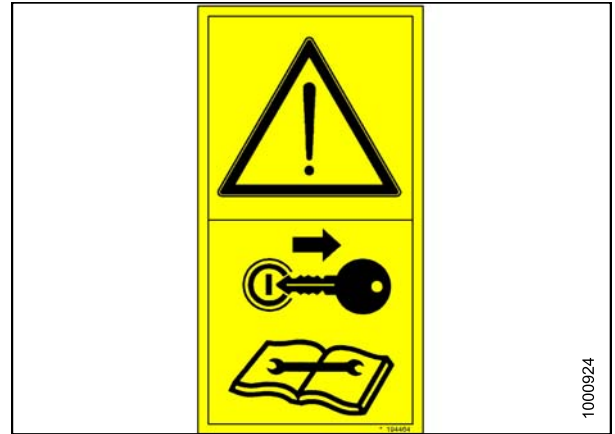


Figure 1.26: MD #194464

MD #194465

Rotating cutters

WARNING

- Stand clear.
- Stop the engine and remove the key.
- Disengage PTO and shut off tractor.
- Listen and look for evidence of rotation before lifting cover.
- Rotating cutters may continue to rotate after power is shut off.
- Failure to comply could result in serious injury or death.



Figure 1.27: MD #194465

MD #194466

Rotating parts 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 1.28: MD #194466

SAFETY

MD #194521

Auger entanglement hazard

CAUTION

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

General hazard pertaining to machine operation and servicing.

CAUTION

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

MD #247166

Moving implement hazard

WARNING

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

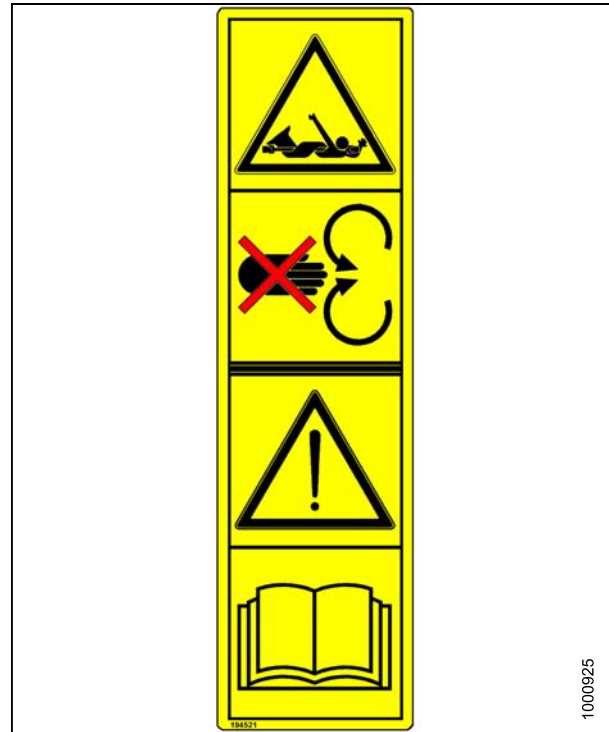


Figure 1.29: MD #194521



Figure 1.30: MD #247166

SAFETY

MD #247167

Rotating blades

WARNING

- Disengage power take-off, stop engine, 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.

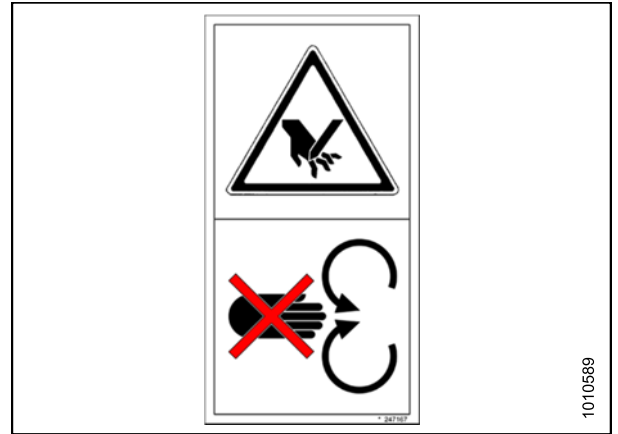


Figure 1.31: MD #247167

2 Product Overview

2.1 Definitions

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

Term	Definition
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
Bolt	A headed and externally threaded fastener that is designed to be paired with a nut
Cab-forward	Windrower operation with Operator and cab facing in direction of travel
CDM	Cab display module on a self-propelled windrower
Center-link	A hydraulic cylinder link between header and machine to which it is attached: It is used to change header angle
CGVW	Combined vehicle gross weight
DWA	Double Windrow Attachment
ECM	Engine control module
ECU	Electronic control unit
Engine-forward	Windrower operation with Operator and engine facing in direction of travel
Export header	Header configuration typical outside North America
Finger tight	Finger tight is a reference position where sealing surfaces or components are making contact with each other and fitting has been tightened to a point where fitting is no longer loose
FFFT	Flats from finger tight
GSL	Ground speed lever
GSS	Grass Seed Special
GVW	Gross vehicle weight
Hard joint	A joint made with the use of a fastener where joining materials are highly incompressible
Header	A machine that cuts and lays crop into a windrow and is attached to a self-propelled windrower
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 head (internal-wrenching hexagon drive)
hp	Horsepower
ISC	Intermediate Speed Control
JIC	Joint Industrial Council: A standards body that developed standard sizing and shape for original 37° flared fitting
n/a	Not applicable
Nut	An internally threaded fastener that is designed to be paired with a bolt
N-DETENT	The slot opposite the NEUTRAL position on operator's console

PRODUCT OVERVIEW

Term	Definition
North American header	Header configuration typical in North America
NPT	National Pipe Thread: A style of fitting used for low pressure port openings Threads on NPT fittings are uniquely tapered for an interference fit
ORB	O-ring boss: A style of fitting commonly used in port opening on manifolds, pumps, and motors
ORFS	O-ring face seal: A style of fitting commonly used for connecting hoses and tubes This style of fitting is also commonly called ORS, which stands for O-ring seal
rpm	Revolutions per minute
R-Series header	MacDon R80 and R85 rotary disc headers
RoHS (Reduction of Hazardous Substances)	A directive by the European Union to restrict use of certain hazardous substances (such as hexavalent chromium used in some yellow zinc platings)
SAE	Society of Automotive Engineers
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread in one of mating parts
Self-Propelled (SP) Windrower	Self-propelled machine consisting of a power unit with a header
Soft joint	A joint made with use of a fastener where joining materials are compressible or experience relaxation over a period of time
Tension	Axial load placed on a bolt or screw, usually measured in Newtons (N) or pounds (lb.)
TFFT	Turns from finger tight
Torque	The product of a force X lever arm length, usually measured in Newton-meters (N·m) or foot-pounds (ft·lbf)
Torque angle	A tightening procedure where fitting is assembled to a precondition (finger tight) and then nut is turned further a number of degrees or a number of flats to achieve its final position
Torque-tension	The relationship between assembly torque applied to a piece of hardware and axial load it induces in bolt or screw
Washer	A thin cylinder with a hole or slot located in the center that is to be used as a spacer, load distribution element, or a locking mechanism
Windrower	Power unit of a self-propelled header
WCM	Windrower control module

2.2 Component Identification

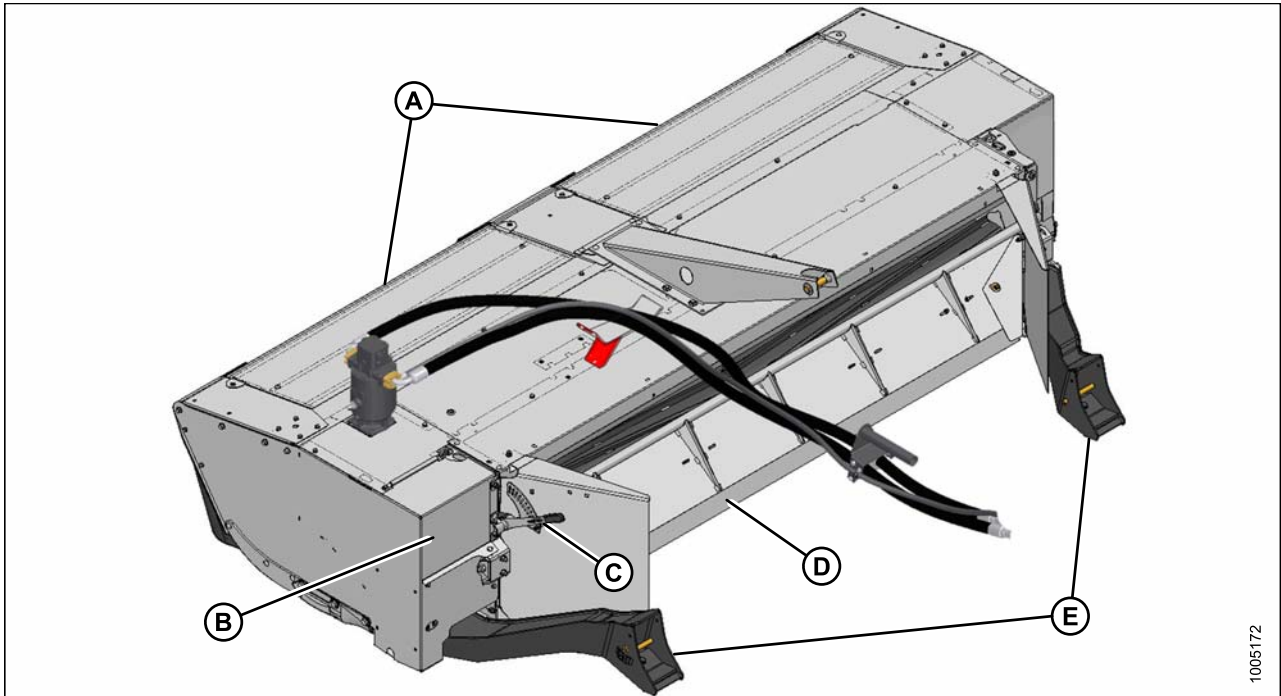


Figure 2.1: Component Identification M205

A - Doors

D - Swath Baffle

B - Driveshield

E - Header Boot

C - Swath Baffle Control

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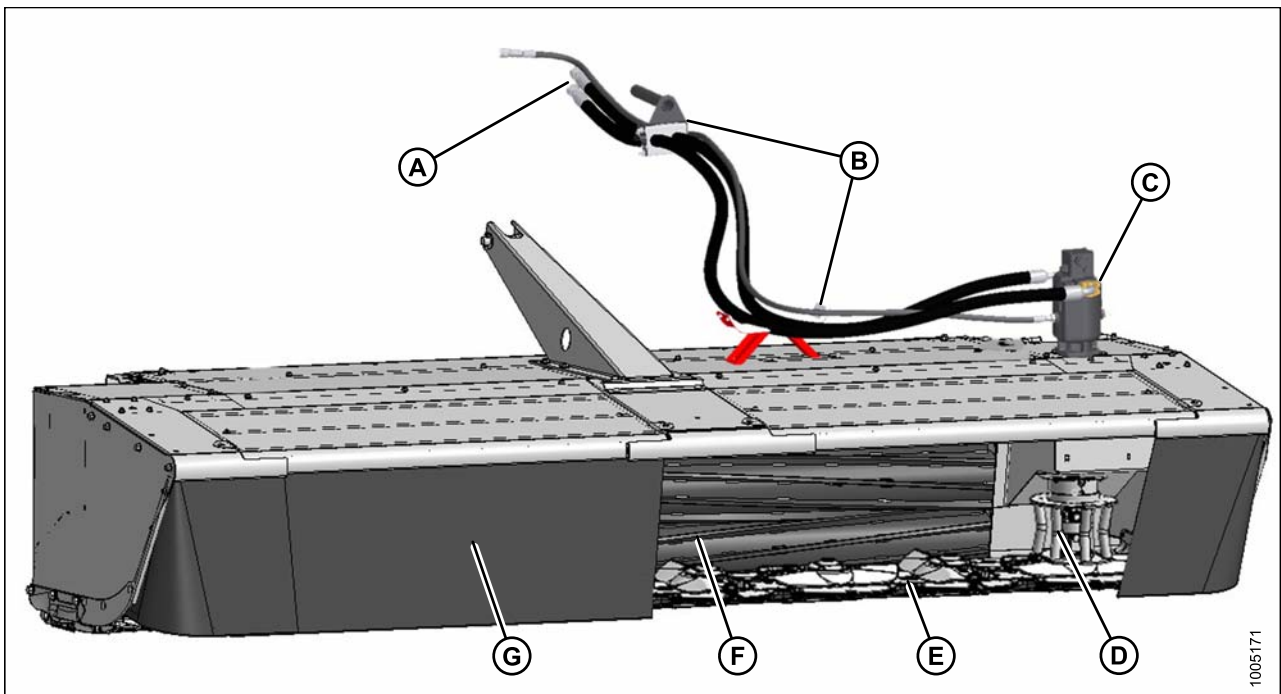


Figure 2.2: Component Identification M205

A - Hydraulic Hoses to SP Windrower

E - 8 Disc Cutterbar

B - Hose Supports

F - Conditioner Rolls

C - Drive Motor

G - Front Curtains

D - Rotary Deflector

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PRODUCT OVERVIEW

2.3 Specifications

NOTE:

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

S: standard / O_F: optional (factory installed) / O_D: optional (dealer installed) / -: not available

	13-Foot R85
Cutterbar	
Effective cutting width	3895 mm (12.78 ft.)
Number of cutting discs	8
Number of blades per disc	2
18 degree bevel down knives	S
Inline spur gear cutterbar design	S
Geartrain protection - shearable key in spindle (all discs)	S
Austempered cutting discs	S
Range of cutting disc rpm	1800–2600 rpm
Knife tip speed range	59.2–85.5 mps (131–189 mph)
Cutterbar spindle anti-wrap ring	S
Austempered rock guards	S
Hourglass converging impellers	S
Heat treated crop lifters	S
Cutting angle range	0-8° below horizontal
Cutting angle range - minimum cut height	19 mm (3/4 in.)
Adjustable shoes	O
Hay Conditioner	S
Drive: Bevel gearbox to 3 HB belt drive to enclosed timing gearbox and driveline	S
Roll type: Intermeshing steel bars	S
Roll length: 3000 mm (118 in.)	S
Roll diameter 229 mm (9.0 in.) outside diameter on 179 mm (7.0 in.) O.D. tube	S
Roll speed	730–1040 rpm
Forming Shield for 915 mm (36 in.) windrow to 2540 mm (102 in.) wide swath	S
Header mounted adjustable baffle	S
Tractor mounted side deflector and rear baffle	S

PRODUCT OVERVIEW

	13-Foot R85
Frame and Structure	
Mounts to self-propelled windrower tractor	S
Easy access doors to access cutterbar components	2
Transport width	3952 mm (156 in.)
Total weight complete with lift arms (estimated)	1360 kg (3000 lb.)
Drives	
M150/M155/M155E4 Windrower tractor to 75 CC (4.6 cu in.) Eaton heavy duty hydraulic motor	S
M205 Windrower tractor to 106 cc (6.4 cu in.) Eaton heavy duty hydraulic motor	S
M150/M155 maximum hydraulic power developed	97 kW (130 Hp)
M205 maximum hydraulic power developed	174 kW (231 Hp)
Hydraulic Header Connection	
Hydraulic couplers for quick attachment	O _D
Attachments and Accessories	
Double Windrow Attachment	O _D
Tall Crop Divider kit	O
Cutterbar Repair Tool kit	O

3 Operation

3.1 Owner/Operator Responsibilities

CAUTION

- It is your responsibility to read and understand this manual completely before operating the header. Contact your MacDon Dealer if an instruction is not clear to you.
- Follow all safety messages in the manual and on safety decals on the machine.
- Remember that YOU are the key to safety. Good safety practices protect you and the people around you.
- Before allowing anyone to operate the header, for however short a time or distance, make sure they have been instructed in its safe and proper use.
- Review the manual and all safety related items with all Operators annually.
- Be alert for other Operators not using recommended procedures or not following safety precautions. Correct these mistakes immediately before an accident occurs.
- Do NOT modify the machine. Unauthorized modifications may impair the function and/or safety 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 windrower is properly equipped to safely operate the header. This may include adding ballast according to windrower operator's manual requirements for attachments of this size and mass.

3.2 Operational Safety

CAUTION

Follow these safety precautions:

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

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 cutting ditch banks, use extreme caution. If the header hits an obstruction, the front of the windrower will usually swerve toward the ditch
- When working on inclines, travel uphill or downhill when possible. Be sure to keep the windrower transmission in gear when travelling downhill
- Never attempt to get on or off a moving machine
- Do NOT get off the windrower while the header is in operation
- To avoid bodily injury or death from unexpected startup of machine, always stop the windrower engine and remove the key before adjusting or removing plugged material from the machine.
- Check for excessive vibration and unusual noises. If there is any indication of trouble, shut down and inspect the machine

CAUTION

Follow proper shut down procedure:

- Engage the windrower brake
- Stop the engine and remove the key
- Wait for all movement to stop
- Engage the header safety props before inspecting a raised machine

⚠ CAUTION

- Operate only in daylight or good artificial light
- 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
- Extreme care must be exercised to avoid injury from thrown objects. Do NOT, under any circumstances, operate the header when other people are in the vicinity. Stones and other objects can be thrown great distances by the rotating cutting blades
- The cutterbar curtains are very important to reduce the potential for thrown objects. Always keep the cutterbar curtains down when operating the header. Replace the curtains if they become worn or damaged

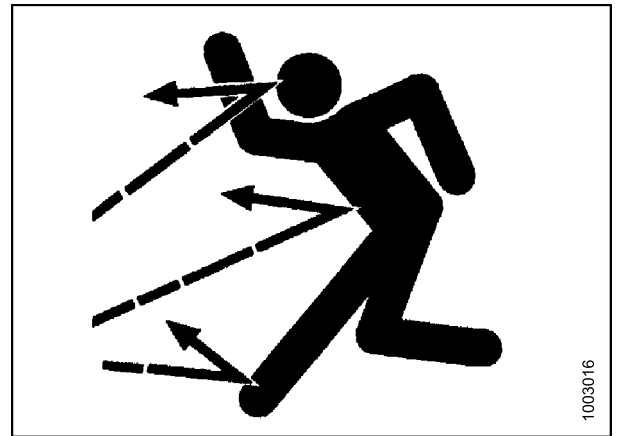


Figure 3.1: Ejected Objects Warning

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3.3 Engaging/Disengaging the Header Safety Props

Safety props are located on both header lift cylinders on the windrower.

⚠ DANGER

To avoid bodily injury from fall of raised header, always engage safety props when working on or around raised header, and before going under header for any reason.

Engage safety props as follows:

1. Start engine and press header up (A) switch to raise header to maximum height.
2. Rephase cylinders if one end of the header does not raise fully. If rephasing is required, proceed as follows:
 - a. Press and hold the header up (A) switch until both cylinders stop moving.
 - b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.
3. Pull lever (A) and rotate toward header to lower safety prop (B) onto cylinder. Repeat for opposite cylinder.

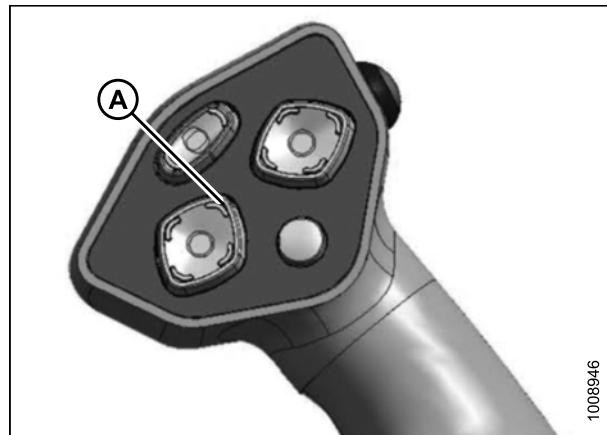


Figure 3.2: Ground Speed Lever (GSL)

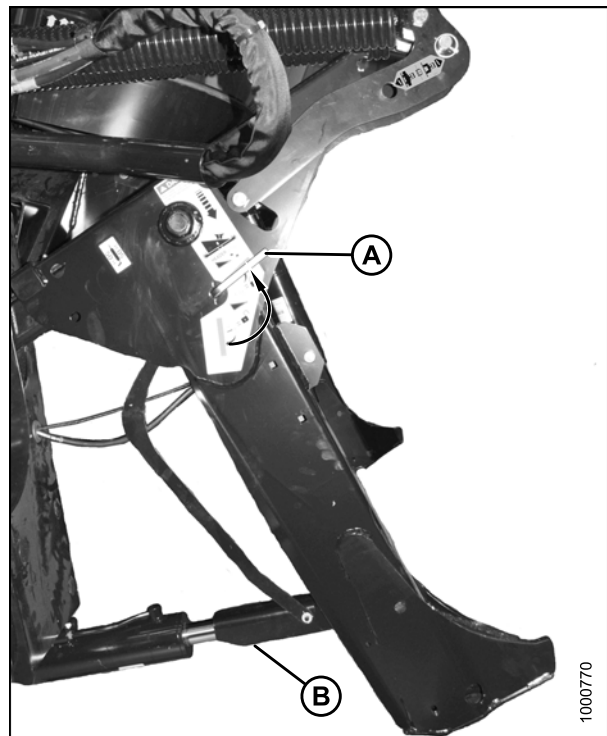


Figure 3.3: Safety Prop

OPERATION

Disengage safety props as follows:

1. Turn lever (A) away from header to raise safety prop until lever locks into vertical position. Repeat for opposite cylinder.
2. Start engine, choose a level area, and lower header to the ground.
3. Stop the engine and remove the key.

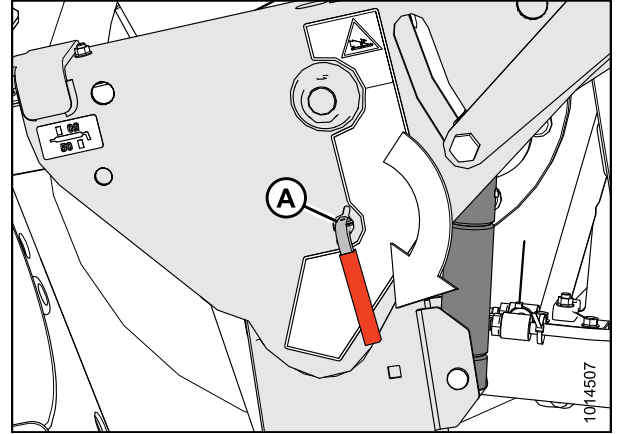


Figure 3.4: Safety Prop

3.4 Driveshields

⚠ WARNING

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

The R85 13-Foot Header for Self-Propelled Windrowers comes in two configurations—one configured for use in North America and one configured for use outside of North America. The configuration is specified in the title when necessary.

3.4.1 Opening the Driveshield: North American Headers

Follow these steps to open the driveshield (A) on North American headers:

1. Disengage rubber latch (B) from hook (C).
2. Lift driveshield (A) to the open position.

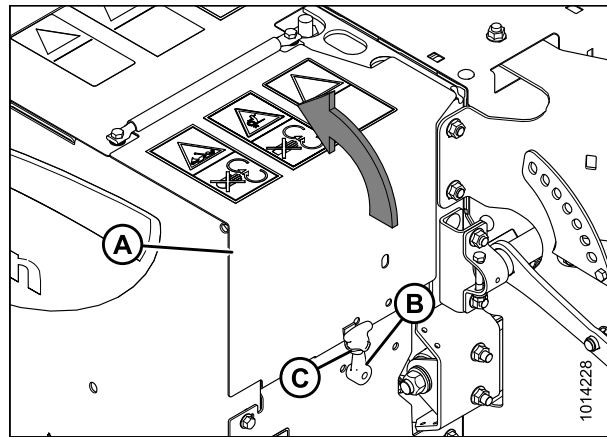


Figure 3.5: Driveshield

3.4.2 Closing the Driveshield: North American Headers

Follow these steps to close the driveshield on North American headers:

1. Lower driveshield (A) so that tabs at lower end of shield engage holes in lower panel.
2. Engage rubber latch (B) on hook (C).

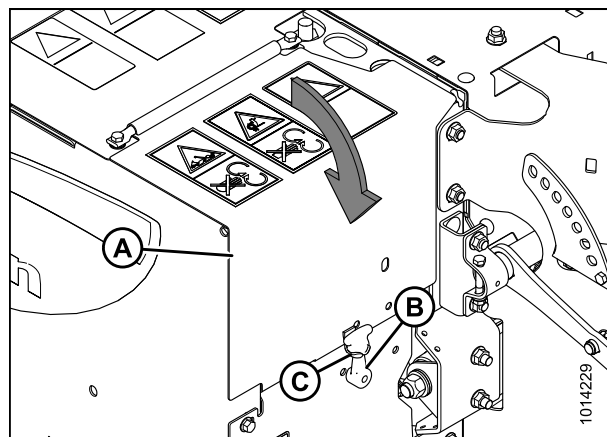


Figure 3.6: Driveshield

3.4.3 Opening the Driveshield: Export Headers

Follow these steps to open the driveshield on export headers:

1. Release rubber latch (A).
2. Insert a screwdriver (or equivalent) through hole (B) in driveshield and into the notch in latch (C) and disengage latch.
3. Open driveshield (D).

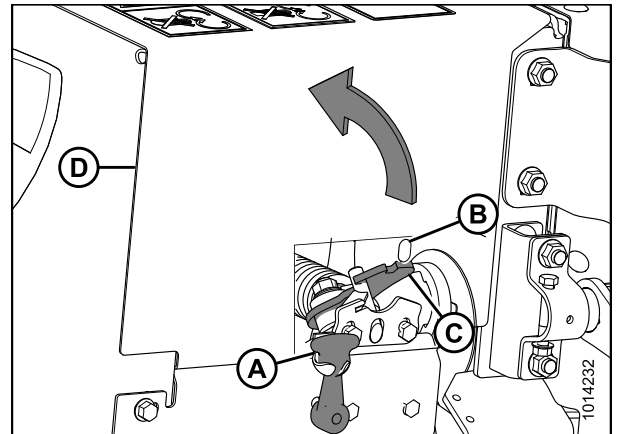


Figure 3.7: Driveshield

3.4.4 Closing the Driveshield: Export Headers

Follow these steps to close the driveshield on export headers:

1. Lower driveshield (A), so that at lower end of driveshield engage holes in the lower panel and latch (B) re-engages shield.
2. Engage rubber latch (C).

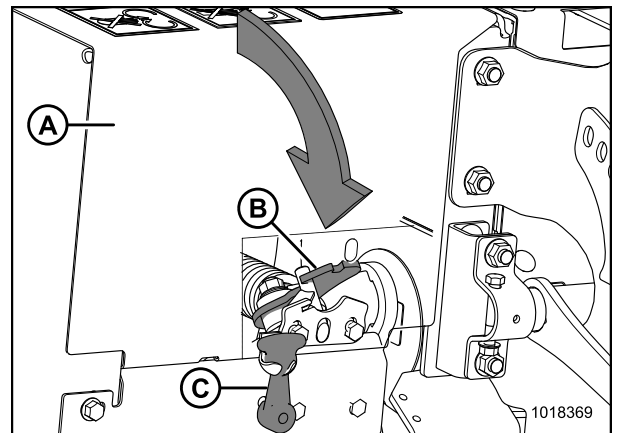


Figure 3.8: Driveshield

3.5 Cutterbar Doors

The R85 comes in two configurations—one configured for use in North America and one configured for use outside of North America. The configuration is specified in the title when necessary.

⚠ CAUTION

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

Two doors provide access to the cutterbar area.

Rubber curtains are attached to each door at the front corners and center fixed cover. Latches at the lower corners of each curtain keep the curtains together to minimize the risk of thrown objects.

The cutterbar curtains reduce the potential for thrown objects. Always keep curtains down when operating the header.

Replace the worn or damaged curtains. Refer to your Dealer for replacement instructions.

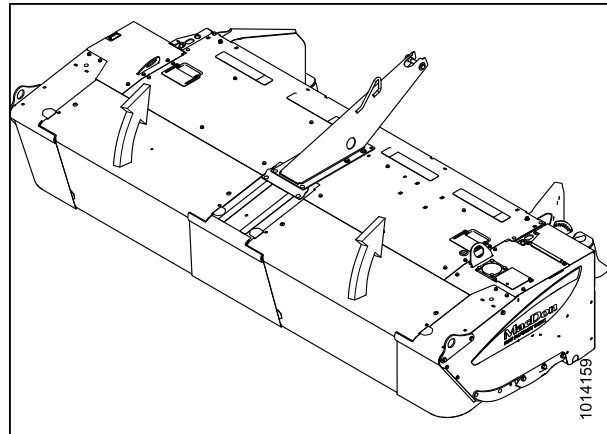


Figure 3.9: Cutterbar Doors

OPERATION

3.5.1 Opening the Cutterbar Doors: North America

Follow these steps to open the cutterbar doors on a North American header:

1. Unhook the curtain latches (A).

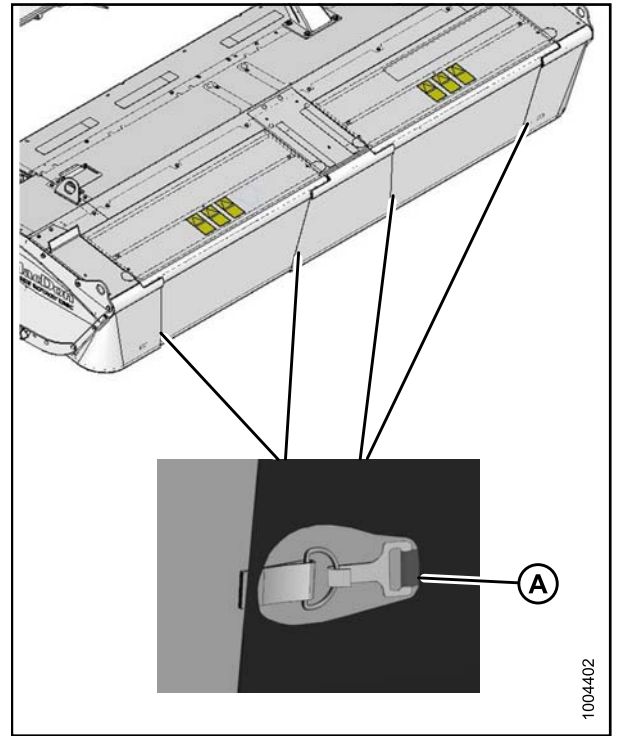


Figure 3.10: Curtain Latches

2. Lift front of door to the open position.



Figure 3.11: Cutterbar Doors

3.5.2 Closing the Cutterbar Doors: North American Header

Follow these steps to close the cutterbar doors on a North American header:

⚠ CAUTION

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

1. Pull at top of the cutterbar door and move to the closed position.



Figure 3.12: Cutterbar Doors

2. Hook curtain latches (A).

NOTE:

Ensure that curtains hang properly and completely enclose cutterbar area.

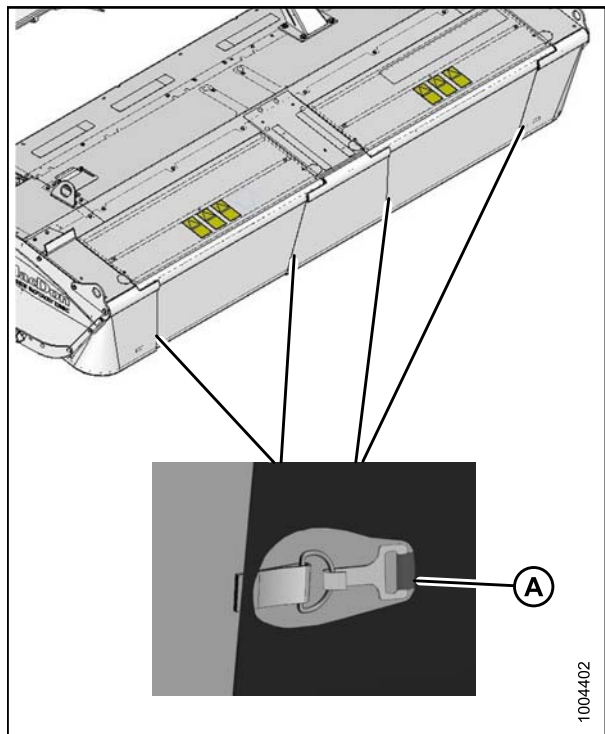


Figure 3.13: Curtain Latches

OPERATION

3.5.3 Opening the Cutterbar Doors: Export Header

Follow these steps to open the cutterbar doors on an export header:

1. Unhook curtain latches (A).

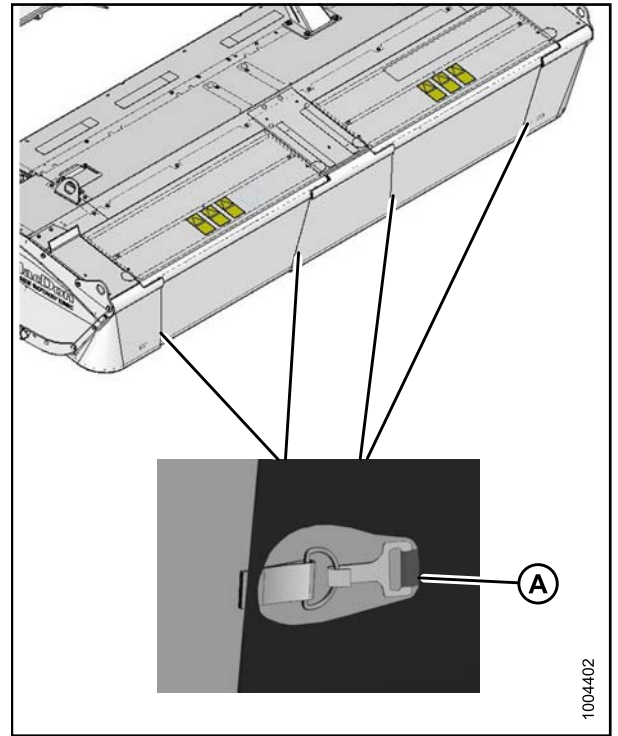


Figure 3.14: Curtain Latches

OPERATION

2. Insert a screwdriver (or equivalent) through hole (A) in door into notch in latch (B) and push latch to disengage.
3. Lift at front of door to open.

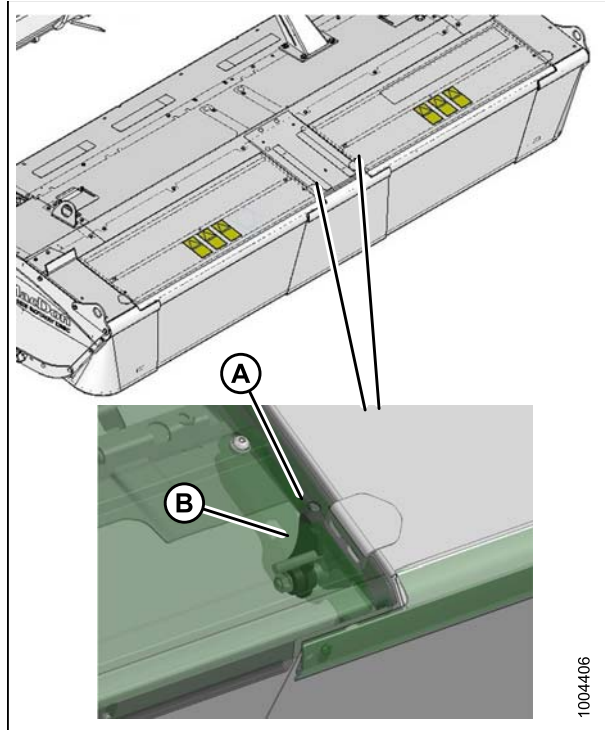


Figure 3.15: Cutterbar Door Latch

3.5.4 Closing the Cutterbar Doors: Export Header

To close the cutterbar doors on an export header follow these steps:

CAUTION

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

OPERATION

1. Pull at top and move to closed position. Ensure latch (A) has engaged the door.

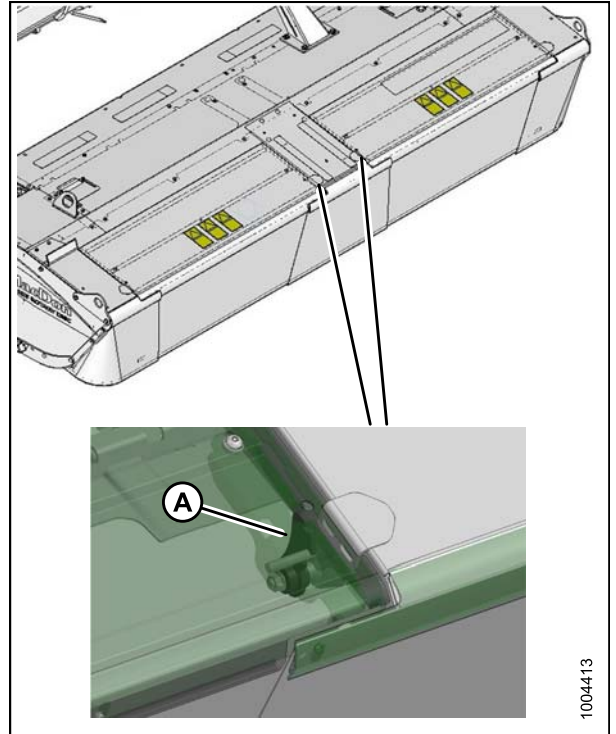


Figure 3.16: Cutterbar Door Latch

2. Hook curtain latches (A).

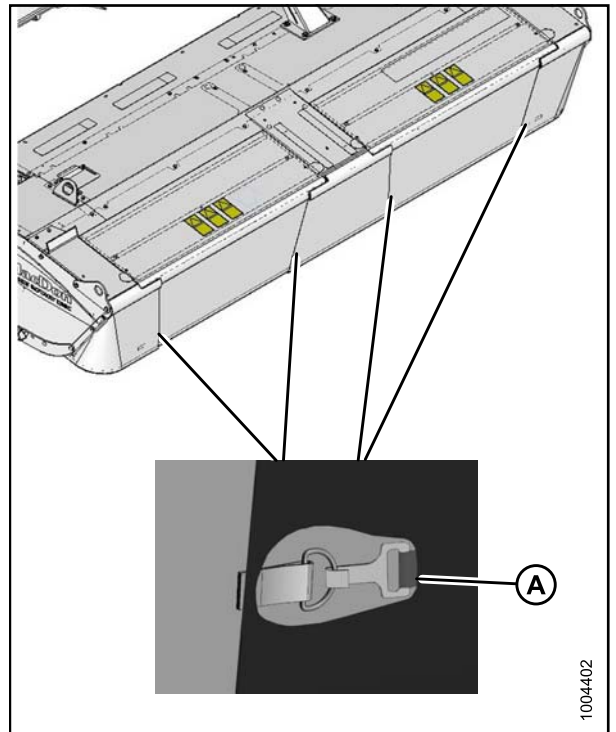


Figure 3.17: Curtain Latches

3.6 Daily Start-Up Check

CAUTION

- Be sure windrower and header are properly attached, all controls are in NEUTRAL, and windrower brake is engaged.
- Clear the area of other persons, pets etc. Keep children away from machinery. Walk around the header to be 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 through the day. Don't take chances.
- Remove foreign objects from the machine and surrounding area.

You may need the following:

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

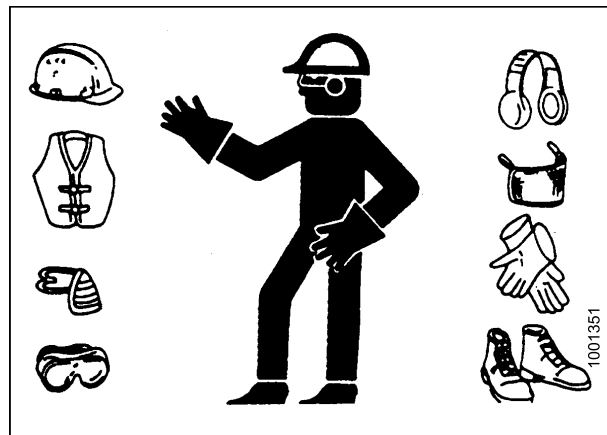


Figure 3.18: Safety Equipment

- 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

Do the following each day before start-up:

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 [5.6.2 Hydraulic Hoses and Lines, page 147](#).

2. Perform all daily maintenance. Refer to [5.3.1 Maintenance Schedule/Record, page 101](#).

3.7 Attaching the Header

3.7.1 Attaching the Forming Shield

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. Stop the engine and remove the key.
2. Remove the two clevis pins (A) from forming shield forward end.

