MacDon

D1X and D1XL Series Draper Headers for M1 Series Windrowers

IMPORTANT: PAGE 35 HAS BEEN UPDATED SINCE THIS MANUAL WAS PUBLISHED.

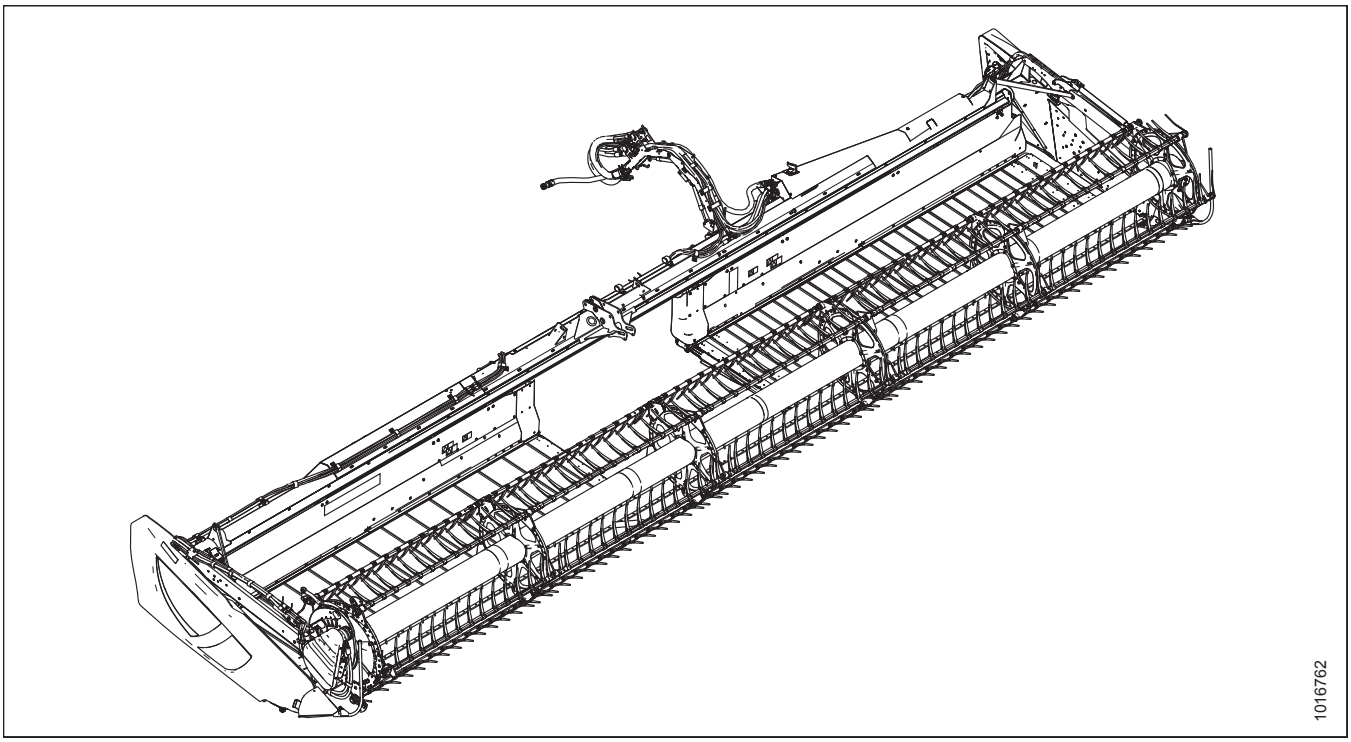
Operator's Manual

215651 Revision B

Original Instruction

The Harvesting Specialists.

D1XL Series Draper Header for M1 Series Windrowers



Published: October 2021

Declaration of Conformity

CE

EC Declaration of Conformity

[1] MacDon

MacDon Industries Ltd.
680 Moray Street,
Winnipeg, Manitoba, Canada
R3J 3S3

[2] Windrower Draper Header

[3] MacDon D1X and D1XL Series

[4] As per Shipping Document

[5] August 16, 2021

[6] _____
Adrienne Tankeu
Product Integrity

EN

We, [1]

Declare, that the product:

Machine Type: [2]

Name & Model: [3]

Serial Number(s): [4]

fulfils 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:

Benedikt von Riedesel
General Manager, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Germany)
bvonriedesel@macdon.com

BG

Ние, [1]

декларираме, че следният продукт:

Тип машина: [2]

Наименование и модел: [3]

Сериен 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:

Бенедикт фон Рийдезел
Управител, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Германия)
bvonriedesel@macdon.com

CZ

My, [1]

Prohlašujeme, 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:

Benedikt von Riedesel
generální ředitel, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Německo)
bvonriedesel@macdon.com

DA

Vi, [1]

erklærer, at prduktet:

Maskintype [2]

Navn og model: [3]

Serienummer (-numre): [4]

Opfylder alle bestemmelser i direktiv 2006/42/EF.

Anvendte harmoniserede standarder, som henvist 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:

Benedikt von Riedesel
Direktør, MacDon Europe GmbH
Hagenauer Straße 59
D-65203 Wiesbaden (Tyskland)
bvonriedesel@macdon.com

DE

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:

Benedikt von Riedesel
General Manager, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden
bvonriedesel@macdon.com

ES

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:

Benedikt von Riedesel
Gerente general - MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Alemania)
bvonriedesel@macdon.com

ET

Meie, [1]

deklareerime, et toode

Seadme tüüp: [2]

Nimi ja mudel: [3]

Seerianumbrid: [4]

vastab kõigile direktiivi 2006/42/EÜ asjakohastele sätetele.

Kasutatud on järgnevaid 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:

Benedikt von Riedesel
Peadirektor, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Saksamaa)
bvonriedesel@macdon.com

FR

Nous soussignés, [1]

Déclarons que le produit :

Type de machine : [2]

Nom et modèle : [3]

Numéro(s) de série : [4]

Est conforme à toutes les dispositions pertinentes de la directive 2006/42/EC.

Utilisation des normes harmonisées, comme indiqué dans l'Article 7(2):

EN ISO 4254-1:2013
EN ISO 4254-7:2009

Lieu et date de la déclaration : [5]

Identité et signature de la personne ayant reçu le pouvoir de rédiger cette déclaration : [6]

Nom et adresse de la personne autorisée à constituer le dossier technique :

Benedikt von Riedesel
Directeur général, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Allemagne)
bvonriedesel@macdon.com

EC Declaration of Conformity

IT

Noi, [1]

Dichiariamo 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.

Utilizzo degli standard armonizzati, come indicato nell'Articolo 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
General Manager, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Germania)
bvonriedesel@macdon.com

HU

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.

Az alábbi harmonizált szabványok kerültek alkalmazásra a 7(2) cikkely szerint:

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
Vezérigazgató, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Németország)
bvonriedesel@macdon.com

LT

Mes, [1]

Pareiškiame, kad šis produktas:

Mašinos tipas: [2]

Pavadinimas ir modelis: [3]

Serijos numeris (-iai): [4]

atitinka taikomus reikalavimus pagal Direktyvą 2006/42/EB.

Naudojami harmonizuoti standartai, kai nurodoma straipsnyje 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
Generalinis direktorius, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Vokietija)
bvonriedesel@macdon.com

LV

Mēs, [1]

Deklarējam, ka produkts:

Mašīnas tips: [2]

Nosaukums un modelis: [3]

Sērijas numurs(-i): [4]

Atbilst visām būtiskajām Direktīvas 2006/42/EK prasībām.

Piemēroti šādi saskaņotie standarti , kā minēts 7. panta 2. punktā:

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikts fon Rīdīzels
Ģenerāldirektors, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Vācija)
bvonriedesel@macdon.com

NL

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.

Geharmoniseerde normen toegepast, zoals vermeld in Artikel 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
Algemeen directeur, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Duitsland)
bvonriedesel@macdon.com

PO

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.

Zastosowaliśmy następujące (zharmonizowane) normy zgodnie z artykułem 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
Dyrektor generalny, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Niemcy)
bvonriedesel@macdon.com

PT

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.

Normas harmonizadas aplicadas, conforme referido no Artigo 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
Gerente Geral, MacDon Europa Ltda.
Hagenauer Straße 59
65203 Wiesbaden (Alemanha)
bvonriedesel@macdon.com

RO

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/EC.

Au fost aplicate următoarele standarde armonizate conform articolului 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Data și locul declarației: [5]

Identitatea și semnătura persoanei împuternicite pentru întocmirea declarației: [6]

Numele și semnătura persoanei autorizate pentru întocmirea cărții tehnice:

Benedikt von Riedesel
Manager General, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Germania)
bvonriedesel@macdon.com

SR

Mi, [1]

Izjavljujemo da proizvod

Tip mašine: [2]

Naziv i model: [3]

Serijski broj(evi): [4]

Ispunjava sve relevantne odredbe direktive 2006/42/EC.

Korišæeni su usklađeni standardi kao što je navedeno u èlanu 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Datum i mesto izdavanja deklaracije: [5]

Identitet i potpis lica ovlašæenog za sastavljanje deklaracije: [6]

Ime i adresa osobe ovlašæene za sastavljanje tehnièke datoteke:

Benedikt von Riedesel
Generalni direktor, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Nemačka)
bvonriedesel@macdon.com

SV

Vi, [1]

Intygar att produkten:

Maskintyp: [2]

Namn och modell: [3]

Serienummer: [4]

uppfyller alla relevanta villkor i direktivet 2006/42/EG.

Harmonierade standarder används, såsom anges i artikel 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

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:

Benedikt von Riedesel
Administrativ chef, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Tyskland)
bvonriedesel@macdon.com

SL

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.

Uporabljeni usklajeni standardi, kot je navedeno v členu 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Kraj in datum izjave: [5]

Istovetnost in podpis osebe, opolnomočene za pripravo izjave: [6]

Ime in naslov osebe, pooblaščene za pripravo tehnične datoteke:

Benedikt von Riedesel
Generalni direktor, MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Nemčija)
bvonriedesel@macdon.com

SK

My, [1]

týmto prehlasujeme, že tento výrobok:

Typ zariadenia: [2]

Názov a model: [3]

Výrobné číslo: [4]

spĺňa príslušné ustanovenia a základné požiadavky smernice č. 2006/42/ES.

Použité harmonizované normy, ktoré sa uvádzajú v Článku č. 7(2):

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Miesto a dátum prehlásenia: [5]

Meno a podpis osoby oprávnenej vypracovať toto prehlásenie: [6]

Meno a adresa osoby oprávnenej zostaviť technický súbor:

Benedikt von Riedesel
Generálny riaditeľ MacDon Europe GmbH
Hagenauer Straße 59
65203 Wiesbaden (Nemecko)
bvonriedesel@macdon.com

Introduction

This instructional manual contains information on D1X and D1XL Series Draper Headers. Teamed with a MacDon M1 Series Windrower, D1X and D1XL Series Draper Headers will cut and lay crop into fluffy, uniform windrows.

The D1X and D1XL Series Draper Headers are designed as straight-cut headers, and are equipped to work well in all straight-cut conditions whether cutting on or above the ground.

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

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

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

This manual is currently available in English, French, German, Latvian, and Lithuanian.

Conventions

The following conventions are used in this document:

- Right and left are determined from the operator's position. The front of the header faces the crop.
- Unless otherwise noted, use the standard torque values provided in this manual.

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

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

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).

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

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

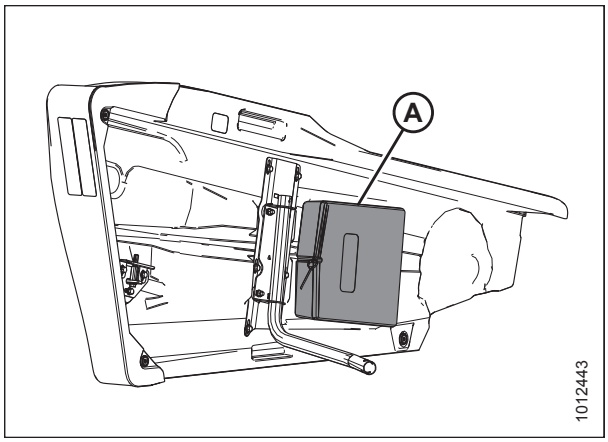


Figure 1: Left Endshield Manual Storage Location

Summary of Changes

This list covers changes made since the last revision (215651 Rev. A).

Section	Summary of Change	Internal Use Only
Introduction, page iii	Added German and Lithuanian to the list of available translations.	Publications
2.3 Specifications, page 28	Corrected header model numbers.	Publications
3.7.7 Knife Speed Information, page 66	Corrected header model numbers.	Publications
Adjusting Reel Cam, page 70	Revised topic to show D1X and D1XL content; erroneously included content for the wrong header model.	Product Support
Replacing Reel Endshield Supports, page 223	Revised procedure for clarity.	Publications

Model and Serial Number

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

Header Model: _____

Serial Number: _____

Model Year: _____

Header serial number plate (A) is located on the upper corner on the left endsheet.

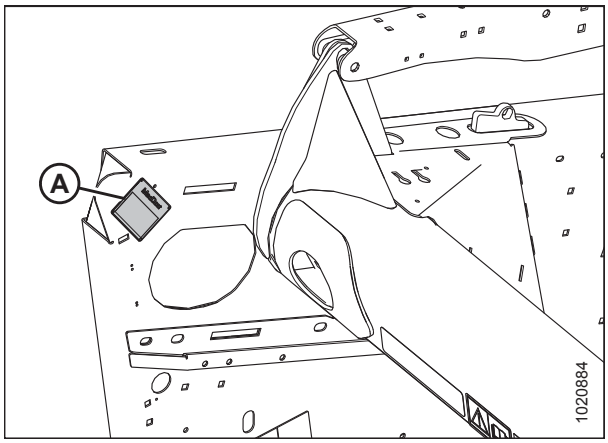


Figure 2: Header Serial Number Plate Location

Transport / Stabilizer Wheel Option

Serial Number: _____

Model Year: _____

Transport serial number plate (A) is located on the right axle assembly.

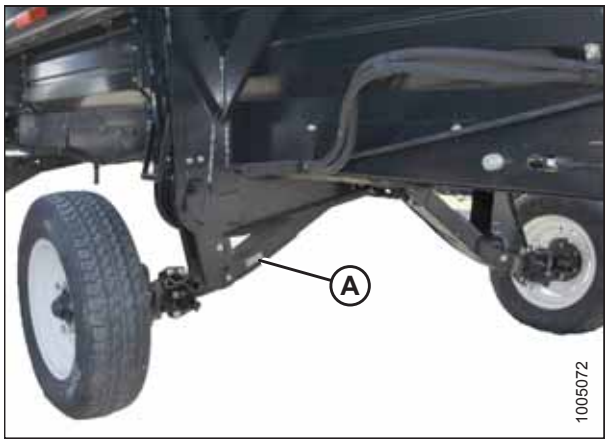


Figure 3: Transport / Stabilizer Wheel Location

Chapter 1: Safety

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

1.1 Safety Alert Symbols

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

This symbol means:

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

Carefully read and follow the safety message accompanying this symbol.

Why is safety important to you?

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

Figure 1.1: Safety Symbol

1.2 Signal Words

Three signal words, **DANGER**, **WARNING**, and **CAUTION**, are used to alert you to hazardous situations. Two signal words, **IMPORTANT** and **NOTE**, identify non-safety related information.

Signal words are selected using the following guidelines:

DANGER

Indicates an imminently hazardous situation that, if 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.

IMPORTANT:

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

NOTE:

Provides additional information or advice.

1.3 General Safety

Protect yourself when assembling, operating, and servicing machinery.

CAUTION

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

Wear all protective clothing and personal safety devices that could be necessary for the job at hand. Do **NOT** take chances. You may need the following:

- Hard hat
- Protective footwear with slip-resistant soles
- Protective glasses or goggles
- Heavy gloves
- Wet weather gear
- Respirator or filter mask

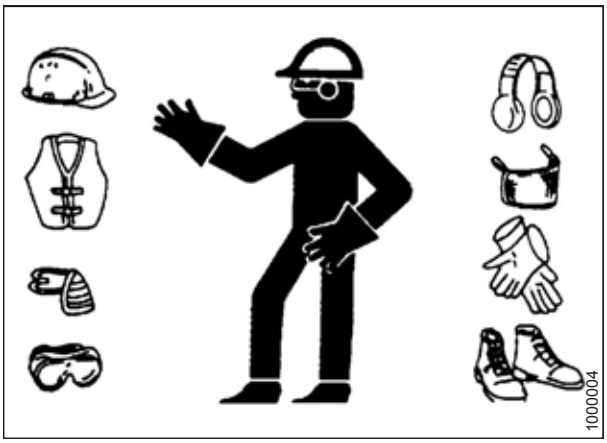


Figure 1.2: Safety Equipment

In addition, take the following precautions:

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

Figure 1.3: Safety Equipment

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

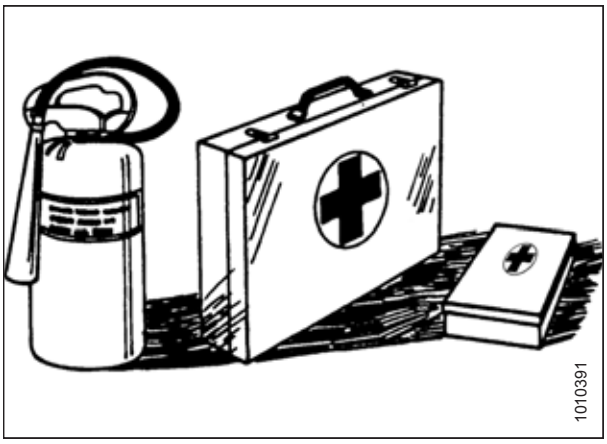


Figure 1.4: Safety Equipment

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

Figure 1.5: Safety around Equipment

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

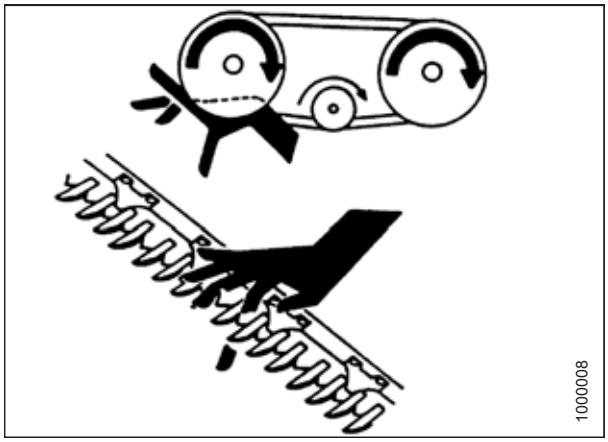


Figure 1.6: Safety around Equipment

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

Figure 1.7: Safety around Equipment

1.4 Maintenance Safety

Protect yourself when maintaining machinery.

To ensure your safety while maintaining the machine:

- Review the operator's manual and all safety items before the operation and/or maintenance of the machine.
- Place all controls in Neutral, stop the engine, set the parking brake, remove the ignition key, and wait for all moving parts to stop before servicing, adjusting, and/or repairing the machine.
- Follow good shop practices:
  - Keep service areas clean and dry
  - Ensure that electrical outlets and tools are properly grounded
  - Keep the work area well lit
- Relieve pressure from hydraulic circuits before servicing and/or disconnecting the machine.
- Ensure that 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 the 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 lubricant 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

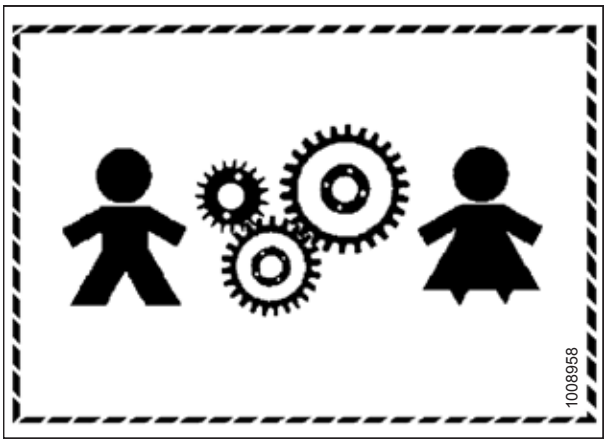


Figure 1.9: Equipment is NOT Safe for Children

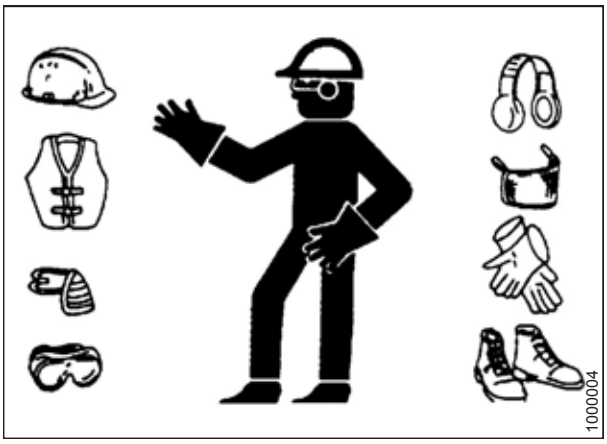


Figure 1.10: Safety Equipment

1.5 Hydraulic Safety

Protect yourself when assembling, operating, and servicing hydraulic components.

- Always place all hydraulic controls in Neutral before leaving the operator's seat.
- 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 hydraulic lines, fittings, or hoses by using tapes, clamps, cements, or welding. The hydraulic system operates under extremely high pressure. Makeshift repairs can fail suddenly and create hazardous conditions.

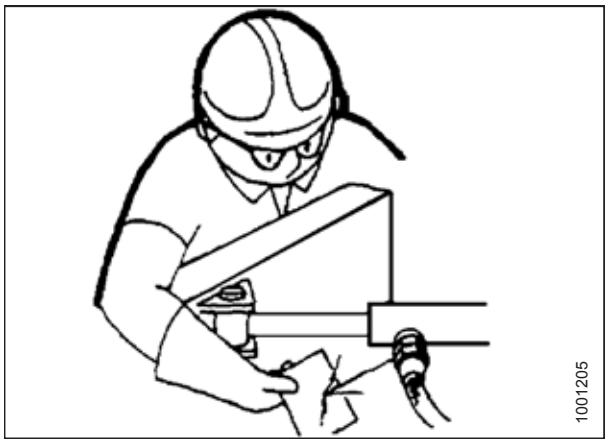


Figure 1.11: Testing for Hydraulic Leaks

- Wear proper hand and eye protection when searching for high-pressure hydraulic fluid leaks. Use a piece of cardboard as a backstop instead of your hands to isolate and identify a leak.
- If 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

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

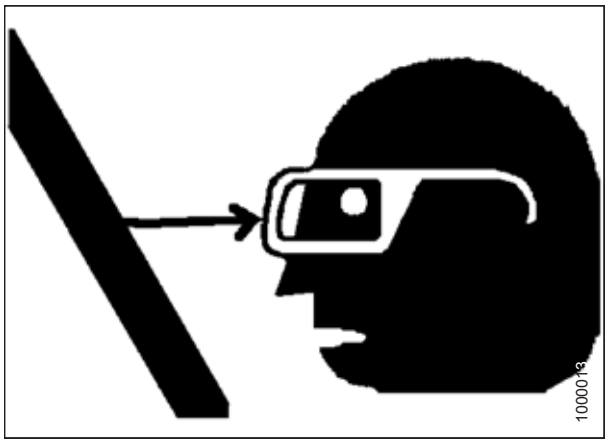


Figure 1.13: Safety around Equipment

1.6 Welding Precaution

To prevent damage to sensitive electronics, welding should never be attempted on the header while it is connected to a windrower.

WARNING

Severe damage to sensitive, expensive electronics can result from welding on the header while it is connected to the windrower. It can be impossible to know what effect high current could have with regard to future malfunctions or shorter lifespan. It is very important that welding on the header is not attempted while the header is connected to the windrower.

If it is unfeasible to disconnect the header from the windrower before welding, contact your MacDon Dealer for welding precautions detailing all electrical components that must be disconnected first for safe welding.

1.7 Safety Signs

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

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

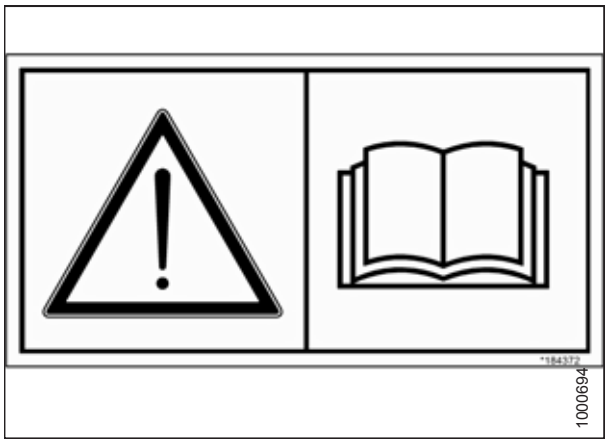


Figure 1.14: Operator's Manual Decal

1.7.1 Installing Safety Decals

If a safety decal is damaged it should be replaced.

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

1.8 Safety Decal Locations

Safety decals are installed in several locations on the header. Replace any missing or damaged decals on the machine with identical parts.

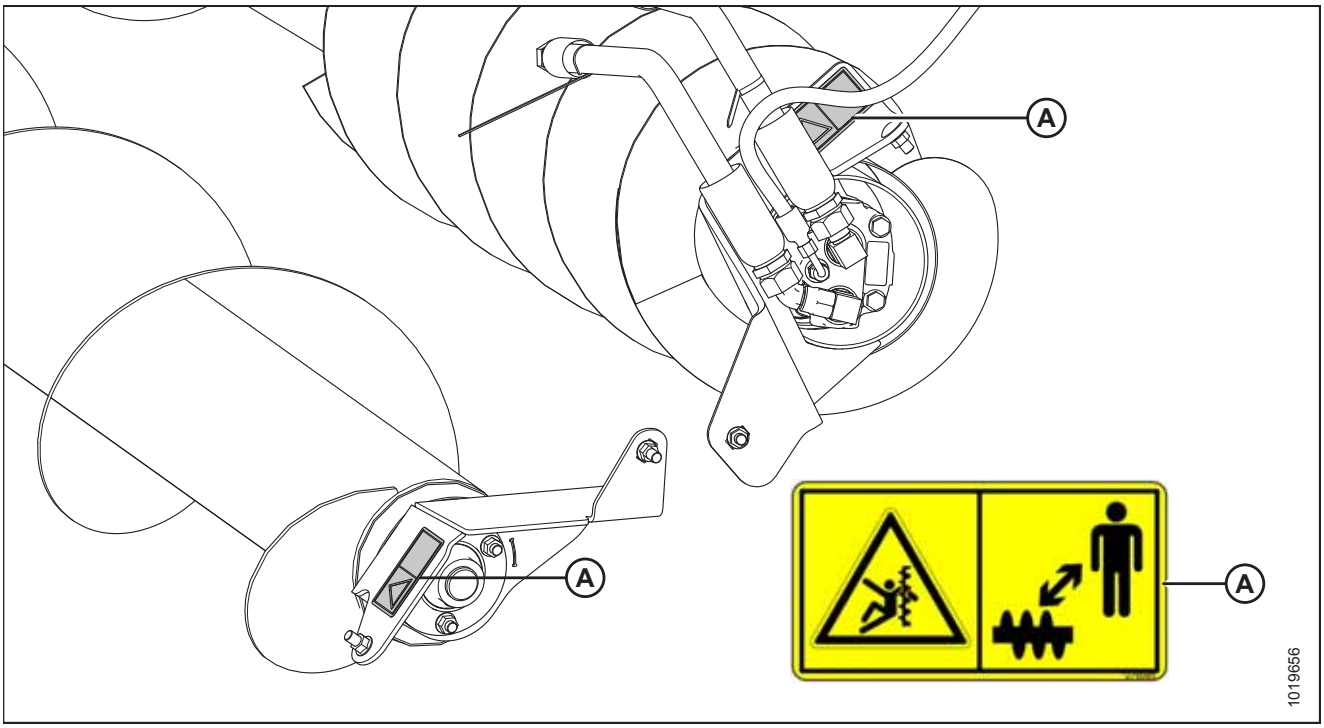


Figure 1.15: Upper Cross Auger (Optional)

A - MD #279085

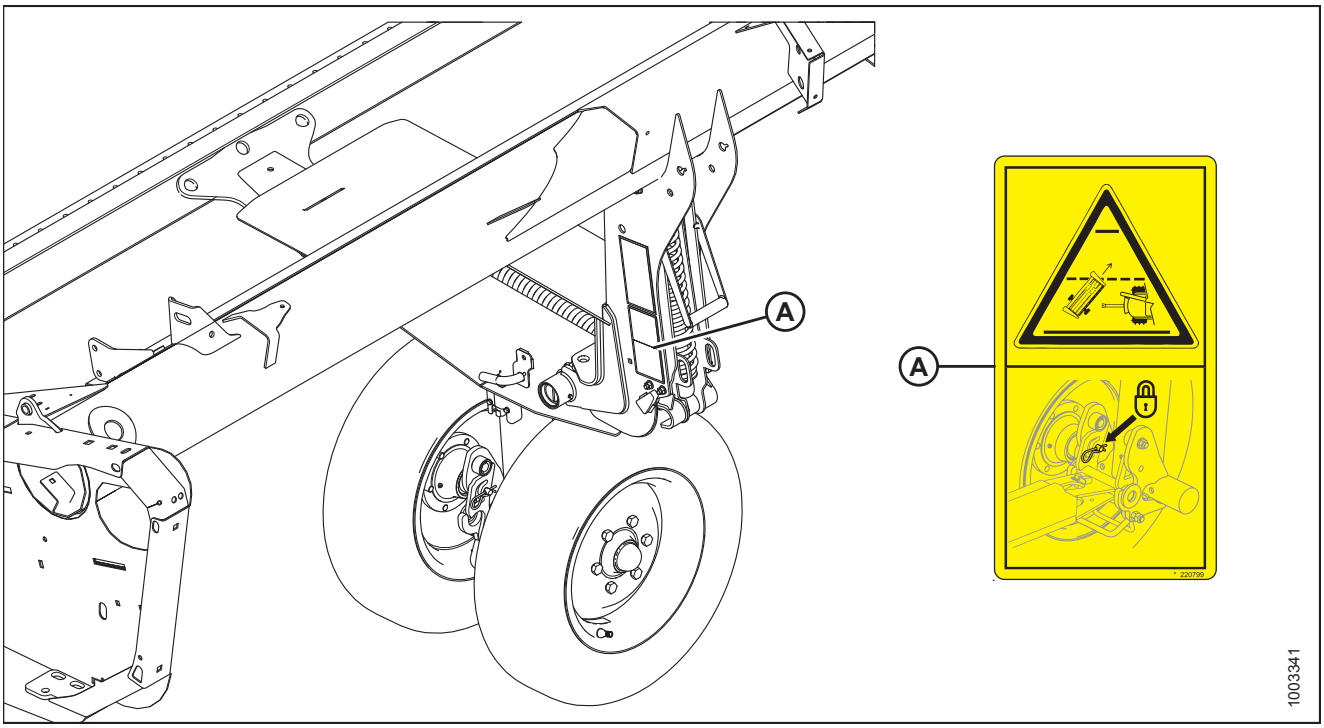


Figure 1.16: Slow Speed Transport (Optional)

A - MD #220799

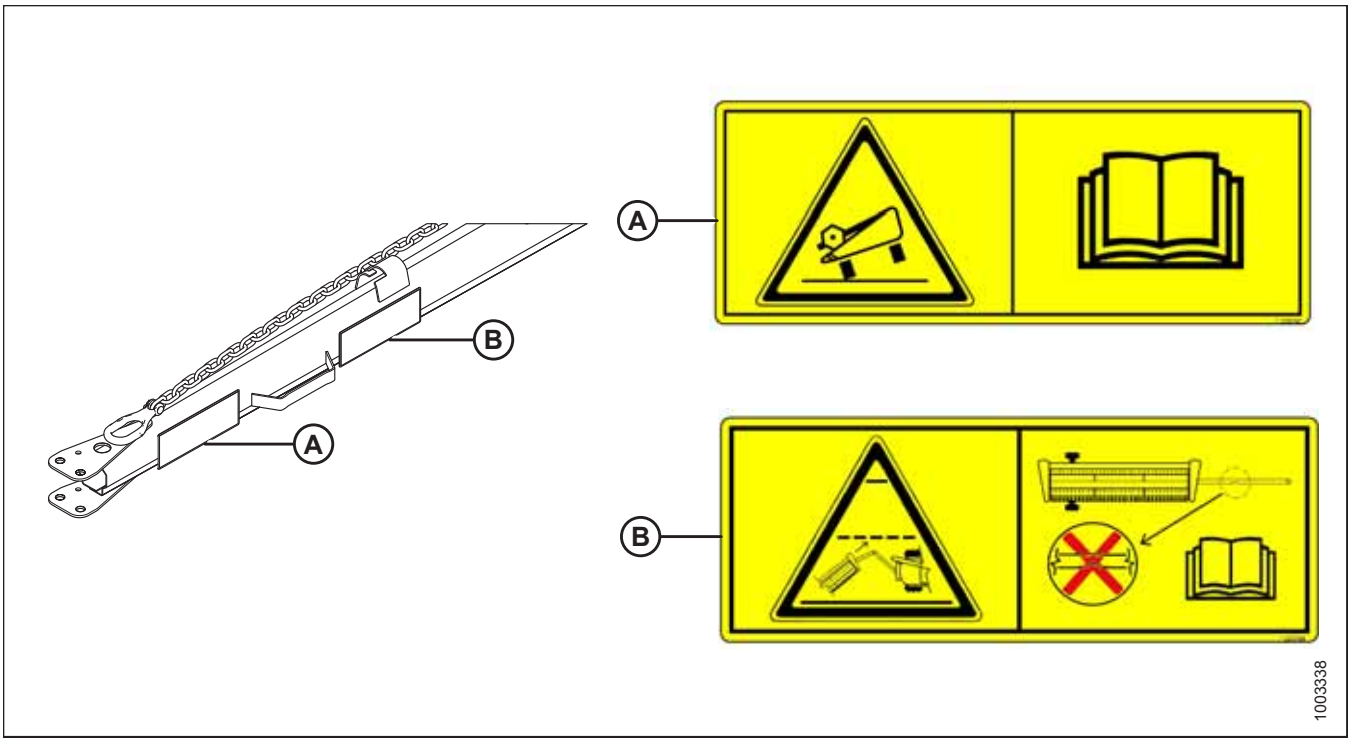


Figure 1.17: Slow Speed Transport Tow-Bar (Optional)

A - MD #220797 **B - MD #220798**

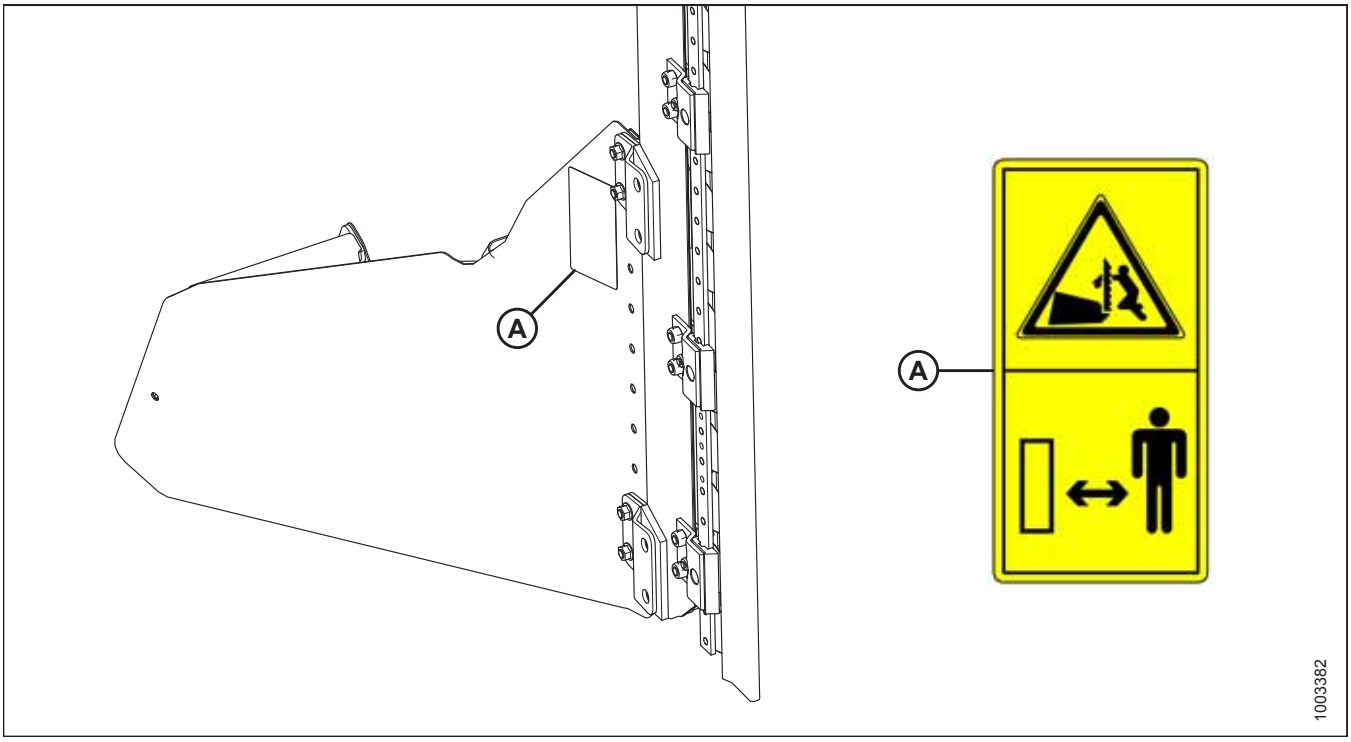


Figure 1.18: Vertical Knife (Optional)

A - MD #174684

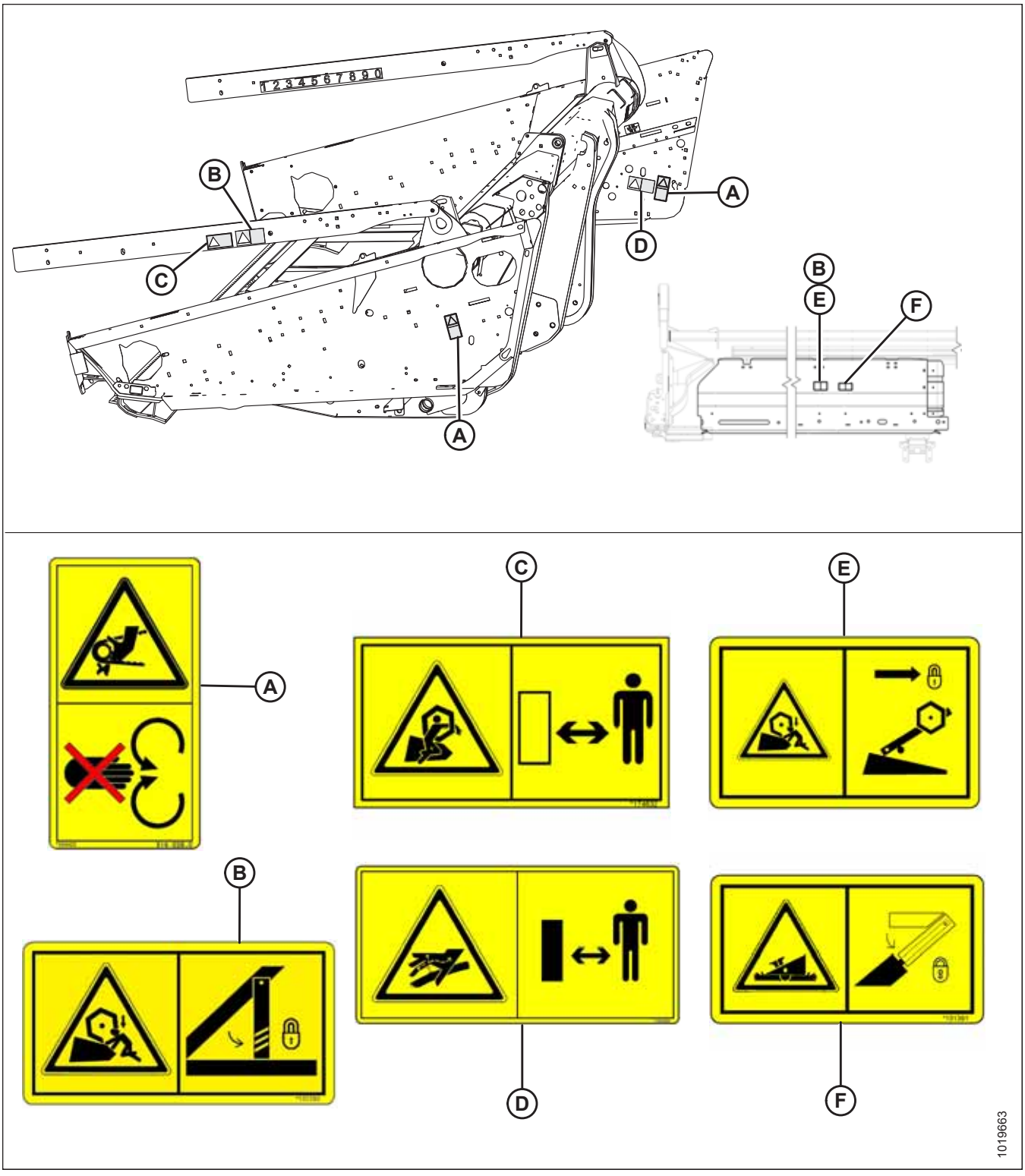


Figure 1.19: Endsheets, Reel Arms, and Backsheet

A - MD #184422 (Four Places)
B - MD #131393 (Three Places on Single Reel)
C - MD #174632
D - MD #166466 (Two Places)
E - MD #131392 (Double Reel)
F - MD #131391 (Two Places)

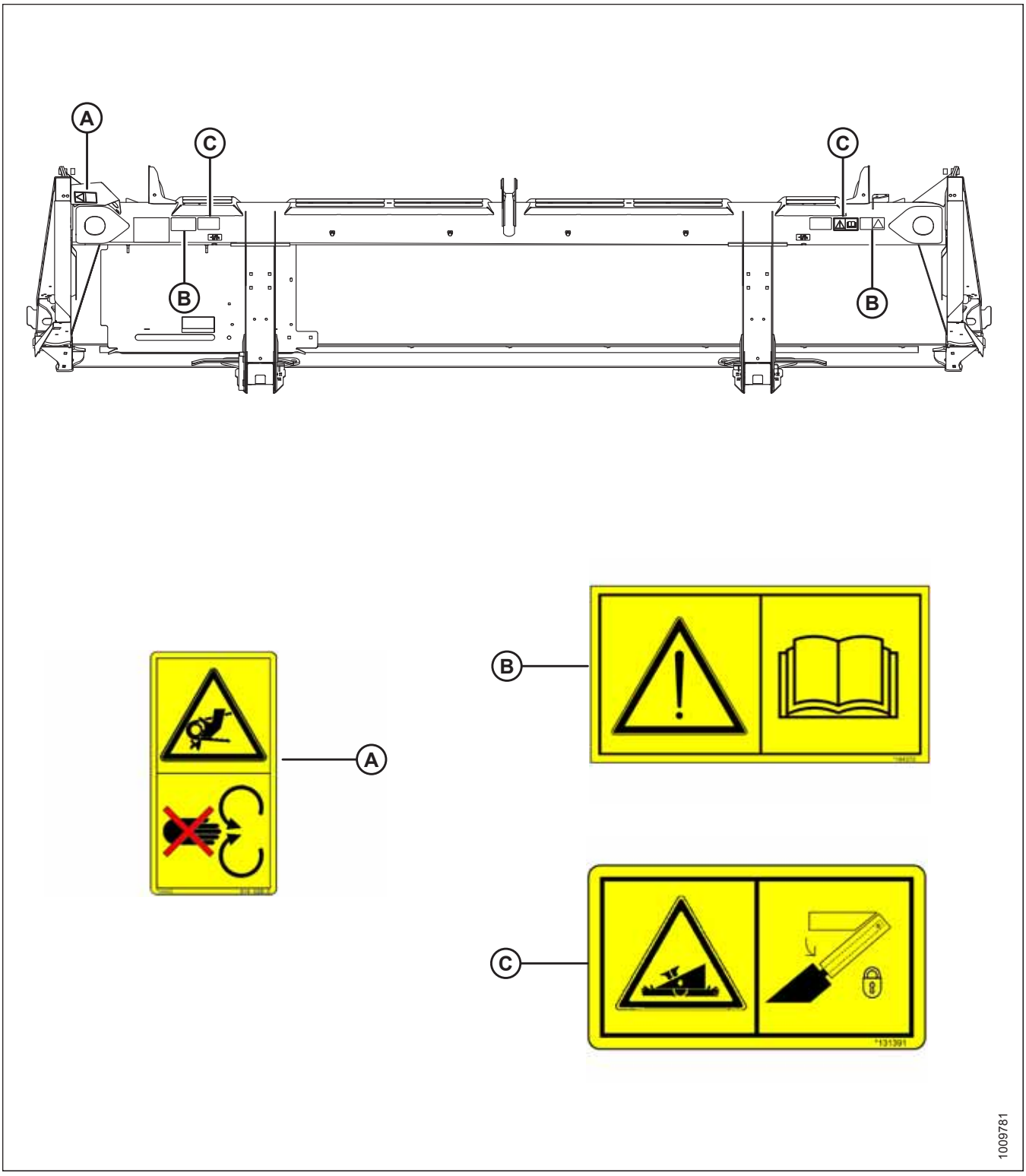


Figure 1.20: Backtube – D115X Draper Header

A - MD #184422 **B - MD #184372** **C - MD #131391**

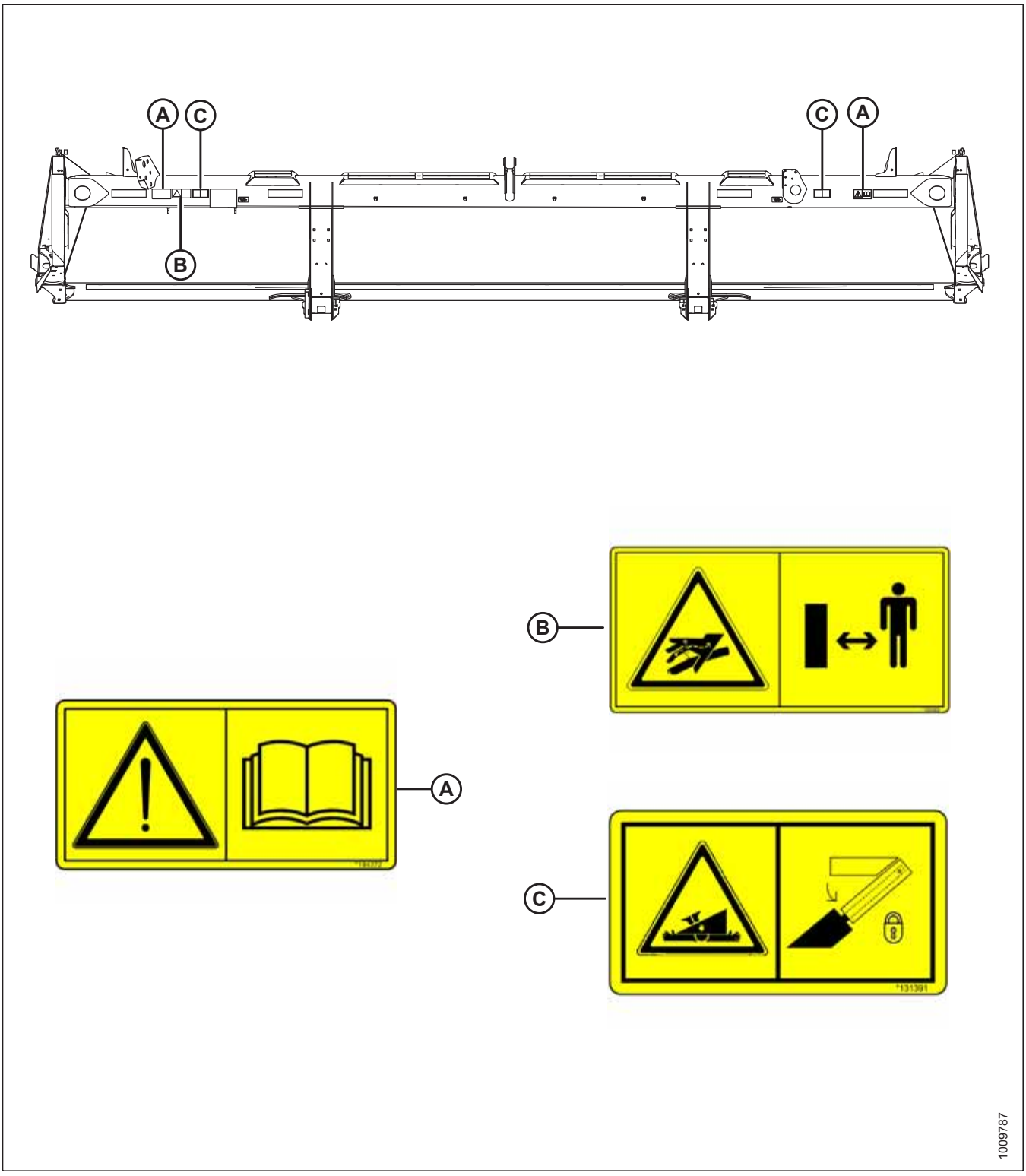


Figure 1.21: Backtube – D120X Draper Header

A - MD #184372 **B - MD #166466** **C - MD #131391**

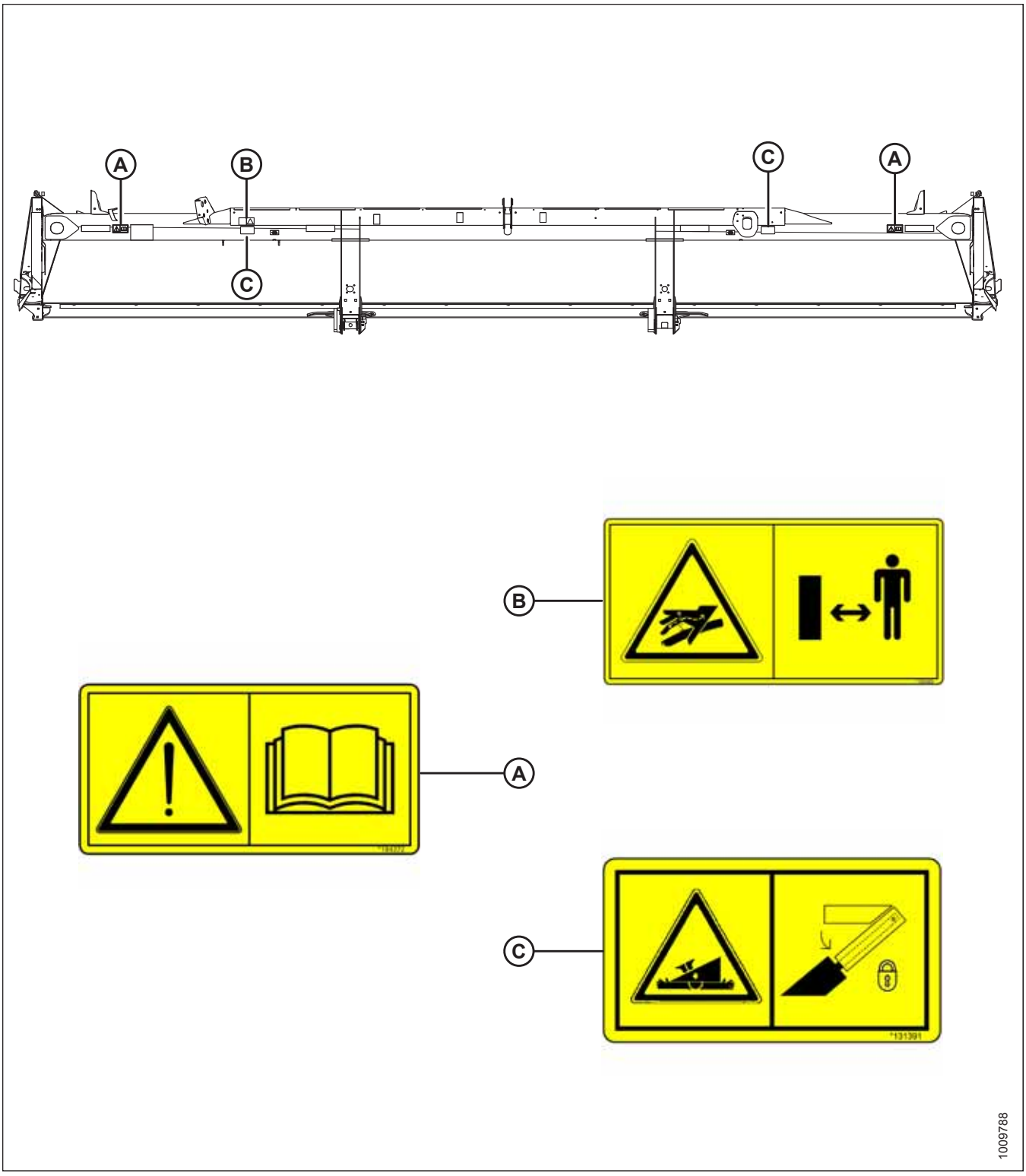


Figure 1.22: Backtube – D125X Draper Header

A - MD #184372 **B - MD #166466** **C - MD #131391**

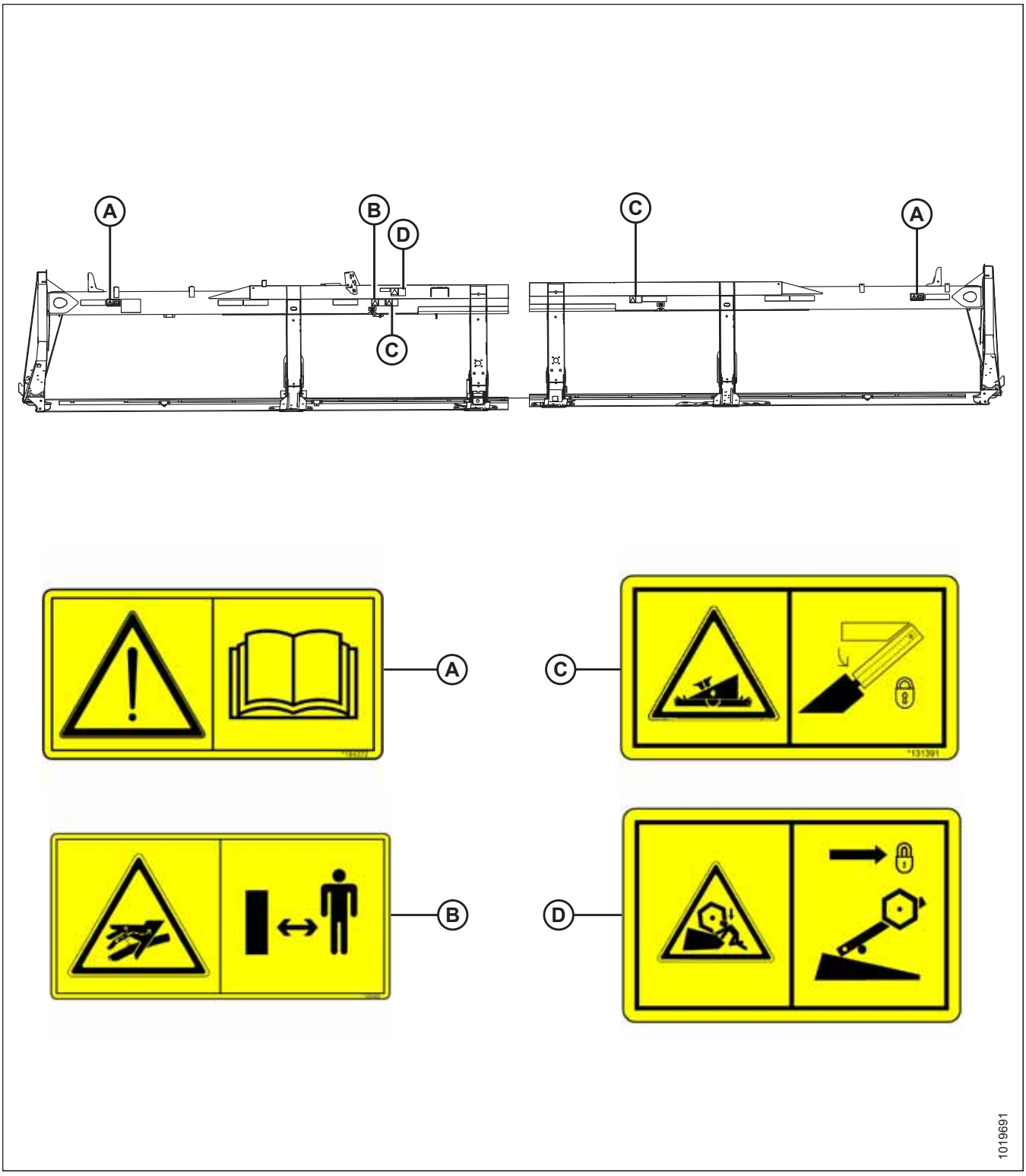


Figure 1.23: Backtube – D135XL Draper Header (D130XL Draper Header Similar)

A - MD #184372 **B - MD #166466** **C - MD #131391** **D - MD #131392 (D135XL Double Reel Only)**

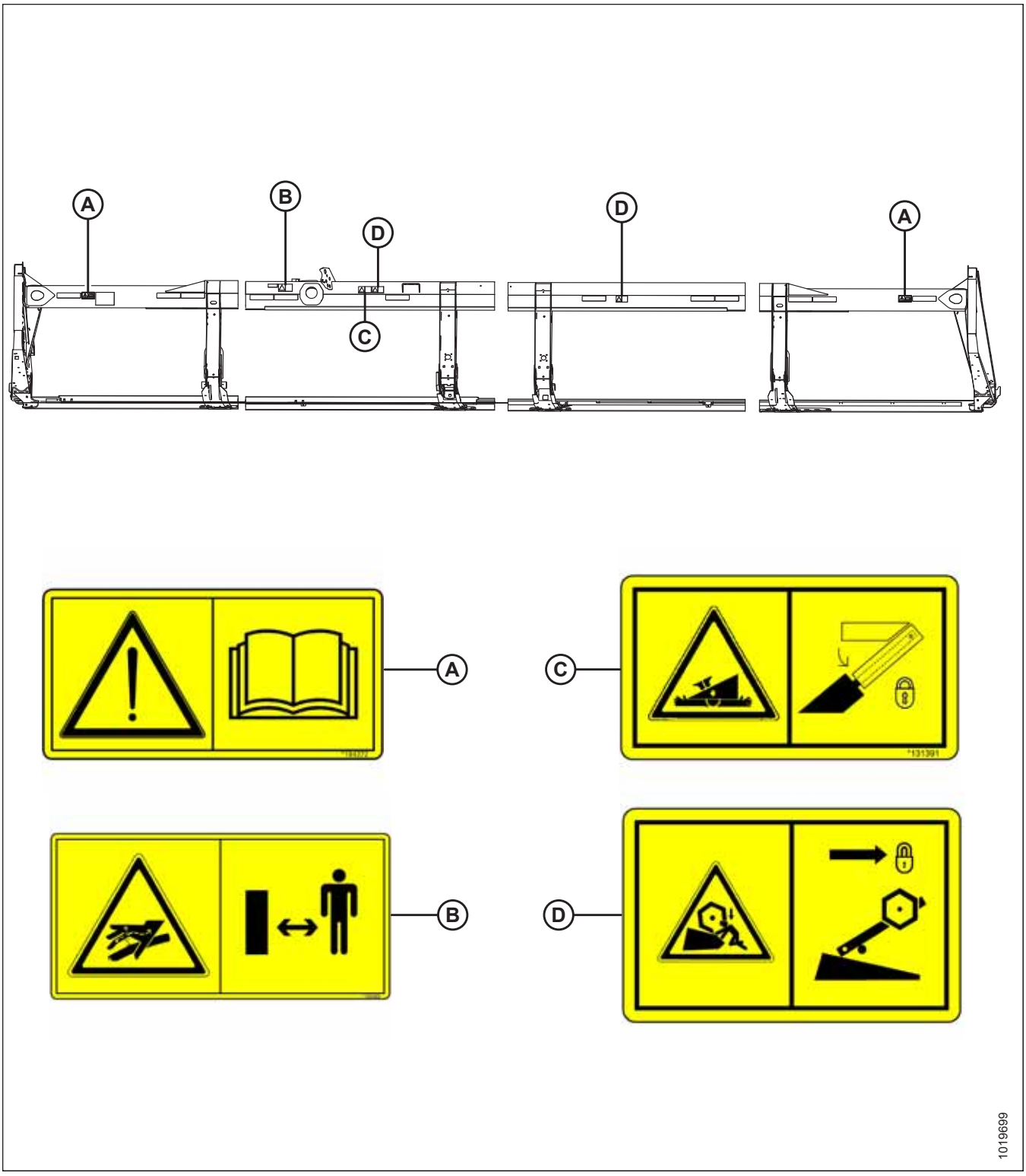


Figure 1.24: Backtube – D140XL Draper Header (D145XL Draper Header Similar)

A - MD #184372 **B - MD #166466** **C - MD #131391** **D - MD #131392**

1.9 Understanding Safety Signs

Consult this section to learn the dangers that each type of safety sign denotes.

MD #113482

General hazard pertaining to machine operation and servicing

DANGER

To prevent 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 the safety instructions with all Operators every year.
- Ensure that all the safety signs are installed and legible.
- Make certain everyone is clear of the machine before starting engine and during operation.
- Keep riders off of the machine.
- Keep all the shields in place and stay clear of the moving parts.
- Disengage the header drive, put the transmission in Neutral, and wait for all movement to stop before leaving the operator's position.
- Stop the engine and remove the key from the ignition before servicing, adjusting, lubricating, cleaning, or unplugging the machine.
- Engage the safety locks to prevent lowering of a raised unit before servicing it in the raised position.
- Use the slow moving vehicle emblem and flashing warning lights when operating on roadways unless prohibited by law.

Figure 1.25: MD #113482

MD #131391

Header crushing hazard

DANGER

To prevent injury or death from fall of a raised header:

- Fully raise the header, stop the engine, remove the key, and engage the safety props on the windrower before going under header.
- Alternatively, rest header on ground, stop the engine, and remove the key before servicing.

Figure 1.26: MD #131391

MD #131392

Reel crushing hazard

WARNING

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

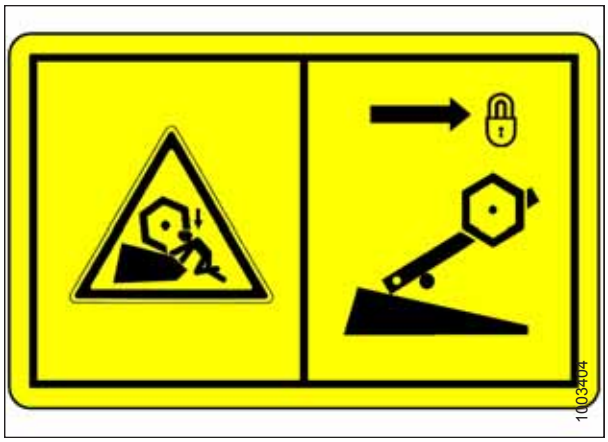


Figure 1.27: MD #131392

MD #131393

Reel crushing hazard

WARNING

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

Figure 1.28: MD #131393

MD #166466

High-pressure oil hazard

WARNING

High-pressure hydraulic fluid can penetrate human skin, which can cause serious injury such as gangrene, which can be fatal. To prevent this:

- Do **NOT** go near hydraulic fluid leaks.
- Do **NOT** use a finger or skin to check for hydraulic fluid leaks.
- Lower the load or relieve the pressure in the hydraulic system before loosening any hydraulic fittings.
- If you are injured, seek emergency medical help. **IMMEDIATE** surgery is required to remove hydraulic fluid which has penetrated the skin.

Figure 1.29: MD #166466

MD #174436

High-pressure oil hazard

WARNING

To prevent serious injury, gangrene, or death:

- Do **NOT** go near leaks.
- Do **NOT** use a finger or skin to check for leaks.
- Lower the load or relieve hydraulic pressure before loosening fittings.
- High-pressure oil can easily puncture skin, and can cause serious injury, gangrene, or death.
- If injured, seek emergency medical help. Immediate surgery is required to remove oil.

Figure 1.30: MD #174436

MD #174632

Reel entanglement hazard

DANGER

To prevent injury from entanglement with the rotating reel:

- Stand clear of the header while the machine is running.

Figure 1.31: MD #174632

MD #174682

Auger entanglement hazard

DANGER

To prevent injury:

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

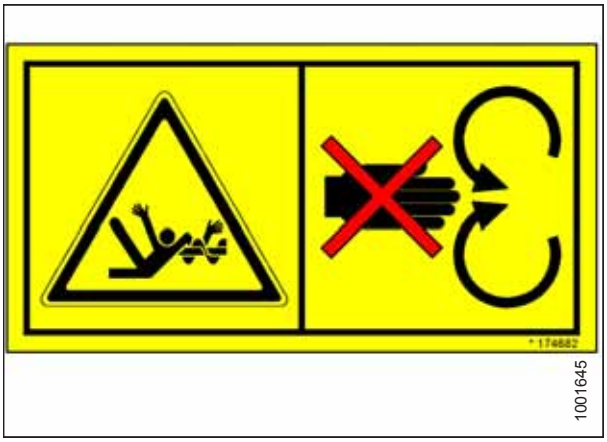


Figure 1.32: MD #174682

MD #174684

Knife cutting hazard

WARNING

To prevent injury from a sharp cutting knife:

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

Figure 1.33: MD #174684

MD #184372

General hazard pertaining to machine operation and servicing

DANGER

To prevent injury or death from the improper or unsafe operation of the machine:

- 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 these safety instructions with all machine Operators every year.
- Ensure that all safety signs are installed and are legible.
- Make certain that bystanders are clear of the header before starting the engine and during operation of the header.
- Keep riders off of the machine.
- Keep all shields in place. Stay clear of moving parts.
- Disengage the header drive, put the transmission into Neutral, and wait for all movement to stop before leaving the operator's position.
- Stop the engine and remove the key from the ignition before servicing, adjusting, lubricating, cleaning, or unplugging the machine.
- Before servicing a header in the raised position, engage the windrower's cylinder safety props.
- Display a slow-moving vehicle emblem and activate the header's warning lights when operating the header on roadways (unless these actions are prohibited by law).

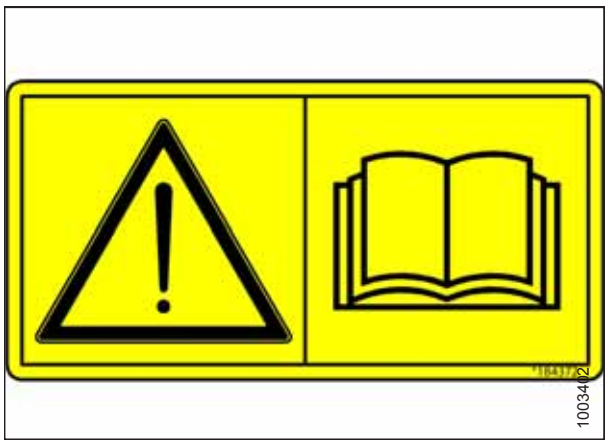


Figure 1.34: MD #184372

MD #184422

Hand and arm entanglement hazard

WARNING

To prevent injury:

- Stop the engine and remove the key before opening any shielding.
- Do **NOT** operate the header without the shields in place.

Figure 1.35: MD #184422

MD #193147

Loss of control hazard

DANGER

To prevent injury or death from loss of control:

- Ensure the tow-bar lock mechanism is locked.

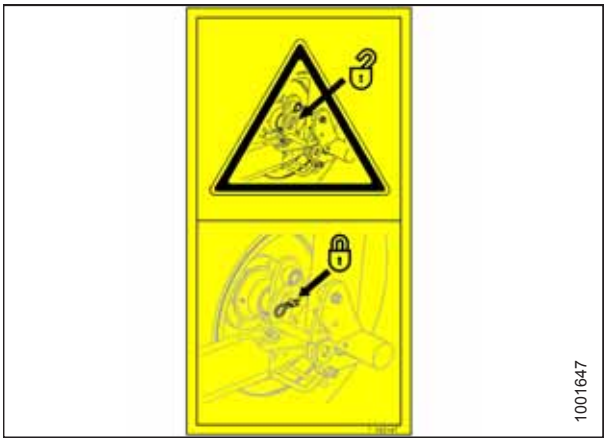


Figure 1.36: MD #193147

MD #220797

Transport tipping hazard

DANGER

To prevent serious injury or death from the transport tipping:

- Read the operator’s manual for more information on potential tipping or rollover of the header while transporting.

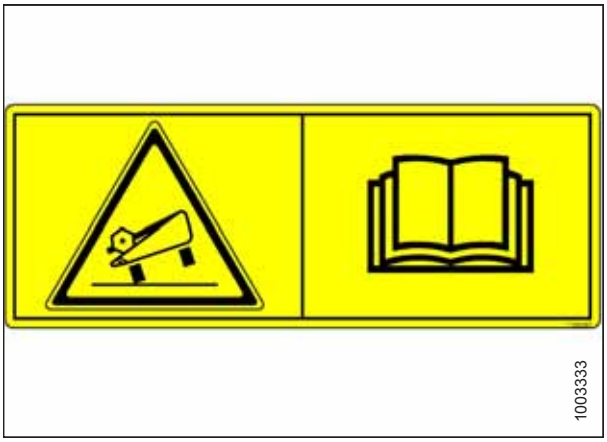


Figure 1.37: MD #220797

MD #220798

Loss of control hazard.

DANGER

To prevent serious injury or death from loss of control:

- Do **NOT** tow the header with a dented or otherwise damaged tow pole.
- Consult the operator's manual for more information.

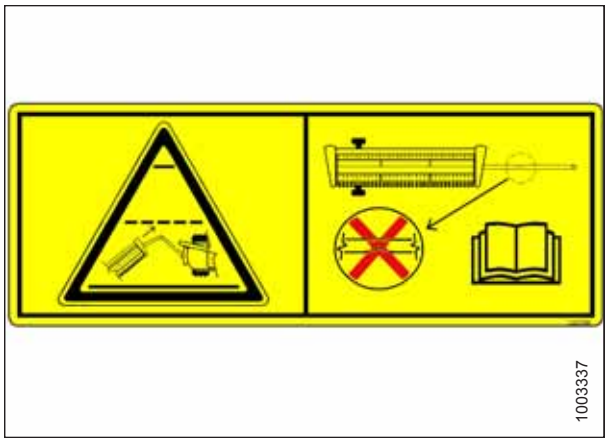


Figure 1.38: MD #220798

MD #220799

Loss of control hazard

WARNING

To prevent serious injury or death from loss of control:

- Ensure the tow-bar lock mechanism is locked.

Figure 1.39: MD #220799

MD #279085

Auger entanglement hazard

DANGER

To prevent injury from the rotating auger:

- Stand clear of the auger while the machine is running.
- Stop the engine and remove the key before servicing the auger.
- Do **NOT** reach into moving parts while the machine is running.

Figure 1.40: MD #279085

MD #304865

Header crushing hazard

WARNING

To prevent injury or death from the fall of a raised header:

- Do **NOT** lift the header at the marked locations.
- Only use locations marked for this purpose to lower the header from the vertical to the horizontal position.

Figure 1.41: MD #304865

Chapter 2: Product Overview

The product overview provides the dimensions, details, and performance criteria for the various sizes and configurations.

2.1 Definitions

The following terms, abbreviations, 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 designed to be paired with a nut
Cab-forward	Windrower operation mode, in which the Operator's seat faces the header
Center-link	A hydraulic cylinder connection between the header and the vehicle, which is used to change the angle of the header relative to the vehicle
CGVW	Combined gross vehicle weight
D1X Series Header	MacDon D115X, D120X, and D125X rigid draper headers for M1 Series Windrowers
D1XL Series Header	MacDon D130XL, D135XL, D140XL, and D145XL rigid draper headers for M1 Series Windrowers
DDD	Double-draper drive
DK	Double knife
DKD	Double-knife drive
DR	Double reel
DWA	Double Windrow Attachment
Engine-forward	Windrower operation with Operator and engine facing in direction of travel
Export header	The header configuration typical outside North America
FFFT	Flats from finger tight
Finger tight	Finger tight is a reference position in which the given sealing surfaces or components are making contact with each other and the fitting has been tightened by hand to a point where the fitting is no longer loose and cannot be tightened further by hand
GSL	Ground speed lever
GVW	Gross vehicle weight
Hard joint	A joint made with use of a fastener where joining materials are highly incompressible
Header	A machine that cuts and lays crop into a windrow when attached to a windrower
Hex key	A tool of hexagonal cross-section used to drive bolts and screws that have a hexagonal socket in the head (internal-wrenching hexagon drive); also known as an Allen key
HDS	Hydraulic deck shift
hp	Horsepower
HPT display	Harvest Performance Tracker display module on an M1 Series Windrower
ISC	Intermediate Speed Control
JIC	Joint Industrial Council: A standards body that developed standard sizing and shape for original 37° flared fitting
Knife	A cutting device found on a header's cutterbar which uses a reciprocating cutter (also called a sickle) to cut crop so that it can be fed into the header
M1 Series Windrowers	MacDon M1170 and M1240 Windrowers
n/a	Not applicable

Term	Definition
North American header	The 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
Nut	An internally threaded fastener designed to be paired with a bolt
ORB	O-ring boss: A style of fitting commonly used in port openings on manifolds, pumps, and motors
ORFS	O-ring face seal: A style of fitting commonly used for connecting hoses and tubes. This style of fitting is also commonly called ORS, which stands for O-Ring Seal
PARK	The slot opposite the NEUTRAL position on operator's console of M1 Series windrowers
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)
rpm	Revolutions per minute
SAE	Society of Automotive Engineers
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread when inserted into a mating part
SDD	Single-draper drive
Soft joint	A flexible joint made by use of a fastener in which the joining materials compress or relax over a period of time
spm	Strokes per minute
SR	Single reel
Tension	An axial load placed on a bolt or screw, usually measured in Newtons (N) or pounds (lb.). This term can also be used to describe the force a belt exerts on a pulley or sprocket
TFFT	Turns from finger tight
Timed knife drive	Synchronized motion applied at cutterbar to two separately driven knives from a single hydraulic motor
Torque	The product of a force * the length of a lever arm, usually measured in Newton-meters (Nm) or foot-pounds (lbf·ft)
Torque angle	A tightening procedure in which a fitting is assembled to a specified tightness (usually finger tight) and then the nut is turned farther by a specified number of degrees until it achieves its final position
Torque-tension	The relationship between the assembly torque applied to a piece of hardware and the axial load it induces in a bolt or screw
Truck	A four-wheel highway/road vehicle weighing no less than 3400 kg (7500 lb.)
UCA	Upper Cross Auger
Untimed knife drive	Unsynchronized motion applied at the cutterbar to two separately driven knives from a single hydraulic motor or from two hydraulic motors
Washer	A thin cylinder with a hole or a slot located in the center, used as a spacer, a load distribution element, or a locking mechanism
Windrower	The power unit for a header
WOT	Wide-open throttle

2.2 Component Identification

Operating and maintaining the header requires understanding the names of its parts and their locations.

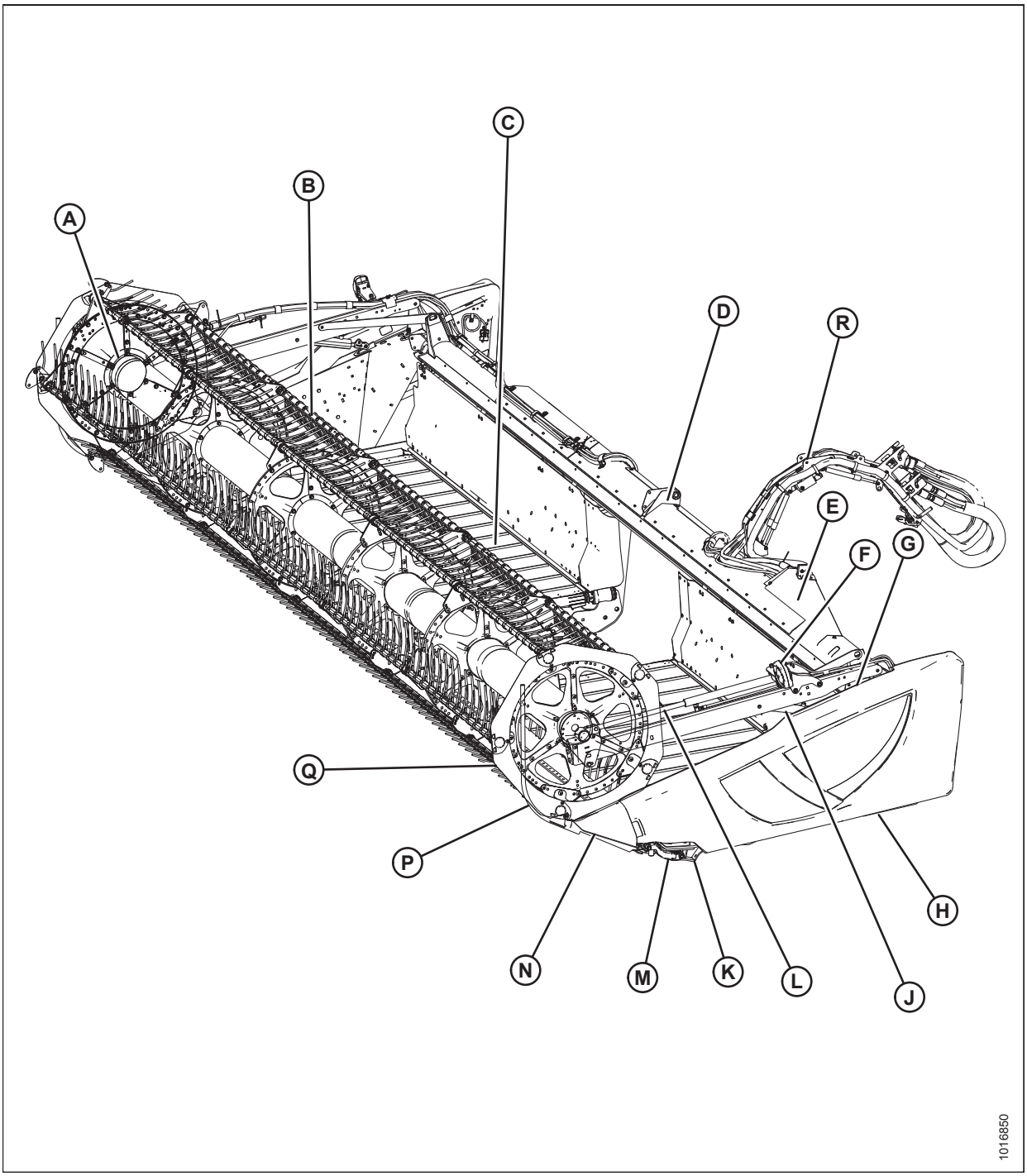


Figure 2.1: Windrower Header Components

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

2.3 Specifications

Here is a list of all the specifications for D1X and D1XL windrower-configured headers.

The following symbol and letters are used in the table below:

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

Table 2.1 Header Specifications

Cutterbar			
Effective cutting width (distance between crop divider points)			
D115X – 4.6 m (15 ft.) header		4572 mm (180 in.)	S
D120X – 6.1 m (20 ft.) header		6096 mm (240 in.)	S
D125X – 7.6 m (25 ft.) header		7620 mm (300 in.)	S
D130XL – 9.1 m (30 ft.) header		9144 mm (360 in.)	S
D135XL – 10.7 m (35 ft.) header		10,668 mm (420 in.)	S
D140XL – 12.2 m (40 ft.) header		12,192 mm (480 in.)	S
D145XL – 13.7 m (45 ft.) header		13,716 mm (540 in.)	S
Cutterbar lift range at guard tip (center-link fully retracted)		1265 mm (49 13/16 in.)	—
Knife			
Double-knife drive 4.6–10.7 m (15–35 ft.) (timed): One hydraulic motor with two banded-belts to two heavy duty knife drive boxes			S
Double-knife drive 12.2–13.7 m (40–45 ft.) (untimed): Two untimed hydraulic motors with cogged-belts to two heavy duty knife drive boxes			S
Knife stroke		76 mm (3 in.)	S
Double-knife speed (strokes per minute)[1]	D115X	1500–1900 spm	S
Double-knife speed (strokes per minute)[1]	D120X	1500–1900 spm	S
Double-knife speed (strokes per minute)[1]	D125X	1400–1700 spm	S
Double-knife speed (strokes per minute)[1]	D130XL	1200–1600 spm	S
Double-knife speed (strokes per minute)[1]	D135XL	1200–1400 spm	S
Double-knife speed (strokes per minute)[1]	D140XL	1100–1400 spm	S
Double-knife speed (strokes per minute)[1]	D145XL	1100–1400 spm	S
Knife Sections			
Over-serrated, solid, bolted, 9 serrations per inch			S
Over-serrated, solid, bolted, 14 serrations per inch			O_D
Knife overlap at center (double-knife headers)		3 mm (1/8 in.)	S
Guards and Hold-Down Clips			
Guard: pointed, forged, double heat treated (DHT) Hold-down clip: sheet metal, adjustment bolt			O_F
Guard: stub, forged bottom, forged top, adjustment plate			O_D
Guard: stub, forged bottom, sheet metal top, adjustment bolt			O_D

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

Table 2.1 Header Specifications (continued)

Guard Angle – Cutterbar on Ground			
Center-link retracted	D115X, D120X, D125X	7.5°	S
Center-link retracted	D130XL, D135XL, D140XL, D145XL	2.5°	S
Center-link extended	D115X, D120X, D125X	17.0°	S
Center-link extended	D130XL, D135XL, D140XL, D145XL	12.0°	S
Conveyor (Draper) and Decks			
Draper width (D1X Series)		1057 mm (41.6 in.)	S
Draper width (D1XL Series)		1270 mm (50 in.)	S
Draper drive		Hydraulic	S
Draper speed		225 m/min. (0–742 fpm)	S
Delivery opening width (center delivery), variable by shifting decks	4.6 m (15 ft.)	1540–1770 mm (60 5/8 – 69 11/16 in.)	S
Delivery opening width (center delivery), variable by shifting decks	6.1–13.7 m (20–45 ft.)	1720–1950 mm (67 1/8 – 76 11/16 in.)	S
PR15 Pick-Up Reel			
Quantity of tine tubes		5, 6, or 9	—
Center tube diameter	10.7 m (35 ft.) (single reel) only	254 mm (10 in.)	—
Center tube diameter	All reel sizes (except 10.7 m [35 ft.] single reel)	203 mm (8 in.)	—
Finger tip radius	Factory-set	800 mm (31 1/2 in.)	—
Finger tip radius	Adjustment range	766–800 mm (30 3/16 – 31 1/2 in.)	—
Effective reel diameter (via cam profile)		1650 mm (65 in.)	—
Finger length		290 mm (11 in.)	—
Finger spacing (staggered on alternate bats)		150 mm (6 in.)	—
Reel drive		Hydraulic	S
Reel speed (auto-adjust from cab using ground speed index)		0–85 rpm	S

Table 2.2 Header Attachments

Upper Cross Auger			O_D
Outside diameter		305 mm (12 in.)	
Tube diameter	All sizes	152 mm (6 in.)	
Stabilizer Wheel / Slow Speed Transport			O_D
Wheels		38 cm (15 in.)	
Tires		P205/75 R-15	

Table 2.3 Header Weights

Weight	
Estimated weight range with base header (variances are due to different package configurations)	
D115X – 4.6 m (15 ft.) header	1479–1538 kg (3260–3390 lb.)
D120X – 6.0 m (20 ft.) header	1678–1640 kg (3615–3700 lb.)
D125X – 7.6 m (25 ft.) header	1753 kg (3872 lb.)
D130XL – 9.1 m (30 ft.) header	2318 kg (5110 lb.)
D135XL – 10.7 m (35 ft.) header	2562–2730 kg (5649–6018 lb.)
D140XL – 12.2 m (40 ft.) header	2823 kg (6224 lb.)
D145XL – 13.7 m (45 ft.) header	2996 kg (6605 lb.)

