MacDon

M155*E4*
Self-Propelled Windrower

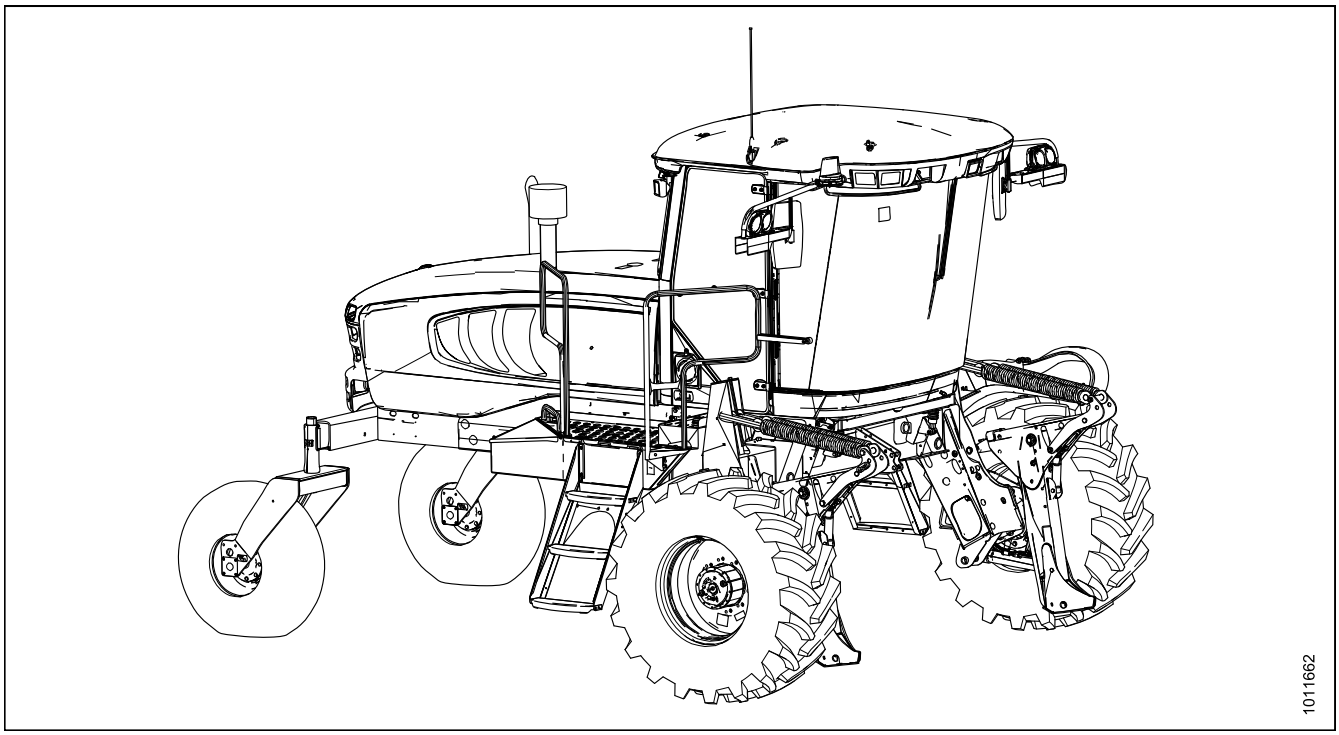
Operator's Manual

214737 Revision A

Original Instruction

The harvesting specialists.

M155*E4* Self-Propelled Windrower, featuring Dual Direction® and Ultra Glide® suspension.



Published August, 2018

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm. Battery posts, terminals, and related accessories contain lead and lead components. Wash hands after handling.

Introduction

This manual contains information on The MacDon M155*E4* Self-Propelled Windrower which, when coupled with one of MacDon's auger, rotary, or draper headers, provides a package designed to cut and lay in windrows a variety of grain, hay, and specialty crops.

The M155*E4* Windrower features Dual Direction®, meaning that the windrower can be driven in cab-forward or engine-forward mode. Right and left designations are therefore determined by the operator's position, facing the direction of travel. This manual uses the terms right cab-forward, left cab-forward, right engine-forward, and left engine-forward when referencing specific locations on the machine.

Use this manual as your first source of information about the machine. Use the Table of Contents and the Index to guide you to specific areas. Study the Table of Contents to familiarize yourself with how the material is organized.

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 the machine function and machine life and may result in a hazardous situation.

If you follow the instructions given here, your M155*E4* Windrower will work well for many years.

Use this manual in conjunction with your header operator's manual.

A manual storage case is provided in the cab. Keep this manual handy for frequent reference and to pass on to new Operators or Owners. Call your Dealer if you need assistance, information, or additional copies of this manual.

Unless otherwise noted, use the standard torque values provided in Chapter *8.2 Recommended Torques, page 455* of this document.

CAREFULLY READ ALL THE MATERIAL PROVIDED BEFORE ATTEMPTING TO USE THE MACHINE.

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

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).

Declaration of Conformity

Figure 1. Declaration of Conformity (Page 1 of 2)

EC Declaration of Conformity

[1] MacDon

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

[2] Windrower

[3] M155*E4*

[4] As per Shipping Document

[5] May 15, 2018

[5] _____
Christoph Martens
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

The Harvesting Specialists. MacDon

1026522

Figure 2. Declaration of Conformity (Page 2 of 2)

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]

Sériaszám(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 Ridzels
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 maşinii: [2]

Denumirea şi modelul: [3]

Număr (numere) serie: [4]

corespunde tuturor dispoziţiilor esenţiale 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 şi locul declaraţiei: [5]

Identitatea şi semnătura persoanei împuternicite pentru întocmirea declaraţiei: [6]

Numele şi semnătura persoanei autorizate pentru întocmirea cărţii 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 usklaðeni 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

1026523

Whole Body and Hand-Arm Vibration Levels

The weighted root mean square acceleration, to which the whole body is subjected, ranges from 0.59 to 1.07 m/s^2 as measured on a representative machine during typical operations and analyzed in accordance with ISO 5008.

During the same operations, the weighted root means square hand-arm vibration was less than 1.81 m/s^2 when analyzed in accordance with ISO 5349. These acceleration values depend on the roughness of the ground, the speeds at which the windrower is operated, the operator's experience, weight, and driving habits.

Noise Levels

The A-weighted sound pressure levels inside the operator's station ranged from 66 to 67 dB(A) as measured on several representative machines in accordance with ISO 5131. The sound pressure level depends upon the engine speed and load, field and crop conditions, and the type of platform used.

List of Revisions

The following list provides an account of major changes from the previous version of this document.

Summary of Change	Location
Updated the Declaration of Conformity.	*Declaration of Conformity, page ii*
Updated caution statements	Throughout
Added content to include R1 series headers	Throughout
Updated fuse box decal illustration	*Fuse Box Decal, page 391*
Updated table	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
Corrected callouts in illustration	*2.4 Component Location, page 37*
Revised notes to say two front field lights remain on when auto road light feature is activated	*3.6.1 Field Light: Cab-Forward, page 50* *Driving on the Road, page 182*
Revised table content	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
Added replacement bulb information	*5.9.10 Replacing the Bulbs in Beacon Lights, page 383*
Corrected callouts and graphics	*4.2.2 Windrower Operating Symbols, page 163*
Corrected callouts and graphics	*4.2.3 Header Functions, page 164*
Added R1 Series information	*4.8 Operating with an R Series or R1 Series Header, page 284*
Updated procedure	*Connecting Batteries, page 368*
Added topic	*3.18.6 Cab Display Module (CDM) Configuration, page 93*
Added note	*4.5.6 Attaching to an R/R1 Series Header, page 248*
Added topics to CDM chapter	• *Activating the Swath Compressor, page 111* • *3.18.12 Calibrating the Swath Compressor Sensor, page 135*
Edited note	*Inflating Caster Tire, page 414*
Updated hydraulic filter/service kit number	*5.10.4 Changing Hydraulic Oil Filters, page 399* *8.1.4 Filter Part Numbers, page 453*
Updated illustrations	*Replacing the Diesel Exhaust Fluid (DEF) Vent Hose Filter , page 336*

Serial Numbers

Record the model number, model year, and serial number of the windrower and engine on the lines below.

The windrower serial number plate (A) is located on the left side of the main frame near the walking beam.

Windrower model number _____

Windrower serial number _____

Year of manufacture _____

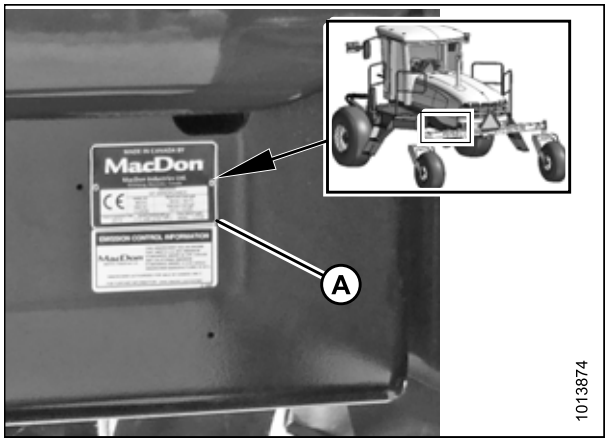


Figure 3. Machine Serial Number Location

The engine serial number plate (A) is located on top of the engine cylinder head cover.

Engine serial number _____

Date of manufacture _____

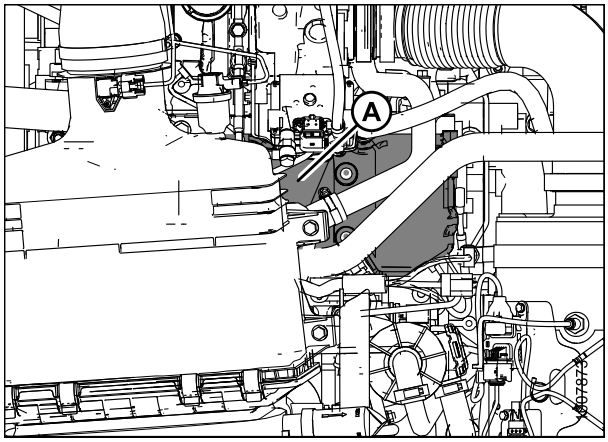


Figure 4. Engine Serial Number Location

1 Safety

1.1 Safety Alert Symbols

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

This symbol means:

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

Carefully read and follow the safety message accompanying this symbol.

Why is safety important to you?

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

Figure 1.1: Safety Symbol

1.2 Signal Words

Three signal words, **DANGER**, **WARNING**, and **CAUTION**, are used to alert you to hazardous situations. 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.

1.3 General Safety

CAUTION

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

Protect yourself.

- When assembling, operating, and servicing machinery, wear all protective clothing and personal safety devices that could be necessary for job at hand. Do **NOT** take chances. You may need the following:
  - Hard hat
  - Protective footwear with slip-resistant soles
  - Protective glasses or goggles
  - Heavy gloves
  - Wet weather gear
  - Respirator or filter mask
- Be aware that exposure to loud noises can cause hearing impairment or loss. Wear suitable hearing protection devices such as earmuffs or earplugs to help protect against loud noises.

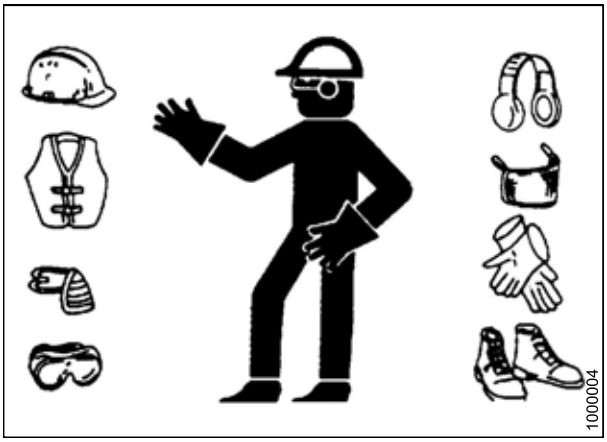


Figure 1.2: Safety Equipment

Figure 1.3: Safety Equipment

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

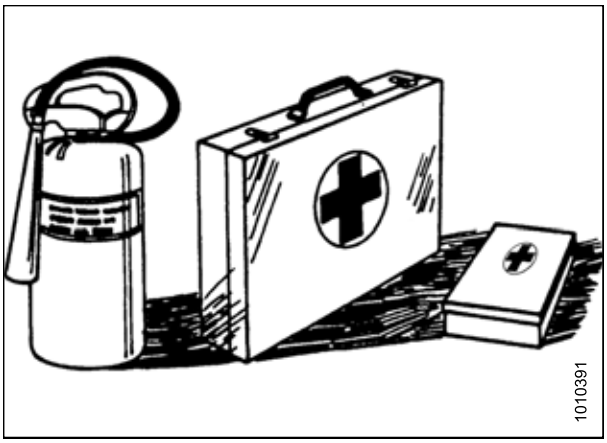


Figure 1.4: Safety Equipment

- 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. Make sure driveline guards can rotate independently of shaft and can telescope freely.
- Use only service and repair parts made or approved by equipment manufacturer. Substituted parts may not meet strength, design, or safety requirements.

Figure 1.5: Safety around Equipment

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

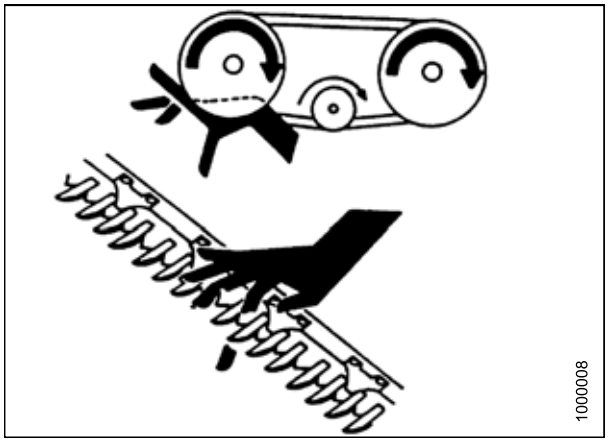


Figure 1.6: Safety around Equipment

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

Figure 1.7: Safety around Equipment

1.4 Maintenance Safety

To ensure your safety while maintaining machine:

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

Figure 1.8: Safety around Equipment

- Relieve pressure from hydraulic circuits before servicing and/or disconnecting machine.
- Make sure all components are tight and that steel lines, hoses, and couplings are in good condition before applying pressure to hydraulic systems.
- Keep hands, feet, clothing, and hair away from all moving and/or rotating parts.
- Clear area of bystanders, especially children, when carrying out any maintenance, repairs, or adjustments.
- Install transport lock or place safety stands under frame before working under machine.
- If more than one person is servicing machine at 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 machine.
- Wear heavy gloves when working on knife components.

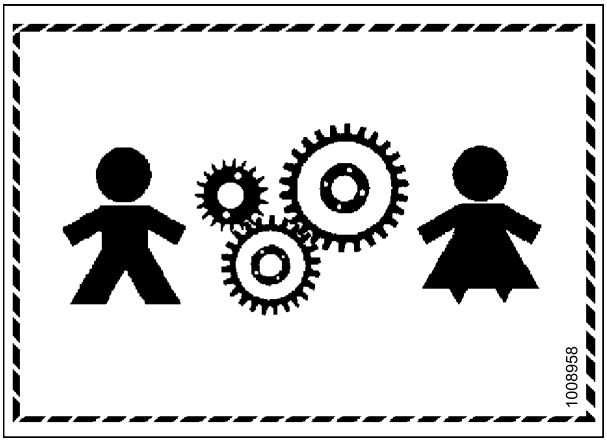


Figure 1.9: Equipment NOT Safe for Children

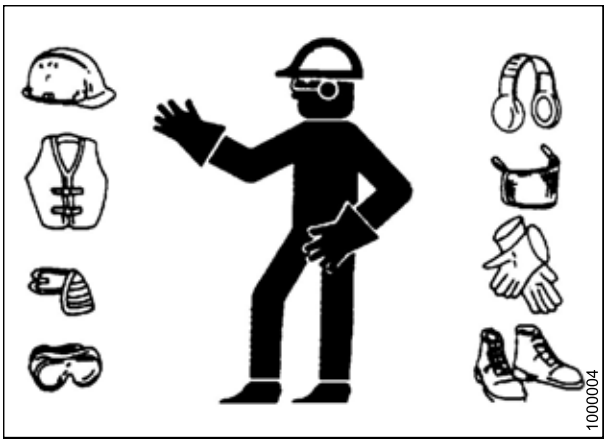


Figure 1.10: Safety Equipment

1.5 Hydraulic Safety

- Always place all hydraulic controls in Neutral before dismounting.
- Make sure that all components in 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 will fail suddenly and create hazardous and unsafe conditions.

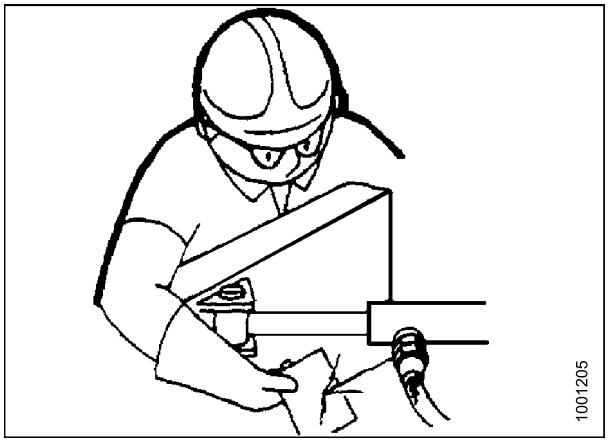


Figure 1.11: Testing for Hydraulic Leaks

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

Figure 1.12: Hydraulic Pressure Hazard

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

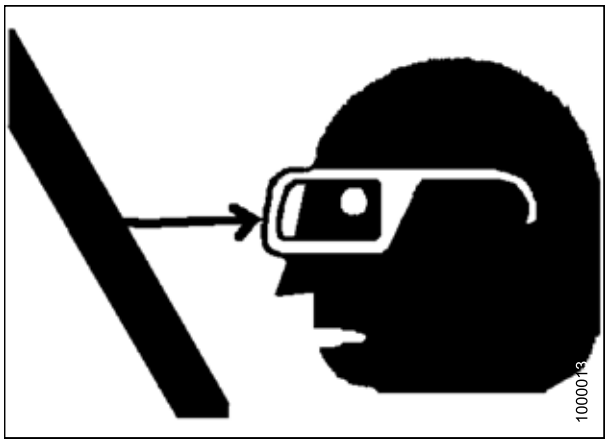


Figure 1.13: Safety around Equipment

1.6 Tire Safety

WARNING

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

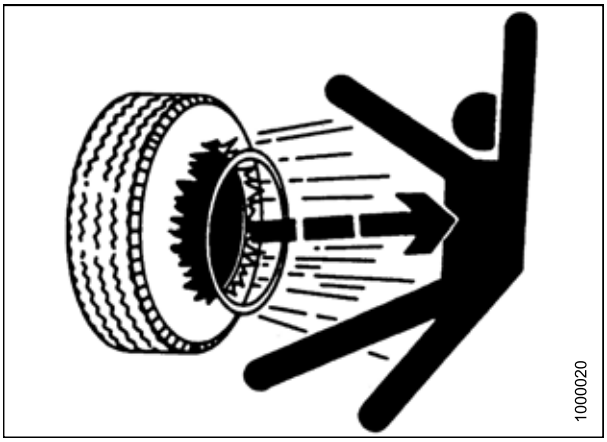


Figure 1.14: Overinflated Tire

WARNING

- **Do NOT stand over tire. Use a clip-on chuck and extension hose.**
- **Do NOT exceed maximum inflation pressure indicated on tire label.**
- **Replace tires that have defects.**
- **Replace wheel rims that are cracked, worn, or severely rusted.**
- **Never weld a wheel rim.**
- **Never use force on an inflated or partially inflated tire.**
- **Make sure tire is correctly seated before inflating to operating pressure.**

Figure 1.15: Safely Inflating Tire

- **If tire is not correctly positioned on rim or is overinflated, 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 tire in any direction endangering anyone in area.**
- **Make sure all air is removed from tire before removing tire from rim.**
- **Do NOT remove, install, or repair a tire on a rim unless you have proper equipment and experience to perform job.**
- **Take tire and rim to a qualified tire repair shop.**

1.7 Battery Safety

WARNING

- Keep all sparks and flames away from batteries, as a gas given off by electrolyte is explosive.
- Ventilate when charging in enclosed space.

Figure 1.16: Safety around Batteries

WARNING

- Wear safety glasses when working near batteries.
- Do NOT tip batteries more than 45° to avoid electrolyte loss.
- Battery electrolyte causes severe burns. Avoid contact with skin, eyes, or clothing.
- Electrolyte splashed into eyes is extremely dangerous. Should this occur, force eye open, and flood with cool, clean water for 5 minutes. Call a doctor immediately.
- If electrolyte is spilled or splashed on clothing or body, neutralize it immediately with a solution of baking soda and water, then rinse with clear water.

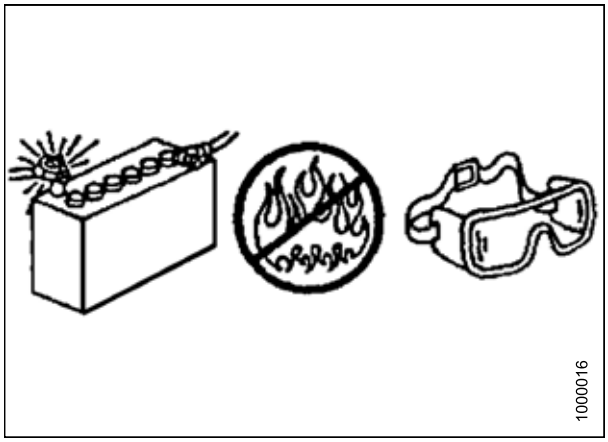


Figure 1.17: Safety around Batteries

WARNING

- To avoid injury from spark or short circuit, disconnect battery ground cable before servicing any part of electrical system.
- Do NOT operate engine with alternator or battery disconnected. With battery cables disconnected and engine running, a high voltage can be built up if terminals touch frame. Anyone touching frame under these conditions would be severely shocked.
- When working around storage batteries, remember that all of the exposed metal parts are live. Never lay a metal object across terminals because a spark or short circuit will result.
- Keep batteries out of reach of children.

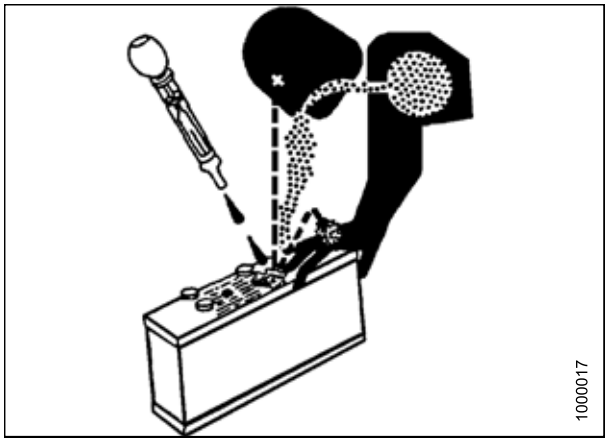


Figure 1.18: Safety around Batteries

1.8 Welding Precautions

High currents and voltage spikes associated with welding can cause damage to electronic components. Before welding on any part of windrower or an attached header, disconnect all electronic module harness connections as well as battery cables. Refer to your Dealer for proper procedures.

1.9 Engine Safety

WARNING

Do NOT use aerosol starting aids such as ether. Such use could result in an explosion and personal injury.

CAUTION

- **On initial start-up of a new, serviced, or repaired engine, always be ready to stop the engine in order to stop an overspeed. This may be accomplished by shutting off the air and/or fuel supply to the engine.**
- **Do NOT bypass or disable automatic shutoff circuits. The circuits are provided in order to help prevent personal injury. The circuits are also provided in order to help prevent engine damage. Contact your Dealer for repairs and adjustments.**
- **Inspect the engine for potential hazards.**
- **Before starting the engine, ensure that no one is on, underneath, or close to the engine. Ensure that people clear the area.**
- **All protective guards and all protective covers must be installed if the engine must be started in order to perform service procedures.**
- **To help prevent an accident that is caused by parts in rotation, work around parts carefully.**
- **If a warning tag is attached to engine start switch or to controls, do NOT start engine or move controls. Consult with person who attached warning tag before engine is started.**
- **Start engine from operator's compartment. Always start engine according to procedure that is described in Starting Engine section of operator's manual. Knowing correct procedure will help to prevent major damage to engine components and prevent personal injury.**
- **To ensure that the jacket water heater (if equipped) and/or lubricant oil heater (if equipped) is working correctly, check the water temperature gauge and/or oil temperature gauge during heater operation.**
- **Engine exhaust contains products of combustion, which can be harmful to your health. Always start the engine and operate the engine in a well-ventilated area. If the engine is started in an enclosed area, vent the engine exhaust to the outside.**
- **Engine exhaust gases become very hot during operation and can burn people and common materials. Stay clear of the rear of machine and avoid exhaust gases when engine is running.**

NOTE:

The engine may be equipped with a device for cold starting. If the engine will be operated in very cold conditions, then an additional cold starting aid may be required.

1.9.1 High-Pressure Rail

CAUTION

- **Contact with high-pressure fuel may cause fluid penetration and burn hazards. High-pressure fuel spray may cause a fire hazard. Failure to follow these instructions may cause personal injury or death.**
- **Before disconnecting fuel lines or any other components under high-pressure between the fuel pump and high-pressure common rail fuel system, confirm that the fuel pressure is relieved.**

1.9.2 Engine Electronics

WARNING

Tampering with electronic system installation or original equipment manufacturer (OEM) wiring installation can be dangerous and could result in personal injury or death and/or engine damage.

WARNING

Electrical Shock Hazard. The electronic unit injectors use DC voltage. The engine control module (ECM) sends this voltage to the electronic unit injectors. Do NOT come in contact with the harness connector for the electronic unit injectors while engine is operating. Failure to follow this instruction could result in personal injury or death.

This engine has a comprehensive, programmable engine monitoring system. The ECM has the ability to monitor engine operating conditions. If conditions exceed the allowable range, the ECM will initiate immediate action.

The following actions are available for engine monitoring control:

- Warning
- Derate
- Shut down

The following monitored engine operating conditions have the ability to limit engine speed and/or engine power:

- Engine coolant temperature
- Engine oil pressure
- Engine speed
- Intake manifold air temperature
- Diesel exhaust fluid (DEF) system performance
- Aftertreatment system performance

1.10 Safety Signs

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

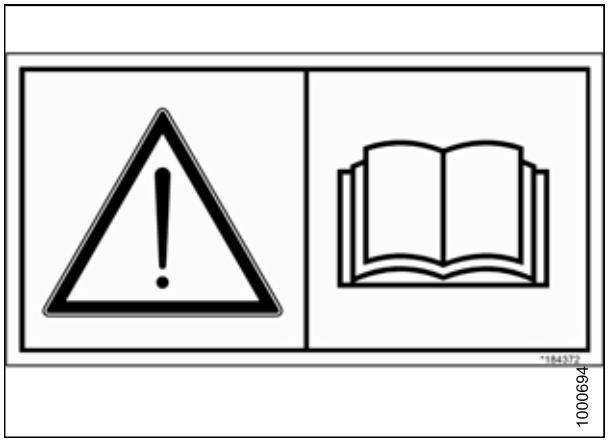


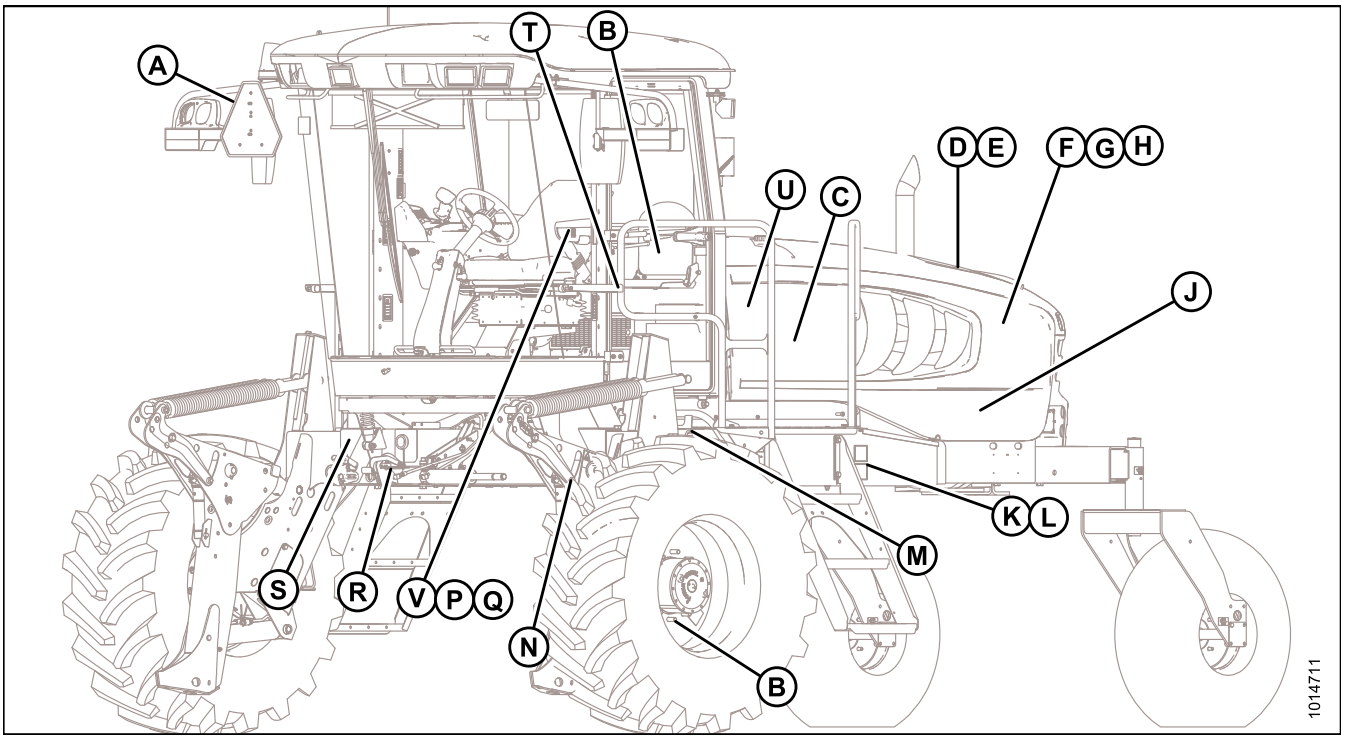
Figure 1.19: Operator's Manual Decal

1.10.1 Installing Safety Decals

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

1.11 Safety Sign Locations

Figure 1.20: Safety Sign Locations (Left Side)



A - Hazard Sign (MD #135378)
B - Cab Door and Rim (MD #166454)
C - Oil Reservoir under Hood (MD #166466)
D - Exhaust Cover (MD #166450)
E - Close to Radiator Cap (MD #166461)
F - Fan Shroud (Top) (MD #166450)
G - Fan Shroud (Middle) (MD #166451)
H - Fan Shroud (Bottom) (MD #166452)
J - Frame Opening (MD #166233)
K - Platform (Left of Step) (MD #166425)
L - Platform (Right of Step) (MD #166441)
M - Frame at Valve Manifold (MD #166466)
N - Lift Linkage (MD #166438)
P - Inner Post (MD #166234)
Q - Inner Post (MD #166463)
R - Neutral Interlock (MD #166425)
S - Frame (MD #166425)
T - Trainers Seat (MD #167502)
U - Air Baffle (MD #166450)
V - Inner Post (MD #166457)

Figure 1.21: Safety Signs (Left Side)

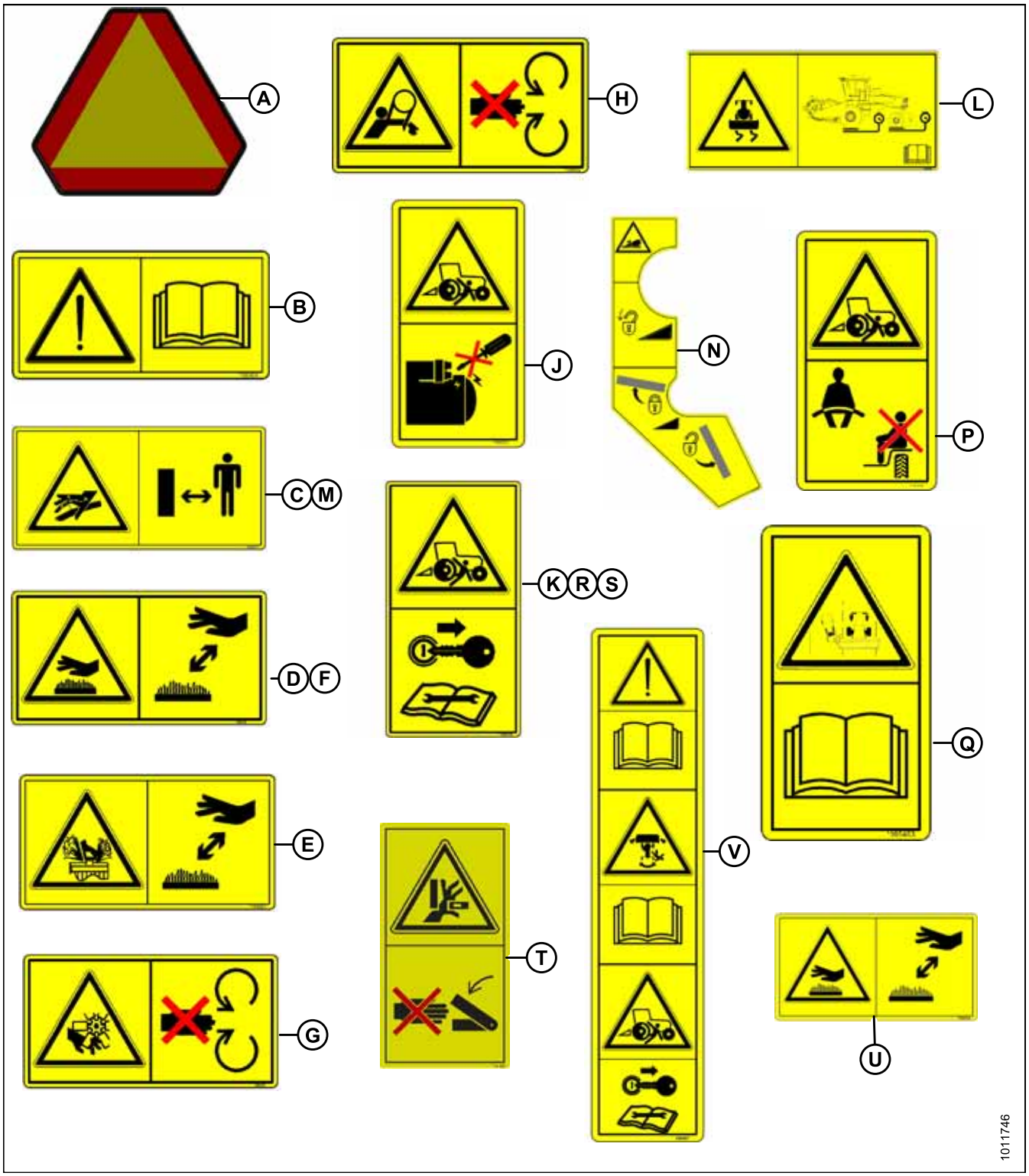
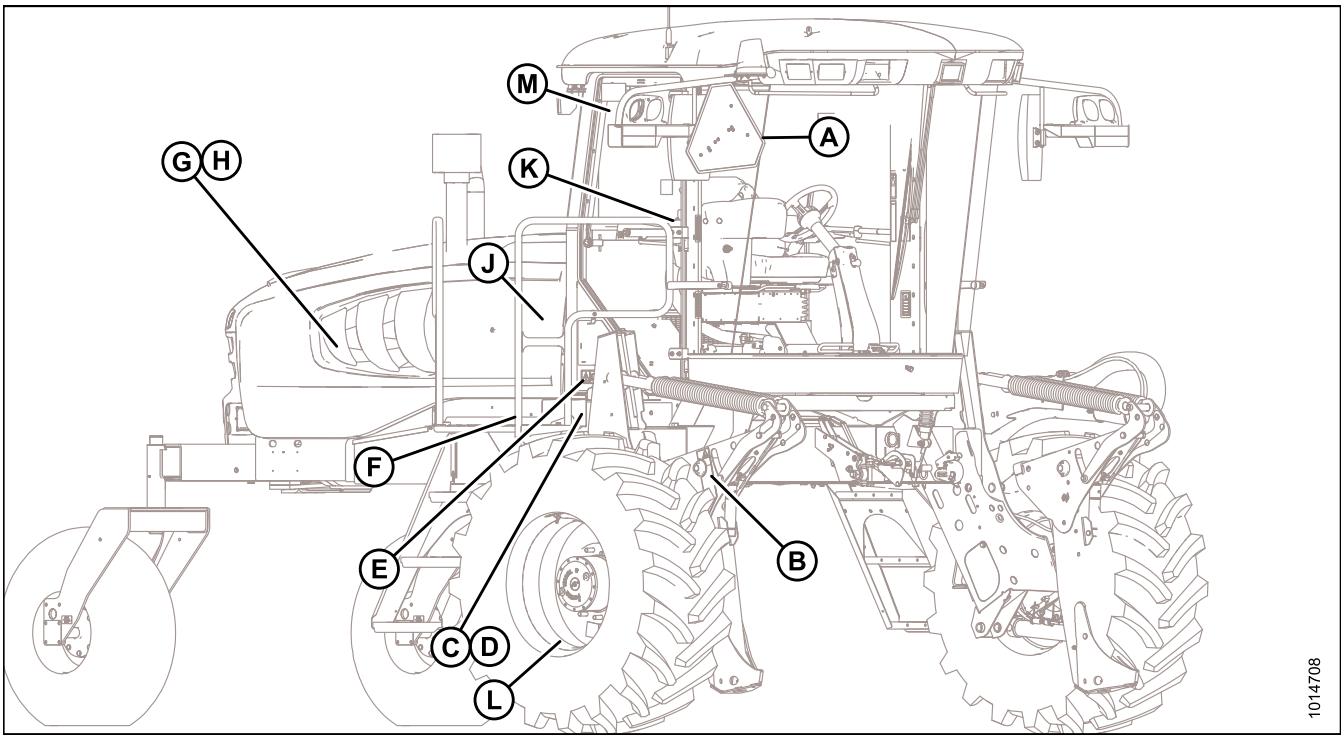
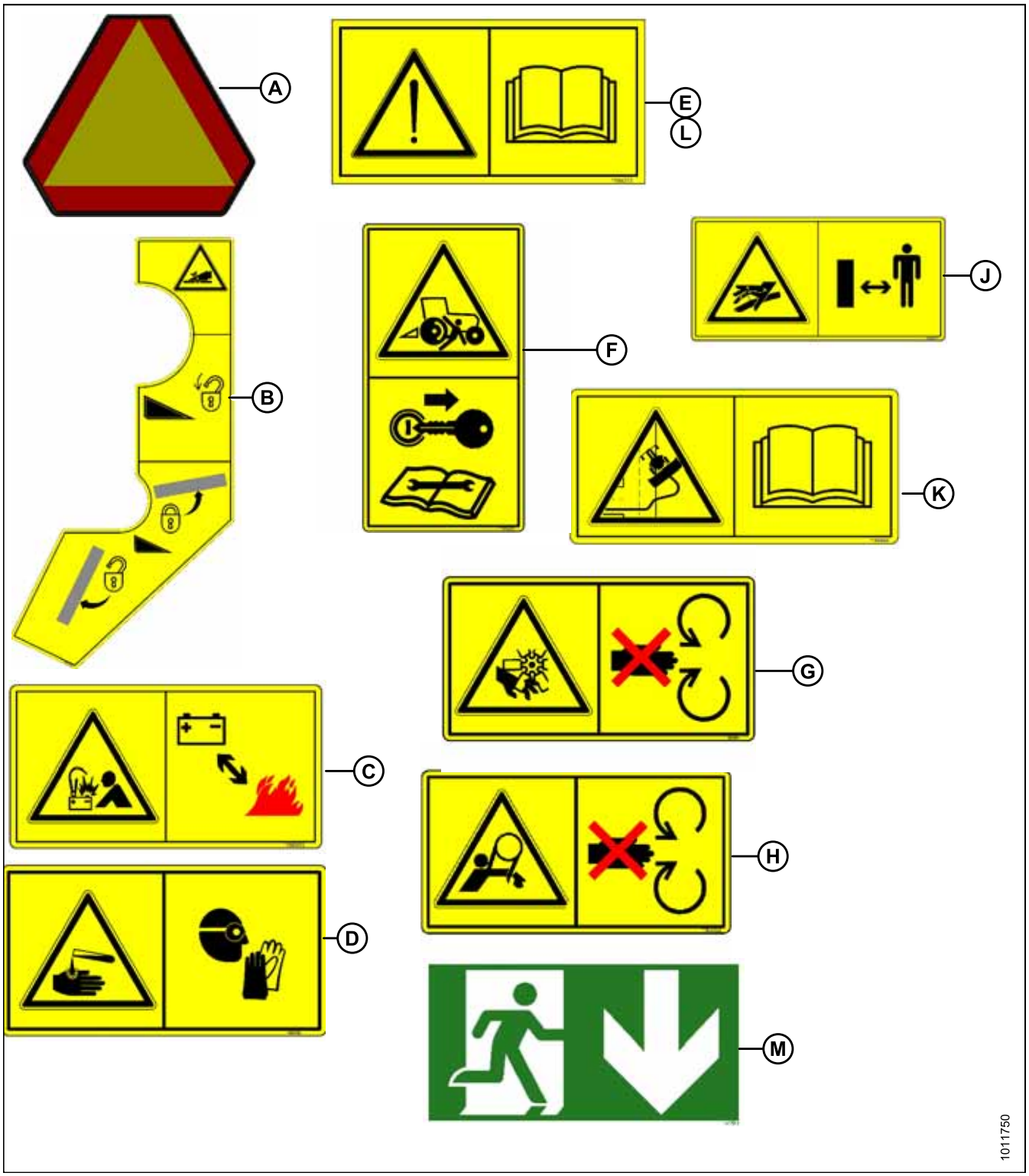


Figure 1.22: Safety Sign Locations (Right Side)



A - Hazard Sign on Seat (MD #115148)
B - Lift Linkage (MD #166439)
C - Frame (MD #166455)
D - Frame (MD #166456)
E - Cab Frame (MD #184372)
F - Platform (MD #166425)
G - Shroud (MD #166451)
H - Shroud (MD #166452)
J - Hydraulic Reservoir (MD #166466)
K - Wiper Cover (MD #166465)
L - Rim (MD #166454 [similar to [E])
M - Window (MD #167504)

Figure 1.23: Safety Signs (Right Side)



1.12 Understanding Safety Signs

MD #166233

Run-over hazard

DANGER

- Do **NOT** start engine by shorting across starter or starter relay terminals. Machine will start with drive engaged and move if starting circuitry is bypassed.
- Start engine only from operator's seat. Do **NOT** try to start engine with someone under or near machine.

Figure 1.24: MD #166233

MD #166234

Run-over hazard

WARNING

- The training seat is provided for an experienced Operator of the machine when a new Operator is being trained.
- The training seat is not intended as a passenger seat or for use by children.
- Use the seat belt whenever operating the machine or riding as a trainer.
- Keep all other riders off the machine.

Figure 1.25: MD #166234

MD #166425

Run-over hazard

WARNING

- Remove the key from the ignition.
- Read the windrower and header manuals for inspection and maintenance instructions.

Figure 1.26: MD #166425

MD #166438

Crushing hazard

DANGER

- Rest header on ground or engage safety props before going under unit.

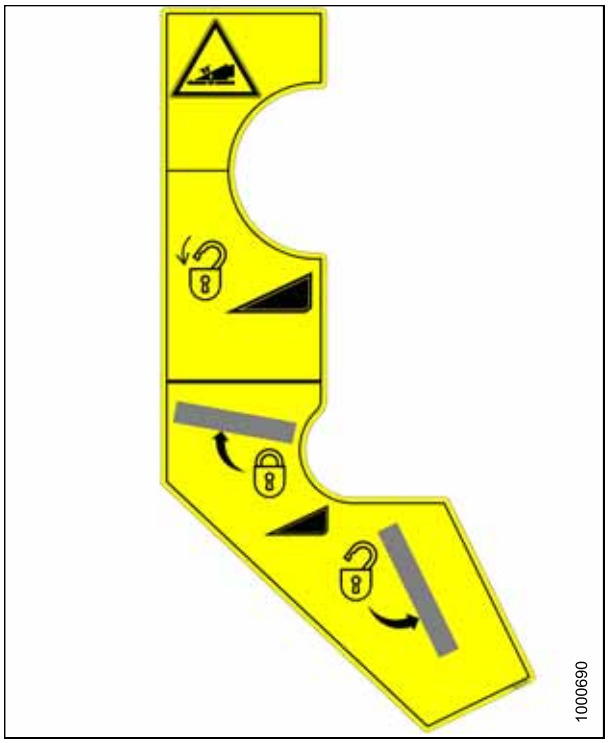


Figure 1.27: MD #166438

MD #166439

Crushing hazard

DANGER

- Rest header on ground or engage safety props before going under unit.

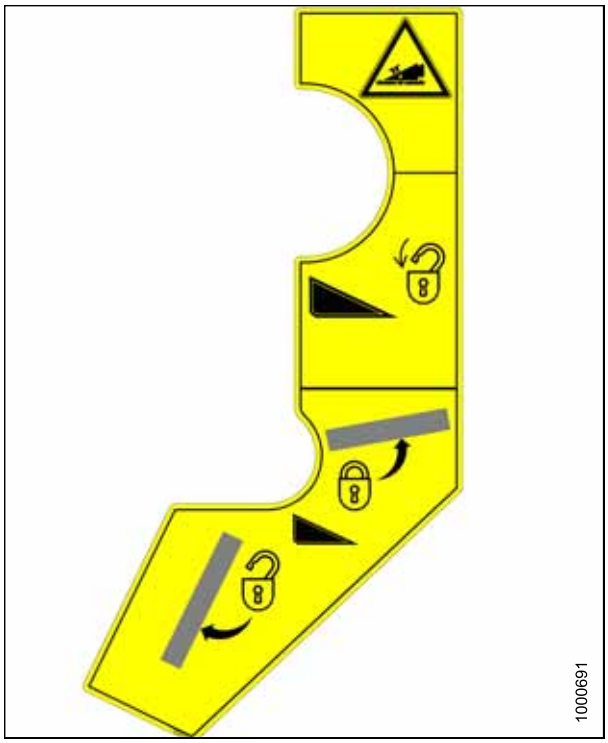


Figure 1.28: MD #166439

MD #166441

Loss of control hazard

CAUTION

- To prevent machine damage and/or loss of control, it is essential that the machine be equipped such that weights are within the specified limits.

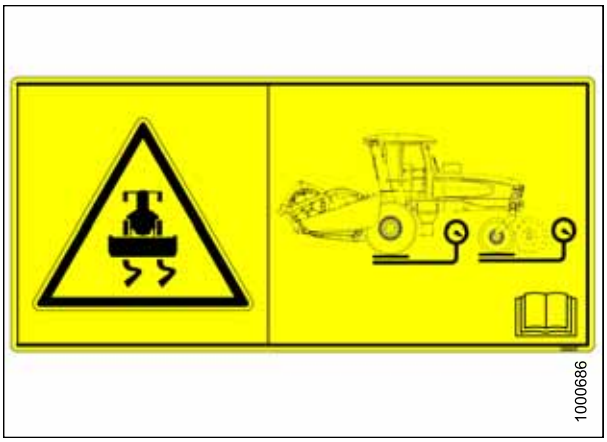


Figure 1.29: MD #166441

MD #166450

Hot surface hazard

WARNING

- To avoid injury, keep a safe distance from hot surface.

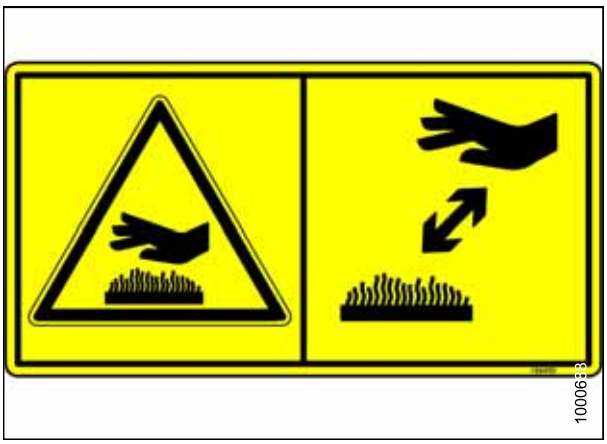


Figure 1.30: MD #166450

MD #166451

Rotating fan hazard

WARNING

- To avoid injury, stop the engine and remove the key before opening engine hood.

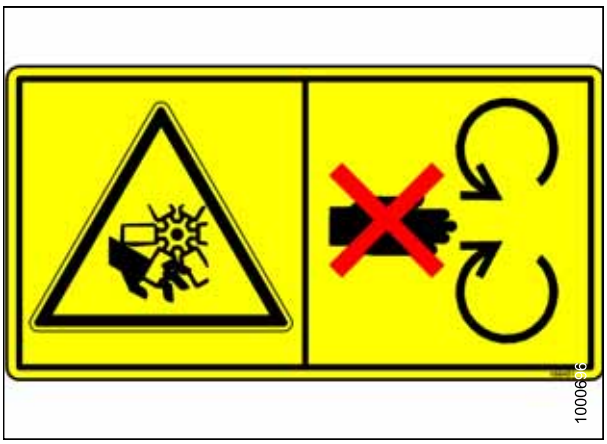


Figure 1.31: MD #166451

MD #166452

Hand and arm entanglement hazard

WARNING

- Do **NOT** open or remove safety shields while the engine is running.
- To avoid injury, stop the engine and remove the key before opening engine hood.

Figure 1.32: MD #166452

MD #166454

General hazard pertaining to machine operation and servicing

CAUTION

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

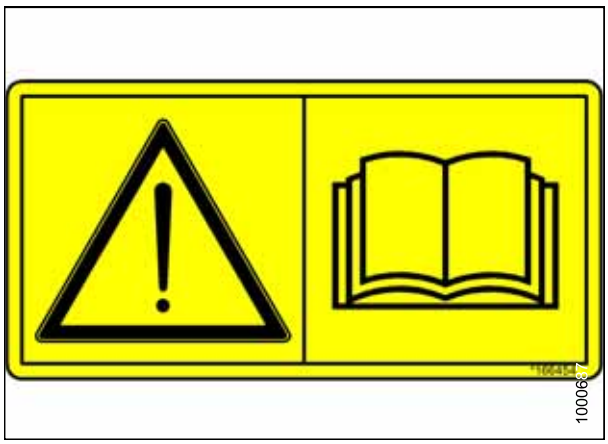


Figure 1.33: MD #166454

MD #166455

Explosion hazard

WARNING

- Prevent serious bodily injury caused by explosive battery gases.
- Keep sparks and flames away from the battery.
- Refer to operator's manual for battery boosting and charging procedures.

Figure 1.34: MD #166455

MD #166456

Battery acid hazard

WARNING

- Corrosive and poisonous battery acid. Acid can severely burn your body and clothing.

Figure 1.35: MD #166456

MD #166457

General hazard pertaining to machine operation and servicing

CAUTION

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

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

Run-over hazard

WARNING

- Machine will move if steering wheel is turned while engine is running.
- Steering response is opposite to what is normally expected when backing up. Turn bottom of steering wheel in direction you want to go.
- Always move ground speed lever to slow end of range before shifting high-low speed control.
- Stop the engine and remove the key from the ignition before servicing, adjusting, lubricating, cleaning, or unplugging the machine.

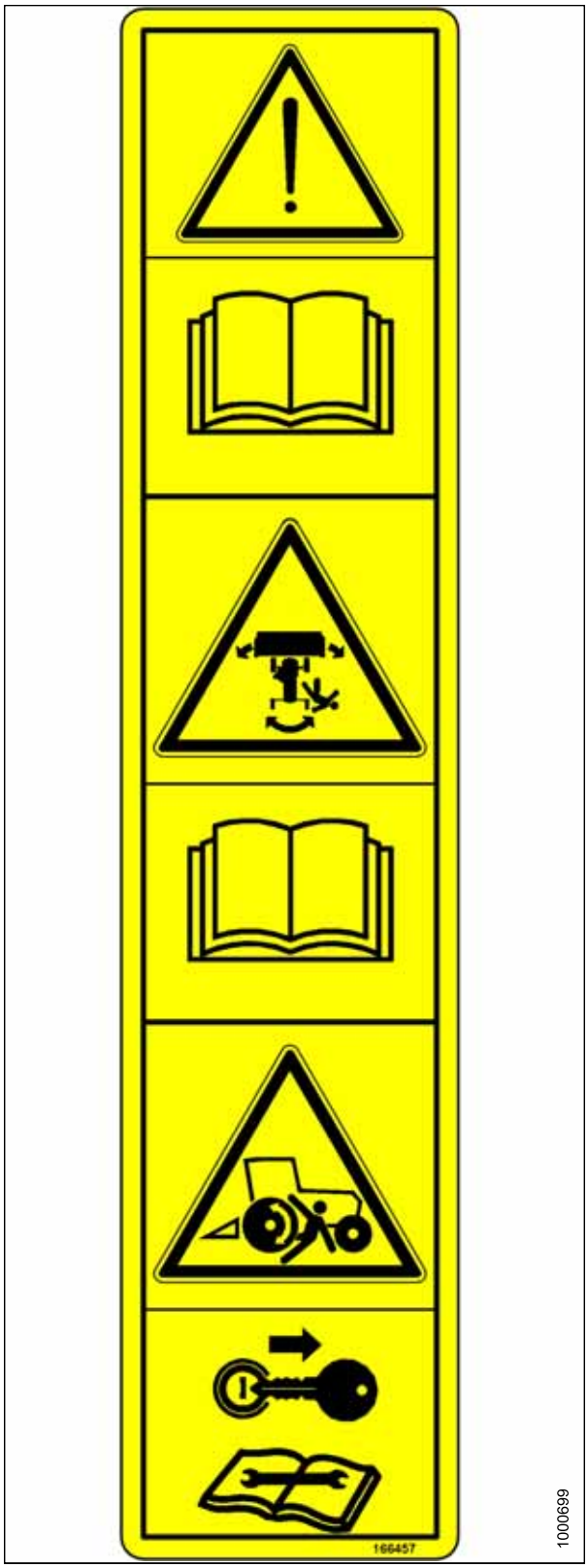


Figure 1.36: MD #166457

MD #166461

Hot fluid under pressure hazard

CAUTION

- Coolant is under pressure and may be hot. Never remove pressurized coolant tank cap when engine is hot.

Figure 1.37: MD #166461

MD #166463

Collision hazard in transport

WARNING

- Collision between windrower and other vehicles may result in injury or death.

When driving windrower on public roadways:

- Obey all highway traffic regulations in your area. Use pilot vehicles front and rear of windrower if required by law.
- Use slow moving vehicle emblem and flashing warning lights unless prohibited by law.
- If width of attached header impedes other vehicle traffic, remove header and install MacDon approved weight box. Refer to operator's manual for safe procedure to tow header.

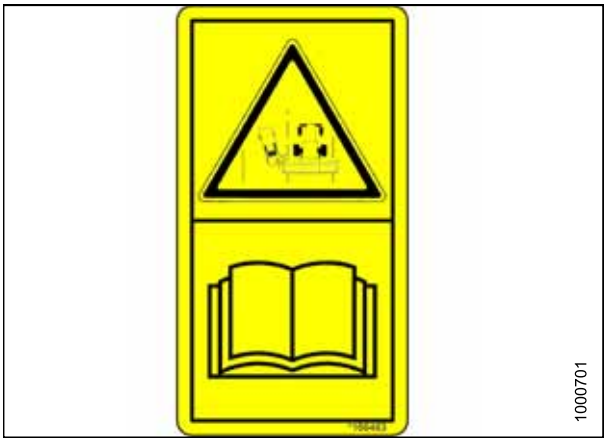


Figure 1.38: MD #166463

MD #166465

Loss of control hazard

WARNING

To avoid serious injury or death from loss of control:

- Do **NOT** make abrupt changes in steering direction.
- Anticipate turns by slowing down well in advance.
- Do **NOT** rapidly accelerate or decelerate while turning.

When travelling on steep slopes:

- Reduce speed and lower header.
- Move ground speed lever to slow end of range.
- Shift high-low speed control to low range.

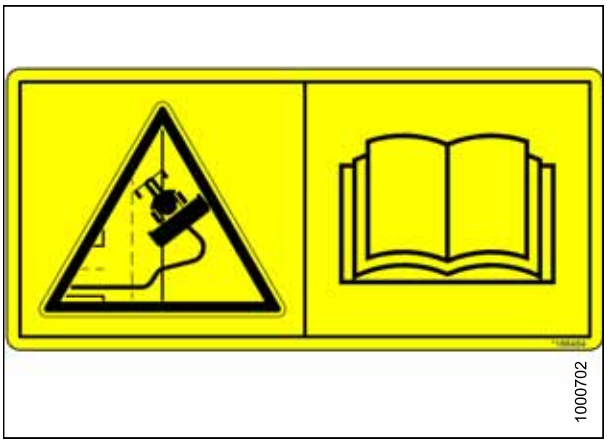


Figure 1.39: MD #166465

With header removed, steering control is reduced if weight is not added to drive wheels. If you must drive the windrower without header or MacDon weight system:

- Operate in low-speed range.
- Avoid slopes.
- Do **NOT** tow a header. **If control of machine is lost, immediately pull ground speed lever to neutral**.

MD #166466

High-pressure oil hazard

WARNING

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

Figure 1.40: MD #166466

MD #166843

Steering control

WARNING

To avoid serious injury or death from loss of control:

- Do not make abrupt changes in steering direction.
- Anticipate turns by slowing down well in advance.
- Do not rapidly accelerate or decelerate while turning.

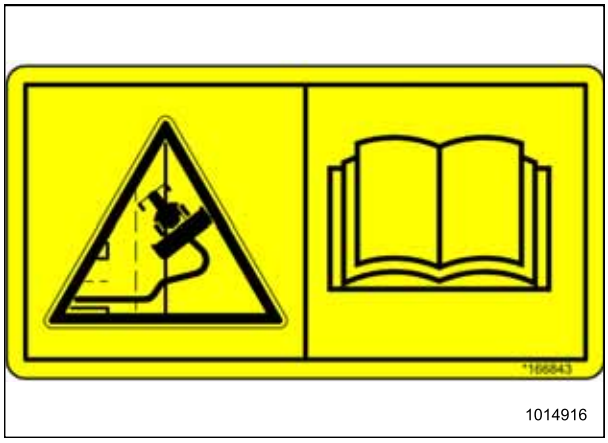


Figure 1.41: MD #166843

MD #167502

Pinch point hazard

WARNING

- To avoid injury, be cautious when opening/closing the training seat to avoid getting pinched.
- Failure to comply could result in death or serious injury.

Figure 1.42: MD #167502

MD #167504

Emergency exit

ATTENTION

- To exit the machine via the secondary door, follow the arrow on the running man sign.

Figure 1.43: MD #167504

MD #184372

General hazard pertaining to machine operation and servicing

CAUTION

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

- Read the operator's manual and follow all safety instructions. If you do not have a manual, obtain one from your Dealer.
- Do not allow untrained persons to operate the machine.
- Review safety instructions with all Operators annually.
- Ensure that all safety signs are installed and legible.
- Make certain everyone is clear of machine before starting engine and during operation.
- Keep riders off the machine.
- Keep all shields in place and stay clear of moving parts.

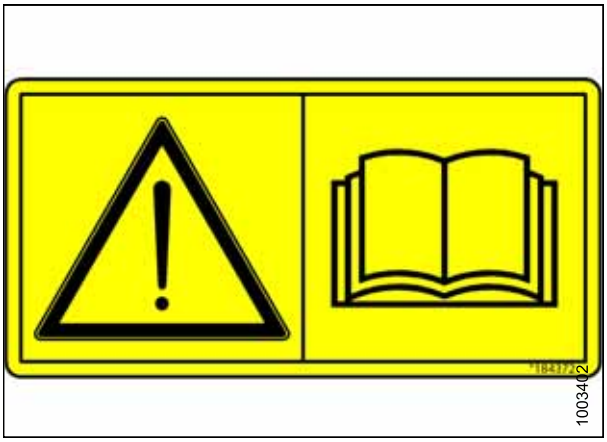


Figure 1.44: MD #184372

- Disengage header drive, put transmission in Neutral, and wait for all movement to stop before leaving operator's position.
- Stop the engine and remove the key from the ignition before servicing, adjusting, lubricating, cleaning, or unplugging machine.
- Engage safety props to prevent lowering of raised unit before servicing in the raised position.
- Use slow moving vehicle emblem and flashing warning lights when operating on roadways unless prohibited by law.

MD #190546

Slippery surface

WARNING

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

Figure 1.45: MD #190546

2 Product Overview

2.1 Definitions

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

Term	Definition
A Series header	MacDon A30D and A40D auger headers
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
Bolt	A headed and externally threaded fastener that is designed to be paired with a nut
Cab-forward	Windrower operation with Operator and cab facing in direction of travel
CDM	Cab display module on a windrower
Center-link	A hydraulic cylinder link between header and machine used to change header angle
CGVW	Combined gross vehicle weight
D Series header	MacDon D50, D60, and D65 rigid draper headers
D1 Series header	MacDon D115, D120, D125, D130, D135, and D140 rigid draper headers for M Series Windrower
DDD	Double-draper drive
DEF	Diesel exhaust fluid; also called AdBlue in Europe, and AUS 32 in Australia
DEF DOSING UNIT	Pump that supplies diesel exhaust fluid through system
DM	Dosing module
DK	Double knife
DKD	Double-knife drive
DOC	Diesel oxidation catalyst
DRT	Aftertreatment decomposition tube
DWA	Double Windrow Attachment
ECM	Engine control module
Engine-forward	Windrower operation with Operator and engine facing in direction of travel
FFFT	Flats from finger tight
Finger tight	Finger tight is a reference position where sealing surfaces or components are making contact with each other, and fitting has been tightened to a point where fitting is no longer loose
GSL	Ground speed lever
GSS	Grass Seed
GVW	Gross vehicle weight
Hard joint	A joint made with use of a fastener where joining materials are highly incompressible

Term	Definition
Header	A machine that cuts and lays crop into a windrow and is attached to a windrower
Hex key	A tool of hexagonal cross-section used to drive bolts and screws that have a hexagonal socket in head (internal-wrenching hexagon drive); also known as an Allen key and various other synonyms
HDS	Hydraulic deck shift
hp	Horsepower
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 which uses a reciprocating cutter (also called a sickle)
MDS	Mechanical deck shift
n/a	Not applicable
N-DETENT	The slot opposite the NEUTRAL position of M Series SP Windrowers on operator's console
NPT	National Pipe Thread: A style of fitting used for low-pressure port openings. Threads on NPT fittings are uniquely tapered for an interference fit
Nut	An internally threaded fastener that is designed to be paired with a bolt
ORB	O-ring boss: A style of fitting commonly used in port 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
R Series header	MacDon R80 and R85 rotary disc headers
RoHS (Reduction of Hazardous Substances)	A directive by the European Union to restrict use of certain hazardous substances (such as hexavalent chromium used in some yellow zinc platings)
rpm	Revolutions per minute
SAE	Society of Automotive Engineers
SCR	Selective catalytic reduction catalyst
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread into a mating part
SDD	Single-draper drive
Self-Propelled (SP) Windrower	Self-propelled machine consisting of a power unit with a header
SK	Single knife
SKD	Single-knife drive
Soft joint	A joint made with use of a fastener where joining materials are compressible or experience relaxation over a period of time
spm	Strokes per minute
Tension	Axial load placed on a bolt or screw, usually measured in Newtons (N) or pounds (lb.)

Term	Definition
TFFT	Turns from finger tight
Torque	The product of a force X lever arm length, usually measured in Newton-meters (Nm) or foot-pounds (lbf·ft)
Torque angle	A tightening procedure where fitting is assembled to a precondition (finger tight) and then nut is turned farther a number of degrees to achieve its final position
Torque-tension	The relationship between assembly torque applied to a piece of hardware and axial load it induces in bolt or screw
UCA	Upper cross auger
ULSD	Ultra-low sulphur diesel
Washer	A thin cylinder with a hole or slot located in the center that is to be used as a spacer, load distribution element, or locking mechanism
WCM	Windrower control module
Windrower	Power unit of a self-propelled header
WOT	Wide open throttle

2.2 Specifications

Engine		
Type		Cummins QSB-4.5L CM2350 4 cylinder turbo diesel, B20 biodiesel approved
Displacement		4.5 L (275 cu. in.)
Power	Rated	116 kW (156 hp) @ 2200 rpm
Electrical System		
Recommended battery (2)		12 Volt, maximum dimension: 334 x 188 x 232 mm (13.25 x 7.37 x 9.44 in.), group rating 29H or 31A. Heavy duty / off road / vibration resistant.
Minimum CCA per battery (cold cranking amps)		650
Battery BCI group rating		29H or 31A
Alternator		160 amp
Egress lighting		Standard
Warning beacons		Standard
Starter		Wet type
Working lights		11
GPS ready		Wiring harness factory installed for Trimble® and JD Greenstar
Traction Drive		
Type		Hydrostatic, three-speed electric shift
Speed	Field (cab-forward)	Low range: 0–18 km/h (11 mph), Mid range: 0–26 km/h (16 mph)
Speed	Reverse (cab-forward)	9.6 km/h (6 mph)
Speed	Transport (engine-forward)	High range: 0–37 km/h (23 mph)
Transmission	Type	Two piston pumps: one per drive wheel
Transmission	Displacement	44 cc (2.65 cu. in.)
Transmission	Flow	167 L/min (40 US gpm)
Transmission	Pressure	379 bar (5500 psi)
Final drive	Type	Planetary gearbox
Final drive	Ratio	30.5 : 1
Wheel motor displacement	Low range	68 cc (4.15 cu. in.)
Wheel motor displacement	Mid range	50 cc (3.01 cu. in.)
Wheel motor displacement	High range	32 cc (1.93 cu. in.)

System Capacities		
Fuel tank		367 L (97 US gallons)
Hydraulic reservoir		65 L (17.2 US gallons)
Diesel exhaust fluid (DEF) tank capacity		29 L (7.5 US gallons)
Header Drive (Refer to Table *2.1, page 33*).		
Header Lift/Tilt		
Type		Lift - Hydraulic double-acting cylinders Tilt - Optional hydraulic positioning Tilt - Hydraulic center-link
Function		Lift/tilt
Header Float		
Primary adjustment		Manual, external, drawbolt with springs (one per side), two inner booster spring
Fine adjustment		Hydraulic, in-cab switch
Automatic		Hydraulic, three programmable settings for all headers (Deck shift compensation on draper headers)
Cab		
Type		Spring/shock suspension
Dimensions	Width	1600 mm (63 in.)
Dimensions	Depth	1735 mm (68.3 in.) (at top of window)
Dimensions	Height	1640 mm (64.6 in.)
Dimensions	Volume	3540 L (125 cu. ft.)
Seat	Driver	Adjustable air-ride suspension, seat belt
Seat	Training	Folding, cab mounted, seat belt
Windshield wiper	Front	800 mm (31.5 in.) blade
Windshield wiper	Rear	560 mm (22 in.) blade
Heater		37,900 Btu/h (11,107 W)
Air conditioning		29,800 Btu/h (8734 W)
Electrical outlets		One live, two on ignition, one live/keyed
Mirrors		One inside (transport), two outside (field)
Radio		Two speakers and antenna are factory installed. Radio is dealer installed
System Monitoring		
Speeds		Ground (mph or km/h), engine (rpm), knife (spm), disc (rpm), reel (rpm or mph/km/h), conveyor (ref. no.)
Header		Height, angle, float, header drive load gauge

Tire Options (Refer to Table *2.2, page 34* for options.)		
Frame and Structure		
Dimensions		Refer to *2.3 Windrower Dimensions, page 34*
Frame to ground (crop clearance)		1160 mm (45.7 in.)
Weight	Base	4450 kg (9810 lb.)[1]
Weight	Maximum GVW	9750 kg (21,500 lb.)[1]
Weight	Maximum CGVW	10,480 kg (23,100 lb.)[1]
Header Compatibility		
Auger headers	A30 D, A40 D	All sizes
Draper headers	D50[2]	Up to 35 ft.
Draper headers	D60 and D65[2]	Up to 40 ft.
Draper headers	D1 Series	Up to 40 ft.
Rotary disc	R80 and R85	13 ft. only[3]
Rotary disc	R113 and R116	13 ft. and 16 ft.

NOTE:

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

Pump Locations:

- A – Piston pump (closest to engine) knife drive.
- B – Reel/conveyor pump (or M2 with disc).
- C – Oil from the inner gear pump is normally routed directly to the cooler bypass valve and combines with the return flow from the first gear pump. From there the oil is cooled and moves through the high pressure filter and then into the supercharge valve manifold. If a Double Windrow Attachment (DWA) is installed, oil is diverted to power the draper; the return flow proceeds to the supercharge valve manifold.
- D – The outboard gear pump (D) supplies oil to the multifunction control manifold. The returned oil combines with the return flow from the inboard gear pump (C) at the cooler bypass and maintains standby pressure to operate brake disengage (either low- or high-speed range) and the neutral interlock cylinder.

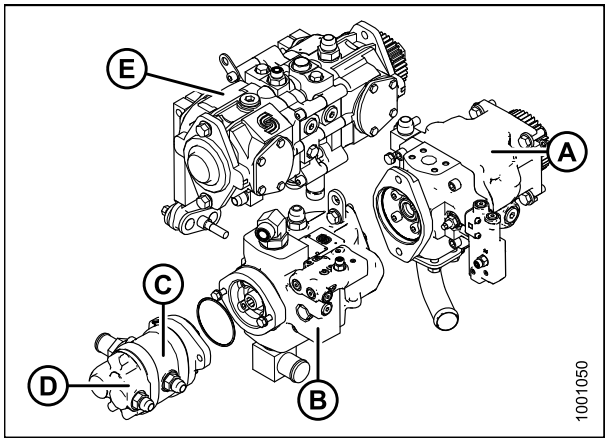


Figure 2.1: Pumps

1. Weights do not include options.
2. Depending on header options.
3. Only 18.4 x 26 tires are compatible with the 4 m (13 ft.) R80 and R85.

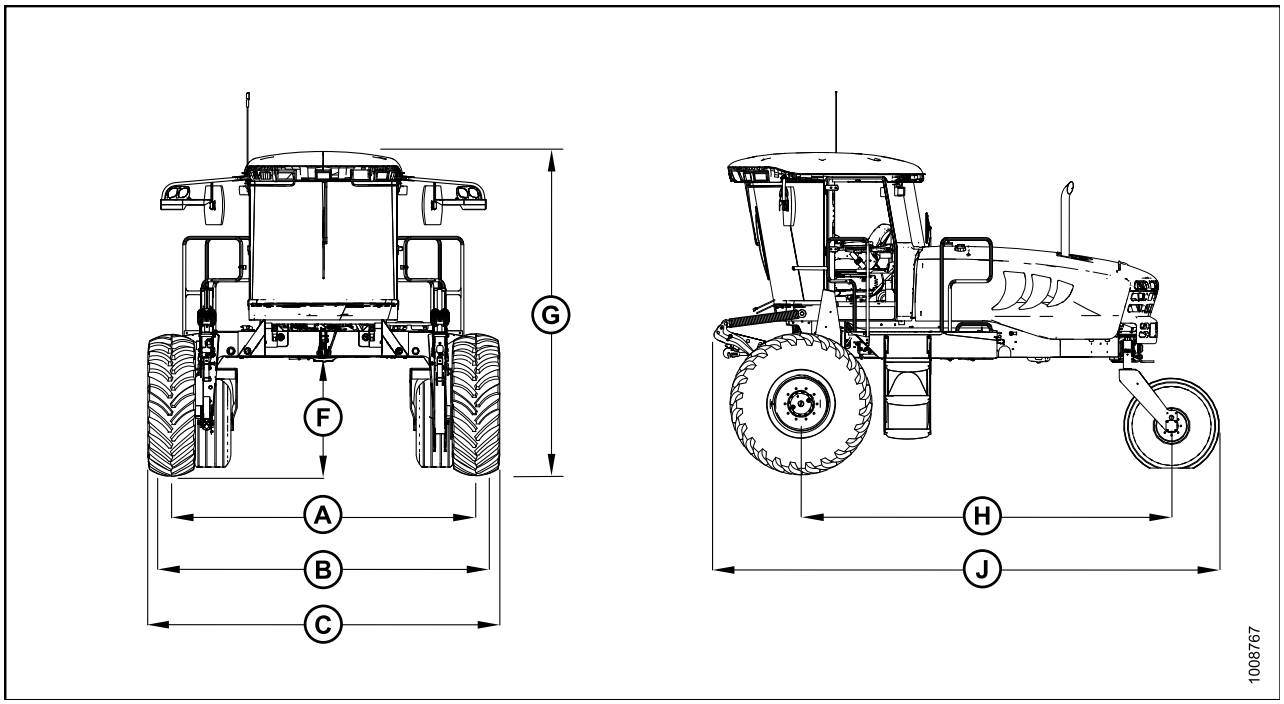
- E – Traction drive double piston pump. Engine end pump drives right wheel; outboard pump drives left wheel.

Table 2.1 Hydraulic Pumps

Pump Type	Specifications	Controller Type	Function
Pump A - Load sense pressure compensated piston pump	Variable displacement: 0–45 cc (2.75 cu. in.) flow = 0–102 L/min (27 gpm) at 27.56 MPa (4000 psi)	Electric over hydraulic max. flow rate determined by header ID	Knife drive or part of disc drive (option) M1 circuit
Pump B - Load sense pressure compensated piston pump	Variable displacement: 0–38 cc (2.32 cu. in.) flow = 0–84 L/min (24 gpm) at 22.05 MPa (3200 psi)	Electric over hydraulic max. flow rate determined by header ID	Conveyor and reel drive or part of disc drive (option) M2 circuit
Pump C - Gear pump	Displacement: 16.7 cc (1.02 cu. in.) flow at full throttle 44 L/min (11.5 gpm) at 17.23 MPa (2500 psi)	Engine rpm	Supercharge flow and pressure for traction drive, brake release, neutral lock, and DWA draper drive (if installed)
Pump D - Gear pump	Displacement: 16.7 cc (1.02 cu. in.) flow at full throttle 44 L/min (11.5 gpm) at 17.23 MPa (2500 psi)	Engine rpm	Supercharge flow and pressure for traction drive, brake release, and neutral lock

2.3 Windrower Dimensions

Figure 2.2: Windrower Dimensions – Cab-Forward



A - Drive Tire Tread
B - Drive Tire Hubs
C - Drive Tires
F - 1160 mm (45-3/4 in.)
G - 3378 mm (133 in.)
H - 4022 mm (158-5/16 in.)
J - 5280 mm (207-7/8 in.)

Table 2.2 Drive Tires

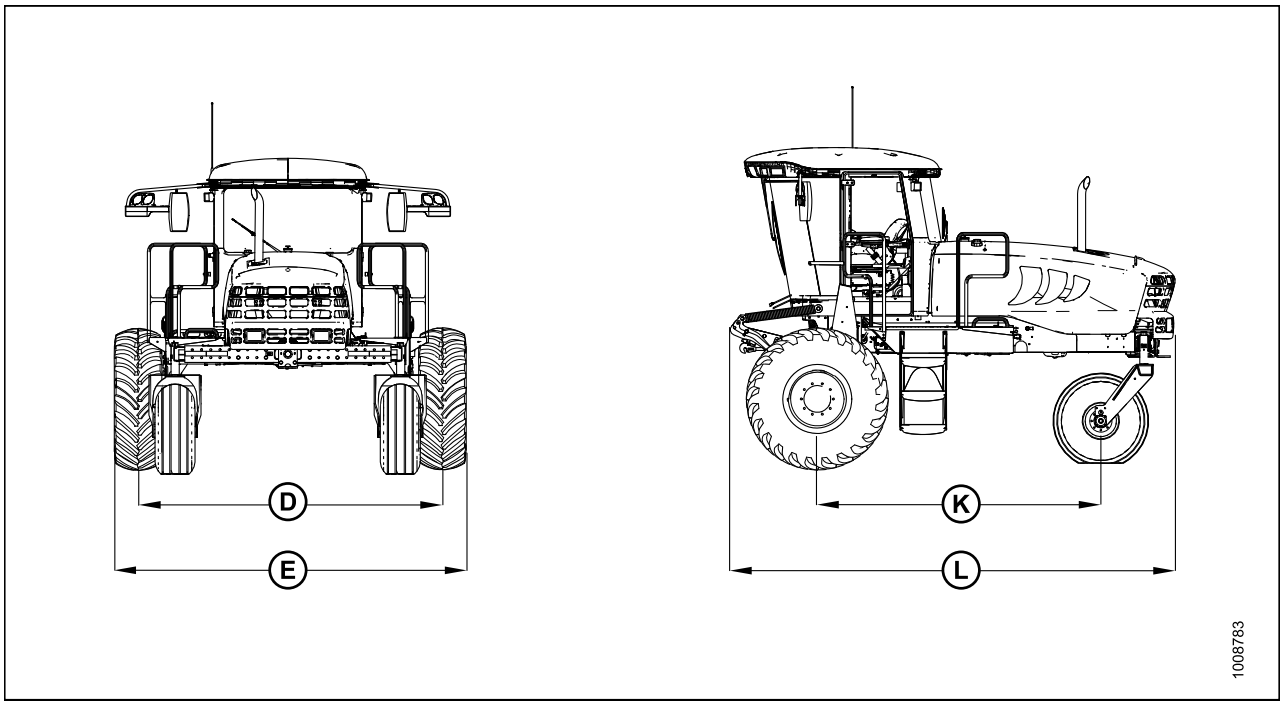
Tire Size	Wheel Position	Tread (A) mm (in.)	Hubs (B) mm (in.)	Tires (C) mm (in.)
18.4 x 26 bar and turf narrow track[4]	Inner/outer (shipping)	3144 (123-3/4)	3571 (140-9/16)	3644 (143-7/16)
18.4 x 26 bar and turf narrow track[4]	Outer/outer	3324 (130-7/8)	3751 (147-11/16)	3824 (150-5/8)
18.4 x 26 bar and turf narrow track[4]	Inner/inner	2964 (116-11/16)	3391 (133-1/2)	3464 (136-3/8)
18.4 x 26 bar and turf wide track[4]	Inner/outer (shipping)	3319 (130-11/16)	3571 (140-9/16)	3819 (150-3/8)
18.4 x 26 bar and turf wide track[4]	Outer/outer	3499 (137-3/4)	3751 (147-11/16)	3999 (157-7/16)

4. Only 18.4 x 26 tires are compatible with the 4.0 m (13 ft.) R80 and R85.

Table 2.2 Drive Tires (continued)

Tire Size	Wheel Position	Tread (A) mm (in.)	Hubs (B) mm (in.)	Tires (C) mm (in.)
18.4 x 26 bar and turf wide track[4]	Inner/inner	3139 (123-9/16)	3391 (133-1/2)	3639 (143-1/4)
600/65R28 radial tire	Inner/outer (shipping)	3139 (123-9/16)	3571 (140-9/16)	3758 (147-15/16)
600/65R28 radial tire	Outer/outer	3319 (130-11/16)	3751 (147-11/16)	3938 (155-1/16)
600/65R28 radial tire	Inner/inner	2959 (116-1/2)	3391 (133-1/2)	3578 (140-7/8)
23.1-26 and 580/70R26 turf tires	Inner/outer (shipping)	3203 (126-1/8)	3571 (140-9/16)	3793 (149-5/16)
23.1-26 and 580/70R26 turf tires	Outer/outer	3383 (133-3/16)	3751 (147-11/16)	3973 (156-7/16)
23.1-26 and 580/70R26 turf tires	Inner/inner	3023 (119)	3391 (133-1/2)	3613 (142-1/4)

Figure 2.3: Windrower Dimensions – Engine-Forward



D - Caster Tire Tread
K - 3064 mm (120-9/16 in.)

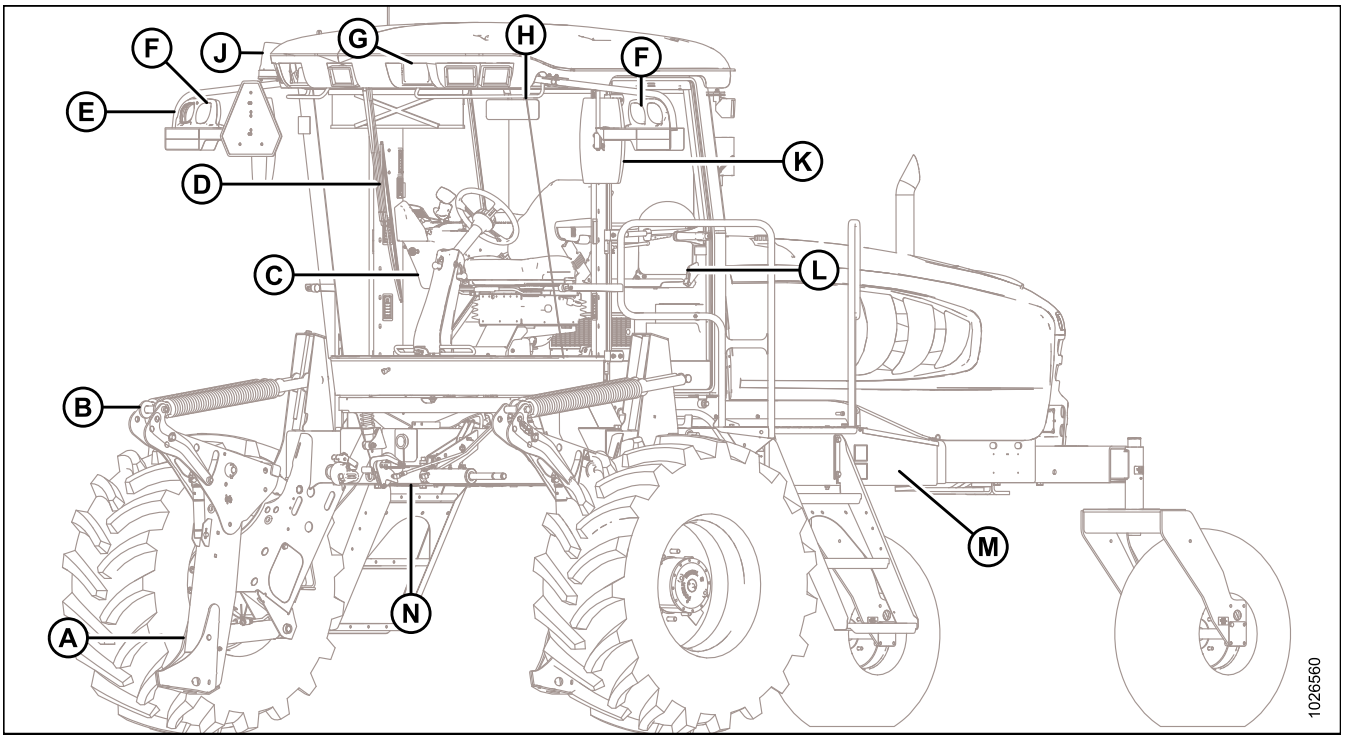
E - Caster Tire Casters
L - 4747 mm (186-7/8 in.)

Table 2.3 Caster Tires

Tire Size	Wheel Position	Tread (D) mm (in.)	Casters (E) mm (in.)
7.5-16SL	Minimum	2448 (96-7/16)	3032 (118-15/16)
7.5-16SL	Maximum	3448 (135-11/16)	4032 (158-3/4)
10-16 formed caster	Minimum	2448 (96-7/16)	3032 (118-15/16)
10-16 formed caster	Maximum	3448 (135-11/16)	4032 (158-3/4)
10-16 forked caster	Minimum	2448 (96-7/16)	3014 (118-11/16)
10-16 forked caster	Maximum	3448 (135-11/16)	4014 (158)
16.5 x 16.1	Minimum	2448 (96-7/16)	3014 (118-11/16)
16.5 x 16.1	Maximum	3448 (135-11/16)	4014 (158)

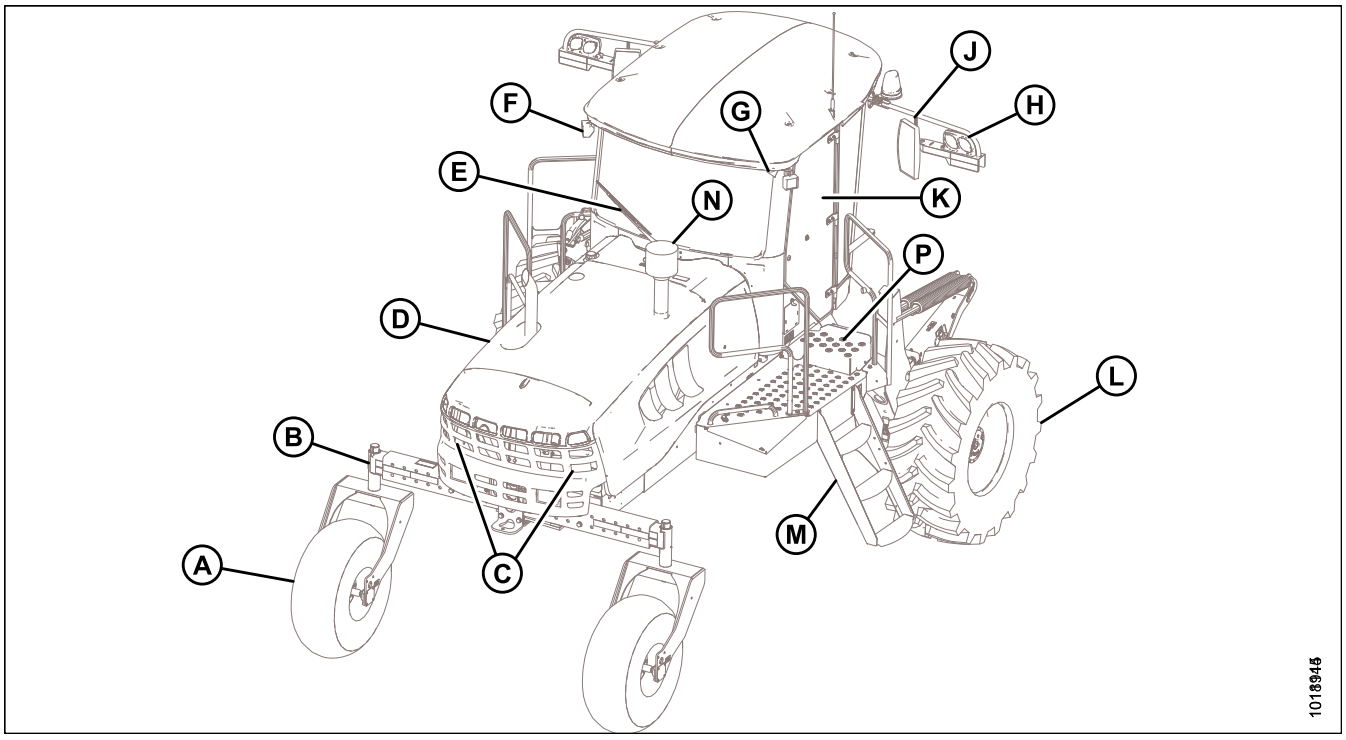
2.4 Component Location

Figure 2.4: Front Cab-Forward View



A - Header Lift Leg
B - Header Float Springs
C - Operator's Station
D - Windshield Wiper
E - Turn Signal/Hazard Lights
F - Tail Light Engine-Forward
G - Field/Road Lights
H - Handholds
J - Beacon
K - Mirror
L - Door
M - Maintenance Platform
N - Center-Link

Figure 2.5: Rear Cab-Forward View



A - Caster Wheel
B - Walking Beam
C - Taillights - Cab-Forward (Option)
D - Engine Compartment Hood
E - Windshield Wiper
F - Field/Road Lights
G - Horn
H - Turn Signal/Hazard Lights
J - Mirror
K - Door
L - Drive Wheel
M - Maintenance Platform
N - Precleaner
P - Diesel Exhaust Fluid (DEF) Tank

3 Operator’s Station

The operator’s station is designed for operating the windrower in cab-forward mode (working mode) or in engine-forward mode (transport mode). The operator’s station—which includes the seat, console, and steering column—pivots 180° to provide access to controls and gauges regardless of the direction of travel.