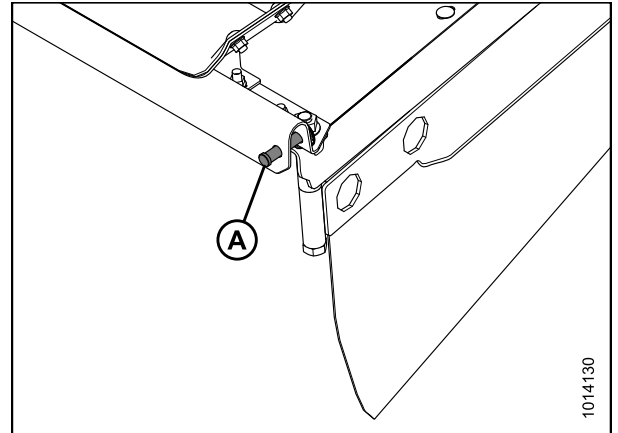


Figure 3.20: Forming Shield

3. Position the forming shield (A) under the windrower frame.

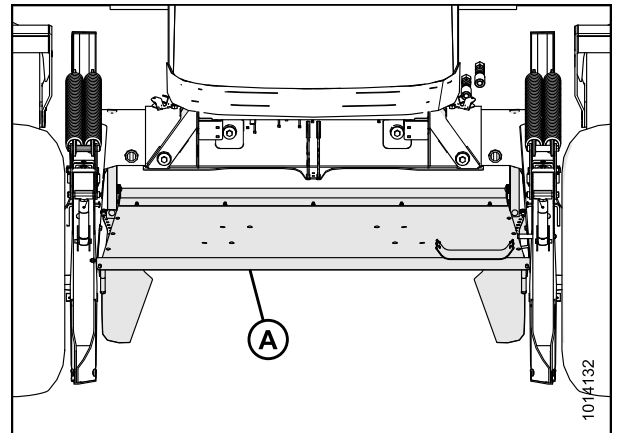


Figure 3.21: Forming Shield under Windrower

OPERATION

4. Position the forming shield onto spacers (B) on windrower legs. Secure with clevis pins (A) and lynch pin.

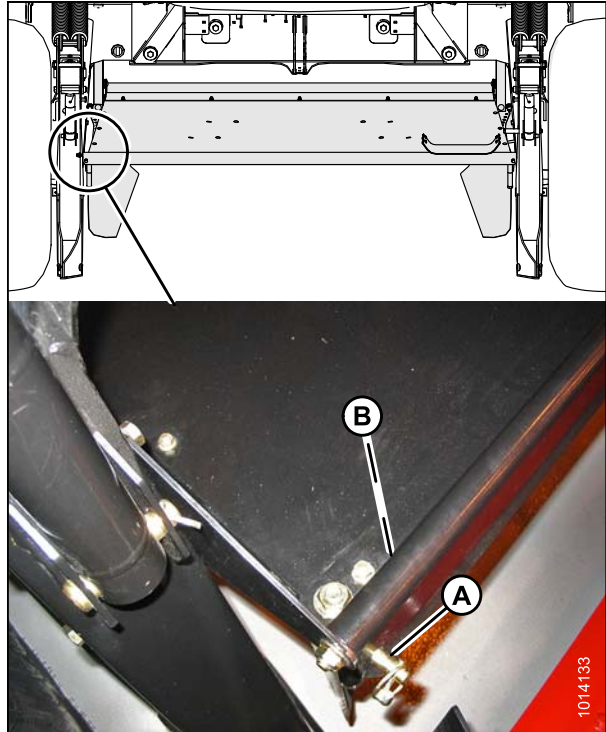


Figure 3.22: Forming Shield under Windrower

5. Lift the aft end of the forming shield and attach straps (B) to pins (A) on windrower frame.
6. Install washer and hairpin to secure strap. Use the middle hole and adjust height to suit the crop.

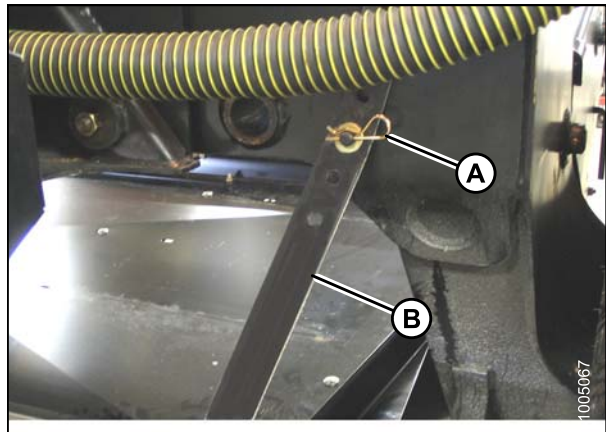


Figure 3.23: Forming Shield Strap

OPERATION

7. Set the forming shield side deflectors to the desired width by repositioning adjuster bars (A). Use the same hole location on both sides.
8. Adjust rear fluffer deflector (C) to middle position. Loosen handles (B) if required.
9. Attach the R85 header to the windrower. Refer to the windrower operator's manual, and then return to this manual to complete the attachment.
10. Connect the hydraulics and electrical harness.
 - For M205, refer to [3.7.2 Attaching the Header: M205 Windrowers, page 39](#).
 - For M200, refer to [3.7.3 Attaching the Header: M200 Windrowers, page 44](#).

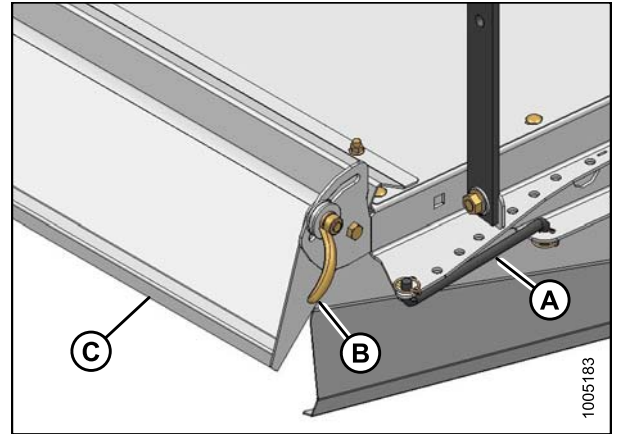


Figure 3.24: Forming Shield Adjuster Bar

3.7.2 Attaching the Header: M205 Windrowers

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.

Refer to your windrower operator's manual for procedures to mechanically attach the header to the windrower. Refer to the following procedures for electrical and hydraulic connections:

The R85 13-foot header requires motor/hose kit (MD #B5456) installed to enable operation on an M205 Self-Propelled Windrower.

If required, obtain the kit through your MacDon Dealer and install it in accordance with the instructions supplied with the kit.

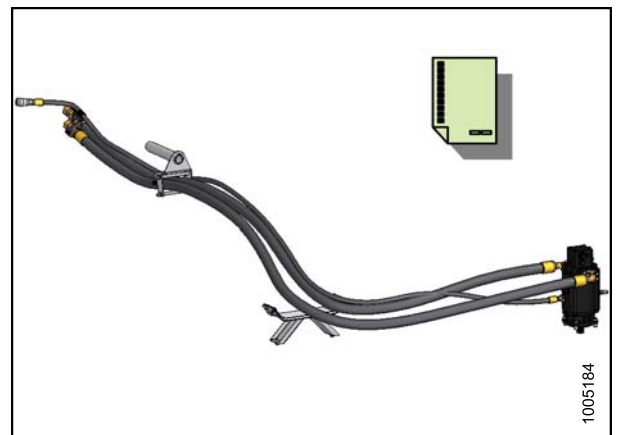


Figure 3.25: MD #B5456

OPERATION

1. Move windrower left-hand (cab-forward) platform (A) to OPEN position.

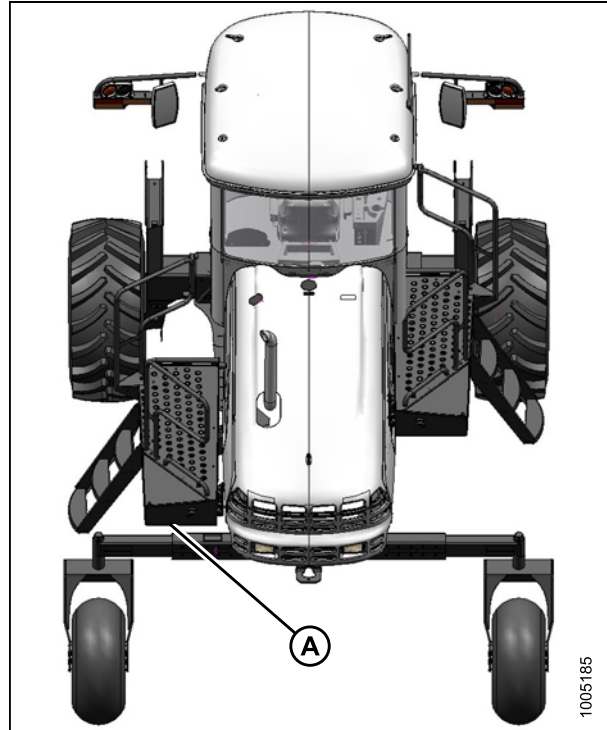


Figure 3.26: Windrower with LH Platform in Open Position

2. Route the hose bundle (A) from the header, under the windrower frame, and insert pin (B) into hole in windrower frame.
3. Place hoses on support (C) and on the hose support on the forming shield (not shown).
4. If optional couplers and lock are installed on hoses and lines, proceed as follows. Otherwise, proceed to Step 13., page 43.

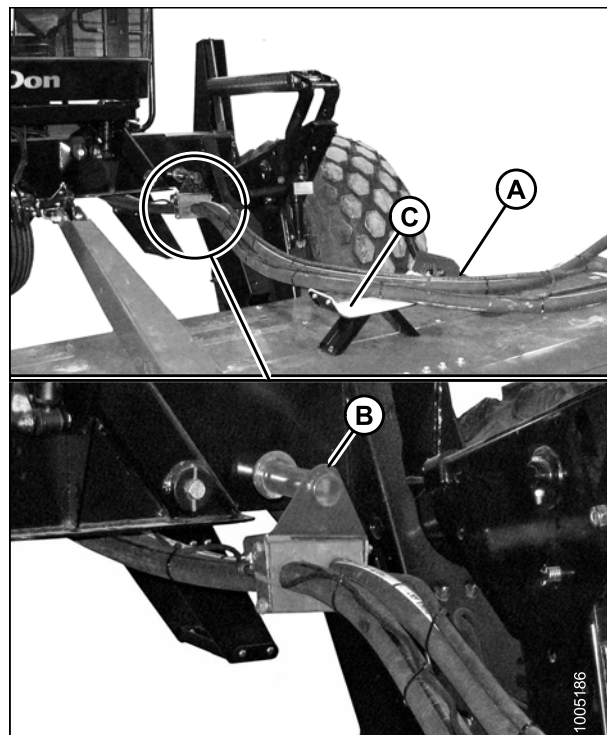


Figure 3.27: Hydraulic Hoses

OPERATION

5. Remove coupler lock as follows:
 - a. Remove lynch pin (A) and open up coupler lock (B).
 - b. Remove lock from coupler.

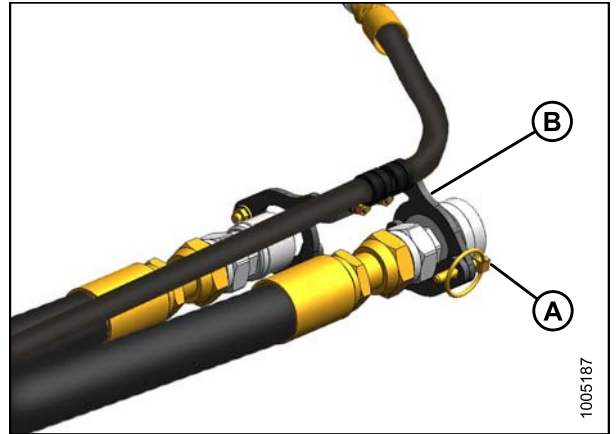


Figure 3.28: Hydraulic Couplers with Coupler Lock

6. Connect the rear pump hose (A) to outboard line (D) on windrower using coupler (C).
7. Connect the front pump hose (B) to the inboard line (E) on windrower using coupler (C).

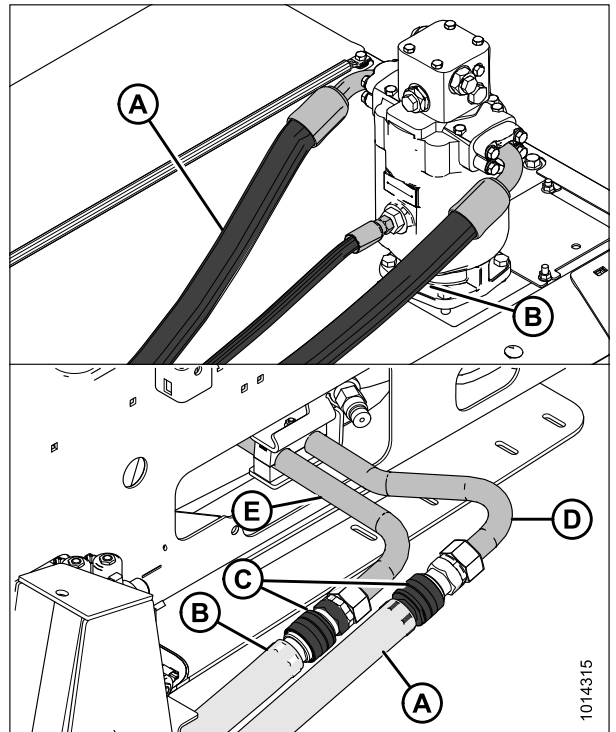


Figure 3.29: Hose Routing and Connections

OPERATION

- Position the lock onto the couplers so that retainer (A) rests under the fitting next to the sleeve on each coupler.

NOTE:

The retainer can be adjusted by loosening bolts (B). Tighten bolts after adjusting.

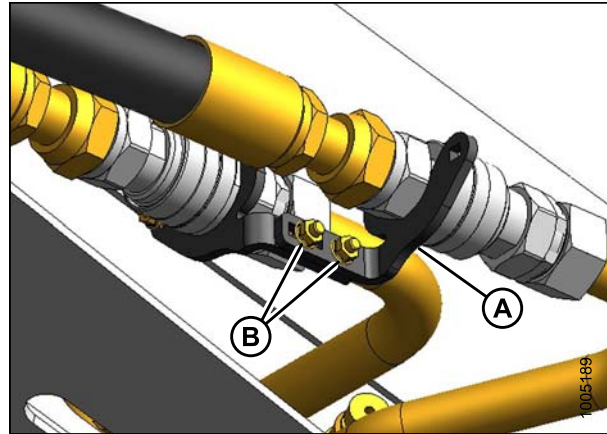


Figure 3.30: Hydraulic Couplers with Coupler Lock

- Lower holder (A) onto sleeves (B) so that the flats are positioned on the holder.

NOTE:

Holder can be adjusted by loosening bolts (C). Tighten bolts after adjusting.

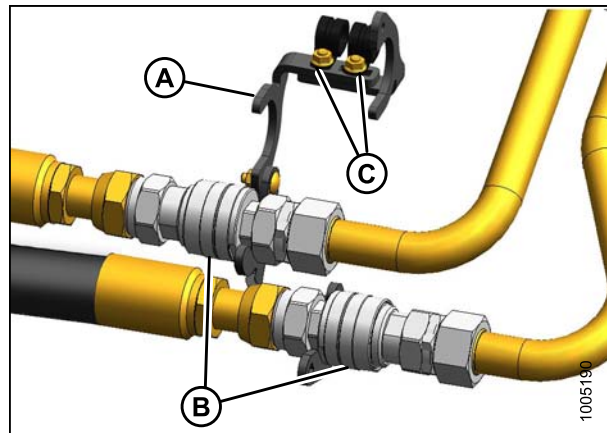


Figure 3.31: Hydraulic Couplers with Coupler Lock

- Insert lynch pin (A) to secure the lock.
- Attach case drain hose coupler at (B).
- Proceed to Step [17.](#), [page 43](#).

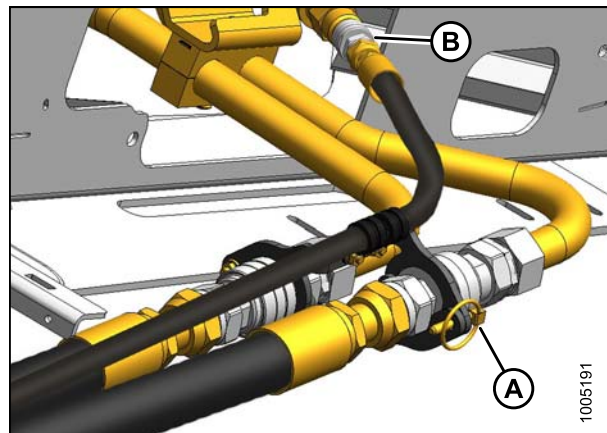


Figure 3.32: Hydraulic Couplers with Case Drain Hose

OPERATION

13. Connect the rear pump hose (A) to outboard line (F) on windrower using fitting (D).
14. Connect the front pump hose (B) to the inboard line (G) on windrower using fitting (D).
15. Torque fittings to 183 N·m (135 ft·lbf).
16. Attach case drain hose and coupler (C) to (E).

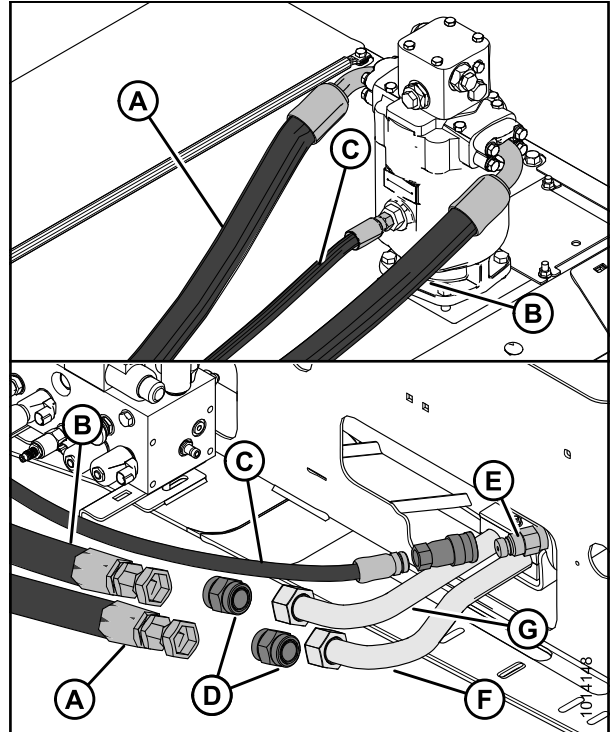


Figure 3.33: Hose Routing and Connections

17. Connect the electrical harness to connector HC-2A (A) (located beside the forward valve block on the windrower).

NOTE:

Valve block hidden to show the electrical connector.

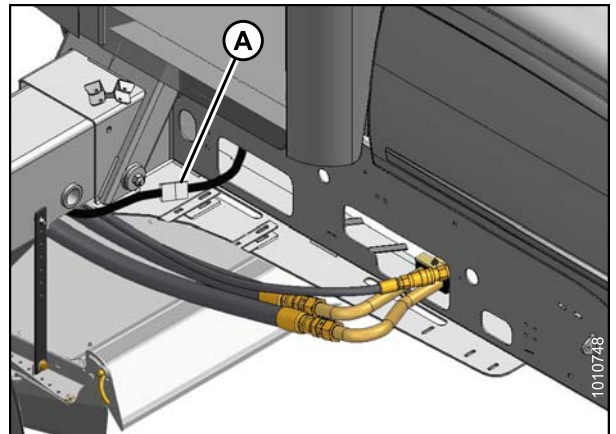


Figure 3.34: Electrical Connection

OPERATION

18. Move the windrower platform (A) to the CLOSED position.

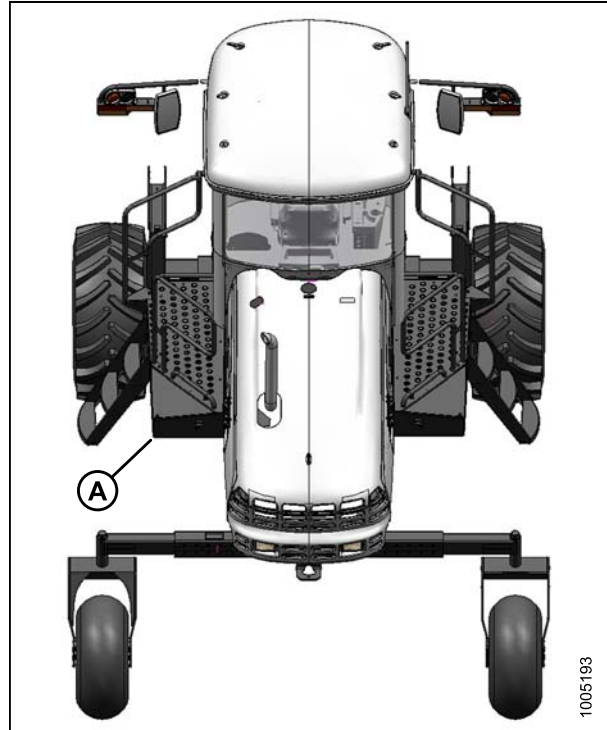


Figure 3.35: Windrower with LH Platform in Closed Position

3.7.3 Attaching the Header: M200 Windrowers

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.

Refer to [3.7 Attaching the Header, page 37](#) for procedure to mechanically attach the header to the windrower. Refer to the following procedures for electrical and hydraulic connections:

To operate the 13-foot header on an M200 windrower, installation of a motor/hose kit (MD #B5511) is required.

If required, obtain the kit through your MacDon Dealer. Install kit in accordance with the supplied instructions.



Figure 3.36: MD #B5511 Hydraulic Drive Kit

OPERATION

1. Disengage and rotate lever (A) counterclockwise to the UP position.
2. Remove the cap (B) securing the electrical connector to the frame.

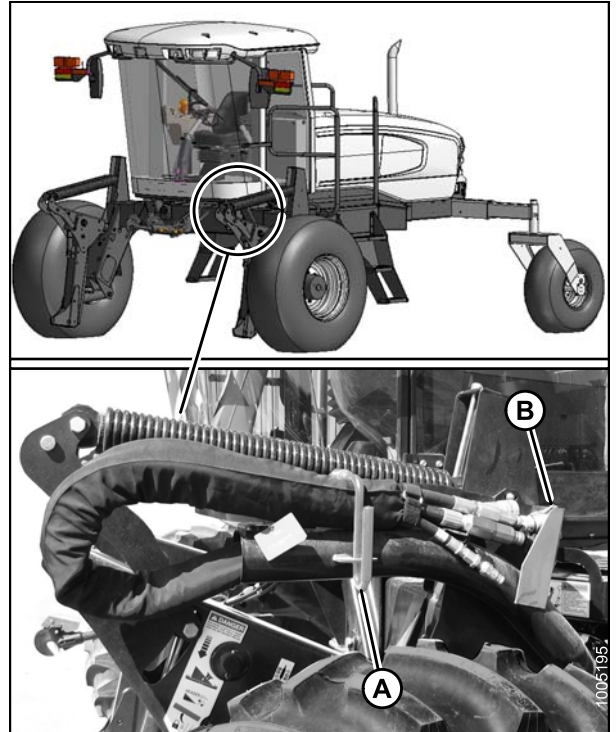


Figure 3.37: Hose Bundle

3. Move hose bundle (A) from the windrower and rest the bundle on the header.

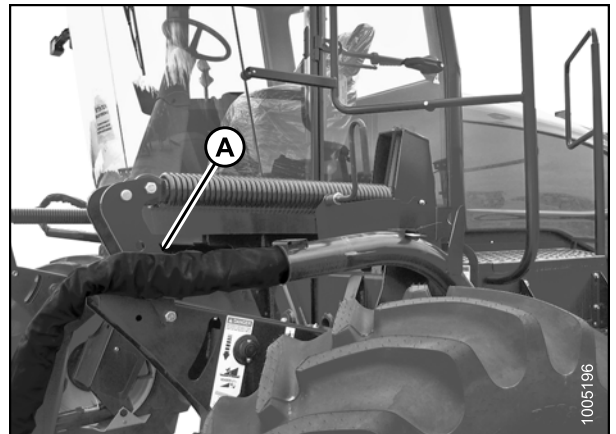


Figure 3.38: Hose Bundle

OPERATION

4. Position the hose support with the lower bolt (A) in the forward hole and the support positioned as shown. Loosen both bolts and adjust as required.

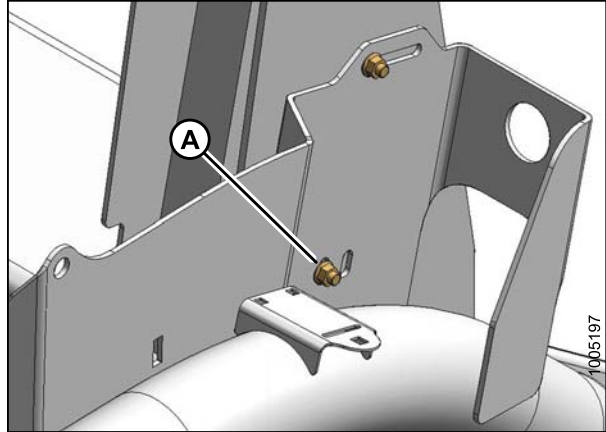


Figure 3.39: Hose Support

5. Route hose bundle (A) from the windrower through the support (B) on header.
6. Route header return and pressure hose bundle (C) through support (B) on header to the windrower.

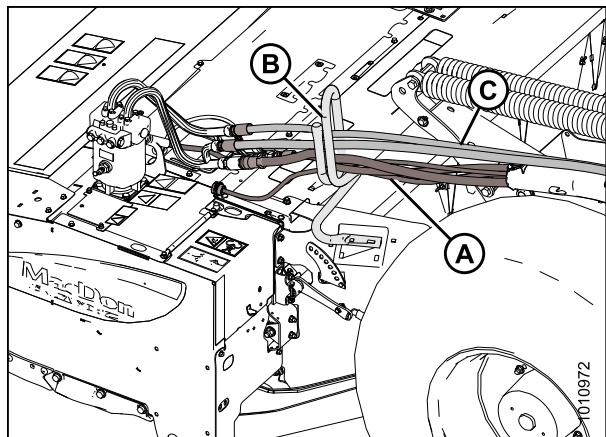


Figure 3.40: Hose Bundle

7. Secure hose bundles with three cinch straps (B).
8. Lower and lock lever (A).

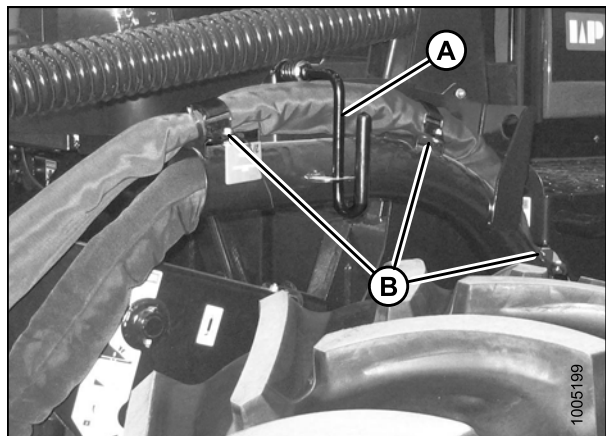


Figure 3.41: Hose Bundle

OPERATION

9. Move the windrower's left-hand side (cab-forward) platform (A) to the OPEN position to access the valve blocks.

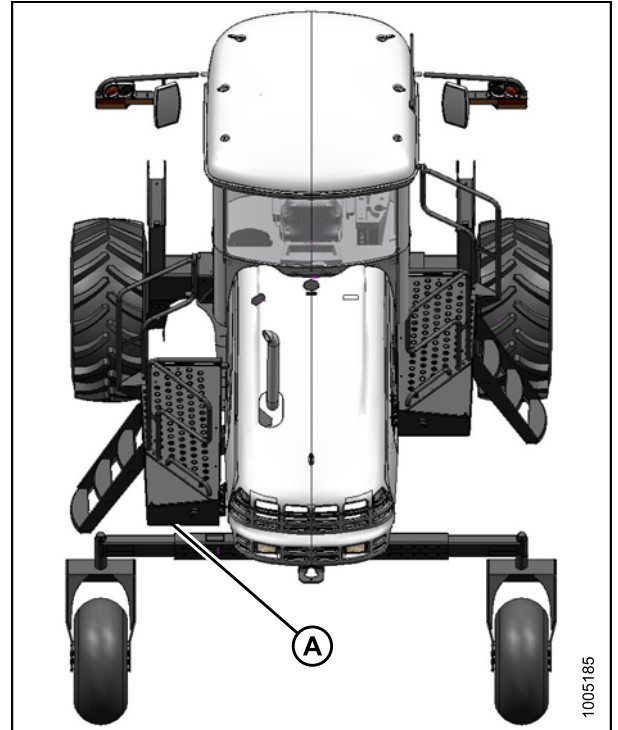


Figure 3.42: Windrower with LH Platform in Open Position

IMPORTANT:

Keep open lines and ports clean.

10. Connect the pressure hose (C) from port (A) on the header motor to port (M2) on the header drive valve block.
11. Connect the return hose (D) coming from port (B) on the header motor to port (R2) on the header drive valve block.

NOTE:

If the windrower is equipped with a reverser valve for an auger header, replace the 90° fitting on hose (D) with a 45° fitting. Refer to Figure 3.46: *M200 Windrower Hose Connections with Reverser*, page 49.

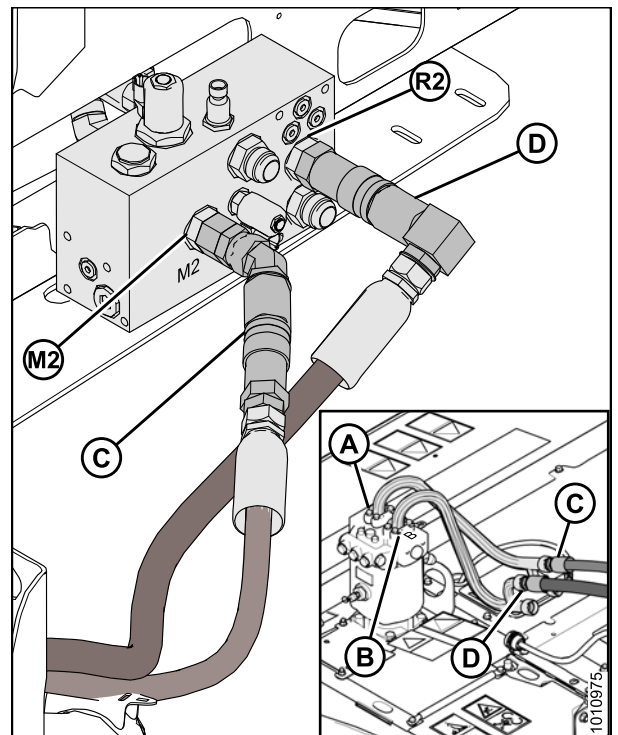


Figure 3.43: Header Hydraulic Connections

OPERATION

12. Connect the return hose (A) from the header drive valve block port (R1) to the steel line attached to motor port (B).

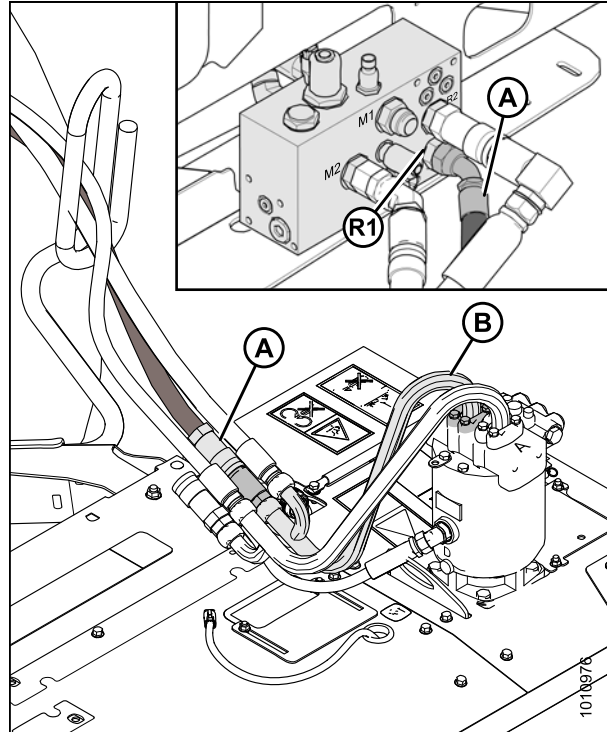


Figure 3.44: Windrower Connections

13. Connect the pressure hose (B) from the header drive valve block port (M1) to the steel line attached to motor port (A).

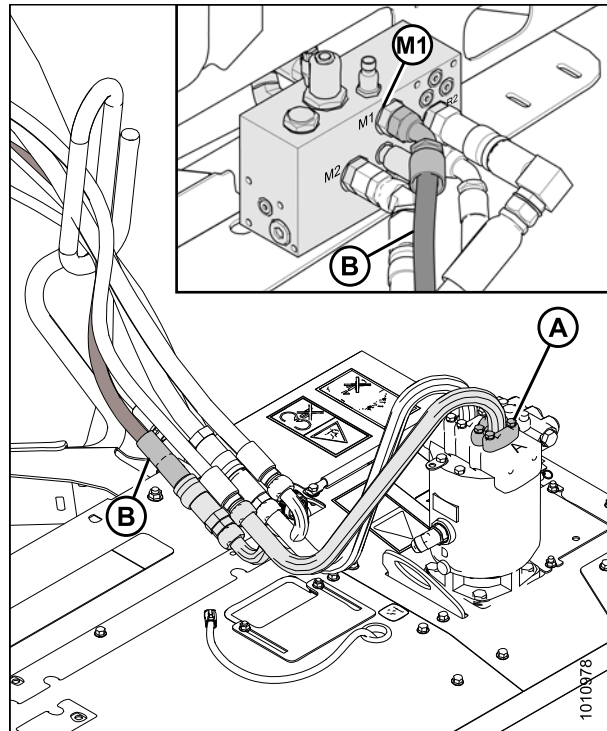


Figure 3.45: Windrower Connections

OPERATION

NOTE:

Final hose configuration shown for an M200 Self-Propelled Windrower equipped with a reverser valve.

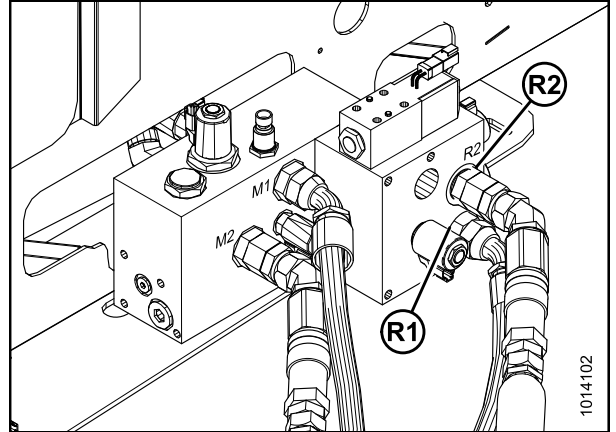


Figure 3.46: M200 Windrower Hose Connections with Reverser

14. Connect the case drain hose (A) from the header lift valve block port (T3) to the hose attached to motor port (D).

NOTE:

Hydraulic pressure lines and hoses hidden to show the case drain hose.

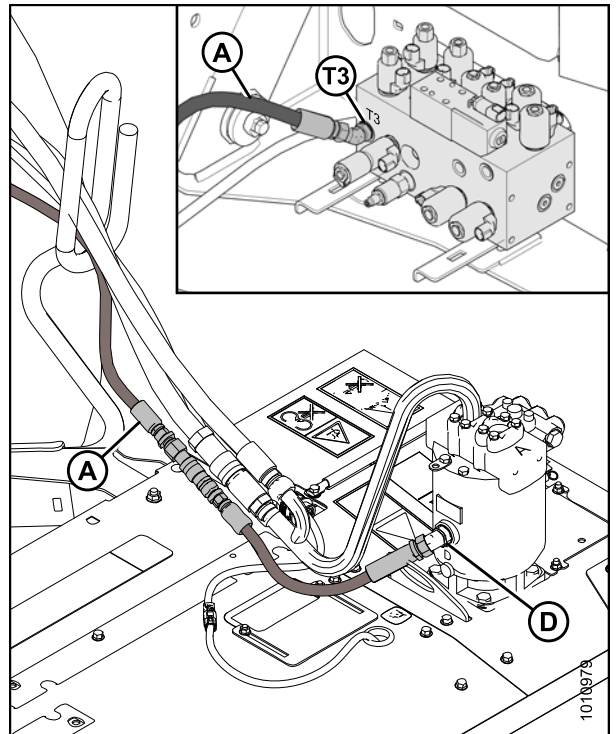


Figure 3.47: Windrower Connections

OPERATION

15. Connect the electrical harness (A) from windrower to the electrical connector on the header.

NOTE:

Hydraulic lines and hoses hidden on illustration to show the electrical connection.

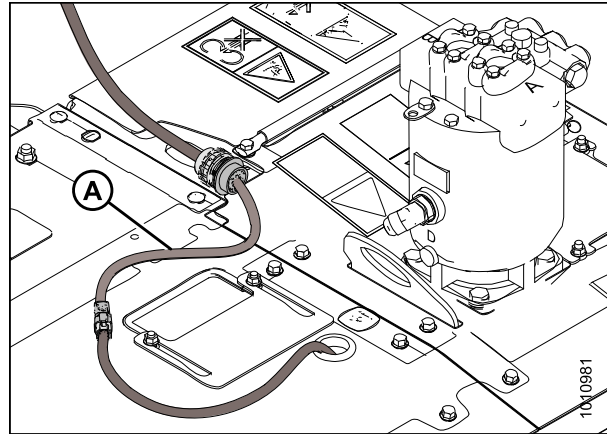


Figure 3.48: Windrower Connections

16. Move platform (A) to the CLOSED position.

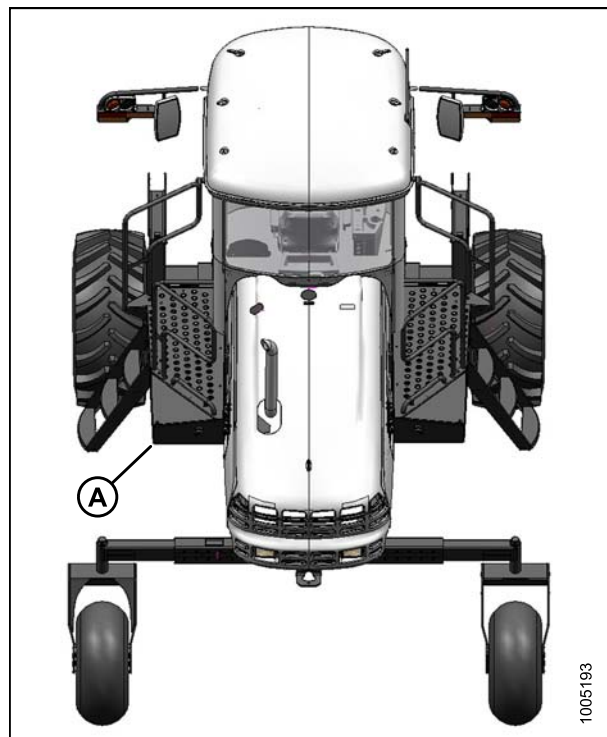


Figure 3.49: Top View of Windrower

3.7.4 Attaching the Header: M150, M155, or M155E4 Windrowers

⚠ 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.

Refer to your windrower operator's manual for procedures to mechanically attach the header to the windrower. Refer to the following procedures for electrical and hydraulic connections.

NOTE:

The M150, M155, and M155E4 Self-Propelled Windrowers require the disc drive manifold kit (MD #B4657) to hydraulically connect the R85 13-foot header.

OPERATION

The R85 13-foot header requires motor/hose kit (MD #B5510) installed to enable operation on an M150, M155, or M155E4 Self-Propelled Windrower.

If required, obtain the kit through your MacDon Dealer. Install kit in accordance with the supplied instructions.

1. Disengage and rotate lever (A) counterclockwise to FULLY UP position.
2. Remove the cap (B) securing the electrical connector to the frame.