2.4 Dimensions

Here is a list of dimensions for D1X and D1XL windrower-configured headers.

The following symbol and letters are used in the table below:

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

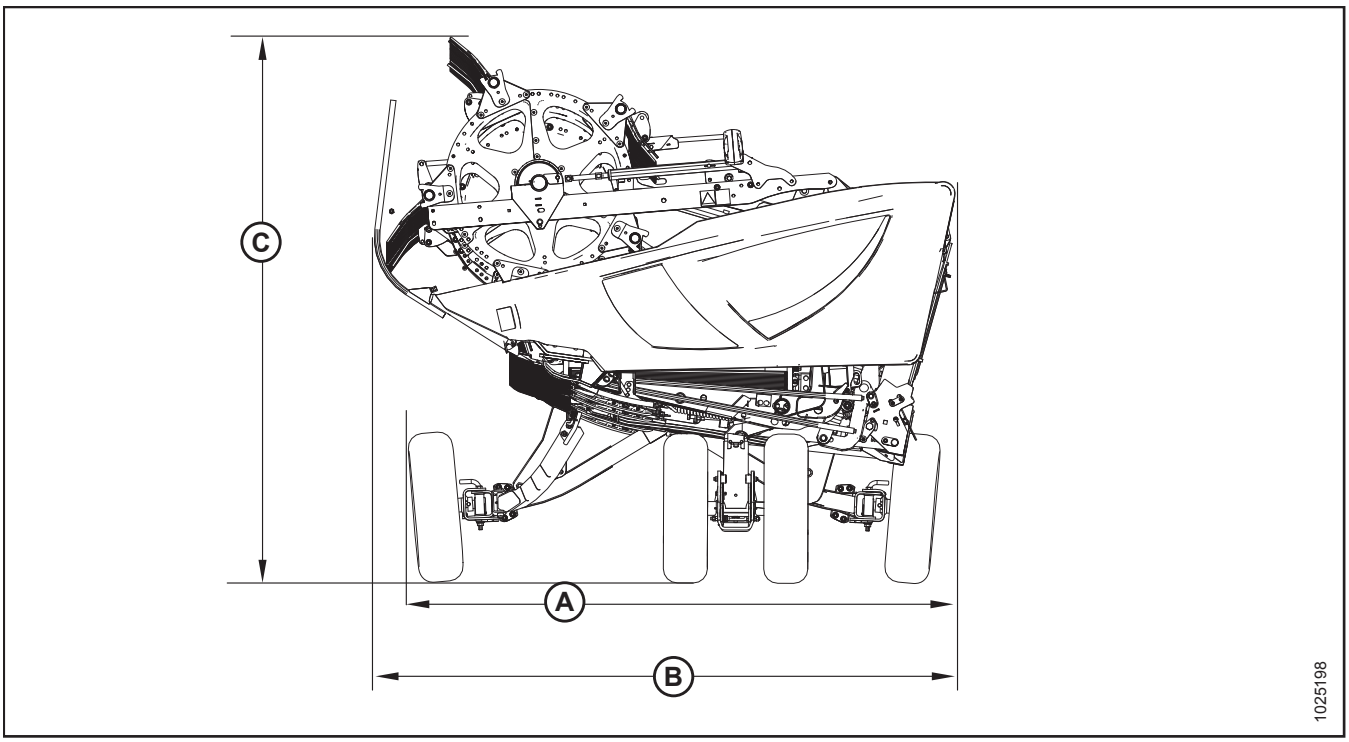


Figure 2.2: Header Width

Table 2.4 Header Dimensions

Header Width (Transport Mode, Reel Fore-Aft Fully Retracted)			
D1XL Series headers	(B)[2] (long dividers installed)	2845 mm (112 in.)	S
D1XL Series headers	(A)[2] (long dividers removed)	2667 mm (105 in.)	S
D1X Series headers	(B)[2] (long dividers installed)	2636 mm (104 in.)	S
D1X Series headers	(A)[2] (long dividers removed)	2452 mm (97 in.)	S
Header Height (Transport Mode, Reel Fore-Aft Fully Retracted)			
D1X Series headers	(C)[2] (long dividers installed)	2460 mm (97 in.)	S
D1XL Series headers	(C)[2] (long dividers installed)	2460 mm (97 in.)	S

2. Refer to Figure *2.2, page 31*.

Chapter 3: Operation

Safely operating your machine requires familiarizing yourself with its capabilities.

3.1 Owner/Operator Responsibilities

Owning and operating heavy equipment comes with certain duties.

CAUTION

- **It is your responsibility to read and understand this manual completely before operating the header. Contact your 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 someone to operate the header, for however short a time or distance, make sure they have been instructed in its safe and proper use.**
- **Review the manual and all safety related items with all Operators annually.**
- **Be alert for other Operators not using recommended procedures or not following safety precautions. Correct these mistakes immediately, before an accident occurs.**
- **Do NOT modify the machine. Unauthorized modifications may impair the function and/or safety of the machine and may reduce the length of service you receive from your machine.**
- **The safety information given in this manual does not replace safety codes, insurance needs, or laws governing your area. Be sure your machine meets the standards set by these regulations.**

3.2 Operational Safety

Follow all the safety and operational instructions given in this manual.

CAUTION

Adhere to the following safety precautions:

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

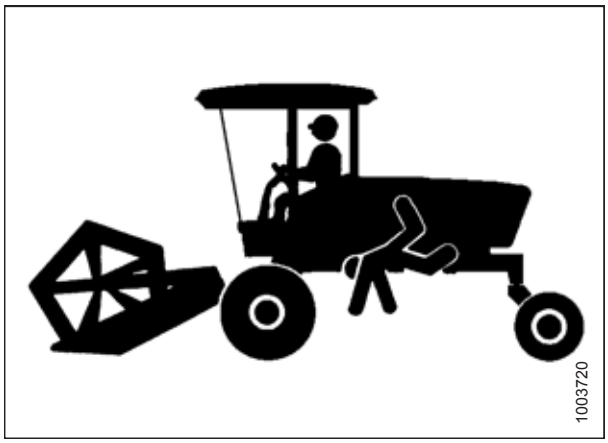


Figure 3.1: No Riders

CAUTION

- **Never start or move the machine until you are sure all bystanders have cleared the area.**
- **Avoid travelling over loose fill, rocks, ditches, or holes.**
- **Drive slowly through gates and doorways.**
- **When working on inclines, travel uphill or downhill whenever possible. Be sure to keep transmission in gear when travelling downhill.**
- **Never attempt to get on or off a moving machine.**
- **Do NOT leave the operator's station while the engine is running.**
- **To avoid bodily injury or death from the unexpected startup of a machine, always stop the engine and remove the key before adjusting or removing plugged material from the machine.**

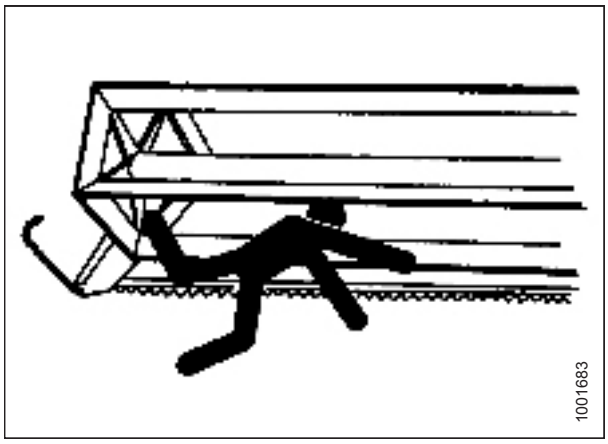


Figure 3.2: Bystander Safety

- **Check for excessive vibration and unusual noises. If there is any indication of trouble, shut down and inspect the machine. Follow the proper shutdown procedure. For instructions, refer to *3.4 Shutting down the Windrower, page 44*.**
- **Operate only in daylight or good artificial light.**

3.2.1 Header Safety Props

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

DANGER

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

3.2.2 Reel Safety Props

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

WARNING

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

IMPORTANT:

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

Engaging Reel Safety Props

Engage the reel safety props whenever you intend to work on or around a raised reel. When engaged, the reel safety props prevent the reel from falling unexpectedly.

DANGER

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

WARNING

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

1. Raise the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Move reel safety props (A) to the engaged position (as shown). **The prop MUST be placed on the top surface of raised lug (B), making contact with the cylinder mount, to ensure positive engagement.**
   NOTE:
   Keep pivot bolt (C) sufficiently tight so that the prop remains in the stored position when not in use, but can still be engaged using hand force.
4. Repeat the previous step on the opposite side of the header.

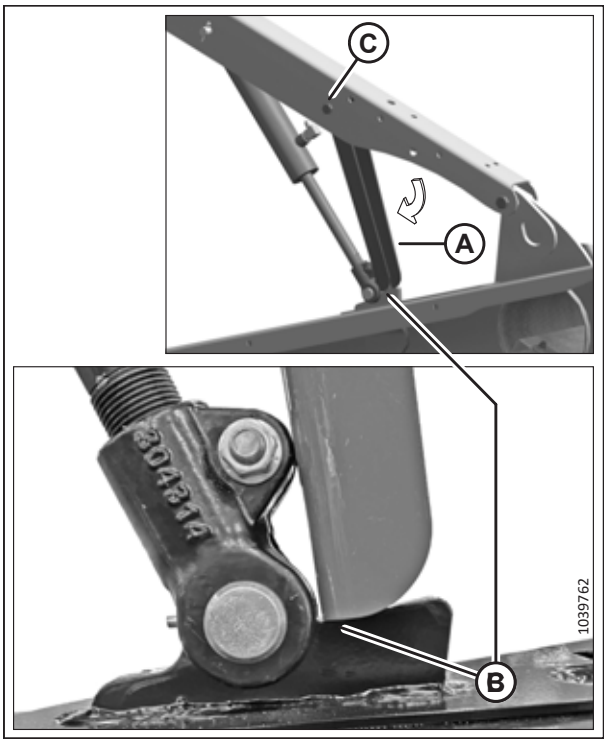


Figure 3.3: Engaged Reel Safety Prop – Left Shown

THE CONTENT ON THIS PAGE HAS CHANGED SINCE THIS MANUAL (215651 REVISION B) WAS PUBLISHED.

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

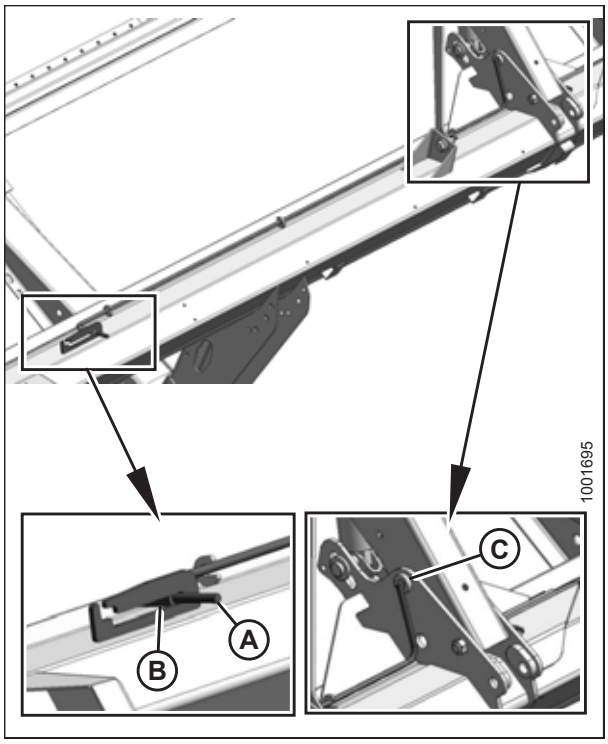


Figure 3.4: Reel Safety Prop – Center Arm

Disengaging Reel Safety Props

Disengage the reel safety props once you have completed working on or around a raised reel to ensure the proper operation of the reel and header.

1. Raise the reel to its maximum height.
2. Move reel safety prop (A) back inside the reel arm.
3. Repeat the previous step on the opposite end of the reel.

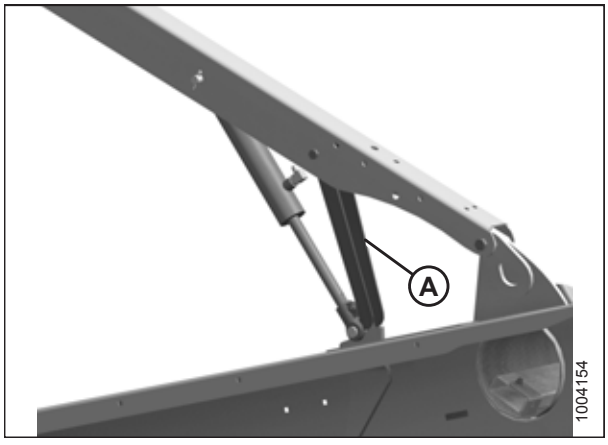


Figure 3.5: Left Reel Safety Prop

4. Use handle (B) on double-reel headers to move lock rod (A) to the outboard position.

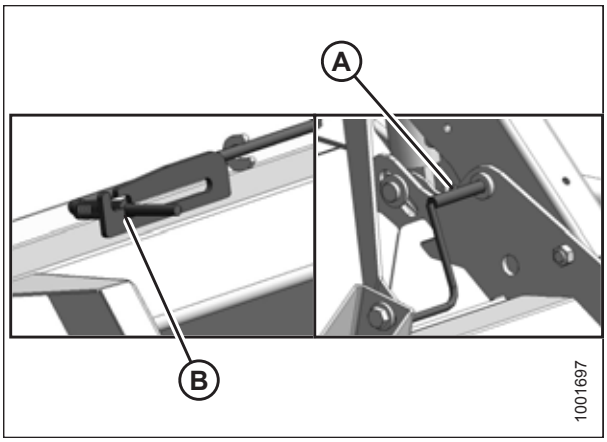


Figure 3.6: Reel Safety Prop – Center Arm

3.2.3 Header Endshields

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

Opening Endshields

The endshields can be opened to access serviceable components or stored items.

This procedure details the steps necessary to open the left endshield; the procedure for opening the right endshield is opposite.

1. Locate the endshield.
2. From the back of the header, push release lever (A) to unlock the endshield.
3. Pull the endshield open using handle depression (B).

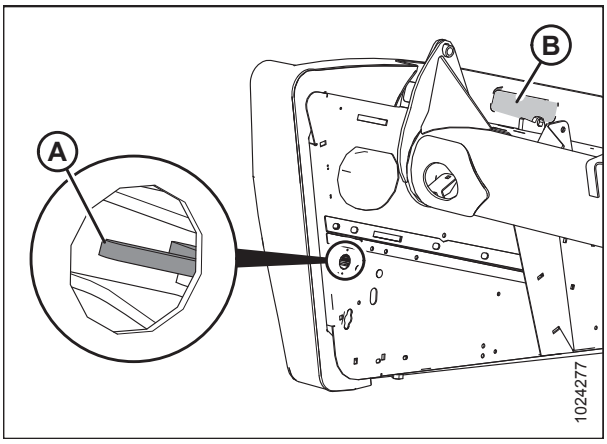


Figure 3.7: Left Endshield

4. Pull the endshield at handle depression (A).

   NOTE:

   The endshield is retained by hinge tab (B) and will open in direction (C).

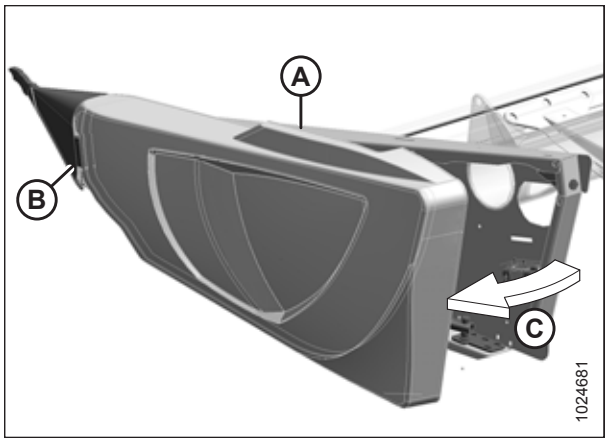


Figure 3.8: Left Endshield

5. If additional clearance is required, pull the endshield free of hinge tab (A) and swing the endshield toward the rear of the header.
6. Engage safety latch (B) on the hinge arm to secure the endshield in the fully open position.

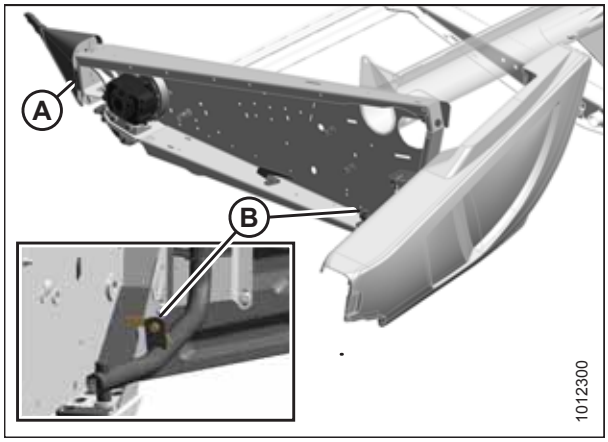


Figure 3.9: Left Endshield

Closing Endshields

Close and lock the endshields before moving the header.

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

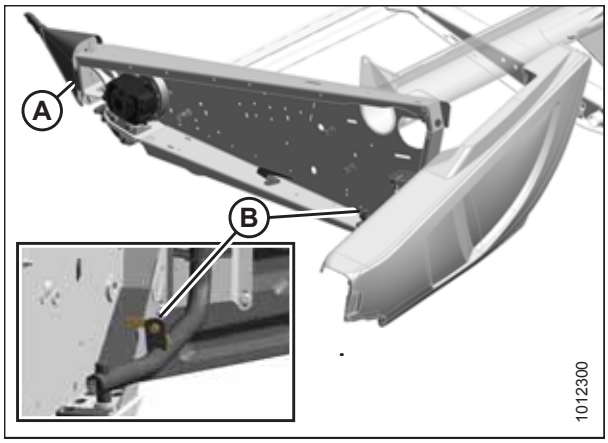


Figure 3.10: Left Endshield

3. Swing the endshield into the closed position (direction [A]). Engage the latch by pushing firmly on the endshield in the direction shown.
4. Ensure that the endshield is locked by pulling the endshield toward you; if it has successfully locked, it will not be possible to move the endshield.

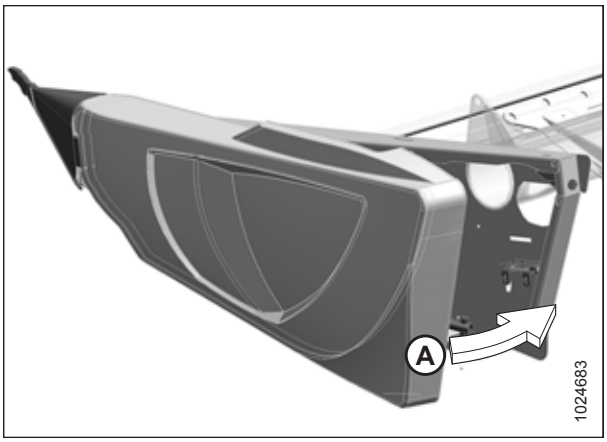


Figure 3.11: Left Endshield

Removing Endshields

To ensure the endshields are removed correctly, follow the recommended removal procedure provided here.

NOTE:

A D1X Series Draper Header is shown in the illustration. A D1XL Series Draper Header is similar.

1. Fully open the endshield. For instructions, refer to *Opening Endshields, page 37*.
2. Engage lock (A) to prevent endshield movement.
3. Remove self-tapping screw (B).
4. Slide the endshield upwards and remove it from hinge arm (C).

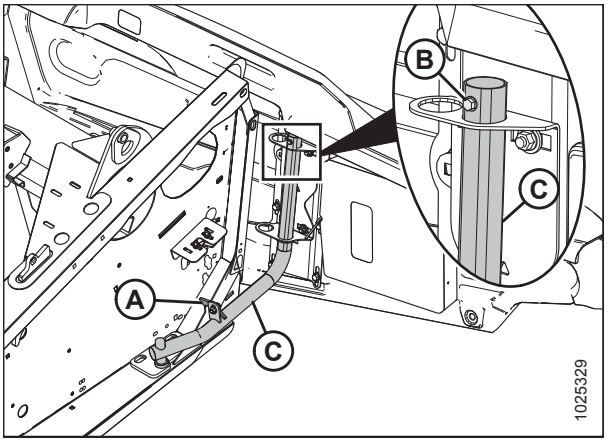


Figure 3.12: Left Endshield on D1X Series Draper Header

Installing Endshields

To ensure the endshields are installed correctly, follow the recommended installation procedure provided here.

NOTE:

A D1X Series Draper Header is shown in the illustration. A D1XL Series Draper Header is similar.

1. Guide the endshield onto hinge arm (C) and slowly lower it.

   NOTE:

   Ensure hinge arm (C) is installed in the outboard hole on the hinge bracket, as shown in the illustration at right.

2. Install self-tapping screw (B).
3. Disengage lock (A) to allow endshield movement.
4. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

   NOTE:

   Endshields may expand or contract when subjected to large temperature changes. The top pin and lower latch bracket positions can be adjusted to compensate for dimensional changes. For instructions, refer to *Checking and Adjusting Endshields, page 40*.

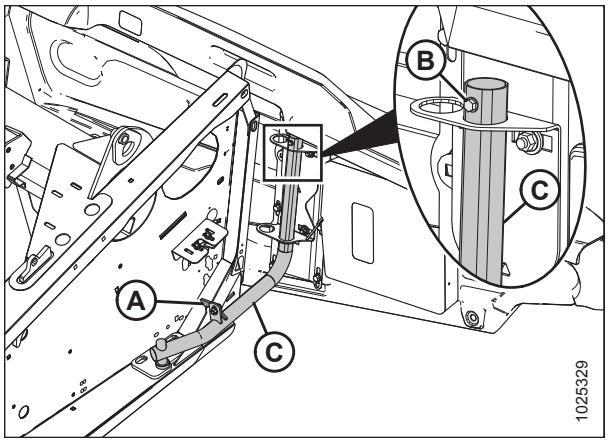


Figure 3.13: Left Endshield on D1X Series Draper Header

Checking and Adjusting Endshields

The header's endshields are made from molded plastic and are therefore subject to expansion or contraction caused by variations in the ambient temperature. The position of the top pin and that of the lower latch can be adjusted to compensate for dimensional changes in the endshield.

Checking the endshield

1. Measure gap (X) between the front end of the endshield and the header frame. Compare the measurement to the values provided in Table *3.1, page 40*.

Table 3.1 Endshield Gaps at Various Ambient Temperatures

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

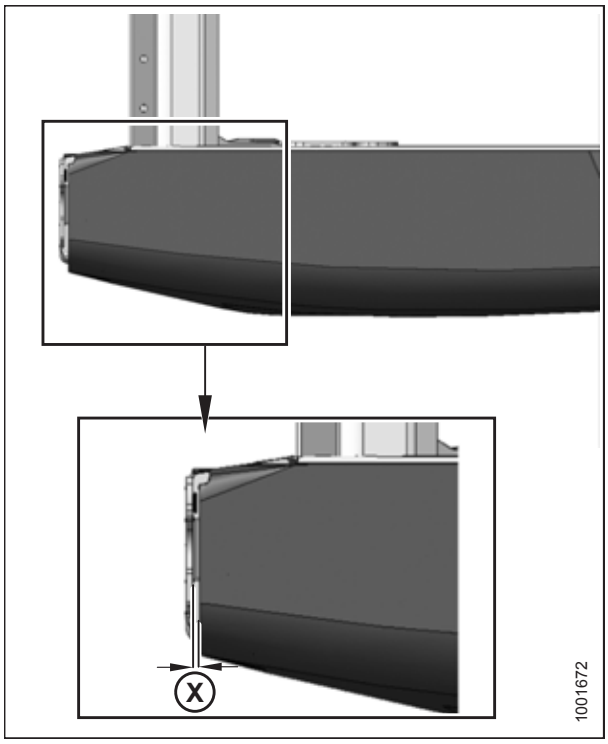


Figure 3.14: Gap between Endshield and Header Frame

Adjusting the endshield

2. Inside the endshield, loosen four bolts (A) on support tube bracket (B).

   NOTE:

   A D1X Series Draper Header is shown in the illustration. The endshield on a D1XL Series Draper Header is similar.

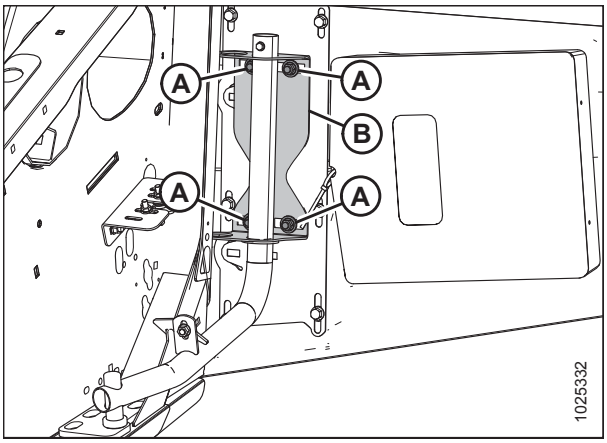


Figure 3.15: Left Endshield Support Tube on D1X Series Header

3. Loosen three bolts (A) on latch assembly (B).
4. Adjust latch assembly (B) to achieve the desired gap between the front end of the endshield and the header frame. Refer to Table *3.1, page 40* for the recommended endshield gap at various ambient temperatures.
5. Tighten three bolts (A) on the latch assembly to 27 Nm (20 lbf·ft).

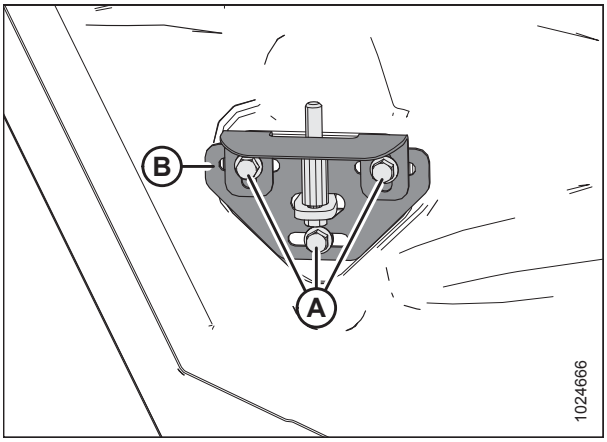


Figure 3.16: Left Endshield Latch Assembly

6. Tighten four bolts (A) on support tube bracket (B) to 31 Nm (23 lbf·ft).

   NOTE:

   A D1X Series Draper Header is shown in the illustration; D1XL Series Draper Headers are similar.

7. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.
8. Repeat Step *2, page 41* to Step *7, page 41* to adjust the right endshield.

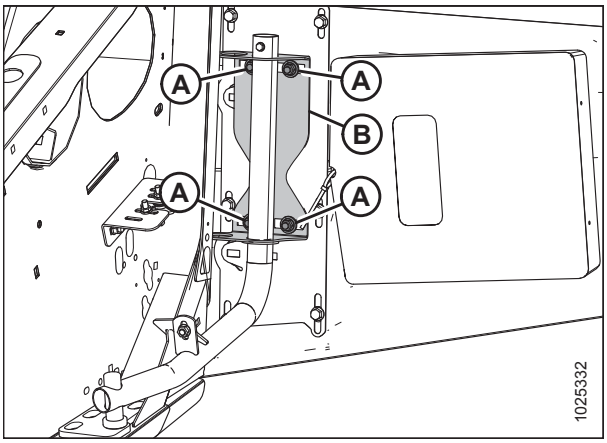


Figure 3.17: Left Endshield Support Tube on D1X Series Header

3.2.4 Daily Start-Up Check

Perform daily start-up checks daily before operating the machine.

CAUTION

- **Clear the area of other persons, pets, etc. Keep children away from machinery. Walk around the machine to be sure no one is under, on, or close to it.**
- **Wear close-fitting clothing and protective shoes with slip-resistant soles.**
- **Remove foreign objects from the machine and surrounding area.**
- **Carry with you any protective clothing and personal safety devices that could be necessary through the day. Do NOT take chances. Personal safety devices that may be needed include a hard hat, protective glasses or goggles, heavy gloves, a respirator or filter mask, or wet weather gear.**

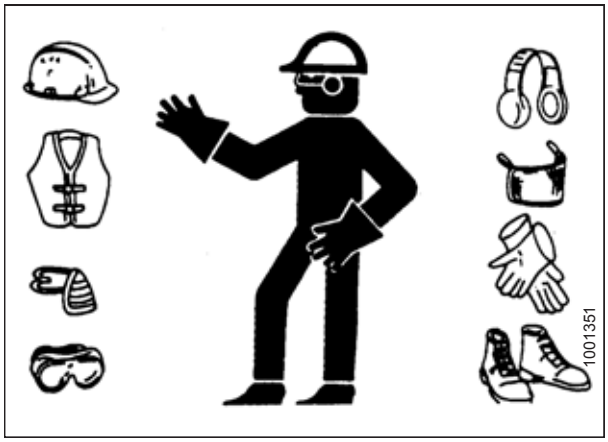


Figure 3.18: Safety Devices

- **Protect against noise. Wear a suitable hearing protective device such as ear muffs or ear plugs to protect against objectionable or uncomfortably loud noises.**

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

   NOTE:

   Use proper procedure when searching for pressurized fluid leaks. For instructions, refer to *5.3.5 Checking Hydraulic Hoses and Lines, page 119*.

2. Clean all lights and reflectors on the machine.
3. Perform all daily maintenance. For instructions, refer to *5.3.1 Maintenance Schedule/Record, page 116*.

3.3 Break-in Period

A brand-new machine must be operated gently when it is run for the first time.

NOTE:

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

WARNING

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

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

1. Operate the machine with the reels, drapers, and knives running slowly for 5 minutes. Watch and listen **FROM THE OPERATOR'S SEAT** for binding or interfering parts.

   NOTE:

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

2. Refer to *5.3.2 Break-In Inspection, page 117* and perform all specified tasks.

3.4 Shutting down the Windrower

Before leaving the operator's seat for any reason, shut down the windrower.

DANGER

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

To shut down the windrower, do the following:

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

3.5 Cab Controls

The header is controlled from the windrower cab.

WARNING

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

For instructions, refer to your windrower operator's manual for identification of the following in-cab controls:

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

3.6 Header Setup

Perform the following procedures before operating the machine for optimal performance.

3.6.1 Header Attachments

Optional attachments can improve performance in specific conditions or add features to the header. Optional attachments can be ordered and installed by your MacDon Dealer.

Refer to *6 Options and Attachments, page 243* for descriptions of available items.

3.6.2 Header Settings

The following tables provide guidelines for setting up D1X or D1XL Series Draper Headers for different crops and crop conditions; however, the suggested settings can be changed to suit crops and conditions not covered in the tables.

Refer also to *3.6.3 Reel Settings, page 56*.

Table 3.2 Recommended D1X/D1XL Header Settings for Canola, Stubble Height 102–203 mm (4–8 in.)

Stabilizer Wheels[3]	Variable							
Float N (lbf)[4]	311–445 (70–100)							
Crop Condition	**Divider Rods**	**Header Angle**[5]	**Skid Shoe Position**[6]	**Reel Cam**[7]	**Reel Speed %**[8]	**Knife Speed**[9]	**Reel Position**[10]	**Upper Cross Auger**
Light	On	8–10	Variable	2	5–10	Medium	6 or 7	Not required
Normal	On	8–10	Middle or Down	1	10	Low	6 or 7	Not required
Heavy	On	8–10	Variable	1	10	Low	3 or 4	Recommended
Lodged	On	8–10	Middle or Down	2	5–10	Low	3 or 4	Recommended

3. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
4. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
5. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
6. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
7. Refer to *Reel Cam Settings, page 68*.
8. Percentage above ground speed.
9. Refer to *3.7.7 Knife Speed Information, page 66*.
10. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.3 Recommended D1X/D1XL Header Settings for Canola, Stubble Height >203 mm (>8 in.)

Stabilizer Wheels[11]	Variable							
Float N (lbf)[12]	667 (150)							
Crop Condition	**Divider Rods**	**Header Angle**[13]	**Skid Shoe Position**[14]	**Reel Cam**[15]	**Reel Speed %**[16]	**Knife Speed**[17]	**Reel Position**[18]	**Upper Cross Auger**
Light	On	8–10	Not applicable	2	5–10	Medium	6 or 7	Not required
Normal	On	8–10	Not applicable	2	10	Low	6 or 7	Not required
Heavy	On	8–10	Not applicable	3	10	Low	3 or 4	Recommended
Lodged	On	8–10	Not applicable	3	5–10	Low	3 or 4	Recommended

11. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
12. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
13. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
14. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
15. Refer to *Reel Cam Settings, page 68*.
16. Percentage above ground speed.
17. Refer to *3.7.7 Knife Speed Information, page 66*.
18. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.4 Recommended D1X/D1XL Header Settings for Cereals, Stubble Height <102 mm (<4 in.)

Stabilizer Wheels[19]	Storage							
Float N (lbf)[20]	311 (70)							
Crop Condition	**Divider Rods**	**Header Angle**[21]	**Skid Shoe Position**[22]	**Reel Cam**[23]	**Reel Speed %**[24]	**Knife Speed**[25]	**Reel Position**[26]	**Upper Cross Auger**
Light	On	0–3	Up or Middle	2	10–15	High	6 or 7	Not required
Normal	On	0–3	Up or Middle	2	10	Medium	6 or 7	Not required
Heavy	On	4–7	Up or Middle	2	10	Medium	6 or 7	Not required
Lodged	On	4–7	Up or Middle	3	5–10	Medium	4 or 5	Not required

19. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
20. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
21. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
22. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
23. Refer to *Reel Cam Settings, page 68*.
24. Percentage above ground speed.
25. Refer to *3.7.7 Knife Speed Information, page 66*.
26. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.5 Recommended D1X/D1XL Header Settings for Cereals, Stubble Height 102–203 mm (4–8 in.)

Stabilizer Wheels[27]	Variable							
Float N (lbf)[28]	311 (70)							
Crop Condition	**Divider Rods**	**Header Angle**[29]	**Skid Shoe Position**[30]	**Reel Cam**[31]	**Reel Speed %**[32]	**Knife Speed**[33]	**Reel Position**[34]	**Upper Cross Auger**
Light	On	0–3	Middle or Down	2	10–15	High	6 or 7	Not required
Normal	On	0–3	Middle or Down	2	10	Medium	6 or 7	Not required
Heavy	On	4–7	Middle or Down	2	10	Medium	6 or 7	Not required
Lodged	On	4–7	Down	3	5–10	Medium	4 or 5	Not required

27. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
28. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
29. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
30. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
31. Refer to *Reel Cam Settings, page 68*.
32. Percentage above ground speed.
33. Refer to *3.7.7 Knife Speed Information, page 66*.
34. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.6 Recommended D1X/D1XL Header Settings for Cereals, Stubble Height >203 mm (>8 in.)

Stabilizer Wheels[35]	Variable							
Float N (lbf)[36]	667 (150)							
Crop Condition	**Divider Rods**	**Header Angle**[37]	**Skid Shoe Position**[38]	**Reel Cam**[39]	**Reel Speed %**[40]	**Knife Speed**[41]	**Reel Position**[42]	**Upper Cross Auger**
Light	On	0–3	Not applicable	2	10–15	High	6 or 7	Not required
Normal	On	0–3	Not applicable	2	10	Medium	6 or 7	Not required
Heavy	On	4–7	Not applicable	2	10	Medium	6 or 7	Not required
Lodged	On	4–7	Not applicable	3	5–10	Medium	4 or 5	Not required

35. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
36. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
37. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
38. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
39. Refer to *Reel Cam Settings, page 68*.
40. Percentage above ground speed.
41. Refer to *3.7.7 Knife Speed Information, page 66*.
42. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.7 Recommended D1X/D1XL Header Settings for Edible Beans, Ground Level Stubble Height (0 mm [0 in.])

Stabilizer Wheels[43]	Storage							
Float N (lbf)[44]	445 (100)							
Crop Condition	**Divider Rods**	**Header Angle**[45]	**Skid Shoe Position**[46]	**Reel Cam**[47]	**Reel Speed %**[48]	**Knife Speed**[49]	**Reel Position**[50]	**Upper Cross Auger**
Light	Off	8–10	Up or Middle	2	5–10	Medium	3 or 4	Not required
Normal	Off	8–10	Up or Middle	2	5–10	Medium	3 or 4	Not required
Heavy	Off	8–10	Up or Middle	2	5–10	Medium	3 or 4	Not required
Lodged	Off	8–10	Up or Middle	3	5–10	Medium	3 or 4	Not required

43. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
44. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
45. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
46. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
47. Refer to *Reel Cam Settings, page 68*.
48. Percentage above ground speed.
49. Refer to *3.7.7 Knife Speed Information, page 66*.
50. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.8 Recommended D1X/D1XL Header Settings for Flax, Stubble Height 51–153 mm (2–6 in.)

Stabilizer Wheels[51]	Variable							
Float N (lbf)[52]	311–445 (70–100)							
Crop Condition	**Divider Rods**	**Header Angle**[53]	**Skid Shoe Position**[54]	**Reel Cam**[55]	**Reel Speed %**[56]	**Knife Speed**[57]	**Reel Position**[58]	**Upper Cross Auger**
Light	On	4–7	Middle or Down	2	5–10	High	6 or 7	Not required
Normal	On	0–3	Middle or Down	2	10	High	6 or 7	Not required
Heavy	On	4–7	Middle or Down	2	10	High	6 or 7	Not required
Lodged	On	8–10	Middle or Down	2	10	High	6 or 7	Not required

51. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
52. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
53. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
54. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
55. Refer to *Reel Cam Settings, page 68*.
56. Percentage above ground speed.
57. Refer to *3.7.7 Knife Speed Information, page 66*.
58. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.9 Recommended D1X/D1XL Header Settings for Grass, Ground Level Stubble Height (0 mm [0 in.])

Stabilizer Wheels[59]	Storage							
Float N (lbf)[60]	311–445 (70–100)							
Crop Condition	**Divider Rods**	**Header Angle**[61]	**Skid Shoe Position**[62]	**Reel Cam**[63]	**Reel Speed %**[64]	**Knife Speed**[65]	**Reel Position**[66]	**Upper Cross Auger**
Light	On	Variable	Up or Middle	2	10	High	6 or 7	Not required
Normal	On	Variable	Up or Middle	2	10	High	6 or 7	Not required
Heavy	On	Variable	Up or Middle	2	10	High	6 or 7	Not required
Lodged	On	Variable	Up or Middle	2	10–15	High	6 or 7	Not required

59. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
60. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
61. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
62. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
63. Refer to *Reel Cam Settings, page 68*.
64. Percentage above ground speed.
65. Refer to *3.7.7 Knife Speed Information, page 66*.
66. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

Table 3.10 Recommended D1X/D1XL Header Settings for Alfalfa, Ground Level Stubble Height (0 mm [0 in.])

Stabilizer Wheels[67]	Storage							
Float N (lbf)[68]	311–445 (70–100)							
Crop Condition	**Divider Rods**	**Header Angle**[69]	**Skid Shoe Position**[70]	**Reel Cam**[71]	**Reel Speed %**[72]	**Knife Speed**[73]	**Reel Position**[74]	**Upper Cross Auger**
Light	On	Variable	Up or Middle	3	10	High	6 or 7	Not required
Normal	On	Variable	Up or Middle	2	10	High	6 or 7	Not required
Heavy	On	Variable	Up or Middle	2	10	High	6 or 7	Not required
Lodged	On	Variable	Up or Middle	3	10–15	High	6 or 7	Not required

67. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain and to minimize bouncing.
68. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.
69. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to *3.7.3 Header Angle, page 63*.
70. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to *Adjusting Skid Shoes, page 62*.
71. Refer to *Reel Cam Settings, page 68*.
72. Percentage above ground speed.
73. Refer to *3.7.7 Knife Speed Information, page 66*.
74. Refer to *3.7.9 Reel Fore-Aft Position, page 67*.

3.6.3 Reel Settings

The reel cam setting and reel position can be adjusted to produce different reel finger patterns.

Table *3.11, page 56* illustrates the profile of the reel at each cam or finger pitch setting as well as the reel position relative to the ground at different positions on the reel arm. Refer to *3.6.2 Header Settings, page 46* for the applicability of each finger pattern and reel position.

Table 3.11 Recommended Reel Settings

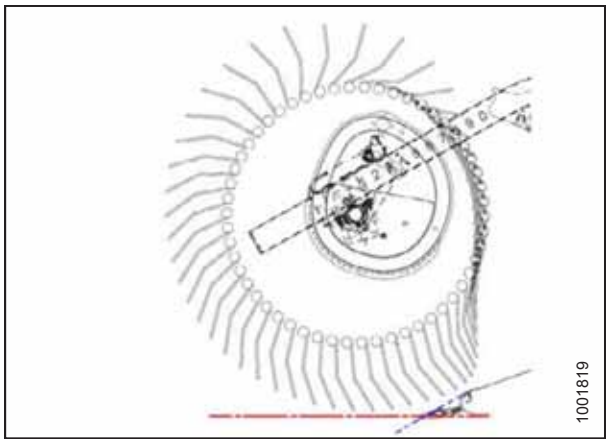
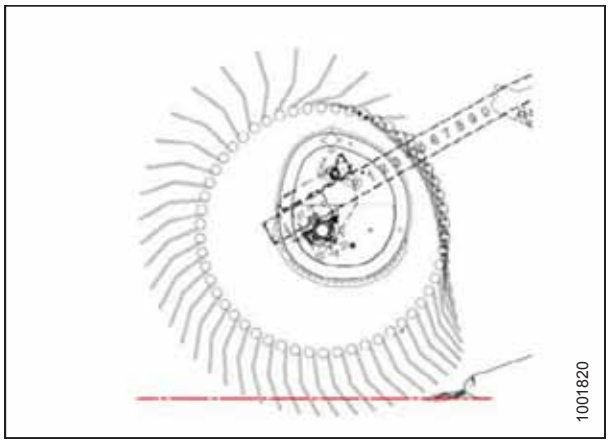
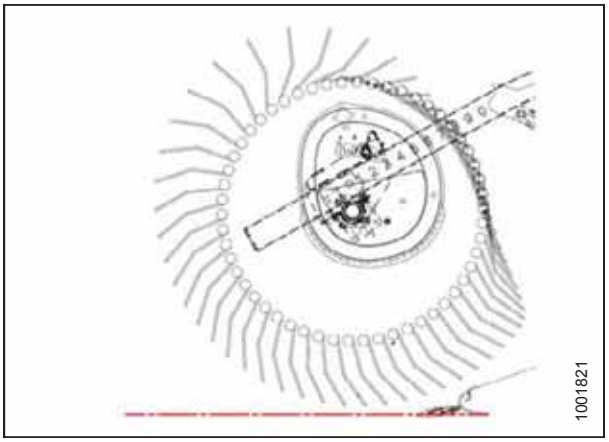
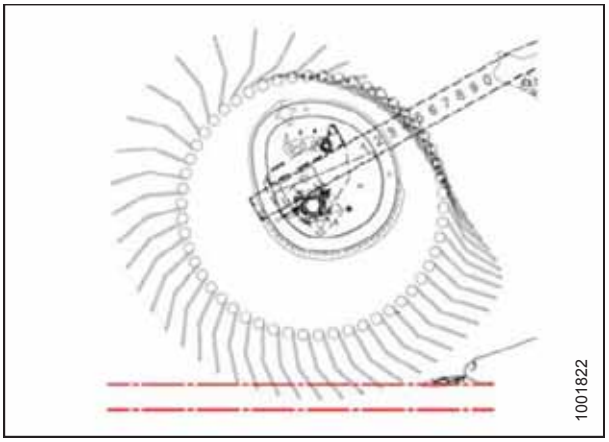
Cam Setting Number (Finger Speed Gain)	Reel Position Number	Reel Finger Pattern
1 (0)	6 or 7	 1001819
2 (20%)	3 or 4	 1001820

Table 3.11 Recommended Reel Settings (continued)

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

NOTE:

- Adjust the reel forward to get closer to the ground while tilting the header back. Fingers/tines will dig into the ground at extreme reel-forward positions, so adjust skid shoes or header angle to compensate. Adjust the reel rearwards to position the reel farther away from the ground when tilting the header forward.
- Header tilt can be increased to position the reel closer to the ground, or decreased to position the reel farther from the ground, while keeping material flowing onto drapers.
- To leave the maximum amount of stubble behind in lodged crop, raise the header and increase the header tilt to keep the reel close to the ground. Position the reel fully forward.
- The reel may have to be moved back to prevent lumps or plugging on the cutterbar in thinner crops.
- Minimum crop carrying capacity (minimum area of exposed draper between the reel and the header backsheet) occurs with the reel in the farthest aft position.
- Maximum crop carrying capacity (maximum area of exposed draper between the reel and the header backsheet) occurs with the reel in the farthest forward position.
- The tip speed of the fingers/tines at the cutterbar becomes higher than the reel speed at higher cam settings due to the nature of the cam action. Refer to Table *3.11, page 56*.

3.7 Header Operating Variables

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

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

The variables listed in Table *3.12, page 58* and detailed on the following pages will affect the performance of your header.

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

Table 3.12 Operating Variables

Variable	Refer to
Cutting height	*3.7.1 Cutting Height, page 58*
Header float	*3.7.2 Header Float, page 63*
Header angle	*3.7.3 Header Angle, page 63*
Reel speed	*3.7.4 Reel Speed, page 64*
Ground speed	*3.7.5 Ground Speed, page 65*
Reel height	*3.7.8 Reel Height, page 66*
Reel fore-aft position	*3.7.9 Reel Fore-Aft Position, page 67*
Reel tine pitch	*3.7.10 Reel Tine Pitch, page 68*
Crop divider rods	*3.7.12 Crop Divider Rods, page 75*

3.7.1 Cutting Height

The header design allows you to cut the crop above the ground at a desired stubble height or to cut the crop at ground level with the header on the ground. Cutting height will vary depending on a range of factors including crop type and crop conditions.

Cutting off the Ground

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

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

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

If stabilizer wheels are installed, refer to *Adjusting Stabilizer Wheels, page 60* to change the wheel position.

If stabilizer/slow speed transport wheels are installed, refer to *Adjusting Stabilizer/Slow Speed Transport Wheels, page 58* to change the wheel position.

Adjusting Stabilizer/Slow Speed Transport Wheels

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

Refer to *3.6.2 Header Settings, page 46* for recommended use in specific crops and crop conditions.

DANGER

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

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

CAUTION

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

4. Remove hairpin (A) from the latch on the right wheel assembly.
5. Disengage latch (B), lift the wheel out of the hook, and place the wheel on the ground as shown.

   NOTE:

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

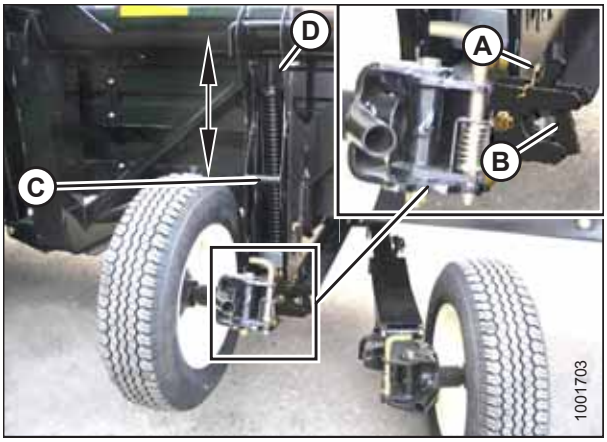


Figure 3.19: Right Wheels

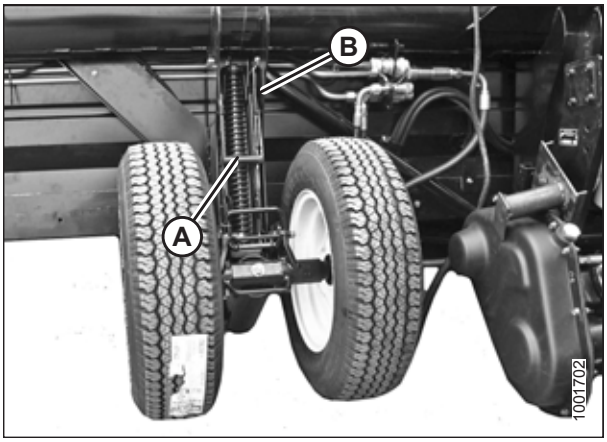


Figure 3.20: Left Wheels

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

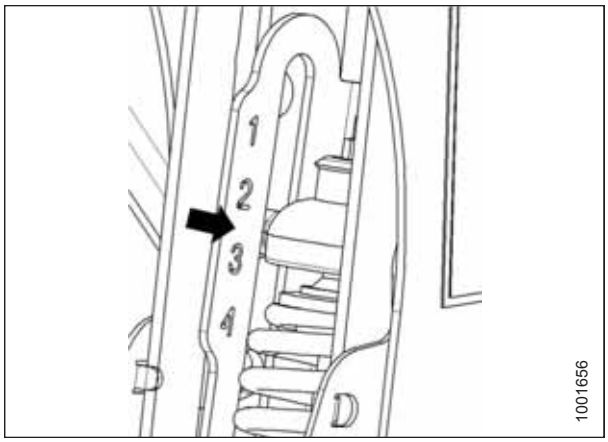


Figure 3.21: Load Indicator

IMPORTANT:

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

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

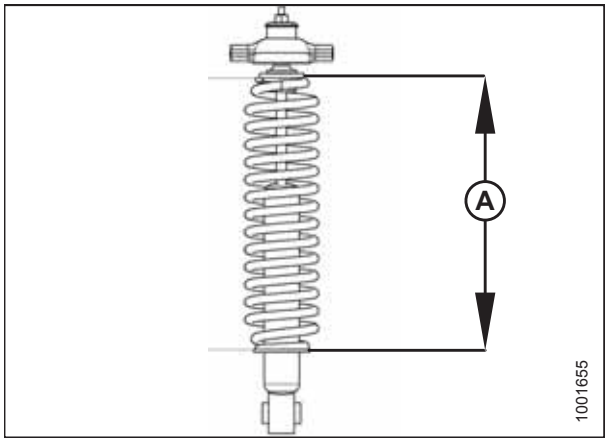


Figure 3.22: Spring Compression

Adjusting Stabilizer Wheels

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

Refer to *3.6.2 Header Settings, page 46* for recommended use in specific crops and crop conditions.

DANGER

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

CAUTION

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

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

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

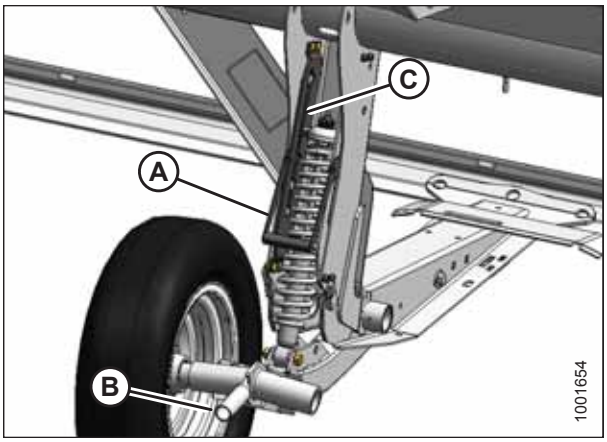


Figure 3.23: Stabilizer Wheel

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

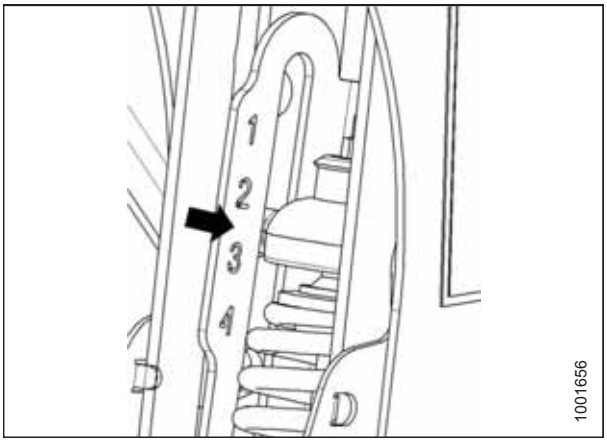


Figure 3.24: Load Indicator

IMPORTANT:

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

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

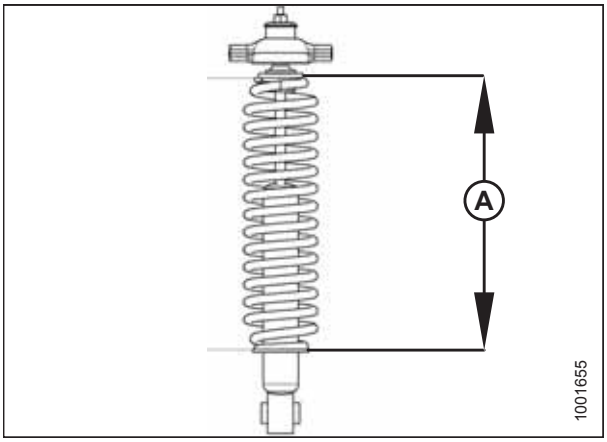


Figure 3.25: Spring Compression

Cutting on the Ground

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

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

Refer to the following for additional information:

- *3.6.2 Header Settings, page 46*
- *Adjusting Skid Shoes, page 62*
- *3.7.2 Header Float, page 63*

Adjusting Skid Shoes

The skid shoes can be adjusted to optimize header performance and maximize the life of the skid shoes. To adjust the skid shoes, follow this procedure.

DANGER

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

1. Raise the header fully.
2. Engage the header's safety props.
3. Shut down the engine, and remove the key from the ignition.
4. Raise the stabilizer wheels or slow speed transport wheels fully (if installed). For instructions, refer to the following:
   - *Adjusting Stabilizer/Slow Speed Transport Wheels, page 58*
   - *Adjusting Stabilizer Wheels, page 60*

   IMPORTANT:

   Note the adjustment hole position on support (A) and ensure each skid shoe is set to the same position.
5. Remove lynch pin (B) from each skid shoe.
6. Hold the shoe and remove pin (C) by disengaging it from the frame and pulling it away from the shoe.
7. Raise or lower the skid shoe to the desired position using the holes in support (A) as a guide.
8. Install pin (C), engage in frame, and secure with lynch pin (B).
9. Check that all of the skid shoes are adjusted to the same position.

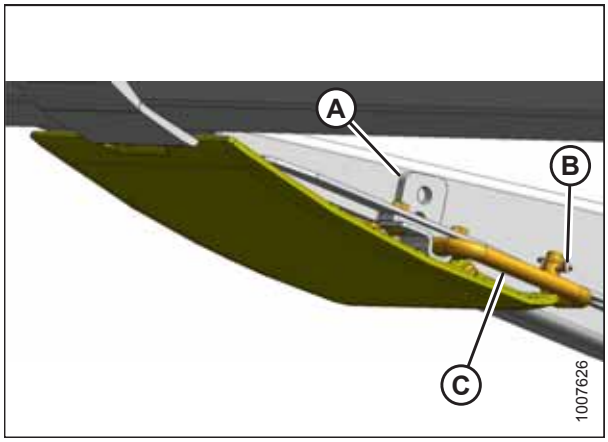


Figure 3.26: Inner Skid Shoe

10. Check the header float as described in your windrower operator's manual.

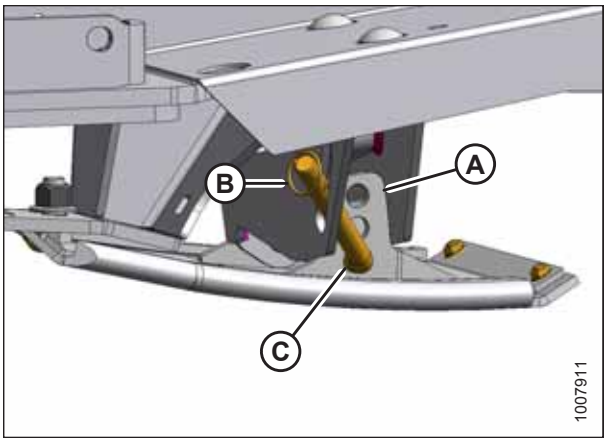


Figure 3.27: Outer Skid Shoe

3.7.2 Header Float

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

3.7.3 Header Angle

Header angle is the angle between the header and the ground. The header angle is adjustable to accommodate different crop conditions and/or soil types and can be adjusted using the center-link between the windrower and the header.

For in-cab adjustment details, refer to the windrower operator's manual.

The header angle (A) controls the distance (B) between the cutterbar knife and the ground and is a critical component for effective cutting crop at ground level.

Adjusting the header angle pivots the header at the point of skid shoe/ground contact (C).

Guard angle (D) is the angle between the upper surface of the cutterbar guards and the ground.

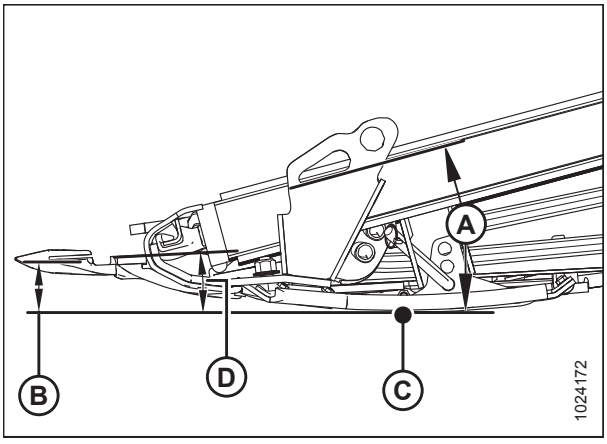


Figure 3.28: Header Angle

Set the header angle according to the type and condition of crop and soil as follows:

- Use shallower settings (A) (position **A** on the indicator) for normal cutting conditions and wet soil to reduce soil buildup at the cutterbar. Shallow angle settings also minimize damage to the knife in stony fields.
- Use steeper settings (D) (position **D** on the indicator) for lodged crops and crops that are close to the ground such as soybeans.

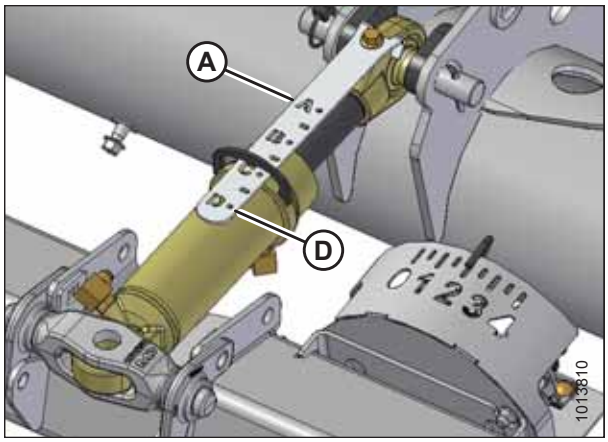


Figure 3.29: Center-Link

The shallowest angle (A) (center-link fully retracted) produces the highest stubble when cutting on the ground.

The steepest angle (D) (center-link fully extended) produces the lowest stubble when cutting on the ground.

Choose an angle that maximizes performance for your crop and field conditions. Refer to the table below for a summary of adjustment ranges.

Table 3.13 D1X/D1XL Series Header Angle

Header Size	Guard Angle
6.1–7.6 m (20 and 25 ft.)	7.0–12.4°
9.1–13.7 m (30–45 ft.)	2.0–7.4°

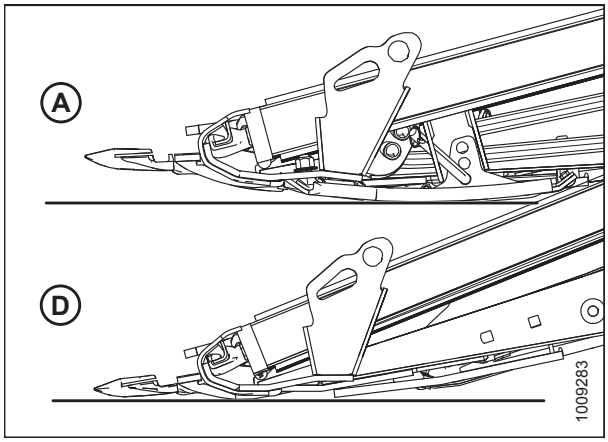


Figure 3.30: Guard Angles

For recommended header/guard angle settings for your particular crop conditions, refer to *3.6.2 Header Settings, page 46*.

Adjusting Header Angle

Header angle can be adjusted using the center-link between the windrower and the header.

Refer to the windrower operator's manual for adjustment details.

3.7.4 Reel Speed

Reel speed is one of the factors that determines how crop is moved from the cutterbar onto the drapers.

The reel performs best when it appears to be driven by the ground. It should move the cut crop evenly through the cutterbar and onto the drapers without bunching and with minimal disturbance.

In standing crop, reel speed should be slightly higher than, or equal to, ground speed.

In flattened crop or crop that is leaning away from the cutterbar, the reel speed needs to be higher than the ground speed. To achieve this, either increase the reel speed or decrease the ground speed.

Excessive shattering of grain heads or crop loss over the header backtube may indicate that the reel speed is too high. Excessive reel speed also increases reel component wear and overloads the reel drive.

Slower reel speeds can be used with nine-bat reels, which is advantageous in shatter-prone crops.

Refer to for recommended reel speeds in specific crops and crop conditions.

The reel speed is adjustable using the controls in the windrower cab. Refer to the windrower operator's manual for adjustment details.

Optional Reel Drive Sprockets

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

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

For installation details, refer to *5.9.3 Reel Drive Sprocket, page 229*.

3.7.5 Ground Speed

Operating at the proper ground speed will cleanly cut crop and evenly distribute crop material in uniform windrows.

For effects of ground speed on windrow formation, refer to *3.10 Windrow Types, page 80*.

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

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

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

Figure *3.31, page 65* illustrates the relationship between ground speed and area cut for the various sized headers.

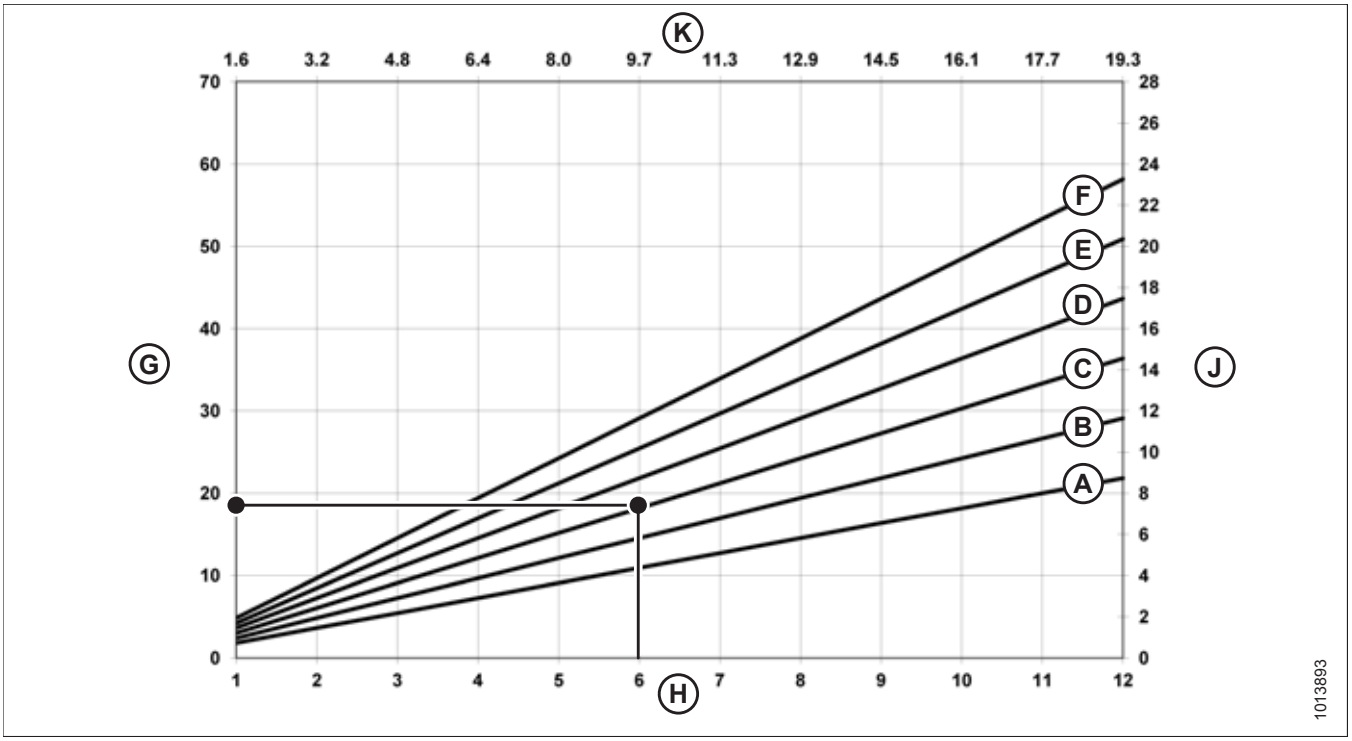


Figure 3.31: Ground Speed versus Acres

A - 4.6 m (15 ft.)
B - 6.1 m (20 ft.)
C - 7.6 m (25 ft.)
D - 9.1 m (30 ft.)
E - 10.7 m (35 ft.)
F - 12.2 m (40 ft.)
G - acres/hour
H - miles/hour
J - hectares per hour
K - kilometers/hour

Example: A 7.6 m (25 ft.) header operating at a ground speed of 9.7 km/h (6 mph) would produce a cut area of approximately 7.3 hectares (18 acres) in one hour.

3.7.6 Draper Speed

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

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

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

3.7.7 Knife Speed Information

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

NOTE:

Refer to your windrower operator's manual for information about using the HPT.

Table 3.14 D1X/D1XL Series Knife Speed

Header	Recommended Knife Speed Range (spm)
D115X	1500–1900
D120X	1500–1900
D125X	1400–1700
D130XL	1200–1600
D135XL	1200–1400
D140XL	1100–1400
D145XL	1100–1400

3.7.8 Reel Height

The reel operating position depends on the type of crop and cutting conditions.

You can create preset reel height positions using the Headland Management feature on an M1 Series Windrower. To set up this feature, refer to your windrower operator's manual. Set the reel height and fore-aft position to carry material past the knife and onto the drapers with minimal damage to the crop.

The reel height is controlled manually or with button presets on the ground speed lever (GSL) in the windrower cab. Refer to your windrower operator's manual for instructions on controlling reel height or setting up auto reel height presets.

For more information on fore-aft positioning, refer to *3.7.9 Reel Fore-Aft Position, page 67*.

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

- Crop loss over the header backtube
- Crop disturbance on the drapers caused by the reel fingers
- Crop pushed down by the tine tubes
- Tall crop wrapped around the reel drive and ends

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

- Cutterbar plugging
- Crop lodging and being left uncut

- Grain stalks dropping ahead of the cutterbar

For recommended reel heights for specific crops and crop conditions, refer to *3.6.2 Header Settings, page 46*.

IMPORTANT:

Maintain adequate clearance to prevent fingers contacting the knife or the ground. For instructions, refer to *5.8.1 Reel-to-Cutterbar Clearance, page 198*.

3.7.9 Reel Fore-Aft Position

Reel fore-aft position is a critical factor for achieving the best results in adverse conditions. The factory-set reel position suits normal conditions, but the fore-aft position can be adjusted as required using the controls inside the cab. You can create preset reel fore-aft positions using the Headland Management feature on an M1 Series Windrower. To set up this feature, refer to your windrower operator's manual.

Use decal (A), on the right reel support arm, to identify your reel position. The aft edge of cam disc (B) is the reel fore-aft position marker.

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

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

NOTE:

If experiencing difficulty picking up flattened crop, adjust to a steeper header angle. Refer to *3.7.3 Header Angle, page 63* for adjustment instructions. Adjust reel position only if header angle adjustments are not satisfactory.

For recommended reel positions in specific crops and crop conditions, refer to *3.6.2 Header Settings, page 46*.

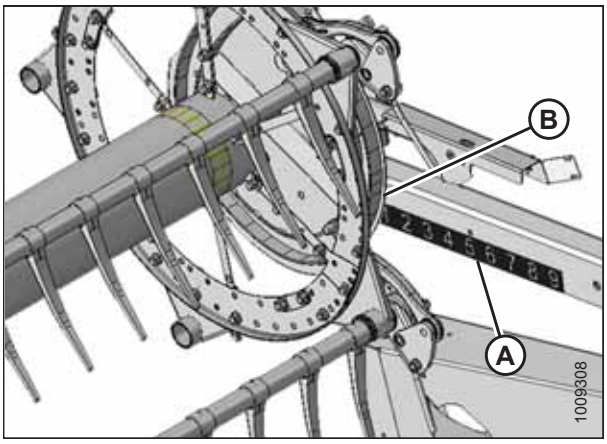


Figure 3.32: Fore-Aft Decal

NOTE:

In crops that are difficult to pick up such as rice or severely lodged crops that require full forward positioning of the reel, set the reel tine pitch to provide proper placement of the crop onto the drapers. Refer to *3.7.10 Reel Tine Pitch, page 68* for adjustment details.

Adjusting Reel Fore-Aft Position

Reel fore-aft position is a critical factor for achieving the best results in adverse conditions. The factory-set reel position suits normal conditions, but the fore-aft position can be adjusted as required using the controls inside the cab.

1. Use the in-cab controls to move the reel to the desired position. For more information on reel fore-aft position, refer to *3.7.9 Reel Fore-Aft Position, page 67*.
2. Check the reel clearance to cutterbar after making changes to the cam setting. Refer to the following for measurement and adjustment procedures:
   - *5.8.1 Reel-to-Cutterbar Clearance, page 198*
   - *Adjusting Reel Frown, page 202*

   IMPORTANT:

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

3.7.10 Reel Tine Pitch

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

IMPORTANT:

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

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

For the best results, use the minimum cam setting that delivers the crop past the rear edge of the cutterbar and onto the drapers. For more information, refer to *3.6.2 Header Settings, page 46*.

Reel Cam Settings

The cam position is used to adjust the reel fingers release point of the crop at the back of the reel to the drapers.

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

The setting numbers are visible above the slots on the cam disc. For instructions, refer to *Adjusting Reel Cam, page 70*.

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

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

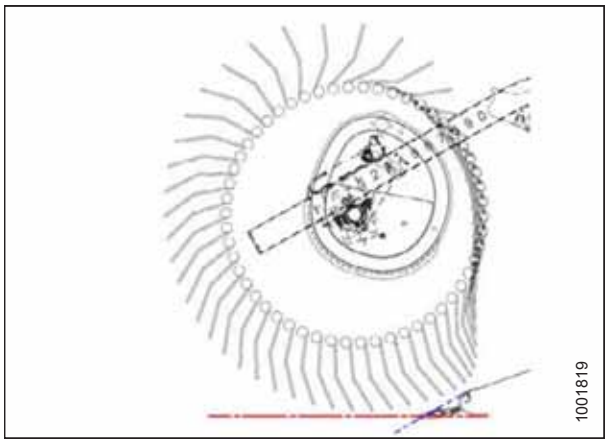


Figure 3.33: Finger Profile – Position 1

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

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

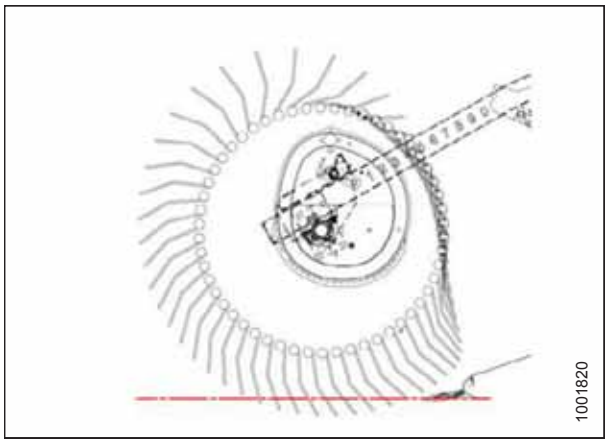


Figure 3.34: Finger Profile – Position 2

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

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

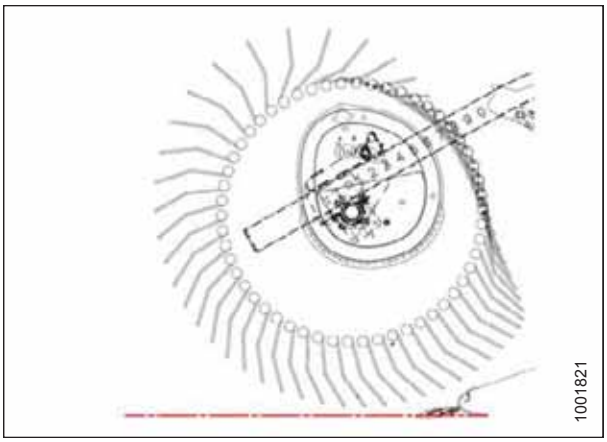


Figure 3.35: Finger Profile – Position 3

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

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

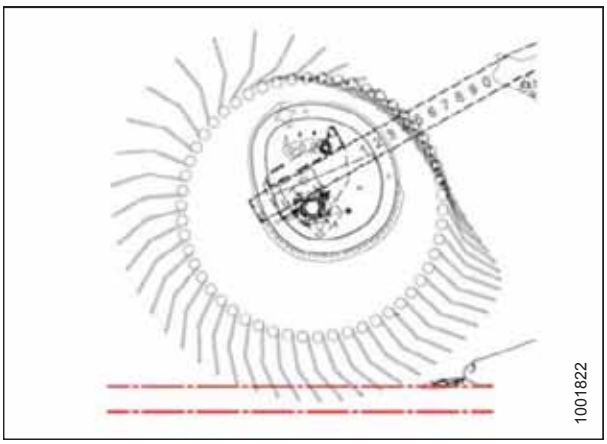


Figure 3.36: Finger Profile – Position 4

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

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

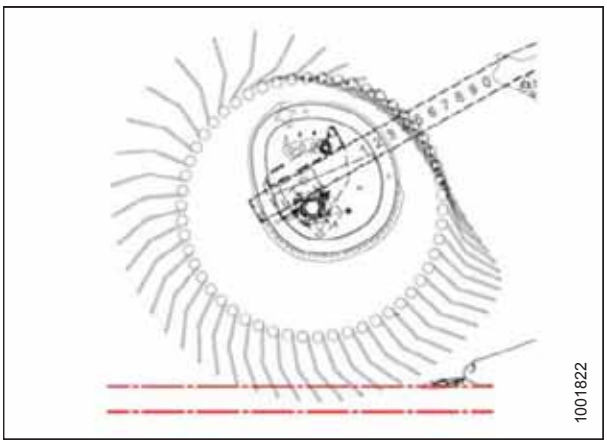


Figure 3.37: Finger Profile – Position 4

NOTE:

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

Adjusting Reel Cam

The reel is designed to pick up flattened and severely lodged crops. Adjustment may be required as crop conditions change.

DANGER

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

IMPORTANT:

The reel-to-cutterbar clearance should always be checked following adjustments to reel tine pitch and reel fore-aft positions. For information, refer to *5.8.1 Reel-to-Cutterbar Clearance, page 198* and *3.6.2 Header Settings, page 46*.

NOTE:

If there are multiple reel cams, the adjustments need to be made on all of the reel cams.

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

   NOTE:

   Bolt (B) is positioned through the cam disc (transparent view shown in the illustration for improved clarity).
4. Turn latch pin (A) clockwise to engage and lock the cam disc.

   IMPORTANT:

   Ensure the cam is secured into position before operating the machine.
5. For double-reel headers, repeat the above procedure for the next reel.

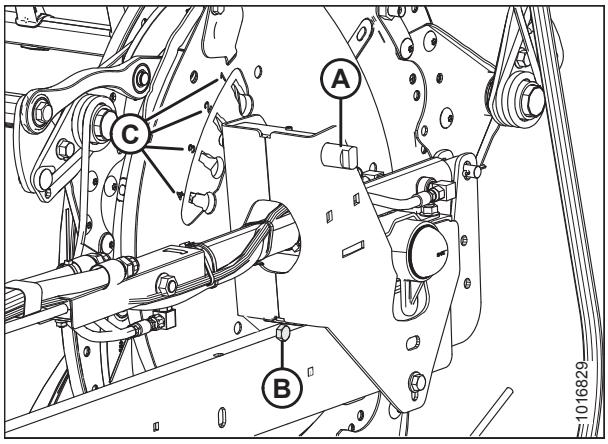


Figure 3.38: Cam Disc Positions

3.7.11 Crop Dividers

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

Removing Crop Dividers with Latch Option from Header

To correctly remove crop dividers with the latch option, follow the recommended removal procedure provided here.

DANGER

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

1. Lower the reel fully. For instructions, refer to your windrower operator's manual.
2. Raise the header fully. For instructions, refer to your windrower operator's manual.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the safety props. For instructions, refer to your windrower operator's manual.
5. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.

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

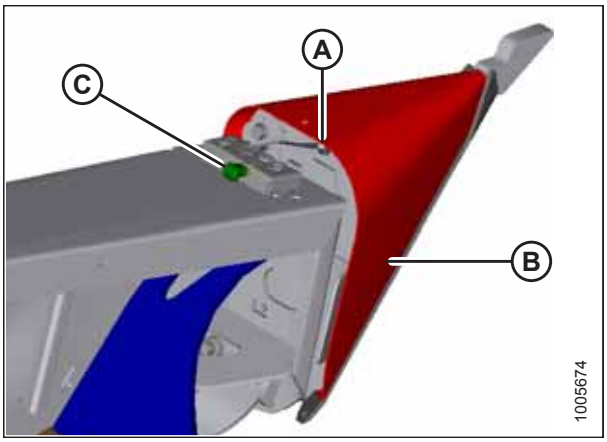


Figure 3.39: Crop Divider

8. Lift the crop divider off of the endsheet and store it as follows:
   a. Insert pin (A) on the crop divider into the hole in the endsheet at the location shown.
   b. Lift the crop divider and position lugs (B) on the crop divider into the bracket on endsheet. Ensure the lugs engage the bracket.
9. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

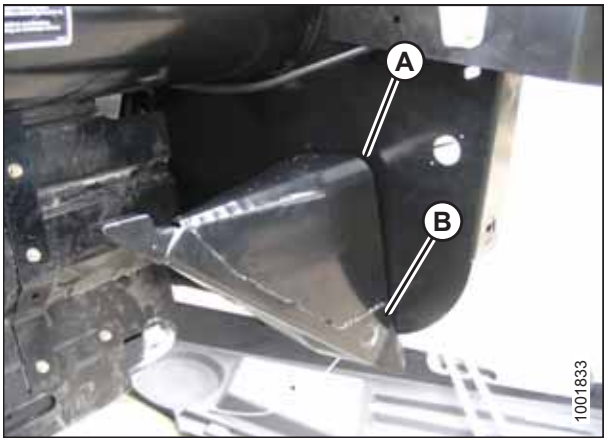


Figure 3.40: Stored Crop Divider

Removing Crop Dividers without Latch Option from Header

To correctly remove crop dividers without the latch option, follow the recommended removal procedure provided here.

DANGER

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

1. Lower the reel fully. For instructions, refer to your windrower operator's manual.
2. Raise the header fully. For instructions, refer to your windrower operator's manual.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the safety props. For instructions, refer to your windrower operator's manual.
5. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.

6. Remove bolt (A), the lock washer, and the flat washer.
7. Lower crop divider (B), then lift it to remove it from the endsheet.
8. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

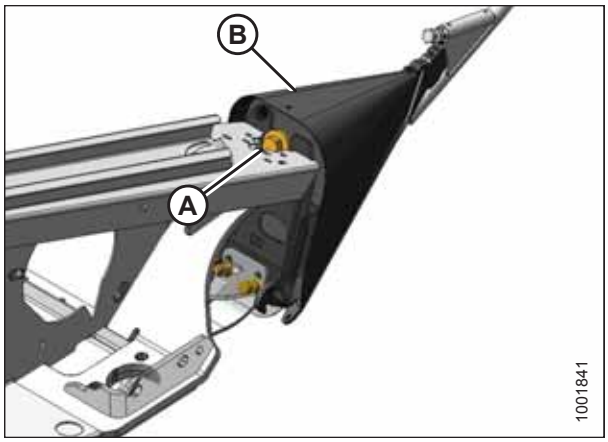


Figure 3.41: Crop Divider

Installing Crop Dividers with Latch Option onto Header

To correctly install crop dividers with the latch option, follow the recommended installation procedure provided here.

DANGER

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

1. Lower the reel fully. For instructions, refer to your windrower operator's manual.
2. Raise the header fully. For instructions, refer to your windrower operator's manual.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the safety props. For instructions, refer to your windrower operator's manual.
5. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.
6. If the crop divider is stored on the header, remove the crop divider from its storage location by lifting the crop divider to disengage lugs (A) at the lower end. Then lower it slightly to disengage pin (B) from the endsheet.

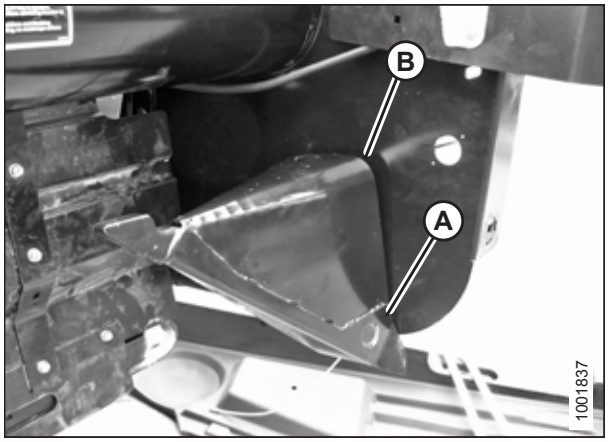


Figure 3.42: Stored Crop Divider

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

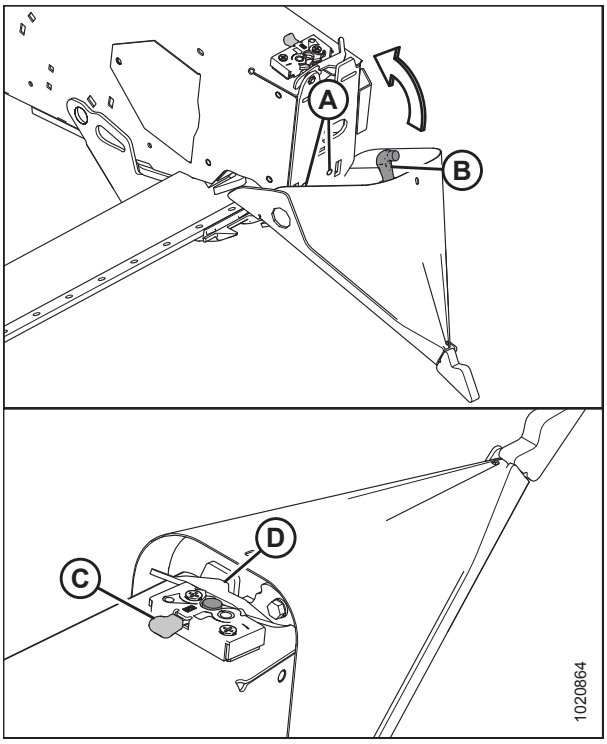


Figure 3.43: Crop Divider

10. Pull the tip of the crop divider to ensure there is no lateral movement. If necessary, adjust bolts (A) to tighten the crop divider and eliminate any lateral movement.
11. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

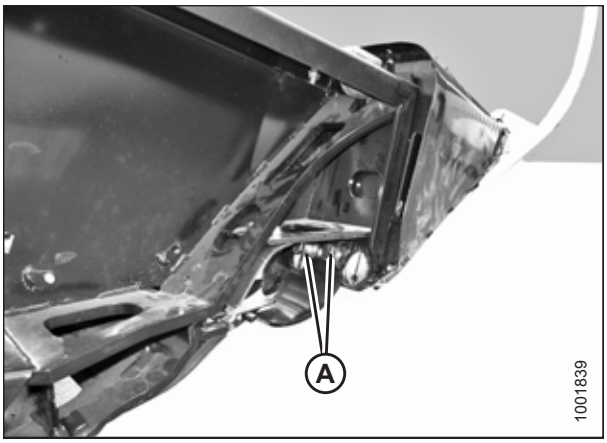


Figure 3.44: Crop Divider

Installing Crop Dividers without Latch Option onto Header

To correctly install crop dividers without the latch option, follow the recommended installation procedure provided here.