3.1 Operator Console

The console contains controls to operate the windrower, as well as amenities for the Operator. The console position is adjustable to suit each Operator.

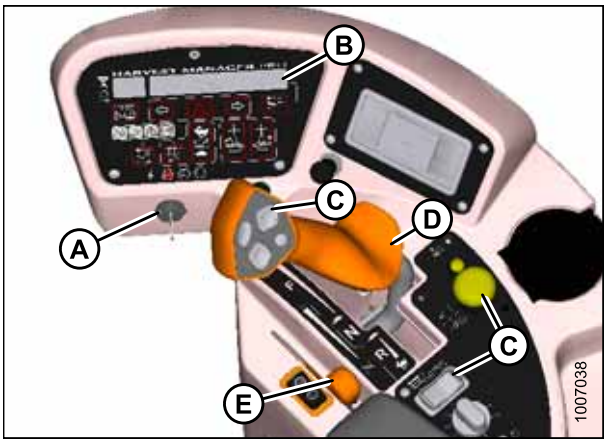


Figure 3.1: Operator Console

A - Ignition
B - Cab Display Module (CDM)
C - Header Controls
D - Ground Speed Lever (GSL)
E - Throttle

1. Adjusting fore-aft and height:

   a. Pull lever (A) and slide console fore or aft to the desired position.

   b. Release lever to lock console.

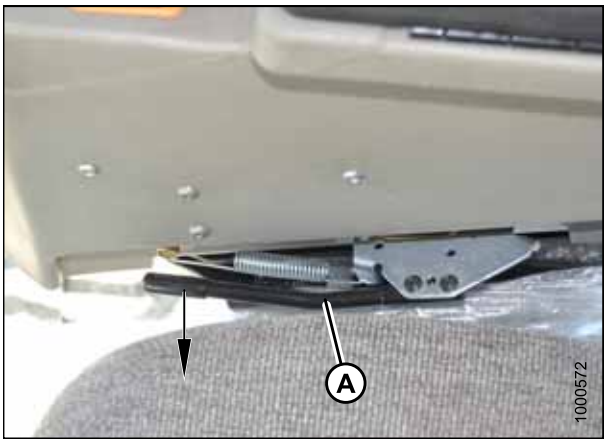


Figure 3.2: Console Fore-Aft

2. Adjusting only fore-aft:
   a. Loosen nuts (A) under console.
   b. Move console as required.
   c. Tighten nuts (A).

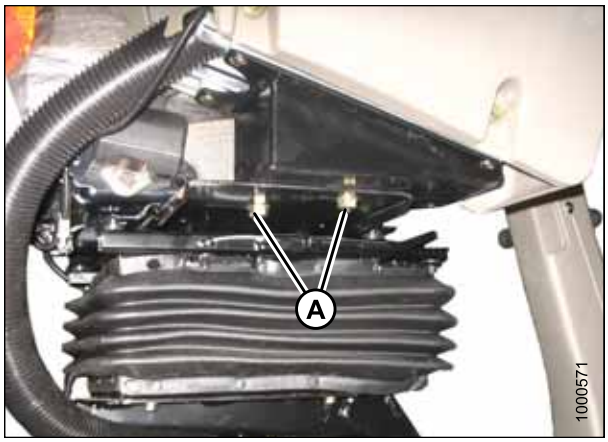


Figure 3.3: Console Fore-Aft

3.2 Operator Presence System

The operator presence system is a safety feature designed to deactivate or alert selected systems when the Operator is not seated at the operator's station.

These systems include:

- Header drive
- Engine and transmission

3.2.1 Header Drive

- To engage the header drive, the Operator must be seated in the operator's seat.
- If the Operator leaves the seat, power to the header drive is maintained for 5 seconds, then the header shuts down automatically.
- To restart the header after an automatic shut down, move the HEADER DRIVE switch to the OFF position and then to the ON position.

3.2.2 Engine and Transmission

- If the HEADER DRIVE switch is engaged, the engine will not start.
- If the windrower is moving 8 km/h (5 mph) or slower and the Operator leaves the seat, the CDM will flash NO OPERATOR on the upper line and ENGINE SHUT DOWN 5...4...3...2...1...0 on the lower line accompanied by a steady tone. When the countdown reaches 0, the engine shuts down.
- If the windrower is moving 8 km/h (5 mph) or faster, and the Operator leaves the seat for more than 5 seconds, an alarm will sound and the lower display line will flash NO OPERATOR.
- If the operator's seat is in between cab-forward and engine-forward positions and the transmission is not locked in the NEUTRAL position, the engine shuts off. The lower display will flash LOCK SEAT BASE until the seat base is locked into position.

3.3 Operator's Seat Adjustments

The operator's seat has several adjustments. Refer to the following for the location and description of each adjustment.

3.3.1 Adjusting Fore-Aft Position

1. Pull lever (A) up to release.
2. Move seat forward or rearward.
3. Release lever (A).

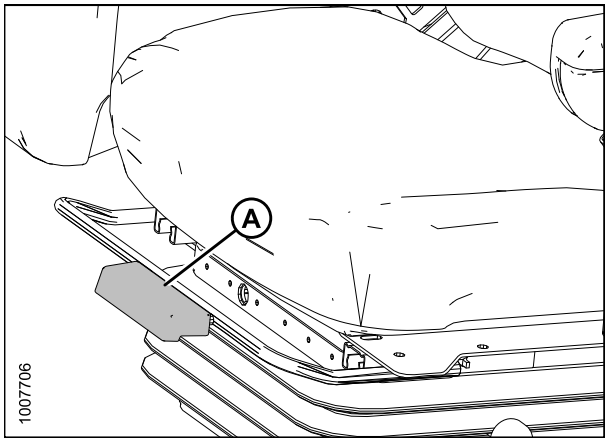


Figure 3.4: Fore-Aft Position

3.3.2 Adjusting Fore-Aft Isolator Lock

Locks seat fore-aft isolator.

LOCK: Push lever (A) down.

UNLOCK: Pull lever (A) up.

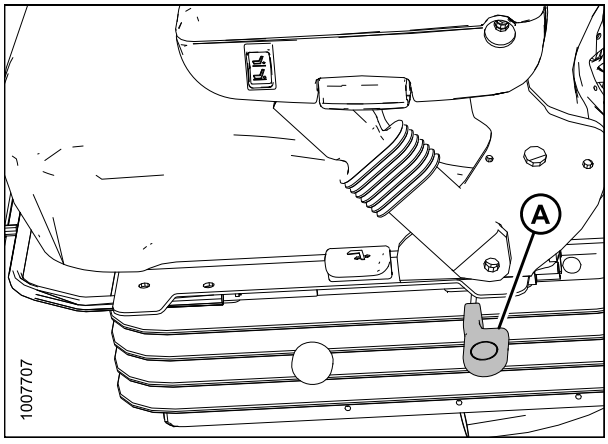


Figure 3.5: Fore-Aft Isolator Lock

3.3.3 Adjusting Seat Suspension and Height

Controls suspension stiffness and seat height.

INCREASE: Press upper switch (A).

DECREASE: Press lower switch (B).

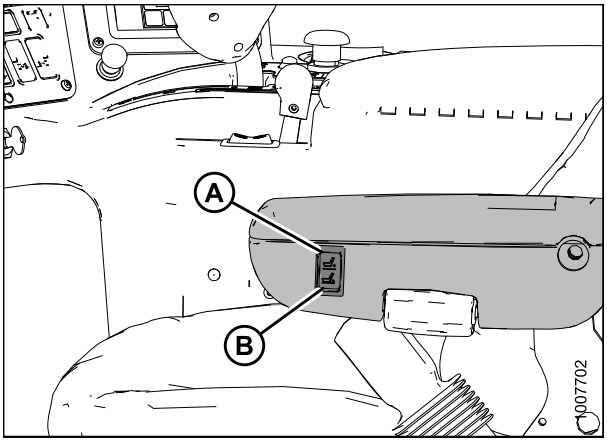


Figure 3.6: Seat Suspension and Height on Armrest

3.3.4 Adjusting Seat Tilt

1. Pull lever (A) up to release.
2. Position seat back as desired.
3. Release lever (A).

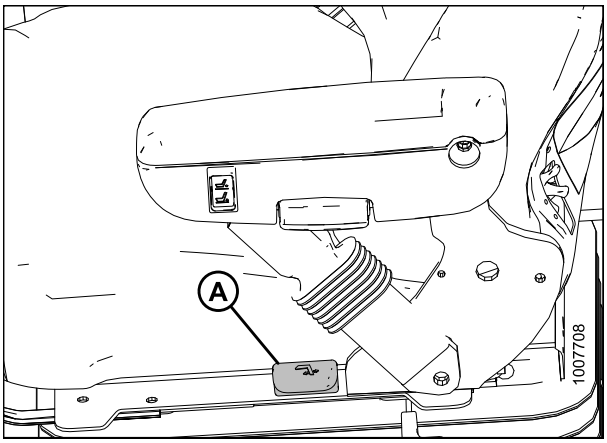


Figure 3.7: Seat Tilt

3.3.5 Adjusting Vertical Dampener

Controls suspension dampening.

INCREASE: Turn knob (A) counterclockwise.

DECREASE: Turn knob (A) clockwise.

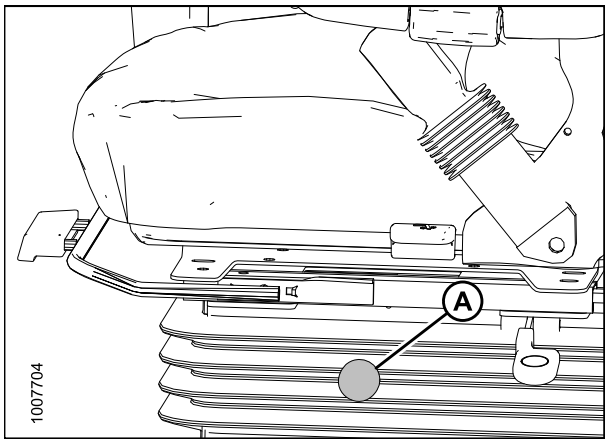


Figure 3.8: Vertical Dampener

3.3.6 Adjusting Armrest

Raise armrest (A) for easier access to seat.

Lower armrest (A) after seat belt is buckled.

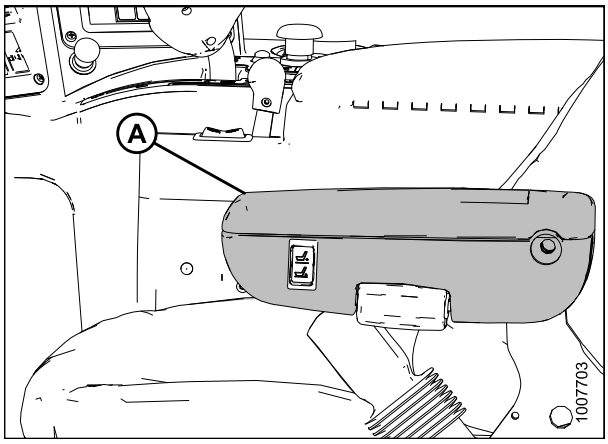


Figure 3.9: Armrest

3.3.7 Adjusting Armrest Angle

INCREASE: Rotate knob (A) clockwise.

DECREASE: Rotate knob (A) counterclockwise.

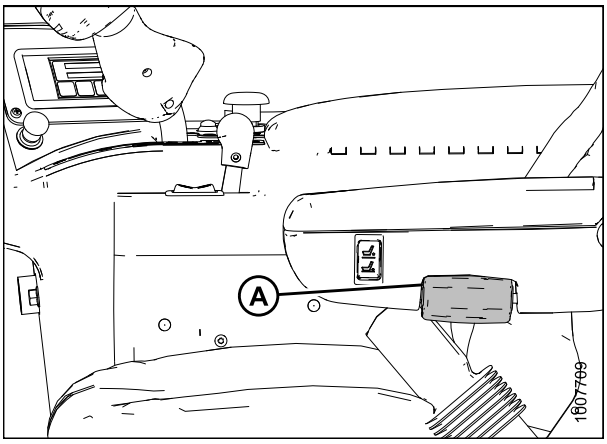


Figure 3.10: Armrest Angle

3.3.8 Adjusting Lumbar Support

Adjusts the stiffness of seat back.

INCREASE: Rotate knob (A) upward.

DECREASE: Rotate knob (A) downward.

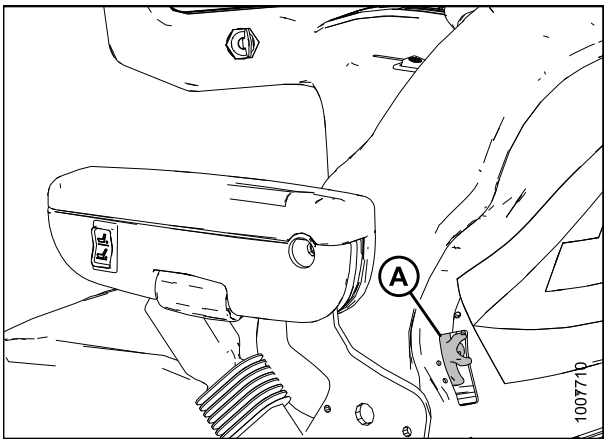


Figure 3.11: Lumbar Support

3.3.9 Using Seat Belts

The windrower is equipped with seat belts on the operator's and trainer's seats.

WARNING

Seat belts can help ensure your safety when properly used and maintained.

- **Before starting the engine, fasten your seat belt, and ensure that the training seat occupant's seat belt is securely fastened.**
- **Never wear a seat belt loosely or with slack in the belt system. Never wear the belt in a twisted condition or pinched between the seat structural members.**

To fasten seat belt:

1. Pull belt with metal eye (A) at right side completely across your body.
2. Push metal eye (A) into buckle (B) until it locks.
3. Adjust the position of the belt as low on your body as possible.

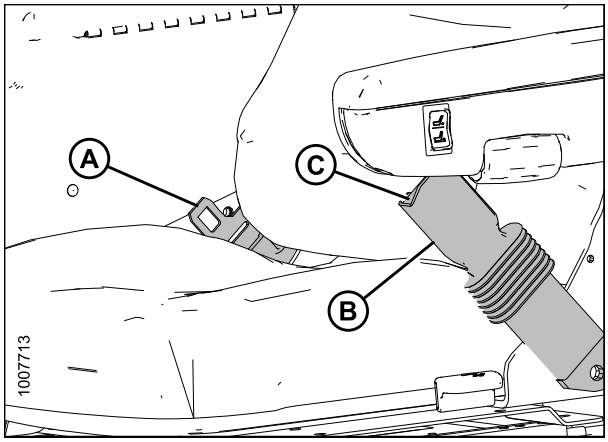


Figure 3.12: Seat Belt

To release seat belt:

4. Push red button (C) in the end of the buckle.
5. Separate buckle (B) and metal eye (A).

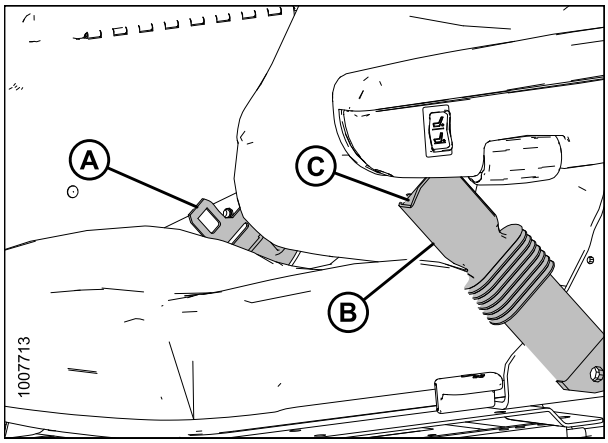


Figure 3.13: Seat Belt

3.4 Training Seat

A wall-mounted, fold-up training seat complete with seat belt is provided.

WARNING

- **The training seat is provided for use by an experienced machine Operator while training a new Operator.**
- **The training seat is NOT intended as a passenger seat or for use by children. Use the seat belt whenever operating the machine or riding as a Trainer.**
- **Keep all other riders off the machine.**

For storage, lift seat (B) and secure with latch (A).

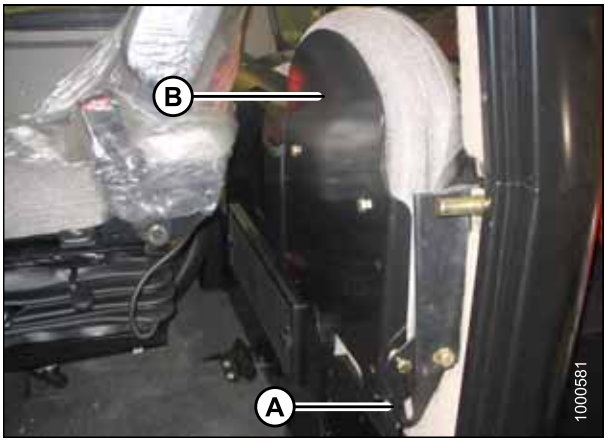


Figure 3.14: Training Seat in Storage Position

To lower seat, lift latch (A) and lower seat (B).

Figure 3.15: Training Seat

3.5 Adjusting Steering Column

The steering column can be adjusted to suit each particular Operator and to make it easier to get in and out of the seat.

1. Hold onto the steering wheel, lift handle (A), and move the steering wheel up or down to desired position.
2. Release handle (A) to lock the steering wheel position.

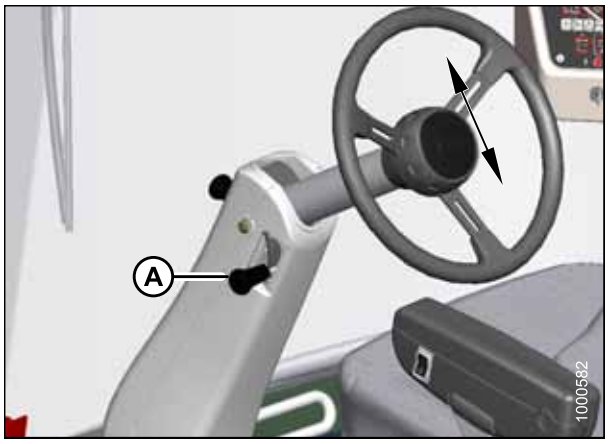


Figure 3.16: Steering Column

3.6 Exterior Lighting

The field/road (A), high/low beam (B), and beacon light (C) switches are located on a panel in the cab headliner. The hazard/turn signal switch is located on the cab display module (CDM).

The position of the operator's station (cab-forward mode or engine-forward mode) automatically determines the lighting.

An auto-road light feature is available and is activated when certain conditions are met. For more information, refer to *3.6.6 Auto Road Light, page 54*.

IMPORTANT:

Red and amber reflector tape is positioned so as to be visible in both engine-forward and cab-forward modes.

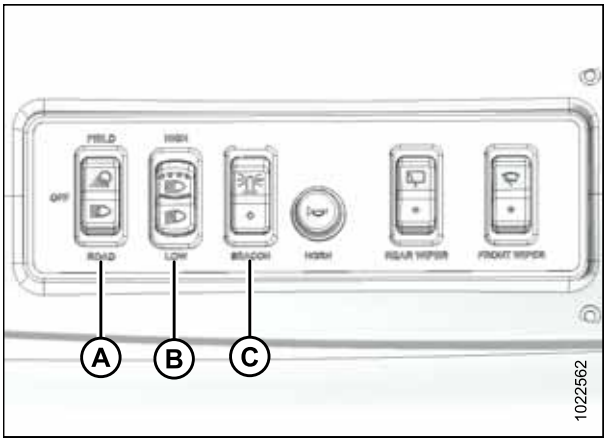


Figure 3.17: Headliner Console (except Russia)

A - FIELD / OFF / ROAD
B - HIGH / LOW
C - BEACONS / OFF

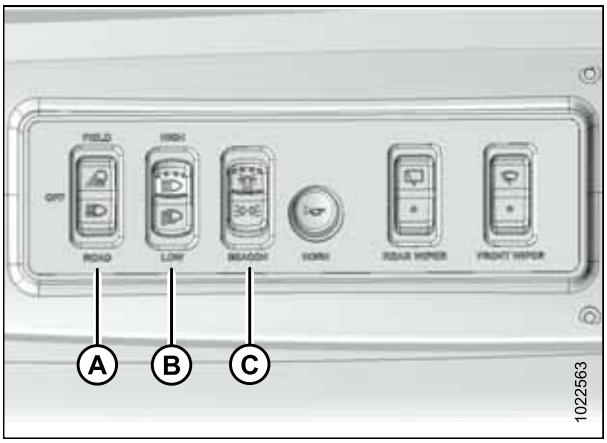


Figure 3.18: Headliner Console (Russia)

A - FIELD / OFF / ROAD
B - LOW / HIGH
C - BEACON & CLEARANCE / OFF / CLEARANCE

3.6.1 Field Light: Cab-Forward

The following lights are ON when the light switch is in FIELD position with the windrower in cab-forward mode:

- Field lights in cab roof (front and rear)
- Swath lights in hood
- HID lights (if installed) on mirror supports

NOTE:

If the auto-road light feature is activated (i.e., windrower is in engine- or cab-forward mode, out of park, high range switch position, and header off), only the two front corner field lights will turn on; the remaining field lights are disabled.

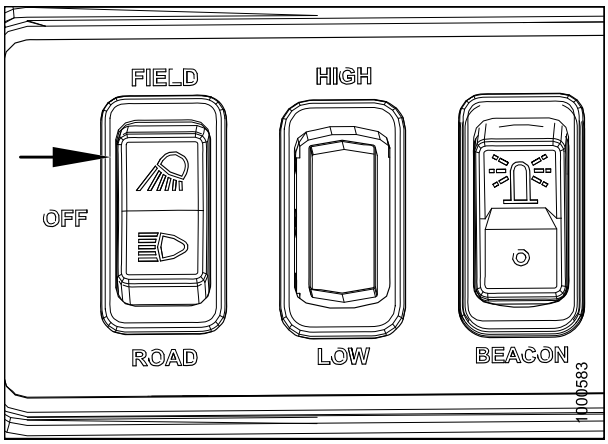


Figure 3.19: Field Light Switch

The two innermost lights in the field light group (A) at the front of the cab are adjustable. Refer to *Adjusting Field Lights, page 374*.

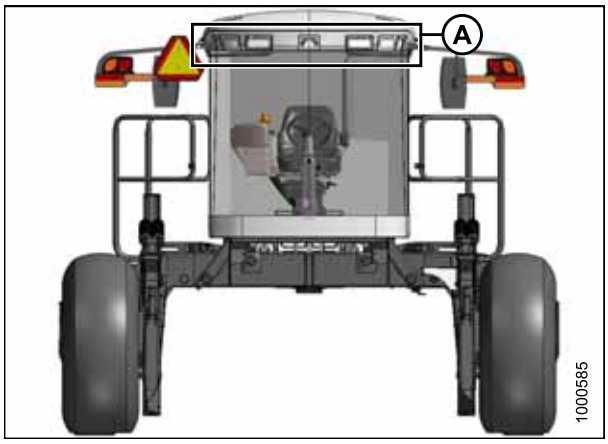


Figure 3.20: Cab-Forward: Front View

The two field lights (A) at the rear of the cab are adjustable. Refer to *Adjusting Rear Floodlights, page 380*.

NOTE:

When the engine is shut down, rear field lights (A) turn on for 60 seconds to illuminate the platform and stairs.

The two swath lights (B) in the hood are adjustable, but because they are used as road lights in engine-forward mode and adjusted accordingly, they should **NOT** be adjusted for field operation.

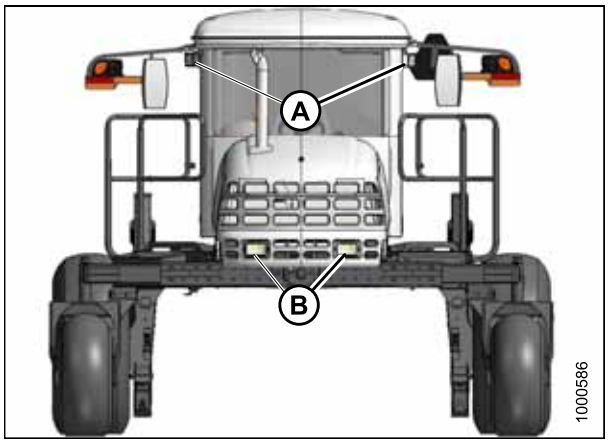


Figure 3.21: Cab-Forward: Rear View

3.6.2 Road Light: Engine-Forward

The following lights are ON when the light switch (A) is in ROAD position with the windrower in engine-forward mode:

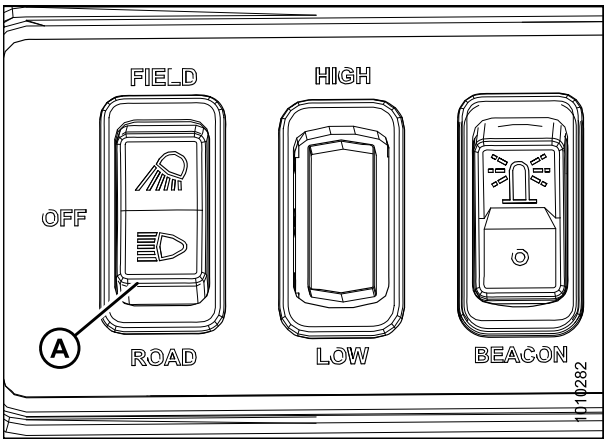


Figure 3.22: Road Light Switch

- Red taillights (A) on the mirror supports
- Amber turn signals and hazard lights (B) on mirror supports rear view
- Beacon lights (C) on mirror supports

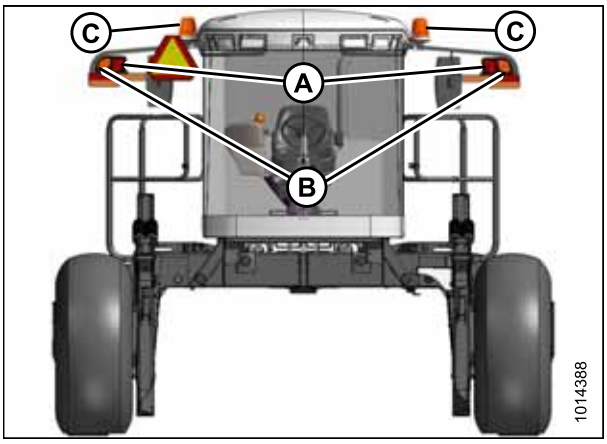


Figure 3.23: Engine-Forward: Rear View

- Amber turn signals and hazard lights (A) on mirror supports front view
- Headlights (B) in hood with low/high switch
- Beacon lights (C) on mirror supports

The two headlights in the hood are adjustable. Refer to *Aligning Headlights, page 369*.

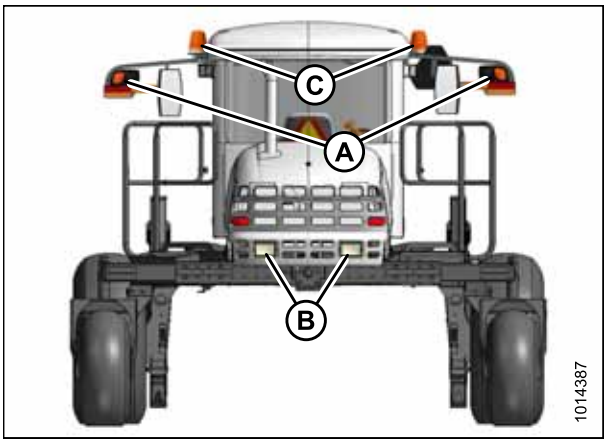


Figure 3.24: Engine-Forward: Front View

3.6.3 Road Light: Cab-Forward

If equipped, the following lights are functional with switch (A) in the ROAD position:

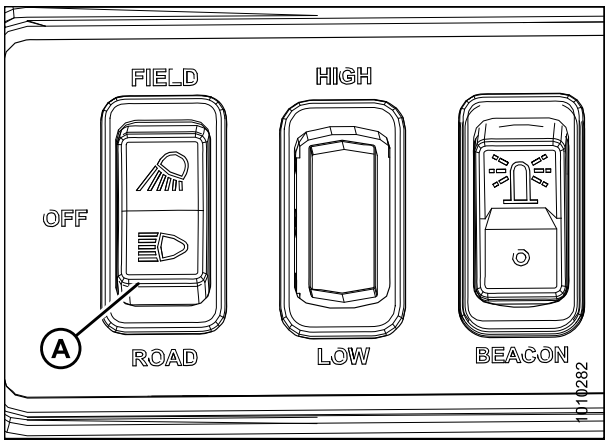


Figure 3.25: Road Light Switch

- Four lights (A) in cab roof
- Amber turn signals and hazard lights (B) on mirror supports visible from both front and rear
- Beacon lights (C) on both sides of the cab roof

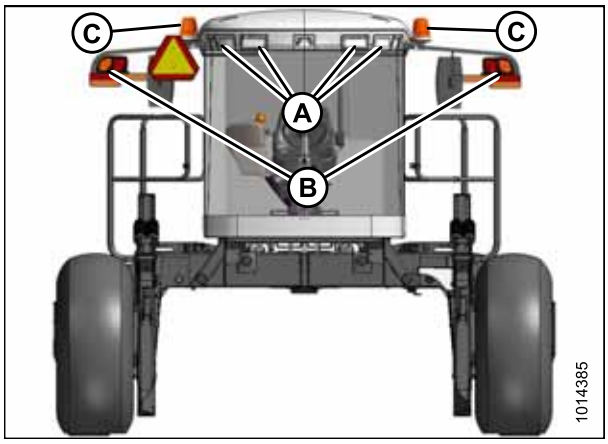


Figure 3.26: Cab-Forward: Front View

- Red lights (A) in hood
- Beacon lights (B) on mirror supports visible from both front and rear

IMPORTANT:

Optional red tail lighting and marking kit must be installed so that road travel in the cab-forward mode complies with regulations. Refer to *6.4.1 Lighting and Marking for Cab-Forward Road Travel, page 432* or see your MacDon Dealer.

NOTE:

If the red tail lighting kit is not installed, travelling in cab-forward mode and activating the turn indicator will trigger a stop lamp error (E134 or E135).

IMPORTANT:

If red tail lighting kit is installed and stop lamp errors still occur, contact your MacDon Dealer.

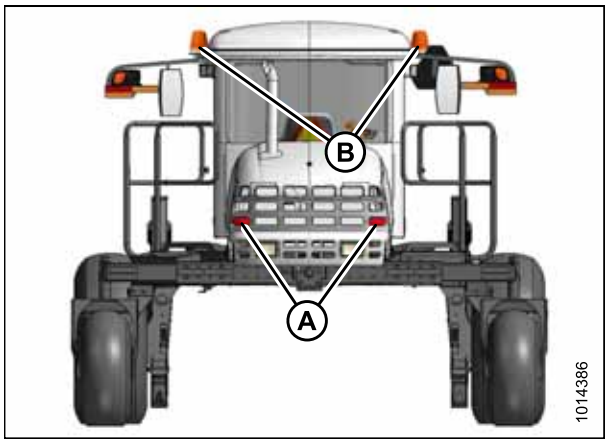


Figure 3.27: Cab Forward: Rear View

3.6.4 Hazard Light

The hazard lights can be switched on or off manually by pressing the HAZARD switch (A) on the cab display module (CDM).

These lights will also turn on automatically when the auto-road light feature is activated (i.e., engine running, header off, and transmission in either mid or high range), and can only be turned off by engaging the header drive.

Figure 3.28: CDM

3.6.5 Beacon Light

The beacon lights (A) are functional when the ignition and the beacon switch (B) are ON.

The beacons will also turn on automatically when the auto-road light feature is activated (i.e., engine running, header off, and transmission in either mid or high range), and can only be turned off by engaging the header drive.

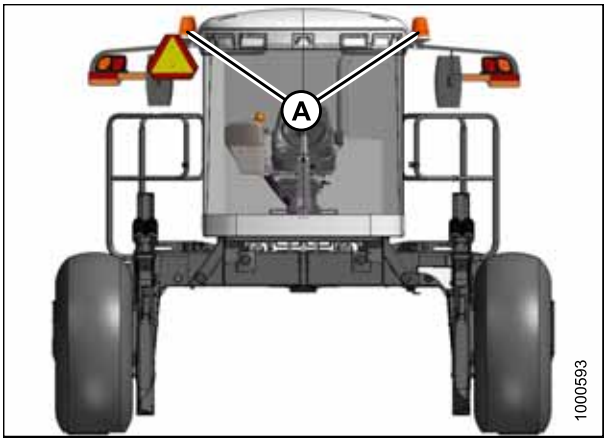


Figure 3.29: Cab-Forward: Front View

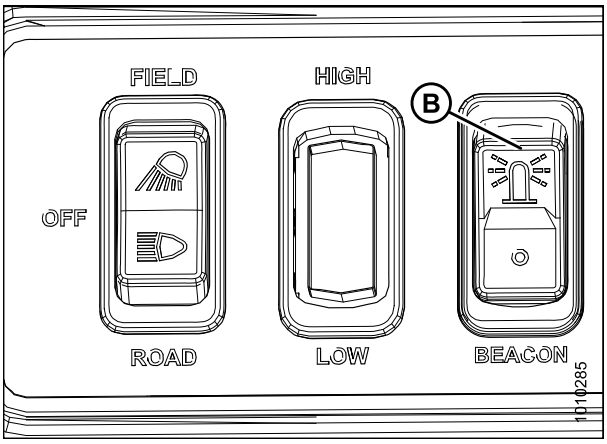


Figure 3.30: Beacon Light Switch

3.6.6 Auto Road Light

The beacon and hazard lights are included in the auto road light feature. The beacon and hazard lights will turn on when this feature is activated, and can only be turned off by engaging the header drive.

This feature will activate when

- Windrower is in cab- or engine-forward mode
- Engine is running
- Header is disengaged
- Transmission is in either mid or high range

Moving the ground speed lever (GSL) out of neutral (brake off) will switch the white lights from field/work lights to road lights, if the switch is in the field/road lights position.

3.7 Windshield Wipers

The windshield wiper controls are located in the cab headliner. The illustration shows the controls in cab-forward mode.

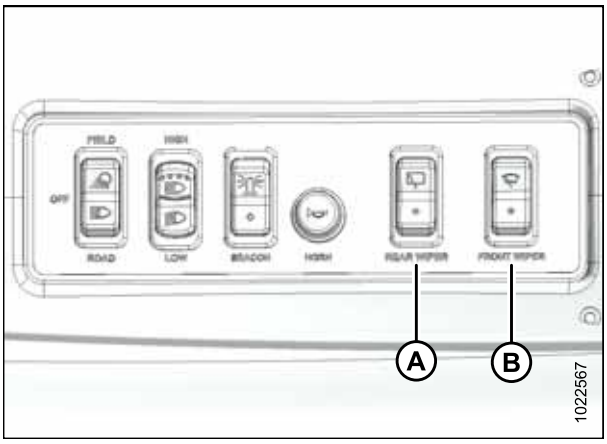


Figure 3.31: Wiper Controls

A - Rear Wiper **B - Front Wiper**

3.8 Rear View Mirrors

Two outside-mounted, adjustable mirrors (A) provide a rear view when the windrower is in cab-forward mode.

A single interior-mounted mirror (B) provides a rear view in the engine-forward mode.

The mirror/light assembly (A) is designed to fold back if accidentally struck. A detent-type lock keeps it in place.

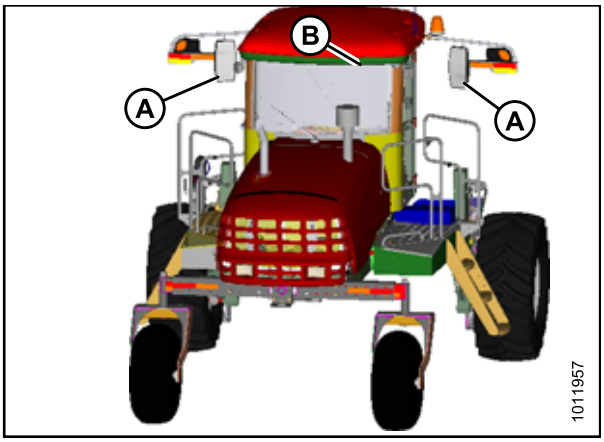


Figure 3.32: Mirrors

3.9 Cab Temperature

The cab environment is controlled by a climate control system that provides clean air-conditioned or heated air.

The heater/evaporator/blower assembly is located under the cab floor and is accessible from beneath the windrower.

3.9.1 Heater Shut-Off

A shut-off valve (A) at the engine allows the cab heater to be isolated from the engine coolant.

The valve must be OPEN to provide heat to the cab, but can be CLOSED for maximum cooling.

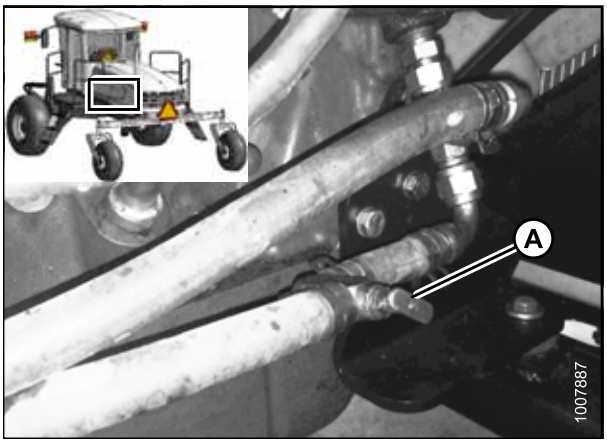


Figure 3.33: Heater Shut-Off Valve

3.9.2 Air Distribution

Cab air distribution is controlled through adjustable air vents (A) located in the cab posts. The vents provide Operator ventilation.

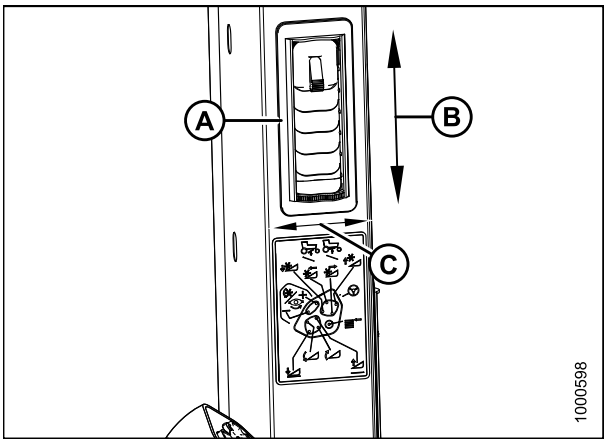


Figure 3.34: Adjustable Air Vents

A - Vent **B - Open/Close** **C - Direction**

3.9.3 Climate Controls

A – BLOWER Switch controls the blower speed

- OFF / LOW / MEDIUM / HIGH

B – Air Conditioning (A/C) Switch controls A/C system

- OFF: A/C does not operate
- ON: A/C operates with blower switch ON

C – Outside Air Switch controls the air source

- FRESH AIR: Starts booster fan and filtered outside air is drawn into cab
- RECIRCULATE: Stops booster fan and cab air is recirculated

D – TEMPERATURE Control Dial controls cab temperature

- Turning the dial clockwise increases temperature
- Turning the dial counterclockwise decreases temperature

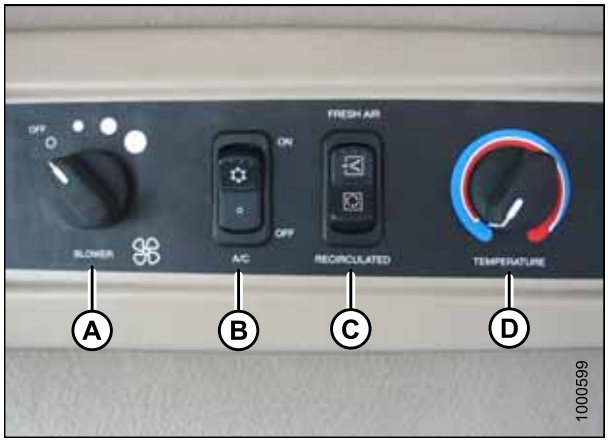


Figure 3.35: Climate Controls

IMPORTANT:

When starting the windrower after more than one week of storage, the refrigerant oil needs to be distributed through the A/C system. For instructions, refer to *Air Conditioning (A/C) Compressor Coolant Cycling, page 167*.

3.10 Interior Lights

Two interior lights are installed in the cab headliner.

A low intensity LED light (A) is located directly overhead to provide ambient lighting if desired. It functions only when the key is in the RUN position. An ON/OFF switch is located on the light.

The other interior light (B) is located on the headliner switch panel and the push-ON, push-OFF button is located on the light. It functions at any time.

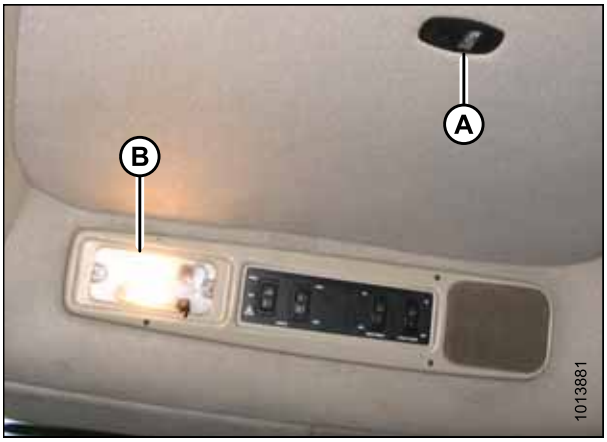


Figure 3.36: Interior Lights

3.11 Emergency Exit

The emergency exit window (indicated by the emergency exit decal [A]) is located beside the operator's station.

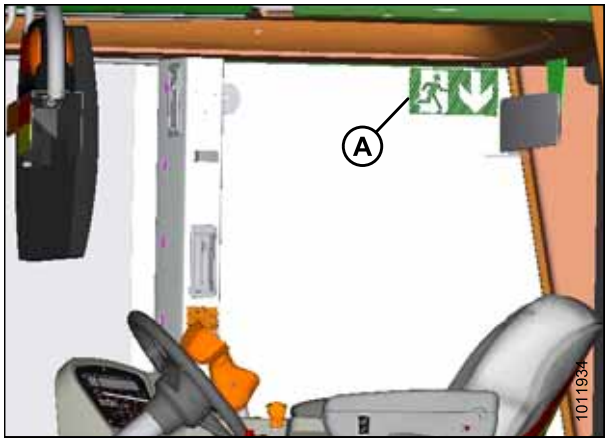


Figure 3.37: Emergency Exit Sign

To open the emergency exit window, follow these steps:

1. Release the window latch (A).
2. Remove the latch pin (B).
3. Push window open (C).

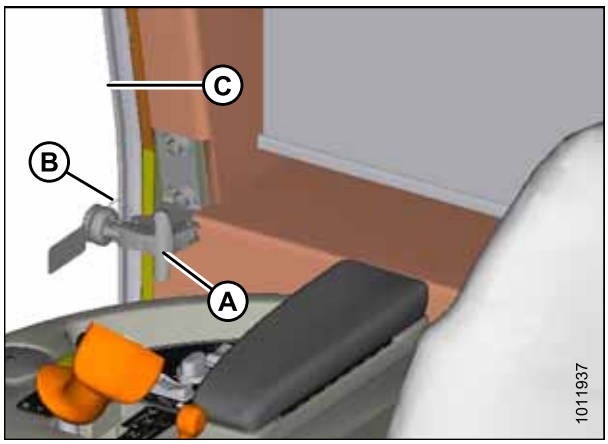


Figure 3.38: Emergency Exit Window

3.12 Operator Amenities

The operator's station includes the following amenities:

Operator's console

A - Auxiliary power outlet

B - Utility tray (under armrest)

C - Cigarette lighter

D - Ashtray/cup holder

E - Utility tray

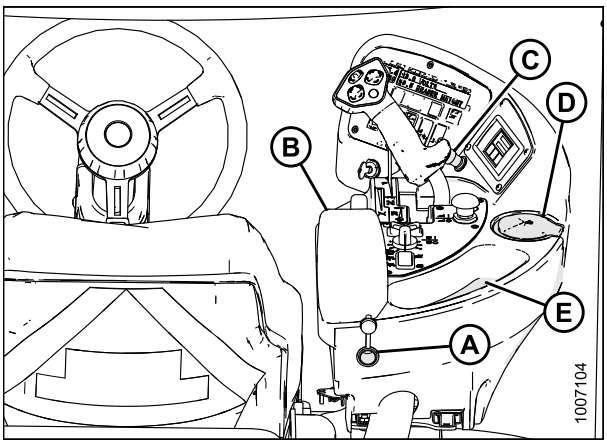


Figure 3.39: Console

Windshield shades (optional)

Retractable window shades (A) can be installed for the front and rear windows. Refer to *6.1.4 Windshield Shades, page 427* for ordering information.

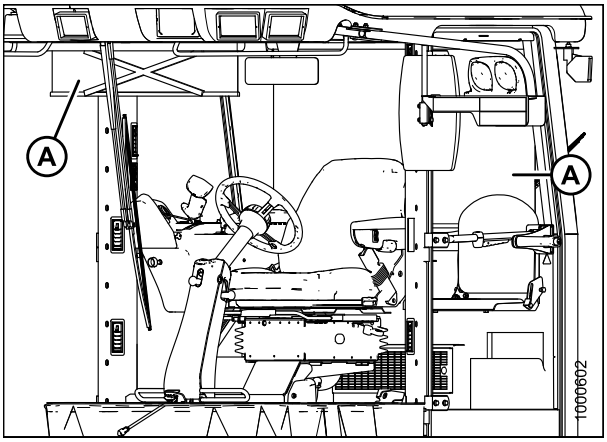


Figure 3.40: Windshield Shades

Auxiliary outlets

Two auxiliary power outlets are located on either side of the wiper motor cover/storage tray behind the Operator (cab-forward mode).

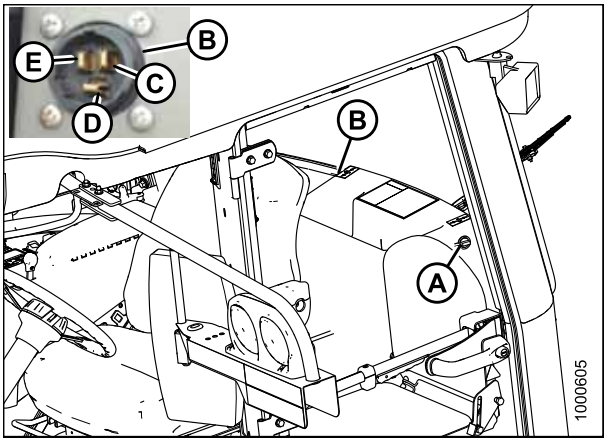


Figure 3.41: Auxiliary Power Outlets

A - Auxiliary Power Outlet
B - Auxiliary Power Outlet
C - Battery Terminal
D - Ground Terminal
E - Switched Terminal

Manual storage

A manual storage case (A) is located under the training seat.

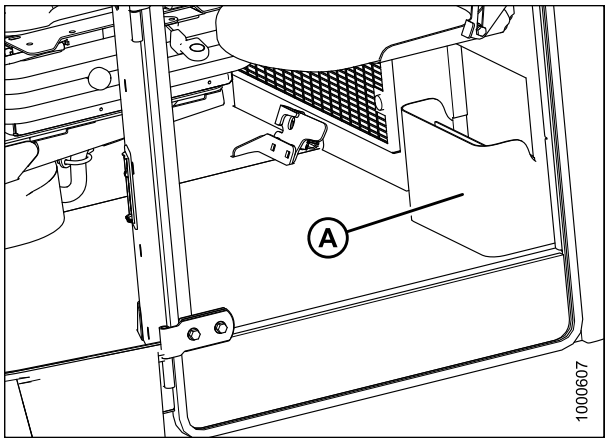


Figure 3.42: Operator's Manual Storage

Coat hook

A coat hook (A) is located above the training seat, left of the Operator.

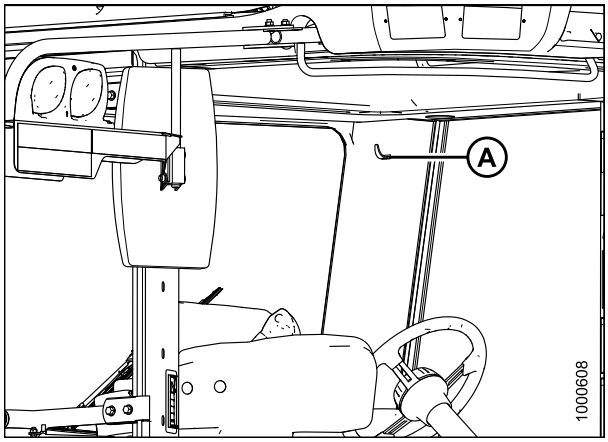


Figure 3.43: Coat Hook

3.13 Radio

A radio is available as optional equipment from your Dealer.

3.13.1 AM/FM Radio

A space (B) is provided in the cab headliner to accommodate the installation of an AM/FM radio. In order to retain radio settings and preset memory with the battery disconnect turned off, select a radio with non-volatile settings memory.

Two pre-wired speakers (A) have been factory-installed in the headliner.

Operating instructions are supplied with the radio.

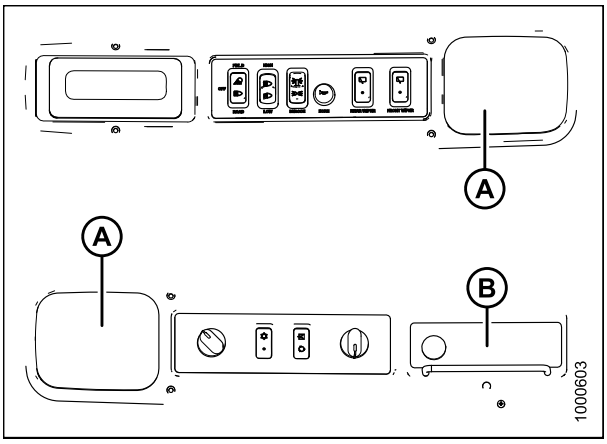


Figure 3.44: Speakers in Headliner

A - Speakers **B - Radio Mounting Location**

3.13.2 Mounting the Antenna

An optional base for a magnetic, roof-mounted antenna is available from your Dealer.

IMPORTANT:

The antenna base can only be installed on the left cab-forward and right rear cab roof bolts.

Order antenna mount (MD #160288 [B]) or refer to *3.47, page 64* for part dimensions to make an improvised version. A knockout (C) for the antenna lead is provided on the cab post, as shown in the following illustration.

1. Remove existing bolt (A).
2. Install antenna mount (B) and secure with bolt (A).

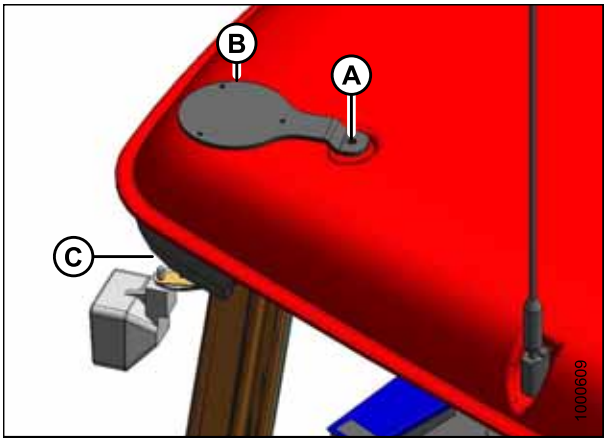


Figure 3.45: Antenna Mount

The knockout (A) is located on the exterior right cab-forward rear corner post of the cab, under the roof, between the horn and the light.

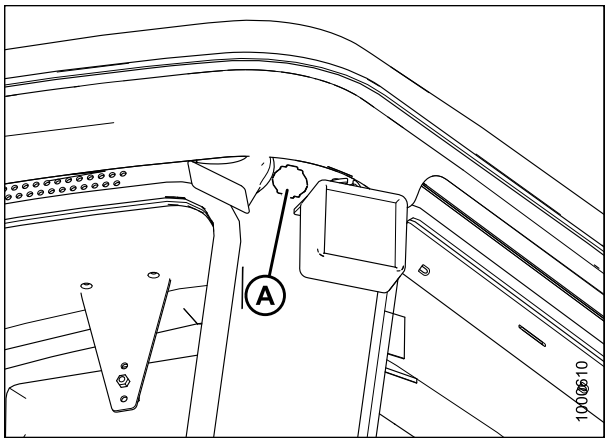


Figure 3.46: Knockout Location in Cab

To make your own mount, refer to dimensions template. Use 11 GA. or 3.0 mm steel sheet.

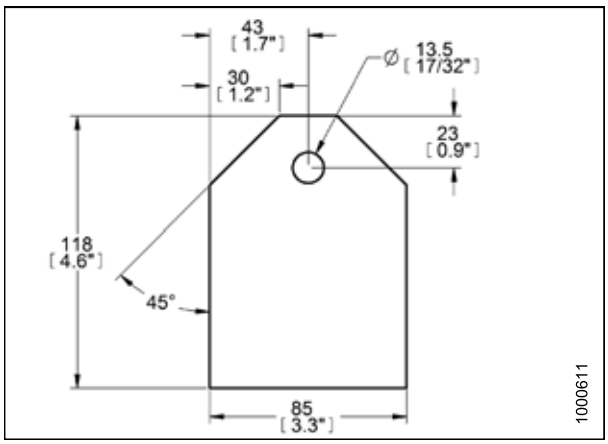


Figure 3.47: Template for Antenna Mount

3.14 Horn

The horn is activated by pushing button (A) located beside the ignition key.

Sound the horn three times prior to starting the engine.

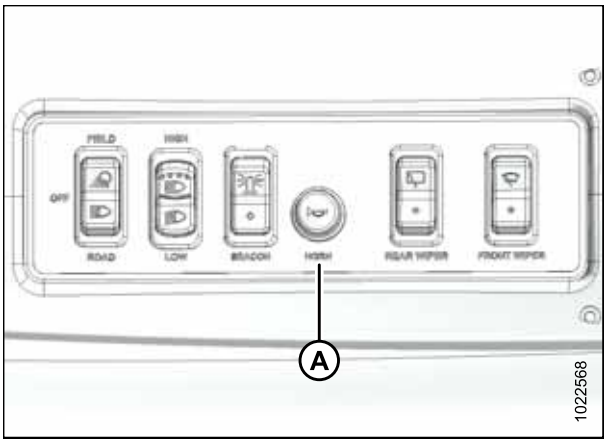


Figure 3.48: Horn Button Location

The horn (A) is located outside the cab on the rear right cab-forward corner of the cab, under the roof.

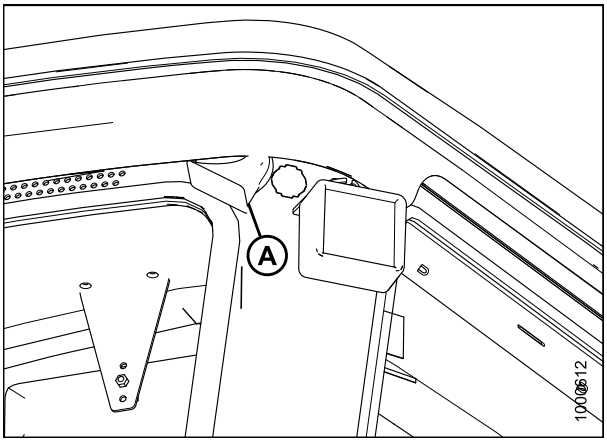


Figure 3.49: Horn Location

3.15 Engine Controls and Display Module

The following engine controls and display module are conveniently located on the operator's console.

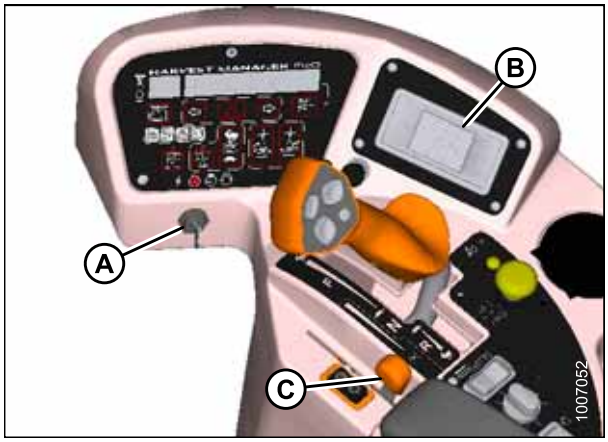


Figure 3.50: Engine Controls and DEF Display Module

Ignition switch (A)

- ACC (Accessory): Fully counterclockwise
- OFF: All electrical systems OFF
- RUN: Clockwise
- START: Fully clockwise to crank engine: Release and switch returns to RUN

NOTE:

Remove key when windrower is not in use; the key also locks doors.

Fuel and diesel exhaust fluid (DEF) display module (B)

- Fuel level monitoring
- DEF monitoring
- High Exhaust System Temp indicator (HEST)
- Selective Catalytic Reduction (SCR) system cleaning inhibit and forced indicator

NOTE:

For information about temperature warnings and alarms, refer to *Display Warnings and Alarms, page 90*.

Throttle (C) controls engine speed

- FULL: Push lever forward
- OPERATING: Refer to *Driving Forward in Cab-Forward Mode, page 175*
- CLOSED: Pull lever back

3.15.1 Fuel and Diesel Exhaust Fluid (DEF) Display Module

Figure 3.51: Fuel and Diesel Exhaust Fluid (DEF) Display Module

A - Fuel and DEF Level
B - High Exhaust System Temperature (HEST)
C - Inhibit Selective Catalytic Reduction (SCR) System Cleaning
D - Force SCR System Cleaning

Fuel and DEF level

- Level gauge appears green when levels are between full and 1/8, and appears red when levels are between 1/8 and empty.
- When the levels are in the green range, switches (icons) appear white. When the levels are in the red range, switches (icons) turn black and are backlit with amber light. The amber lights blink when the tank level is depleted to 1/16.

IMPORTANT:

Running out of DEF will cause the engine to derate and will eventually limit throttle to idle.

WARNING

Do NOT park vehicle indoors when HEST lamp is on.

- When the HEST warning is active, the switch (icon) turns black and a warning lamp is backlit with amber light at location (A) (warning lamp not shown).
- The HEST lamp appears when the engine enters a selective catalytic reduction (SCR) system cleaning—this will not hinder normal vehicle operation.
- When the HEST warning is inactive, the switch (icon) is not visible and will appear entirely black (A).

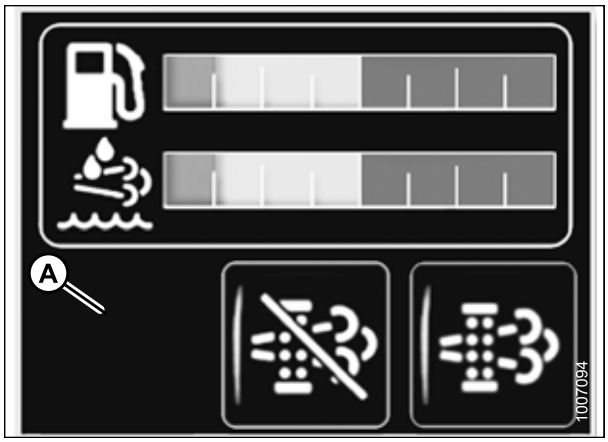


Figure 3.52: Inactive HEST Icon

NOTE:

A forced system cleaning can only be initiated if the Operator is prompted by a flashing icon. A forced system cleaning cannot be initiated at other times.

SCR System Cleaning Inhibit and SCR System Cleaning Forced

SCR system cleaning is a high-temperature clean-out cycle to keep the after-treatment free of crystallized DEF.

A passive system cleaning may occur depending on engine duty cycles, and may last for 15–30 minutes. It will not affect operation other than high exhaust temperature. A forced SCR system cleaning may be required for extensive cleaning (for example, when the inhibit switch has been left ON for a long period of time). The system will derate if the forced SCR system cleaning is not done.

- Switches (icons) (A) and (B) work as lamps and switches.
- The switches (icons) turn gray when the function is not active. When the function is active, the switches (icons) turn black and are backlit with amber light.
- To activate the functions, press and hold the switch (icon) (SCR system cleaning inhibit [A] or SCR system cleaning forced [B]) for 3 seconds. During the 3-second interval, the fuel icon and gauge are replaced with the following red text at location (C), HOLD 3 SECONDS, and the red border turns white. After which, the fuel gauge returns and the white border starts blinking. The border reverts to solid red when the switch (icon) is released.

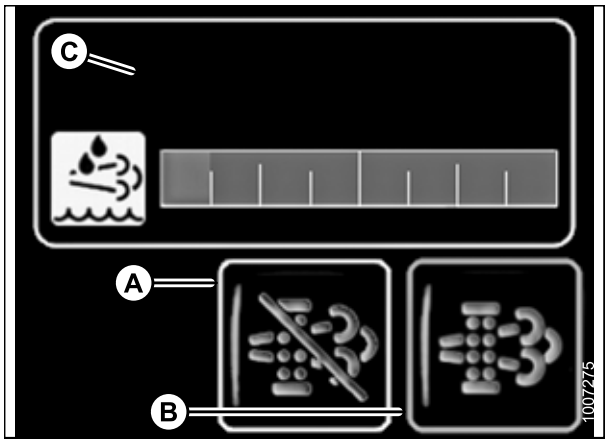


Figure 3.53: SCR System Cleaning Icons

IMPORTANT:

- SCR System Cleaning inhibit (A) allows the Operator to temporarily prevent the machine from performing an SCR System Cleaning. It should be used only when the environment is unsafe to allow high exhaust temperatures (e.g., inside of a building).
- SCR System Cleaning Forced (B) will rarely require activation by the Operator. If required, the switch (icon) will flash amber. If the SCR System Cleaning Forced switch (icon) begins to flash, park the windrower outside in a safe environment for high exhaust temperatures. Place the ground speed lever (GSL) in N-DETENT, throttle to idle, and press and hold the SCR System Cleaning Forced switch (icon) for 3 seconds. The engine will then take over throttle control. During the 3-second interval, the fuel icon and gauge will be replaced with the following red text, HOLD 3 SECONDS (C), and the red border will turn white. After which, the fuel gauge will return and the white border will start blinking. The border will revert to solid red when the switch (icon) is released.

Tools Menu

To display the tools and brightness symbols, press and hold the fuel gauge display (A) for two seconds.

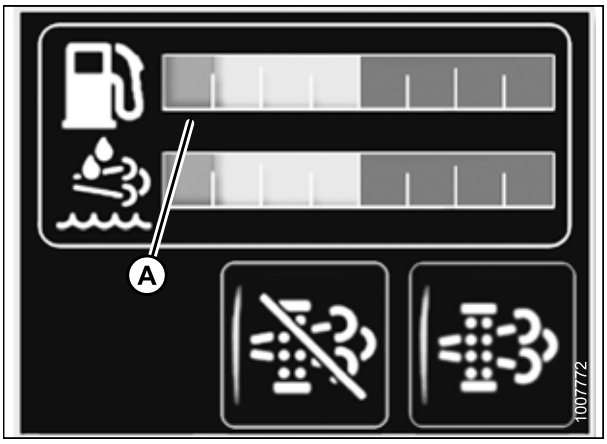


Figure 3.54: Fuel and Diesel Exhaust Fluid (DEF) Display Module

The fuel gauge display will be replaced by the tools (A) and brightness (B) symbols.

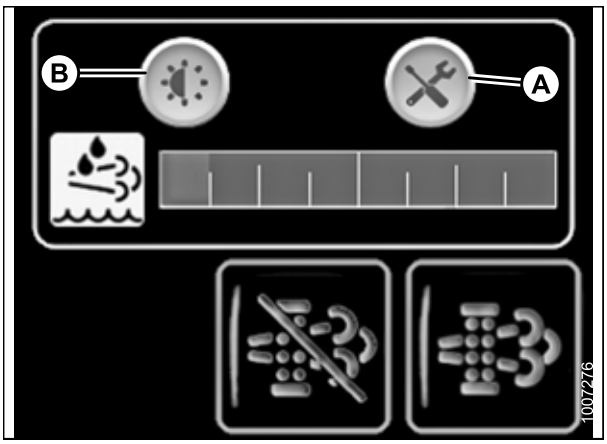


Figure 3.55: Tools and Brightness Symbols on Display

Press the brightness symbol to display the backlighting control function (A).

Display will revert back to fuel gauge display if backlighting control function is not pressed for five seconds or if the DEF gauge display is pressed.

Press (–) to decrease backlighting and (+) to increase backlighting.

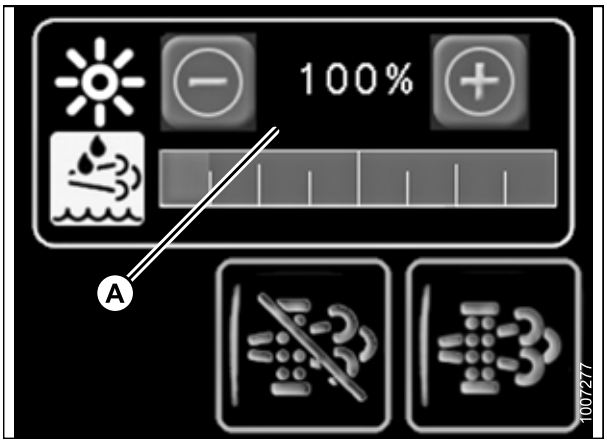


Figure 3.56: Backlighting Control Display

Press the tools symbol to display the languages menu (A).

The active language will be indicated by a white square (B) around the flag symbol and a text corresponding to the flag (C). Software version (D) is at the bottom of the languages menu screen.

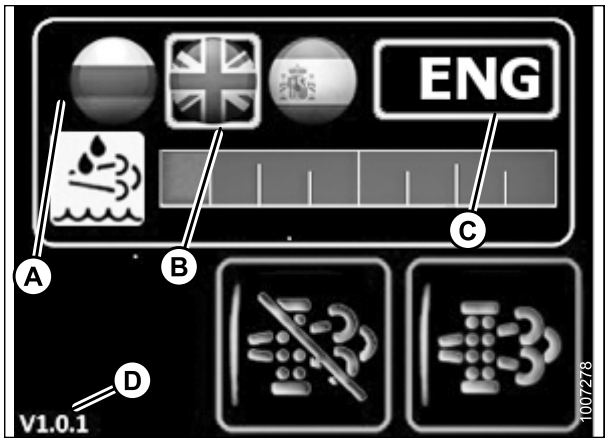


Figure 3.57: Language Display

NOTE:

Languages available are Russian (A), English (B), and Spanish (C).

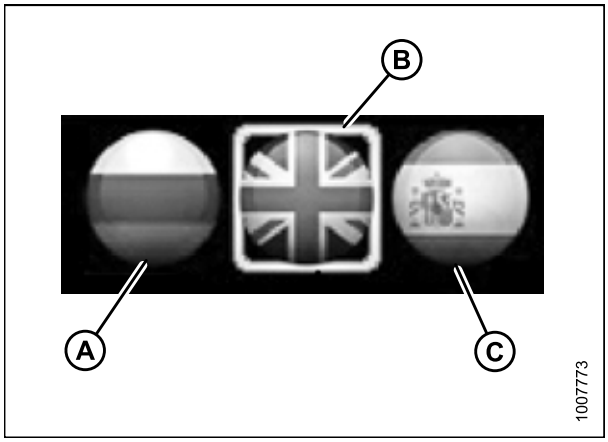


Figure 3.58: Language Icons on Display

Audible Alarm

An audible alarm indicates that something needs attention as shown in the fuel and diesel exhaust fluid (DEF) display module.

Alarm Tone	Reason	Duration
Ongoing intermittent moderate tone until the condition is corrected	When DEF or fuel level amber light first starts to blink (1/16th tank)	5 seconds
	When the **selective catalytic reduction (SCR) system cleaning INHIBIT** is active and the system calls for a passive SCR system cleaning	5 seconds; repeats every 30 minutes
Single moderate tone	At the end of the delay when a switch (icon) is activated	—
	At the end of the delay for entering the brightness/ tools menu	—

3.16 Windrower Controls

Console controls:

A – TURN SIGNALS activate turn signals on windrower and header

- Push-ON/Push-OFF

B – GROUND SPEED LEVER (GSL) controls speed and direction of movement

- F: Forward
- N: NEUTRAL
- N-DETENT: Engages neutral interlock, and applies park brake when steering locked in center
- R: Reverse

C – HAZARD WARNING LIGHTS activate signals on windrower and header

- Push-ON/Push-OFF

D – GROUND SPEED RANGE SWITCH shifts transmission speed range

- High range: 0–37 km/h (23 mph) ENGINE-FORWARD ONLY
- Mid range: 0–25.7 km/h (16 mph) CAB-FORWARD ONLY
- Low range: 0–17.7 km/h (11 mph)

E – N-DETENT

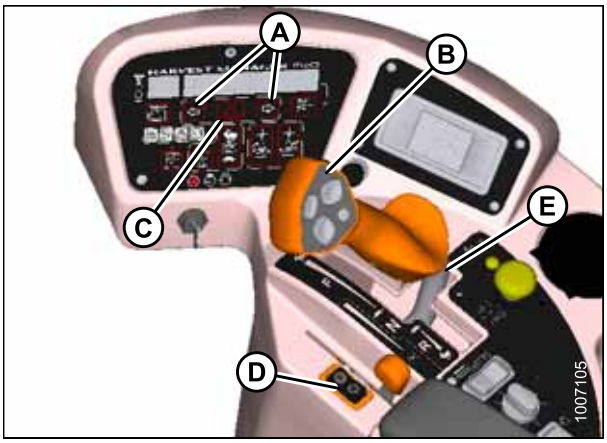


Figure 3.59: Console Controls

Autosteer control:

A – AUTOSTEER ENGAGEMENT SWITCH engages/disengages the automated steering system (if compatible system is installed)

- ENGAGE: Click to engage
- DISENGAGE: Turn steering wheel or click to disengage

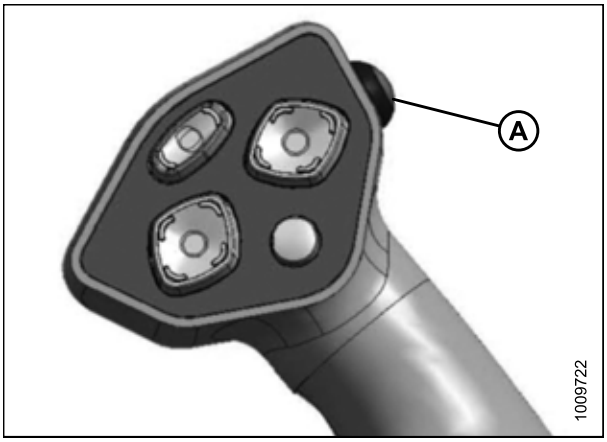


Figure 3.60: GSL

The autosteer engagement switch harness has two connectors and is located as follows:

GSL SW1 (A) is located in the cab, beneath the floor mat at the engine-end seat position switch.

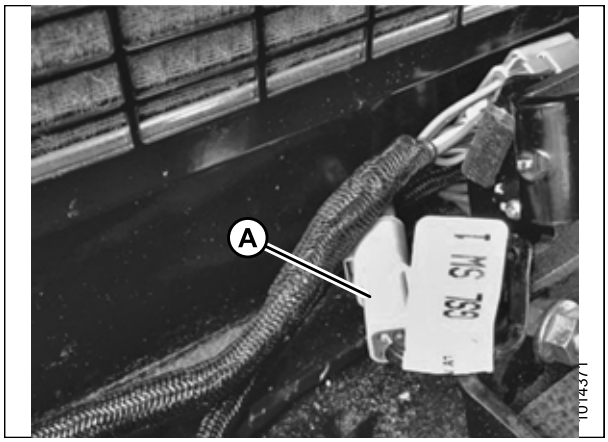


Figure 3.61: Autosteer Harness SW1

GSL SW2 (A) is located beneath the cab, between the fuel tank and evaporator box.

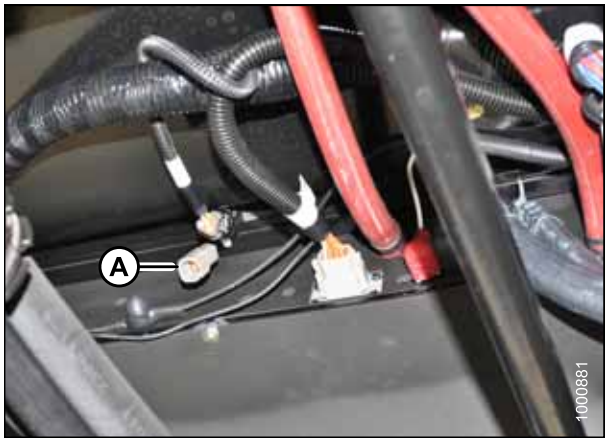


Figure 3.62: Autosteer Harness SW2

3.17 Header Controls

All header controls are conveniently located on the operator's console and on the ground speed lever (GSL) handle.

NOTE:

Some controls are optional equipment and may not be present in your unit. Some controls may be installed, but nonfunctional for certain headers.

Refer to specific header sections in this manual for detailed header operating procedures.

3.17.1 Header Drive Switch

The HEADER DRIVE switch (A) engages and disengages the header drive.

To engage the header drive, pull up on collar (B) and push down on switch (A).

To disengage the header drive, push the switch down.

IMPORTANT:

Always move throttle lever back to IDLE before engaging header drive. Do **NOT** engage header with engine at full rpm.

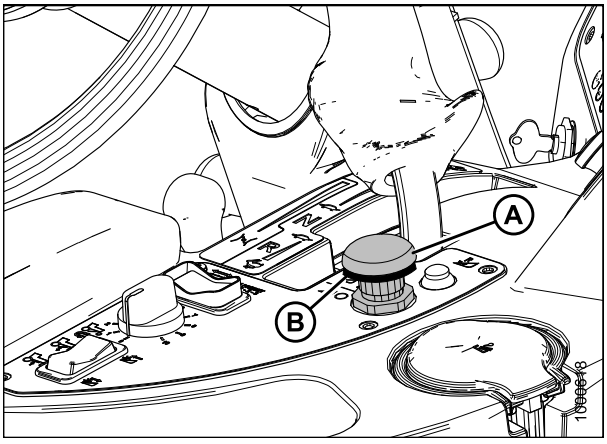


Figure 3.63: Header Drive Switch

3.17.2 Header Drive Reverse Button

NOTE:

The hydraulic reversing kit must be installed on auger headers and on draper headers with a conditioner. Rotary disc headers are factory-equipped with the ability to reverse.

- ENGAGE: Push and hold REVERSER button (B) and engage header with switch (A)
- DISENGAGE: Release REVERSER Button (B)

NOTE:

To engage forward operation, push switch (A) down and then up again.

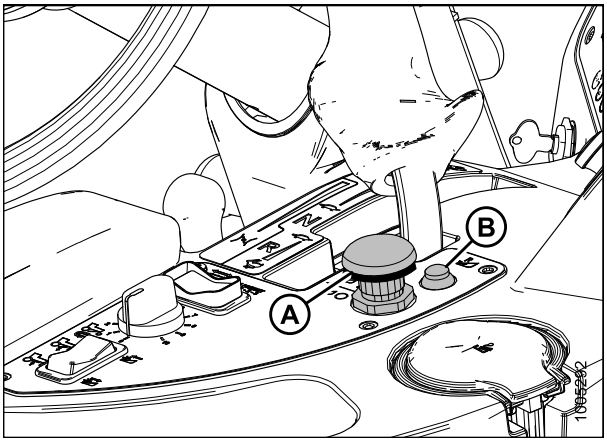


Figure 3.64: Header Drive Switches

3.17.3 Ground Speed Lever (GSL) Header Switches

The switches on the GSL (A) control the most common header functions.

NOTE:

A decal (B) identifying switch functions is located on the cab post above the operator's console.

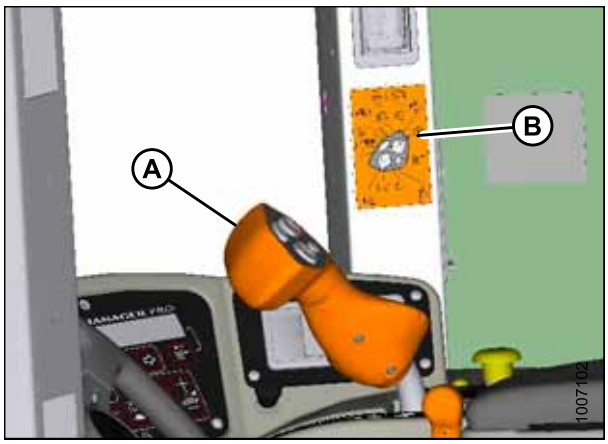


Figure 3.65: Decal on Cab Post

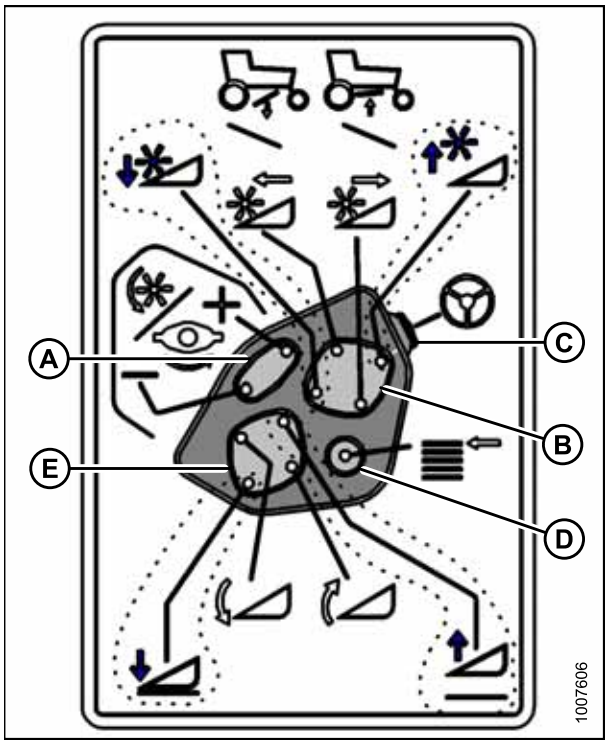


Figure 3.66: GSL Function Groups

A - Reel Speed
B - Reel Position
C - Autosteer Engagement
D - Display Selector
E - Header Position

Display Selector Switch

Pressing the display selector switch (A) selects and displays the settings on the cab display module (CDM) top line read-out for each of the header controls.

Press switch (A) to scroll through settings.

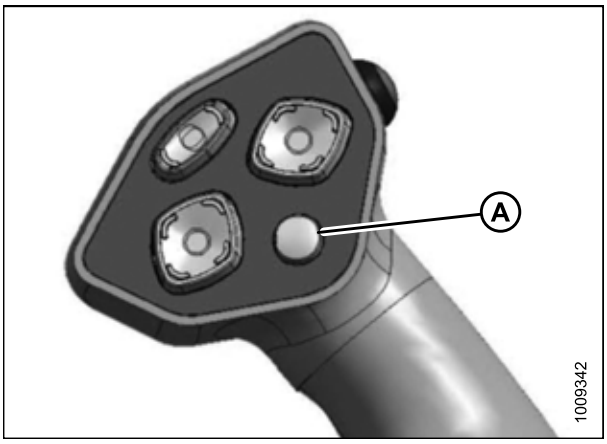


Figure 3.67: Ground Speed Lever

Reel Position Switches

The reel position switches perform different functions depending on cab display module (CDM) programming, and on which header is attached. For detailed switch operating modes, refer to one of the following sections that is specific to your header:

- Double Windrow Attachment (DWA) position. Refer to:
  - *4.4.7 Using the Double Windrowing Attachment, page 215*
- Reel fore-aft position and height on draper headers. Refer to:
  - *4.6.3 Adjusting the Reel Fore-Aft Position, page 264*
  - *4.6.4 Adjusting the Reel Height, page 264*
- Center-link assist cylinder. Refer to:
  - *4.5.2 Attaching a D Series or D1 Series Header, page 219*
  - *4.5.4 Attaching an A Series Header, page 233*

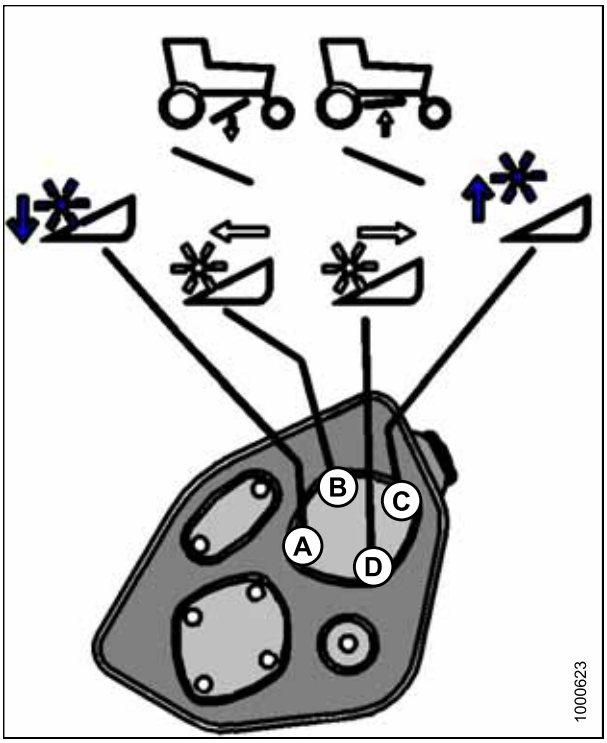


Figure 3.68: Ground Speed Lever

A - Reel Down **B - Reel Forward**
C - Reel Up **D - Reel Aft**

Header Position Switches

Use the header position switches on the ground speed lever (GSL) to adjust the position of the header relative to the ground.

- To lower the header, press switch (A)
- To raise the header, press switch (C)
- To tilt the header down, press switch (B)
- To tilt the header up, press switch (D)

Release switch at desired position.

NOTE:

Refer to the section in this manual that is specific to your header for detailed switch operating modes.

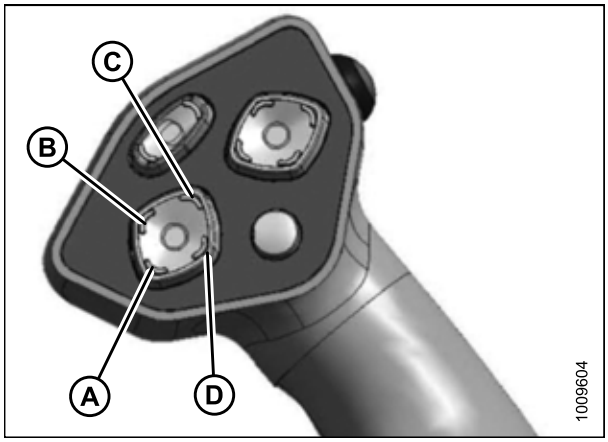


Figure 3.69: Ground Speed Lever

Reel and Disc Speed Switches

Press and hold switch (A) to increase the reel or disc speed. Press and hold switch (B) to decrease the reel or disc speed. Release switch at desired speed.

Auger header

- A30D header: Not applicable
- A40D header: Auger speed is automatically maintained when reel speed is changed

  IMPORTANT:

  Reel speed on auger header **MUST NOT EXCEED** 85 rpm. Auger speed **MUST NOT EXCEED** 320 rpm.

Draper header

- Reel speed is limited in INDEX HEADER SPEED mode

Rotary disc header

- Conditioner speed automatically adjusts when DISC SPEED is changed

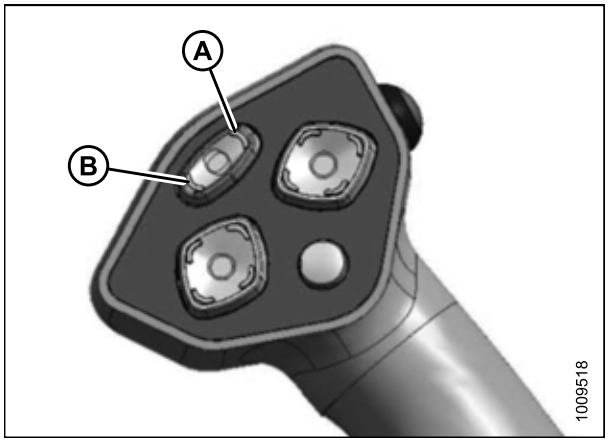


Figure 3.70: Ground Speed Lever

3.17.4 Console Header Switches

The operator's console contains switches for the following header functions:

Deck Shift / Float Preset Switch

Draper header with deck shift option

Controls deck shifting and float settings for double windrowing options with a draper header.

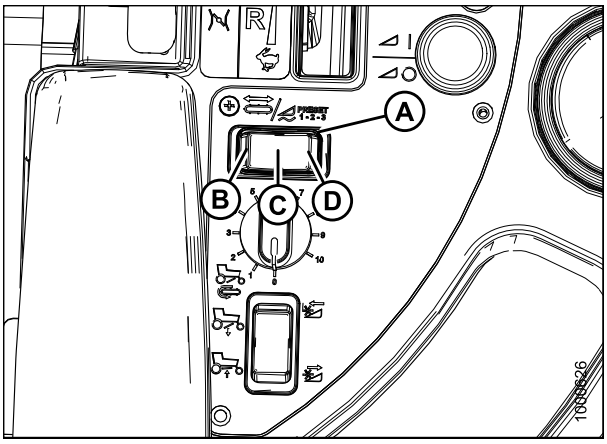


Figure 3.71: Header Switches

A - Deck Shift / Float Preset Switch
B - Left-Side Delivery
C - Center Delivery
D - Right-Side Delivery

Draper header with fixed decks / auger header / rotary header

Selects preprogrammed header float settings. Refer to *Float Options, page 202* to learn how to preset the float.

NOTE:

Refer to the section in this manual that is specific to your header for detailed switch operating modes.

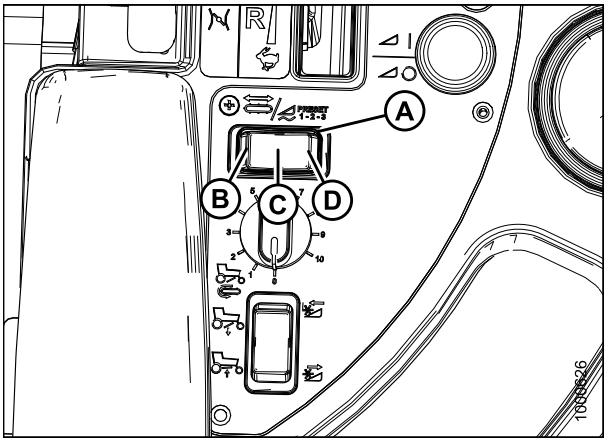


Figure 3.72: Header Switches

A - Deck Shift / Float Preset Switch
B - Float Preset 1
C - Float Preset 2
D - Float Preset 3

Double Windrow Attachment (DWA) / Swath Compressor Switch (If Installed)

The functions performed by the DWA/swath compressor switch depend on how the windrower is equipped.