Figure 3.50: Hydraulic Drive Kit (MD #B5510)

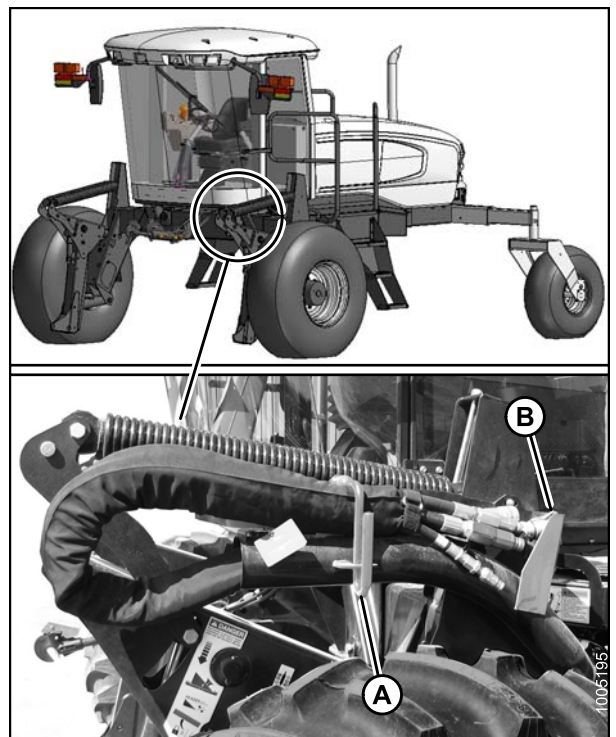


Figure 3.51: Hose Bundle

OPERATION

3. Move hose bundle (A) from the windrower and rest the bundle on the header.

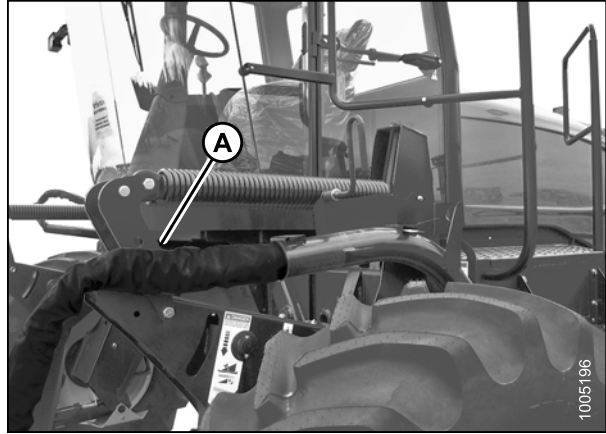


Figure 3.52: Hose Bundle

4. Position the hose support with lower bolt (A) in the forward hole and support positioned as shown. Loosen both bolts and adjust as required.

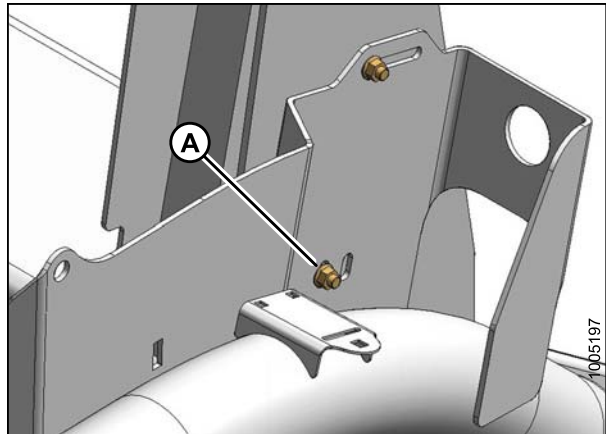


Figure 3.53: Hose Support

OPERATION

5. Move the windrower's left side (cab forward) platform (A) to the OPEN position.

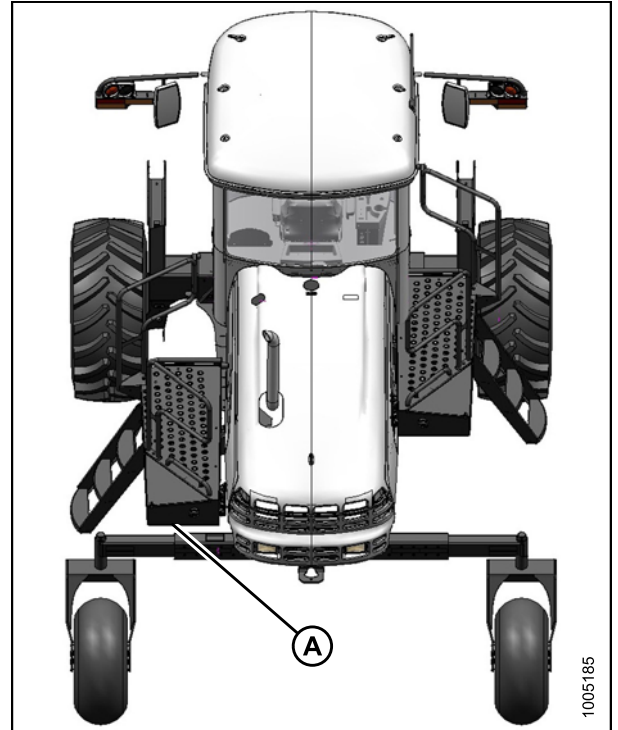


Figure 3.54: Windrower LH Platform in Open Position

6. Route the windrower hose bundle (A) through hose support (B) on the header.
7. Route the hose (C) from the header through support (B) to the windrower.

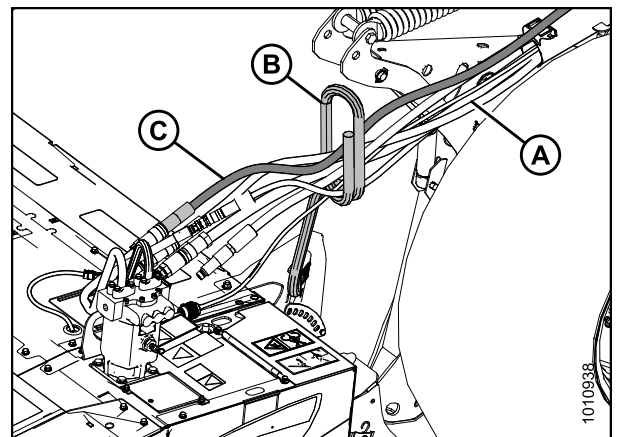


Figure 3.55: Hose Bundle

OPERATION

IMPORTANT:

Keep open lines and ports clean.

8. Connect the single pressure hose (A) routed from the header to port M2 on the disc drive valve (middle block).

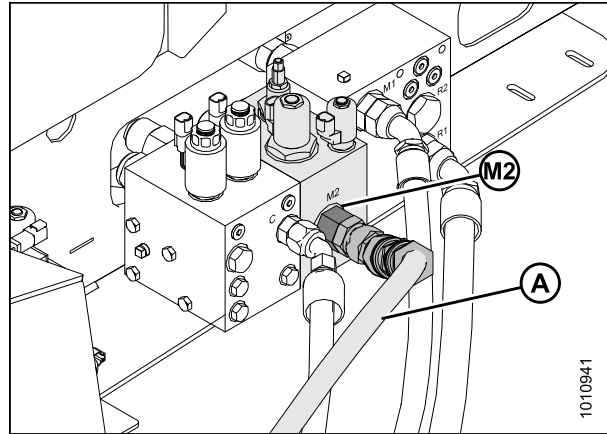


Figure 3.56: Hydraulic Connections

9. Remove caps and plugs on hoses from windrower and lines on header.
10. Connect the pressure hose (B) from the drive manifold port M1 to the steel line attached to motor port (A).

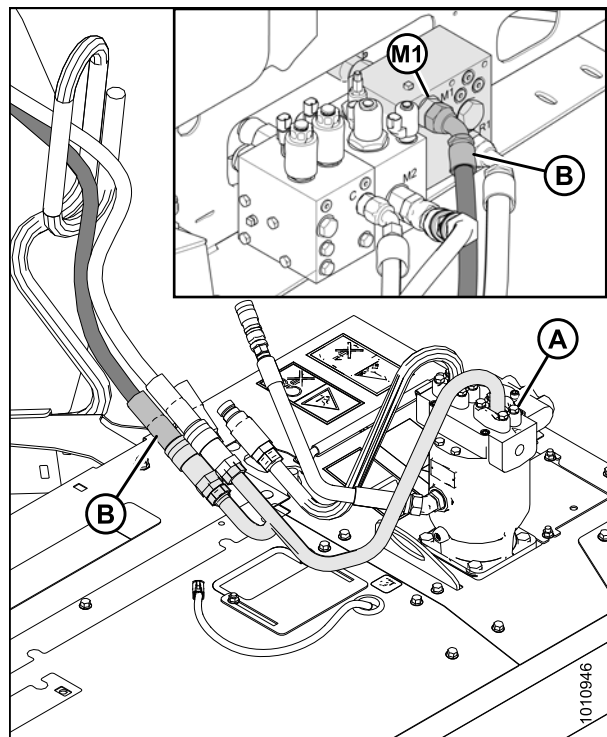


Figure 3.57: Hydraulic Connections

OPERATION

11. Connect the return hose (A) from the drive manifold port R1 to the steel line attached to motor port (B).

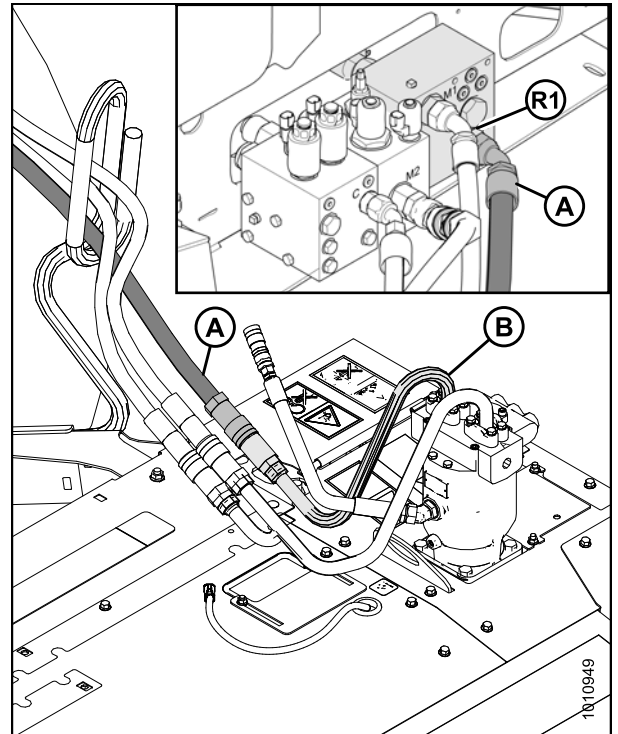


Figure 3.58: Hydraulic Connections

NOTE:

If the windrower is equipped with a reverser valve (A) for an auger header, route the return hose (B) from port R1 on the reverser valve to the steel line attached to motor port (C).

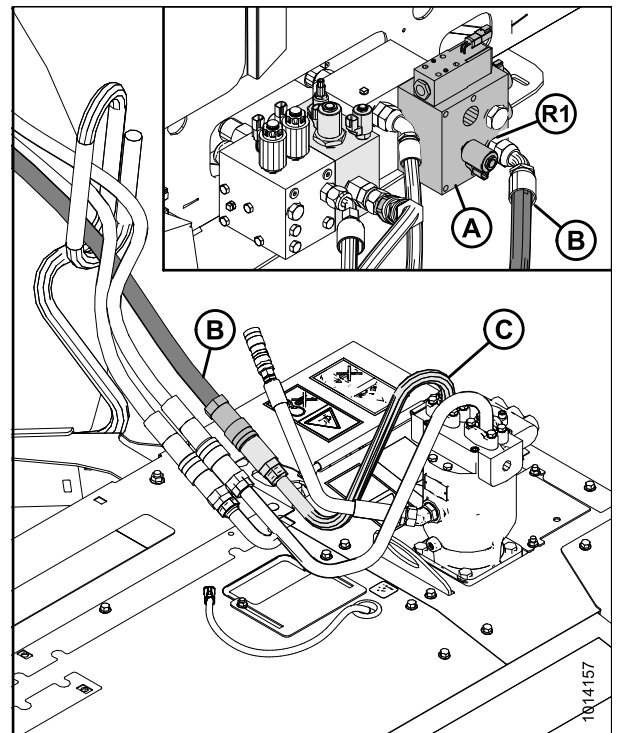


Figure 3.59: Windrower Hose Connections with Reverser

OPERATION

12. Connect the case drain hose (A) from the lift manifold port T3 to the fitting attached to motor port (D).

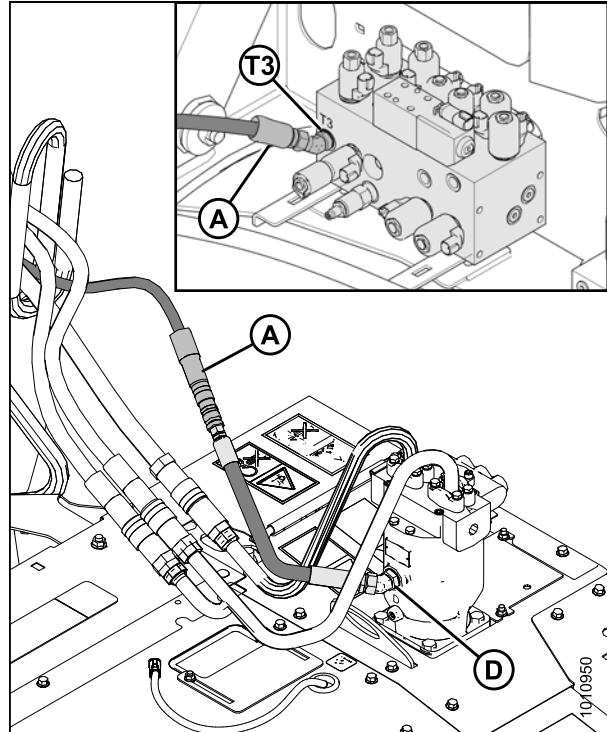


Figure 3.60: Hydraulic Connections

13. Connect the electrical harness (A) from windrower to the electrical connector on the header.

NOTE:

Hydraulic hoses removed from the illustration to improve clarity.

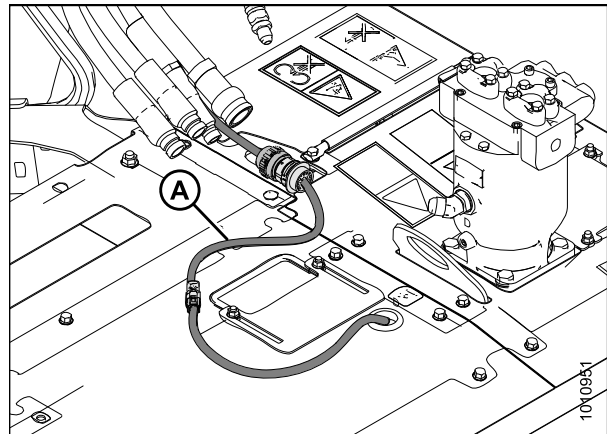


Figure 3.61: Electrical Connection

OPERATION

14. Lower and lock lever (A). Secure hose (B) with three cinch straps (C).

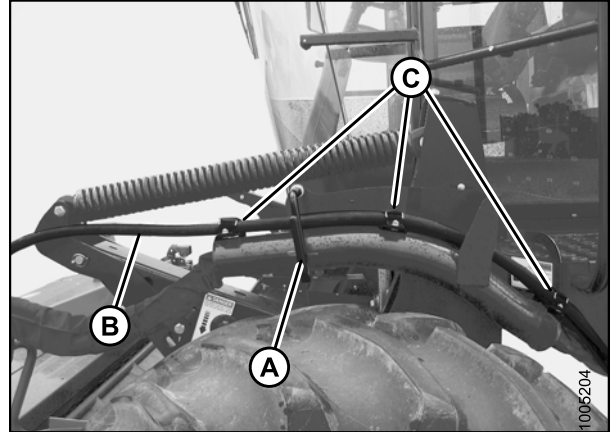


Figure 3.62: Hose Bundle

15. Move platform (A) to the CLOSED position.

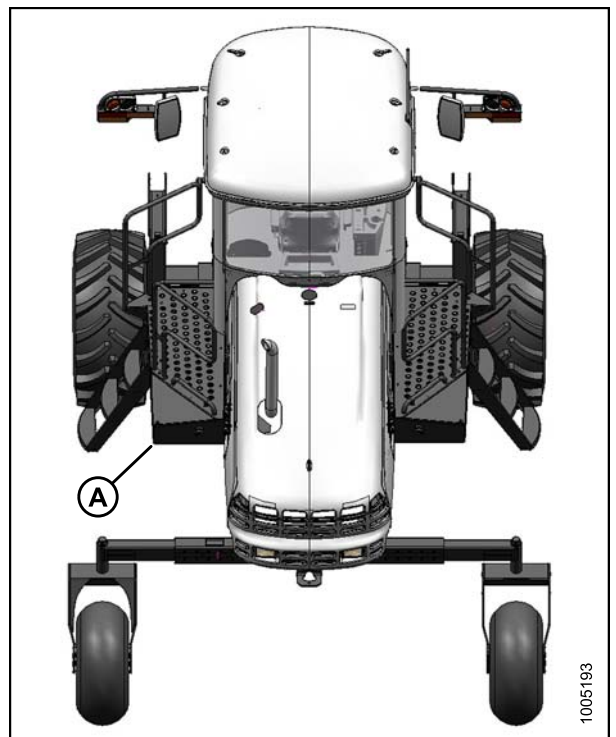


Figure 3.63: Top View of Windrower

3.8 Detaching the Header

3.8.1 Detaching the Header: M205 Windrowers

Refer to your windrower operator's manual for procedure to mechanically detach the header from a windrower. Refer to the following procedure to disconnect electrical and hydraulic systems:

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. Lower header to ground. If ground is soft, place blocks under header.
2. Stop the engine and remove the key.
3. Move the left side (cab-forward) platform (A) to the open position.

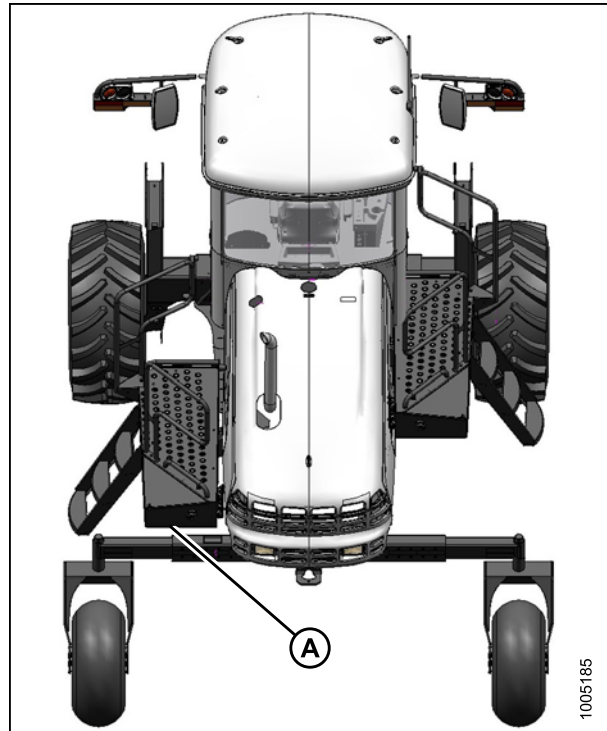


Figure 3.64: Windrower LH Platform

OPERATION

4. Disconnect the electrical harness at connector (A).

NOTE:

Valve block hidden to show the electrical connector.

5. If couplers and coupler lock are installed on lines, proceed as follows. Otherwise, proceed to Step 13., [page 60](#).

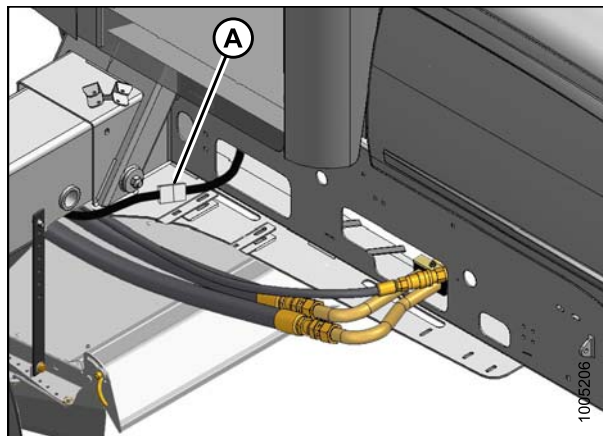


Figure 3.65: Hydraulic Connections

6. Disconnect 12.7 mm (1/2 in.) hose (B) from windrower coupler and remove lynch pin (A).

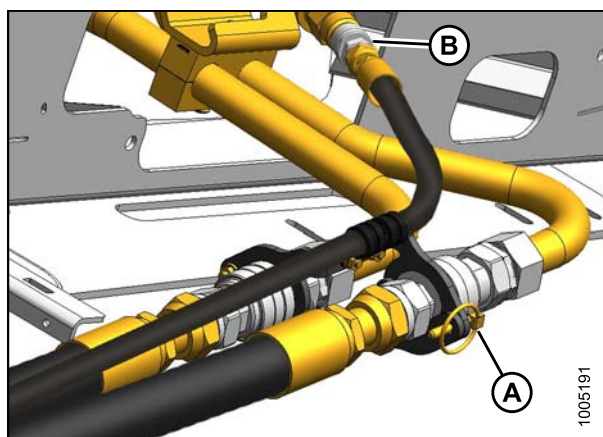


Figure 3.66: Hydraulic Connections

7. Open up coupler lock (A).
8. Remove lock from couplers (B).

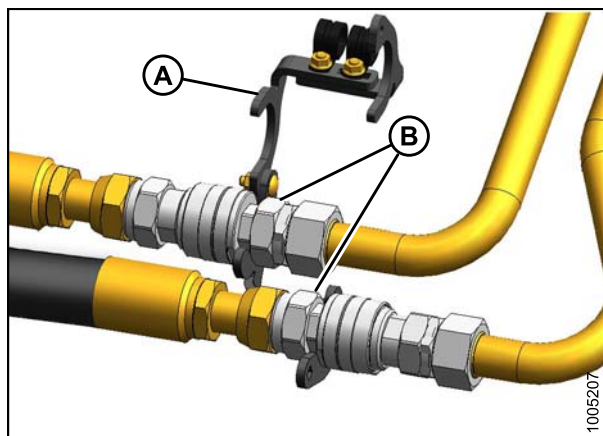


Figure 3.67: Hydraulic Connections

OPERATION

9. Unscrew sleeves (A) on couplers and separate couplers.
10. Install caps and plugs on open lines.

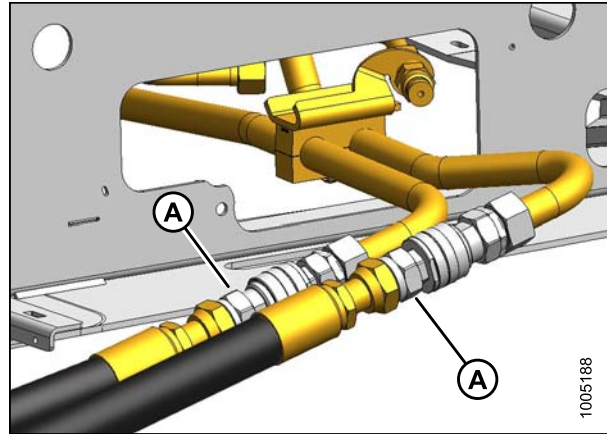


Figure 3.68: Hydraulic Connections

11. Attach coupler lock (B) to hoses and secure with lynch pin (A).
12. Proceed to Step [14.](#), [page 61.](#)

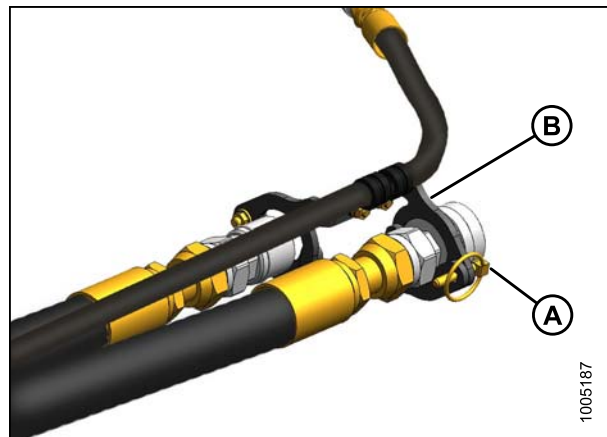


Figure 3.69: Hydraulic Connections

13. Disconnect hoses from lines (A), (B), and (C) on windrower. Install caps and plugs on open lines.

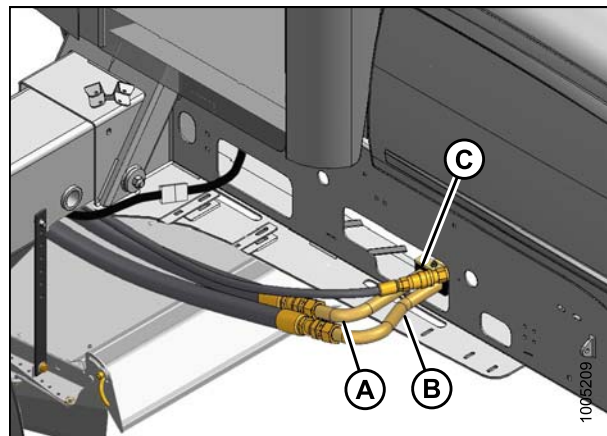


Figure 3.70: Hydraulic Connections

OPERATION

14. Remove hose support (A) from the windrower frame.
15. Route hoses (B) and electrical harness onto the header.

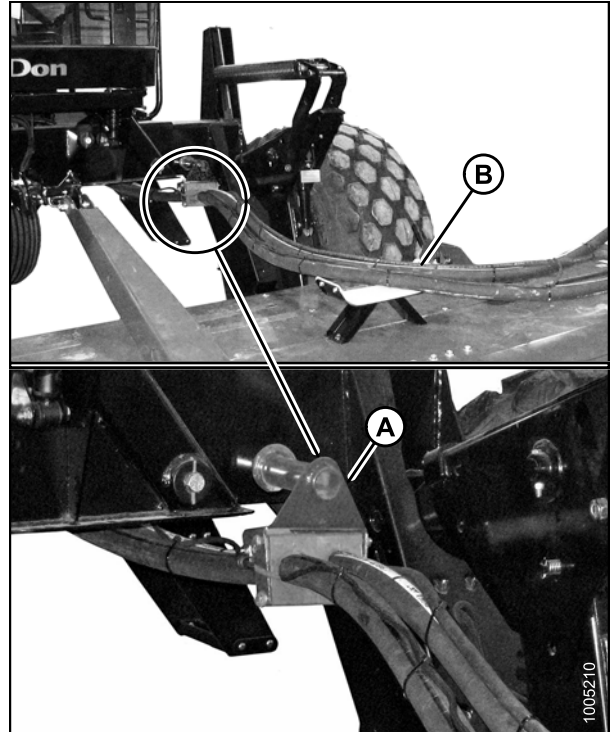


Figure 3.71: Hose Bundle

16. Move maintenance platform (A) to the CLOSED position.
17. Refer to the windrower operator's manual to mechanically detach the header from the windrower.

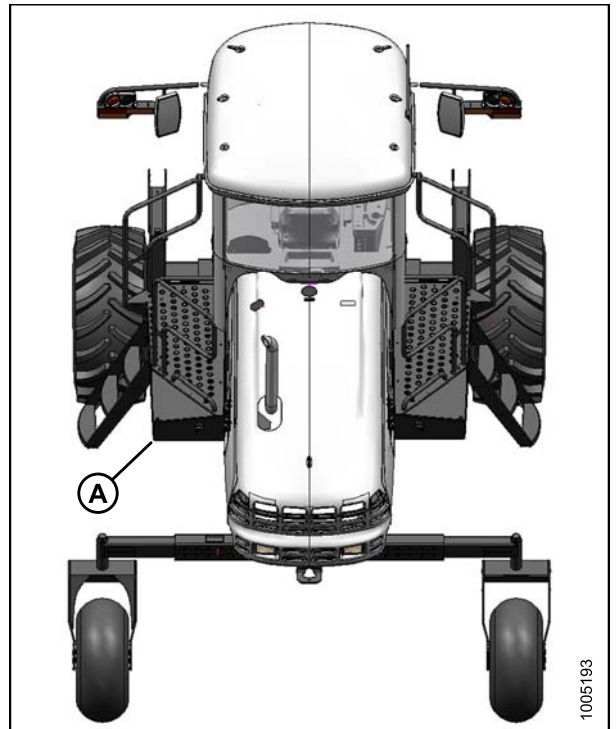


Figure 3.72: Windrower LH Platform

3.8.2 Detaching the Header: M200 Windrowers

Refer to your windrower operator's manual for procedure to mechanically detach the header from a windrower. Refer to the following procedure to disconnect electrical and hydraulic systems:

⚠ 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. Lower the header to ground. If ground is soft, place blocks under header.
2. Stop the engine and remove the key.
3. Move the left side (cab-forward) platform (A) to the open position.

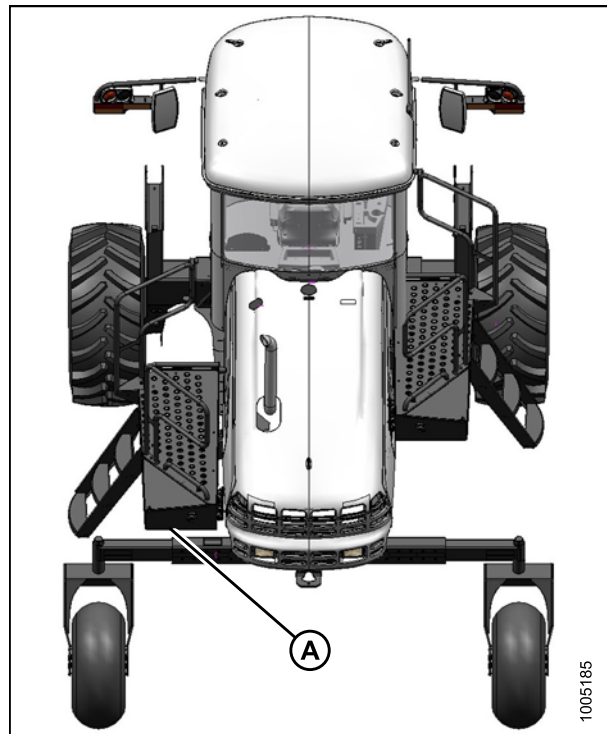


Figure 3.73: Windrower LH Platform

4. Disconnect the pressure hose (A) from port (M2) on the header drive valve block.
5. Disconnect the return hose (B) from port (R2) on the header drive valve block.
6. Install plugs and caps on open windrower lines and header hoses.

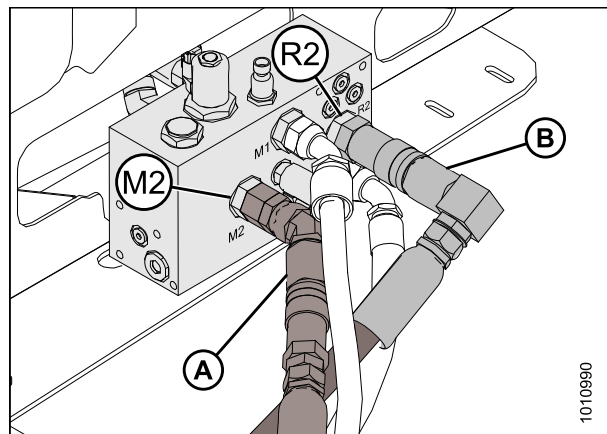


Figure 3.74: Hydraulic Connections

OPERATION

7. Raise and unlock lever (A) and undo the three cinch straps (B).
8. Move hose bundle to store on header.

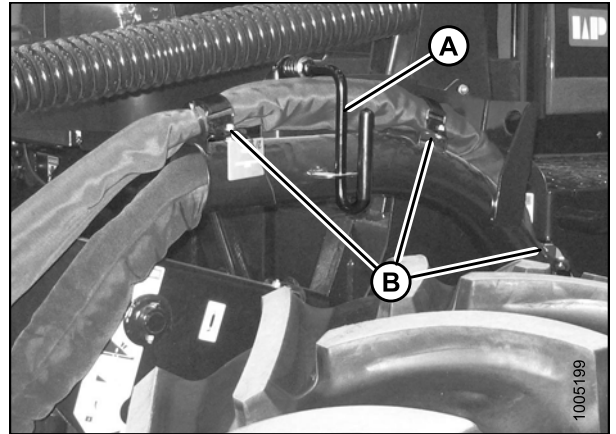


Figure 3.75: Hose Bundle

9. Disconnect the electrical connector (A) at the header by turning the collar counterclockwise and pulling the connector to disengage.

NOTE:

Hydraulic lines and hoses hidden on illustration to show the electrical connection.

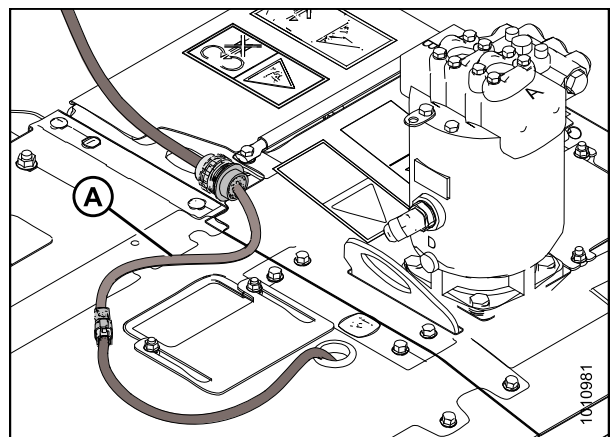


Figure 3.76: Electrical Connection

OPERATION

10. Disconnect the following hoses from the hydraulic motor:

- Pressure hose (A)
- Return hose (B)
- Case drain hose (C)

11. Install caps on the connectors and hose ends (if equipped).

NOTE:

Hydraulic hoses from the header hidden on illustration for clarity.

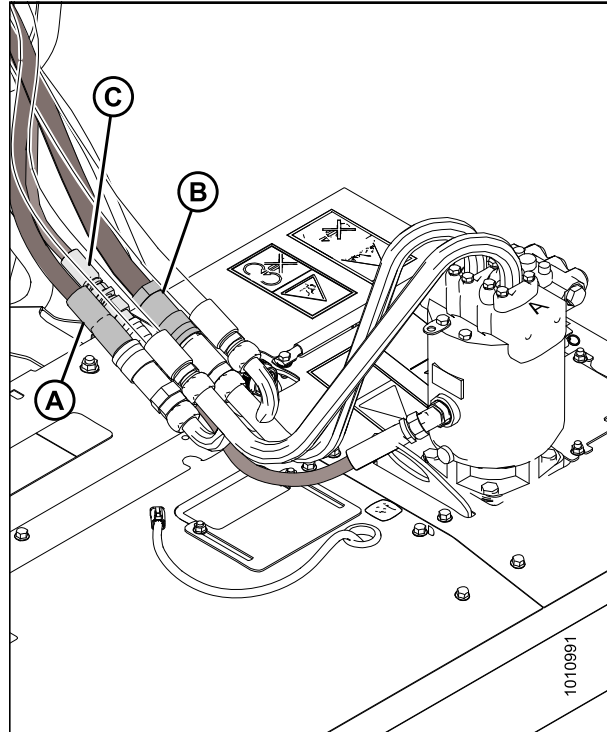


Figure 3.77: Hydraulic Connections

12. Move the hose bundle from header to the left-side (cab forward) hose support (B).

13. Rotate lever (A) clockwise and push to engage bracket.

14. Route the electrical harness through the hose support (B) and attach cap to electrical connector (C).

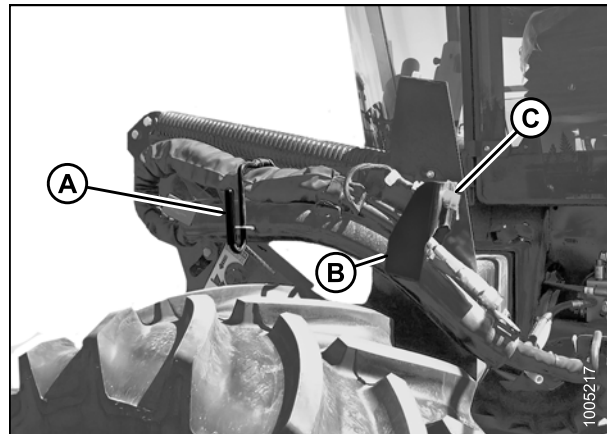


Figure 3.78: Hose Bundle

OPERATION

15. Move the windrower platform (A) back to the CLOSED position.
16. Refer to the windrower operator's manual to mechanically detach header from the windrower.

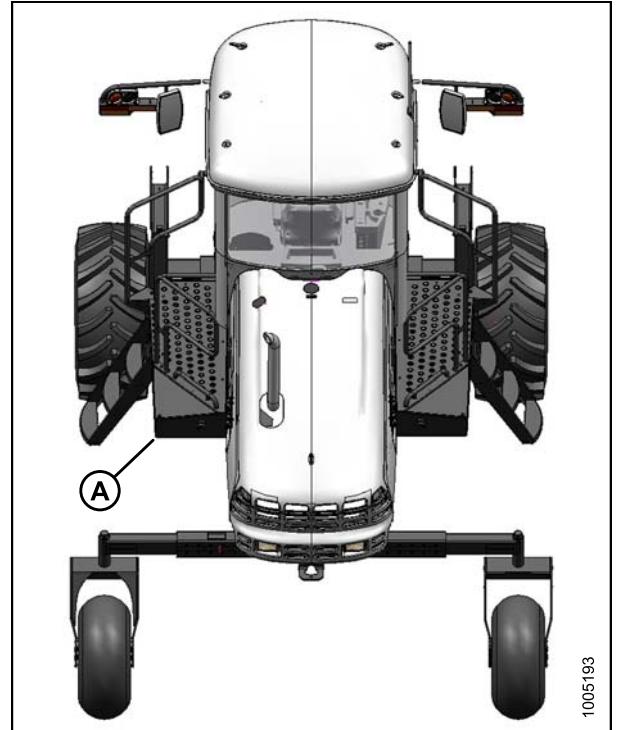


Figure 3.79: Windrower LH Platform

3.8.3 Detaching the Header: M150, M155, or M155E4 Windrowers

Refer to your windrower operator's manual for the procedure to mechanically detach the header from a windrower. Refer to the following procedure to disconnect electrical and hydraulic systems.

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. Lower the header to the ground. If the ground is soft, place blocks under the header.
2. Stop the engine and remove the key.

OPERATION

3. Move the left side (cab-forward) platform (A) to the open position.

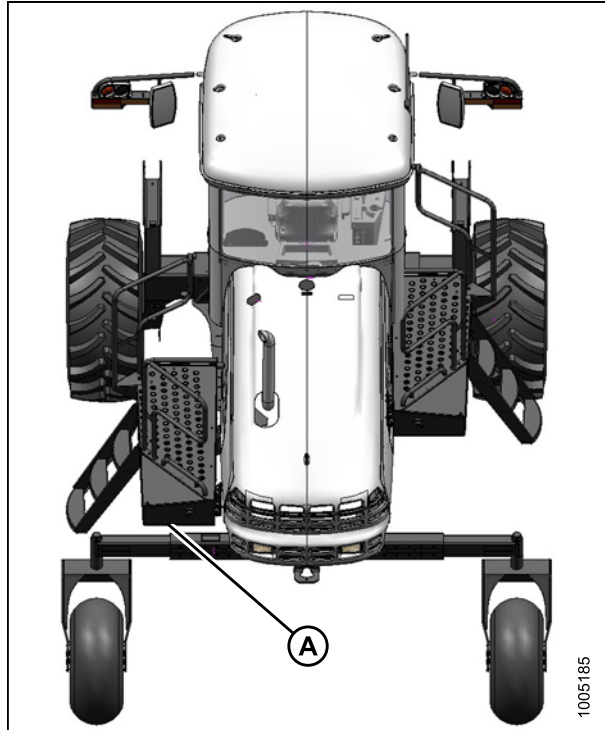


Figure 3.80: Windrower LH Platform

4. Disconnect hose (A) from port (M2) on the disc drive valve.

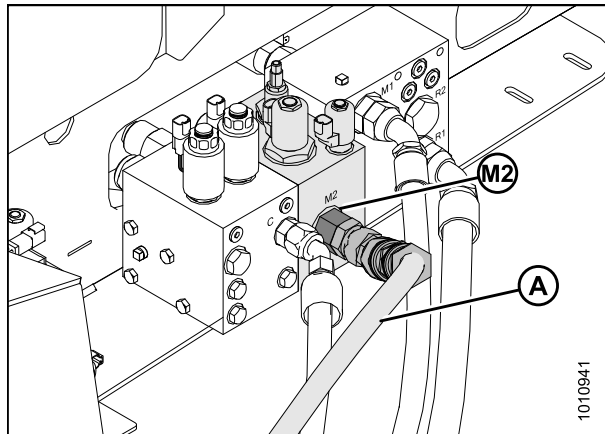


Figure 3.81: Hydraulic Connections

OPERATION

5. Raise lever (A) and undo the three cinch straps (C).
6. Move hose (B) to store on header.

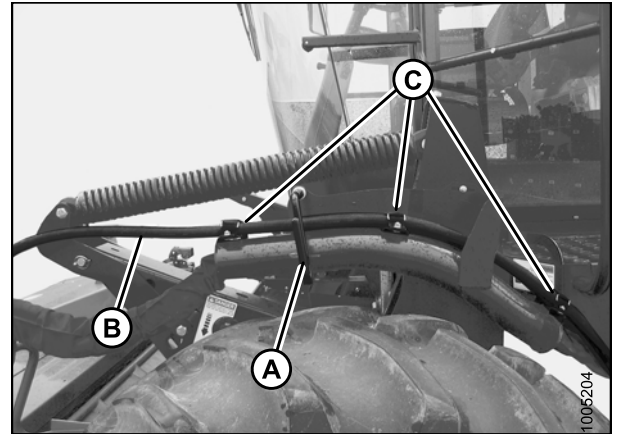


Figure 3.82: Hose Bundle

7. Disconnect the following hoses from the hydraulic motor:
 - Pressure hose (A)
 - Return hose (B)
 - Case drain hose (C)
8. Install caps on the connectors and hose ends (if equipped).