DANGER

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

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

5. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.

6. If the crop divider is stored on the header, remove the crop divider from the storage location by lifting the crop divider to disengage lugs (A) at the lower end and then lowering it slightly to disengage pin (B) from the endsheet.

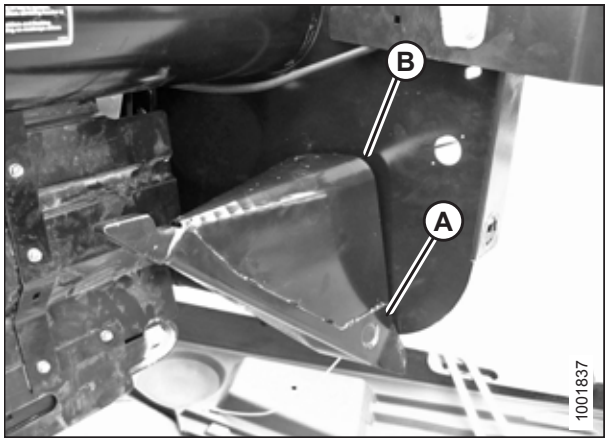


Figure 3.45: Stored Crop Divider

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

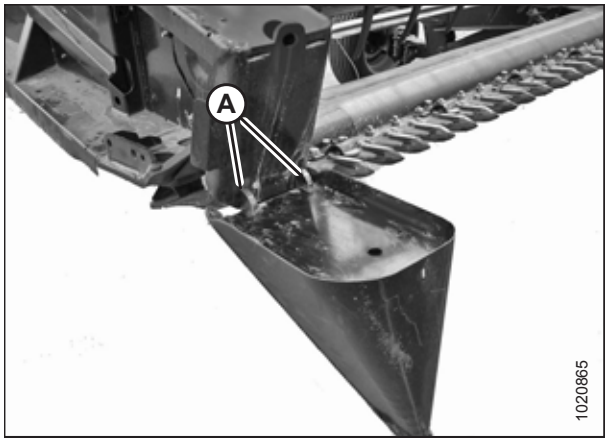


Figure 3.46: Crop Divider

8. Lift the forward end of the crop divider and install bolt (A), and special stepped washer (B) (step towards divider). Tighten the bolt.

9. Pull on the tip of the crop divider to ensure there is no lateral movement. If necessary, adjust bolts (C) to tighten the crop divider and eliminate any lateral movement.

10. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

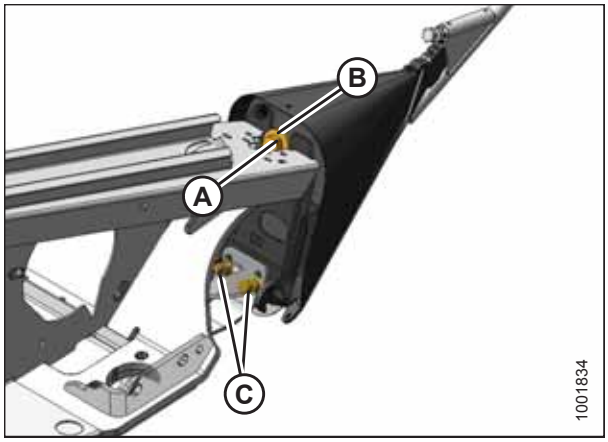


Figure 3.47: Crop Divider

3.7.12 Crop Divider Rods

Removable crop divider rods are used in conjunction with crop dividers to help divide the crop when harvesting. The rods are most useful when crop is bushy or down. In standing crops, using only crop dividers is recommended.

Table 3.15 Crop Divider Rods Recommended Use

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

Removing Crop Divider Rods

To remove the crop divider rods and place them in their storage position, perform the removal procedure provided here.

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

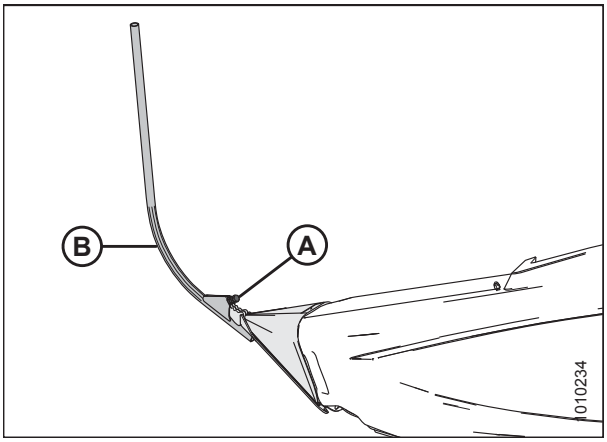


Figure 3.48: Crop Divider Rod

2. Store both crop divider rods (A) inboard on the right endsheet.

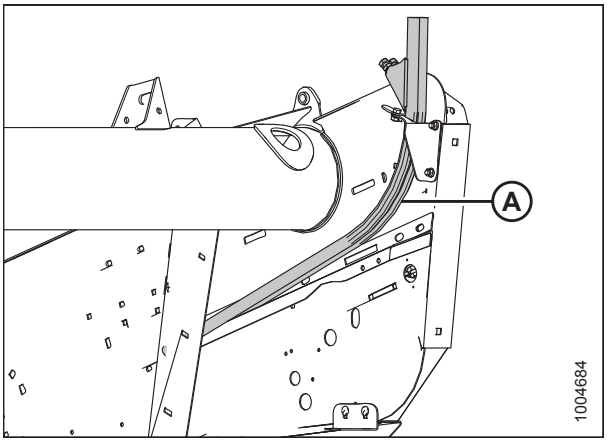


Figure 3.49: Right Endsheet

Installing Crop Divider Rods

To install the crop divider rods onto the crop dividers, perform the installation procedure provided here.

1. Remove crop divider rods (A) from their storage location on the inboard of the side endsheet.

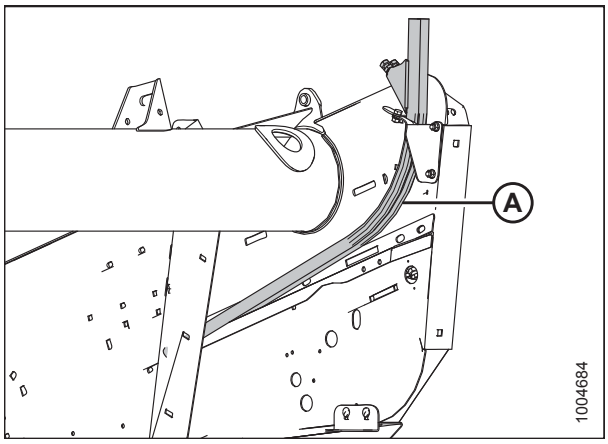


Figure 3.50: Right Endsheet

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

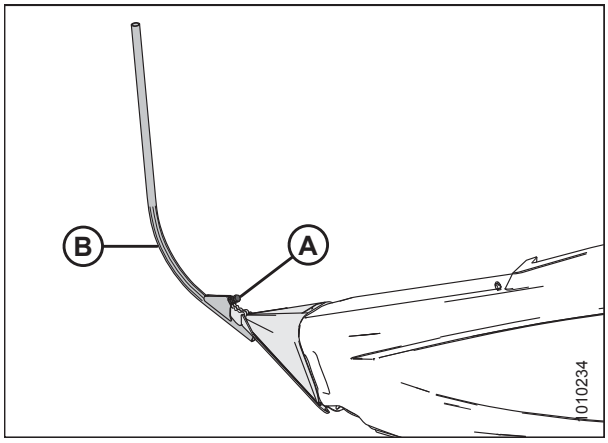


Figure 3.51: Divider Rod on Crop Divider

3.8 Delivery Opening

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

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

- Windrower pick-up capability
- Type and yield of crop
- Weather conditions
- Available drying time

Refer to *3.10 Windrow Types, page 80* for the pros and cons of various windrow configurations with respect to these factors, and also refer to *3.9 Double Windrowing, page 79*.

3.8.1 Manually Adjusting Delivery Opening on Header

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

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

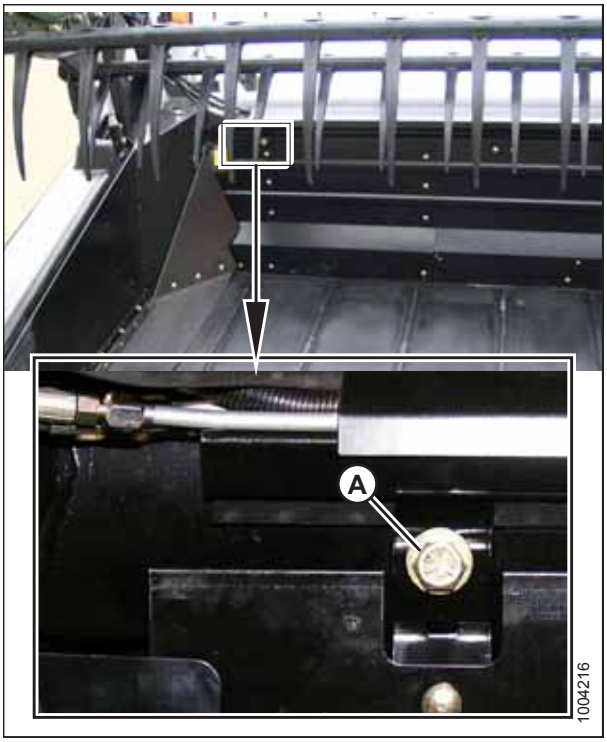


Figure 3.52: Manual Deck Shift

3.8.2 Adjusting Delivery Opening on Header using Hydraulic Deck Shift

The width and position of the delivery opening affects the width and configuration of the windrow. Adjust the delivery opening by moving the inboard deck shift stops.

Adjusting inboard deck shift stop

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

   IMPORTANT:

   Ensure that the deck shift stops are sufficiently adjusted to prevent the decks from contacting each other.
3. Install two 1/4 in. hex head bolts (A) and nuts, and tighten them.

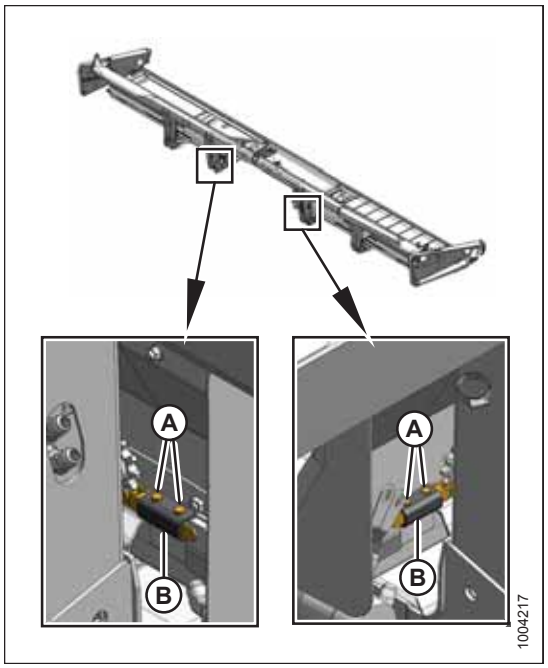


Figure 3.53: Inboard Hydraulic Deck Shift Stops

Adjusting outboard deck shift stop

4. Remove two 1/4 in. hex head bolts (A) and nuts.
5. Slide stop (B) inboard to move decks away from each other, or slide the stop outboard to move decks closer to each other.

   IMPORTANT:

   Ensure that the deck shift stops are sufficiently adjusted to prevent the decks from contacting each other.
6. Install two 1/4 in. hex head bolts (A) and nuts, and tighten them.

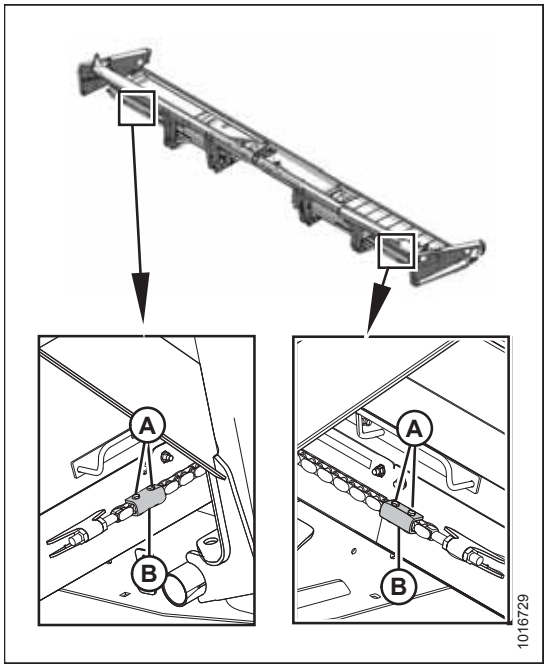


Figure 3.54: Outboard Hydraulic Deck Shift Stops

3.9 Double Windrowing

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

Double windrowing is used for crops that don't require conditioning such as grains, canola, and beans.

Double windrowing is performed using the header's deck shifting ability. For instructions, refer to *3.9.1 Shifting Decks Hydraulically, page 79*.

3.9.1 Shifting Decks Hydraulically

The hydraulic deck shift option allows you to select center, left, or right delivery from the windrower cab. It is available only on D130XL and D135XL Draper Headers. Refer to *6.4.10 Hydraulic Deck Shift Package, page 255* for ordering information.

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

Laying a double windrow

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

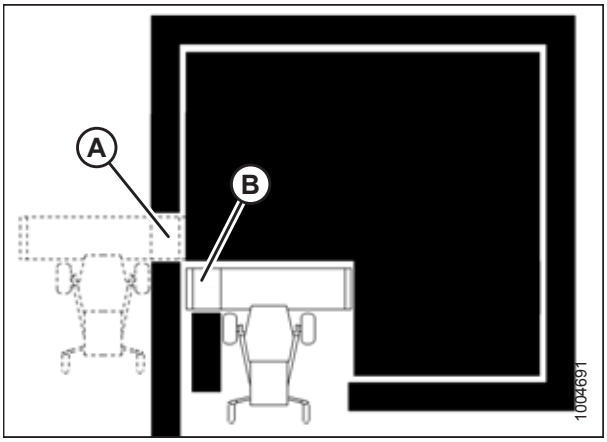


Figure 3.55: Left and Right End Crop Delivery

NOTE:

Raise transport or stabilizer system wheels on D130XL and D135XL Draper Headers to avoid interference with windrows.

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

NOTE:

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

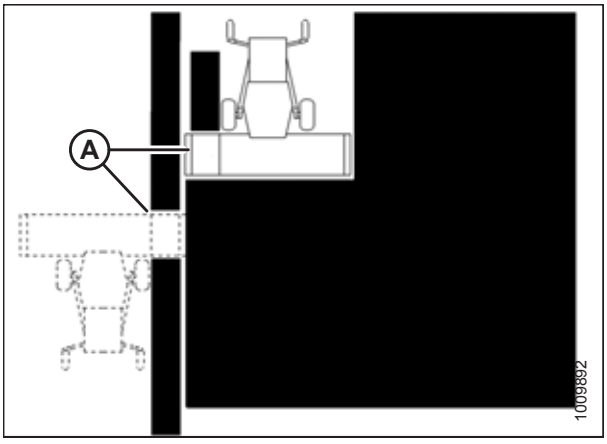


Figure 3.56: Double Windrowing

3.10 Windrow Types

Crops can be laid into six types of windrows depending on crop conditions, machine settings, and weather conditions.

The following criteria determine windrow quality:

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

Table 3.16 Windrow Types

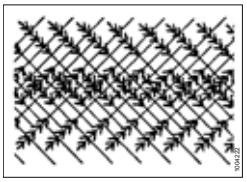
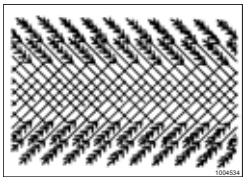
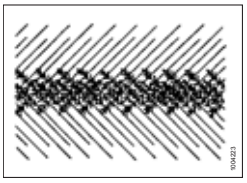
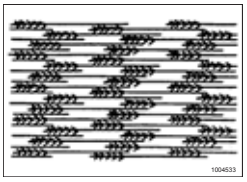
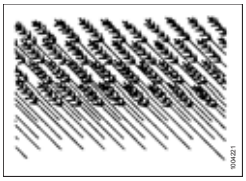
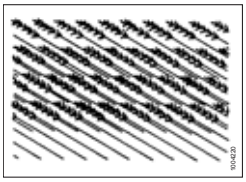
Windrow Type	Description	Weight Distribution	Curing	Weatherability	Machine Setting Guidelines
Herringbone 	The most desirable form of windrow, stalks are crossed and interwoven. Heads are distributed across full width of windrow. This windrow can be formed by center delivery only.	Good	Good	Excellent	• Reel and ground speed approximately equal • Medium draper speed • Center delivery
Fantail 	The stalks are crossed in the center and the heads are in line along outside edges. This windrow can be formed by center delivery only.	Fair	Fair	Fair	• Low draper speed • Low header angle • Center delivery
Dovetail 	The stalks are lined along outside edges of windrow and heads are crossed in center. This windrow can be formed by center delivery only.	Poor	Fair	Poor	• High draper speed • High header angle • Center delivery
Parallel 	The stalks are parallel to windrow and heads are evenly distributed across width of windrow. This windrow can be formed by center delivery or end delivery.	Good	Good	Good	• Medium draper speed • Medium header angle • Center or end delivery

Table 3.16 Windrow Types (continued)

Windrow Type	Description	Weight Distribution	Curing	Weatherability	Machine Setting Guidelines
45° diagonal 	The stalks are lined along one edge and heads are lined along opposite edge, 45° to windrow perpendicular. This windrow can be formed by end delivery or by center delivery if the crop is leaning to one side.	Poor	Fair	Poor	• Low reel speed • Less aggressive tine pitch • If crop is leaning, end delivery or center delivery
75° diagonal 	The stalks are closer to parallel than the 45° windrow. Stalk tips are lined along one edge with heads opposite, 75° to windrow perpendicular. This windrow can be formed by end delivery or by center delivery if the crop is leaning to one side.	Fair	Good	Fair	• Low reel speed • Less aggressive tine pitch • If crop is leaning, end delivery or center delivery

3.11 Haying Tips

Refer to the following tips to optimize haying.

3.11.1 Curing

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

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

3.11.2 Topsoil Moisture

Topsoil moisture levels can be classified as wet, damp, or dry.

Table 3.17 Topsoil Moisture Levels

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

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

3.11.3 Weather and Topography

Weather conditions and topography can greatly affect haying.

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

3.11.4 Windrow Characteristics

Producing windrows with the recommended characteristics will achieve the greatest results.

Refer to *3.7 Header Operating Variables, page 58* for instructions on adjusting the header.

Table 3.18 Recommended Windrow Characteristics

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

3.11.5 Driving on Windrow

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

NOTE:

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

3.11.6 Raking and Tedding

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

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

3.11.7 Using Chemical Drying Agents

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

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

3.12 Levelling the Header

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

NOTE:

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

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

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

3.13 Unplugging the Cutterbar

The cutterbar is located on the front of the header. It supports the knife and guards which are used to cut the crop.

DANGER

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

WARNING

Wear heavy gloves when working around or handling knives.

IMPORTANT:

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

To unplug the cutterbar, reverse the windrower. If the cutterbar is still plugged, do the following:

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

   NOTE:

   If cutterbar plugging persists, refer to *8 Troubleshooting, page 259*.

3.14 Upper Cross Auger

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

The UCA is available as an optional kit. For more information, refer to *6.4.3 Upper Cross Auger, page 253*.

NOTE:

Optional wide draper deflectors are **NOT** compatible with the UCA.

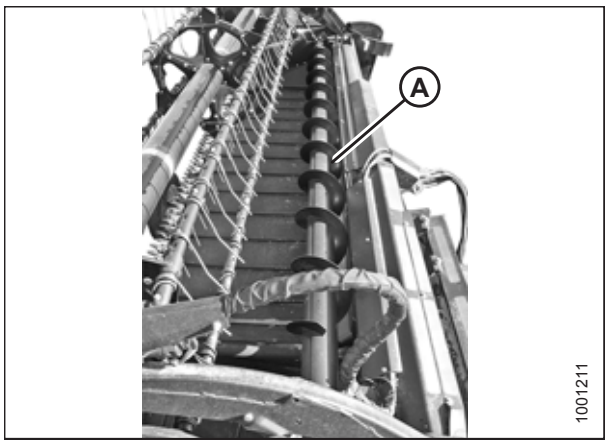


Figure 3.57: Upper Cross Auger

3.15 Transporting Header

There are two ways to transport the header: attached to the front of the windrower, and towed behind a combine, windrower, or agricultural tractor.

The towing option is only available for headers with the Slow Speed Transport option installed. For more information, refer to *6.3.4 Stabilizer Wheels and Transport Package, page 250*.

3.15.1 Transporting Header on Windrower

Take the following precautions when transporting the header on a windrower.

WARNING

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

CAUTION

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

3.15.2 Towing

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

Attaching Header to Towing Vehicle

Read and understand the guidelines for towing a header to prevent loss of control leading to bodily injury and/or machine damage.

CAUTION

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

- **The weight of the towing vehicle must exceed the header weight to ensure adequate control and braking performance. Refer to *2.3 Specifications, page 28* for weights.**
- **Do NOT tow with any highway-capable vehicle. Use only an agricultural tractor, a combine, or a properly configured MacDon windrower.**
- **Ensure the reel is fully lowered and back on the support arms to increase header stability during transport. For headers with hydraulic reel fore-aft, never connect the fore-aft couplers to each other or the circuit will be complete and the reel could creep forward during transport.**
- **Check that all the pins are properly secured in the transport position at the wheel supports, cutterbar support, and hitch.**
- **Check the tire condition and pressure prior to transporting.**
- **Connect hitch to towing vehicle using a proper hitch pin with a spring locking pin or other suitable fastener.**
- **Attach the hitch safety chain to the towing vehicle. Adjust the safety chain length to provide only enough slack to permit turning.**
- **Connect the header seven-pole plug wiring harness to the mating receptacle on the towing vehicle (the seven-pole receptacle is available from your MacDon Dealer parts department.)**
- **Ensure all lights are functioning properly, and clean the slow moving vehicle sign and other reflectors. Use flashing warning lights unless prohibited by law.**

Towing the Header

Read and understand the guidelines for towing a header to prevent loss of control leading to bodily injury and/or machine damage.

CAUTION

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

- **Do NOT exceed 32 km/h (20 mph).**
- **Reduce transport speed to less than 8 km/h (5 mph) in slippery and rough conditions.**
- **Turn corners at very low speeds (8 km/h [5 mph] or less); header stability is reduced while cornering. Do NOT accelerate at any point when turning.**
- **Obey all highway traffic regulations in your area when transporting on public roads. Use flashing amber lights unless prohibited by law.**

3.15.3 Converting from Transport to Field Position

To convert from transport position to field position, follow all the recommended procedures provided here.

Removing Tow-Bar

Perform the following procedure to remove the tow-bar.

DANGER

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

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

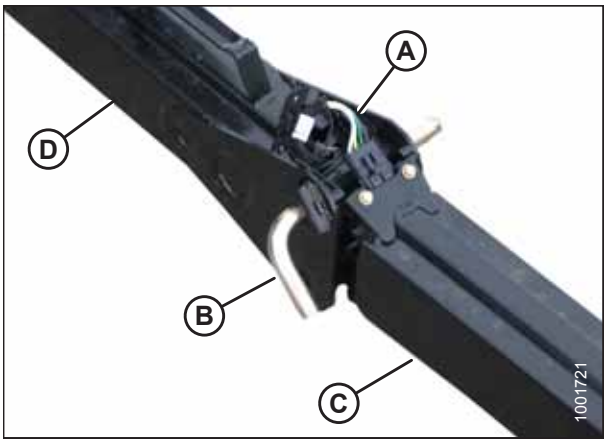


Figure 3.58: Tow-Bar Assembly

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

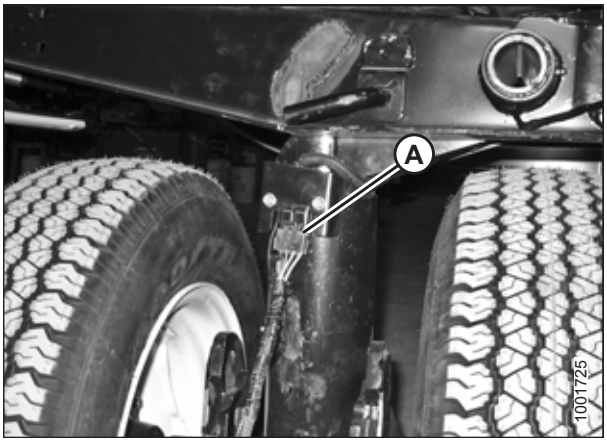


Figure 3.59: Wiring Connector

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

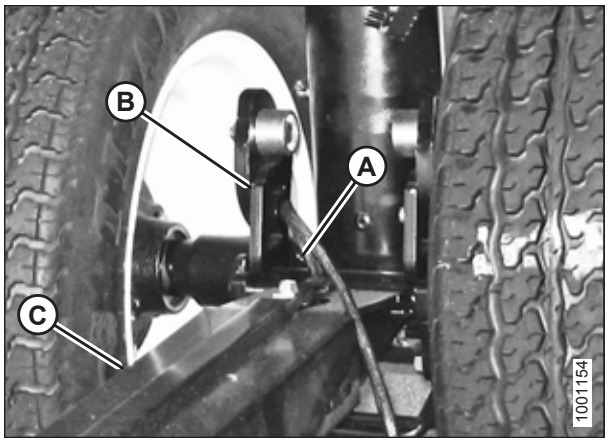


Figure 3.60: Tow-Bar Latch

Storing Tow-Bar

Perform the following procedure to store the tow-bar.

The tow-bar consists of two sections, an inner half (A) and an outer half (B); this makes storage and handling easier.

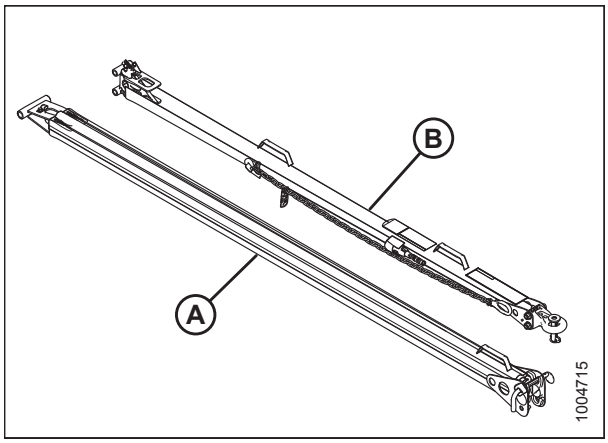


Figure 3.61: Tow-Bar Assembly

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

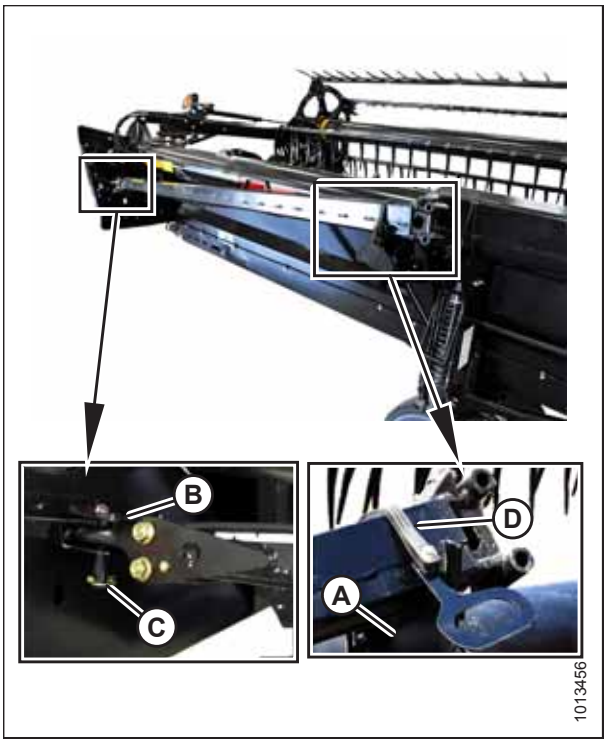


Figure 3.62: Tow-Bar Storage – Left Side

4. **At the right end of the 10.7 m and 12.2 m (35 ft. and 40 ft.) header:**
   a. Place the inner end of the inner half of the tow-bar in cradle (A) on header backtube.
   b. Secure tube end in support (B) with clevis pin (C). Secure with hairpin.
   c. Install rubber strap (D) on cradle (A).

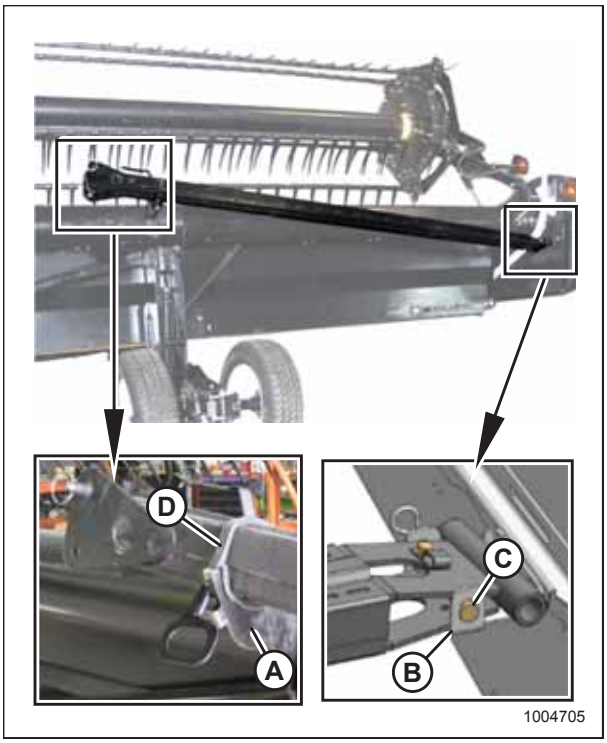


Figure 3.63: 10.7 m and 12.2 m (35 ft. and 40 ft.) Header

5. **At the right end of the 9.1 m (30 ft.) header:**

   a. Place the inner end of the inner half of the tow-bar in cradle (A) on header backtube.

   b. Secure tube end in support (B) with pin (C).

   c. Install rubber strap on cradle (A).

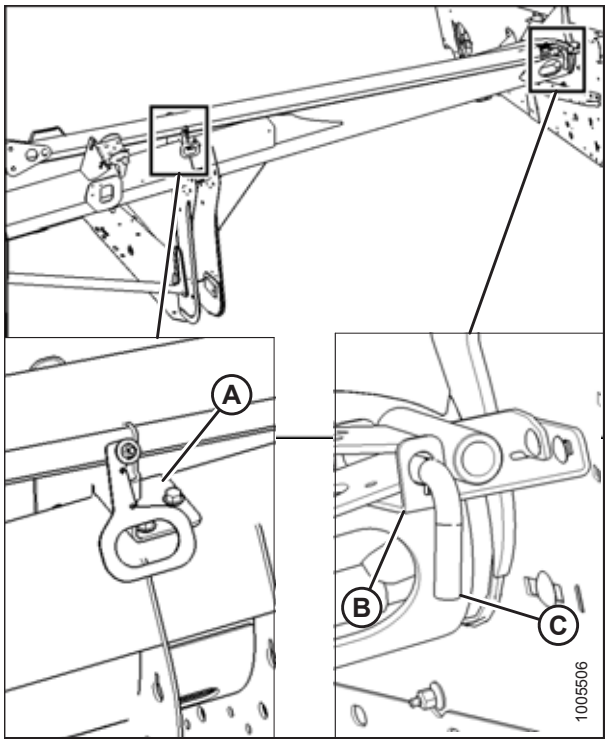


Figure 3.64: 9.1 m (30 ft.) Header

6. Attach the header to the windrower. For instructions, refer to the windrower operator's manual.

   IMPORTANT:

   Carrying the tow-bar on the header will affect the main header float. For instructions to check and adjust header float, refer to the windrower operator's manual.

7. Place the transport wheels into field position. For instructions, refer to the following:

   - *Moving Front (Left) Wheels into Field Position, page 92*
   - *Moving Rear (Right) Wheels into Field Position, page 94*

Moving Front (Left) Wheels into Field Position

Perform the following procedure to move the front (left) wheels into field position.

DANGER

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

1. Raise the header fully.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the header's safety props.

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

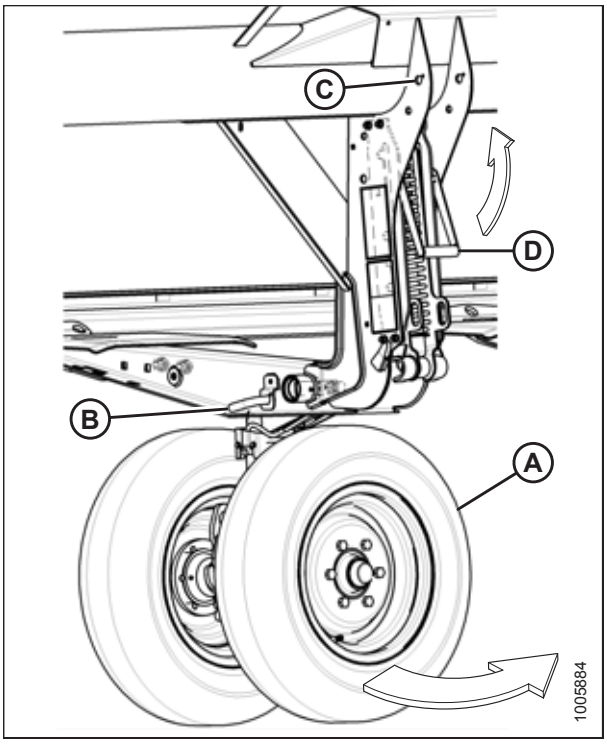


Figure 3.65: Front Wheels

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

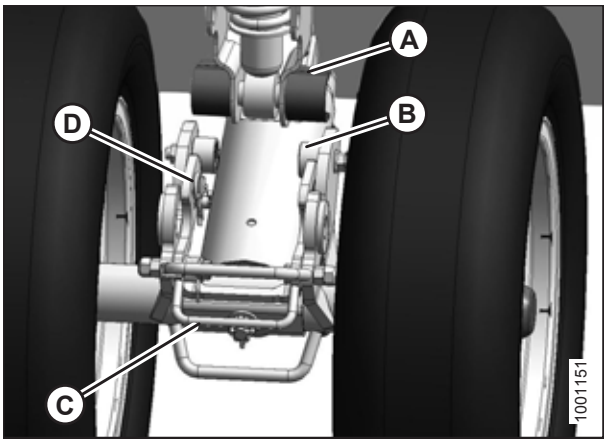


Figure 3.66: Front Wheels

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

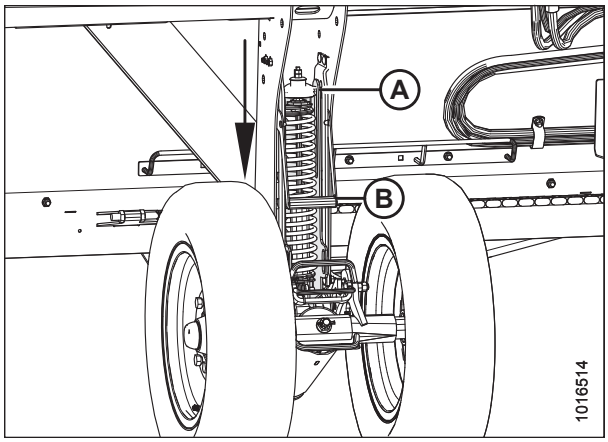


Figure 3.67: Front Wheels

Moving Rear (Right) Wheels into Field Position

Perform the following procedure to move the rear (right) wheels into field position.

DANGER

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

1. Raise the header fully.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the header's safety props.
4. Pull pin (A) on the left rear wheel. Swivel the wheel clockwise and lock with the pin.

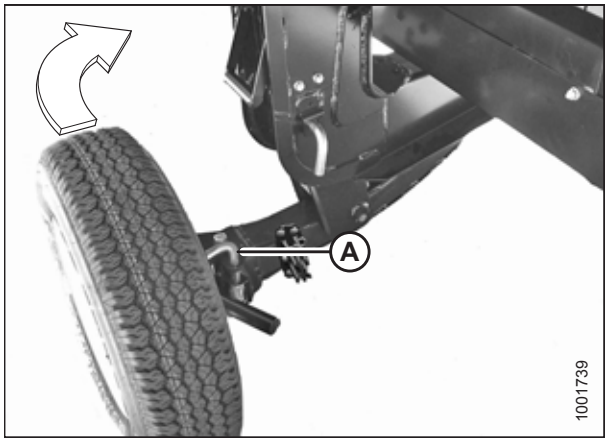


Figure 3.68: Rear Wheel – Right Side

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

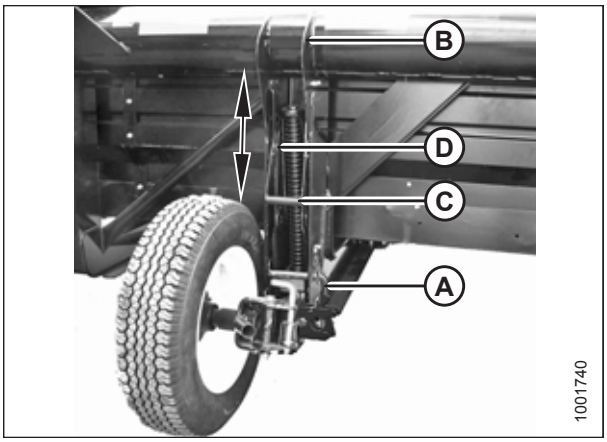


Figure 3.69: Rear Wheel – Right Side

9. Pull pin (A) on brace (B) on the right wheel in front of the cutterbar. Disengage the brace from the cutterbar, and lower the brace against axle (C).
10. Remove pin (D), lower support (E) onto axle, and reinsert the pin into the support.
11. Swing axle (C) clockwise towards the rear of the header.

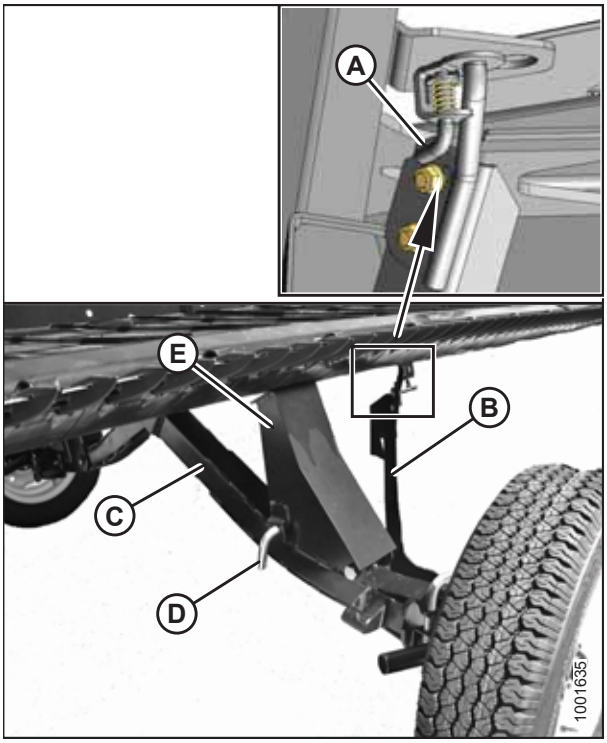


Figure 3.70: Rear Wheel – Right Side

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

    IMPORTANT:

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

    NOTE:

    The hairpin can become dislodged by crop if it is installed with the open end facing the cutterbar.
16. Complete the conversion by ensuring left wheels (A) and right wheels (B) are in the position shown.

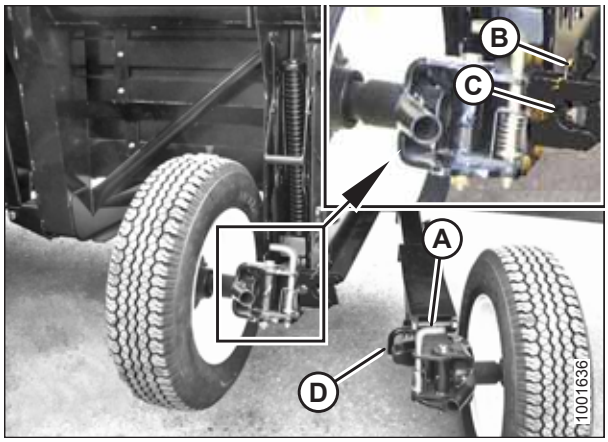


Figure 3.71: Rear Wheels

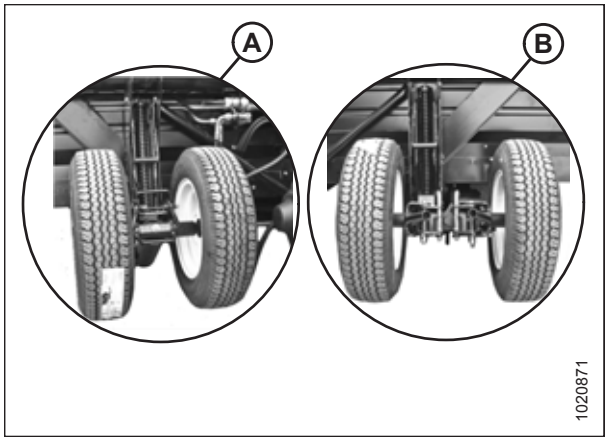


Figure 3.72: Field Position

3.15.4 Converting from Field to Transport Position

To convert from field position to transport position, follow all the recommended procedures provided here.

Moving Front (Left) Wheels into Transport Position

Perform the following procedure to move the front (left) wheels into transport position.

DANGER

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

CAUTION

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

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

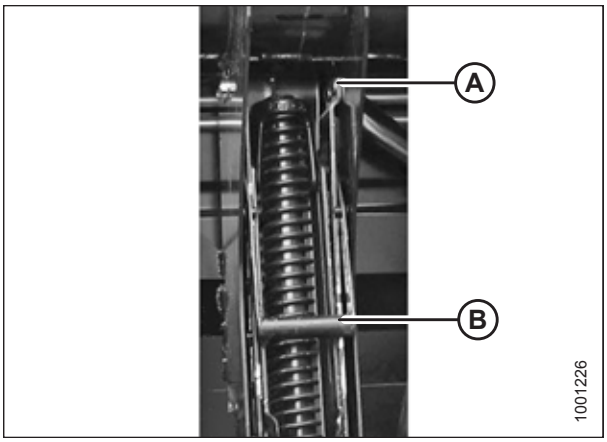


Figure 3.73: Suspension Linkage

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

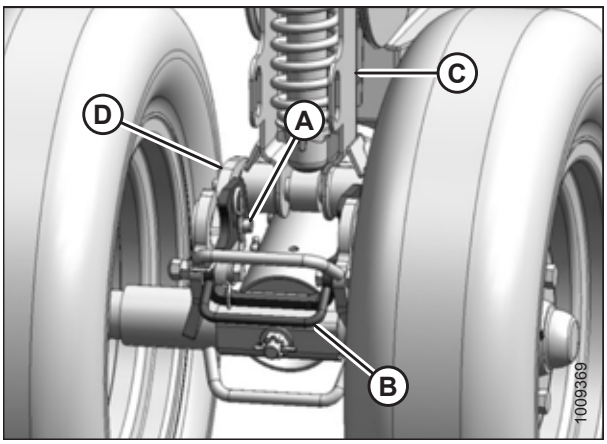


Figure 3.74: Left Front Wheels

8. Lower handle (A) to lock.

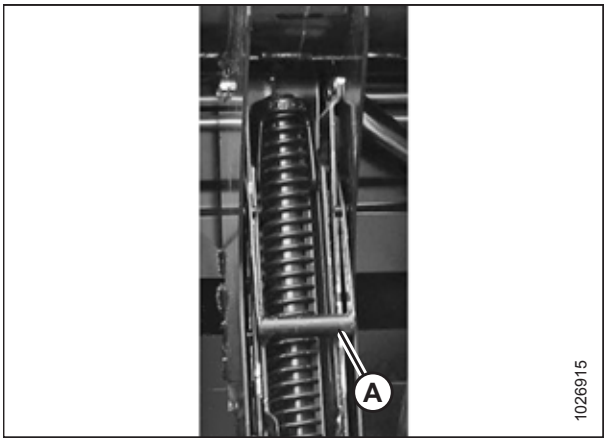


Figure 3.75: Suspension Linkage

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

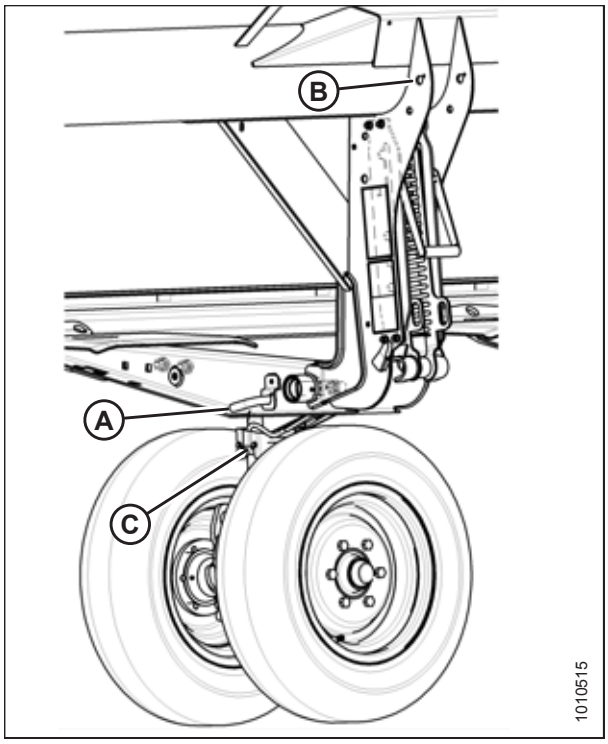


Figure 3.76: Left Front Wheels

Moving Rear (Right) Wheels into Transport Position

Perform the following procedure to move the rear (right) wheels into transport position.

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

CAUTION

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

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

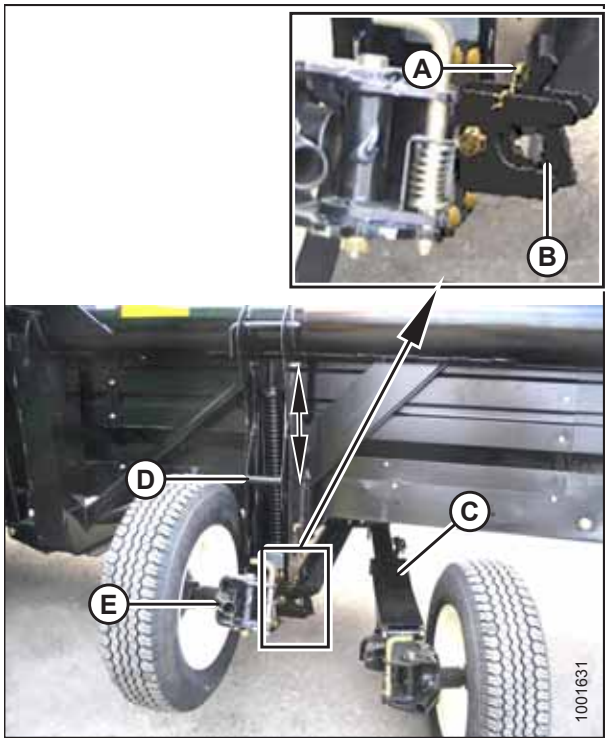


Figure 3.77: Separating Axles

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

Figure 3.78: Wheel Position

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

Figure 3.79: Left Wheel in Transport Position

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

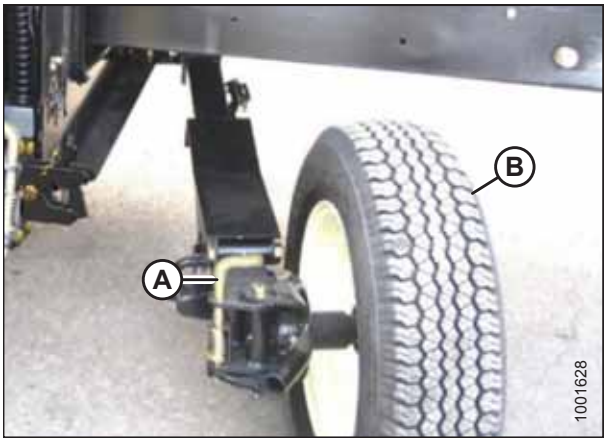


Figure 3.80: Right Rear Wheel

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

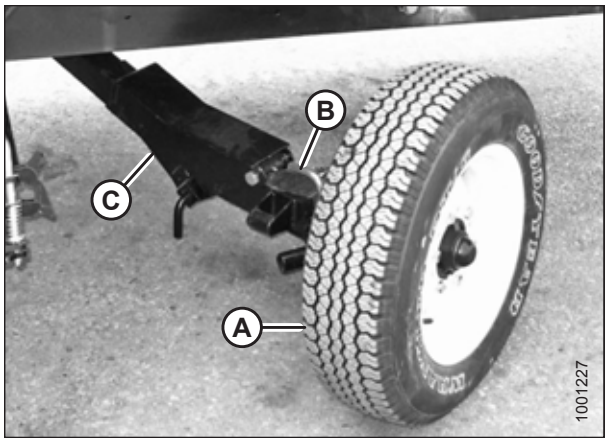


Figure 3.81: Right Rear Wheel

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

    IMPORTANT:

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

12. Swing the brace (C) into the position shown and insert the brace into the slot (D) behind the cutterbar. Position the brace so that pin (E) engages the hole in the bracket (F). The right wheel is now in transport position.
13. Disengage the header cylinder lift stops.
14. Detach the header's hydraulic and electrical connections from the windrower. Refer to *4 Header Attachment/ Detachment, page 105*.
15. Start the windrower and lower the header to the ground.

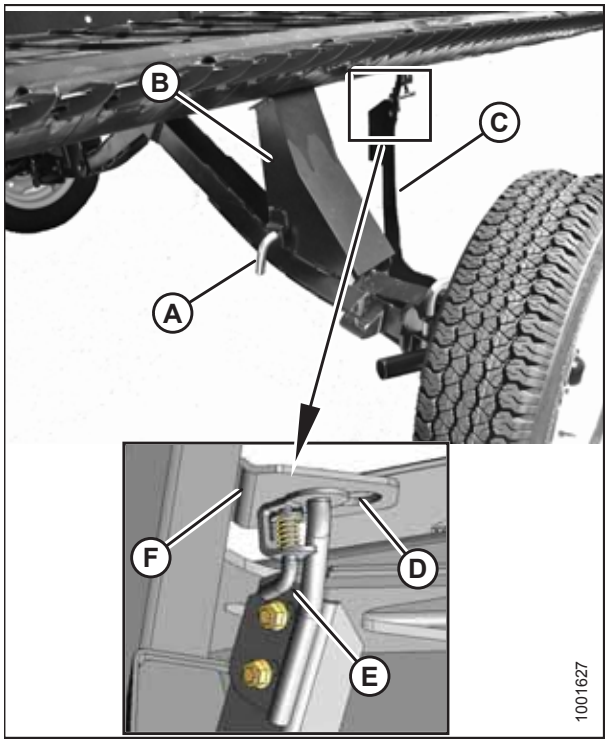


Figure 3.82: Right Rear Wheel Position

Attaching Tow-Bar

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

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

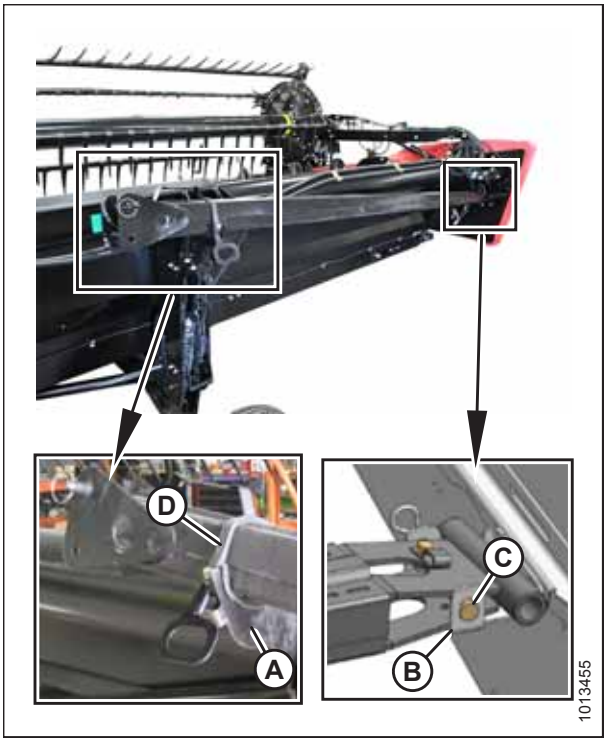


Figure 3.83: Tow-Bar Removal – Right Side

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

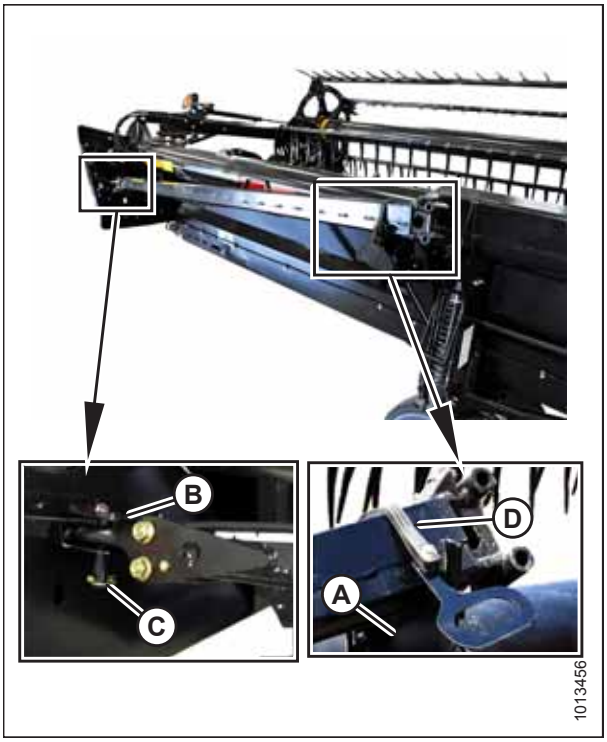


Figure 3.84: Tow-Bar Removal – Left Side

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

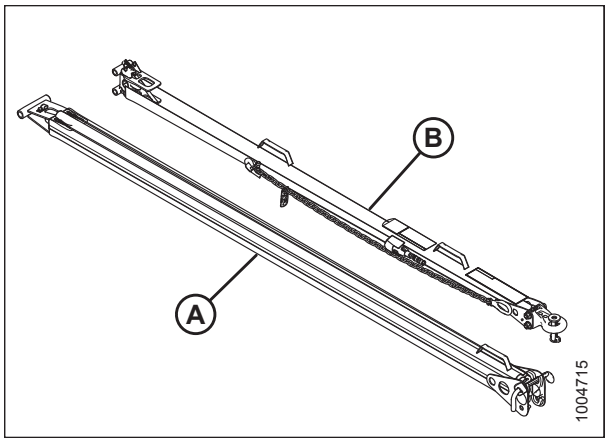


Figure 3.85: Tow-Bar Assembly

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

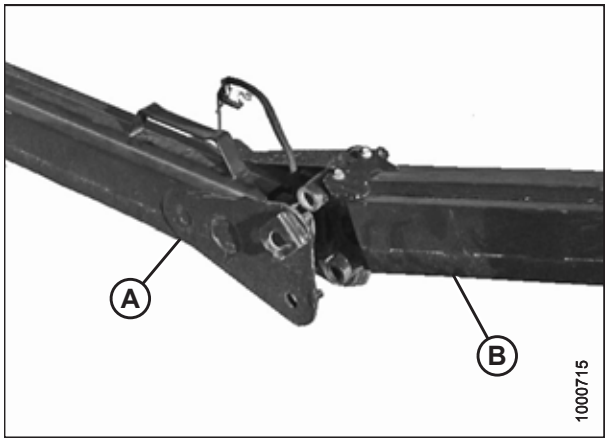


Figure 3.86: Tow-Bar Assembly

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

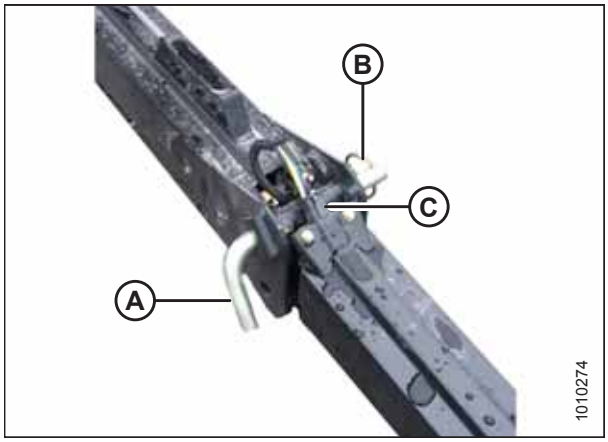


Figure 3.87: Tow-Bar Assembly

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

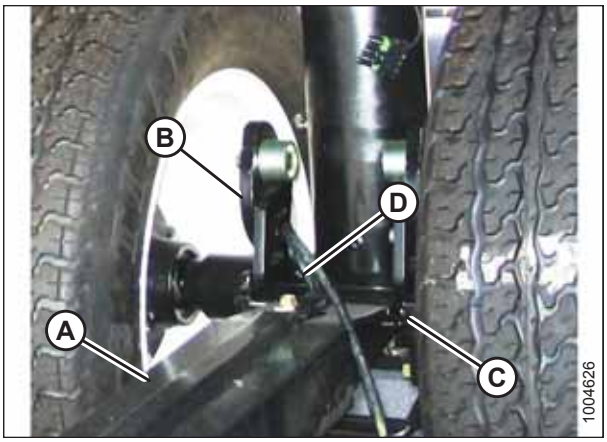


Figure 3.88: Attaching Tow-Bar

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

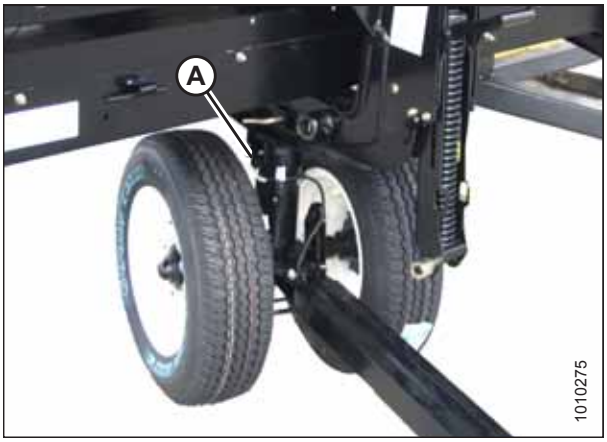


Figure 3.89: Harness Connection

Chapter 4: Header Attachment/Detachment

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

IMPORTANT:

When attaching a D1X Series Draper Header to an M1 Series Windrower that has been previously configured for an R216 SP Rotary Disc Header, remove two shield mount plates (A) (MD #307045) from the forming shield before attaching the draper header to the windrower.

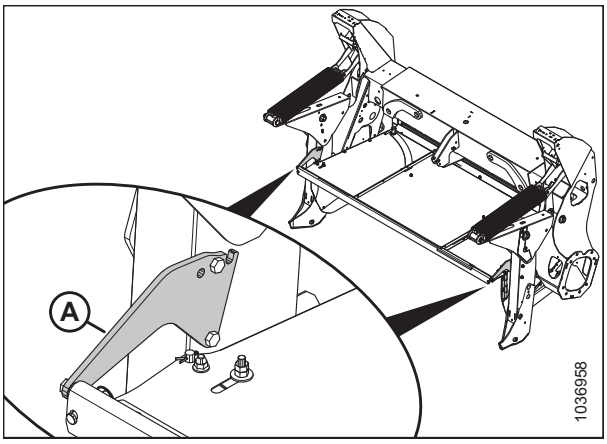


Figure 4.1: Shield Mount Plates on Forming Shield

4.1 Attaching Header to M1 Series Windrowers

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Swing the left windrower platform backwards. For instructions, refer to the windrower operator's manual.

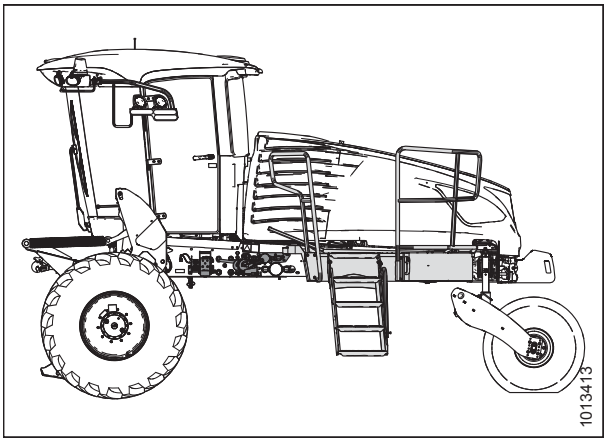


Figure 4.2: Left Windrower Platform

3. **All draper headers except D115X:** Push lever (A) up and pull arm (B) to get pin (C) out of latch (D).

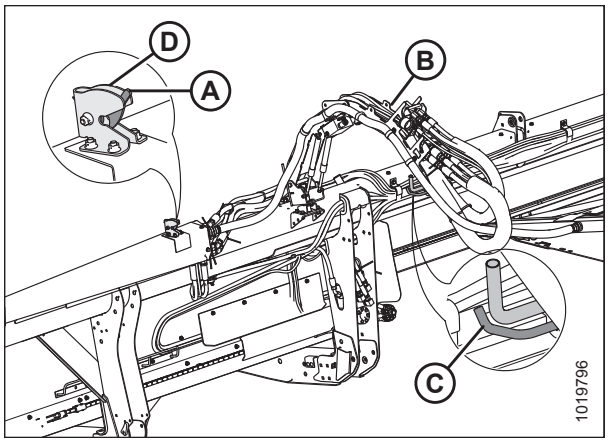


Figure 4.3: Hydraulic Hose Management System – All Headers Except D115X

4. **D115X Draper Headers:** Pull hydraulic hose management system (A) towards the left outboard end of the header, disengage ball stud (B) from the cradle in support (C).

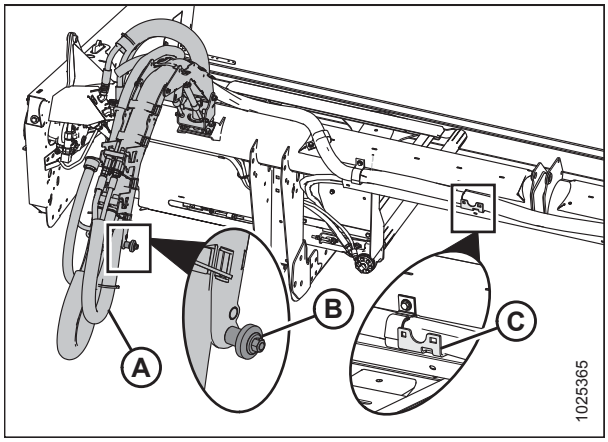


Figure 4.4: Hydraulic Hose Management System – D115X Header

5. Connect hydraulic hose management system (A) to the left outer leg of the windrower by pushing ball stud (B) into ball stud latch (C).

   NOTE:

   The hydraulic hoses have been removed from the illustration for clarity.

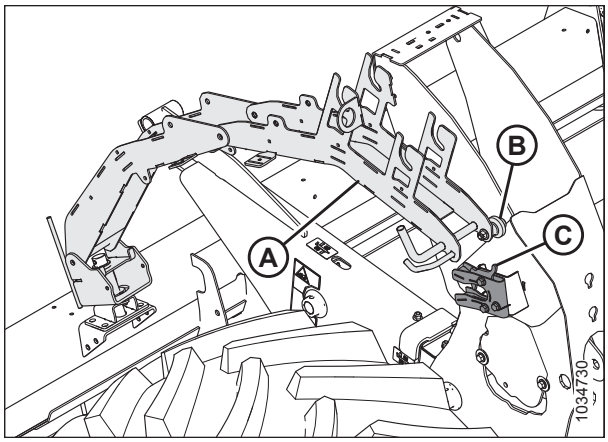


Figure 4.5: Windrower Left Outer Leg

6. Check the connectors and ensure they are clean before connecting the hydraulics and electrical harnesses.
7. Retrieve draper drive and reel control multicoupler (A) from the hydraulic hose management system.
8. Push knob (B) on the hydraulic receptacle and pull handle (C) fully away from the windrower.
9. Open cover (D) and position the coupler onto the receptacle. Align the pins in the coupler with slots in handle (C), and push the handle toward the windrower so that coupler is locked onto the receptacle and knob (B) snaps out.
10. Remove the cover from electrical connector (E), push the electrical connector onto the receptacle, and secure by turning the collar on the electrical connector clockwise.
11. Retrieve knife and reel drive multicoupler (A) from the hydraulic hose management system.
12. Push knob (B) on the hydraulic receptacle and pull handle (C) fully away from the windrower.
13. Open cover (D) and position the coupler onto the receptacle. Align the pins in the coupler with slots in handle (C) and push the handle toward the windrower so that the coupler is locked onto the receptacle and knob (B) snaps out.
14. Swing the left windrower platform forward. For instructions, refer to the windrower operator's manual.

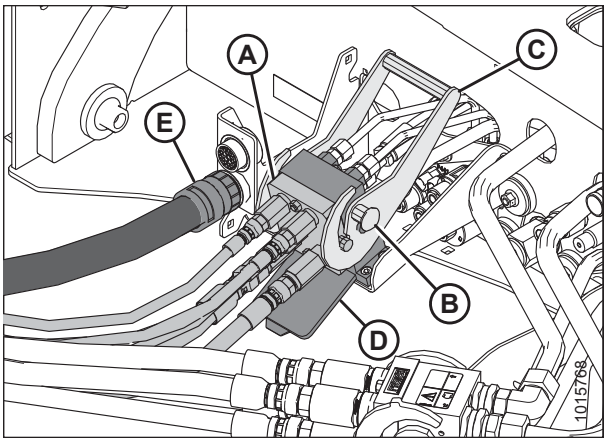


Figure 4.6: Draper/Reel Multicoupler

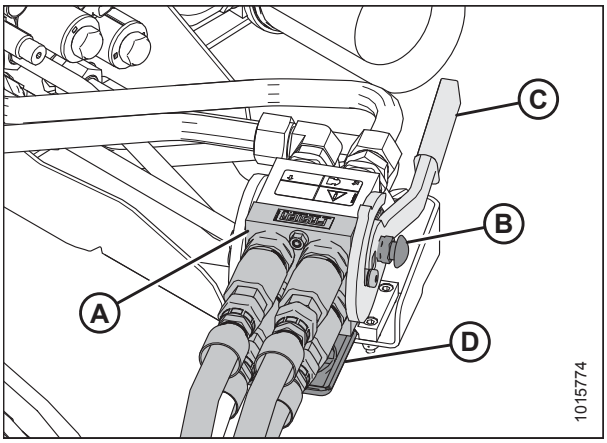


Figure 4.7: Knife/Reel Drive Multicoupler

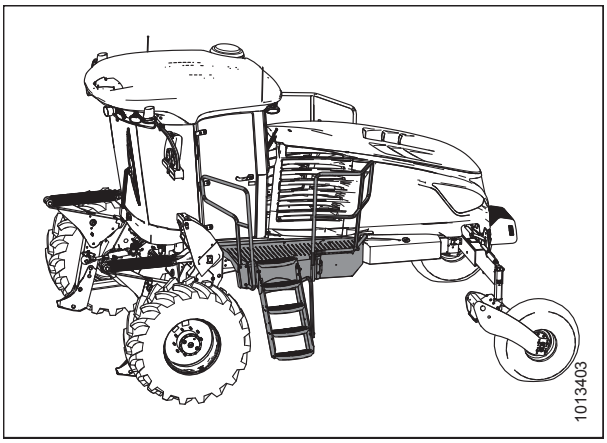


Figure 4.8: Left Windrower Platform

15. Ensure the hydraulic hose routing is as straight as possible and avoid potential rub/wear points.

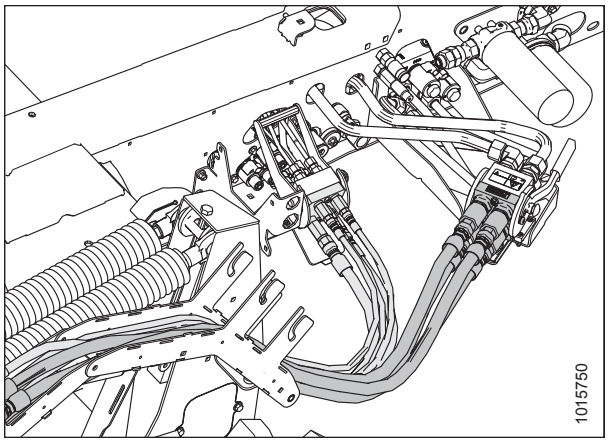


Figure 4.9: Hydraulic Multicouplers and Hose Routing

4.2 Detaching Header from M1 Series Windrowers

To detach the header from an M1 Series Windrower, follow the recommended detachment procedure provided here.

DANGER

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

1. Lower the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Swing the left windrower platform backwards. For instructions. refer to the windrower operator's manual.

CAUTION

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

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

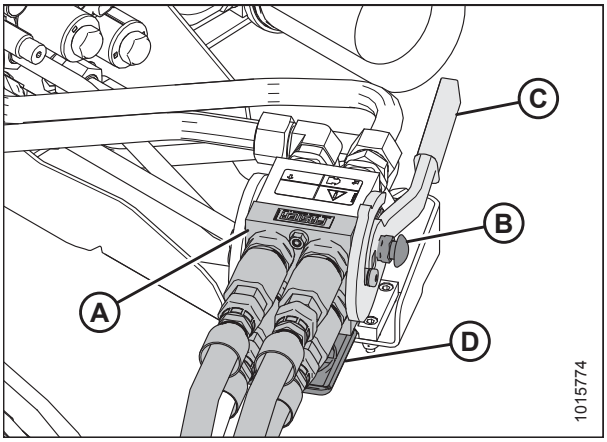


Figure 4.10: Knife/Reel Drive Multicoupler

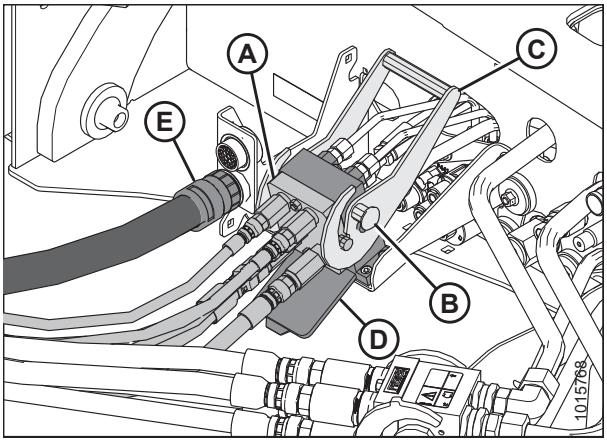


Figure 4.11: Draper/Reel Multicoupler

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

    NOTE:

    The hydraulic hoses have been removed from the illustration for clarity.

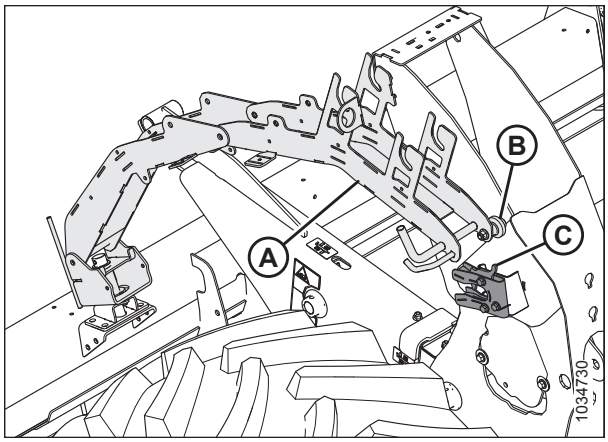


Figure 4.12: Windrower Left Outer Leg

12. **All draper headers except D115X:** Pull arm (B) towards latch (D), on the left side of the header. Align pin (C) to the latch opening. Push arm (B) so lever (A) can secure the pin.

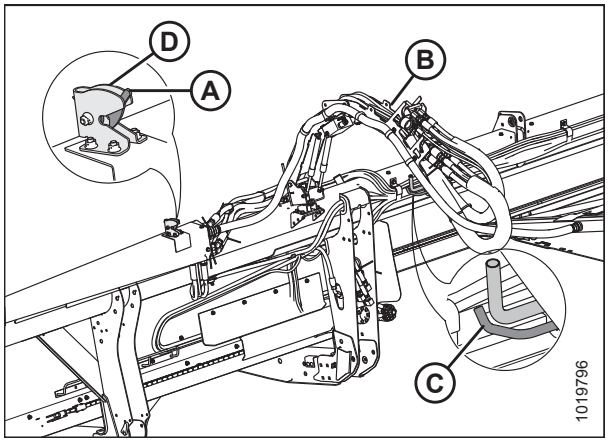


Figure 4.13: Hydraulic Hose Management System – All Headers Except D115X

13. **D115X Draper Headers:** Pull hose management system (A) inboard and toward the center of the header. Set ball stud (B) into the cradle on support (C).

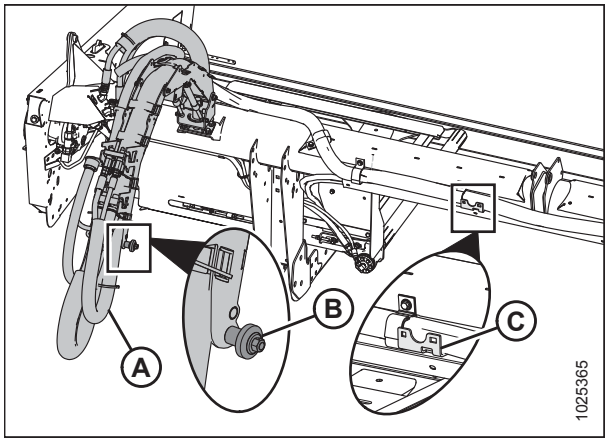


Figure 4.14: Hydraulic Hose Management System – D115X Header

14. Swing the left windrower platform forwards. For instructions, refer to the windrower operator's manual.
15. Detach the header from the windrower. For instructions, refer to the windrower operator's manual.

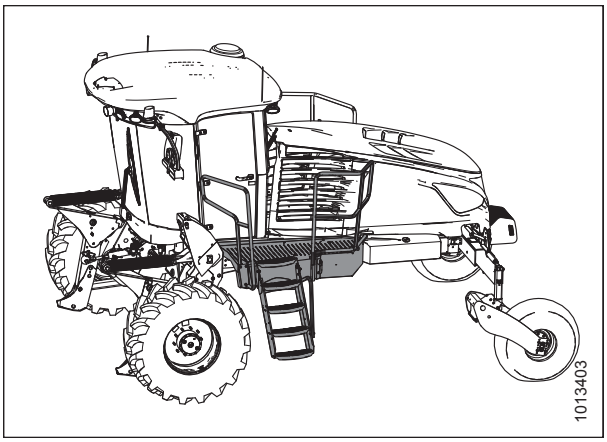


Figure 4.15: Left Windrower Platform

Chapter 5: Maintenance and Servicing

Information necessary to perform routine maintenance and occasional servicing tasks on your machine is provided here. The word “maintenance” refers to scheduled tasks that help your machine operate safely and effectively; “Service” refers to tasks that must be performed when a part needs to be repaired or replaced. For advanced service procedures, contact your Dealer. For replacement parts, refer to the parts catalog provided in the plastic manual case inside the left endshield of the header.

Log hours of operation and use the maintenance record provided (refer to *5.3.1 Maintenance Schedule/Record, page 116*) to keep track of your scheduled maintenance.

5.1 Preparing Machine for Servicing

Observe all safety precautions before beginning service on the machine.

DANGER

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

CAUTION

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

Before servicing the machine, follow these steps:

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

5.2 Maintenance Specifications

5.2.1 Installing a Roller Chain

A typical roller chain is shown here, but the same steps apply to any roller chain.

DANGER

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

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

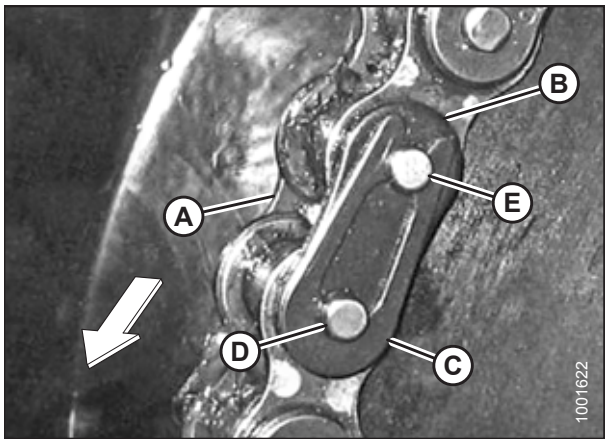


Figure 5.1: Roller Chain

5.2.2 Installing Sealed Bearing

A typical sealed bearing is shown here, but the same steps apply to any sealed bearing.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Clean the shaft and apply a rust-preventive coating.
3. Install flangette (A), bearing (B), second flangette (C), and then lock the collar (D).

   NOTE:

   The locking cam is only on one side of the bearing.
4. Install flangette bolts (E). Do **NOT** tighten.
5. Position the shaft correctly, and lock the lock collar with a punch. Lock the collar in the same direction the shaft rotates, and tighten the set screw in the collar.
6. Tighten flangette bolts (E).

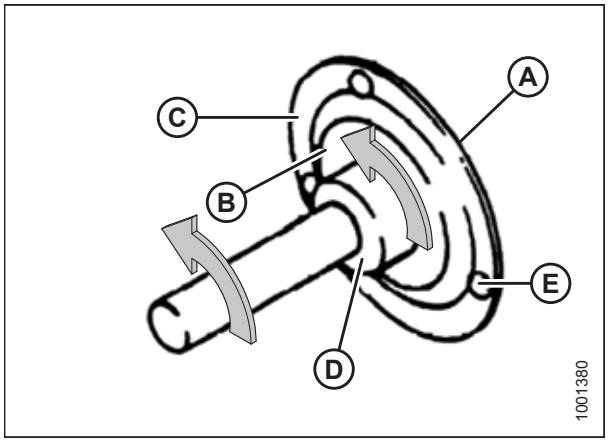


Figure 5.2: Sealed Bearing

7. Loosen the flangette bolts on the mating bearing (one turn) and then retighten. This will allow the bearing to properly line up.

5.3 Maintenance Requirements

Periodic maintenance requirements are organized according to service intervals.

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

When servicing the machine, refer to the specific headings in this section and use only fluids and lubricants specified in the *Recommended Fluids and Lubricants* section on the inside back cover of this manual.

Log hours of operation, use the maintenance record, and keep copies of your maintenance records (refer to *5.3.1 Maintenance Schedule/Record, page 116*).

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

IMPORTANT:

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

CAUTION

Carefully follow safety messages. Refer to *5.1 Preparing Machine for Servicing, page 113* and *1 Safety, page 1*.

5.3.1 Maintenance Schedule/Record

Action		✓ - Check					♦ - Lubricate					▲ - Change				
✎	Hour Meter Reading															
✎	Service Date															
✎	Serviced By															
First Use		Refer to *5.3.2 Break-In Inspection, page 117*														
End of Season		Refer to *5.3.4 End-of-Season Service, page 118*														
10 Hours or Daily																
✓	Hydraulic Hoses and Lines - Refer to *5.3.5 Checking Hydraulic Hoses and Lines, page 119*.	**NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.**														
✓	Knife Sections, Guards, and Hold-Downs - Refer to *5.5 Cutterbar, page 132*.	**NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.**														
✓	Tire Pressure - Refer to *5.10.3 Checking Tire Pressure, page 240*.	**NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.**														
♦	Knife (except in sandy conditions) - Refer to *5.5 Cutterbar, page 132*.	**NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.**														
25 Hours																
♦	Knifehead(s) - Refer to *5.5 Cutterbar, page 132*.	**NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.**														
50 Hours																
✓	Draper Roller Bearings - Refer to *5.7.7 Draper Roller Maintenance, page 187*.															

♦	Knife Drive Box Lubricant (First 50 Hours Only) - Refer to *5.6.1 Knife Drive Box, page 146*.															
250 Hours																
✓	Draper Seal - Refer to *5.7.2 Installing Drapers, page 175*.															
♦	Reel Drive U-Joint - Refer to *5.9 Reel Drive, page 225*.															
♦	Transport Axle Pivot Bushings - Refer to *5.10 Transport System (Option), page 239*.															
♦	Upper Cross Auger Center Support and U-Joint - Refer to figure*5.11, page 124*.															
500 Hours																
✓	Draper Seal - Refer to *5.7.2 Installing Drapers, page 175*.															
♦	Reel Drive U-Joint - Refer to *5.9 Reel Drive, page 225*.															
♦	Stabilizer/Slow Speed Transport Wheel Bearings - Refer to *5.10 Transport System (Option), page 239*.															
1000 Hours																
▲	Knife Drive Box Lubricant - Refer to *5.6.1 Knife Drive Box, page 146*.															

5.3.2 Break-In Inspection

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

Inspection Interval	Item	Refer to
5 Hours	Check for loose hardware and tighten them to required torque.	*9.1 Torque Specifications, page 273*
5 Hours	Check knife drive belts tension (check periodically for first 50 hours).	• *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160* • *Tensioning Timed Double-Knife Drive Belts, page 167*
10 Hours	Check knife drive box mounting bolts.	*Checking Knife Drive Box Mounting Bolts, page 146*
50 Hours	Change knife drive box lubricant.	*Changing Oil in Knife Drive Box, page 157*

5.3.3 Preseason Servicing

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

CAUTION

- **Review this manual to refresh your memory on the safety and operating recommendations.**
- **Review all the safety decals and other decals on the header and note the hazard areas.**
- **Be sure all the shields and guards are properly installed and secured. Never alter or remove safety equipment.**
- **Be sure you understand and have practiced safe use of all controls. Know the capacity and operating characteristics of the machine.**
- **Ensure you have a first aid kit and fire extinguisher. Know where they are and how to use them.**

1. Lubricate the machine completely. For instructions, refer to *5.3.6 Lubrication, page 120*.
2. Adjust the tension on the drive belts. For instructions, refer to *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160* or *Tensioning Timed Double-Knife Drive Belts, page 167*.
3. Perform all annual maintenance tasks. For instructions, refer to *5.3.1 Maintenance Schedule/Record, page 116*.