If the windrower is equipped with a double windrow attachment:

- The DWA deck is raised with switch (A) in position (C)
- The DWA deck is lowered with switch (A) in position (B)

The cab display module (CDM) must be programmed for this configuration. Refer to *Activating the Double Windrow Attachment (DWA), page 106*.

Switch (A) may be used instead of the DWA switches on the ground speed lever (GSL). If using switch (A) is not desired, the controls can be swapped to the reel fore/aft buttons on the GSL.

The DWA draper speed is controlled with the rotary switch (D) next to the rocker switch on the operator's console.

For more information on the DWA attachment and controls, refer to *4.4.7 Using the Double Windrowing Attachment, page 215*.

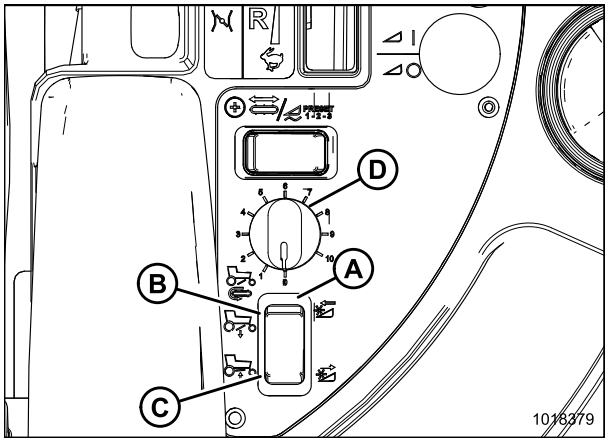


Figure 3.73: Console Switches

If the windrower is equipped with a swath compressor attachment:

- The swath compressor is raised by pressing switch (A) to position (C)
- The swath compressor is lowered by pressing switch (A) to position (B)

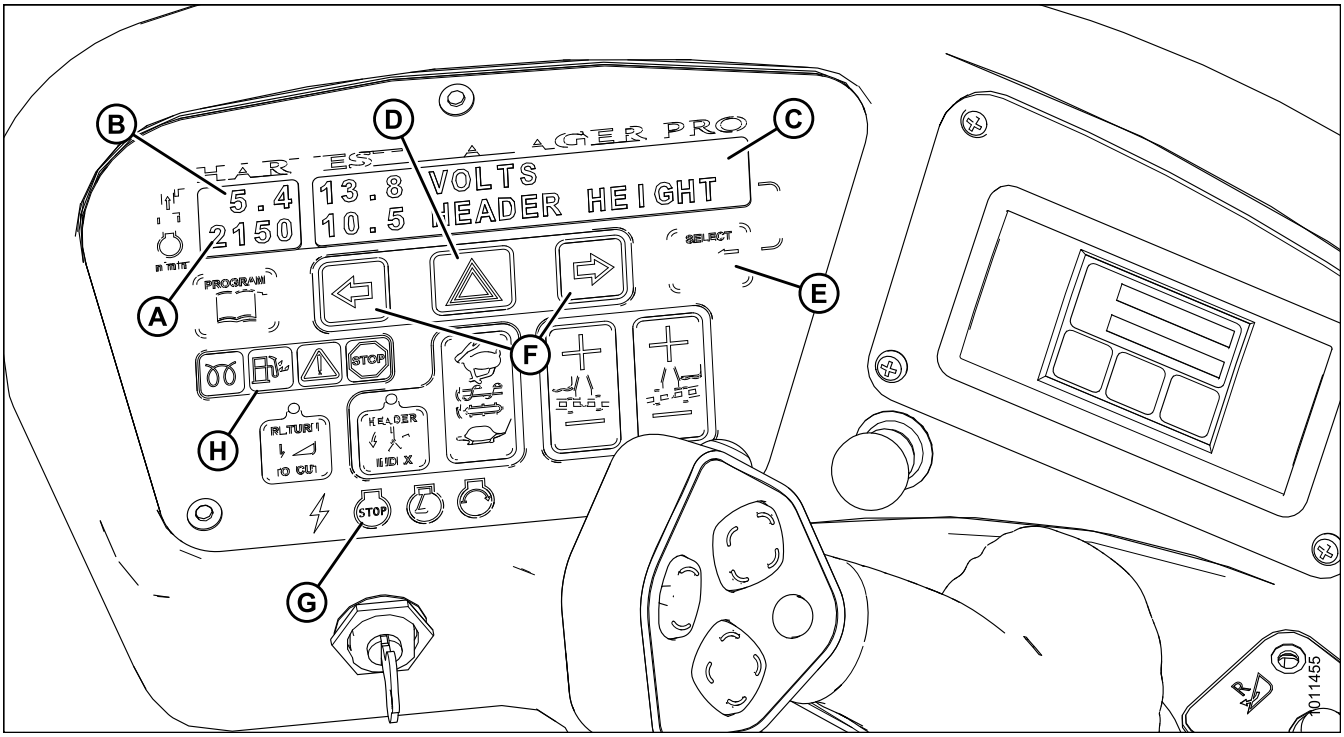
NOTE:

When using the Double Windrower Attachment (DWA), you may swap controls to the rocker switch or to the GSL handle using the programming in the CDM. Refer to *3.18.6 Cab Display Module (CDM) Configuration, page 93*.

3.18 Cab Display Module (CDM)

3.18.1 Engine and Windrower Functions

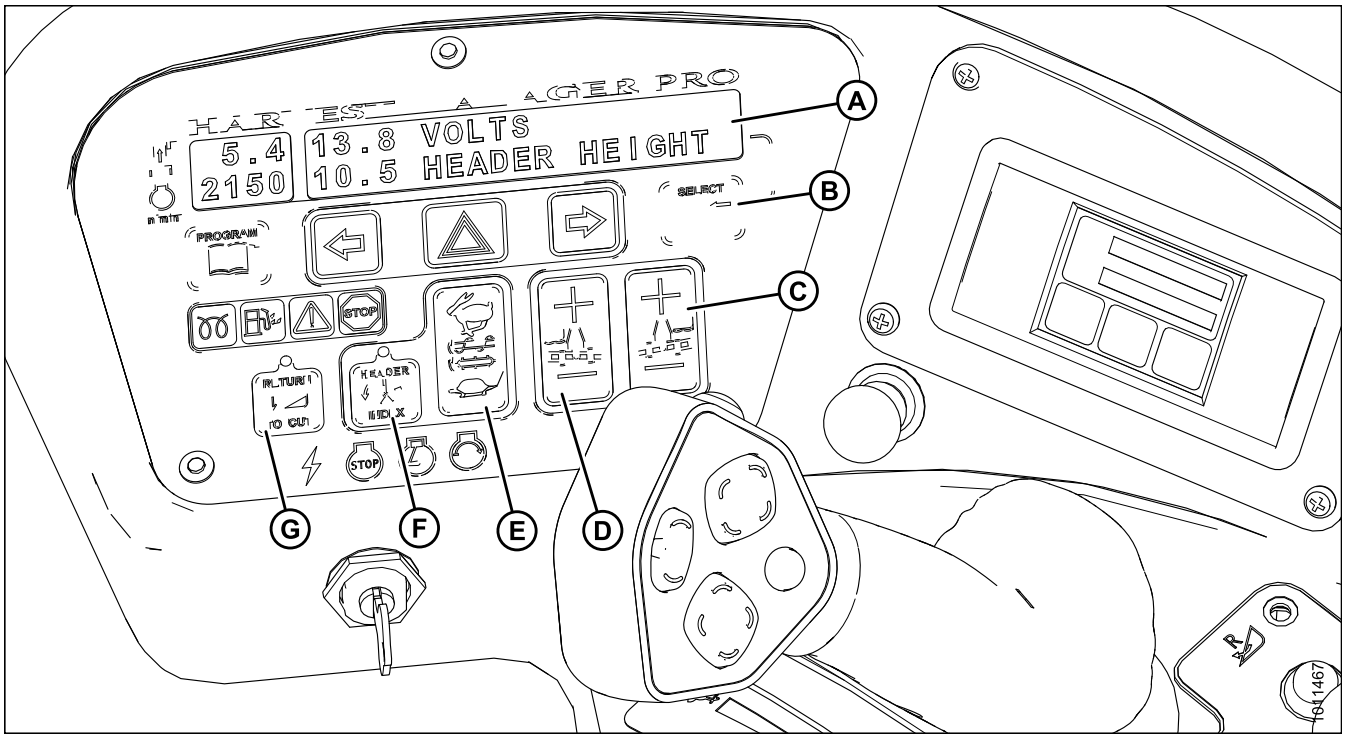
Figure 3.74: Cab Display Module (CDM) Engine and Windrower Functions



- (A) ENGINE RPM
- (B) GROUND SPEED – km/h or mph
- (C) DISPLAY – Engine/windrower functions
- (D) HAZARD WARNING LIGHTS SWITCH – Activates hazard warning lights, cancels turn signal
- (E) SELECT SWITCH – Allows Operator to select display item on lower line. Push to SELECT
- (F) TURN SIGNAL SWITCHES – Activates turn signals on windrower and header. Push-ON/Push-OFF
- (G) IGNITION SWITCH POSITIONS – Accessory / Stop / Run / Start
- (H) ENGINE WARNING LIGHTS – Engine Pre-Heat / Water In Fuel / CAUTION / Stop Engine

3.18.2 Header Functions

Figure 3.75: Cab Display Module (CDM)



- (A) DISPLAY – Header functions.
- (B) SELECT SWITCH – Allows Operator to select display item on lower line. Push to SELECT.
- (C) FLOAT SWITCH – Header Right Side: Changes header float. The system remembers setting with deck shift option if activated with float setting switch. Push + to Increase. Push – to Decrease.
- (D) FLOAT SWITCH – Header Left Side: Changes header float. The system remembers setting with deck shift option if activated with float setting switch. Push + to Increase. Push – to Decrease.
- (E) AUGER/DRAPER SPEED ADJUST: Changes auger/draper speed INDEX with INDEX SWITCH ON. Changes auger/draper SPEED with INDEX SWITCH OFF. Push upper switch to increase. Push lower switch to decrease.
- (F) HEADER INDEX SWITCH: Links reel and conveyor speed to ground speed. Push-ON/Push-OFF.

  NOTE:

  Illuminates in ON position. (Header must be engaged)
- (G) RETURN TO CUT HEIGHT SWITCH: Allows cutting height preset. Push-ON/Push-OFF.

  NOTE:

  Illuminates in ON position (Header must be engaged).

3.18.3 Operating Screens

The cab display module (CDM) and the windrower control module (WCM) provide information on several functions for the engine, header, and windrower. The information displayed in various operating modes is described in the following sections.

Figure 3.76: CDM Operating Screen

A - Display Selector for Upper Line
B - Display
C - CDM Upper Line
D - CDM Lower Line
E - Display Selector for Lower Line

Ignition ON, Engine Not Running

Display (Upper Line) (2–3 Seconds)	Description
HEADER DISENGAGED	Indicates HEADER DRIVE switch is OFF
IN PARK	Indicates ground speed lever (GSL) is in N-DETENT

Engine-Forward, Engine Running

Display	Description
ROAD GEAR (upper line)	low-speed range in HIGH range
#####.# ENGINE HRS (upper or lower line)	Total engine operating time
#####.# UNIT HRS (upper or lower line)	Total windrower operating time
#####.# HEADER HRS (upper or lower line)	Total header operating time
###### TOTAL ACRES (upper or lower line) ###### TOTAL HECT (if metric)	Total area cut by machine
##.# HEADER HEIGHT (upper or lower line)	Distance setting (00.0–10.0) between cutterbar and ground
##.# HEADER ANGLE (upper or lower line)	Angle setting (00.0–10.0) header relative to ground
### °C or F HYD OIL TEMP	Hydraulic oil temperature
##.# VOLTS (upper or lower line)	Engine electrical system operating voltage
##.# SWATH COMPR HT	Swath compressor height (00.0–10.0); fully raised is 0
SCROLL (lower line)	Displays above items after 2 to 3 seconds; press SELECT to cancel

Cab-Forward, Engine Running, Header Disengaged

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Lower or Upper Line)	Description
#####.# ENGINE HRS	Total engine operating time
#####.# UNIT HRS	Total windrower operating time
#####.# HEADER HRS	Total header operating time
###.# SUB ACRES ###.# SUB HECTARES (if metric)	Area cut since last reset. To reset, display SUB ACRES on lower line, and hold down PROGRAM switch until display resets (5 to 7 seconds)
###### TOTAL ACRES ###### TOTAL HECT (if metric)	Total area cut by machine
##.# HEADER HEIGHT	Distance setting (00.0–10.0) between cutterbar and ground
##.# HEADER ANGLE	Angle setting (00.0–10.0) header relative to ground
##.# L FLOAT R ##.#	Float setting (0.0–10.0)
### °C or F HYD OIL TEMP	Hydraulic oil temperature
##.# VOLTS	Engine electrical system operating voltage
##.# SWATH COMPR HT	Swath compressor height (00.0–10.0); fully raised is 0
SCROLL (lower line)	Displays above items after 2 to 3 seconds; press SELECT to cancel

Cab-Forward, Engine Running, Header Engaged, Auger Header Index Switch OFF

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Lower or Upper Line)	Description
#####.# ENGINE HRS	Total engine operating time
#####.# UNIT HRS	Total windrower operating time
#####.# HEADER HRS	Total header operating time
##.# ACRES/HOUR ##.# HECTARES/HOUR (if Metric)	Actual cutting rate in acres (hectares)/hour
###.# SUB ACRES ###.# SUB HECTARES (if Metric)	Area cut since last reset; to reset, display SUB ACRES on lower line, and hold down PROGRAM switch until display resets (5 to 7 seconds)
###### TOTAL ACRES ###### TOTAL HECT (if Metric)	Total area cut by machine
##.## REEL RPM ##.## REEL SENSOR	Reel rotational speed Sensor disabled. RPM and SENSOR alternate at 1 second intervals
##.# AUGER SPEED	Auger rotational speed (4.7–9.9)
#### KNIFE SPEED #### KNIFE SENSOR	Knife speed in strokes per minute Sensor disabled. SPEED and SENSOR alternate at 1 second intervals
##.# HEADER HEIGHT ##.# HEADER SENSOR	Distance setting (00.0–10.0) between cutterbar and ground Sensor disabled. HEIGHT and SENSOR alternate at 1 second intervals.
##.# HEADER ANGLE ##.# HEADER SENSOR	Angle setting (00.0–10.0) header relative to ground Sensor disabled. ANGLE and SENSOR alternate at 1 second intervals
##.# L FLOAT R ##.# FLOAT SENS DISABLED	Left and right float setting (0.0–10.0) Sensor disabled
LOAD|■■■■| | ####	Bar graph representing hydraulic operating pressure. Full scale is preprogrammed overload pressure (17,237–34,474 kPa [2500–5000 psi]). If sensor disabled, LOAD does not display[5]
### °C or F HYD OIL TEMP ### °C or F HYD TEMP	Hydraulic oil temperature Sensor disabled. TEMP and SENSOR alternate at 1 second intervals
##.# VOLTS	Engine electrical system operating voltage

5. The LOAD sensor to monitor knife/conditioner circuit pressure is optional. To monitor reel/auger circuit pressure, relocate sensor as per kit instruction MD #169031, which is available through your Dealer.

Display (Lower or Upper Line)	Description
##.# SWATH COMPR HT SWATH CO SENSOR	Swath compressor height (00.0–10.0); fully raised is 0 Sensor disabled
SCROLL SUB-MENU (lower line only) #### KNIFE SPEED ##.# HEADER HEIGHT LOAD|■■■■|■■■■| ####	Displays sub-menu after 2 to 3 seconds. Press SELECT to cancel. Scroll through sub-menu display with CDM switch

Cab-Forward, Engine Running, Header Engaged, Auger Header Index Switch ON

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Lower or Upper Line)	Description
#####.# ENGINE HRS	Total engine operating time
#####.# UNIT HRS	Total windrower operating time
#####.# HEADER HRS	Total header operating time
##.# ACRES/HOUR ##.# HECTARES/HOUR (if metric)	Actual cutting rate in acres (hectares)/hour
###.# SUB ACRES ###.# SUB HECTARES (if metric)	Area cut since last reset; to reset, display SUB ACRES on lower line, and hold down PROGRAM switch until display resets 5 to 7 seconds)
###### TOTAL ACRES ###### TOTAL HECT (if metric)	Total area cut by machine
##.## ##.# REEL IND. ##.## REEL SENSOR	Reel peripheral speed along with ground speed in mph or km/h Sensor disabled. IND and SENSOR alternate at 1 second intervals
##.# AUGER SPEED ##.# AUGER SENSOR	Auger rotational speed (4.7–9.9) Sensor disabled. SPEED and SENSOR alternate at 1 second intervals
#### KNIFE SPEED #### KNIFE SENSOR	Knife speed In strokes per minute Sensor disabled. SPEED and SENSOR alternate at 1 second intervals
##.# HEADER HEIGHT ##.# HEADER SENSOR	Distance setting (00.0–10.0) between cutterbar and ground Sensor disabled. HEIGHT and SENSOR alternate at 1 second intervals
##.# HEADER ANGLE ##.# TILT SENSOR	Angle setting (00.0–10.0) header relative to ground. Sensor disabled. ANGLE and SENSOR alternate at 1 second intervals
##.# L FLOAT R ##.# FLOAT SENS DISABLED (if sensor disabled)	Left and right float setting (0.0–10.0) Sensor disabled

Display (Lower or Upper Line)	Description
LOAD|■■■■| | ####	Bar graph representing hydraulic operating pressure. Full scale is preprogrammed overload pressure (17,237–34,474 kPa [2500–5000 psi]).. If sensor disabled, LOAD does not display[6]
### °C or F HYD OIL TEMP ### °C or F HYD TEMP	Hydraulic oil temperature Sensor disabled. TEMP and SENSOR alternate at 1 second intervals
##.# VOLTS	Engine electrical system operating voltage
##.# SWATH COMPR HT SWATH CO SENSOR	Swath compressor height (00.0–10.0); fully raised is 0 Sensor disabled
SCROLL SUB-MENU (lower line only) #### KNIFE SPEED ##.# HEADER HEIGHT LOAD|■■■■|■■■■| ####	Displays sub-menu after 2 to 3 seconds. Press SELECT to cancel. Scroll through sub-menu display with CDM switch

Cab-Forward, Engine Running, Header Engaged, Draper Header, Index Switch OFF

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Lower or Upper Line)	Description
#####.# ENGINE HRS	Total engine operating time
#####.# UNIT HRS	Total windrower operating time
#####.# HEADER HRS	Total header operating time
##.# ACRES/HOUR ##.# HECTARES/HOUR (if metric)	Actual cutting rate in acres (hectares)/hour
###.# SUB ACRES ###.# SUB HECTARES (if metric)	Area cut since last reset. To reset, display SUB ACRES on lower line, and hold down PROGRAM switch until display resets (5 to 7 seconds)
###### TOTAL ACRES ###### TOTAL HECT (if metric)	Total area cut by machine
##.## REEL MPH ##.## REEL KPH (if metric) ##.## REEL SENSOR (flashing)	Reel peripheral speed Sensor disabled. MPH or KPH and SENSOR alternate at 1 second intervals
##.# DRAPER SPEED	Draper speed (0.0–11.0)
#### KNIFE SPEED #### KNIFE SENSOR	Knife speed In strokes per minute Sensor disabled. SPEED and SENSOR alternate at 1 second intervals
##.# HEADER HEIGHT ##.# HEADER SENSOR	Distance setting (00.0–10.0) between cutterbar and ground Sensor disabled. HEIGHT and SENSOR alternate at 1 second intervals
##.# HEADER ANGLE ##.# HEADER SENSOR	Angle setting (00.0–10.0). Header relative to ground Sensor disabled. ANGLE and SENSOR alternate at 1 second intervals

6. The LOAD sensor to monitor knife/conditioner circuit pressure is optional. To monitor reel/auger circuit pressure, relocate sensor as per kit instruction MD #169031, which is available through your Dealer.

Display (Lower or Upper Line)	Description
##.# L FLOAT R ##.# FLOAT SENS DISABLED	Left and right float setting (0.0–10.0) Sensor disabled
### °C or F HYD OIL TEMP ### °C or F HYD SENSOR	Hydraulic oil temperature Sensor disabled. TEMP and SENSOR alternate at 1 second intervals
LOAD|■■■■| | ####	Bar graph representing hydraulic operating pressure. Full scale is pre-programmed overload pressure (2500–5000 psi). If sensor disabled, LOAD does not display[7]
##.# VOLTS	Engine electrical system operating voltage
##.# SWATH COMPR HT SWATH CO SENSOR	Swath compressor height (00.0–10.0); fully raised is 0 Sensor disabled
SCROLL SUB-MENU (lower line only) #### KNIFE SPEED ##.# HEADER HEIGHT LOAD|■■■■|■■■■| #### ##.## REEL MPH ##.# DRAPER SPEED	Displays sub-menu after 2 to 3 seconds. Press SELECT to cancel. Scroll through sub-menu display with CDM switch
KNIFE SPD OVERLOAD	Knife or disc speed drops below programmed value

Cab-Forward, Engine Running, Header Engaged, Draper Header Index Switch ON

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Lower or Upper Line)	Description
#####.# ENGINE HRS	Total engine operating time
#####.# UNIT HRS	Total windrower operating time
#####.# HEADER HRS	Total header operating time
##.# ACRES/HOUR ##.# HECTARES/HOUR (if metric)	Actual cutting rate in acres (hectares)/hour
###.# SUB ACRES ###.# SUB HECTARES (if metric)	Area cut since last reset. To reset, display SUB ACRES on lower line and hold down PROGRAM switch until display resets (5 to 7 seconds)
###### TOTAL ACRES ###### TOTAL HECT (if metric)	Total area cut by machine
##.## ##.# REEL IND REEL.SENSOR	Reel peripheral speed along with ground speed in mph or km/h Sensor disabled. IND and SENSOR alternate at 1 second intervals
##.# ##.# DRAP INDX	Draper speed along with ground speed in mph or km/h
#### KNIFE SPEED #### KNIFE SENSOR	Knife speed in strokes per minute. Sensor disabled SPEED and SENSOR alternate at 1 second intervals
##.# HEADER HEIGHT ##.# HEADER SENSOR	Distance setting (00.0–10.0) between cutterbar and ground Sensor disabled. HEIGHT and SENSOR alternate at 1 second intervals

7. The LOAD sensor to monitor knife/conditioner circuit pressure is optional. To monitor reel/auger circuit pressure, relocate sensor as per kit instruction MD #169031, which is available through your Dealer.

Display (Lower or Upper Line)	Description
##.# HEADER ANGLE ##.# HEADER SENSOR	Angle setting (00.0–10.0) header relative to ground Sensor disabled. ANGLE and SENSOR alternate at 1 second intervals.
##.# L FLOAT R ##.# FLOAT SENS DISABLED	Left and right float setting (0.0–10.0) Sensor disabled
LOAD|■■■■| | ####	Bar graph representing hydraulic operating pressure. Full scale is preprogrammed overload pressure (17,237–34,474 kPa [2500–5000 psi]). If sensor disabled, LOAD does not display[8]
##.# VOLTS	Engine electrical system operating voltage
##.# SWATH COMPR HT SWATH CO SENSOR	Swath compressor height (00.0–10.0); fully raised is 0. Sensor disabled.
SCROLL SUB-MENU (lower line only) #### KNIFE SPEED ##.# HEADER HEIGHT LOAD|■■■■|■■■■| ##.## ##.# REEL IND ##.# ##.# DRAP INDX	Displays sub-menu after 2 to 3 seconds. Press SELECT to cancel Scroll through sub-menu display with CDM switch
##.## REEL MIN RPM (lower line)	Reel speed drops below programmed set-point
MINIMUM (lower line)	Reel speed at zero ground speed

Cab-Forward, Engine Running, Header Engaged, Rotary Header Installed

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Lower or Upper Line)	Description
#####.# ENGINE HRS	Total engine operating time
#####.# UNIT HRS	Total windrower operating time
#####.# HEADER HRS	Total header operating time
##.# ACRES/HOUR ##.# HECTARES/HOUR (if metric)	Actual cutting rate in acres (hectares)/hour
###.# SUB ACRES ###.# SUB HECTARES (if metric)	Area cut since last reset; to reset, display SUB ACRES on lower line, and hold down PROGRAM switch until display resets (5 to 7 seconds)
###### TOTAL ACRES ###### TOTAL HECT (if metric)	Total area cut by machine
#### DISC RPM ##.## DISC SENSOR	Disc rotational speed Sensor disabled. RPM and SENSOR alternate at 1 second intervals
##.# HEADER HEIGHT ##.# HEIGHT SENSOR	Distance setting (00.0–10.0) between cutterbar and ground Sensor disabled. HEIGHT and SENSOR alternate at 1 second intervals
##.# HEADER ANGLE ##.# HEADER SENSOR	Angle setting (00.0–10.0) header relative to ground Sensor disabled. ANGLE and SENSOR alternate at 1 second intervals

8. The LOAD sensor to monitor knife/conditioner circuit pressure is optional. To monitor reel/auger circuit pressure, relocate sensor as per kit instruction MD #169031, which is available through your Dealer.

Display (Lower or Upper Line)	Description
##.# L FLOAT R ##.# FLOAT SENS DISABLED	Left and right float setting (0.0–10.0) Sensor disabled
LOAD|■■■■| | ####	Bar graph representing hydraulic operating pressure. Full scale is preprogrammed overload pressure (17,237–34,474 kPa [2500–5000 psi]). If sensor disabled, LOAD does not display[9]
### °C or F HYD OIL TEMP ### °C or F HYD TEMP	Hydraulic oil temperature Sensor disabled. TEMP and SENSOR alternate at 1 second intervals
##.# VOLTS	Engine electrical system operating voltage
##.# SWATH COMPR HT SWATH CO SENSOR	Swath compressor height (00.0–10.0); fully raised is 0 Sensor disabled
SCROLL SUB-MENU (lower line only) #### DISC RPM ##.# HEADER HEIGHT LOAD|■■■■|■■■■| ####	Displays sub-menu after 2 to 3 seconds. Press SELECT to cancel. Scroll through sub-menu display with CDM switch

Miscellaneous Operational Information

Scroll through display with cab display module (CDM) switch or ground speed lever (GSL) switch.

Display (Upper Line)	Description
HEADER DISENGAGED	Header drive is disengaged
##.# FOOT DISK	AUGER or DRAPER will appear in place of DISK, depending on type of header attached
IN PARK	GSL in N-DETENT position
< LEFT TURN ■	Indicates left turn when left arrow is pressed on CDM (engine-forward mode only[10])
■ RIGHT TURN >	Indicates right turn when right arrow is pressed on CDM (engine-forward mode only[11])
■ HAZARD ■	Indicates hazard warning lights are on when hazard button is pressed on CDM
HEADER REVERSE	Header drive running in reverse
HEADER ENGAGED	Header drive engaged
ROAD GEAR	With HIGH RANGE selected on console switch (engine-forward only[11])

9. The LOAD sensor to monitor knife/conditioner circuit pressure is optional-installed. To monitor reel/auger circuit pressure, relocate sensor as per kit instruction MD #169031, which is available through your Dealer.
10. If road light kit is not installed, CDM will display E135 LEFT STOP LAMP as a malfunction in cab-forward mode.
11. If road light kit is not installed, CDM will display E134 RIGHT STOP LAMP as a malfunction in cab-forward mode.

3.18.4 Cab Display Module (CDM) Warning and Alarms

The CDM displays warnings and sounds alarms to notify of abnormal windrower status at startup when the ignition is turned ON, and at engine operating speeds above 500 rpm.

Engine Warning Lights

Figure 3.77: CDM Engine Warning Lights

A - Engine Preheat **B - Water in Fuel** **C - Caution**
D - Stop **E - Display**

- ENGINE PRE-HEAT: Illuminates yellow. Wait to start engine.
- WATER IN FUEL: Illuminates yellow. Service recommended.
- CAUTION: Illuminates yellow. Prompt attention is required. Refer to display code.
- STOP: Illuminates red. Stop engine immediately. Refer to display code.
- DISPLAY: Displays malfunction code. Refer to *8.4 Engine Error Codes, page 467* or your Dealer.

Display Warnings and Alarms

The cab display module (CDM) warnings and alarms indicate abnormal windrower conditions.

Figure 3.78: CDM Display Warnings and Alarms

Display (A)	Flashing	Alarm Tone	Description
BRAKE OFF	X	Short beep with each flash	Engine running, GSL in N-DETENT, brake pressure switch or brake switch relay fault
BRAKE ON	X	Short beep with each flash	Ground speed lever (GSL) out of N-DETENT, but interlock switch remains closed to apply brake
BRAKE SW FAILURE	X	Short beep with each flash	Ignition ON/engine not running, brake switch and relay closed
CAB-FORWARD SW ON/ ENG-FORWARD SW ON	X	Messages flash alternately	Both seat switches activated
CENTER STEERING		Two beeps per second	GSL or interlock switches not closed with key ON/engine OFF
DISENGAGE HEADER RE-ENGAGE <1800 RPM>	X	None	R80/R85 - Engine rpm above 1800 rpm when engaging header
ENGINE AIR FILTER	X	Single loud tone for 10 seconds, Repeats every 30 minutes until condition is corrected	Engine air filter requires servicing

Display (A)	Flashing	Alarm Tone	Description
ENGINE TEMPERATURE	X	Ongoing intermittent moderate tone until temperature is below 102°C (215°F)	Engine temperature over 104°C (220°F)
HEADER DISENGAGED		None	Normal
DISENGAGE HEADER	X	None	Header switch is in the ON position when ignition switch is turned ON
HEADER OIL PRESS	X	Continuous loud tone until oil pressure is regained	Low header charge oil pressure causes header to shut down: header ON switch must be moved to OFF position and then to ON position to restart the header
HYDRAULIC FILTER	X	Single loud tone for 10 seconds, Repeats every 15 minutes until condition is corrected	Excessive pressure increase across hydraulic oil filter
### °C or F HYD OIL COLD	X	Tone sounds with each flash for 5 seconds and then stops for 1 minute, flashing continues if oil still cold after 1 minute, tone sounds again	Hydraulic oil temp <10°C (50°F)
### °C or F HYD OIL HOT	X	Tone with each flash for 5 seconds at 104°C (220°F) then tone stops for 1 minute while flashing continues. If oil still hot after 1 minute, tone sounds again. Flashing and steady tone at temperatures of 110°C (230°F) and higher	Hydraulic oil temp >104°C (220°F) but <110°C (230°F)
IN PARK	X	One short beep	GSL in N-DETENT, steering wheel centered, and brakes are engaged
KNIFE SPEED OVERLOAD	X	Short beep with each flash until condition is corrected	Machine overload: knife or disc speed drops below programmed value
LOCK SEAT BASE	X	None	Seat base not detected in cab or engine-forward position
LOW HYDRAULIC OIL	X	Continuous loud tone for 5 seconds. If condition is not rectified, single loud tone every 5 minutes	Low hydraulic oil level, header shuts down automatically if engaged: Header ON switch must be moved to OFF position and then to ON position to restart the header
NO HEADER		None	Header is not detected

Display (A)	Flashing	Alarm Tone	Description
NO OPERATOR		Continuous tone	Operator not detected in seat with header engaged or out of N-DETENT: engine shutdown after 5 seconds
NO OPERATOR ENGINE SHUT DOWN		Continuous tone	Engine shutdown when Operator not detected in seat with machine moving under 8 km/h (5 mph)
NOT IN PARK	X	Short beep with each flash	GSL or interlock switches not closed with key ON/engine OFF
PLACE GSL INTO N		Two beeps per second	GSL or interlock switches not closed with key ON/engine OFF
SLOW DOWN	X	Short beep with each flash	Ground speed is greater than or equal to 40 km/h (25 mph): Operator should pull back on the GSL to reduce ground speed
TRANS OIL PRESS	X	Continuous loud tone until oil pressure is regained	Low transmission charge oil pressure
##.# LOW VOLTS	X	Single loud tone for 10 seconds	Voltage below 11.5
##.# HIGH VOLTS	X	Single loud tone for 10 seconds	Voltage above 15.5

3.18.5 Configuration Guidelines

Use the following guidelines when configuring the cab display module (CDM):

- The monitoring system requires configuration for each header.
- The **HEADER MUST BE ATTACHED TO THE WINDROWER** so the CDM recognizes the header type.
- The transmission must be in Neutral (GSL in N-DETENT) to configure the system with the engine running.
- The ignition switch must be in the RUN position to configure the system when the engine is not running.
- The system only needs to be configured once for each header. Most functions are factory preset, but the Operator can make changes to suit windrowing conditions or modifications to the machine.
- The windrower input values are provided in this manual. Header function values are in the header operator's manual.
- The CDM must be in programming mode to view the program menus. Press PROGRAM and SELECT simultaneously on the CDM to enter programming mode. Exit programming mode at any time by pressing PROGRAM or by turning ignition to OFF.
- Refer to *3.18.6 Cab Display Module (CDM) Configuration, page 93* for a detailed list of menu items.

NOTE:

Contact your MacDon Dealer for information about software updates to the electronic modules. Your Dealer will have the necessary interface tools and access to the latest software upgrades.

3.18.6 Cab Display Module (CDM) Configuration

Figure 3.79: CDM

A - Side Display
B - Main Display
C - Select Switch
D - Menu Item Scroll Forward
E - Menu Item Scroll Backward
F - Program Switch

Side Display: Displays software revision status.

- Upper line – C### (CDM)
- Lower line – E### (WCM)

Main Display: Displays menu item and selection[12].

- Upper line – Menu item
- Lower line – Selection

Select Switch: Places monitor into program mode with PROGRAM switch. Press to accept menu item and advance to next item.

Menu Item Scroll Forward: Displays value under menu item.

- Push to scroll forward
- Hold down for fast scroll[13]

Menu Item Scroll Backward: Displays value under menu item.

- Push to scroll backward
- Hold down for fast scroll[13]

12. The current selection is flashing.
13. Fast scroll applies only when changing KNIFE SPEED, OVERLOAD PRESSURE, and TIRE SIZE.

Program Switch: Places monitor into program mode. Press while pressing select switch.

NOTE:

Contact your MacDon Dealer for information regarding software updates to the electronic modules. Your Dealer will have the necessary interface tools and access to the latest software upgrades.

NOTE:

The following menus are available when ignition key is set to RUN:

- WINDROWER SETUP
- CAB DISPLAY SETUP
- DIAGNOSTIC MODE

The CALIBRATE SENSORS menu is available only when engine is running.

3.18.7 Cab Display Options

The display and sound features of the cab display module (CDM) can be adjusted to suit each particular Operator.

NOTE:

The procedures listed in this section are current for CDM software version C512 and windrower control module (WCM) E237. The WCM is supplied preloaded with the latest released version of the operating software. Any subsequent updates will be made available via internet download from the MacDon Dealer Portal *(https://portal.macdon.com)*.

NOTE:

Pages may appear differently if running newer or older versions of software, and not all features are available on every machine.

Setting the Cab Display Language

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.80: Windrower Setup Display

3. Press SELECT (A) until CAB DISPLAY SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.81: Cab Display Setup

4. Press right arrow (C) to select YES. Press SELECT (D).
   - DISPLAY LANGUAGE? is displayed on the upper line.
   - Default language is displayed on the lower line.
5. Press left (B) or right (C) arrow to select preferred language.

   NOTE:

   English, Russian, and Spanish language options are available on windrowers. Not all language options are available on all windrowers.
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next CAB DISPLAY SETUP? action.

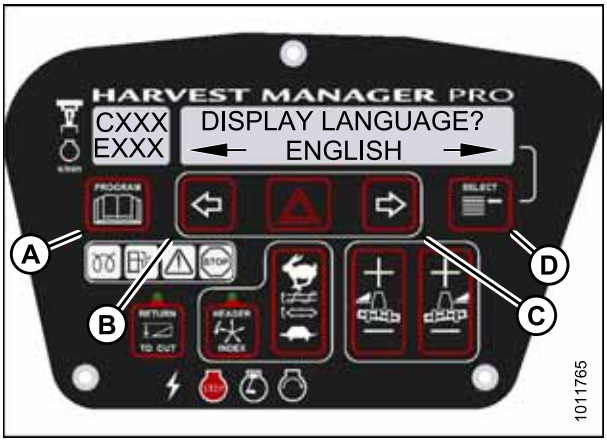


Figure 3.82: Language Display

Changing the Windrower Display Units

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.83: CDM Programming Buttons

3. Press SELECT (B) until CAB DISPLAY SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).
   - DISPLAY LANGUAGE? is displayed on the upper line.

Figure 3.84: Cab Display Setup

5. Press SELECT (D) until DISPLAY UNITS? is displayed on the upper line.
   - Default setting is displayed on the lower line.
6. Press left (B) or right (C) arrow to select either METRIC or IMPERIAL speed display.
7. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next CAB DISPLAY SETUP? action.

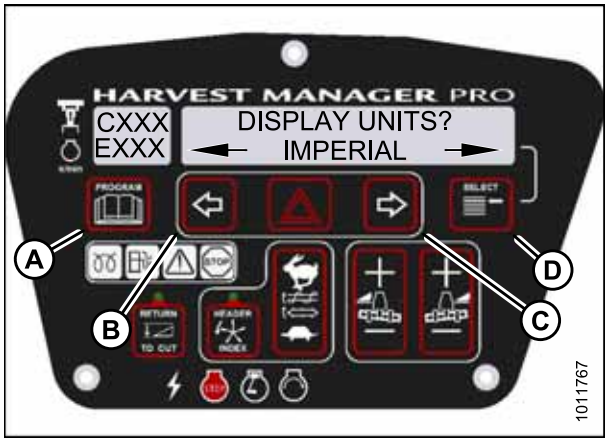


Figure 3.85: Display Units

Adjusting the Cab Display Buzzer Volume

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.86: CDM Programming Buttons

3. Press SELECT (B) until CAB DISPLAY SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).
   - DISPLAY LANGUAGE? is displayed on the upper line.

Figure 3.87: Cab Display Setup

5. Press SELECT (D) until BUZZER VOLUME is displayed on the upper line.
   - Previous setting is displayed on the lower line.
6. Press left (B) or right (C) arrows to adjust buzzer volume.
7. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next CAB DISPLAY SETUP? action.

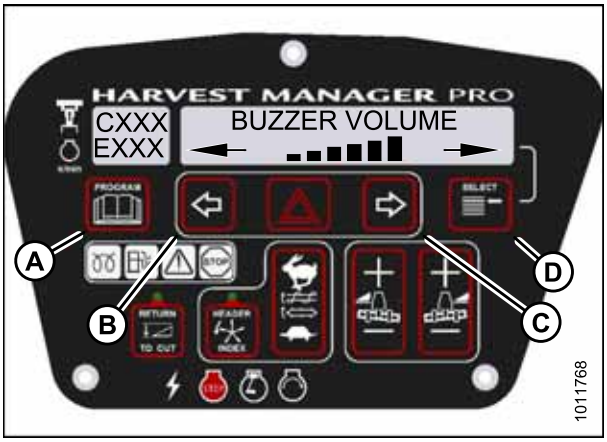


Figure 3.88: Buzzer Volume

Adjusting the Cab Display Backlighting

The backlighting feature brightens the display screen helping you read the cab display module (CDM) in low light situations.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.89: CDM Programming Buttons

3. Press SELECT (B) until CAB DISPLAY SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).
   - DISPLAY LANGUAGE? is displayed on the upper line.

Figure 3.90: Cab Display Setup

5. Press SELECT (D) until BACKLIGHTING is displayed on the upper line.
   - Default setting is displayed on the lower line.
6. Press left (B) or right (C) arrows to adjust display backlighting.
7. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next CAB DISPLAY SETUP? action.

Figure 3.91: Backlighting

Adjusting the Cab Display Contrast

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.92: CDM Programming Buttons

3. Press SELECT (B) until CAB DISPLAY SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).
   - DISPLAY LANGUAGE? is displayed on the upper line.

Figure 3.93: Cab Display Setup

5. Press SELECT (D) until DISPLAY CONTRAST is displayed on the upper line.
   - Default setting is displayed on the lower line.
6. Press left (B) or right (C) arrows to adjust display contrast.
7. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next CAB DISPLAY SETUP? action.

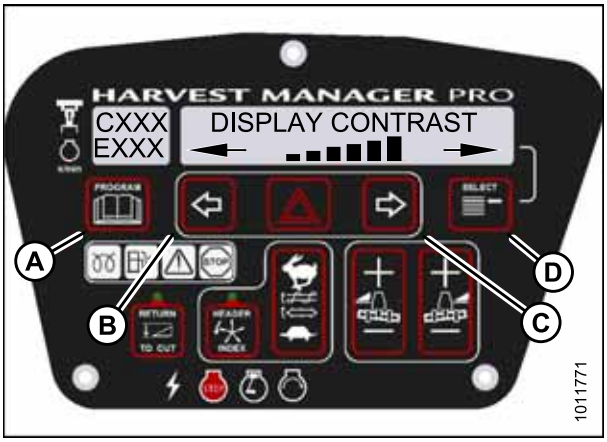


Figure 3.94: Display Contrast

3.18.8 Configuring the Windrower

The windrower can be configured to meet changing crop conditions, activate newly added options, indicate a change of header type, or increase operator comfort level.

Setting the Header Knife Speed

This topic does not apply to rotary disc headers.

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed.
   - The current knife speed is displayed on the lower line.

Figure 3.95: CDM Programming Buttons

4. Press left (B) or right (C) arrows to select knife speed. Press SELECT (D).
5. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

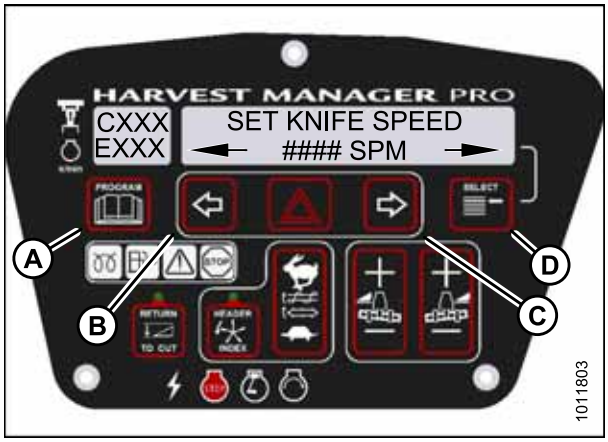


Figure 3.96: Knife Speed

Setting the Knife Overload Speed

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The recommended knife overload speed is 75% of knife speed.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed.

Figure 3.97: CDM Programming Buttons

4. Press SELECT (D) until KNIFE OVERLOAD SPD? is displayed on the upper line.
   - Current overload speed is displayed on the lower line.

   NOTE:

   Default setting is -300 spm. Range is -500 to -100 spm.
5. Press left (B) or right (C) arrows to set knife overload speed. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

Figure 3.98: Knife Overload Speed

Setting the Rotary Disc Overload Speed

This topic applies to rotary disc headers only.

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The recommended disc overload speed is 75% of disc speed. For more information, refer to the rotary disc header operator's manual to determine proper overload speed.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line. NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed.

Figure 3.99: CDM Programming Buttons

4. Press SELECT (D) until DISC OVERLOAD SPD? is displayed on the upper line.
   - The current overload speed is displayed on the lower line.

   NOTE:

   Default setting is -300 rpm. Range is -500 to -100 rpm.
5. Press left (B) or right (C) arrows to set disc overload speed. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

Figure 3.100: Disc Overload Speed

Setting the Hydraulic Overload Pressure

NOTE:

- This procedure requires installation of the optional pressure sensor (MD #B5574). For overload pressure values, refer to pressure sensor installation instructions (MD #169031).
- To enable sensor, refer to *Switching the Installed Header Sensors ON or OFF, page 138*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed.

Figure 3.101: CDM Programming Buttons

4. Press SELECT (D) until OVERLOAD PRESSURE? is displayed on the upper line.
   - The current overload pressure is displayed on lower line.

   NOTE:

   Pressure range is 17,237–34,474 kPa (2500–5000 psi).
5. Press left (B) or right (C) arrows to set hydraulic overload pressure. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

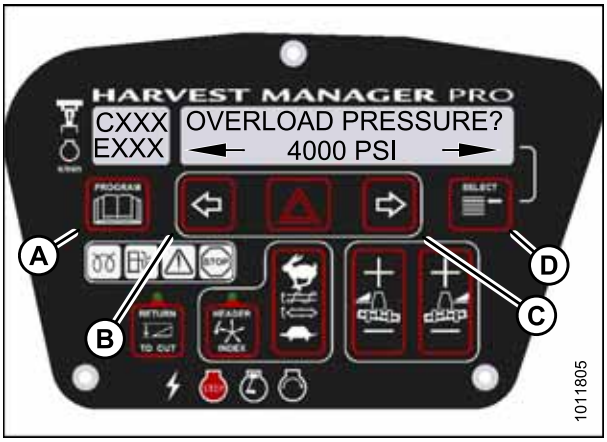


Figure 3.102: Hydraulic Overload Pressure

Setting the Header Index Mode

Index mode links reel and draper speed to ground speed. This feature is not applicable to rotary disc headers.

For more information on the Header Index feature, refer to *4.6.5 Reel Speed, page 264* and *4.6.6 Draper Speed, page 267*.

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.103: CDM Programming Buttons

4. Press SELECT (D) until HEADER INDEX MODE? is displayed on the upper line.
   - REEL & CONVEYOR or REEL ONLY is displayed on the lower line.
5. Press left (B) or right (C) arrows to set HEADER INDEX mode. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

Figure 3.104: Header Index Mode

Setting the Return to Cut Mode

Return to Cut allows the operator to resume preferred header positions and headland presets.

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed.

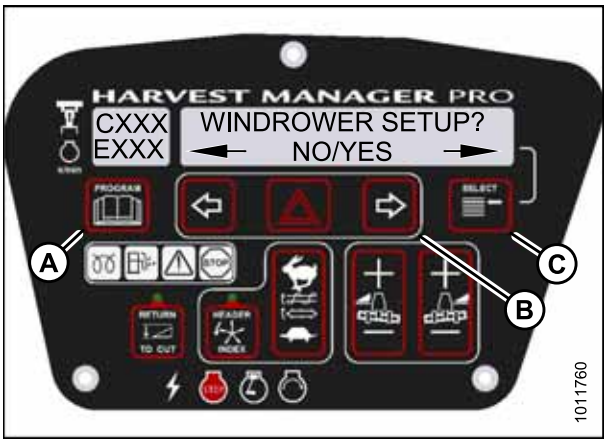


Figure 3.105: CDM Programming Buttons

4. Press SELECT (D) until RETURN TO CUT MODE? is displayed on the upper line.
   - HEIGHT & TILT or HEIGHT ONLY will be displayed on the lower line.
5. Press left (B) or right (C) arrows to select RETURN TO CUT MODE. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

Figure 3.106: Return to Cut Mode

Setting the Auto Raise Height

For more information on the Auto Raise Height feature, refer to *Auto Raise Height, page 213*.

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter Programming Mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.107: CDM Programming Buttons

4. Press SELECT (D) until AUTO RAISE HEIGHT? is displayed on the upper line.
   - Last measurement is displayed on the lower line.

   NOTE:

   The auto raise height ranges from 4.0 (minimum) to 9.5 (maximum), in 0.5 increments. A setting of 10 disables the auto raise function.
5. Press left arrow (B) or right arrow (C) to change auto raise height.
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

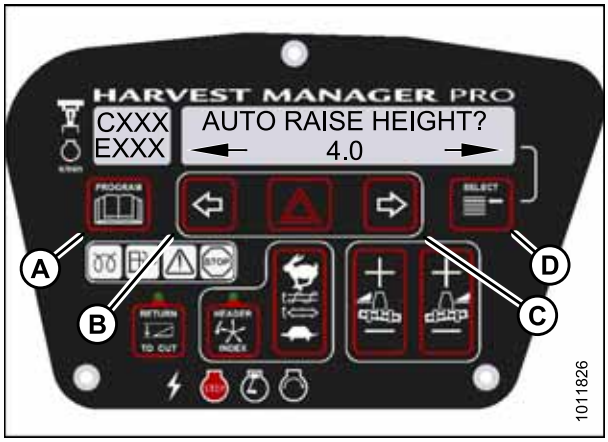


Figure 3.108: Auto Raise Height

Activating the Double Windrow Attachment (DWA)

NOTE:

- Follow this procedure if installing the DWA; however, refer to the DWA manual if you require additional installation instructions.
- The DWA cannot be activated if the swath compressor is enabled.
- Follow this procedure if installing a drive manifold (MD #139508).

⚠ CAUTION

Check to be sure all bystanders have cleared the area.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.109: CDM Programming Buttons

4. Press SELECT (B) until DWA INSTALLED? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.110: DWA Controls

6. SWAP DWA CONTROLS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

   NOTE:

   This step swaps the DWA controls from the console switch to the ground speed lever (GSL) reel fore-aft buttons.

Figure 3.111: DWA Controls

7. Press right arrow (C) to select YES. Press SELECT (D).
   - DWA AUTO UP/DOWN? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

   NOTE:
   If the Operator selects YES, the DWA Auto-Up function will be activated by the GSL Reel Fore-Aft button.
8. Press right arrow (C) to select YES. Press SELECT (D).
9. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next windrower setup action.

Figure 3.112: DWA Auto Up/Down

Activating the Hydraulic Center-Link

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.113: CDM Programming Buttons

4. Press SELECT (C) until TILT CYL INSTALLED? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (B) to select YES. Press SELECT (C).
6. Press PROGRAM (A) to exit programming mode or press SELECT (C) to proceed to next WINDROWER SETUP action.

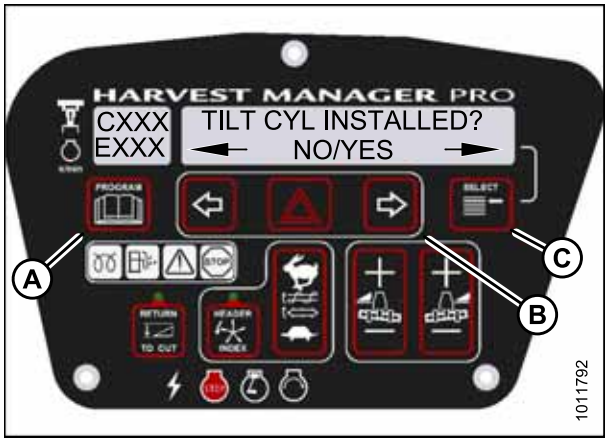


Figure 3.114: Hydraulic Center-Link

Activating the Rotary Header Drive Hydraulics

NOTE:

This procedure requires installation of the optional Rotary Header Drive Hydraulics (MD #B5510).

For more information, refer to *6.3.8 R80 and R85 Rotary Header Drive Hydraulics (4.0 m [13 ft.]), page 430*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

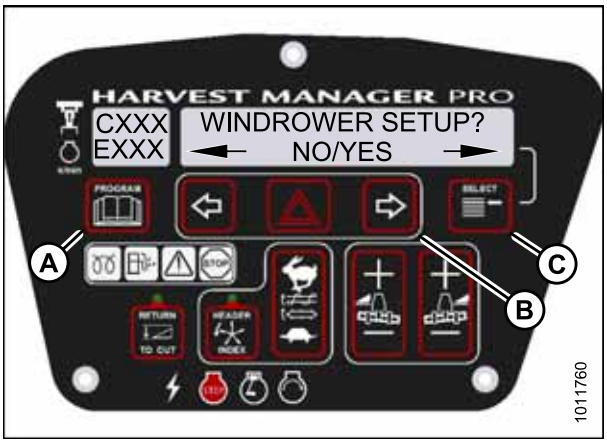


Figure 3.115: CDM Programming Buttons

4. Press SELECT (C) until DISC BLK INSTALLED? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (B) to select YES. Press SELECT (C).
6. Press PROGRAM (A) to exit programming mode or press SELECT (C) to proceed to next WINDROWER SETUP action.

Figure 3.116: Rotary Disc Hydraulics

Setting the Header Cut Width

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- Header cut width is less than actual header width to accurately measure number of acres cut.
- The header sends an electrical signal to the windrower to produce a header ID; however, the cut width will always default to the smallest header size available for each header type. For example, A Series Auger Headers come in 4.3, 4.9, and 5.5 m (14, 16, and 18 ft.) sizes, but the cut width will default to 4.3 m (14 ft.). Adjust setting to your specific header size.

1. Turn ignition key to RUN, or start the engine.

2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed.

Figure 3.117: CDM Programming Buttons

4. Press SELECT (D) until HDR CUT WIDTH? #### is displayed on the upper line.
   - Previous cutting width is displayed on the lower line.
5. Press left (B) or right (C) arrows to change the header cut width. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

Figure 3.118: Header Cut Width

Activating the Swath Compressor

An optional swath compressor (MD #C2061) is available through your MacDon Dealer.

NOTE:

- CDM5 (version 512 or later) and WCM2 (version 237 or later), or WCM3 (version 116 or later), are required to operate the swath compressor.
- The Double Windrow Attachment (DWA) system must be disabled in the CDM when setting up the swath compressor.
- Users can activate and set up the swath compressor via in-cab controls without a header attached to the windrower.
- Use the following procedure when installing and setting up the swath compressor.

CAUTION

Check to be sure all bystanders have cleared the area.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

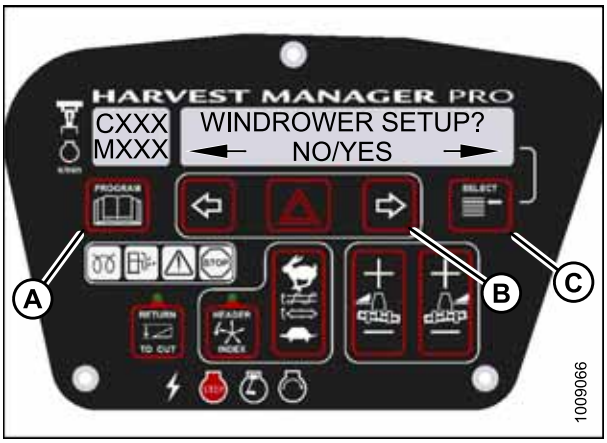


Figure 3.119: CDM Programming Buttons

4. Press SELECT (B) until SWATH COMPR INSTALL? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).
6. Press SELECT (B) until CALIBRATE SENSORS is displayed on upper line. NO/YES is displayed on lower line.
7. Press right arrow (A) to select YES. Press SELECT (B).
   - TO CALIBRATE SELECT is displayed on upper line.
   - HEADER HEIGHT is displayed on lower line.
8. Press right arrow (A) to scroll through choices until SWATH COMPR HT is displayed. Press SELECT (B).
   - SWATH SENSOR CAL is displayed on upper line.
   - SWATH UP TO START is displayed on lower line.

Figure 3.120: Swath Compressor Controls

9. Press switch (B) on console to raise swath compressor.
   - CALIBRATING SWATH is displayed on upper line.
   - FORM UP and flashing HOLD is displayed on lower line until system has completed reading signal with swath compressor fully raised.
   - SWATH FORM UP and DONE (with buzzer) is displayed on lower line when complete.
   - SWATH SENSOR CAL is displayed on upper line.
   - PRESS SWATH DOWN is displayed on lower line.
10. Press switch (A) on console to lower swath compressor.
    - CALIBRATING SWATH is displayed on upper line.
    - FORM DOWN and HOLD is displayed on lower line.
    - SWATH FORM COMPLETE flashes for 2 seconds on lower line (with buzzer) when calibration is finished.
11. Press PROGRAM (A) to exit programming mode or press SELECT (B) to proceed to next windrower setup action.

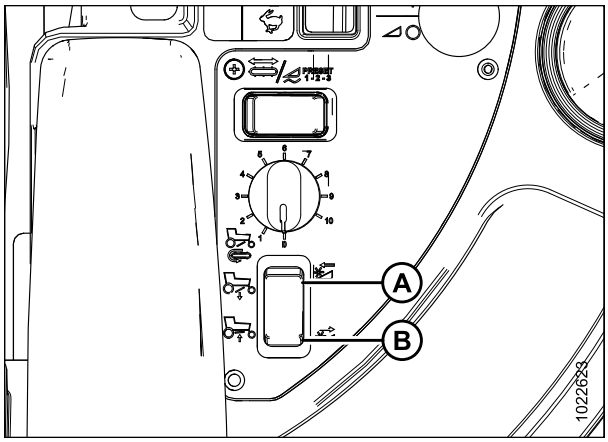


Figure 3.121: Swath Compressor Switch

Figure 3.122: CDM Programming Buttons

Activating the Hay Conditioner

NOTE:

- This procedure is for draper headers only.
- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.123: CDM Programming Buttons

4. Press SELECT (C) until HAY CONDITIONER? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (B) to select YES. Press SELECT (C).
6. Press PROGRAM (A) to exit programming mode or press SELECT (C) to proceed to next WINDROWER SETUP action.

Figure 3.124: Hay Conditioner

Displaying Reel Speed

NOTE:

- This procedure is for draper and auger headers. It does not apply to rotary disc headers.
- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on CDM to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.125: CDM Programming Buttons

4. Press SELECT (D) until HEADER REEL SPEED? is displayed on the upper line.
   - RPM/MPH or RPM/KPH is displayed on the lower line.
5. Press left (B) or right (C) arrow to select either IMPERIAL or METRIC units. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

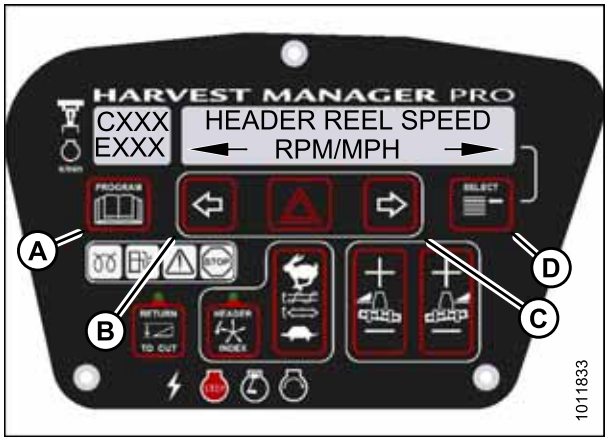


Figure 3.126: Reel Speed Display

Setting the Windrower's Tire Size

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

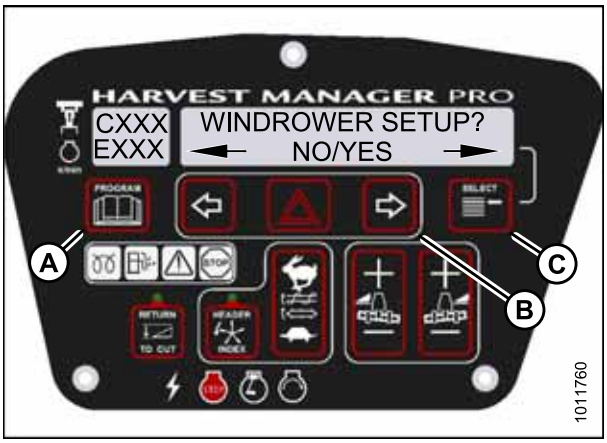


Figure 3.127: CDM Programming Buttons

4. Press SELECT (D) until SET TIRE SIZE? is displayed on the upper line.
   - Currently installed tire size is displayed on the lower line.

   NOTE:

   The following tire sizes are available:
   - 18.4 x 26 TURF
   - 18.4 x 26 BAR
   - 23.1 x 26 TURF
   - 600 – 65 R28
5. Press left (B) or right (C) arrow and select tire size. Press SELECT (D).
6. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

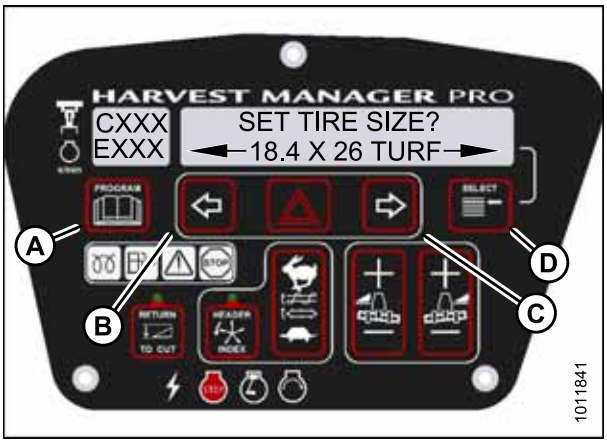


Figure 3.128: Tire Size

Setting the Engine Intermediate Speed Control (ISC) RPM

The engine operating speed can be programmed to enable the windrower to operate at reduced engine rpm (that is, 1900, 2050, or 2200 rpm) without significantly affecting the ground or header speeds. The default setting is 2200 rpm or the last selected rpm.

NOTE:

The programmed engine speed is activated when the header is engaged. For more information, refer to *Engine Intermediate Speed Control (ISC), page 170*.

The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (C) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.129: CDM Programming Buttons

4. Press SELECT (B) until SET ENGINE ISC RPM? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).
   - PRESS HAZARD TO SET is displayed on the upper line.
   - ISC RPM #### is displayed on the lower line.

Figure 3.130: Engine ISC RPM

Table 3.1 ISC Settings

ISC and RPM		
Off[14]	1	2
High Idle	2050	1900

NOTE:

The previously selected ISC rpm will be flashing.

14. Off is always used when the header is not engaged.

6. Press right arrow (C) to cycle between rpm options. Press HAZARD (B) to set.
7. Press Select (D).
   - EXIT ENGINE ISC? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
8. Press right arrow (C) to select YES. Press SELECT (D).
9. Press PROGRAM (A) to exit programming mode.

Figure 3.131: ISC RPM

Clearing Sub-Acres

The windrower has two counters for acres: one counter tracks a total count of acres harvested for the machine's lifetime, and the other counter tracks sub-acres harvested for smaller harvesting instances (instances like harvesting a particular field, or for a particular day). The total acres can't be cleared from the windrower's tracking, but the sub-acres can be cleared between smaller harvesting instances.

1. With the key in the ON position, and the operator's station in cab-forward mode, press SELECT until the cab display module (CDM) displays sub-acres on the bottom line. Then press and hold the PROGRAM (A) button on the CDM until the sub-acres are cleared.

Figure 3.132: Cab Display Module (CDM)

3.18.9 Activating Cab Display Lockouts

You can lock some of the header functions controlled by the cab display module (CDM) to prevent accidental changes to header settings. You can use this feature to keep header settings constant when several different Operators use the windrower.

NOTE:

FUNCTION LOCKED flashes on CDM when locked header function switch is pressed.

Activating the Header Tilt Control Lockout

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.133: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

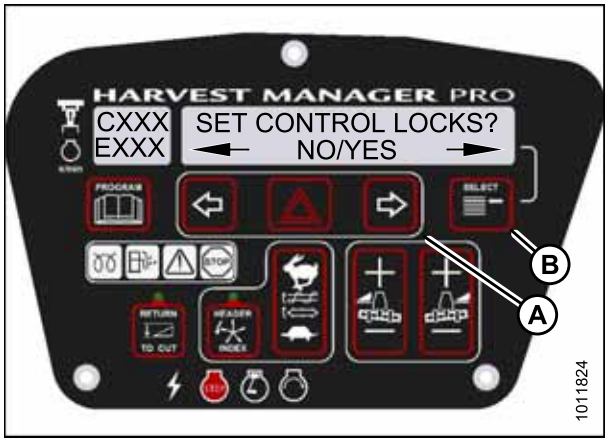


Figure 3.134: Control Locks

6. Press SELECT (D) until HEADER TILT is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable the HEADER TILT control switch.

   Press right arrow (C) to lock the HEADER TILT control switch.
8. Press PROGRAM (A) to exit programming mode, or press SELECT (D) to proceed to next WINDROWER SETUP action.

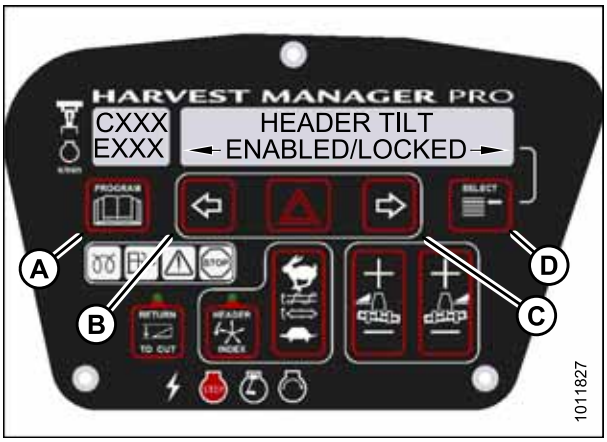


Figure 3.135: Header Tilt Control Lock

Activating the Header Float Control Lockout

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header.

For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.136: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.137: Control Locks

6. Press SELECT (D) until HEADER FLOAT is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable HEADER FLOAT control switch, or press right arrow (C) to lock HEADER FLOAT control switch.
8. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

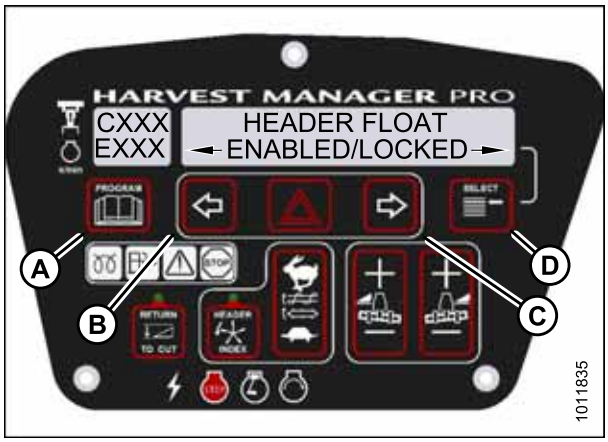


Figure 3.138: Header Float Control Lock

Activating the Reel Fore-Aft Control Lockout

NOTE:

- This procedure is for draper headers only.
- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

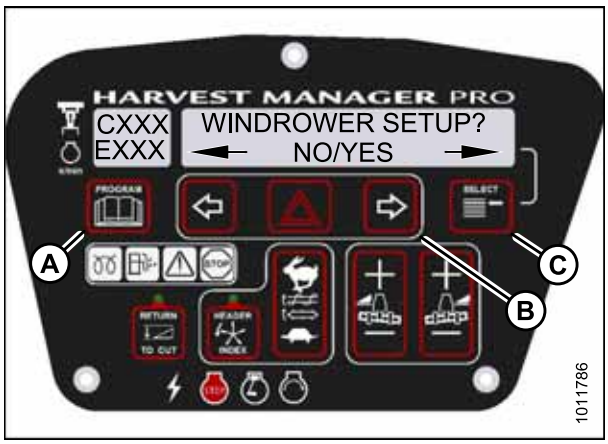


Figure 3.139: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.140: Control Locks

6. Press SELECT (D) until REEL FORE/AFT is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable REEL FORE/AFT control switch.

   Press right arrow (C) to lock REEL FORE/AFT control switch.
8. Press PROGRAM (A) to exit programming mode, or press SELECT (D) to proceed to next WINDROWER SETUP action.

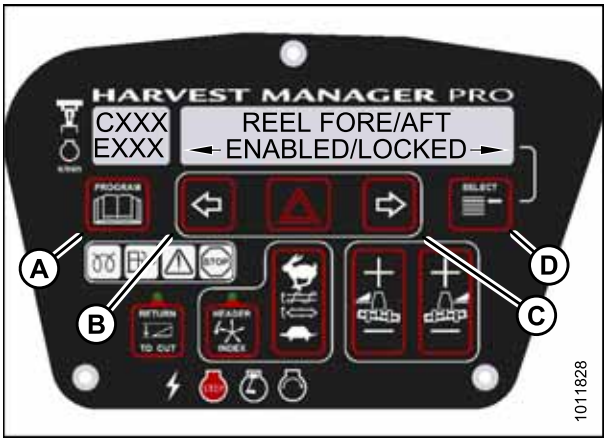


Figure 3.141: Reel Fore-Aft Control Lock

Activating the Draper Speed Control Lockout

NOTE:

- This procedure is for draper headers only.
- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.142: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.143: Control Locks

6. Press SELECT (D) until DRAPER SPEED is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable DRAPER SPEED control switch, or press right arrow (C) to lock DRAPER SPEED control switch.
8. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

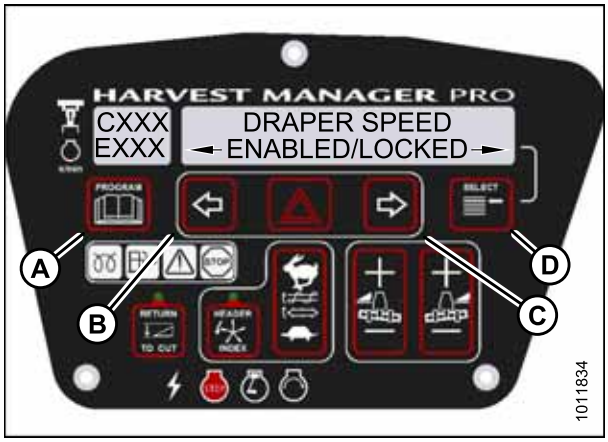


Figure 3.144: Draper Control Lock

Activating the Auger Speed Control Lockout

NOTE:

- This procedure is for A40D headers only.
- An auger header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.145: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.146: Control Locks

6. Press SELECT (D) until AUGER SPEED is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable AUGER SPEED control switch.

   Press right arrow (C) to lock AUGER SPEED control switch.
8. Press PROGRAM (A) to exit programming mode, or press SELECT (D) to proceed to next WINDROWER SETUP action.

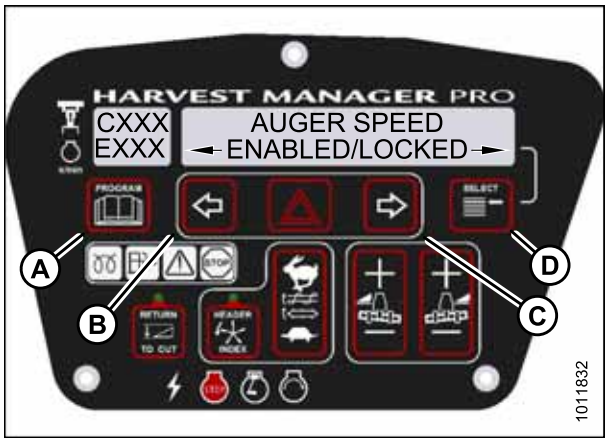


Figure 3.147: Auger Control Lock

Activating Knife Speed Control Lockout

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.148: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.149: Control Locks

6. Press SELECT (D) until KNIFE SPEED is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable KNIFE SPEED control switch, or press right arrow (C) to lock KNIFE SPEED control switch.
8. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

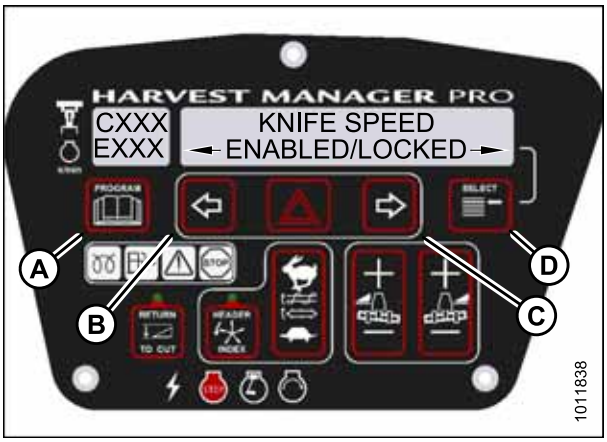


Figure 3.150: Knife Speed Control Lock

Activating Rotary Disc Speed Control Lockout

NOTE:

- This procedure is for rotary disc headers only.
- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

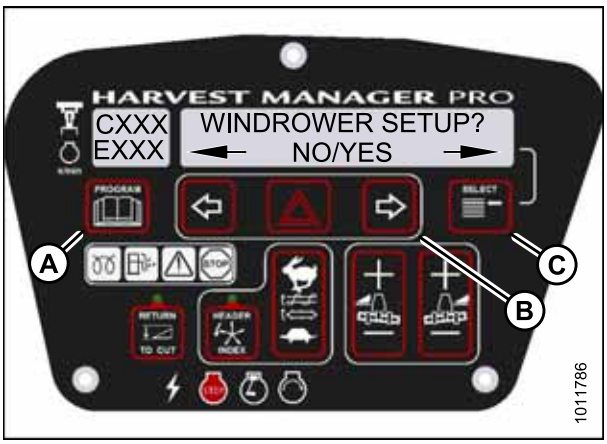


Figure 3.151: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.152: Control Locks

6. Press SELECT (D) until DISK SPEED is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable DISK SPEED control switch, or press right arrow (C) to lock DISK SPEED control switch.
8. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

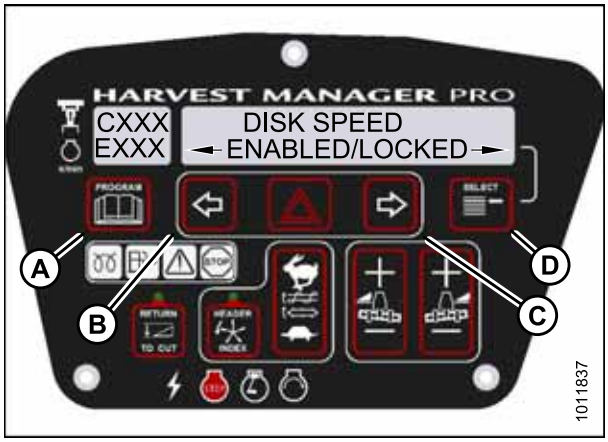


Figure 3.153: Disc Speed Control Lock

Activating the Reel Speed Control Lockout

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header.

For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

Figure 3.154: CDM Programming Buttons

4. Press SELECT (B) until SET CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.155: Control Locks

6. Press SELECT (D) until REEL SPEED is displayed on the upper line.
   - ENABLED/LOCKED is displayed on the lower line.
7. Press left arrow (B) to enable the REEL SPEED control switch.

   Press right arrow (C) to lock the REEL SPEED control switch.
8. Press PROGRAM (A) to exit programming mode, or press SELECT (D) to proceed to next WINDROWER SETUP action.

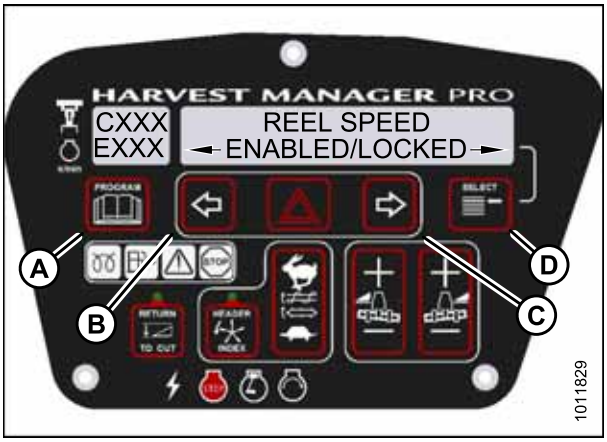


Figure 3.156: Reel Speed Control Lock

3.18.10 Displaying Activated Cab Display Lockouts

Displaying the activated control locks allows you to quickly determine which controls are locked on the cab display module (CDM).

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press right arrow (B) to select YES. Press SELECT (C).
   - SET KNIFE SPEED? is displayed on the upper line.

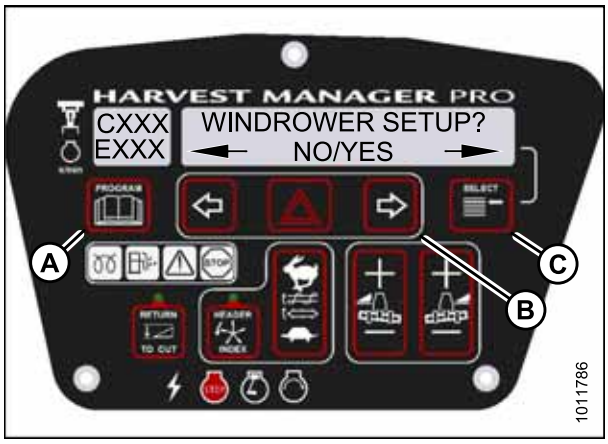


Figure 3.157: CDM Programming Buttons

4. Press SELECT (B) until VIEW CONTROL LOCKS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
5. Press right arrow (A) to select YES. Press SELECT (B).

   HEADER TILT is displayed on the upper line.
   - The control switch status is displayed on the lower line. The hours displayed indicate when a switch was enabled or locked.

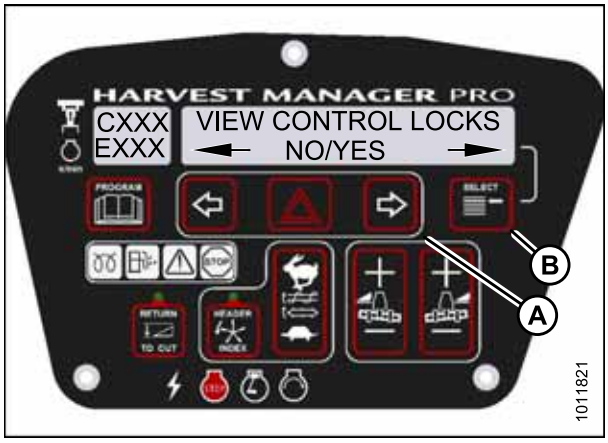


Figure 3.158: Control Locks

6. Press left (B) or right (C) arrow to cycle between control switch lockouts. The displayed control switches are as follows:
   - HEADER TILT
   - HEADER FLOAT
   - REEL FORE/AFT
   - DRAPER SPEED
   - AUGER SPEED
   - KNIFE SPEED
   - DISK SPEED
   - REEL SPEED

   NOTE:

   Not all control locks apply to every header.

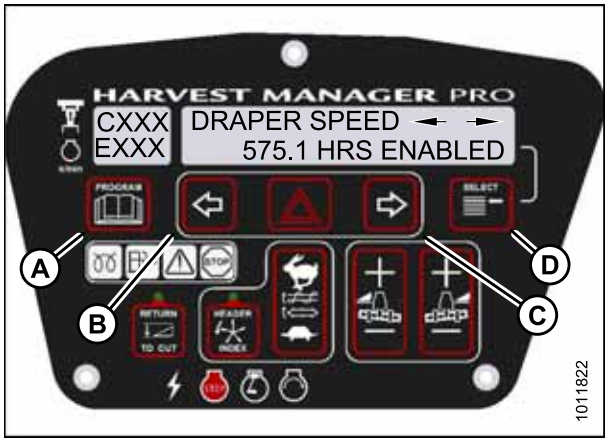


Figure 3.159: Control Locks

7. Press SELECT (D).
   - EXIT VIEW LOCKOUTS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
8. Press right (C) to select YES.
9. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next WINDROWER SETUP action.

3.18.11 Calibrating the Header Sensors

Sensor calibration programs the windrower control module (WCM) with settings for the attached header.

Calibrating the Header Height Sensor

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its configuration for each header type. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
3. Press SELECT (B) until CALIBRATE SENSORS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

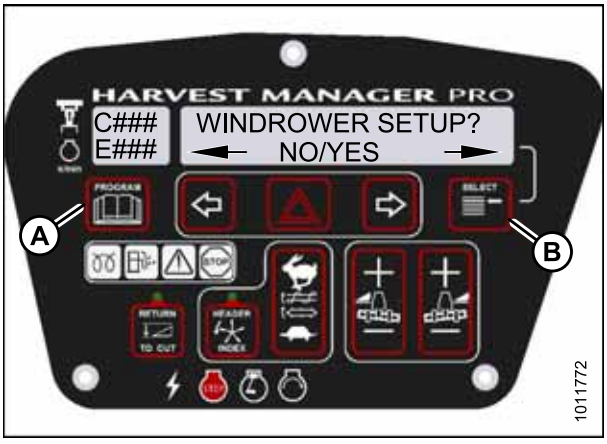


Figure 3.160: CDM Programming Buttons

4. Press right arrow (B) to select YES. Press SELECT (C).
   - TO CALIBRATE SELECT is displayed in upper line.
5. Press left (A) or right (B) arrow until HEADER HEIGHT is displayed on the lower line. Press SELECT (C).
   - CALIBRATING HEIGHT is displayed on the upper line.
   - RAISE HEADER HOLD is displayed on the lower line.

Figure 3.161: Header Height Calibration

CAUTION

Check to be sure all bystanders have cleared the area.

6. Press and hold the HEADER UP button (A) on the ground speed lever (GSL).
   - CALIBRATING HEIGHT is displayed on the upper line.
   - RAISE HEADER HOLD is displayed on the lower line.

   NOTE:

   The word HOLD will flash during calibration. RAISE HEADER DONE will display on the lower line once calibration is complete.
7. Release the HEADER UP button (A).
   - HEIGHT SENSOR CAL is displayed on the upper line.
   - PRESS LOWER HEADER is displayed on the lower line.

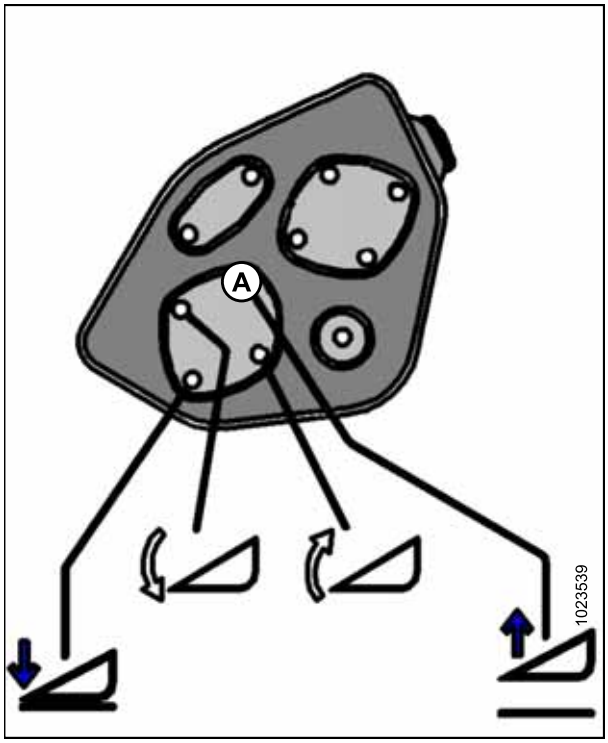


Figure 3.162: Header Height Controls on GSL

8. Press and hold HEADER DOWN button (A) on the GSL.

   NOTE:

   The word HOLD will flash during calibration. HT SENSOR COMPLETE will display on the lower line once calibration is complete.

9. Release HEADER DOWN button (A).
   - TO CALIBRATE SELECT is displayed on the upper line.
   - HEADER HEIGHT is displayed on the lower line.
10. Press right arrow to select next header sensor calibration or STOP & EXIT. Press SELECT.

    Refer to *Calibrating the Header Tilt Sensor, page 131* or *Calibrating the Header Float Sensors, page 133*.

11. Press PROGRAM to exit programming mode.

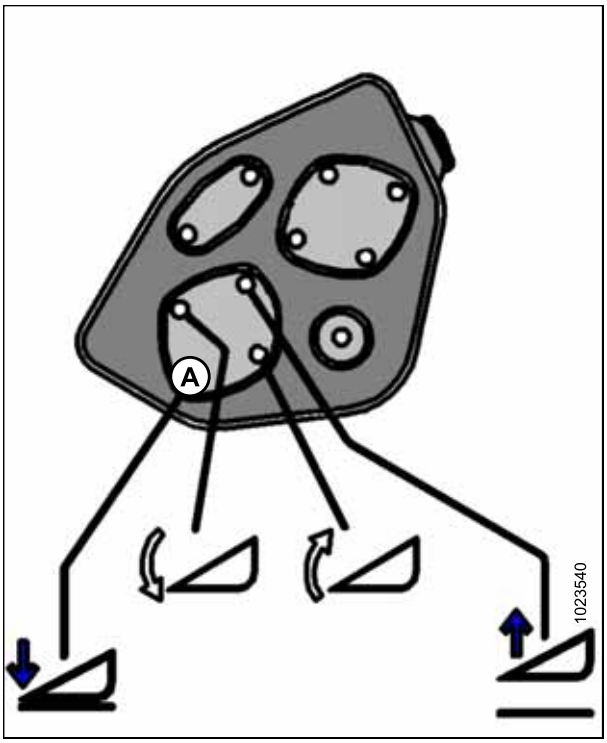


Figure 3.163: Header Height Controls on GSL

Calibrating the Header Tilt Sensor

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. Refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
3. Press SELECT (B) until CALIBRATE SENSORS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

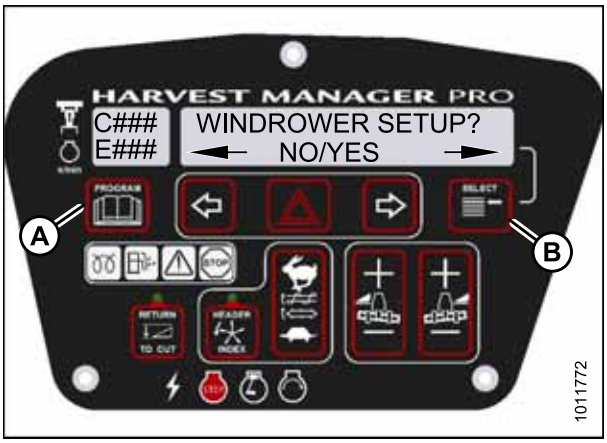


Figure 3.164: CDM Programming Buttons

4. Press right arrow (B) to select YES. Press SELECT (C).
   - TO CALIBRATE SELECT is displayed in upper line.
5. Press left (A) or right (B) arrow until HEADER TILT is displayed on the lower line. Press SELECT (C).
   - HDR TILT SENSOR CAL is displayed on the upper line.
   - EXTEND TILT TO START is displayed on the lower line.

Figure 3.165: Header Tilt

CAUTION

Check to be sure all bystanders have cleared the area.

6. Press and hold the HEADER TILT EXTEND button (A) on the ground speed lever (GSL).
   - CALIBRATING TILT is displayed on the upper line.
   - EXTEND TILT HOLD is displayed on the lower line.

   NOTE:

   The word HOLD will flash during calibration. HEADER TILT DONE will display on the lower line once calibration is complete.
7. Release the HEADER TILT EXTEND button (A).
   - HEADER TILT SENSOR CAL is displayed on upper line.
   - PRESS RETRACT TILT is displayed on the lower line.

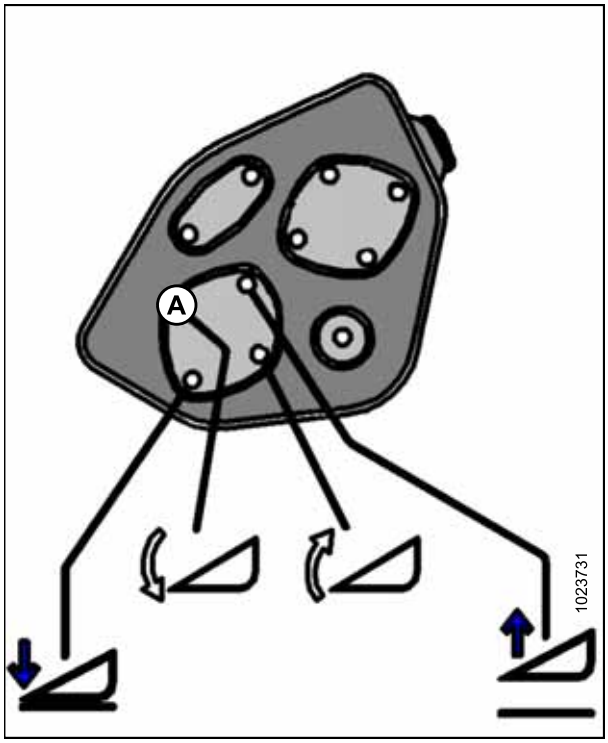


Figure 3.166: Header Tilt Controls on GSL

8. Press and hold HEADER TILT RETRACT button (A) on GSL.
   - CALIBRATING TILT is displayed on the upper line.
   - RETRACT TILT HOLD is displayed on the lower line.