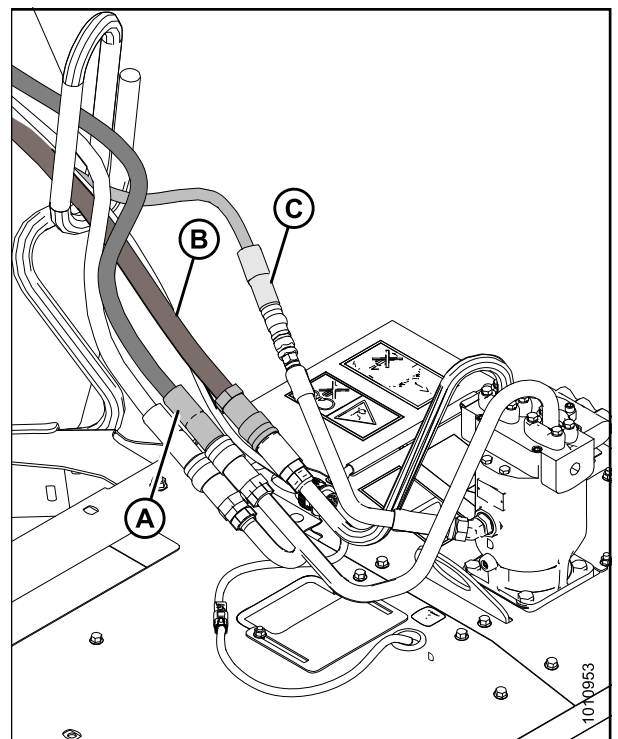


Figure 3.83: Hose Bundle

OPERATION

9. Disconnect the electrical connector (A) by turning the collar counterclockwise and pulling connector to disengage.

NOTE:

Hydraulic lines and hoses hidden on illustration to show the electrical connection.

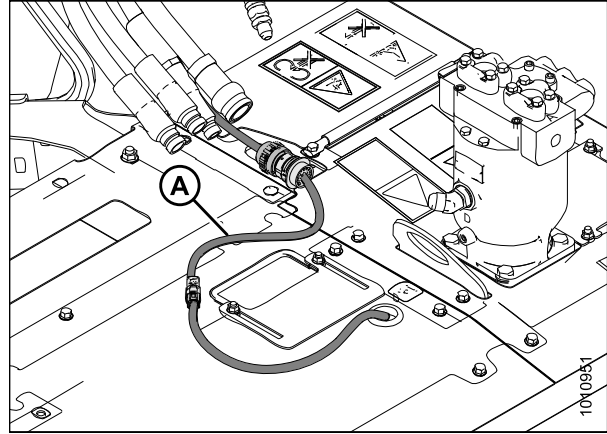


Figure 3.84: Electrical Connection

10. Move the hose bundle from header to the left-side (cab forward) hose support (B).
11. Rotate lever (A) clockwise and push to engage bracket.
12. Route the electrical harness through the hose support (B) and attach cap to electrical connector (C).

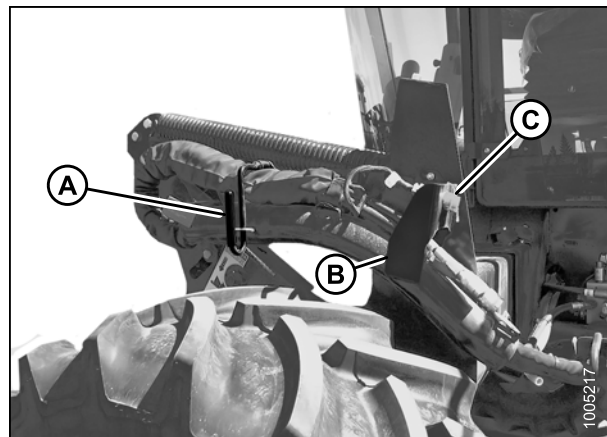


Figure 3.85: Hose Bundle

OPERATION

13. Move the windrower platform (A) to the CLOSED position.
14. Refer to the windrower operator's manual to mechanically detach the header from the windrower.

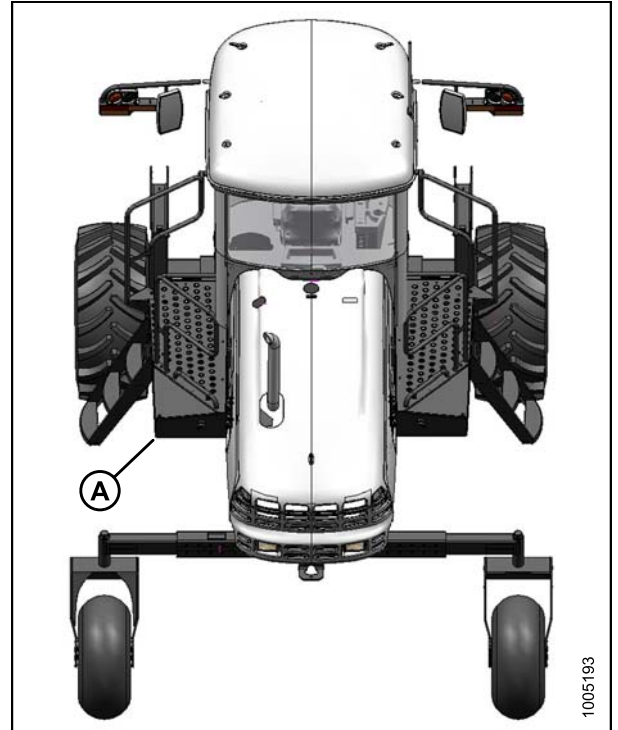


Figure 3.86: Windrower LH Platform

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3.9 Break-In Period

After attaching the header to the windrower for the first time, operate the machine slowly for five minutes, watching and listening from the windrower seat for binding or interfering parts.

NOTE:

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

 **CAUTION**

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

NOTE:

Perform the items specified in [5.3.1 Maintenance Schedule/Record, page 101](#).

3.10 Shutting down the Windrower

CAUTION

Before leaving the windrower seat for any reason:

1. Park on level ground (if possible).
2. Lower the header fully.
3. Place ground speed control in N-DETENT.
4. Stop the engine and remove the key.
5. Wait for all movement to stop.

3.11 Transporting the Header

For information on transporting the header when attached to the windrower, refer to your windrower operator's manual.

IMPORTANT:

For cab-forward road travel the windrower must have the lighting and marking bundle installed (MD #B5412).

4 Operating the Header

Your header will provide the best performance when it is properly adjusted to suit the crop 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 the machine.

The variables listed below and detailed on the following pages will affect the performance of the header. You will quickly become familiar with adjusting the machine to give you the desired results. Most of the adjustments have been set at the factory, but if desired, the settings can be changed to suit crop conditions.

Table 4.1 Header Adjustment Procedures

Variable	Refer to
Header float	4.1 Header Float, page 73
Roll gap	4.2 Roll Gap, page 75
Roll tension	4.3 Roll Tension, page 78
Roll timing	4.4 Roll Timing, page 79
Forming shields	4.5 Forming Shields, page 81
Header angle	4.6 Header Angle, page 85
Cutting height	4.7 Cutting Height, page 86
Ground speed	4.9 Ground Speed, page 88
Double windrowing	4.10 Double Windrowing, page 89

4.1 Header Float

Header float springs are normally set so 422–467 N (95–105 lbf) of force is required to lift the header at either end.

In rough or stony conditions, it may be desirable to maintain a lighter setting to protect cutting components.

When float setting is light, it may be necessary to use a slower ground speed to avoid excessive bouncing resulting in a ragged cut. Faster ground speeds may require additional ground pressure.

Up to three—user defined—float positions can be stored in the windrower's control system. For information on setting float, refer to the Float Options topic in the windrower operator's manual.

4.1.1 Checking Float

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. Lower the header until lift cylinders are fully retracted.
2. Stop the engine and remove the key.
3. Grasp the front corner of the header and lift. The force to lift should be 426–471 N (95–105 lbf) and should be approximately the same at both ends. If adjustment is required, refer to [4.1.2 Adjusting Float, page 74](#).

4.1.2 Adjusting Float

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.

Set the float fine adjustment to **MID-RANGE** with the windrower float adjustment system in the cab (refer to your windrower operator's manual).

Check the float by grasping the front corner of the header and lifting. The force to lift should be 426–471 N (95–105 lbf) and should be approximately the same at both ends.

If adjustment is required, follow these steps:

1. Raise the header fully
2. Stop the engine and remove the key.
3. Turn drawbolt (A):
 - a. Clockwise to **INCREASE** float (makes header lighter).
 - b. Counterclockwise to **DECREASE** float (makes header heavier).
4. Recheck the float.



Figure 4.1: Windrower Lift Linkage

4.2 Roll Gap

Steel rolls condition the crop by crimping and crushing the stem in several places. This allows moisture release for quicker drying. The degree to which the crop is conditioned as it passes through the rolls is controlled by roll gap, which is factory set at 13 mm (1/2 in.).

Correct conditioning of alfalfa, clover, and other legumes is usually indicated when 90% of the stems show cracking, but no more than 5% of the leaves are damaged. Set enough roll gap to achieve this result.

A larger gap (up to 25.4 mm [1 in.]) may be desirable in thick stemmed cane-type crops. However, too large a gap may cause feeding problems. Grass type crops may require less gap for proper feeding and conditioning.

IMPORTANT:

If settings below the factory setting are used, it is recommended that the actual gap be visually checked.

4.2.1 Checking Roll Gap

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).
4. Loosen bolts (B) that secure conditioner shield (A).
5. Remove the conditioner shield (A) by sliding it up.

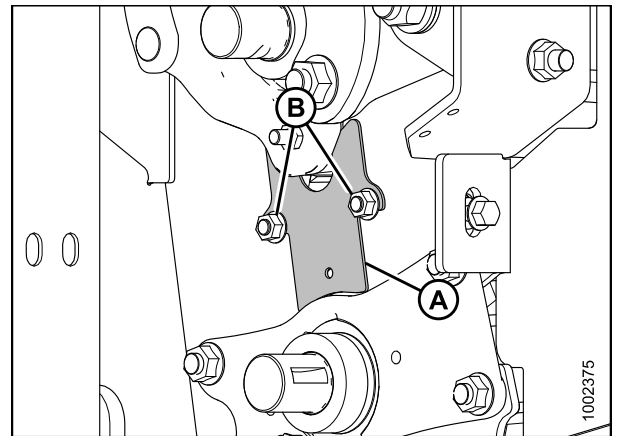


Figure 4.2: Conditioner Shield

OPERATING THE HEADER

- Center the upper roll bar (B) between two lower roll bars.
- Inspect roll gap at both ends of the rolls. Gap (C) should be 12.7 mm (0.5 in.).

NOTE:

Factory setting is 12.7 mm (1/2 in.). A gap of 16 mm (5/8 in.) is strongly recommended for heavier crop conditions.

IMPORTANT:

Roll timing is critical when the roll gap is decreased because the bars may contact each other if the timing is wrong.

- To check roll timing, refer to [4.4 Roll Timing, page 79](#).
- Reinstall the conditioner shield (A) and secure with bolts (B).
- Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

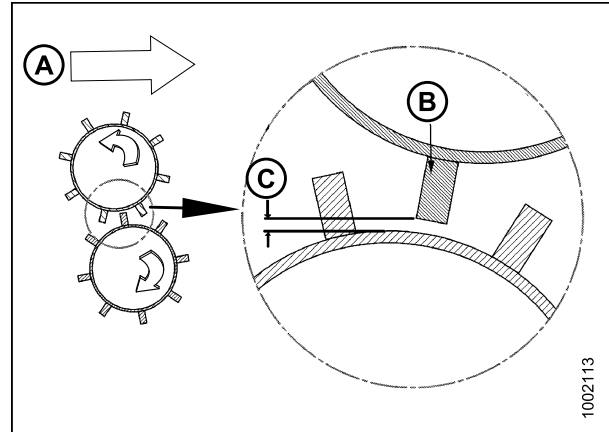


Figure 4.3: Conditioner Roll Gap (Roll Spacing Not to Scale)

A - Direction of Crop Flow B - Center Roll Bars
C - Roll Gap

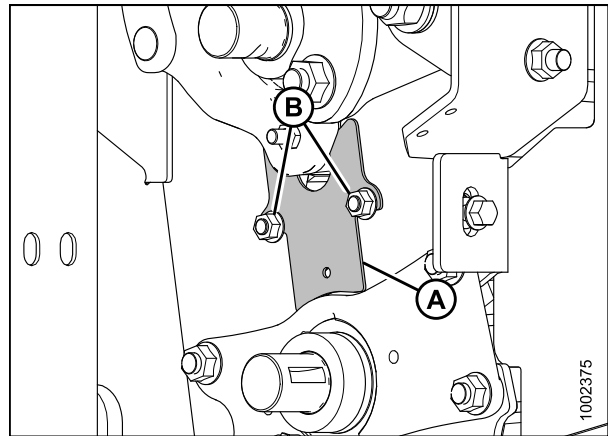


Figure 4.4: Conditioner Shield

4.2.2 Adjusting Roll Gap

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.

- Lower the header fully.
- Stop the engine and remove the key.
- Open the driveshield. Refer to [3.4 Driveshields, page 28](#).

OPERATING THE HEADER

4. Loosen upper jam nut (A) on both sides of conditioner.
5. To increase roll gap (increase conditioning action), turn lower nut (B) clockwise.
6. To decrease roll gap (reduce conditioning action), turn lower nut (B) counterclockwise.
7. Measurement at (C) should be 25.4 mm (1 in.). This equates to 12.7 mm (0.5 in.) of roll gap.
8. Once adjustment is complete, hold nut (B) and torque jam nut (A) to 102 N·m (75 ft·lbf).

NOTE:

When adjusting roll gap, be sure that the thread protruding at the adjustment is the same on both ends of the conditioner rolls. This will achieve consistent intermesh across the rolls.

9. Check the roll gap. Refer to [4.2.1 Checking Roll Gap, page 75](#).

IMPORTANT:

Roll timing is critical when the roll gap is decreased because the bars may contact each other if the timing is wrong.

10. Check the timing. Refer to [4.4 Roll Timing, page 79](#).
11. Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

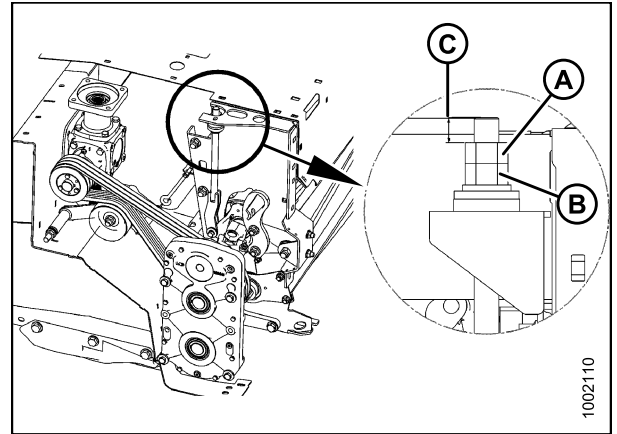


Figure 4.5: Roll Gap Adjustment Bolt

4.3 Roll Tension

Roll tension (the force holding the rolls together) is factory set with a spring type adjustable linkage.

The roll tension factory setting is the spring fully tensioned.

Heavy crops or tough forage tend to separate the rolls and require more tension to ensure material is sufficiently crimped. Light alfalfa and short grasses require less tension to minimize over-conditioning.

4.3.1 Adjusting Roll Tension

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).
4. To decrease the roll tension, turn the spring drawbolts counterclockwise to loosen the springs.
5. To increase the roll tension, loosen jam nut (A) and turn the spring drawbolt (B) clockwise to tighten the spring at each end of the roll. Spring is fully tensioned at the factory.

IMPORTANT:

Turn each bolt equal amounts. Each turn of the bolt changes the roll tension by approximately 44.5 N (10 lbf).

6. Tighten jam nut (A) against casting after adjusting tension.
7. Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

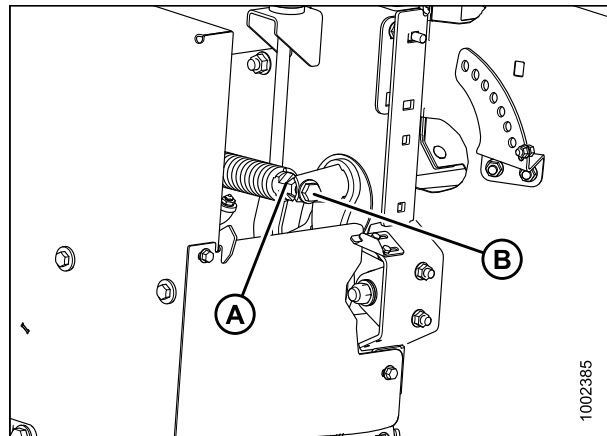


Figure 4.6: Spring Tension (LH Side)

4.4 Roll Timing

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

IMPORTANT:

Roll timing is especially critical when roll gap is decreased because the bars can contact each other if the timing is wrong.

4.4.1 Checking Roll Timing

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).
4. Loosen nuts (B) and slide conditioner shield (A) up to remove.

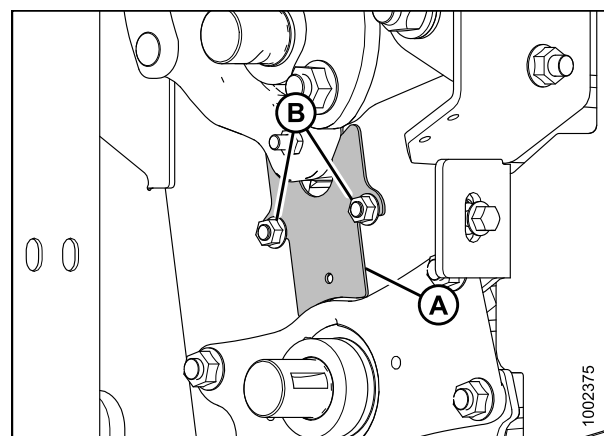


Figure 4.7: Conditioner Shield

5. Measure the roll timing distance (B) at each end of the rolls. Each steel bar on one roll should be centered between two bars of the other roll so that the distance (B) is approximately equal on both sides of the bar.
6. If adjustment is required, refer to [4.4.2 Adjusting Roll Timing, page 80](#).

NOTE:

Roll spacing not to scale in illustration.

7. Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

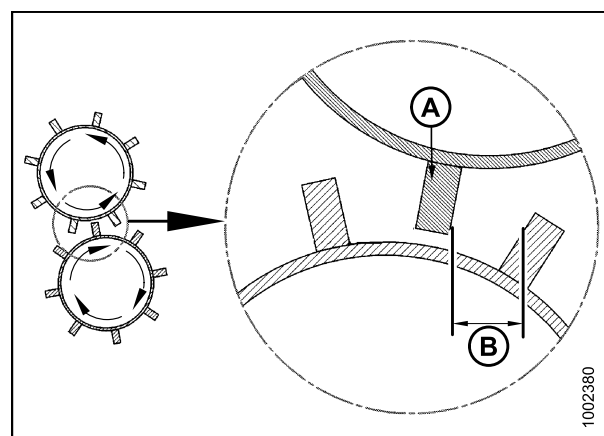


Figure 4.8: Conditioner Roll Timing

A - Center Roll Bars

B - Roll Timing Distance

4.4.2 Adjusting Roll Timing

Follow these steps to adjust the roll timing (if necessary):

1. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).
4. Loosen four bolts (A) in slots of yoke plate (B) on upper roll universal shaft.
5. Manually rotate upper roll until it stops. Make a mark on yoke flange to align with the center of one of the bolt heads (A).
6. Manually rotate upper roll in opposite direction until it stops. Make a second mark on yoke flange to align with the bolt.
7. Determine the center between the two marks, and mark a third line on the yoke flange.
8. Rotate the upper roll until the bolt lines-up with the third line.
9. Tighten bolts (A) to secure the position. Torque to 95 N·m (70 ft·lbf).

NOTE:

For additional conditioning action in lighter or thin stem crops, the distance between the conditioner roll bars can be adjusted (advanced timing).

10. Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

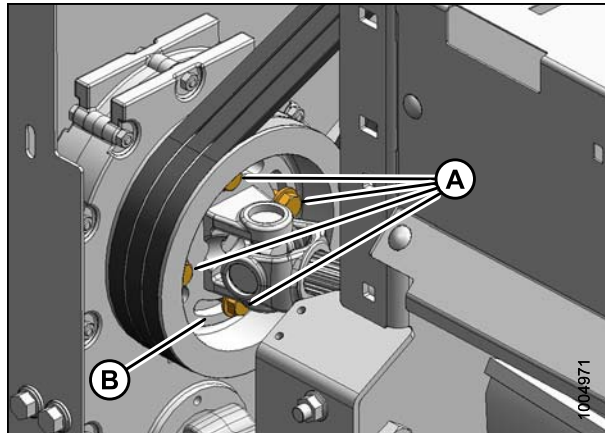


Figure 4.9: Yolk Plate (Upper Roll)

4.5 Forming Shields

WARNING

Keep hands and feet away from discharge opening. Keep everyone several hundred feet away from your operation. Never direct the discharge toward anyone. Stones or other foreign objects can be ejected with force.

The position of the forming shields controls the width and placement of the windrow. The decision on forming shield position should be based on the following factors:

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

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 [4.13 Haying, page 94](#).

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

4.5.1 Adjusting the Side Deflectors

The position of the side deflectors controls the width and placement of the windrow.

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. Set forming shield side deflectors (A) to desired width by repositioning adjuster bars (B) in holes in forming shield cover. To ensure windrow placement is centered, adjust both side deflectors to the same position.

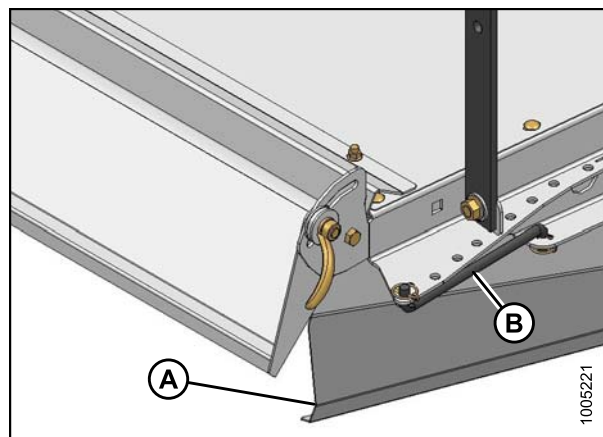


Figure 4.10: Forming Shield

OPERATING THE HEADER

2. If side deflector attachment is too tight or too loose, tighten or loosen nut (A) as required.

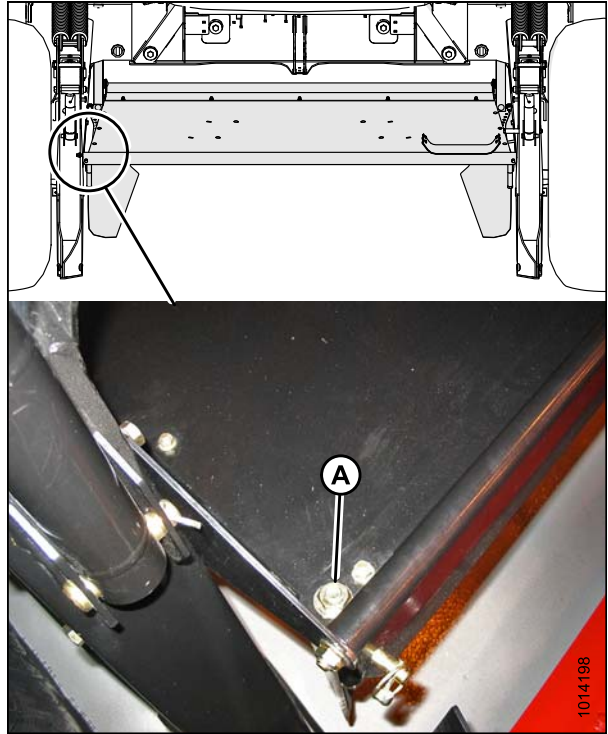


Figure 4.11: Forming Shield

4.5.2 Adjusting the Rear Deflector (Fluffer Shield)

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.

The rear deflector (fluffer shield) slows the crop exiting the conditioner rolls, directs the flow downward, and fluffs the material.

1. For more crop control in light material, lower the deflector (A) by pushing down on one side of the deflector and then on the other side.

NOTE:

Locking handles (B) are located at both ends of the deflector and may be loosened slightly.

2. For heavier crops, raise the deflector by pulling up on one side and then on the other side.

NOTE:

For even windrow formation, be sure the deflector (A) is not twisted.

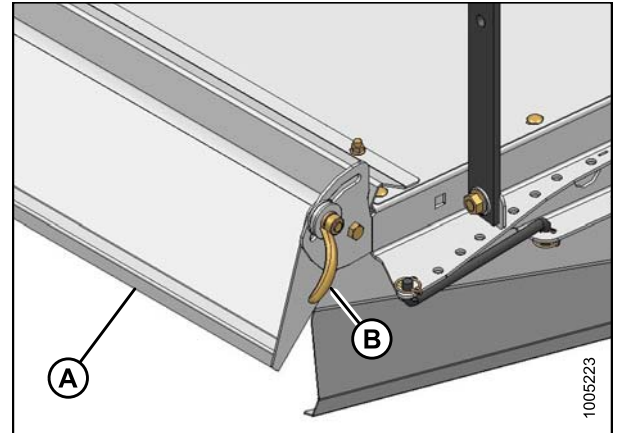


Figure 4.12: Forming Shield

3. Tighten handles (B) to secure deflector position.

4.5.3 Adjusting the Swath Baffle

The swath baffle determines the width and height of the windrow.

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.

OPERATING THE HEADER

The swath baffle (A) is located immediately behind and above the conditioning rolls and can be positioned to:

- Direct the crop flow into the forming shield for narrow and moderate width windrows
 - Direct crop downward to form a wide swath
1. Remove lynch pin from pin (B) and remove pin from lever (C).
 2. Move lever to middle hole in bracket and reinstall pin (B) through lever and bracket.
 3. Secure with lynch pin.

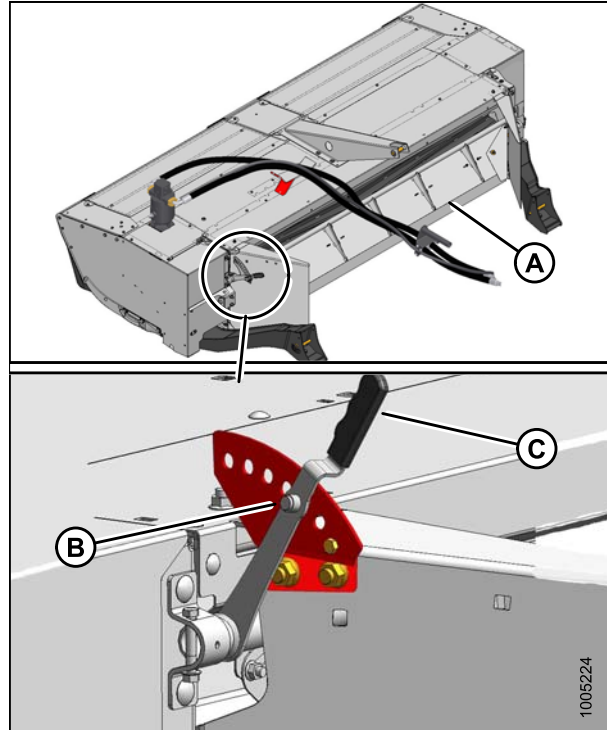


Figure 4.13: Swath Baffle Lever

NOTE:

Swath baffle position may need to be adjusted for proper pin engagement. Loosen bolts (A) and adjust bracket (B) and baffle as required. Tighten bolts (A).

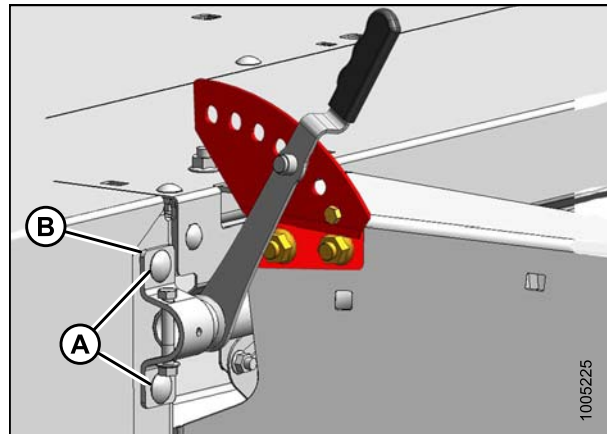


Figure 4.14: Swath Baffle Lever

4.6 Header Angle

Header (or cutterbar) angle can be varied from 0–8° below horizontal. Choose an angle that maximizes performance for your crop and field conditions. A flatter angle provides better clearance in stony conditions while a steeper angle provides better lifting action in down crops.

The header angle may be hydraulically adjusted from the windrower cab using the hydraulic cylinder (A)—if equipped—without shutting down the windrower.

Refer to your windrower operator's manual.

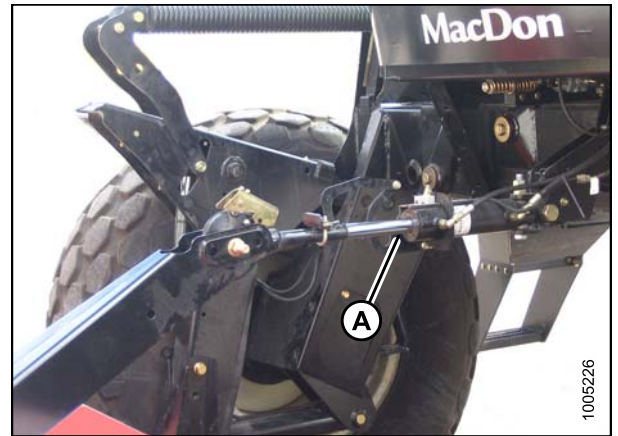


Figure 4.15: Hydraulic Center-Link

4.7 Cutting Height

Cutting height is determined by a combination of the angle of the cutterbar/header and the optional skid shoe settings if installed. Cutting height should be adjusted for optimum cutting performance without excessive mud build-up inside the header that can lead to poor crop flow and increased wear on cutting components. Choose an angle that maximizes performance for your crop and field conditions. Refer to [4.6 Header Angle, page 85](#).

Optional adjustable skid shoes are also available to provide different cutting heights. Refer to:

- [6.1 Options and Attachments: Kits, page 149](#)
- [4.7.1 Adjusting the Skid Shoe Height, page 86](#)

Lowering the skid shoes or decreasing header angle increases the cutting height. This may reduce damage to cutting components in stony conditions. Also, a longer stubble length helps material dry faster.

Raising the skid shoes and increasing header angle allows the crop to be cut lower.

To minimize damage to cutterbar components, scooping soil, or soil build-up at the cutterbar in damp conditions, set header float as light as possible without excessive bouncing.

A light float setting may require reduced ground speeds to avoid excess bouncing and a ragged cut.

4.7.1 Adjusting the Skid Shoe Height

DANGER

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

1. Raise header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
4. Remove bolts (A).
5. Raise or lower skid shoe (B).
6. Reinstall bolts (A).
7. Repeat for skid shoe at opposite end of header.
8. Check header float as described in [4.1 Header Float, page 73](#).
9. Adjust header angle to desired working position using the machine's header angle controls. If angle is not critical, set it to mid-position. Refer to [4.6 Header Angle, page 85](#).

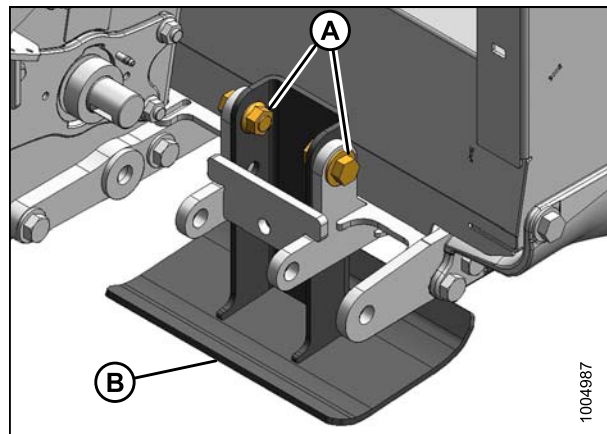


Figure 4.16: Skid Shoe

4.8 Disc Speed

The disc header can be used to cut a variety of crops.

For the best cutting results, a range of disc speeds is recommended for each type of crop and condition. Refer to table below.

Table 4.2 Disc Speed Recommendations

Crop	Condition	Disc rpm
Alfalfa	Heavy	2300–2500
	Light	1600–2000
Sudan, Sorghum, Haygrazer, Timothy	Tall and stemmy	2300–2500
Short grass	Dense	2500
	Thin	1800–2000

Disc speeds are set and adjusted from the cab using system controls, without shutting down the windrower.

Refer to your windrower operator's manual.

4.9 Ground Speed

CAUTION

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

Choose a ground speed that allows the cutterbar and conditioner to cut the crop smoothly and evenly. Try different combinations of header speed and ground speed to suit your specific crop.

Refer to your windrower operator's manual for changing ground speed.

In tough cutting conditions, such as native grasses, the disc speed will need to be increased.

In light crops, the header speed can be reduced while maintaining ground speed.

NOTE:

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

The chart below indicates the relationship between ground speed and area cut for a 13-foot header.

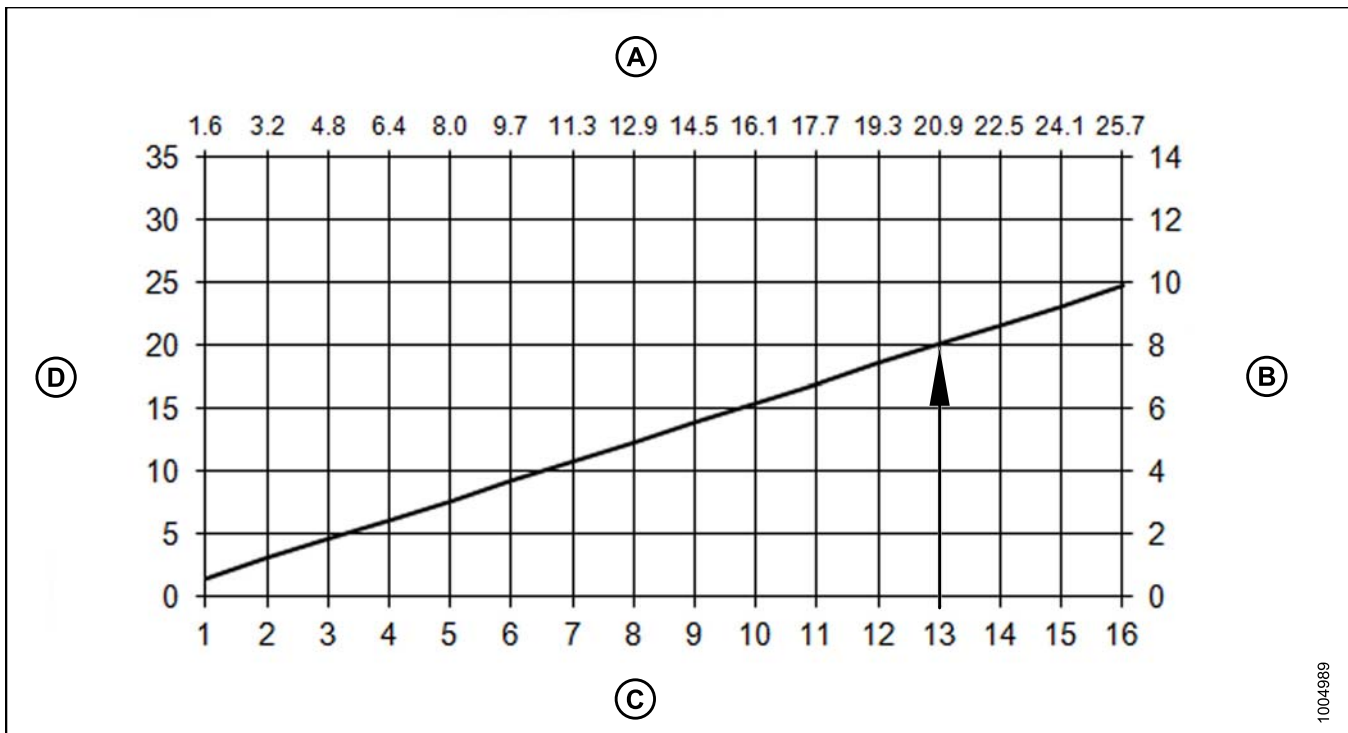


Figure 4.17: Ground Speed Chart

A - Kilometers/Hour

B - Hectares/Hour

C - Miles/Hour

D - Acres/Hour

Example: at a ground speed of 21 km/h (13 mph) a 13-foot header would cut approximately 20 acres (8 hectares) per hour.

4.10 Double Windrowing

If your windrower is equipped with the Double Windrow Attachment (DWA [A]), refer to the MacDon DWA Manual for operating and maintenance instructions.

The manual is shipped with the DWA Kit.

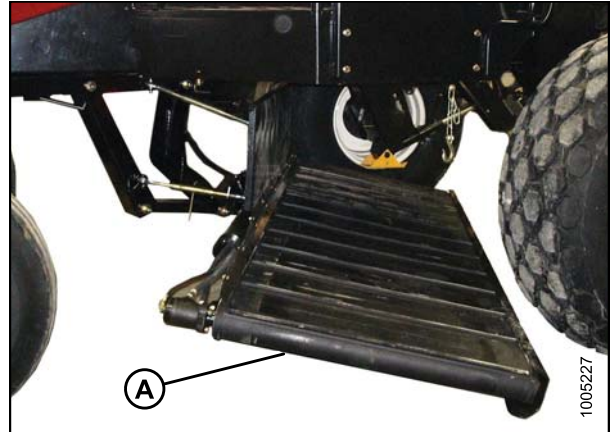


Figure 4.18: DWA

4.11 Tall Crop Divider Option

Tall crop dividers (one on each end of the header) assist in clean crop dividing and cutterbar entry in tall crops. Tall crop dividers are not adjustable, but they are removable.

4.11.1 Installing Tall Crop Divider

To install the tall crop divider kit (MD #B5509), follow these steps:

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. Lower header fully.
2. Stop the engine and remove the key.
3. Unpack kit.
4. Open cutterbar doors. Refer to [3.5 Cutterbar Doors](#), page 30.

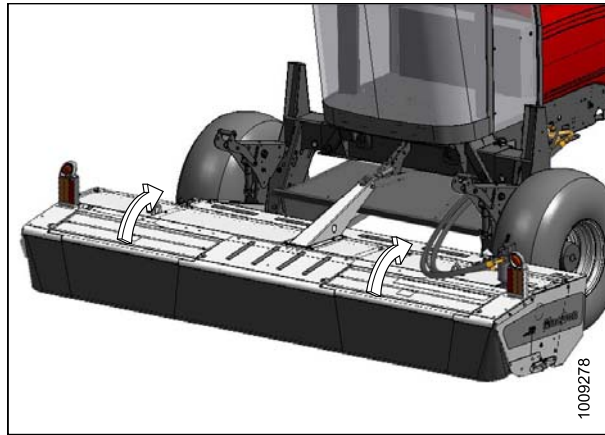


Figure 4.19: Cutterbar Doors

5. Remove the four bolts (A) from the divider (B).

NOTE:

Mounting holes in header should be vacant. Remove fasteners if necessary.