5.3.4 End-of-Season Service

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

CAUTION

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

CAUTION

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

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

   NOTE:

   If storing the machine outside, remove the drapers and store them in a dark, dry place. If not removing the drapers, store the header with the cutterbar lowered so water and snow will not accumulate on the drapers. The weight of water and snow accumulation puts excessive stress on the drapers and header.
3. Lower the header onto blocks to keep the cutterbar off the ground.
4. Lower the reel completely. If stored outside, tie the reel to the frame to prevent rotation caused by the wind.
5. Repaint all worn or chipped painted surfaces to prevent rust.
6. Loosen the drive belts.
7. Lubricate the header thoroughly leaving excess grease on the fittings to keep moisture out of the bearings.
8. Apply grease to exposed threads, cylinder rods, and sliding surfaces of components.
9. Lubricate the knife. Refer to the inside back cover for recommended lubricants.
10. Check for worn components and repair as necessary.
11. Check for broken components and order replacements from your Dealer. Immediate repair of these items will save time and effort at the beginning of next season.

12. Replace or tighten any missing or loose hardware. For instructions, refer to *9.1 Torque Specifications, page 273*.

5.3.5 Checking Hydraulic Hoses and Lines

Check hydraulic hoses and lines daily for signs of leaks.

WARNING

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

Figure 5.3: Hydraulic Pressure Hazard

- **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.

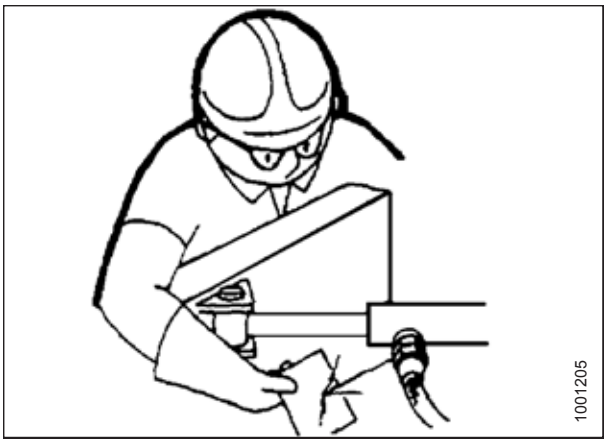


Figure 5.4: Testing for Hydraulic Leaks

5.3.6 Lubrication

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

Refer to the inside back cover for recommended lubricants.

Log hours of operation and use the Maintenance Record provided to keep a record of scheduled maintenance. Refer to *5.3.1 Maintenance Schedule/Record, page 116*.

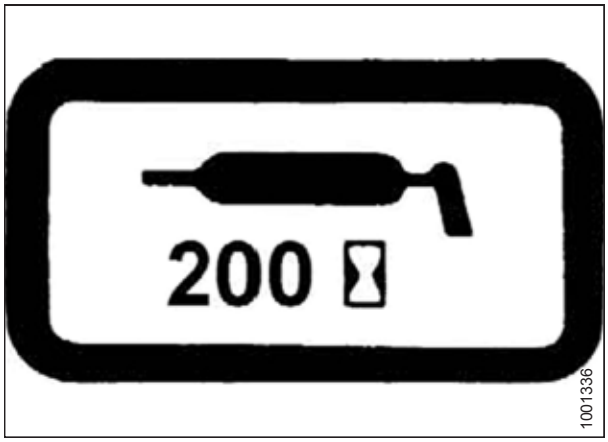


Figure 5.5: Grease Interval Decal

Lubricating Header

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

DANGER

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

1. Open the driveshields at the ends of the header to access greasing points. For instructions, refer to *Opening Endshields, page 37*.
2. Refer to the grease point location decal for the locations of the greasing points on the header. For service intervals, refer to *Lubrication Service Intervals, page 121*.
3. Wipe each grease fitting with a clean cloth before lubricating to avoid injecting dirt and grit.
4. Inject grease through each fitting with a grease gun until grease overflows the fitting, except where noted.

   IMPORTANT:

   Use only the recommended lubricants specified in this manual. For information, refer to the inside back cover of this manual.
5. Leave excess grease on the fittings to keep out dirt.
6. Replace any loose or broken fittings immediately.
7. Remove and thoroughly clean any fitting that will not take grease. Also clean the lubricant passageway. Replace the fitting if necessary.

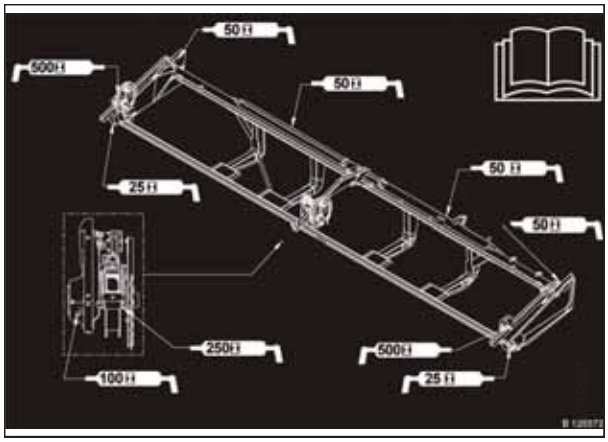


Figure 5.6: Grease Point Location Decal

Lubrication Service Intervals

Lubricate the components detailed in the following lubrication service intervals for optimal performance.

Every 10 Hours

Lubricate the following components every 10 hours unless otherwise stated.

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

Knife: Lubricate the knife every 10 hours or daily, except in sandy conditions. In sandy conditions, lubricate it less as sand will stick to the lubricant.

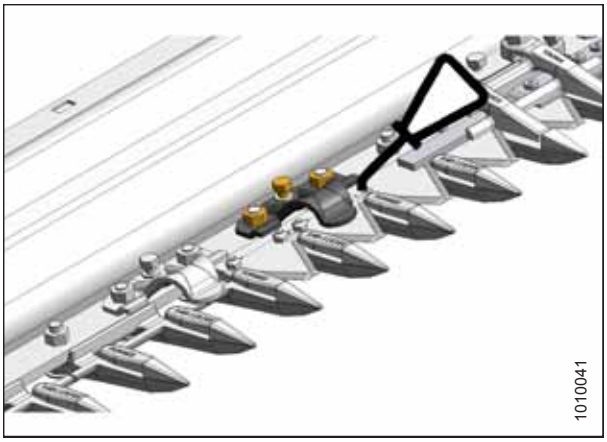


Figure 5.7: Lubricating Knife

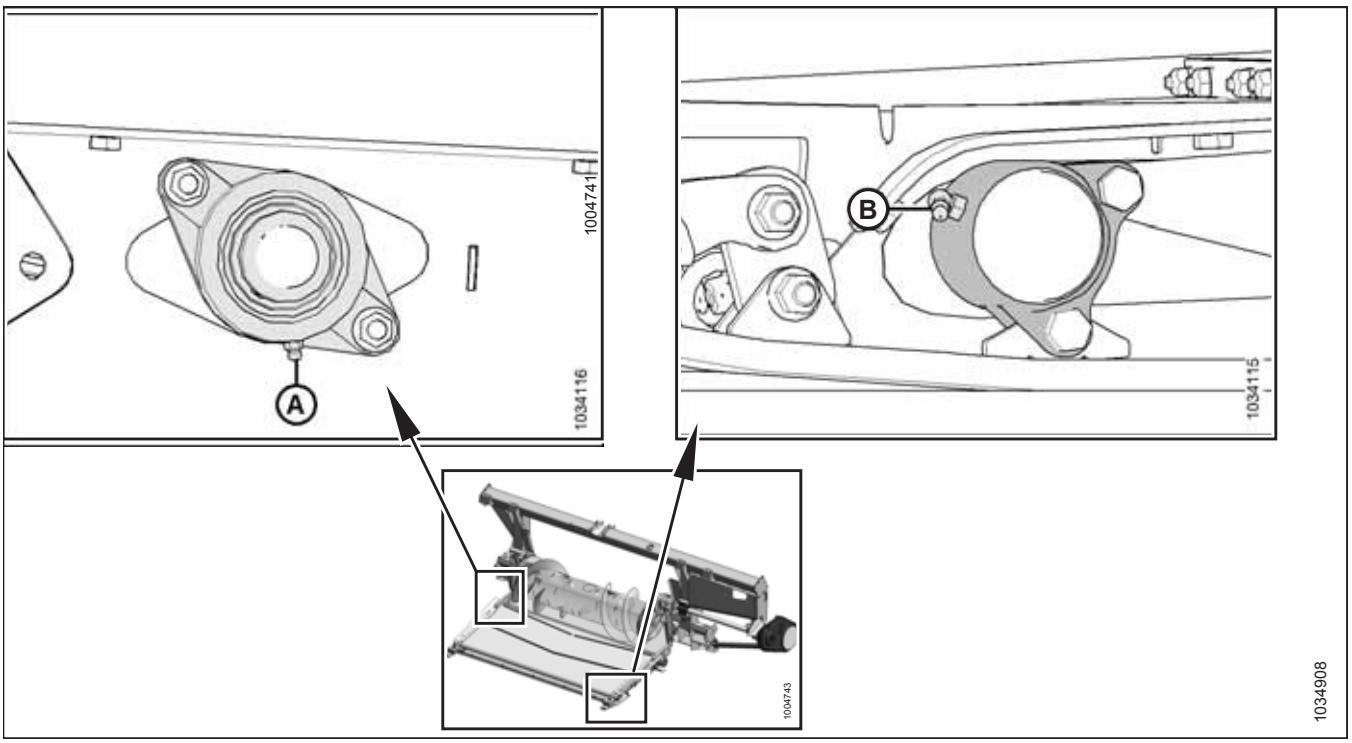


Figure 5.8: Every 10 Hours

A - Drive Roller Bearing

IMPORTANT:

When greasing the drive roller bearing, clear any debris and excess grease from around the bearing and bearing housing. Inspect the condition of the bearing and bearing housing. Grease the feed draper drive roller bearing until grease comes out of the seal. Wipe any excess grease from area after greasing.

B - Idler Roller Bearing (Both Sides)

IMPORTANT:

When greasing the idler roller bearings, clear any debris and excess grease from around the bearing housing. Inspect the condition of the roller and bearing housing. Grease the feed draper idler roller bearing until grease comes out of the seal. Initial greasing on a new header may require additional grease (may require 5–10 pumps). Wipe any excess grease from area after greasing.

Every 25 Hours

Lubricate the following components every 25 hours unless otherwise stated.

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

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

IMPORTANT:

Overgreasing the knifehead puts pressure on the knife, causing it to rub against the guards, resulting in excessive wear from binding. Do **NOT** overgrease the knifehead. Apply only one to two pumps using a mechanical grease gun (do **NOT** use an electric grease gun). If more than six to eight pumps of the grease gun are required to fill the cavity, replace the seal in the knifehead. For instructions, refer to *5.5.4 Removing Knifehead Bearing, page 134*.

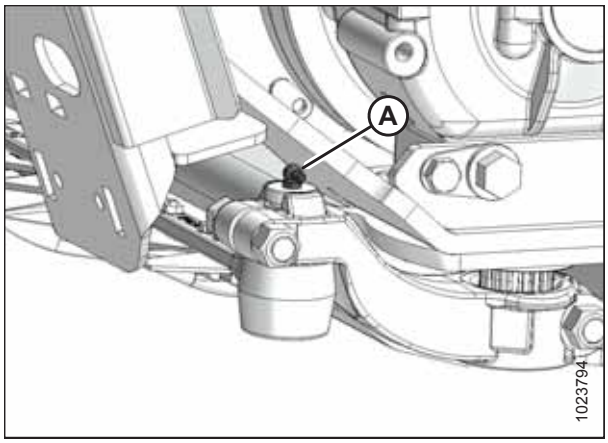


Figure 5.9: Knifehead

Every 100 Hours

Lubricate the following components every 100 hours unless otherwise stated.

NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

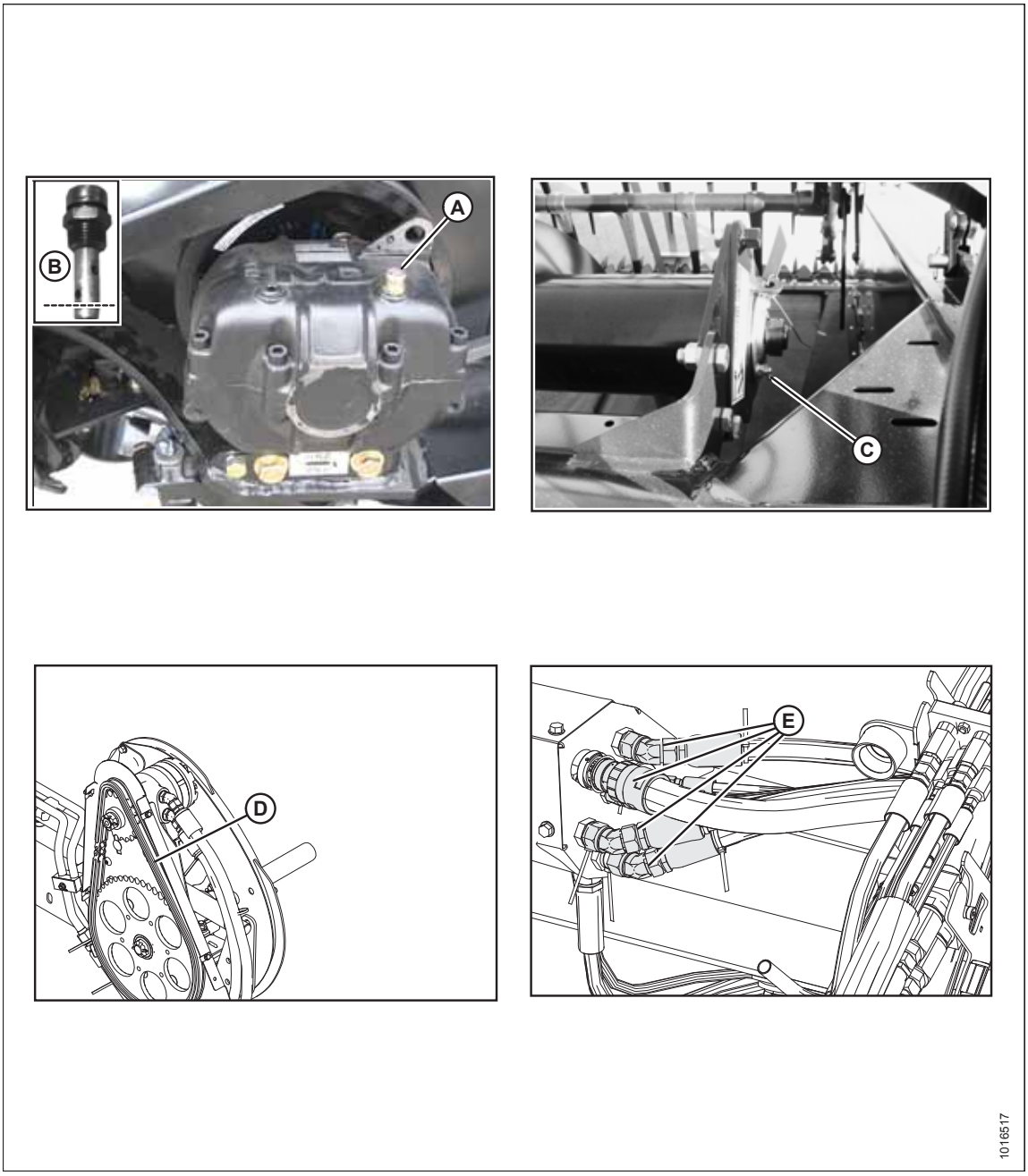


Figure 5.10: Every 100 Hours

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

Every 250 Hours

Lubricate the following components every 250 hours unless otherwise stated.

NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

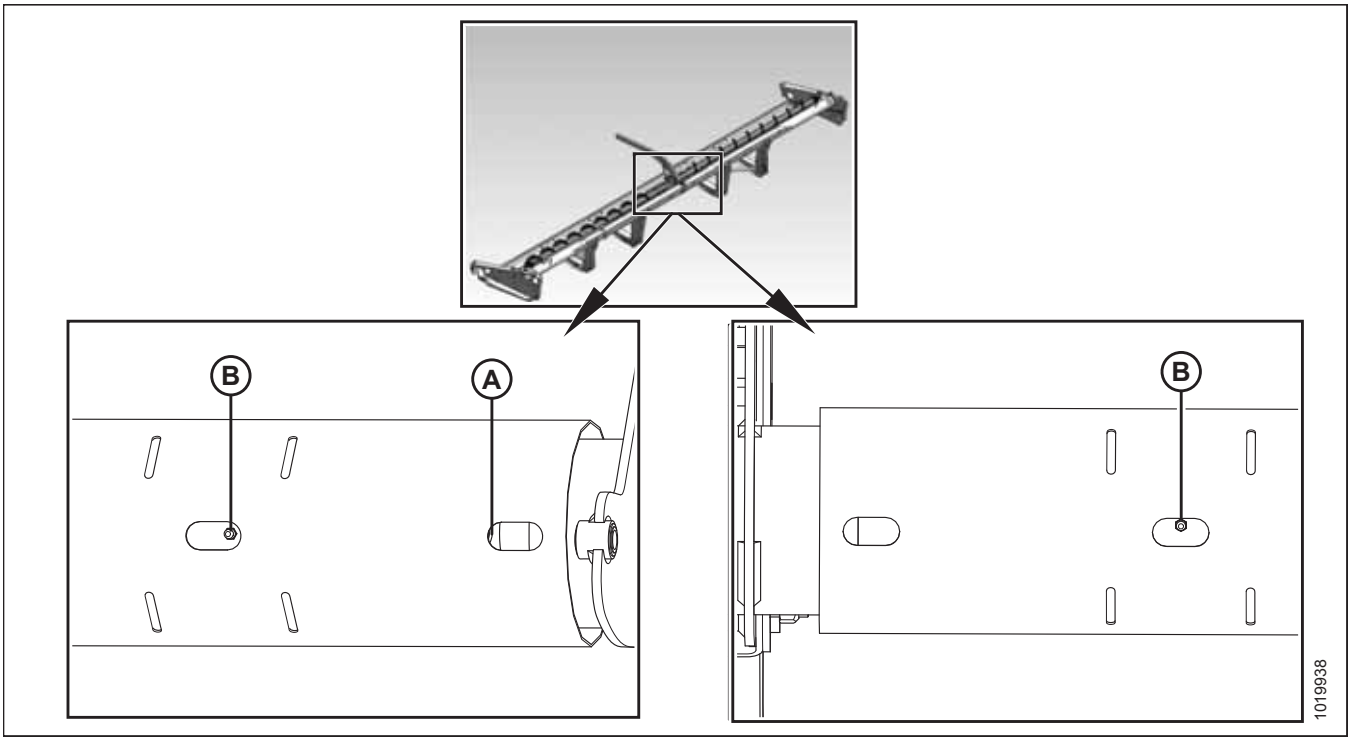


Figure 5.11: Every 250 Hours

A - Upper Cross Auger U-Joint[75]

B - Upper Cross Auger Bearing (Two Places)[76]

75. U-joint has an extended lubrication cross and bearing kit. Stop greasing when greasing becomes difficult or if U-joint stops taking grease. Overgreasing will damage U-joint. Six to eight pumps are sufficient at first grease done at (factory). Decrease grease interval as U-joint wears and requires more than six pumps.
76. Use High Temperature Extreme Pressure (EP2) Performance With 1.5–5.0% molybdenum disulphide (NLGI Grade 2) lithium base grease.

NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% Max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

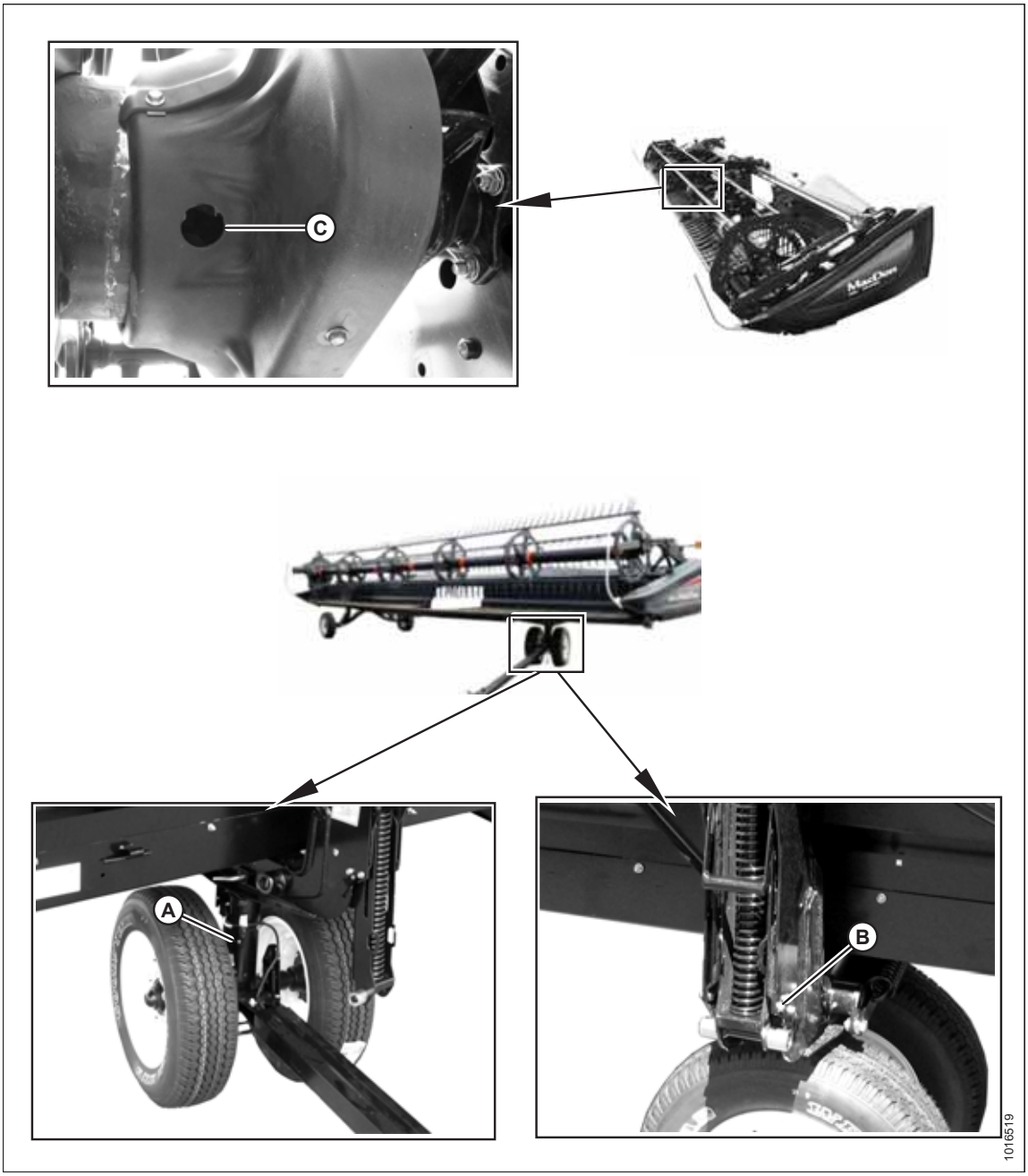


Figure 5.12: Every 250 Hours

A - Front Wheel Pivot
B - Frame/Wheel Pivot (Both Sides)
C - Double Reel U-Joint[77]

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

Every 500 Hours

Lubricate the following components every 500 hours unless otherwise stated.

NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

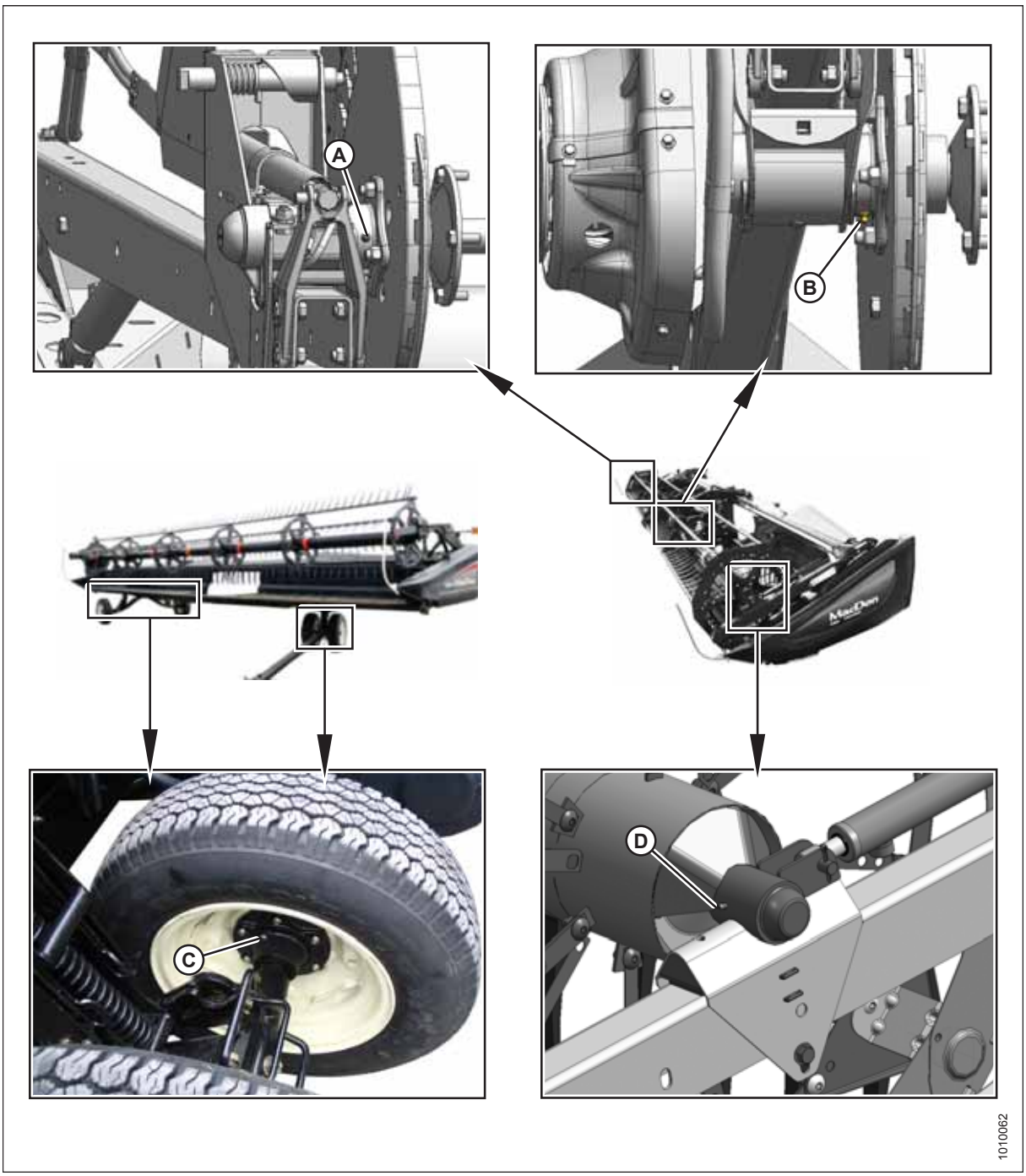


Figure 5.13: Every 500 Hours

A - Reel – Right Side Bearing
B - Reel – Center Bearing
C - Wheel Bearings (Four Places)
D - Reel – Left Bearing

5.4 Electrical System

The electrical system for the header is powered by the windrower. The header has various lights and sensors that require power.

5.4.1 How It Works

Understanding how the electrical system works will help you identify situations where it is not working properly and help you determine the cause of any problems.

Wire identification

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

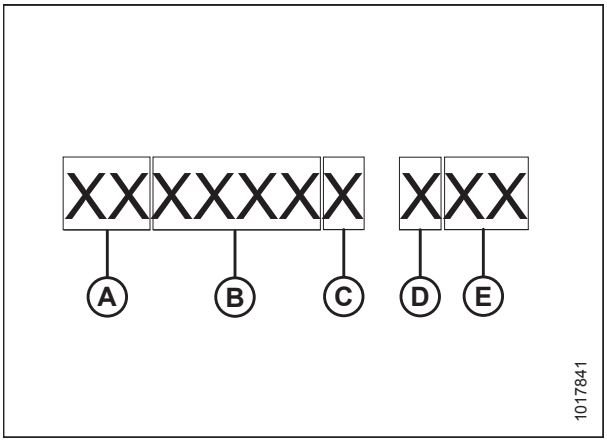


Figure 5.14: Wire Identification Label

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

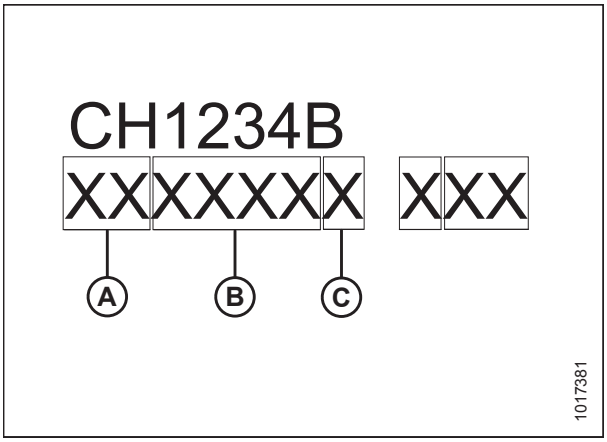


Figure 5.15: Wire Identification – Location, Identification Number, Branch location

Table 5.1 D1XL Series Wire Prefix Identification

Prefix	System
HM	D1XL main harness
DS	Header deck shift
HA	Auger/draper adapter
HR	Reel extend
HT	Transport lights
IDA	Header identification (D130XL)
IDB	Header identification (D135XL)
IDC	Header identification (D140XL and D145XL)
XL	Draper speed (left)
XR	Draper speed (right)

Table 5.2 D1X Series Wire Prefix Identification

Prefix	System
DS	D1 Series main harness
DX	D1 Series reel extension harness

Table 5.2 D1X Series Wire Prefix Identification (continued)

Prefix	System
DD	Hydraulic deck shift
HA	Auger/draper adapter

Color codes apply to actual wire colors on the header. For the color code legend, refer to Table *5.3, page 128*.

Wire example, XXXXXXX N18: The wire color (A) is brown and the wire gauge (B) is 18.

Table 5.3 Wire Color Identification

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

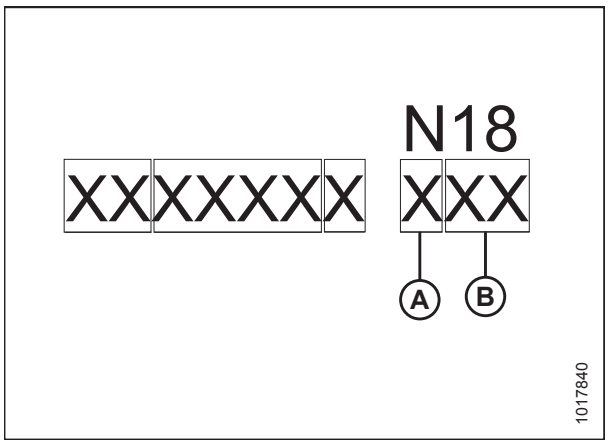


Figure 5.16: Wire Identification – Color

5.4.2 Replacing Light Bulbs

To replace the light bulbs on the header, perform the recommended replacement procedure provided here.

DANGER

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

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

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

   NOTE:

   Use trade #1156 bulb for amber transport lights and #1157 for red tail lights. The red tail lights are only on headers with the transport option installed.

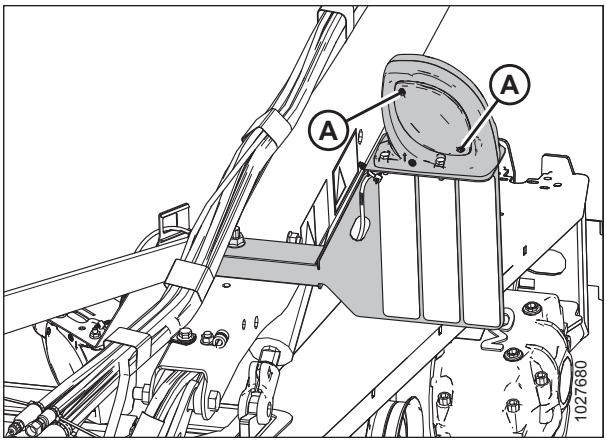


Figure 5.17: Left Transport Light

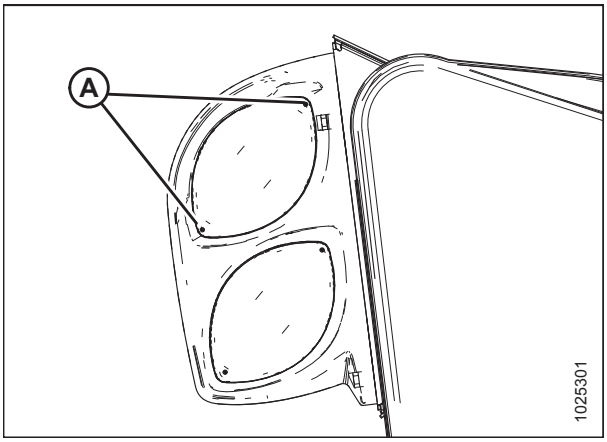


Figure 5.18: Transport Option – Red and Amber Lights

5.4.3 Checking and Adjusting Reel Height Sensor

The output voltage range of the auto reel height sensor can be checked from inside the windrower or manually at the sensor.

For in-cab instructions, refer to the windrower operator's manual.

DANGER

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

WARNING

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

WARNING

Check to be sure all bystanders have cleared the area.

IMPORTANT:

Ensure minimum reel height is properly set before adjusting the reel height sensor. For instructions, refer to *Measuring Reel Clearance, page 198*.

1. Shut down the engine, and remove the key from the ignition.
2. Check that sensor arm (A) and pointer (B) are configured properly for your machine.

   NOTE:

   The sensor arm is semitransparent in the illustration to show the sensor pointer behind it.

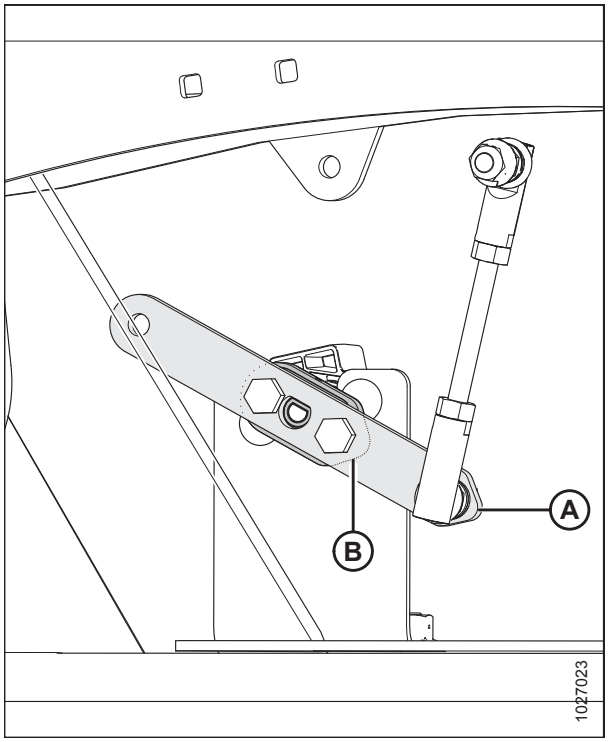


Figure 5.19: Sensor Arm/Pointer Configurations

A - Sensor Arm (Shown Semitransparent)

B - Sensor Pointer (Shown Under Sensor Arm)

IMPORTANT:

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

Table 5.4 Reel Height Sensor Voltage Limits

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

To check the voltage range manually, follow these steps:

1. Engage the parking brake.
2. Start the engine. For instructions, refer to the windrower operator's manual.
3. Lower the reel fully.

4. Use the windrower display or a voltmeter (if measuring the sensor manually) to measure voltage range **Y**. Refer to Table *5.4, page 130* for range requirements.
5. If using a voltmeter, measure the voltage between the ground wire (pin 2) and the signal wire (pin 3) at the reel height sensor (B).
6. Shut down the engine, and remove the key from the ignition.
7. Adjust the length of threaded rod (A) to modify voltage range **Y**.

   NOTE:

   Dimension (C) is factory set to 41.7 mm (1.6 in).
8. Repeat checking and adjusting until voltage range **Y** is within the range specified.
9. Start the engine.
10. Raise the reel fully.
11. Shut down the engine, and remove the key from the ignition.
12. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
13. Start the engine.
14. Use the windrower display or a voltmeter (if measuring the sensor manually) to measure voltage range **X**. Refer to Table *5.4, page 130* for range requirements.
15. If using a voltmeter, measure the voltage between the ground (Pin 2 wire) and the signal (Pin 3 wire) at the reel height sensor (A).
16. Shut down the engine, and remove the key from the ignition.
17. Loosen two M5 hex nuts (B) and rotate sensor (A) to modify voltage range **X**.
18. Repeat checking and adjusting until voltage range **X** is within the range specified.
19. Disengage the reel safety props. For instructions, refer to *Disengaging Reel Safety Props, page 36*.
20. Start the engine.
21. Lower the reel fully.
22. Recheck voltage range **Y** and ensure it is still within the range specified. Adjust if required.

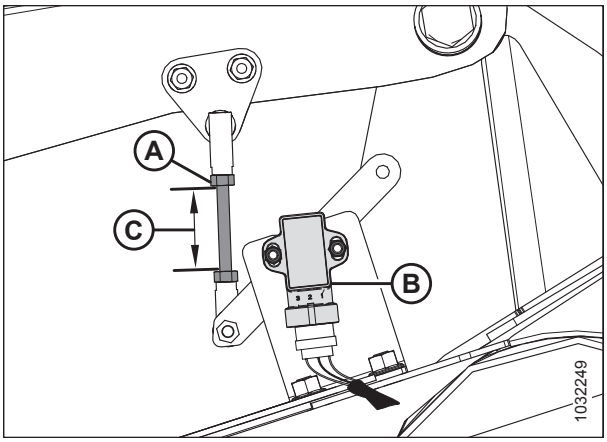


Figure 5.20: Reel Height Sensor – Right Reel Arm with Reel Down

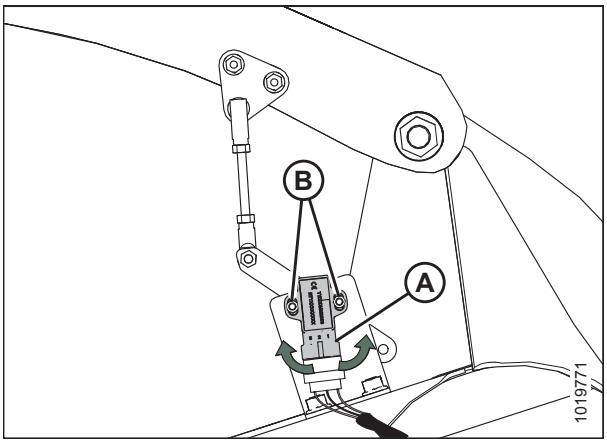


Figure 5.21: Reel Height Sensor – Right Reel Arm with Reel Up

5.5 Cutterbar

The cutterbar is located on the front of the header. It supports the knife and guards which is used to cut the crop.

WARNING

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

CAUTION

To avoid personal injury, before servicing machine or opening drive covers, refer to *5.1 Preparing Machine for Servicing, page 113*.

WARNING

Wear heavy gloves when working around or handling knives.

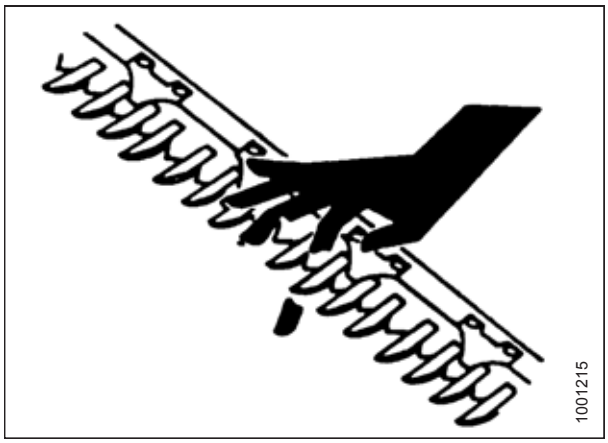


Figure 5.22: Cutterbar Hazard

5.5.1 Replacing Knife Section

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

DANGER

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

WARNING

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

IMPORTANT:

Do **NOT** mix finely and coarsely serrated knife sections on the same knife.

1. Raise the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.

4. Stroke the knife as required to center knife section (A) that you want to replace between guards (E).
5. Remove and retain nuts (B).
6. Remove bars (C) and lift knife section (A) off the knife bar.
7. Remove splice bar (D) if knife section is under the bar.
8. Clean dirt off the knife back, and position the new knife section onto the knife back.
9. Reposition bars (C) and/or splice bars (D), and install nuts (B).

   NOTE:

   If replacing screws, ensure they are fully inserted. Do **NOT** use nuts to draw screws into the knife bar.
10. Torque nuts to 9.5 Nm (7 lbf·ft).

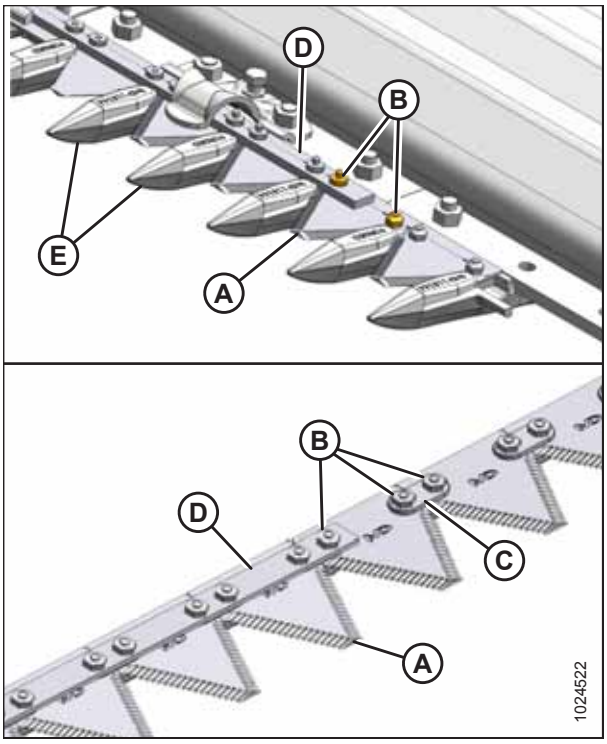


Figure 5.23: Cutterbar

5.5.2 Spare Knife

A spare knife contains all the parts required to replace the entire knife on the cutterbar. A spare knife can be ordered when you order a new header.

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

If there is no spare knife in the header backtube, individual knife sections can be ordered from your MacDon Dealer Parts Department.

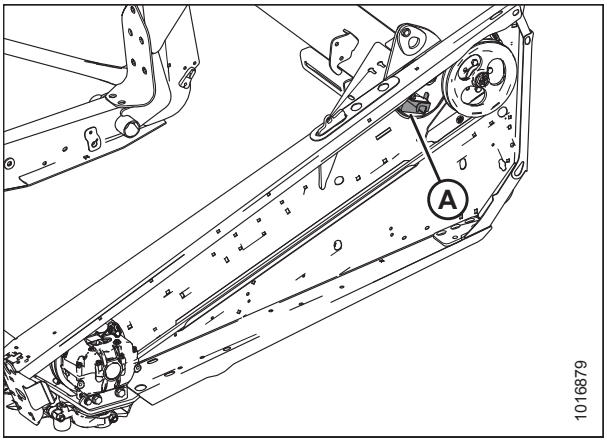


Figure 5.24: Spare Knife

5.5.3 Removing Knife

To remove the knife, perform the recommended removal procedure provided here.

DANGER

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

WARNING

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

WARNING

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

1. Raise the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
4. Manually stroke the knife to its outer limit.
5. Clean the area around the knifehead.
6. Remove grease fitting (B) from the pin.

   NOTE:

   Removing the grease fitting will make it easier to reinstall the knifehead pin later.
7. Remove bolt and nut (A).
8. Use a screwdriver or chisel in slot (C) to release the load on the knifehead pin.
9. Use a screwdriver or chisel to pry the pin upwards in the pin groove until the pin is clear of the knifehead.

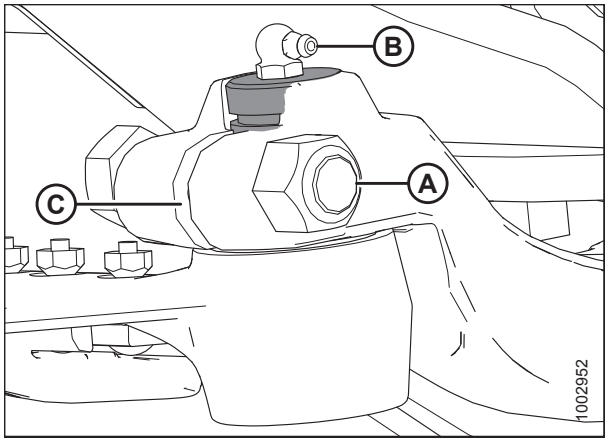


Figure 5.25: Knifehead

10. Push the knife assembly inboard until it is clear of the output arm.
11. Seal the knifehead bearing with plastic or tape to keep out dirt and debris unless it is being replaced.
12. Wrap a chain around the knifehead and pull out the knife.

5.5.4 Removing Knifehead Bearing

The knifehead bearing allows the knifehead pin to rotate within the knifehead as the drive arm strokes the knife back and forth. To remove the knifehead bearing, perform the recommended removal procedure provided here.

DANGER

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

WARNING

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

WARNING

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

1. Raise the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
4. Remove the knife. For instructions, refer to *5.5.3 Removing Knife, page 134*.

   NOTE:

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

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

   NOTE:

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

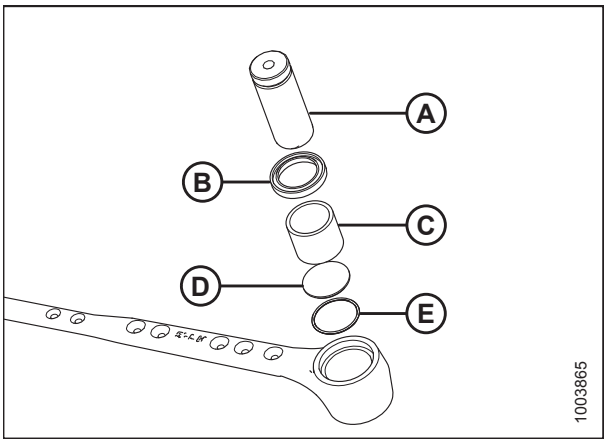


Figure 5.26: Knifehead Bearing Assembly

5.5.5 Installing Knifehead Bearing

The knifehead bearing allows the knifehead pin to rotate within the knifehead as the drive arm strokes the knife back and forth. To install the knifehead bearing, perform the recommended installation procedure provided here.

1. Place O-ring (E) and plug (D) into the knifehead.
2. Use a flat-ended tool (A) with the same approximate diameter as bearing (C), and push the bearing into the knifehead until the top of the bearing is flush with the step in the knifehead.

   IMPORTANT:

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

3. Install seal (B) into the knifehead with the lip facing outwards.

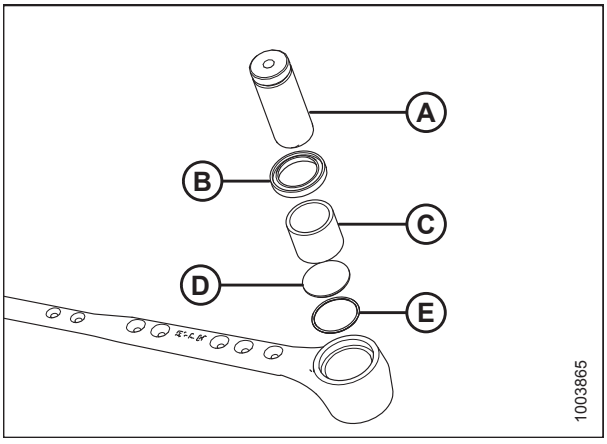


Figure 5.27: Knifehead Bearing Assembly

IMPORTANT:

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

4. Install the knife. For instructions, refer to *5.5.6 Installing Knife, page 136*.

5.5.6 Installing Knife

To install the knife, perform the recommended installation procedure provided here.

DANGER

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

WARNING

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

WARNING

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

1. Raise the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
4. Slide the knife into place and align the knifehead with the output arm.
5. Install knifehead pin (A) through output arm (C) and into the knifehead.

   NOTE:

   Remove the grease fitting from the knifehead pin for easier installation of knifehead pin.
6. Position the pin so that groove (B) is 1.5 mm (1/16 in.) above output arm (C).
7. Secure pin with 5/8 x 3 in. hex head bolt and nut (D), and torque to 217 Nm (160 lbf·ft).

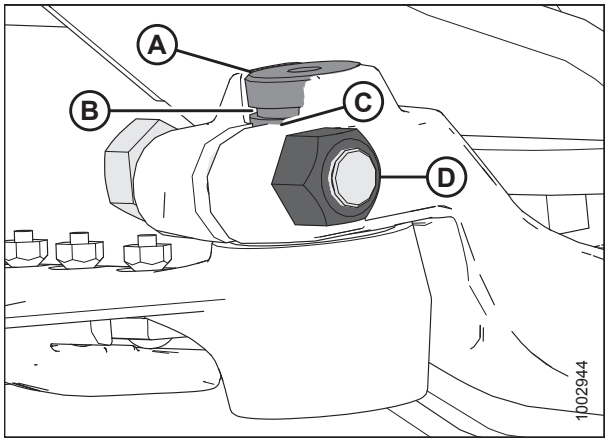


Figure 5.28: Knifehead

8. Install grease fitting (A) into the knifehead pin, and turn the grease fitting for easy access.
9. Slowly apply grease to the knifehead until slight downward movement of the knifehead is observed.

   IMPORTANT:

   Do **NOT** overgrease the knifehead. Overgreasing leads to knife misalignment causing excessive heating of guards and overloading of drive systems. If overgreasing occurs, remove the grease fitting to release pressure.

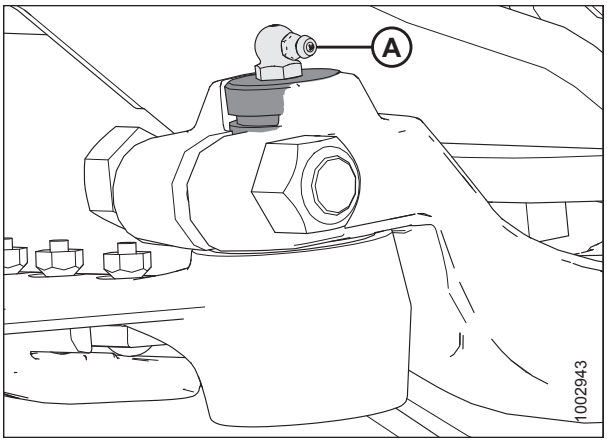


Figure 5.29: Knifehead

5.5.7 Knife Guards

Perform **DAILY** inspections to ensure the knife guards are aligned and the knife sections are contacting the shear surfaces of the knife guards. Depending on your cutting needs, you may be using either pointed guards or stub guards.

Adjusting Pointed Knife Guards

To adjust pointed knife guards, perform the recommended adjustment procedure provided here.

DANGER

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

NOTE:

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

1. Shut down the engine, and remove the key from the ignition.
2. Position tool (A) as shown, and pull up to adjust the guard tips upwards.

Figure 5.30: Upward Adjustment

3. Position tool (A) as shown, and push down to adjust the guard tips downwards.

   NOTE:

   If material is tough to cut, install short knife guards with top guard and adjuster plate. A kit is available from your MacDon Dealer. For more information, refer to *6.2.4 Stub Guard Conversion Kit, page 247*.

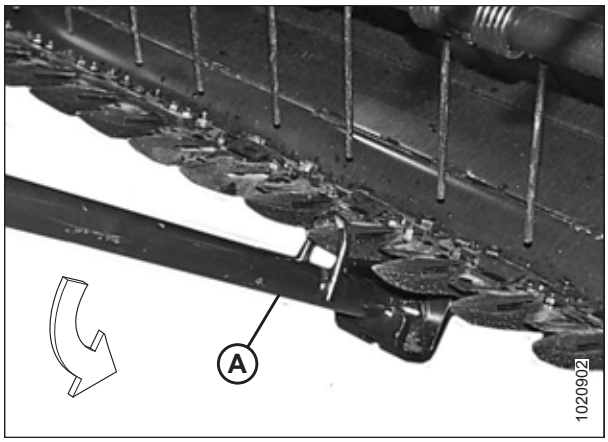


Figure 5.31: Downward Adjustment

Replacing Pointed Guards

To replaced pointed guards, perform the recommended replacement procedure provided here.

DANGER

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

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

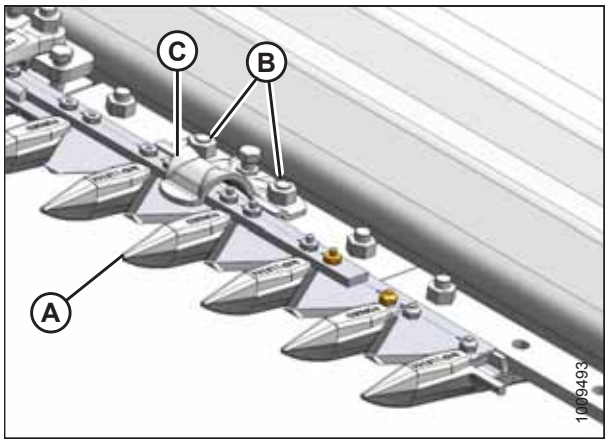


Figure 5.32: Pointed Guards

IMPORTANT:

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

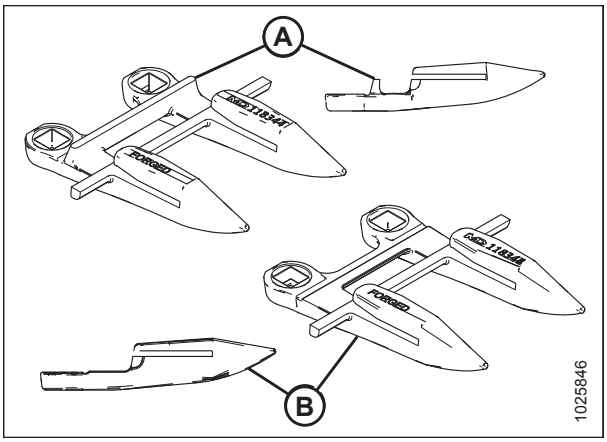


Figure 5.33: Pointed Guards

A - Standard **B - Drive Side**

5. Position new guard (A), hold-down (C), and the plastic wearplate (if applicable) onto the cutterbar. Secure with two nuts (B) and bolts. Do **NOT** tighten.
6. Check and adjust the clearance between the hold-downs and the knife. For instructions, refer to *Checking and Adjusting Hold-Downs with Pointed Guards, page 141*.
7. Torque nuts (B) to 88 Nm (65 lbf·ft).

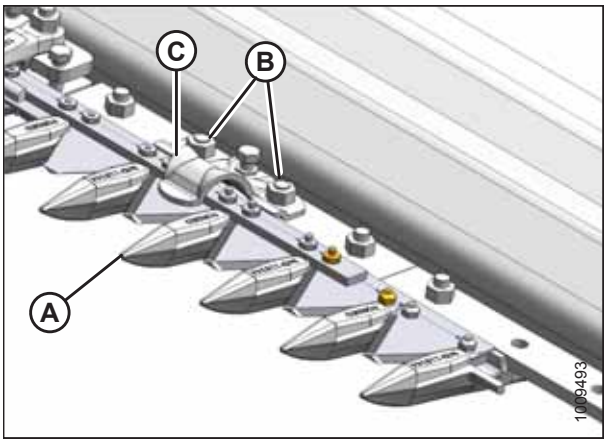


Figure 5.34: Pointed Guards

Replacing Stub Knife Guards

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

DANGER

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

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

2. Stroke the knife manually until the knife sections are spaced midway between the guards.
3. Remove two nuts (A) and bolts attaching guard (B) and top guide (C) to the cutterbar.
4. Remove guard (B), the plastic wearplate (if installed), top guide (C), and adjuster bar (D).

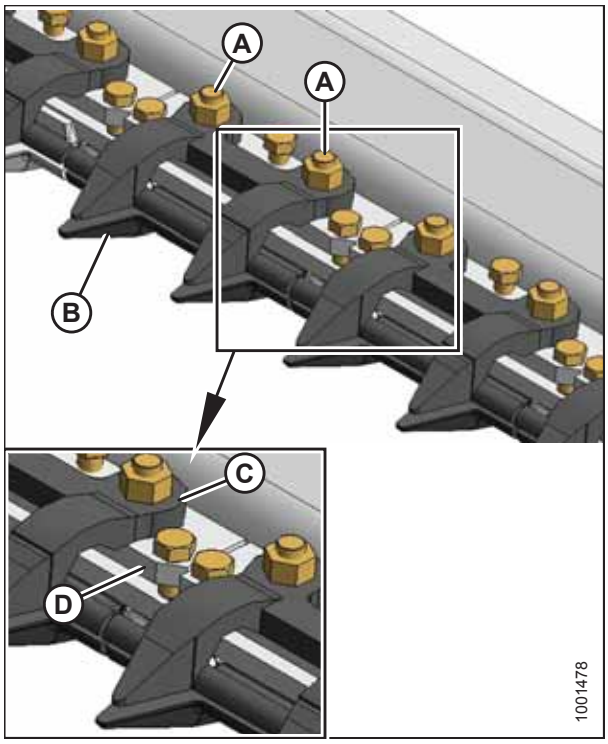


Figure 5.35: Stub Knife Guards

IMPORTANT:

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

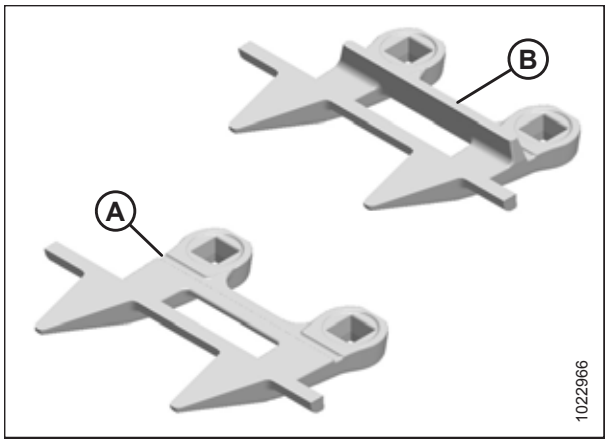


Figure 5.36: Stub Knife Guards

A - Drive Side Guard **B - Standard Guard with Ledger Plate**

5. Position the plastic wearplate (if applicable), replacement guard (B), adjuster bar (D), and top guide (C), and then install bolts and nuts (A). Do **NOT** tighten.
6. Check and adjust the clearance between the hold-downs and the knife. For instructions, refer to *Checking and Adjusting Hold-Down with Stub Guards, page 143*.
7. Torque nuts (B) to 88 Nm (65 lbf·ft).

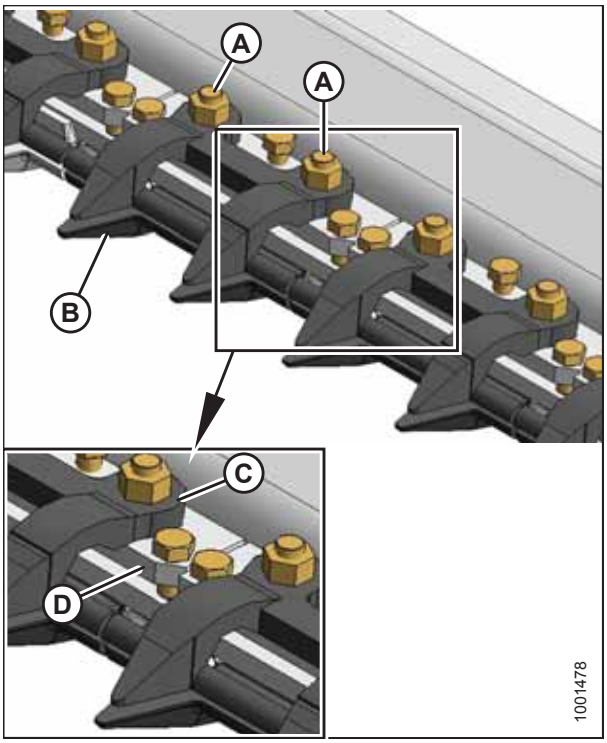


Figure 5.37: Stub Knife Guards

5.5.8 Knife Hold-Downs

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

For checking and adjusting instructions, refer to the following procedures:

- *Checking and Adjusting Hold-Downs with Pointed Guards, page 141*
- *Checking and Adjusting Hold-Down at Double-Knife Center Pointed Guard, page 142*
- *Checking and Adjusting Hold-Down with Stub Guards, page 143*

NOTE:

Align guards prior to adjusting the hold-downs. For instructions, refer to *Adjusting Pointed Knife Guards, page 137*.

Checking and Adjusting Hold-Downs with Pointed Guards

To adjust hold-downs with pointed guards, follow the recommended adjustment procedure provided here.

DANGER

To prevent bodily injury or death from the unexpected startup of the machine, always stop the engine and remove the key before adjusting the machine.

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

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

   NOTE:

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

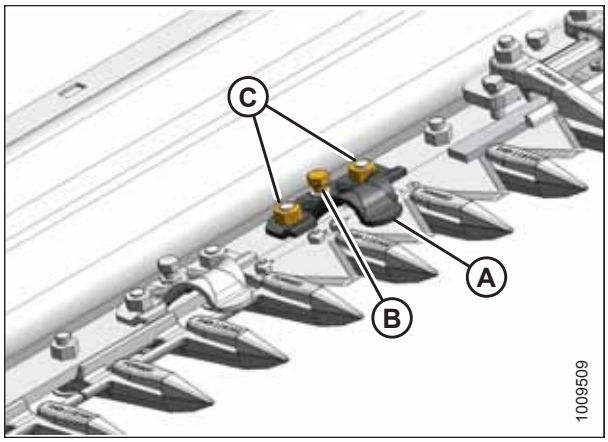


Figure 5.38: Standard Guard Hold-Down

4. Use a feeler gauge to measure the clearance between the center guard hold-down (A) and the knife section. Ensure the clearance is between the following measurements:
   - **At hold-down tip (B):** 0.1–0.4 mm (0.004–0.016 in.)
   - **At rear of hold-down (C):** 0.1–1.0 mm (0.004–0.040 in.)
5. Adjust the clearance as follows:
   a. Tighten nuts (D) until finger tight.
   b. Turn three adjuster bolts (E) clockwise to raise the front of the hold-down and increase clearance, or counterclockwise to lower the front of the hold-down and decrease clearance.
   c. When all the adjustments are complete and the specified clearances are achieved, torque nuts (D) to 88 Nm (65 lbf·ft).

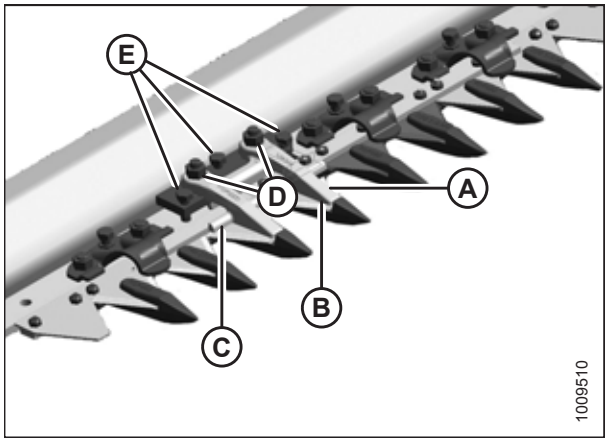


Figure 5.39: Center Guard Hold-Down

WARNING

Check to be sure all bystanders have cleared the area.

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

   IMPORTANT:

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

Checking and Adjusting Hold-Down at Double-Knife Center Pointed Guard

To adjust the hold-down at the double-knife center pointed guard, follow the recommended adjustment procedure provided here.

DANGER

To prevent bodily injury or death from the unexpected startup of the machine, always stop the engine and remove the key before adjusting the machine.

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

2. Use a feeler gauge to measure the clearance between the center guard hold-down (A) and the knife section. Ensure the clearance is between the following measurements:
   - **At hold-down tip (B):** 0.1–0.4 mm (0.004–0.016 in.)
   - **At rear of hold-down (C):** 0.1–1.0 mm (0.004–0.040 in.)
3. Adjust the clearance as follows:
   a. Tighten nuts (D) until finger tight.
   b. Turn three adjuster bolts (E) clockwise to raise the front of the hold-down and increase clearance, or counterclockwise to lower the front of the hold-down and decrease clearance.
   c. When all the adjustments are complete and the specified clearances are achieved, torque nuts (D) to 88 Nm (65 lbf·ft).

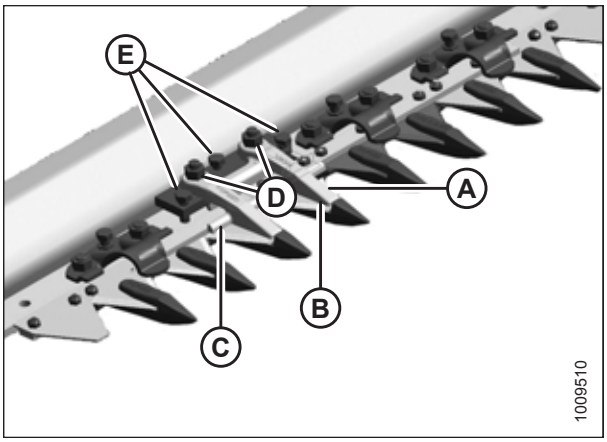


Figure 5.40: Center Guard Hold-Down

WARNING

Check to be sure all bystanders have cleared the area.

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

   IMPORTANT:

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

6. Manually stroke knives until sections (A) are under hold-down (B) as shown.
7. Loosen nuts (C) and back off bolts (D) until they don't contact cutterbar.
8. Lightly clamp hold-down (B) to guard (E) with a C-clamp or equivalent. Position clamp on trash bar at location (F) as shown.
9. Turn bolts (D) until they contact cutterbar, then tighten **ONE** turn.
10. Remove clamp.
11. Tighten nuts (C) and torque to 88 Nm (65 lbf·ft).

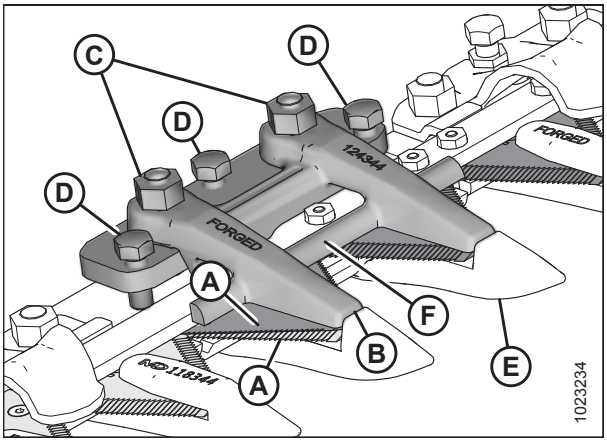


Figure 5.41: Center Guard

Checking and Adjusting Hold-Down with Stub Guards

To adjust hold-downs with stub guards, follow the recommended adjustment procedure provided here.

DANGER

To prevent bodily injury or death from the unexpected startup of the machine, always stop the engine and remove the key before adjusting the machine.

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

2. Use a feeler gauge to measure the clearance between stub guard hold-down (A) and the knife section. Ensure the clearance is between the following measurements:
   - **At hold-down tip (B):** 0.1–0.4 mm (0.004–0.016 in.)
   - **At rear of hold-down (C):** 0.1–1.0 mm (0.004–0.040 in.)
3. Adjust the clearance as follows:
   a. Tighten nuts (D) until they are finger tight.
   b. To lower the front of the hold-down and decrease clearance, turn three adjuster bolts (E) clockwise; to raise the front of the hold-down and increase clearance, turn adjuster bolts (E) counterclockwise.
   c. Torque nuts (D) to 88 Nm (65 lbf·ft) after all the adjustments are complete and the specified clearances are achieved.

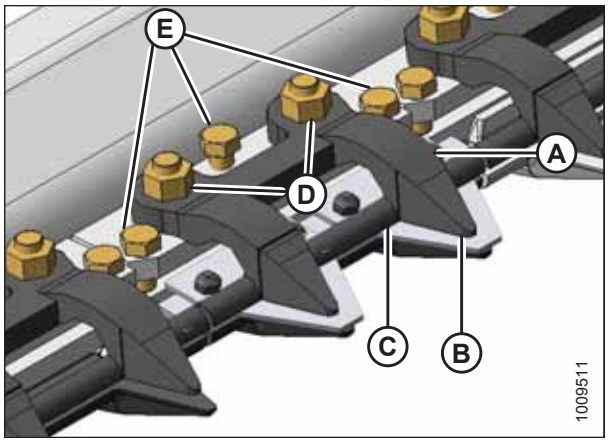


Figure 5.42: Stub Guards

WARNING

Check to be sure all bystanders have cleared the area.

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

   IMPORTANT:

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

5.5.9 Knifehead Shield

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

Part numbers for knifehead shields / knife opening covers and mounting hardware are listed in the header parts catalog.

IMPORTANT:

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

Installing Knifehead Shield

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

DANGER

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

WARNING

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

WARNING

Wear heavy gloves when working around or handling knives.

1. Raise the reel to its full height, and lower the header to the ground.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
4. Place knifehead shield (A) against the endsheet as shown. Align the shield so the cutout matches the profile of the knifehead and/or hold-downs.
5. Bend knifehead shield (A) along the slit to conform to the endsheet.
6. Align the mounting holes and secure with two 3/8 x 1/2 in. Torx® head bolts (B).
7. Tighten bolts (B) just enough to hold knifehead shield (A) in place while allowing it to be adjusted as close to the knifehead as possible.
8. Manually rotate the knife drive box pulley to move the knife and check for areas of contact between the knifehead and knifehead shield (A). Adjust the shield to eliminate interference with the knife if necessary.
9. Tighten bolts (B).

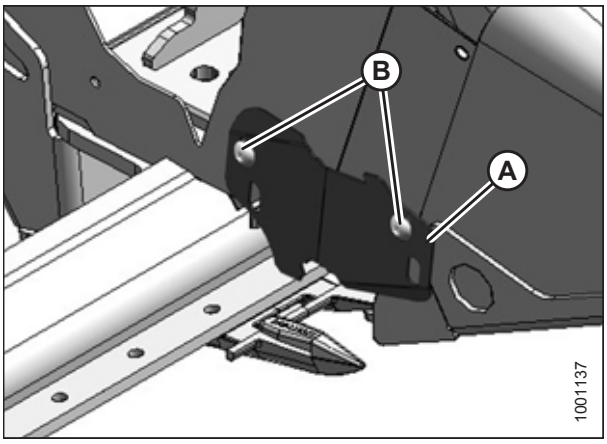


Figure 5.43: Knifehead Shield

5.6 Knife Drive System

The knife drive system transforms pumped hydraulic pressure into a mechanical motion that stokes a series of serrated knife blades at the front of the header back and forth to cut a variety of crops.

5.6.1 Knife Drive Box

The knife drive box is an enclosed oil bath with a 76.2 mm (3 in.) stroke. Knife drive boxes are belt-driven by a hydraulic motor, and convert rotational motion into reciprocating motion at the knife. Double-knife drive systems have two knife drive boxes, one at each end of the header.

CAUTION

To avoid personal injury, before servicing machine or opening drive covers, refer to *5.1 Preparing Machine for Servicing, page 113*.

There is a knife drive box (A) at each end of the header.

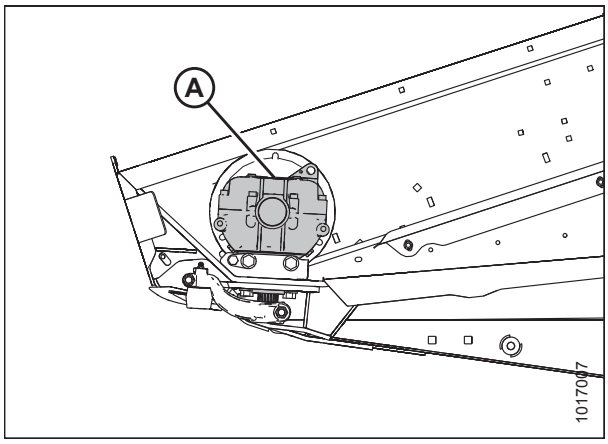


Figure 5.44: Left Knife Drive Box Shown – Right Similar

Checking Knife Drive Box Mounting Bolts

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

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

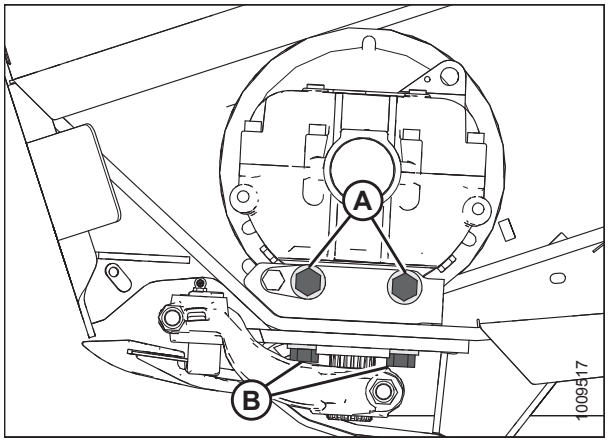


Figure 5.45: Knife Drive Box

Removing Knife Drive Box

The knife drive box may need to be removed for repair at the Dealership. To remove the knife drive box, follow the recommended removal procedure provided here.

DANGER

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

NOTE:

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.

For timed headers:

3. Loosen the two nuts (A) enough to allow idler pulleys (B) to pivot.

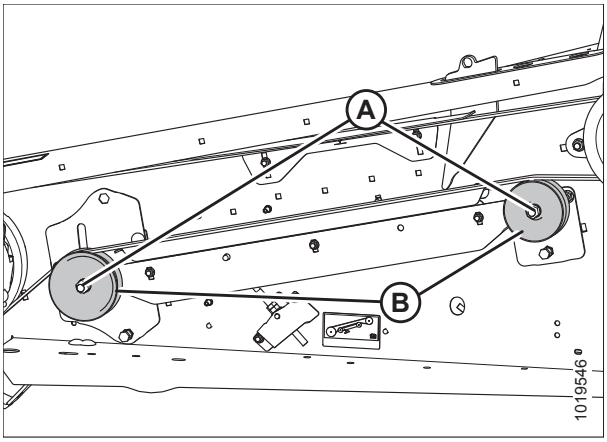


Figure 5.46: Timed Double-Knife Drive

4. Loosen jam nut (C).
5. Turn flange nut (A) counterclockwise on adjuster bolt (B) to relieve knife drive belt tension.
6. Proceed to Step *9, page 148*.

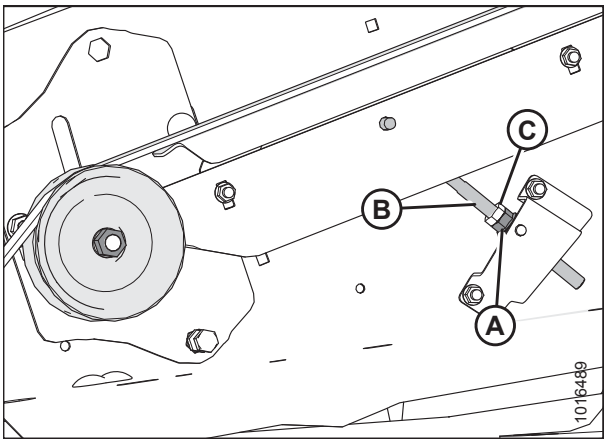


Figure 5.47: Timed Double-Knife Drive

For untimed headers:

7. Loosen two bolts (A) securing the motor assembly to the header endsheet.
8. Loosen the belt tension by turning tensioning bolt (B) counterclockwise.

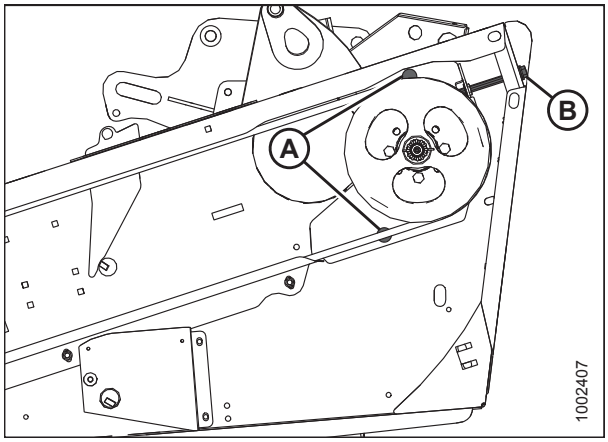


Figure 5.48: Untimed Double-Knife Drive

For both timed and untimed headers:

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

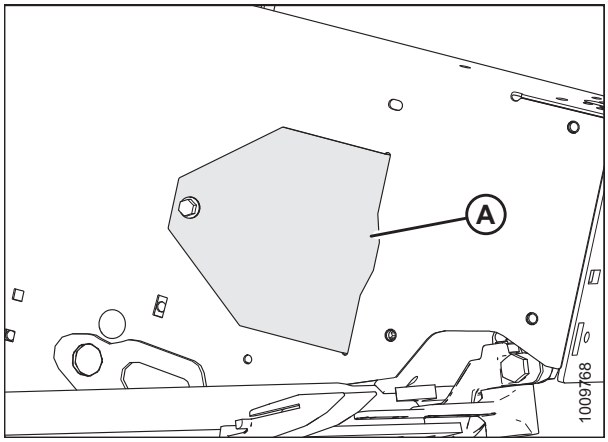


Figure 5.49: Access Cover

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

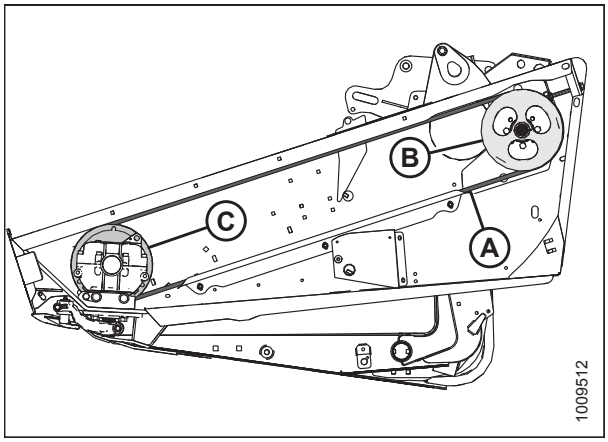


Figure 5.50: Knife Drive

12. Manually stroke the knife to its outer limit.
13. Clean the area around the knifehead.
14. Remove grease fitting (B) from the pin.

    NOTE:

    Removing the grease fitting will make it easier to reinstall the knifehead pin later.

15. Remove bolt and nut (A).
16. Use a screwdriver or chisel in slot (C) to release the load on the knifehead pin.
17. Use a screwdriver or chisel to pry the pin upwards in the pin groove until the pin is clear of the knifehead.
18. Push the knife assembly inboard until it is clear of the output arm.
19. Seal the knifehead bearing with plastic or tape to keep out dirt and debris unless it is being replaced.
20. Remove bolt (A) that clamps knife drive arm (B) to the knife drive box output shaft.
21. Remove knife drive arm (B) from the knife drive box output shaft.
22. Remove the four knife drive box mounting bolts (C) and (D).

    NOTE:

    If shims are set on bolts (C) between the knife drive box and housing, mark the location of the shims for later reinstallation.

    NOTE:

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

CAUTION

The knife drive box and pulley weigh over 35 kg (65 lb.) Use care when removing or installing. Lug (L) can be used for lifting.

23. Remove the knife drive box from the header and set aside.

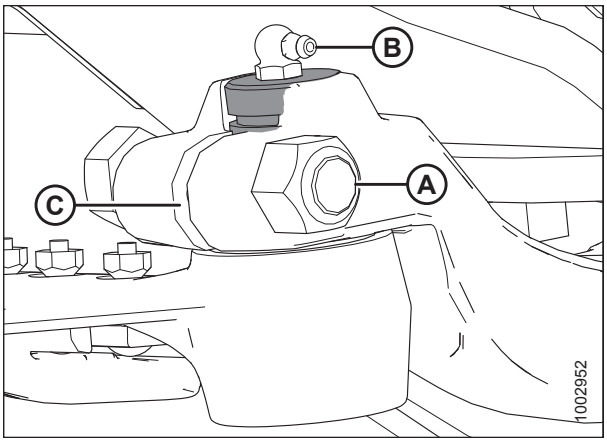


Figure 5.51: Knifehead

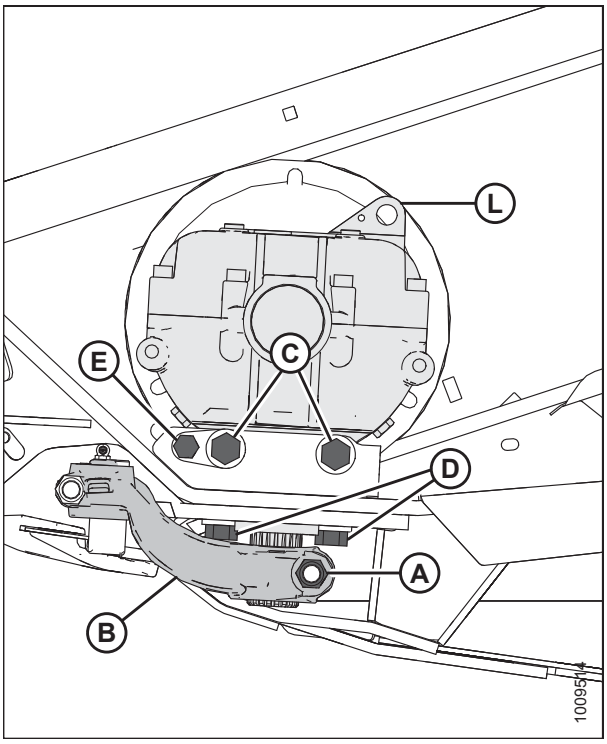


Figure 5.52: Knife Drive Box

Removing Knife Drive Box Pulley

To remove the knife drive box pulley, follow the recommended removal procedure provided here.

NOTE:

Before removing the knife drive box pulley, remove the knife drive box from the header. For instructions on removing the knife drive box, refer to *Removing Knife Drive Box, page 147*.

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

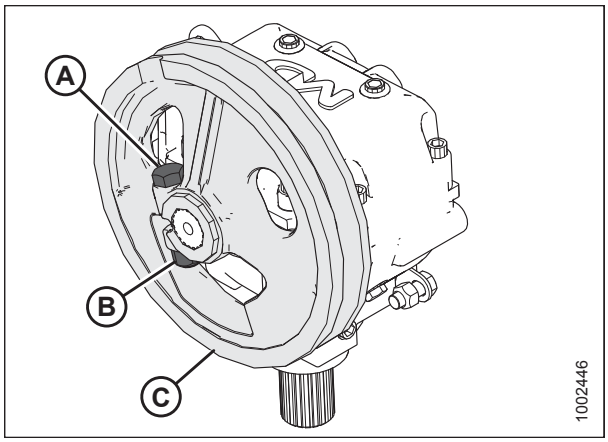


Figure 5.53: Knife Drive Box and Pulley

Installing Knife Drive Box Pulley

The knife drive box pulley is driven by the knife drive motor and the knife drive belt. To install the knife drive box pulley, follow the recommended installation procedure provided here.