   NOTE:

   The word HOLD will flash during calibration. HEADER TILT COMPLETE will display on the lower line once calibration is complete.
9. Release HEADER TILT RETRACT button (A).
   - TO CALIBRATE SELECT is displayed on the upper line.
   - HEADER TILT is displayed on the lower line.
10. Press right arrow to select next header sensor calibration or STOP & EXIT. Press SELECT.

    Refer to *Calibrating the Header Height Sensor, page 129* or *Calibrating the Header Float Sensors, page 133*.
11. Press PROGRAM to exit programming mode.

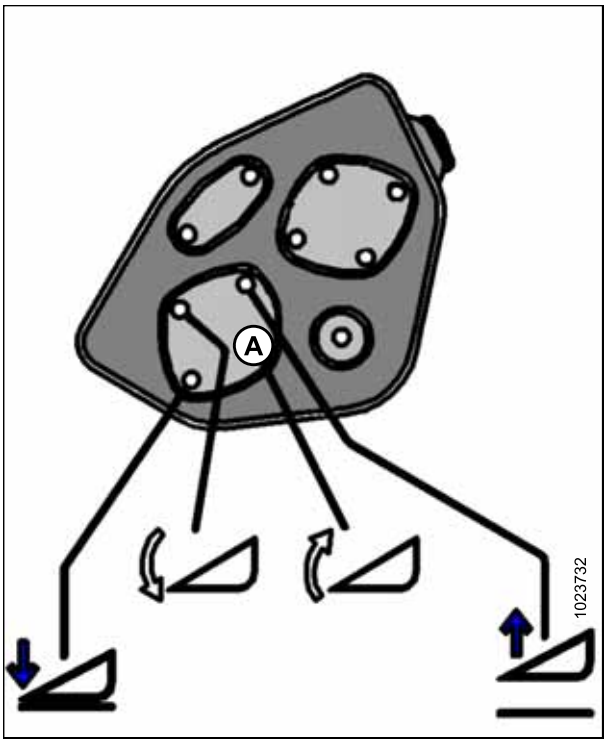


Figure 3.167: Header Tilt Controls on GSL

Calibrating the Header Float Sensors

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- Use the left or right FLOAT buttons on the cab display module (CDM) to perform this procedure.

IMPORTANT:

Ensure float pins (A) are installed in the working position.

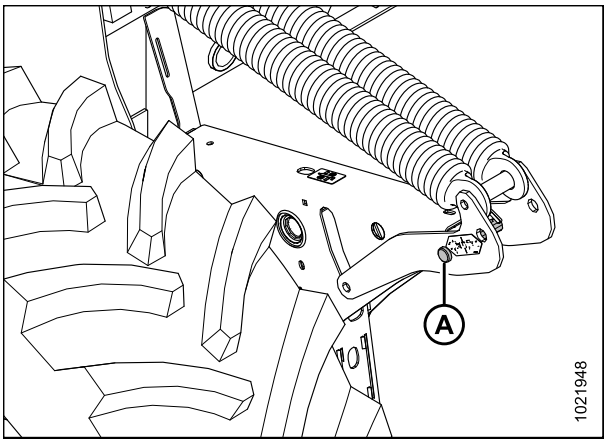


Figure 3.168: Float Pin – Right Side

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
3. Press SELECT (B) until CALIBRATE SENSORS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.169: CDM Programming Buttons

4. Press right arrow (B) to select YES. Press SELECT (C).
   - TO CALIBRATE SELECT is displayed in upper line.
5. Press left (A) or right (B) arrow until HEADER FLOAT is displayed on the lower line. Press SELECT (C).
   - CALIBRATING FLOAT is displayed on the upper line.
   - PRESS FLOAT + TO START is displayed on the lower line.

Figure 3.170: Header Float Display

CAUTION

Check to be sure all bystanders have cleared the area.

6. Press and hold FLOAT + button (A) on the CDM.
   - CALIBRATING FLOAT is displayed on the upper line.
   - FLOAT (+) HOLD is displayed on the lower line.

   NOTE:

   The word HOLD will flash during calibration. FLOAT (+) DONE will display on the lower line once calibration is complete.
7. Release the FLOAT + button (A).
   - CALIBRATING FLOAT is displayed on the upper line.
   - FLOAT (–) HOLD is displayed on the lower line.

Figure 3.171: Positive Header Float Display

8. Press and hold FLOAT – button (A) on CDM.
   - CALIBRATING FLOAT is displayed on the upper line.
   - FLOAT (–) HOLD is displayed on the lower line.

   NOTE:

   The word HOLD will flash during calibration. HDR FLOAT COMPLETE will display on the lower line once calibration is complete.
9. Release FLOAT – button (A).
   - TO CALIBRATE SELECT is displayed on the upper line.
   - HEADER FLOAT is displayed on the lower line.

Figure 3.172: Negative Header Float Display

10. Press right arrow to select next header sensor calibration or STOP & EXIT. Press SELECT. Refer to *Calibrating the Header Height Sensor, page 129* or *Calibrating the Header Tilt Sensor, page 131*.
11. Press PROGRAM to exit programming mode.

3.18.12 Calibrating the Swath Compressor Sensor

This topic only applies to machines equipped with a swath compressor. To calibrate the swath compressor sensor, follow these steps:

NOTE:

To calibrate the swath compressor sensor, the DWA must be disabled, and the swath compressor enabled in WINDROWER SETUP on the CDM.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
3. Press SELECT (B) until CALIBRATE SENSORS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

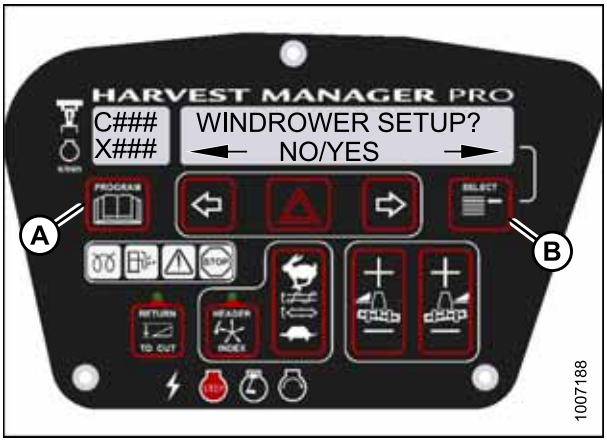


Figure 3.173: CDM Programming Buttons

4. Press right arrow (A) to select YES. Press SELECT (B).
   - TO CALIBRATE SELECT is displayed in upper line.
5. Press right arrow (A) to scroll through the choices until SWATH COMPR HT is displayed on the lower line. Press SELECT (B).
   - SWATH SENSOR CAL is displayed on the upper line.
   - SWATH UP TO START is displayed on the lower line.

Figure 3.174: Swath Compressor Sensor Calibration

6. Press and hold button (B) to raise the swath compressor.
   - CALIBRATING SWATH is displayed on the upper line.
   - FORM UP and flashing HOLD is displayed on the lower line until the system has completed reading signal with swath compressor fully raised.
   - SWATH FORM UP DONE (with buzzer) is displayed on the lower line when complete.

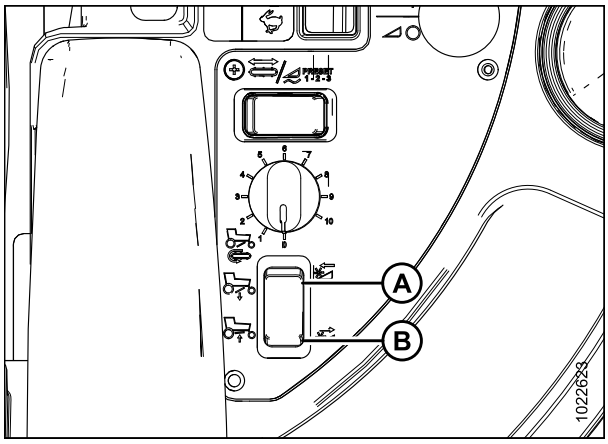


Figure 3.175: Swath Compressor Controls

A - Lower Swath Compressor
B - Raise Swath Compressor

- SWATH SENSOR CAL is displayed on the upper line.
- PRESS SWATH DOWN is displayed on the lower line.

Figure 3.176: Swath Compressor Sensor Calibration

7. Press and hold button (A) to lower the swath compressor.
   - CALIBRATING SWATH is displayed on the upper line.
   - FORM DOWN and flashing HOLD is displayed on the lower line.
   - SWATH FORM COMPLETE flashes for 2 seconds on the lower line (with buzzer) when the calibration is complete.
8. Press PROGRAM to exit programming mode.

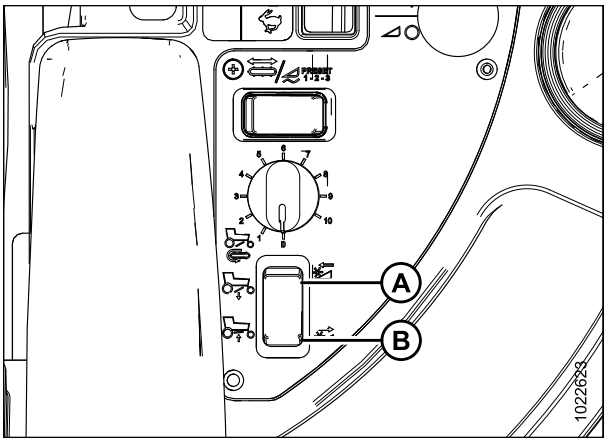


Figure 3.177: Swath Compressor Controls

3.18.13 Troubleshooting Windrower Problems

Displaying the Windrower and Engine Error Codes

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode. Press SELECT (B).
   - WINDROWER SETUP? is displayed on the upper line.
3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.

Figure 3.178: CDM Programming Buttons

4. Press right arrow (A) to select YES. Press SELECT (B).
5. VIEW ERROR CODES? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - VIEW WINDRWR CODES? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

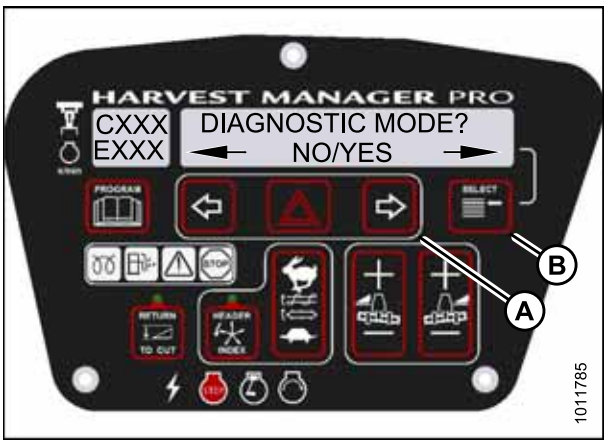


Figure 3.179: Diagnostic Functions

7. Press right arrow (A) to select YES. Press SELECT (C).
   - The most recent error code will be displayed.
   - Refer to *8.7.1 Cab Display Module (CDM) Error Codes, page 499*.
8. Press and left (A) or right (B) arrow to cycle through the last ten recorded windrower error codes until EXIT WINDROWER CODES is displayed.
9. Press right arrow (B) to select YES. Press SELECT (C).
   - VIEW ENGINE CODES is displayed on the upper line.
   - NO/YES is displayed on the lower line.
10. Press right arrow (C) to select YES. Press SELECT (D).
11. Press left (B) or right (C) arrow to cycle through the last ten recorded engine error codes until EXIT ENGINE CODES is displayed.
    - Refer to *8.4 Engine Error Codes, page 467*.
12. Press right arrow (C) to select YES. Press SELECT (D).
13. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next diagnostic mode.

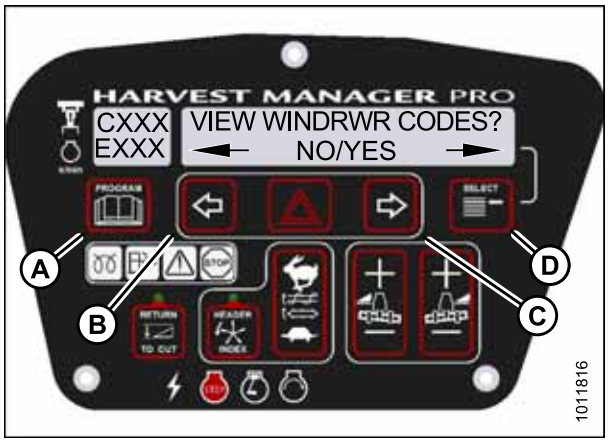


Figure 3.180: Windrower Codes

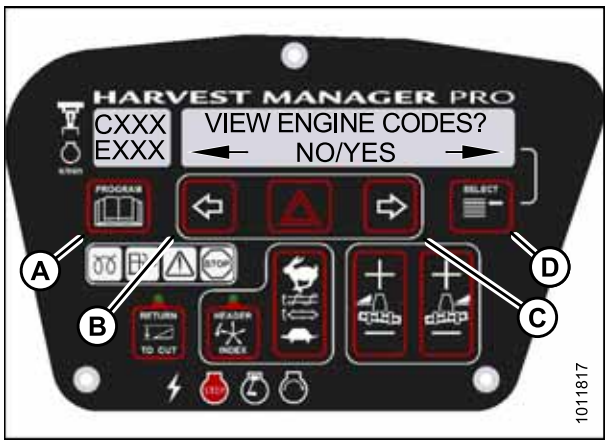


Figure 3.181: Engine Codes

Switching the Installed Header Sensors ON or OFF

You can selectively enable or disable header sensors in the event of a malfunction or as part of a troubleshooting routine.

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- Disabled sensors flash the word SENSOR on CDM during regular operation.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (C) on the cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
3. Press SELECT (C) until DIAGNOSTIC MODE? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (B) to select YES. Press SELECT (C).
   - VIEW ERROR CODES? is displayed on the upper line.
5. Press SELECT (B) until ENTER SENSOR SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - KNIFE SPEED SENSOR is displayed on the lower line.
   - ENABLE/DISABLE is displayed on the lower line.

Figure 3.182: CDM Programming Buttons

Figure 3.183: Diagnostic Functions

7. Press left arrow (B) to enable a sensor. Press right arrow (C) to disable sensor. Press SELECT (D) to confirm selection and move on to next sensor.

   The following sensors are available:
   - HEADER HT SENSOR
   - HEADER TILT SENSOR
   - KNIFE SPEED SENSOR
   - REEL SPEED SENSOR
   - HEADER FLOAT SENSOR
   - OVERLOAD PRESSURE[15]
   - HYD OIL TEMP SENSOR

   When sensors have been modified, press SELECT (D) to display the EXIT SENSOR SETUP? selection.
8. Press right arrow (C) to select YES. Press SELECT.

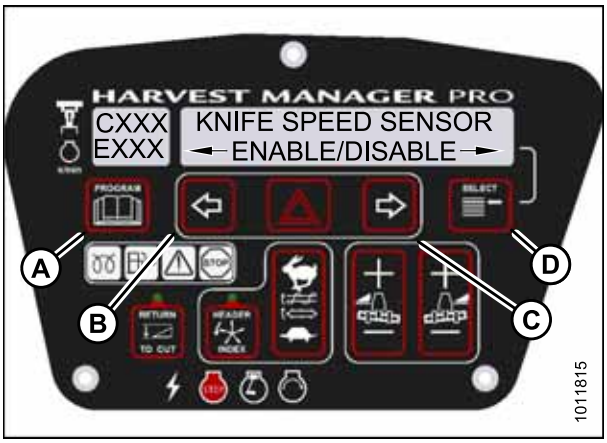


Figure 3.184: Header Sensors

15. Requires installation of optional pressure sensor (MD #B5574).

9. Press PROGRAM (A) to exit programming mode or press SELECT to proceed to next diagnostic mode.

Displaying Header Sensor Input Signals

You can display individual sensor input signals in the event of a malfunction or as part of a troubleshooting routine.

NOTE:

The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.185: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).
   - VIEW ERROR CODES? is displayed on the upper line.
5. Press SELECT (B) until READ SENSOR SETUP? is displayed on the upper line.
   - NO/YES is displayed on the lower line.

Figure 3.186: Diagnostic Functions

6. Press right arrow (C) to select YES. Press SELECT (D).
   - SENSOR INPUT is displayed on the upper line.
   - HDR HEIGHT 1.23 V is displayed on the lower line.
7. Press left (B) or right (C) arrow to cycle between individual sensor readers.
8. Press SELECT (D) to skip to EXIT READ SENSORS? selection.
9. Press right arrow (C) to select YES. Press SELECT.
10. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next diagnostic mode.

Figure 3.187: Header Sensors

Forcing a Header ID

The header must be attached to the windrower to troubleshoot certain issues. If damage has occurred to the header wiring or no header is available, you can force the windrower control module (WCM) to read a header ID. The WCM reverts to reading NO HEADER each time the engine ignition is cycled.

IMPORTANT:

Forcing a Header ID that is different from the attached header can damage the windrower and header. Doing so can lead to vibration, belt failures, and other overspeeding related problems.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.188: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.189: Diagnostic Functions

5. Press SELECT (B) until FORCE HEADER TYPE? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - SELECT HEADER TYPE is displayed on the upper line.
   - DISK HEADER is displayed on the lower line.

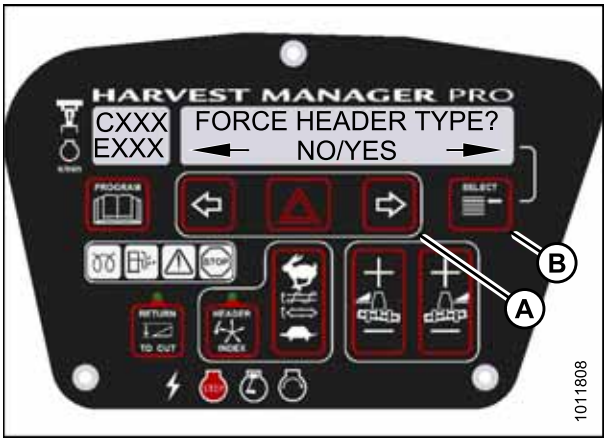


Figure 3.190: Header Type

7. Press left (A) or right (B) arrow to cycle through list of header types.
8. When desired header type is displayed, press SELECT (C).
   - EXIT FORCE HEADER? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
9. Press right arrow (B) to select YES. Press SELECT (C).

   Proceed to next diagnostic mode, or press PROGRAM to exit programming mode.

Figure 3.191: Header Type

3.18.14 Troubleshooting Header Problems

You can test individual parts of the header as part of a troubleshooting routine.

Testing the Header Up/Down Activate Function Using the Cab Display Module (CDM)

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode. Press SELECT (B).
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.192: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.193: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).

CAUTION

Check to be sure all bystanders have cleared the area.

Figure 3.194: Functions

7. Press SELECT (D) until ACTIVATE HEADER HT is displayed on the upper line.
   - DOWN/UP is displayed on the lower line.
8. Press and hold left arrow (B) to lower header, or press and hold right arrow (C) to raise header. Verify header is functioning properly.
9. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next ACTIVATE FUNCTION.

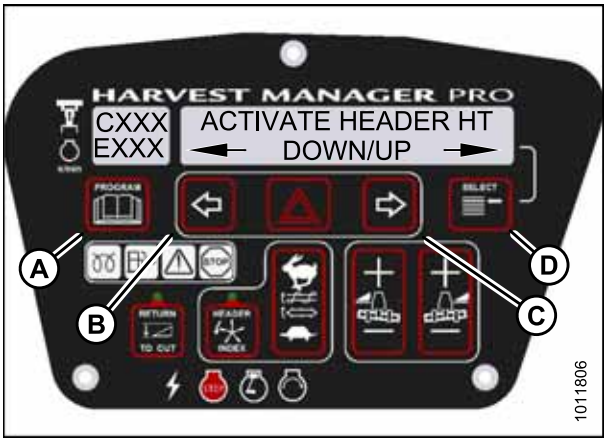


Figure 3.195: Header Height

Testing the Reel Up/Down Activate Function Using the Cab Display Module (CDM)

NOTE:

- This procedure is for draper headers only.
- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header.

1. Turn ignition key to RUN, or start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode. Press SELECT (B).
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.196: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

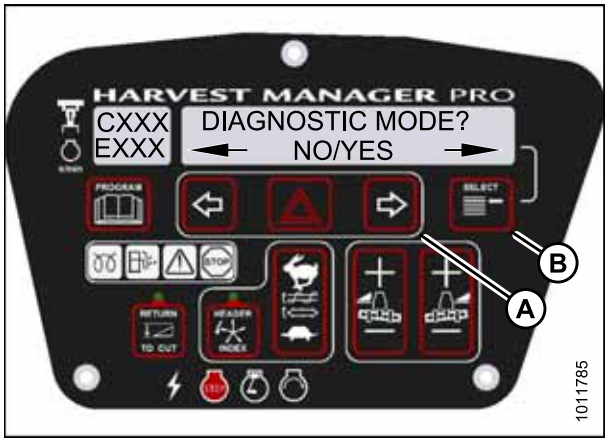


Figure 3.197: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).

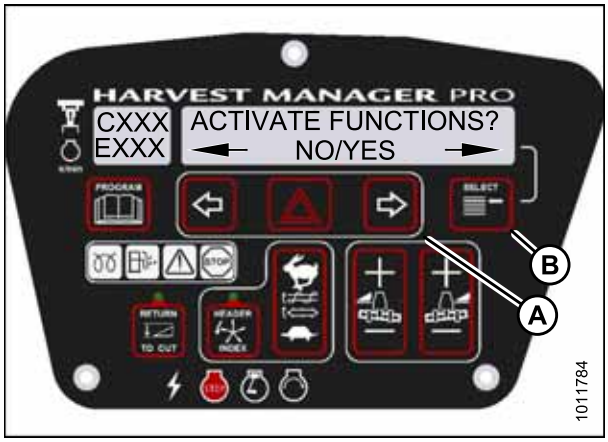


Figure 3.198: Functions

7. Press SELECT (D) until ACTIVATE REEL HT is displayed on the upper line.
   - DOWN/UP is displayed on the lower line.

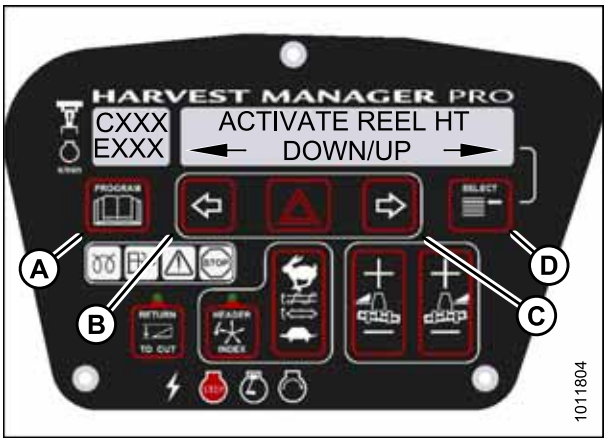


Figure 3.199: Reel Height

CAUTION

Check to be sure all bystanders have cleared the area.

8. Press and hold left arrow (B) to **lower** reel. Press and hold right arrow (C) to **raise** reel.

   IMPORTANT:

   Verify reel is functioning properly.

9. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next ACTIVATE FUNCTION.

Testing the Header Tilt Activate Function Using the Cab Display Module (CDM)

NOTE:

- The header **MUST** be attached to the windrower to perform this procedure. The cab display module (CDM) automatically adjusts its programming for each header. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.200: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.201: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.202: Functions

7. Press SELECT (D) until ACTIVATE HDR TILT is displayed on the upper line.
   - IN/OUT is displayed on the lower line.
8. Press and hold left arrow (B) to **decrease** header tilt. Press and hold right arrow (C) to **increase** header tilt.

   IMPORTANT:

   Verify header is functioning properly.
9. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next ACTIVATE FUNCTION.

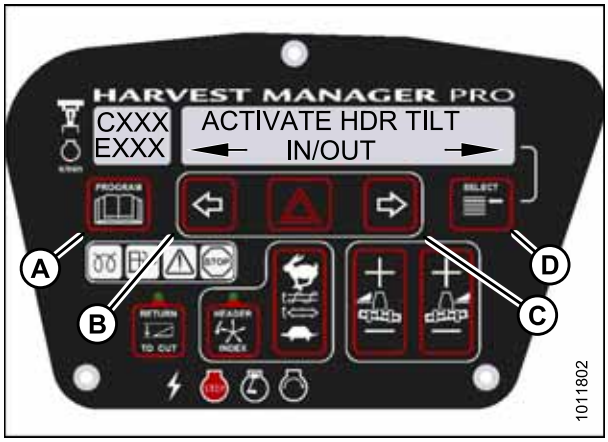


Figure 3.203: Header Tilt Angle

Testing the Knife Drive Circuit Using the Cab Display Module (CDM)

IMPORTANT:

Do **NOT** overspeed a drive. Overspeeding can lead to vibration, belt failures, or other overspeeding related problems.

NOTE:

- The header **MUST** be attached to windrower to follow this procedure. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode. Press SELECT (B).
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.204: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

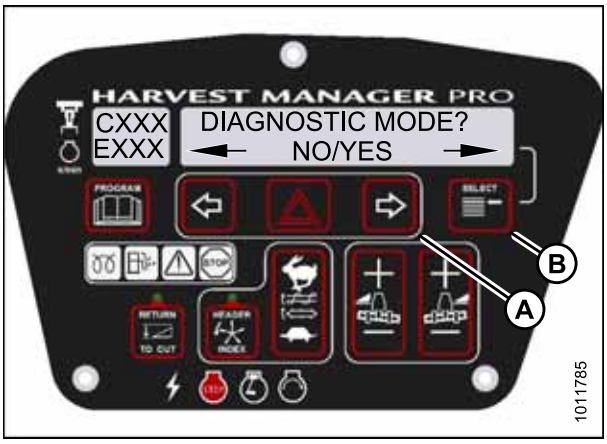


Figure 3.205: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - ACTIVATE HEADER HT is displayed on the upper line.

Figure 3.206: Functions

CAUTION

Check to be sure all bystanders have cleared the area.

7. Press SELECT (E) until KNIFE DRIVE SPD XXXX is displayed on the upper line.

   IMPORTANT:

   Do **NOT** overspeed the knife drive.
8. Press and hold HAZARD (C) button.
   - Press left arrow (B) to **decrease** knife speed.
   - Press right arrow (D) to **increase** knife speed.

   IMPORTANT:

   Verify the knife drive is functioning properly.
9. Release the HAZARD (C) button. The knife will stop.
10. Press PROGRAM (A) to exit programming mode or press SELECT (E) to proceed to next ACTIVATE FUNCTION.

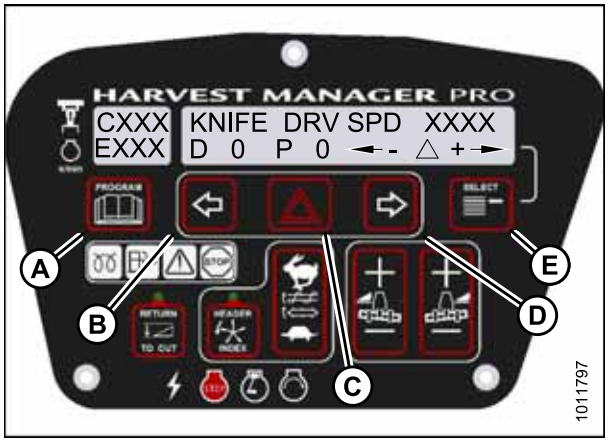


Figure 3.207: Knife Drive

Testing the Draper Drive Circuit Activate Function Using the Cab Display Module (CDM)

IMPORTANT:

Do **NOT** overspeed a drive. Overspeeding can lead to vibration, belt failures, or other overspeeding related problems.

NOTE:

- A draper header **MUST** be attached to windrower to follow this procedure. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.208: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.209: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - ACTIVATE HEADER HT is displayed on the upper line.

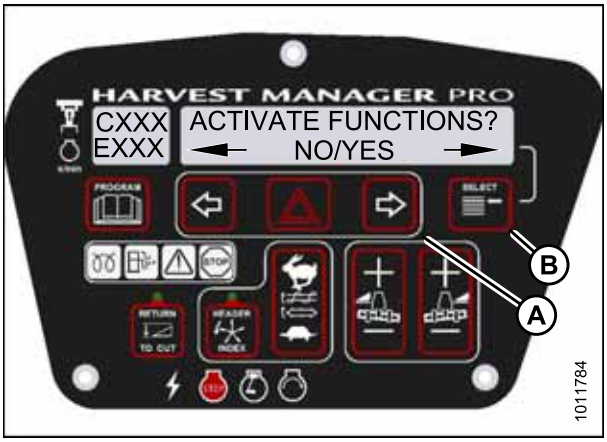


Figure 3.210: Functions

CAUTION

Check to be sure all bystanders have cleared the area.

7. Press SELECT (E) until DRAPER DRV SPD XXXX is displayed on the upper line.

   IMPORTANT:

   Do **NOT** overspeed the drapers.

8. Press and hold HAZARD (C) button.

   - Press left arrow (B) to **decrease** draper speed.
   - Press right arrow (D) to **increase** draper speed.

   IMPORTANT:

   Verify the draper drive is functioning properly.

9. Release the HAZARD (C) button. The drapers will stop.
10. Press PROGRAM (A) to exit programming mode or press SELECT (E) to proceed to next ACTIVATE FUNCTION.

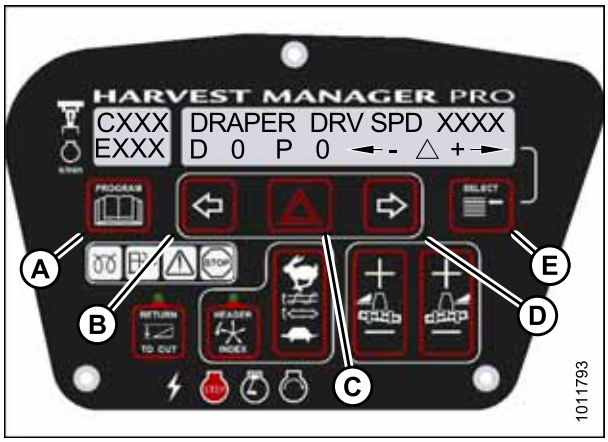


Figure 3.211: Draper Drive

Testing the Reel Drive Circuit Activate Function Using the Cab Display Module (CDM)

IMPORTANT:

Do **NOT** overspeed a drive. Overspeeding can lead to vibration, belt failures, or other overspeeding related problems.

NOTE:

- The header **MUST** be attached to windrower to follow this procedure. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- This procedure does not apply to rotary disc headers.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.212: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.213: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - ACTIVATE HEADER HT is displayed on the upper line.

Figure 3.214: Functions

CAUTION

Check to be sure all bystanders have cleared the area.

7. Press SELECT (E) until REEL DRV SPD XXXX is displayed on the upper line.

   IMPORTANT:

   Do **NOT** overspeed the reel.
8. Press and hold HAZARD (C) button.
   - Press left arrow (B) to **decrease** reel speed.
   - Press right arrow (D) to **increase** reel speed.

   IMPORTANT:

   Verify the reel drive is functioning properly.
9. Release the HAZARD (C) button. The reel will stop.
10. Press PROGRAM (A) to exit programming mode or press SELECT (E) to proceed to next ACTIVATE FUNCTION.

Figure 3.215: Reel Drive

Testing the Rotary Disc Drive Circuit Activate Function Using the Cab Display Module (CDM)

IMPORTANT:

Do **NOT** overspeed a drive. Overspeeding can lead to vibration, belt failures, or other overspeeding related problems.

NOTE:

- A rotary disc header **MUST** be attached to windrower to follow this procedure.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.216: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.217: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - ACTIVATE HEADER HT is displayed on the upper line.

Figure 3.218: Functions

CAUTION

Check to be sure all bystanders have cleared the area.

7. Press SELECT (E) until DISC DRV SPD XXXX is displayed on the upper line.

   IMPORTANT:

   Do **NOT** overspeed the disc drive.
8. Press and hold HAZARD (C) button.
   - Press left arrow (B) to **decrease** disc speed.
   - Press right arrow (D) to **increase** disc speed.

   IMPORTANT:

   Verify the disc drive is functioning properly.
9. Release the HAZARD (C) button. The disc drive will stop.
10. Press PROGRAM (A) to exit programming mode or press SELECT to proceed to next ACTIVATE FUNCTION.

Figure 3.219: Disc Drive

Testing the Double Windrower Attachment (DWA) Drive Activate Function Using the Cab Display Module (CDM)

IMPORTANT:

Do **NOT** overspeed a drive. Overspeeding can lead to vibration, belt failures, or other overspeeding related problems.

NOTE:

- The DWA must be attached to the windrower and activated under the WINDROWER SETUP menu. For more information, refer to *Activating the Double Windrow Attachment (DWA), page 106*.
- Engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode. Press SELECT (B).
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.220: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

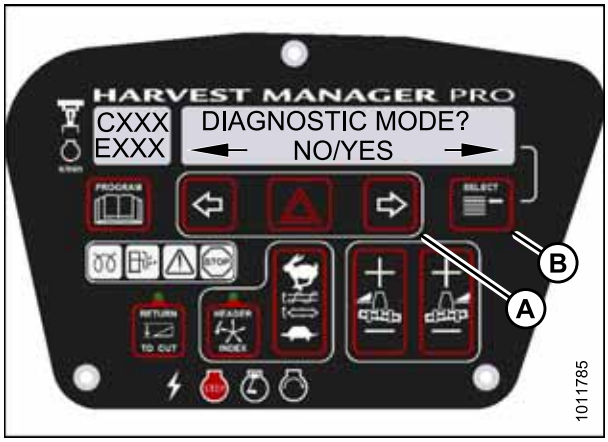


Figure 3.221: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - ACTIVATE HEADER HT is displayed on the upper line.

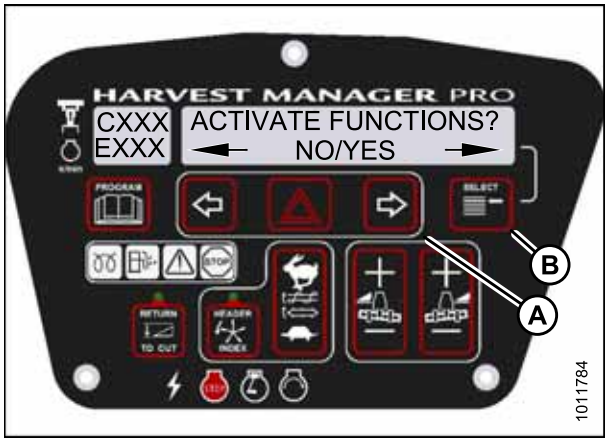


Figure 3.222: Functions

7. Press SELECT (E) until ACTIVATE DWA DRV is displayed on the upper line.

Figure 3.223: DWA Drive

CAUTION

Check to be sure all bystanders have cleared the area.

IMPORTANT:

Do **NOT** overspeed the DWA drive.

8. Press and hold HAZARD (C) button.
   - Press left arrow (B) to **decrease** DWA drive speed.
   - Press right arrow (D) to **increase** DWA drive speed.

IMPORTANT:

Verify the DWA drive is functioning properly.

9. Release the HAZARD (C) button. The DWA drive will stop.
10. Press PROGRAM (A) to exit programming mode or press SELECT (E) to proceed to next ACTIVATE FUNCTION.

Testing the Reel Fore-Aft Activate Function Using the Cab Display Module (CDM)

NOTE:

- The header **MUST** be attached to windrower to perform this procedure. For more information, refer to *4.5 Attaching and Detaching Headers, page 218*.
- The engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

Figure 3.224: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.225: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).

CAUTION

Check to be sure all bystanders have cleared the area.

Figure 3.226: Functions

7. Press SELECT (D) until ACTIVATE REEL F/A is displayed on the upper line.
   - FORE/AFT is displayed on the lower line.
8. Verify reel fore-aft is functioning properly.
   a. Press and hold left arrow (B) to move reel **forward**. Press and hold right arrow (C) to move reel **backward**.
   b. Press PROGRAM (A) to exit programming mode or press SELECT (D) to proceed to next ACTIVATE FUNCTION.

Figure 3.227: Reel Fore-Aft

Activating the Hydraulic Purge Using the Cab Display Module (CDM)

The hydraulic purge removes air from the hydraulic pump system after it has been repaired or changed.

NOTE:

Engine **MUST** be running to perform this procedure.

1. Start the engine.
2. Press PROGRAM (A) and SELECT (B) on cab display module (CDM) to enter programming mode.
   - WINDROWER SETUP? is displayed on the upper line.

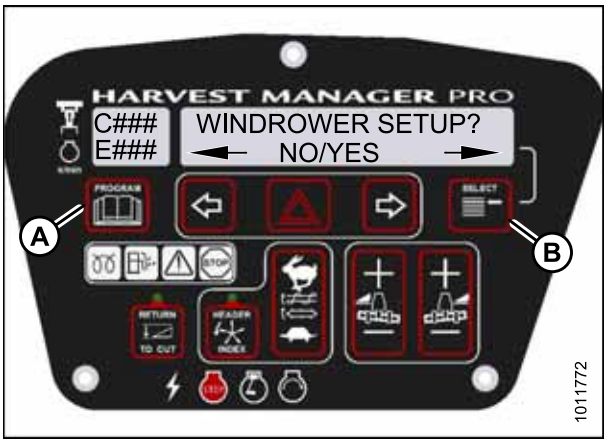


Figure 3.228: CDM Programming Buttons

3. Press SELECT (B) until DIAGNOSTIC MODE? is displayed in upper line.
   - NO/YES is displayed on the lower line.
4. Press right arrow (A) to select YES. Press SELECT (B).

Figure 3.229: Diagnostic Functions

5. Press SELECT (B) until ACTIVATE FUNCTIONS? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
6. Press right arrow (A) to select YES. Press SELECT (B).
   - ACTIVATE HEADER HT is displayed on the upper line.
   - DOWN/UP is displayed on the lower line.

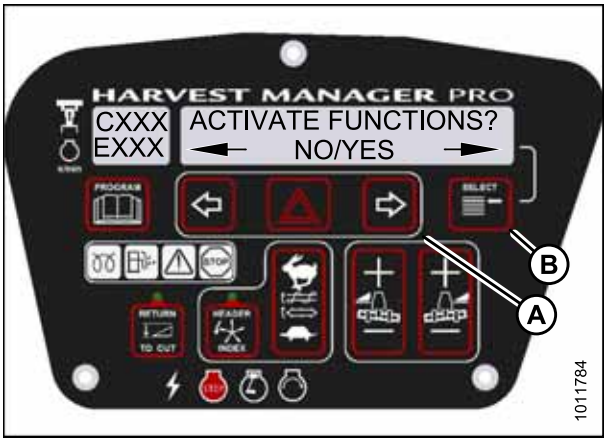


Figure 3.230: Functions

7. Press SELECT (B) until ACTIVATE HYD PURGE? is displayed on the upper line.
   - NO/YES is displayed on the lower line.
8. Press right arrow (A) to select YES. Press SELECT (B).
   - TO ACTIVATE PURGE is displayed on the upper line.
   - PRESS AND HOLD is displayed on the lower line.

   NOTE:

   Holding the right arrow (A) activates a timed purge cycle. The CDM will jump to the exit menu if the arrow is released before the end of the timed cycle.

Figure 3.231: Hydraulic Purge

CAUTION

Check to be sure all bystanders have cleared the area.

9. Press and hold right arrow (A) to activate purge cycle.
   - PURGE CYCLE STARTED will display on the upper line.
10. When PURGE CYCLE ENDED is displayed release right arrow (A).
    - NO EXIT YES is displayed on the lower line.
11. Press right arrow to select YES. Press SELECT.
12. Press PROGRAM to exit programming mode or press SELECT to proceed to next ACTIVATE FUNCTION.

Figure 3.232: Hydraulic Purge Cycle

3.18.15 Engine Error Codes

To assist the Operator or Technician in locating a specific problem with engine operation, the cab display module (CDM) displays error codes when there is a fault with one of the several sensors that monitor and control engine operation. For an explanation of an engine error code, refer to *8.4 Engine Error Codes, page 467*.

3.18.16 Cab Display Module (CDM) and Windrower Control Module (WCM) Fault Codes

To assist the Operator or Technician in locating a specific problem with the windrower, the CDM displays fault codes when there is a fault with one of the sensors that monitor and control windrower operation. For an explanation of fault code, refer to *8.7.1 Cab Display Module (CDM) Error Codes, page 499*.

4 Operation

4.1 Owner/Operator Responsibilities

CAUTION

- **It is your responsibility to read and understand this manual completely before operating the windrower. Contact your Dealer if an instruction is not clear to you.**
- **Follow all safety messages in the manual and on safety signs on the machine.**
- **Remember that YOU are the key to safety. Good safety practices protect you and the people around you.**
- **Before allowing anyone to operate the windrower, 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 every year.**
- **Be alert for other Operators not using recommended procedures or not following safety precautions. Correct these mistakes immediately, before an accident occurs.**
- **Do NOT modify the machine. Unauthorized modifications may impair the function and/or safety and affect machine life.**
- **The safety information given in this manual does NOT replace safety codes, insurance needs, or laws governing your area. Be sure your machine meets the standards set by these regulations.**

4.2 Symbol Definitions

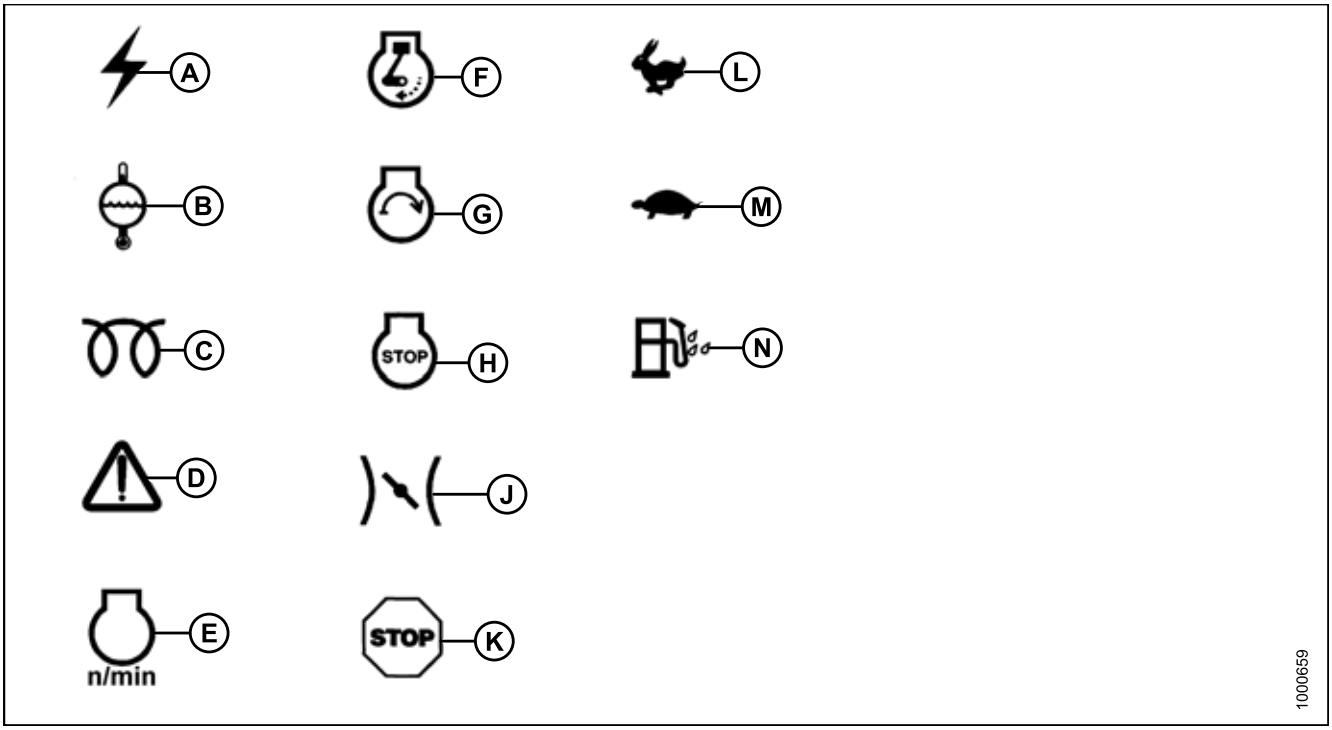
The following symbols are used to depict functions or reactions of the various instruments and controls.

Learn the meaning of these symbols before operating the windrower.

4.2.1 Engine Functions

These are the symbols that are used on the console.

Figure 4.1: Engine Function Symbols

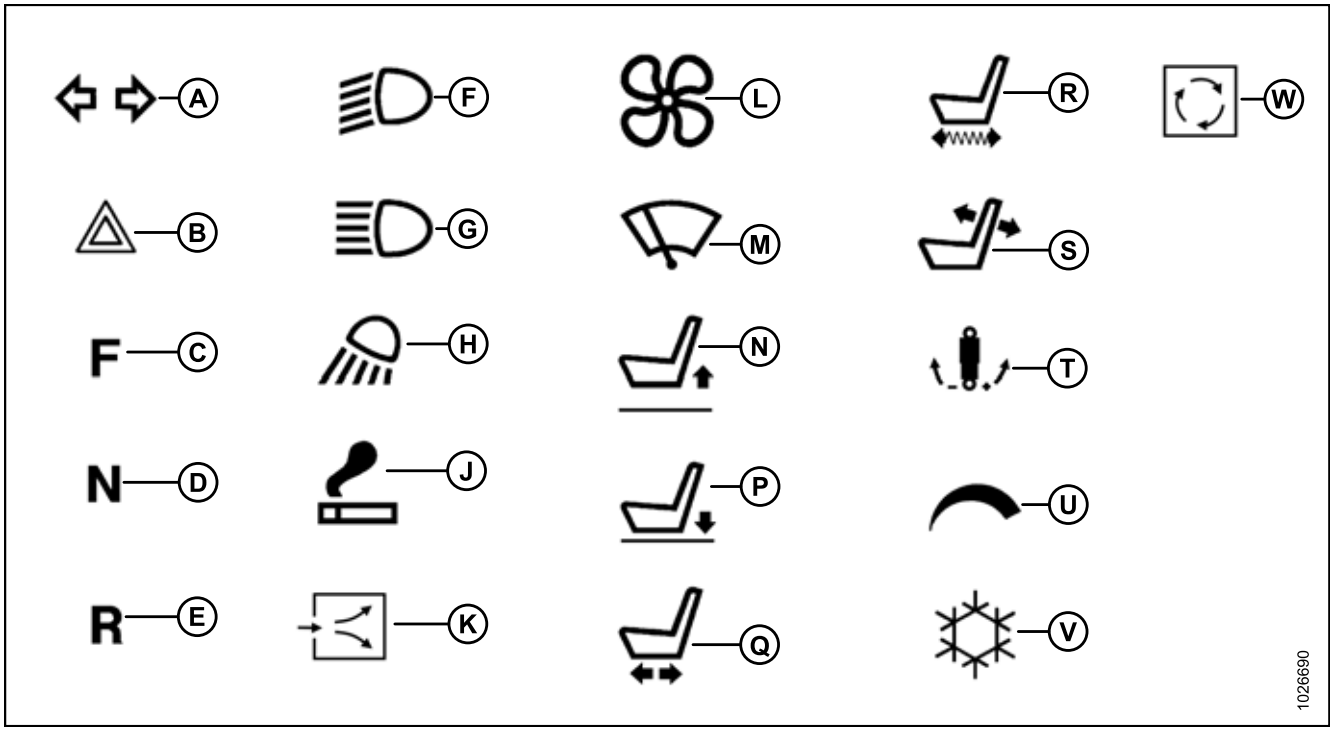


A - Electrical Power – Accessories
B - Engine Coolant Temperature
C - Engine Glow Plugs
D - Engine Malfunction
E - Engine rpm
F - Engine Run
G - Engine Start
H - Engine Stop
J - Engine Throttle
K - Engine Urgent Stop
L - Fast
M - Slow
N - Water in Fuel

4.2.2 Windrower Operating Symbols

These are the symbols used on the console for windrower operation.

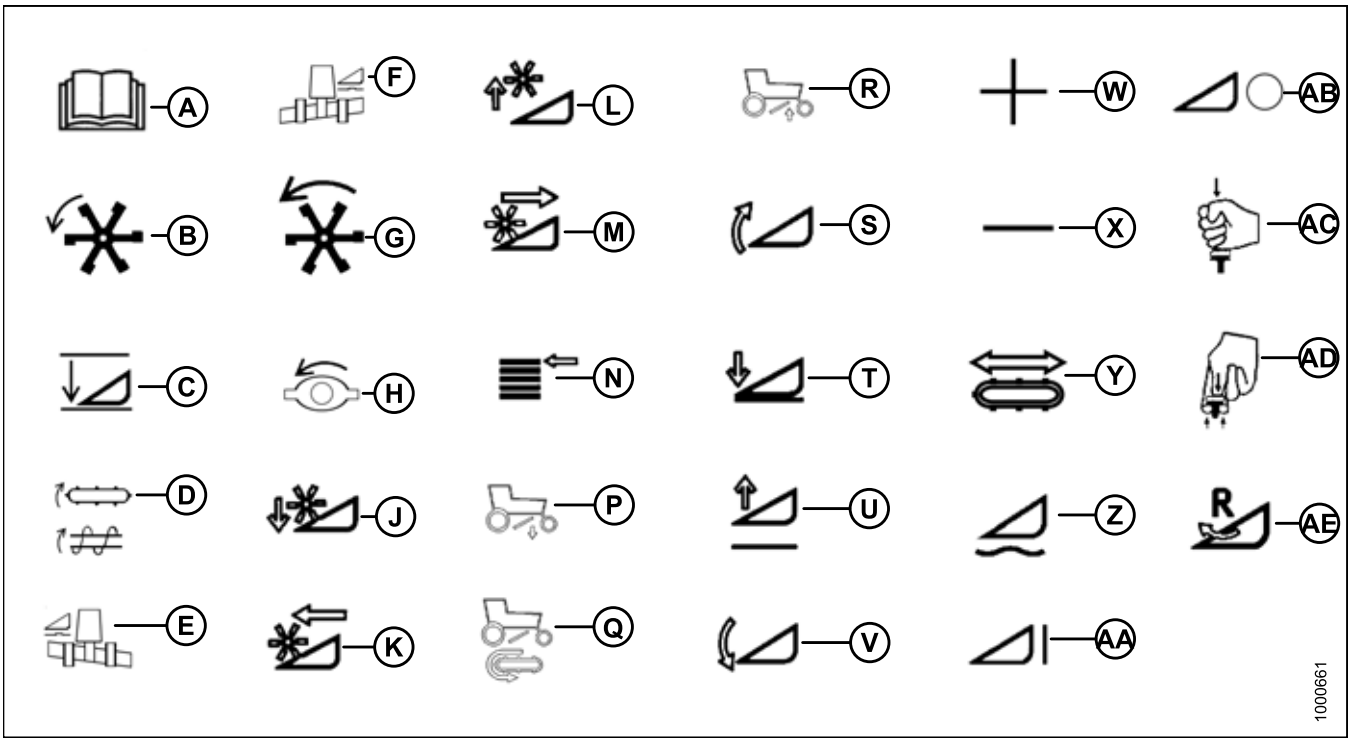
Figure 4.2: Windrower Operating Symbols



A - Turn Signals
B - Hazard Warning Lights
C - Forward
D - Neutral
E - Reverse
F - Headlights Low Beam
G - Headlights High Beam
H - Work Light
J - Lighter
K - Fresh Air
L - Blower
M - Windshield Wiper
N - Seat Height Up
P - Seat Height Down
Q - Seat Fore and Aft
R - Seat Fore Aft Isolator
S - Seat Back Fore and Aft
T - Seat Ride Damping
U - Cab Temperature Control
V - Air Conditioning
W - Recirculate

4.2.3 Header Functions

Figure 4.3: Header Function Symbols



A - Program
B - Header Index
C - Return to Cut
D - Conveyor/Auger Speed
E - Float Left
F - Float Right
G - Reel Speed
H - Disc Speed
J - Reel Down
K - Reel Forward
L - Reel Up
M - Reel Rearward
N - Display Select
P - DWA Down
Q - DWA Draper Speed
R - DWA Up
S - Header Tilt Up
T - Header Down
U - Header Up
V - Header Tilt Down
W - Increase
X - Decrease
Y - Deck Shift
Z - Float
AA - Header Engage
AB - Header Disengage
AC - Push Down Header Disengage
AD - Pull Up Header Engage
AE - Header Reverse

4.3 Operating the Windrower

4.3.1 Operational Safety

CAUTION

Follow these safety precautions:

- **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. Don't take chances.**
- **You may need:**
  - **a hard hat**
  - **protective glasses or goggles**
  - **heavy gloves**
  - **respirator or filter mask**
  - **wet weather gear**
- **Protect against noise. Wear a suitable hearing protective device such as ear muffs or ear plugs to protect against objectionable or uncomfortable loud noises.**
- **Follow all safety and operational instructions given in your operator's manuals. If you do not have a header 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.**
- **Check for excessive vibration and unusual noises. If there is any indication of trouble, shut down and inspect the machine. Follow proper shutdown procedure. Refer to *Shutting down the Engine, page 171*.**
- **Operate only in daylight or good artificial light.**

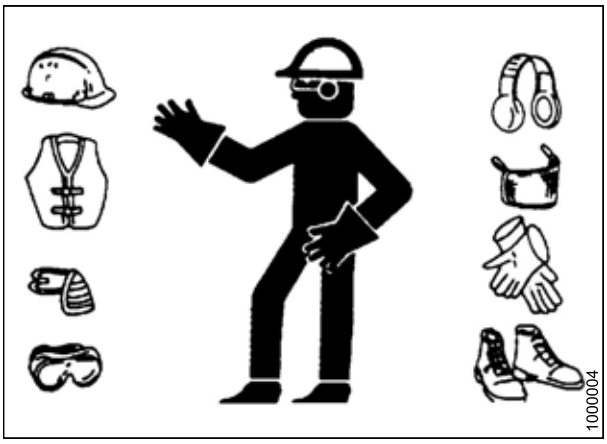


Figure 4.4: Safety Equipment

Figure 4.5: Safety Equipment

4.3.2 Break-In Period

The windrower is ready for normal operation. However, there are several items to check and watch out for during the first 150 hours.

IMPORTANT:

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

DANGER

Before investigating an unusual sound or attempting to correct a problem, place ground speed lever (GSL) in N-DETENT, shut off engine, and remove key.

In addition to the following, check the items specified in *5.12.1 Maintenance Schedule/Record, page 422*:

- Operate engine at moderate load and avoid extremely heavy or light loading for longer than 5 minutes.
- Avoid unnecessary idling. If engine will be idling longer than 5 minutes after reaching operating temperature, turn key OFF to stop engine.
- Check engine oil level frequently. Watch for any signs of leakage. If oil must be added, refer to *5.7.3 Checking Engine Oil Level, page 315*.

  NOTE:

  During the break-in period, a higher than usual oil consumption should be considered normal.

  NOTE:

  If windrower must be driven in cold weather (below freezing), let engine idle for 3 minutes, and then operate at moderate speed until oil has warmed up.
- Watch coolant gauge in cab for temperature rising beyond normal operating range. Check that coolant level at reserve tank (mounted next to radiator) stays between HOT and COLD marks on tank.
  Refer to *5.7.9 Engine Cooling System, page 342*. If over-heating problems occur, check for coolant leaks.

4.3.3 Preseason Checks / Annual Service

CAUTION

- **Review the this operator's manual to refresh your memory on safety and operating recommendations.**
- **Review all safety signs and other decals on the windrower and note hazard areas.**
- **Be sure all shields and guards are properly installed and secured. Never alter or remove safety equipment.**
- **Be sure you understand and have practiced safe use of all controls. Know the capacity and operating characteristics of the machine.**
- **Store a properly stocked first aid kit and charged fire extinguisher on the windrower.**

1. Perform the following checks:
   a. Drain off excess hydraulic oil added for storage. Refer to *5.10.3 Changing the Hydraulic Oil, page 398*.
   b. Remove plastic bags and/or tape from all sealed openings (air cleaner intake, exhaust pipe, fuel tank).
   c. Charge battery and install. Be sure terminals are clean and cables are connected securely.
   d. If the diesel exhaust fluid (DEF) tank was drained for storage, ensure the DEF tank drain plug is tight and add DEF fluid to the tank.
   e. Adjust tension on air conditioning (A/C) compressor belt. Refer to *Tensioning Air Conditioner (A/C) Compressor Belt, page 353*.
   f. Distribute A/C refrigerant by cycling A/C switch. Refer to *Air Conditioning (A/C) Compressor Coolant Cycling, page 167*.
   g. Check the entire A/C system for leakage at the beginning of each season.
2. Perform annual maintenance. Refer to *5.12 Maintenance Schedule, page 422*.

Air Conditioning (A/C) Compressor Coolant Cycling

IMPORTANT:

Perform the following steps whenever the machine is first started after storage for more than one week:

1. Turn blower switch (A) to the first position, turn TEMPERATURE control switch (D) to maximum heating, and A/C control switch (B) to OFF.
2. Start the engine, and operate at low idle until the engine is warm.
3. Click A/C switch (B) from OFF to ON for 1 second, then back to OFF for 5–10 seconds. Repeat this step ten times.

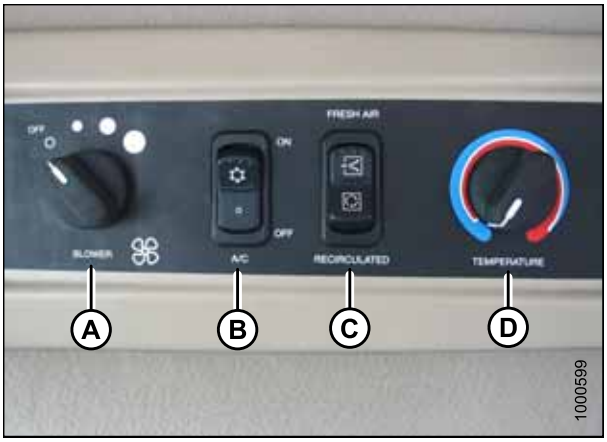


Figure 4.6: Climate Control

A - Blower Switch
B - Air Conditioning Switch
C - Outside Air Switch
D - Temperature Control

4.3.4 Daily Checks and Maintenance

Perform the following checks and recommended maintenance before operating the windrower every day:

1. Check the machine for leaks.

   NOTE:

   Use proper procedure when searching for pressurized fluid leaks. Refer to *5.10.7 Hoses and Lines, page 406*.
2. Check for missing or broken parts.
3. Clean the windows and mirrors to ensure good visibility in all directions. Stand on the platform to access the rear window. Hold onto the handholds on the cab front corners and stand on the header anti-slip strips to wash the front window.
4. Clean all lights and reflective surfaces to maintain visibility to others.
5. Perform daily maintenance. Refer to *5.12 Maintenance Schedule, page 422*.

4.3.5 Engine Operation

Starting the Engine

Carefully review the following topic before attempting to start the engine. It contains important information about Operator safety and the engine ignition system.

DANGER

- **Avoid possible injury or death from a runaway machine.**
- **This machine has safety devices which allow the engine to start only when the ground speed lever is in N-DETENT, the steering wheel is locked in the NEUTRAL position, and the header drive switch is in the OFF position. Under no circumstances are these devices to be deliberately rewired or misadjusted so that the engine can be started with controls out of NEUTRAL.**
- **Do NOT start engine by shorting across starter or starter relay terminals. Machine will start with drive engaged and move if normal starting circuitry is bypassed.**
- **Start engine only from operator's seat with controls in NEUTRAL. NEVER start engine while standing on ground. Never try to start engine with someone under or near machine.**
- **Before starting engine, be sure there is plenty of ventilation to avoid asphyxiation.**

WARNING

If starter engages with steering wheel unlocked, ground speed lever out of NEUTRAL, or header clutch engaged, DO NOT START ENGINE. Contact your Dealer.

IMPORTANT:

Do **NOT** tow machine to start the engine. Damage to hydrostatic drives will result.

1. The battery main disconnect switch (A) is located on the right frame rail, behind the maintenance platform, and can be accessed by moving the platform. Ensure switch is in the POWER ON position.

WARNING

Before starting engine, fasten your seat belt and ensure trainer's seat belt is used if seat is occupied. Seat belts improve safety if used and maintained properly.

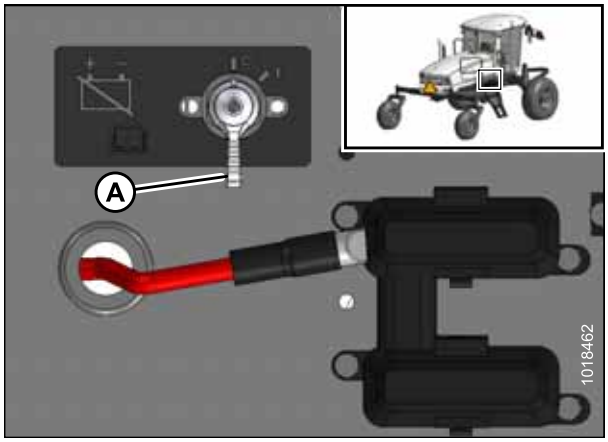


Figure 4.7: Battery Disconnect Switch

2. Ensure lock (A) at the base of the steering column is engaged at cab-forward or engine-forward position.
3. Move ground speed lever (GSL) (B) into N-DETENT.
4. Turn steering wheel until it locks. It may be possible to move the steering wheel slightly in the locked position.

   IMPORTANT:

   Do **NOT** attempt to force the wheel out of locked position as damage to the traction system may occur.
5. Fasten seat belt.
6. Push HEADER DRIVE switch (C) to ensure it is OFF.

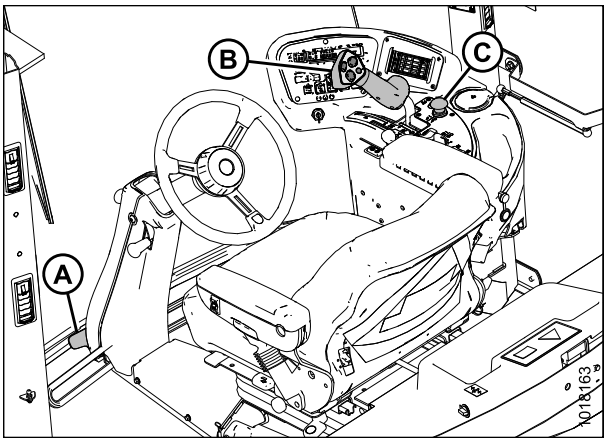


Figure 4.8: Operator Controls

CAUTION

Check to be sure all bystanders have cleared the area.

7. Set throttle (A) to START position—fully back.
8. Sound horn three times.
9. Turn ignition key (B) to RUN position. A single loud tone sounds, engine warning lights illuminate as a self-test, and cab display module (CDM) displays HEADER DISENGAGED and IN PARK.
10. Turn ignition key (B) to START position until engine starts, and then release key. CDM displays programmed header data for 5 seconds if attached, and then returns to previous display.

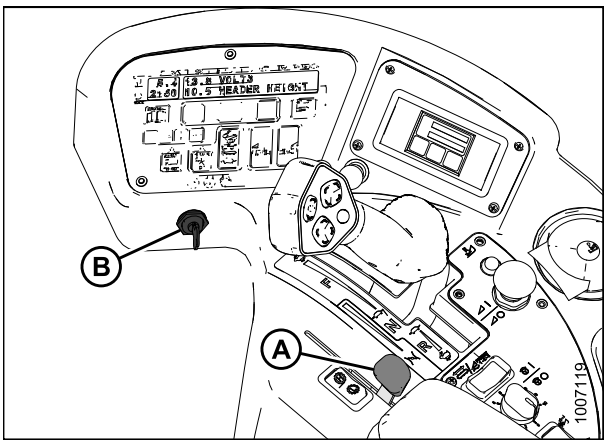


Figure 4.9: Operator Console

IMPORTANT:

The cab display module (CDM) provide important information about machine operation and condition. Familiarize yourself with the CDM's information screen. Refer to *3.18 Cab Display Module (CDM), page 79*.

IMPORTANT:

- Do **NOT** operate starter for longer than 15 seconds at a time.
- If engine does not start, wait at least 2 minutes before trying again.
- After the third 15 second crank attempt, allow solenoid to cool for 10 minutes before further cranking attempts. If engine still does not start, refer to *7.1 Engine Troubleshooting, page 433*.
- Do **NOT** operate engine above 1500 rpm until engine temperature gauge is above 40°C (100°F).

Cold Start

Engine temperature below 5°C (40°F)

WARNING

If starter engages with steering wheel unlocked, ground speed lever (GSL) out of NEUTRAL, or header clutch engaged, DO NOT START ENGINE. See your Dealer.

1. Set throttle (A) to START position—fully back (low idle).
2. Turn ignition key (B) to RUN.

   Grid heater light (C) on CDM will cycle ON–OFF–ON after two seconds for a preset length of time. The operating period for the glow plug light will change depending on engine temperature.
3. Sound horn three times.
4. When grid heater light (C) goes out, turn ignition key to START, and crank engine until it starts. Leave throttle (A) at IDLE.
5. If engine fails to start, repeat procedure beginning with Step *2, page 170*.

   NOTE:

   Engine will cycle through a period where it appears to labour.

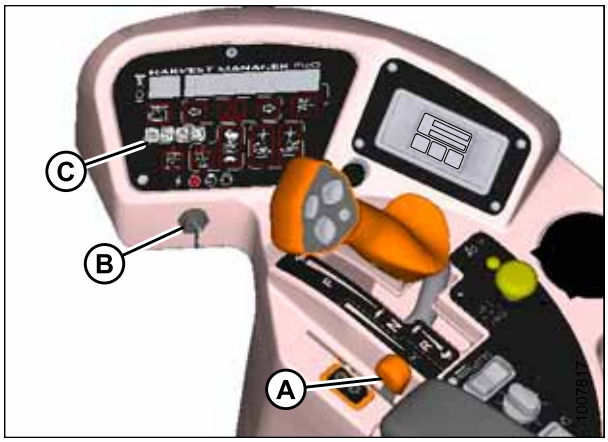


Figure 4.10: Operator Controls

IMPORTANT:

Do **NOT** operate engine above 1500 rpm until engine temperature gauge is above 40°C (100°F).

Engine Warm-Up

Allow engine to run with throttle lever (A) at or near low-idle position until temperature reaches approximately 40°C (100°F).

NOTE:

Scroll through cab display module (CDM) for engine temperature. Refer to *Engine Temperature, page 171*.

Figure 4.11: Operator Console

Engine Intermediate Speed Control (ISC)

The engine operating speed can be programmed to enable the windrower to operate at reduced engine rpm (that is, 1900, 2050, or 2200 rpm) without significantly affecting the ground or header speeds. The default setting is 2200 rpm or the last selected rpm.

Engine ISC is useful when operating loads are reduced such as in light crop conditions that do not require the maximum engine rpm. Reduced engine speed lowers fuel consumption, noise levels, and exhaust emissions in addition to reducing engine wear.

The programmed engine speed is activated when the header is engaged.

Programming instructions are provided in *3.18.6 Cab Display Module (CDM) Configuration, page 93*.

Shutting down the Engine

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

IMPORTANT:

Before stopping engine, run at low idle for approximately 5 minutes to cool hot engine parts (and allow turbocharger to slow down while engine oil pressure is available).

1. Lower header.
2. Place ground speed lever (GSL) (B) into N-DETENT.
3. Lock steering wheel.
4. Turn ignition key (A) counterclockwise to OFF position.

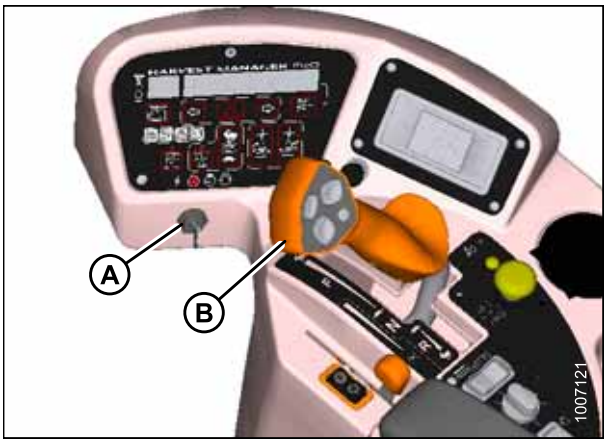


Figure 4.12: Operator Console

Engine Temperature

The engine temperature is displayed on the cab display module (CDM) (A) when selected with the SELECT button (B) on the ground speed lever (GSL) handle or the SELECT switch (C) on the CDM.

The normal engine operating temperature range is 82–104°C (180–220°F).

If the temperature exceeds 104°C (220°F), an ongoing intermittent tone will be heard and the CDM (A) will flash ENGINE TEMP. Stop the engine immediately and determine cause. The tone will stop and the CDM (A) will return to normal when the temperature drops below 102°C (215°F).

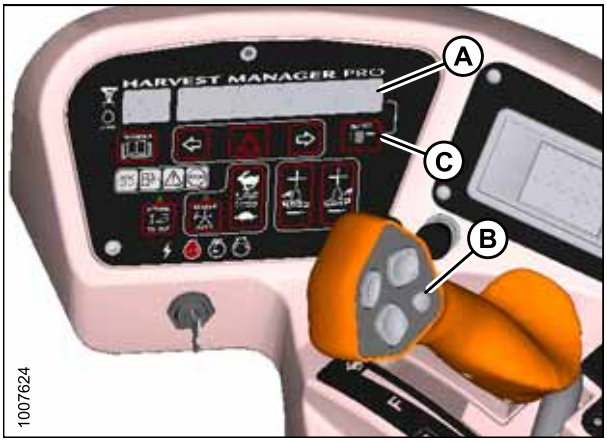


Figure 4.13: Operator Console

Engine Oil Pressure

The nominal engine oil pressure is 69 kPa (10 psi) at low idle and 380 kPa (55.1 psi) at maximum rated speed.

If the oil pressure drops below the preset level of 52 kPa (7.5 psi), the cab display module (CDM) flashes an error code and error message.

If the STOP ENGINE light illuminates, stop the engine **IMMEDIATELY** and investigate.

If the yellow CAUTION light illuminates, you may continue operations and investigate later, but you are **STRONGLY** advised to monitor the situation carefully.

Cab Display Module (CDM) Voltage Display

The electrical system voltage is displayed on the cab display module (CDM) when selected with the SELECT button on the ground speed lever (GSL) handle or the SELECT switch on the CDM. The display indicates the condition of the battery and alternator.

Ignition	Engine	Reading	Indicated Condition
ON	Running	13.8–15.0	Normal
		> 16.0[16]	Regulator out of adjustment
		< 12.5[16]	Alternator not working or regulator out of adjustment
	Shut down	12.0	Battery normal

Engine Warning Lights

There are four engine warning lights that illuminate if abnormal conditions occur while the engine is running. The engine warning lights should **NOT** be illuminated under normal operating conditions. For more information, refer to *Engine Warning Lights, page 89*.

4.3.6 Exhaust System Cleaning

The exhaust aftertreatment system uses diesel exhaust fluid (DEF) and selective catalyst reduction (SCR) technology to reduce the emission of nitrogen oxides (NOx). The process involves injecting DEF (a nitrogenous compound which decomposes into ammonia) into the exhaust over a catalyst. The ammonia reacts with NOx, producing harmless nitrogen and water.

Automatic exhaust system cleaning events maintain the performance of the aftertreatment system by increasing exhaust temperatures in order to remove the buildup of crystallized DEF. Automatic cleaning occurs any time during machine operation as long as the INHIBIT SCR CONDITIONING switch is OFF. Turn on the INHIBIT SCR CONDITIONING switch if the environment is not suitable for high exhaust temperatures (e.g., inside a building). The INHIBIT SCR CONDITIONING switch is intended as a temporary measure. If the INHIBIT switch is left on for an extended period, the engine will derate until manual SCR conditioning is performed.

Activate the MANUAL SCR CONDITIONING exhaust system cleaning if the automatic exhaust system cleaning was deactivated during normal operation. Engine speed may vary between 1000 and 1400 rpm during manual exhaust system cleaning.

16. Display flashes voltage reading with single loud tone. Repeats every 30 minutes until condition is fixed.

4.3.7 Driving the Windrower

Review the following list of dangers, warnings, and cautions before operating the windrower for the first time, or when training new operators.

DANGER

- **NEVER move the ground speed lever or steering wheel until you are sure all bystanders have cleared the area.**
- **Make sure area is clear before making turns, as the ends of a header travel in a large arc.**
- **Check the operation of all controls in a safe, clear area before starting work.**
- **Understand the capacity and operating characteristics of your machine.**
- **Do NOT allow riders in or on the machine.**
- **Do NOT operate unless seated in the operator's position.**
- **Do NOT attempt to get on or off a moving windrower.**
- **AVOID sudden starts and stops.**
- **AVOID inclines, ditches, and fences.**
- **Do NOT rapidly accelerate or decelerate when turning.**
- **REDUCE your speed before turning, crossing slopes, or travelling over rough ground.**
- **Do NOT allow anyone to stand behind the machine while operating. Foreign objects may be forcibly ejected.**

WARNING

Seat belts can help ensure your safety when properly used and maintained.

- **Before starting the engine, fasten your seat belt, and ensure that the training seat occupant’s seat belt is securely fastened.**
- **Never wear a seat belt loosely or with slack in the belt system. Never wear the belt in a twisted condition or pinched between the seat structural members.**

WARNING

Avoid driving the machine with header removed. Removing header decreases the weight on drive wheels, reducing steering control. If you must drive the machine with header removed, or without a MacDon weight system.

- **Use transmission low speed range, do NOT exceed 1500 rpm engine speed, and avoid loose gravel and slopes.**
- **Never use windrower as a towing vehicle when header is removed, except as instructed in . There is insufficient weight on the drive wheels to provide steering control.**
- **If control of machine is lost, immediately pull ground speed lever (GSL) to NEUTRAL.**
- **Be aware that cab structure will NOT withstand a roll-over. Because of windrower shape characteristics, a roll-over protected (ROPS) cab is not required.**

WARNING

When travelling on steep slopes:

- **Lower header and reduce speed.**
- **Move GROUND SPEED RANGE switch to L (low range).**
- **If the ground speed is greater than or equal to 40 km/h (25 mph), the CDM will display a warning message (SLOW DOWN) with an audible alert. Move GSL closer to NEUTRAL to reduce speed.**

CAUTION

Hydrostatic Steering control is different from conventional steering mechanisms:

- **Hydrostatic steering is more sensitive than mechanical steering. Do NOT make abrupt changes in steering direction.**
- **Steering is opposite to normal when driving in reverse.**
- **With the engine running, moving the ground speed lever out of N-DETENT unlocks steering. Any movement of steering wheel will then cause the machine to move, even if the ground speed lever has not been moved forward or rearward from the NEUTRAL position.**
- **The brakes are only on when the ground speed lever (GSL) is in N-DETENT and the steering wheel is centered and locked.**

Entering and Exiting the Windrower

CAUTION

To prevent slipping and possible injury, ALWAYS face the windrower and use the hand rail when dismounting (or mounting). NEVER attempt to get on or off a moving windrower. Before leaving the operator's seat for any reason:

- **Park on a flat, level surface with the ground speed lever in N-DETENT position and the steering wheel in locked position (centered). Wait for the CDM to beep and display an “In Park” message to confirm the park brakes have engaged.**
- **Fully lower header and reel.**
- **Disengage header drives.**
- **To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key from ignition.**
- **Turn off lights unless required for inspection purposes.**
- **Release seat belt.**
- **Turn off wipers.**
- **Raise armrest and steering wheel for easier exit and re-entry.**
- **Lock the cab door when leaving the windrower unattended. (When the door is locked, it can still be opened from inside the cab.)**

Swing-away platforms and stairs (A) are provided on both sides of the windrower to accommodate cab-forward and engine-forward access to the operator's station, as well as several maintenance tasks.

The left cab-forward side platform is shown in the rearward (cab-forward) position.

Two doors (B) are provided for cab entry and exit in either cab-forward mode or engine-forward mode. Enter the cab using the door opposite the operator's console.

NOTE:

When the engine is shut down, rear field lights turn on for 60 seconds to illuminate the platform and stairs.

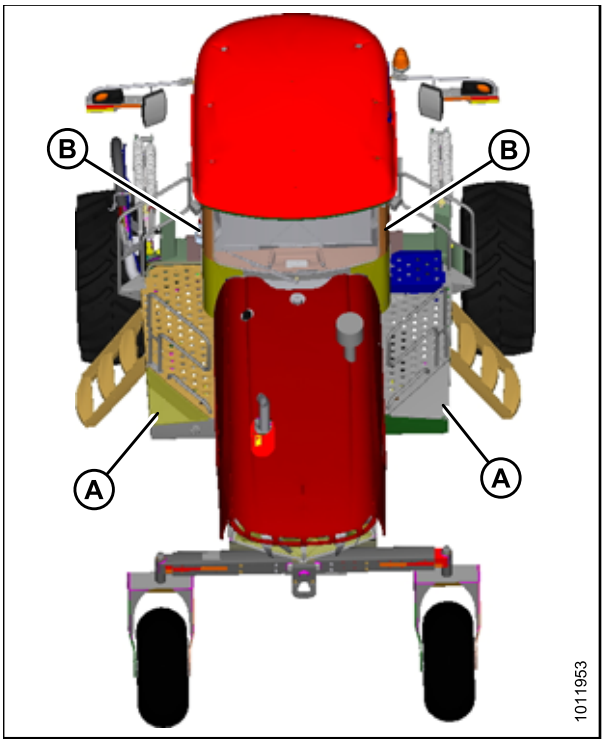


Figure 4.14: Platforms and Doors

Driving Forward in Cab-Forward Mode

CAUTION

Operate both steering wheel and ground speed lever (GSL) slowly for familiarization. Avoid the common tendency of new Operators to oversteer.

WARNING

Do NOT drive windrower on road in cab-forward configuration, unless it is equipped with the proper lighting and markings for cab-forward road travel.

In cab-forward mode, the operator's station is facing away from the engine. If necessary, swivel operator's seat to cab-forward position as follows:

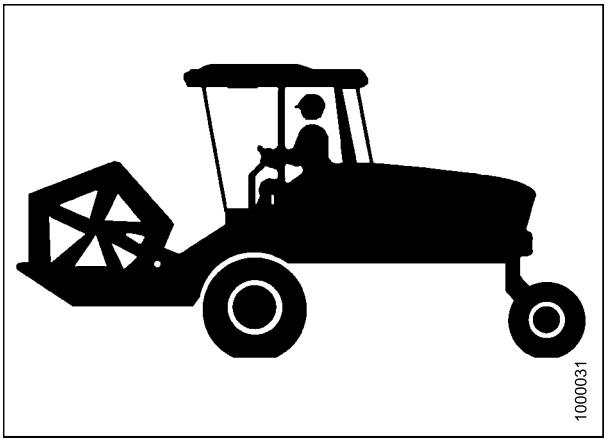


Figure 4.15: Cab-Forward Mode

1. Place ground speed lever (GSL) (A) in N-DETENT. Engine can be running.

   IMPORTANT:

   If GSL is NOT in N-DETENT, damage to the GSL cable may result when swivelling operator's station.

2. Pull up on knob (B) and hold to release latch (C) at base of steering column.
3. Turn steering wheel counterclockwise to pivot operator's station clockwise 180° until pin engages latch to secure operator's station in new position.
4. Ensure seat belt is fastened.
5. Start the engine if not running. Refer to *Starting the Engine, page 168*.
6. There are two cab-forward speed ranges. Set GROUND SPEED RANGE switch (A) to either **H** (0–25.7 km/h [16 mph]), or **L** (0–17.7 km/h [11 mph]).
7. Slowly push throttle (B) to full forward (operating speed). The cab display module (CDM) should display 2320–2350 rpm at location (C).

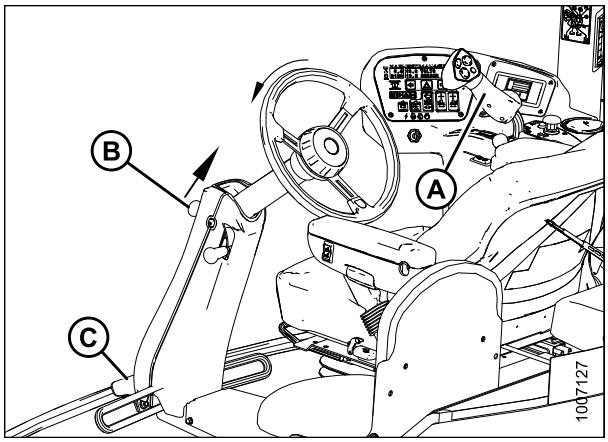


Figure 4.16: Operator Console

CAUTION

Check again to be sure all bystanders have cleared the area.

8. Move the GSL (E) out of N-DETENT and slowly forward to desired speed which will be displayed at location (D).

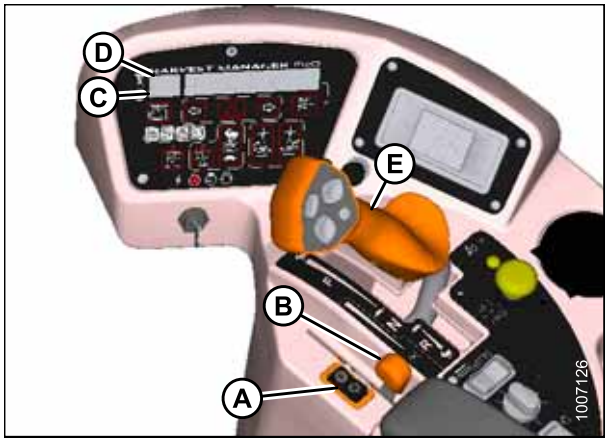


Figure 4.17: Operator Console

Driving Reverse in Cab-Forward Mode

WARNING

Back up slowly. Steering is opposite to normal when reversing. Hold steering wheel at the bottom and turn wheel in direction you want the rear (cab-forward) of the machine to travel.

1. Move GROUND SPEED RANGE switch (A) to **L** (low-range position).
2. Move throttle lever (B) to a mid-range position.

   NOTE:

   Steering will be less sensitive in low-speed range; reduced engine speed.

CAUTION

Check again to be sure all bystanders have cleared the area.

3. Move the ground speed lever (GSL) rearward to desired speed.
4. Steer as shown.

Figure 4.18: Operator's Console

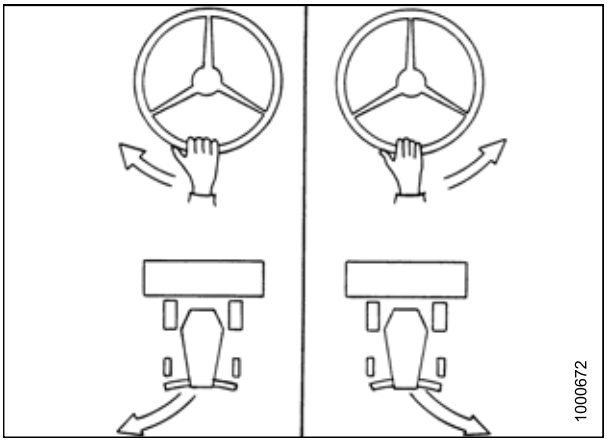


Figure 4.19: Cab-Forward Mode

Driving Forward in Engine-Forward Mode

In the engine-forward mode, the operator's station is facing toward the engine. If necessary, swivel operator's station to engine-forward position as follows:

Figure 4.20: Engine-Forward – Seat Faces Engine

1. Place ground speed lever (GSL) (A) in N-DETENT and lock steering wheel. Engine can be running.

   IMPORTANT:

   If GSL is **NOT** in N-DETENT, damage to the GSL cable may result when swivelling operator's station.

2. Pull up on knob (B) and hold to release latch (C) at base of steering column.
3. Turn steering wheel clockwise to pivot operator's station counterclockwise 180° until pin engages latch to secure operator's station in new position.
4. Start the engine if not running.

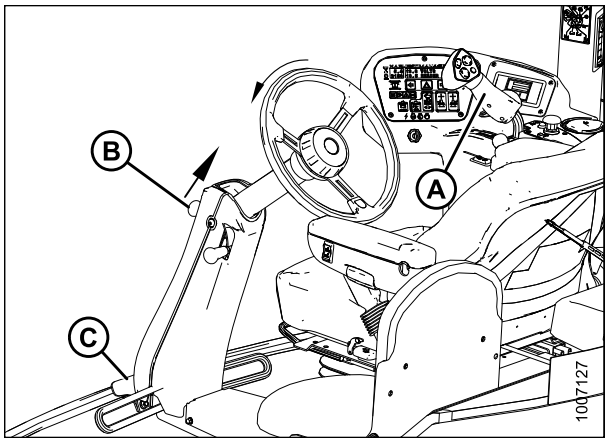


Figure 4.21: Engine-Forward – Seat Faces Engine

5. Set GROUND SPEED RANGE switch (A) to **H** for road speed (0–37 km/h [23 mph]). Cab display module (CDM) will display ROAD GEAR at location (F) and an alarm will briefly sound.
6. Slowly push throttle (B) to full forward (operating speed). CDM should display 2320–2350 rpm at location (C).

CAUTION

Check to be sure all bystanders have cleared the area.

7. Slowly move the GSL (E) forward to desired speed which will be displayed at location (D).

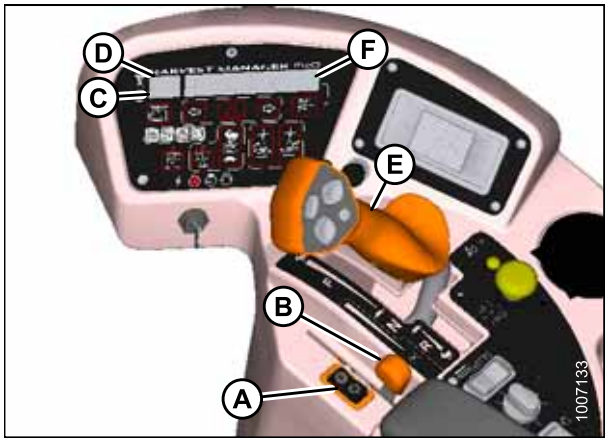


Figure 4.22: Operator Console

CAUTION

Operate both steering wheel and ground speed lever slowly while becoming familiar with the machine. Remember that steering is more sensitive when speed-range control is in high road speed position. Avoid the common tendency of new Operators to oversteer.

8. If more tractive (lugging) power is required (for example, when driving up a ramp, up a hill, or up out of a ditch):
   a. Move the GSL (E) closer to NEUTRAL.
   b. Switch speed-range control (A) to **L** (low range).
9. Once the lugging condition no longer exists:
   a. Set GSL (E) to **NOT MORE THAN HALF** maximum forward speed.
   b. Move speed-range switch (A) to **H** (high range). Steering is more sensitive in this speed range.

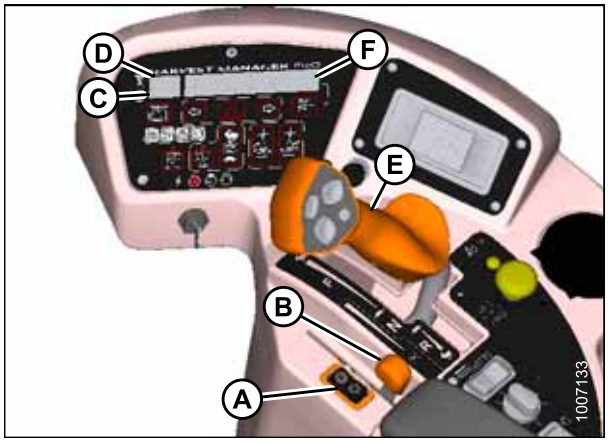


Figure 4.23: Operator Console

Driving in Reverse in Engine-Forward Mode

WARNING

Back up slowly. Steering is opposite to normal when reversing. Hold steering wheel at the bottom and turn wheel in direction you want the rear (cab-forward) of the machine to travel.