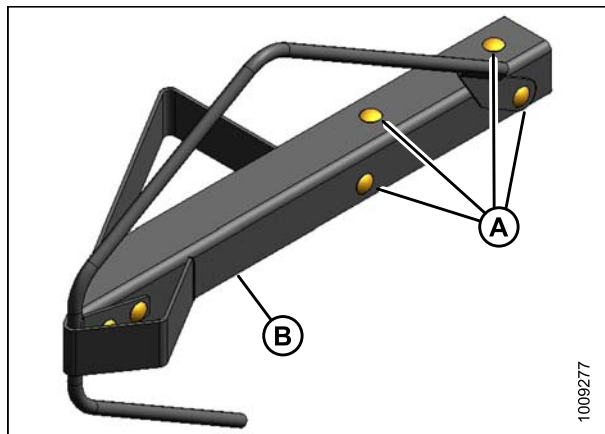


Figure 4.20: Tall Crop Divider Kit (LH Shown, RH Opposite)

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6. Position left-hand divider (B) on header left front corner, and install with four bolts (A) and nuts in existing holes. Tighten hardware.
7. Repeat for right-hand side.
8. Lower cutterbar doors.

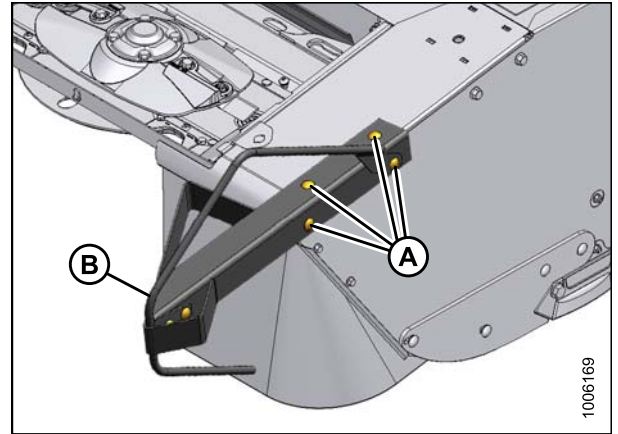


Figure 4.21: Tall Crop Divider Installed

4.11.2 Removing Tall Crop Divider

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
4. Remove the four bolts (A) and remove deflector (B).
5. Reinstall the four bolts (A).
6. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

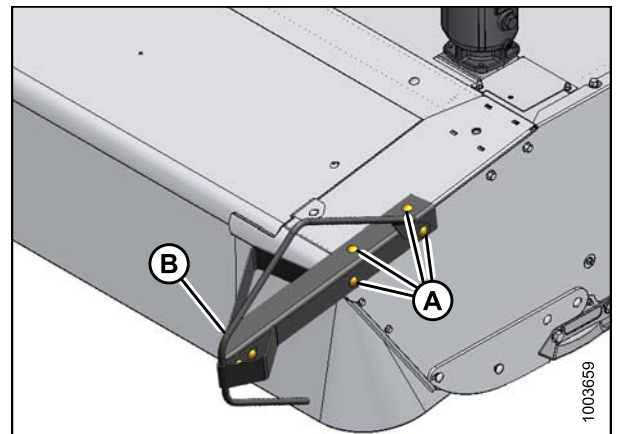


Figure 4.22: LH Crop Divider

4.12 Header Pan

The header pan is located behind the cutterbar and helps prevent material loss and wrapping in certain crops, such as grass seed, oats, and tall stalky crops.

In conditions where more soil and stones are being picked up by the cutterbar, it may be desirable to remove the pan to allow the debris to fall out before being fed into the conditioner.

4.12.1 Removing Header Pan

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. Raise the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
4. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
5. Remove six bolts (A) securing pan (B) to header and remove pan.

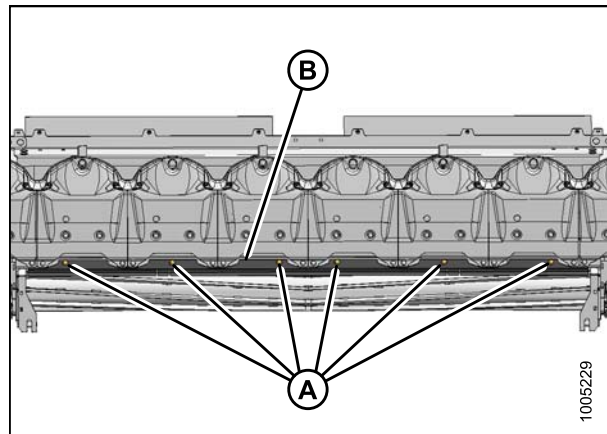


Figure 4.23: Underside of Header

4.12.2 Installing Header Pan

To install the header pan, follow these steps:

1. Locate pan (B) under header frame and hold in place.
2. Install six 1/2 x 1 in. carriage bolts (A) and flanged lock nuts. Tighten hardware.
3. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors](#), page 30.

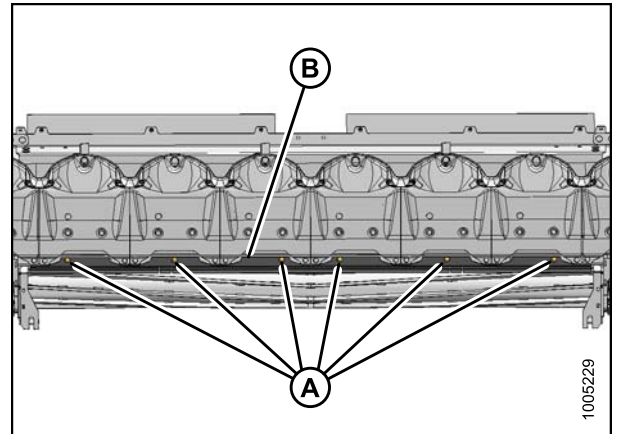


Figure 4.24: Underside of Header

4.13 Haying

4.13.1 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.

4.13.2 Topsoil Moisture

Table 4.3 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.

4.13.3 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.

4.13.4 Windrow Characteristics

Producing windrows with the recommended characteristics will achieve the greatest results. Refer to [4 Operating the Header, page 73](#) for instructions on adjusting the header.

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Table 4.4 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

4.13.5 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.

4.13.6 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.

4.13.7 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.

4.14 Levelling the Header

Windrower linkages are factory-set to provide the proper level for the header and should not normally require adjustment. The float springs are NOT used to level the header.

If the header is not level, check the tire pressures on the windrower ensuring they are properly inflated. Refer to your windrower operator's manual.

If the header is still not level, then adjustment to the windrower linkages is required. Refer to the appropriate section in the windrower operator's manual.

4.15 Unplugging the Header

Follow these steps to remove plugged material from the header:

DANGER

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

1. Stop forward movement of the windrower and disengage the header.
2. Raise the header fully.
3. Stop the engine and remove the key.
4. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props](#), page 26.

WARNING

Wear heavy gloves when working around cutterbar.

5. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors](#), page 30.
6. Clean off the cutterbar or rolls by hand.

NOTE:
Header reversing feature is standard to M205 windrowers.

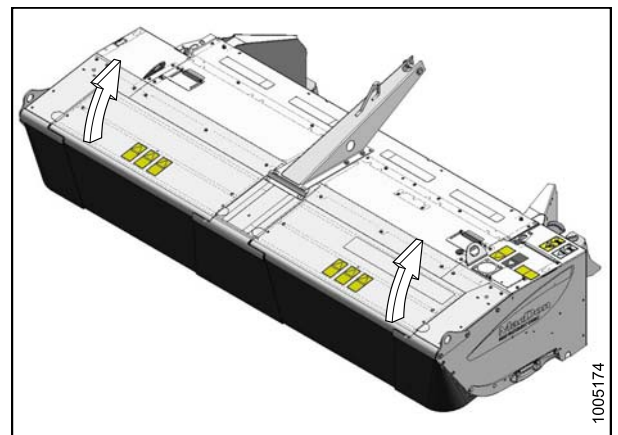


Figure 4.25: Cutterbar Doors

5 Maintenance and Servicing

Use the following instructions as your first source of information for servicing the header. A parts catalog is located in a plastic case at the right end of the header. If more detailed maintenance and service information is required, contact your Dealer.

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

5.1 Preparation for Servicing

CAUTION

To avoid personal injury, before servicing the header or opening drive covers, perform the following:

1. Lower the header fully.
2. Stop the engine and remove the key.
3. Engage park brake.
4. Wait for all moving parts to stop.

5.2 Recommended Fluids and Lubricants

Your machine can operate at top efficiency only if clean lubricants are used.

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

Table 5.1 Fluids and Capacities

Lubricant	Location	Description	Capacities
Grease	As required unless otherwise specified	SAE Multi-Purpose, High temperature extreme pressure (EP) performance with 0–1% max. Molybdenum Disulphide (NLGI Grade 2) Lithium complex base	—
	Driveline slip-joints	High temperature extreme pressure (EP) performance with 10% max. Molybdenum Disulphide (NLGI Grade 2) Lithium base	—
Gear Lubricant	Cutterbar	80W-90 gear lubricant with high thermal and oxidation stability conforming to API gear lubricant service GL-5 minimum (SAE J2360 preferred) specifications such as Traxon 80W-90 gear oil	3.25 l (3.43 US quarts)
	Conditioner gearbox	75W-90 synthetic gear lubricant with high thermal and oxidation stability conforming to API GL-5 minimum (SAE J2360 preferred) specifications such as Traxon E Synthetic 75W-90 gear oil	750 ml (0.79 US quarts)
	Bevel gearbox		400 ml (13.6 oz.)

5.3 Maintenance Requirements

In this manual, periodic maintenance requirements are organized by service intervals. For detailed instructions, refer to the specific headings in this section.

Regular maintenance is the best insurance against early wear and breakdowns. Use the following schedule and recommendations to increase machine life.

- Use fluids and lubricants specified in [5.2 Recommended Fluids and Lubricants, page 100](#).
- Make copies of the [5.3.1 Maintenance Schedule/Record, page 101](#) and log the hours of operation.

Where a service interval is given with 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 operated under adverse conditions (severe dust, extra heavy loads, etc.).

CAUTION

Carefully follow safety messages given in [1 Safety, page 1](#).

5.3.1 Maintenance Schedule/Record

Action		✓ Check				⬇ Lubricate				▲ Change			
	Hour meter reading												
	Service date												
	Serviced by												
Preseason or Annual. Refer to 5.3.2 Preseason/Annual Service, page 103 .													
End of season. Refer to 5.3.3 End-of-Season Service, page 104 .													
First 5 hours													
✓	Check for loose hardware. Refer to 8.1 Torque Specifications, page 157 .												
✓	Check drive belt tension. Refer to Inspecting the Conditioner Drive Belt, page 138 .												
First 10 hours then daily													
✓	Check hydraulic hoses and lines. Refer to 5.6.2 Hydraulic Hoses and Lines, page 147 .												
✓	Check cutter blades, deflectors, and discs. Refer to 5.4.2 Inspecting the Cutterbar Discs, page 117 .												

MAINTENANCE AND SERVICING

Action	✓ Check	☼ Lubricate	▲ Change										
First 25 hours													
✓	Check drive belt tension. Refer to <i>Inspecting the Conditioner Drive Belt, page 138.</i>												
Every 25 hours													
☼	Lube roll universal joints. Refer to <i>5.3.4 Lubrication and Servicing, page 104.</i>												
☼	Lube cutterbar driveline bearings. Refer to <i>5.3.4 Lubrication and Servicing, page 104.</i>												
First 50 hours													
✓	Check drive belt tension. Refer to <i>Inspecting the Conditioner Drive Belt, page 138.</i>												
▲	Change cutterbar lubricant. Refer to <i>5.3.7 Lubricating the Cutterbar, page 111¹.</i>												
▲	Change bevel gearbox lubricant. Refer to <i>5.5.1 Bevel Gearbox, page 137.</i>												
▲	Change conditioner gearbox lubricant. Refer to <i>5.5.1 Bevel Gearbox, page 137.</i>												
Every 50 hours													
☼	Lube drive belt tensioner. Refer to <i>5.3.4 Lubrication and Servicing, page 104.</i>												
☼	Lube roll shaft bearings. Refer to <i>5.3.4 Lubrication and Servicing, page 104.</i>												
☼	Lube gauge roller bearings. ²												
Every 100 hours or annually													
✓	Check conditioner drive belt. Refer to <i>Inspecting the Conditioner Drive Belt, page 138.</i>												
✓	Check conditioner gearbox lubricant. Refer to <i>5.5.3 Conditioner Gearbox, page 142.</i>												

1. Use only the specified amount. DO NOT overfill
2. Optional

MAINTENANCE AND SERVICING

Action	✓ Check	Lubricate	▲ Change
✓ Check bevel gearbox lubricant. Refer to 5.5.1 Bevel Gearbox, page 137 .			
First 150 hours			
▲ Change cutterbar lubricant. Refer to 5.3.7 Lubricating the Cutterbar, page 111¹ .			
▲ Change bevel gearbox lubricant. Refer to 5.5.1 Bevel Gearbox, page 137 .			
▲ Change conditioner gearbox lubricant. Refer to 5.5.3 Conditioner Gearbox, page 142 .			
Every 250 hours³			
▲ Change cutterbar lubricant. Refer to 5.3.7 Lubricating the Cutterbar, page 111¹ .			
▲ Change bevel gearbox lubricant. Refer to 5.5.1 Bevel Gearbox, page 137 .			
▲ Change conditioner gearbox lubricant. Refer to 5.5.3 Conditioner Gearbox, page 142 .			

5.3.2 Preseason/Annual Service

CAUTION

- Review the operator’s manual to refresh your memory on safety and operating recommendations.
- Review all safety signs and other decals on the header and note hazard areas.
- Be sure all shields and guards are properly installed and secured. Never alter or remove safety equipment.
- Be sure you understand and have practiced safe use of all controls. Know the capacity and 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 at the beginning of each operating season:

- Lubricate machine completely. Refer to [5.3.4 Lubrication and Servicing, page 104](#).
- Perform all annual maintenance. Refer to [5.3.1 Maintenance Schedule/Record, page 101](#).

3. Begins after the first 150 hour service

5.3.3 End-of-Season Service

CAUTION

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

Do the following at the end of each operating season:

- Clean the header thoroughly.
- Store in a dry, protected place if possible. If stored outside, always cover the header with a waterproof canvas or other protective material.
- Raise the header and engage header safety props
- If possible, block up the header to take weight off tires.
- Repaint all worn or chipped painted surfaces to prevent rust.
- Loosen drive belt.
- Lubricate the header thoroughly, leaving excess grease on fittings to keep moisture out of bearings.
- Apply grease to exposed threads, cylinder rods, and sliding surfaces of components.
- Oil cutterbar components to prevent rust.
- Check for worn components and repair as necessary.
- Check for broken components and order replacements from your Dealer. Attention to these items right away will save time and effort at beginning of next season.
- Replace or tighten any missing or loose hardware. Refer to [8.1 Torque Specifications, page 157](#).
- Remove divider rods (if equipped) to reduce space required for inside storage.

5.3.4 Lubrication and Servicing

WARNING

To avoid personal injury, before servicing the header or opening drive covers, follow procedures in [5.1 Preparation for Servicing, page 99](#).

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

MAINTENANCE AND SERVICING

To access the drive systems, open the driveshield and cutterbar doors. Refer to:

- [3.4 Driveshields, page 28](#)
- [3.5 Cutterbar Doors, page 30](#)

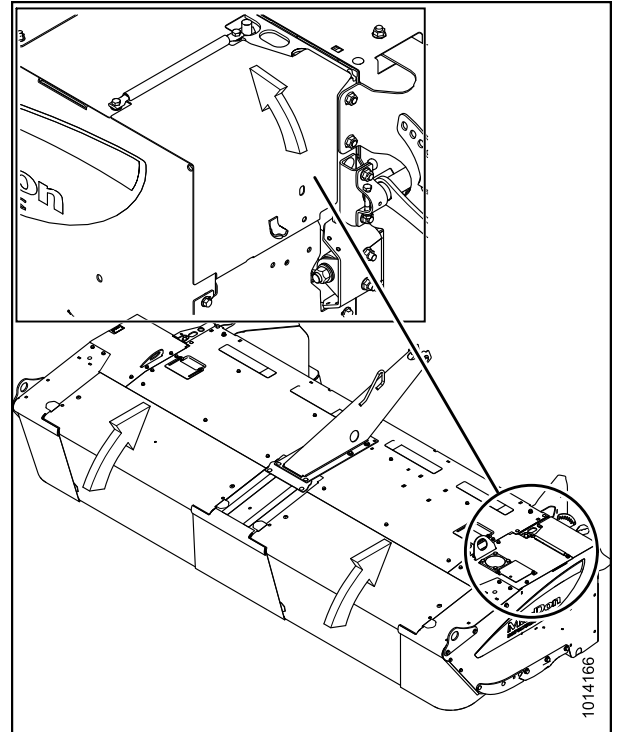


Figure 5.1: Driveshield

5.3.5 Greasing Procedure

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.

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

Use the recommended lubricants specified in this manual. Refer to [5.2 Recommended Fluids and Lubricants, page 100](#).

1. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.
2. Inject grease through fitting with grease gun until grease overflows fitting except where noted.
3. Leave excess grease on fitting to keep out dirt.
4. Replace any loose or broken fittings immediately.
5. If fitting will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

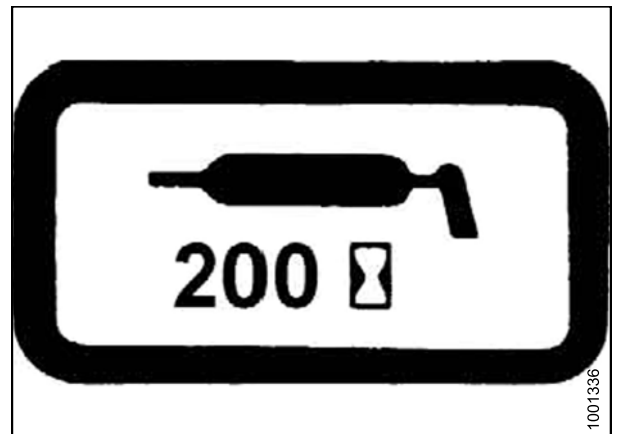


Figure 5.2: Grease Interval Decal

5.3.6 Lubrication and Servicing Intervals

To identify the various locations that require lubrication and servicing, refer to the following illustrations (organized by the frequency of service that is required).

MAINTENANCE AND SERVICING

Every 25 Hours

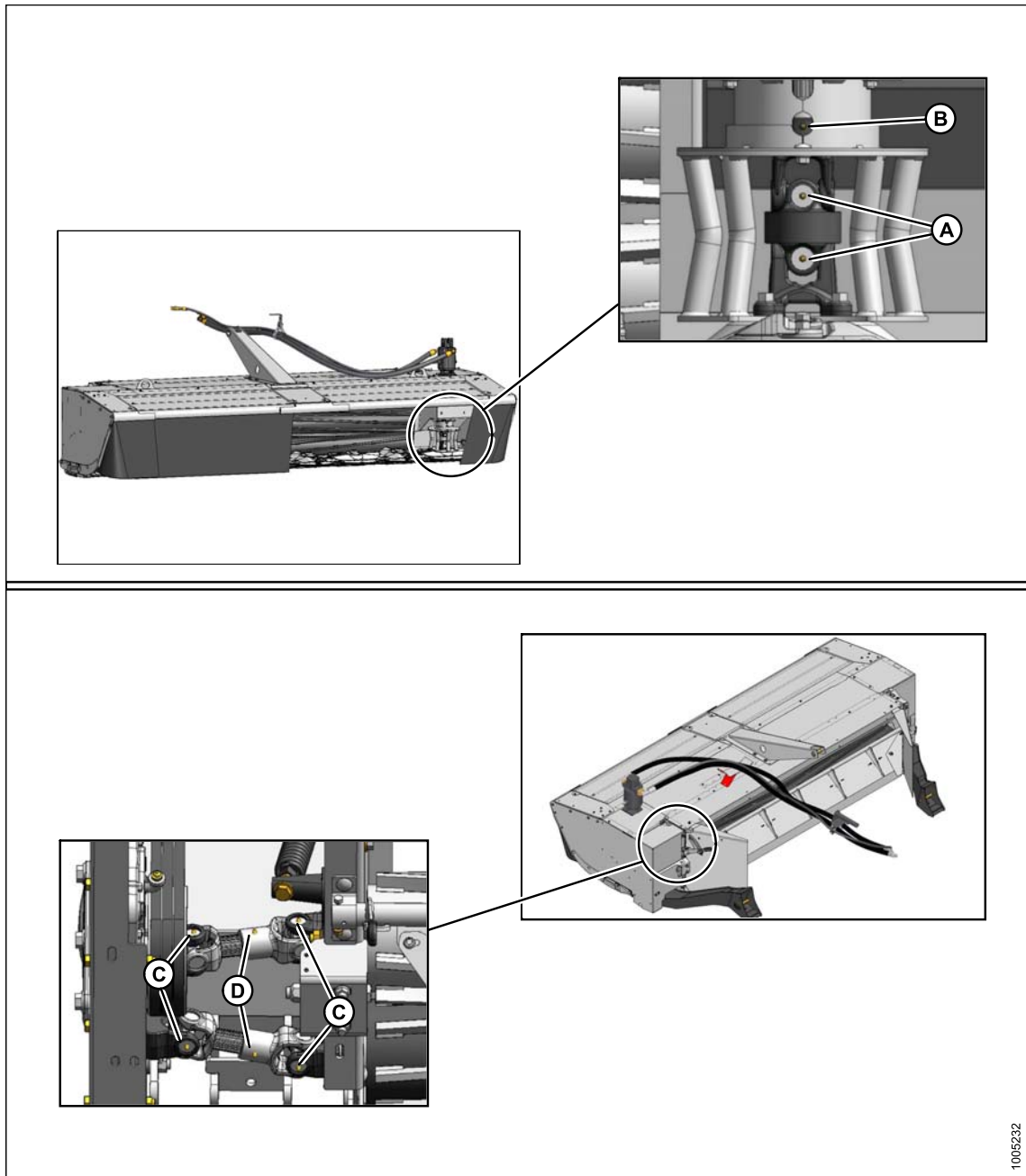


Figure 5.3

A - Cutterbar Driveline Universals (2 Places)
C - Conditioner Driveline Universals (4 Places)

B - Driveshaft⁴
D - Driveline Shaft⁴

NOTE:

Use high temperature extreme pressure (EP2) performance with 1% max molybdenum disulphide (NLGI grade 2) lithium base except where noted.

4. 10% moly grease is recommended for driveline shaft slip joint only

MAINTENANCE AND SERVICING

Every 50 Hours

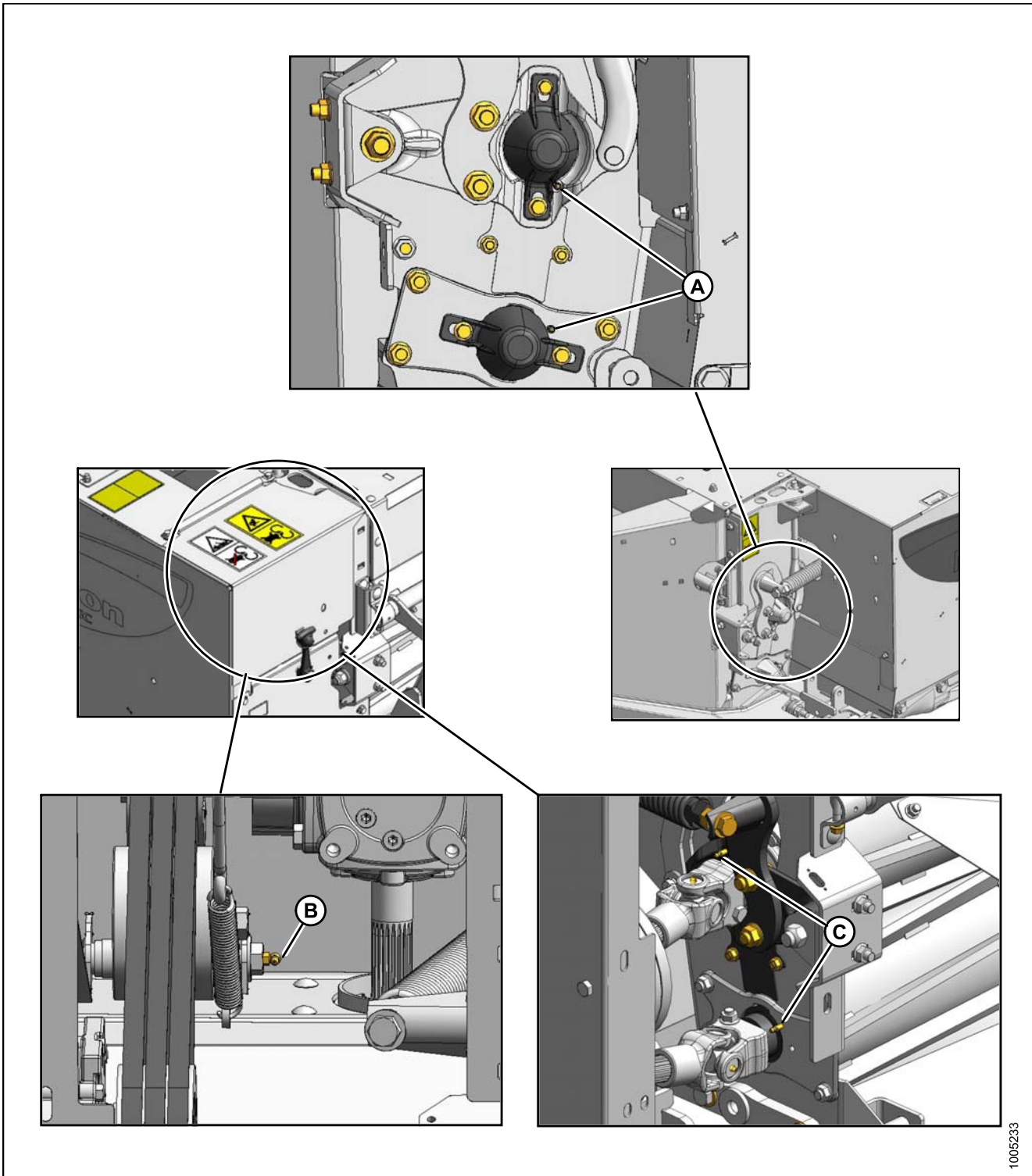


Figure 5.4

A - Roll Shaft Bearing (2 Places)

B - Belt Tensioner Pivot (1 Place)

C - Roll Shaft Bearing (2 Places)

NOTE:

Use high temperature extreme pressure (EP2) performance with 1% max molybdenum disulphide (NLGI grade 2) lithium base except where noted.

MAINTENANCE AND SERVICING

Every 100 Hours or Annually

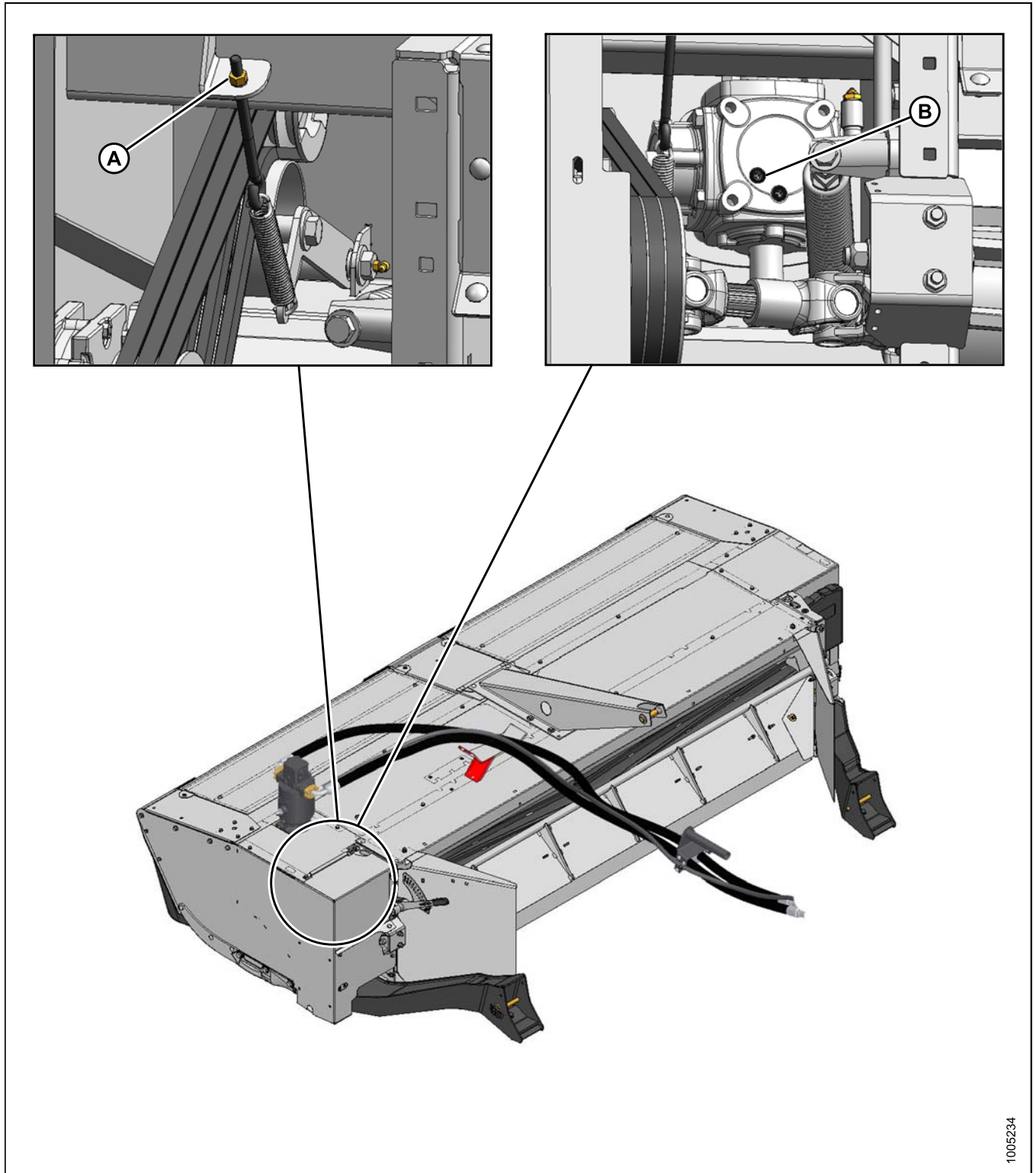


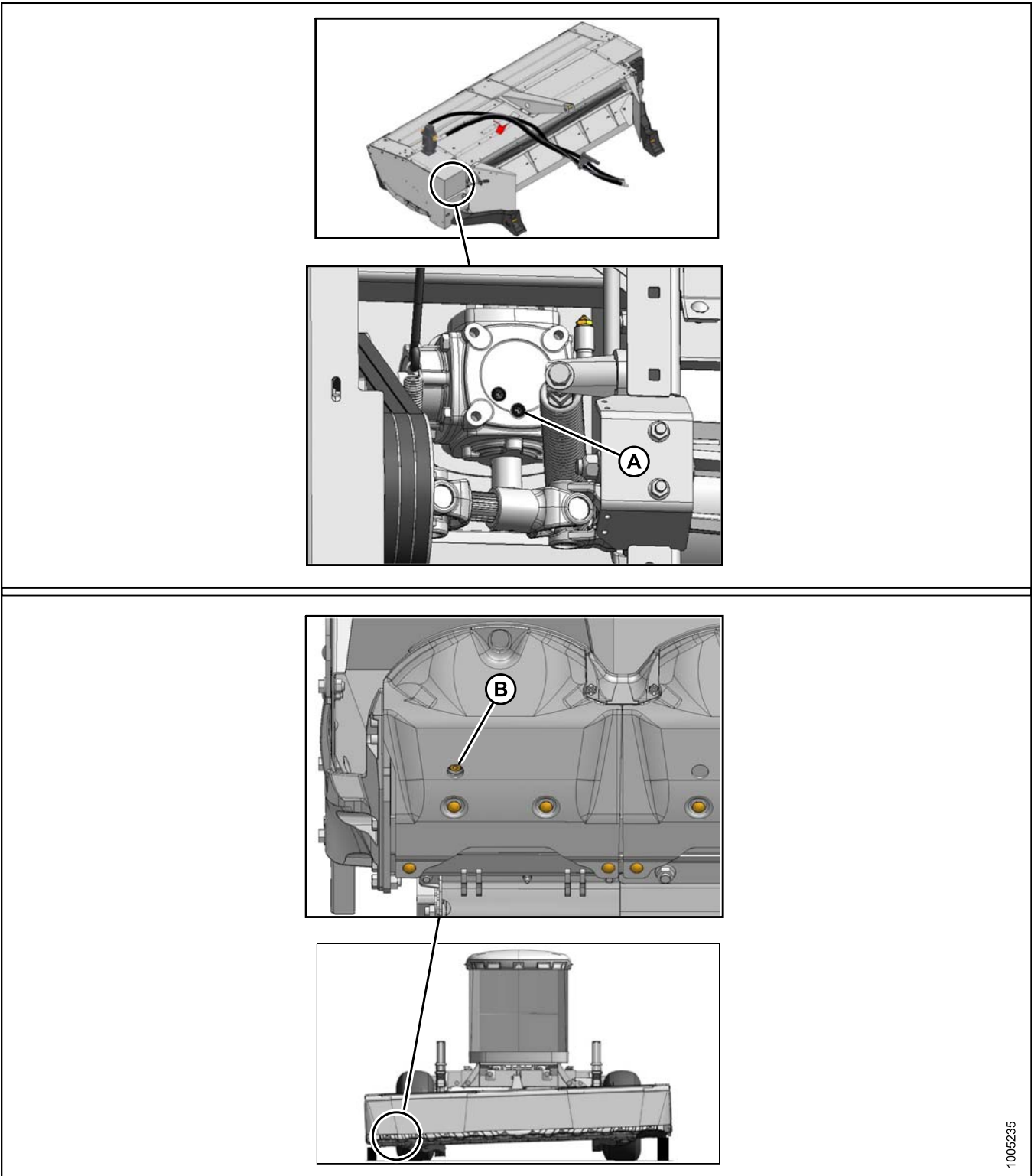
Figure 5.5

A - Conditioner Drive Belt Tension

B - Gearbox Lubricant Level (Check with Top of Header Horizontal)

MAINTENANCE AND SERVICING

Every 250 Hours



1005235

Figure 5.6

A - Change Bevel Gearbox Oil

B - Change Cutterbar Lube

5.3.7 Lubricating the Cutterbar

The lubricant level in the cutterbar **CANNOT** be checked. If the cutterbar lubricant quantity is in doubt, do **NOT** add lubricant. Drain the cutterbar and refill with new clean lubricant.

Draining the Cutterbar Lubricant

IMPORTANT:

Drain the cutterbar when the lubricant is warm. If the lubricant is cold, idle the machine for about 10 minutes prior to draining.

⚠ 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.

⚠ CAUTION

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

⚠ DANGER

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

1. Place a block under each end of the header (A).

NOTE:

The block under the left end of the header should be higher than the right end.

2. Disengage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
3. Start the windrower and lower header onto blocks.
4. Stop the engine and remove the key.
5. Open cutterbar doors (B). Refer to [3.5 Cutterbar Doors, page 30](#).

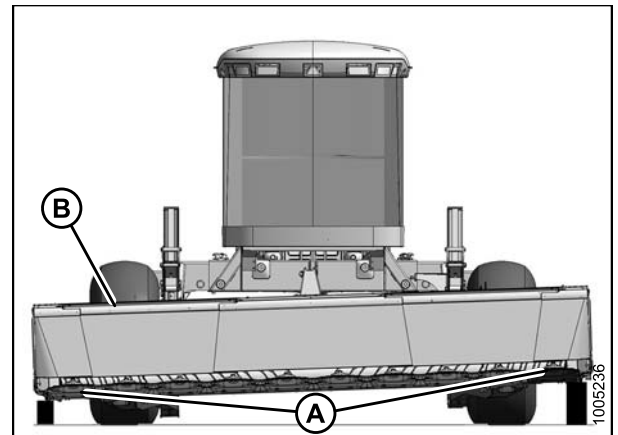


Figure 5.7: Header Raised Left Side

MAINTENANCE AND SERVICING

6. Locate one of the two filler plugs along the top of the cutterbar. Refer to [5.8: Cutterbar Filler Plug Locations](#), page 112.

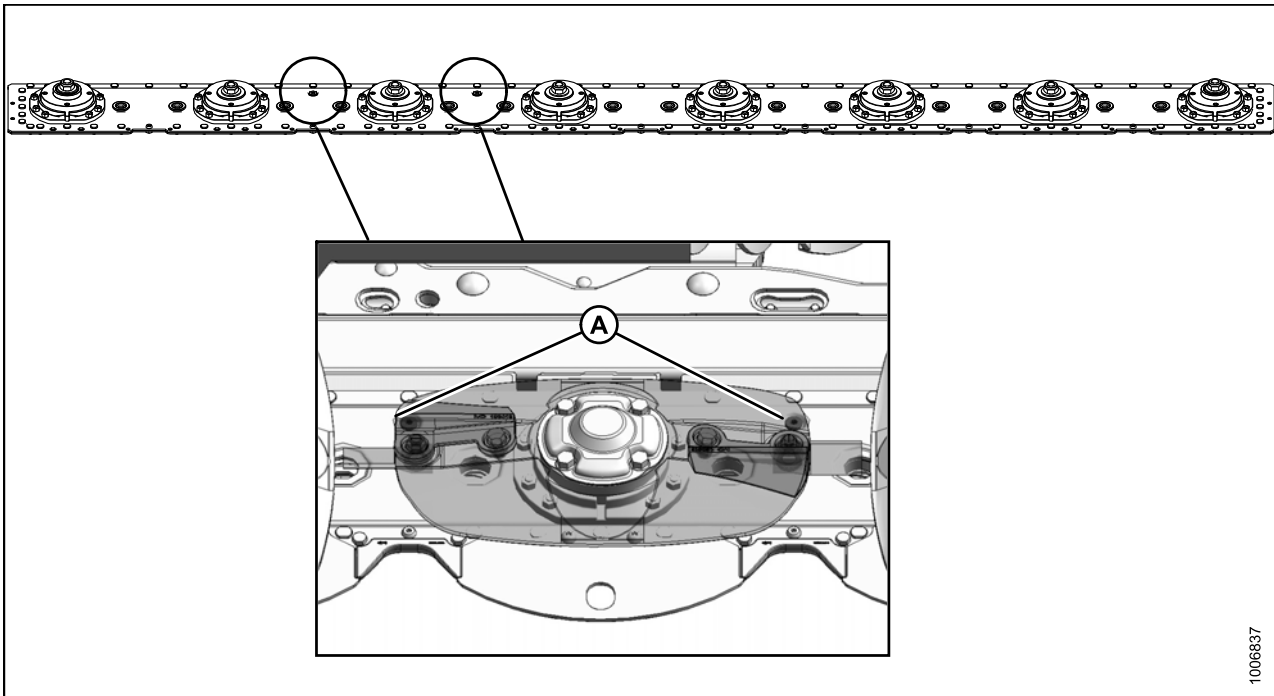


Figure 5.8: Cutterbar Filler Plug Locations

7. Clean around either filler plug (A) and remove one plug with an 8 mm hex key.

NOTE:

Rotate disc to expose filler plug if necessary.

8. Place a suitably sized container under the cutterbar drain hole (A).
9. Remove plug (A) with an 8 mm hex key and allow sufficient time for lubricant to drain.

IMPORTANT:

Do NOT flush the cutterbar.

10. Replace drain plug (A) and tighten.
11. Safely dispose of lubricant.
12. Add lubricant. Refer to [Filling the Cutterbar Lubricant](#), page 113.