1. Ensure the splines and bores in the pulley and drive arm are free of paint, oil, and solvents.
2. Apply two bands (A) of medium-strength threadlocker (Loctite® 243 or equivalent) around the shaft as shown at right. Apply one band at the end of the spline and the second band in the middle.
3. Press pulley (B) onto the shaft until flush with the end of the shaft.

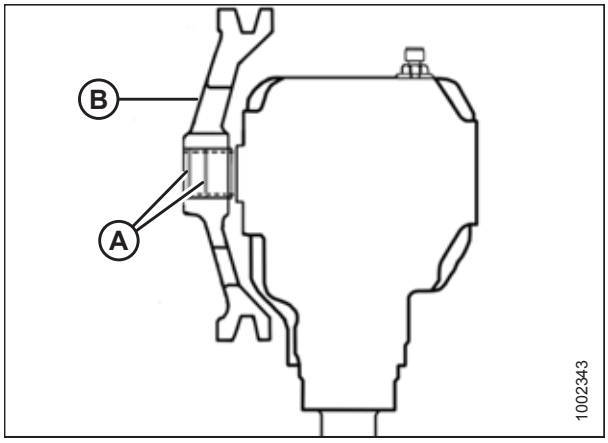


Figure 5.54: Knife Drive Box

4. Secure pulley (C) with a 5/8 x 3 in. hex head bolt (A) and a distorted thread NC lock nut (B). Torque bolt to 217 Nm (160 lbf·ft).

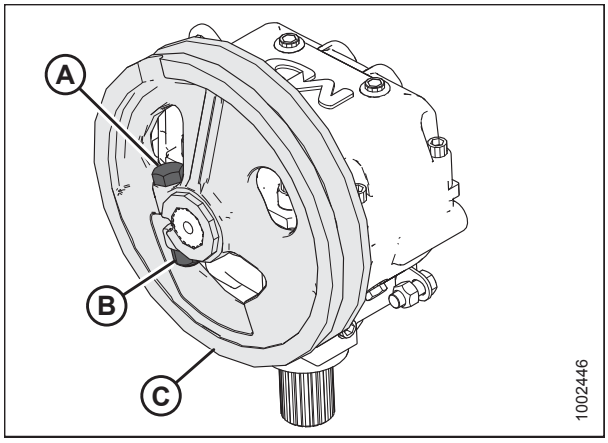


Figure 5.55: Knife Drive Box and Pulley

Installing Knife Drive Box

To install a knife drive box, follow the recommended installation procedure provided here.

NOTE:

If the pulley was removed from the knife drive box, refer to *Installing Knife Drive Box Pulley, page 150*. If the pulley was **NOT** removed, proceed to Step *1, page 151*.

CAUTION

The knife drive box and pulley weigh over 35 kg (65 lb.) Use care when removing or installing. Lug (L) can be used for lifting.

1. Position the knife drive box onto the header mount and install the belt onto the pulley.
2. Secure the knife drive box to the frame using two 5/8 x 1 3/4 in. grade 8 hex head bolts (A) on the side and two 5/8 x 2 1/4 in. grade 8 hex head bolts (B) on the bottom.

   NOTE:

   If shims were removed from bolts (A) in Step *22, page 149*, install them again in the same place between the knife drive box and housing.
3. Tighten knife drive box side bolts (A) slightly, then tighten bottom bolts (B) to ensure proper contact with the vertical and horizontal mounting surfaces. Do **NOT** torque the bolts at this time.

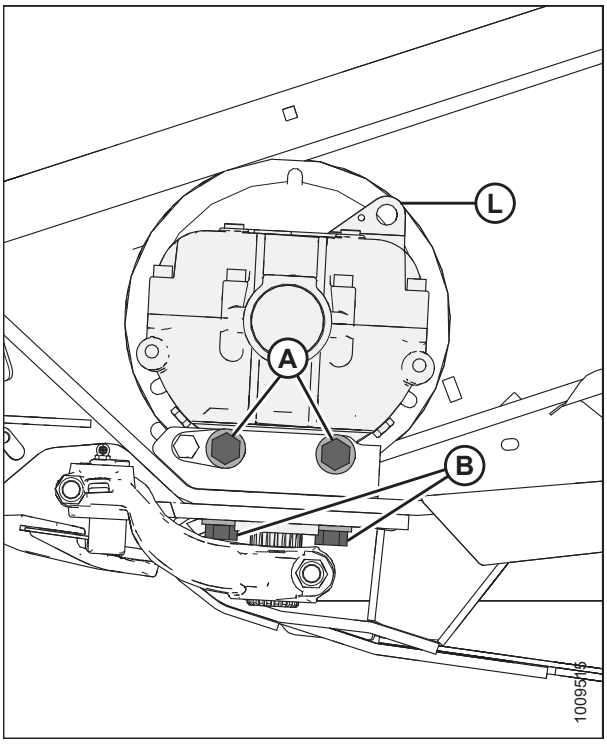


Figure 5.56: Knife Drive Box

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

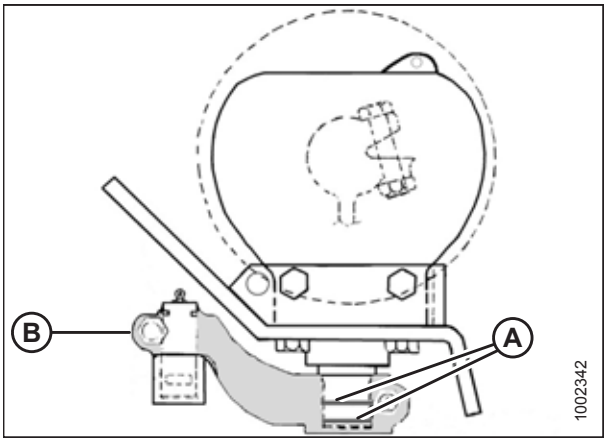


Figure 5.57: Knife Drive Box

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

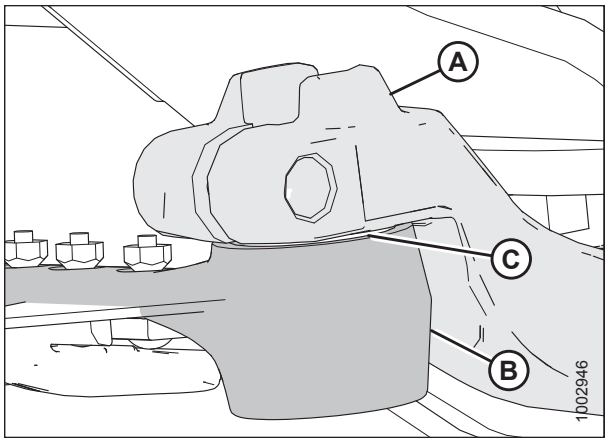


Figure 5.58: Knifehead

8. Torque output arm bolt (A) to 217 Nm (160 lbf·ft).

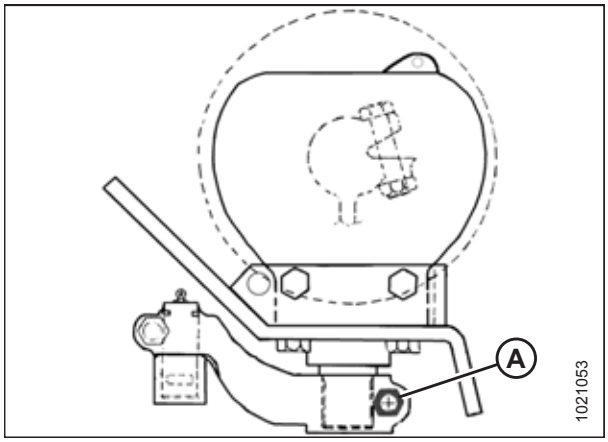


Figure 5.59: Knife Drive Box

9. Slide the knife into place and align the knifehead with the output arm.
10. Install knifehead pin (A) through output arm (C) and into the knifehead.

    NOTE:

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

11. Position the pin so that groove (B) is 1.5 mm (1/16 in.) above output arm (C).
12. Secure pin with 5/8 x 3 in. hex head bolt and nut (D), and torque to 217 Nm (160 lbf·ft).

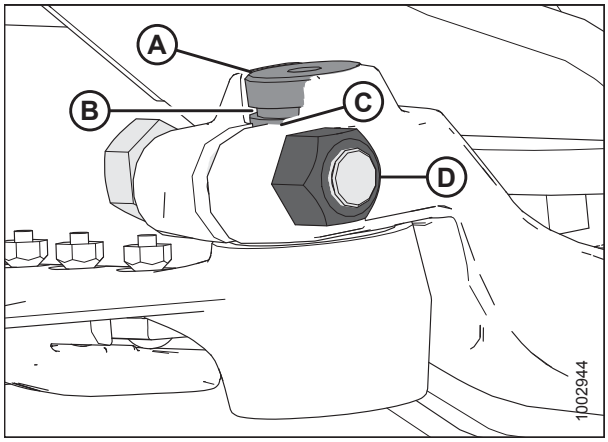


Figure 5.60: Knifehead

13. Install grease fitting (A) into the knifehead pin, and turn the grease fitting for easy access.
14. Slowly apply grease to the knifehead until a slight downward movement of the knifehead is observed.

    IMPORTANT:

    Do **NOT** overgrease the knifehead. Overgreasing leads to knife misalignment causing excessive heating of guards and overloading of drive systems. If overgreasing occurs, remove the grease fitting to release pressure.
15. Check the alignment of the knife drive box pulley and the drive pulley. If pulleys require adjustment, contact your MacDon Dealer.

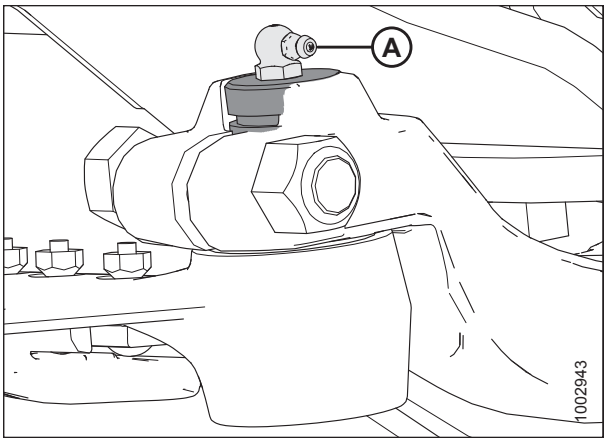


Figure 5.61: Knifehead

16. Tighten the knife drive box side bolts (A) first, then tighten bottom bolts (B). Torque to 271 Nm (200 lbf·ft).
17. Move the output arm to the mid-stroke position, and ensure the knife bar doesn't contact the front of the first guard. If the knife drive box requires adjustment, contact your MacDon Dealer.
18. Install and tension the knife drive belts.
    - For untimed headers, refer to *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160*.
    - For timed double-knife headers, refer to *Tensioning Timed Double-Knife Drive Belts, page 167*.
    - For timed double-knife headers, also check the knife timing. For instructions, refer to *Adjusting Timed Double-Knife Timing, page 169*.
19. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

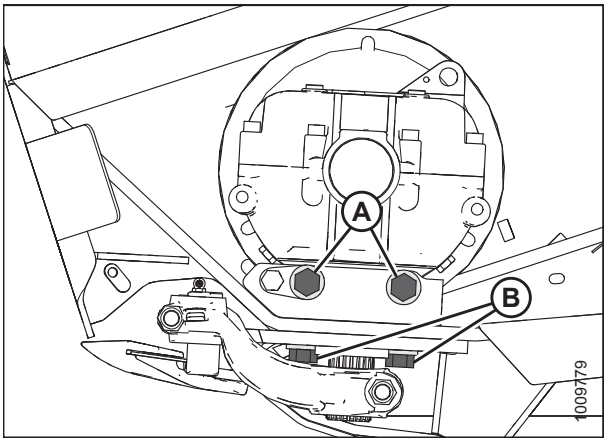


Figure 5.62: Knife Drive Box

Adjusting Knife Drive Box Squareness

To avoid damaging the knifehead, the knife drive box should be adjusted properly.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the required endshield(s). For instructions, refer to *Opening Endshields, page 37*.

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

   NOTE:

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

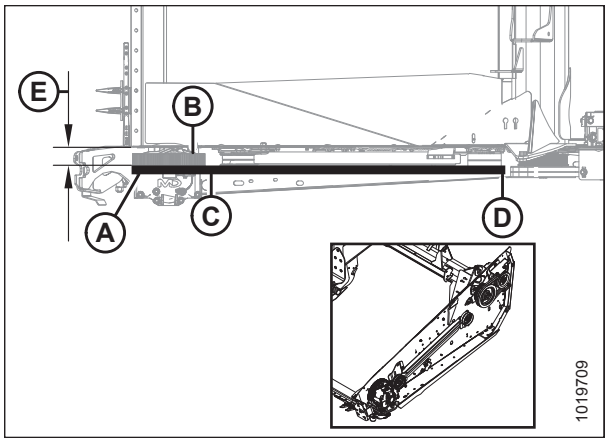


Figure 5.63: Knife Drive Box – Top View

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

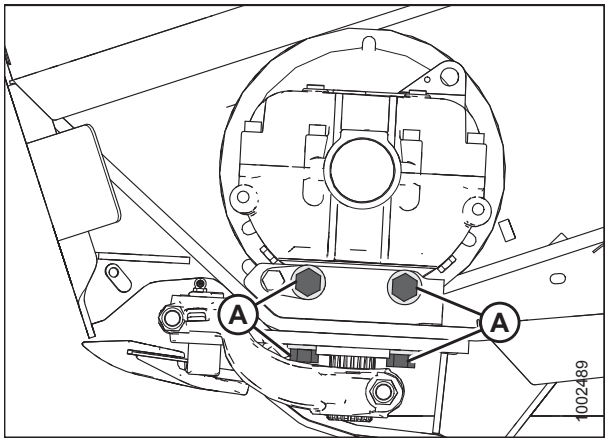


Figure 5.64: Knife Drive Box

6. Manufacture a U-shaped shim (A) to fit under the side bolts securing the knife drive box to the frame. Place the shim between the header mount and the knife drive box. Shim the drive box as required to align the pulley.
7. For bolt installation instructions, refer to *Installing Knife Drive Box, page 151*.
8. Tighten bolts and recheck squareness.
9. For belt tensioning instructions, refer to *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160*.

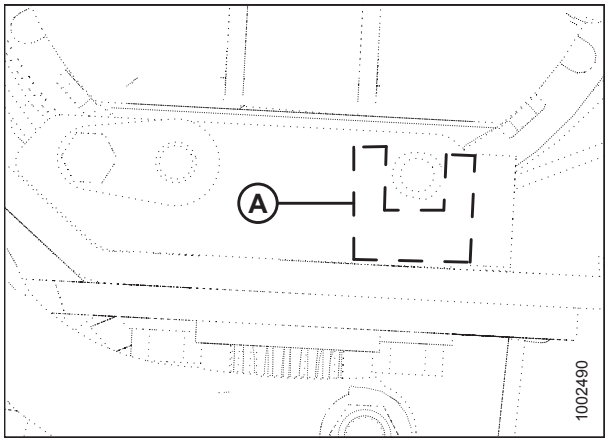


Figure 5.65: U-Shaped Shim

Adjusting Knife Drive Box Fore-Aft

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

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

NOTE:

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

2. Shut down the windrower, and remove the key from the ignition.
3. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.
4. Loosen two nuts (A) enough to allow idler pulleys (B) to pivot.

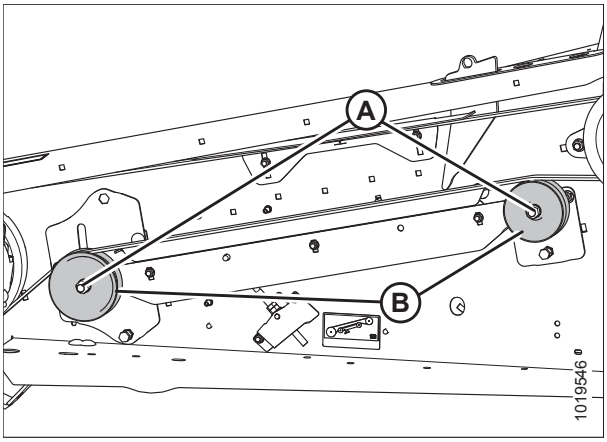


Figure 5.66: Timed Double-Knife Drive

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

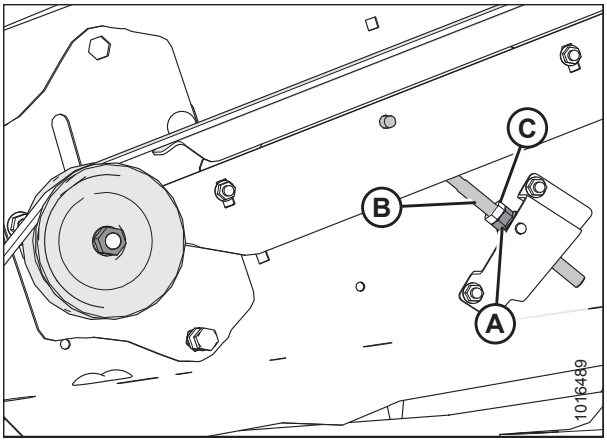


Figure 5.67: Timed Double-Knife Drive

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

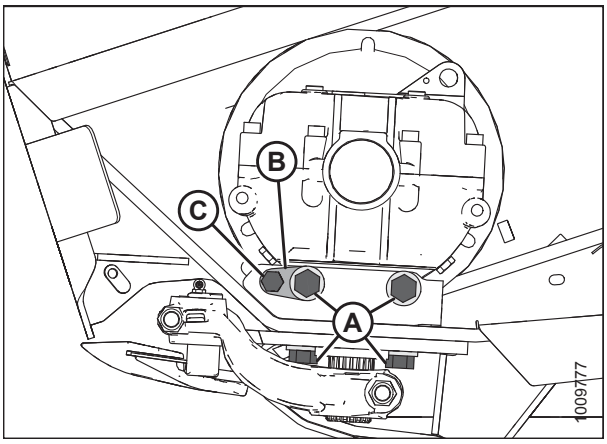


Figure 5.68: Knife Drive Box

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

   NOTE:

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

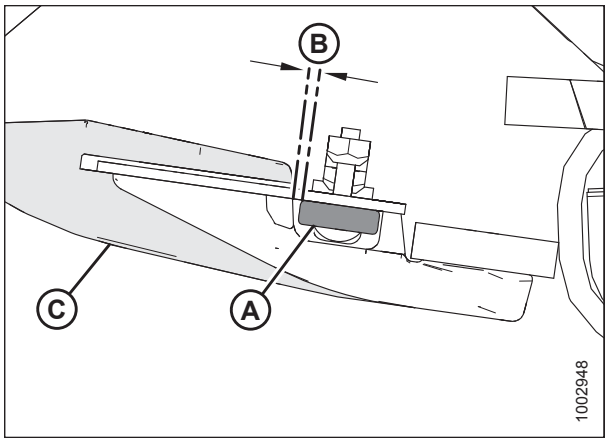


Figure 5.69: Clearance between Guard and Front of Knife Bar

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

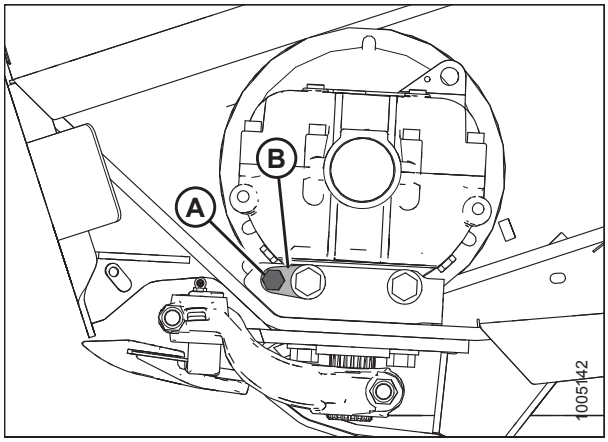


Figure 5.70: Knife Drive Box

11. Tighten knife drive box side bolts (A) first, then tighten bottom bolts (B). Torque to 271 Nm (200 lbf·ft).
12. Install and tension the knife drive belts.
    - For non-timed belts, refer to *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160*.
    - For timed belts, refer to *Tensioning Timed Double-Knife Drive Belts, page 167*.

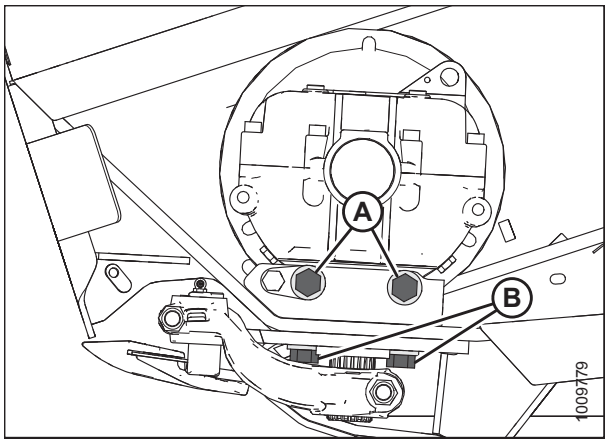


Figure 5.71: Knife Drive Box

Changing Oil in Knife Drive Box

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

DANGER

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

1. Raise the header and place a container large enough to hold approximately 2.2 liters (2.3 quarts) under the knife drive box to collect the oil.
2. Shut down the engine, and remove the key from the ignition.
3. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.
4. Remove breather/dipstick (A) and drain plug (B).
5. Allow the oil to drain from the knife drive box and into the container placed below it.
6. Reinstall drain plug (B).
7. Add oil to the knife drive box. Refer to the inside back cover for recommended fluids and lubricants.
8. Reinstall breather/dipstick (A).
9. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

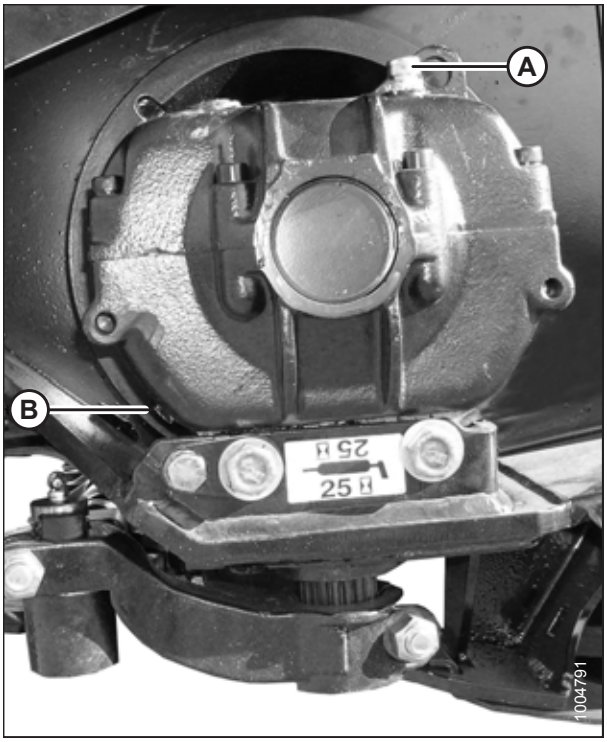


Figure 5.72: Knife Drive Box

5.6.2 Knife Drive Belts

Untimed Double-Knife Drive Belts – D1XL Only

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

NOTE:

This is only for D140XL and D145XL headers.

Removing Untimed Double-Knife Drive Belts

The procedure for removing untimed double-knife drive belts is the same for both sides of the header.

DANGER

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

1. Loosen two bolts (A) securing the motor assembly to the header endsheet.
2. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.

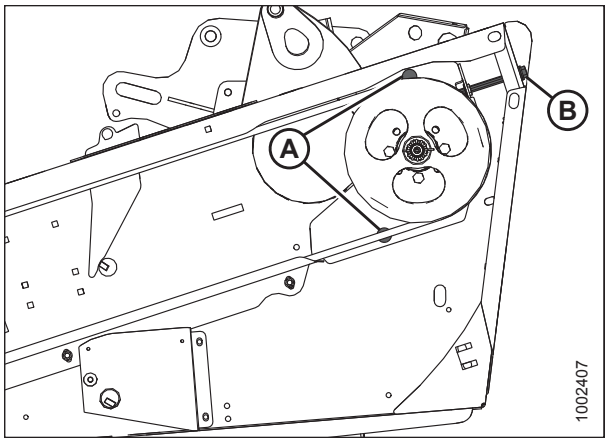


Figure 5.73: Untimed Double-Knife Drive

3. Loosen two bolts (A) securing the motor assembly to the header endsheet.
4. Loosen the belt tension by turning tensioning bolt (B) counterclockwise.

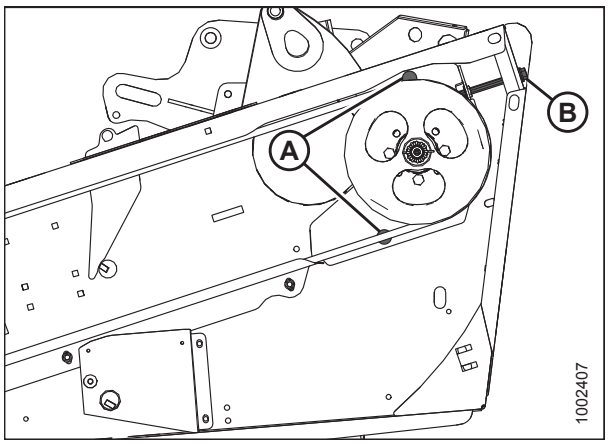


Figure 5.74: Untimed Double-Knife Drive

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

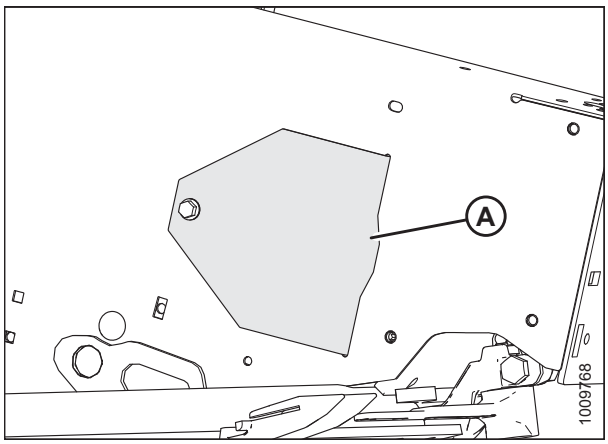


Figure 5.75: Access Cover

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

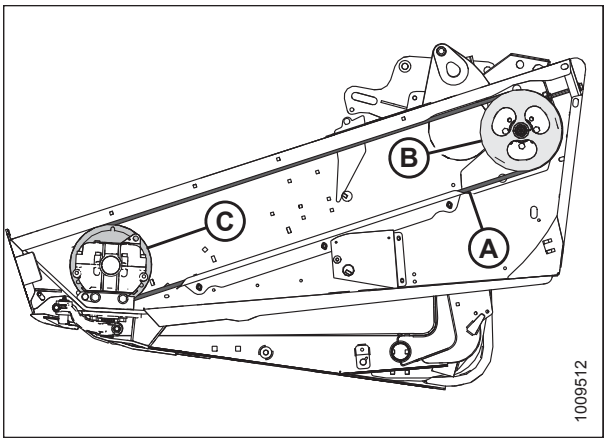


Figure 5.76: Knife Drive

Installing Untimed Double-Knife Drive Belts

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

DANGER

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

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

   NOTE:

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

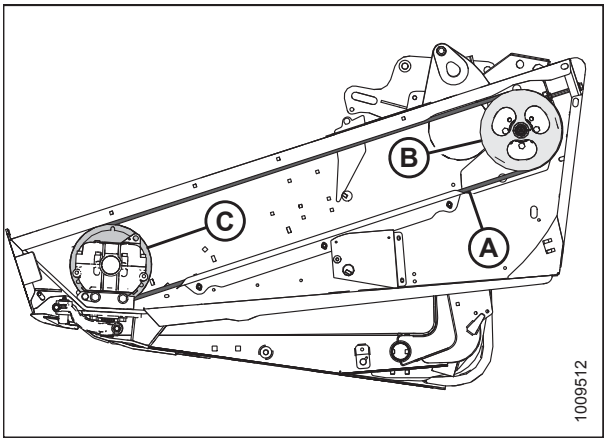


Figure 5.77: Knife Drive

3. Tension the knife drive belt. For instructions, refer to *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160*.
4. Install access cover (A) and secure with bolt.
5. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

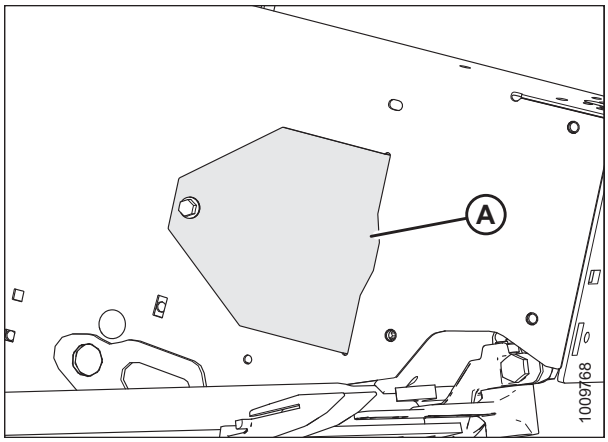


Figure 5.78: Access Cover

Checking and Tensioning Untimed Double-Knife Drive Belts

Knife drive systems are fitted with a drive belt which must be tensioned correctly for the knives to stroke properly.

DANGER

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

IMPORTANT:

To ensure the service life of the belt and the knife drive, **NEVER** overtighten a drive belt.

1. Shut down the engine, and remove the key from the ignition.
2. Open the left endshield. For instructions, refer to *Opening Endshields, page 37*.
3. Check the tension on knife drive belt (C). A properly tensioned drive belt should deflect 24–28 mm (15/16–1 1/8 in.) when 133 N (30 lbf) of force is applied at the midspan of the belt.
4. Loosen two bolts (A).

   NOTE:

   The belt guide has been removed from the illustration for the sake of clarity.
5. If the tension on the belt needs to be adjusted, turn adjuster bolt (B) clockwise to move the drive motor until the proper level of tension is achieved.

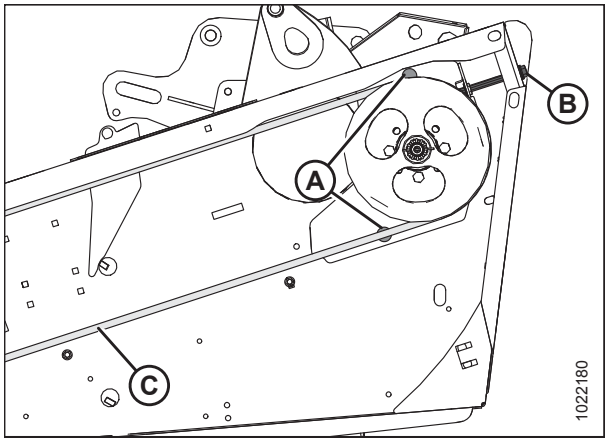


Figure 5.79: Knife Drive Motor and Adjuster

6. Ensure that the clearance between belt (A) and belt guide (B) is 1 mm (1/16 in.).
7. Loosen three bolts (C), and adjust the position of guide (B) as needed.
8. Tighten three bolts (C).
9. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

   NOTE:

   Readjust the tension of a new belt after a short run-in period (about 5 hours).
10. Repeat this procedure to check the knife drive's belt tension on the other side of the header.

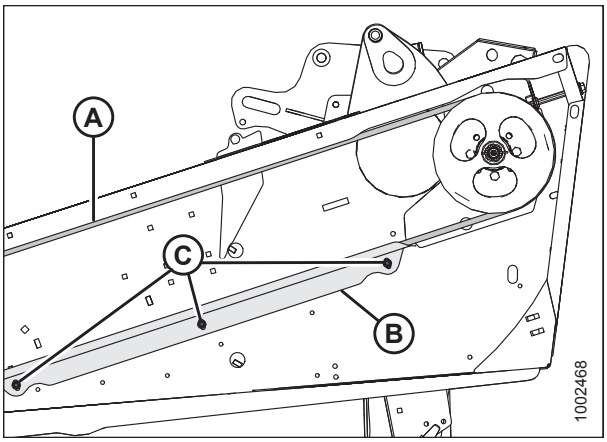


Figure 5.80: Knife Drive Belt Guide

Timed Double-Knife Drive Belts

Knife drive boxes are belt driven by a hydraulic motor, and convert rotational motion into reciprocating motion at the knife. Double-knife drive systems have two knife drive boxes, one at each end of the header. Timing is achieved using cogged belts on both sides of the header.

Removing Timed Drive V-Belts

Matching V-belts transfer power from the knife drive motor to the pulley that drives the knife drive belt.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.
3. Loosen two bolts (A) securing the motor assembly to the header endsheet.
4. Turn adjuster bolt (B) counterclockwise to loosen and remove the two V-belts (C).

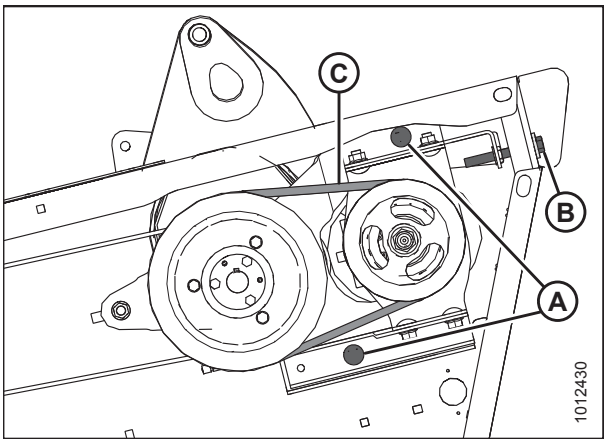


Figure 5.81: Knife Drive V-Belts

Installing Timed Drive V-Belts

Matching V-belts transfer power from the knife drive motor to the pulley that drives the knife drive belt.

NOTE:

Install new V-belts in matching pairs.

DANGER

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

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

   NOTE:

   Ensure the drive motor is fully forward. Do **NOT** pry the belts over the pulley.
3. Turn adjuster bolt (B) clockwise to tighten the V-belts. A properly tensioned V-belt should deflect 4 mm (5/32 in.) when a force of 52–77 N (12–17 lbf) is applied at midspan.

   IMPORTANT:

   To prolong the life of V-belts and drives, do **NOT** overtighten the V-belts.
4. Tighten two bolts (A) on the endsheet.
5. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.
6. Check the tension of the new V-belts after a short run-in period (about 5 hours).

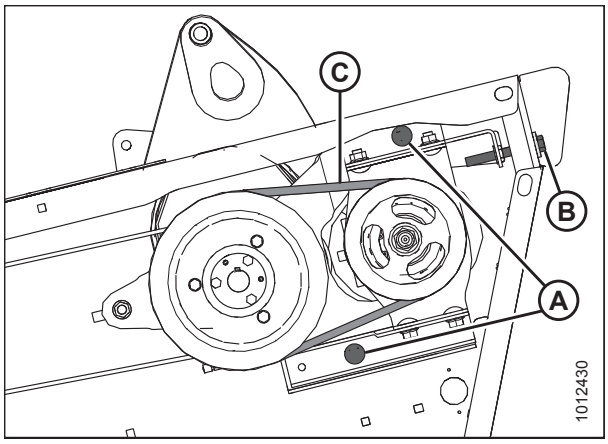


Figure 5.82: Knife Drive V-Belts

Removing Timed Knife Drive Belt

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

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the endshield. For instructions, refer to *Opening Endshields, page 37*.
3. Loosen two nuts (A) enough to allow idler pulleys (B) to pivot.

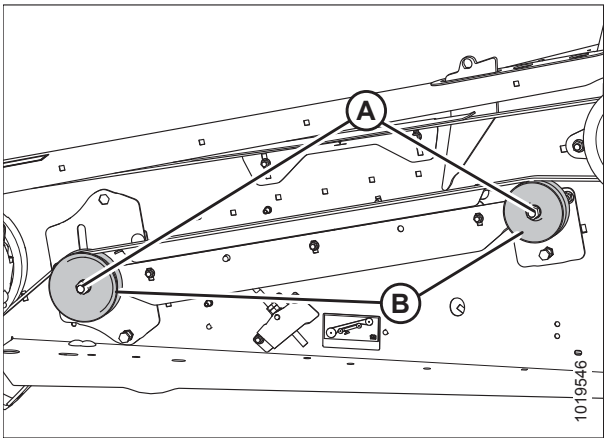


Figure 5.83: Knife Drive

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

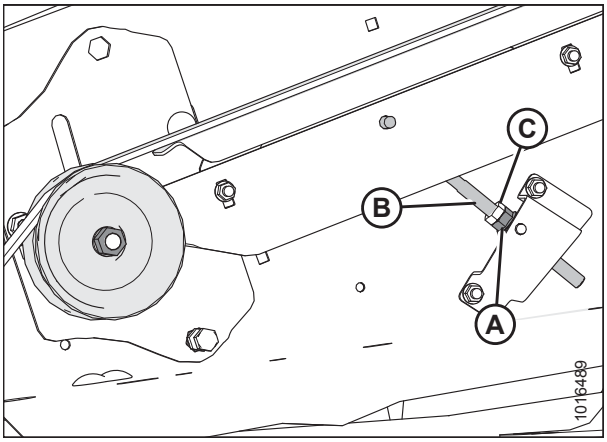


Figure 5.84: Timed Double-Knife Drive

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

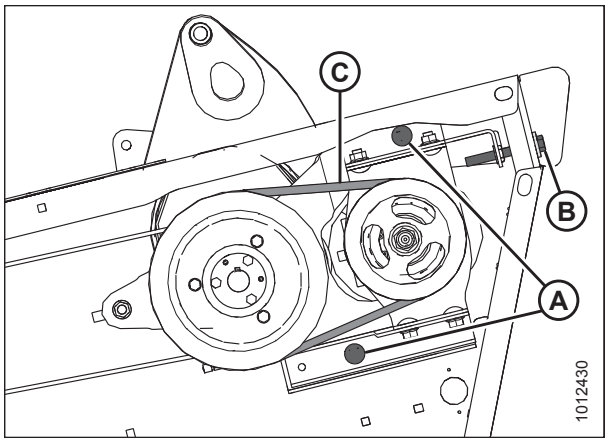


Figure 5.85: Knife Drive V-Belts

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

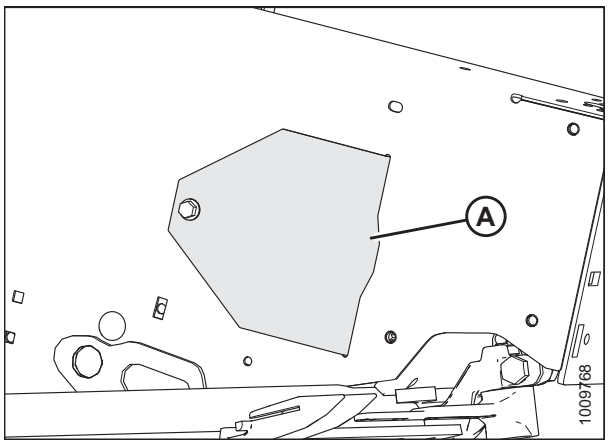


Figure 5.86: Access Cover

Installing Timed Knife Drive Belt

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

DANGER

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

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

   NOTE:

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

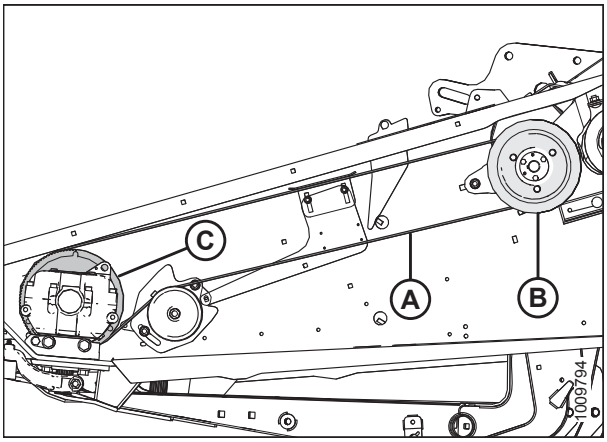


Figure 5.87: D1X Header Timed Knife Drive Belt – Left Shown

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

   NOTE:

   Ensure the drive motor is fully forward, do **NOT** pry the belts over the pulley.
4. Turn adjuster bolt (B) clockwise to tighten the V-belts. A properly tensioned V-belt should deflect 4 mm (5/32 in.) when a force of 52–77 N (12–17 lbf) is applied at the midspan.

   IMPORTANT:

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

   NOTE:

   If the belt is out of alignment, refer to *Adjusting Tracking for Timed Double-Knife Belt, page 171*.
5. Tighten two bolts (A) on the endsheet.

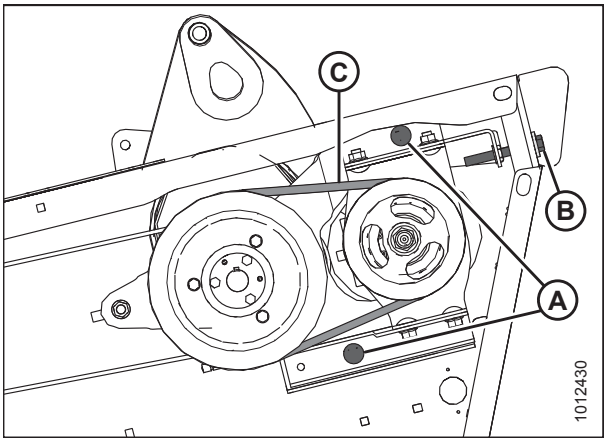


Figure 5.88: Knife Drive V-Belts

For D1X headers only:

6. Ensure the knives are timed before tightening the belt. For instructions, refer to *Adjusting Timed Double-Knife Timing, page 169*.
7. Slide idler pulley (A) up the slot on support bracket (B) to take up the slack in the timing belt.

   NOTE:

   Ensure nut (C) is as high as possible in the slot on support bracket (B).
8. Tighten nut (D) to 212–234 Nm (157–173 lbf·ft).

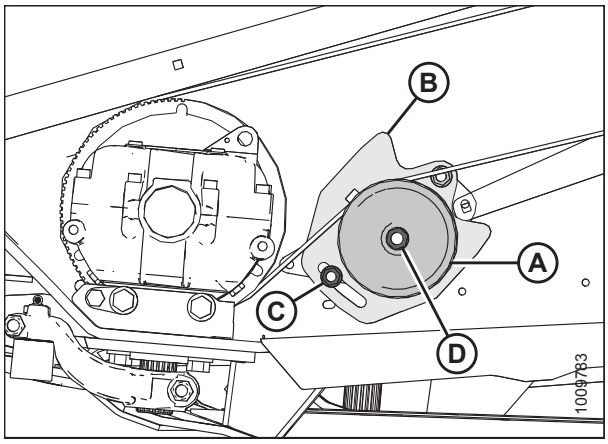


Figure 5.89: Knife Drive – D1X Header Shown

For D1XL Series Draper Headers only:

1. Ensure the knives are timed before tightening the belt. For instructions, refer to *Adjusting Timed Double-Knife Timing, page 169*.
2. Slide pulley (A) up the slot on support bracket (B) to take up the slack in the timing belt and tighten adjuster nut (C).

   NOTE:

   Ensure idler pulley (A) is as high as possible in the support bracket slot.
3. Tighten nut (D) to 212–234 Nm (157–173 lbf·ft).

   NOTE:

   If the belt is out of alignment, refer to *Adjusting Tracking for Timed Double-Knife Belt, page 171*.
4. Tension the knife drive belt. For instructions, refer to *Tensioning Timed Double-Knife Drive Belts, page 167*.
5. Install access cover (A) and secure with bolt.
6. Close the endshield. For instructions, refer to *Closing Endshields, page 38*.

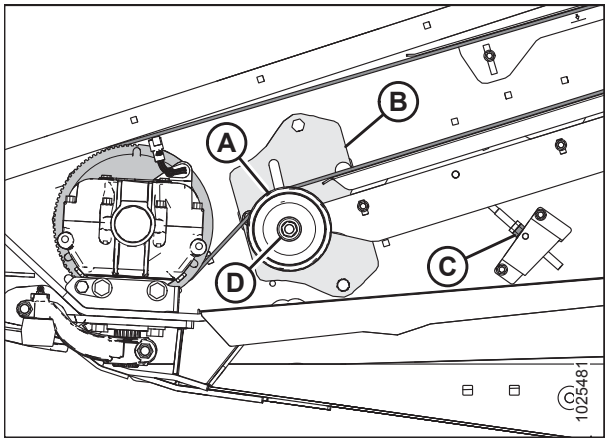


Figure 5.90: Knife Drive – D1XL Header Shown

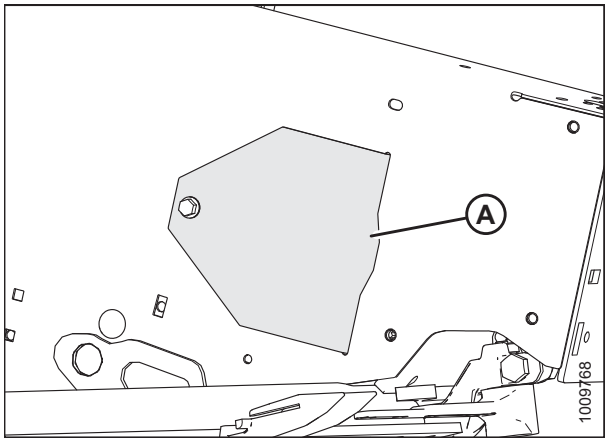


Figure 5.91: Access Cover

Tensioning Timed Double-Knife Drive Belts

The tension of the timed knife drive belts must be set correctly in order for the cutterbar's knife sections to stroke properly.

IMPORTANT:

To ensure the service life of the belt and the knife drives, **NEVER** overtighten a drive belt.

IMPORTANT:

Do **NOT** use the adjuster bolt at the drive pulley to adjust the tension on the timing belt of a timed knife drive.

1. Shut down the windrower, and remove the key from the ignition.
2. Open the left endshield. For instructions, refer to *Opening Endshields, page 37*.
3. Check the tension on the knife drive belt. A properly tensioned drive belt should deflect 20 mm (3/4 in.) when 89 N (20 lbf) of force is applied at the midspan of the belt.
4. Loosen two nuts (A).

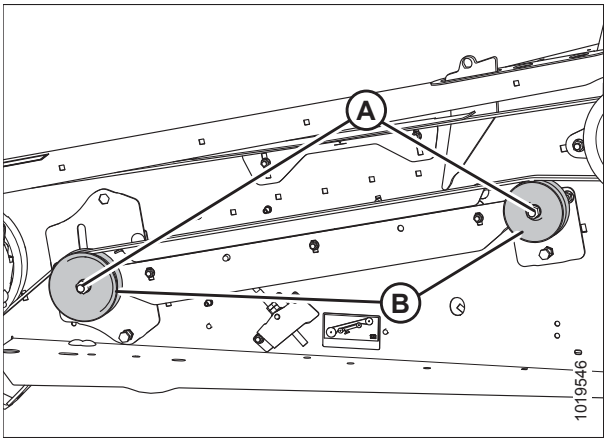


Figure 5.92: Left Knife Drive Pulleys

5. The tension on the knife drive belt can be adjusted by moving belt guide (A) up or down. Thread adjuster nut (C) down adjuster bolt (B) to increase the tension, or up to decrease the tension.

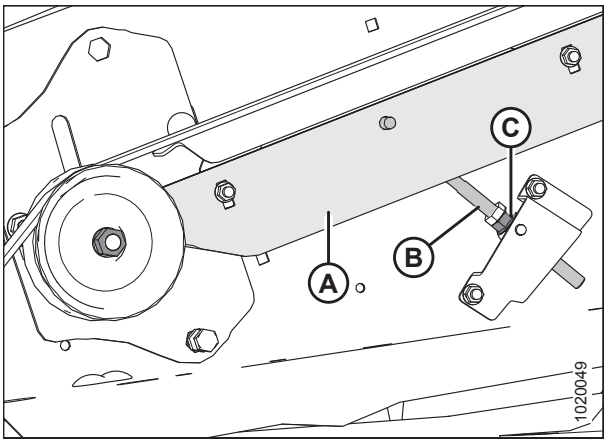


Figure 5.93: Left Knife Drive Belt Guide

6. Tighten nuts (A) on idler pulleys (B) to 217 Nm (160 lbf·ft).

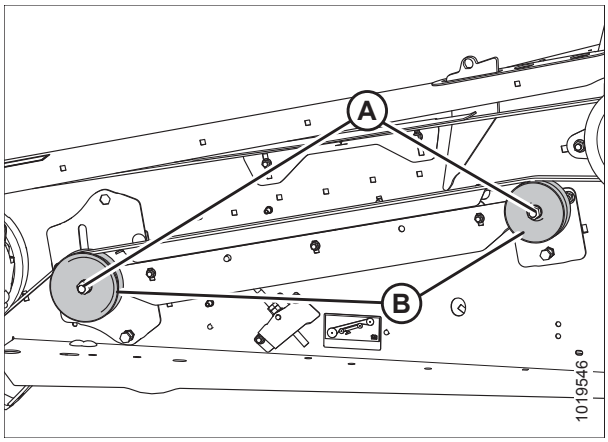


Figure 5.94: Left Knife Drive Pulleys

7. Tighten jam nut (A) to lock the position of adjuster bolt (B).

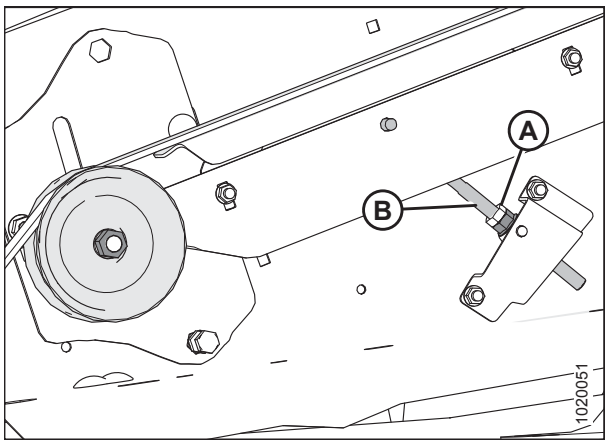


Figure 5.95: Left Knife Drive

8. Ensure that there is a clearance of 2.5–3.5 mm (3/32–1/8 in.) between lower belt (A) and lower guide (B).
9. If necessary, loosen three bolts (C) and adjust lower guide (B), then tighten the bolts again.
10. Check that upper belt (D) and upper guide (E) have a clearance of 1.5–2.5 mm (1/16–3/32 in.). If necessary, loosen the two bolts (F) and adjust upper guide (E), then tighten the bolts again.
11. Close the left endshield. Refer to *Closing Endshields, page 38*.
12. Repeat this procedure to check and adjust the tension on the right knife drive.

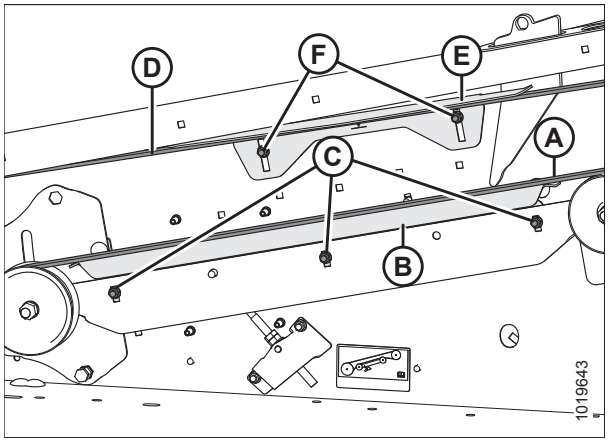


Figure 5.96: Left Knife Drive

Adjusting Timed Double-Knife Timing

Timed double-knife drive headers (10.7 m [35 ft.] and smaller) require the knives to be properly timed to move in opposite directions.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open both endshields. For instructions, refer to *Opening Endshields, page 37*.
3. Remove the right belt. For instructions, refer to *Removing Timed Knife Drive Belt, page 163*.
4. Rotate the left knife drive box-driven pulley clockwise until left knife (A) is at the center of inboard stroke (B) (moving towards the center of the header).

   NOTE:

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

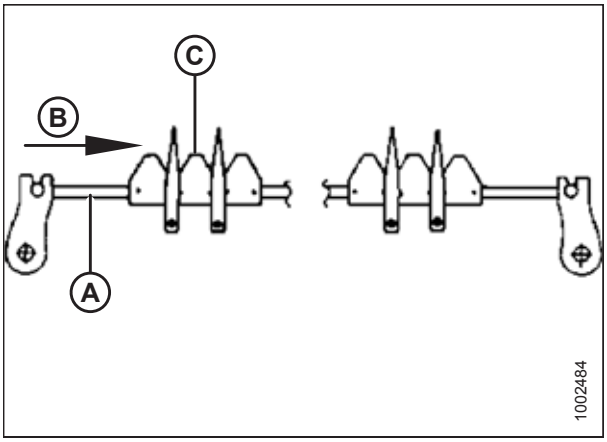


Figure 5.97: Adjusting Timing – Left Side

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

   NOTE:

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

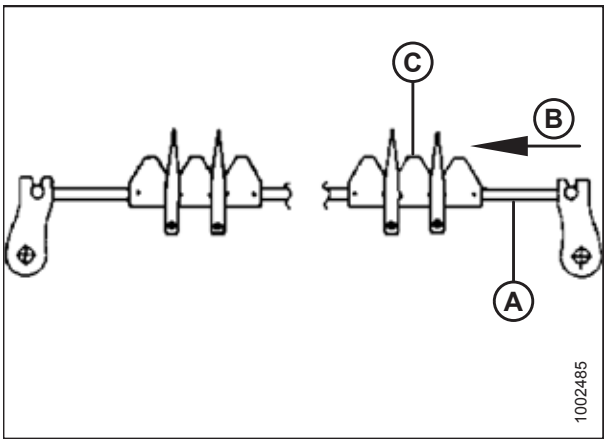


Figure 5.98: Adjusting Timing – Right Side

6. Install right belt (A).

   NOTE:

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

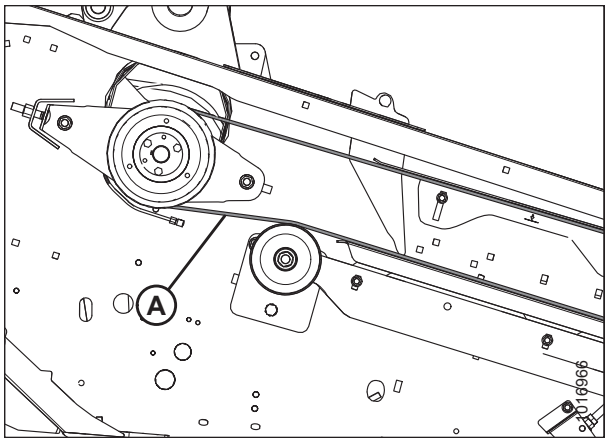


Figure 5.99: Knife Drive – Right Side

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

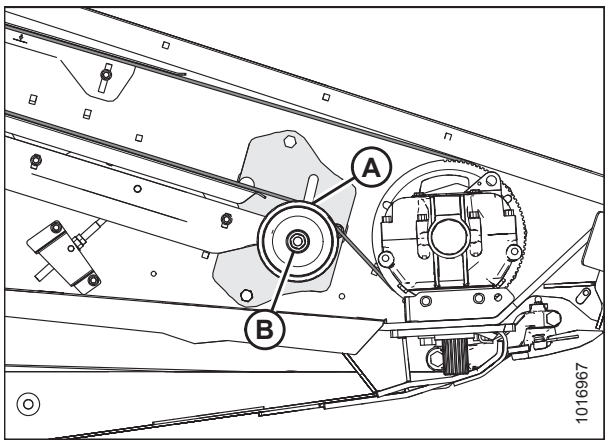


Figure 5.100: Knife Drive – Right Side

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

   NOTE:

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

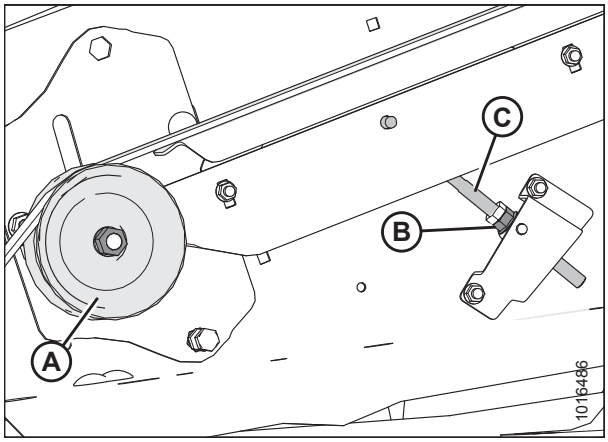


Figure 5.101: Knife Drive – Left Side, Right Side Opposite

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

    IMPORTANT:

    The knives must begin moving at the exact same time, and must move in opposite directions.
12. If necessary, adjust the knife timing by loosening the drive belt just enough to reposition pulley (C) to the next cog(s), and proceed as follows:

    a. If the right knife leads the left knife, rotate right driven pulley (C) clockwise.

    b. If the right knife lags the left knife, rotate right driven pulley (C) counterclockwise.

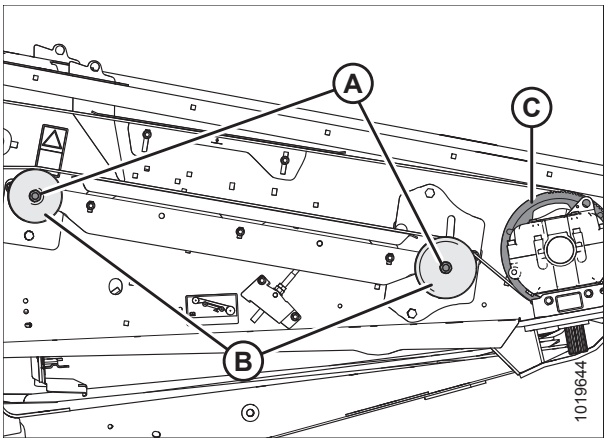


Figure 5.102: Knife Drive – Right Side

13. Ensure the drive pulleys don't rotate, and tension the right-side drive belts (refer to Step *10, page 171* to Step *11, page 171*).

    IMPORTANT:

    Do **NOT** use the adjuster bolt at the drive pulley to adjust the timing belt tension.
14. Recheck the timing (refer to Step *11, page 171*) and readjust if necessary (refer to Step *12, page 171*).
15. Close both endshields. For instructions, refer to *Closing Endshields, page 38*.

Adjusting Tracking for Timed Double-Knife Belt

Proper belt tracking with ensure longer belt life. Belts that are not tracking properly are subject to premature failure; ensure the pulleys are aligned and parallel.

Two people are required for this procedure—one to operate the windrower and header, and the other to observe and adjust the belt tracking.

IMPORTANT:

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

NOTE:

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

DANGER

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

1. Shut down the windrower engine and remove the key from the ignition.
2. Open both endshields. For instructions, refer to *Opening Endshields, page 37*.

CAUTION

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

3. Operate the header. Observe the belt tracking on both the drive pulley and the knife drive box pulley on both sides of the header.
4. Shut down the engine, and remove the key from the ignition.

5. If the belt is tracking towards the inboard side of the drive pulley, the likely cause is a toe-out problem (A) and (B). If the belt tends to move towards the low tension [inboard] side of the pulley, proceed to Step *8, page 173*.
6. If the belt is tracking towards the outboard side of the drive pulley, the likely cause is a toe-in problem (C) and (D). If the belt tends to move towards the high tension [outboard] side of the pulley, proceed to Step *8, page 173*.

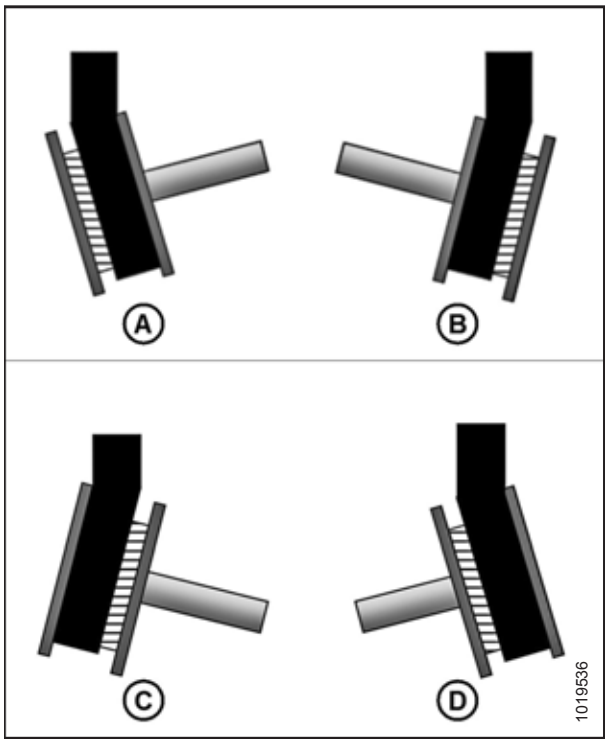


Figure 5.103: Knife Drive Pulley

7. If belt (A) is tracking to one side of the knife drive box pulley (B), the likely cause is an out-of-position idler pulley (C). Proceed to Step *9, page 173*.

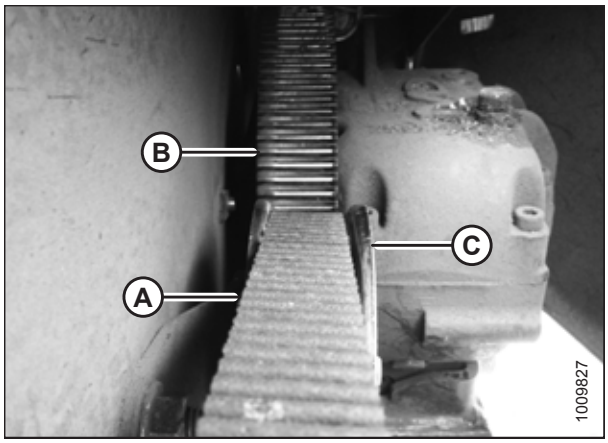


Figure 5.104: Knife Drive Belt

8. If there is a tracking problem on the drive pulley, adjust the position of the cross-shaft support tube as follows:
   a. Loosen nut (A) on support assembly (B).
   b. To correct a toe-out condition, slide support assembly (B) rearward in slot (C).
   c. To correct a toe-in condition, slide support assembly (B) forward.
   d. Tighten nut (A).
   e. Operate the header and check the belt tracking. Adjust the support assembly as required.
   f. If belt tracking problems continue, proceed to Step *10, page 174*.
9. Correct a tracking problem on the knife drive box pulley by adjusting idler positions as follows:
   a. Loosen jam nuts (A).
   b. Loosen jam nut and adjuster bolt (B) to relieve belt tension.
   c. Turn bolts (C) and (D) clockwise to move belt inboard, or counterclockwise to move belt outboard.

      NOTE:

      Bolts must touch the endsheet to prevent vibration.
   d. Check that belt does not ride against flanges on pulley (E).
   e. Tighten jam nuts (A).
   f. Tension the belt. For instructions, refer to *Tensioning Timed Double-Knife Drive Belts, page 167*.
   g. Operate the header and check the belt tracking.

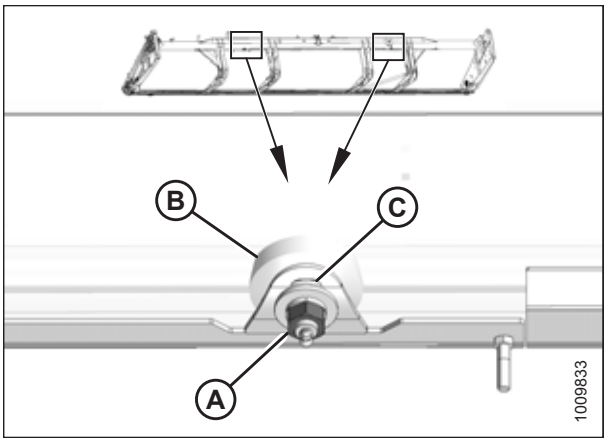


Figure 5.105: Cross-Shaft Support

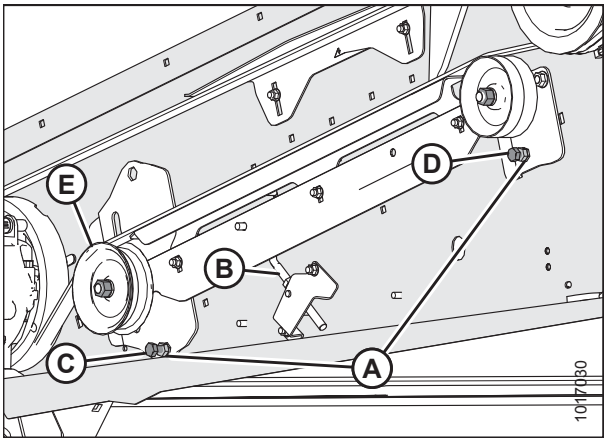


Figure 5.106: Knife Drive – Left Side

10. If further adjustment is required to correct drive pulley tracking, proceed as follows:
    a. Loosen jam nuts (A).
    b. Loosen jam nut and adjuster bolt (B) to relieve belt tension.
    c. Loosen nuts (C) at the drive pulley location.
    d. To correct toe-in problems, turn the adjuster bolt (D) clockwise to enable the belt to track inboard.
    e. To correct toe-out problems, turn the adjuster bolt (D) counterclockwise to enable the belt to track outboard.
    f. Tighten the nuts (C) at the drive pulley location.
    g. Tension the belt. For instructions, refer to *Tensioning Timed Double-Knife Drive Belts, page 167*.
    h. Operate the header, check the belt tracking, and readjust the drive pulley as necessary.

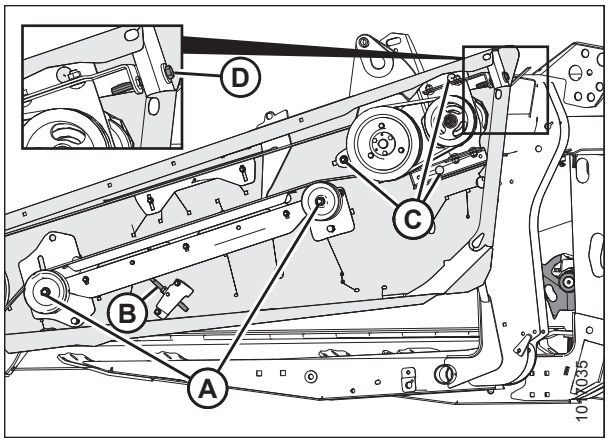


Figure 5.107: Knife Drive – Left Side

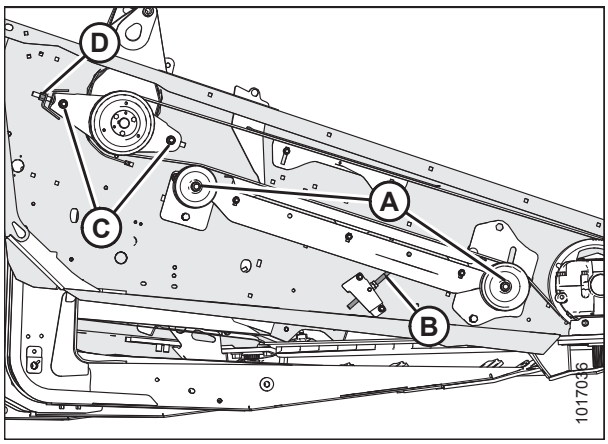


Figure 5.108: Knife Drive – Right Side

5.7 Drapers

Two drapers convey cut crop to center opening. Replace drapers if torn, cracked, or missing slats.

5.7.1 Removing Drapers

DANGER

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

1. Start the engine. For instructions, refer to the windrower operator's manual.
2. Raise the reel fully.
3. Raise the header fully.
4. Move the draper until the draper joint is in the work area.
5. Shut down the engine, and remove the key from the ignition.
6. Engage the header safety props.
7. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
8. Release the tension on the draper. For instructions, refer to *5.7.3 Checking and Adjusting Draper Tension, page 177*.
9. Remove screws (A) and tube connectors (B) at the draper joint.
10. Pull the draper from the deck.

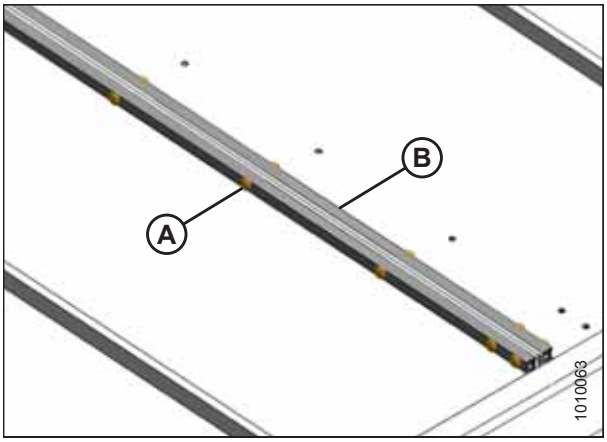


Figure 5.109: Draper Connector

5.7.2 Installing Drapers

DANGER

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

WARNING

Check to be sure all bystanders have cleared the area.

1. Start the engine. For instructions, refer to the windrower operator's manual.
2. Raise the reel fully.
3. Raise the header fully.

4. Shut down the engine, and remove the key from the ignition.
5. Engage the header safety props.
6. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
7. Check the deck height before installing the drapers. For instructions, refer to *5.7.5 Adjusting Deck Height, page 181*.
8. Apply talc, baby powder, or talc/graphite lubricant mix to the underside of the draper guides and to the draper surface that forms the seal with the cutterbar.
9. Insert the draper into the deck at the outboard end under the rollers. Pull the draper into the deck while feeding it at the end.
10. Feed in the draper until it can be wrapped around the drive roller.
11. Insert the opposite end of the draper into the deck over the rollers. Pull the draper fully into the deck.

Figure 5.110: Installing Draper

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

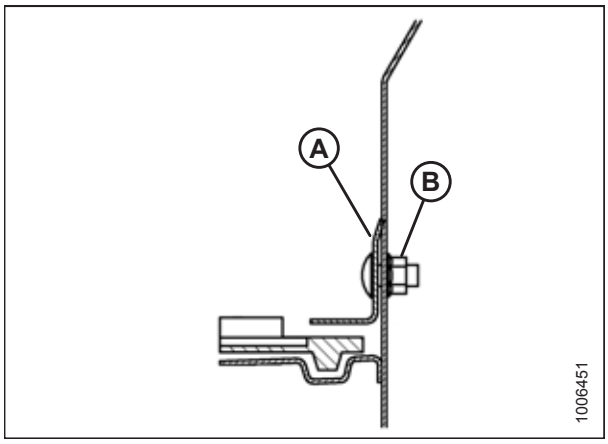


Figure 5.111: Draper Seal

13. Attach the ends of the draper with tube connectors (B), screws (A) (with the heads facing the center opening), and nuts.
14. Adjust the draper tension. For instructions, refer to *5.7.3 Checking and Adjusting Draper Tension, page 177*.

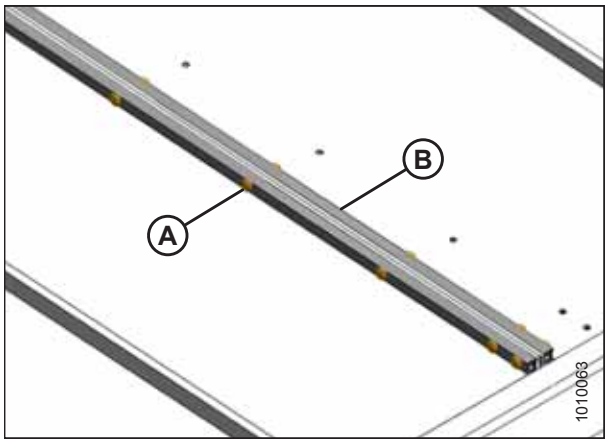


Figure 5.112: Draper Connector

15. Check clearance (A) between drapers (B) and cutterbar (C). Clearance should be 1–3 mm (1/16–1/8 in.). If adjustment is necessary, refer to *5.7.5 Adjusting Deck Height, page 181*.

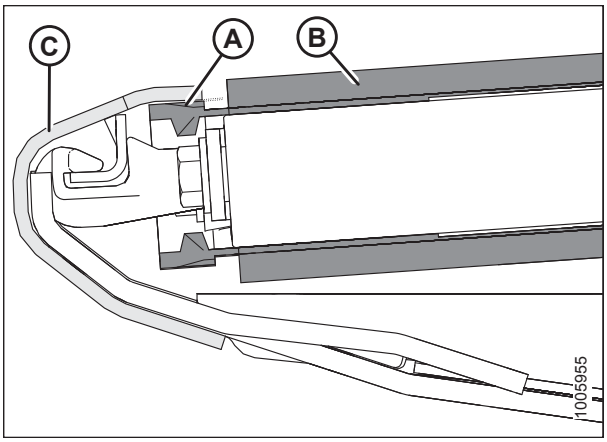


Figure 5.113: Draper Seal

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

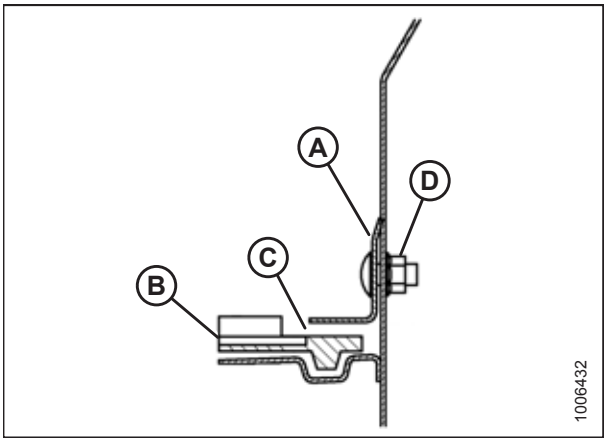


Figure 5.114: Draper Seal

5.7.3 Checking and Adjusting Draper Tension

The header's drapers are tensioned at the factory and rarely need adjustment. If adjustment is required, tension the drapers just enough so that the drapers do not slip when in operation, and so that the draper does not sag below the cutterbar; ensure that the draper is adjusted similarly on both sides of the header.

DANGER

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

1. Locate the draper tension adjuster and the tension inspection window on the rear left side of the header.
2. Ensure that white indicator bar (A) is at the halfway point in the window. If this is not the case, then adjustment is required. Proceed to Step *3, page 178*.

WARNING

Check to be sure all bystanders have cleared the area.

3. Start the engine.
4. Fully raise the header.
5. Shut down the engine, and remove the key from the ignition.
6. Engage the header safety props. Refer to the windrower operator's manual for instructions.

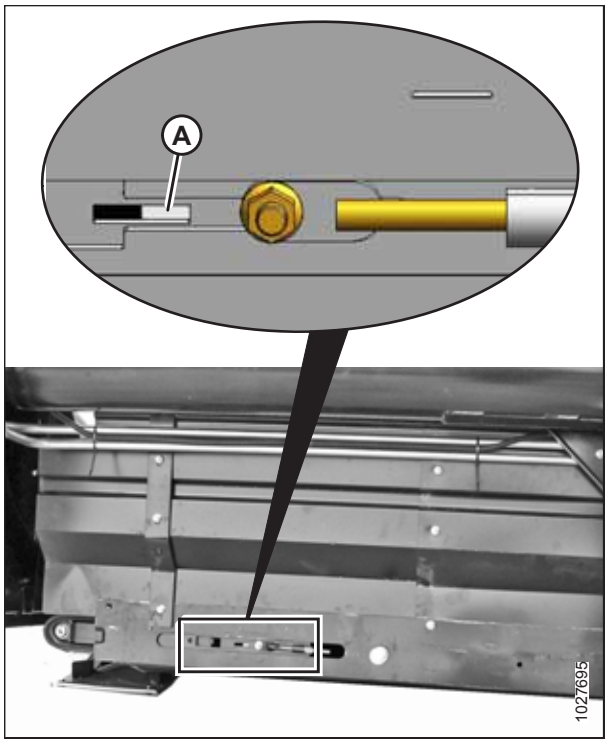


Figure 5.115: Left Draper Tension Adjuster

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

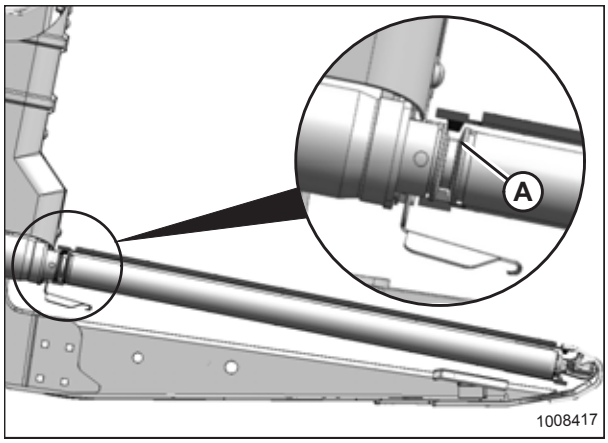


Figure 5.116: Drive Roller

8. Ensure that idler roller (A) sits between draper guides (B).

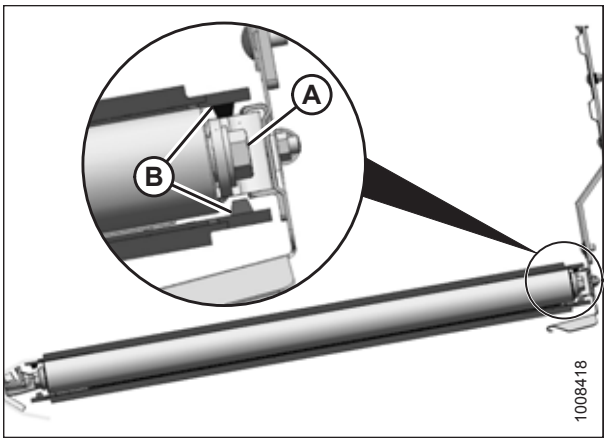


Figure 5.117: Idler Roller

9. To reduce the tension on the draper, turn adjuster bolt (A) counterclockwise. White indicator bar (B) will move outboard in the direction of arrow (D) to indicate that the tension on the draper has lessened. Continue to turn adjuster bolt (A) counterclockwise until the white indicator bar is at the halfway point in the window.

   IMPORTANT:

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

10. To increase the tension on the draper, turn adjuster bolt (A) clockwise. White indicator bar (B) will move inboard in the direction of arrow (E) to indicate that the tension on the draper has increased. Continue to turn adjuster bolt (A) clockwise until the white indicator bar is at the halfway point in the window.

    IMPORTANT:

    To prevent premature failure of the draper, draper rollers, and/or tightener components, do **NOT** operate the draper if the white bar is not visible in the inspection window.

    IMPORTANT:

    To prevent the header from scooping soil while in operation, ensure that the draper is tight enough that it does not sag below the point where the cutterbar contacts the ground.

11. Repeat Steps *1, page 178* to *10, page 179* to inspect and adjust the tension on the other draper belt.

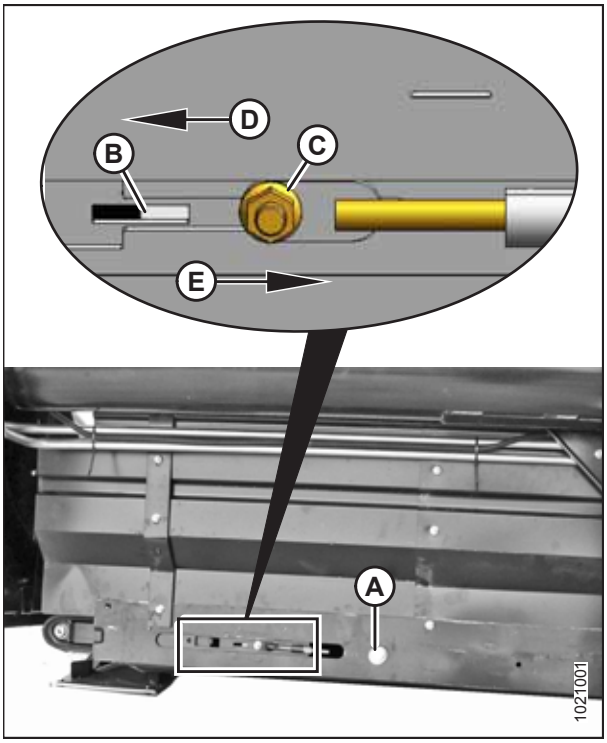


Figure 5.118: Left Tension Adjuster

5.7.4 Adjusting Draper Tracking

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

NOTE:

The left draper deck is shown in the illustrations in this procedure. The right deck is opposite.

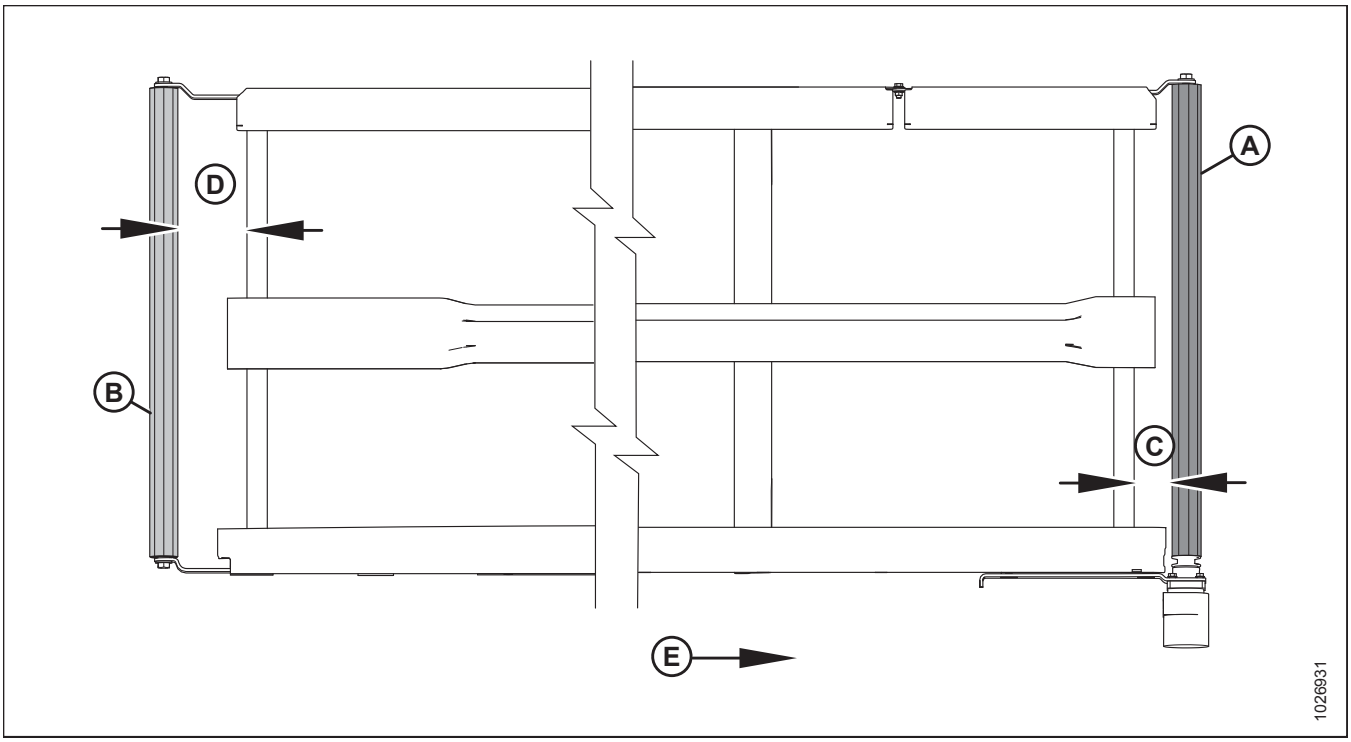


Figure 5.119: Draper Tracking Overview

A - Drive Roller
B - Idler Roller
C - Drive Roller Adjust
D - Idler Roller Adjust
E - Draper Direction

1. To determine which roller requires adjustment and which adjustments are necessary, refer to the following table:

Table 5.5 Draper Tracking

Tracking	Adjustment Location	Method
Backward	Increase drive roller (C)	Tighten adjuster nut (C)
Forward	Decrease drive roller (C)	Loosen adjuster nut (C)
Backward	Increase idler roller (D)	Tighten adjuster nut (C)
Forward	Decrease idler roller (D)	Loosen adjuster nut (C)

2. Refer to Table *5.5, page 180* and adjust drive roller (either by increasing or decreasing its alignment) as follows:

   a. Loosen nuts (A) and jam nut (B).

   b. Turn adjuster nut (C).