1. Move speed-range switch (A) to **L** (low-range position).
2. Move throttle lever (B) to a mid-range position.

   NOTE:

   Reversing in low-speed range and at reduced engine speed is recommended since steering will be less sensitive than at higher speed settings.

CAUTION

Check to be sure all bystanders have cleared the area.

3. Move the ground speed lever (GSL) (C) rearward to desired speed.
4. Steer as shown.

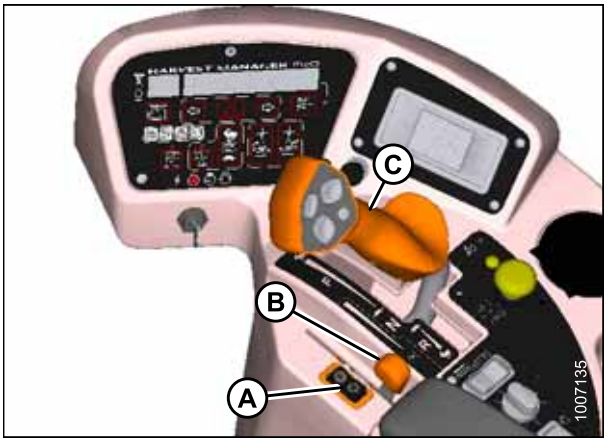


Figure 4.24: Operator Console

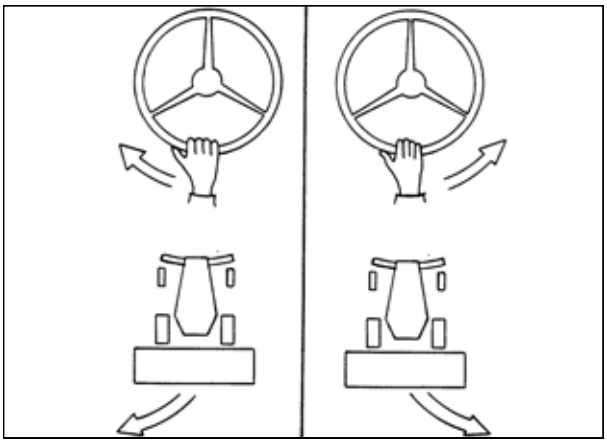


Figure 4.25: Steering the Windrower

Spin Turning

Hydrostatic steering provides significantly more maneuverability than mechanical steering.

CAUTION

Be sure area is clear before making turns. Although windrower pivots on the spot, the ends of the header travel faster and in a large arc.

1. Move the ground speed lever (GSL) (A) out of N-DETENT towards the seat and hold.
2. Slowly turn the steering wheel in the desired direction of turn. The windrower will pivot between the drive wheels.
3. To increase the turn radius, slowly move the GSL away from NEUTRAL. Remember that this will increase ground speed as well.
4. To stop the turn, slowly turn the steering wheel back to its centered position.

Figure 4.26: Operator Console

Stopping

WARNING

Do NOT move ground speed lever rapidly back to NEUTRAL. You may be thrown forward by a sudden stop and wheels may skid, reducing steering control. Always wear a seat belt when operating windrower.

CAUTION

Park on a flat, level surface with the ground speed lever in N-DETENT position and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

To stop the windrower:

1. **SLOWLY** return the ground speed lever (GSL) (A) to NEUTRAL and into N-DETENT.
2. Turn steering wheel until it locks.
3. Move throttle lever (B) to low idle position.

   NOTE:

   Avoid unnecessary idling. Stop engine if it will be idling for longer than 5 minutes.

   NOTE:

   Brakes are automatically engaged when steering wheel is locked in NEUTRAL position.

   IMPORTANT:

   Before stopping engine, run at low idle for approximately 5 minutes to cool hot engine parts (and allow turbocharger to slow down while engine oil pressure is available).
4. Turn ignition key counterclockwise to OFF position.

Figure 4.27: Operator Console

4.3.8 Adjusting Caster Tread Width

The rear casters can be adjusted to a narrow tread width to allow loading and shipping without having to remove them.

A narrow tread width also suits smaller headers by allowing more space to the uncut crop and provides more maneuverability around poles, irrigation inlets, or other obstacles.

A wider tread width is useful in heavy crops that produce large windrows so that runover is reduced.

WARNING

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

Adjust the caster tread width as follows:

1. Raise rear of windrower slightly so that most of the weight is off the casters, using a jack or other lifting device under the frame at location (A).

   NOTE:

   Lifting device should have a lifting capacity of at least 2270 kg (5000 lb.).

2. Remove six bolts (B) (four on backside, two on underside) and washers from left and right side of walking beam.

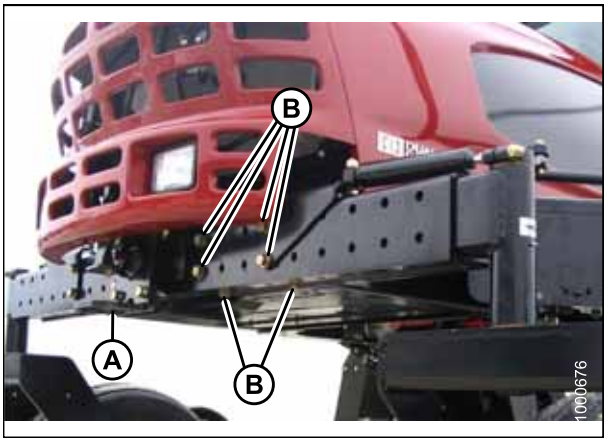


Figure 4.28: Caster Wheel Extensions

3. Slide extensions inboard or outboard equal amounts and align holes at desired location.

   NOTE:

   Use the caster wheels to assist in moving the extensions by rotating the caster until the wheel is parallel to the walking beam.

Figure 4.29: Caster Wheel Extensions

IMPORTANT:

Caster wheels must be equidistant (A) from center of windrower.

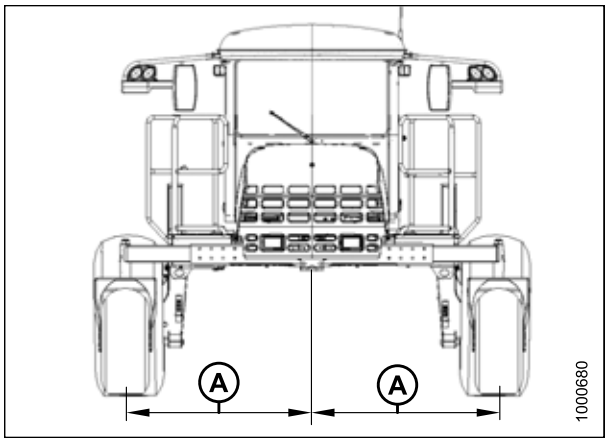


Figure 4.30: Adjustable Caster Wheels

4. Line up holes, then install shorter bottom bolts (B).
5. Position bracket (A) and install back bolts (C).
6. Tighten bolts as follows:
   a. Snug bottom bolts (B), then snug back bolts (C).
   b. Tighten and torque back bolts (C) to 447 Nm (330 lbf·ft).
   c. Tighten and torque bottom bolts (B) to 447 Nm (330 lbf·ft).
7. Lower windrower to ground.

IMPORTANT:

Torque bolts after first 5 and 10 hours of operation.

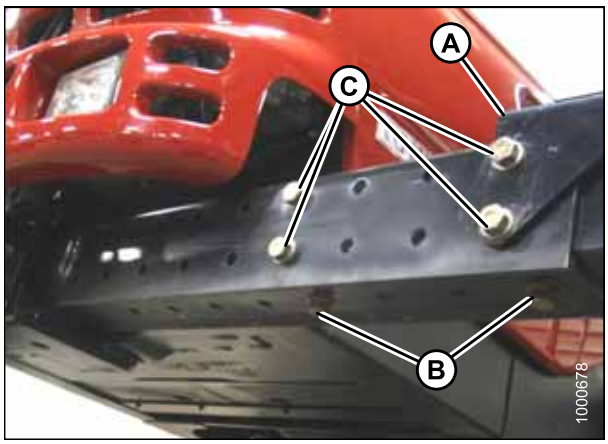


Figure 4.31: Caster Wheel Extensions

4.3.9 Transporting

Driving on the Road

The M155*E4* Self-Propelled Windrower is designed to be driven on the road with the engine facing forward to provide better visibility for the Operator and improved stability for the machine. The windrower can also be driven on the road in cab-forward mode, but at a reduced speed and under restricted conditions.

⚠ WARNING

Collision between windrower and other vehicles may result in injury or death.

⚠ WARNING

When driving windrower on public roadways:

- **Obey all highway traffic regulations in your area. Use pilot vehicles in front and rear of windrower if required by law.**
- **Use slow-moving vehicle emblem and flashing warning lights unless prohibited by law.**
- **If width of attached header impedes other vehicle traffic, remove header and install a MacDon approved weight box.**

WARNING

- **Do NOT drive windrower on the road in the cab-forward mode, unless the optional lighting and marking kit is installed, as lighting/reflector visibility will not be compliant with road regulations. Refer to *6.4.1 Lighting and Marking for Cab-Forward Road Travel, page 432*.**
- **Do NOT drive windrower on a road or highway at night or in conditions that reduce visibility, such as fog or rain. The width of the windrower may not be apparent under these conditions.**

CAUTION

Operate both steering wheel and ground speed lever slowly while becoming familiar with the machine. Remember that steering is more sensitive when speed-range control is in high road speed position. Avoid the common tendency of new Operators to oversteer.

CAUTION

Check local laws for width regulations and lighting and marking requirements before transporting on roads.

Before driving windrower on a roadway:

1. Ensure HEADER DRIVE switch (A) is pushed to OFF position (down).
2. Clean flashing amber lamps, red tail and head lamps, and check that they work properly.
3. Clean all reflective surfaces and slow moving vehicle emblems.
4. Adjust interior rear view mirror and clean windows.

Figure 4.32: Header Drive Switch

5. Push LIGHT switch to ROAD position (A) to activate lamps. Always use these lamps on roads to provide warning to other vehicles. Refer to *3.6 Exterior Lighting, page 49*.

   NOTE:

   If the auto-road light feature is activated (i.e., windrower is in engine- or cab-forward mode, out of park, high range switch position, and header off), only the two front corner field lights will turn on; the remaining field lights are disabled.
6. Use HIGH/LOW LIGHTS (B) as required when other vehicles are approaching.
7. Push BEACON switch (C) ON to activate beacons.

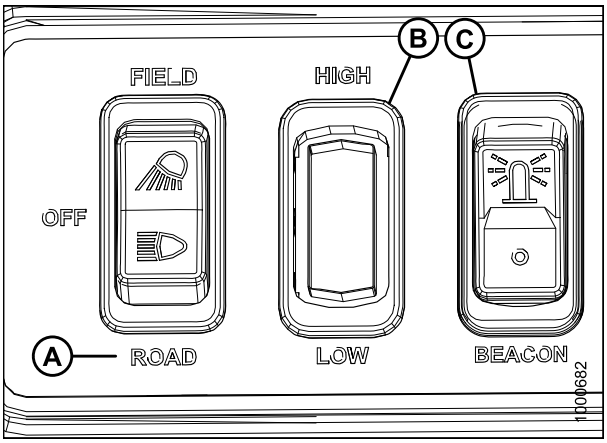


Figure 4.33: Light Switches

8. Press switch (A) on cab display module (CDM) to activate hazard lights.

   IMPORTANT:

   Switch ON the beacon and hazard lights when travelling on the road with the transmission in low range.

Figure 4.34: CDM

9. Set GROUND SPEED RANGE switch (A) for ROAD speed. CDM will display ROAD GEAR at location (F) if windrower is in engine-forward mode.

   NOTE:

   Windrower can be moving, but speed must be less than 8 km/h (5 mph) for road gear to engage.

10. Slowly push throttle (B) to full forward (operating speed). CDM should display 2320–2350 rpm (C).
11. Slowly move the ground speed lever (GSL) (E) forward to desired speed which will be displayed at location (F).
12. If towing a header, refer to *Towing Header with Windrower, page 184*.

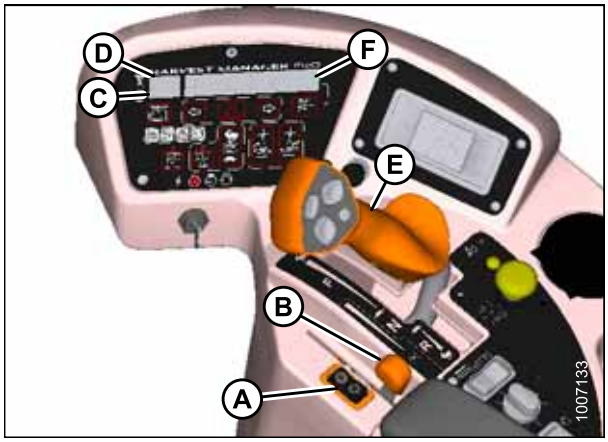


Figure 4.35: Operator Console

Towing Header with Windrower

The windrower can be used to tow a MacDon draper header that has the slow speed transport option installed. Ensure the optional weight box or an approved header transporter is installed on the windrower to transfer weight to the lift arms.

⚠ WARNING

- **A windrower without a header or weight box must NOT be used to tow headers due to reduced traction and possible loss of control.**
- **For towed equipment without brakes, do NOT exceed 32 km/h (20 mph).**

Figure 4.36: Towing a Header

CAUTION

- **To tow a header with an M155*E4* Self-Propelled Windrower, the header must be equipped with the appropriate equipment to comply with local regulations.**
- **Before towing, conduct a pretrip inspection to verify signal lighting and safety equipment is installed and functioning properly.**
- **Do NOT exceed the Combined Gross Vehicle Weight (CGVW) specified in table *4.1, page 185*.**
- **To prevent damage and/or loss of control, ensure the machine and attached equipment are within the following weight limits:**

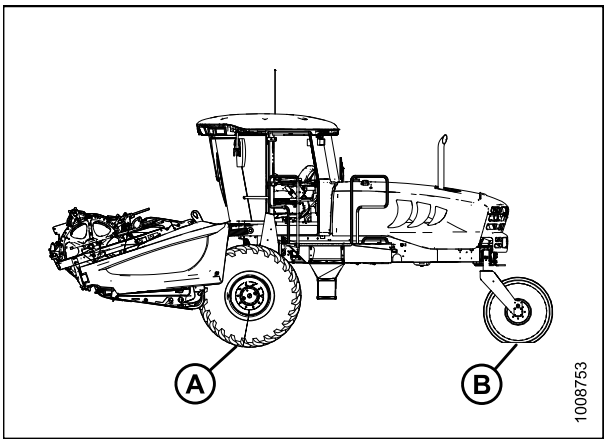


Figure 4.37: M Series Windrower

Table 4.1 Maximum Weight

		kg	lb.
Maximum GVW (includes mounted implements)		9750	21,500
Maximum CGVW (includes towed and mounted implements)		10,480	23,100
Weight (A) on both drive wheels	**Maximum**	8500	18,750
	Minimum	4570	10,070
Maximum weight (B) on both caster tires		2750	6050

Converting from Field to Transport Mode

WARNING

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

DANGER

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

1. Set header on the ground (field position).
2. Disconnect the following hydraulic and electrical connections:

a. **Left Side** – Store hydraulic hoses and electrical cable into the storage position. Refer to header operator's manual.

b. **Right Side** – Release the multi-link and place into storage on windrower. Refer to header operator's manual.

3. Retrieve temporary lift pin from storage location on weight box and install into rear hole (A) at the top of the lift arms. This provides additional lift height for transport wheel deployment.

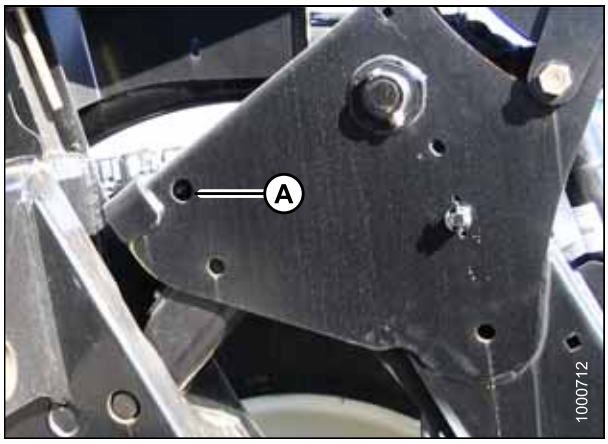


Figure 4.38: Lift Arms

CAUTION

Check to be sure all bystanders have cleared the area.

4. Start the engine and raise the header to full height.
5. Stop the engine and engage safety props on the lift cylinders.
6. Deploy header slow speed transport system. Refer to header operator's manual.

Figure 4.39: Header in Transport Mode

7. Remove float pin from engaged position (A) and insert in storage location (B). Secure with lynch pin.

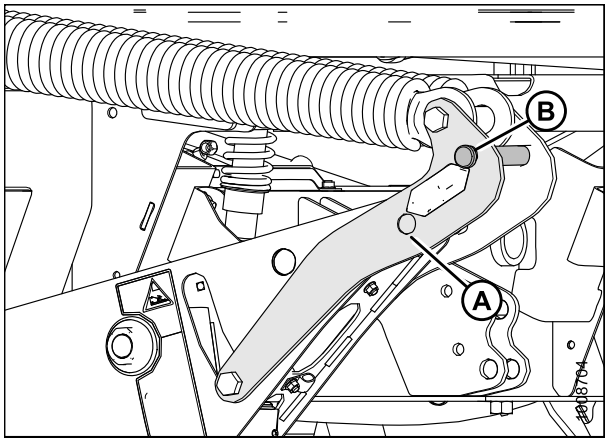


Figure 4.40: Lift Arms

8. Remove pins (A) from lower end of lift linkages.

   NOTE:

   Pins (A) are also used to secure weight box to windrower linkage.

9. Release the safety props on the header lift cylinders. Refer to *4.4.1 Engaging and Disengaging Header Safety Props: M Series Self-Propelled Windrower, page 197*.

10. Start the engine and lower header down onto the transport wheels.

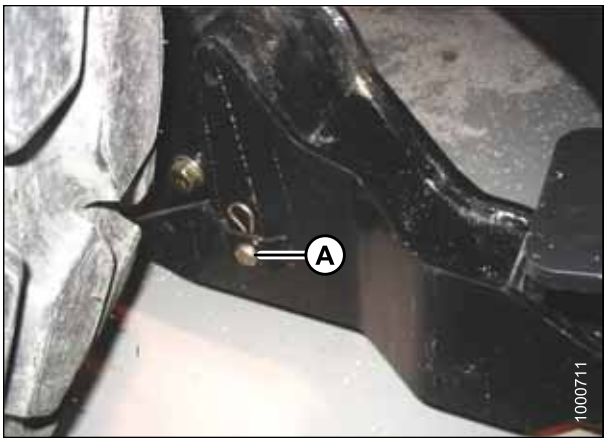


Figure 4.41: Lift Arms

11. Use the HEADER TILT switches to release load on the center-link if necessary.

12. Shut down the engine and remove the key from ignition.

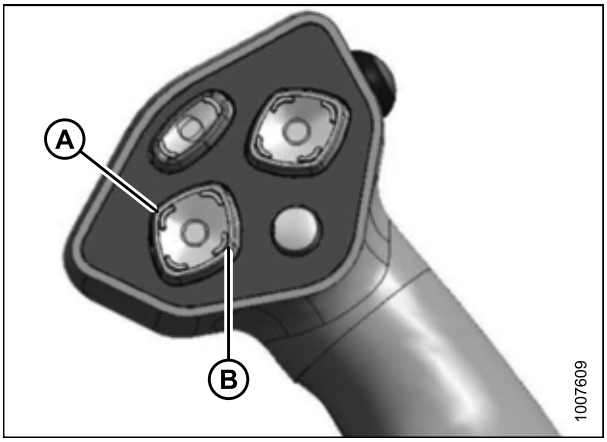


Figure 4.42: Ground Speed Lever (GSL)

A - Header Tilt Down **B - Header Tilt Up**

Disconnect the center-link as follows:

13. If using hydraulic link, disconnect the center-link as follows:

    a. Pull up on latch (A), and position latch into notch (B) on top of hook.

    b. Release the safety props on the header lift cylinders. For instructions, refer to *4.4.1 Engaging and Disengaging Header Safety Props: M Series Self-Propelled Windrower, page 197*.

    c. Lower the header down onto the transport wheels.

    d. Disengage top-link from the header. If necessary, use the HEADER TILT switch to release load on the cylinder.

14. To unlock the center-link, pull up on latch (A) and position latch into notch (B) on top of hook.

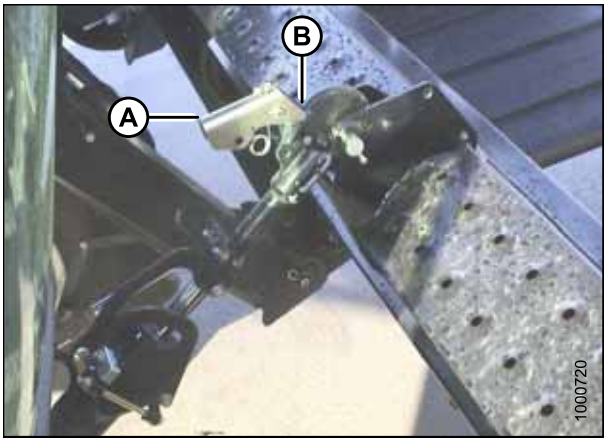


Figure 4.43: Hydraulic Link

15. Lift center-link off header pin.

    NOTE:

    If center-link self-alignment kit is installed, start engine and raise center-link with the REEL UP switch on the ground speed lever (GSL).

16. Slowly back the windrower away from the header, shut the engine OFF, and remove the key from the ignition.

Attaching Header Transport Hitch to Header

Attach header transport hitch to header as follows:

1. Position end (A) of the aft section onto front wheel hook (B).
2. Push down until latch (C) captures the end (A).
3. Secure latch (C) with clevis pin (D).

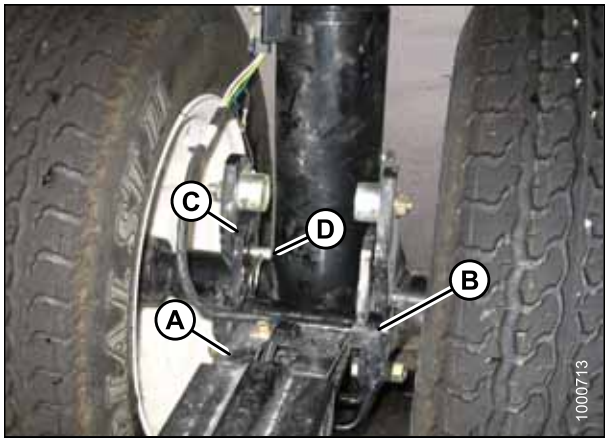


Figure 4.44: Transport Hitch

4. Remove the L-pin from end (A) of aft section (if installed).

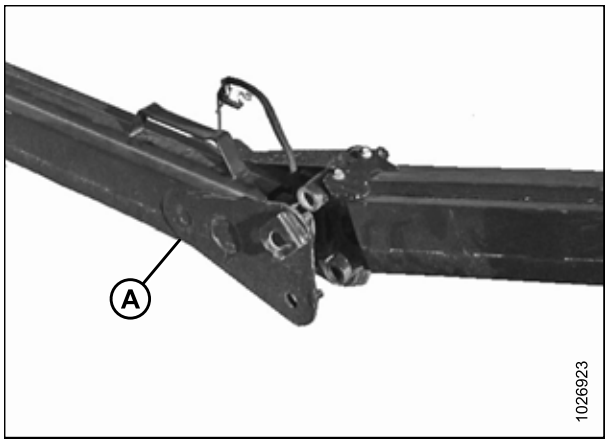


Figure 4.45: Transport Hitch

5. Position end (B) of the forward section into end (A) of the aft section. Lower forward section into aft section.

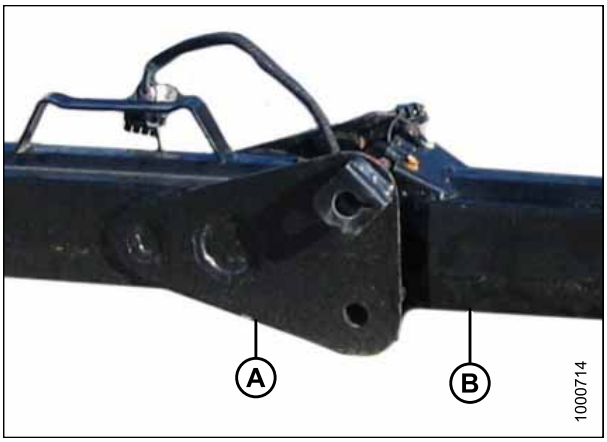


Figure 4.46: Transport Hitch

6. Fully insert L-pin (A) in upper hole and turn pin to lock it. Secure with ring pin (B).
7. Make electrical connection at the joint (C).

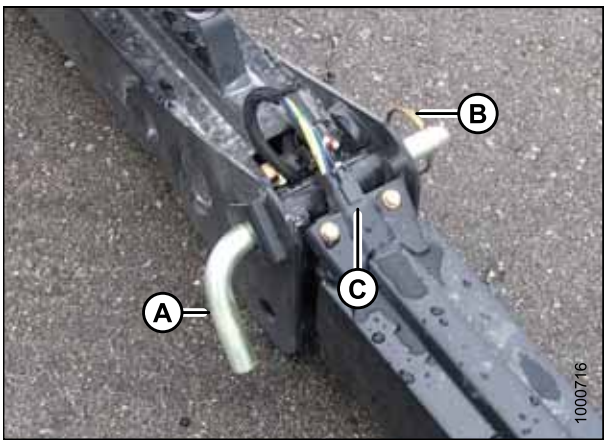


Figure 4.47: Transport Hitch

8. Make the electrical connection at the header wheel (A).

Figure 4.48: Header Transport Wheel

IMPORTANT:

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to windrower, ensure that float engagement pin is installed in storage location (B) and **NOT** installed at hole location (A).

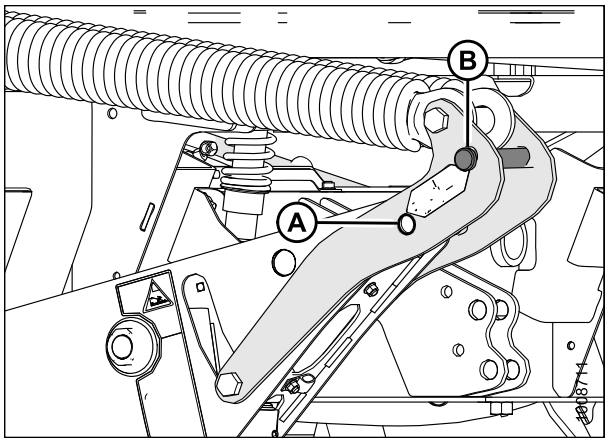


Figure 4.49: Lift Linkage

9. Drive windrower so that windrower lift arms are positioned into the weight box pockets.
10. Raise lift arms slightly, install locking pins (A) into pockets, and through windrower header lift linkages. Secure with hairpin.

    NOTE:

    Pins (A) were previously removed from the header lift linkage lower end.

Figure 4.50: Windrower Lift Linkage

11. Route the weight box harness (A) to the electrical connector at the left side lift linkage and connect harness to connector on windrower (B).
12. Raise lift arms fully, shut engine OFF, and remove key from ignition.

Figure 4.51: Weight Box

13. Move float pins from storage location (A) to engaged position (B).

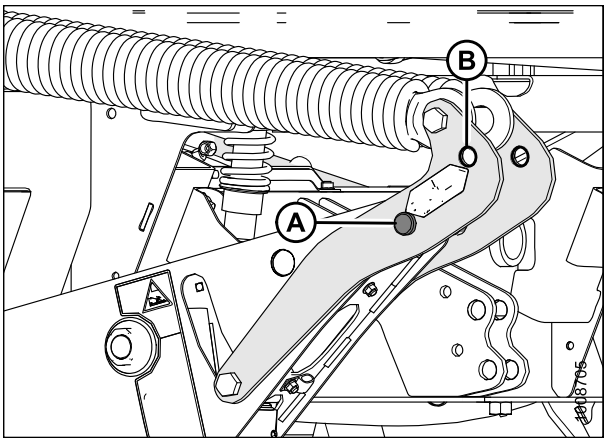


Figure 4.52: Lift Linkage

14. Start engine and press HEADER DOWN switch (A) on ground speed lever (GSL) to lower lift arms until the rear of the arms lift away from the linkage.

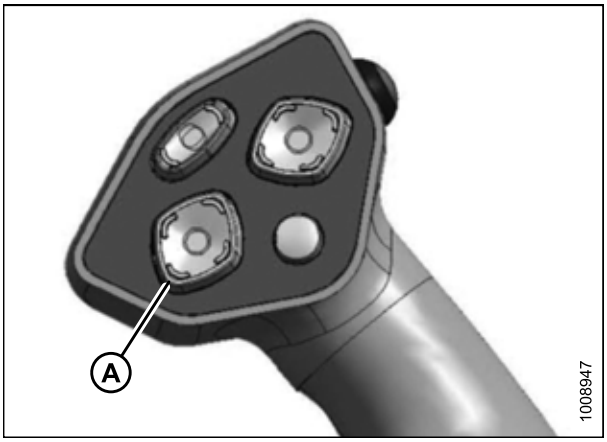


Figure 4.53: GSL

15. Attach slow speed transport hitch to the weight box tongue with drawbar pin. Secure using lynch pin (A). Attach safety chain (B).
16. Connect hitch harness (C) to electrical socket at front of weight box.

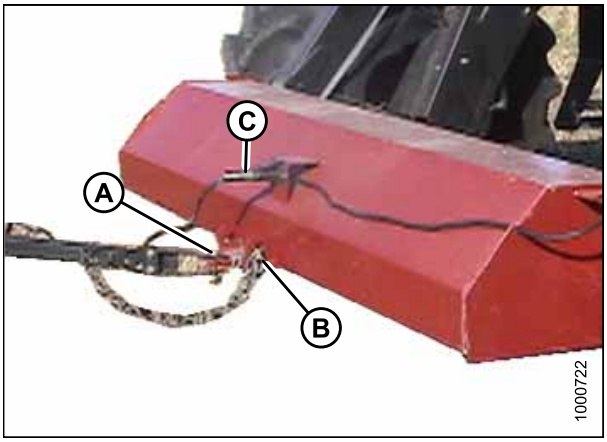


Figure 4.54: Weight Box

17. Remove the temporary lift pins (A) (should be loose in lift arm) and place into storage holes on weight box.

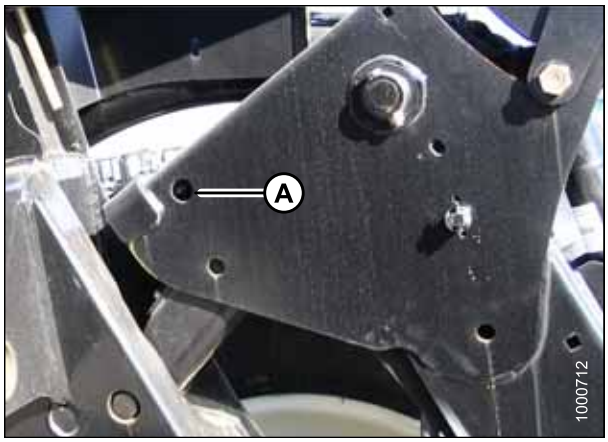


Figure 4.55: Lift Arms

Converting from Transport Mode to Field Operation

WARNING

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

1. Stop the engine and remove the key from the ignition.
2. Disconnect electrical harness at connector (B) from the windrower and store harness (A) on weight box.

Figure 4.56: Electrical Harness

3. Disconnect wiring connector (A) at front wheel.

Figure 4.57: Header Transport Wheel

4. Remove clevis pin (D).
5. Push latch (C) and lift tow-bar (A) from hook. Release latch and replace clevis pin.
6. Unhook tow-bar from weight box.

Figure 4.58: Header Transport Wheel

CAUTION

Check to be sure all bystanders have cleared the area.

7. Start the engine and lower lift arms until rear of lift arms floats up and away from the lift arm mechanism.
8. Stop the engine and remove the key from the ignition.
9. Remove temporary lift pins (A) from weight box and install pins into holes at rear of lift arms.
10. Start the engine and fully raise lift arms. Stop the engine and remove the key from the ignition.
11. Engage lift cylinder safety props. Refer to *4.4.1 Engaging and Disengaging Header Safety Props: M Series Self-Propelled Windrower, page 197*.

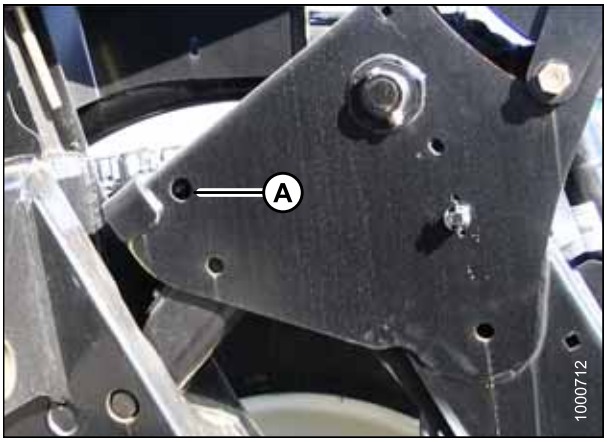


Figure 4.59: Lift Arms

12. Move float pins from working hole location (A) to disengage the float and store pins at storage hole location (B).

    IMPORTANT:

    To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to windrower, ensure that float engagement pin is installed in storage hole location and **NOT** installed in working hole location.

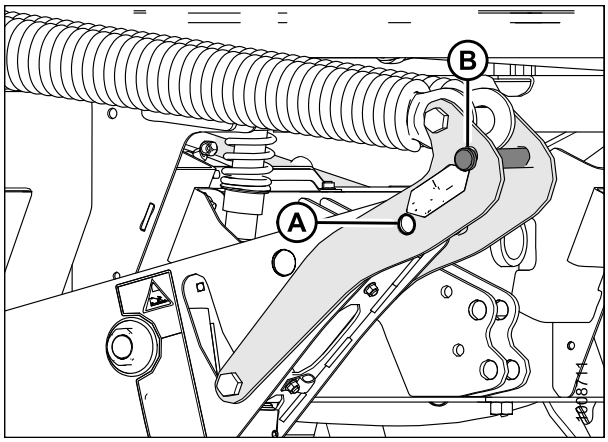


Figure 4.60: Float Pins

13. Remove pins (A) securing lift linkages to weight box, and retain pins for attaching header to windrower. Disengage lift cylinder safety props. Refer to *4.4.1 Engaging and Disengaging Header Safety Props: M Series Self-Propelled Windrower, page 197*.
14. Start the engine, lower weight box onto blocks, and back away.
15. Attach the header to the windrower. Refer to *4.5 Attaching and Detaching Headers, page 218*.
16. Convert header into field position. Refer to header operator's manual for procedure.

Figure 4.61: Weight Box

Towing the Windrower (Emergency)

Towing the windrower is **NOT** recommended. If the windrower gets stuck, or must be towed onto a truck or trailer, follow these steps:

IMPORTANT:

- **NEVER** attempt to start the windrower by towing it. Serious damage to the final drives may occur.
- Failure to disengage final drives before towing will result in serious transmission damage.
- Only tow the windrower for a short distance, on level ground, and at slow speed.

DANGER

Uncontrolled heavy equipment. With final drives disengaged (turned inward), brakes and steering do NOT work. After towing, place blocks under front and rear wheels to prevent uncontrolled movement.

1. Before towing the vehicle, disengage the final drives. Refer to *Engaging and Disengaging Final Drives, page 195*.
2. Use attachment point (A) to tow if windrower gets stuck, or when pulling onto a truck or trailer for transport.
3. When towing is complete, place blocks under front and rear wheels to prevent uncontrolled movement.
4. Engage final drives. Refer to *Engaging and Disengaging Final Drives, page 195*.

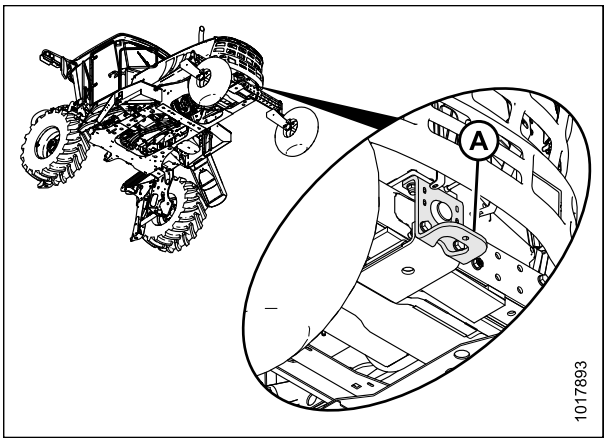


Figure 4.62: Emergency Towing

Engaging and Disengaging Final Drives

Disengage and engage final drives as follows:

WARNING

Park on a flat, level surface, and chock wheels to prevent unexpected rolling when disengaging final drive.

1. Remove the two bolts (A) at the center of drive wheel.
2. Remove cap (B) and flip over so that dished side faces in. The cap presses a pin that disengages the gearbox.
3. Reinstall bolts (A) to secure cap (B).
4. Repeat for the other drive wheel.
5. After towing, reverse cap (B) to engage final drives. Be sure plunger at center of wheel pops out to engage drive.

   NOTE:

   Engaging the final drives may require rocking the wheels slightly.

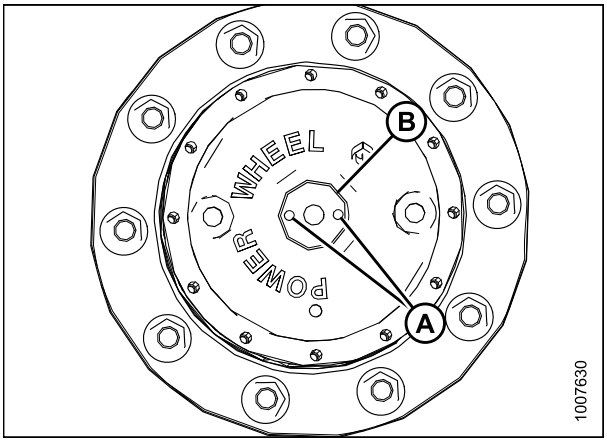


Figure 4.63: Final Drives

4.3.10 Storing the Windrower

At the end of each operating season, you need to store your windrower properly.

WARNING

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

CAUTION

Never operate engine in a closed building. Proper ventilation is required to avoid exhaust gas hazards.

CAUTION

Remember when working around storage batteries that all of the exposed metal parts are live. Never lay a metal object across the terminals because a spark and short circuit will result.

1. Clean the windrower thoroughly.
2. Store windrower in a dry protected place.
3. Remove and store your batteries properly. Refer to *Removing Batteries, page 365*.
4. Charge batteries, store in a cool, dry area in an upright position. Do **NOT** stack batteries on top of each other unless they are in cartons.
5. If stored outside, cover windrower with a waterproof tarpaulin or other protective material. This will protect the switches, instruments, tires, etc. from inclement weather.
6. If no cover is available, seal air cleaner intake and exhaust pipe with plastic bags and/or waterproof tape.
7. If possible, store the windrower on blocks to take weight off tires. If blocking up the machine is not possible, increase tire pressure by 25% for storage. Adjust to recommended operating pressure before next use.
8. Repaint all worn or chipped painted surfaces to prevent rust.
9. Lubricate the windrower thoroughly, leaving excess grease on fittings to keep moisture out of bearings. Apply grease to exposed threads and sliding surfaces of components.
10. Check for worn components and repair. Tighten loose hardware and replace any missing hardware. Refer to *8.2 Recommended Torques, page 455*.
11. Check for broken components and order replacements from your Dealer. Attention to these items right away will save time and effort at beginning of next season.
12. Add approved rust inhibitor to the engine oil in accordance with the manufacturer's instructions. Run engine to operating temperature to mix inhibitor with oil, unless otherwise specified.
13. To prevent condensation, fill hydraulic oil reservoir to filler neck with approved hydraulic system oil. Refer to *5.10.1 Checking and Filling Hydraulic Oil, page 397*.
14. Test engine coolant antifreeze concentration to ensure it is sufficient to protect engine against lowest expected temperature.
15. Before storing the machine in temperatures below 0°C (32°F), ensure the diesel exhaust fluid (DEF) tank is lower than 75 percent full.
16. If storing the machine for periods of time greater than six months, drain the DEF to prevent degradation of fluid.

4.4 Operating with a Header

The M155*E4* Self-Propelled Windrower is designed to operate with a MacDon A Series Auger Header, R and R1 Series Rotary Disc Header, or D and D1 Series Rigid Draper Header with or without a Hay Conditioner.

This section describes the attachment and detachment procedures and operating instructions for these header types.

4.4.1 Engaging and Disengaging Header Safety Props: M Series Self-Propelled Windrower

Safety props are located on both header lift cylinders on the windrower. Follow these steps to engage or disengage the header safety props:

DANGER

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

Engage safety props as follows:

1. Start engine and press HEADER UP switch (A) to raise header to maximum height.
2. Rephase cylinders if one end of the header does not raise fully. If rephasing is required, proceed as follows:
   a. Press and hold the HEADER UP switch (A) until both cylinders stop moving.
   b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.

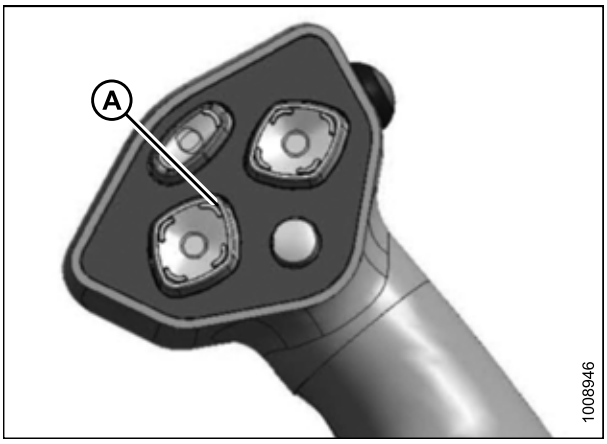


Figure 4.64: Ground Speed Lever (GSL)

3. Pull lever (A) and rotate toward header to lower safety prop (B) onto cylinder. Repeat for opposite cylinder.

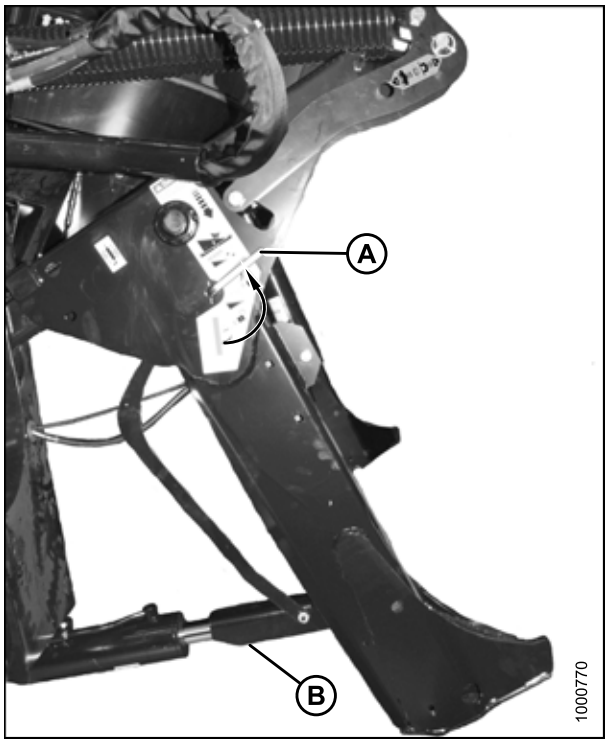


Figure 4.65: Safety Prop

Disengage safety props as follows:

DANGER

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

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

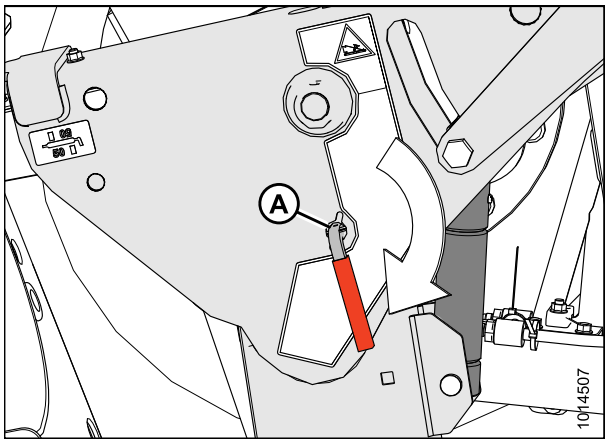


Figure 4.66: Safety Prop

4.4.2 Using Header Float

The header float feature allows the header to closely follow ground contours and to respond quickly to sudden changes or obstacles. The float setting is ideal when the cutterbar is on the ground with minimal bouncing, or scooping, or pushing soil.

IMPORTANT:

- Set header float as light as possible—without excessive bouncing—to avoid frequent breakage of knife components, scooping soil, or soil build-up at the cutterbar in wet conditions.
- Avoid excessive bouncing (resulting in a ragged cut) by operating at a slower ground speed when the float setting is light.
- Before setting header float, install header options (upper cross auger, skid shoes, transport kit, etc.). If the Slow Speed Transport (SST) tow bar will be stored on the header during operation, set float with tow bar in place.
- Adjust the float when adding or removing optional attachments that affect the weight of the header.

Float Operating Guidelines

When working with the cutterbar on the ground:

- Set center-link to mid-range position (5.0 on cab display module [CDM]). Refer to *4.4.5 Adjusting Header Angle, page 208*.
- When operating at the flattest header angle, minimize scooping rocks by adjusting the header skid shoes downward to raise guards.
- To minimize pushing soil, adjust header height or adjust header angle.

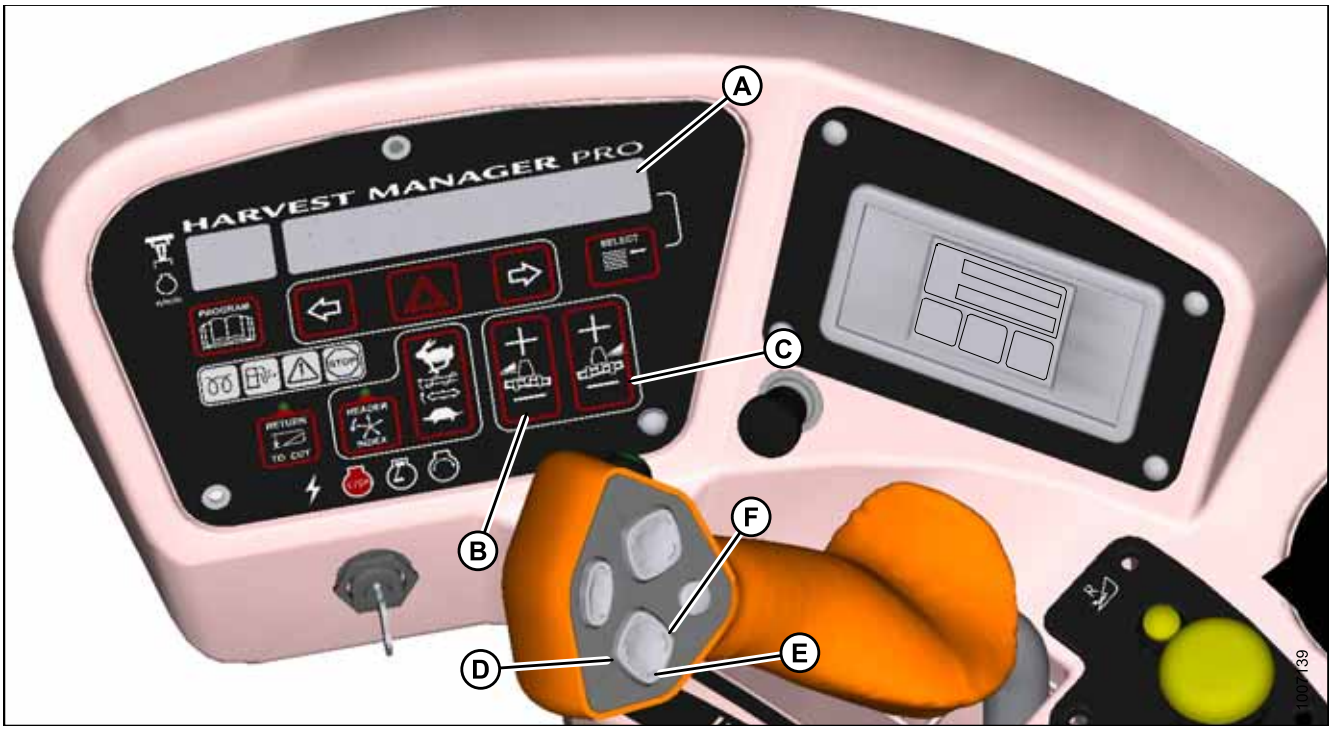
When working with the cutterbar off the ground (draper header only):

- Set center-link to mid-range position (5.0 on CDM). Refer to *4.4.5 Adjusting Header Angle, page 208*.
- Balance the amount of header weight carried by the float and stabilizer wheels. Refer to your draper header operator's manual.
- Use the CDM controls to automatically maintain cutting height. Refer to *4.4.6 Controlling Cutting Height, page 211*.

Checking Float

The M155*E4* is equipped with primary (coarse) and secondary (fine) float adjustment systems. The primary adjustment uses drawbolts to change the tension on the springs in the lift linkages. The secondary adjustment uses hydraulic cylinders to change the spring tension.

Figure 4.67: Cab Display Module (CDM) Float Adjustment



A - CDM Display
B - Left Float Adjustment
C - Right Float Adjustment
D - Header Tilt Down
E - Header Lower
F - Header Tilt Up

Check header float as follows:

WARNING

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

CAUTION

Check to be sure all bystanders have cleared the area.

1. Start the engine.
2. Lower header to ground.
3. Using HEADER TILT switches (D) and (F), set center-link to mid-range position (5.0 on CDM [A]).

   NOTE:

   If equipped with the optional draper header reel drive (MD #B5496), adjust reel fore-aft to your normal operating position.
4. Using HEADER DOWN switch (E), lower header fully with lift cylinders fully retracted.
5. Set left (B) and right (C) float fine adjustments on CDM to approximately 5.0 as follows:

   a. Using FLOAT SELECTOR switch (B), push **+** to increase float or **–** to decrease float on left side of header. CDM display (A) will indicate selected float for left side, for example, (5.0 L FLOAT R XX.X).

b. Repeat for right side float with switch (C). Display will indicate float for both sides, for example, (5.0 L FLOAT R 5.0).

6. Shut down engine, and remove key.
7. Grasp the end of the header and lift. The force to lift should be as noted in the following table and should be approximately the same at both ends.

Header	Force Required to Lift Header at the Ends with Lift Cylinder Fully Retracted
Auger	335–380 N (75–85 lbf)
Rotary disc	426–471 N (95–105 lbf)
Draper	335–380 N (75–85 lbf) with stabilizer/transport wheels raised (if equipped)

Adjusting Float Using Drawbolts

Coarse float adjustment is done using the drawbolts located on either side of the windrower.

If necessary, coarse adjust the float with the drawbolts as follows:

CAUTION

Check to be sure all bystanders have cleared the area.

1. Start the engine.
2. Using HEADER UP (A) switch on the ground speed lever (GSL), raise the header fully, shut down the engine, and remove the key.

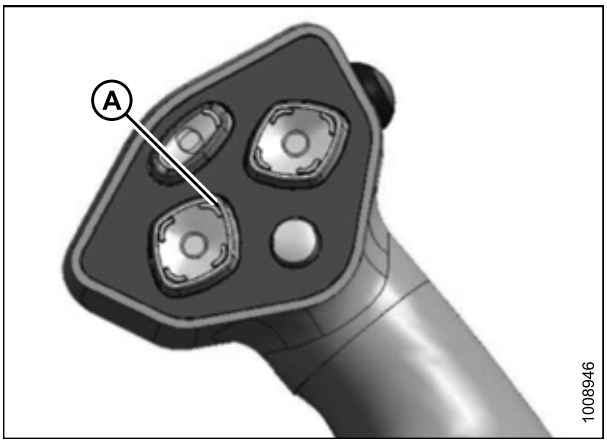


Figure 4.68: GSL

3. Turn drawbolt (A) clockwise to increase float (makes header lighter) or counterclockwise to decrease float (makes header heavier).
4. Recheck the header float.

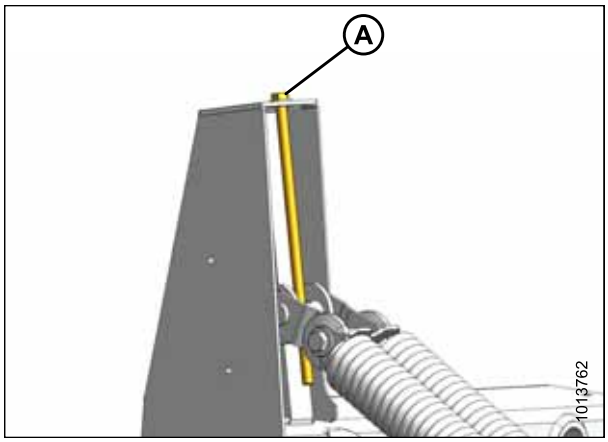


Figure 4.69: Header Float Adjustment

Float Options

For draper headers without the deck shift option, auger headers, and rotary headers, the float disc can be preprogrammed for three types of windrowing conditions.

Example:

- Position 1: Border
- Position 2: Normal
- Position 3: Rocky

Set float presets as follows:

1. Engage header.
2. Push FLOAT PRESET SWITCH (A) to Position 1 (B).

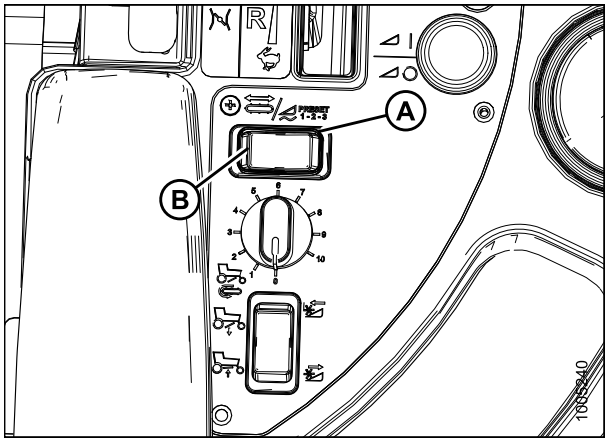


Figure 4.70: Float Preset Switch

Figure 4.71: Cab Display Module (CDM) Float Adjustment

A - CDM Display
B - Left Float Adjustment
C - Right Float Adjustment
D - Header Tilt Down
E - Header Lower
F - Header Tilt Up

3. Using HEADER TILT switches (D) and (F), set center-link to mid-range position (5.0 on CDM [A]).

   NOTE:

   If equipped with the optional draper header reel drive (MD #B5496), adjust reel fore-aft to your normal operating position.

4. Using HEADER DOWN switch (E), lower header fully with lift cylinders fully retracted.

5. Set left (B) and right (C) float fine adjustments on CDM to approximately 5.0 as follows:

   a. Using FLOAT SELECTOR switch (B), push **+** to increase float or **–** to decrease float on left side of header. CDM display (A) will indicate selected float for left side, for example, (5.0 L FLOAT R XX.X).

   b. Repeat for right side float with switch (C). Display will indicate float for both sides, for example, (5.0 L FLOAT R 5.0).

6. Select a second preset with the FLOAT PRESET 2 SWITCH (C).
7. Repeat Steps *1, page 202* and *2, page 202* to set the float.
8. Select a third preset with the FLOAT PRESET 3 SWITCH (D).
9. Repeat Steps *1, page 202* and *2, page 202* to set the float.

NOTE:

For draper headers with the deck shift option, the float can be preprogrammed to compensate for weight distribution when the decks are shifted. Refer to *Setting Float Options with Deck Shift, page 273*.

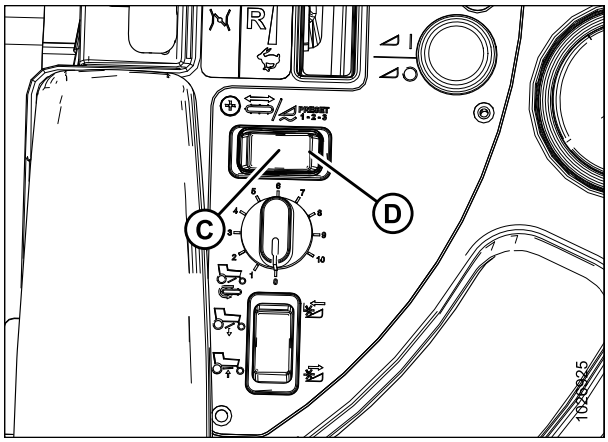


Figure 4.72: Float Preset Switch

4.4.3 Levelling the Header

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

WARNING

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

If the header is not level, check the windrower tire pressures before adjusting the levelling linkages.

NOTE:

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

To level the header, follow these steps:

1. Place float pins in locked out location (A).

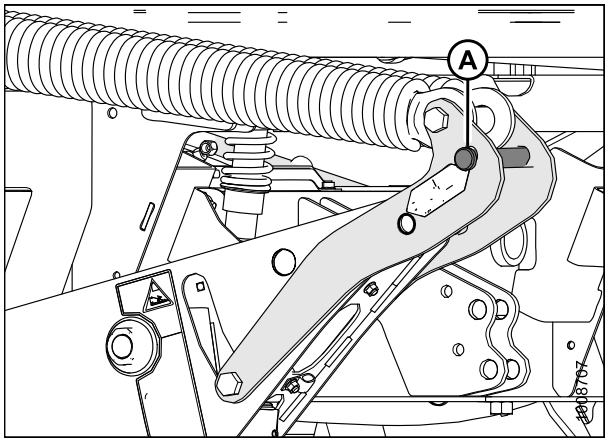


Figure 4.73: Float Pins – Disengaged

2. Park windrower on level ground.
3. Raise header fully with HEADER UP button (A) and hold momentarily to allow lift cylinders to rephase.

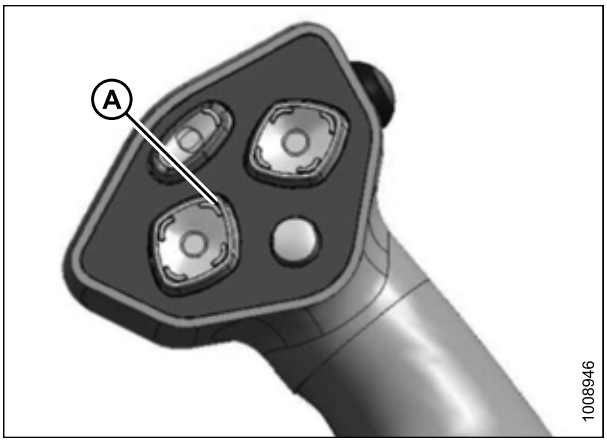


Figure 4.74: Ground Speed Lever (GSL)

4. Set header approximately 150 mm (6 in.) off ground and check that member (A) is against link (B). Stop engine and remove key from ignition.
5. Measure distance to ground at both ends of header and determine the end that is higher.
6. If adjustment is necessary, start the engine and raise the header fully. Turn off the engine and remove the key from the ignition.

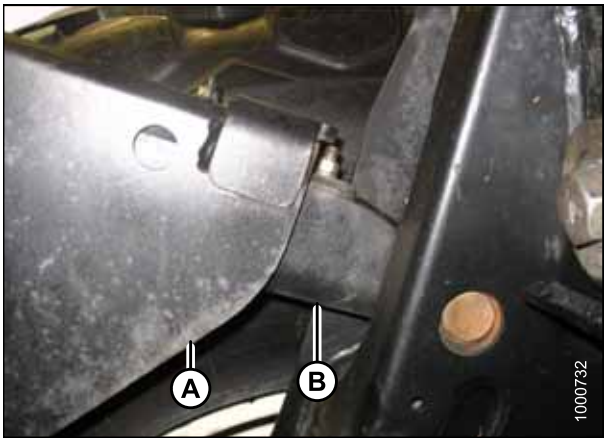


Figure 4.75: Lift Linkage

7. Move float pins to engaged position (A).

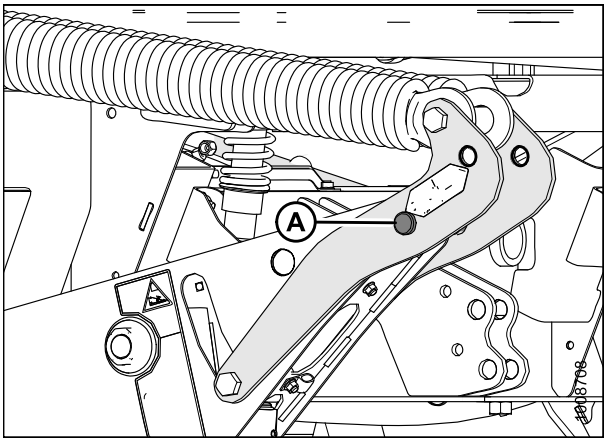


Figure 4.76: Float Pins – Engaged

8. Start the engine and lower the header onto the ground until member (A) lifts off link (B) on both sides.
9. Stop the engine and remove the key.

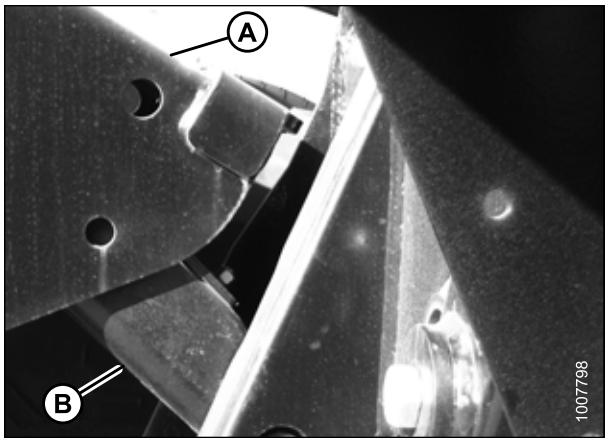


Figure 4.77: Lift Linkage

10. On high side, remove nut, washer, and bolt (A) that attaches shims (B) to link.
11. Remove one or both shims (B), and reinstall the hardware (A).

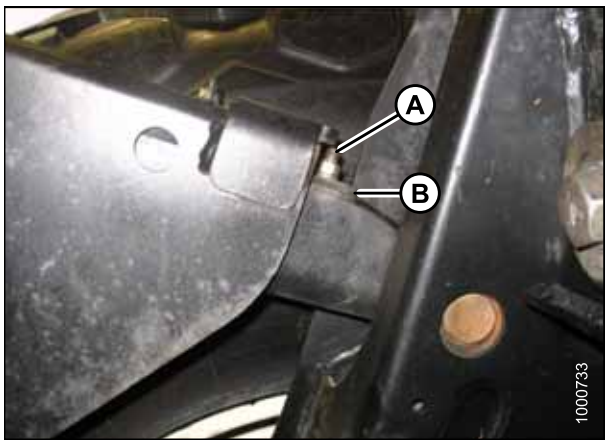


Figure 4.78: Lift Linkage

12. Start the engine and raise the header fully.
13. Stop the engine and remove the key from the ignition.
14. Move float pins to disengaged position.
15. Start the engine and set the header approximately 150 mm (6 in.) off ground and check that member (A) is against link (B). Stop the engine and remove the key from the ignition.
16. Measure distance to ground at both ends of the header.
17. If additional levelling is required, repeat Steps *6, page 205* to *9, page 206* and install the removed shim on the opposite linkage.

    NOTE:

    If required, additional shims are available from your Dealer.

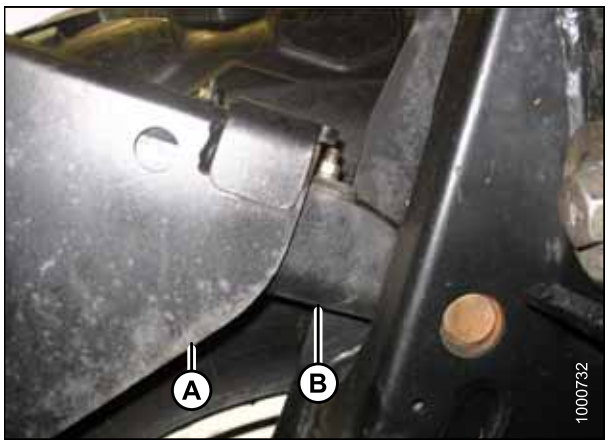


Figure 4.79: Lift Linkage

18. Once the header is level, return float pins to their engaged position (A).

    NOTE:

    Float does **NOT** require adjustment after levelling the header.

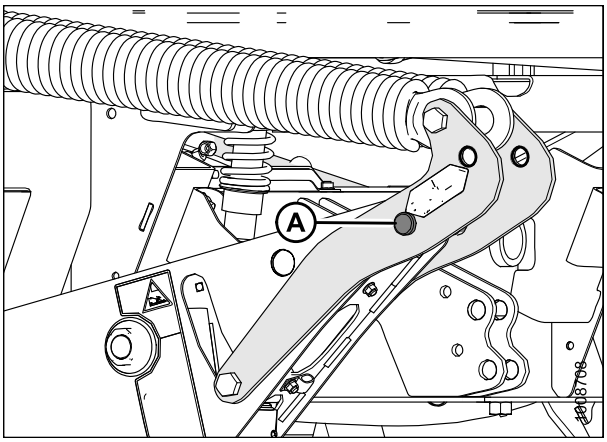


Figure 4.80: Float Pins – Engaged

4.4.4 Header Drive

All header controls are conveniently located on the operator's console and on the ground speed lever (GSL) handle.

NOTE:

Some controls are optional equipment and may not be present in your unit. Some controls may be installed, but will be nonfunctional for certain headers.

Engaging and Disengaging the Header

IMPORTANT:

Always move throttle lever back to idle before engaging header drive. Do **NOT** engage header with engine at full rpm.

⚠ CAUTION

Check to be sure all bystanders have cleared the area.

1. ***To engage header:***
   a. Move throttle (A) to adjust engine speed to idle.
   b. Push the center down and pull up the HEADER DRIVE switch (B) to engage header drive. A slight delay between switch ON and operating speed is normal.
2. ***To disengage header:***
   a. Push HEADER DRIVE switch (B) down to disengage header drive.

Figure 4.81: Operator Console

Reversing the Header

Reverse the header as follows:

1. Push down and hold HEADER DRIVE REVERSE button (A) and pull up the HEADER DRIVE switch (B). CDM will display HEADER REVERSE.
2. Release REVERSE button (A) to stop header.
3. Push down the HEADER DRIVE switch (B) to OFF, so that it can be restarted.

   NOTE:

   To engage header drive, push down, and pull up HEADER DRIVE knob.

Figure 4.82: Operator Console

4.4.5 Adjusting Header Angle

Header angle is defined as the angle between the ground and the drapers/cutterbar. It is adjustable to accommodate crop conditions and/or soil type.

Refer to the appropriate header operator's manual for the range of adjustment and recommended settings for your particular header.

The header angle can be hydraulically adjusted from the cab without shutting down the windrower when the windrower is equipped with the hydraulic center-link. A readout on the cab display module (CDM) allows you to establish settings for each crop condition.

IMPORTANT:

- Changing header angle will affect float slightly because it has the effect of making the header lighter or heavier.
- To prevent excessive guard breakage when conditions are not suited to heavier float (e.g., rocky or wet), do **NOT** use the TILT CONTROL. Instead, use the HEADER HEIGHT switch.

Figure 4.83: Operator Console

A - Program Button
B - Display
C - Header Tilt Down
D - Header Tilt Up
E - Display Selector

Adjust the header angle as follows:

- To decrease (flatten) header angle, operate HEADER TILT UP switch (D) on ground speed lever (GSL) handle so that cylinder retracts. The CDM display will show a reading on the lower line of decreasing value between 00.0 and 10.0.
- To increase (steepen) header angle, operate HEADER TILT DOWN switch (C) on the GSL handle so the cylinder extends. The CDM display will show a reading on the lower line of increasing value between 00.0 and 10.0.

NOTE:

The HEADER TILT switch can be locked out to prevent inadvertent header angle changes when pressing the HEADER HEIGHT control switches. Refer to *Activating the Header Tilt Control Lockout, page 118*.

Checking Self-Locking Center-Link Hook

Periodically check the operation of the hook locking mechanism and ensure that it is working properly as follows:

1. If header is attached to windrower, disconnect center-link hook from header by pulling up on handle (A) to release the locking device and then lifting the hook off the header pin.

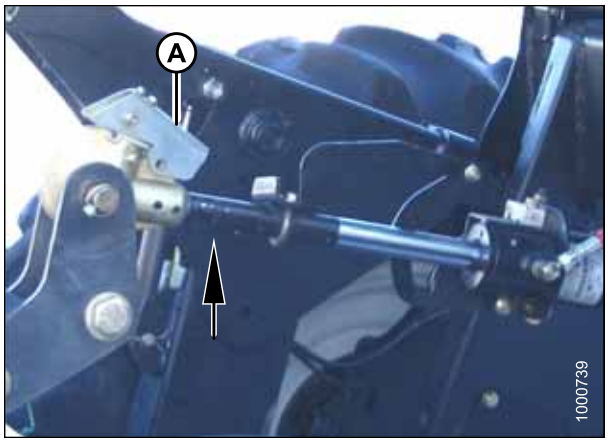


Figure 4.84: Center-Link

2. Lower the handle (A) into the **LOCK** position.
3. Push up on lock pin (B) only. Handle should catch on casting and pin should **NOT** lift.

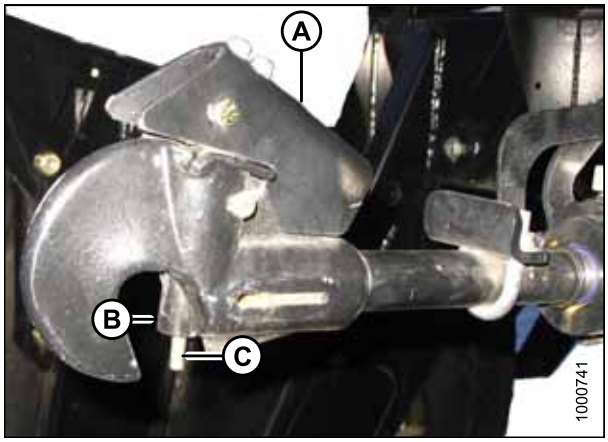


Figure 4.85: Center-Link Hook

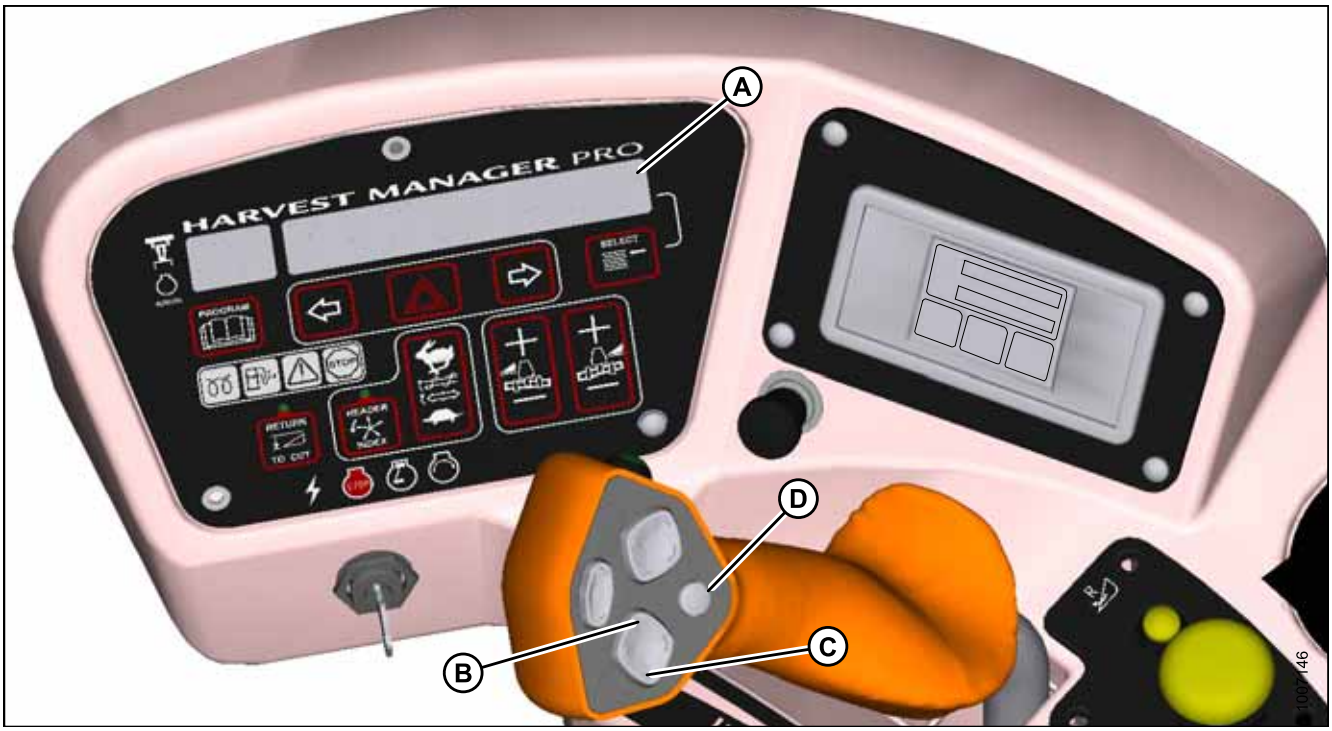
A - Handle **B - Lock Pin** **C - Actuator Rod**

4. Push up on actuator rod and lock pin should lift with the handle.

Figure 4.86: Center-Link Hook

4.4.6 Controlling Cutting Height

Figure 4.87: Operator Console



Cutting height is adjusted by raising or lowering the header with the HEADER UP (B) or HEADER DOWN (C) switches on the ground speed lever (GSL).

The cab display module (CDM) indicates header height with a reading on the DISPLAY (A) lower line between 00.0 and 10.0, with 00.0 being on the ground.

Use DISPLAY SELECTOR switch (D) to display the current setting.

Return to Cut

The monitoring system will assist you in maintaining the desired cutting height with the RETURN TO CUT feature. This feature can be turned OFF or ON with a switch on the cab display module (CDM).

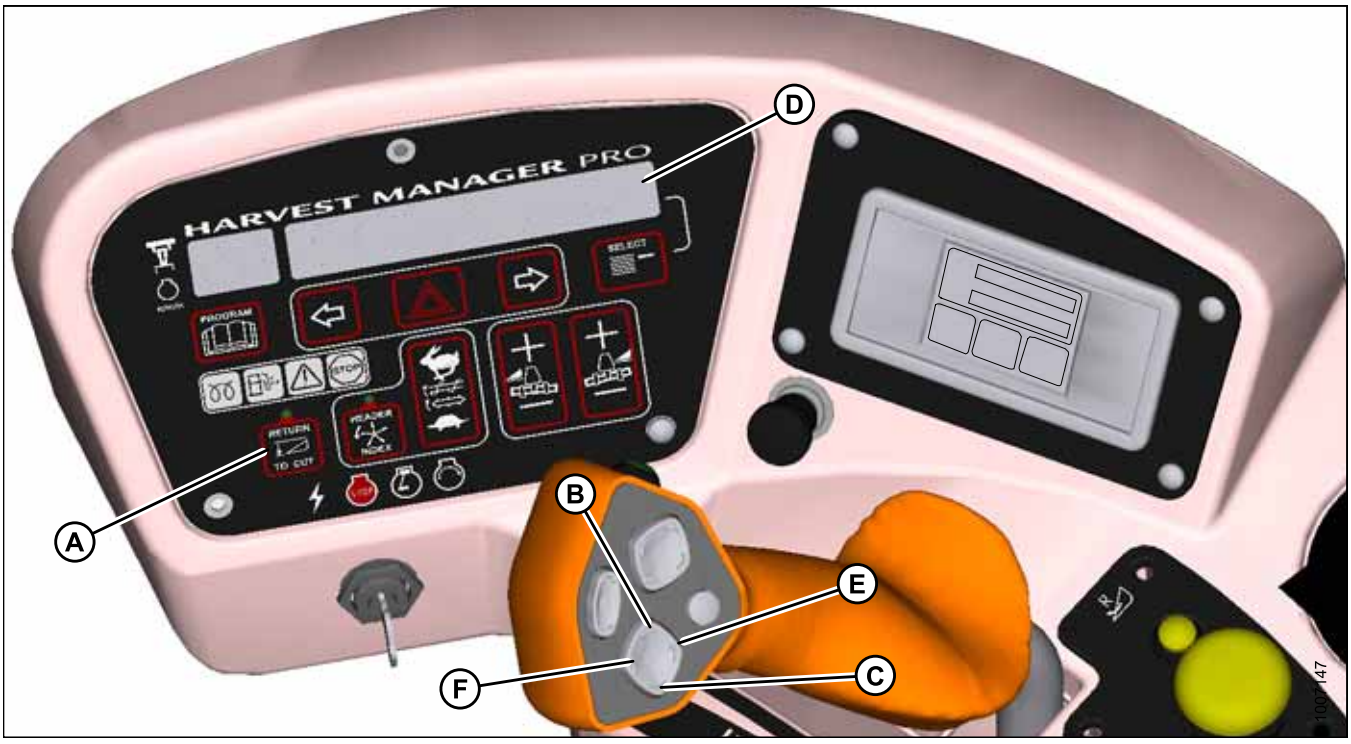
The return to cut (RTC) feature provides preset cutting height and tilt angle settings for the header.

If desired, the CDM can be programmed so that only the cutting height feature is active.

The AUTO RAISE HEIGHT feature allows you to raise the header to a preselected height while in the RETURN TO CUT mode. Refer to *Programming the Auto Raise Height Feature, page 214*.

Programming the Return to Cut Feature

Figure 4.88: Operator Console



Program the return to cut (RTC) feature as follows:

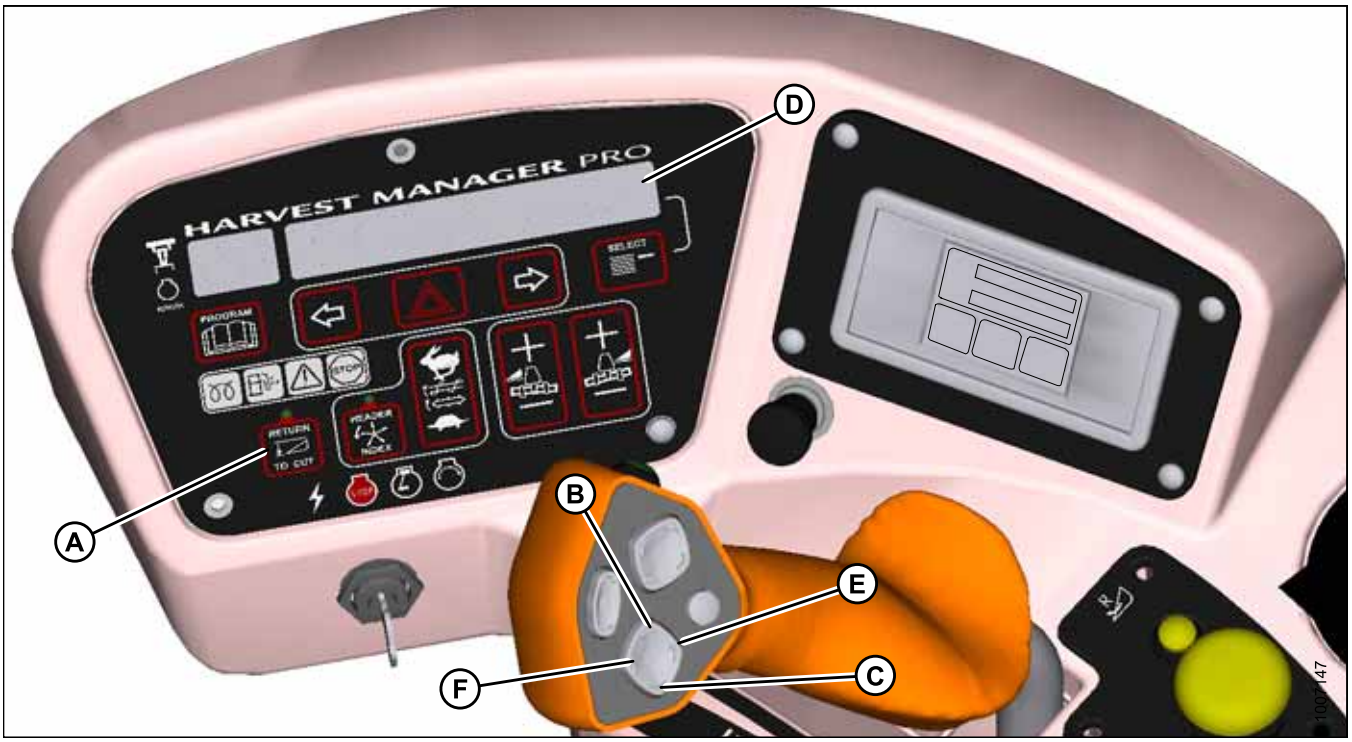
CAUTION

Check to be sure all bystanders have cleared the area.

1. Start and windrower and engage the header.
2. Set RETURN TO CUT switch (A) to OFF (indicator light is OFF).
3. Adjust the header to the desired cutting height with the HEADER UP (B) or HEADER DOWN (C) switches on the ground speed lever (GSL). The cab display module (CDM) displays between **00.0 and 10.0** at location (D).
4. Adjust the header angle with the HEADER TILT UP (E) or HEADER TILT DOWN (F) switches on the GSL. The CDM displays between **00.0 and 10.0**. This step is not required when height only has been preselected.
5. Press the RETURN TO CUT switch (A) on the CDM. The indicator light will illuminate and the settings are now programmed into the windrower control module (WCM).

Using the Return to Cut Feature

Figure 4.89: Operator Console



A - Return to Cut
B - Header Up
C - Header Down
D - Display
E - Header Tilt Up
F - Header Tilt Down

Use the return to cut feature as follows:

IMPORTANT:

Ensure the header is engaged and the RETURN TO CUT switch (A) is illuminated.

NOTE:

The header can be raised or lowered by **pressing and holding** the HEADER UP (B) or HEADER DOWN (C) switches on the ground speed lever (GSL).

1. If header is above the preset cutting height, **momentarily press** HEADER DOWN switch (C) and the header will return to preset height.
2. If the header is below the preset height, **press and hold** the HEADER UP (B) switch to raise the header. Release switch to stop header. Alarm will sound when header rises past the preset height.
3. If the header angle changes, double-click (two clicks within 0.5 seconds) the HEADER TILT UP (E) or HEADER TILT DOWN switch (F) and the header will return to the preset angle.

   NOTE:

   If the header cannot return to the preset height or angle within 30 seconds, the return to cut feature will deactivate to prevent the hydraulic oil from overheating. Push the RETURN TO CUT switch (A) to reactivate.

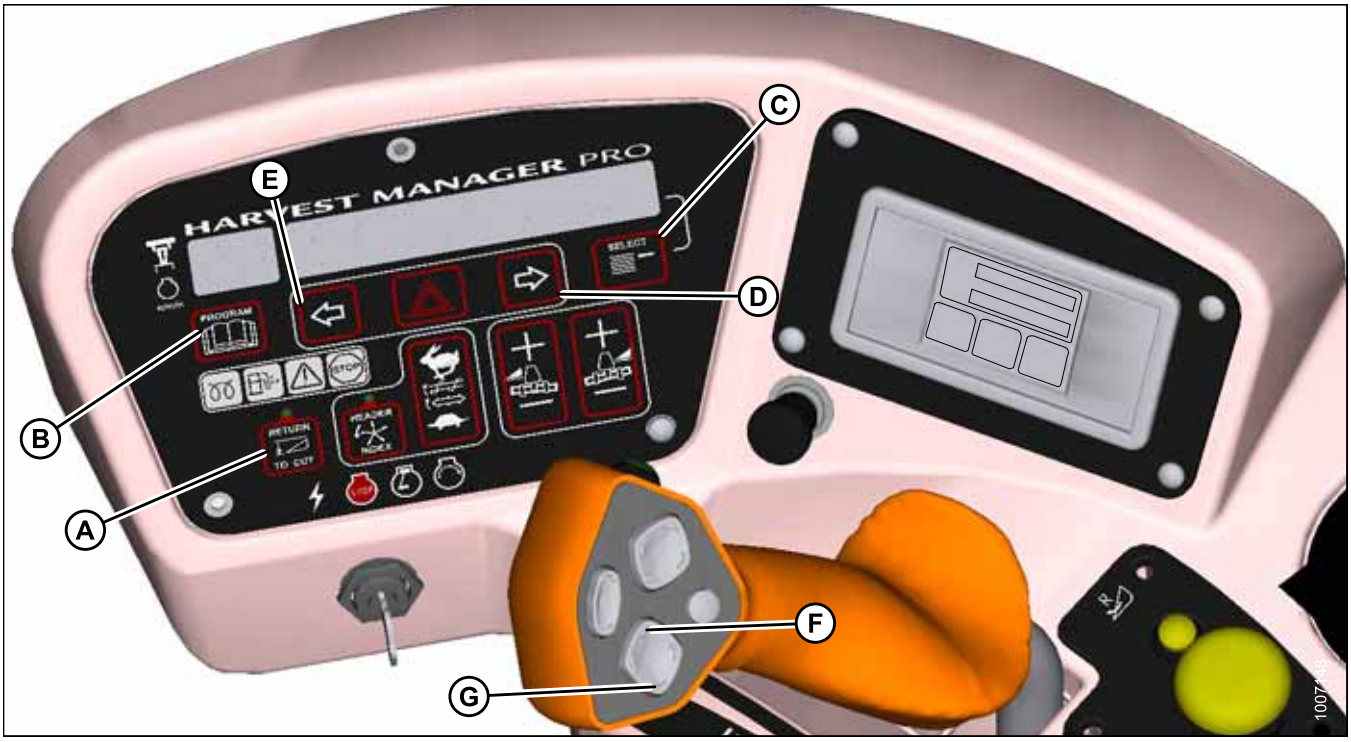
Auto Raise Height

The header can be raised to a preset height by enabling the auto raise height feature in the cab display module (CDM).

Refer to the following topics:

Programming the Auto Raise Height Feature

Figure 4.90: Operator Console



A - Return to Cut **B - Program** **C - Select** **D - Right Arrow**
E - Left Arrow **F - Header Up** **G - Header Down**

Program the auto raise height feature as follows:

NOTE:

RETURN TO CUT switch (A) can be OFF or ON.

1. Turn ignition ON or run engine.
2. Press PROGRAM (B) and SELECT (C) on cab display module (CDM) to enter programming mode.
3. Press SELECT (C). WINDROWER SETUP? is displayed on upper line.
4. Press right arrow (D), then SELECT. SET KNIFE SPEED? is displayed.
5. Press SELECT (C) until AUTO RAISE HEIGHT is displayed.
6. Press left arrow (E) or right arrow (D) to change value on lower line. Working range is 4.0 to 9.5. At 10.0, the feature is disabled and OFF is displayed.
7. When finished entering desired values, press PROGRAM to exit programming mode.

Using the Auto Raise Height Feature

IMPORTANT:

The windrower must be running with the header engaged at the cutting height and the RETURN TO CUT switch (A) activated.