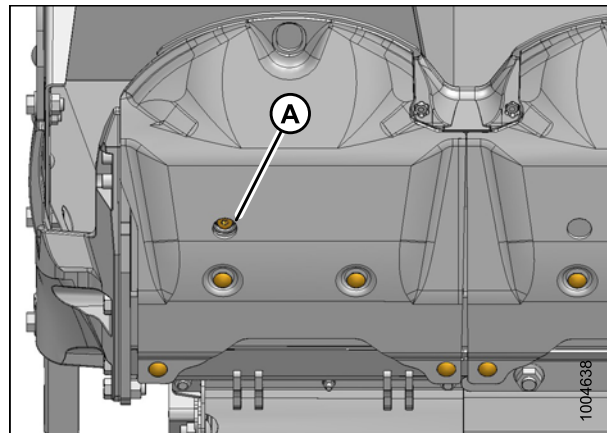


Figure 5.9: Cutterbar Lubricant Drain

Filling the Cutterbar Lubricant

⚠ DANGER

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

1. Park the machine on level ground.
2. Raise the header fully.
3. Stop the engine and remove the key.
4. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
5. Move higher block to right end of header.

NOTE:

Having the fill end higher allows for quicker filling of cutterbar.

6. Disengage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).

⚠ CAUTION

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

7. Start windrower and lower header onto blocks (A).
8. Start tractor and lower the header onto blocks (A).
9. Stop the engine and remove the key.
10. Verify that drain plug (A) has been installed before adding new lubricant.

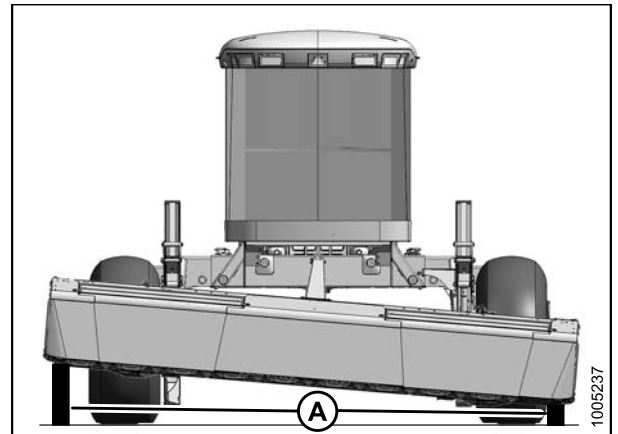


Figure 5.10: Header Raised Right Side

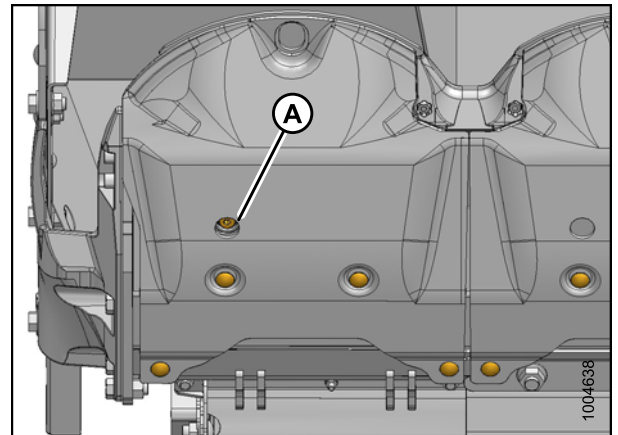


Figure 5.11: Cutterbar Drain Plug

MAINTENANCE AND SERVICING

11. Locate one of the two filler plugs along the top of the cutterbar. Refer to [Figure 5.12: Cutterbar Filler Plug Locations, page 114](#).

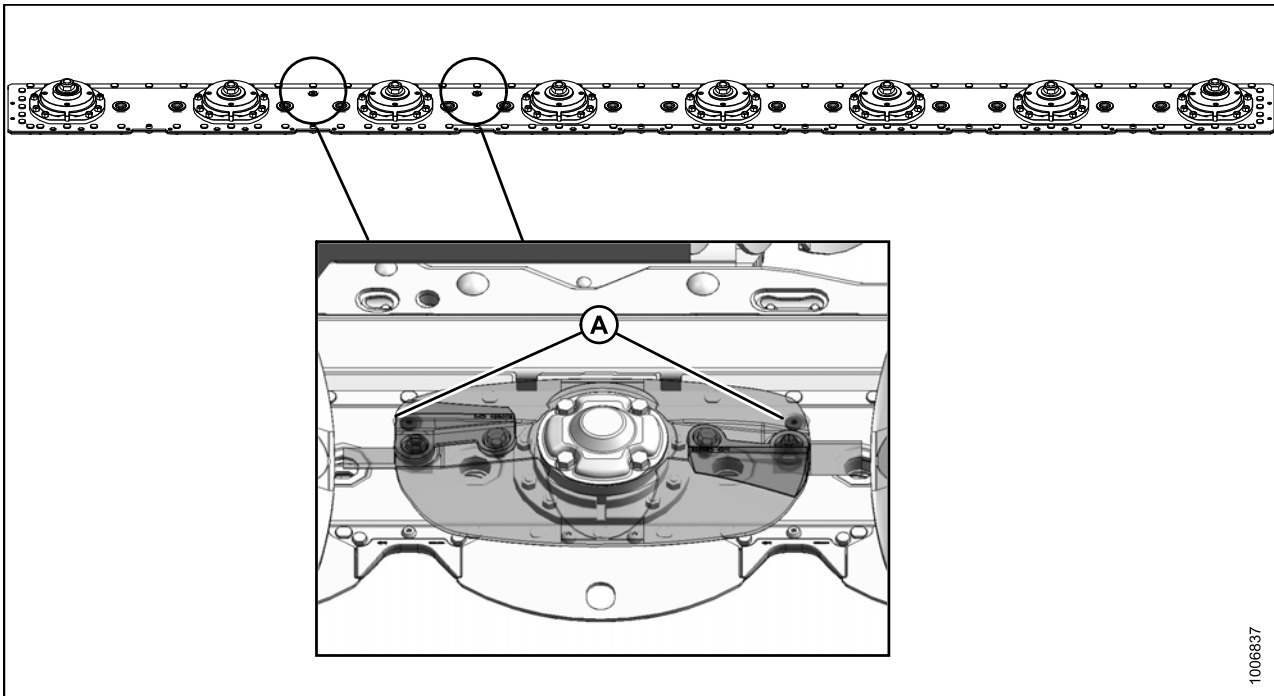


Figure 5.12: Cutterbar Filler Plug Locations

12. Clean around either filler plug (A) and remove one plug with an 8 mm hex key.

NOTE:

Rotate disc to expose filler plug if necessary.

13. Add lubricant to cutterbar through filler hole (A). Refer to [5.2 Recommended Fluids and Lubricants, page 100](#).

IMPORTANT:

DO NOT overfill the cutterbar. Overfilling can cause overheating and damage to or failure of the cutterbar.

14. Install the filler plug that was removed.
15. Close the cutterbar door(s). Refer to [3.5 Cutterbar Doors, page 30](#).
16. Start engine and raise header off blocks.
17. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
18. Remove blocks and lower the header fully.
19. Stop the engine and remove the key.
20. Disengage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
21. Start engine and lower the header fully.

5.3.8 Rock Guards

Inspecting the Rock Guards

Check rock guards periodically for severe damage or wear as follows:

⚠ 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.

⚠ DANGER

To avoid bodily injury or death from unexpected start-up or fall of raised machine: stop the engine, remove the key, and engage header safety props 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 the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props.
4. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
5. Inspect rock guards (A) for severe damage, wear, and distortion. The guards should be replaced if severely damaged or worn.
6. Check for loose or missing fasteners and tighten or replace fastener if missing.
7. Contact your MacDon Dealer for replacement procedures.

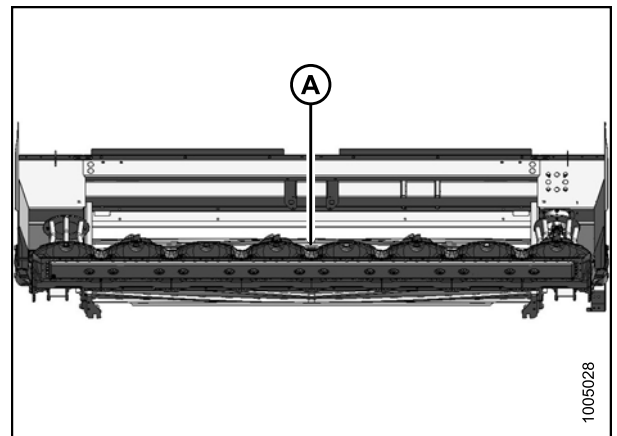


Figure 5.13: Rock Guards

5.4 Cutterbar Disc Maintenance

Perform daily inspections to ensure that cutterbar discs have not suffered damage from rocks, or experienced excessive wear from abrasive working conditions.

Cutterbar discs are interchangeable and can be moved to a spindle that rotates in the opposite direction as long as it is in usable condition and the blades are oriented to cut in the correct direction.

The cutterbar discs are **NOT** repairable and must be replaced if severely damaged or worn.

IMPORTANT:

If holes appear in a cutterbar disc, replace the disc immediately. Do **NOT** attempt to repair the cutterbar discs. Always use factory replacement parts.

5.4.1 Direction of Spindle Rotation

When installing cutter blades or disc accelerators, the direction of rotation determines proper crop positioning. Refer to Figure 5.14: *Spindle Rotation*, page 116 to determine the direction of spindle rotation.

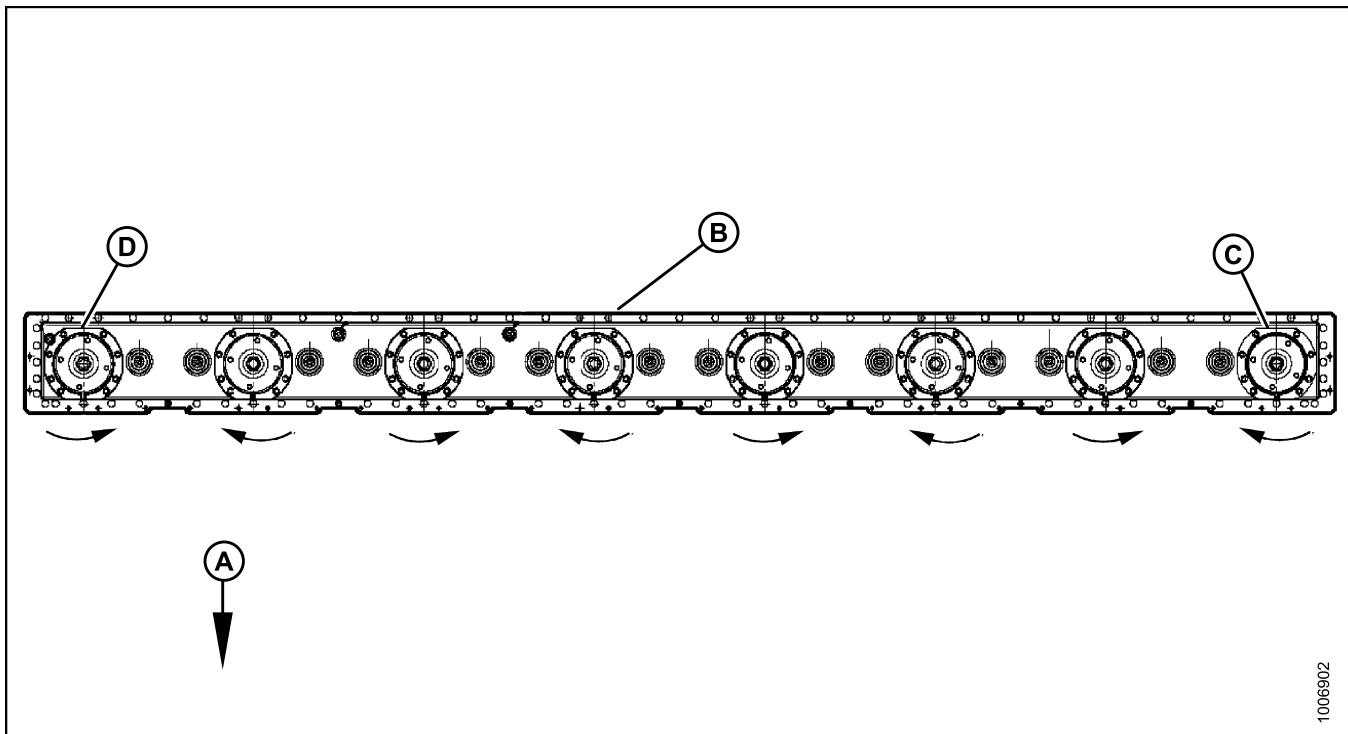


Figure 5.14: Spindle Rotation

A - Front of Header
D - Disc 8⁶

B - 13-foot Cutterbar

C - Disc 1⁵

5. Driveline deflector installed here.
6. Driven deflector installed here.

5.4.2 Inspecting the Cutterbar Discs

Perform the following cutterbar disc inspection daily:

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
4. Check discs (A) for damage or loose fasteners.
5. Replace damaged discs. Refer to:
 - [5.4.3 Removing a Cutterbar Disc, page 117](#)
 - [5.4.4 Installing a Cutterbar Disc, page 118](#)
6. Replace damaged fasteners. Tighten loose fasteners.
7. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

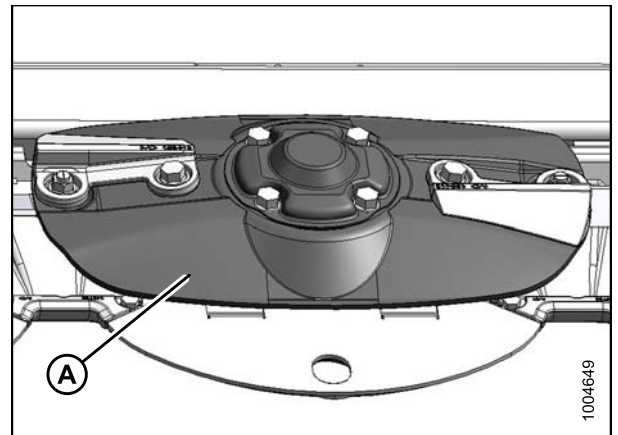


Figure 5.15: Cutterbar Disc

5.4.3 Removing a Cutterbar Disc

CAUTION

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

1. Open cutterbar door(s). Refer to [3.5 Cutterbar Doors, page 30](#).
2. Identify which disc needs to be replaced.
3. Place a block of wood between two discs to prevent disc rotation while loosening bolts.
4. If the disc has a deflector installed on it. Remove the rotary deflector. Refer to:
 - [Removing the Driveline Deflector, page 130](#)
 - [Removing the Driven Deflector, page 129](#)

MAINTENANCE AND SERVICING

- Remove four bolts (A) on disc cover (B) and remove cover and disc (C).

NOTE:

If removing multiple discs, mark the position of each disc to assist in reinstallation. The blades on each disc are direction-specific. Refer to [5.4.1 Direction of Spindle Rotation, page 116](#).

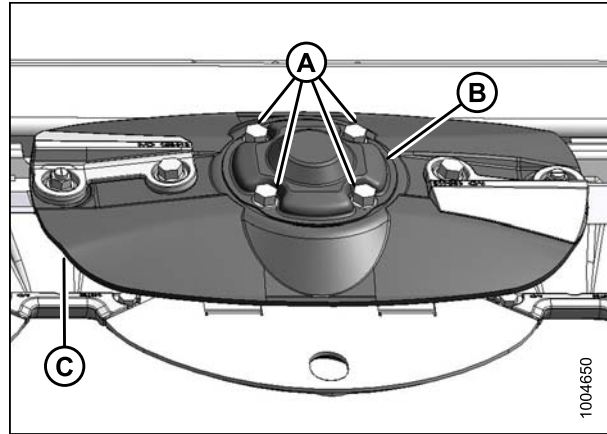


Figure 5.16: Cutterbar Disc

5.4.4 Installing a Cutterbar Disc

CAUTION

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

- Install the new disc on spindle positioned at a 90° angle to the adjacent discs.

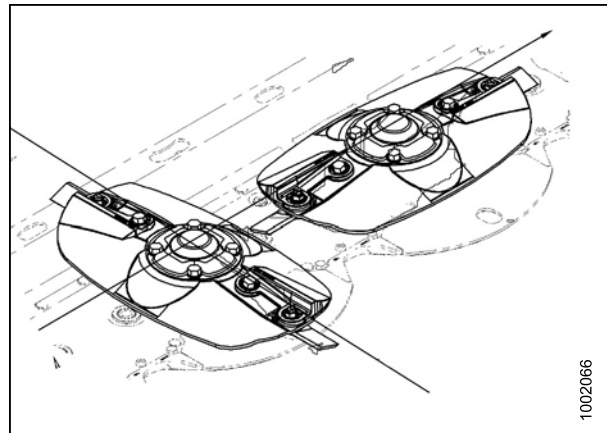


Figure 5.17: Cutterbar Discs

- Install cover (B) and secure with four bolts (A). Tighten bolts.
- Reinstall previously removed rotary deflector (if applicable). Refer to:
 - [Installing the Driveline Deflector, page 131](#)
 - [Installing the Driven Deflector, page 130](#)
- Close the cutterbar door(s). Refer to [3.5 Cutterbar Doors, page 30](#).

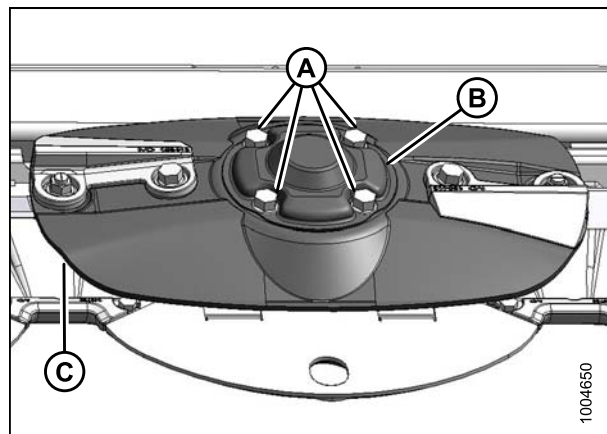


Figure 5.18: Cutterbar Disc

5.4.5 Cutterblades

Each disc has two cutterblades (A) attached at each end with a specially designed shoulder bolt that allows the blades to swivel horizontally.

Since each blade has two cutting edges, they can be flipped over to extend the life of the blades.

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

IMPORTANT:

Always use MacDon factory replacement parts.

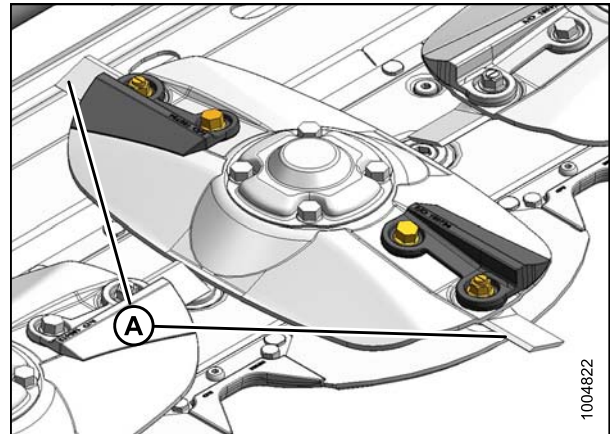


Figure 5.19: Cutterblades

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.

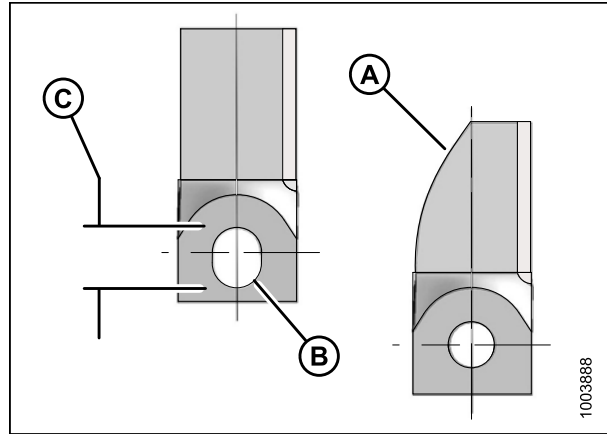


Figure 5.20: Cutterblades

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 [5.4.1 Direction of Spindle Rotation, page 116](#).

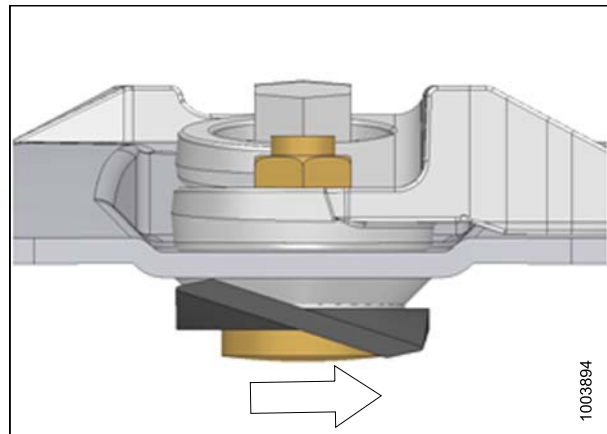


Figure 5.21: Counterclockwise Disc Rotation Direction

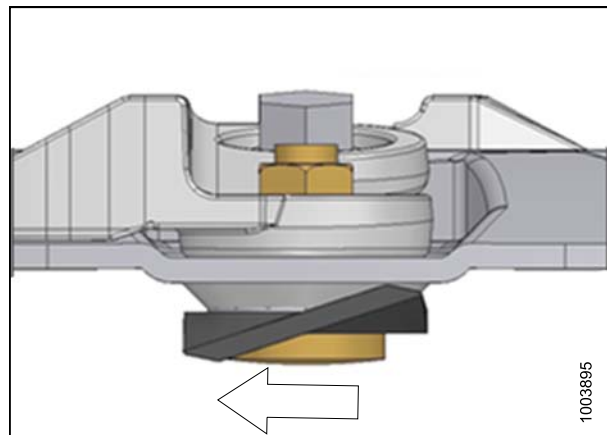


Figure 5.22: Clockwise Disc Rotation Direction

MAINTENANCE AND SERVICING

Inspecting Cutterblade Hardware

CAUTION

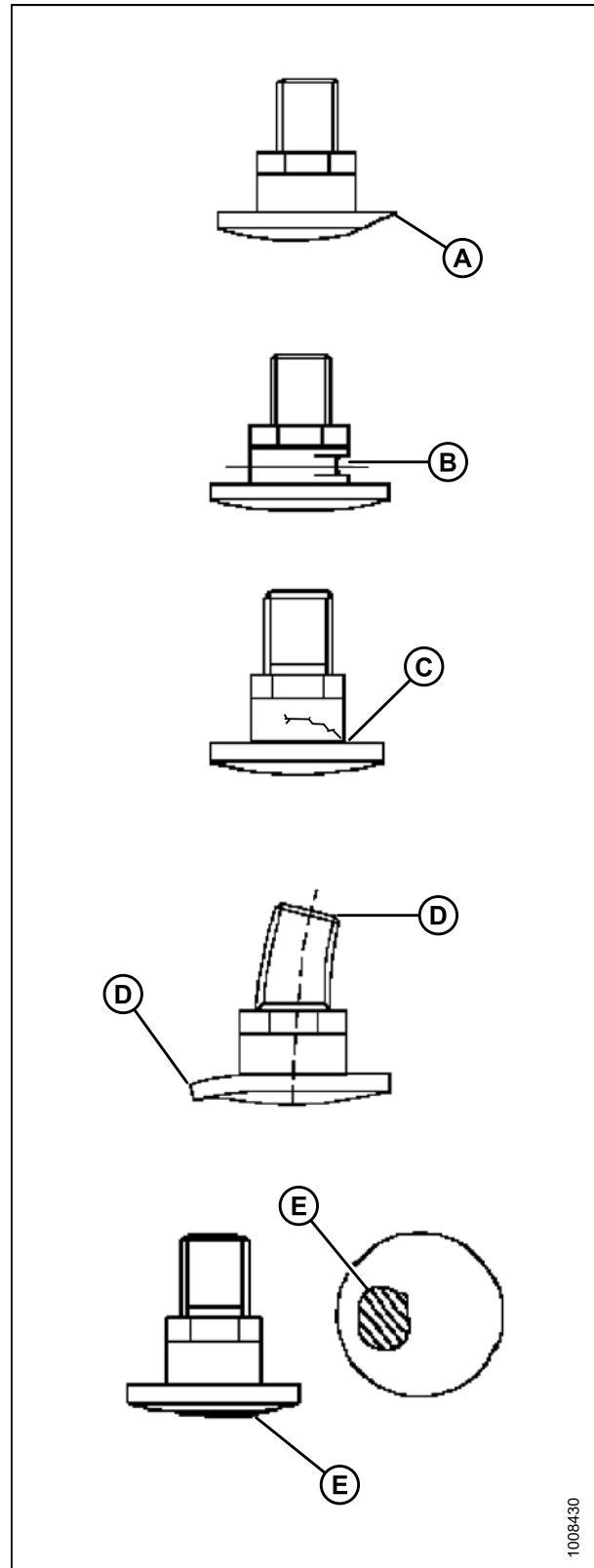
Damaged or loose cutterblades or blade attachment hardware can be ejected during machine operation and may cause personal injury or machine damage.

MAINTENANCE AND SERVICING

Check blade attachment hardware each time blades are changed. Refer to [Replacing the Cutterblades, page 123](#) for hardware replacement procedure.

Check bolts and replace bolt if:

- Bolt has been removed and installed five times
- Head (A) is worn flush with bearing surface of blade
- Diameter of bolt neck is worn (B) 3 mm (1/8 in.)
- Bolt is cracked (C)
- Bolt is visibly distorted (D)
- There is evidence of interference (E) with adjacent parts



MAINTENANCE AND SERVICING

Check nuts and replace nut if:

- Nut has been removed and installed five times
- Worn height (A) is less than half original height (B)
- Nut is cracked

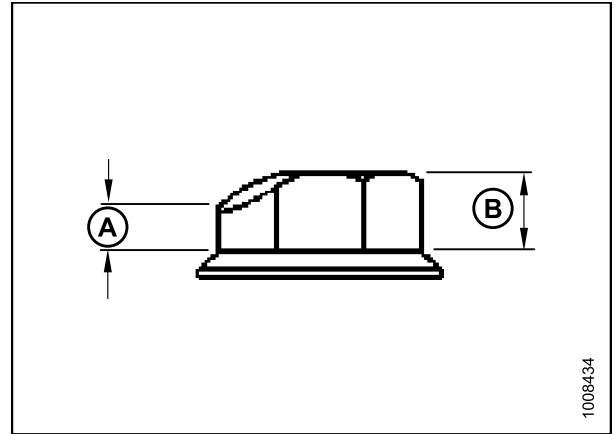


Figure 5.24: Cutterblade Nut

Replacing the Cutterblades

Follow these steps to replace the cutterblades:

DANGER

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

CAUTION

Cutterblades have two cutting edges. Be careful when working around the blades. Blades are sharp and can cause serious injury. Wear gloves when handling blades.

1. Raise the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
4. Open the cutterbar door(s). Refer to [3.5 Cutterbar Doors, page 30](#).
5. Rotate disc (A) so that blade (B) faces forward and lines up with hole (C) in rock guard.
6. Place a block of wood between two discs to prevent disc rotation while loosening blade bolts.
7. Clean debris from blade attachment area.

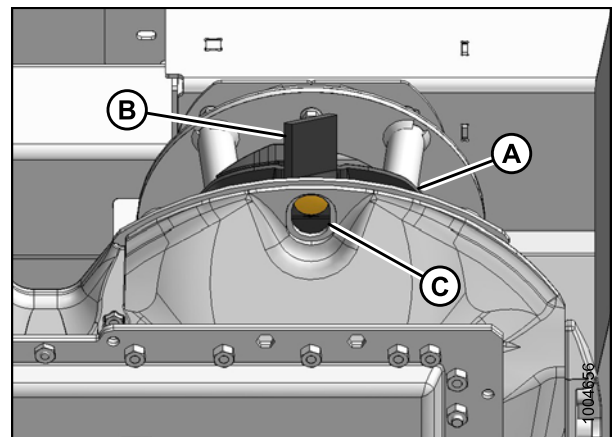


Figure 5.25: Cutterblades

MAINTENANCE AND SERVICING

- Remove nut (A).
- Remove shoulder bolt (B) and blade (C).
- Install new or reversed blade (C) with shoulder bolt (B) onto disc.

NOTE:

Ensure shoulder bolt is fully engaged into blade before tightening nut.

NOTE:

Ensure blade is installed correctly to suit rotation of disc. Refer to:

- [5.21: Counterclockwise Disc Rotation Direction, page 120](#)
- [5.22: Clockwise Disc Rotation Direction, page 120](#)

If you are unsure which direction the spindle rotates, Refer to [5.4.1 Direction of Spindle Rotation, page 116](#).

- Install nut (A). Tighten nut to 135 N·m (100 ft·lbf).
- Remove block of wood (if used).

WARNING

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

- Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

5.4.6 Accelerators

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

Accelerators are replaceable and should be inspected periodically for damage and loose or missing fasteners.

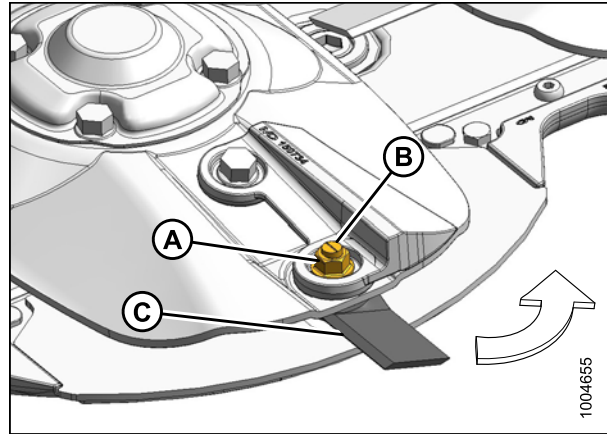


Figure 5.26: Cutterblades

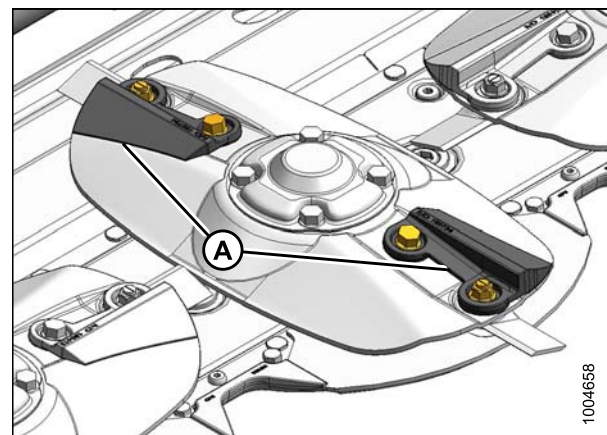


Figure 5.27: Outboard Disc

Inspecting Accelerators

Follow these steps to inspect accelerators:

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. Raise the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props](#), page 26.
4. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors](#), page 30.

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.

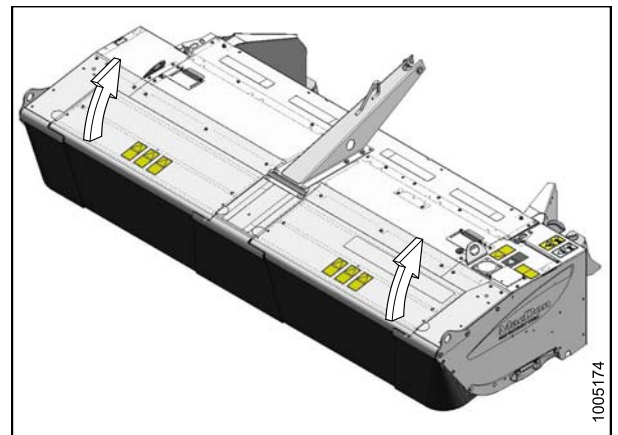


Figure 5.28: Cutterbar Doors

5. Inspect accelerators (A) and replace if severely damaged or worn.
6. Check for loose or missing fasteners and tighten or replace fastener if missing.

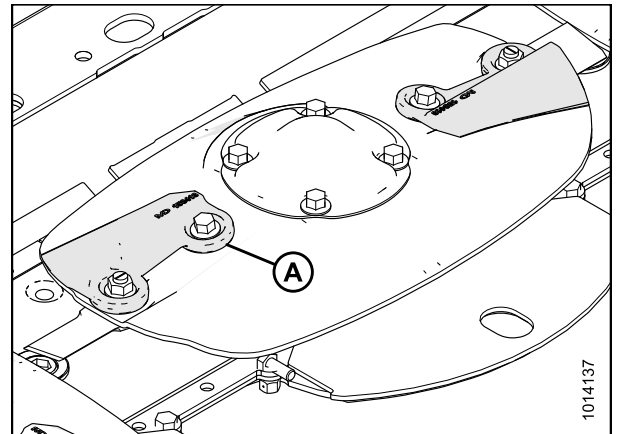


Figure 5.29: Inspecting Accelerators

Replacing Accelerators

Follow these steps to replace the accelerators:

1. Raise the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
4. Remove disc (D). Refer to [5.4.3 Removing a Cutterbar Disc, page 117](#).
5. Remove bolt and nut (A) and nut (B).
6. Remove accelerator (C) from disc (D).

IMPORTANT:

Do NOT remove cutter blade bolt unless it or the blade is being replaced. Repeat for other accelerator.

7. Install a new accelerator on disc onto existing cutter blade bolt. Install nut (B).

NOTE:

Accelerators are handed for clockwise or counterclockwise operation. Verify the direction of disc before installing accelerators.

8. Install hex bolt (A) and nut at inboard hole. Bolt head faces up.
9. Tighten both nuts to 135 N·m (100 ft·lbf).
10. Repeat for other accelerator.
11. Reinstall disc (D) on spindle. Refer to [5.4.4 Installing a Cutterbar Disc, page 118](#).
12. Remove block of wood (if used).

⚠ WARNING

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

13. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

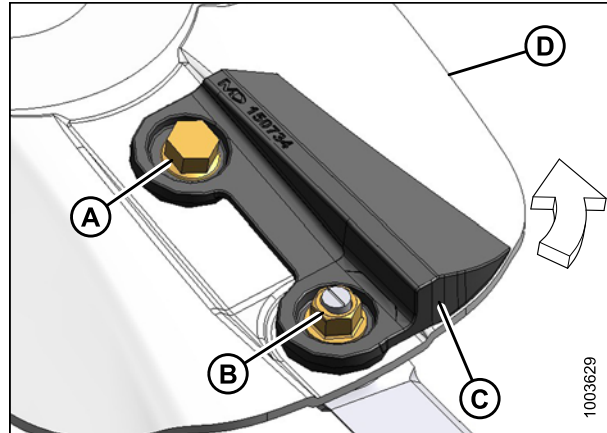


Figure 5.30: Disc Accelerator

5.4.7 Nut Shield

If accelerators are not used, nut shields will be required to protect the cutter blade nuts.

Nut shields are mounted on each outboard disc.

Nut shields are replaceable and should be inspected periodically for damage and loose or missing fasteners.

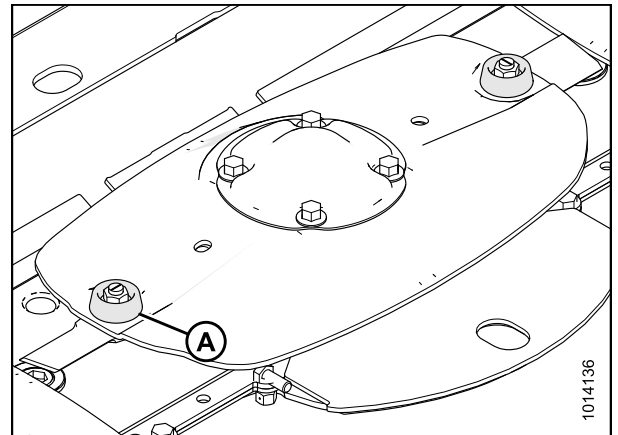


Figure 5.31: Inspecting Nut Shield

Inspecting Nut Shield

1. Raise the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
4. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
5. Inspect nut shields (A) and replace if severely damaged or worn.
6. Check for loose or missing fasteners and tighten or replace fastener if missing. If replacement is required, refer to [Replacing Nut Shield, page 128](#).
7. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

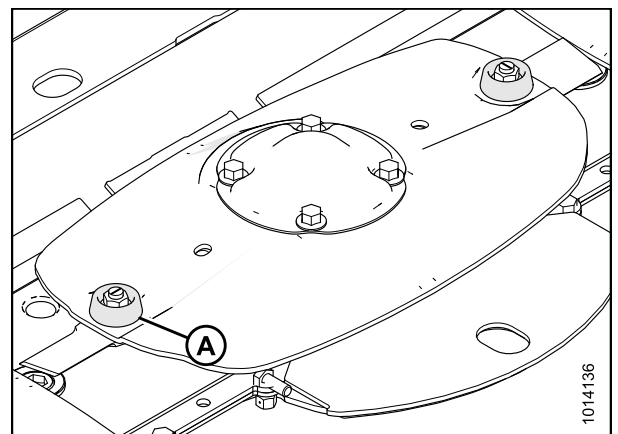


Figure 5.32: Inspecting Nut Shield

Replacing Nut Shield

1. Raise the header fully.
2. Stop the engine and remove the key.
3. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
4. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
5. Remove disc (C). Refer to [5.4.3 Removing a Cutterbar Disc, page 117](#).
6. Remove nut shield by loosening nut (A) and removing nut shield (B) from disc (C).

IMPORTANT:

Do NOT remove cutter blade bolt unless it or the blade are being replaced. Repeat for other accelerator.

7. Locate new nut shield (B) on disc (C) and align with existing cutter blade bolt. Install nut (A).
8. Tighten nut. Torque to 135 N·m (100 ft·lbf).
9. Reinstall disc (D) on spindle. Refer to [5.4.4 Installing a Cutterbar Disc, page 118](#).
10. Remove block of wood (if used).

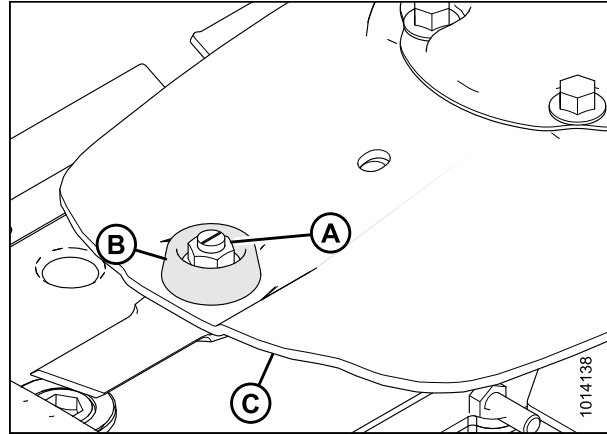


Figure 5.33: Disc Accelerator

⚠ WARNING

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

11. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

5.4.8 Rotary Deflectors

The rotary cage deflectors are designed to deliver an even flow of cut material from the ends of the cutterbar into the conditioner roll.

Rotary deflectors should be checked daily for damage or wear.

Inspecting Rotary Deflectors

⚠ 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. Lower the header fully.

MAINTENANCE AND SERVICING

2. Stop the engine and remove the key.
3. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
4. Check that deflectors (A) are not damaged or bent, also check for loose hardware.
5. Replace deflectors (A) if they are severely damaged or worn. Do **NOT** repair. Refer to:
 - [Removing the Driven Deflector, page 129](#)
 - [Installing the Driven Deflector, page 130](#)
 - [Removing the Driveline Deflector, page 130](#)
 - [Installing the Driveline Deflector, page 131](#)
6. Tighten loose fasteners.

WARNING

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

7. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

Removing the Driven Deflector

Follow these steps to replace the driven rotary deflector:

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
4. Remove four bolts (A).
5. Remove cover (B) and deflector (C).