   NOTE:

   Some parts were removed from the illustration for clarity.

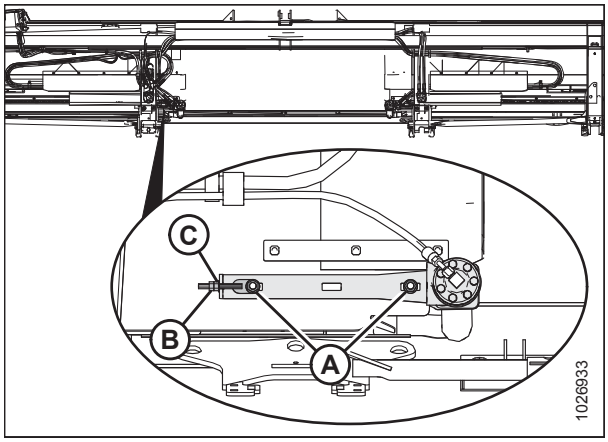


Figure 5.120: Left Deck Drive Roller – Right Side Opposite

3. Refer to Table *5.5, page 180* and adjust nut (C) to adjust the idler roller (either by increasing or decreasing its alignment) as follows:

   a. Loosen nut (A) and jam nut (B).

   b. Turn adjuster nut (C).

   NOTE:

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

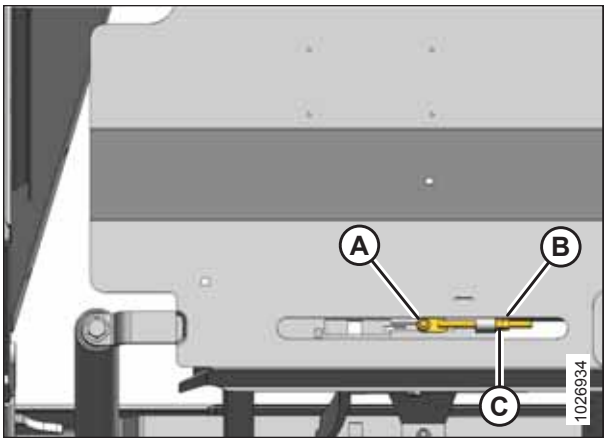


Figure 5.121: Left Deck Idler Roller – Right Side Opposite

5.7.5 Adjusting Deck Height

The draper seal is the gap between the draper and the cutterbar. It should be inspected before the draper is operated, to prevent potential damage to the draper system.

DANGER

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

WARNING

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

IMPORTANT:

The draper seal is set to 0–3 mm (0.00–0.12 in.) at the factory to prevent material from entering into the side drapers and stalling them. Whenever you are installing new drapers, the draper seal **MUST** be set to at least 1 mm (0.04 in.). This is because new drapers are very tacky and can cause material to accumulate on the underside of the cutterbar, which can cause the draper to rub against the cutterbar and thereby cause the hydraulic pressure in the draper circuit to increase to dangerous levels. A gap of 1–3 mm (0.04–0.12 in.) is acceptable. Follow this procedure to check the gap; adjust the gap if necessary.

1. Lower the header onto blocks.
2. Raise the reel fully.
3. Move reel safety props (A) to the engaged position.

   NOTE:

   Keep pivot bolt (B) sufficiently tight that the prop remains in the stored position when not in use, but can be engaged using hand force.
4. Repeat the previous step on the opposite reel arm.

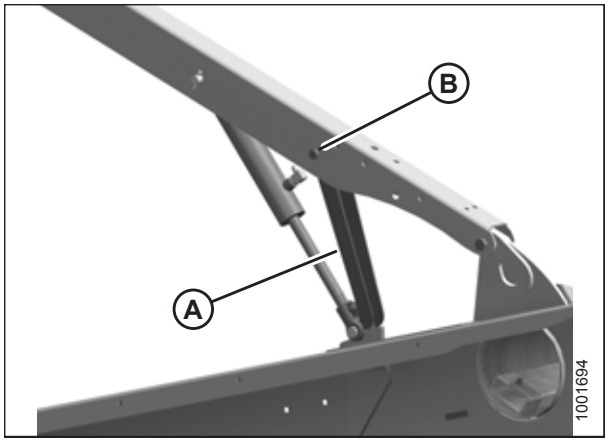


Figure 5.122: Engaged Reel Safety Prop – Left Shown

5. Use handle (A) to move the lock rod to inboard position (B), which engages pin (C) under the prop.
6. Lower the reel until the safety props contact the outer arm cylinder mounts and the center arm pins.
7. Shut down the engine, and remove the key from the ignition.

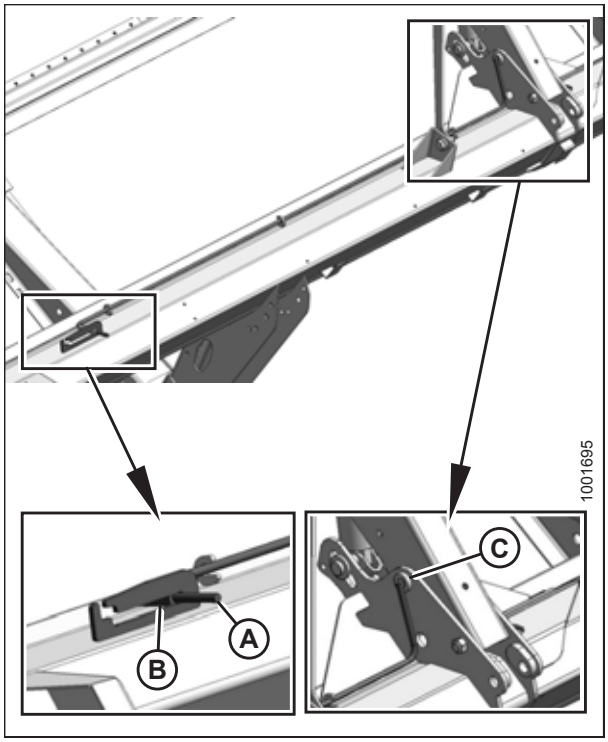


Figure 5.123: Reel Safety Prop – Center Arm

8. Ensure that clearance (A) between draper (B) and cutterbar (C) is 1–3 mm (0.04–0.12 in.).

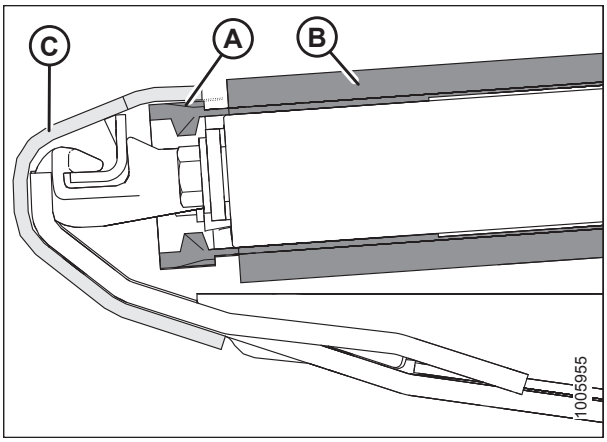


Figure 5.124: Draper Seal

9. Measure the clearance between the draper and the cutterbar at deck supports (A). Depending on the header size, there are between two and five supports per deck.
10. Reduce the tension on the draper. For instructions, refer to *5.7.3 Checking and Adjusting Draper Tension, page 177*.

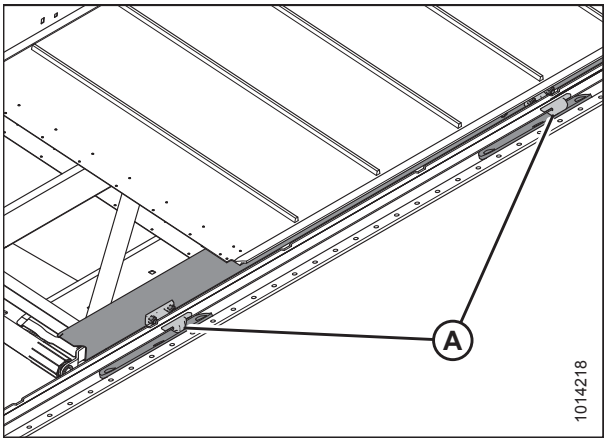


Figure 5.125: Draper Deck Supports

11. Lift the front edge of draper (A) past cutterbar (B) to expose the deck support.

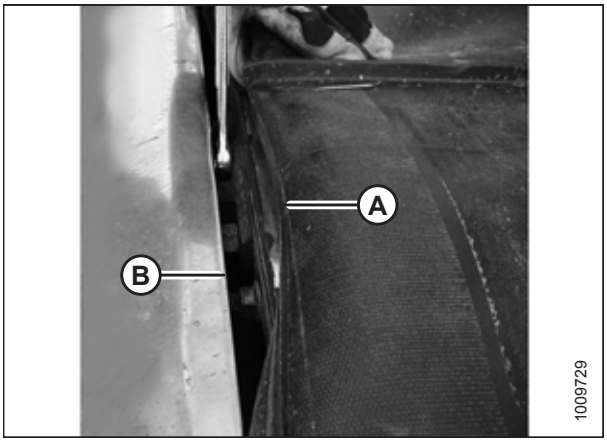


Figure 5.126: Deck Adjustment

12. Loosen two lock nuts (A) on deck support (B) by one half-turn **ONLY**.

    NOTE:

    The deck is shown with the draper removed. The number of deck supports depends on the width of the header:

    - **D115X and D120X:** Four supports
    - **D125X:** Six supports
    - **D130XL:** Six supports
    - **D135XL and D140XL:** Eight supports
    - **D145XL:** Ten supports

13. Tap deck (C) with a hammer to lower the deck relative to the deck supports. Tap deck support (B) using a hammer and punch to raise the deck relative to the deck supports.
14. Measure the thickness of the draper belt.
15. Locate a feeler gauge of the same thickness as the draper belt plus 1 mm (0.04 in.).
16. Slide the feeler gauge along deck (A) under the cutterbar in order to properly set the gap.
17. To create a seal, adjust deck (A) so that clearance (B) between cutterbar (C) and the deck is the same thickness as the draper belt plus 1 mm (0.04 in.).

    NOTE:

    When checking the clearance at either roller, measure the gap beginning at the roller tube, **NOT** the deck.

18. Tighten deck support hardware (D).
19. Recheck gap (B) with the feeler gauge. For instructions, refer to Step *15, page 184*.
20. Repeat Steps *12, page 184* to *19, page 184* for each draper deck support requiring adjustment.
21. Tension the draper. For instructions, refer to *5.7.3 Checking and Adjusting Draper Tension, page 177*.

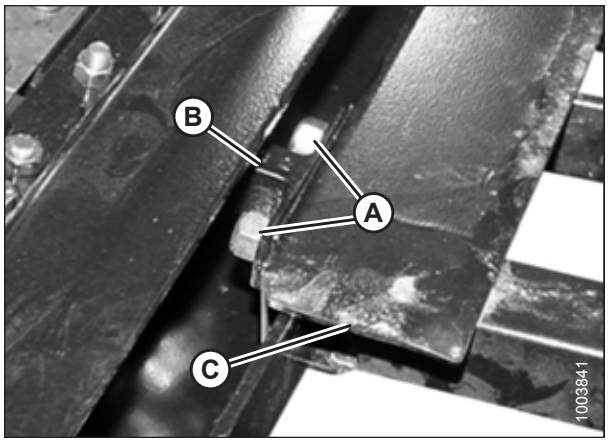


Figure 5.127: Deck Support

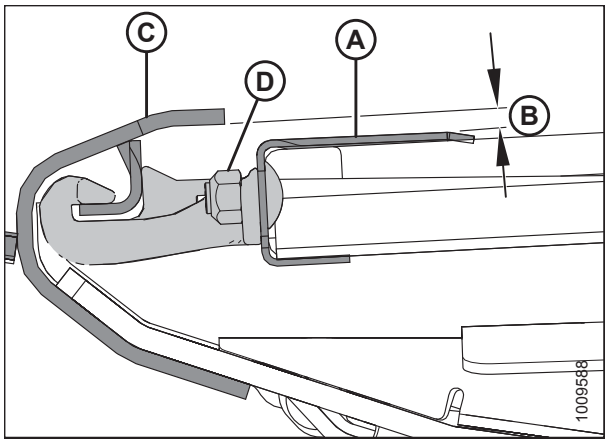


Figure 5.128: Deck Support

22. If necessary, adjust backsheet deflector (A) by loosening nut (D) and moving the deflector until there is a 1–7 mm (0.04–0.28 in.) gap (indicated by callout [C]) between draper (B) and the deflector.

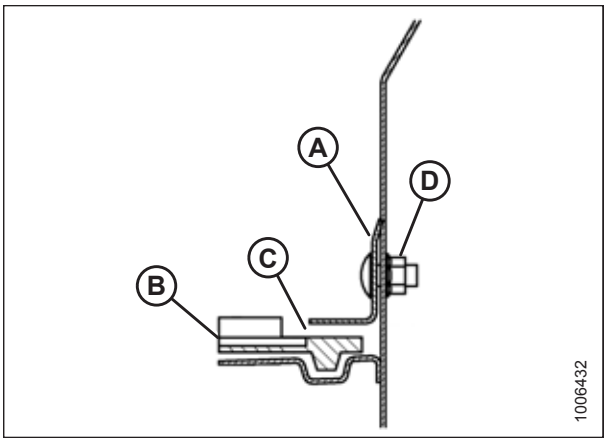


Figure 5.129: Backsheet Deflector

WARNING

Check to be sure all bystanders have cleared the area.

23. Start the engine.

24. Raise the reel to its maximum height.
25. Move reel safety prop (A) back inside the reel arm.
26. Repeat the previous step on the opposite end of the reel.

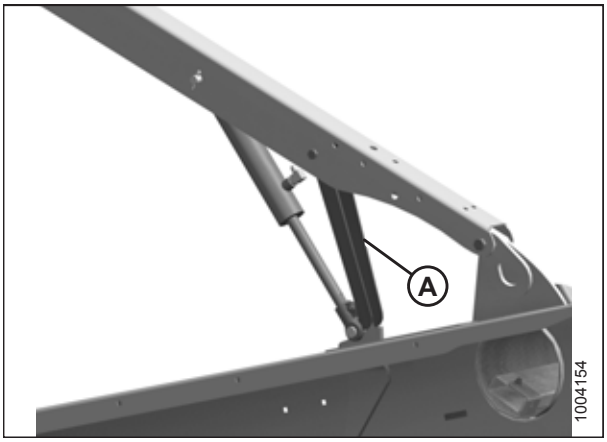


Figure 5.130: Left Reel Safety Prop

27. Use handle (B) on double-reel headers to move lock rod (A) to the outboard position.
28. Lower the reel fully.
29. Shut down the engine, and remove the key from the ignition.

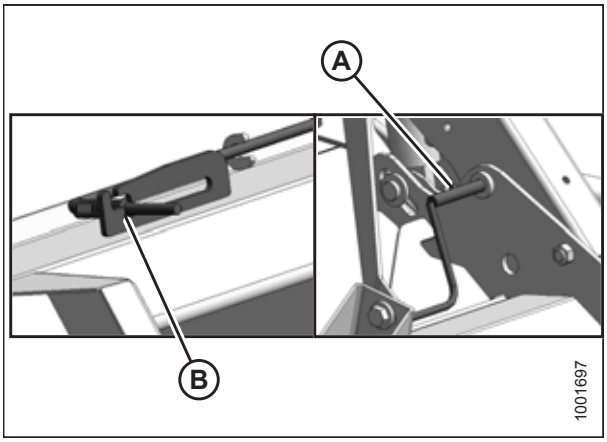


Figure 5.131: Reel Safety Prop – Center Arm

5.7.6 Replacing Draper Clips (Option)

Optional draper clips prevent wear to draper cleats caused by friction with the support tracks.

DANGER

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

1. Start the engine. For instructions, refer to the windrower operator's manual.
2. Lower the header fully.
3. Raise the reel fully.
4. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
5. Shut down the engine, and remove the key from the ignition.

   NOTE:

   Views are from the left end of the header.

6. Remove the existing draper clips (A) from the draper.
7. Clean the area with water and a rag. Coat the installation surface of the clip with a small amount of dish soap to allow the clip to slide on easier.

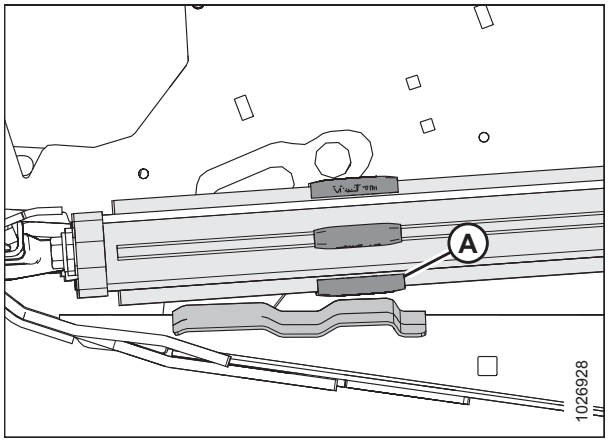


Figure 5.132: Draper Clips

8. Rotate the draper until the cleat is aligned with a roller. Using a rubber mallet, hit clip (A) directly down onto the cleat, being careful not to hit too hard as the clip may break. It may take a couple hits to fit properly.
9. Repeat clip installation for each cleat on both drapers.

   NOTE:

   The clips may have a small gap (approximately 1 mm [0.04 in.]) between the draper cleat and the clip.

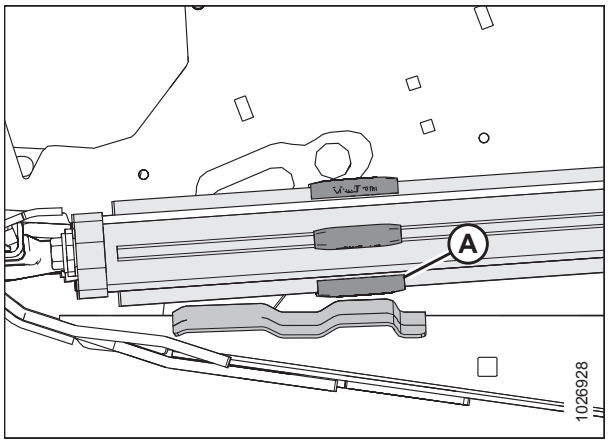


Figure 5.133: Clip Installation

5.7.7 Draper Roller Maintenance

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

Inspecting Draper Roller Bearing

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

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

1. Engage the header and run the drapers for approximately 3 minutes.
2. Check the temperature of the draper roller bearings at each of roller arms (A), (B), and (C) on each deck. Ensure the temperature does not exceed 44°C (80°F) above the ambient temperature.

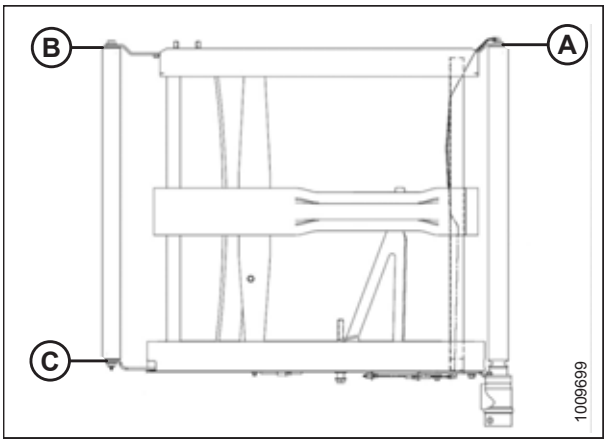


Figure 5.134: Roller Arms

Draper Deck Idler Roller

Removing Draper Idler Roller

DANGER

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

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

WARNING

Check to be sure all bystanders have cleared the area.

2. Start the engine.
3. Raise the reel fully.
4. Raise the header fully.
5. Shut down the engine, and remove the key from the ignition.
6. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
7. Engage the header's safety props.

8. Loosen the draper by turning adjuster bolt (A) counterclockwise.

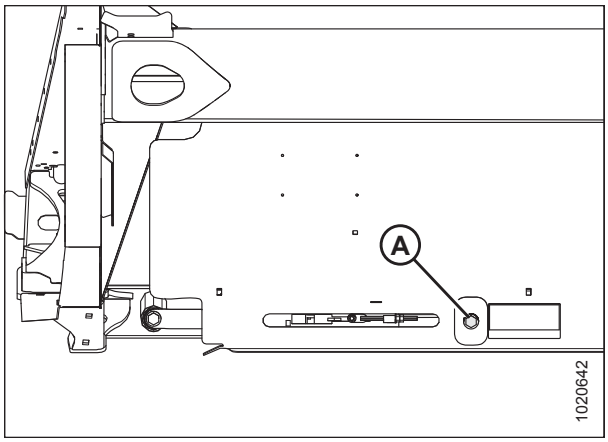


Figure 5.135: Tensioner

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

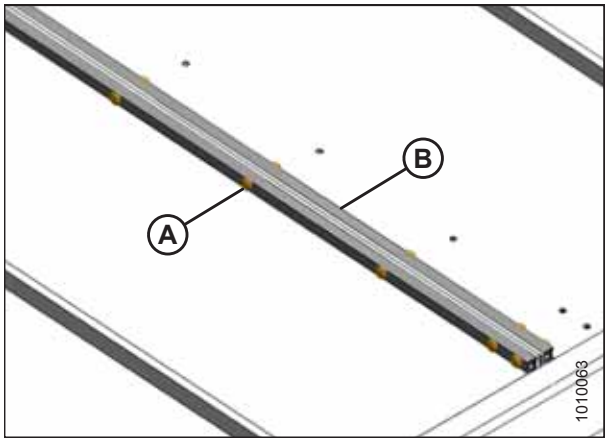


Figure 5.136: Draper Connector

11. Remove bolt (A) and washer from the idler roller at the back of the header deck.
12. Remove bolt (B) and washer from the idler roller at the front of the header deck.
13. Spread roller arms (C) and (D), and remove the idler roller.

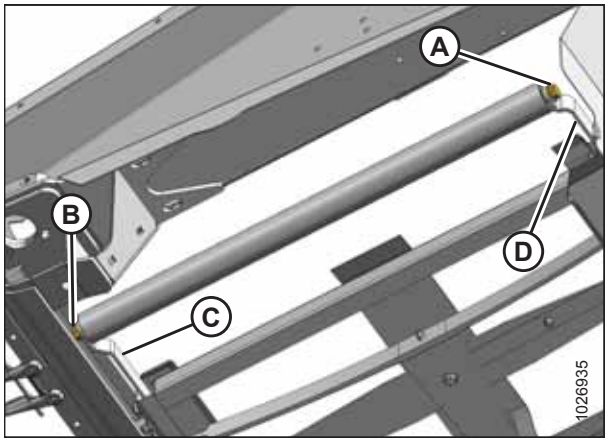


Figure 5.137: Idler Roller

Replacing Draper Idler Roller Bearing

1. Remove draper deck idler roller. For instructions, refer to *Removing Draper Idler Roller, page 187*.
2. Clamp idler roller (A) in a vise, with cloth wrapped around the roller to prevent damage to the roller.
3. Use a slide hammer to remove bearing assembly (B) and seal (C) from the roller.

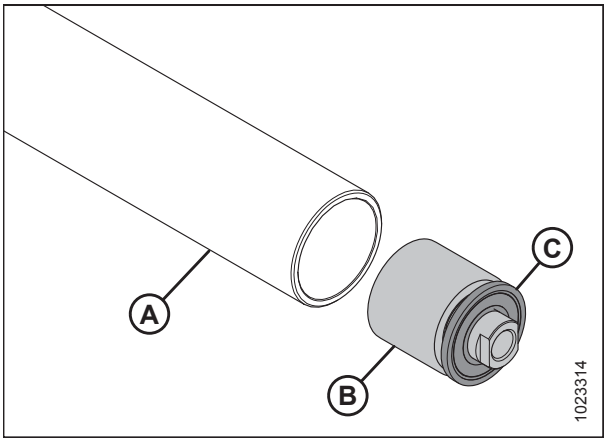


Figure 5.138: Idler Roller Bearing and Seal

IMPORTANT:

When installing the new bearing, do **NOT** place the end of the roller directly onto the ground. Bearing assembly (A) protrudes past roller tube (B), and placing the end on the ground will push the bearing farther into the tube.

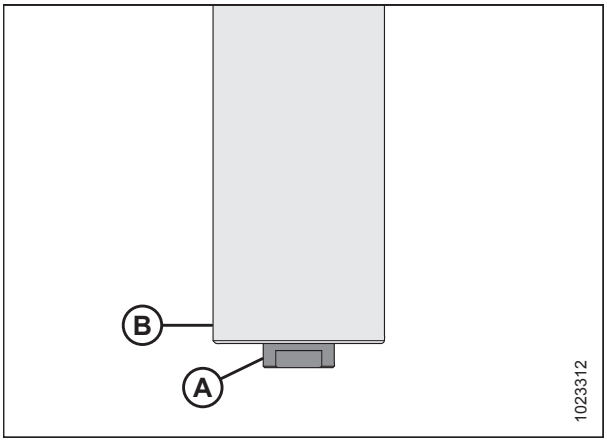


Figure 5.139: Idler Roller

4. Cut a relief (A) into a block of wood.
5. Place the end of idler roller (B) onto the block, with the protruding bearing assembly inside relief (A).

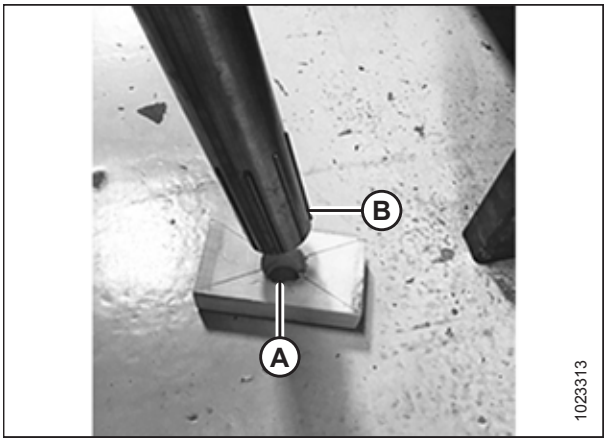


Figure 5.140: Idler Roller

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

   NOTE:

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

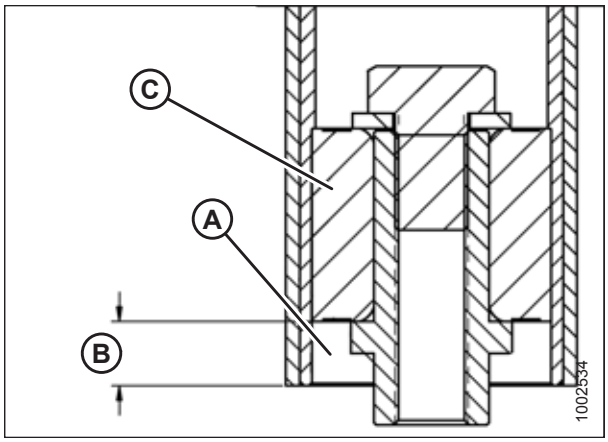


Figure 5.141: Idler Roller Bearing

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

   NOTE:

   The seal can be oriented in either direction.

8. Reinstall idler roller. For instructions, refer to *Installing Draper Idler Roller, page 190*.

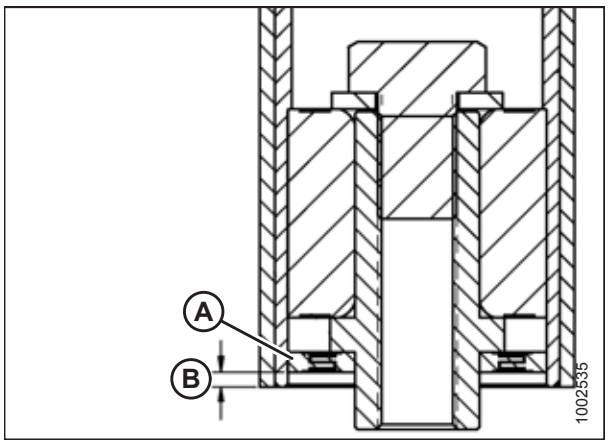


Figure 5.142: Idler Roller Bearing

Installing Draper Idler Roller

1. Install idler roller (A) between idler arms (B), and secure with two bolts (C) and washers. Tighten bolts to 95 Nm (70 lbf·ft).

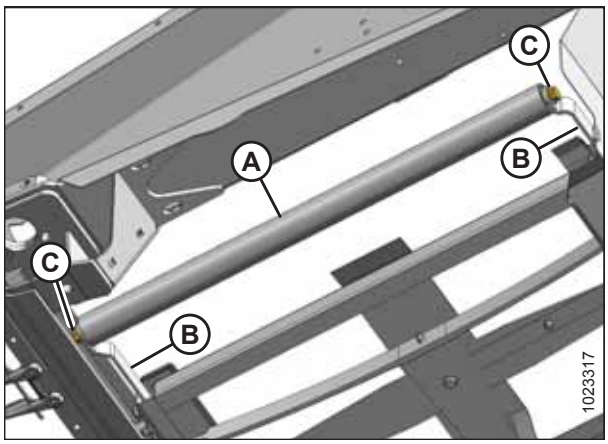


Figure 5.143: Idler Roller

2. Attach screws (A) (with the heads facing the center opening), tube connectors (B), and nuts to the draper joint.

   NOTE:

   Use channel lock pliers to bring tube connectors (B) together. Place the draper seal under the cutterbar.

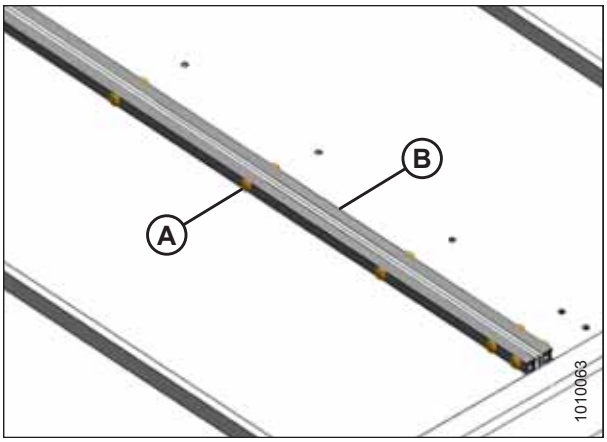


Figure 5.144: Draper Connector

3. Tighten the draper by turning adjuster bolt (A) clockwise. For instructions, refer to *5.7.3 Checking and Adjusting Draper Tension, page 177*.
4. Disengage the reel and header safety props.

WARNING

Check to be sure all bystanders have cleared the area.

5. Start the engine and lower the header and reel.
6. Run machine to verify that draper tracks correctly. Refer to *5.7.4 Adjusting Draper Tracking, page 179* if additional adjustment is necessary.

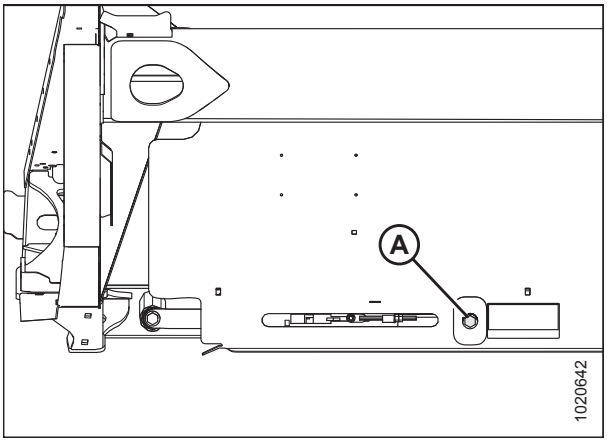


Figure 5.145: Draper Tensioner

Draper Deck Drive Roller

Removing Draper Drive Roller

DANGER

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

WARNING

Check to be sure all bystanders have cleared the area.

1. Start the engine.
2. If the draper connector is not visible, engage the header until the connector is accessible (preferably close to the outboard end of the deck).
3. Raise the reel fully.
4. Raise the header fully.
5. Shut down the engine, and remove the key from the ignition.
6. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.

7. Engage the header safety props.
8. Loosen the draper by turning adjuster bolt (A) counterclockwise.

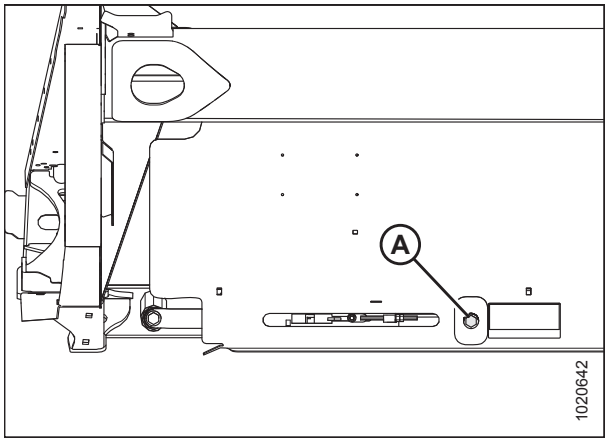


Figure 5.146: Draper Tensioner

9. Remove tube connectors (B), screws (A), and nuts from the draper joint.
10. Pull the draper off the drive roller.

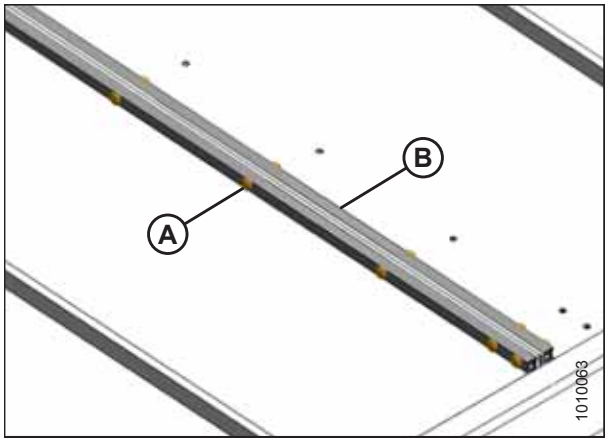


Figure 5.147: Draper Connector

11. Align the set screws with hole (A) in the guard. Remove the two set screws holding the motor onto the drive roller.

    NOTE:

    The set screws are 1/4 turn apart.

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

    NOTE:

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

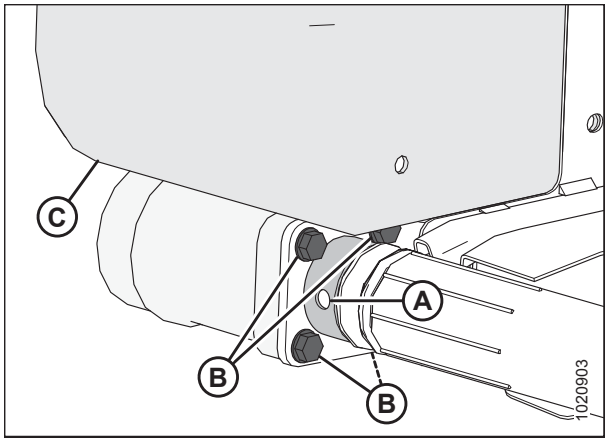


Figure 5.148: Drive Roller

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

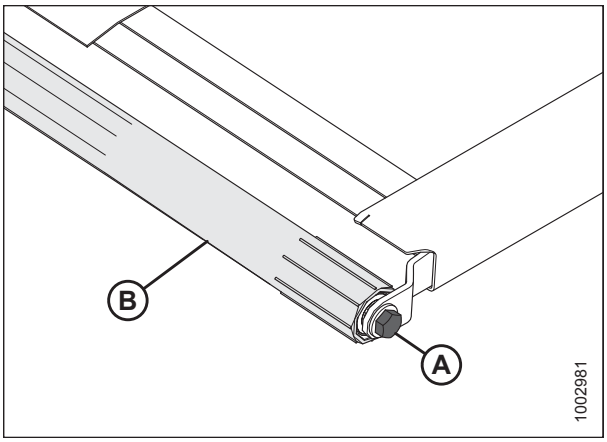


Figure 5.149: Drive Roller

Replacing Draper Drive Roller Bearing

1. Remove draper drive roller assembly. For instructions, refer to *Removing Draper Drive Roller, page 191*.
2. Remove bearing assembly (A) and seal (B) from roller tube (C) as follows:
   a. Attach slide hammer (D) to threaded shaft (E) in bearing assembly.
   b. Tap out bearing assembly (A) and seal (B).
3. Clean inside of roller tube (C). Check tube for wear or damage, and replace if necessary.

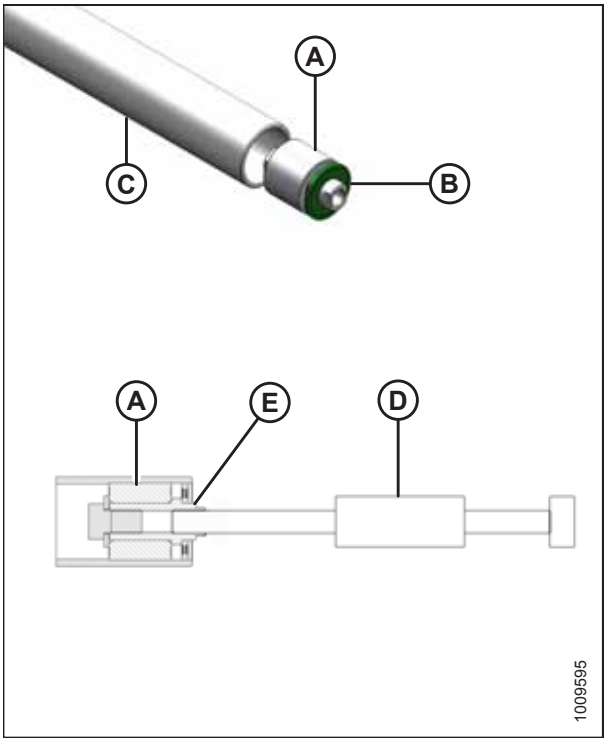


Figure 5.150: Drive Roller Bearing

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

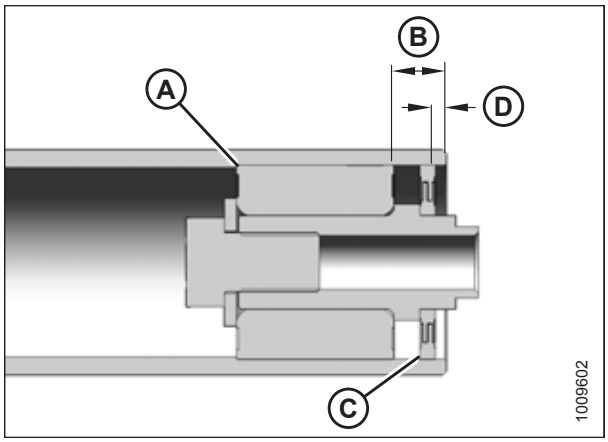


Figure 5.151: Drive Roller Bearing

Installing Draper Drive Roller

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

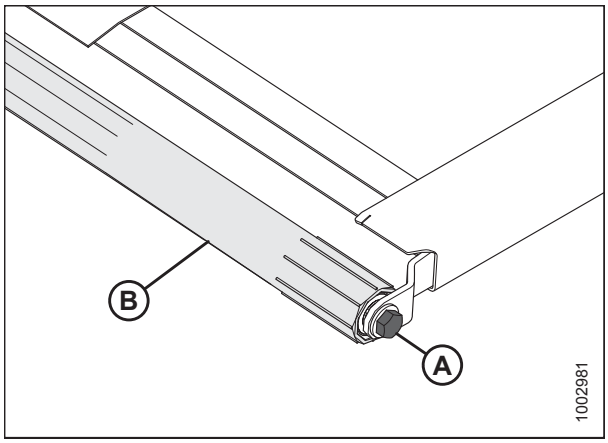


Figure 5.152: Drive Roller

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

   NOTE:

   Tighten any loosened bolts and reinstall plastic shield (C) if previously removed.
5. Ensure the motor is all the way into the roller, and tighten the two set screws (not shown) through access hole (A).

   NOTE:

   The set screws are 1/4 turn apart.

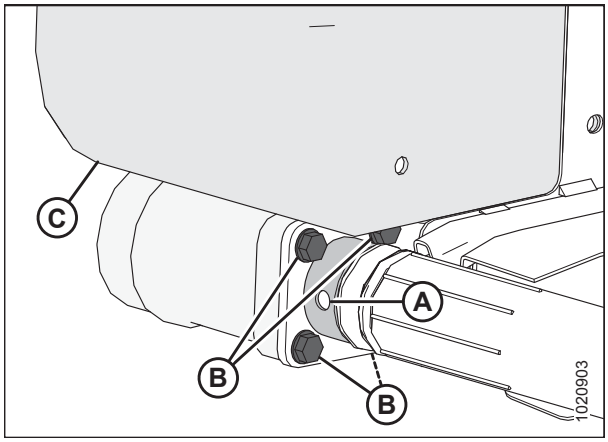


Figure 5.153: Drive Roller

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

   NOTE:

   The heads of the screws must face the center opening.

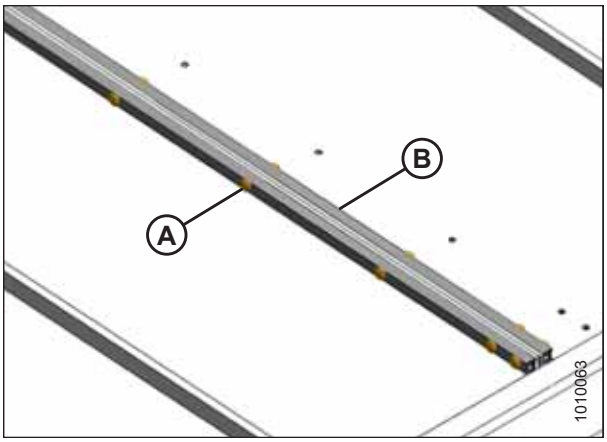


Figure 5.154: Draper Connector

7. Tension the draper. Locate adjuster bolt (A) and follow the directions on decal (B), or refer to *5.7.3 Checking and Adjusting Draper Tension, page 177* for proper draper tensioning.
8. Disengage the reel and header safety props.

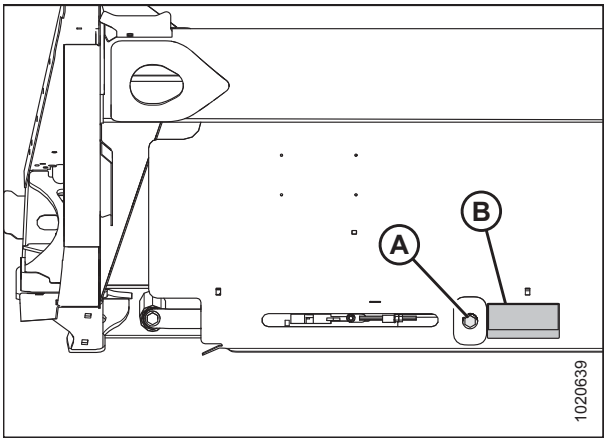


Figure 5.155: Draper Tensioner – Left Side Shown

WARNING

Check to be sure all bystanders have cleared the area.

9. Start the engine and lower the header and reel.
10. Run the machine to verify the draper tracks correctly. If additional adjustment is necessary, refer to *5.7.4 Adjusting Draper Tracking, page 179*.

5.7.8 Draper Deflectors

Narrow draper deflectors can reduce bunching at the ends of the header when decks are set for center delivery.

Removing Narrow Draper Deflectors

DANGER

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

DANGER

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

1. Raise the reel to its full height and lower the header to the ground.
2. If hydraulic deck shift is installed, shift the decks to create a work space at one end of the header.
3. Stop the engine, remove the key, and engage the reel safety props.

4. Open the endshield.
5. Remove two Torx® head screws (A) and lock nuts.
6. Remove three carriage bolts (B) and lock nuts, and remove aft deflector (C).

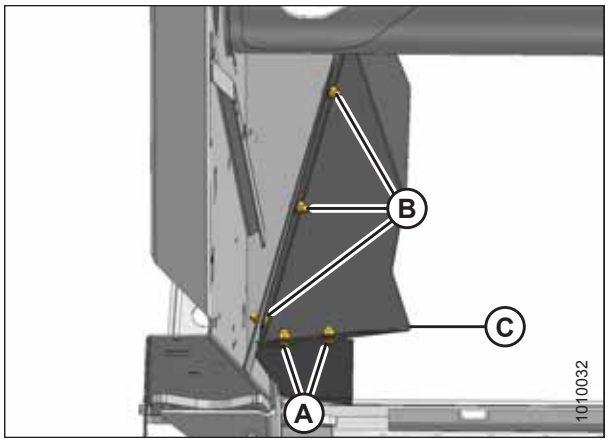


Figure 5.156: Aft Deflector

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

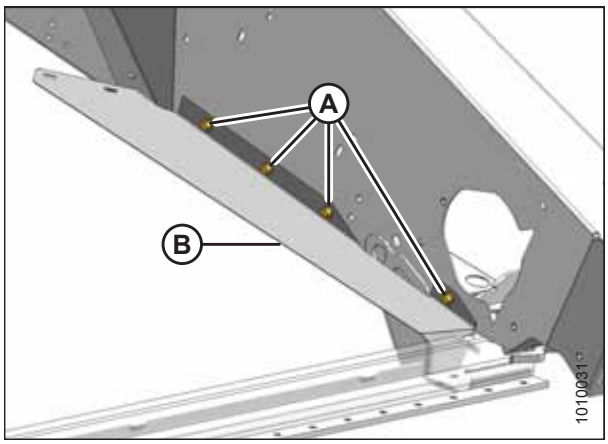


Figure 5.157: Forward Deflector – Left Side

Installing Narrow Draper Deflectors

DANGER

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

DANGER

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

1. Raise the reel to its full height and lower the header to the ground.
2. If hydraulic deck shift is installed, shift the decks to create a work space at one end of the header. Refer to *3.9.1 Shifting Decks Hydraulically, page 79* for instructions if hydraulic deck shift is installed.
3. Stop the engine, remove the key, and engage the reel safety props.

4. Open the endshield.
5. Position forward deflector (B) onto the endsheet and temporarily install forward and aft 3/8 x 5/8 in. self tapping screws (A).
6. Check the fit of the forward end of deflector (B) on the cutterbar and ensure there is no gap between the deflector and the cutterbar. Remove and bend the deflector as required to obtain the best fit.
7. Install two 3/8 x 5/8 in. self tapping screws (A) and tighten all four screws.

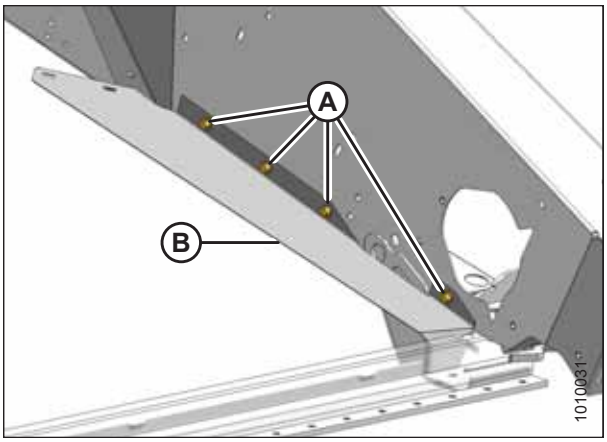


Figure 5.158: Forward Deflector

8. Position aft deflector (C) as shown and install three 3/8 x 3/4 in. carriage bolts (B) and lock nuts.
9. Install two Torx® head screws (A) and lock nuts with the heads facing down.
10. Tighten all fasteners.
11. Repeat for the opposite end of the header.

NOTE:

The draper deflector may be damaged by the reel tines if the reel height is set incorrectly. For instructions about setting the reel height, refer to *3.7.8 Reel Height, page 66*.

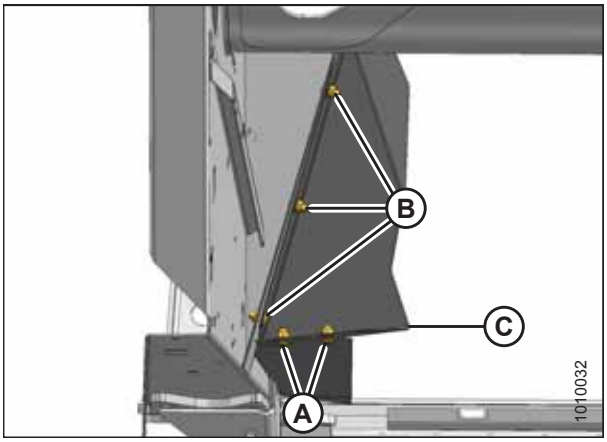


Figure 5.159: Rear Deflector – Left Side

5.8 Reel

The reel features a uniquely shaped cam, which allows the fingers to get underneath lodged crop and pick it up before it is cut.

CAUTION

To avoid personal injury, before servicing machine or opening drive covers, refer to *5.1 Preparing Machine for Servicing, page 113*.

5.8.1 Reel-to-Cutterbar Clearance

Correctly setting the clearance between the reel fingers and the cutterbar ensures that the reel fingers do not contact the cutterbar when the header is operating. The clearance is set at the factory, but some adjustment may be necessary before the header can be operated.

The finger to guard/cutterbar clearance values when the reels are fully lowered are shown in the table below.

Table 5.6 Finger to Guard/Cutterbar Clearance

Header Model	(X) +/- 3 mm (1/8 in.) at Reel Ends	
	Single Reel	Double Reel
D115X	20 mm (3/4 in.)	—
D120X	20 mm (3/4 in.)	—
D125X	25 mm (1 in.)	—
D130XL	55 mm (2 11/64 in.)	25 mm (1 in.)
D135XL	70 mm (2 3/4 in.)	25 mm (1 in.)
D140XL	—	25 mm (1 in.)
D145XL	—	25 mm (1 in.)

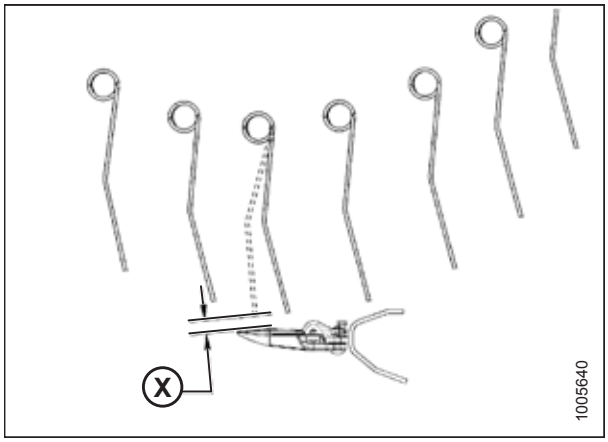


Figure 5.160: Finger Clearance

Measuring Reel Clearance

Measure the clearance between the reel fingers and the cutterbar before operating the reel.

DANGER

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

WARNING

Check to be sure all bystanders have cleared the area.

1. Start the engine.
2. Park the windrower on a level surface.
3. Lower the header fully.

4. Set the fore-aft position to the middle position (**5**), as shown on fore-aft position decal (A).
5. Lower the reel fully.
6. Shut down the engine, and remove the key from the ignition.

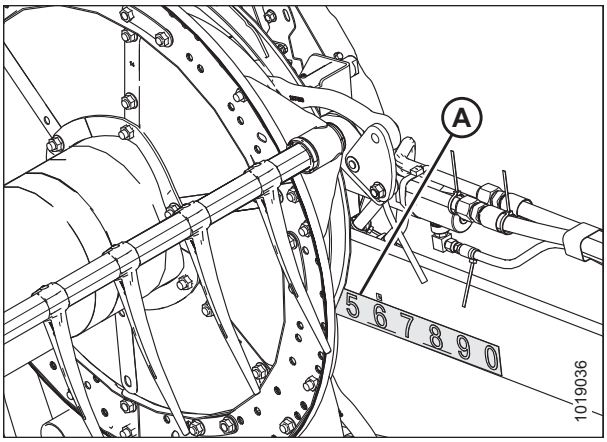


Figure 5.161: Fore-Aft Position

7. Measure clearance (X) between guard (A) and finger (B) at the specified measurement locations. For the clearance specifications, refer to Table *5.7, page 199*.

   For the measurement locations, refer to Figure *5.163, page 200*.

   NOTE:

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

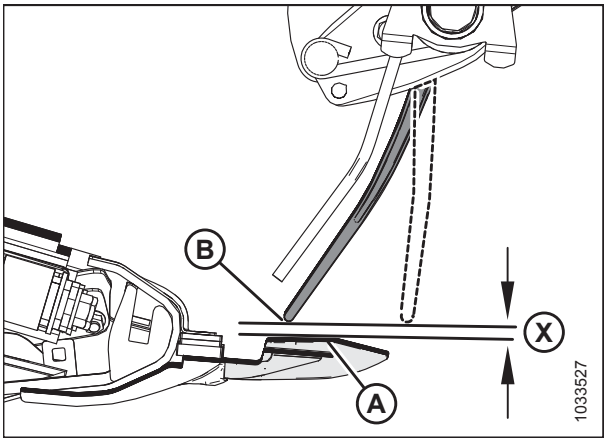


Figure 5.162: Reel-to-Cutterbar Clearance

Table 5.7 Finger to Guard/Cutterbar Clearance

Header Model	Clearance at Reel Ends +/- 3 mm (1/8 in.)	
	Single Reel	Double Reel
D115X	20 mm (3/4 in.)	—
D120X	20 mm (3/4 in.)	—
D125X	25 mm (1 in.)	—
D130XL	55 mm (2 11/64 in.)	25 mm (1 in.)
D135XL	70 mm (2 3/4 in.)	25 mm (1 in.)
D140XL	—	25 mm (1 in.)
D145XL	—	25 mm (1 in.)

8. Measure the clearances at the outer ends of the reel at locations (A).

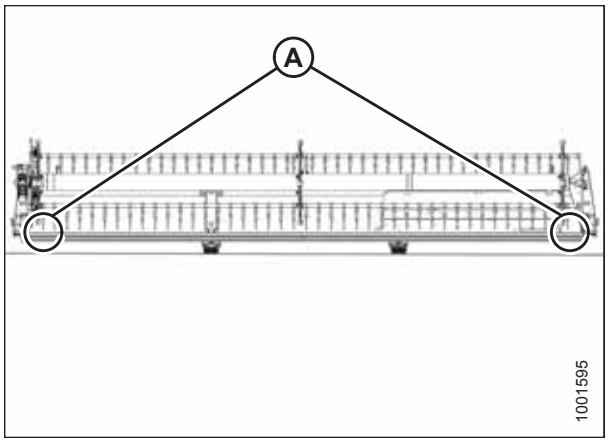


Figure 5.163: Reel Clearance Measurement Locations – Single-Reel Header

9. Adjust the reel clearance, if necessary. For instructions, refer to *Adjusting Reel Clearance, page 200*.

Adjusting Reel Clearance

Adjust the reel until there is enough clearance to prevent the reel fingers from contacting the cutterbar during operation.

DANGER

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

1. Start the engine.
2. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
3. Shut down the engine, and remove the key from the ignition.
4. **Single-reel headers:** Adjust the outboard reel arm lift cylinders to set the clearance at the outboard ends of the reel as follows:
   a. Loosen bolt (A).
   b. Turn cylinder rod (B) out of the clevis to raise the reel and thereby increase the reel-to-cutterbar clearance, or else turn cylinder rod into the clevis to lower the reel and thereby decrease the reel-to-cutterbar clearance.
   c. Tighten bolt (A).
   d. Repeat Steps a) to c) to set the reel-to-cutterbar clearance on the opposite side of the header.

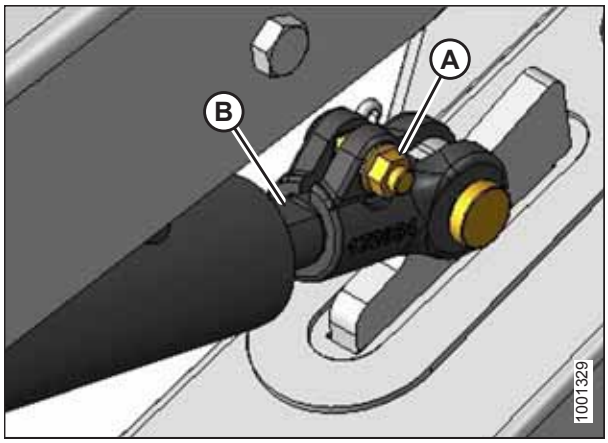


Figure 5.164: Outside Reel Arm

5. **Double-reel headers:** adjust center arm lift cylinder stop (A) to change the reel-to-cutterbar clearance at the inboard ends of the reels as follows:

   a. Loosen nut (B).

   b. Turn nut (C) counterclockwise to raise the reel and increase the reel-to-cutterbar clearance, or clockwise to lower the reel and decrease the reel-to-cutterbar clearance.

   c. Tighten nut (B).

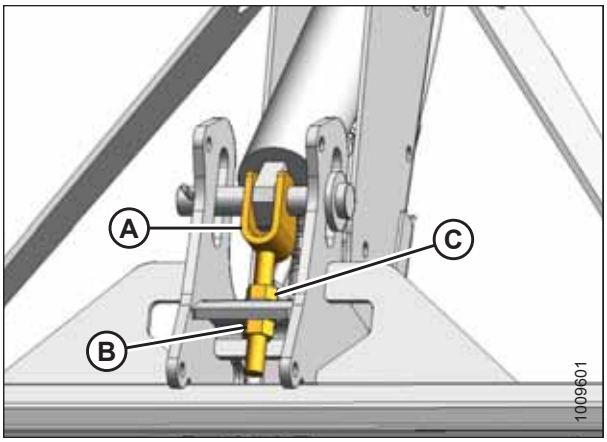


Figure 5.165: Underside of Center Arm

6. Measure the reel clearance again. For instructions, refer to *Measuring Reel Clearance, page 198*. If necessary, repeat the reel-to-cutterbar clearance adjustment procedure.

WARNING

Check to be sure all bystanders have cleared the area.

7. Start the engine.
8. Move the reel back to ensure that the steel end fingers do **NOT** contact the deflector shields.
9. If contact between the steel end fingers and the deflector shields occurs, adjust the reel upward to maintain the reel-to-cutterbar clearance at all reel fore-aft positions. If contact between the steel end fingers and the deflector shields still occurs after adjusting the reel, trim the steel end fingers to obtain the proper clearances.

   NOTE:

   Periodically inspect the equipment for abrasion damage caused by insufficient equipment clearance. Adjust the clearances as needed.

10. Raise the reel to its maximum height.
11. Move reel safety prop (A) back inside the reel arm.
12. Repeat the previous step on the opposite end of the reel.

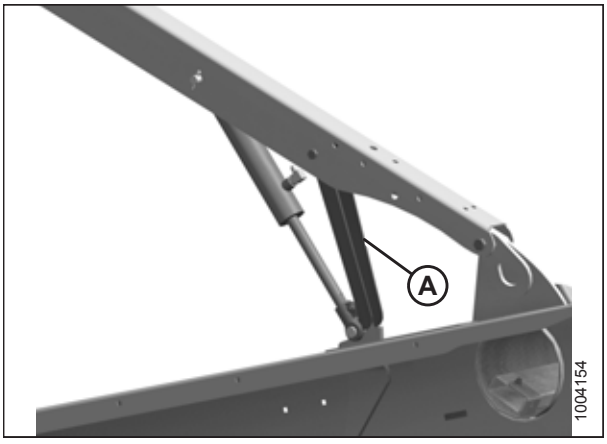


Figure 5.166: Left Reel Safety Prop

13. Use handle (B) on double-reel headers to move lock rod (A) to the outboard position.
14. Lower the reel fully.
15. Shut down the engine, and remove the key from the ignition.

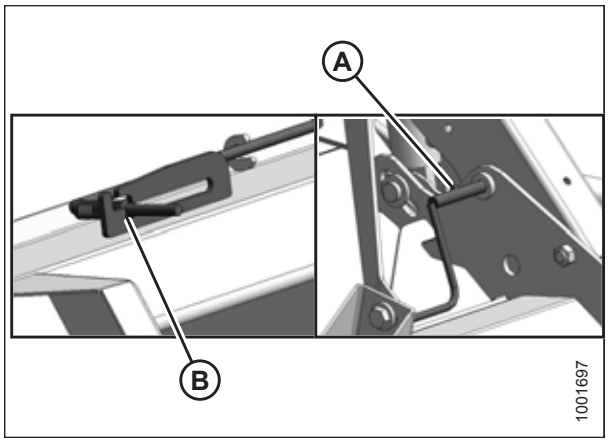


Figure 5.167: Reel Safety Prop – Center Arm

5.8.2 Reel Frown

The reel must be set up to frown (providing more clearance at the center of the reel than at the ends) to compensate for reel flexing.

Adjusting Reel Frown

The reel must be set up to frown (provide more clearance at the center of the reel than at the ends) to compensate for reel flexing.

DANGER

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

1. Position the reel over the cutterbar (between **4** and **5** on fore-aft position decal [A]) to provide adequate clearance at all reel fore-aft positions.
2. Record the measurement at each reel disc location for each reel tube.

   NOTE:

   Measure the frown profile before disassembling the reel for servicing so the profile can be maintained during reassembly.
3. Shut down the engine, and remove the key from the ignition.

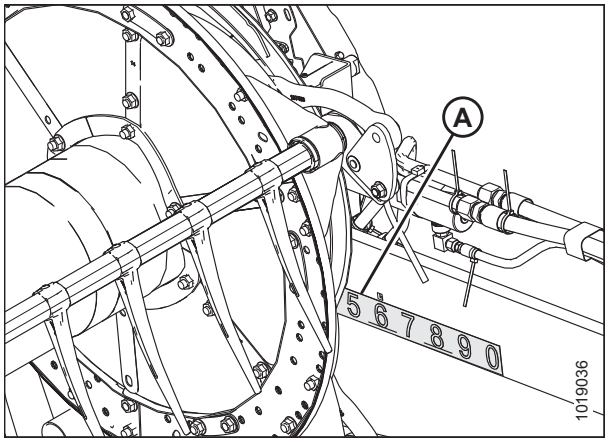


Figure 5.168: Fore-Aft Position Decal

4. Start with the reel disc closest to the center of the header and proceed outward towards the ends, adjusting the header profile as follows:

   a. Remove bolts (A).

   b. Loosen bolt (B) and adjust arm (C) until the desired measurement is obtained between the reel tube and cutterbar.

      NOTE:

      Allow the reel tubes to curve naturally and position the hardware accordingly.

   c. Reinstall bolts (A) in the aligned holes and tighten.

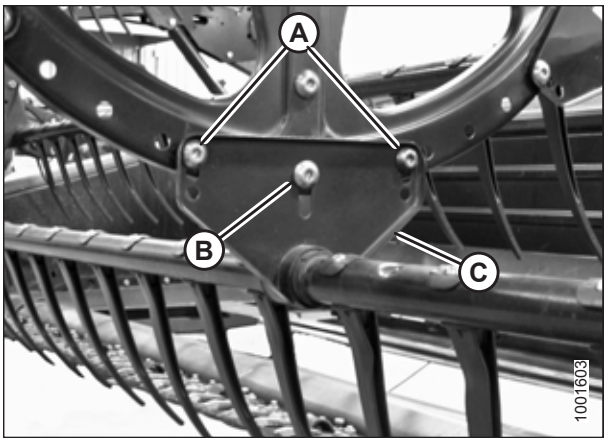


Figure 5.169: Center Reel Disc

5.8.3 Centering the Reel

Centering Double Reel

Centering a double reel requires measuring the current reel-endsheet clearance on each side of the header and adjusting the center reel support arm.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Measure clearance (A) at locations (B). Clearance (A) is the gap between the reel tine tube and the endsheet at each end of the header. You should obtain identical measurements if the reels are properly centered.

   - If the reel is not centered, proceed to Step *3, page 204*.
   - If the reel is centered, proceed to *5.8.1 Reel-to-Cutterbar Clearance, page 198*.

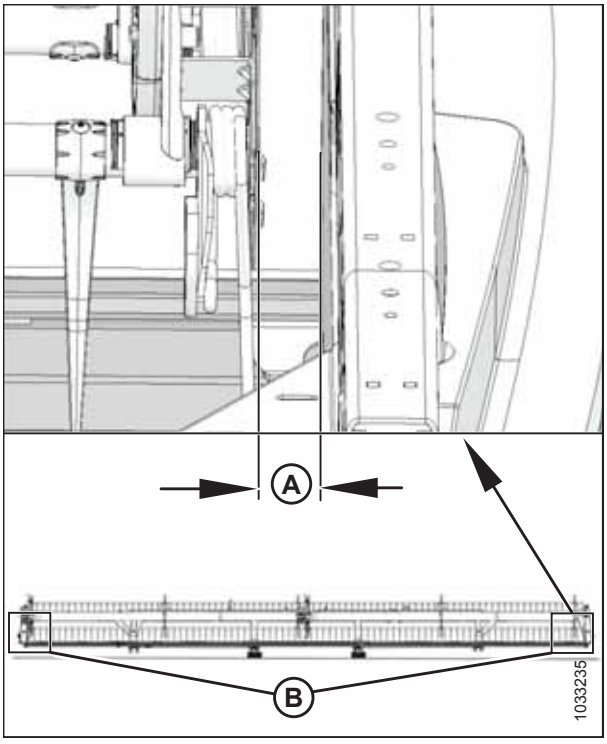


Figure 5.170: Double Reel Measurement Locations

3. Locate braces (B) on reel center support arm (C).
4. Loosen bolts (A).
5. Move the forward end of reel center support arm (C) laterally as needed to center both reels.
6. Tighten bolts (A). Torque the bolts to 382 Nm (282 lbf·ft).
7. Proceed to *5.8.1 Reel-to-Cutterbar Clearance, page 198*.

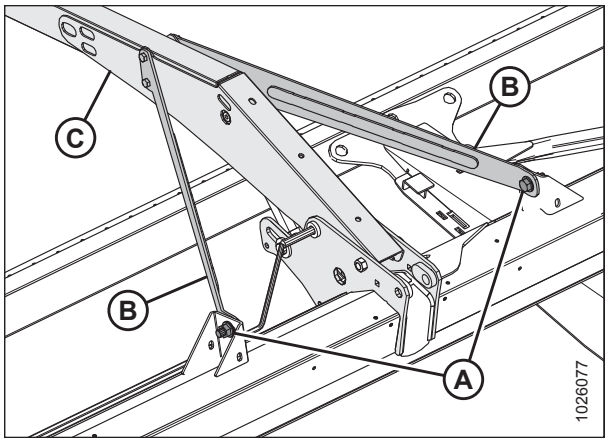


Figure 5.171: Reel Center Support Arm

Centering Single Reel

Centering a single reel requires measuring the current reel-to-endsheet clearance on each side of the header.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Measure clearance (A) at locations (B). Clearance (A) is the gap between the reel tine tube and the endsheet at each end of the header. You should obtain identical measurements if the reels are properly centered.

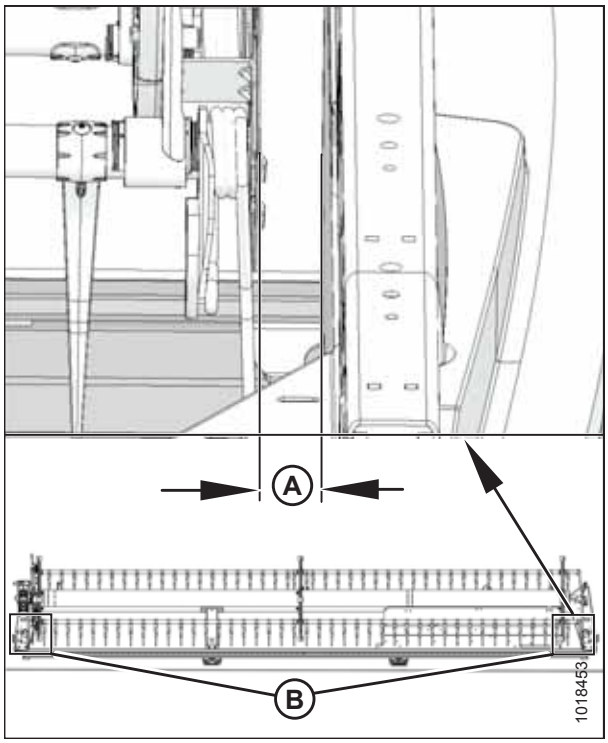


Figure 5.172: Single-Reel Measurement Locations

3. Loosen bolt (A) on brace (B) at each end of the reel.
4. Move the forward end of reel support arm (C) laterally as needed to center the reel.
5. Tighten bolt (A). Torque the bolt to 359 Nm (265 lbf·ft).
6. Repeat the previous step to secure the reel brace on the opposite side of the header.

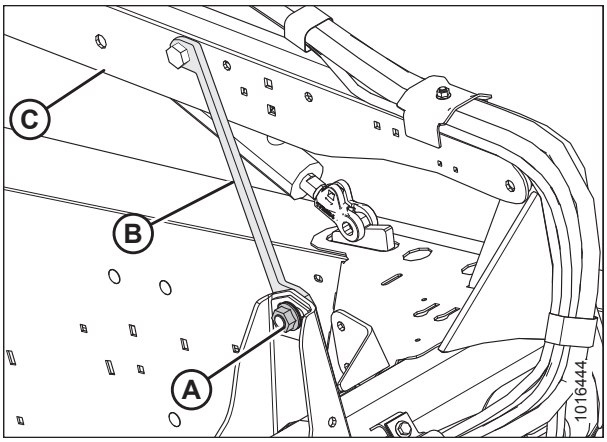


Figure 5.173: Reel Support Arm

5.8.4 Reel Fingers

IMPORTANT:

Keep the reel fingers in good condition and straighten or replace them as necessary.

Removing Steel Fingers

WARNING

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

IMPORTANT:

Ensure the tine tube is supported at all times to avoid damaging it and other components.

1. Lower the header fully.
2. Raise the reel fully.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.
5. Remove the tine tube bushings from the applicable tine tube at the center and left reel discs. For instructions, refer to *Removing Bushings from Reels, page 208*.
6. Attach tine tube arms (B) to the reel disc at original attachment locations (A).
7. Cut the damaged finger so it can be removed from the tine tube.
8. Remove bolts from the existing fingers and slide the fingers over to replace the finger that was cut off in Step *7, page 205* (remove tine tube arms [B] from the tine tubes as necessary).

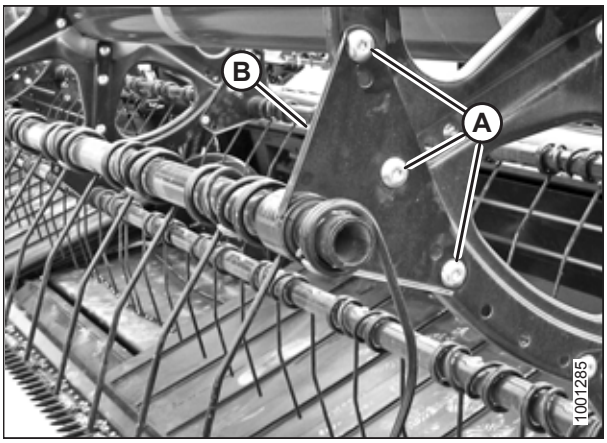


Figure 5.174: Tine Tube Arm

Installing Steel Fingers

DANGER

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

WARNING

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

IMPORTANT:

Ensure the tine tube is supported at all times to prevent damage to the tube and other components.

NOTE:

This procedure assumes a finger has been removed from the machine. For instructions about removing fingers, refer to *Removing Steel Fingers, page 205*.

1. Slide the new finger and tine tube arm (A) onto the end of the tube.
2. Install the tine tube bushings. For instructions, refer to *Installing Bushings onto Reels, page 214*.
3. Attach the fingers to the tine tube with bolts and nuts (B).

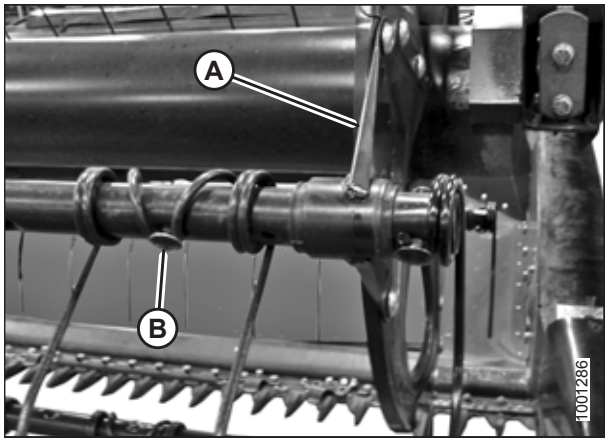


Figure 5.175: Tine Tube

Removing Plastic Fingers

WARNING

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

1. Lower the header fully.
2. Raise the reel fully.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.

5. Remove screw (A) using a Torx® Plus 27 IP socket wrench.

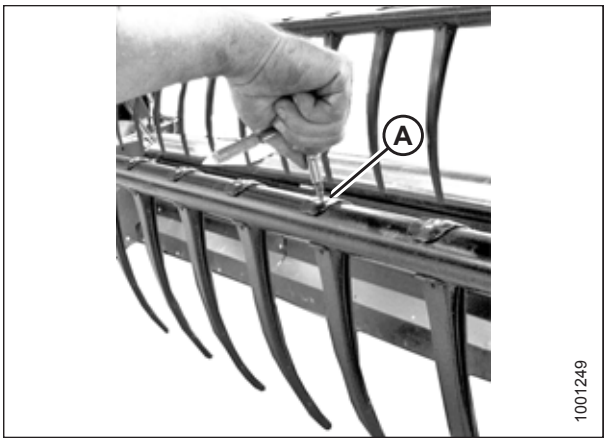


Figure 5.176: Removing Plastic Finger

6. Push the clip at the top of the finger back towards the reel tube as shown and remove the finger from the tube.

Figure 5.177: Removing Plastic Finger

Installing Plastic Fingers

DANGER

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

WARNING

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

NOTE:

This procedure assumes a finger has been removed from the machine. For information about removing fingers, refer to *Removing Plastic Fingers, page 206*.

1. Position the new finger on the rear of the tine tube. Engage the lug at the bottom of the finger in the lower hole in the tine tube.
2. Lift the top flange gently and rotate the finger as shown until the lug in the top of the finger engages the upper hole in the tine tube.

Figure 5.178: Installing Plastic Finger

IMPORTANT:

Do **NOT** apply force to the finger prior to tightening the mounting screw. Applying force without tightening the mounting screw will break the finger or shear the locating pins.

3. Install screw (A) using a Torx® Plus 27 IP socket wrench and torque to 8.5–9.0 Nm (75–80 lbf·in).

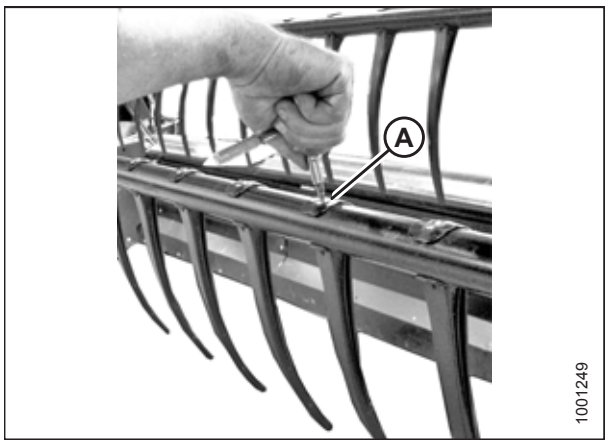


Figure 5.179: Installing Plastic Finger

5.8.5 Tine Tube Bushings

Removing Bushings from Reels

Bushing are located where the reel tine connects to the reel disc.

WARNING

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

IMPORTANT:

Ensure the tine tube is supported at all times to prevent damage to the tube and other components.

1. Lower the header fully.
2. Raise the reel fully.
3. Shut down the engine, and remove the key from the ignition.
4. Engage the reel safety props. For instructions, refer to *Engaging Reel Safety Props, page 35*.

NOTE:

If replacing only the cam end bushing, proceed to Step *10, page 210*.

Center disc and tail end bushings

5. Remove the reel endshields and endshield support (C) from the tail end of the reel at the applicable tine tube location.

   NOTE:

   There are no endshields on the center disc.

6. Remove bolts (A) securing tine tube arm (B) to the disc.

   IMPORTANT:

   Note the hole locations in the arm and disc and ensure bolts (A) are reinstalled at the original locations.

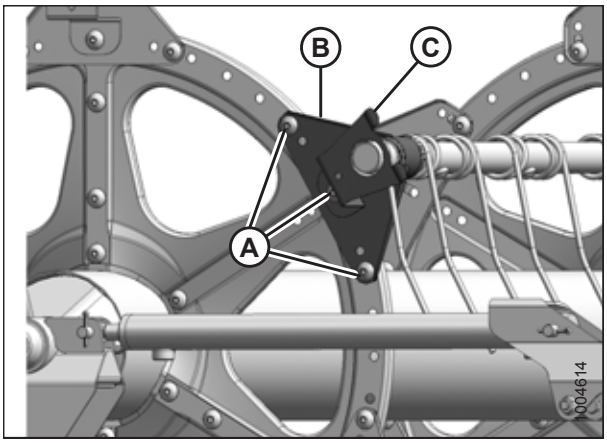


Figure 5.180: Tail End

7. Release bushing clamps (A) using a small screwdriver to separate the serrations. Pull the clamp off the tine tube.

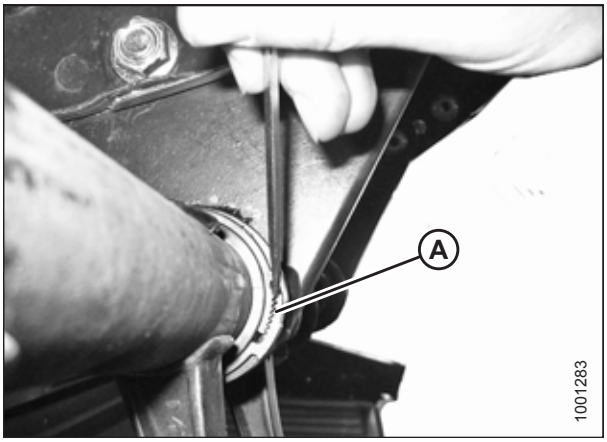


Figure 5.181: Bushing Clamp

8. Rotate tine tube arm (A) until clear of the disc and slide the arm inboard off of bushing (B).
9. Remove bushing halves (B). If required, remove the next steel or plastic finger, so the arm can slide off the bushing. Refer to the following procedures as necessary:
   - *Removing Plastic Fingers, page 206*
   - *Removing Steel Fingers, page 205*

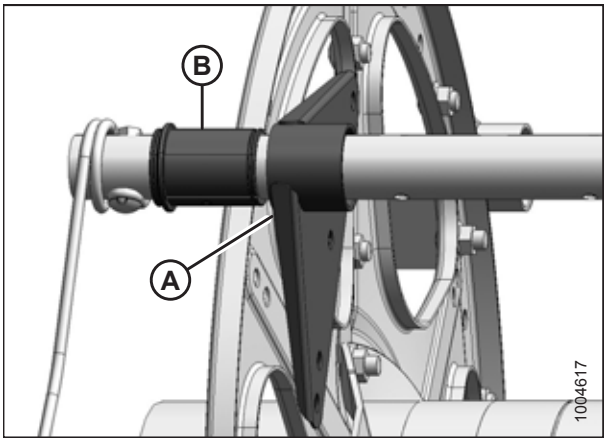


Figure 5.182: Bushing

Cam end bushings

10. Remove the endshields and endshield support (A) from the applicable tine tube location on the cam end.

    NOTE:

    Removing cam end bushings requires the tine tube to be moved through the disc arms to expose the bushing.

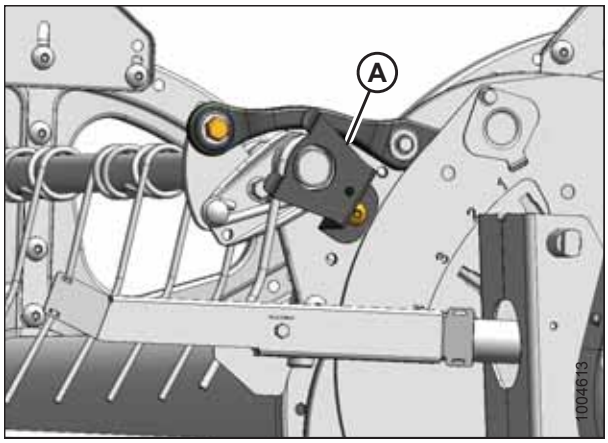


Figure 5.183: Cam End

11. Remove the reel endshields and endshield support (C) from the tail end of the reel at the applicable tine tube location.

    NOTE:

    There are no endshields on the center disc.

12. Remove bolts (A) securing tine tube arms (B) to the tail and center discs.

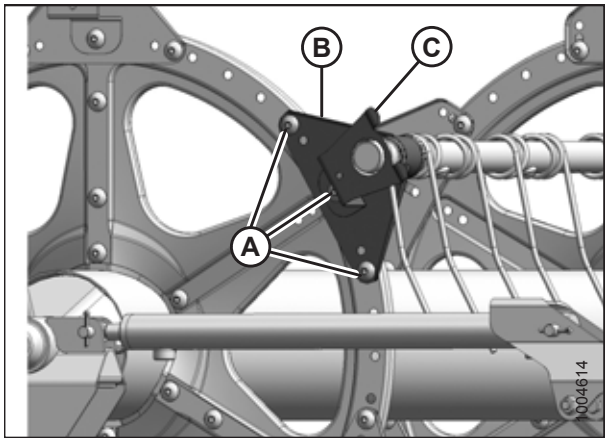


Figure 5.184: Tail End

Tine tube reinforcing kit (option)

13. Release the bushing clamps or disconnect the support channels from the tine tube support (if installed) depending on which tine tube is being moved. Three tine tubes (A) require channel disconnection and two tine tubes (B) require only bushing clamp removal.