Use the auto raise height feature as follows:

1. To raise the header to the auto raise height set-point, double-click (two clicks within 0.5 seconds) the HEADER UP switch (B) on the ground speed lever (GSL).

   NOTE:

   With AUTO RAISE HEIGHT turned ON, the ACRE counter will be disabled when header height greater than preset cutting height.

2. If desired, press HEADER UP switch while header is being raised to disable auto raise height and maintain current height.

   NOTE:

   With AUTO RAISE HEIGHT turned OFF, the ACRE counter will be disabled when header height value is greater than 9.5. OFF is displayed on the cab display module (CDM).

3. To return the header to the preset cutting height, momentarily press HEADER DOWN switch (C).

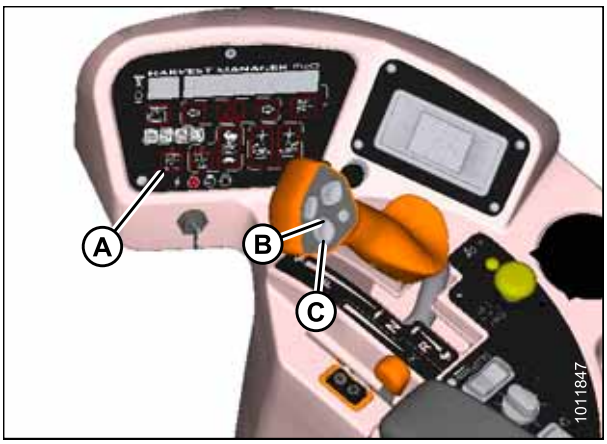


Figure 4.91: Operator's Station

Header Drop Rate

The header should lower gradually when the HEADER DOWN switch is pressed. From full height to ground should take 3–4 seconds.

If the drop rate requires adjustment, refer to *Adjusting Header Drop Rate, page 403*.

4.4.7 Using the Double Windrowing Attachment

The double windrow attachment (DWA) deposits two windrows of conditioned material close together to be picked up by a forage chopper.

1. The system is for use with the A Series Auger Headers, R Series Rotary Disc Headers, and D65 Draper Headers with HC10 Hay Conditioner.

   Raising the side delivery system shuts off the draper and allows the crop to be deposited between the windrower wheels as it would be without the side delivery system.

   Refer to MacDon M Series Windrower Double Windrow Attachment Manual for complete operating and maintenance instructions. The manual is shipped with the DWA kit.

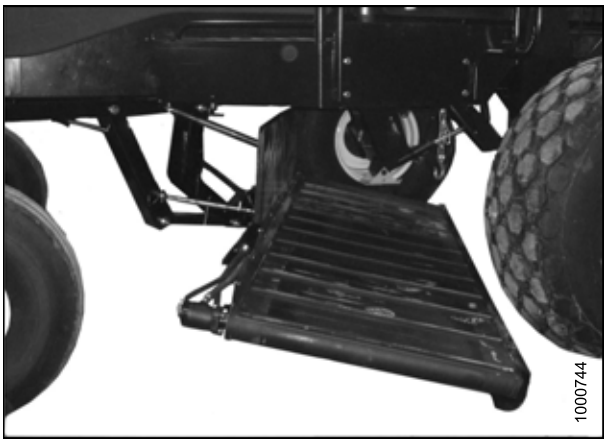


Figure 4.92: DWA on SP Windrower

2. The conditioned crop is deposited onto the side delivery system draper and delivered to the side of the windrower when required. Cutting up and down shown.

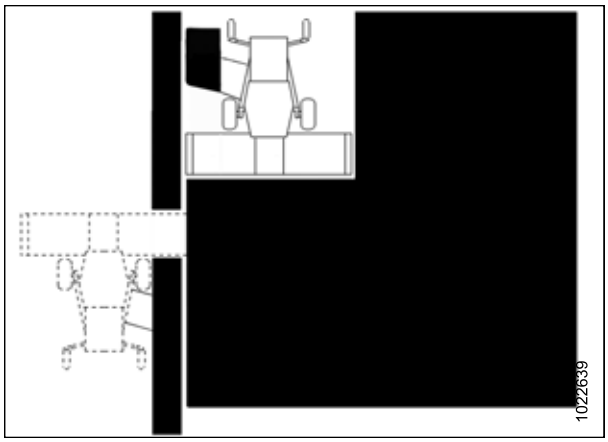


Figure 4.93: Double Windrowing

Engaging and Disengaging the Double Windrow Attachment (DWA)

The DWA system is engaged with controls in the cab.

The deck is lowered and raised with the DWA DOWN (B) and DWA UP (A) switches on the ground speed lever (GSL) or with the rocker switch on the operator's console, depending on operator preference. The windrower cab display module (CDM) is programmed during the installation of the double windrow attachment (DWA) but the controls can be swapped at any time. Refer to *Activating the Double Windrow Attachment (DWA), page 106*. The draper is activated during deck lowering and deactivated during raising.

NOTE:

The same switch is used for raising and lowering a swath compressor (if installed).

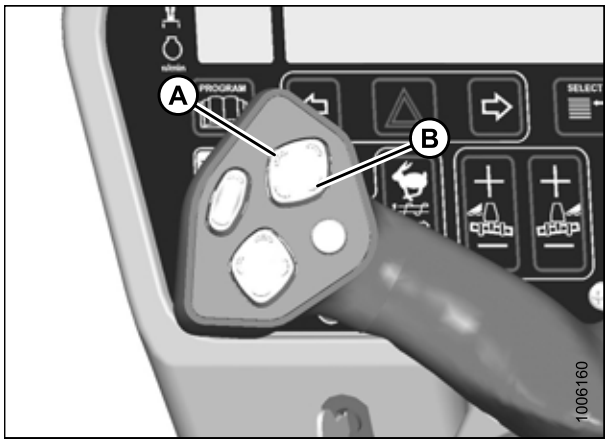


Figure 4.94: Ground Speed Lever (GSL)

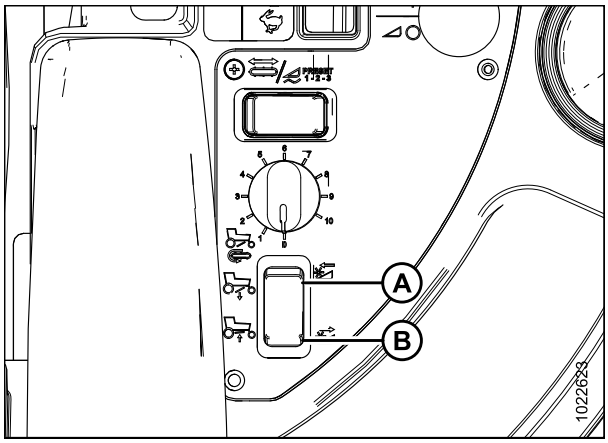


Figure 4.95: Operator's Console

Adjusting Double Windrow Attachment (DWA) Draper Speed

The DWA draper speed is controlled with the rotary switch (A) on the operator's console.

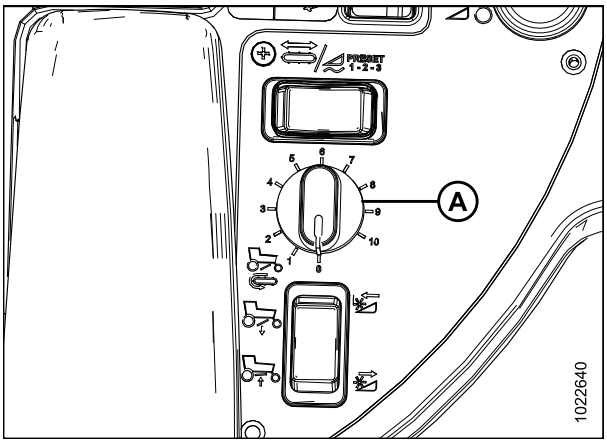


Figure 4.96: Operator's Console

4.4.8 Swath Roller Operation

The swath roller is raised and lowered with the DWA UP (A) and DWA DOWN (B) switches on the ground speed lever (GSL) or with the rocker switch (C) on the operator's console. This depends on how the windrower cab display module (CDM) is programmed during the installation of the Swath Roller kit.

To swap controls from the console to the GSL, refer to *Activating the Double Windrow Attachment (DWA), page 106*.

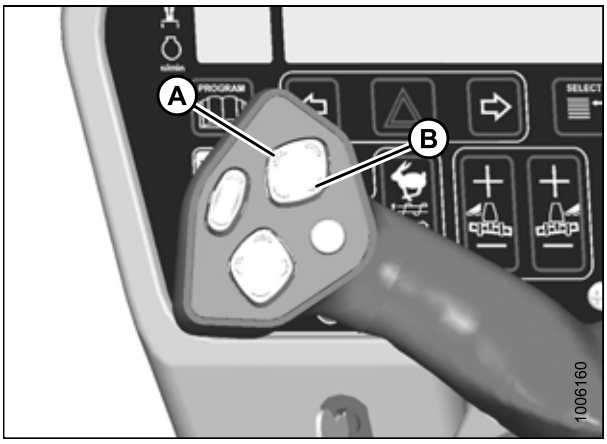


Figure 4.97: GSL

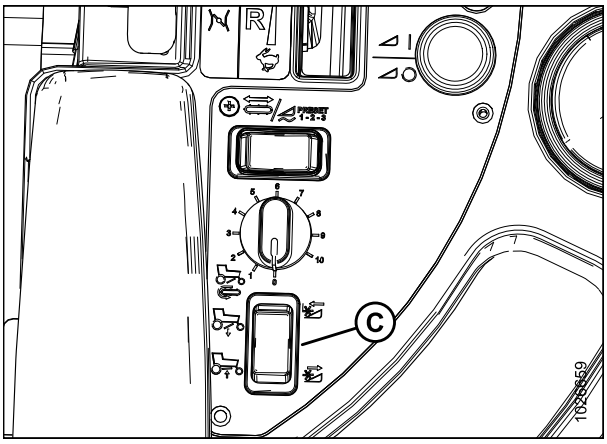


Figure 4.98: Rocker Switch

4.5 Attaching and Detaching Headers

4.5.1 Attaching Header Boots

Header boots are required to attach a D Series or D1 Series Draper Header to the windrower. Attach header boots (supplied with header) to windrower lift linkage if not already installed.

IMPORTANT:

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and **NOT** in engaged position (A).

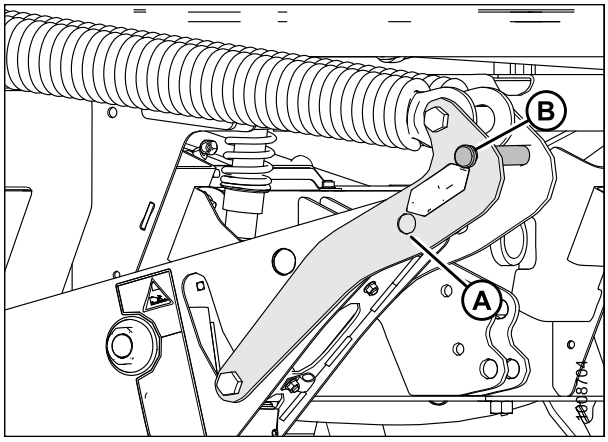


Figure 4.99: Header Float Linkage

1. Remove pin (B) from boot (A).

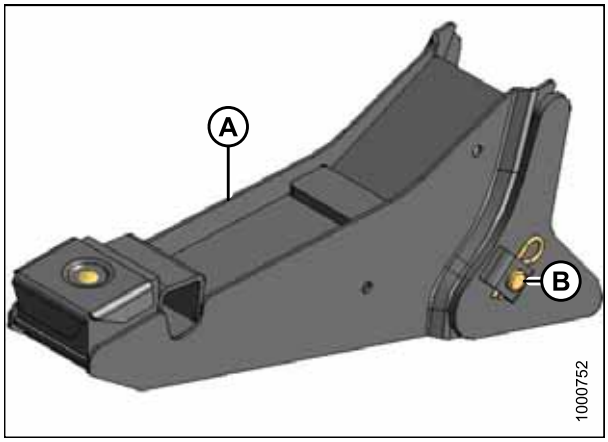


Figure 4.100: Header Boot

2. Position boot (B) onto lift linkage (A) and reinstall pin (C). Pin may be installed from either side of boot.
3. Secure pin (C) with hairpin (D).
4. Repeat for opposite side.

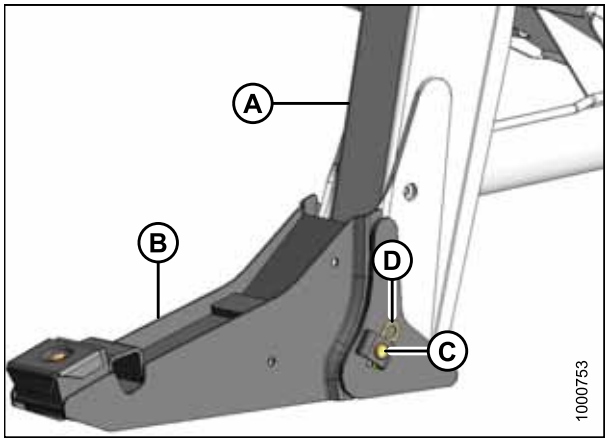


Figure 4.101: Header Boot

4.5.2 Attaching a D Series or D1 Series Header

D50, D60, D65, and D1 Series headers can be attached to an M155*E4* Self-Propelled Windrower.

Refer to the following instructions based on the type of center-link installed on your windrower:

- *Attaching a D Series or D1 Series Header: Hydraulic Center-Link with Optional Self-Alignment, page 219*
- *Attaching a D Series or D1 Series Header: Hydraulic Center-Link without Self-Alignment, page 224*

Attaching a D Series or D1 Series Header: Hydraulic Center-Link with Optional Self-Alignment

NOTE:

Draper header boots must be installed onto the windrower lift linkage before starting this procedure. Refer to *4.5.1 Attaching Header Boots, page 218*.

WARNING

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

1. Remove hairpin (A) from pins (B), and remove pins from both header legs.

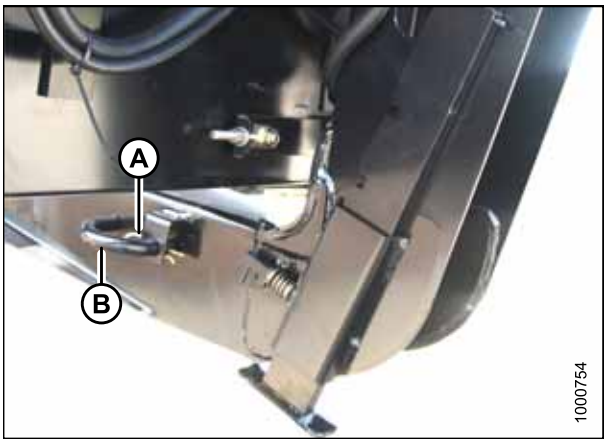


Figure 4.102: Header Leg

CAUTION

Check to be sure all bystanders have cleared the area.

IMPORTANT:

Before starting engine, remove protective cover from exhaust stack.

2. Start the engine and activate the HEADER DOWN button (A) on the ground speed lever (GSL) to fully retract header lift cylinders.

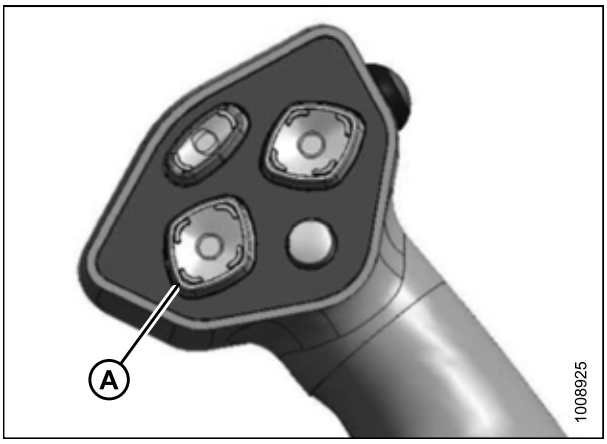


Figure 4.103: Ground Speed Lever

3. Activate the REEL UP switch (A) on the GSL to raise the center-link until the hook is above the attachment pin on the header.

   IMPORTANT:

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

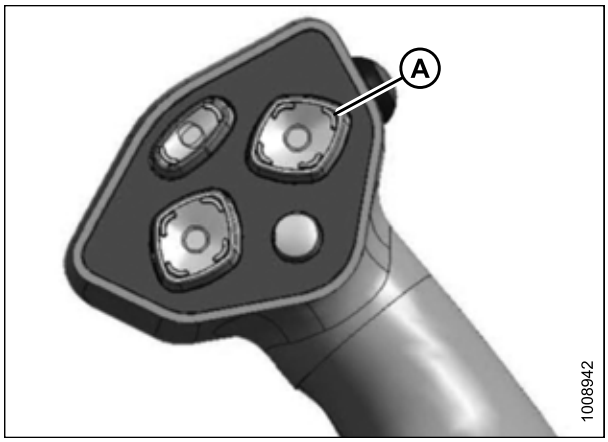


Figure 4.104: Ground Speed Lever

4. Drive the windrower slowly forward until the boots (A) enter the header legs (B). Continue driving slowly forward until lift linkages contact the support plates in the header legs and the header nudges forward.
5. Ensure the lift linkages are properly engaged in the header legs and are contacting the support plates.

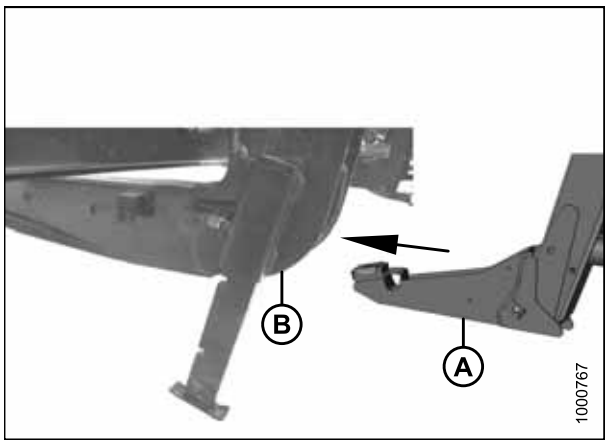


Figure 4.105: Header Leg and Boot

6. Use the following GSL functions to position the center-link hook above the header attachment pin:
   - REEL UP (A) to raise the center-link
   - REEL DOWN (B) to lower the center-link
   - HEADER TILT UP (C) to retract the center-link
   - HEADER TILT DOWN (D) to extend the center-link

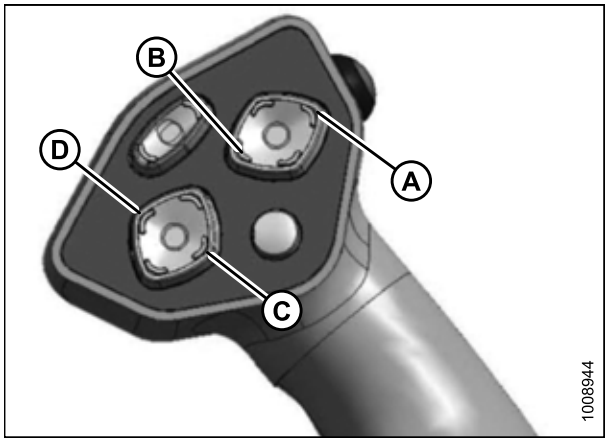


Figure 4.106: Ground Speed Lever

7. Adjust position of the center-link cylinder (A) with the REEL UP, REEL DOWN, AND HEADER TILT switches on the GSL until the hook is above the header attachment pin.

   IMPORTANT:

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

8. Lower center-link (A) onto the header with the REEL DOWN switch on the GSL until it locks into position (hook release [B] is down).

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

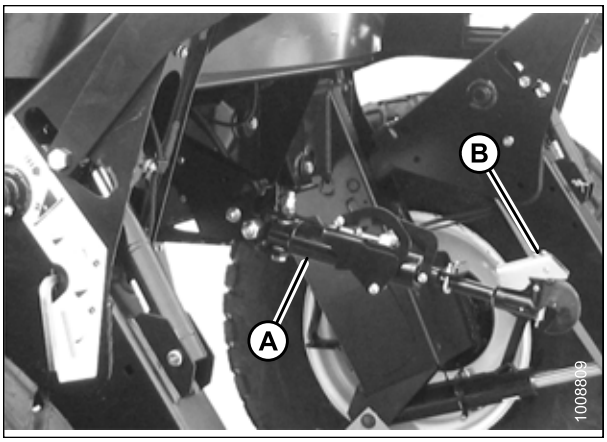


Figure 4.107: Hydraulic Center-Link

CAUTION

Check to be sure all bystanders have cleared the area.

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

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

    a. Press and hold the HEADER UP switch until both cylinders stop moving.

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

    NOTE:

    It may be necessary to repeat this procedure if there is air in the system.

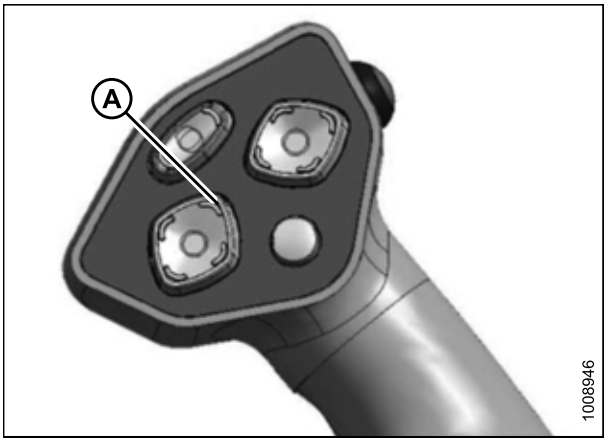


Figure 4.108: Ground Speed Lever

12. Engage the safety props on both lift cylinders as follows:
    a. Stop engine and remove key from ignition.
    b. Pull lever (A) and rotate towards the header to release and lower safety prop (B) onto the lift cylinder.
    c. Repeat for opposite lift cylinder.

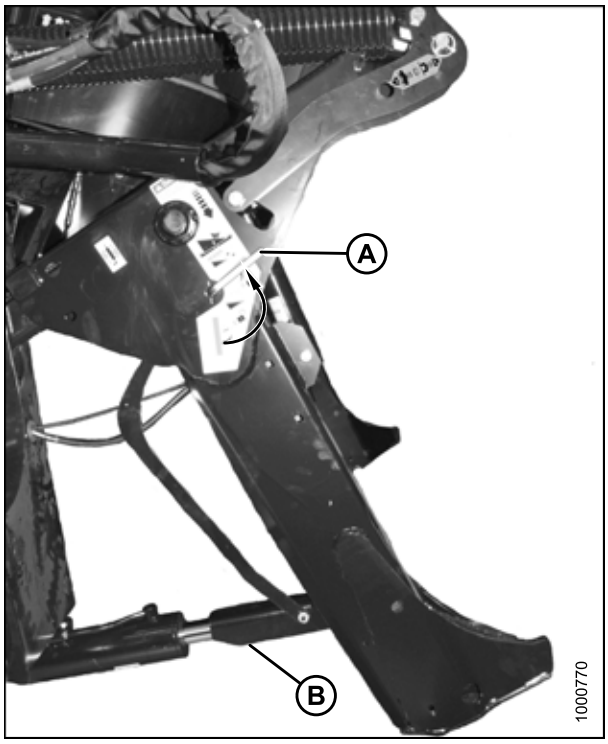


Figure 4.109: Safety Prop

13. Install pin (B) through the header leg (engaging U-bracket in lift linkage) on both sides and secure with hairpin (A).
14. Raise header stand (D) to storage position by pulling spring pin (C) and lifting stand into uppermost position. Release spring pin.

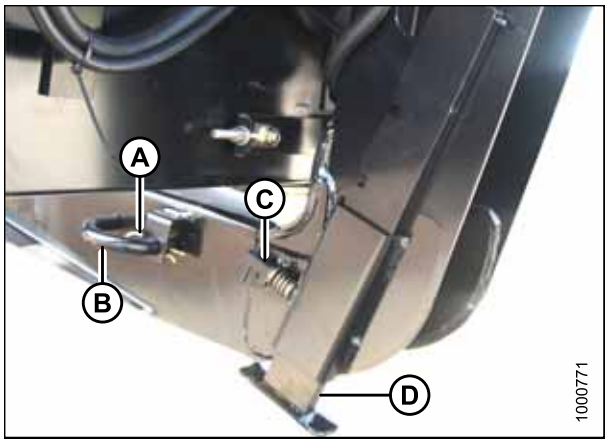


Figure 4.110: Header Leg

15. Remove the clevis pin from storage position (B) in linkage and insert into hole (A) to engage the float springs. Secure with hairpin.

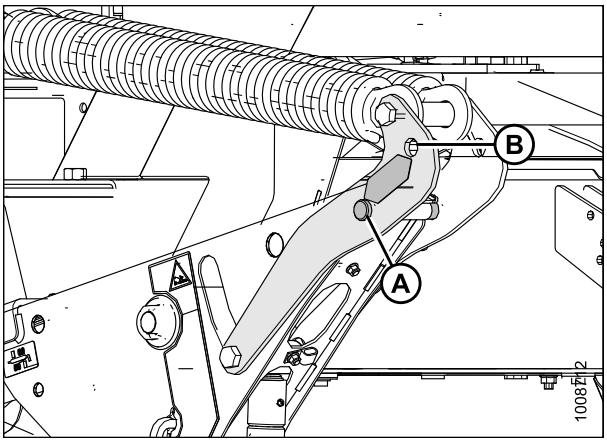


Figure 4.111: Header Float Linkage

16. Disengage the safety prop by turning lever (A) downwards until lever locks into vertical position.
17. Repeat for opposite safety prop.

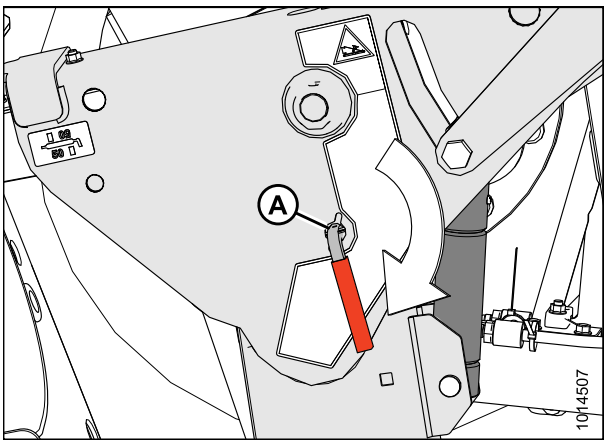


Figure 4.112: Safety Prop Lever

CAUTION

Check to be sure all bystanders have cleared the area.

18. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.
19. Stop engine and remove key from ignition.

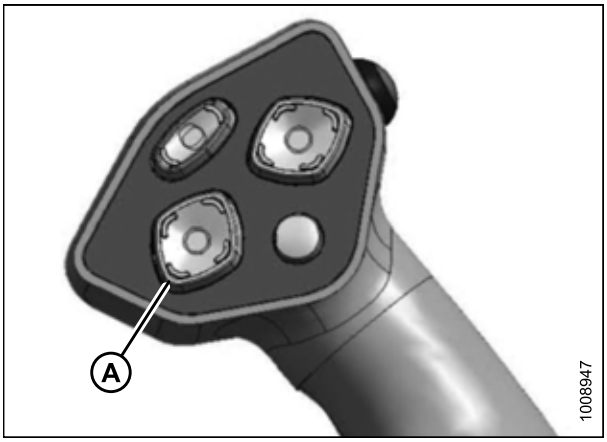


Figure 4.113: Ground Speed Lever

20. Connect header drive hoses (A) and electrical harness (B) to header. Refer to the header operator's manual.

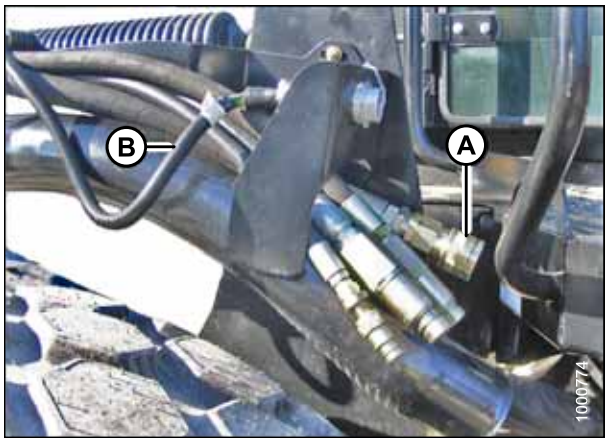


Figure 4.114: Header Drive Hoses and Harness

21. Connect reel hydraulics (A) at right cab-forward side of windrower. Refer to the draper header operator's manual.

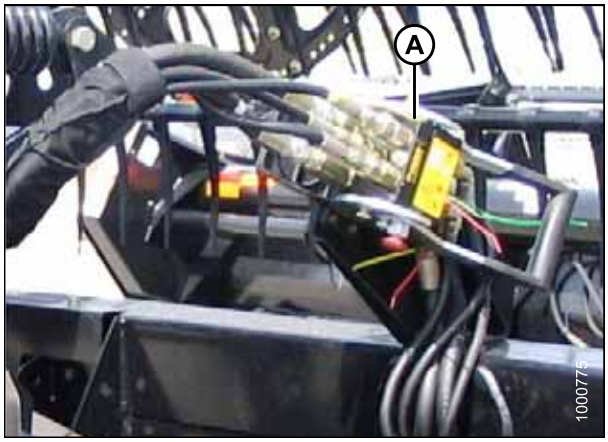


Figure 4.115: Reel Hydraulics

Attaching a D Series or D1 Series Header: Hydraulic Center-Link without Self-Alignment

NOTE:

Draper header boots must be installed onto the windrower lift linkage before starting this procedure. Refer to *4.5.1 Attaching Header Boots, page 218*.

⚠ WARNING

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

1. Remove hairpin (A) from pins (B), and remove pins from both header legs.

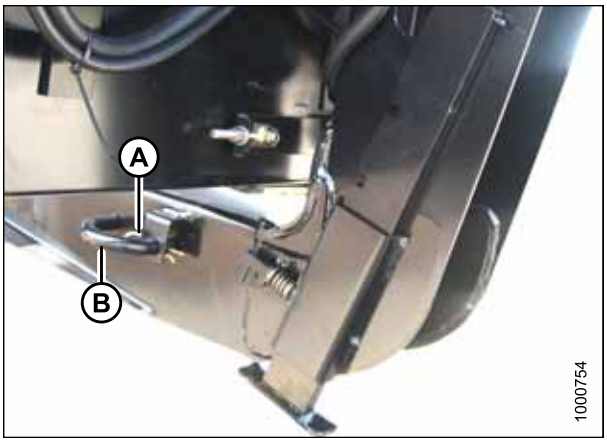


Figure 4.116: Header Leg

CAUTION

Check to be sure all bystanders have cleared the area.

IMPORTANT:

Before starting engine, remove protective cover from exhaust stack.

2. Start the engine and activate the HEADER DOWN button (A) on the ground speed lever (GSL) to fully retract header lift cylinders.

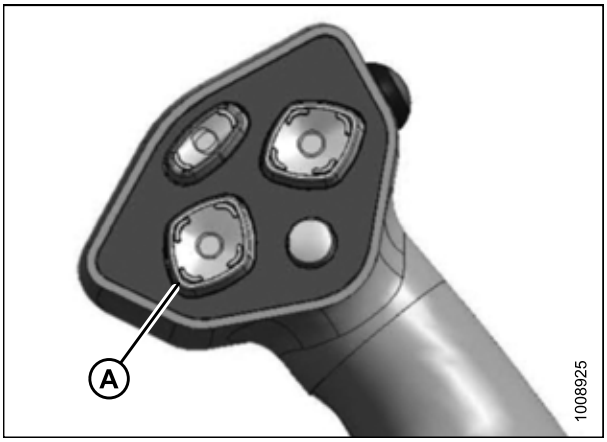


Figure 4.117: Ground Speed Lever

3. Remove pin (A) pin in frame linkage and raise center-link (B) until hook is above the attachment pin on header. Replace pin (A) to hold center-link in place.

IMPORTANT:

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

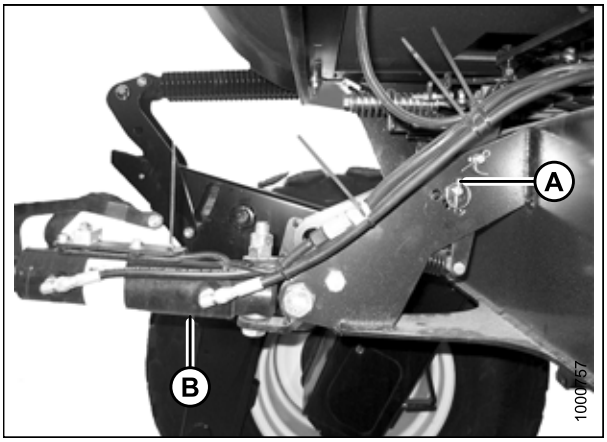


Figure 4.118: Hydraulic Center-Link without Self-Alignment Kit

4. Drive the windrower slowly forward until the boots (A) enter the header legs (B). Continue driving slowly forward until lift linkages contact the support plates in the header legs and the header nudges forward.
5. Ensure the lift linkages are properly engaged in the header legs and are contacting the support plates.

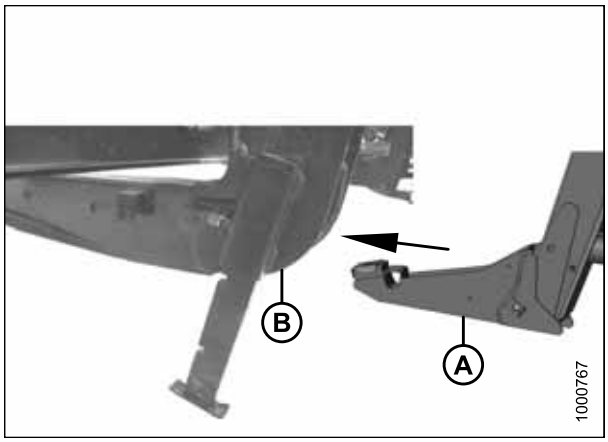


Figure 4.119: Header Leg and Boot

6. Use the following GSL functions to position the center-link hook above the header attachment pin:
   - HEADER TILT UP (A) to retract the center-link
   - HEADER TILT DOWN (B) to extend the center-link
7. Stop engine and remove key from ignition.

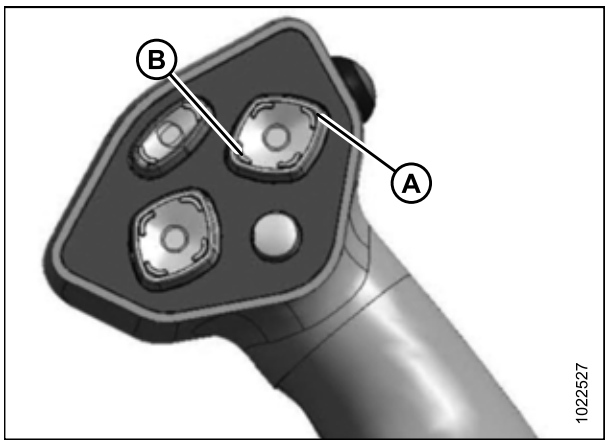


Figure 4.120: Ground Speed Lever

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

   IMPORTANT:

   The hook release must be down to enable the self-locking mechanism. If the release is open (up), manually push it down after hook engages header pin.
9. Check that center-link (A) is locked onto the header by pulling upward on rod end (B) of cylinder.

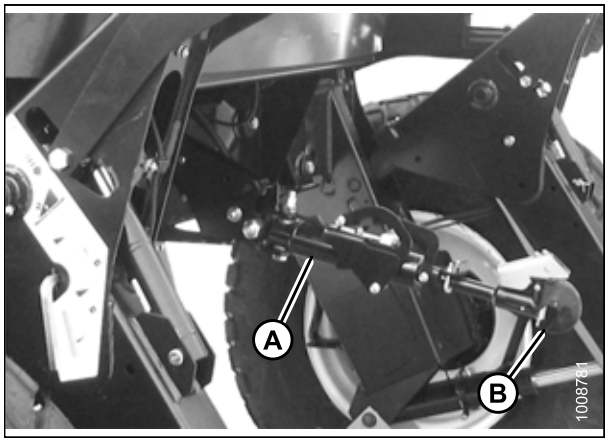


Figure 4.121: Hydraulic Center-Link

CAUTION

Check to be sure all bystanders have cleared the area.

10. Start the engine.
11. Press the HEADER UP switch (A) to raise the header to maximum height.
12. If one end of the header does **NOT** fully raise, rephase the lift cylinders as follows:
    a. Press and hold the HEADER UP switch until both cylinders stop moving.
    b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.

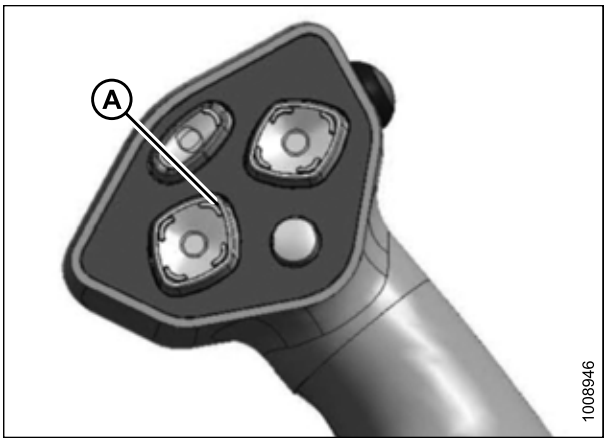


Figure 4.122: Ground Speed Lever

NOTE:

It may be necessary to repeat this procedure if there is air in the system.

13. Engage the safety props on both lift cylinders as follows:
    a. Stop engine and remove key from ignition.
    b. Pull lever (A) and rotate towards the header to release and lower safety prop (B) onto the lift cylinder.
    c. Repeat for opposite lift cylinder.

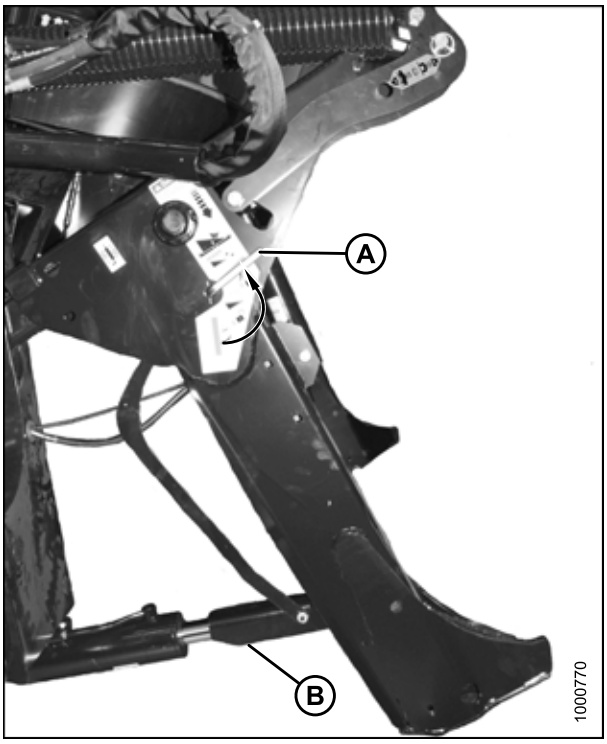


Figure 4.123: Safety Prop

14. Install pin (B) through the header leg (engaging U-bracket in lift linkage) on both sides and secure with hairpin (A).
15. Raise header stand (D) to storage position by pulling spring pin (C) and lifting stand into uppermost position. Release spring pin.

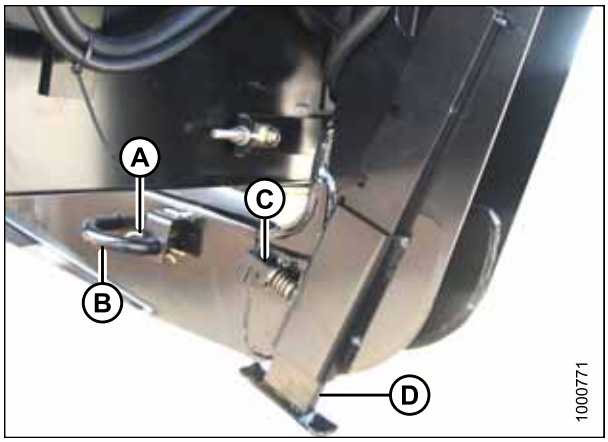


Figure 4.124: Header Leg

16. Remove the clevis pin from storage position (B) in linkage and insert into hole (A) to engage the float springs. Secure with hairpin.

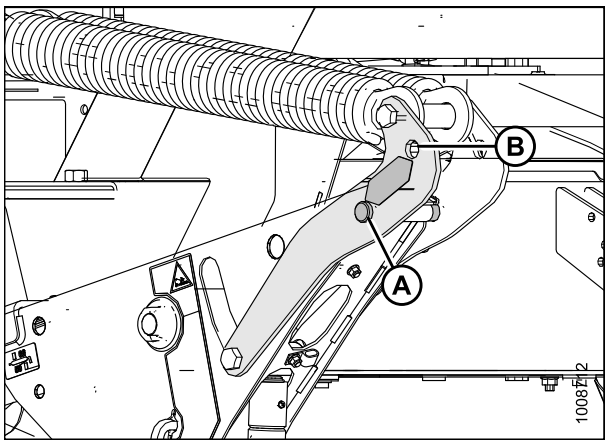


Figure 4.125: Header Float Linkage

17. Disengage the safety prop by turning lever (A) downwards until lever locks into vertical position.
18. Repeat for opposite safety prop.

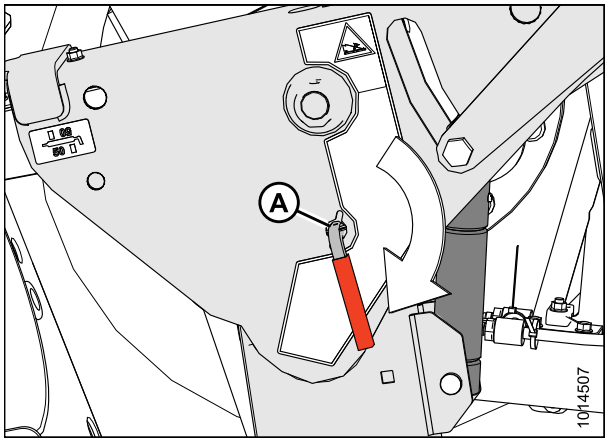


Figure 4.126: Safety Prop Lever

CAUTION

Check to be sure all bystanders have cleared the area.

19. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.
20. Stop engine and remove key from ignition.

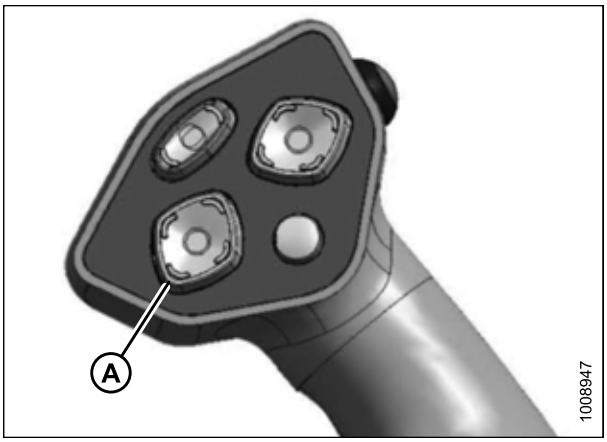


Figure 4.127: Ground Speed Lever

21. Connect header drive hoses (A) and electrical harness (B) to header. Refer to the header operator's manual.

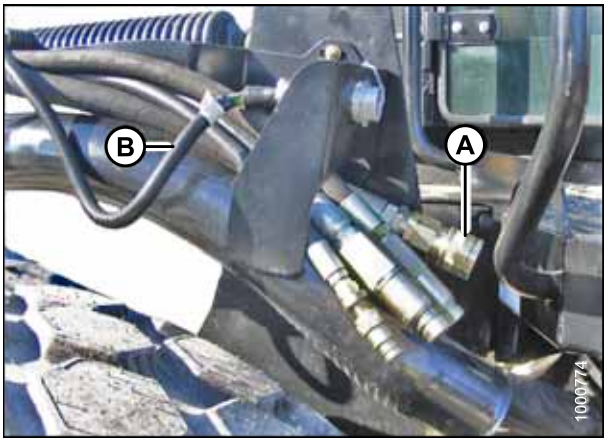


Figure 4.128: Header Drive Hoses and Harness

22. Connect reel hydraulics (A) at right cab-forward side of windrower. Refer to the draper header operator's manual.

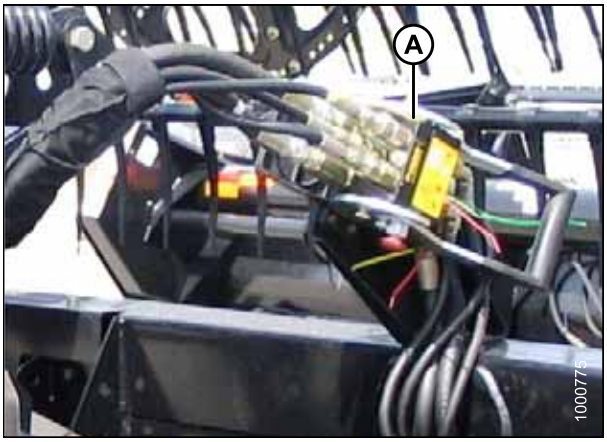


Figure 4.129: Reel Hydraulics

4.5.3 Detaching a D Series or D1 Series Header

Detaching a D Series or D1 Series Header: Hydraulic Center-Link

WARNING

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

1. Start engine and press HEADER UP switch (A) to raise header to maximum height.
2. Rephase cylinders if one end of the header does not raise fully. If rephasing is required, proceed as follows:
   a. Press and hold the HEADER UP switch (A) until both cylinders stop moving.
   b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.
3. Stop engine, and remove key.

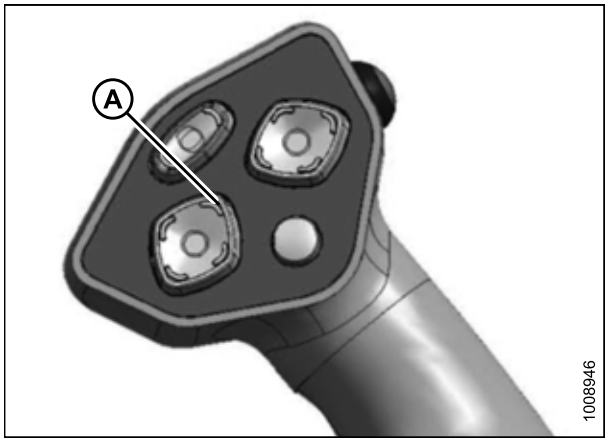


Figure 4.130: Ground Speed Lever (GSL)

4. Pull lever (A) and rotate toward header to lower safety prop (B) onto cylinder. Repeat for opposite cylinder.

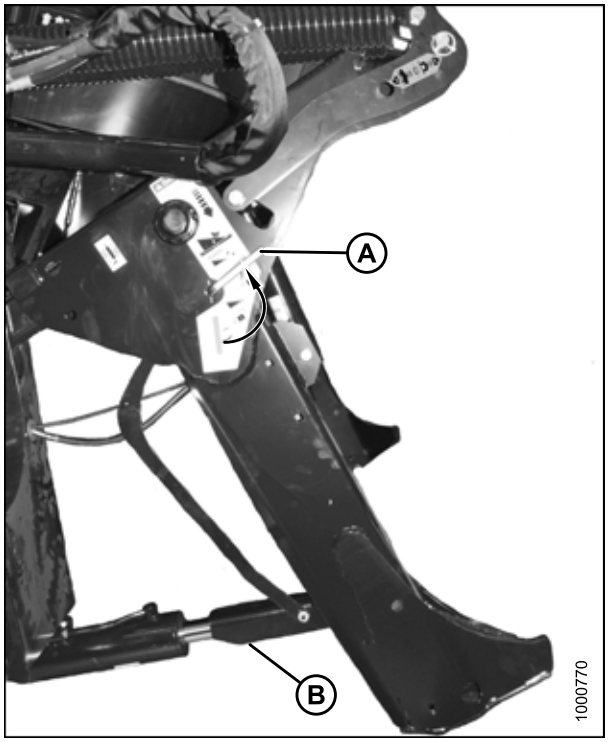


Figure 4.131: Safety Prop

5. Remove the pin (B) by removing the hairpin (A) from header leg on both sides.
6. Lower header stand (D) by pulling spring loaded pin (C). Release spring pin to lock stand.

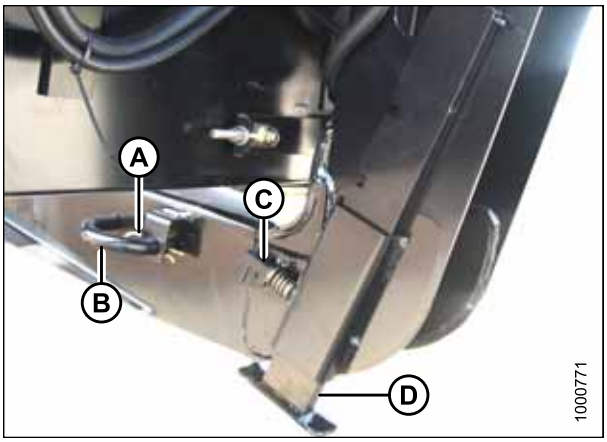


Figure 4.132: Header Stand

7. Remove clevis pin from location (A) to disengage float springs and insert in storage hole (B). Secure with lynch pin.

CAUTION

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and NOT in engaged position (A).

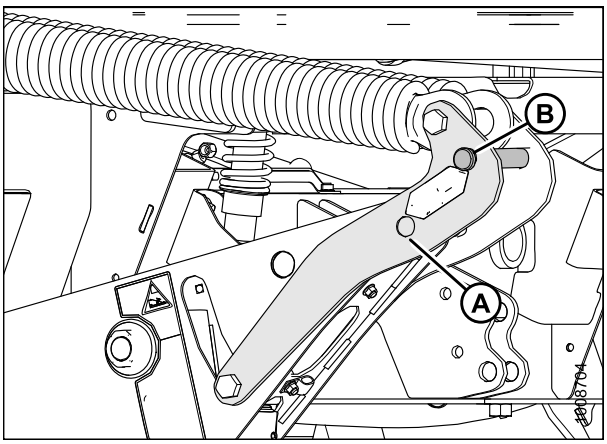


Figure 4.133: Header Float Linkage

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

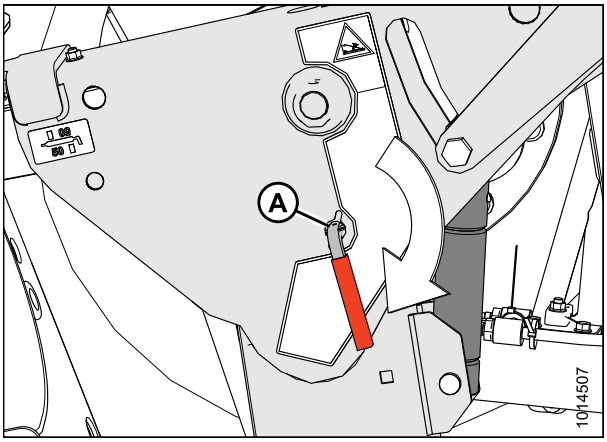


Figure 4.134: Safety Prop

11. Disconnect header drive hydraulics (A) and electrical harness (B) from header and store in support on windrower left cab-forward side. Refer to the draper header operator's manual for further information.

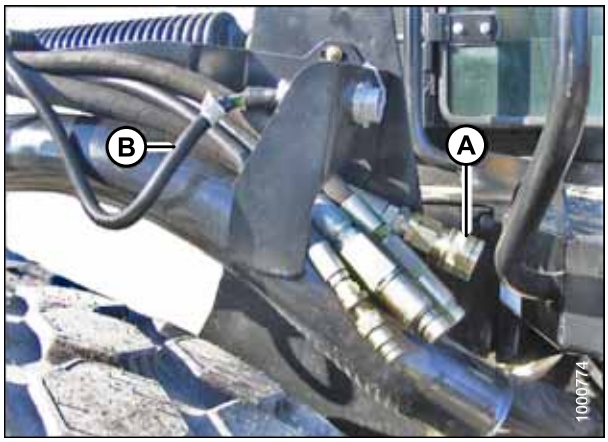


Figure 4.135: Header Drive Hydraulics

12. Disconnect reel hydraulics (A) from header and store on bracket at windrower left cab-forward side. Refer to the draper header operator's manual for further information.

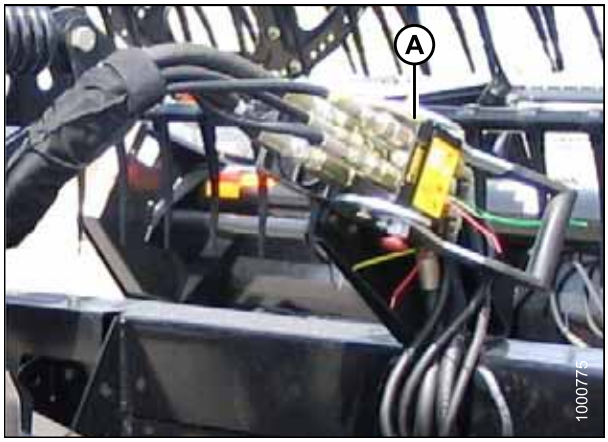


Figure 4.136: Reel Hydraulics

CAUTION

Check to be sure all bystanders have cleared the area.

13. Start the engine, and activate HEADER TILT UP (A) and HEADER TILT DOWN (B) cylinder switches on the ground speed lever (GSL) to release load on the center-link cylinder.

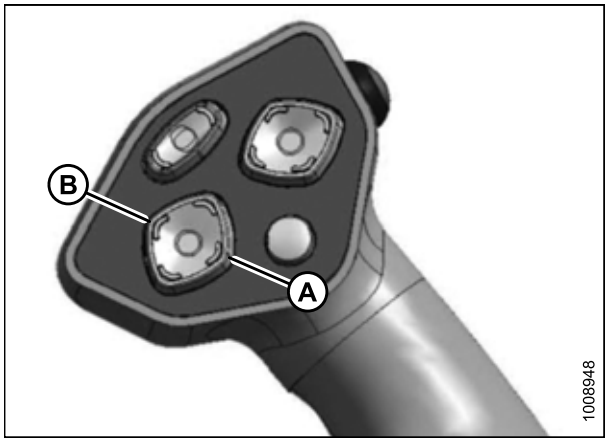


Figure 4.137: Ground Speed Lever

14. Disconnect center-link by lifting release (B) and hook (A) off header.

    NOTE:

    If optional center-link self-alignment kit is installed, lift release (B) and then operate the link lift cylinder with REEL UP switch on the GSL to disengage the center-link from the header.

    NOTE:

    If hay conditioner is installed, watch clearances on both sides.

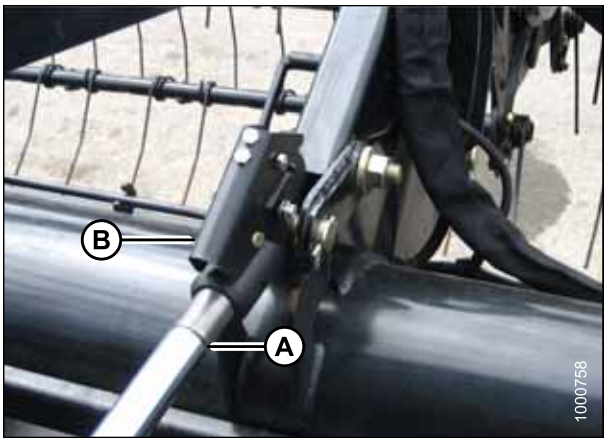


Figure 4.138: Hydraulic Center-Link

15. Reinstall pin (A) into header leg and secure with a hairpin (B).

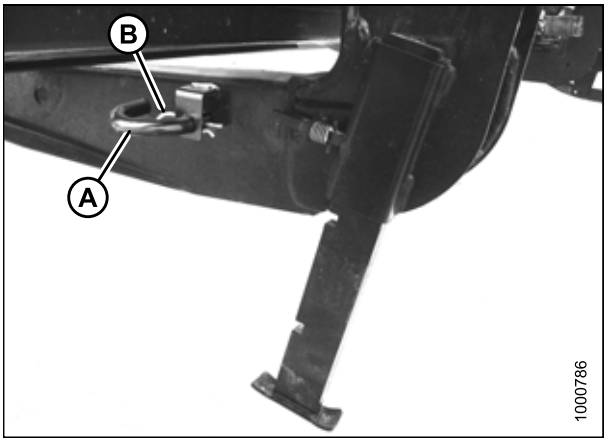


Figure 4.139: Header Stand

4.5.4 Attaching an A Series Header

A30D, A30S, and A40D headers can be attached to an M155*E4* Self-Propelled Windrower.

Refer to the following instructions based on the type of center-link installed on your windrower:

- *Attaching an A Series Header: Hydraulic Center-Link with Optional Self-Alignment, page 233*
- *Attaching an A Series Header: Hydraulic Center-Link without Self-Alignment, page 239*

Attaching an A Series Header: Hydraulic Center-Link with Optional Self-Alignment

WARNING

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

1. Remove hairpin (A) from clevis pin (B) and remove clevis pin from the header boots (C) on both sides of the header.

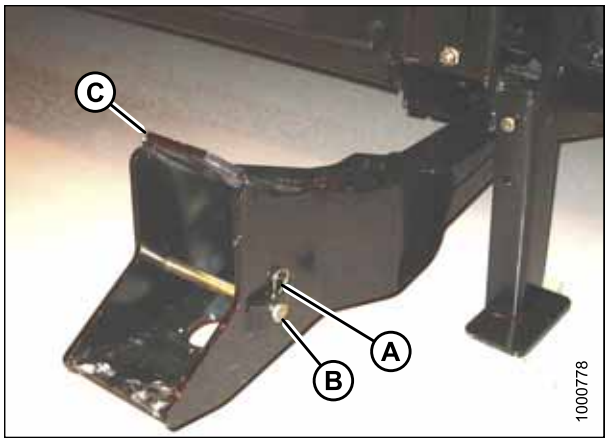


Figure 4.140: Header Boot

IMPORTANT:

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and **NOT** in engaged position (A).

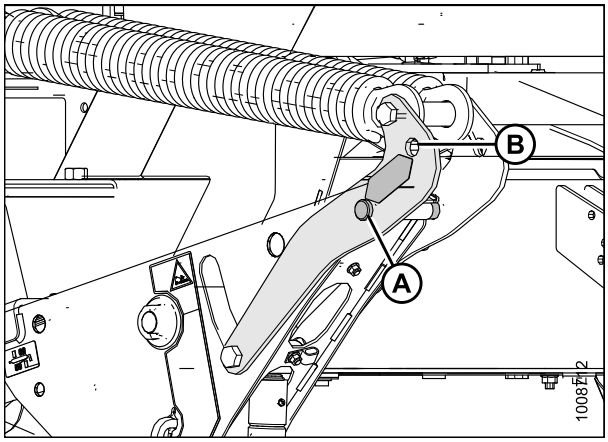


Figure 4.141: Header Float Linkage

CAUTION

Check to be sure all bystanders have cleared the area.

IMPORTANT:

Before starting engine, remove protective cover from exhaust stack.

2. Start the engine and activate the HEADER DOWN button (A) on the ground speed lever (GSL) to fully retract header lift cylinders.

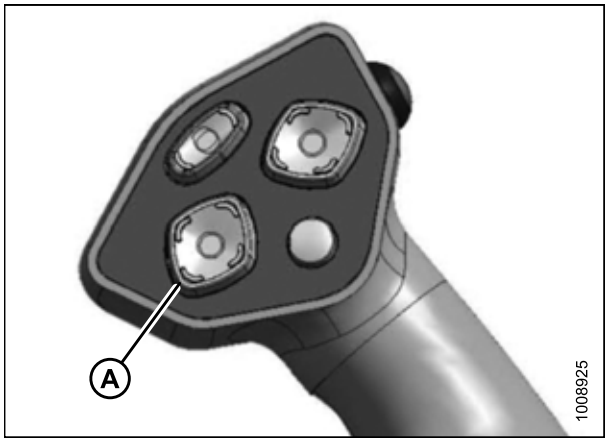


Figure 4.142: Ground Speed Lever

3. Activate the REEL UP switch (A) on the GSL to raise the center-link until the hook is above the attachment pin on the header.

   IMPORTANT:

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

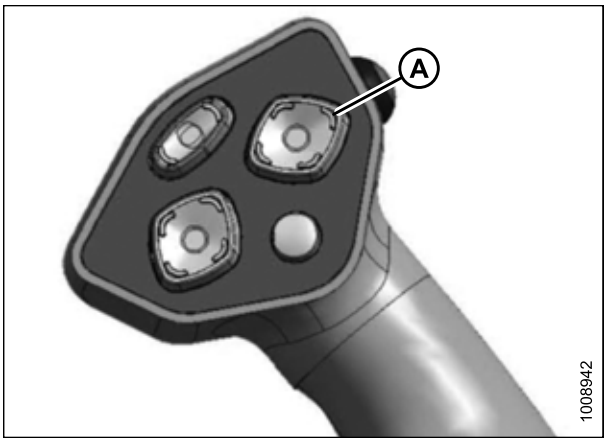


Figure 4.143: Ground Speed Lever

4. Drive the windrower slowly forward until the windrower feet (A) enter the header supports (B). Continue driving slowly forward until the feet engage the supports and the header nudges forward.

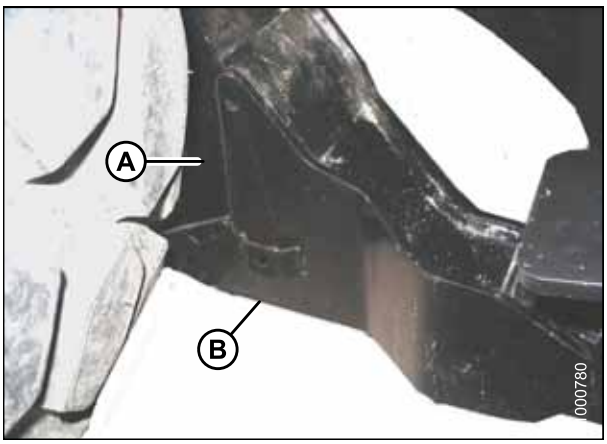


Figure 4.144: Header Support

5. Use the following GSL functions to position the center-link hook above the header attachment pin:
   - REEL UP (A) to raise the center-link
   - REEL DOWN (B) to lower the center-link
   - HEADER TILT UP (C) to retract the center-link
   - HEADER TILT DOWN (D) to extend the center-link

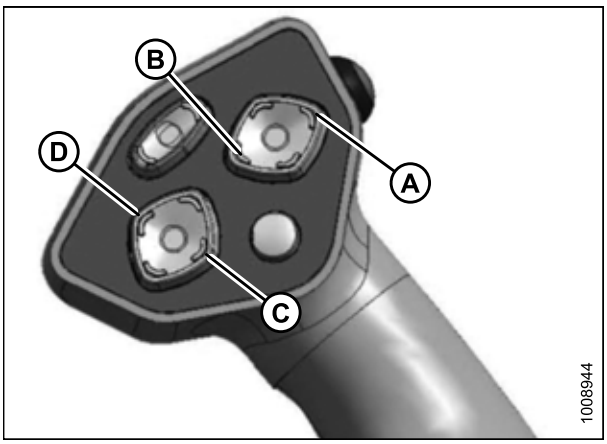


Figure 4.145: Ground Speed Lever

6. Adjust center-link cylinder (A) position with the REEL UP and REEL DOWN switches on the GSL until the hook is positioned above the header attachment pin.

   IMPORTANT:

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

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

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

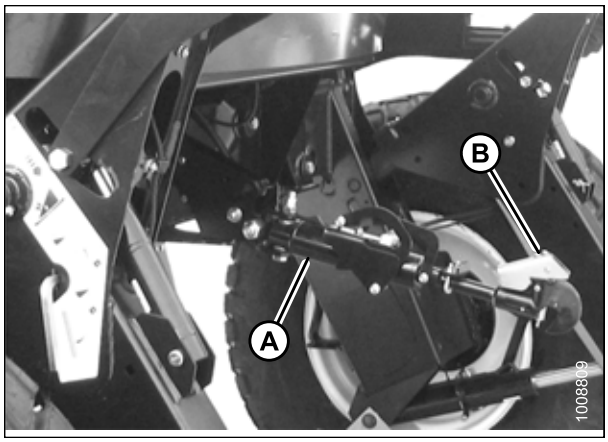


Figure 4.146: Hydraulic Center-Link

CAUTION

Check to be sure all bystanders have cleared the area.

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

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

    a. Press and hold the HEADER UP switch until both cylinders stop moving.

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

    NOTE:

    It may be necessary to repeat this procedure if there is air in the system.

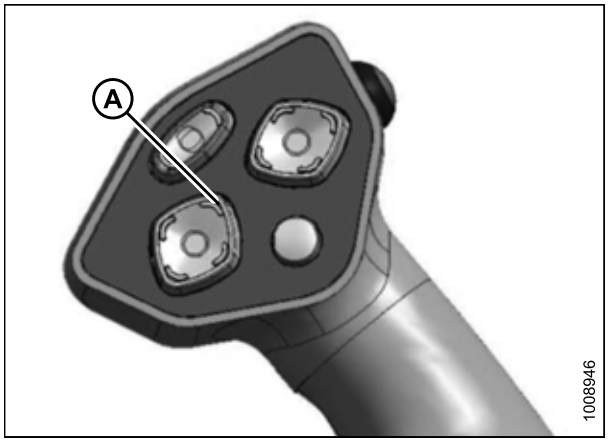


Figure 4.147: Ground Speed Lever

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

    a. Stop engine and remove key from ignition.

    b. Pull lever (A) and rotate towards the header to release and lower safety prop (B) onto the lift cylinder.

    c. Repeat for opposite lift cylinder.

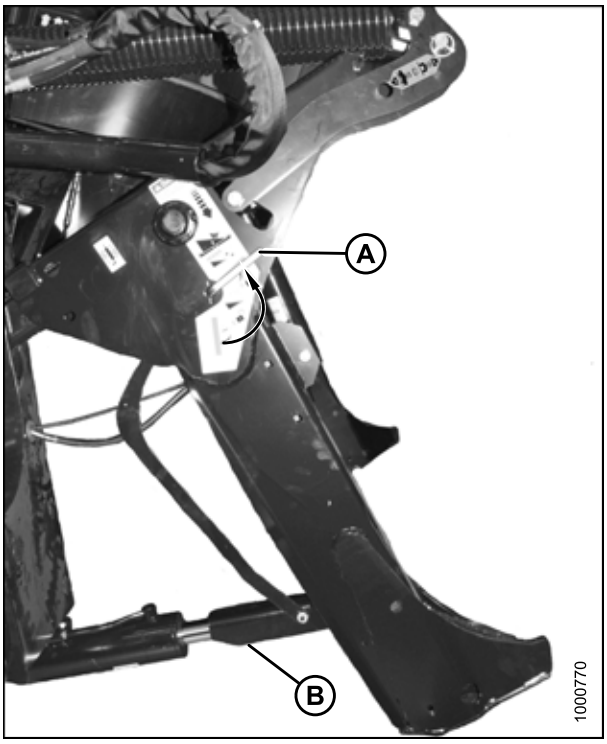


Figure 4.148: Safety Prop

12. Install clevis pin (A) through support and foot and secure with hairpin. Repeat for opposite support.

    IMPORTANT:

    Ensure clevis pin (A) is fully inserted and hairpin is installed behind bracket.

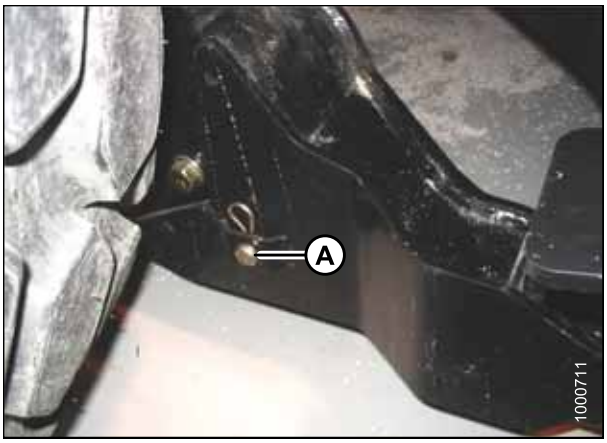


Figure 4.149: Header Support

13. Remove lynch pin from clevis pin (A) in stand (B).
14. Hold stand (B) and remove pin (A).
15. Move stand (B) to storage position by inverting and relocating onto bracket as shown. Reinsert clevis pin (A) and secure with lynch pin.

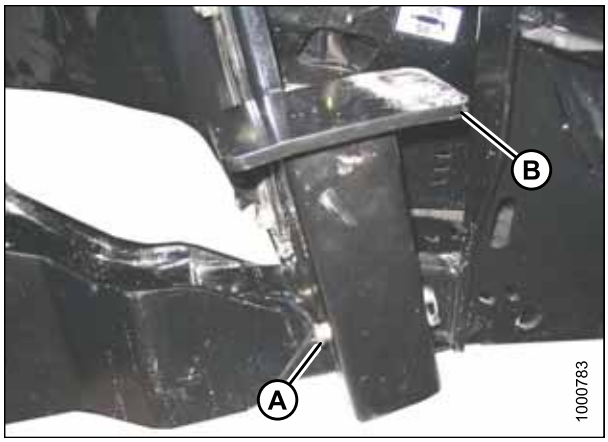


Figure 4.150: Header Stand

16. Remove the clevis pin from storage position (B) in linkage and insert into hole (A) to engage the float springs. Secure with hairpin.

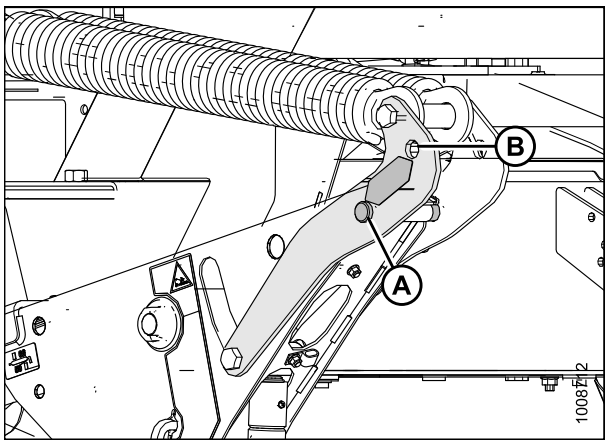


Figure 4.151: Header Float Linkage

17. Disengage the safety prop by turning lever (A) downwards until lever locks into vertical position.
18. Repeat for opposite safety prop.

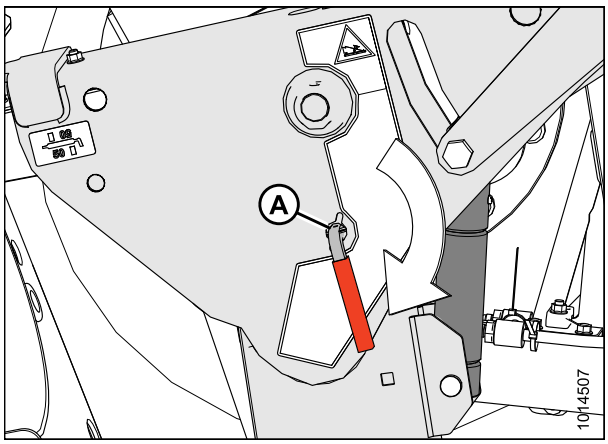


Figure 4.152: Safety Prop Lever

CAUTION

Check to be sure all bystanders have cleared the area.

19. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.
20. Stop engine and remove key from ignition.

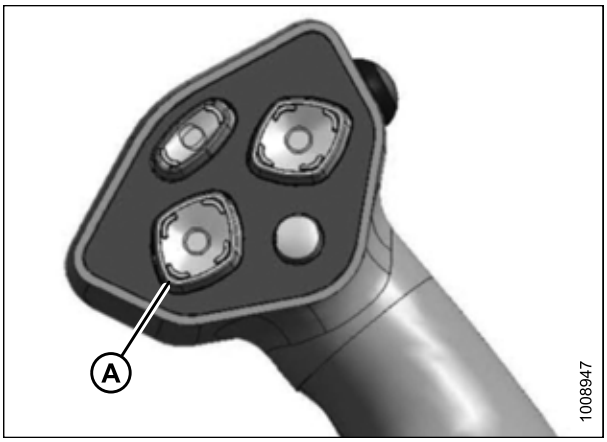


Figure 4.153: Ground Speed Lever

21. Connect header drive hoses (A) and electrical harness (B) to header. Refer to the header operator's manual.

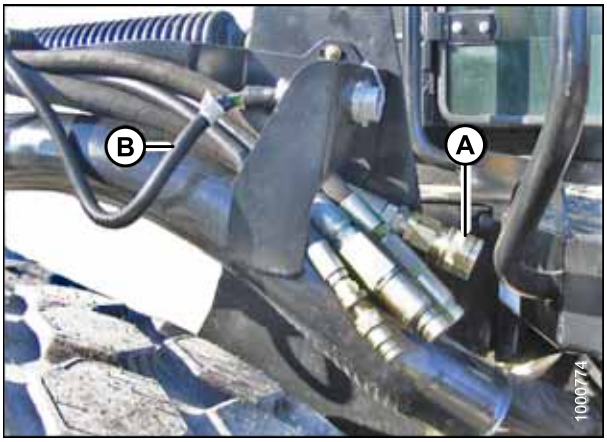


Figure 4.154: Header Drive Hoses and Harness

Attaching an A Series Header: Hydraulic Center-Link without Self-Alignment

WARNING

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

1. Remove hairpin (A) from clevis pin (B) and remove clevis pin from the header boots (C) on both sides of the header.

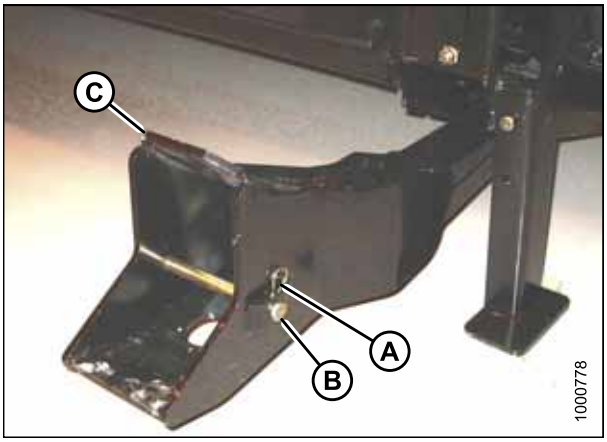


Figure 4.155: Header Boot

IMPORTANT:

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and **NOT** in engaged position (A).

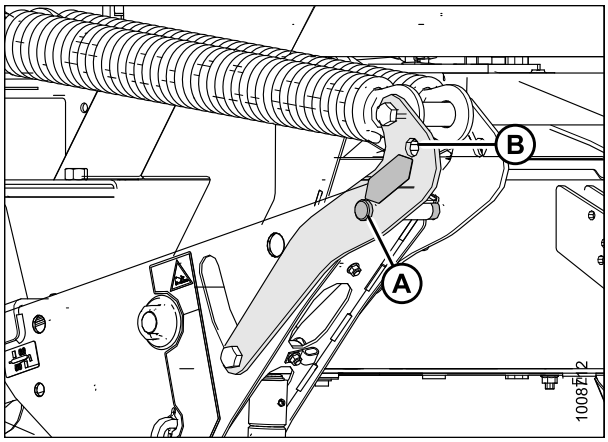


Figure 4.156: Header Float Linkage

CAUTION

Check to be sure all bystanders have cleared the area.

IMPORTANT:

Before starting engine, remove protective cover from exhaust stack.

2. Start the engine and activate the HEADER DOWN button (A) on the ground speed lever (GSL) to fully retract header lift cylinders.

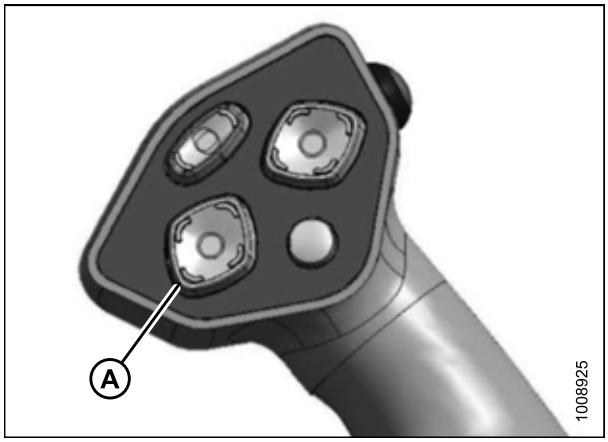


Figure 4.157: Ground Speed Lever

3. Remove pin (A) pin in frame linkage and raise center-link (B) until hook is above the attachment pin on header. Replace pin (A) to hold center-link in place.

IMPORTANT:

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

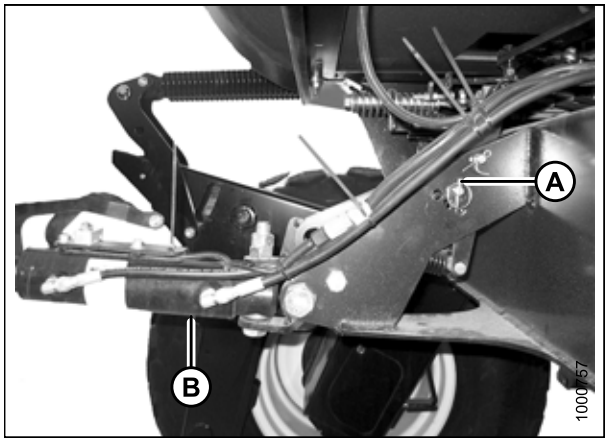


Figure 4.158: Hydraulic Center-Link without Self-Alignment Kit

4. Drive the windrower slowly forward until the windrower feet (A) enter the header supports (B). Continue driving slowly forward until the feet engage the supports and the header nudges forward.

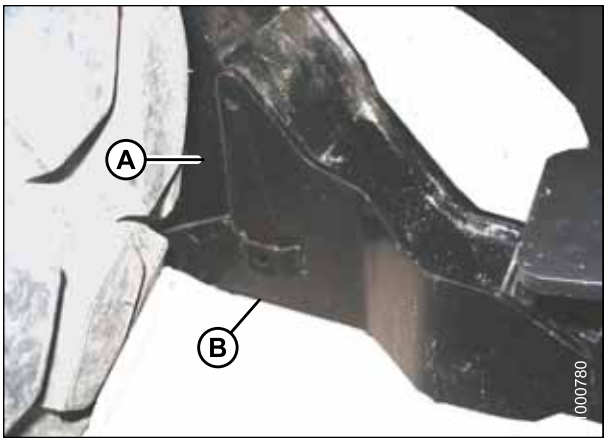


Figure 4.159: Header Support

5. Use the following ground speed lever functions to position the center-link hook above the header attachment pin:
   - HEADER TILT UP (A) to retract center-link
   - HEADER TILT DOWN (B) to extend center-link
6. Stop engine and remove key from ignition.

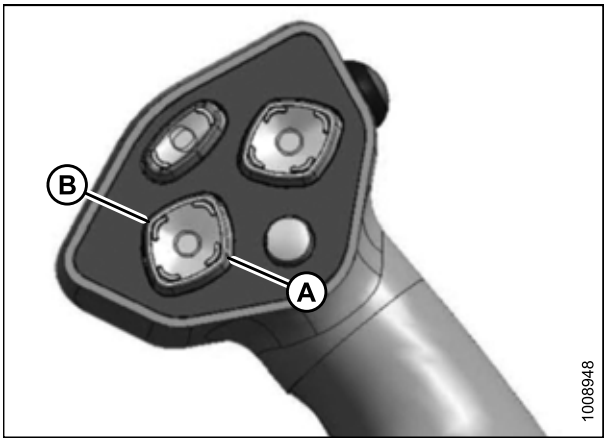


Figure 4.160: Ground Speed Lever

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

   IMPORTANT:

   The hook release must be down to enable the self-locking mechanism. If the release is open (up), manually push it down after hook engages header pin.
8. Check that center-link (A) is locked onto the header by pulling upward on rod end (B) of cylinder.

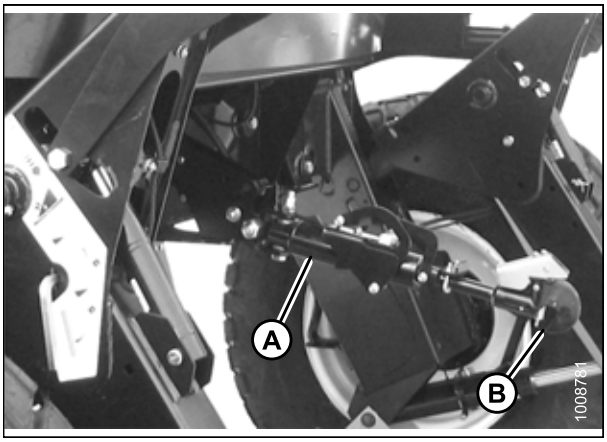


Figure 4.161: Hydraulic Center-Link

CAUTION

Check to be sure all bystanders have cleared the area.

9. Start the engine.
10. Press the HEADER UP switch (A) to raise header to maximum height.
11. If one end of the header does **NOT** fully raise, rephase the lift cylinders as follows:
    a. Press and hold the HEADER UP switch until both cylinders stop moving.
    b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.

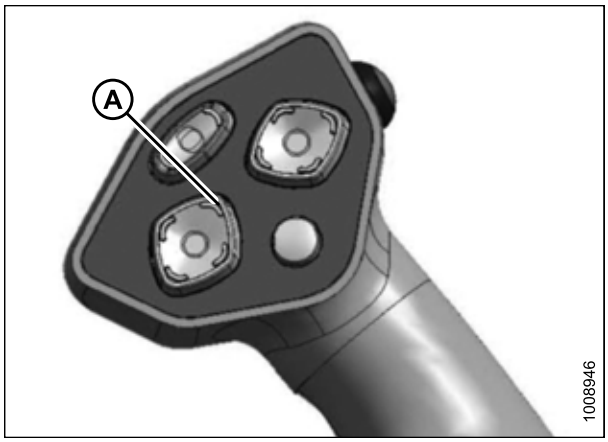


Figure 4.162: Ground Speed Lever

NOTE:

It may be necessary to repeat this procedure if there is air in the system.

12. Engage the safety props on both lift cylinders as follows:
    a. Stop engine and remove key from ignition.
    b. Pull lever (A) and rotate towards the header to release and lower safety prop (B) onto the lift cylinder.
    c. Repeat for opposite lift cylinder.

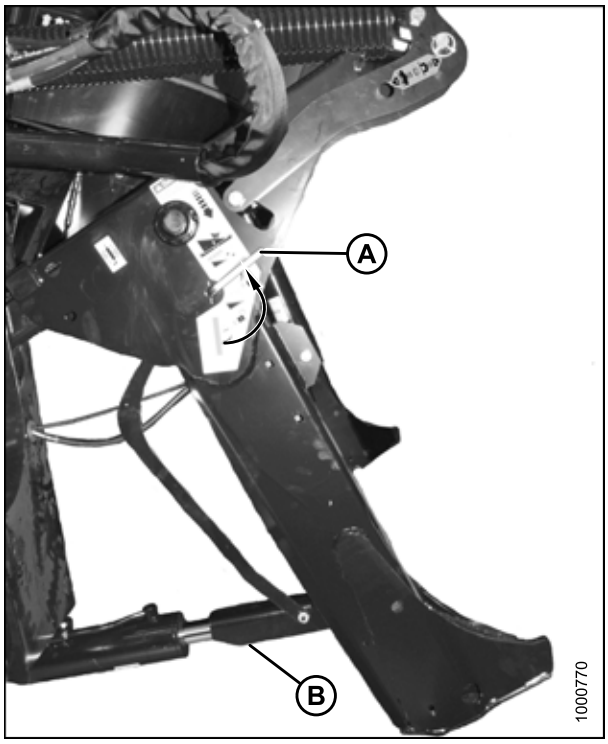


Figure 4.163: Safety Prop

13. Install clevis pin (A) through support and foot and secure with hairpin. Repeat for opposite support.

    IMPORTANT:

    Ensure clevis pin (A) is fully inserted and hairpin is installed behind bracket.

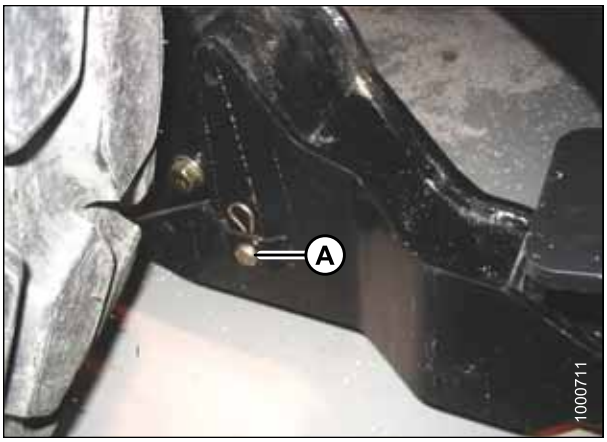


Figure 4.164: Header Support

14. Remove lynch pin from clevis pin (A) in stand (B).
15. Hold stand (B) and remove pin (A).
16. Move stand (B) to storage position by inverting and relocating onto bracket as shown. Reinsert clevis pin (A) and secure with lynch pin.

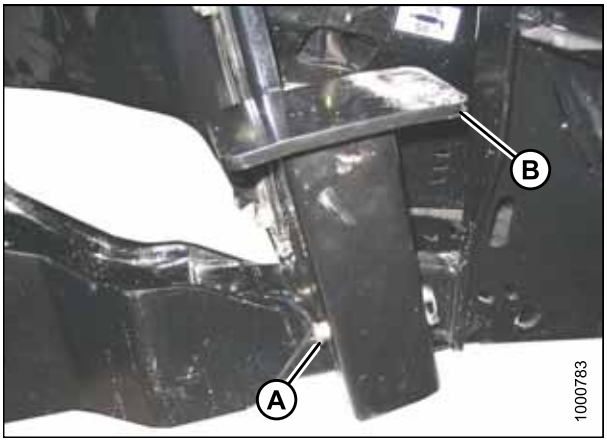


Figure 4.165: Header Stand

17. Remove the clevis pin from storage position (B) in linkage and insert into hole (A) to engage the float springs. Secure with hairpin.

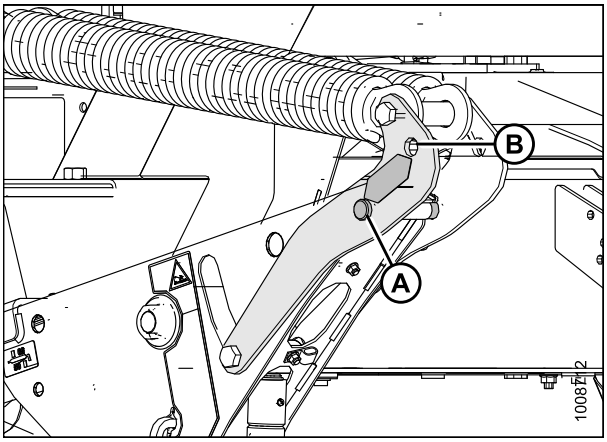


Figure 4.166: Header Float Linkage

18. Disengage the safety prop by turning lever (A) downwards until lever locks into vertical position.
19. Repeat for opposite safety prop.