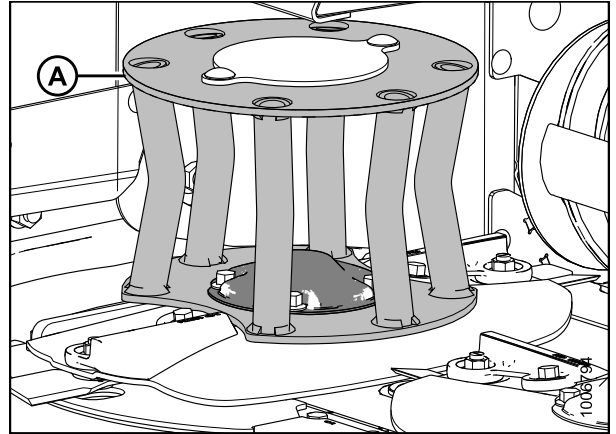


Figure 5.34: Rotary Deflector

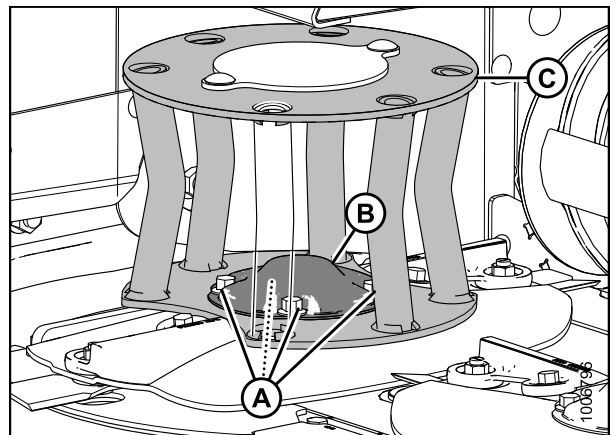


Figure 5.35: Driven Deflector

Installing the Driven Deflector

Follow these steps to replace the driven rotary deflector:

1. Position new deflector (C) on spindle so that it clears accelerators (D).
2. Install cover (B) and secure with four bolts (A).
3. Tighten bolts.
4. Remove block of wood (if used).

WARNING

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

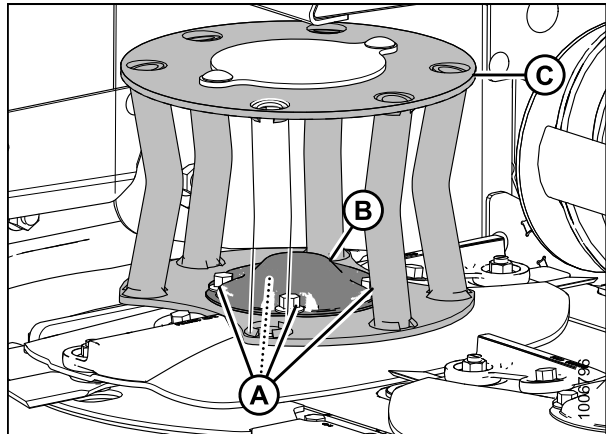


Figure 5.36: Driven Deflector

Removing the Driveline Deflector

Follow these steps to replace the driveline deflector:

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. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).
4. Locate the deflector (C) with the driveline in the center of it.
5. Remove the four bolts (A) that secure the driveline (B) and disc to the spindle.
6. Rotate the deflector (C) as required so the large opening in deflector faces you.
7. Remove the driveline (B) through the larger opening in the deflector.
8. remove spacer plate (D).

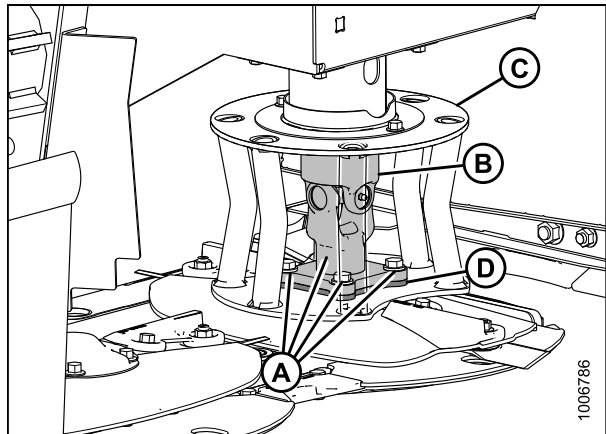


Figure 5.37: Driveline Deflector

MAINTENANCE AND SERVICING

- Loosen the four bolts (A) in the two plates (B) that hold the upper driveline shield (C) in place.
- Move the plates (B) so that shield (C) can be lowered into deflector (D).
- Remove the deflector (D).

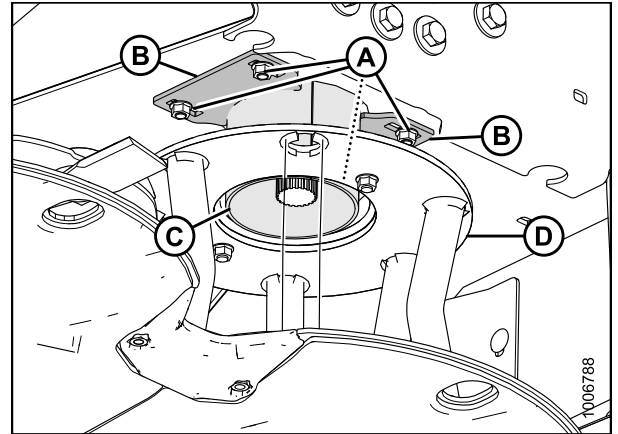


Figure 5.38: Driveline Deflector

Installing the Driveline Deflector

Follow these steps to replace the driveline deflector:

- Position the deflector (D) and upper driveline shield (C) onto spindle.
- Raise the upper driveline shield (C) into position and slide plates (B) into slots in shield. Do not tighten bolts.

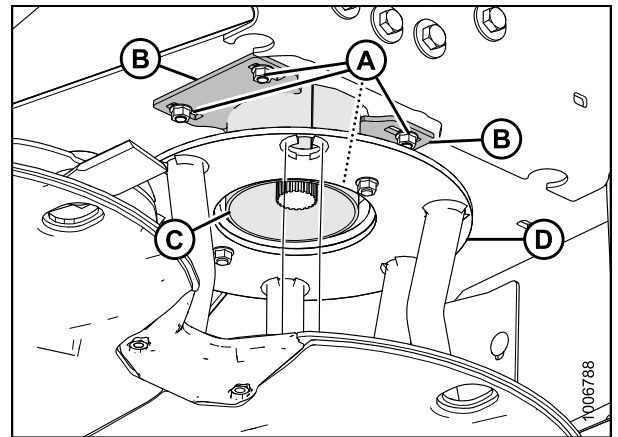


Figure 5.39: Driveline Deflector

- insert spacer (D) onto disc.
- Insert driveline (B) into deflector (C) and install onto shaft. Ensure that driveline (B) grease zerks will be accessible through large opening in deflector.
- Align mounting holes in deflector (C), spindle, and driveline (B) and reinstall four bolts (A). Tighten bolts.
- Adjust the upper driveline shield to achieve consistent gap around deflector shield (C).

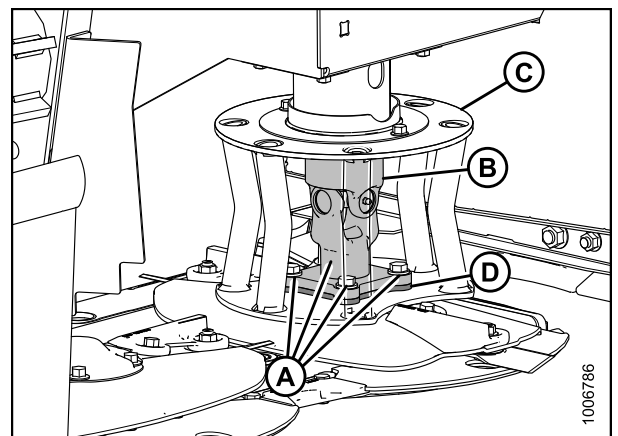


Figure 5.40: Driveline Deflector

MAINTENANCE AND SERVICING

7. Tighten bolts (A) on shield plates (B).
8. Remove block of wood (if used).
9. Manually rotate discs to check for interference of adjacent parts.
10. Close the cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

WARNING

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

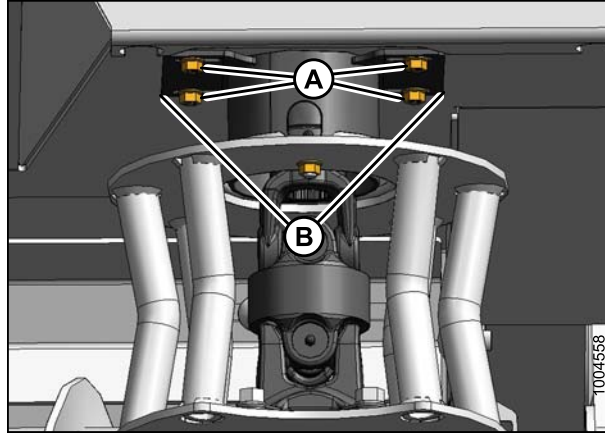


Figure 5.41: Driveline Deflector

5.4.9 Disc Spindles

To prevent damaging the cutterbar and drive systems, each disc is attached to a spindle which incorporates a key that shears if the disc contacts a large stone, a stump, or other large object. In the event of a sheared key, the disc stops rotating, but remains attached to the spindle.

Replacing a Spindle Key

Follow these steps to replace a spindle key:

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. Lower the header fully.
2. Stop the engine and remove key.
3. Open cutterbar doors. Refer to [3.5 Cutterbar Doors, page 30](#).

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. Remove disc (A) from failed spindle. Refer to [5.4.3 Removing a Cutterbar Disc, page 117](#).

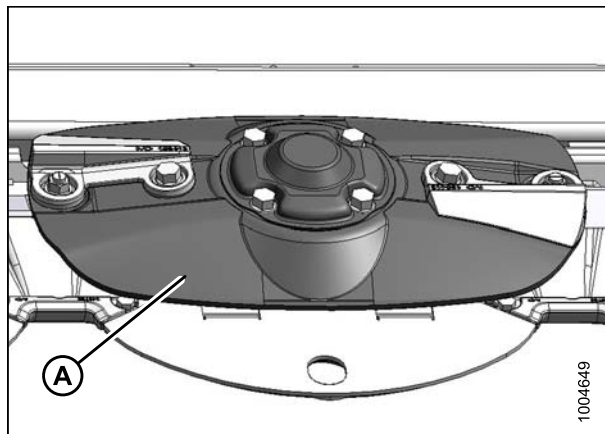


Figure 5.42: Cutter Disc

MAINTENANCE AND SERVICING

- Using a 34 mm socket wrench, remove nut (A) and washer (B) from spindle.

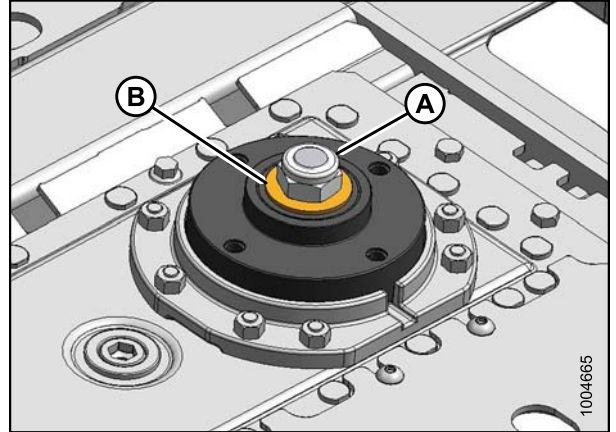


Figure 5.43: Cutterbar Spindle

- Install four M12 mm x 60 mm long bolts (A) into holes in plate (B).
- Use bolts (A) as jacking screws to remove plate (B) from gear. Remove bolts from plate.

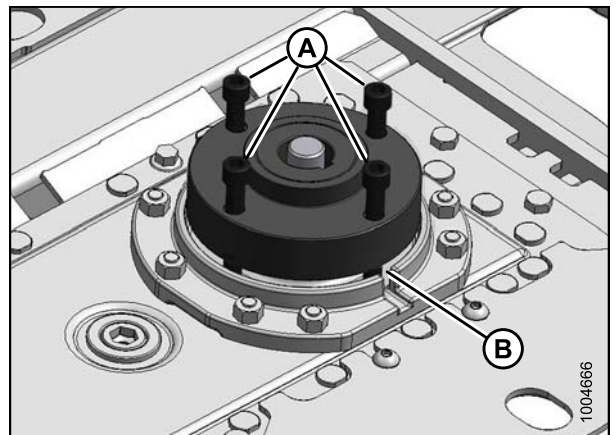


Figure 5.44: Cutterbar Spindle

- Pry out failed key (A) from gear (B) and plate.
- Thoroughly clean metal debris from disassembled components and cutterbar.

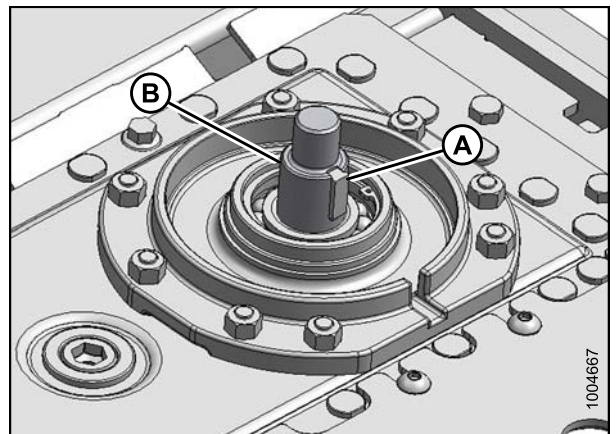


Figure 5.45: Cutterbar Spindle Gear

MAINTENANCE AND SERVICING

10. Inspect plate (C) and gear shaft (E) for damage. If seriously damaged, replace entire spindle assembly. Contact your MacDon Dealer.
11. Install new key (D) into gear (E) keyway as shown.
12. Align keyway in plate (C) with key in gear (E) and install plate (C) onto gear until sufficient threads are exposed to install washer (B) and nut (A).

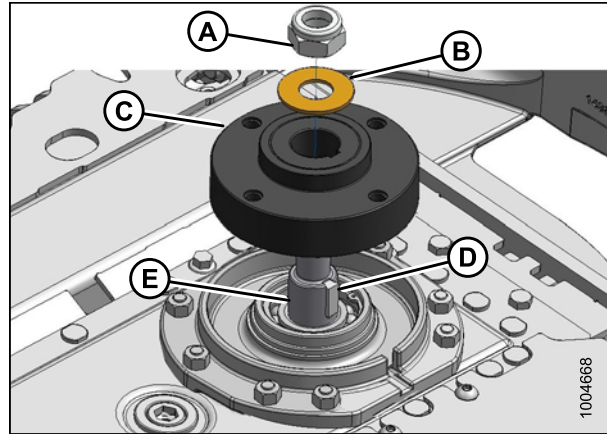


Figure 5.46: Cutterbar Spindle

13. Tighten nut (A) until plate is in final position. Torque nut to 440 N·m (325 ft·lbf).
14. Reinstall disc. Refer to [5.4.4 Installing a Cutterbar Disc, page 118](#).

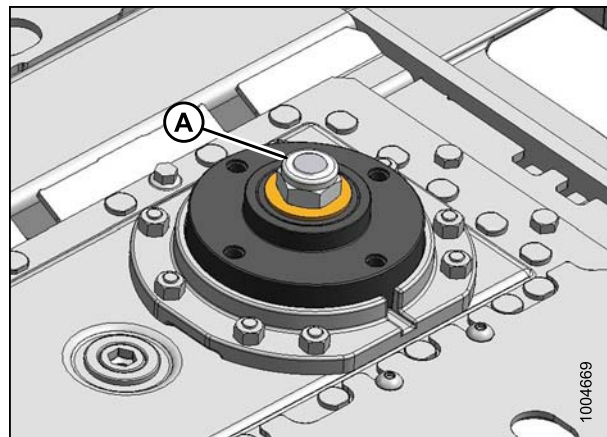


Figure 5.47: Cutterbar Spindle

5.4.10 Cutterbar Doors

Inspecting Curtains

Replace the curtains if they should become worn or damaged. Contact your Dealer for replacement instructions.

Inspecting Door Latches: Export Header

The cutterbar door latches should operate smoothly and remain engaged when the doors are down. Tighten latch hardware if loose. If the rubber bushing is damaged or does not allow the latch to operate properly, the latch should be replaced.

Adjusting Latches

Follow these steps to adjust the door latches:

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. Unlatch and lift curtain.

MAINTENANCE AND SERVICING

2. Loosen bolts (A) and move latch assembly to position as shown so that latch (B) engages pin.
3. Tighten bolts (A).
4. If necessary, loosen nut (C) and rotate latch (B) to position as shown.
5. Tighten nut (C).

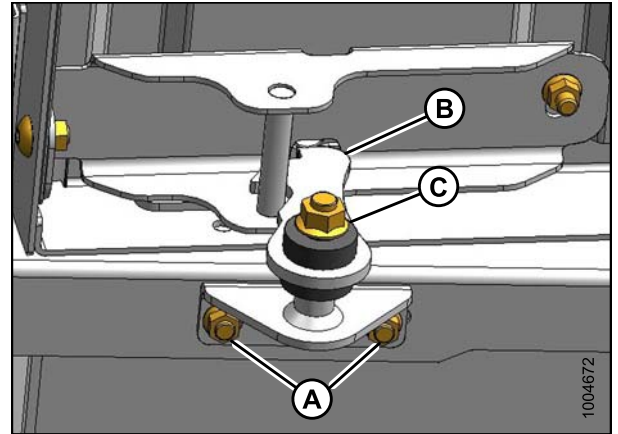


Figure 5.48: Cutterbar Door Latch

Replacing Latches

To replace cutterbar door latches, follow these steps:

1. Unlatch and lift curtain.
2. Remove bolts (A) and remove latch assembly from frame.
3. Locate new latch assembly on frame and reinstall bolts (A).
4. Adjust to position shown and tighten bolts (A).

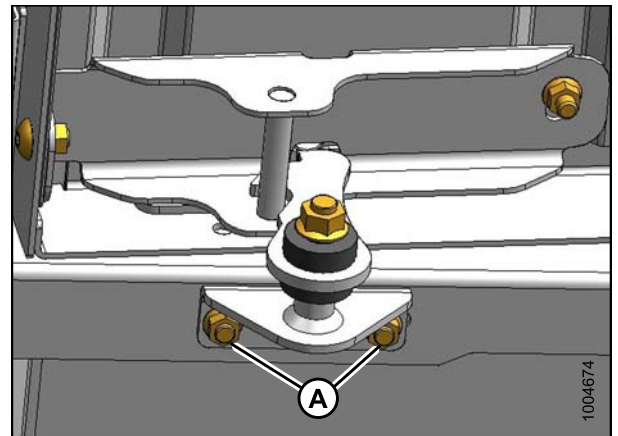


Figure 5.49: Cutterbar Door Latch

MAINTENANCE AND SERVICING

Replacing Latch Brackets

To replace the cutterbar door latch brackets, follow these steps:

1. Open cutterbar door.
2. Remove bolts (A), washers, and nuts, and remove latch bracket (B) from door.
3. Locate new latch bracket (B) on door and reinstall bolts (A), washers, and nuts. Use three washers on aft bolt as spacers between bracket (B) and door.
4. Close door and check alignment with latch. Adjust as necessary and tighten bolts (A).

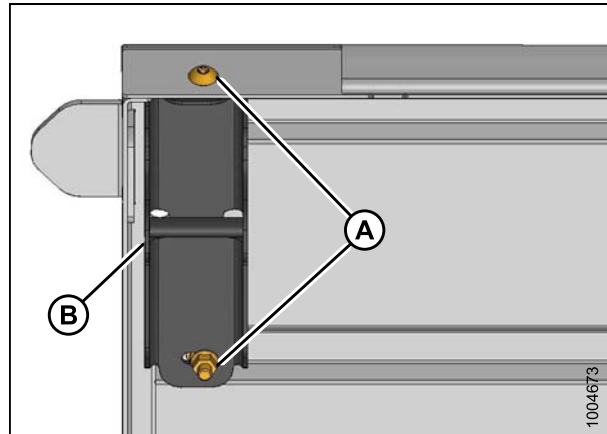


Figure 5.50: Latch Bracket

5.5 Drive Systems

5.5.1 Bevel Gearbox

The bevel gearbox (A), which transfers power from the hydraulic motor to the header drives, is located inside the drive compartment at the left end of the header.

If repairs are required, it should be removed and serviced at your Dealer.

The only regular servicing required is maintaining the lubricant level and changing the lubricant according to the intervals specified in this manual. Refer to [5.3.1 Maintenance Schedule/Record, page 101](#).

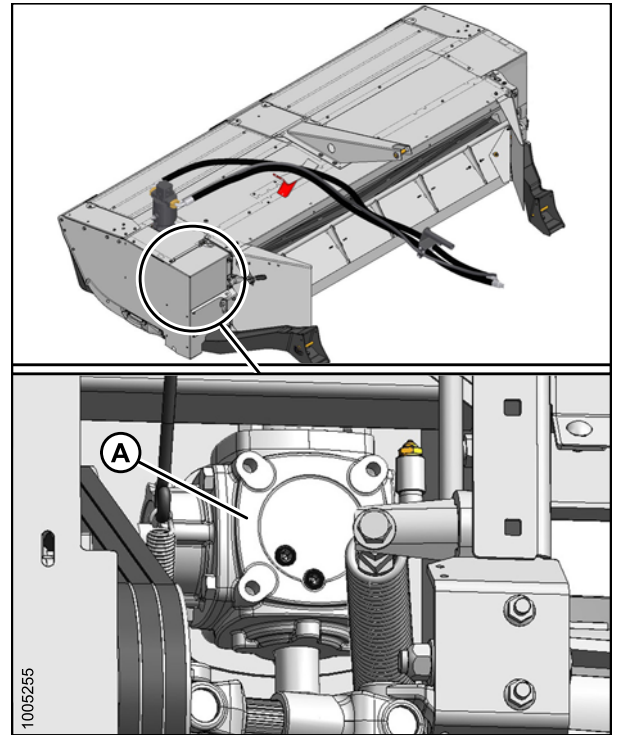


Figure 5.51: Bevel Gearbox

Changing the Bevel Gearbox Lubricant

Follow these steps to change the bevel gearbox lubricant:

⚠ 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. Drain the gearbox when the lubricant is warm. If the lubricant is cold, idle the machine for about 10 minutes prior to draining.
2. Raise the header fully.
3. Stop the engine and remove the key.
4. Engage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
5. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).

MAINTENANCE AND SERVICING

6. Place a suitable container under drain plug (A).
7. Remove plug (A).
8. Allow sufficient time for lubricant to drain.
9. Disengage header safety props. Refer to [3.3 Engaging/Disengaging the Header Safety Props, page 26](#).
10. Start engine, and lower the header until the gearbox is level with the ground.
11. Stop the engine and remove the key.
12. Install plug (A).
13. Remove breather and bushing from filler elbow (B).
14. Add gear lubricant to gearbox through elbow (B). Lubricant should slightly run out of port (C) when at the proper level. Refer to [5.2 Recommended Fluids and Lubricants, page 100](#) for quantity and specification.
15. Install plug (C), bushing and breather (B), and tighten.
16. Properly dispose of used lubricant and clean up any spilled lubricant.
17. Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

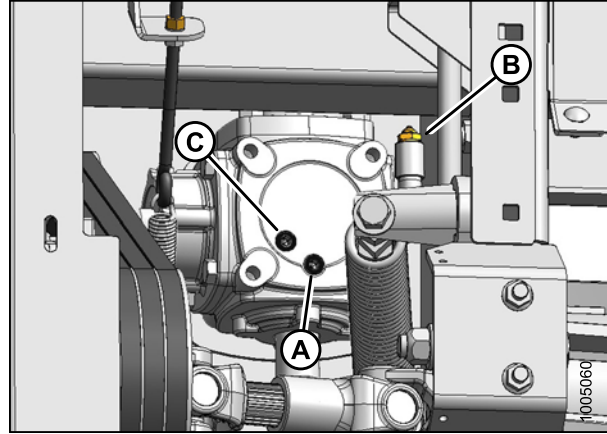


Figure 5.52: Bevel Gearbox

5.5.2 Conditioner Drive Belt

Inspecting the 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 the machine, always stop the engine and remove the key from the ignition before leaving the operator's seat for any reason.

1. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).

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4. Check that adjuster nuts (A) and (B) are tight.

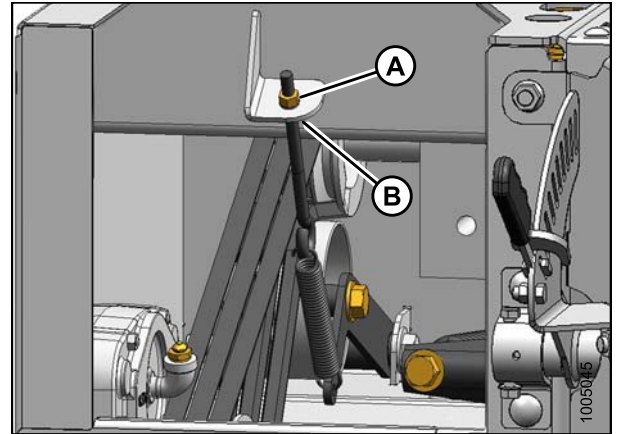


Figure 5.53: Conditioner Drive Belt Adjuster

5. When properly tensioned, tensioner spring (A) should measure approximately 141–151 mm (5-9/16 to 5-15/16 in.) in length.

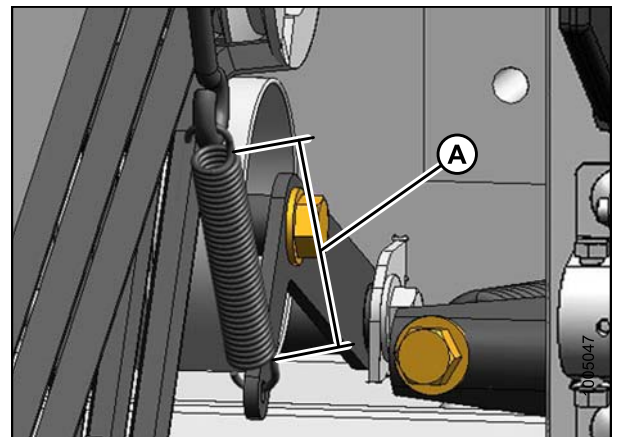


Figure 5.54: Drive Belt Tensioner Spring

6. If necessary, adjust tension as follows:
 - a. Loosen jam nut (B).
 - b. Turn nut (A) clockwise to increase spring length (increase tension).
 - c. Turn nut (A) counterclockwise to decrease spring length (decrease tension).
7. Tighten jam nut (B).
8. Close the driveshield. Refer to [3.4 Driveshields, page 28](#).

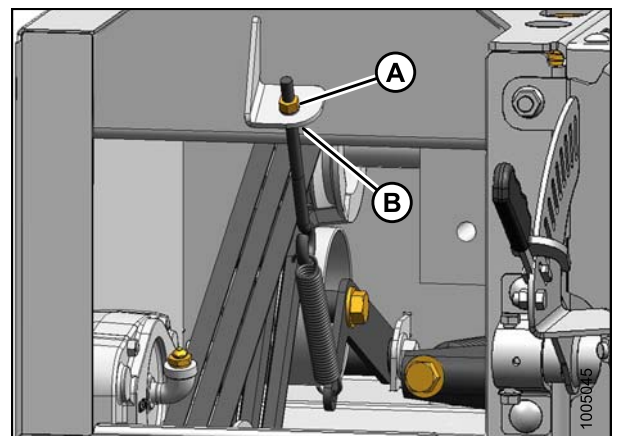


Figure 5.55: Conditioner Drive Belt Adjuster

Replacing the Conditioner Drive Belt

Follow these steps to replace the conditioner drive belt:

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:

Change all three belts when replacing as they are a matched set.

1. Lower the header fully.
2. Stop the engine and remove the key.
3. Open the driveshield. Refer to [3.4 Driveshields, page 28](#).
4. Remove three bolts (A), then remove lower shield (B).

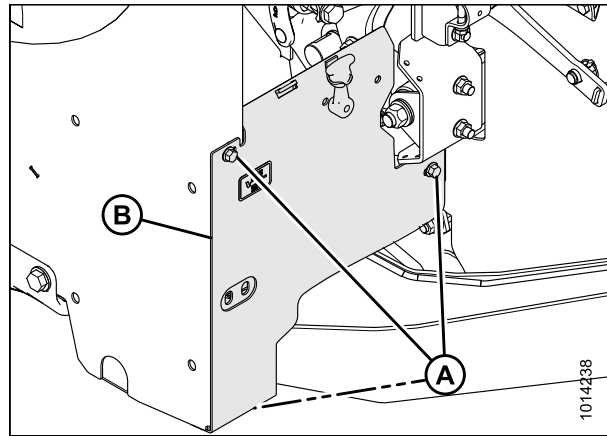


Figure 5.56: Driveshield

5. Release tension on conditioner drive belt (A).
6. Remove conditioner drive belt (A) from drive pulley (B). Tensioner (C) can be forced away from belt to ease removal.

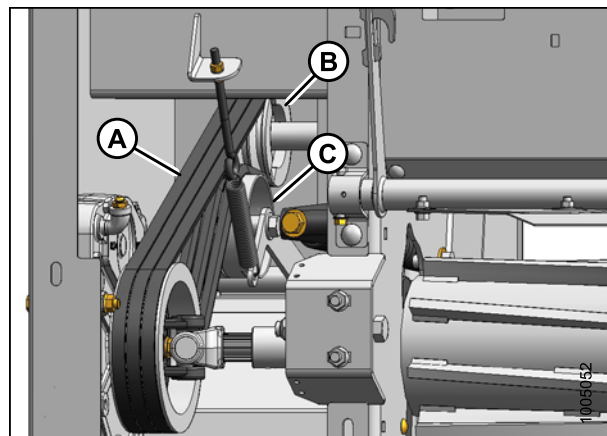


Figure 5.57: Conditioner Drive Belt

MAINTENANCE AND SERVICING

7. Remove the four bolts (A) and washers attaching upper driveline to driven pulley (B) and slide driveline away from pulley.
8. Remove drive belt (C) from driven pulley.

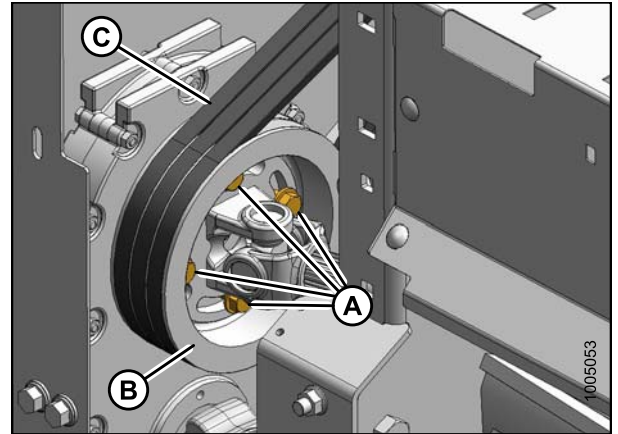


Figure 5.58: Conditioner Drive Belt

9. Install new belts (A) onto driven pulley (B) first and then onto drive pulley (D), ensure belts are in the pulley grooves.
10. Tension belt (A).

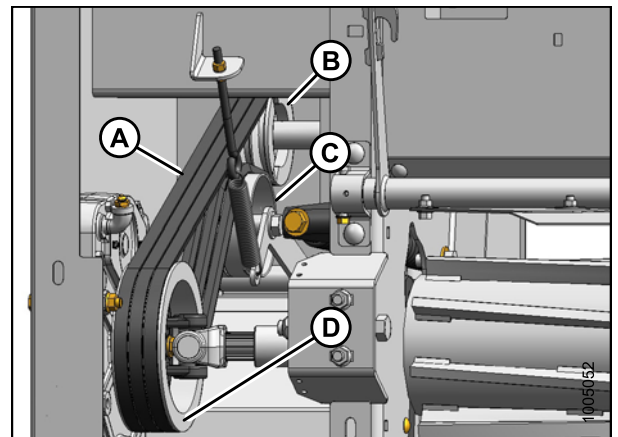


Figure 5.59: Conditioner Drive Belt

11. Reattach upper driveline to driven pulley (B) with bolts and washers (A). Check roll timing before fully tightening bolts. Refer to [4.4.1 Checking Roll Timing, page 79](#).
12. Torque bolts to 102 N·m (75 ft·lbf).

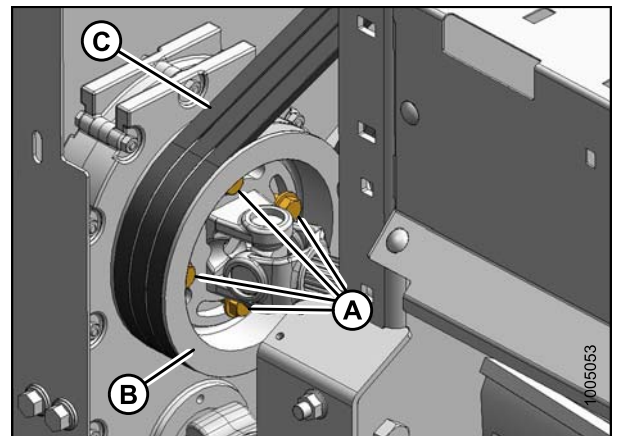


Figure 5.60: Conditioner Drive Belt

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13. Install the lower shield (B). Secure with three bolts (A).
14. Close the driveshield. Refer to [3.4 Driveshields](#), page 28.

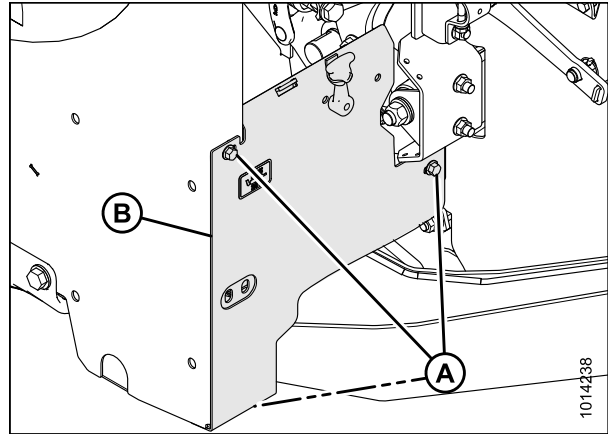


Figure 5.61: Driveshield

5.5.3 Conditioner Gearbox

The conditioner gearbox (A), which transfers power from the bevel gearbox to the conditioner rolls, is located inside the drive compartment at the left end of the header.

The only regular servicing required is maintaining the lubricant level and changing the lubricant according to the intervals specified in this manual. Refer to [5.3.1 Maintenance Schedule/Record](#), page 101.

If repairs are required, the conditioner gearbox should be removed and serviced at your MacDon Dealer.

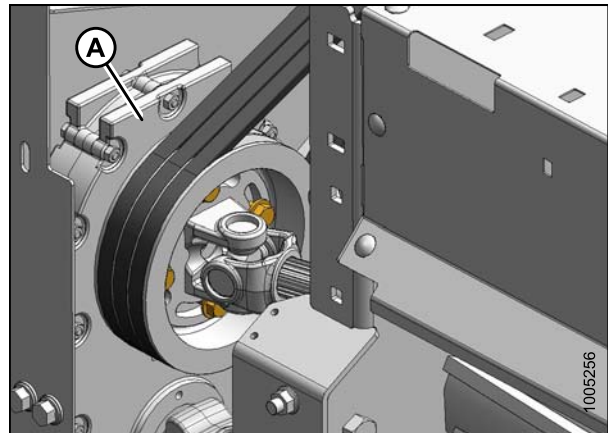


Figure 5.62: Conditioner Gearbox

5.5.4 Gearbox Speed Sensor

The gearbox speed sensor monitors the rotational speed of the gearbox output shaft and sends a signal to the system monitor in the operator's station that is displayed as disc speed.

The sensor does not require regular maintenance; if it malfunctions or is damaged, it can be easily adjusted or replaced.

Adjusting the Gearbox Speed Sensor

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. Lower header to ground, turn off engine, and remove key.

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2. Loosen bolts (A) and slide cover (B) off opening.

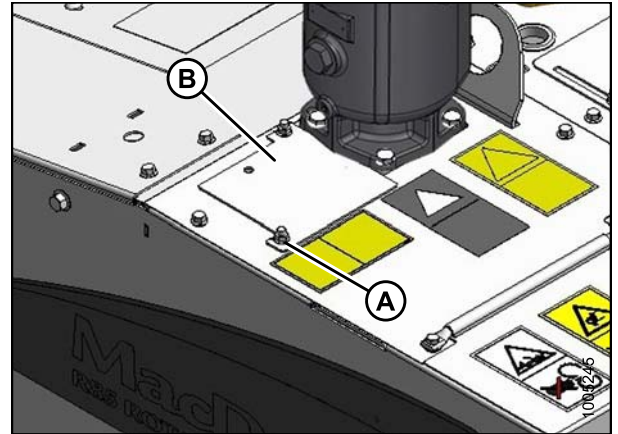


Figure 5.63: Gearbox

3. Check gap (E) between sensor (A) and pulley. If required, adjust gap by loosening bolts (B) and moving bracket (C) to achieve 2 mm (0.08 in.) gap (E). When correct gap is achieved, tighten bolts (B).
4. Check position of sensor. If required, adjust position by loosening bolt (D) and moving sensor to align it with rim of pulley.

NOTE:

Top panel removed for clarity.

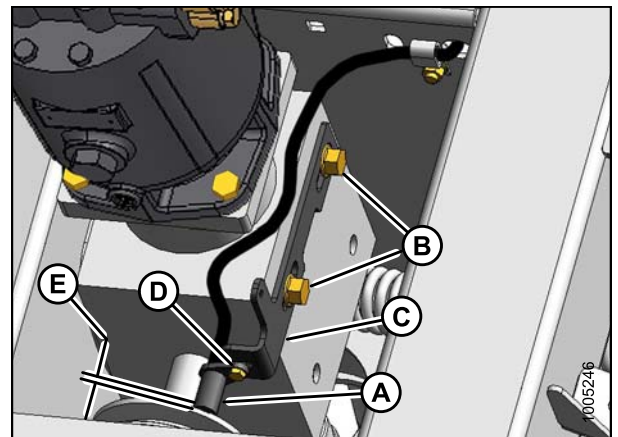


Figure 5.64: Gearbox Speed Sensor

Replacing the Gearbox Speed Sensor

1. Loosen bolts (A) and remove the cover (B).

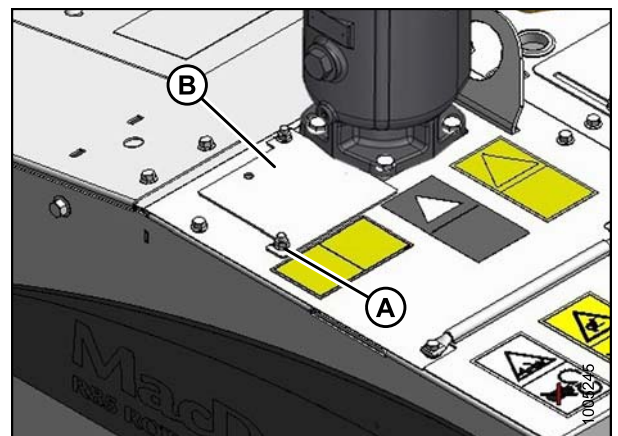


Figure 5.65: Gearbox Cover

MAINTENANCE AND SERVICING

2. Disconnect the sensor wire from the header wiring harness at connector (A).
3. Remove bolt through clip (B).
4. Pull the harness through grommet and into the drive compartment.
5. Remove nut and bolt (C) securing sensor (D) to bracket and remove the sensor.
6. Install the new sensor (D) onto the bracket with bolt and nut (C). Ensure sensor is aligned with the pulley rim.
7. Check that gap between sensor and pulley is 2 mm (0.08 in.). Adjust as required.
8. Route connector and harness through hole in the frame and through grommet in cover.
9. Connect sensor wiring to existing connector (A).
10. Reinstall cover (B) and secure with bolts (A).

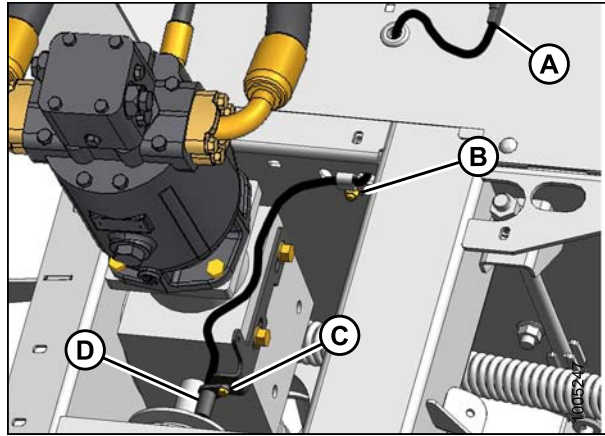


Figure 5.66: Gearbox Speed Sensor

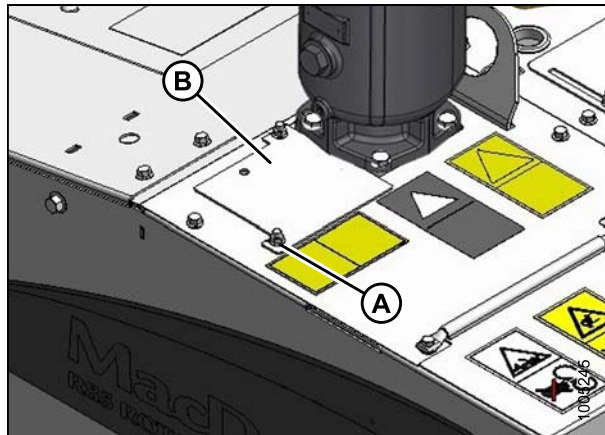


Figure 5.67: Gearbox Cover

5.6 Hydraulics

Refer to your windrower operator's manual for hydraulic system maintenance procedures.