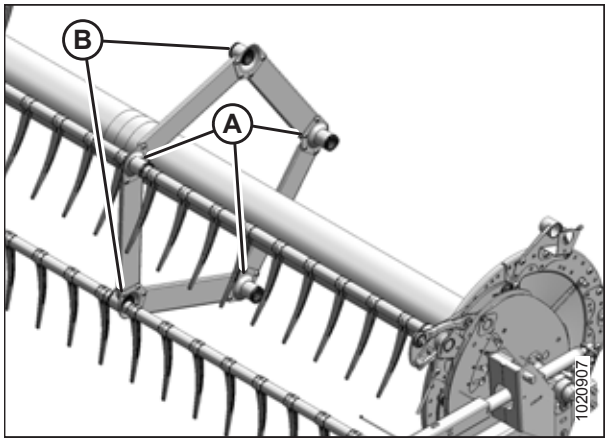


Figure 5.185: Tine Tube Supports

14. Remove bolt (A) from the cam linkage so tine tube (B) is free to rotate.

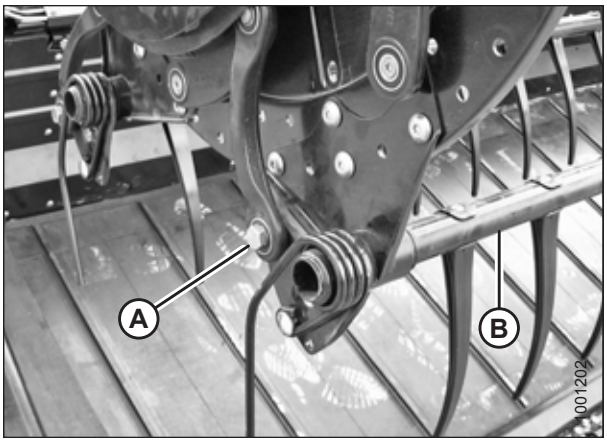


Figure 5.186: Cam End

15. Release bushing clamps (A) at the cam disc using a small screwdriver to separate the serrations. Move the clamps off the bushings.

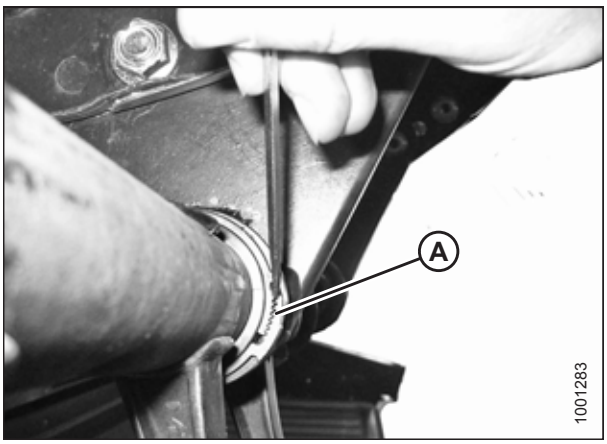


Figure 5.187: Bushing Clamp

16. Slide tine tube (A) outboard to expose bushing (B).
17. Remove bushing halves (B). If required, remove the next steel or plastic finger so the arm can slide off the bushing. Refer to the following procedures if necessary:
    - *Removing Plastic Fingers, page 206*
    - *Removing Steel Fingers, page 205*

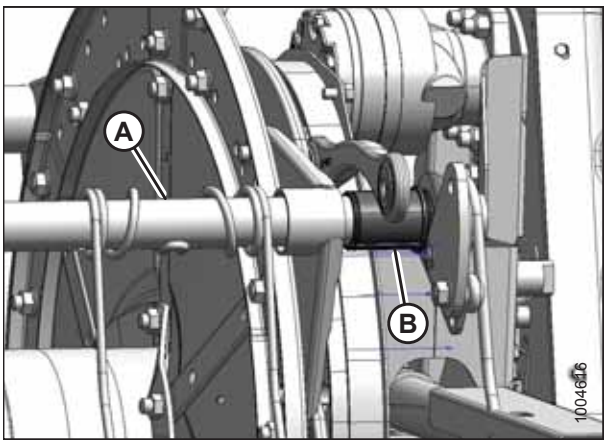


Figure 5.188: Cam End

Tine tube reinforcing kit bushings – option

18. Locate support (A) that requires a new bushing.
19. Remove four bolts (B) securing channel (C) to support (A).
20. Remove screw (E) and remove finger (D) if it is too close to the support to allow access to the bushing. For instructions, refer to *Removing Plastic Fingers, page 206* or *Removing Steel Fingers, page 205*.

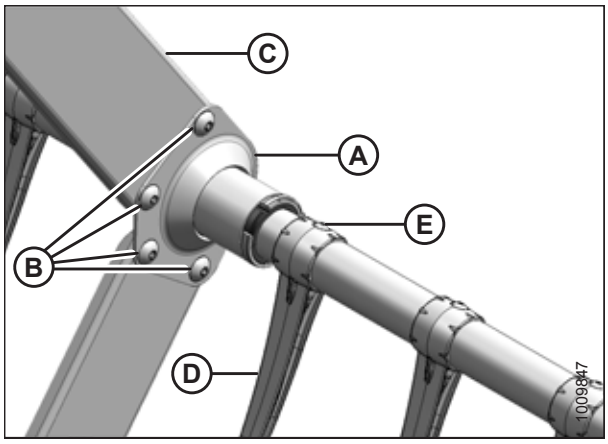


Figure 5.189: Tine Tube Support

21. Release bushing clamps (A) using a small screwdriver to separate the serrations.

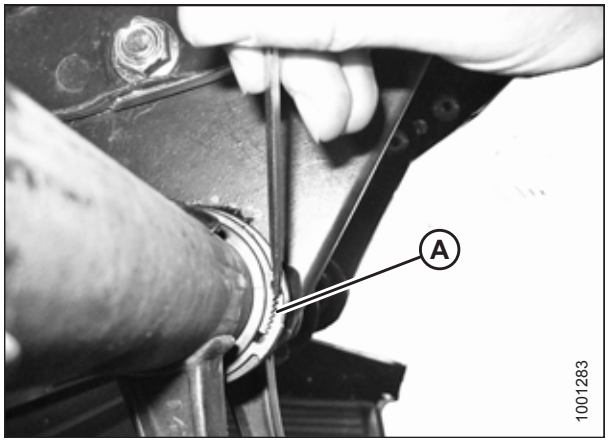


Figure 5.190: Bushing Clamp

22. Move clamps (A) off the bushings.

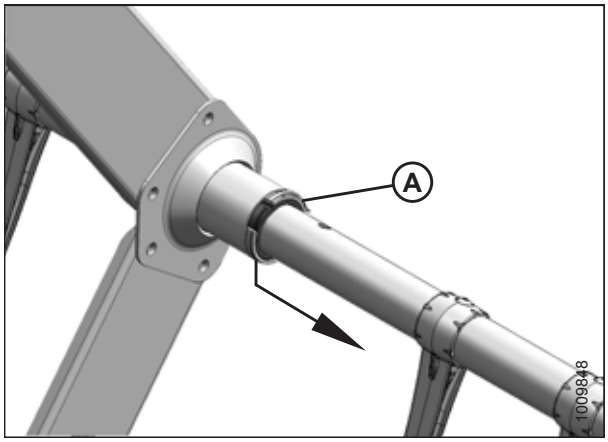


Figure 5.191: Tine Tube Reinforcing Kit Bushing Clamp – Option

23. On each reel, there are three right-facing supports (A). Slide the support off bushing halves (B).

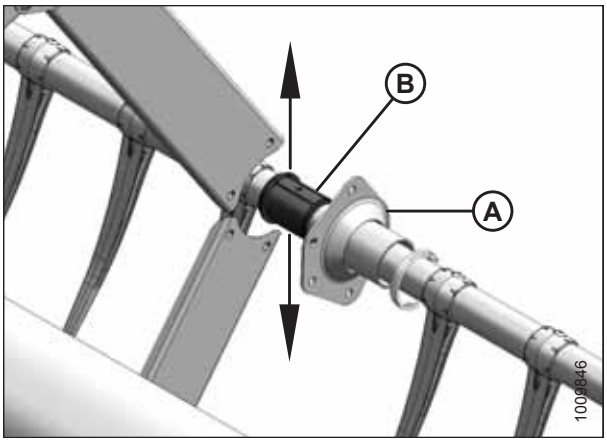


Figure 5.192: Tine Tube Reinforcing Kit Support – Option

24. On each reel, there are two left-facing supports (A). Rotate the supports until the flanges clear the channels before moving them off bushing (B). Move the tube slightly away from the reel if necessary.
25. Remove bushing halves (B) from the tine tubes.

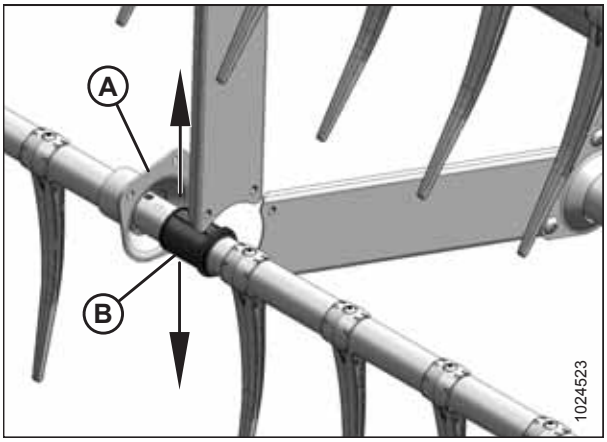


Figure 5.193: Tine Tube Reinforcing Kit Opposite Support – Option

Installing Bushings onto Reels

NOTE:

This procedure assumes the steps for *Removing Bushings from Reels, page 208* have been completed.

WARNING

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

IMPORTANT:

Ensure the tine tube is supported at all times to prevent damage to the tube or other components.

Use a pair of modified channel lock pliers (A) to install bushing clamps (C). Secure pliers in a vise and grind a notch (B) into the end of each arm to fit the clamp as shown.

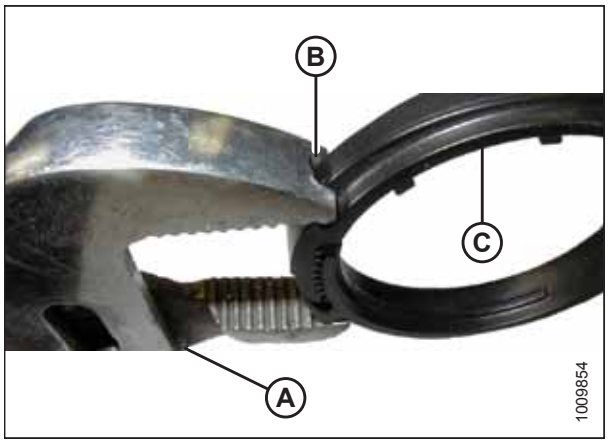


Figure 5.194: Modified Channel Lock Pliers

Cam end bushings

1. Position bushing halves (B) on tine tube (A) with the flangeless end adjacent to the tine tube arm, and position the lug in each bushing half into the hole in the tine tube.
2. Slide tine tube (A) towards the tail end of the reel to insert bushing (B) into the tine tube arm. If the tine tube supports are installed, ensure the bushings at those locations slide into the support.
3. Reinstall the previously removed fingers. Refer to the following procedures as necessary:
   - *Removing Plastic Fingers, page 206*
   - *Removing Steel Fingers, page 205*

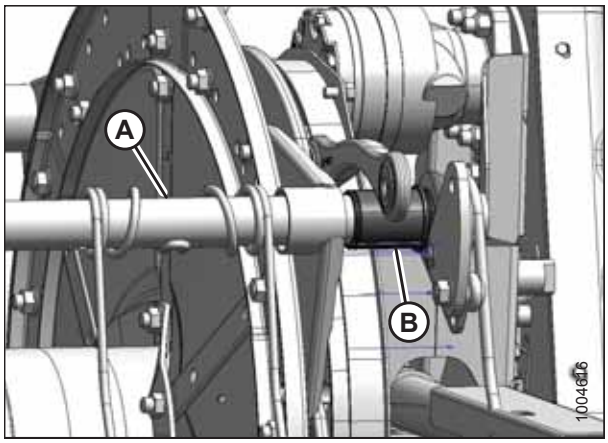


Figure 5.195: Cam End

4. Install bushing clamp (A) onto the tine tube adjacent to the flangeless end of bushing (B).
5. Position clamp (A) on bushing (B) so the edges of the clamp and bushing are flush when the clamp is fit into the groove on the bushing and the lock tabs are engaged.

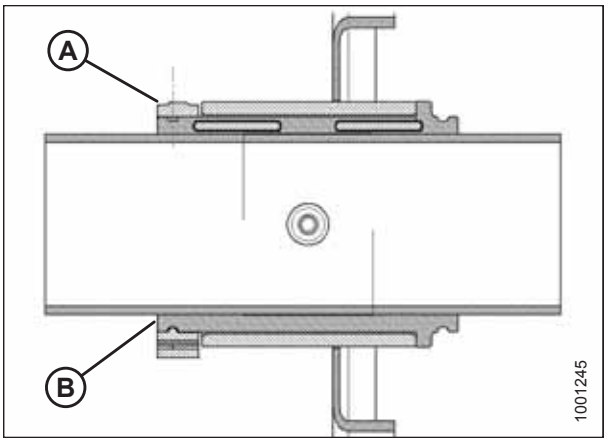


Figure 5.196: Bushing

6. Tighten clamp (A) using modified channel lock pliers (B) until finger pressure will **NOT** move the clamp.

   IMPORTANT:

   Overtightening clamp may result in breakage.

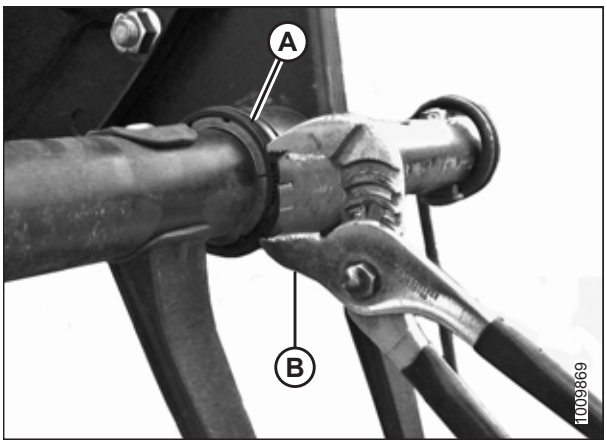


Figure 5.197: Installing Clamp

7. Line up tine tube (B) with the cam arm and install bolt (A). Torque bolt to 165 Nm (120 lbf·ft).

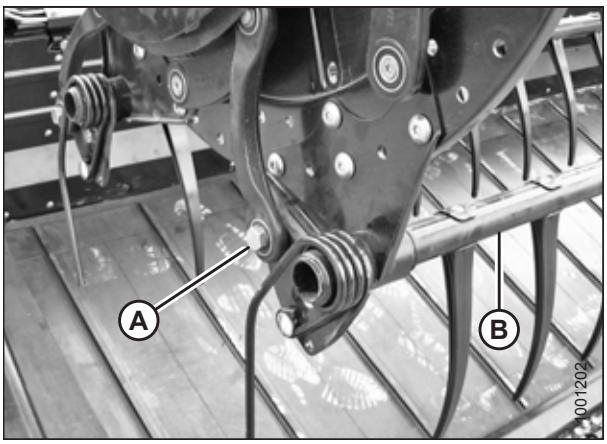


Figure 5.198: Cam End

8. Install bolts (A) securing tine tube arm (B) to the center disc.
9. Install tine tube arm (B) and endshield support (C) to the tail end of the reel at the applicable tine tube location and secure with bolts (A).

   NOTE:

   There are no endshields on the center discs.

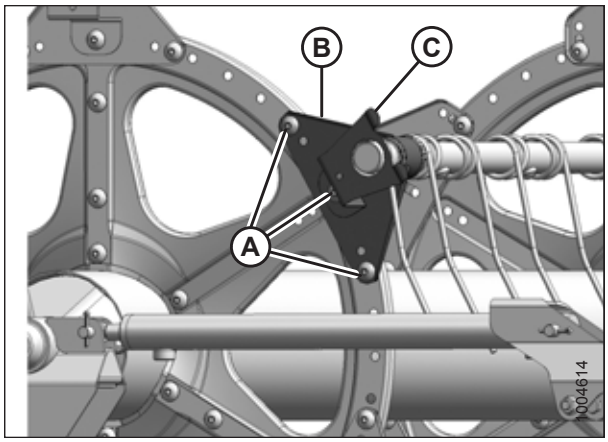


Figure 5.199: Tail End

10. Install endshield support (A) at the applicable tine tube location at the cam end.
11. Reinstall the reel endshields. For instructions, refer to *Replacing Reel Endshields, page 220*.

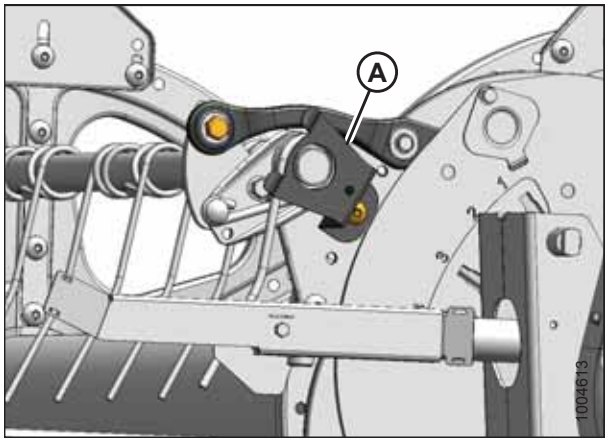


Figure 5.200: Cam End

Center disc and tail end bushings

12. Position bushing halves (B) on tine tube (A) with the flangeless end adjacent to the tine tube arm, and position the lug in each bushing half into the hole in the tine tube.
13. Slide tine tube (A) onto bushing (B) and position against the disc at the original location.
14. Reinstall the previously removed fingers. For instructions, refer to:
    - *Removing Plastic Fingers, page 206*
    - *Removing Steel Fingers, page 205*

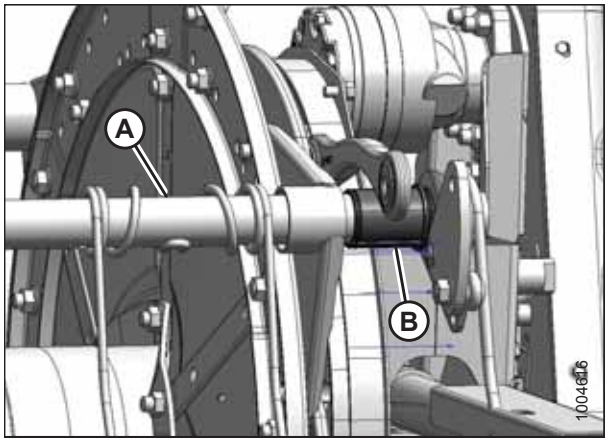


Figure 5.201: Cam End

15. Install bushing clamp (A) onto the tine tube adjacent to the flangeless end of bushing (B).
16. Position clamp (A) on bushing (B) so the edges of the clamp and bushing are flush when the clamp is fit into the groove on the bushing and the lock tabs are engaged.

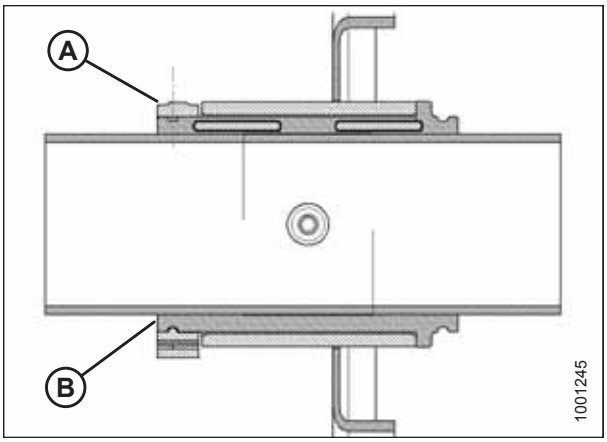


Figure 5.202: Bushing

17. Tighten clamp (A) using modified channel lock pliers (B) until finger pressure will **NOT** move the clamp.

    IMPORTANT:

    Overtightening clamp may result in breakage.

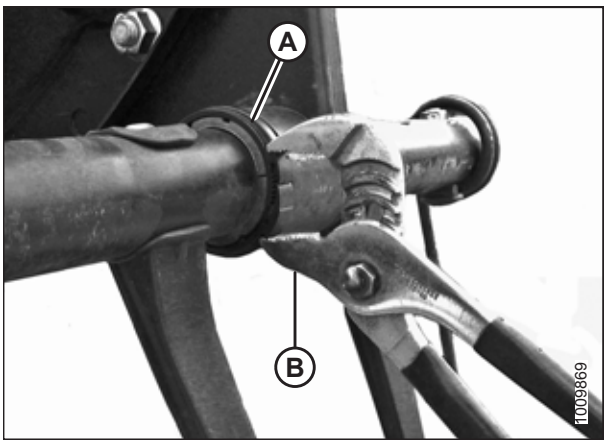


Figure 5.203: Installing Clamp

18. Install bolts (A) securing tine tube arm (B) to the center disc.
19. Install tine tube arm (B) and endshield support (C) to the tail end of the reel at the applicable tine tube location and secure with bolts (A).

    NOTE:

    There are no endshields on the center discs.

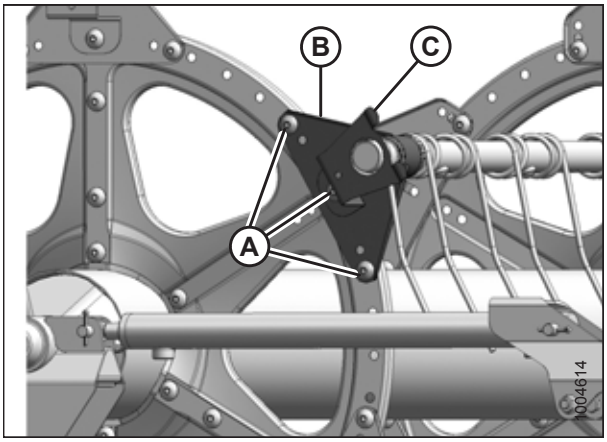


Figure 5.204: Tail End

Tine tube reinforcing kit – option

20. Position bushing halves (B) on tine tube (A) with the flangeless end adjacent to the tine tube arm, and position the lug in each bushing half into the hole in the tine tube.

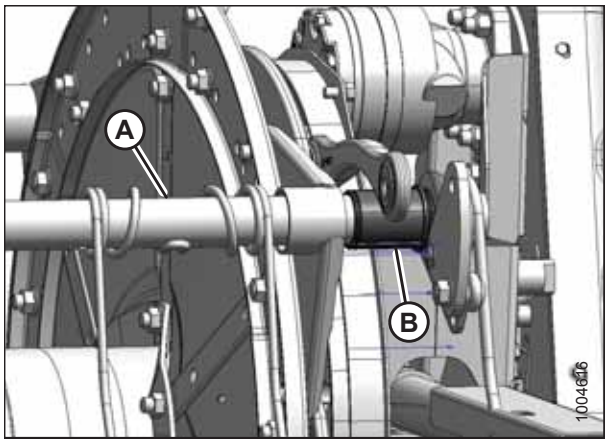


Figure 5.205: Cam End

21. On each reel, there are three right-facing supports (A). Slide the support onto bushing (B).

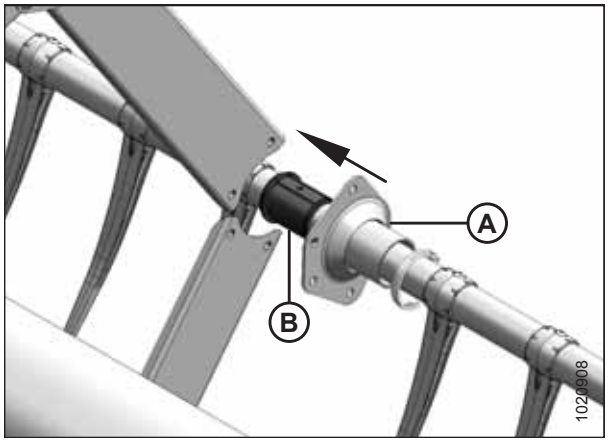


Figure 5.206: Tine Tube Reinforcing Kit Support – Option

22. On each reel, there are two left-facing supports (A). Rotate support (A) until its flanges clear channels (C) before moving the support onto bushing (B).

    NOTE:

    If necessary, move tine tube (D) slightly away from the reel to allow the support flange enough room to clear the channel.

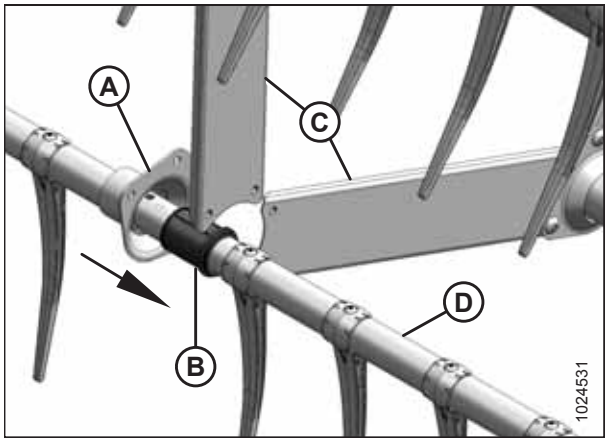


Figure 5.207: Tine Tube Reinforcing Kit Opposite Support – Option

23. Install bushing clamp (A) onto the tine tube adjacent to the flangeless end of bushing (B).
24. Position clamp (A) on bushing (B) so the edges of the clamp and bushing are flush when the clamp is fit into the groove on the bushing and the lock tabs are engaged.

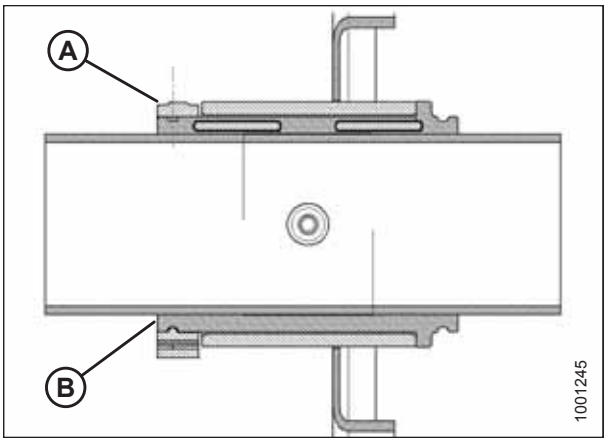


Figure 5.208: Bushing

25. Tighten clamp (A) using modified channel lock pliers (B) until finger pressure will **NOT** move the clamp.

    IMPORTANT:

    Overtightening clamp may result in breakage.

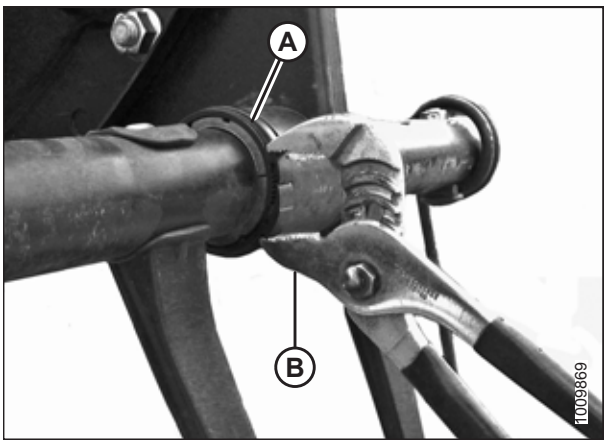


Figure 5.209: Installing Clamp

26. Reattach channels (C) to the three right-facing supports (A) on each reel with screws (B) and nuts. Torque screws to 43 Nm (32 lbf·ft).
27. Using screws (E), reinstall any fingers (D) that were previously removed. For instructions, refer to:
    - *Installing Plastic Fingers, page 207*
    - *Installing Steel Fingers, page 206*

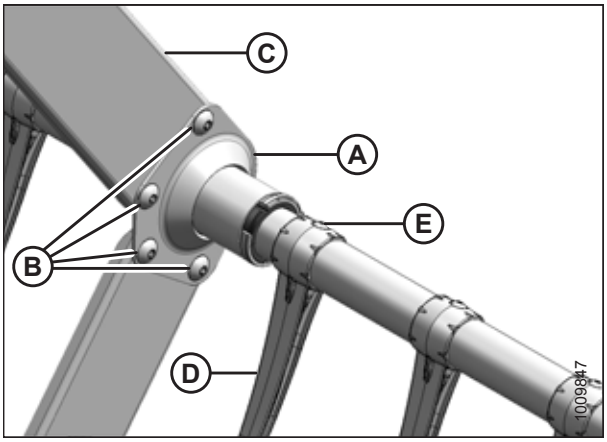


Figure 5.210: Tine Tube Reinforcing Kit Support – Option

28. Reattach channels (C) to two left-facing supports (A) on each reel with screws (B) and nuts. Torque screws to 43 Nm (32 lbf·ft).
29. Using screws (E), reinstall any fingers (D) that were previously removed. For instructions, refer to:
    - *Installing Plastic Fingers, page 207*
    - *Installing Steel Fingers, page 206*

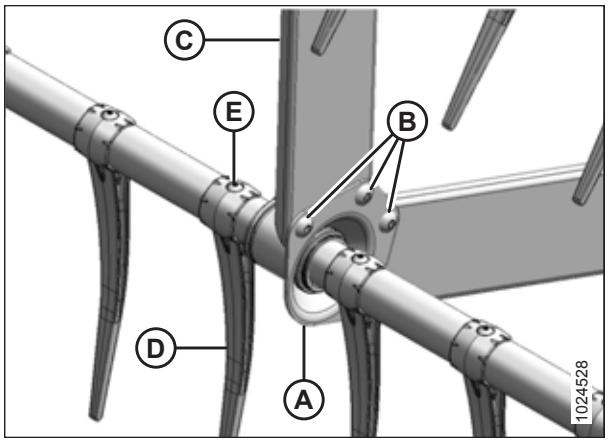


Figure 5.211: Tine Tube Reinforcing Kit Opposite Support – Option

5.8.6 Reel Endshields

Reel endshields and supports do not require regular maintenance, but they should be checked periodically for damage and loose or missing fasteners. Slightly dented or deformed endshields and supports are repairable, but it's necessary to replace severely damaged components.

You can attach reel endshields to either end of the reel.

Replacing Reel Endshields

DANGER

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

1. Start the engine. For instructions, refer to the windrower operator's manual.
2. Lower the reel fully.
3. Lower the header fully.
4. Shut down the engine, and remove the key from the ignition.
5. Rotate the reel manually until reel endshield (A) requiring replacement is accessible.
6. Remove three bolts (B).

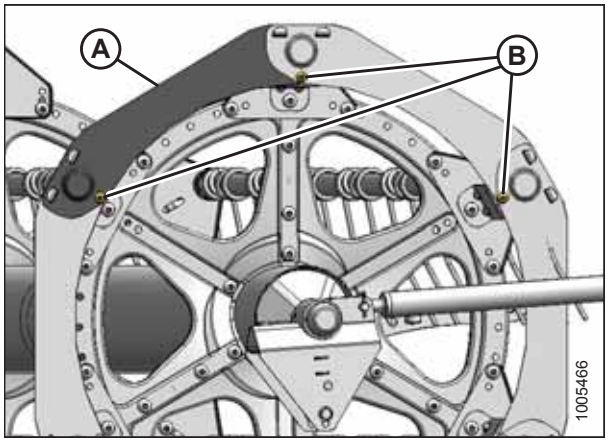


Figure 5.212: Reel Endshields

7. Lift the end of reel endshield (A) off support tabs (B).

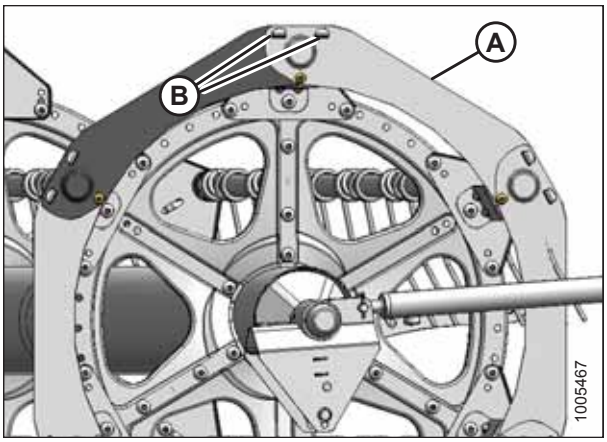


Figure 5.213: Reel Endshields

8. Remove the reel endshield from the supports.

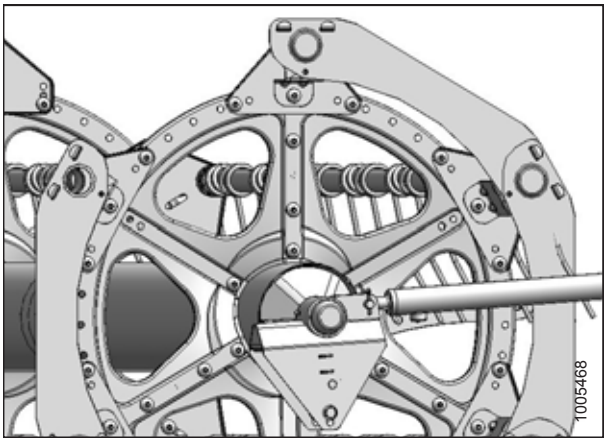


Figure 5.214: Reel Endshield Removed

9. Slightly lift the end of reel endshield (A) off of support tabs (B).
10. Install new reel endshield (C), behind reel endshield (A).
11. Reattach reel endshield (C), then (A) onto support tabs (B).
12. Reinstall three bolts (D).
13. Tighten all hardware.

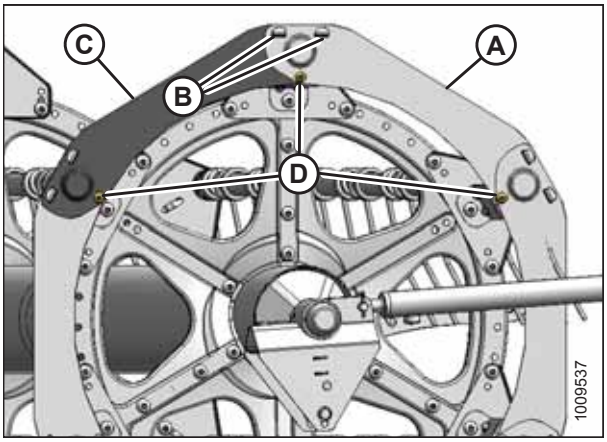


Figure 5.215: Reel Endshields

Replacing Reel Endshields – Right Reel on Double-Reel Header

DANGER

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

1. Lower the header and reel, shut down the engine, and remove the key from the ignition.
2. Rotate the reel manually until the reel endshield (A) requiring replacement is accessible.
3. Remove six bolts (B). Retain hardware.

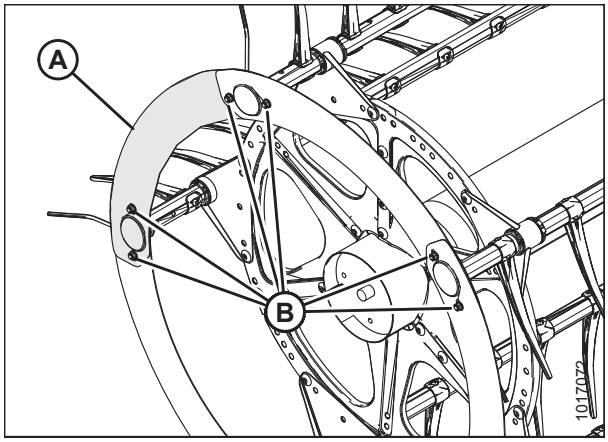


Figure 5.216: Reel Endshields

4. Lift end of reel endshield (A) off endshield (E) and rotate down.
5. Remove bolt (B), steel tine (C), and bushing (D). Retain hardware.
6. Remove the reel endshield (E).

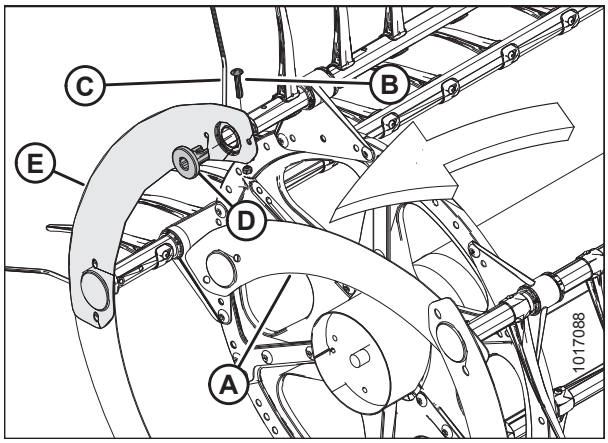


Figure 5.217: Reel Endshields

7. Install new reel endshield (A) onto reel.
8. Reattach bushing (B) and steel tine (C) using retained hardware (D).
9. Rotate endshield (E) to connect with endshield (A).

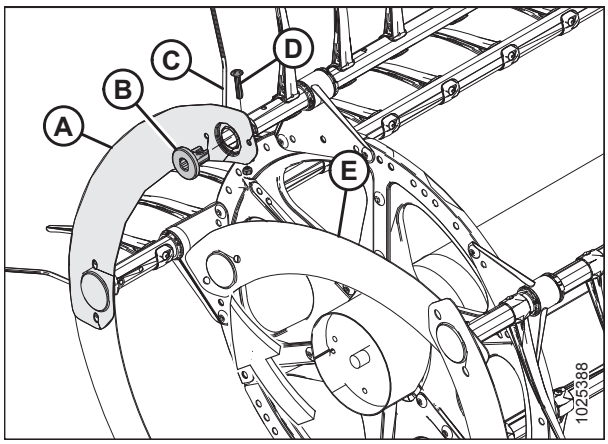


Figure 5.218: Reel Endshields

10. Reinstall bolts (A).
11. Tighten all hardware.

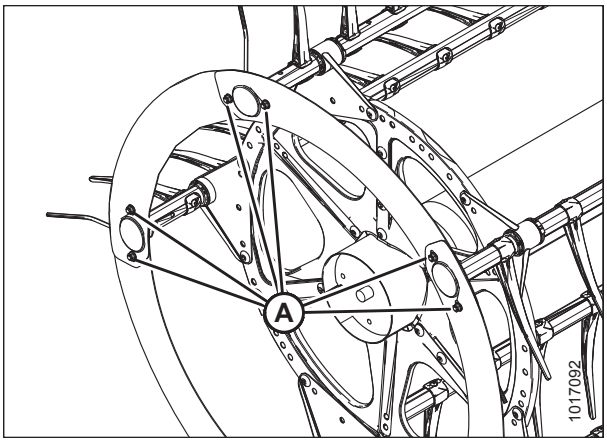


Figure 5.219: Reel Endshields

Replacing Reel Endshield Supports

DANGER

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

1. Lower the header fully.
2. Lower the reel fully.
3. Shut down the engine, and remove the key from the ignition.
4. Rotate the reel manually until the reel endshield support requiring replacement is accessible.
5. Remove bolt (B) from support (A).
6. Remove bolts (C) from support (A) and two adjacent supports.

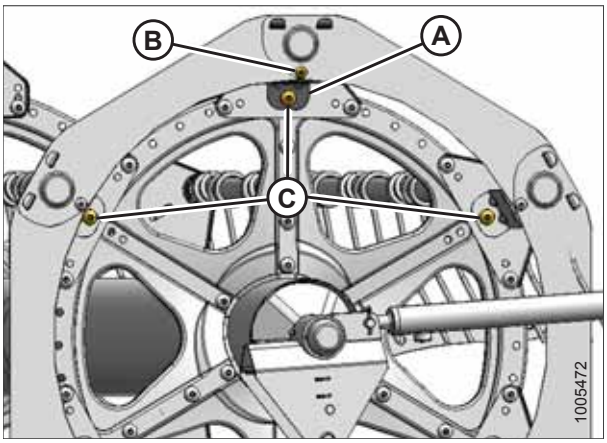


Figure 5.220: Reel Endshield Supports

7. Move reel endshields (A) away from the tine tube and rotate support (B) towards the reel to remove it.
8. Insert tabs of new support (B) into the slots in reel endshields (A). Ensure the tabs engage both reel endshields.
9. Secure support (B) to the disc sector with bolt (C) and nut. Do **NOT** tighten.
10. Secure reel endshields (A) to support (B) with bolt (D) and nut. Do **NOT** tighten.
11. Reattach the supports with bolts (E) and nuts.
12. Check the clearance between the tine tube and reel endshield support and adjust if necessary.
13. Torque nuts to 27 Nm (20 lbf·ft).

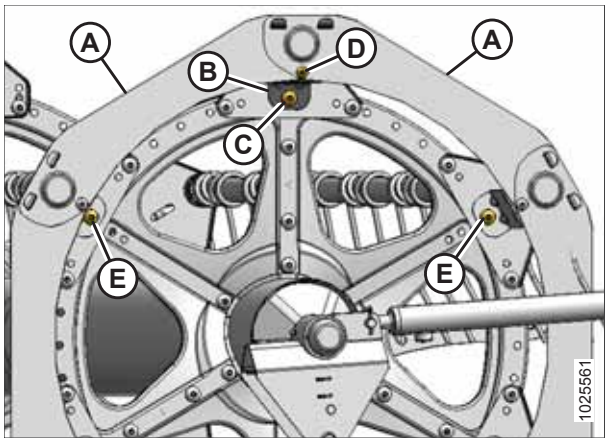


Figure 5.221: Reel Endshield Supports

5.9 Reel Drive

The hydraulically driven reel motor drives a chain that is attached to the center arm between the reels on a double-reel header, and to the right end of the reel on a single-reel header.

5.9.1 Reel Drive Cover

The reel drive cover protects the reel drive components from dirt and debris.

Removing Reel Drive Cover

The chain drive is protected by a removable cover.

DANGER

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

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

Single-reel drive:

2. Remove four bolts (A) securing cover (B) to the reel drive.

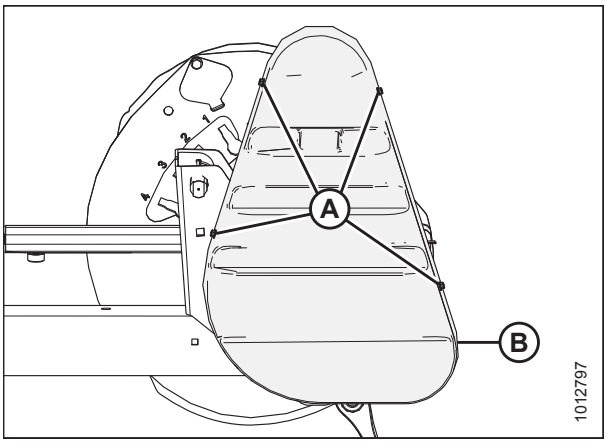


Figure 5.222: Drive Cover – Single Reel

Double-reel drive:

3. Remove six bolts (A) securing upper cover (B) to the reel drive and lower cover (C).
4. Remove upper cover (B).

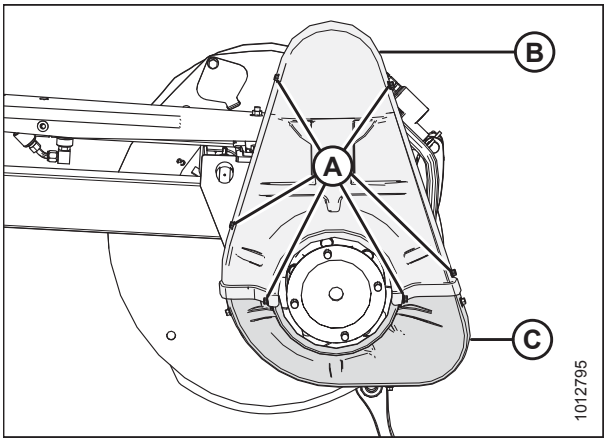


Figure 5.223: Drive Cover – Double Reel

5. Remove three bolts (A) and remove lower cover (B) if necessary.

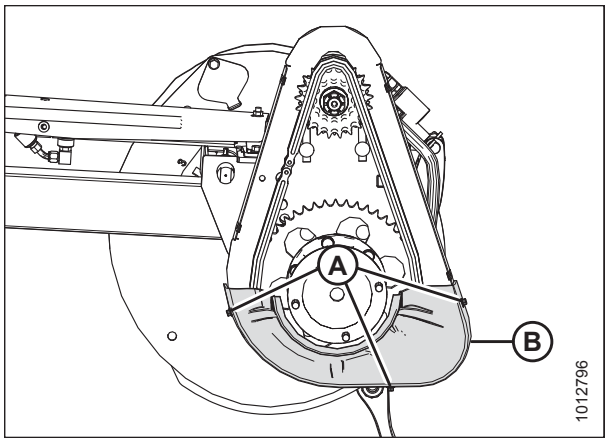


Figure 5.224: Lower Drive Cover

Installing Reel Drive Cover

The chain drive is protected by a removable cover.

DANGER

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

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

Single-reel drive:

2. Position drive cover (B) onto the reel drive, and secure with four bolts (A). Torque bolts to 12–13.2 Nm (9–10 lbf·ft).

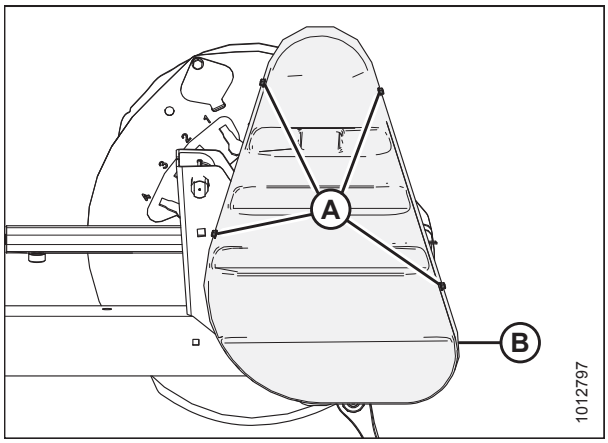


Figure 5.225: Drive Cover – Single Reel

Double-reel drive:

3. Position lower drive cover (B) onto the reel drive (if previously removed), and secure with three bolts (A). Torque bolts to 12–13.2 Nm (9–10 lbf·ft).

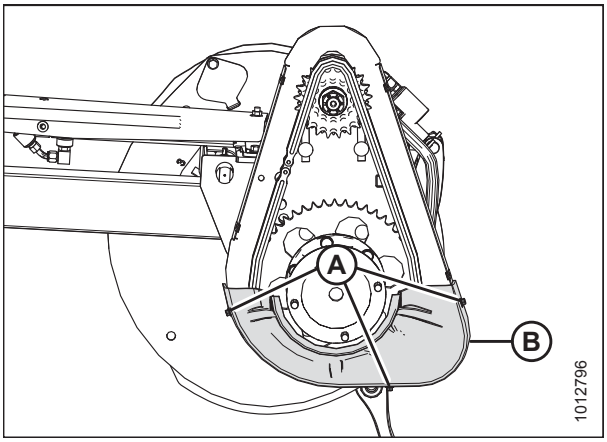


Figure 5.226: Lower Drive Cover – Double Reel

4. Position upper drive cover (B) onto the reel drive and lower cover (C), and secure with six bolts (A). Torque bolts to 12–13.2 Nm (9–10 lbf·ft).

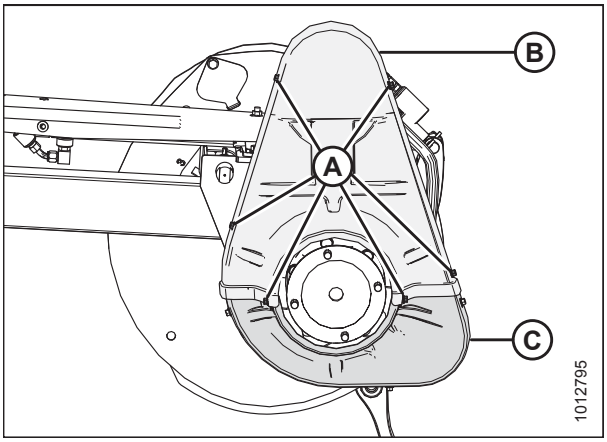


Figure 5.227: Drive Cover – Double Reel

5.9.2 Reel Drive Chain

The reel drive chain transfers power from the hydraulically driven reel motor to the sprockets that rotate the reels.

Loosening Reel Drive Chain

DANGER

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

1. Lower the header fully.
2. Adjust the reel to full forward position for easier access to the work area.
3. Shut down the engine, and remove the key from the ignition.
4. Remove the drive cover. For instructions, refer to *Removing Reel Drive Cover, page 225*.

5. Loosen six nuts (A).
6. Slide motor (B) and motor mount (C) down towards the reel shaft.

   IMPORTANT:

   Do **NOT** operate the reel with the reel cover removed.
7. To retighten the drive chain, refer to *Tightening Reel Drive Chain, page 228*.

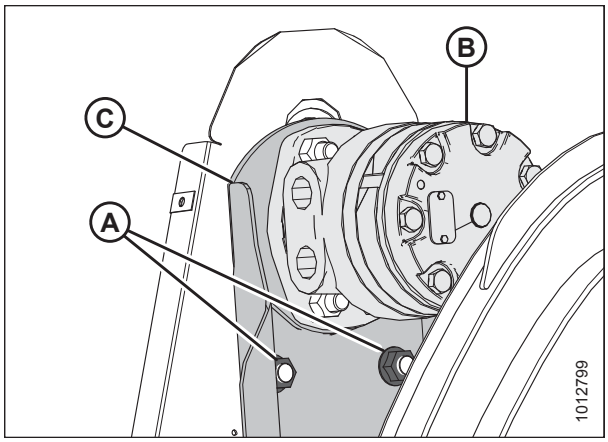


Figure 5.228: Single-Reel Drive

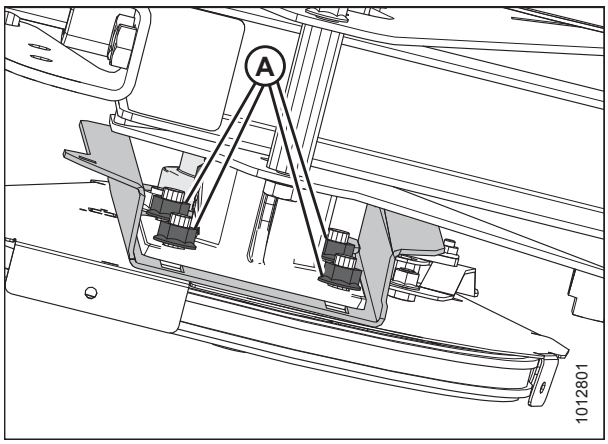


Figure 5.229: Single-Reel Drive – Viewed from Underside of Reel

Tightening Reel Drive Chain

DANGER

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

1. Lower the header fully.
2. Adjust the reel to full forward position for easier access to the work area.
3. Shut down the engine, and remove the key from the ignition.
4. Remove the drive cover. For instructions, refer to *Removing Reel Drive Cover, page 225*.

5. Slide motor (A) and motor mount (B) upward until chain (C) is tight.
6. Ensure there is 3 mm (1/8 in.) of slack at the chain midspan. Adjust if necessary.

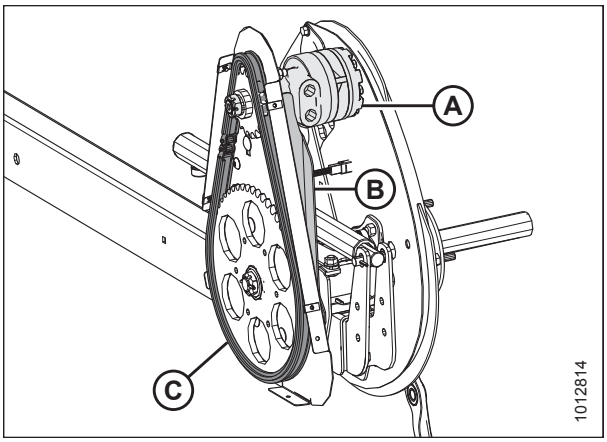


Figure 5.230: Single-Reel Drive – Double Reel Similar

7. Tighten six nuts (A). Torque to 73 Nm (54 lbf·ft).
8. Install the drive cover. For instructions, refer to *Installing Reel Drive Cover, page 226*.

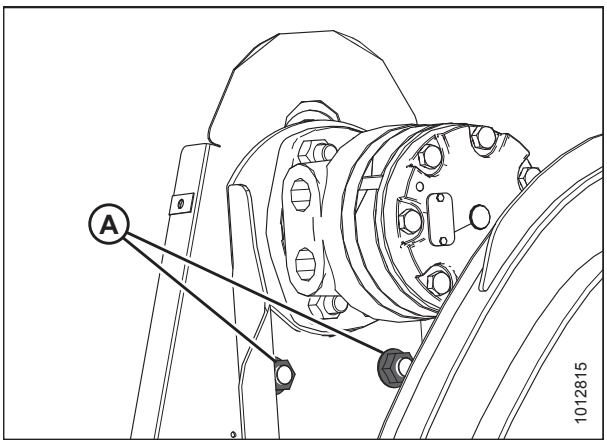


Figure 5.231: Single-Reel Drive – Double Reel Similar

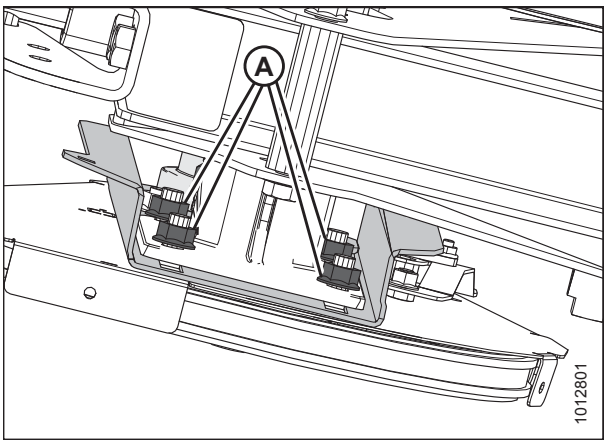


Figure 5.232: Single-Reel Drive – Viewed from Underside of Reel

5.9.3 Reel Drive Sprocket

The reel drive sprocket is attached to the reel drive motor.

For Case IH and New Holland combine models, configure the combine according to the reel sprocket size in order to optimize the auto reel to ground speed control. Refer to the combine service manual for more information.

Removing Reel Drive Sprocket

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Remove the reel drive cover. For instructions, refer to *Removing Reel Drive Cover, page 225*.
3. Loosen reel drive chain (A). For instructions, refer to *Loosening Reel Drive Chain, page 227*.
4. Remove reel drive chain (A) from reel drive sprocket (B).

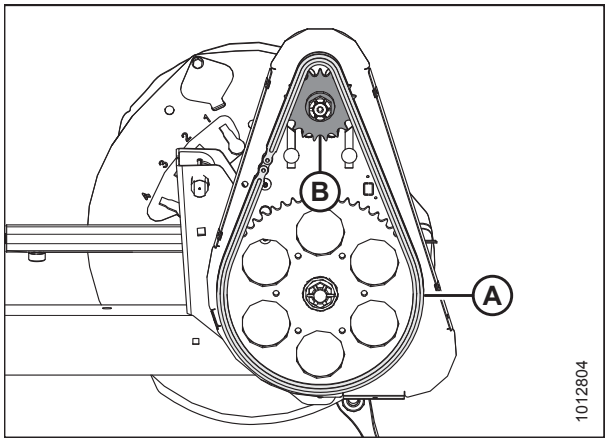


Figure 5.233: Reel Drive Sprocket

5. Remove cotter pin (A), slotted nut (B), and flat washer (C) from the motor shaft.
6. Remove reel drive sprocket (D). Ensure the key remains in the shaft.

   IMPORTANT:

   To avoid damaging the motor, use a puller if the drive sprocket (D) does not come off by hand. Do **NOT** use a pry bar and/or hammer to remove the drive sprocket.

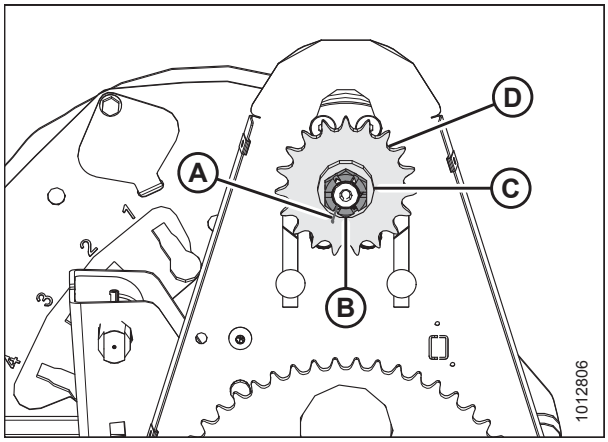


Figure 5.234: Reel Drive Sprocket

Installing Reel Drive Sprocket

DANGER

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

1. Align the keyway in sprocket (D) with the key on the motor shaft, and slide the sprocket onto the shaft. Secure with flat washer (C) and slotted nut (B).
2. Torque slotted nut (B) to 54 Nm (40 lbf·ft).
3. Install cotter pin (A). If necessary, tighten slotted nut (B) to the next slot to install the cotter pin.

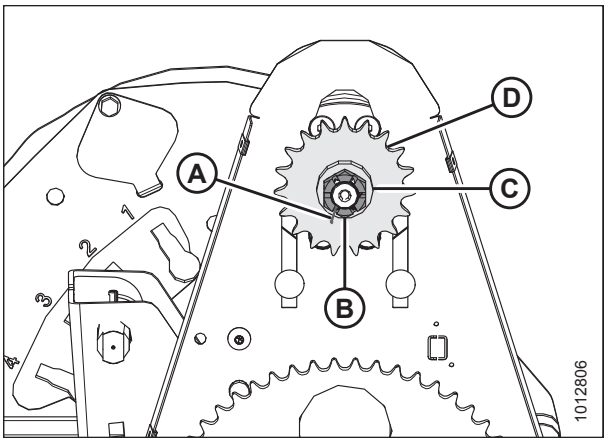


Figure 5.235: Reel Drive

4. Install drive chain (A) onto drive sprocket (B).
5. Tighten the drive chain. For instructions, refer to *Tightening Reel Drive Chain, page 228*.
6. Reinstall the reel drive cover. For instructions, refer to *Installing Reel Drive Cover, page 226*.

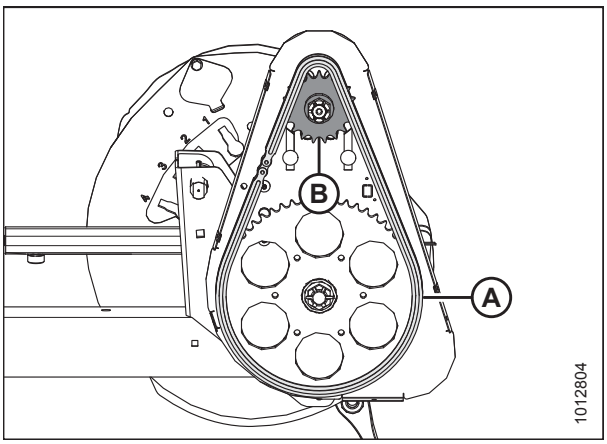


Figure 5.236: Reel Drive

5.9.4 Double-Reel Drive U-Joint

The double-reel drive U-joint allows each reel to move independently.

Lubricate the U-joint according to the specifications. For instructions, refer to *5.3.6 Lubrication, page 120*.

Replace the U-joint if severely worn or damaged. For instructions, refer to *Removing Double-Reel Drive U-Joint, page 231*.

Removing Double-Reel Drive U-Joint

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Remove the drive cover. For instructions, refer to *Removing Reel Drive Cover, page 225*.

3. Support the inboard end of the right reel with a front end loader and nylon slings (A) or equivalent lifting devices.

   IMPORTANT:

   To avoid damaging or denting the center tube, support the reel as close to the end disc as possible.

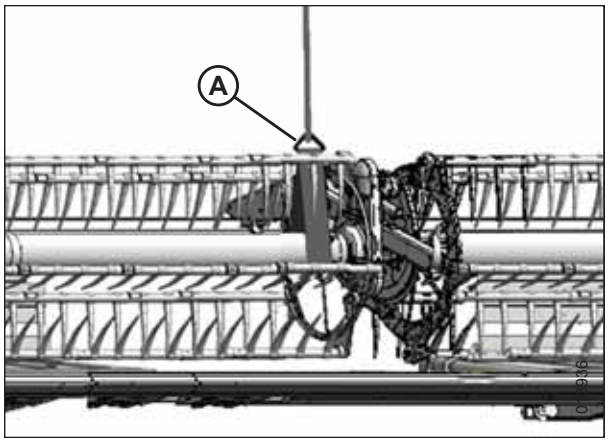


Figure 5.237: Supporting Reel

4. Remove four bolts (A) securing the reel tube to U-joint flange (B), and move the reel sideways.

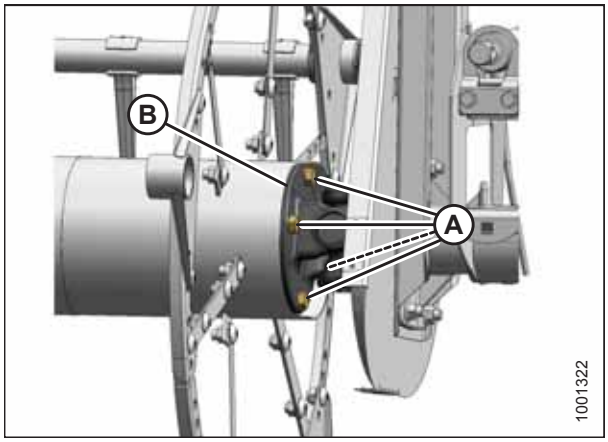


Figure 5.238: U-Joint

5. Remove six bolts (A) attaching U-joint flange (B) to driven sprocket (C).
6. Remove the U-joint.

   NOTE:

   It may be necessary to move the right reel sideways so that the U-joint can clear the tube.

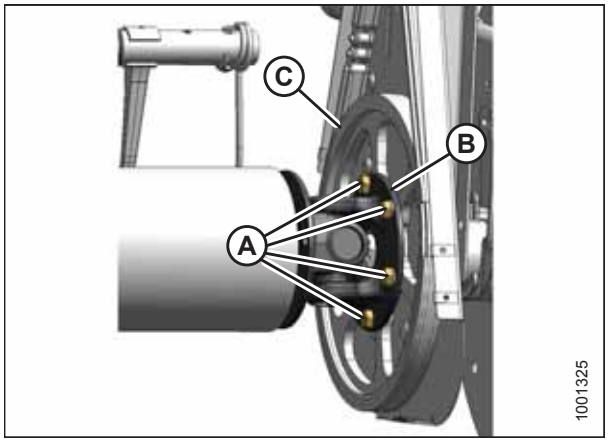


Figure 5.239: U-Joint

Installing Double-Reel U-Joint

1. Position U-joint flange (B) onto driven sprocket (C) as shown.
2. Apply medium-strength threadlocker (Loctite® 243 or equivalent), and install six bolts (A). Hand-tighten the bolts; do **NOT** torque the bolts.

   NOTE:

   Only four bolts (A) are shown in the illustration at right.

   NOTE:

   It may be necessary to move the right reel sideways so that the U-joint can clear the reel tube.

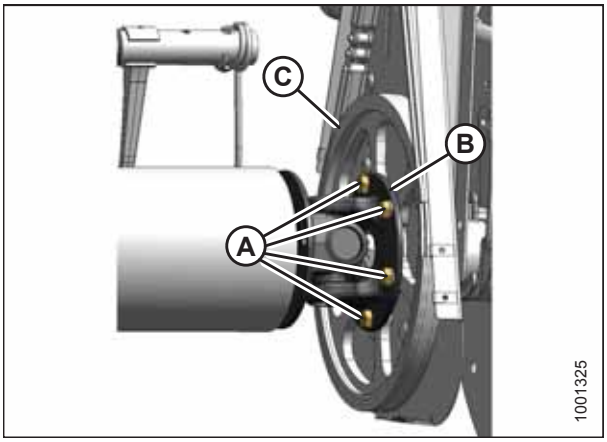


Figure 5.240: U-Joint

3. Position the right reel tube against the reel drive and engage the stub shaft into the U-joint pilot hole.
4. Rotate the reel until the holes in the end of the reel tube and U-joint flange (B) line up.
5. Apply medium-strength threadlocker (Loctite® 243 or equivalent) to four 1/2 in. bolts (A) and secure in the flange.
6. Torque the ten bolts to 108 Nm (80 lbf·ft).

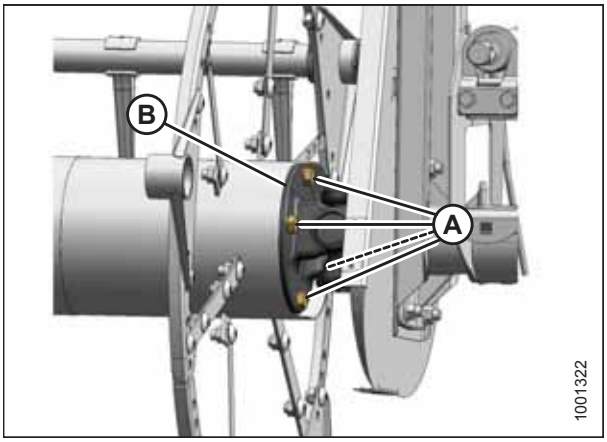


Figure 5.241: U-Joint

7. Remove sling (A) from the reel.
8. Install the drive cover. For instructions, refer to *Installing Reel Drive Cover, page 226*.

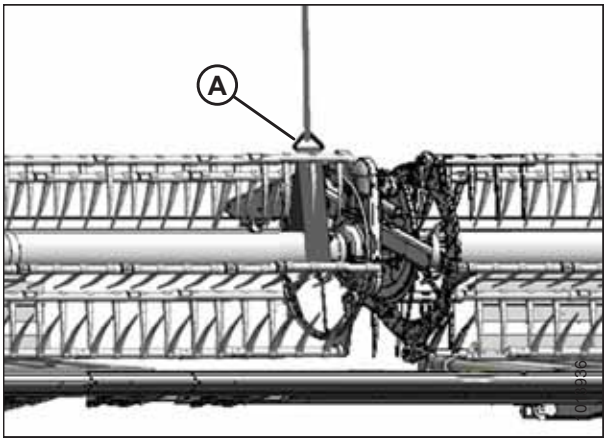


Figure 5.242: Supporting Reel

5.9.5 Reel Drive Motor

The reel drive motor is used on the reel drive system on double-reel draper headers. This motor does not require regular maintenance or servicing. If problems occur with the motor, remove it and have it serviced by your MacDon Dealer.

Removing Reel Drive Motor

To remove the reel drive motor, follow the recommended removal procedure provided here.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Loosen the drive chain. For instructions, refer to *Loosening Reel Drive Chain, page 227*.
3. Remove the drive sprocket. For instructions, refer to *Removing Reel Drive Sprocket, page 230*.
4. Mark hydraulic lines (A) and their connections on motor (B) to ensure correct reinstallation.

   NOTE:

   Before disconnecting the hydraulic lines, clean the motor's ports and exterior surfaces.
5. Disconnect hydraulic lines (A) at motor (B). Cap or plug open ports and lines.
6. Remove four nuts and bolts (C), and remove motor (B). Retrieve the spacer (if installed) from between motor (B) and the motor mount.
7. If the motor is being replaced, remove the hydraulic fittings from the old motor and install them in the new motor using the same orientations.

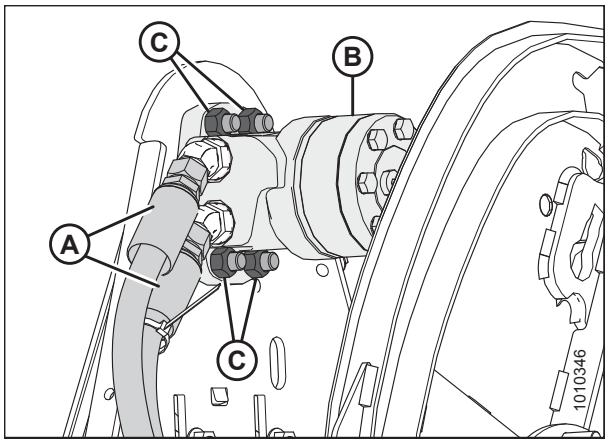


Figure 5.243: Reel Motor and Hoses

Installing Reel Drive Motor

To install the reel drive motor, follow the recommended installation procedure provided here.

1. Slide motor mount (A) up or down so the motor mounting holes (B) are accessible through the openings in the chain case.

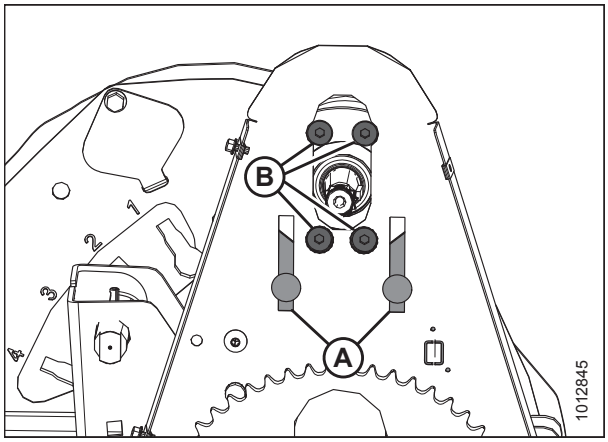


Figure 5.244: Reel Drive Motor Mounting Holes

2. Attach motor (A) (and spacer if previously removed) to motor mount (B) with four 1/2 x 1 3/4 in. countersunk bolts and nuts (C).
3. If installing a new motor, install the hydraulic fittings (not shown) from the original motor.

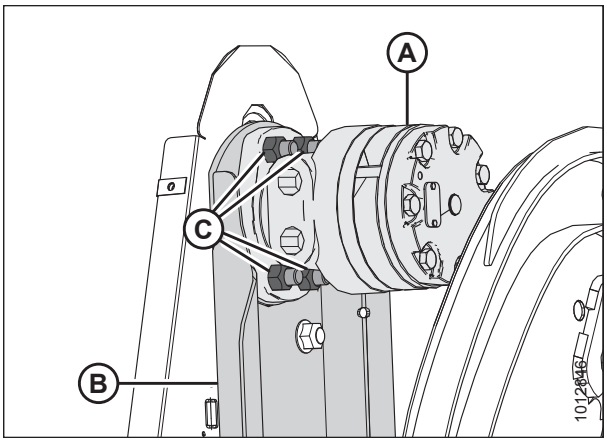


Figure 5.245: Reel Drive Motor

4. Remove the caps or plugs from the ports and lines and connect hydraulic lines (A) to hydraulic fittings (B) on motor (C).

   NOTE:

   Ensure hydraulic lines (A) are installed in their original locations.
5. Install the drive sprocket. For instructions, refer to *Installing Reel Drive Sprocket, page 230*.
6. Tighten the drive chain. For instructions, refer to *Tightening Reel Drive Chain, page 228*.

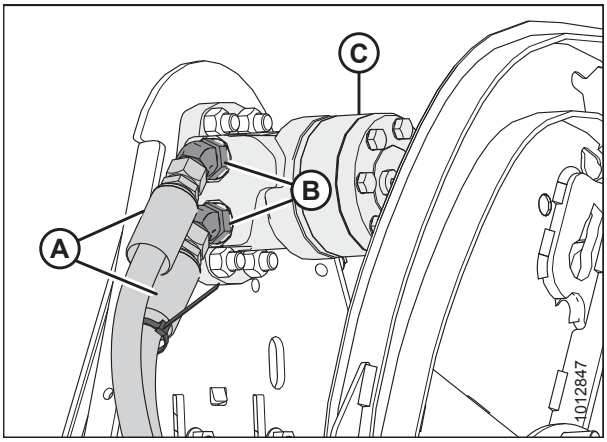


Figure 5.246: Reel Motor and Hoses

5.9.6 Replacing Double-Reel Header Drive Chain

Refer to the following two methods for replacing the drive chain on a double-reel drive:

- *Replacing Chain Using the Reel Drive Method, page 235*
- *Replacing Chain Using the Breaking the Chain Method, page 237*

Both procedures are acceptable, but disconnecting the reel drive method is preferable because it doesn't affect the chain's integrity.

Replacing Chain Using the Reel Drive Method

DANGER

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

1. Loosen the drive chain. For instructions, refer to *Loosening Reel Drive Chain, page 227*.

2. Stop the engine, and remove the key from the ignition.
3. Support the inboard end of the right reel with a front end loader and nylon slings (A) (or equivalent lifting device).

   IMPORTANT:

   Avoid damaging or denting the center tube by supporting the reel as close to the end disc as possible.

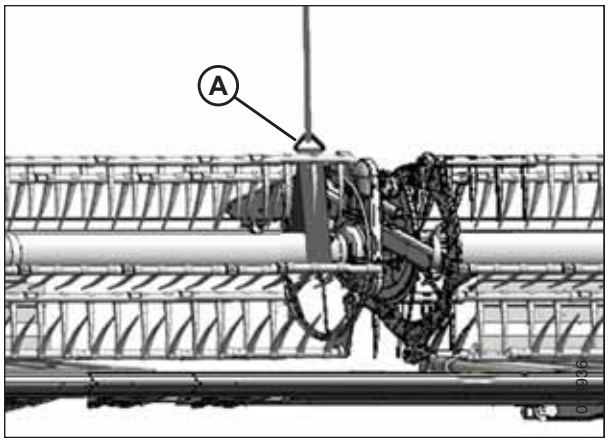


Figure 5.247: Supporting Reel

4. Remove four bolts (A) securing the reel tube to U-joint flange (B).

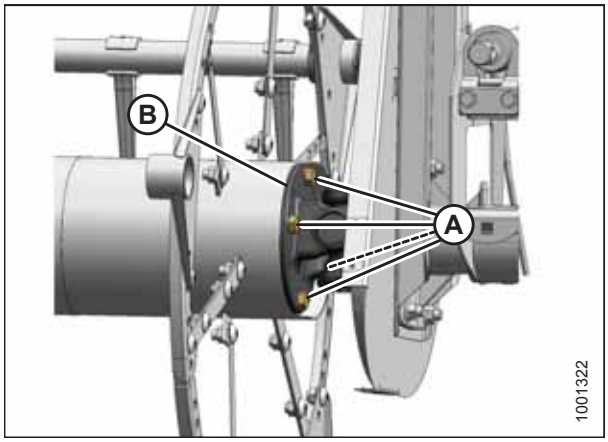


Figure 5.248: U-Joint

5. Move the right reel sideways to separate reel tube (A) from U-joint (B).
6. Remove drive chain (C).
7. Route new chain (C) over U-joint (B), and position it on the sprockets.
8. Position right reel tube (A) against the reel drive, and engage the stub shaft into the U-joint pilot hole.
9. Rotate the reel until the holes in the end of the reel tube and U-joint flange (B) line up.

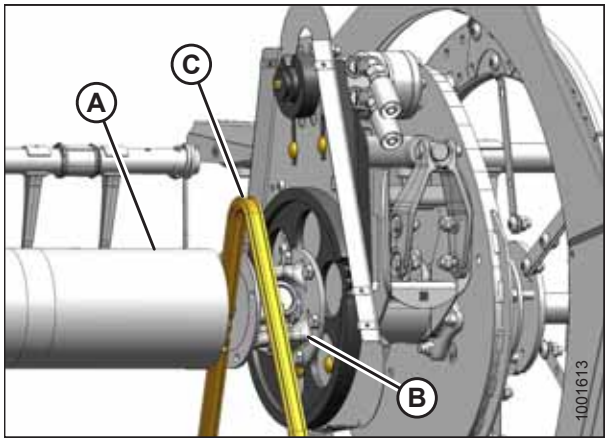


Figure 5.249: Replacing Chain

10. Apply medium-strength threadlocker (Loctite® 243 or equivalent) to four 1/2 in. bolts (A), and secure with lock washers.
11. Torque to 102–115 Nm (75–85 lbf·ft).

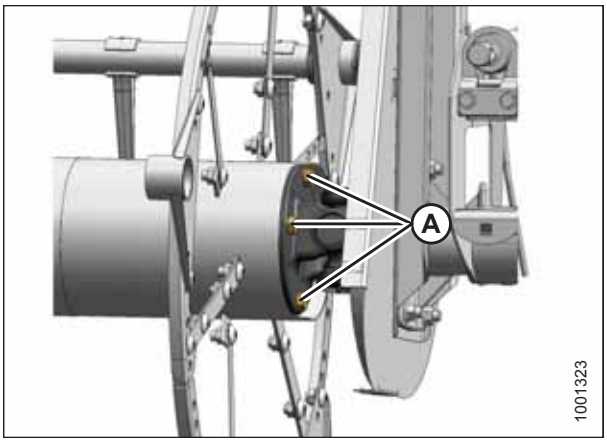


Figure 5.250: U-Joint

12. Remove temporary reel support (A).

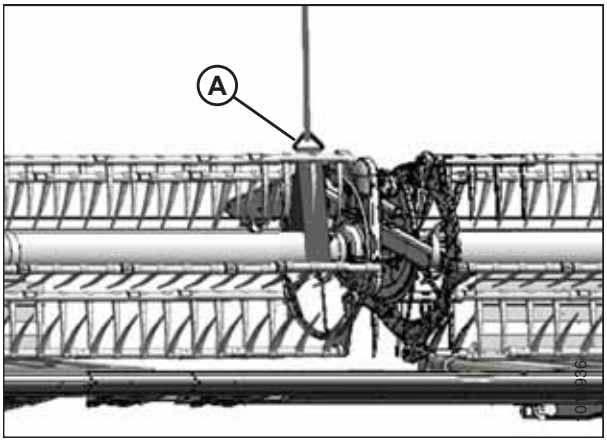


Figure 5.251: Supporting Reel

Replacing Chain Using the Breaking the Chain Method

1. Grind off the head of a link rivet on chain (A), punch out the rivet, and remove the chain.
2. Grind off the head of a link rivet on the new chain, punch out the rivet, and separate the chain.
3. Position the ends of the new chain onto sprocket (B).

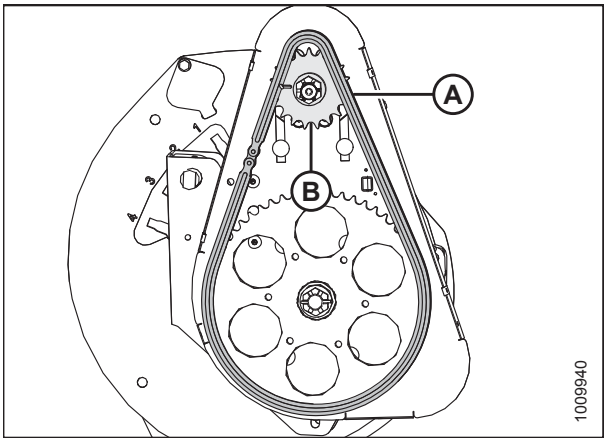


Figure 5.252: Reel Drive

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

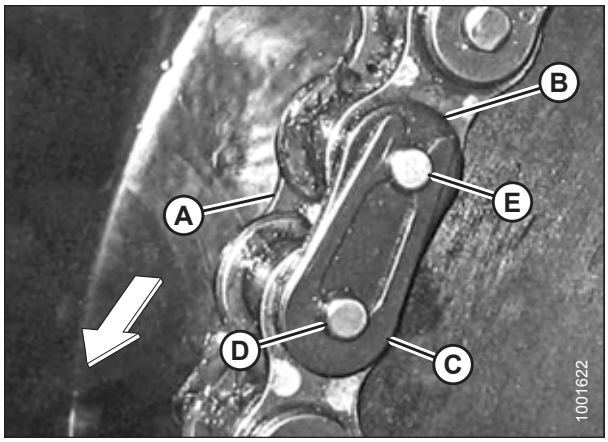


Figure 5.253: Chain

10. Tighten the drive chain. For instructions, refer to *Tightening Reel Drive Chain, page 228*.

5.9.7 Replacing Single-Reel Header Drive Chain

Chains wear out and need to be replaced.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Remove the reel drive cover. For instructions, refer to *Removing Reel Drive Cover, page 225*.
3. Loosen the drive chain. For instructions, refer to *Loosening Reel Drive Chain, page 227*.
4. Lift chain (A) off drive sprocket (B).
5. Lower the chain until it is free from lower sprocket (C), and then remove the chain from the drive.
6. Position new chain (A) around the bottom teeth on lower sprocket (C).
7. Lift the chain onto drive sprocket (B), ensuring all the links are properly engaged in the teeth.
8. Tighten the drive chain. For instructions, refer to *Tightening Reel Drive Chain, page 228*.
9. Reinstall the reel drive cover. For instructions, refer to *Installing Reel Drive Cover, page 226*.

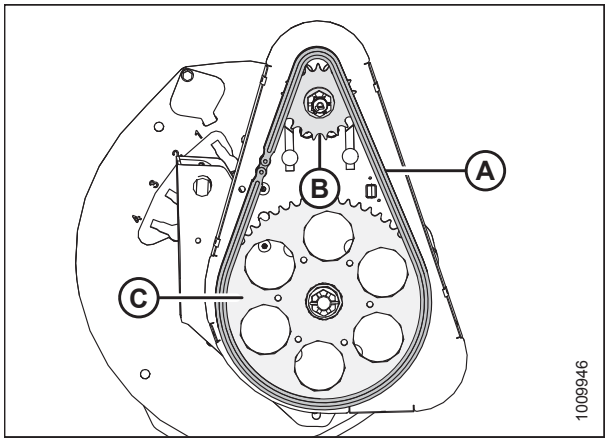


Figure 5.254: Reel Drive

5.10 Transport System (Option)

Refer to *6.3.4 Stabilizer Wheels and Transport Package, page 250* for more information.

5.10.1 Checking Wheel Bolt Torque

If a transport system is installed, follow these steps to torque the wheel bolts. Wheel bolt torque should be checked 1 hour after installation and every 100 hours thereafter.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Follow the bolt tightening sequence shown, and torque the wheel bolts to 110–120 Nm (80–90 lbf·ft).

   IMPORTANT:

   Whenever a wheel is removed and reinstalled, check the wheel bolt torque after 1 hour of operation and every 100 hours thereafter.