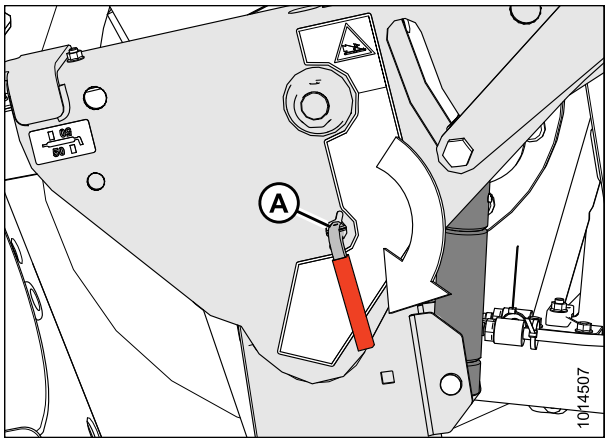


Figure 4.167: Safety Prop Lever

CAUTION

Check to be sure all bystanders have cleared the area.

20. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.
21. Stop engine and remove key from ignition.

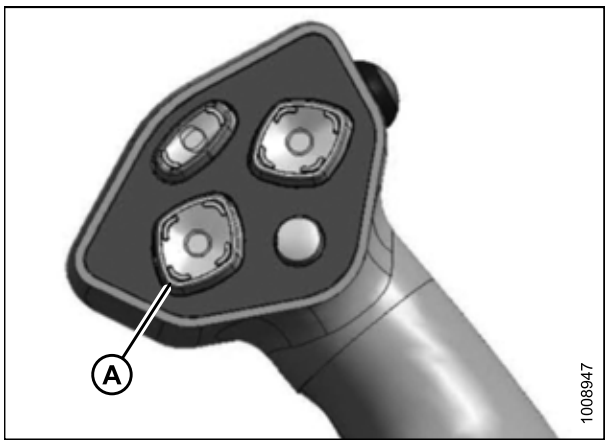


Figure 4.168: Ground Speed Lever

22. Connect header drive hoses (A) and electrical harness (B) to header. Refer to the header operator's manual.

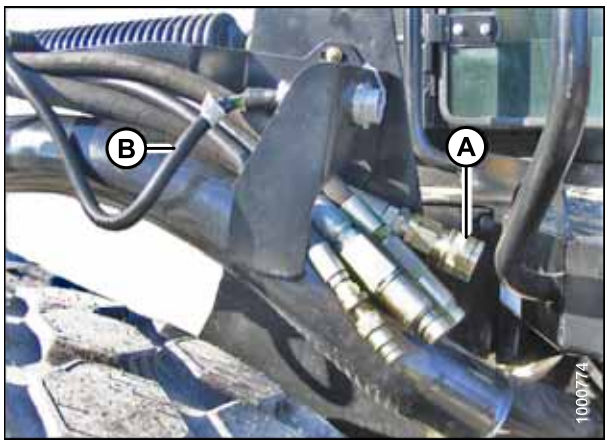


Figure 4.169: Header Drive Hoses and Harness

4.5.5 Detaching an A Series Header

Detaching an A Series Header: Hydraulic Center-Link

WARNING

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

1. Start the engine and press HEADER UP switch (A) on the ground speed lever (GSL) to raise the header to maximum height.
2. If one end of the header does **NOT** raise fully, rephase the cylinders as follows:
   a. Press and hold the HEADER UP switch (A) until both cylinders stop moving.
   b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.
3. Stop the engine and remove the key.

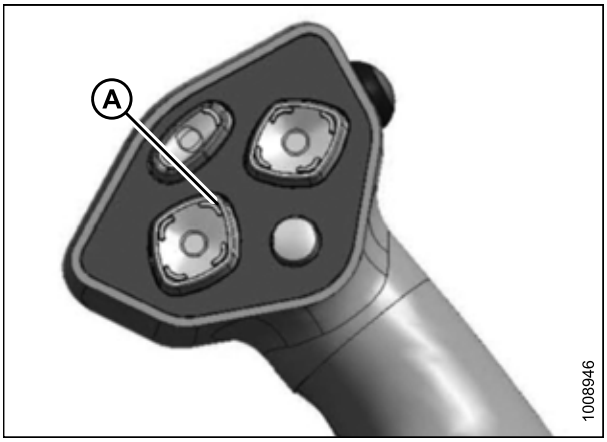


Figure 4.170: Ground Speed Lever

DANGER

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

4. Pull lever (A) and rotate toward header to lower safety prop (B) onto cylinder. Repeat for opposite cylinder.

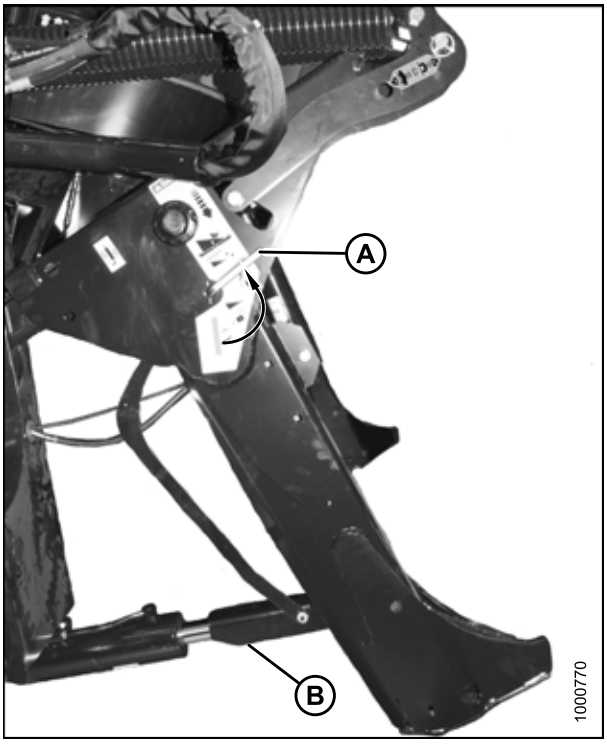


Figure 4.171: Safety Prop

5. Remove the hairpin from clevis pin (A), and remove clevis pin from header boots (B) on both sides.

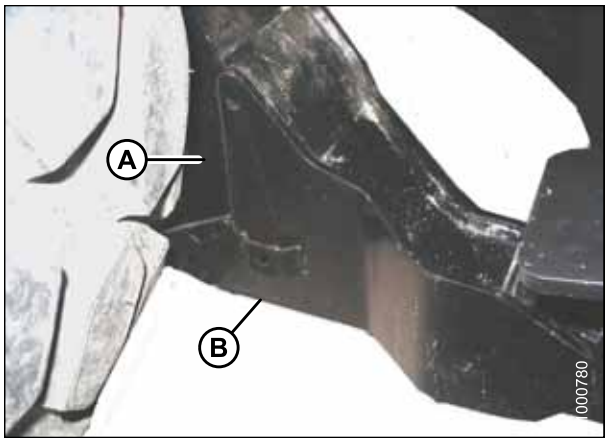


Figure 4.172: Header Boot

6. Lower stand (A) by pulling clevis pin (B), inverting stand, and relocating on bracket. Reinsert pin (B) and secure with hairpin.

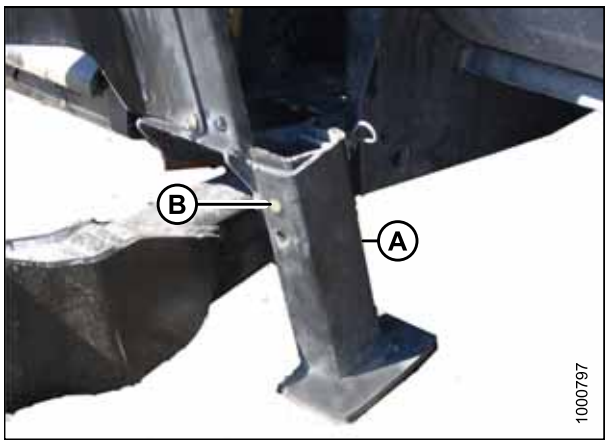


Figure 4.173: Header Stand

CAUTION

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and NOT in engaged position (A).

7. Remove the lynch pin from the clevis pin, and remove the clevis pin from linkage (A) to disengage float springs, and insert clevis pin into storage hole (B). Secure with lynch pin. Repeat for opposite linkage.

CAUTION

Check to be sure all bystanders have cleared the area.

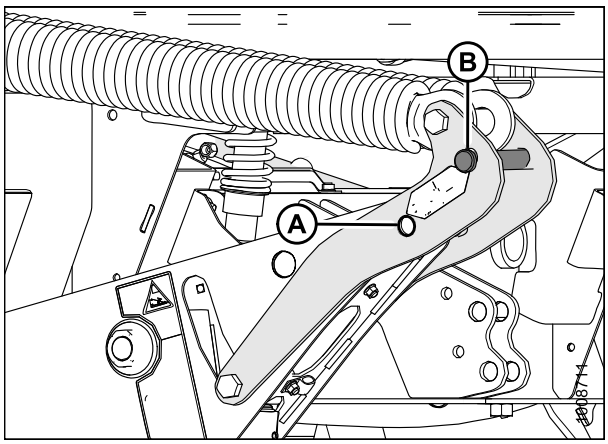


Figure 4.174: Header Float Linkage

8. Disengage safety props by turning lever (A) away from header to raise safety prop until lever locks into vertical position. Repeat for opposite cylinder.
9. Start the engine, choose a level area, and lower the header to the ground.

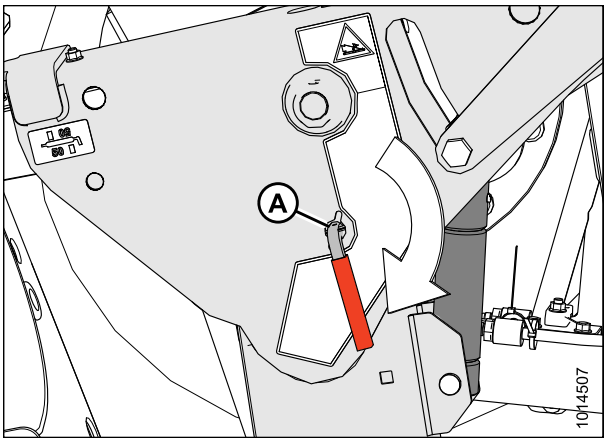


Figure 4.175: Safety Props

10. Activate HEADER TILT UP (A) and HEADER TILT DOWN (B) cylinder switches on the GSL to release load on center-link cylinder.

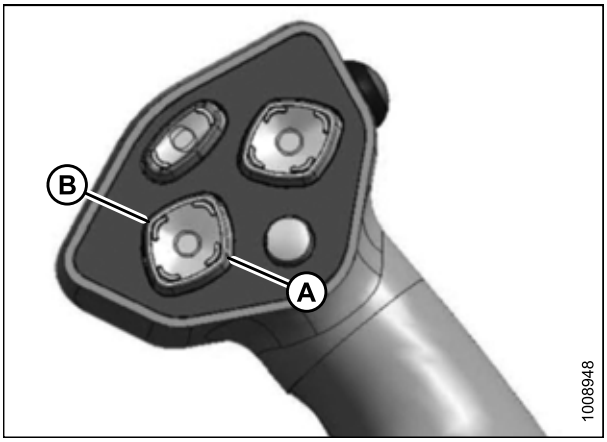


Figure 4.176: Ground Speed Lever

11. Stop the engine and remove the key from the ignition.
12. Lift hook release (C) and lift hook (B) off header pin.

    NOTE:

    If optional center-link self-alignment kit is installed, lift release (C) and then operate the link lift cylinder (A) with REEL UP switch on the GSL to disengage the center-link from the header.

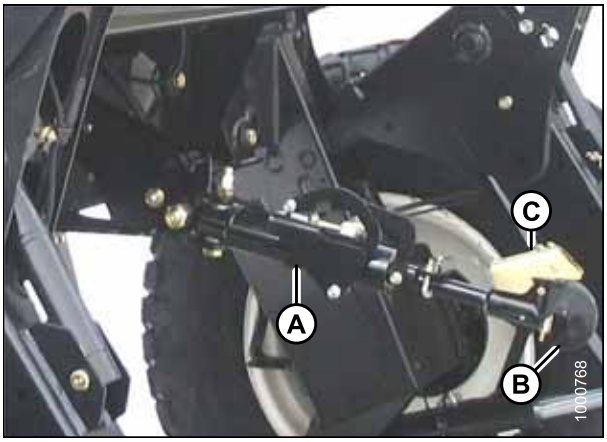


Figure 4.177: Hydraulic Center-Link

13. Disconnect header drive hydraulics (A) and electrical harness (B). Refer to the auger header operator's manual.
14. Back the windrower slowly away from the header.

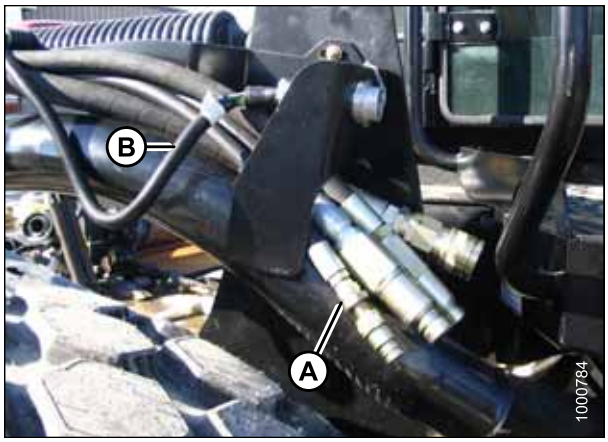


Figure 4.178: Header Drive Hydraulics

15. Reinstall clevis pin (B) into header boot (C) and secure with hairpin (A). Repeat for opposite side.

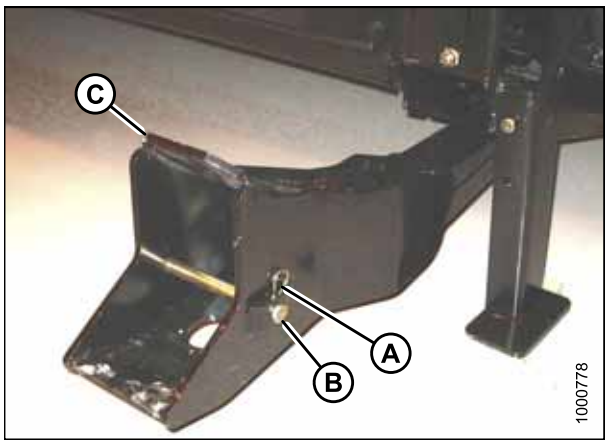


Figure 4.179: Header Boots

4.5.6 Attaching to an R/R1 Series Header

R and R1 Series Rotary Disc Header can be attached to an M155*E4* Self-Propelled Windrower.

NOTE:

The 18.4 x 26 drive tire is recommended on the M155*E4* Self-Propelled Windrower when operated with a 4 m (13 ft.) R80 and R85 Disc Header. These drive tires are reversible and should be mounted inset at 3792 mm (149.3 in.) to provide maximum clearance to uncut crop. Mounting these tires outset or mounting all other drive tire options will result in windrower tires slightly wider than the header width. This may cause some uncut crop to be trampled by tires in turns and corners during windrower operation, and may leave some uncut strips of crop in the windrower's next pass.

Refer to the procedure that is appropriate for the center-link installed on the windrower:

- *Attaching an R/R1 Series Header: Hydraulic Center-Link with Optional Self-Alignment, page 248*
- *Attaching an R/R1 Series Header: Hydraulic Center-Link without Optional Self-Alignment, page 254*

Attaching an R/R1 Series Header: Hydraulic Center-Link with Optional Self-Alignment

CAUTION

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

1. Remove hairpin (B) from clevis pin (A) and remove clevis pin from the header supports (C) on both sides of the header.

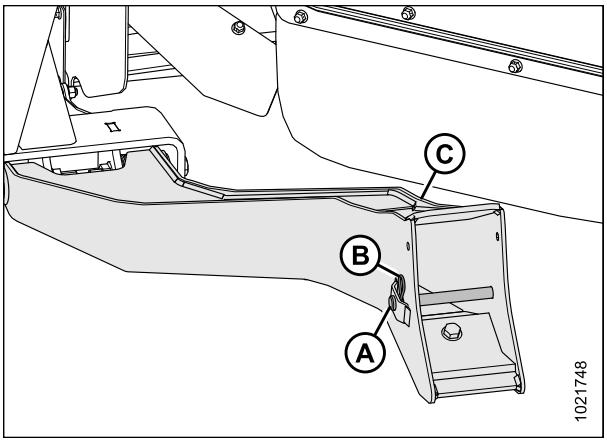


Figure 4.180: Header Support

IMPORTANT:

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and **NOT** in engaged position (A).

2. Remove the clevis pin from linkage (A) to disengage float springs, and insert clevis pin into storage hole (B). Secure with lynch pin. Repeat for opposite linkage.

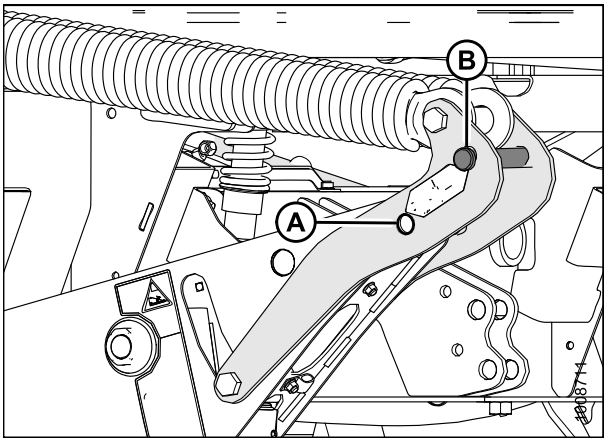


Figure 4.181: Float Linkage

CAUTION

Check to be sure all bystanders have cleared the area.

3. Start the engine and press the HEADER DOWN button (A) on the ground speed lever (GSL) to fully retract header lift cylinders.

IMPORTANT:

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

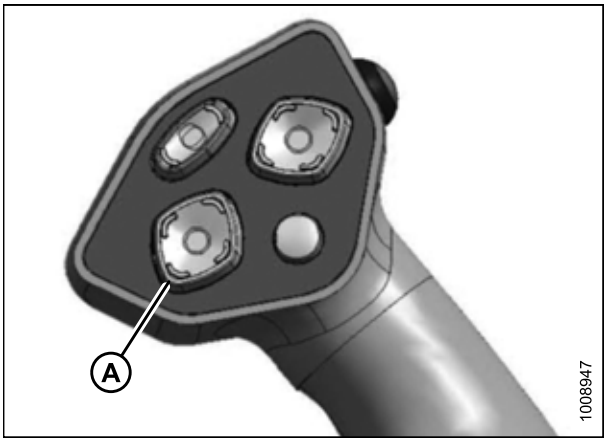


Figure 4.182: Ground Speed Lever

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

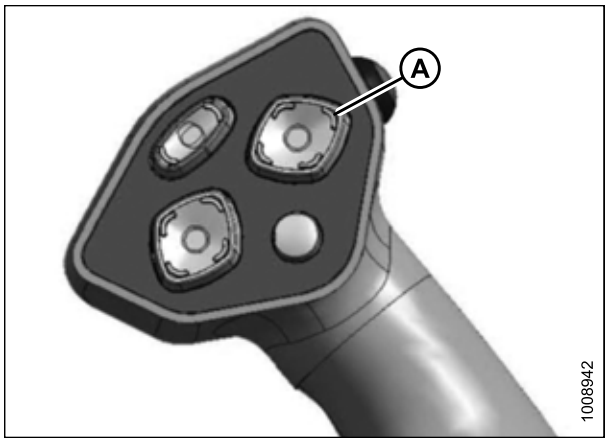


Figure 4.183: Ground Speed Lever

5. Slowly drive the windrower forward until the windrower feet (A) enter the header supports (B). Continue driving slowly forward until the feet engage the supports and the header nudges forward.

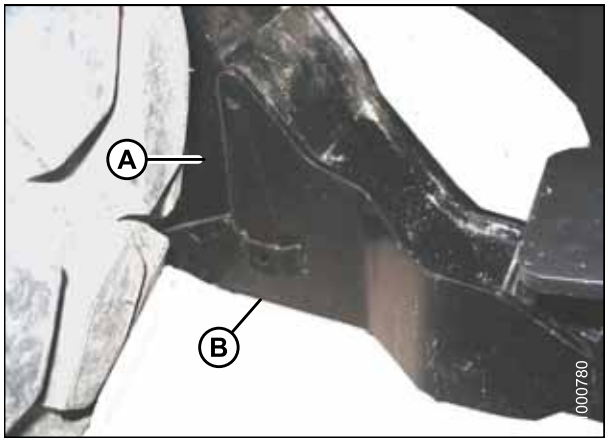


Figure 4.184: Header Support

6. Use the following GSL functions to position the center-link hook above the header attachment pin:
   - REEL UP (A) to raise the center-link
   - REEL DOWN (B) to lower the center-link
   - HEADER TILT UP (C) to retract the center-link
   - HEADER TILT DOWN (D) to extend the center-link

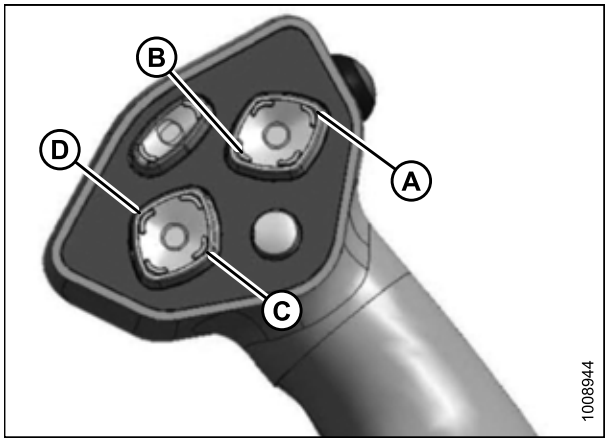


Figure 4.185: Ground Speed Lever

7. Adjust center-link cylinder (A) position with the REEL UP and REEL DOWN switches on the GSL until the hook is positioned above the header attachment pin.

   IMPORTANT:

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

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

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

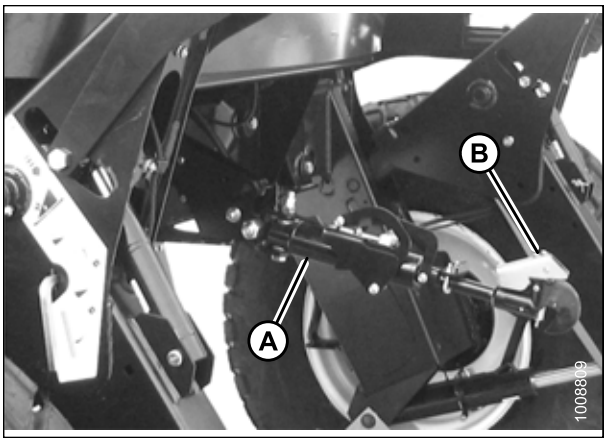


Figure 4.186: Hydraulic Center-Link

CAUTION

Check to be sure all bystanders have cleared the area.

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

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

    a. Press and hold the HEADER UP switch until both cylinders stop moving.

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

    NOTE:

    It may be necessary to repeat this procedure if there is air in the system.

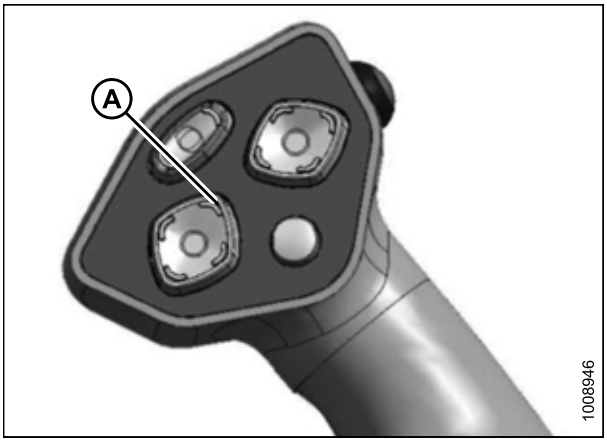


Figure 4.187: Ground Speed Lever

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

    a. Stop engine and remove key from ignition.

    b. Pull lever (A) and rotate towards the header to release and lower safety prop (B) onto the lift cylinder.

    c. Repeat for opposite lift cylinder.

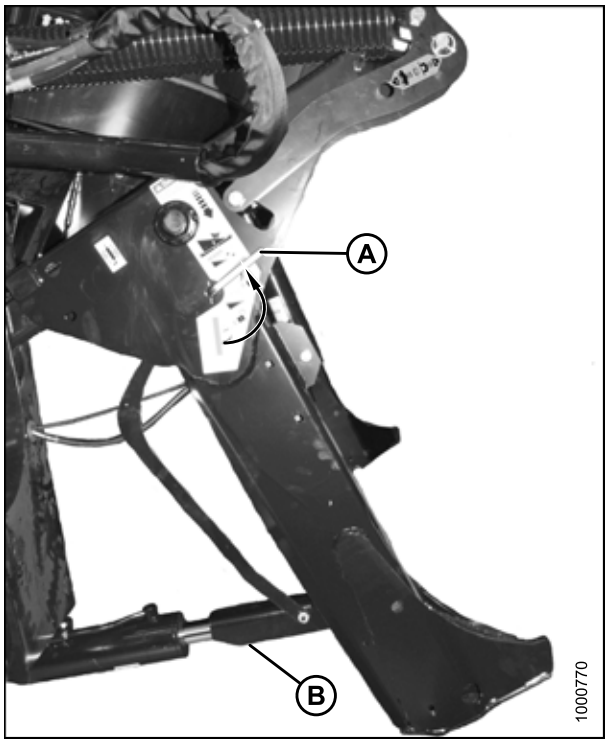


Figure 4.188: Safety Prop

13. Install clevis pin (A) through support and windrower lift member, and secure with hairpin (B). Repeat for opposite side.

    IMPORTANT:

    Ensure clevis pin (A) is fully inserted and hairpin is installed behind bracket.

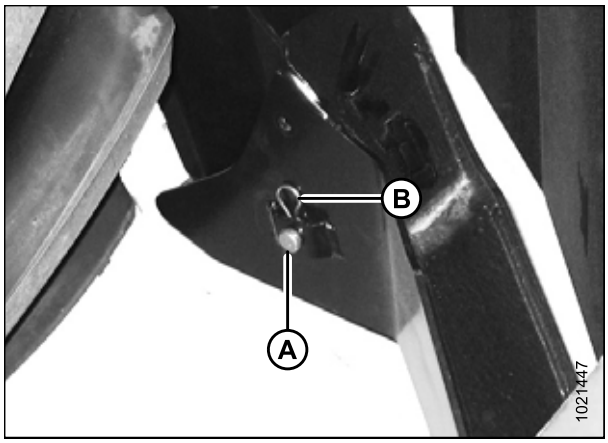


Figure 4.189: Header Support

14. Remove the clevis pin from storage position (B) in linkage and insert into hole (A) to engage the float springs. Secure with hairpin.

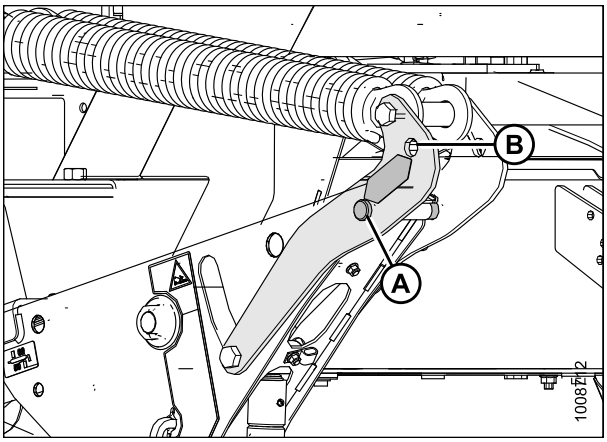


Figure 4.190: Header Float Linkage

15. Disengage the safety prop by turning lever (A) downwards until lever locks into vertical position.
16. Repeat for opposite safety prop.

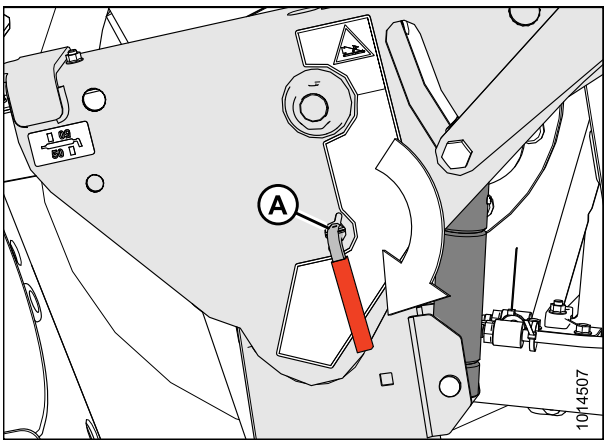


Figure 4.191: Safety Prop Lever

CAUTION

Check to be sure all bystanders have cleared the area.

17. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.
18. Stop engine and remove key from ignition.

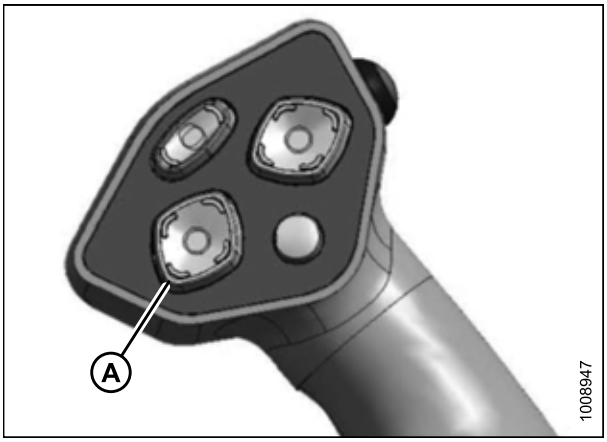


Figure 4.192: Ground Speed Lever

19. Connect header drive hoses (A) and electrical harness (B) to header. Refer to the disc header operator's manual.

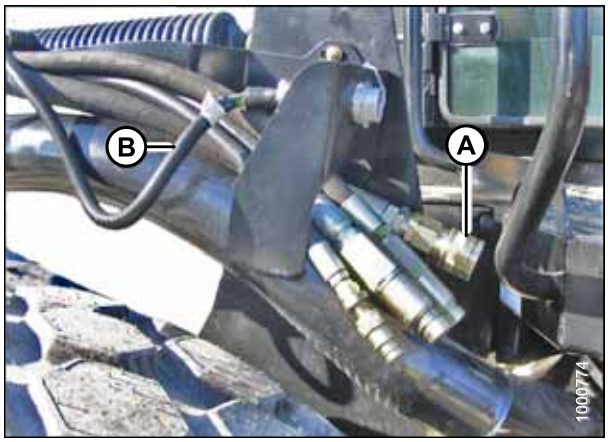


Figure 4.193: Header Drive Hoses and Harness

Attaching an R/R1 Series Header: Hydraulic Center-Link without Optional Self-Alignment

WARNING

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

1. Remove hairpin (B) from clevis pin (A), and then remove clevis pin from header supports (C) on both sides of the header.

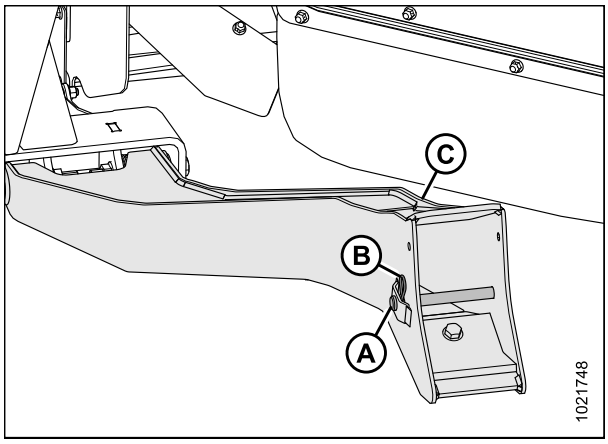


Figure 4.194: Header Support

IMPORTANT:

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and **NOT** in engaged position (A).

2. Remove the clevis pin from linkage (A) to disengage float springs, and insert clevis pin into storage hole (B). Secure with lynch pin. Repeat for opposite linkage.

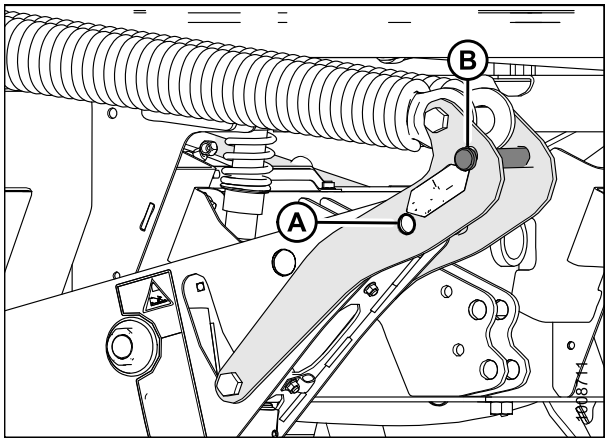


Figure 4.195: Header Float Linkage

CAUTION

Check to be sure all bystanders have cleared the area.

3. Start the engine, and press HEADER DOWN button (A) on the ground speed lever (GSL) to fully retract header lift cylinders.

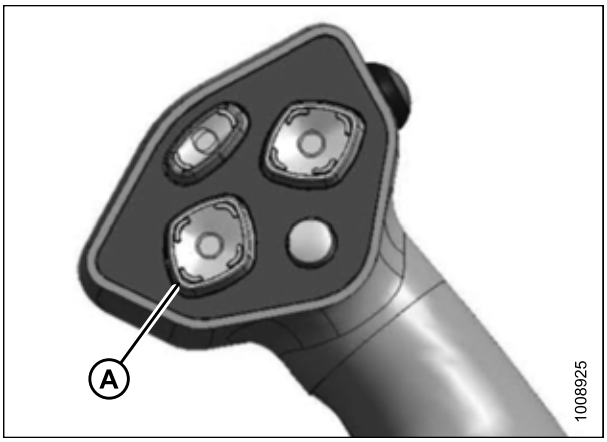


Figure 4.196: Ground Speed Lever

4. Remove pin (A) pin in frame linkage and raise center-link (B) until hook is above the attachment pin on header. Replace pin (A) to hold center-link in place.

   IMPORTANT:

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

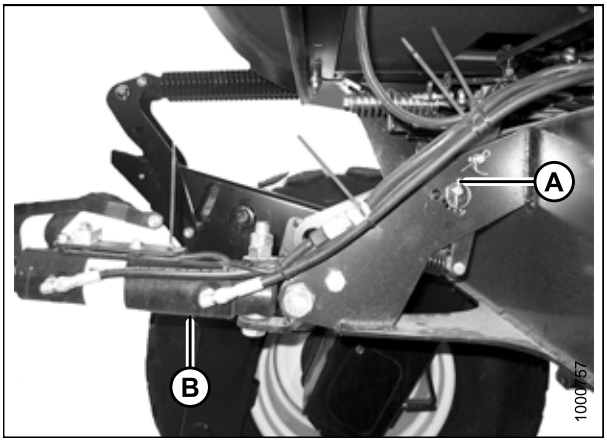


Figure 4.197: Hydraulic Center-Link without Self-Alignment Kit

5. Slowly drive the windrower forward until the windrower feet (A) enter the header supports (B). Continue driving slowly forward until the feet engage the supports and the header nudges forward.

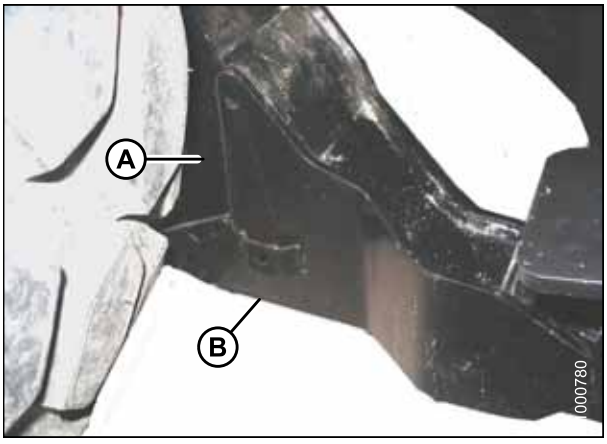


Figure 4.198: Header Support

6. Use the following GSL functions to position the center-link hook above the header attachment pin:
   - HEADER TILT UP (A) to retract the center-link
   - HEADER TILT DOWN (B) to extend the center-link
7. Stop the engine, and remove key from ignition.

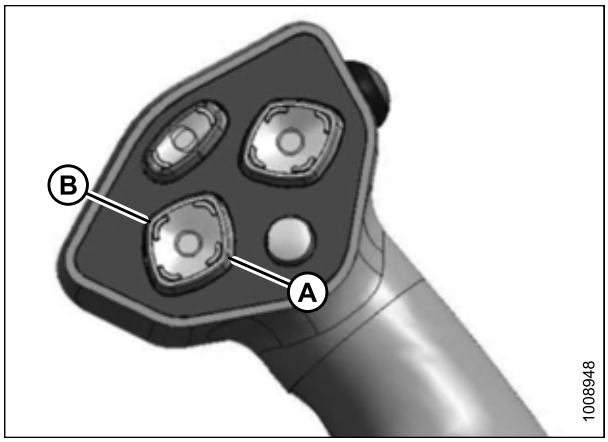


Figure 4.199: Ground Speed Lever

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

   IMPORTANT:

   The hook release must be down to enable the self-locking mechanism. If the release is open (up), manually push it down after hook engages header pin.
9. Check that center-link (A) is locked onto the header by pulling upward on rod end (B) of cylinder.

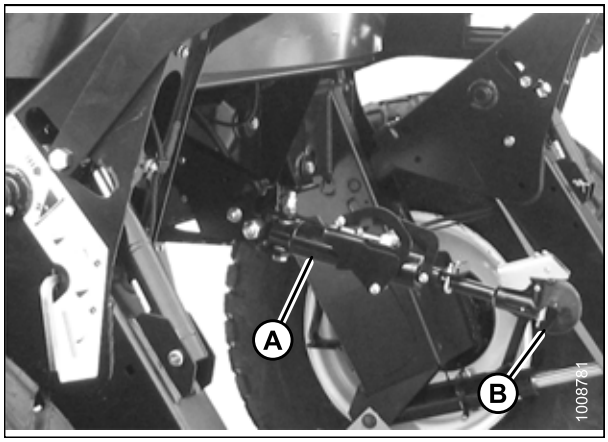


Figure 4.200: Hydraulic Center-Link

CAUTION

Check to be sure all bystanders have cleared the area.

10. Start the engine.
11. Press HEADER UP switch (A) to raise the header to maximum height.
12. If one end of the header does **NOT** fully raise, rephase the lift cylinders as follows:
    a. Press and hold the HEADER UP switch until both cylinders stop moving.
    b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.

       NOTE:

       It may be necessary to repeat this procedure if there is air in the system.

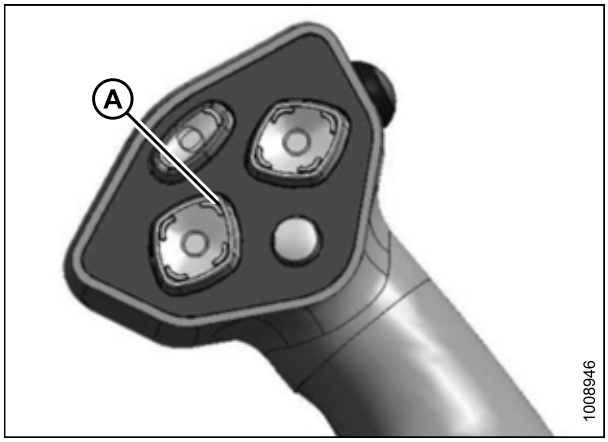


Figure 4.201: Ground Speed Lever

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

    a. Stop engine and remove key from ignition.

    b. Pull lever (A) and rotate towards the header to release and lower safety prop (B) onto the lift cylinder.

    c. Repeat for opposite lift cylinder.

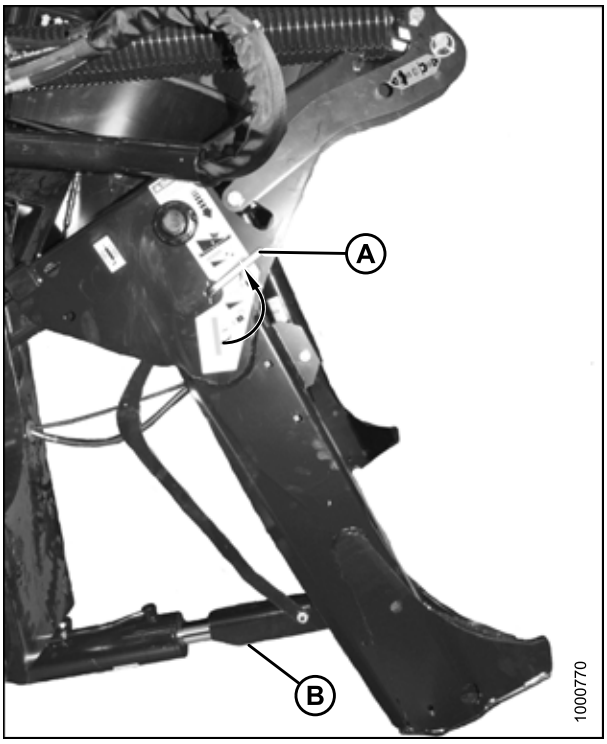


Figure 4.202: Safety Prop

14. Install clevis pin (A) through the support and windrower lift member, and secure with hairpin (B). Repeat for opposite side.

    IMPORTANT:

    Ensure clevis pin (A) is fully inserted and hairpin is installed behind bracket.

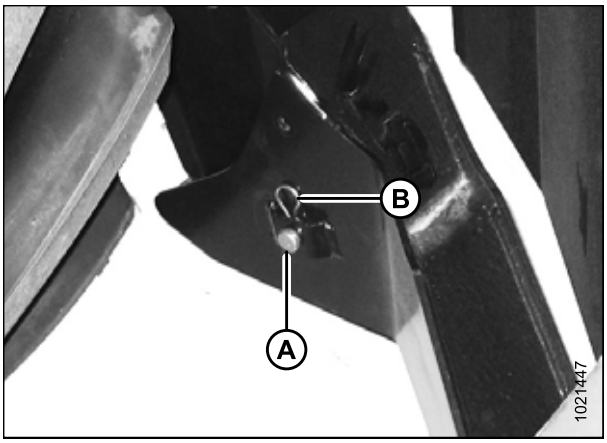


Figure 4.203: Header Support

15. Remove the clevis pin from storage position (B) in linkage and insert into hole (A) to engage the float springs. Secure with hairpin.

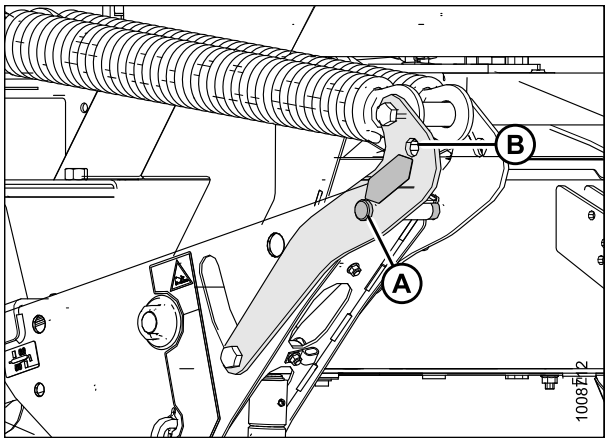


Figure 4.204: Header Float Linkage

16. Disengage the safety prop by turning lever (A) downwards until lever locks into vertical position.
17. Repeat for opposite safety prop.

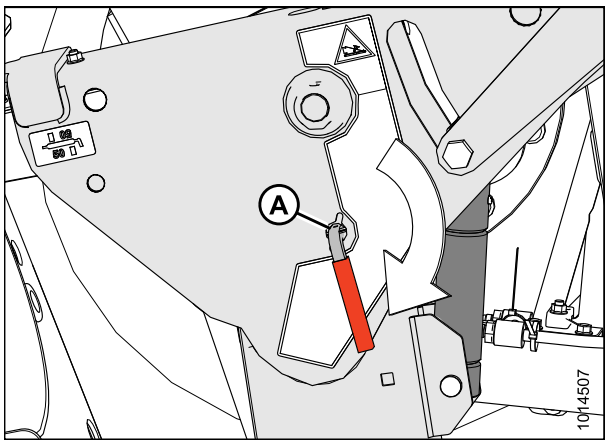


Figure 4.205: Safety Prop Lever

CAUTION

Check to be sure all bystanders have cleared the area.

18. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.
19. Stop engine and remove key from ignition.

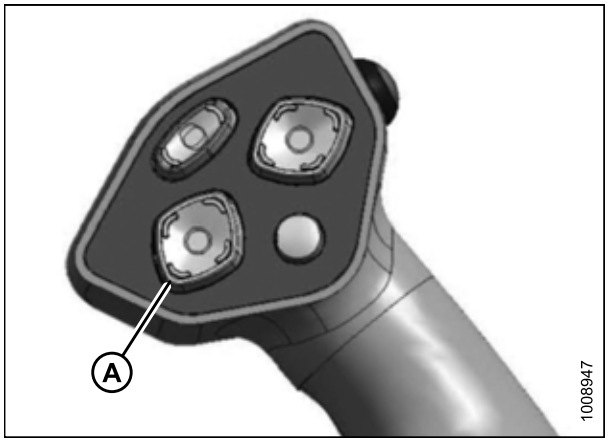


Figure 4.206: Ground Speed Lever

20. Connect header drive hoses (A) and electrical harness (B) to header. Refer to the disc header operator's manual.

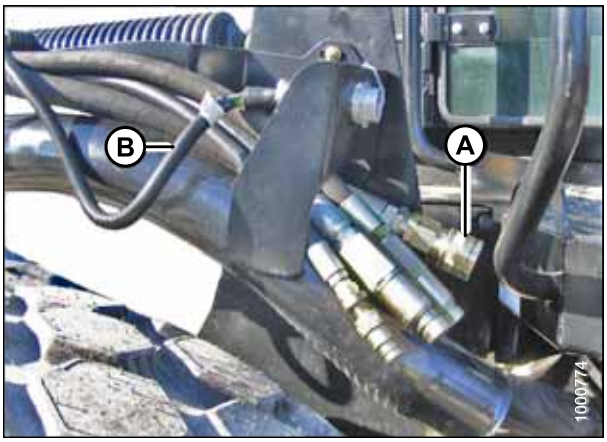


Figure 4.207: Header Drive Hoses and Harness

4.5.7 Detaching an R Series or R1 Series Header

Detaching an R/R1 Series Header: Hydraulic Center-Link

WARNING

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

1. Start engine and press HEADER UP switch (A) to raise header to maximum height.
2. Rephase cylinders if one end of the header does not raise fully. If rephasing is required, proceed as follows:
   a. Press and hold the HEADER UP switch (A) until both cylinders stop moving.
   b. Continue to hold the switch for 3–4 seconds. Cylinders are now phased.

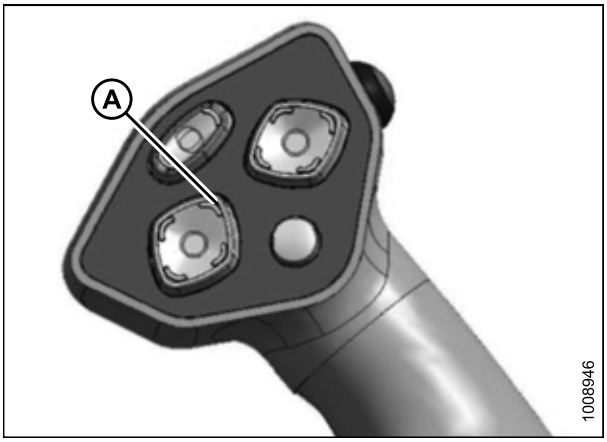


Figure 4.208: Ground Speed Lever (GSL)

3. Stop engine and remove key from ignition.
4. Pull lever (A) and rotate toward header to lower safety prop (B) onto cylinder. Repeat for opposite cylinder.

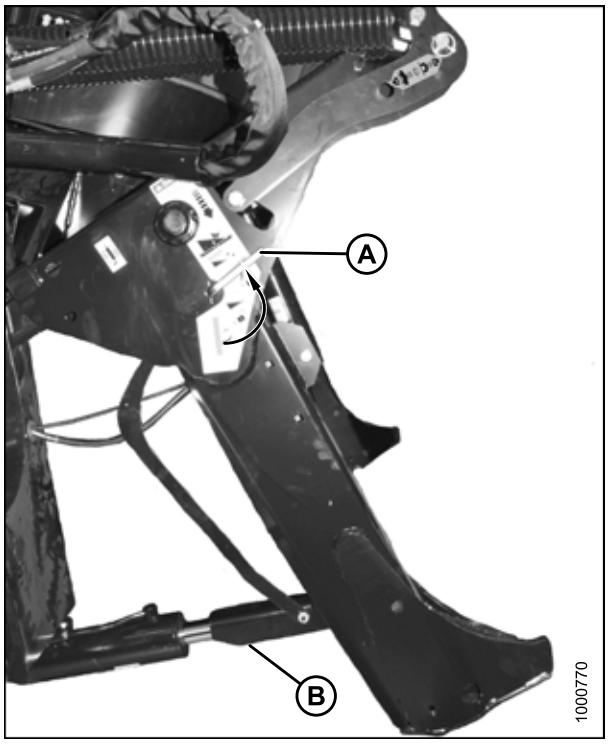


Figure 4.209: Safety Prop

5. Remove hairpin (B) from clevis pin (A) and remove clevis pin from header boot (C) on both sides of header.

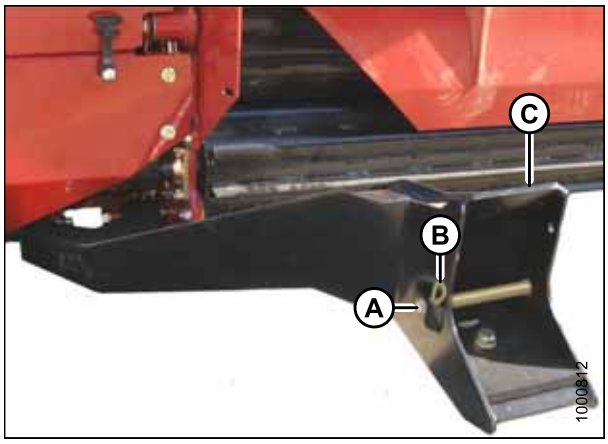


Figure 4.210: Header Boots

CAUTION

To prevent damage to the lift system when lowering header lift linkages without a header or weight box attached to the windrower, ensure the float engagement pin is installed in storage position (B) and NOT in engaged position (A).

6. Remove hairpin and clevis pin from location (A) to disengage float springs, and insert into storage hole (B). Secure with hairpin.

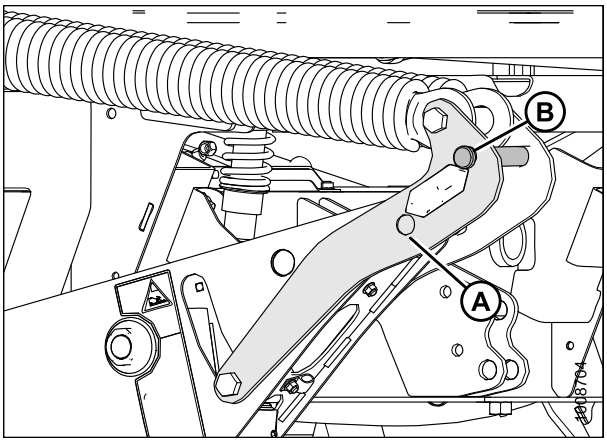


Figure 4.211: Header Float Linkage

CAUTION

Check to be sure all bystanders have cleared the area.

7. Disengage safety props by turning lever (A) away from header to raise safety prop until lever locks into vertical position. Repeat for opposite cylinder.
8. Start the engine, choose a level area, and lower the header to the ground.

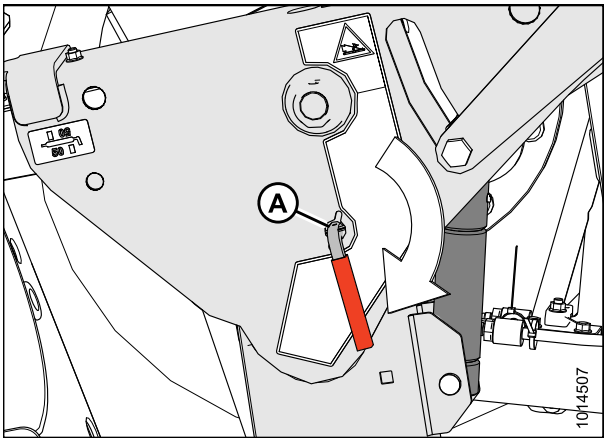


Figure 4.212: Safety Props

9. Press HEADER TILT UP (A) and HEADER TILT DOWN (B) cylinder switches on the GSL to release load on center-link cylinder.

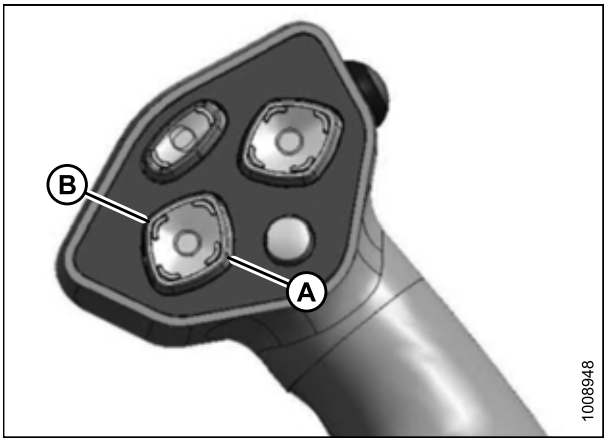


Figure 4.213: Ground Speed Lever

10. Stop the engine and remove the key from the ignition.
11. Lift hook release (C) and lift hook (B) off header pin.

    NOTE:

    If optional center-link lift cylinder is installed, lift release (C) and then operate the link lift cylinder from the cab to disengage the center-link (A) from the header.

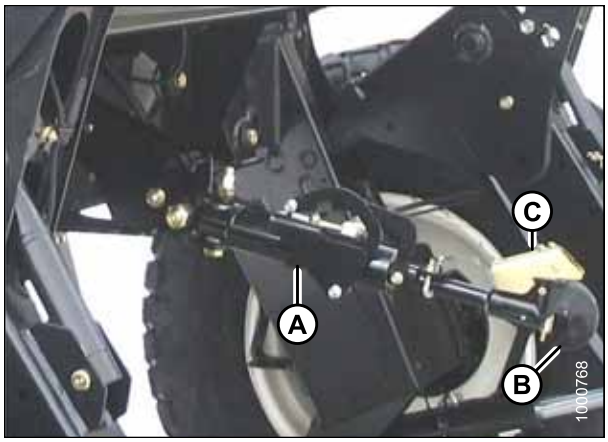


Figure 4.214: Hydraulic Center-Link

12. Disconnect header drive hydraulics (A) and electrical harness (B). Refer to the header operator's manual.
13. Back the windrower slowly away from the header.

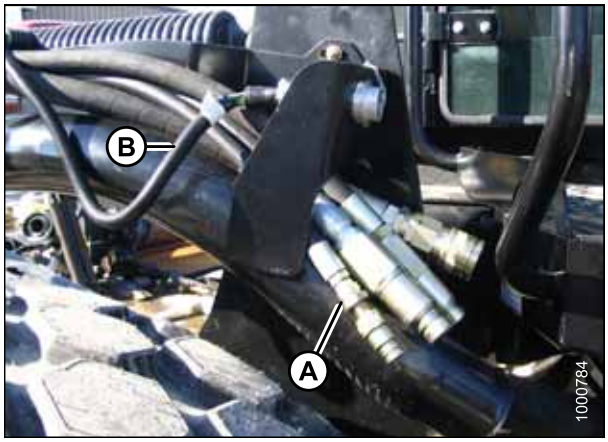


Figure 4.215: Header Drive Hydraulics

14. Reinstall clevis pin (A) through boot (C) and secure with hairpin (B). Repeat for opposite side.

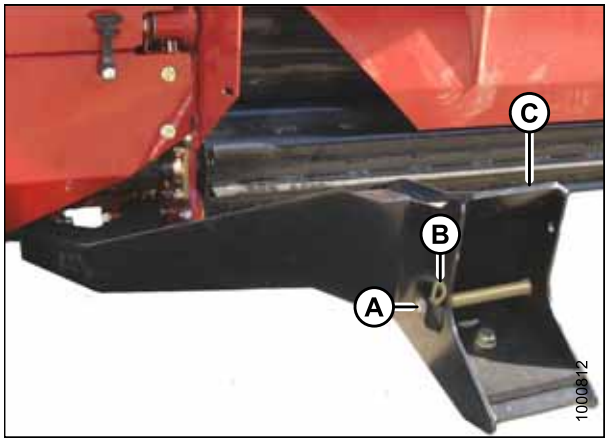


Figure 4.216: Header Boot

4.6 Operating with a D Series or D1 Series Header

The M155*E4* Self-Propelled Windrower is factory-equipped to run a D or D1 Series Draper Header.

If installing a HC10 Hay Conditioner, Reverser kit MD #B4656 is recommended. If necessary, obtain the recommended kit from your MacDon Dealer and install it in accordance with the instructions supplied with the kit.

Refer to the procedures below for the center-link installed on your windrower:

- *Attaching a D Series or D1 Series Header: Hydraulic Center-Link with Optional Self-Alignment, page 219*
- *Attaching a D Series or D1 Series Header: Hydraulic Center-Link without Self-Alignment, page 224*

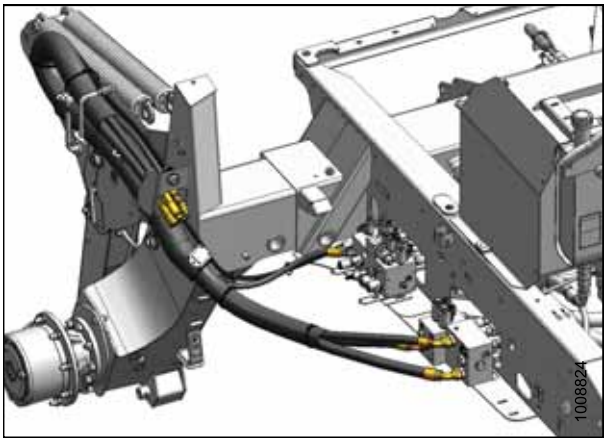


Figure 4.217: Draper Header Hydraulics

4.6.1 Configuring Hydraulics

The windrower must be fitted with a draper drive basic kit to operate a D or D1 Series Draper Headers.

Windrowers equipped with D or D1 Series hydraulics have four header drive hoses on the left cab-forward side.

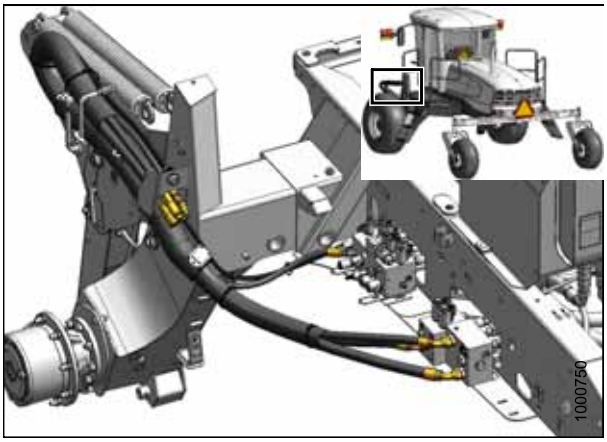


Figure 4.218: Draper Header Drive Hydraulics

There are also up to five reel drive hoses on the right cab-forward side.

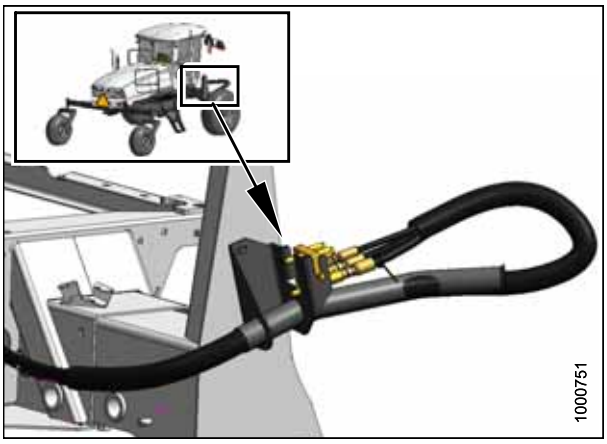


Figure 4.219: Draper Header Reel Hydraulics

4.6.2 Header Position

Refer to *4.4 Operating with a Header, page 197* for procedures for controlling header height, header tilt, and float.

4.6.3 Adjusting the Reel Fore-Aft Position

The reel fore-aft position can be hydraulically adjusted with the optional reel position system and is controlled with multi-function switches on the ground speed lever (GSL).

Press and hold the switch for the desired FORWARD (A) or AFT (B) movement of the reel.

NOTE:

The switches also control adjustments to the optional double windrow attachment (DWA) conveyor and can be activated when programming the cab display module (CDM).

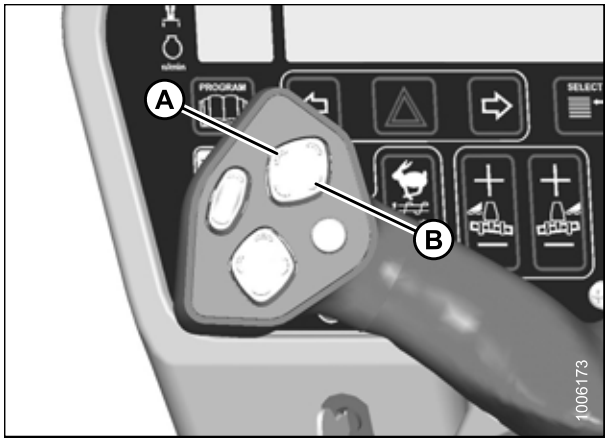


Figure 4.220: Ground Speed Lever

4.6.4 Adjusting the Reel Height

Press and hold the switch for the desired movement of the reel REEL UP (A) or REEL DOWN (B).

IMPORTANT:

Under certain conditions, with the reel raised to full height, the reel tines may contact the cab roof. Exercise care to avoid damage to the machine.

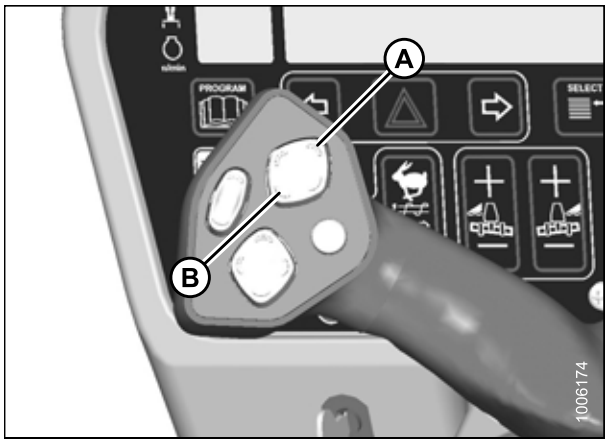


Figure 4.221: Ground Speed Lever (GSL)

4.6.5 Reel Speed

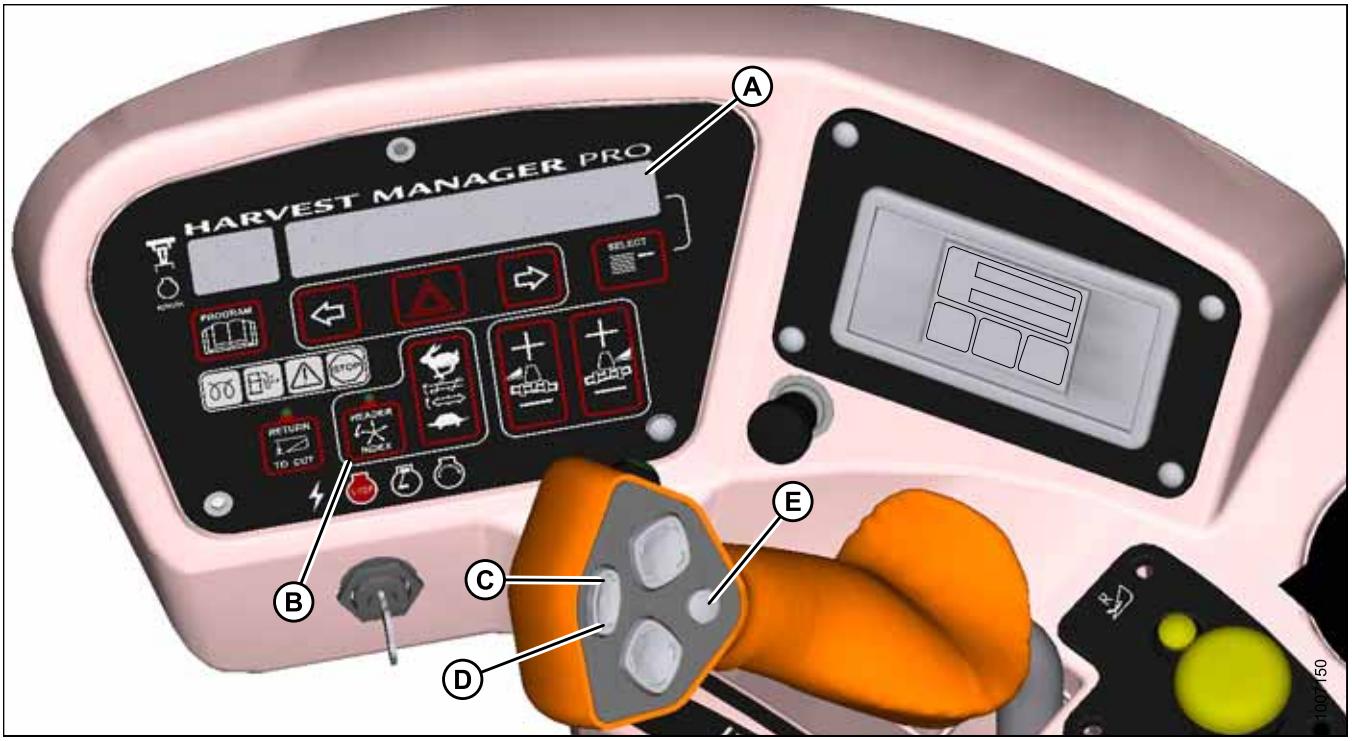
Reel speed is controlled with switches on the ground speed lever (GSL) in the cab. On D and D1 Series draper headers, reel speed can run independently, or be set relative to the ground speed of the windrower using the header index feature. Refer to your header's operator manual for specific windrowing guidelines and recommended speeds.

Setting Reel to Ground Speed

Setting the speed of the reel relative to ground speed (using the header index function) allows you to run the engine at lower rpm while maintaining the desired ground and reel speed. Reducing engine speed saves fuel and reduces noise in the cab.

Setting the reel to ground speed requires setting the minimum reel speed and the reel index.

Figure 4.222: Operator Console



A - Display
B - Header Index
C - Fast
D - Slow
E - Display Selector

CAUTION

Check to be sure all bystanders have cleared the area.

1. Set the minimum reel speed as follows:

   IMPORTANT:
   Set the minimum reel speed while stationary with the ground speed lever (GSL) in the N-DETENT position.

   a. Engage header.
   b. Set HEADER INDEX switch (B) to **ON**.
   c. Press the DISPLAY SELECTOR button (E) on the GSL to display **##.## MIN REEL** at location (A) or press the FAST (C) or SLOW (D) switch

      The displayed value (##.##) = rpm or mph or km/h[17]

   d. Press FAST (C) or SLOW (D) until the desired minimum reel speed is achieved.

2. Set the reel index as follows:

   IMPORTANT:
   Reel index can only be adjusted while operating at a ground speed faster than minimum reel speed plus header index value.

   a. Set HEADER INDEX switch (B) to **ON**.

17. Depending on CDM programming.

b. Press the DISPLAY SELECTOR button (E) on the GSL to display **##.## ##.# REEL IND**[18] or press FAST (C) or SLOW (D) switch.

- The displayed value (##.##) = reel speed (rpm or mph or km/h[17])
- The displayed value (#.##) = reel index value

c. Press FAST (C) or SLOW (D) until the desired reel index is achieved.

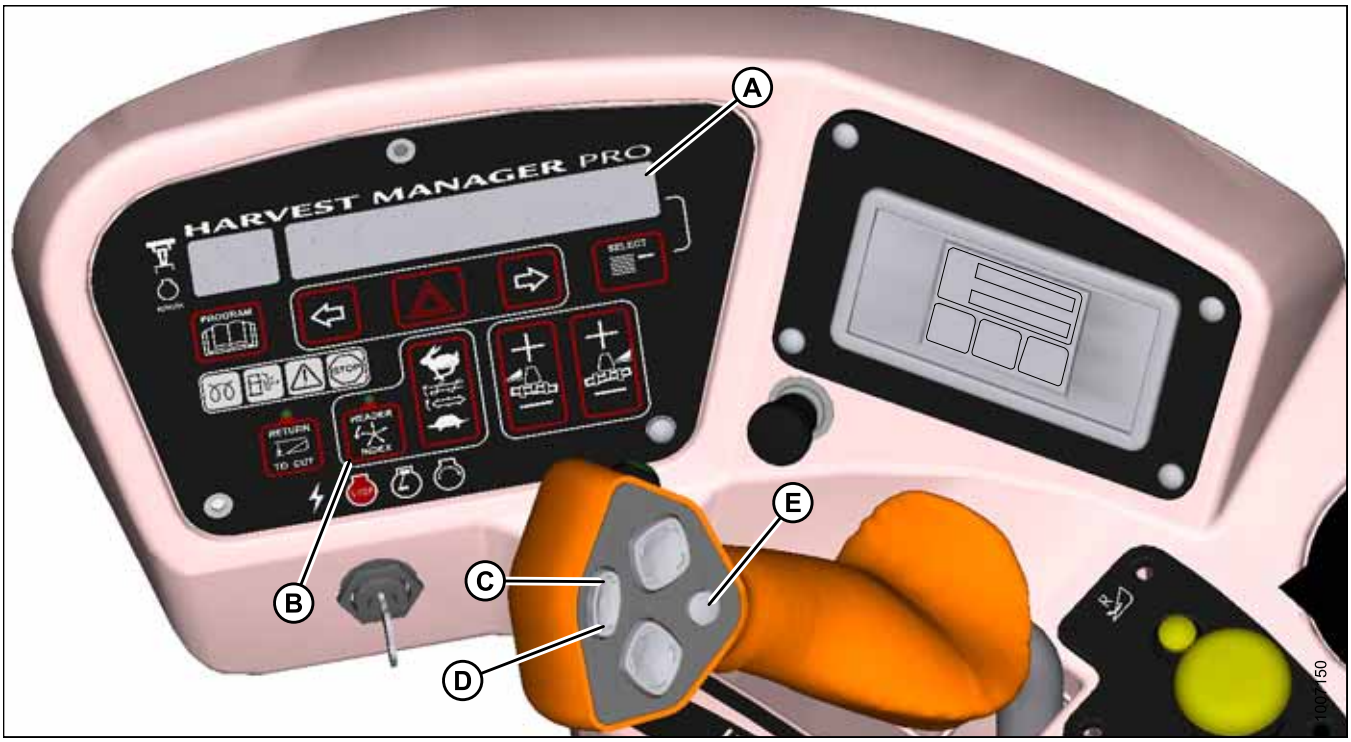
NOTE:

The reel will continue operating at the minimum reel speed setting when the ground speed drops below the set value.

The cab display module (CDM) display (A) will flash ##.## MIN REEL (RPM or MPH or KPH) prompting you to change the minimum set-point or increase your ground speed if the total of the ground speed, plus the index value is **LESS THAN** the minimum reel speed set-point.

Setting the Reel Only Speed

Figure 4.223: Operator Console



A - Display
B - Header Index
C - Reel Fast
D - Reel Slow
E - Display Selector

⚠ CAUTION

Check to be sure all bystanders have cleared the area.

18. REEL IND will only be displayed when operating at a ground speed faster than minimum reel speed plus header index value.

Set the speed of the reel independently of ground speed as follows while operating the windrower:

NOTE:

This procedure is similar to changing the draper speed using the draper speed control switch while in motion. Refer to *Setting Draper Speed Independent of Ground Speed, page 270*. These changes become the new set-points.

1. Set HEADER INDEX (B) to **OFF**.
2. Press REEL FAST (C) or REEL SLOW (D) on the ground speed lever (GSL) until display (A) shows **##. ## REEL MPH** with desired reel speed.

   The displayed value (##.##) = reel speed (rpm or mph or km/h[19])

4.6.6 Draper Speed

Draper speed affects the orientation of stalks in the windrow. For information on draper speed guidelines and windrow types, refer to your header operator's manual. The draper speed can be set to run independently, or relative to the ground speed of the windrower with the header index function.

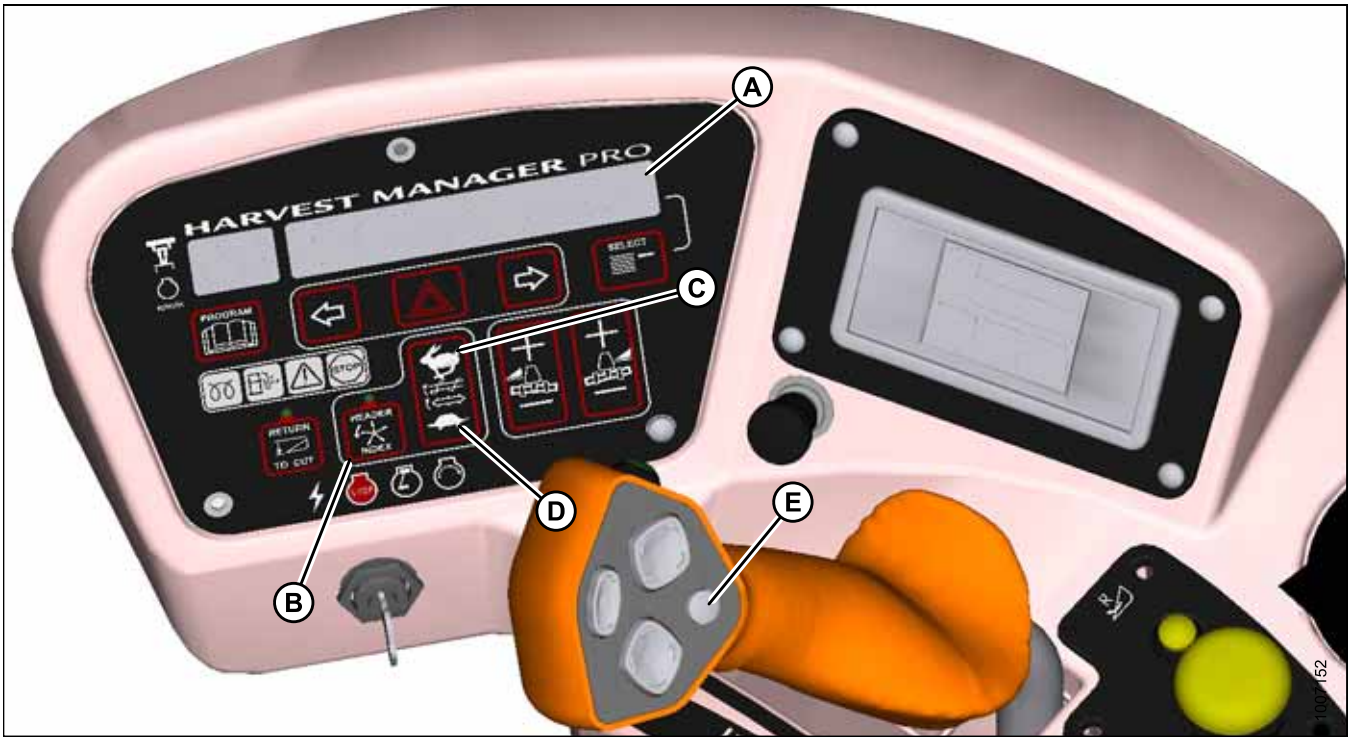
Setting Draper to Ground Speed

Setting the speed of the draper relative to ground speed (using the header index function) allows you to run the engine at lower rpm while maintaining the desired ground and draper speed. Reducing engine speed saves fuel and reduces noise in the cab.

Setting draper to ground speed requires setting both the minimum draper speed and the draper index.

Setting Minimum Draper Speed

Figure 4.224: Operator Console



19. Depending on cab display module (CDM) programming.

Figure 4.224 Operator Console (continued)

A - Display
B - Header Index
C - Draper Fast
D - Draper Slow
E - Display Selector

CAUTION

Check to be sure all bystanders have cleared the area.

Set draper minimum speed as follows:

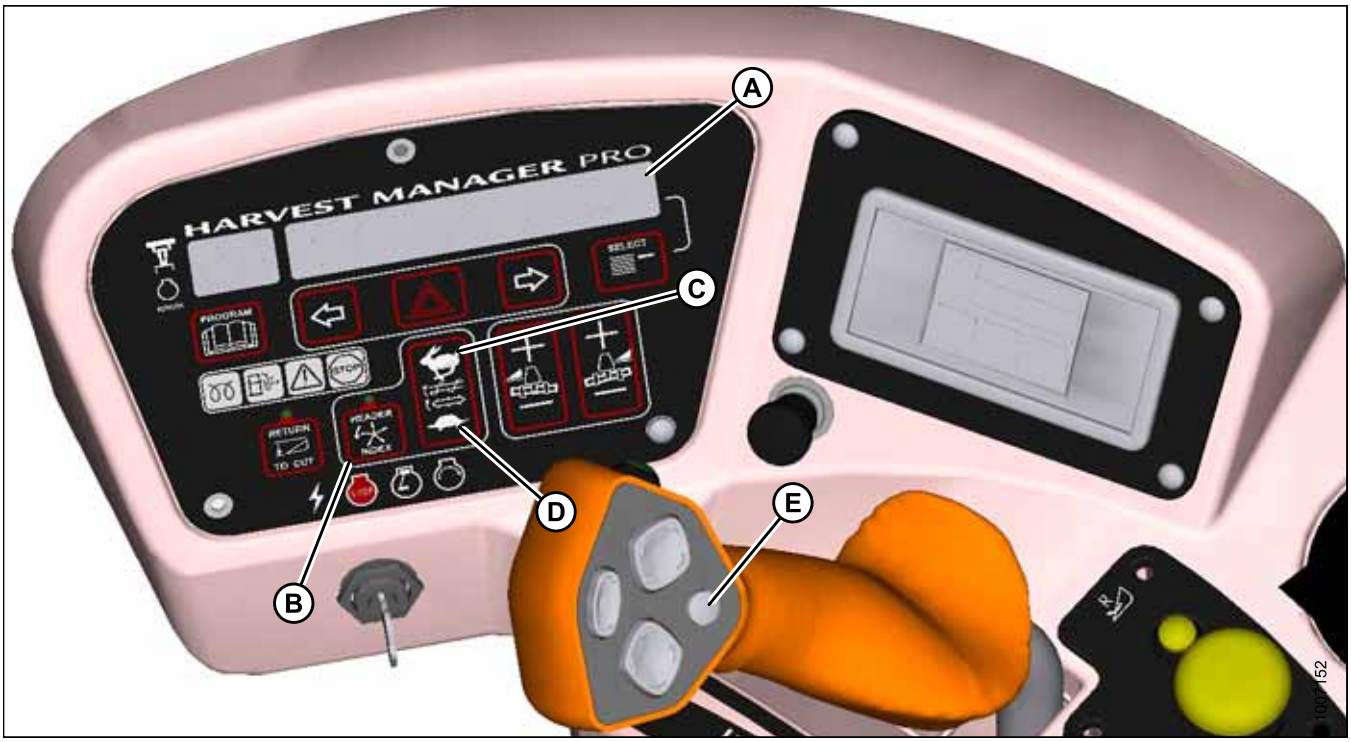
IMPORTANT:
Set the minimum draper speed while stationary with the ground speed lever (GSL) in the N-DETENT position.

1. Engage header.
2. Set HEADER INDEX (B) switch to **ON**.
3. Press DISPLAY SELECTOR button (E) until display (A) shows **##.## DRAPER MIN**.

   The displayed value (##.##) = draper speed (mph or km/h[20]).
4. Use the FAST (C) and SLOW (D) buttons to set the desired minimum draper speed.

Setting Draper Index

Figure 4.225: Operator Console



CAUTION

Check to be sure all bystanders have cleared the area.

20. Depending on cab display module (CDM) programming.

Set draper index as follows:

IMPORTANT:

Draper Index can only be adjusted while operating at a ground speed faster than minimum draper speed plus header index value.

1. Engage header.
2. Set HEADER INDEX switch (B) to **ON**.
3. Press DISPLAY SELECTOR (E) on the ground speed lever (GSL) to display **DRAPER INDX**[21] at (A) on the cab display module (CDM).
4. Press DRAPER FAST (C) or SLOW (D) on the CDM until display (A) shows **##.## ##.# DRAP IND** with the desired index value.
   - The displayed value (##.##) = draper speed (mph or km/h[22])
   - The displayed value (##.#) = the index value

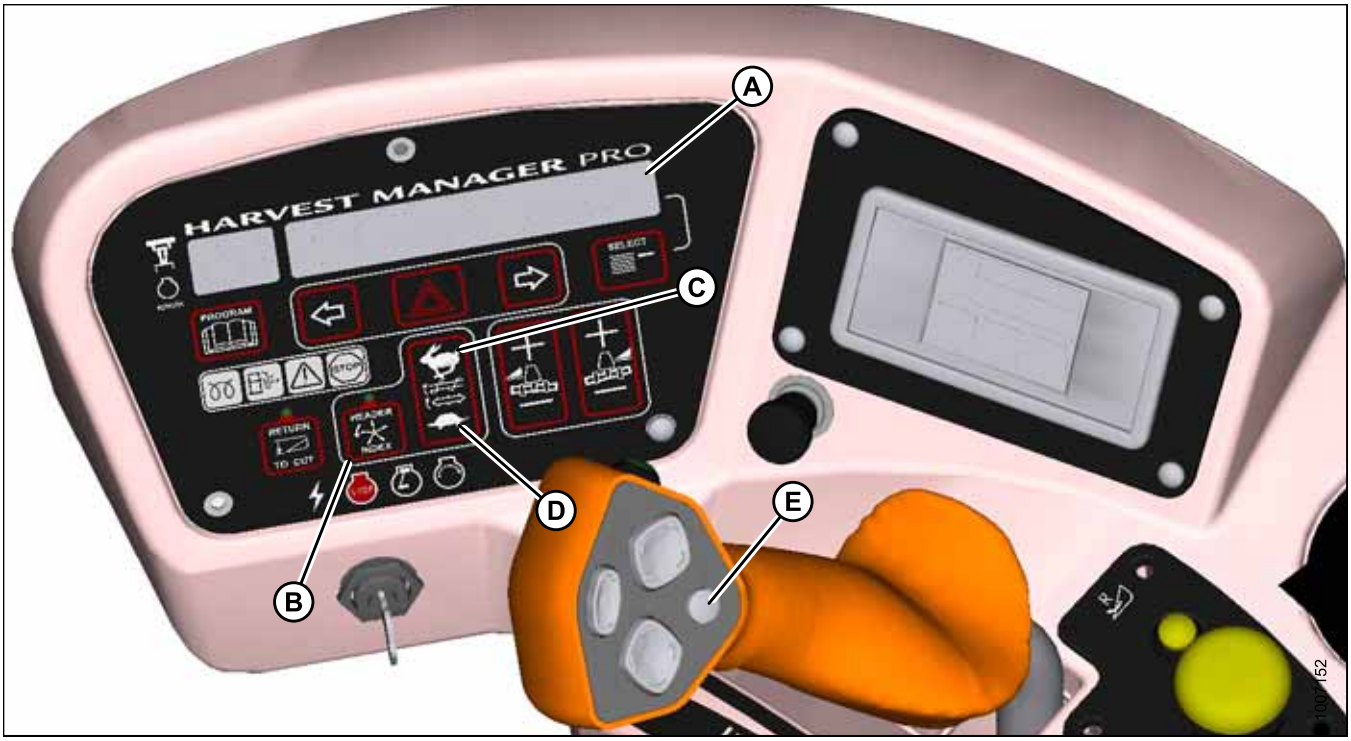
Examples:

- Windrower is operating at 13 km/h (8 mph) with header index ON and set at 1.5.
  Display shows: **9.5 1.5 DRAP INDX** where **9.5** (8 + 1.5) is the draper speed in mph and **1.5** is the header index setting.
- Windrower speed drops to 12 km/h (7.5 mph) at same header index setting.
  Display shows: **9.0 1.5 DRAP INDX** where **9.0** (7.5 + 1.5) is the draper speed in mph and **1.5** is the header index setting.
- Windrower is operating at 13 km/h (8 mph) with header index ON and set at 0.9.
  Display shows: **8.9 0.9 DRAP INDX** where **8.9** (8 + 0.9) is the draper speed in mph and **0.9** is the header index setting.

21. DRAPER INDX will only be displayed when operating at a ground speed faster than minimum draper speed plus the header index value.
22. Depending on CDM programming.

Setting Draper Speed Independent of Ground Speed

Figure 4.226: Operator Console



Set the speed of the draper independent of ground speed as follows:

NOTE:

This procedure can also be used to change the draper speed while in motion.

CAUTION

Check to be sure all bystanders have cleared the area.

1. Engage header.
2. Set HEADER INDEX switch (B) to **OFF.**
3. Press DISPLAY SELECTOR button (E) to show **##.# DRAPER SPEED** on the cab display module (CDM) (A).

   Displayed value (##.#) = draper speed (mph or km/h[23]).
4. Press FAST (C) or SLOW (D) on the CDM until desired draper speed is displayed at location (A).

23. Depending on CDM programming.

4.6.7 Knife Speeds

The ideal knife speed should achieve a clean cut. Crop types and conditions usually influence the knife and ground speeds.

Table 4.2 Knife Speed Table

Header Description		Knife Speed			
Type	Size	Minimum		Maximum	
		rpm[24]	spm[25]	rpm[24]	spm[25]
Draper with double knife	4.6 m (15 ft.)	750	1500	950	1900
Draper with double knife	6.1 and 7.6 m (20 and 25 ft.)	700	1400	850	1700
Draper with double knife	9.1 m (30 ft.)	600	1200	800	1600
Draper with double knife	10.6 m (35 ft.)	600	1200	700	1400
Draper with double knife	12.2 m (40 ft.)	550	1100	700	1400
Draper with single knife	6.1 and 7.6 m (20 and 25 ft.)	600	1200	750	1500
Draper with single knife	9.1 m (30 ft.)	600	1200	700	1400
Draper with single knife	10.6 m (35 ft.)	550	1100	700	1400
Draper with single knife	12.2 m (40 ft.)	525	1050	600	1200

When the header is first attached to the windrower, the windrower control module (WCM) receives a code from the header that determines the knife speed range and the minimum speed.

The desired speed can be programmed on the cab display module (CDM) and stored in the WCM memory so the knife will operate at the original set-point after the header is detached and reattached to the windrower.

If no header code is detected, the CDM displays NO HEADER and the knife speed reverts to the operator's selection from a range of 800–1000 strokes per minute.

Refer to Header Settings in the header operator's manual for the suggested knife speed for a variety of crops and conditions.

NOTE:

Knife speed cannot be programmed outside the range specified for each header.

NOTE:

Knife speed can be adjusted without shutting down the machine; however, the windrower should be stopped before adjusting CDM settings.

24. Revolutions per minute is the speed of knife drive box pulley.
25. Strokes per minute of knife (rpm x 2).

To adjust the knife speed, refer to *Setting the Header Knife Speed, page 99*.