5.6.1 Hydraulic Motor

The hydraulic motor does not require regular maintenance or servicing. If repairs are required, it should be serviced at your Dealer.

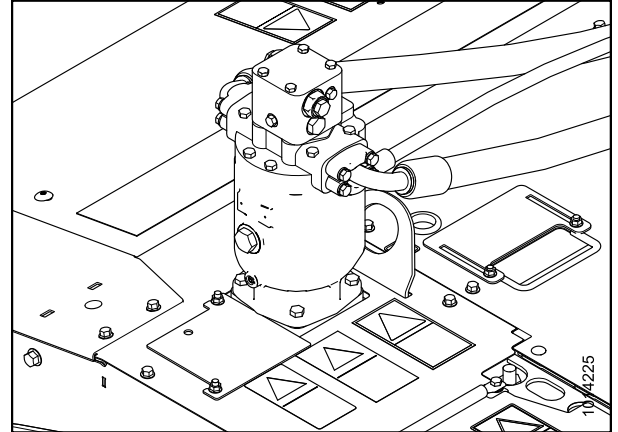


Figure 5.68: Hydraulic Motor

Removing the Hydraulic Motor

Follow these steps to remove the hydraulic motor:

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. If the machine is connected to the windrower, lower header to ground.
2. Stop the engine and remove the key.
3. Disconnect case drain hose (A) from motor (B).
4. Disconnect pressure and return hoses at fittings (C).

IMPORTANT:

To protect the motor from contamination and prevent spillage of excess fluid, install caps and plugs on open fittings and hoses.

5. Remove four bolts (D).
6. Use a sling and a lifting device to remove the motor.

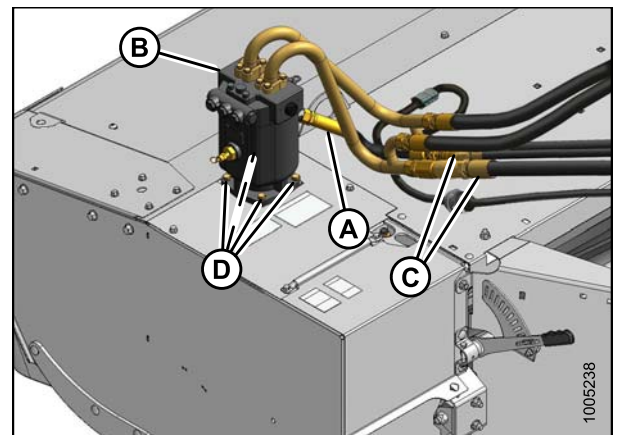


Figure 5.69: Hydraulic Motor (M200 Shown)

MAINTENANCE AND SERVICING

7. Cover gearbox opening (A) with a rag or plastic.

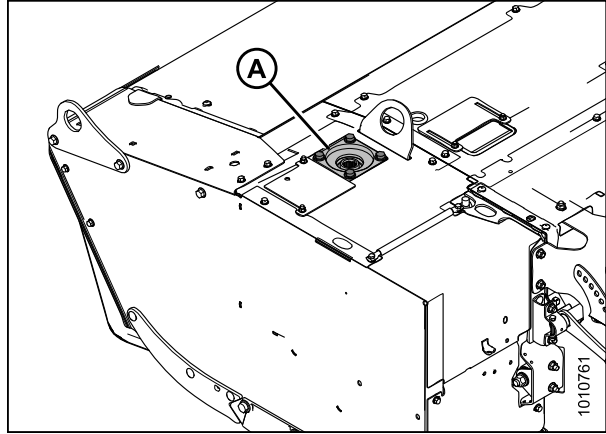


Figure 5.70: Hydraulic Motor Removed

Installing the Hydraulic Motor

Follow these steps to install the hydraulic motor:

1. Remove covering from gearbox opening (A).
2. Attach a sling to the motor with the opposite end to a lifting device.

NOTE:

Do not lift the motor with hydraulic lines.

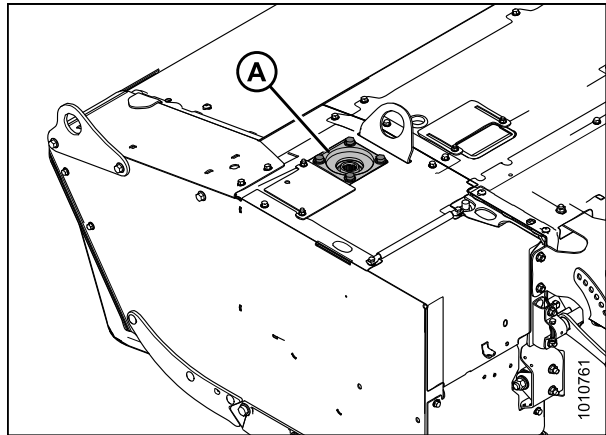


Figure 5.71: Hydraulic Motor Removed

3. Lower the motor (B) on gearbox opening.
4. Install four bolts (D). Torque to 140 N·m (103 ft·lbf).
5. Remove caps from motor ports and hoses and reconnect hoses (A and C) to motor.

NOTE:

Hydraulic connections vary depending on the windrower. Refer to the specific instructions supplied with your hydraulic drive kit.

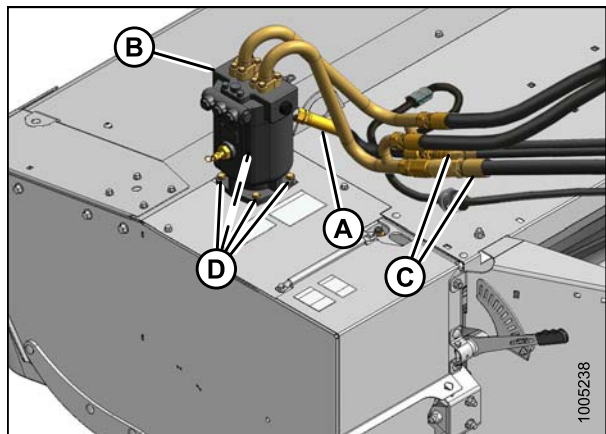


Figure 5.72: Hydraulic Motor (M200 Shown)

5.6.2 Hydraulic Hoses and Lines

Check hydraulic hoses and lines daily for signs of leaks.

WARNING

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

IMPORTANT:

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



Figure 5.73: Hydraulic Pressure Hazard

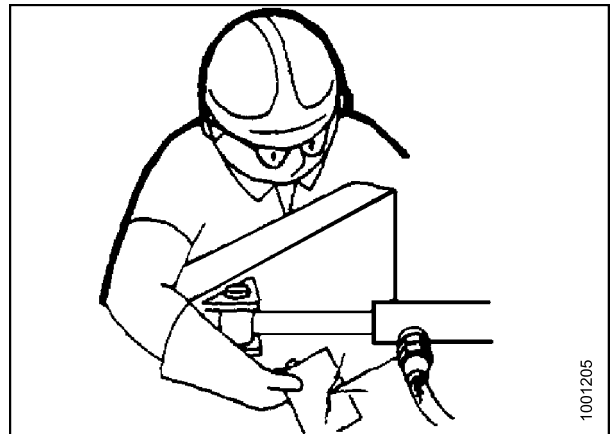


Figure 5.74: Testing for Hydraulic Leaks

6 Options and Attachments

6.1 Options and Attachments: Kits

The following kits are available through your MacDon Dealer. The Dealer will require the “B” number for pricing and availability.

6.1.1 Cutterbar Repair Tool Kit

The cutterbar repair tool kit contains the tools required to replace the cutterbar idler gears.

MD #B4905

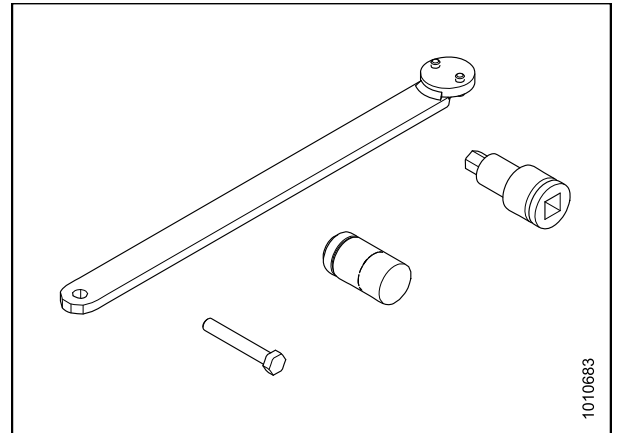


Figure 6.1: MD #B4905

6.1.2 Double Windrow Attachment (DWA)

Allows auger, and draper headers (without deck shift) to lay a double windrow when installed on a self-propelled windrower. The kit includes a draper deck, linkage assembly, hydraulics, and installation instructions.

MD #C1987 consists of:

- MD #B5973 Deck
- MD #B5974 Linkage assembly
- MD #B5301 Hydraulic kit
- Double Windrow Attachment (DWA) manual

OPTIONS AND ATTACHMENTS

6.1.3 Skid Shoes

MD #B5457

Instruction Part Number: MD #169465

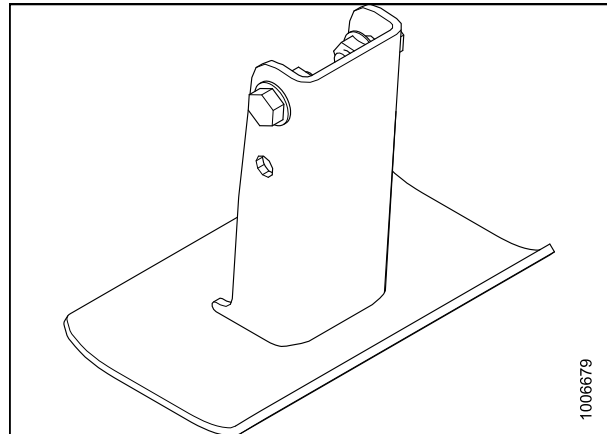


Figure 6.2: MD #B5457

6.1.4 Tall Crop Divider Kit

The tall crop dividers attach to the ends of the header for clean crop dividing and reel entry in tall crops. The kit includes left and right dividers and attachment hardware.

MD #B5509

Instruction Part Number: MD #169485

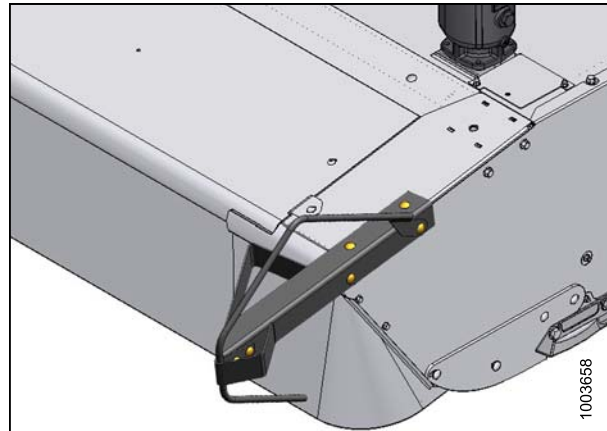


Figure 6.3: MD #B5509

7 Troubleshooting

7.1 HeaderPerformance

Symptom	Problem	Solution	Refer to
Cutterbar plugging	Dull, bent, or badly worn blades	Replace blades.	Replacing the Cutterblades, page 123
	Build-up of dirt between rock guards	Decrease header angle and increase flotation. In some conditions, it may be necessary to carry header slightly with header lift cylinders.	4.6 Header Angle, page 85 and 4.1 Header Float, page 73
	Conditioner drive belt slipping	Adjust conditioner drive belt tension.	Replacing the Conditioner Drive Belt, page 140
Ragged or uneven cutting of crop	Header angle too flat for guards to pick up down crop	Increase header angle.	4.6 Header Angle, page 85
	Downed crop	Adjust header angle to cut closer to ground.	
	Header flotation too light, causing bouncing	Adjust to heavier float setting.	4.1 Header Float, page 73
	Excessive ground speed	Reduce ground speed.	4.9 Ground Speed, page 88
Strips of uncut crop left on field	Bent cutterblades	Replace blades.	Replacing the Cutterblades, page 123
	Build-up of dirt between rock guards	Decrease header angle and increase flotation.	4.6 Header Angle, page 85 and 4.1 Header Float, page 73
	Excessive header speed	Reduce header disc speed.	4.8 Disc Speed, page 87
	Foreign object on cutterbar	Disengage header and stop the engine. When all moving parts are completely stopped, remove foreign object.	4.15 Unplugging the Header, page 97
	Disc not turning	Replace spindle key.	Replacing a Spindle Key, page 132
	Ground speed too slow	Increase ground speed.	4.9 Ground Speed, page 88

TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
Conditioner rolls plugging	Ground speed too fast	Reduce ground speed.	4.9 Ground Speed, page 88
	Roll gap too large for proper feeding	Decrease roll gap.	4.2.2 Adjusting Roll Gap, page 76
	Roll gap too small in thick-stemmed cane-type crops	Increase roll gap.	
	Swath baffle set too low	Raise swath baffle.	4.5.3 Adjusting the Swath Baffle, page 83
	Roll speed too low	Increase disc speed.	4.8 Disc Speed, page 87
	Foreign object between rolls	Disengage header and stop the engine. When all moving parts are completely stopped, remove foreign object.	4.15 Unplugging the Header, page 97
	Cutting height too low	Decrease header angle to raise cutting height.	4.6 Header Angle, page 85
	Backing into windrow	Raise the header before backing up.	—
	Rolls improperly timed	Adjust roll timing.	4.4.2 Adjusting Roll Timing, page 80
Uneven formation and bunching of windrow	Rear deflector bypassing or dragging crop	Adjust rear deflector for proper crop control.	4.5.2 Adjusting the Rear Deflector (Fluffer Shield), page 83
	Forming shields improperly adjusted	Adjust forming shields.	4.5 Forming Shields, page 81
	Roll gap too large	Adjust roll gap.	4.2.2 Adjusting Roll Gap, page 76
	Conditioner rolls running too slow	Maintain rated header speed.	Refer to windrower operator's manual
Uneven windrow formation in light crop	Uneven feeding	Reduce header speed.	
Plugging behind end hourglass deflectors	Ground speed too slow	Increase ground speed.	4.9 Ground Speed, page 88
Not cutting short enough in down crop	Ground speed too fast	Reduce ground speed.	
	Broken, bent, or dull blades	Replace blades or turn blades over.	Replacing the Cutterblades, page 123
	Cutting height too high	Adjust header angle steeper to lower cutting height if field conditions allow.	4.6 Header Angle, page 85

TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
Material being pulled out by roots when cutting. Tall crop leaning into machine	Crop in conditioner rolls before crop is cut	Increase roll gap.	4.2.2 Adjusting Roll Gap, page 76
Damaged leaves and broken stems	Insufficient roll gap	Check roll timing and adjust if necessary.	4.4 Roll Timing, page 79 and 4.4.2 Adjusting Roll Timing, page 80
	Roll timing off		
Slow crop drying	Crop is bunched in windrow	Adjust forming shields/baffle.	4.5 Forming Shields, page 81
	Rolls not crimping crop sufficiently	Decrease roll gap.	4.2.2 Adjusting Roll Gap, page 76
Excessive drying or bleaching of crop	Excessive crimping	Increase roll gap.	4.5 Forming Shields, page 81
	Crop is spread too wide in windrow	Adjust forming shields.	
Poorly formed or bunchy windrows	Forming shields not properly adjusted		
Cutting height varies from one side to the other	Float not properly balanced	Adjust header float.	4.1 Header Float, page 73

TROUBLESHOOTING

7.2 Mechanical Problems

Symptom	Problem	Solution	Refer to
Excessive noises	Bent cutterblade	Replace blade.	Replacing the Cutterblades, page 123
	Conditioner roll timing off	Check roll timing and adjust if necessary.	4.4.1 Checking Roll Timing, page 79 and 4.4 Roll Timing, page 79
	Bent cage deflector	Replace deflector.	5.4.8 Rotary Deflectors, page 128
	Conditioner roll gap too small	Check gap and adjust if necessary.	4.2.2 Adjusting Roll Gap, page 76
Excessive vibration or noise in header	Mud deposits on conditioner rolls	Clean rolls.	—
	Conditioner rolls contacting each other	Increase roll gap.	4.2.2 Adjusting Roll Gap, page 76
		Check roll timing.	4.4.1 Checking Roll Timing, page 79
Excessive heat in cutterbar	Too much lubricant in cutterbar	Drain lubricant and refill with specified amount.	Draining the Cutterbar Lubricant, page 111
Frequent blade damage	Mud on cutterbar	Remove mud from cutterbar: do NOT allow mud to dry on cutterbar.	—
	Spindle bearing failure	Replace spindle bearing.	See MacDon Dealer
	Material wrapped around spindle	Remove disc and remove material.	5.4.3 Removing a Cutterbar Disc, page 117
	Cutting too low in rocky field conditions	Decrease header angle: increase flotation.	4.6 Header Angle, page 85 and 4.1.2 Adjusting Float, page 74
	Header float set too heavy	Increase flotation.	4.1.2 Adjusting Float, page 74
	Ground speed too high in rocky field conditions. At high ground speed, header tends to dig rocks from ground instead of floating over them	Reduce ground speed.	4.9 Ground Speed, page 88
	Blade incorrectly mounted	Check all blade mounting hardware and ensure blades are free to move.	Inspecting Cutterblade Hardware, page 121

TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
Excessive wear of cutting components	Header angle too steep	Reduce header angle.	4.6 Header Angle, page 85
	Crop residue and dirt deposits on cutterbar	Clean cutterbar.	—
	Mud on cutterbar	Remove mud from cutterbar: do NOT allow mud to dry on cutterbar.	
Machine pulling to one side	Header dragging on one end and pulling to that side	Adjust header flotation on both ends.	4.1.2 Adjusting Float, page 74
Breakage of conditioner drive belt	Belt not in proper groove in pulley	Move belt to proper groove.	Replacing the Conditioner Drive Belt, page 140
	Foreign object between rolls	Disengage header and stop the engine. When all moving parts are completely stopped, remove foreign object.	—
	Belt pulleys and idlers misaligned	Align pulleys and idler.	See MacDon Dealer
Disc does not turn when engaging header	Mud on cutterbar	Remove mud from cutterbar: do NOT allow mud to dry on cutterbar.	—
	Hoses not connected	Connect hoses.	3.7 Attaching the Header, page 37
	Faulty drive belt	Check drive belt pulleys.	Inspecting the Conditioner Drive Belt, page 138
	Poor electrical connection at pump solenoid	Check connection at windrower.	Refer to windrower operator's manual
Header slows when going uphill	Hydraulic oil level in windrower is low	Add oil to windrower reservoir.	
Header runs while unloaded, but slows or stops when starting to cut	Defective hydraulic motor	Repair/replace hydraulic motor.	See MacDon Dealer
	Defective hydraulic pump in windrower	Repair/replace pump.	
	Defective relief valve in windrower	Repair/replace relief valve.	
	Cold oil in hydraulic drive system	Reduce ground speed until oil reaches operating temperature.	4.9 Ground Speed, page 88

8 Reference

8.1 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.

8.1.1 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 8.1 SAE Grade 5 Bolt and Grade 5 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	11.9	13.2	*106	*117
5/16-18	24.6	27.1	*218	*241
3/8-16	44	48	32	36
7/16-14	70	77	52	57
1/2-13	106	118	79	87
9/16-12	153	170	114	126
5/8-11	212	234	157	173
3/4-10	380	420	281	311
7/8-9	606	669	449	496
1-8	825	912	611	676

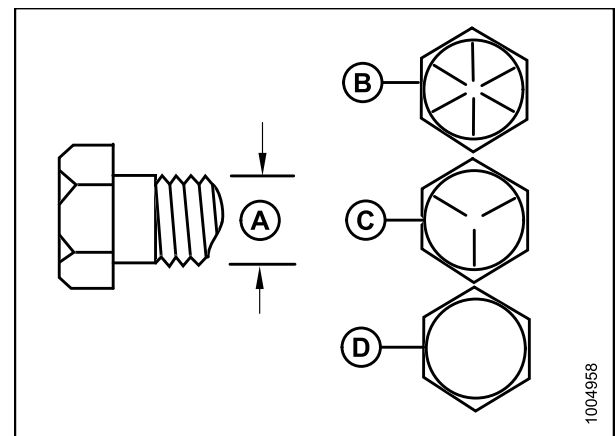


Figure 8.1: Bolt Grades

A - Nominal Size
C - SAE-5

B - SAE-8
D - SAE-2

REFERENCE

Table 8.2 SAE Grade 5 Bolt and Grade F Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	8.1	9	*72	*80
5/16-18	16.7	18.5	*149	*164
3/8-16	30	33	22	24
7/16-14	48	53	35	39
1/2-13	73	80	54	59
9/16-12	105	116	77	86
5/8-11	144	160	107	118
3/4-10	259	286	192	212
7/8-9	413	456	306	338
1-8	619	684	459	507

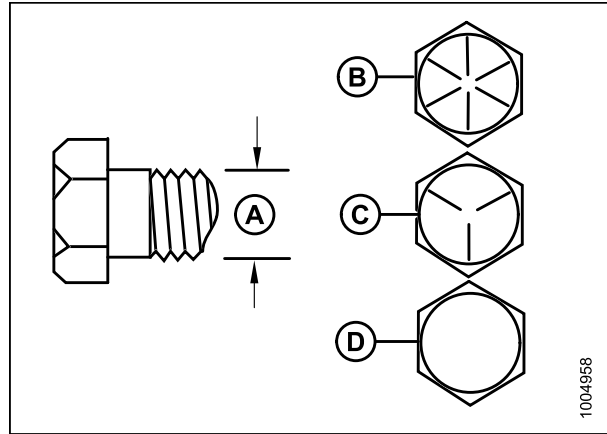


Figure 8.2: Bolt Grades

A - Nominal Size
 B - SAE-8
 C - SAE-5
 D - SAE-2

Table 8.3 SAE Grade 8 Bolt and Grade G Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	16.8	18.6	*150	*165
5/16-18	24	26	18	19
3/8-16	42	46	31	34
7/16-14	67	74	50	55
1/2-13	102	113	76	84
9/16-12	148	163	109	121
5/8-11	204	225	151	167
3/4-10	362	400	268	296
7/8-9	583	644	432	477
1-8	874	966	647	716

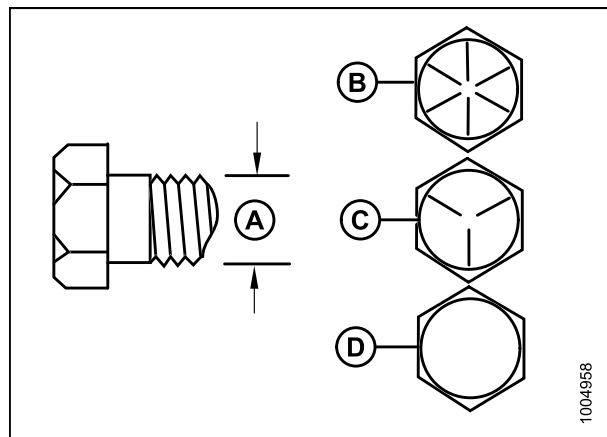


Figure 8.3: Bolt Grades

A - Nominal Size
 B - SAE-8
 C - SAE-5
 D - SAE-2

REFERENCE

Table 8.4 SAE Grade 8 Bolt and Grade 8 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	16.8	18.6	*150	*165
5/16-18	35	38	26	28
3/8-16	61	68	46	50
7/16-14	98	109	73	81
1/2-13	150	166	111	123
9/16-12	217	239	160	177
5/8-11	299	330	221	345
3/4-10	531	587	393	435
7/8-9	855	945	633	700
1-8	1165	1288	863	954

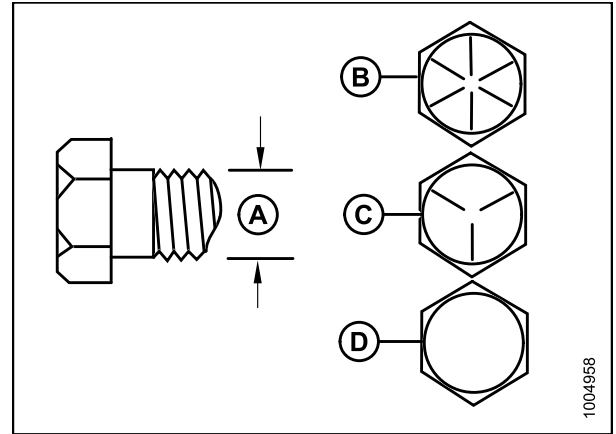


Figure 8.4: Bolt Grades

A - Nominal Size
C - SAE-5

B - SAE-8
D - SAE-2

8.1.2 Metric Bolt Specifications

Table 8.5 Metric Class 8.8 Bolts and Class 9 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.4	1.6	*13	*14
3.5-0.6	2.2	2.5	*20	*22
4-0.7	3.3	3.7	*29	*32
5-0.8	6.7	7.4	*59	*66
6-1.0	11.4	12.6	*101	*112
8-1.25	28	30	20	23
10-1.5	55	60	40	45
12-1.75	95	105	70	78
14-2.0	152	168	113	124
16-2.0	236	261	175	193
20-2.5	460	509	341	377
24-3.0	796	879	589	651

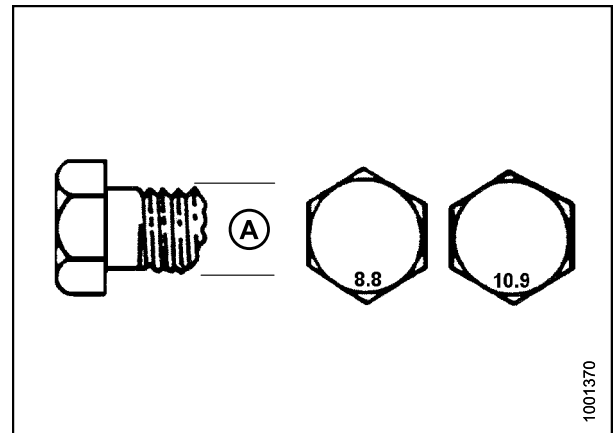


Figure 8.5: Bolt Grades

REFERENCE

Table 8.6 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1	1.1	*9	*10
3.5-0.6	1.5	1.7	*14	*15
4-0.7	2.3	2.5	*20	*22
5-0.8	4.5	5	*40	*45
6-1.0	7.7	8.6	*69	*76
8-1.25	18.8	20.8	*167	*185
10-1.5	37	41	28	30
12-1.75	65	72	48	53
14-2.0	104	115	77	85
16-2.0	161	178	119	132
20-2.5	314	347	233	257
24-3.0	543	600	402	444

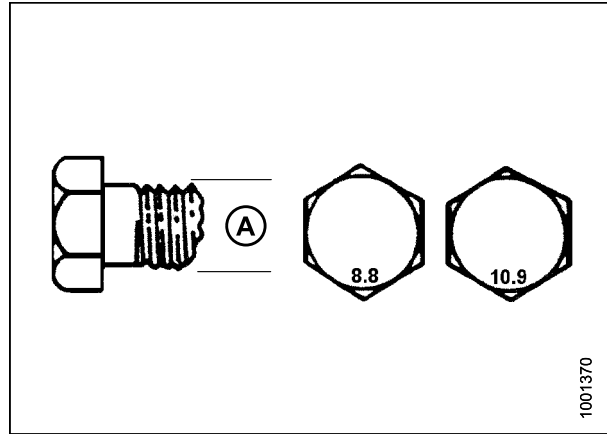


Figure 8.6: Bolt Grades

Table 8.7 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.8	2	*18	*19
3.5-0.6	2.8	3.1	*27	*30
4-0.7	4.2	4.6	*41	*45
5-0.8	8.4	9.3	*82	*91
6-1.0	14.3	15.8	*140	*154
8-1.25	38	42	28	31
10-1.5	75	83	56	62
12-1.75	132	145	97	108
14-2.0	210	232	156	172
16-2.0	326	360	242	267
20-2.5	637	704	472	521
24-3.0	1101	1217	815	901

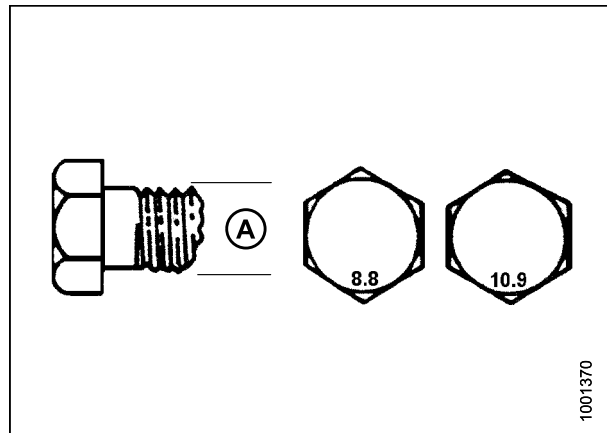


Figure 8.7: Bolt Grades

REFERENCE

Table 8.8 Metric Class 10.9 Bolts and Class 10 Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.3	1.5	*12	*13
3.5-0.6	2.1	2.3	*19	*21
4-0.7	3.1	3.4	*28	*31
5-0.8	6.3	7	*56	*62
6-1.0	10.7	11.8	*95	*105
8-1.25	26	29	19	21
10-1.5	51	57	38	42
12-1.75	90	99	66	73
14-2.0	143	158	106	117
16-2.0	222	246	165	182
20-2.5	434	480	322	356
24-3.0	750	829	556	614

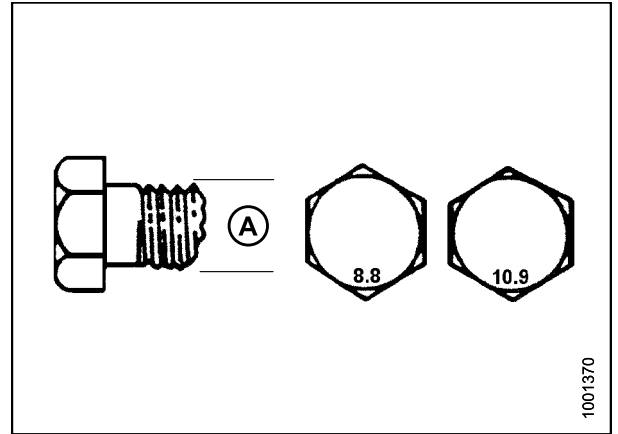


Figure 8.8: Bolt Grades

8.1.3 Metric Bolt Specifications Bolting into Cast Aluminum

Table 8.9 Metric Bolt Bolting into Cast Aluminum

Nominal Size (A)	Bolt Torque			
	8.8 (Cast Aluminum)		10.9 (Cast Aluminum)	
	N·m	ft·lbf	N·m	ft·lbf
M3	–	–	–	1
M4	–	–	4	2.6
M5	–	–	8	5.5
M6	9	6	12	9
M8	20	14	28	20
M10	40	28	55	40
M12	70	52	100	73
M14	–	–	–	–
M16	–	–	–	–

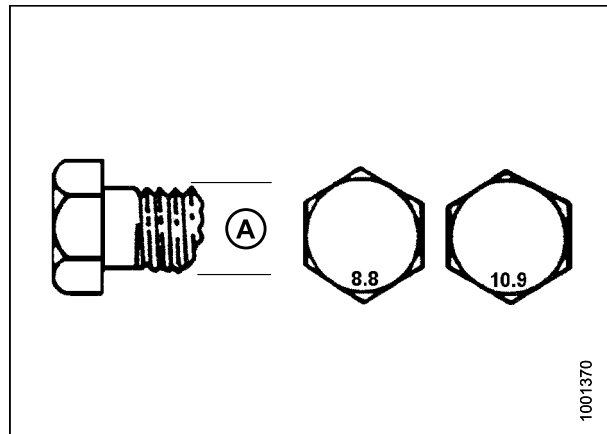


Figure 8.9: Bolt Grades

8.1.4 Flare-Type Hydraulic Fittings

1. Check flare (A) and flare seat (B) for defects that might cause leakage.
2. Align tube (C) with fitting (D) and thread nut (E) onto fitting without lubrication until contact has been made between flared surfaces.
3. Torque fitting nut (E) to specified number of flats from finger tight (FFFT) or to a given torque value in [Table 8.10 Flare-Type Hydraulic Tube Fittings, page 163](#).
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.

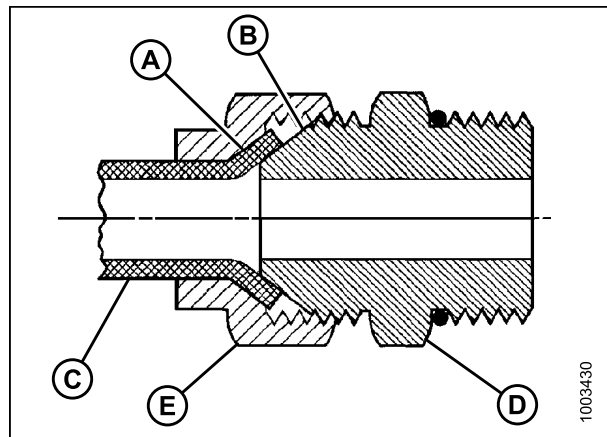


Figure 8.10: Hydraulic Fitting

REFERENCE

Table 8.10 Flare-Type Hydraulic Tube Fittings

SAE Dash Size	Thread Size (in.)	Torque Value ⁷		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

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

REFERENCE

8.1.5 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)

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

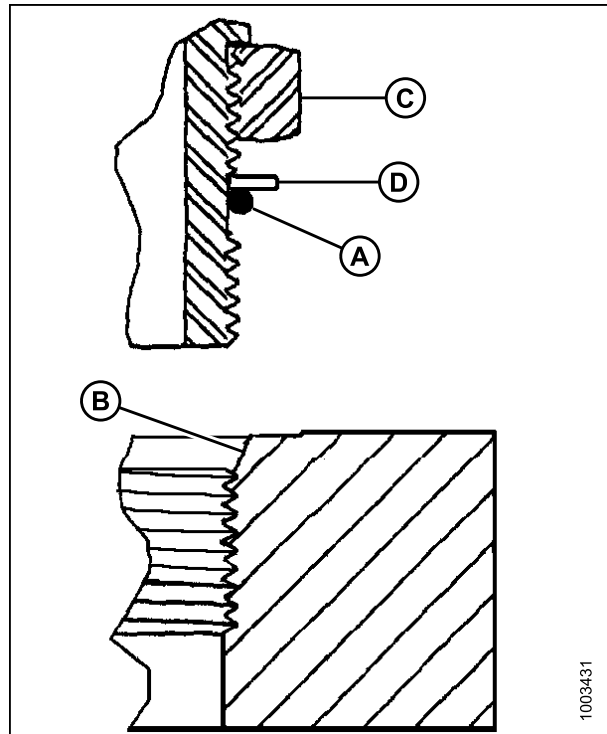


Figure 8.11: Hydraulic Fitting

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.

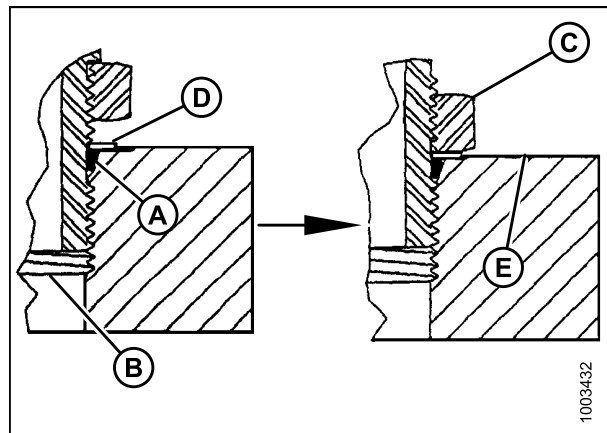


Figure 8.12: Hydraulic Fitting

REFERENCE

Table 8.11 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)

SAE Dash Size	Thread Size (in.)	Torque Value ⁸	
		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

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

REFERENCE

8.1.6 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Check that O-ring (A) is **NOT** on threads and adjust if necessary.
3. Apply hydraulic system oil to O-ring.
4. Install fitting (C) into port until fitting is hand tight.
5. Torque fitting (C) according to values in Table 8.12 *O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)*, page 166.
6. Check final condition of fitting.

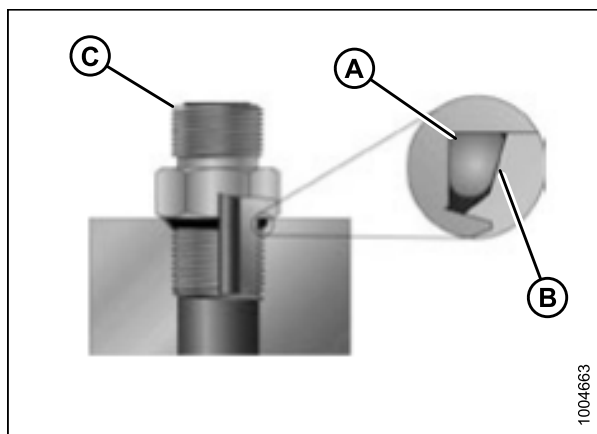


Figure 8.13: Hydraulic Fitting

Table 8.12 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)

SAE Dash Size	Thread Size (in.)	Torque Value ⁹	
		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

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

8.1.7 O-Ring Face Seal (ORFS) Hydraulic Fittings

1. Check components to ensure that sealing surfaces and fitting threads are free of burrs, nicks, scratches, or any foreign material.



Figure 8.14: 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 8.13 *O-Ring Face Seal (ORFS) Hydraulic Fittings, page 168*.

NOTE:

If applicable, hold hex on fitting body (E) to prevent rotation of fitting body and hose when tightening fitting nut (D).

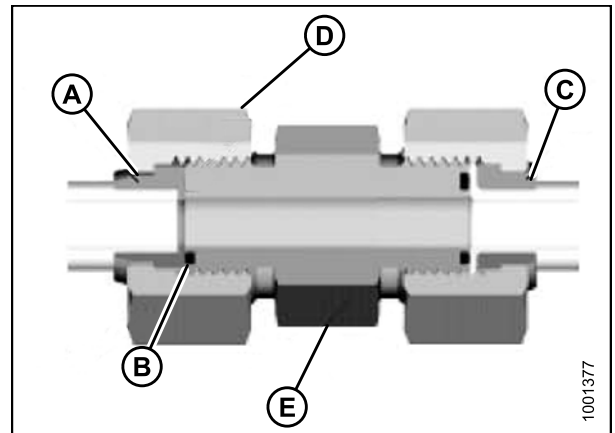


Figure 8.15: Hydraulic Fitting

6. Use three wrenches when assembling unions or joining two hoses together.
7. Check final condition of fitting.

REFERENCE

Table 8.13 O-Ring Face Seal (ORFS) Hydraulic Fittings

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value ¹⁰	
			N·m	ft·lbf
-3	Note ¹¹	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note ¹¹	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 ¹¹	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

10. Torque values and angles shown are based on lubricated connection as in reassembly.

11. O-ring face seal type end not defined for this tube size.

REFERENCE

8.1.8 Tapered Pipe Thread Fittings

Assemble pipe fittings as follows:

1. Check components to ensure that fitting and port threads are free of burrs, nicks and scratches, or any form of contamination.
2. Apply pipe thread sealant (paste type) to external pipe threads.
3. Thread fitting into port until hand-tight.
4. Torque connector to appropriate torque angle. The Turns From Finger Tight (TFFT) values are shown in Table [8.14 Hydraulic Fitting Pipe Thread, page 169](#). 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 8.14 Hydraulic Fitting Pipe Thread

Tapered Pipe Thread Size	Recommended T.F.F.T	Recommended F.F.F.T
1/8-27	2-3	12-18
1/4-18	2-3	12-18
3/8-18	2-3	12-18
1/2-14	2-3	12-18
3/4-14	1.5-2.5	12-18
1-11 1/2	1.5-2.5	9-15
1 1/4-11 1/2	1.5-2.5	9-15
1 1/2-11 1/2	1.5-2.5	9-15
2-11 1/2	1.5-2.5	9-15

REFERENCE

8.2 Conversion Chart

Table 8.15 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.

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