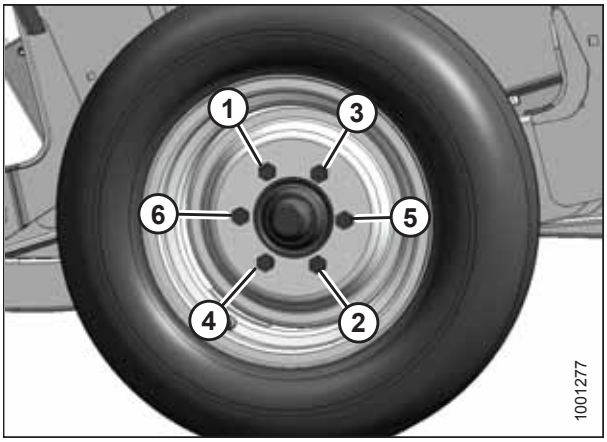


Figure 5.255: Bolt Tightening Sequence

5.10.2 Checking Axle Bolt Torque

If a transport system is installed, do the following steps to torque the axle bolts:

DANGER

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

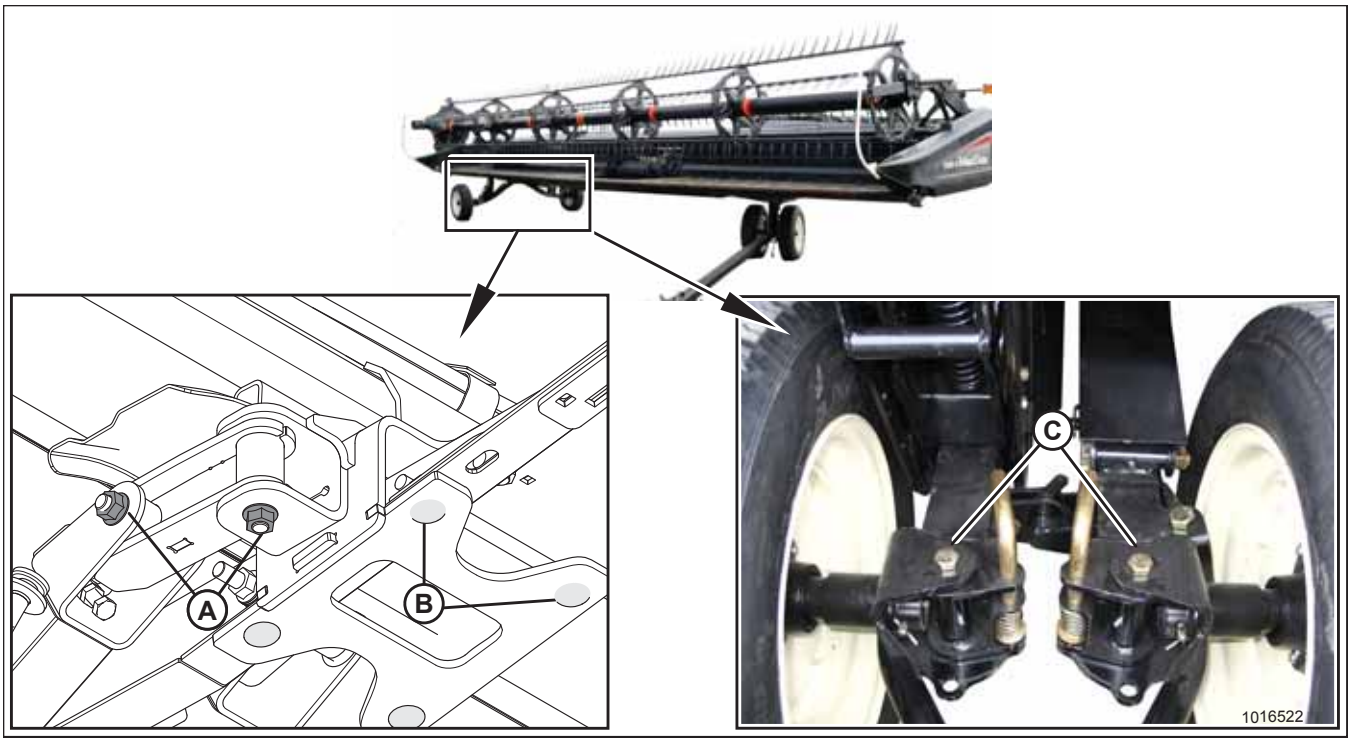


Figure 5.256: Axle Bolts

1. Check and tighten axle bolts **DAILY** until torque is maintained as follows:
   - (A): 244 Nm (180 lbf·ft)
   - (B): 203 Nm (150 lbf·ft)
   - (C): 244 Nm (180 lbf·ft)

5.10.3 Checking Tire Pressure

Proper tire pressure ensures tires perform properly and wear evenly.

WARNING

- **A tire can explode during inflation, which could cause serious injury or death.**
- **Do NOT stand over tire. Use a clip-on chuck and extension hose.**
- **Do NOT exceed maximum inflation pressure indicated on tire label or sidewall.**
- **Replace tires that have defects.**
- **Replace wheel rims that are cracked, worn, or severely rusted.**
- **Never weld a wheel rim.**

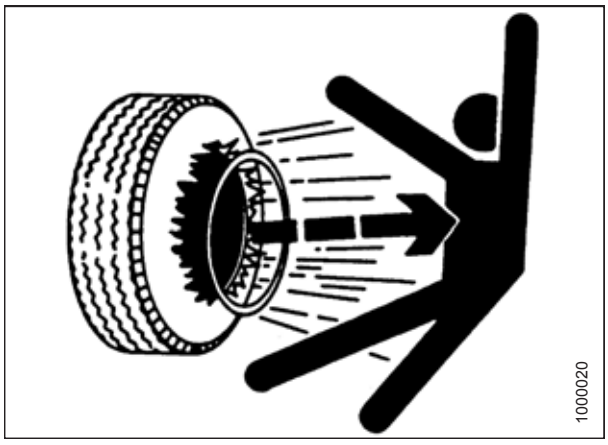


Figure 5.257: Inflation Warning

- **Never use force on an inflated or partially inflated tire.**
- **Make sure the tire is correctly seated before inflating to operating pressure.**

- **If the tire is not correctly positioned on the rim or is overinflated, the tire bead can loosen on one side causing air to escape at high speed and with great force. An air leak of this nature can thrust the tire in any direction endangering anyone in the area.**
- **Make sure all the air is removed from the tire before removing the tire from the rim.**
- **Do NOT remove, install, or repair a tire on a rim unless you have the proper equipment and experience to perform the job.**
- **Take the tire and rim to a qualified tire repair shop.**

1. Check the tire pressure. Refer to Table *5.8, page 241*.
2. Make sure the tire is correctly seated on the rim before inflating.
   a. If the tire is not correctly positioned on the rim, take the tire to a qualified tire repair shop.
3. If inflation is required, use a clip-on chuck and an extension hose to inflate the tire to the desired pressure.

   IMPORTANT:

   Do NOT exceed maximum inflation pressure indicated on tire label or sidewall.

Table 5.8 Tire Pressure

Size	Load Range	Pressure
ST205/75 R15	D	517 kPa (75 psi)
ST205/75 R15	E	586 kPa (85 psi)

Chapter 6: Options and Attachments

The following options and attachments are available for use with your header. See your MacDon Dealer for availability and ordering information.

6.1 Reel

6.1.1 Multi-Crop Rapid Reel Conversion Kit

For use on double-reel headers only, the Multi-Crop Rapid Reel Conversion kit decreases the time required to change the fore-aft cylinder position on the reel support arm from the normal operating location to a farther aft location that minimizes crop disturbance. The kit also allows the reel fore-aft cylinders to be quickly moved to the normal operating location.

MD #B6590

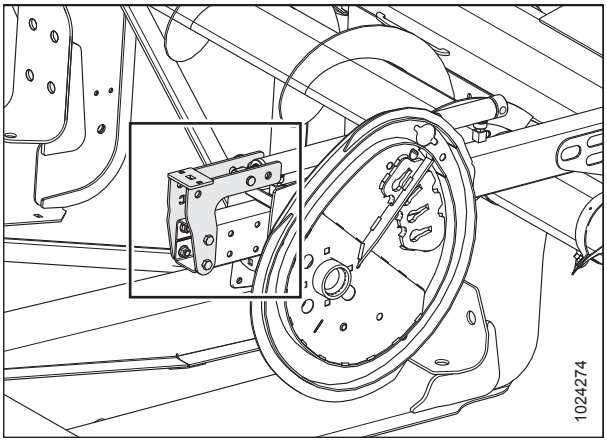


Figure 6.1: Center Arm – Left and Right Arms Similar

6.1.2 Reel Arm Extension Kit – North American-Configured Headers Only

This kit provides extensions for the outer reel support arms. These extensions provide the additional reel arm length required to properly install a Vertical Knife Mount kit (MD #B6608, MD #B6609) onto the header. The Reel Arm Extension kit also includes reel fore-aft brackets allowing quick reel repositioning from the reel's most forward position to its most rearward position.

NOTE:

Parts removed from illustration for clarity.

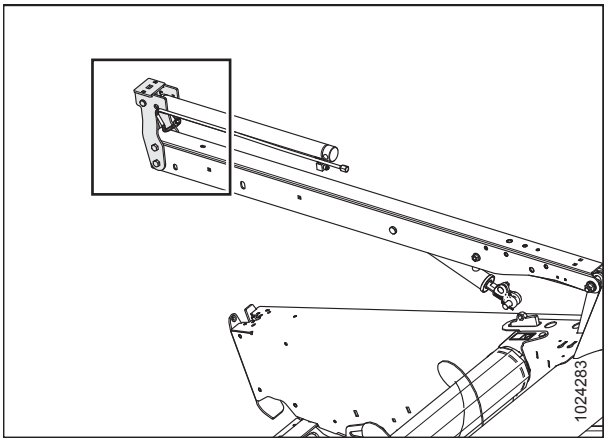


Figure 6.2: Right Arm – Center and Left Arms Similar

6.1.3 Lodged Crop Reel Finger Kit

Steel fingers (A) provided in the Lodged Crop Reel Finger kit attach to the ends of every other tine bar and help to clear material in heavy, hard-to-cut crops such as lodged rice.

Each kit contains three fingers for the cam end of the reel and three fingers for the tail end. Hardware and installation instructions are included in the kit.

MD #B4831

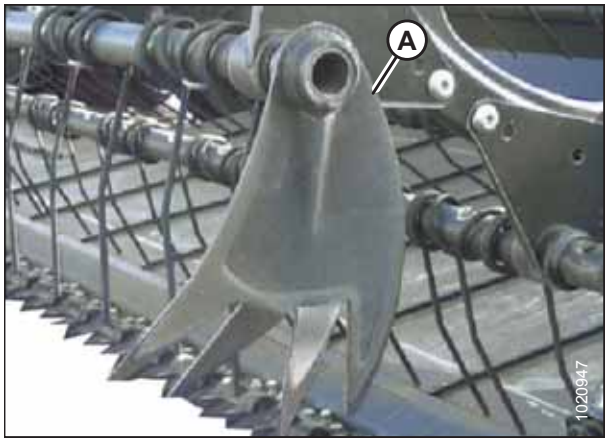


Figure 6.3: Lodged Crop Fingers

6.1.4 Reel Tine Tube Conversion Kit

These kits allow conversion from a five- or six-bat reel to a nine-bat reel.

Order the following bundles according to your header size and type:

- D115X – Steel Fingers – MD #B6514
- D115X – Plastic Fingers – MD #B6516
- D120X – Steel Fingers – MD #B6515
- D120X – Plastic Fingers – MD #B6517
- D125X – Steel Fingers – MD #B5656
- D125X – Plastic Fingers – MD #B5937
- D130XL – Plastic Fingers – MD #B6029

NOTE:

You must also order additional endshields when converting the reel.

6.1.5 Reel Endshield Kit

The steel shields provided in the reel endshield kit attach to the ends of the reels and help to clear material in heavy, hard-to-cut crops. They are standard equipment on all headers (except those with nine-bat reels). Hardware and installation instructions are included in the kit.

See your MacDon Dealer for more information.

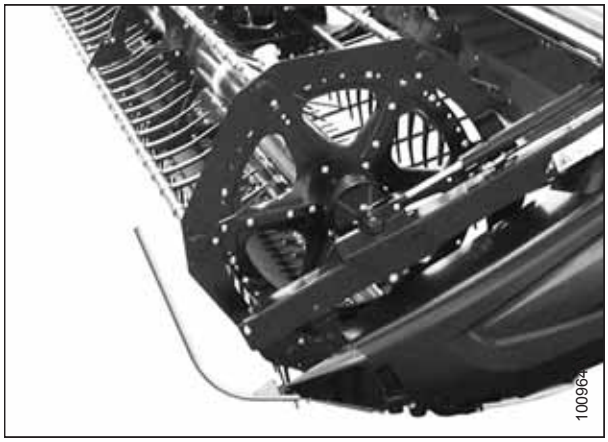


Figure 6.4: Reel Endshields

6.1.6 Tine Tube Reinforcing Kit

Tine tube reinforcing kits are available for five- and six-bat reels. They are designed to support high reel loads when cutting extremely heavy crops. Installation instructions are provided in the kit.

- Five-Bat Reels – MD #B5825
- Six-Bat Reels – MD #B5826

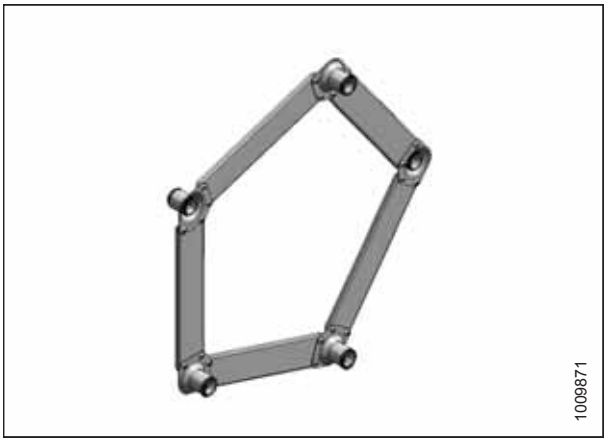


Figure 6.5: Five-Bat Reinforcing Kit Shown – Six-Bat Reinforcing Kit Similar

6.1.7 Reel Drop Rate Adjuster Kit

The reel drop rate adjuster kit (A) permits adjustment of the reel drop rate via a flow control valve that gets installed in the reel lift circuit. Installation instructions are included in the kit.

See your MacDon Dealer for more information.

MD #306410

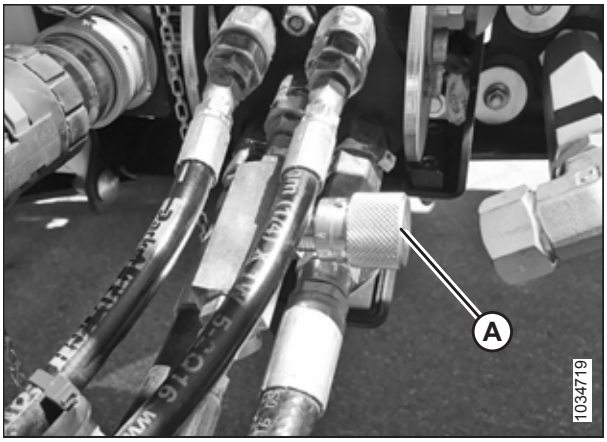


Figure 6.6: Draper/Reel Multicoupler

6.2 Cutterbar Kits

The cutterbar is located on the front of the header. It supports the knife and guards which is used to cut the crop.

6.2.1 Cutterbar Wearplate

Cutterbar wearplates are recommended for cutting on the ground when the soil is adhering to the steel.

Order one of the following bundles based on header size:

- 4.6 m (15 ft.) – MD #B4864
- 6.1 m (20 ft.) – MD #B4865
- 7.6 m (25 ft.) – MD #B4838

Figure 6.7: Cutterbar Wearplates

6.2.2 Knife Cutout Cover

Knife cutout covers attach to the endsheets and prevent cut crop, particularly severely lodged crop, from passing through the knifehead opening and accumulating in the knife drive box and endsheet.

Order the following kits according to your guard type:

- Regular Guards – MD #220101
- Stub Guards – MD #220103

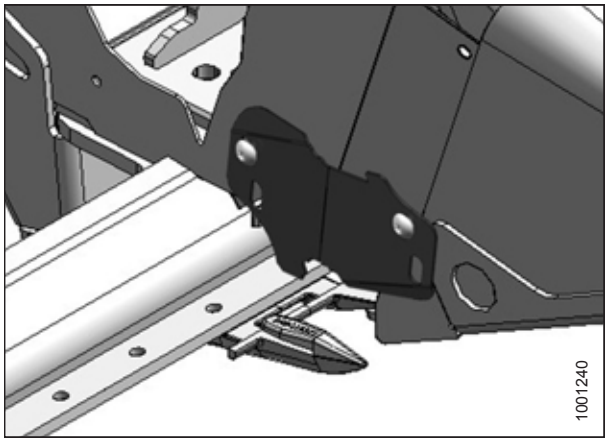


Figure 6.8: Knife Cutout Cover

6.2.3 Rock Retarder

Rock retarder (A) consists of a steel angle that is bolted to the cutterbar immediately aft of the knife, and helps prevent rocks and large debris from being swept onto the drapers with the crop. Installation instructions are included with the kit.

Order bundles by header size:

- D125X – MD #B5084
- D130XL and D135XL – MD #B5084
- D140XL and D145XL – MD #B5085

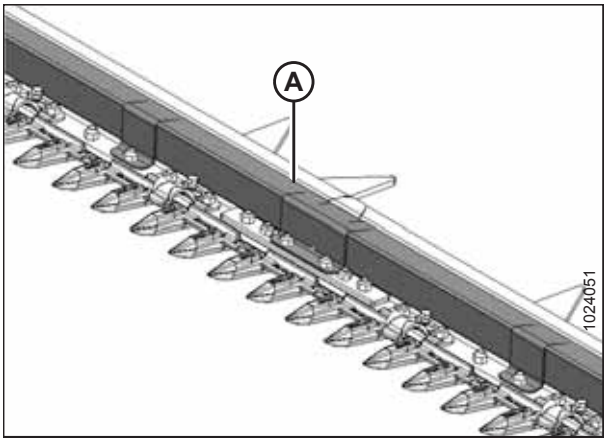


Figure 6.9: Rock Retarder

6.2.4 Stub Guard Conversion Kit

Stub guards, complete with top guides and adjuster shoes, are designed to cut tough crops.

Installation and adjustment instructions are included in the kits.

Order one of the following bundles according to your header size:

- 4.6 m (15 ft.) – MD #B5009
- 6.1 m (20 ft.) – MD #B5010
- 7.6 m (25 ft.) – MD #B5011
- 9.1 m (30 ft.) – MD #B5012
- 10.7 m (35 ft.) – MD #B5013

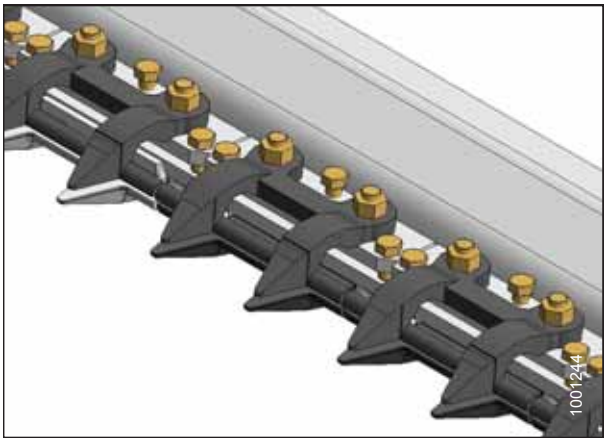


Figure 6.10: Stub Guards

6.2.5 Vertical Knife Mounts

The vertical knife mounts allow the installation of vertically oriented knives onto both ends of the header.

The vertical knives themselves are not sold by MacDon and must be purchased from a separate supplier.

Installation and adjustment instructions are included in the kits.

Order mount kits based on whether they will be installed on the left or right side of the header:

NOTE:

While the Right Vertical Knife Mount kit can be installed independently of the Left Vertical Knife Mount kit, the Left Vertical Knife Mount kit **must** be installed with the Right Vertical Knife Mount kit.

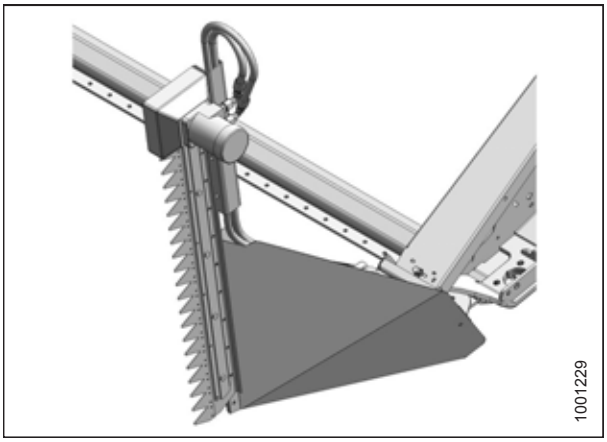


Figure 6.11: Vertical Knife Mount

- Left – MD #B6608 (includes hardware and some plumbing. This mount requires installation of MD #B6609)
- Right – MD #B6609 (includes flow control, template, hardware, and some plumbing. This mount can be installed individually or with MD #B6608)

6.3 Header Kits

Header options add features or enhancements to the header frame rather than a specific system or function.

6.3.1 Divider Quick Latch Kit

Divider Quick Latch kits attach to the endsheets. They allow for quick removal and storage of endsheet divider cones and, if required, reduce the transport width of the header. Installation instructions are included in the kit.

MD #B6158

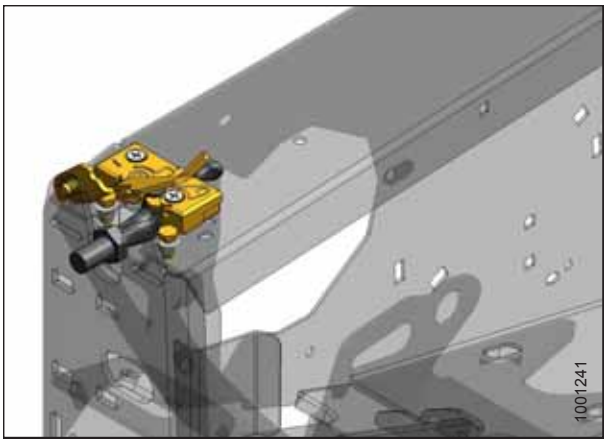


Figure 6.12: Divider Latch

6.3.2 Stabilizer Wheels

Stabilizer wheels help stabilize the header in field conditions that would otherwise cause the header to bounce, resulting in uneven cutting heights. Installation and adjustment instructions are included in the kit.

Available as an attachment for use with 9.1–13.7 m (30–45 ft.) headers.

MD #C1986

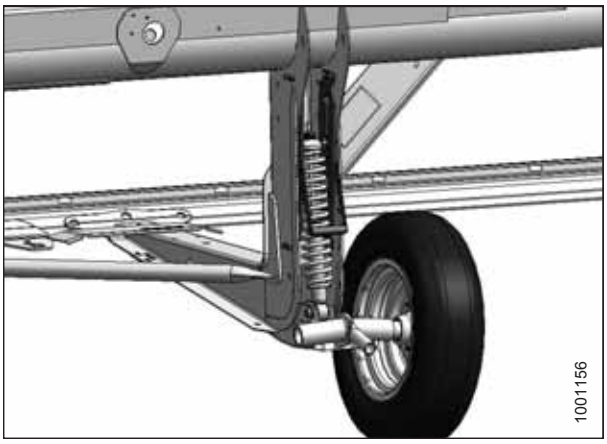


Figure 6.13: Stabilizer Wheel

6.3.3 Secondary Stabilizer Wheel

The secondary stabilizer wheel is added to existing stabilizer wheels to help stabilize the header in field conditions that would otherwise cause the header to bounce and result in uneven cutting height. Installation and adjustment instructions are included with the kit.

Available as an attachment for use with D130XL, D135XL, D140XL, and D145XL headers.

MD #B6179[78]

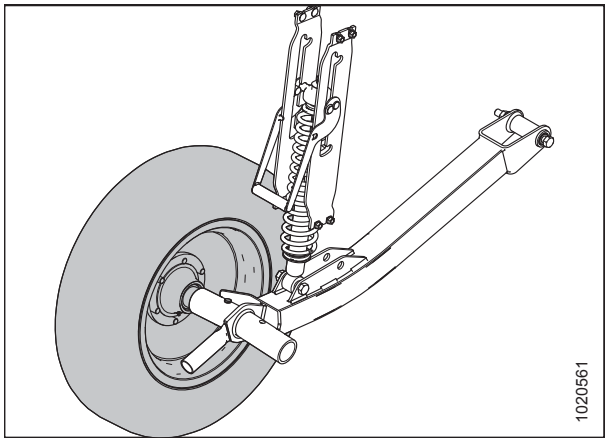


Figure 6.14: Secondary Stabilizer Wheel

6.3.4 Stabilizer Wheels and Transport Package

The Stabilizer Wheels and Transport Package help to stabilize the header in field conditions that would otherwise cause the header to bounce, resulting in uneven cutting heights. This system is similar to the Stabilizer Wheel (MD #C1986) option. For instructions, refer to *6.3.2 Stabilizer Wheels, page 249*.

The Stabilizer Wheels and Transport Package are also used to convert the header into transport mode for slow-speed towing behind a properly-configured windrower (or agricultural tractor). A tow pole and installation instructions are included in the kit.

This option is available for use with 9.1 m (30 ft.) and wider headers.

MD #C2009

Figure 6.15: Stabilizer Wheels and Transport

78. Kit consists of one wheel assembly; two kits are required to upgrade both sides of the header.

6.3.5 Skid Shoe Kits

Skid Shoe kits provide improved performance when cutting low to the ground.

Installation instructions are included in the kits.

- MD #B5615 – Inboard Skid Shoes
- MD #B4963 – Outboard Skid Shoes

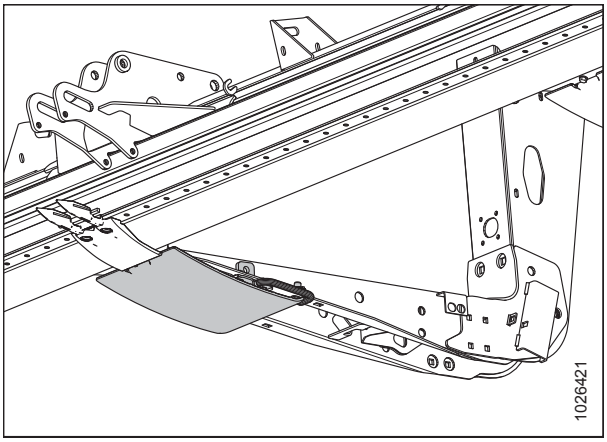


Figure 6.16: Center Skid Shoe – Inboard Shown, Outboard Similar

6.3.6 Steel Skid Shoes

Steel skid shoes offer extra abrasion resistance.

IMPORTANT:

Not recommended for wet mud or conditions prone to sparking.

Installation instructions are included with the kit.

MD #B9053

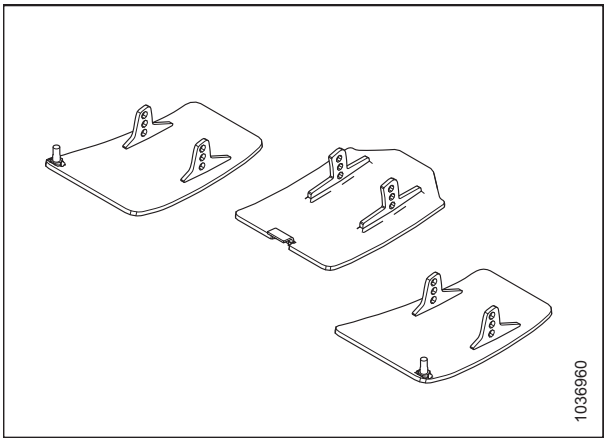


Figure 6.17: Steel Skid Shoe

6.4 Crop Delivery Kits

Crop delivery is the process in which crop gets from the cutterbar to the crimper or opening at the back of the header. Optional crop delivery kits can optimize header performance for specific crops or conditions.

6.4.1 Draper Deflector – Wide

Wide metal draper deflectors attach to the inboard side of the endsheets to prevent material from falling through the gap between the endsheet and the draper.

Installation instructions are included with the kit.

IMPORTANT:

The wide draper deflector is **NOT** compatible with the Lodged Crop Reel Finger (MD #B4831) option.

NOTE:

Required for double swathing only (leaves a gap between the standing crop and the swath for the divider to run through).

MD #B6551 – for D1X (includes extra parts for various cutterbar layouts).

MD #B6552 – for D1XL

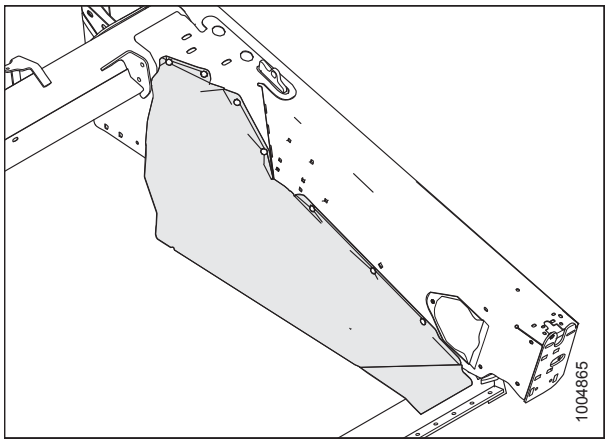


Figure 6.18: Wide Draper Deflector

6.4.2 Draper Clips

Draper clips offer additional wear protection for the draper cleats. They may prove useful in situations where conditions are dry or consistently hot.

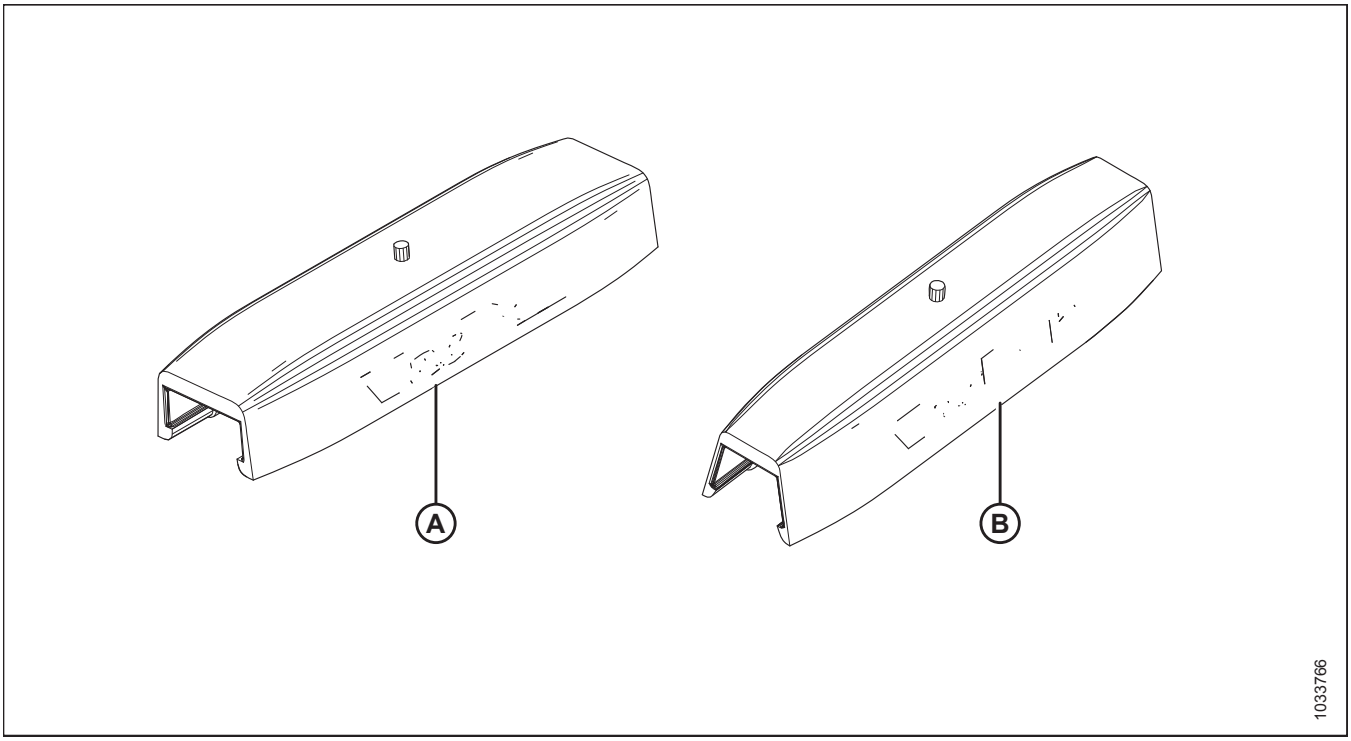


Figure 6.19: Draper Clips

Installation instructions are included with the kit.

- MD #294859 for square cleats (A) (for drapers MD #172195, MD #172196, MD #172197, MD #172198)

- MD #294858 for tapered cleats (B) (for drapers MD #220635, MD #220636, MD #220637, MD #220638, MD #220639, MD #220640)

6.4.3 Upper Cross Auger

Upper Cross Auger (A) attaches in front of the backtube and improves crop feeding into the center of the header in heavy crop conditions. It is ideal for high-volume harvesting of forages, oats, canola, mustard, and other tall, bushy, hard-to-feed crops.

Order from the following list of kits according to your header model:

- D115X – MD #B6280
- D120X – MD #B6281
- D125X – MD #B6461
- D130XL – MD #B6462
- D135XL – MD #B6463
- D140XL – MD #B6464
- D145XL[79] – MD #B6465

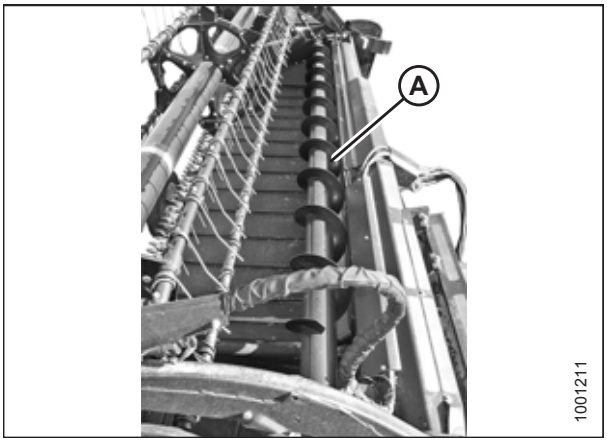


Figure 6.20: Upper Cross Auger

NOTE:

The wide draper deflector option is **NOT** compatible with the upper cross auger option.

6.4.4 Rice Divider Rods

Rice divider rods attach to the left and right crop dividers and divide tall and tangled rice crops in a similar manner to standard crop divider rods performing in standing crops.

Installation instructions are included in the kit.

MD #B5609

Figure 6.21: Rice Divider Rod

6.4.5 Double Draper Drive Kit

The Double Draper Drive (DDD) kit provides power to four draper rollers instead of the usual two in order to minimize draper slipping when using the side delivery feature in heavy forage crops.

Installation instructions are included in the kit.

NOTE:

The draper slip sensor is disabled with the installation of this kit.

79. This is a 12.2 m (40 ft.) auger, and is backtube mounted. It does **NOT** span the full length of the header.

- D1X Series – MD #B6154
- D1XL Series – MD #B6039

6.4.6 Draper Extension Kit

The draper extension kit increases the inboard length of each deck up to 500 mm (20 in.) which narrows the header opening and decreases windrow width when cutting light/thin crops.

The kit includes roller support extensions, a draper repair kit, all necessary hardware, and installation instructions.

- D1X Series – MD #B5407
- D1XL Series – MD #B6378

6.4.7 Swath Forming Rods – Center Delivery

Swath forming rods form windrows so the heads are in the center and protected from shatter. Swath forming rods are mainly used for grass seed cutting applications.

Installation and adjustment instructions are included with the kit.

MD #B4803

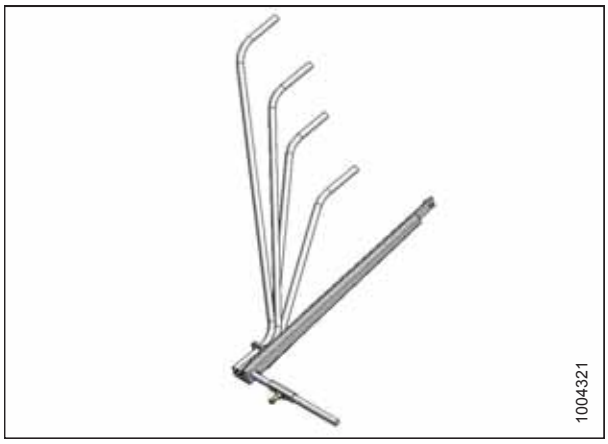


Figure 6.22: Swath Forming Rods

6.4.8 Swath Rods

End delivery deflector rods are used for double swathing with end delivery only.

The deflector rods help prevent delivered crop at the opening from interfering with the standing crop.

Installation and adjustment instructions are included in the kit.

Kits are available for installation on the left or the right side of the header:

- Left side: MD #B5088
- Right side: MD #B5089

For center delivery, order MD #B4803.

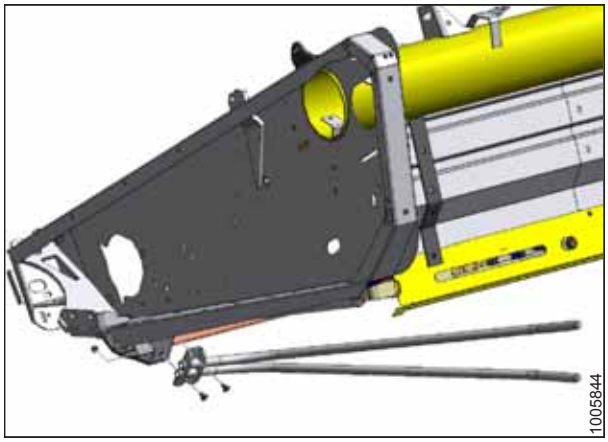


Figure 6.23: Swath Deflector

6.4.9 HC10 Hay Conditioner

The HC10 Hay Conditioner lays uniform, fluffy windrows. Conditioning or crimping the cut hay allows the release of moisture, resulting in faster drying times and earlier processing.

A parts list and installation and operating instructions are included with the kit.

MD #C1982

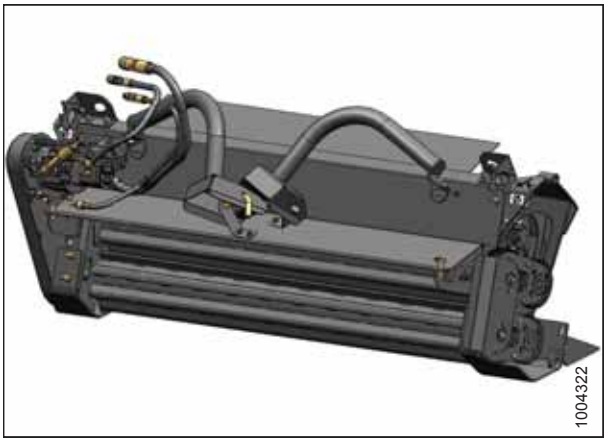


Figure 6.24: Hay Conditioner

6.4.10 Hydraulic Deck Shift Package

This system allows Operators to shift the decks using the in-cab console when double-swathing.

Installation and adjustment instructions are included with the kit.

Available on 7.6–12.2 m (25–40 ft.) headers.

MD #B5664

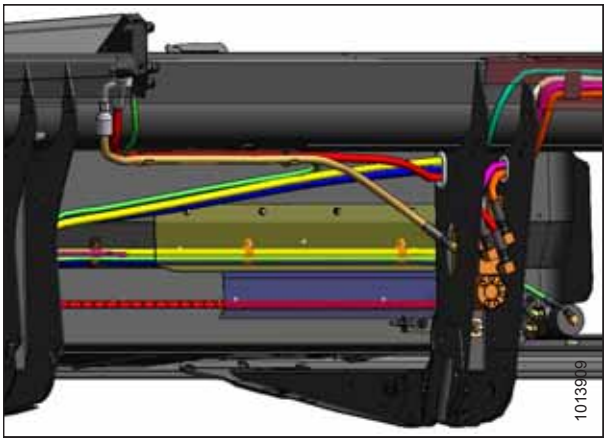


Figure 6.25: Hydraulic Deck Shift

6.4.11 Upper Cross Auger Hydraulic Kit for Double Draper Drive

This kit is required to provide hydraulic power to the upper cross auger (UCA) on headers with both UCA and double draper drive (DDD) kits installed. Operating both options without this kit can result in damage to the UCA motor and inadequate power to the draper drive system.

MD #B5606

Chapter 7: Unloading and Assembly

Refer to the header-specific instructions for unloading, assembly, and setup procedures that are included with your shipment.

Table 7.1 Unloading and Assembly Instructions

Shipping Destination	Header Description
North America	D1X and D1XL Series Draper Header for Windrowers
Export	D1X Series Draper Header for Windrowers

Chapter 8: Troubleshooting

Troubleshooting tables are provided to help you diagnose and solve any problems you may have with the header.

8.1 Crop Loss

Use the following tables to determine the issue with crop loss and find the recommended repair procedure.

Table 8.1 Troubleshooting Crop Loss at Cutterbar

Problem	Solution	Refer to
Symptom: Does not pick up downed crop		
Cutterbar too high	Lower cutterbar	• *Cutting off the Ground, page 58* • *Cutting on the Ground, page 61*
Header angle too low	Increase header angle	*3.7.3 Header Angle, page 63*
Reel too high	Lower reel	*3.7.8 Reel Height, page 66*
Reel too far back	Move reel forward	*3.7.9 Reel Fore-Aft Position, page 67*
Ground speed too fast for reel speed	Increase reel speed or reduce ground speed	• *3.7.4 Reel Speed, page 64* • *3.7.5 Ground Speed, page 65*
Reel fingers not lifting crop sufficiently	Increase finger pitch aggressiveness	*3.7.10 Reel Tine Pitch, page 68*
Reel fingers not lifting crop sufficiently	Install crop lifters	See your MacDon Dealer
Symptom: Heads shattering or breaking off		
Reel speed too fast	Reduce reel speed	*3.7.4 Reel Speed, page 64*
Reel too low	Raise reel	*3.7.8 Reel Height, page 66*
Ground speed too fast	Reduce ground speed	*3.7.5 Ground Speed, page 65*
Crop too ripe	Operate at night when humidity is higher	—
Symptom: Material accumulating in gap between cut-out in endsheet and knifehead		
Crop heads leaning away from knifehead hole in endsheet	Add knifehead shields (except in damp or sticky soils)	*5.5.9 Knifehead Shield, page 144*
Symptom: Strips of uncut material		
Crowding uncut crop	Allow enough room for crop to be fed to cutterbar	—
Broken knife sections	Replace broken sections	*5.5.1 Replacing Knife Section, page 132*
Symptom: Excessive bouncing at normal field speed		
Float set too light	Adjust header float	*3.7.2 Header Float, page 63*
Symptom: Divider rod running down standing crop		
Divider rods too long	Remove divider rod	*3.7.11 Crop Dividers, page 70*
Symptom: Crop not being cut at ends		
Reel not frowning or not centered in header	Adjust reel horizontal position or reel frown	• *3.7.9 Reel Fore-Aft Position, page 67* • *5.8.2 Reel Frown, page 202*

Table 8.1 Troubleshooting Crop Loss at Cutterbar (continued)

Problem	Solution	Refer to
Knife hold-downs not adjusted properly	Adjust hold-downs so knife works freely but still keep sections from lifting off guards	• *Checking and Adjusting Hold-Downs with Pointed Guards, page 141* • *Checking and Adjusting Hold-Down with Stub Guards, page 143*
Knife sections or guards are worn or broken	Replace all worn and broken cutting parts	*5.5 Cutterbar, page 132*
Header is not level	Level header	*3.12 Levelling the Header, page 84*
Reel fingers not lifting crop properly ahead of knife	Adjust reel position and/or finger pitch	• *3.7.9 Reel Fore-Aft Position, page 67* • *3.7.10 Reel Tine Pitch, page 68*
Divider runs down thick crop at ends preventing proper feeding due to material bridging the guards	Replace 3–4 end guards with stub guards	• *5.5.7 Knife Guards, page 137* • *6.2.4 Stub Guard Conversion Kit, page 247* • See your MacDon Dealer
Symptom: Bushy or tangled crop flows over divider rod, builds up on endsheets		
Divider rods providing insufficient separation	Install long divider rods	*3.7.11 Crop Dividers, page 70*
Symptom: Cut grain falling ahead of cutterbar		
Ground speed too slow	Increase ground speed	*3.7.5 Ground Speed, page 65*
Reel speed too slow	Increase reel speed	*3.7.4 Reel Speed, page 64*
Reel too high	Lower reel	*3.7.8 Reel Height, page 66*
Cutterbar too high	Lower cutterbar	• *Cutting off the Ground, page 58* • *Cutting on the Ground, page 61*
Reel too far forward	Move reel back on arms	*3.7.9 Reel Fore-Aft Position, page 67*
Cutting at speeds over 10 km/h (6 mph) with 10-tooth reel drive sprocket	Replace with 19-tooth reel drive sprocket	*5.9.3 Reel Drive Sprocket, page 229*
Worn or broken knife components	Replace components	*5.5 Cutterbar, page 132*

8.2 Cutting Action and Knife Components

Problem	Solution	Refer to
Symptom: Ragged or uneven cutting of crop		
Knife hold-downs not properly adjusted	Adjust hold-downs	• *5.5.8 Knife Hold-Downs, page 141* • *Checking and Adjusting Hold-Downs with Pointed Guards, page 141* • *Checking and Adjusting Hold-Down at Double-Knife Center Pointed Guard, page 142* • *Checking and Adjusting Hold-Down with Stub Guards, page 143*
Knife sections or guards are worn or broken	Replace all worn and broken cutting parts	*5.5.8 Knife Hold-Downs, page 141*
Knife is not operating at recommended speed	Check engine speed of windrower	Refer to the windrower operator's manual
Ground speed too fast for reel speed	Reduce ground speed or increase reel speed	• *3.7.4 Reel Speed, page 64* • *3.7.5 Ground Speed, page 65*
Reel fingers not properly lifting crop ahead of knife	Adjust reel position and/or finger pitch	• *3.7.9 Reel Fore-Aft Position, page 67* • *3.7.10 Reel Tine Pitch, page 68*
Cutterbar too high	Lower cutting height	*3.7.1 Cutting Height, page 58*
Header angle too flat	Steepen header angle	*3.7.3 Header Angle, page 63*
Bent knife causing binding of cutting parts	Straighten bent knife, and align guards	*5.5.7 Knife Guards, page 137*
Cutting edge of guards not close enough or parallel to knife sections	Align guards	*5.5.7 Knife Guards, page 137*
Tangled crop tough to cut	Install stub guards	• *5.5.7 Knife Guards, page 137* • *6.2.4 Stub Guard Conversion Kit, page 247* • See your MacDon Dealer
Reel too far back	Move reel forward	*3.7.9 Reel Fore-Aft Position, page 67*
Loose knife drive belt	Adjust drive belt tension	• *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160* • *Tensioning Timed Double-Knife Drive Belts, page 167*
Symptom: Knife plugging		
Reel too high or too far forward	Lower reel or move reel rearward	• *3.7.8 Reel Height, page 66* • *3.7.9 Reel Fore-Aft Position, page 67*
Ground speed too slow	Increase ground speed	*3.7.5 Ground Speed, page 65*

Problem	Solution	Refer to
Symptom: Ragged or uneven cutting of crop		
Loose knife drive belt	Adjust drive belt tension	• *Checking and Tensioning Untimed Double-Knife Drive Belts, page 160* • *Tensioning Timed Double-Knife Drive Belts, page 167*
Improper knife hold-down adjustment	Adjust knife hold-down	• *5.5.8 Knife Hold-Downs, page 141* • *Checking and Adjusting Hold-Downs with Pointed Guards, page 141* • *Checking and Adjusting Hold-Down at Double-Knife Center Pointed Guard, page 142* • *Checking and Adjusting Hold-Down with Stub Guards, page 143*
Dull or broken knife sections	Replace knife sections	*5.5.1 Replacing Knife Section, page 132*
Bent or broken guards	Align or replace guards	*5.5.7 Knife Guards, page 137*
Reel fingers not properly lifting crop ahead of knife	Adjust reel position and/or finger pitch	• *3.7.9 Reel Fore-Aft Position, page 67* • *3.7.10 Reel Tine Pitch, page 68*
Steel pick-up fingers contacting knife	Increase reel clearance to cutterbar or adjust frown	• *5.8.2 Reel Frown, page 202*
Float is set too heavy	Adjust springs for lighter float	*3.7.2 Header Float, page 63*
Mud or dirt build-up on cutterbar	Raise cutterbar by lowering skid shoes	*Cutting on the Ground, page 61*
Mud or dirt build-up on cutterbar	Install cut-out sections	See your MacDon Dealer
Mud or dirt build-up on cutterbar	Flatten header angle	*Adjusting Header Angle, page 64*
Knife is not operating at recommended speed	Check engine speed of windrower	Refer to the windrower operator's manual
Symptom: Knife back breakage		
Bent or broken guard	Straighten or replace guard	*5.5.7 Knife Guards, page 137*
Worn knifehead pin	Replace knifehead pin	*5.5.4 Removing Knifehead Bearing, page 134*
Dull knife	Replace knife	• *5.5.3 Removing Knife, page 134* • *5.5.6 Installing Knife, page 136*
Symptom: Excessive header vibration		
Knife hold-downs not properly adjusted	Adjust hold-downs	*5.5.8 Knife Hold-Downs, page 141*
Knives on double-knife drive not timed	Adjust knife timing	*Adjusting Timed Double-Knife Timing, page 169*
Knife not operating at recommended speed	Check engine speed of windrower	Refer to the windrower operator's manual

Problem	Solution	Refer to
Symptom: Ragged or uneven cutting of crop		
Excessive knife wear	Replace knife	• *5.5.3 Removing Knife, page 134* • *5.5.6 Installing Knife, page 136*
Loose or worn knifehead pin or drive arm	Tighten or replace parts	• *5.5.4 Removing Knifehead Bearing, page 134* • *5.6.1 Knife Drive Box, page 146*
Bent cutterbar	Straighten cutterbar	See your MacDon Dealer
Symptom: Excessive breakage of knife sections or guards		
Knife hold-downs not properly adjusted	Adjust knife hold-downs	*5.5.8 Knife Hold-Downs, page 141*
Cutterbar operating too low in stony conditions	Raise cutterbar using skid shoes	*Cutting on the Ground, page 61*
Float is set too heavy	Adjust springs for lighter float	*3.7.2 Header Float, page 63*
Bent or broken guard	Straighten or replace guard	*5.5.7 Knife Guards, page 137*
Header angle too steep	Flatten header angle	*Adjusting Header Angle, page 64*

8.3 Reel Delivery

Problem	Solution	Refer to
Symptom: Reel not releasing material in normal standing crop		
Reel speed too fast	Reduce reel speed	*3.7.4 Reel Speed, page 64*
Reel too low	Raise reel	*3.7.8 Reel Height, page 66*
Reel tines too aggressive	Reduce cam setting	*3.7.10 Reel Tine Pitch, page 68*
Reel too far back	Move reel forward	*3.7.9 Reel Fore-Aft Position, page 67*
Symptom: Reel not releasing material in lodged and standing crop (reel fully lowered)		
Reel tines too aggressive for standing crop	Reduce cam setting	*3.7.10 Reel Tine Pitch, page 68*
Symptom: Wrapping on reel end		
Reel tines too aggressive	Reduce cam setting	*3.7.10 Reel Tine Pitch, page 68*
Reel too low	Raise reel	*3.7.8 Reel Height, page 66*
Reel speed too fast	Reduce reel speed	*3.7.4 Reel Speed, page 64*
Crop conditions	Install optional endshields	See your MacDon Dealer
Reel not centered in header	Center reel in header	*5.8.3 Centering the Reel, page 203*
Symptom: Reel releases crop too quickly		
Reel tines not aggressive enough	Increase cam setting	*3.7.10 Reel Tine Pitch, page 68*
Reel too far forward	Move reel back	*3.7.9 Reel Fore-Aft Position, page 67*
Symptom: Reel will not lift		
Reel lift couplers are incompatible or defective	Change quick coupler	—
Symptom: Reel will not turn		
Control set at ‘0’	Activate reel speed control	*3.7.4 Reel Speed, page 64*
Quick couplers not properly connected	Connect couplers	*4 Header Attachment/Detachment, page 105*
Reel drive chain disconnected	Connect reel drive chain	*5.9.7 Replacing Single-Reel Header Drive Chain, page 238*
Symptom: Reel motion uneven under no load		
Excessive slack in reel drive chain	Tighten drive chain	*5.9.2 Reel Drive Chain, page 227*
Symptom: Reel motion is uneven or stalls in heavy crops		
Reel speed too fast	Reduce reel speed	*3.7.4 Reel Speed, page 64*
Reel fingers not aggressive enough	Move to a more aggressive finger pitch notch	*3.7.10 Reel Tine Pitch, page 68*
Reel too low	Raise reel	*3.7.8 Reel Height, page 66*
Relief valve on windrower has low relief pressure setting	Increase relief pressure to manufacturer’s recommendations	Refer to the windrower operator’s manual
Low oil level in reservoir on windrower **NOTE:** There may be more than one reservoir.	Fill to proper level	Refer to the windrower operator’s manual
Relief valve malfunction	Replace relief valve	Refer to the windrower operator’s manual

Problem	Solution	Refer to
Cutting tough crops with standard torque (19-tooth) reel drive sprocket	Replace with high torque (10-tooth) or 14-tooth reel drive sprocket	*5.9.3 Reel Drive Sprocket, page 229*
Symptom: Plastic fingers cut at tip		
Insufficient reel to cutterbar clearance	Increase clearance	*5.8.1 Reel-to-Cutterbar Clearance, page 198*
Symptom: Plastic fingers bent rearward at tip		
Reel digging into ground with reel speed slower than ground speed	Raise header	*3.7.1 Cutting Height, page 58*
Reel digging into ground with reel speed slower than ground speed	Decrease header tilt	*3.7.3 Header Angle, page 63*
Reel digging into ground with reel speed slower than ground speed	Move reel aft	*3.7.9 Reel Fore-Aft Position, page 67*
Symptom: Plastic fingers bent forward at tip		
Reel digging into ground with reel speed faster than ground speed	Raise header	*3.7.1 Cutting Height, page 58*
Reel digging into ground with reel speed faster than ground speed	Decrease header tilt	*3.7.3 Header Angle, page 63*
Reel digging into ground with reel speed faster than ground speed	Move reel aft	*3.7.9 Reel Fore-Aft Position, page 67*
Excessive plugging at cutterbar with wads of crop accumulating at cutterbar while maintaining reel operation	Correct plugging and cutting issues	*3.13 Unplugging the Cutterbar, page 85*
Excessive plugging at cutterbar with wads of crop accumulating at cutterbar while maintaining reel operation	Stop reel before plugging becomes excessive	—

8.4 Header and Drapers

Problem	Solution	Refer to
Symptom: Insufficient header lift		
Low relief pressure	Increase relief pressure	Refer to your MacDon Dealer
Symptom: Insufficient side draper speed		
Speed control set too low	Increase speed control setting	*3.7.6 Draper Speed, page 66*
Windrower header drive too slow	Adjust to correct speed for windrower model	Refer to the windrower operator's manual
Symptom: Insufficient draper speed		
Relief pressure too low	Increase relief pressure to recommended setting	Refer to your MacDon Dealer
Windrower header drive too slow	Adjust to correct speed for windrower model	Refer to the windrower operator's manual
Symptom: Insufficient draper speed		
Worn out gear pump	Replace gear pump	Refer to your MacDon Dealer
Pressure compensator (V7) set too low	Adjust to increase setting	Refer to the windrower operator's manual
Symptom: Draper will not move		
Drapers are loose	Tighten drapers	*5.7.3 Checking and Adjusting Draper Tension, page 177*
Drive or idler roller wrapped with material	Loosen draper and clean rollers	*5.7.3 Checking and Adjusting Draper Tension, page 177*
Slat or connector bar jammed by frame or material	Loosen draper and clear obstruction	*5.7.3 Checking and Adjusting Draper Tension, page 177*
Roller bearing seized	Replace roller bearing	*5.7.7 Draper Roller Maintenance, page 187*
Low hydraulic oil	Fill windrower hydraulic oil reservoir to full level	Refer to the windrower operator's manual
Symptom: Draper stalling		
Material not feeding evenly off knife	Lower reel	*3.7.8 Reel Height, page 66*
Material not feeding evenly off knife	Install stub guards	• *5.5.7 Knife Guards, page 137* • *6.2.4 Stub Guard Conversion Kit, page 247* • Refer to your MacDon Dealer
Symptom: Hesitation in flow of bulky crop		
Header angle too low	Increase header angle	*3.7.3 Header Angle, page 63*
Material overload on drapers	Increase side draper speed	*3.7.6 Draper Speed, page 66*
Material overload on drapers	Install upper cross auger	*6.4.3 Upper Cross Auger, page 253*
Material overload on drapers	Add flighting extensions	Refer to your MacDon Dealer
Symptom: Drapers back feed		
Drapers running too slow in heavy crop	Increase draper speed	*3.7.6 Draper Speed, page 66*
Symptom: Crop is thrown across opening and under opposite side draper		

Problem	Solution	Refer to
Drapers running too fast in light crop	Reduce draper speed	*3.7.6 Draper Speed, page 66*
Symptom: Material accumulates inside or under front edge of draper		
Deck height improperly adjusted	Adjust deck height	*5.7.5 Adjusting Deck Height, page 181*
Symptom: Material accumulating on end deflectors and releasing in bunches		
End deflectors too wide	For headers with manual deck shift only, trim deflector or replace with narrow deflector (MD #172381)	*3.13 Unplugging the Cutterbar, page 85*

8.5 Cutting Edible Beans

Table 8.2 Cutting Edible Beans Troubleshooting

Problem	Solution	Refer to
Symptom: Plants being stripped and complete or partial plants left behind		
Header off ground	Lower header to ground and run on skid shoes and/or cutterbar	*Cutting on the Ground, page 61*
Float set too light—rides on high spots and does not lower soon enough	Set float to 335–338 N (75–85 lbf). Increase or decrease as necessary to prevent header from bouncing excessively or plowing into soft ground	*3.7.2 Header Float, page 63*
Reel too high	Fully retract reel cylinders	*3.7.8 Reel Height, page 66*
Reel too high with cylinders fully retracted	Adjust reel height	*3.7.8 Reel Height, page 66*
Finger pitch not aggressive enough	Adjust finger pitch	*3.7.10 Reel Tine Pitch, page 68*
Reel too far aft	Move reel forward until the fingertips skim the soil surface with header on the ground and the header angle properly adjusted	*3.7.9 Reel Fore-Aft Position, page 67*
Header angle too shallow	Adjust header angle	*Adjusting Header Angle, page 64*
Header angle too shallow	Increase header angle by fully retracting lift cylinders (if cutting on ground)	*Adjusting Header Angle, page 64*
Reel too slow	Adjust reel speed to be marginally faster than ground speed	*3.7.4 Reel Speed, page 64*
Ground speed too fast	Lower ground speed	*3.7.5 Ground Speed, page 65*
Skid shoes too low	Raise skid shoes to highest setting	*Cutting on the Ground, page 61*
Dirt packs on bottom of cutterbar and raises cutterbar off the ground	Install plastic wear strips on bottom of cutterbar and skid shoes	—
Dirt packing on bottom of cutterbar with plastic wear strips on cutterbar and raises cutterbar off the ground	Ground too wet – allow soil to dry	—
Dirt packing on bottom of cutterbar with plastic wear strips on cutterbar and raises cutterbar off the ground	Manually clean the bottom of cutterbar when excessive accumulation occurs	—
Plastic wear strip for cutterbar has been installed over top of steel wearplates	Remove steel cutterbar wearplates when installing the plastic wear strips for cutterbar	—
Header not level	Level header	*3.12 Levelling the Header, page 84*
Worn or damaged knife sections	Replace sections or replace knife	*5.5.1 Replacing Knife Section, page 132*
Parts of vines get caught in pointed guard tip. (Occurs more in row-cropped beans that are hilled from cultivating.)	Install stub guard conversion kit	*6.2.4 Stub Guard Conversion Kit, page 247*
Symptom: Excessive losses at dividers		
Divider rod running down crop and shattering pods	Remove divider rod	*3.7.11 Crop Dividers, page 70*

Table 8.2 Cutting Edible Beans Troubleshooting (continued)

Problem	Solution	Refer to
Vines and plants build up on endsheet	Install divider rod	*3.7.11 Crop Dividers, page 70*
Symptom: Plant vines pinched between top of draper and cutterbar		
Cutterbar fills with debris when draper to cutterbar gap is properly adjusted	Raise header fully at each end of field (or as required) and shift decks back and forth to help clean out cutterbar	—
Shifting the decks with header raised does not clean out cutterbar debris.	Manually remove debris from cutterbar cavity to prevent damaging the drapers	—
Symptom: Crop accumulating at guards and not moving rearward onto drapers		
Reel finger pitch not aggressive enough	Increase finger aggressiveness (cam position)	*3.7.10 Reel Tine Pitch, page 68*
Reel too high	Lower reel	*3.7.8 Reel Height, page 66*
Minimum reel clearance to cutterbar setting too high	Adjust minimum reel height with cylinders fully retracted	*5.8.1 Reel-to-Cutterbar Clearance, page 198*
Reel too far forward	Reposition reel	*3.7.9 Reel Fore-Aft Position, page 67*
Symptom: Crop wrapping around reel		
Reel too low	Raise reel	*3.7.8 Reel Height, page 66*
Symptom: Reel shattering pods		
Reel too far forward	Reposition reel	*3.7.9 Reel Fore-Aft Position, page 67*
Reel speed too high	Reduce reel speed	*3.7.4 Reel Speed, page 64*
Bean pods too dry	Cut at night when heavy dew is present and pods have softened	—
Reel finger pitch not aggressive enough	Increase finger aggressiveness (cam position)	*3.7.10 Reel Tine Pitch, page 68*
Symptom: Cutterbar guards breaking		
Float insufficient (float setting too heavy)	Increase float (adjust to lighter float setting)	*3.7.2 Header Float, page 63*
Excessive number of rocks in field	Consider installing optional stub guards **Note:** Install a few guards on one section of the cutterbar and compare the performance of the two different guard styles	*5.5.7 Knife Guards, page 137*

Table 8.2 Cutting Edible Beans Troubleshooting (continued)

Problem	Solution	Refer to
Symptom: Cutterbar pushing too much debris and dirt		
Header too heavy	Readjust float to make header lighter	*3.7.2 Header Float, page 63*
Header angle too steep	Decrease header angle	*3.7.3 Header Angle, page 63*
Guards plug with debris or and soil	Install stub guard kit	*6.2.4 Stub Guard Conversion Kit, page 247*
Insufficient support for header	Install center skid shoes on header	*Cutting on the Ground, page 61*
Symptom: Crop wrapping around reel ends		
Uncut crop interfering on reel ends	Add reel endshields	For information, refer to the header parts catalog
Symptom: Cutterbar fills up with dirt		
Excessive gap between draper and cutterbar	Adjust front deck supports to achieve proper clearance between cutterbar and draper	*5.7.5 Adjusting Deck Height, page 181*
Excessive gap between draper and cutterbar	Raise header fully at each end of field (or as required) and shift decks back and forth to help clean out cutterbar	—
Symptom: Reel occasionally carries over plants in same location		
Steel fingers bent and hooking plants from drapers	Straighten fingers (steel)	—
Dirt accumulation on end of fingers preventing plants from falling off fingers onto drapers	Raise reel	*3.7.8 Reel Height, page 66*
Dirt accumulation on end of fingers preventing plants from falling off fingers onto drapers	Adjust reel fore-aft position to move fingers out of the ground	*3.7.9 Reel Fore-Aft Position, page 67*
Symptom: Cutterbar pushing soil		
Tire tracks or row crop ridges	Cut at angle to crop rows or ridges	—
Rolling terrain along length of field	Cut at 90° to undulations (provided knife floats across without digging in)	—
Symptom: Reel carries over an excessive amount of plants or wads		
Excessive accumulation of crop on drapers (up to reel center tube)	Increase draper speed	*3.7.6 Draper Speed, page 66*
Finger pitch too slow	Increase finger pitch	*3.7.10 Reel Tine Pitch, page 68*

8.6 Windrow Formation

Problem	Solution	Section
Heads on ground and scattered		
Draper speed too slow	Increase draper speed	*3.7.6 Draper Speed, page 66*
Draper angle too flat	Increase header angle	*3.7.3 Header Angle, page 63*
Ground speed too slow	Increase ground speed	*3.7.5 Ground Speed, page 65*
Crop too ripe	Cut crop before too mature	—
Hollow in center		
Draper speed too slow	Increase draper speed	*3.7.6 Draper Speed, page 66*
Delivery opening too wide	Decrease delivery opening width	*3.8 Delivery Opening, page 77*
All heads in center		
Draper speed too fast or header angle too steep	Reduce draper speed and/or decrease header angle	*3.7.6 Draper Speed, page 66*
Draper speed too fast or header angle too steep	Reduce draper speed and/or decrease header angle	*3.7.3 Header Angle, page 63*
Ground speed too fast	Reduce ground speed	*3.7.5 Ground Speed, page 65*
Crop too green	Allow crop to mature	—
All heads to one side		
Crop leaning to one side and reel too slow	Increase reel speed to re-orient crop parallel to draper slats and/or increase finger pitch aggressiveness	• *3.7.4 Reel Speed, page 64* • *3.7.10 Reel Tine Pitch, page 68*
Uneven windrow (any crop condition)		
Ground speed too fast for drapers, causing heads to fan out and crop to leave drapers unevenly	Reduce ground speed or increase draper speed	• *3.7.5 Ground Speed, page 65* • *3.7.6 Draper Speed, page 66*
Reel too low	Raise reel	*3.7.8 Reel Height, page 66*
Reel speed too fast	Reduce reel speed	*3.7.4 Reel Speed, page 64*

Chapter 9: Reference

The reference section provides additional, support information on topics such as torque specifications, the requirements for lifting equipment, unit measurement conversions, and terminology definitions. Consult this section as needed.

9.1 Torque Specifications

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

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

Jam nuts

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

Self-tapping screws

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

9.1.1 SAE Bolt Torque Specifications

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

Table 9.1 SAE Grade 5 Bolt and Grade 5 Free Spinning Nut

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

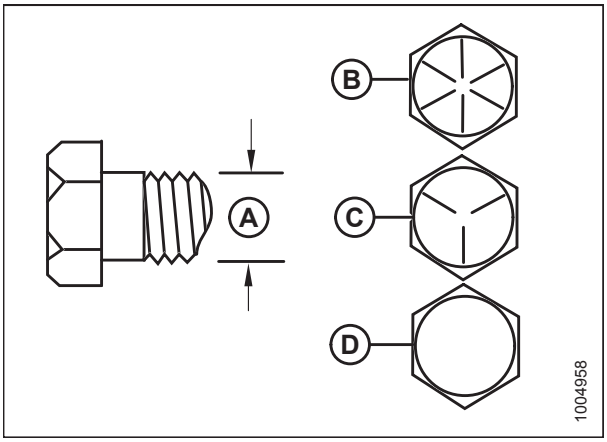


Figure 9.1: Bolt Grades

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

Table 9.2 SAE Grade 5 Bolt and Grade F Distorted Thread Nut

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

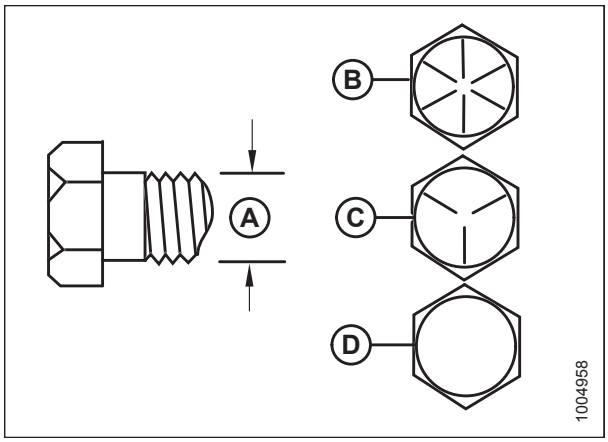


Figure 9.2: Bolt Grades

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

Table 9.3 SAE Grade 8 Bolt and Grade G Distorted Thread Nut

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

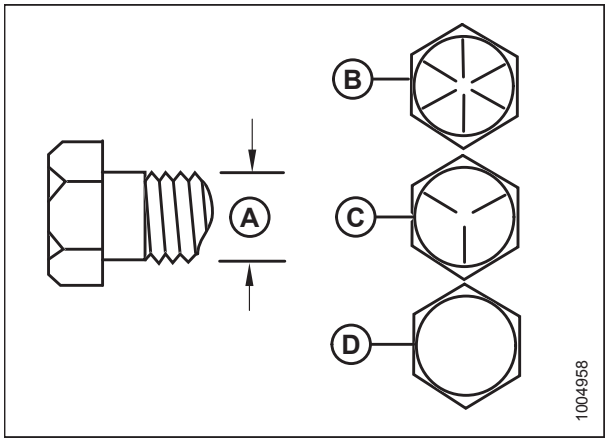


Figure 9.3: Bolt Grades

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

Table 9.4 SAE Grade 8 Bolt and Grade 8 Free Spinning Nut

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

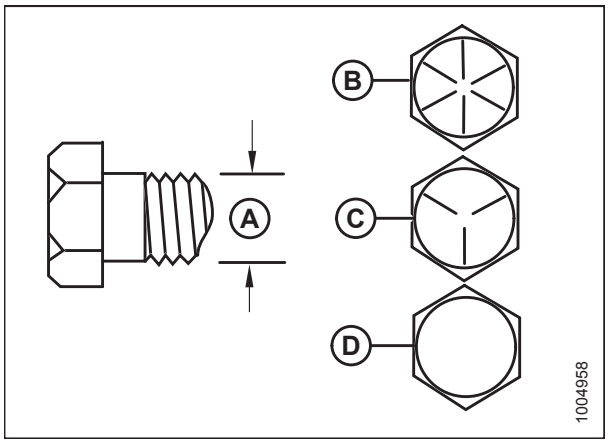


Figure 9.4: Bolt Grades

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

9.1.2 Metric Bolt Specifications

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

Table 9.5 Metric Class 8.8 Bolts and Class 9 Free Spinning Nut

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

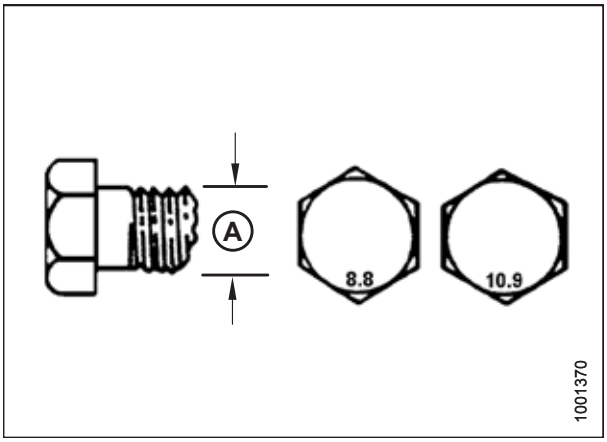


Figure 9.5: Bolt Grades

Table 9.6 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

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

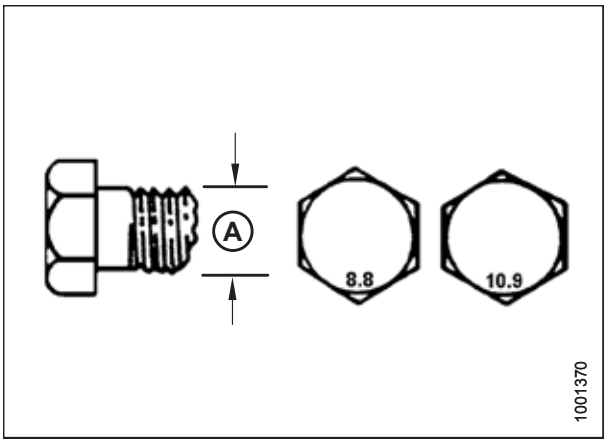


Figure 9.6: Bolt Grades

Table 9.7 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

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

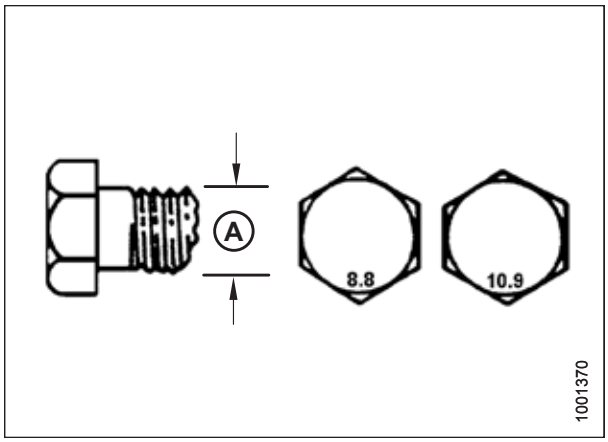


Figure 9.7: Bolt Grades

Table 9.8 Metric Class 10.9 Bolts and Class 10 Distorted Thread Nut

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

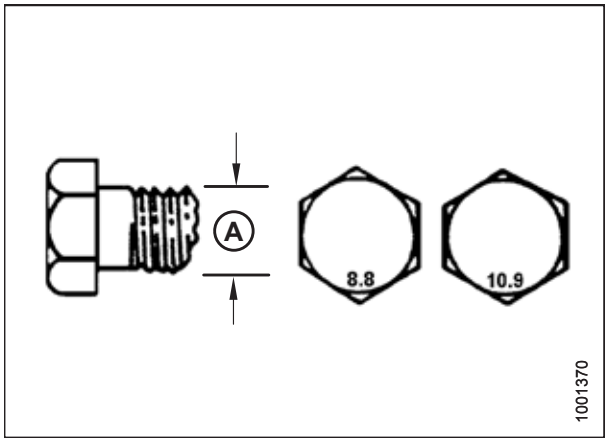


Figure 9.8: Bolt Grades

9.1.3 Metric Bolt Specifications Bolting into Cast Aluminum

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

Table 9.9 Metric Bolt Bolting into Cast Aluminum

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

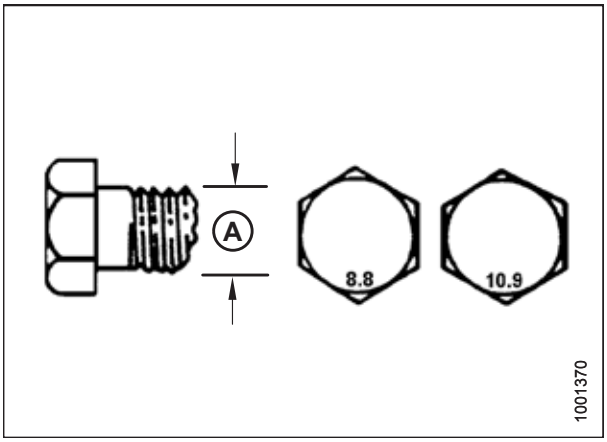


Figure 9.9: Bolt Grades

9.1.4 Flare-Type Hydraulic Fittings

1. Check flare (A) and flare seat (B) for defects that might cause leakage.
2. Align tube (C) with fitting (D) and thread nut (E) onto fitting without lubrication until contact has been made between flared surfaces.
3. Torque fitting nut (E) to specified number of flats from finger tight (FFFT) or to a given torque value in Table *9.10, page 277*.
4. Use two wrenches to prevent fitting (D) from rotating. Place one wrench on fitting body (D), and tighten nut (E) with other wrench to torque shown.
5. Assess final condition of connection.

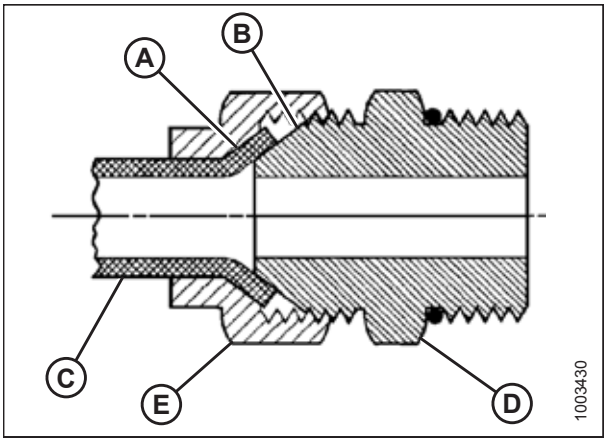


Figure 9.10: Hydraulic Fitting

Table 9.10 Flare-Type Hydraulic Tube Fittings

SAE Dash Size	Thread Size (in.)	Torque Value[80]		Flats from Finger Tight (FFFT)	
		Nm	lbf·ft	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

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

Table 9.10 Flare-Type Hydraulic Tube Fittings (continued)

SAE Dash Size	Thread Size (in.)	Torque Value[81]		Flats from Finger Tight (FFFT)	
		Nm	lbf·ft	Tube	Swivel Nut or Hose
-6	9/16–18	30–33	22–24	2	1 1/2
-8	3/4–16	57–63	42–46	2	1 1/2
-10	7/8–14	81–89	60–66	1 1/2	1 1/2
-12	1 1/16–12	113–124	83–91	1 1/2	1 1/4
-14	1 3/16–12	136–149	100–110	1 1/2	1 1/4
-16	1 5/16–12	160–176	118–130	1 1/2	1
-20	1 5/8–12	228–250	168–184	1	1
-24	1 7/8–12	264–291	195–215	1	1
-32	2 1/2–12	359–395	265–291	1	1
-40	3–12	—	—	1	1

9.1.5 O-Ring Boss Hydraulic Fittings – Adjustable

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

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 the threads. Adjust O-ring (A) if necessary.
4. Apply hydraulic system oil to O-ring (A).

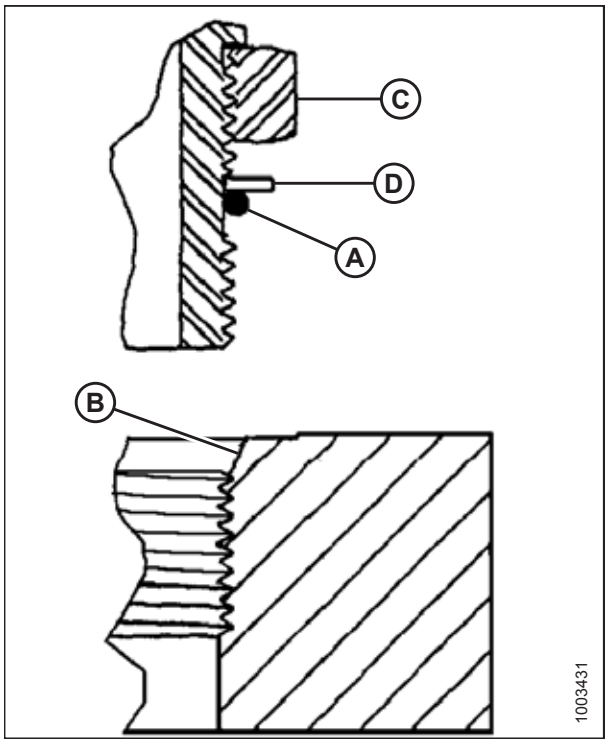


Figure 9.11: Hydraulic Fitting

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

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

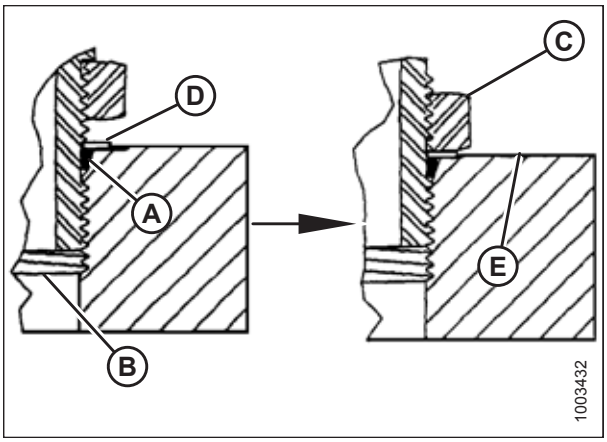


Figure 9.12: Hydraulic Fitting

Table 9.11 O-Ring Boss (ORB) Hydraulic Fittings – Adjustable

SAE Dash Size	Thread Size (in.)	Torque Value[82]	
		Nm	lbf·ft (*lbf·in)
-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

9.1.6 O-Ring Boss Hydraulic Fittings – Non-Adjustable

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

Torque values are shown in following table below.

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Check that O-ring (A) is **NOT** on the threads. Adjust O-ring (A) if necessary.
3. Apply hydraulic system oil to the O-ring.
4. Install fitting (C) into the port until the fitting is hand-tight.
5. Torque fitting (C) according to values in Table *9.12, page 281*.
6. Check the final condition of the fitting.

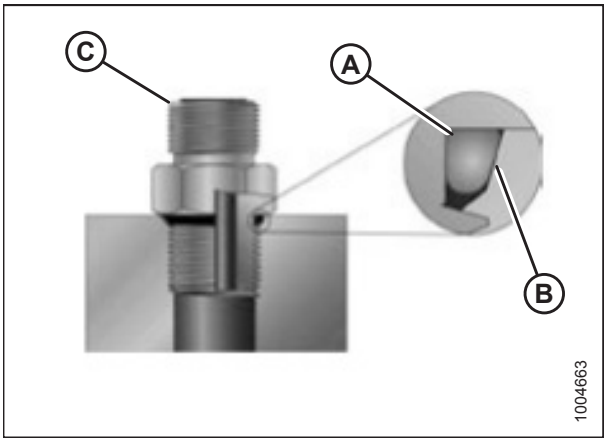


Figure 9.13: Hydraulic Fitting

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

Table 9.12 O-Ring Boss (ORB) Hydraulic Fittings – Non-Adjustable

SAE Dash Size	Thread Size (in.)	Torque Value[83]	
		Nm	lbf·ft (*lbf·in)
-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

9.1.7 O-Ring Face Seal Hydraulic Fittings

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

Torque values are shown in following table below.

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

Figure 9.14: Hydraulic Fitting

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

2. Apply hydraulic system oil to O-ring (B).
3. Align the tube or hose assembly so that the flat face of sleeve (A) or (C) comes into full contact with O-ring (B).
4. Thread tube or hose nut (D) until it is hand-tight. The nut should turn freely until it bottoms out.
5. Torque the fittings according to values in Table *9.13, page 282*.

   NOTE:

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

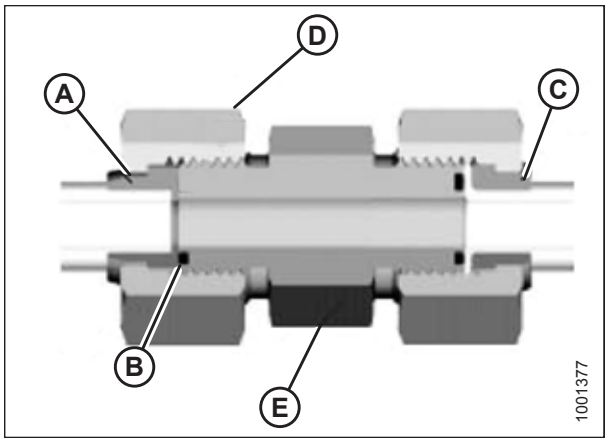


Figure 9.15: Hydraulic Fitting

Table 9.13 O-Ring Face Seal (ORFS) Hydraulic Fittings

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value[84]	
			Nm	lbf·ft
-3	Note[85]	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note[85]	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[85]	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

9.1.8 Tapered Pipe Thread Fittings

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

Assemble pipe fittings as follows:

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

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

4. Torque the connector to the appropriate torque angle. The turns from finger tight (TFFT) and flats from finger tight (FFFT) values are shown in Table *9.14, page 283*. Make sure that the tube end of a shaped connector (typically a 45° or 90° elbow) is aligned to receive the incoming tube or hose assembly. Always finish the alignment of the fitting in the direction of tightening. Never back off (i.e. loosen) the threaded connectors to achieve alignment.
5. Clean all residue and any excess thread conditioner with an appropriate cleaner.
6. Assess the final condition of the fitting. Pay special attention to the possibility of cracks in the port opening.
7. Mark the final position of the fitting. If a fitting leaks, disassemble the fitting and check it for damage.

NOTE:

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

Table 9.14 Hydraulic Fitting Pipe Thread

Tapered Pipe Thread Size	Recommended TFFT	Recommended FFFT
1/8–27	2–3	12–18
1/4–18	2–3	12–18
3/8–18	2–3	12–18
1/2–14	2–3	12–18
3/4–14	1.5–2.5	12–18
1–11 1/2	1.5–2.5	9–15
1 1/4–11 1/2	1.5–2.5	9–15
1 1/2–11 1/2	1.5–2.5	9–15
2–11 1/2	1.5–2.5	9–15

9.2 Conversion Chart

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

Table 9.15 Conversion Chart

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

Index

E

F

G

H

I

K

P

R

S

T

U

V

W

Recommended Fluids and Lubricants

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

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

Table .16 Recommended Fluids and Lubricants

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

MacDon

CUSTOMERS
MacDon.com

DEALERS
Portal.MacDon.com

Printed in Canada