Setting Knife Speed: Windrower in Motion

Figure 4.227: Operator Console

CAUTION

Check to be sure all bystanders have cleared the area.

Display and set knife speed while in motion as follows:

1. Engage header.
2. Press PROGRAM (D) and SELECT (E) on cab display module (CDM) to show **#### KNIFE SPM** at (A).

   Displayed value (####) = strokes per minute.
3. Press LEFT ARROW (B) or RIGHT ARROW (C) until desired knife speed is displayed at (A).

4.6.8 Deck Shift Control

When connected to a draper header with the deck shift option, hydraulic deck shift control allows you to select the deck position and draper rotation of the header from the operator's station. Deck shift allows you to select crop delivery from the left side, center, or right side of the header.

Deck Shift

CAUTION

Check to be sure all bystanders have cleared the area.

Shift decks as follows:

1. Engage header by pushing down on the yellow HEADER DRIVE button (A) while pulling up on the black ring (B) at the base of the switch.

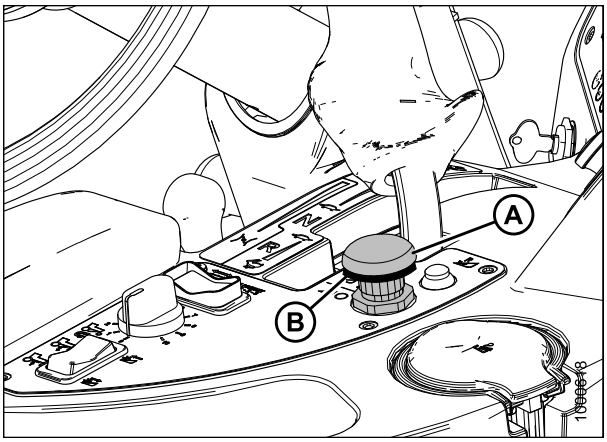


Figure 4.228: Header Drive Button

2. Push switch (A) to desired delivery position. Deck(s) will move and direction of drapers will change accordingly.
3. Operate windrower.

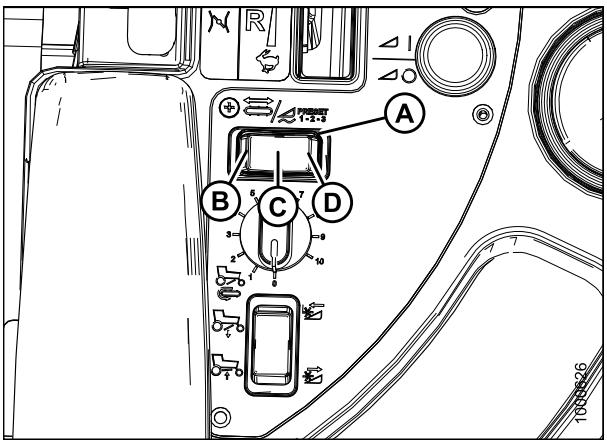


Figure 4.229: Deck Shift Switch

A - Deck Shift Switch
B - Left-Side Delivery
C - Center Delivery
D - Right-Side Delivery

Setting Float Options with Deck Shift

For draper headers equipped with the deck shift option, the header float can be set for each deck position. Float is maintained when the decks are shifted.

⚠ CAUTION

Check to be sure all bystanders have cleared the area.

Program the float as follows:

1. Engage header.

2. Using HEADER TILT SWITCHES (A) and (B) on the ground speed lever (GSL), set center-link to mid-range position (05.0 on display [E]).

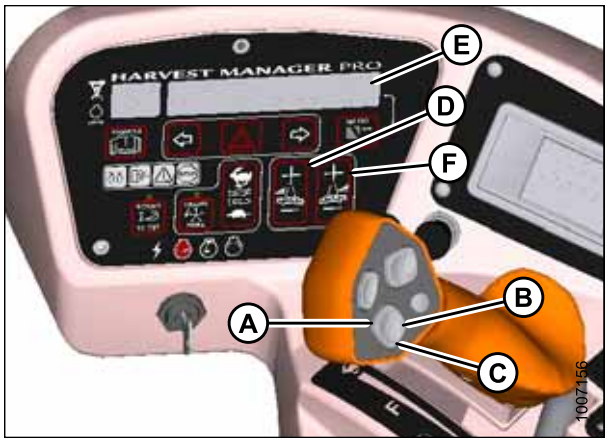


Figure 4.230: Operator Console

A - Header Tilt Down **B - Header Tilt Up**
C - Header Down **D - Left Float**
E - Display **F - Right Float**

3. Select a deck position with DECK SHIFT switch (A) from one of the following delivery options:
   - B - Left-side delivery
   - C - Center delivery
   - D - Right-side delivery

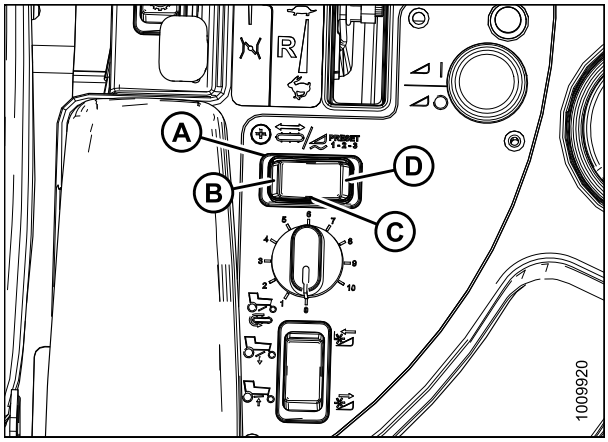


Figure 4.231: Deck Shift Switch

4. Using HEADER DOWN switch (A) on the GSL, lower header fully with lift cylinders fully retracted.
5. Using LEFT FLOAT SWITCH (B), push **+** to increase float or **–** to decrease float on left side of header. Display (D) will indicate selected float value for left side, for example (8.0 L FLOAT R ##.#).
6. Repeat for right side float with RIGHT switch (C). Display (D) will indicate float value for both sides, for example (8.0 L FLOAT R 3.0).

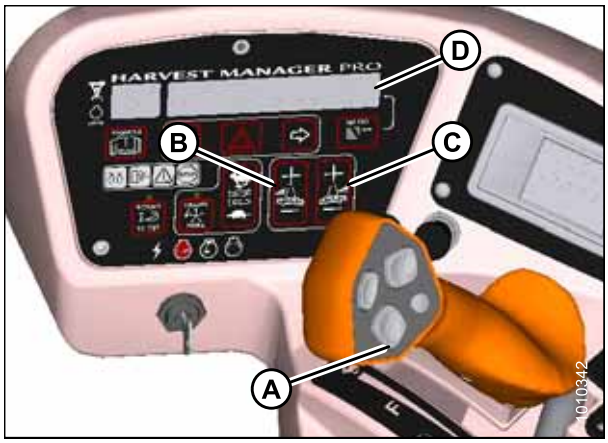


Figure 4.232: Operator Console

7. Select a second deck position with the DECK SHIFT switch (A).
8. Repeat Step *5, page 274* and Step *6, page 274* to set the float for the second deck position.
9. Select a third deck position with the DECK SHIFT switch (A).
10. Repeat Step *5, page 274* and Step *6, page 274* to set the float for the third deck position.

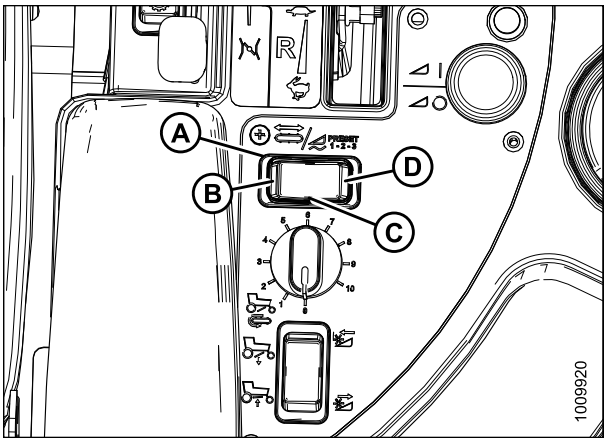


Figure 4.233: Deck Shift Switch

A - Deck Shift Switch
B - Left-Side Delivery
C - Center Delivery
D - Right-Side Delivery

4.7 Operating with an A Series Header

The M155*E4* is factory-equipped to run an A Series Auger Header.

4.7.1 Auger Speed

Auger Speed on A30D Headers

On A30D Auger Headers, the auger speed is fixed to the knife speed. The auger speed is **NOT** monitored and cannot be displayed.

Setting the Auger Speed on A40D Headers

Figure 4.234: Operator Console

CAUTION

Check to be sure all bystanders have cleared the area.

To set the auger speed, follow these steps:

1. Engage header.
2. Set the HEADER INDEX switch (B) to **OFF**.
3. Set the REEL SPEED to the minimum setting. For instructions, refer to *Reel and Disc Speed Switches, page 76*.
4. Press DISPLAY SELECTOR switch (E) on the ground speed lever (GSL) or press FAST (C) or SLOW (D) on the cab display module (CDM) until **##.# AUGER SPEED** is displayed at location (A).

The displayed value (##.#) = auger speed setting.

NOTE:

Changes to reel speed will affect the auger speed directly. However, when adjusting reel speed, the auger speed value displayed on the CDM will not change.

5. Press FAST (C) or SLOW (D) on the CDM until the desired auger speed is achieved.

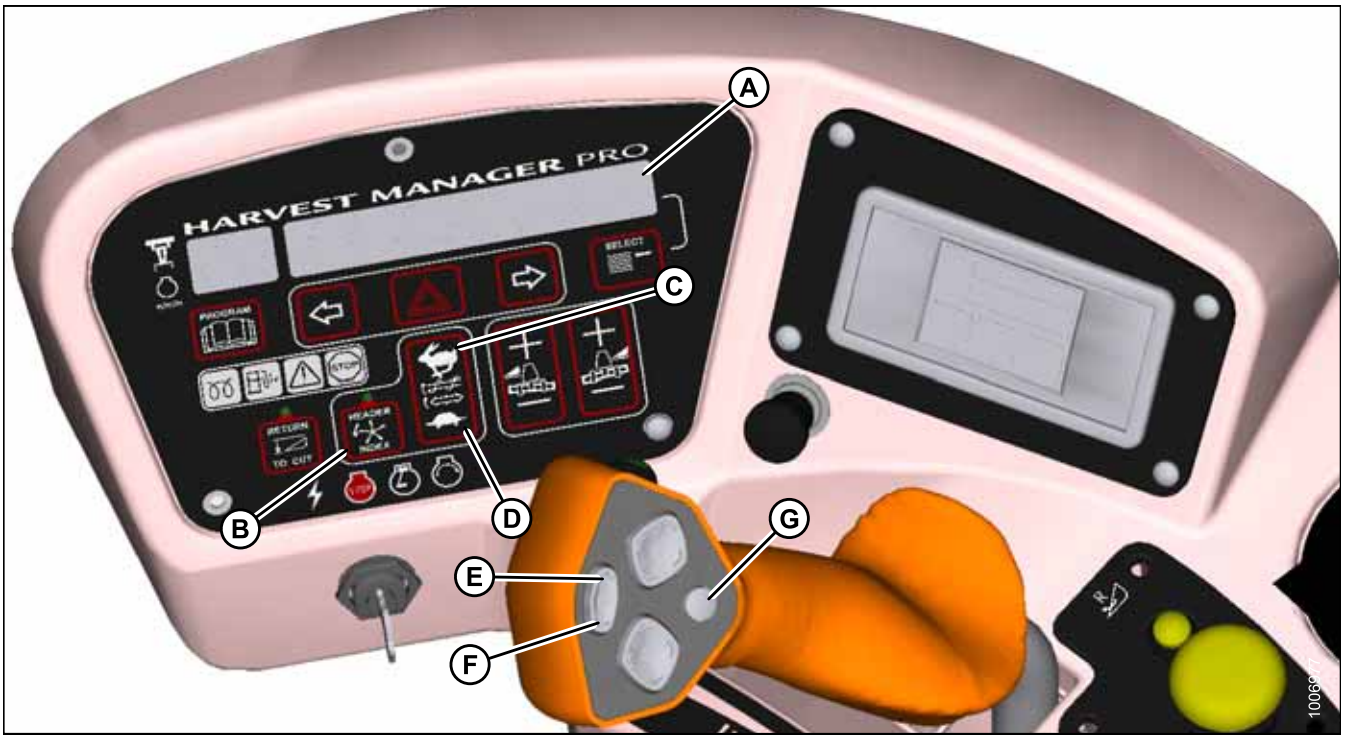
4.7.2 Reel Speed

Refer to your header operator's manual for recommended reel speed settings for your particular crop.

Displaying Reel Speed: A30S and A30D Headers

The reel is driven by the auger, and both are dependent on the main header drive speed. The auger and reel speeds can be changed by installing a different size auger and reel drive sprockets (contact your MacDon Dealer), or by varying the windrower engine rpm.

Figure 4.235: Operator Console



A - Display **B - Header Index** **C - Auger Fast** **D - Auger Slow**
E - Fast **F - Slow** **G - Display Selector**

Display the reel speed as follows:

1. Engage header.
2. Set HEADER INDEX (B) to **OFF**.
3. On the ground speed lever (GSL), press DISPLAY SELECTOR (G) or SELECT SWITCH on the cab display module (CDM) until **##.## REEL RPM** displays at (A).

   ##.## = 15.00 – 85.00

Reel Speed on A40D Headers

The A40D Auger Header features a hydraulic direct drive reel with an operating speed range of 15–85 rpm. Reel speed is controlled by the cab display module (CDM) and the ground speed lever (GSL) in the operator's station.

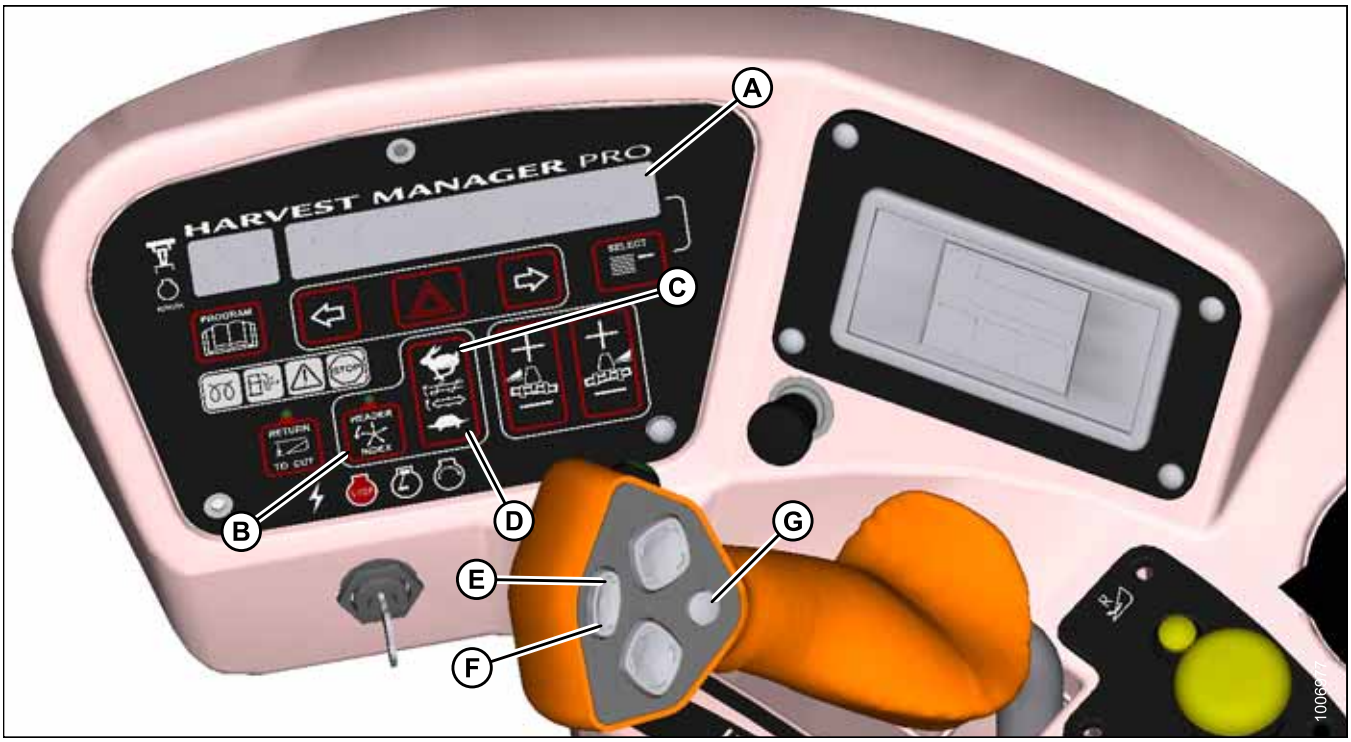
NOTE:

Adjusting the reel speed will result in a change to auger speed unless the auger speed has been preset.

Adjusting Reel Only Speed

The A40D reel drive is hydraulically driven. Adjusting reel speed also changes auger speed, unless the auger speed is initially set at a predetermined value. The following procedure sets the auger speed so that subsequent reel speed adjustments will only affect the reel.

Figure 4.236: Operator Console



A - Display
B - Header Index
C - Auger Fast
D - Auger Slow
E - Fast
F - Slow
G - Display Selector

To prevent overspeeding the auger, initially set the speed of the reel and auger as follows:

NOTE:

Subsequent adjustments to reel speed do **NOT** affect auger speed.

1. Engage header.
2. Set HEADER INDEX SWITCH (B) to **OFF**.
3. On ground speed lever (GSL) press REEL SLOW switch (F) until a beep is heard.
4. Display (A) shows **##.## REEL RPM**.
5. On cab display module (CDM) press AUGER SLOW (D) or FAST (C) switch to set desired auger speed.
6. Display (A) shows **##.# AUGER SPEED**.

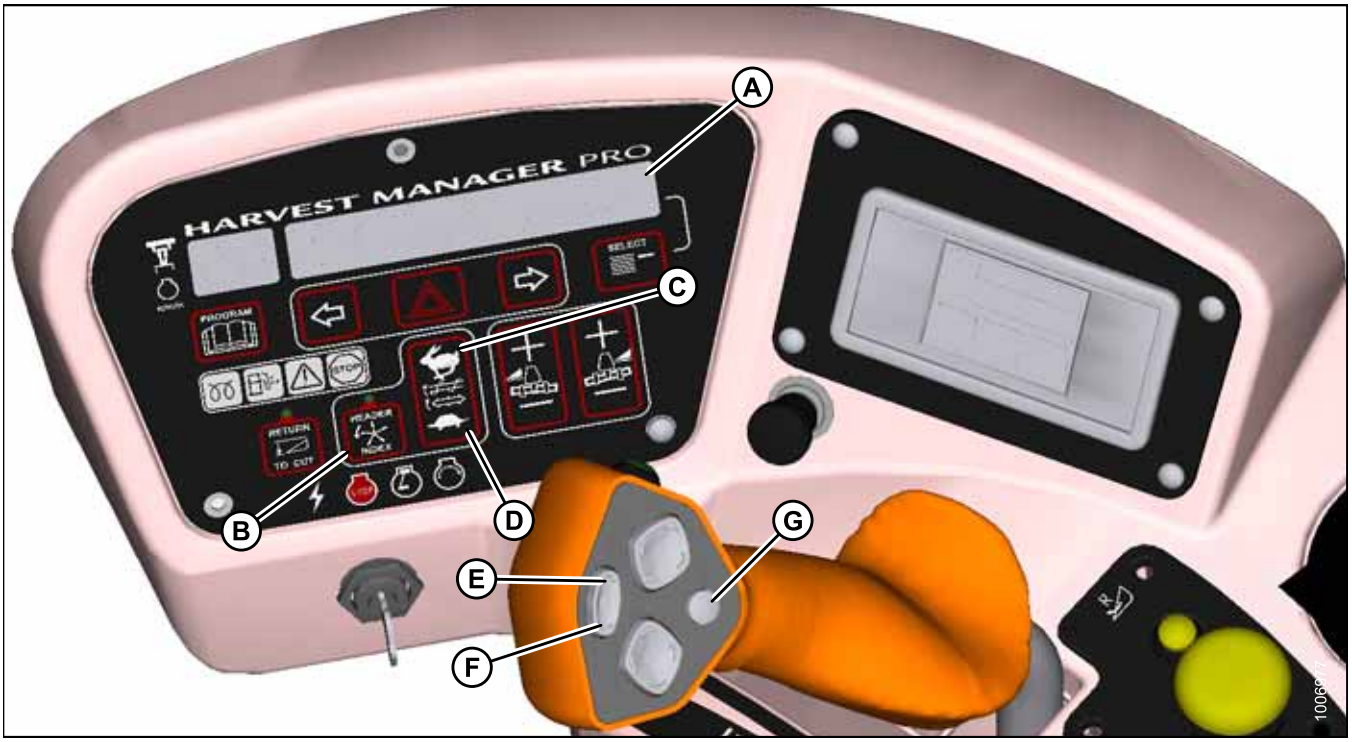
7. On the GSL, press REEL SLOW (F) or FAST (E) switch to set desired reel speed.
8. Display (A) shows **##.## REEL RPM.**

NOTE:

The auger speed will **NOT** change if the reel speed is adjusted.

Adjusting Reel Speed: Windrower in Motion

Figure 4.237: Operator Console



A - Display **B - Header Index** **C - Auger Fast** **D - Auger Slow**
E - Reel Fast **F - Reel Slow** **G - Display Selector**

The reel speed adjustment range is from 15 to 85 rpm. Adjust the reel speed while the machine is in operation as follows:

1. Set HEADER INDEX switch (B) to **OFF**.
2. Press REEL SLOW (F) or REEL FAST (E) on the ground speed lever (GSL) until display (A) shows **##.## REEL RPM** with desired reel speed.

   The displayed value (##.##) = reel speed (rpm or mph or km/h[26]).

NOTE:

Adjusting reel speed will alter auger speed unless the auger speed has been preset.

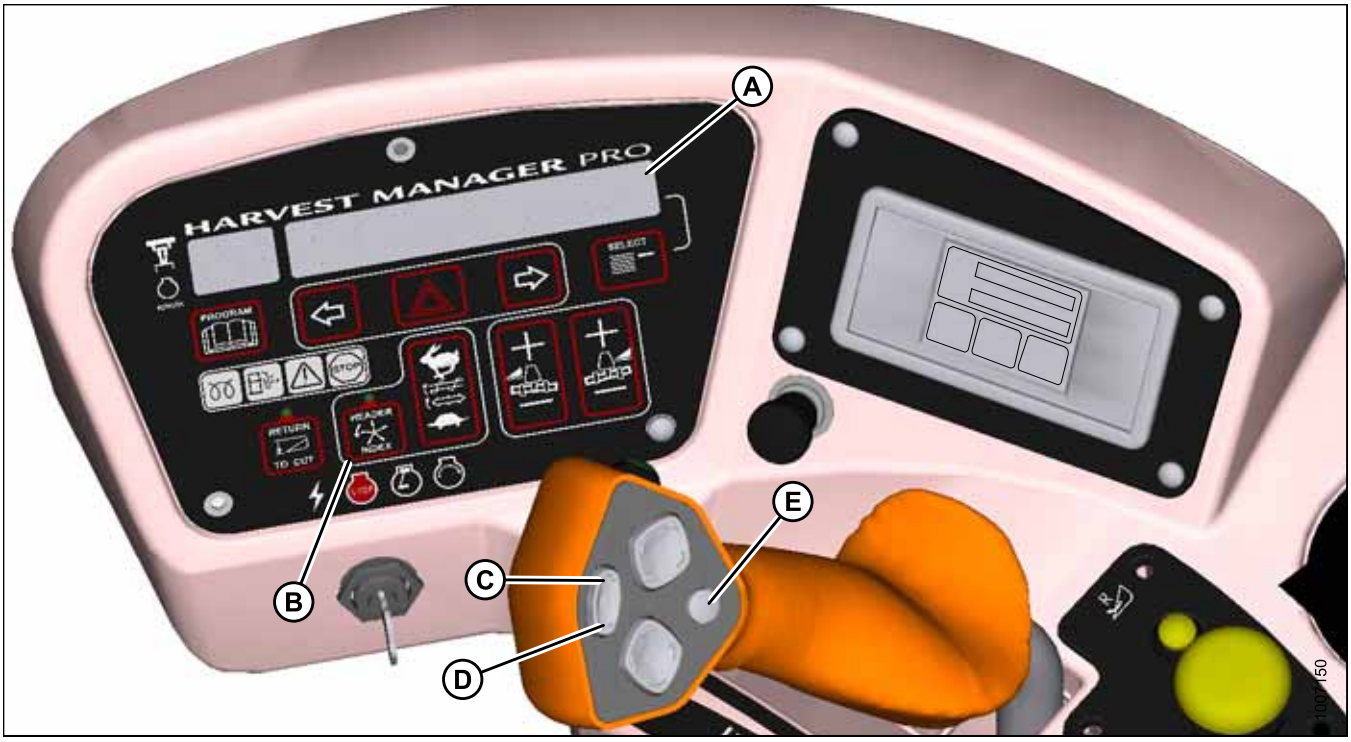
Setting Reel to Ground Speed

Setting the speed of the reel relative to ground speed (using the header index function) automatically adjusts the reel speed with changes to ground speed. Benefits may include improved crop flow and reduced operator fatigue.

Setting the reel to ground speed requires setting the minimum reel speed and the reel index.

26. Depending on CDM programming.

Figure 4.238: Operator Console



CAUTION

Check to be sure all bystanders have cleared the area.

1. Set the minimum reel speed as follows:

   IMPORTANT:

   Set the minimum reel speed while stationary with the ground speed lever (GSL) in the N-DETENT position.

   a. Engage header.

   b. Set HEADER INDEX switch (B) to **ON**.

   c. Press the DISPLAY SELECTOR button (E) on the GSL to display **##.## MIN REEL** at location (A) or press the FAST (C) or SLOW (D) switch.

      The displayed value (##.##) = reel speed (rpm or mph or km/h[27]).

   d. Press FAST (C) or SLOW (D) until the desired minimum reel speed is achieved.

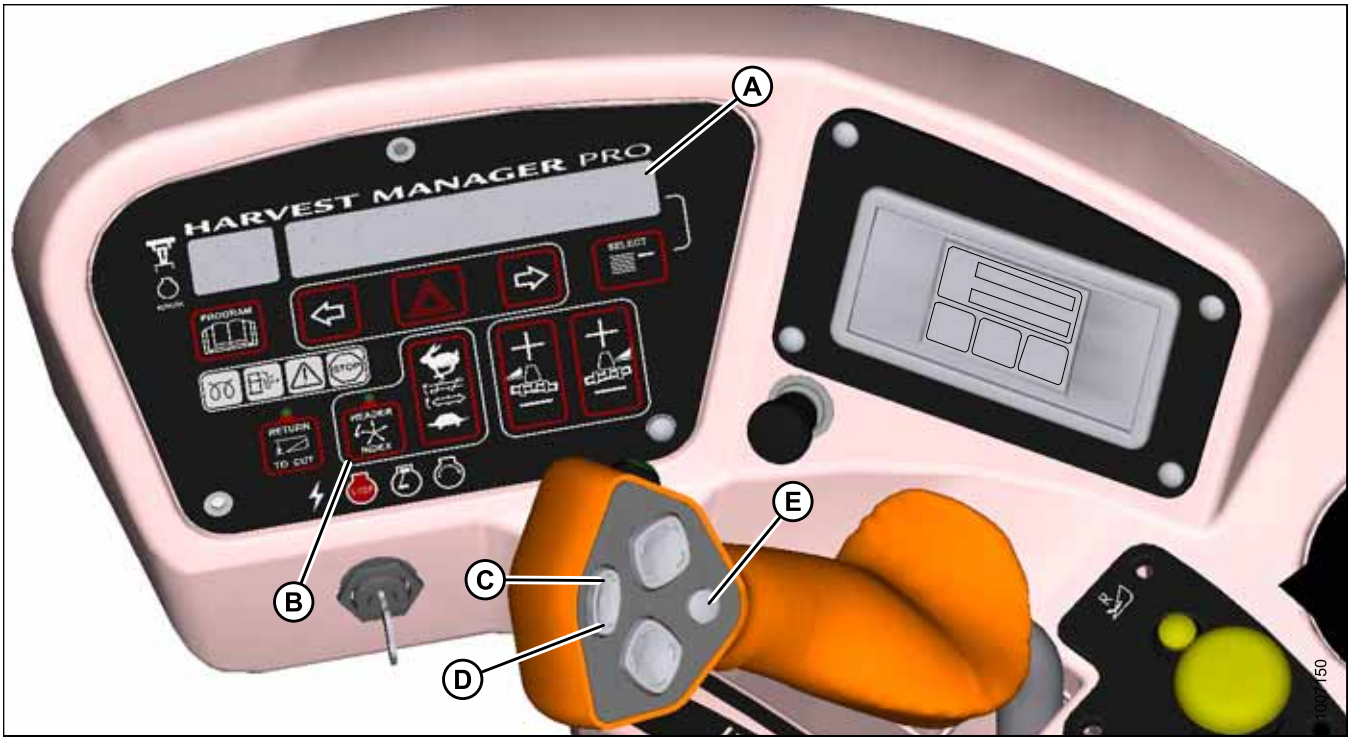
2. Set the reel index as follows:

   IMPORTANT:

   Reel index can only be adjusted while operating at a ground speed faster than minimum reel speed plus header index value.

27. Depending on CDM programming.

Figure 4.239: Operator Console



a. Set the HEADER INDEX switch (B) to **ON**.

b. Press the DISPLAY SELECTOR button (E) on the GSL to display **##.## ##.# REEL IND**[28] or press the FAST (C) or SLOW (D) switch.

   - The displayed value (##.##) = reel speed (mph or km/h or rpm[27])
   - The displayed value (##.#) = reel index value

c. Press FAST (C) or SLOW (D) until the desired reel index value is achieved.

NOTE:

The reel will continue operating at the minimum reel speed setting when ground speed drops below the set value.

The cab display module (CDM) display (A) will flash ##.## MIN REEL (RPM or MPH or KPH[27]) prompting you to change the minimum set-point or increase ground speed if the total of ground speed, plus the index value is **LESS THAN** the minimum reel speed set-point.

Examples:

- Windrower is operating at 8 mph with HEADER INDEX ON, and set at -1.0.
  Display shows: **7.0 -1.0 REEL IND** where **7.0** (8.0-1.0) is the reel speed in mph and **-1.0** is the header index setting.
- Windrower speed drops to 7.5 mph at same HEADER INDEX setting.
  Display shows: **6.5 -1.0 REEL IND** where **6.5** (7.5-1.0) is the reel speed in mph and **-1.0** is the header index setting.
- Windrower is operating at 8 mph with HEADER INDEX ON, and set at 2.0.

28. REEL IND will only be displayed when operating at a ground speed faster than minimum reel speed plus header index value.

Display shows: **10.0 2.0 REEL IND** where **10.0** (8+2.0) is the reel speed in mph and **2.0** is the header index setting.

4.7.3 Knife Speed

The ideal cutting speed should achieve a clean cut. Crop types and conditions usually influence the knife and ground speeds.

When the header is first attached to the windrower, the windrower control module (WCM) receives a code from the header that determines the knife speed range and the minimum speed. The desired speed can be programmed on the cab display module (CDM) and stored in the WCM memory so the knife will operate at the original set-point after the header is detached and reattached to the windrower. If no header code is detected, the CDM displays NO HEADER and the knife speed reverts to the operator's selection from a range of 800–1000 strokes per minute. Refer to the header operator's manual for the suggested knife speed for a variety of crops and conditions.

NOTE:

The knife speed cannot be programmed outside the range specified for each header.

NOTE:

The knife speed can be adjusted without shutting down the machine; however, the windrower should be stopped before adjusting CDM settings.

To adjust the knife speed, refer to *Setting the Header Knife Speed, page 99*.

Setting Knife Speed While in Motion

Figure 4.240: Operator Console

CAUTION

Check to be sure all bystanders have cleared the area.

Display and set knife speed while the windrower is moving as follows:

1. Engage header.
2. Press PROGRAM (D) and SELECT (E) on cab display module (CDM) until display (A) shows **#### KNIFE SPM**.

   The displayed value (####) = strokes per minute.
3. Press LEFT ARROW (B) or RIGHT ARROW (C) until desired knife speed is displayed at (A).

4.8 Operating with an R Series or R1 Series Header

The R80 and R85 4.0 m (13 ft.) headers are shipped without the motor and hoses installed. The installation of a separate motor and hose bundle is necessary.

If required, obtain kit (MD #B5510) from your MacDon Dealer, and install it in accordance with the instructions supplied with the kit.

NOTE:

Hydraulic Coupler kit (MD #B5497) is also available for quick attachment and removal of multiple header types.

R1 Series headers come from the Dealer with the required completion package (MD #B6272).

A Disc Drive kit (MD #B4657) is also required in order for the windrower to operate the header.

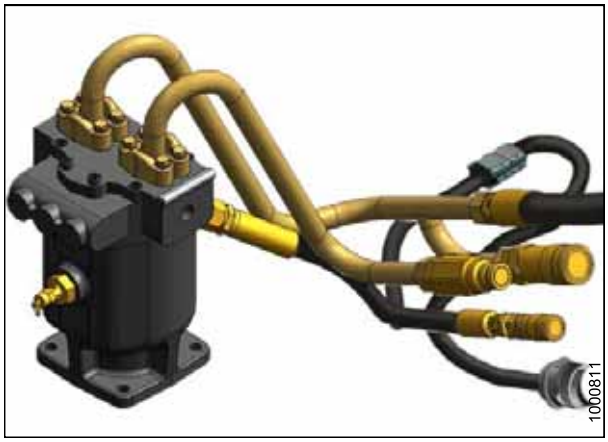


Figure 4.241: Kit MD #B5510

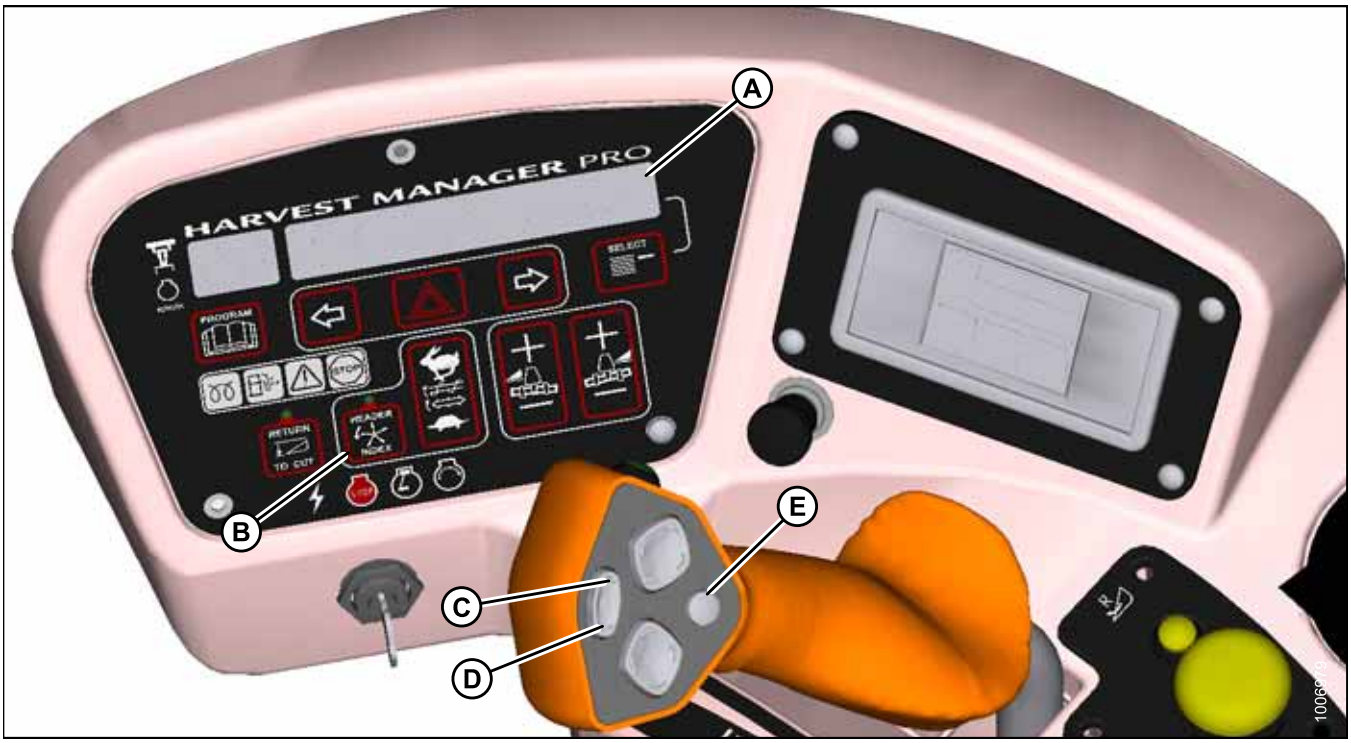
4.8.1 Disc Speed

The ideal disc speed should achieve a clean cut. Crop types and conditions affect disc and ground speeds.

Refer to the header operator's manual for the suggested disc speed for a variety of crops and conditions.

Setting Disc Speed

Figure 4.242: Operator Console



A - Display **B - Header Index** **C - Fast**
D - Slow **E - Display Selector**

CAUTION

Check to be sure all bystanders have cleared the area.

Follow these steps to set the disc speed:

1. Engage header.
2. Set HEADER INDEX switch (B) to **OFF.**
3. Press FAST (C) or SLOW (D) on ground speed lever (GSL) until display (A) shows **#### DISC RPM** with desired disc speed.

   Displayed value (####) = disc speed (rpm).

5 Maintenance and Servicing

The following section will guide you through the windrower's basic maintenance and service requirements.

5.1 Preparation for Servicing

WARNING

To avoid personal injury, before servicing adapter/header or opening drive covers:

- **Fully lower the header. If necessary to service in the raised position, always engage lift safety props.**
- **Disengage drives.**
- **Stop engine, and remove key.**
- **Wait for all moving parts to stop.**

5.2 Engine Compartment Hood

The engine compartment hood has two open positions. The lowest is for general maintenance such as checking and adding fluid, servicing the cooling box, etc. The highest position provides full access to the engine compartment.

5.2.1 Opening Hood (Lower Position)

⚠ WARNING

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

1. Stop the engine and remove the key.
2. Locate latch (A) behind the grill and lift to release the hood.
3. Raise hood until strap (B), which should be looped under hooks (C) and (D), stops at approximately a 40° angle.
4. Remove strap (B) from hook (C) and allow the hood to rise slightly farther.

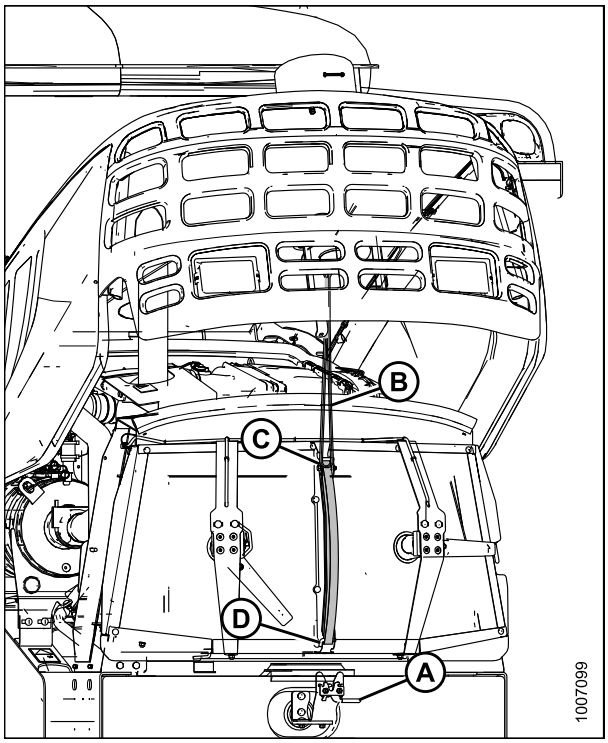


Figure 5.1: Hood Open (Lower Position)

5.2.2 Closing Hood (Lower Position)

1. Grasp the strap at location (B) and loop under upper hook (C).

   IMPORTANT:

   Failure to hook strap may result in it becoming entangled with the screen cleaners or the latch.

2. Pull down on strap, grasp the hood when within reach, and lower until hood engages latch (A).

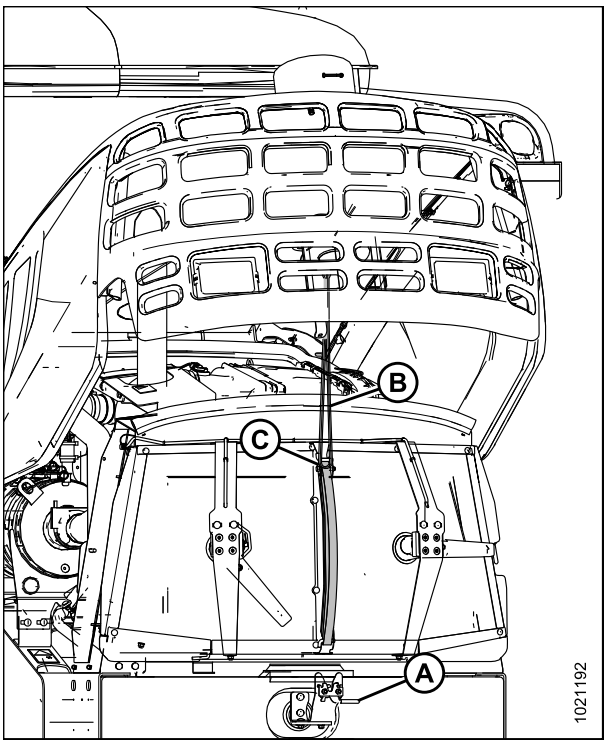


Figure 5.2: Hood Open (Lower Position)

5.2.3 Opening Hood (Highest Position)

⚠ WARNING

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

1. Stop the engine and remove the key.

2. Locate latch (A) behind the grill and lift to release the hood.
3. Raise hood until strap (B), which should be looped under hooks (C) and (D), stops at approximately a 40° angle.
4. Remove strap (B) from hook (C) and allow hood to rise slightly farther.
5. Remove the strap from hook (D) and allow the hood to rise fully to approximately 65°.

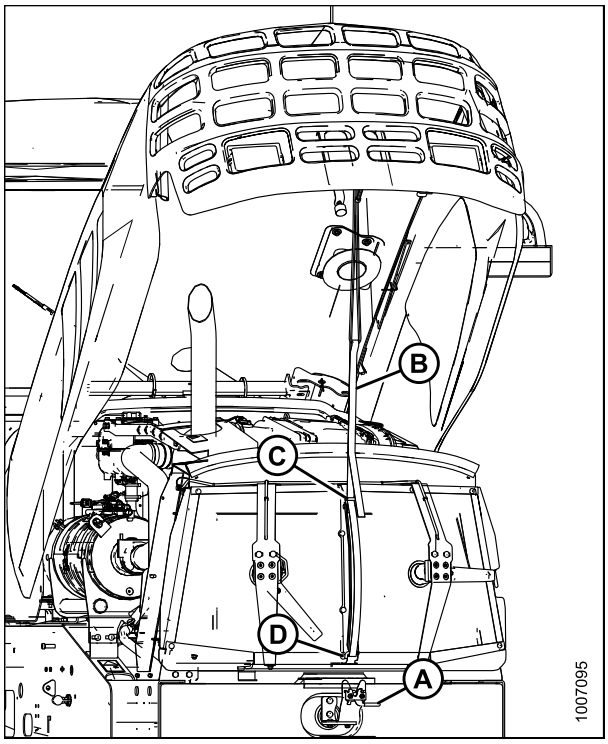


Figure 5.3: Hood Open (Highest Position)

5.2.4 Closing Hood (Highest Position)

1. Pull down on strap (B) and loop under lower hook (D).
2. Grasp strap (B) and loop under upper hook (C).

   IMPORTANT:

   Failure to hook strap may result in it becoming entangled with the screen cleaners or the latch.
3. Pull down on strap (B), grasp the hood when within reach, and lower until hood engages latch (A).

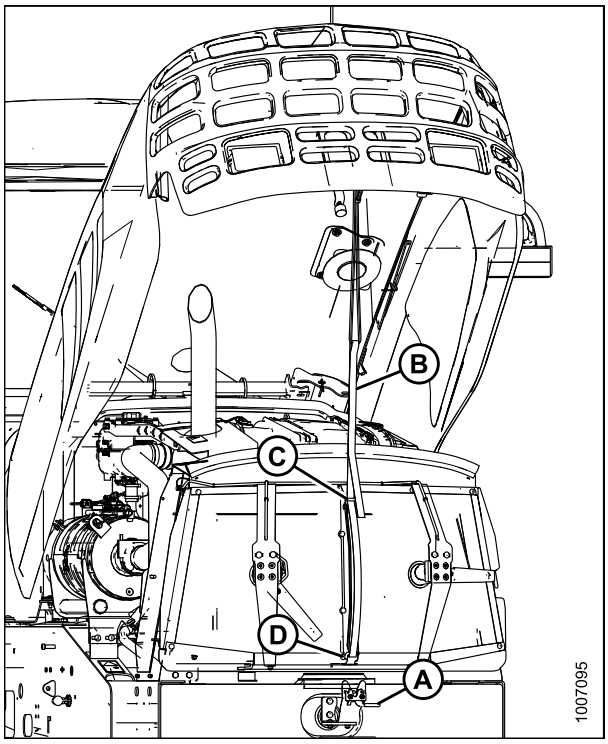


Figure 5.4: Hood Open (Highest Position)

5.3 Maintenance Platforms

Swing-away platforms and stairs are provided on both sides of the windrower for access to the operator's station and engine bay. The platforms can be swung away from the windrower to allow access to the hydraulics plumbing or battery.

The maintenance platforms have three positions:

- Closed position
- Open standard position
- Open major servicing position

5.3.1 Opening Platforms (Standard Position)

CAUTION

Do NOT stand on an unlocked platform. It is unstable and may cause you to fall.

This procedure describes how to open the cab-forward left platform (A). The same procedure is used for the right platform (B).

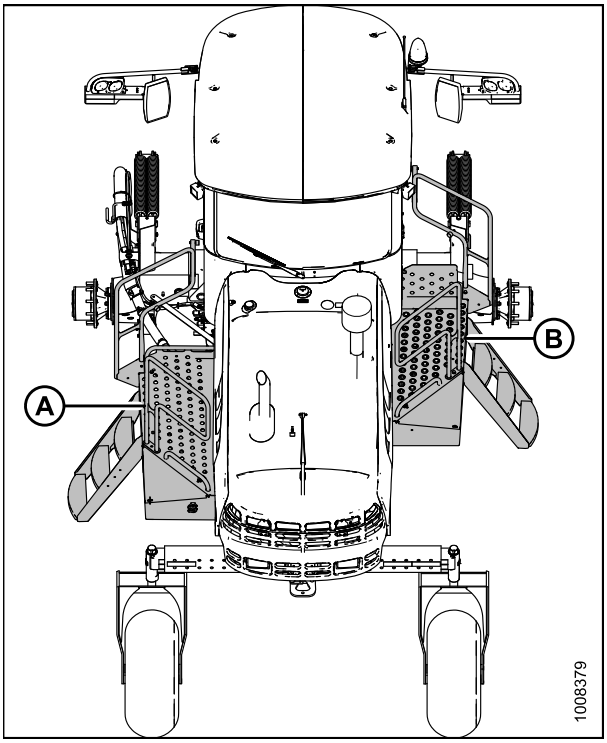


Figure 5.5: Platforms

1. Push latch (A) and pull platform (B) toward walking beam until it stops and latch engages in open position.

   NOTE:

   Ensure the platform is latched before using.

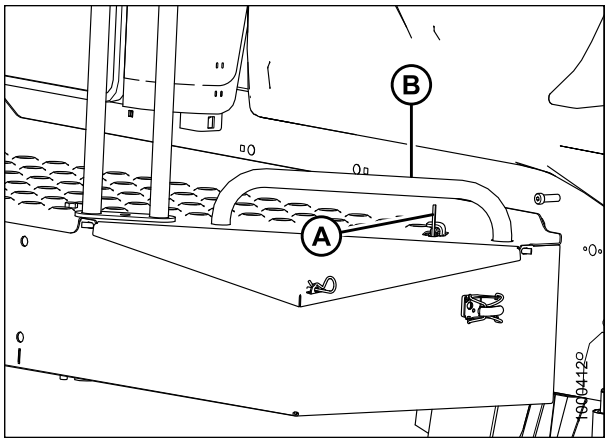


Figure 5.6: Platform Latch

5.3.2 Closing Platforms (Standard Position)

⚠ CAUTION

Do NOT stand on an unlocked platform. It is unstable and may cause you to fall.

This procedure describes how to close the cab-forward left platform (A). The same procedure is used for the right platform (B).

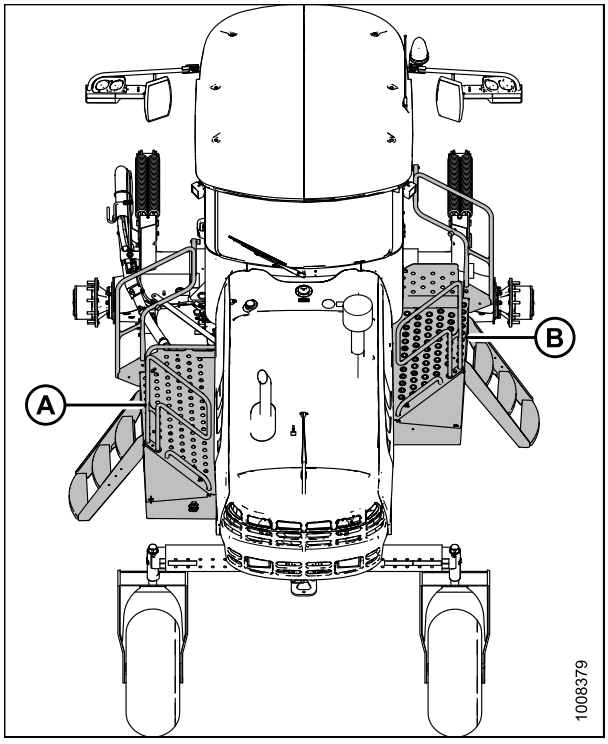


Figure 5.7: Platforms

1. If platform is latched in the open position, push latch (A) to unlock it.
2. Grasp handle (B) on platform and push forward until it stops and latch (A) engages.

   NOTE:

   Ensure the platform is latched properly before using.

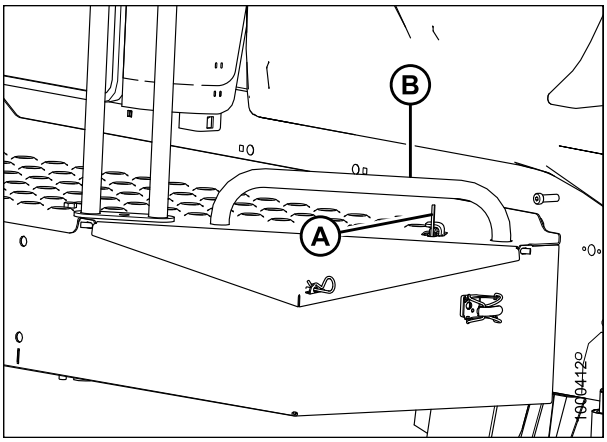


Figure 5.8: Platform Latch

5.3.3 Opening Platforms (Major Service Position)

To improve access to the hydraulics plumbing or battery, the platforms can be swung away from the windrower.

CAUTION

Do NOT stand on an unlocked platform. It is unstable and may cause you to fall.

This procedure describes how to open the cab-forward left platform (A). The same procedure is used for the right platform (B).

Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.

IMPORTANT:

Failure to open hood will result in damage to the hood when the platform is moved.

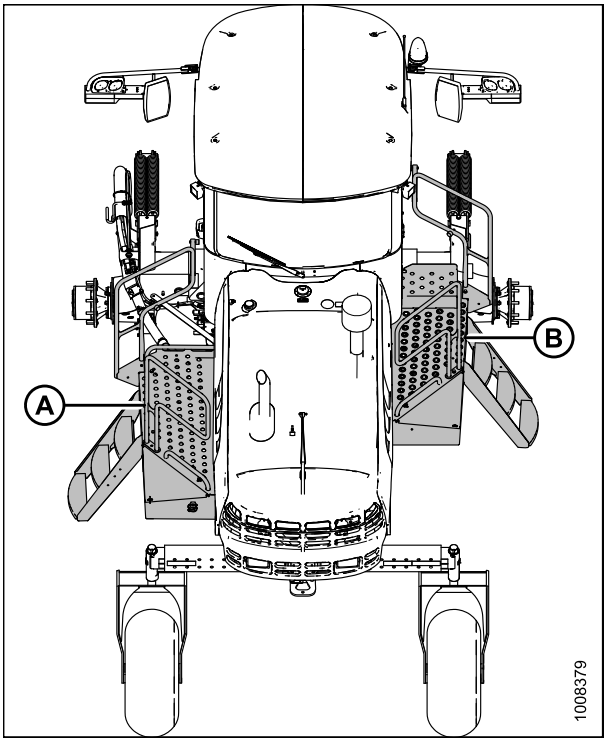


Figure 5.9: Platforms

1. Unlock latch (A) and move platform (B) toward open position. Do **NOT** lock in full aft position.

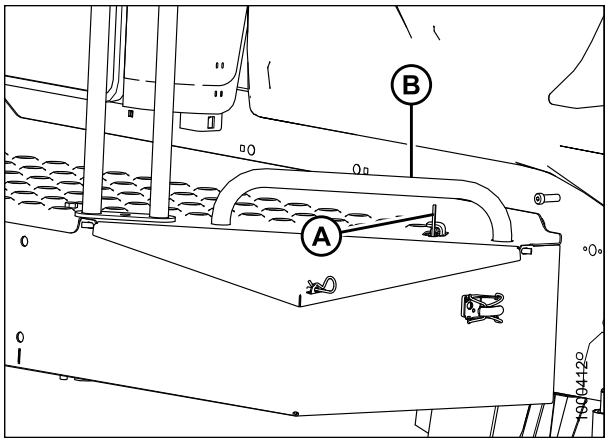


Figure 5.10: Platform Latch

2. Remove the nut and bolt that secure link (A) to the frame. Swing link (A) out of the way.
3. Pull the front (cab-forward) end of platform away from frame while moving it towards the walking beam. The aft corner of platform (B) should project slightly into the engine bay when the opening is optimum.

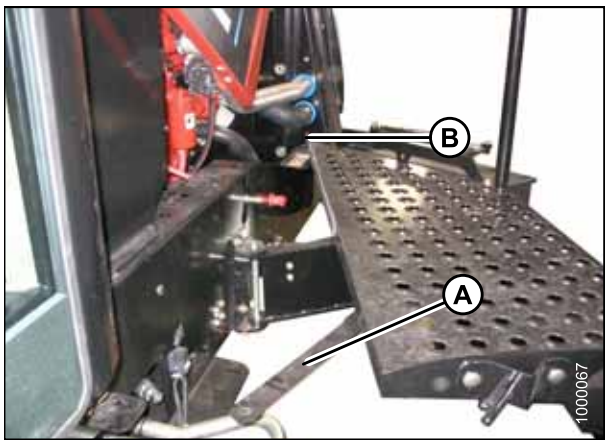


Figure 5.11: Platform

5.3.4 Closing Platforms (Major Service Position)

⚠ CAUTION

Do NOT stand on an unlocked platform. It is unstable and may cause you to fall.

NOTE:

This procedure is applicable to both platforms. Left side is shown.

1. Swing link (A) all the way forward.
2. Push the front (cab-forward) end (B) of platform towards the frame while moving the platform forward (cab-forward).
3. Position link (A) on bracket and install bolt and nut. Tighten enough so that link can still swivel on bracket.

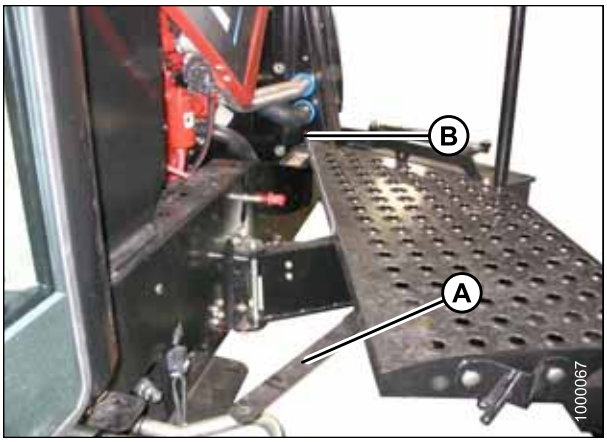


Figure 5.12: Platform

4. Move platform (B) forward (cab-forward) until it stops and latch (A) engages.
5. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

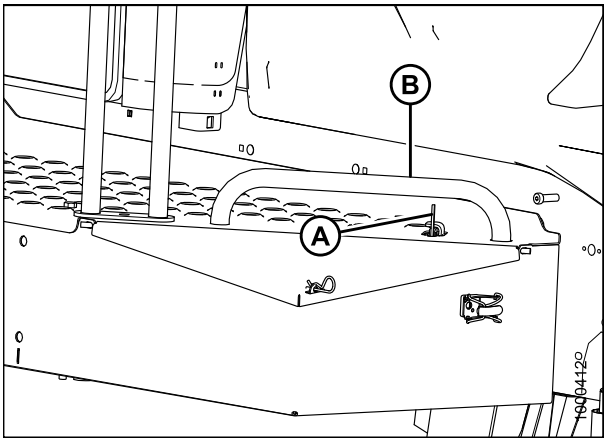


Figure 5.13: Platform Latch

5.4 Windrower Lubrication

WARNING

To avoid personal injury, before servicing windrower or opening drive covers, follow procedures in the SAFETY chapter.

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

Log hours of operation and use the Maintenance Checklist provided to keep a record of scheduled maintenance. Refer to *5.12.1 Maintenance Schedule/Record, page 422*.

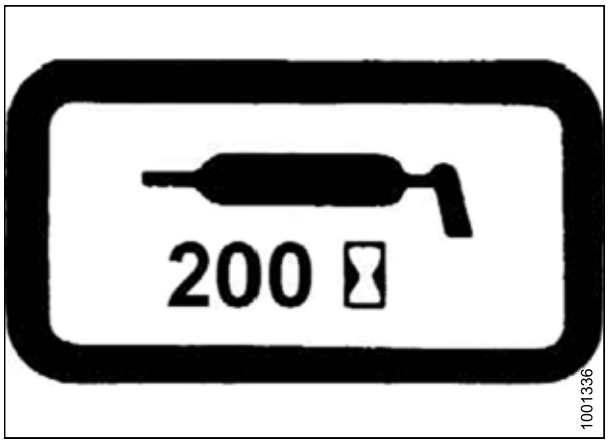


Figure 5.14: Lubrication Interval Decal

5.4.1 Lubricating the Windrower

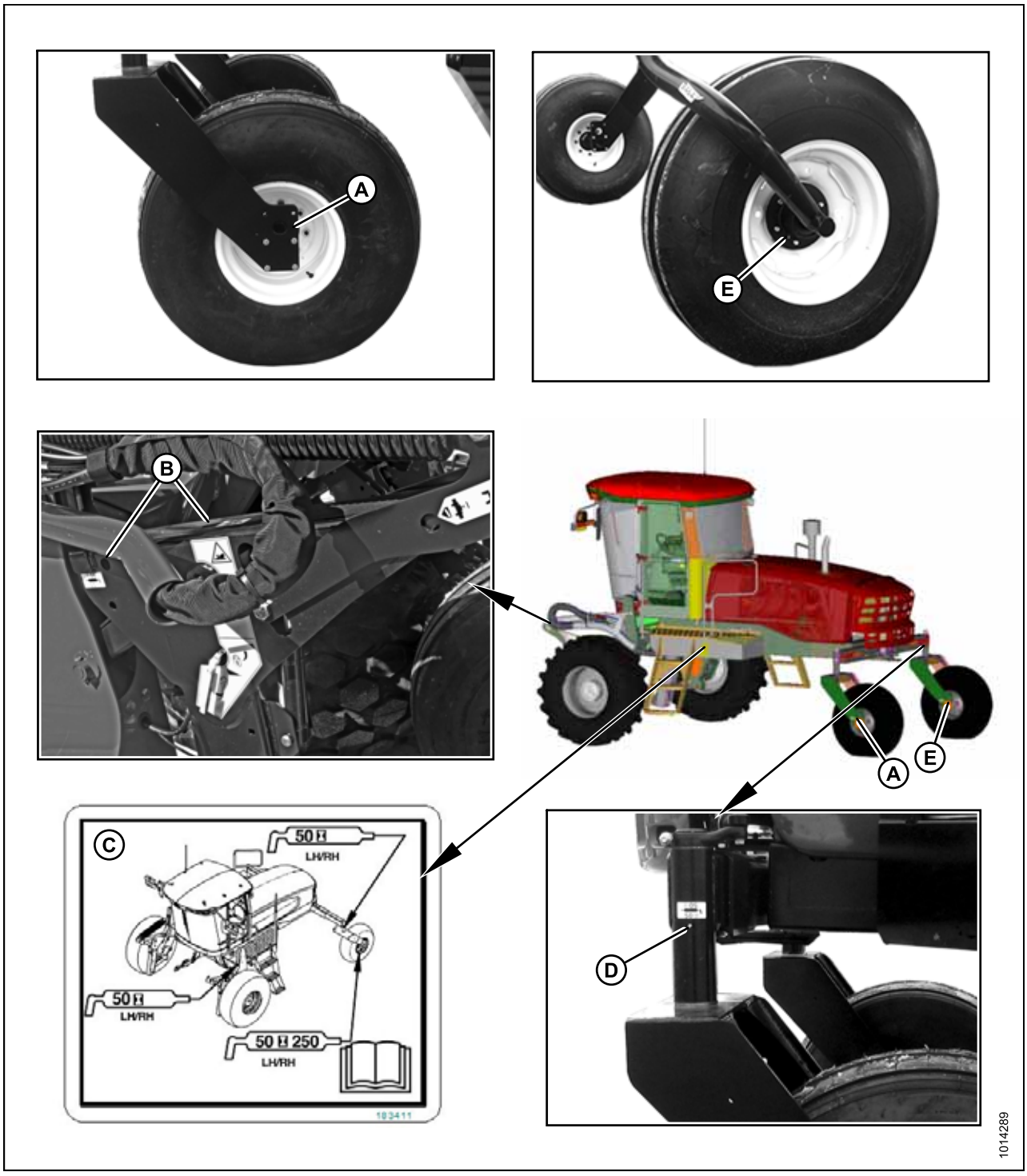
WARNING

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

1. To avoid injecting dirt and grit, wipe grease fitting with a clean cloth before greasing.
2. Inject grease through fitting with grease gun until grease overflows fitting, except where noted. Refer to *8.1.3 Lubricants, Fluids, and System Capacities, page 452*.
3. Leave excess grease on fitting to keep out dirt.
4. Replace any loose or broken fittings immediately.
5. If fitting will **NOT** take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

5.4.2 Lubrication Points

Figure 5.15: Lubrication Points



A - Forked Caster Wheel Bearing (Two Places) (Outer – Both Wheels)
B - Top-Link (Two Places) (Both Sides)
C - Lubrication Decal (MD #183411)
D - Caster Pivot (Both Sides)
E - Forked/Formed Caster Wheel Bearing (Two Places) (Inner – Both Wheels) (50 Hrs/250 Hrs)

5.5 Operator's Station

5.5.1 Seat Belts

Seat belts are an important component of the windrower's operator safety system. The following checks and service points will ensure that seat belts are functioning properly:

- Keep sharp edges and items that can cause damage away from the belts.
- Check belts, buckles, retractors, tethers, slack take-up system, and mounting bolts for damage.
- Check that bolts are tight on the seat bracket or mounting.
- Replace all parts that have damage or wear.
- Replace belts that have cuts that can weaken the belt.
- Keep seat belts clean and dry. Clean only with a soap solution and warm water. Do **NOT** use bleach or dye on the belts, as this may weaken the material.

5.5.2 Safety Systems

Perform the following checks on the operator's presence and engine lock-out systems every year or every 500 hours of operation—whichever occurs first.

Checking Operator Presence System

The operator presence system is a safety feature designed to deactivate or alert selected systems when the Operator is not seated at the operator's station.

CAUTION

Check to be sure all bystanders have cleared the area.

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

1. With the windrower engine running, place the ground speed lever (GSL) in NEUTRAL and turn the steering wheel until it locks.
2. With everyone clear of the machine, engage header drive. Refer to *3.17.1 Header Drive Switch, page 73*.
3. With header drive running, stand up out of the seat. In approximately 5 seconds, the header should shut off. If **NOT**, the Operator Presence System requires adjustment. See your MacDon Dealer.
4. To restart the header, move the HEADER DRIVE switch to OFF position and back to the ON position again.
5. With the engine running, position the GSL in NEUTRAL and in N-DETENT. Refer to *3.16 Windrower Controls, page 71*.
6. Swivel the operator's station, but do **NOT** lock into position.
7. Move GSL out of N-DETENT. The engine should shut down and the display will flash LOCK SEAT BASE → CENTER STEERING WHEEL → NOT IN NEUTRAL.
8. Swivel and lock the operator's station, and the display should return to normal. If the engine does **NOT** shut down, the seat position switches require adjustment. See your MacDon Dealer.

9. With the windrower moving at less than 8 km/h (5 mph), stand up out of the seat. The cab display module (CDM) will flash NO OPERATOR on the upper line and ENGINE SHUT DOWN 5…4…3…2…1…0 on the lower line accompanied by a steady tone. At 0, the engine shuts down. If the engine does **NOT** shut down, the Operator Presence System requires adjustment. See your MacDon Dealer.
10. With the windrower moving at more than 8 km/h (5 mph), stand up out of the seat. The CDM should beep once and display NO OPERATOR on the lower line. If **NOT**, the Operator Presence System requires adjustment. See your MacDon Dealer.

Checking Engine Interlock

CAUTION

Check to be sure all bystanders have cleared the area.

1. With the engine shut down and the header drive switch engaged, try to start the engine. If the engine turns over, the system requires adjustment. See your MacDon Dealer.
2. With the engine shut down, steering wheel **NOT** centered, and the ground speed lever (GSL) in NEUTRAL, but **NOT** in N-DETENT, try to start the engine. The cab display module (CDM) will flash NOT IN NEUTRAL on the display upper line and CENTER STEERING WHEEL on the lower line, accompanied by a short beep with each flash and the engine should **NOT** start. If the engine starts, the system requires adjustment. See your MacDon Dealer.

A properly functioning system should operate as follows:

- The engine should start **ONLY** when the GSL is in N-DETENT, steering wheel is locked in the CENTER position, seat base is latched in either engine-forward or cab-forward direction, and header drive switch is in the OFF position.
- The brake should engage and the machine should **NOT** move after engine start-up, under the above conditions.
- The steering wheel should **NOT** lock with the engine running and the GSL out of the N-DETENT.
- The machine should **NOT** move with the engine running and with the steering wheel still centered, when the GSL is pulled straight out of N-DETENT (**NOT** in forward or reverse).

5.5.3 Ground Speed Lever (GSL) Adjustments

Adjusting Ground Speed Lever (GSL) Lateral Movement

DANGER

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

The ground speed lever (GSL) should easily move into the N-DETENT by itself.

In the cab, adjust the lateral pivot resistance as follows:

1. Remove the five screws (A) securing control panel (B) to console, remove panel, and store in the tray.

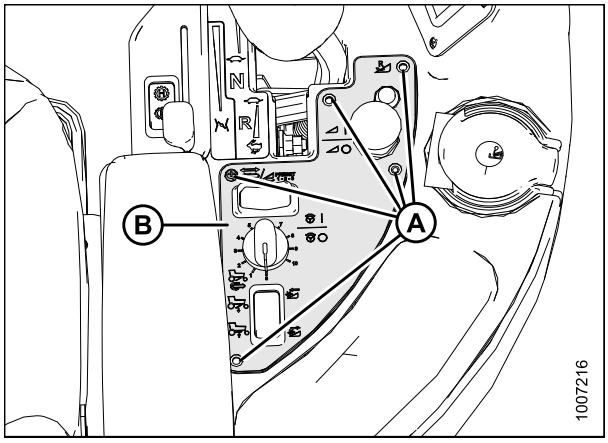


Figure 5.16: Control Panel

2. Back off the jam nut (A) and turn nut (B) to either tighten or loosen the pivot. The nut should be tightened to snug and then backed off 1/2 turn.
3. Tighten jam nut (A).
4. Check movement of GSL.

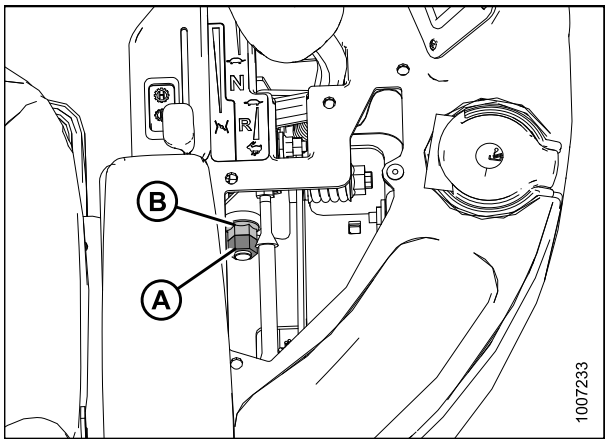


Figure 5.17: Control Panel Removed

5. Reinstall control panel (B) with five screws (A).

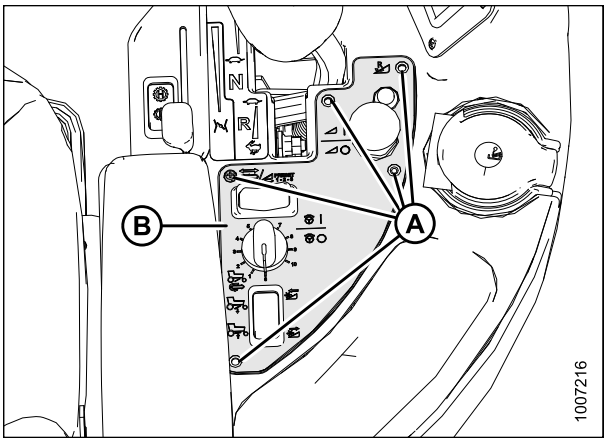


Figure 5.18: Control Panel

Adjusting Ground Speed Lever (GSL) Fore-Aft Movement

The GSL should remain as positioned by the Operator yet be movable without excessive force.

Adjust as follows:

1. Pull handle (A) toward the operator's seat and move the console fully forward to ease accessibility from the underside of the console.

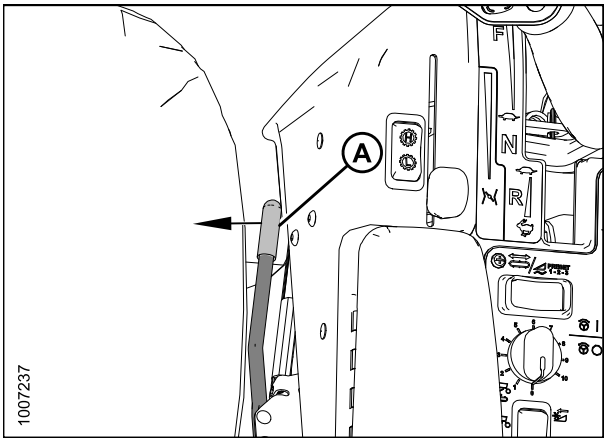


Figure 5.19: Seat Adjustment Handle

2. Set spring dimension (B) to 32 mm (1-1/4 in.).
3. To increase the pivot resistance, turn the nut (A) clockwise to compress the spring.
4. To decrease the resistance, turn the nut (A) counterclockwise to release the spring tension.

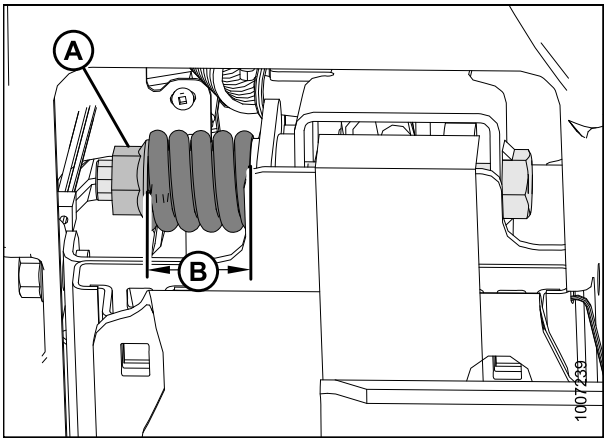


Figure 5.20: GSL Adjustment Spring

5.5.4 Steering Adjustments

Checking Steering Link Pivots

The following checks should be performed every year:

WARNING

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

1. Place ground speed lever (GSL) (A) in N-DETENT.
2. Shut down the engine, and remove the key.

Figure 5.21: Operator Console

3. Check steering rod bolts (A) for looseness and ball joints (B) for any perceptible movement.

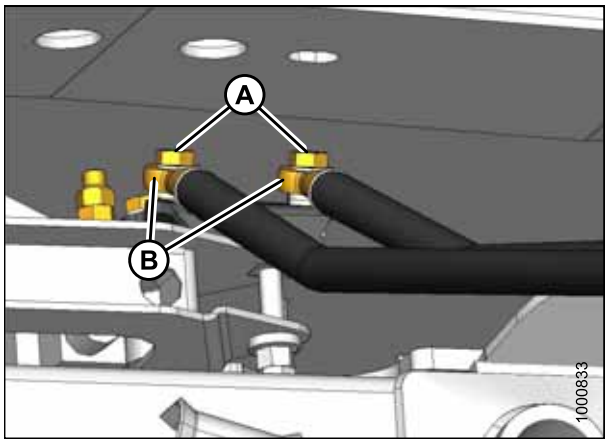


Figure 5.22: Steering Rods

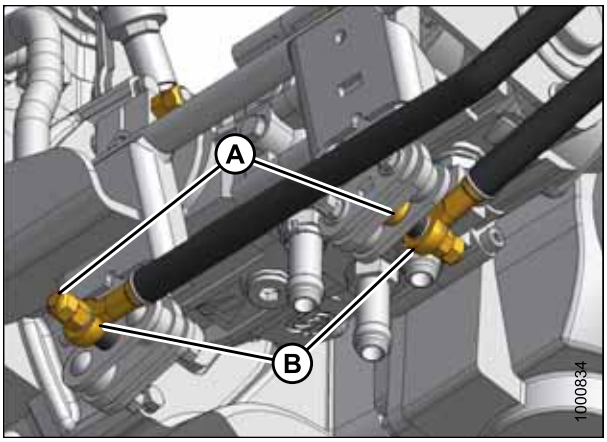


Figure 5.23: Steering Rods (Pump End)

4. Check steering link bolts (A) for looseness and ball joints (B) for any perceptible movement.

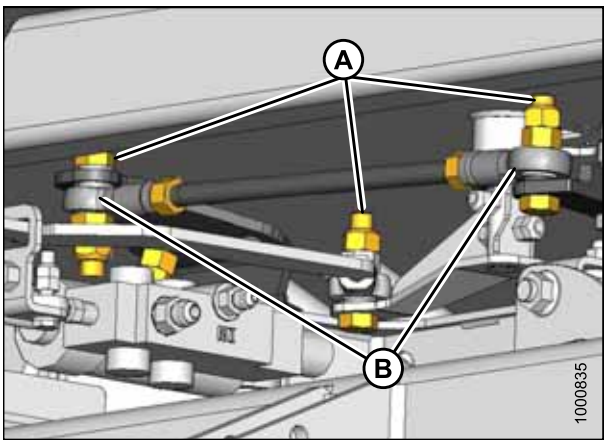


Figure 5.24: Steering Link

5. If bolts are loose:
   a. Back off jam nut (A).
   b. Tighten inside nut (B) to 95–108 Nm (70–80 lbf·ft).
   c. Hold inside nut (B) and tighten jam nut (A) to 81–95 Nm (60–70 lbf·ft).

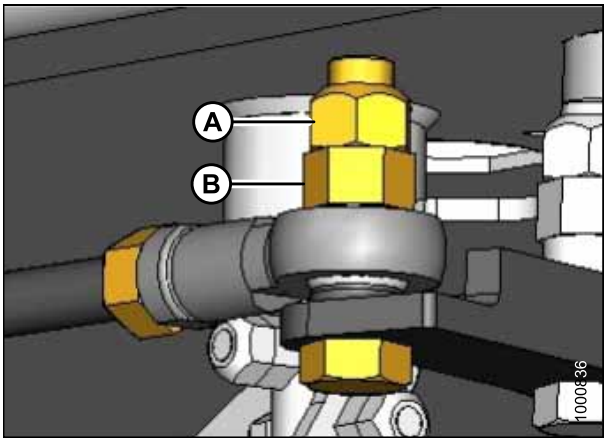


Figure 5.25: Steering Link

6. To replace loose steering link ball joints or steering rod ball joints, contact your MacDon Dealer.
7. After replacing parts or making adjustments, perform checks for neutral interlock and steering lock. Refer to *5.5.2 Safety Systems, page 298*.

Checking and Adjusting Steering Chain Tension

WARNING

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

1. Check steering for binding or excessive play which may be the result of the steering chain being too tight or too loose. If the steering chain does **NOT** require adjustment, skip the following steps.
2. If the chain tension requires adjustment, swivel the operator's station to position steering column close to the door.
3. At the base of the steering column, check dimension (C) at spring. It should be 16 mm (5/8 in.).
4. Adjust dimension as follows:
   a. Loosen nut (A) and turn nut (B) to achieve 16 mm (5/8 in.) dimension (C).
   b. Tighten nut (A) against nut (B) to secure position.
   c. Check that steering chain is taut and steering shaft is free to rotate.

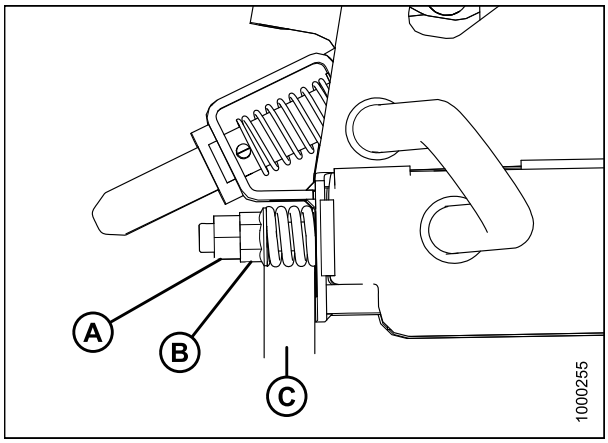


Figure 5.26: Steering Tension Adjuster

5.5.5 Cab Suspension Limit Straps

The cab suspension limit straps are located next to the front suspension on both sides of the cab. These straps protect cab suspension components by preventing the cab shocks from fully extending. The straps do not require regular maintenance, but they should be inspected every 100 hours.

1. Inspect the material on straps (A) for fraying or tearing.
2. If material is torn or frayed, contact your MacDon Dealer for replacement straps.

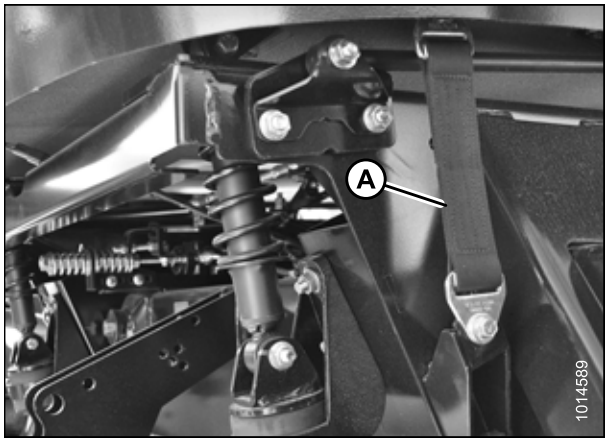


Figure 5.27: Cab Suspension

5.6 Heating, Ventilating, and Air Conditioning (HVAC) System

5.6.1 Fresh Air Intake Filter

The fresh air filter is located outside the right rear of the cab and should be serviced every 50 hours under normal conditions and more frequently in severe conditions.

Removing Fresh Air Filter

WARNING

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

1. Open the right cab-forward platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
2. Rotate latch (A) and slide filter tray (B) out of the housing.

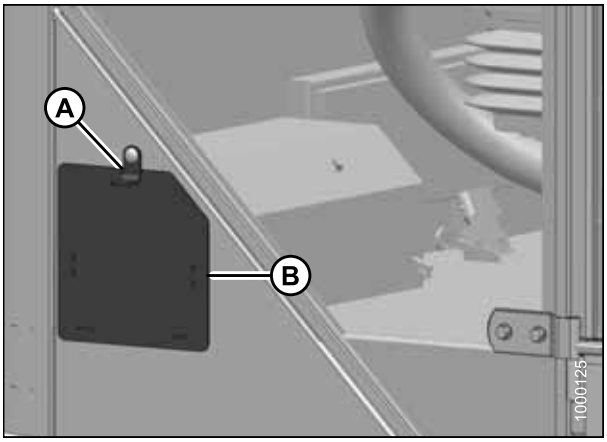


Figure 5.28: Filter Tray

3. Remove filter (A) from tray (B).

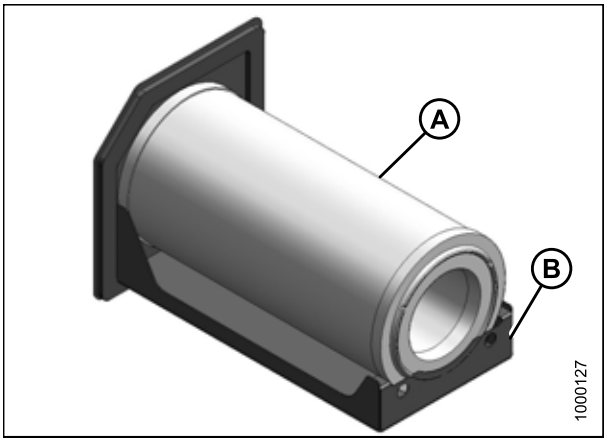


Figure 5.29: Fresh Air Filter

Inspecting and Cleaning Fresh Air Filter Element

1. Tap the sides of filter element (A) gently to loosen dirt. Do **NOT** tap element against a hard surface.
2. Using a dry element cleaner gun, clean element with compressed air.

   IMPORTANT:

   Air pressure must **NOT** exceed 414 kPa (60 psi). Do **NOT** direct air against outside of element, as dirt might be forced through to inside.
3. Hold the air nozzle next to the filter element's inner surface and move up and down pleats.
4. Repeat Steps *1, page 306* to *3, page 306* to remove remaining dirt as required.
5. Hold a bright light inside the element and check carefully for holes. Discard any element that shows the slightest hole.
6. Check outer screen for dents. Vibration would quickly wear a hole in the filter.
7. Check filter gasket for cracks, tears, or other signs of damage. If gasket is damaged or missing, replace element.

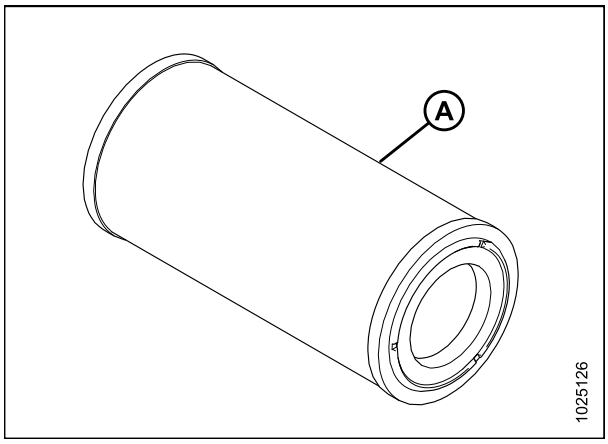


Figure 5.30: Fresh Air Filter Element

Installing Fresh Air Filter

Refer to *8.1.4 Filter Part Numbers, page 453* for part number.

1. Clean tray (B) and interior of filter housing.
2. Place filter (A) onto tray (B).

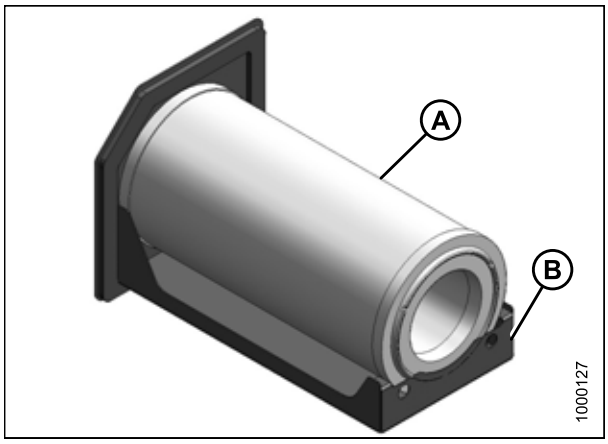


Figure 5.31: Fresh Air Filter

3. Slide filter tray (B) into housing.

   NOTE:

   If necessary, move the Global Positioning System (GPS) wiring harnesses to the left (engine side) of the housing before inserting the filter tray.

4. Close and latch housing door (A).

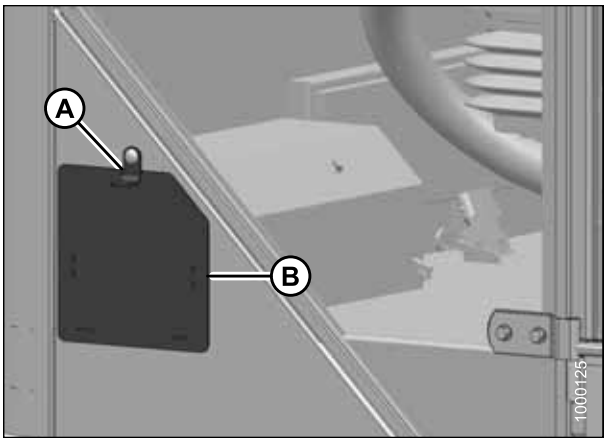


Figure 5.32: Cab Fresh Air Filter Access

5.6.2 Cleaning Return Air Filter

The return air filter is located behind the operator's seat on the cab wall and should be serviced every 100 hours.

Servicing the Return Air Cleaner/Filter

WARNING

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

If replacing the return air filter, refer to *8.1.4 Filter Part Numbers, page 453* for the part number.

1. Unscrew the two knobs (A) attaching cover and filter to cab wall, and remove the cover and filter assembly (B).

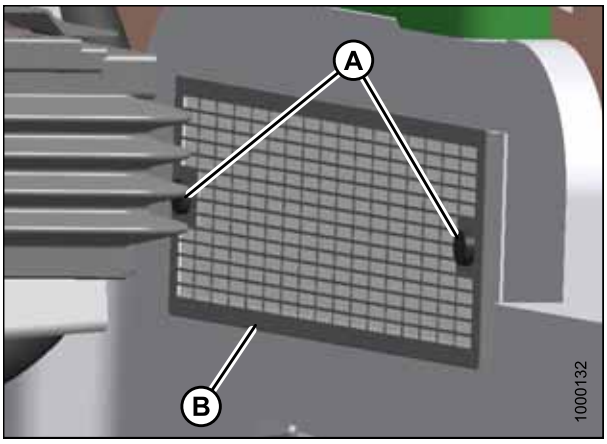


Figure 5.33: Return Air Filter

2. Separate the filter (B) from the cover (A).
3. Clean or replace the filter. If cleaning filter, refer to *Cleaning Return Air Cleaner/Filter, page 308*.
4. Assemble the cleaner (B) and cover (A), and position on cab wall over opening.

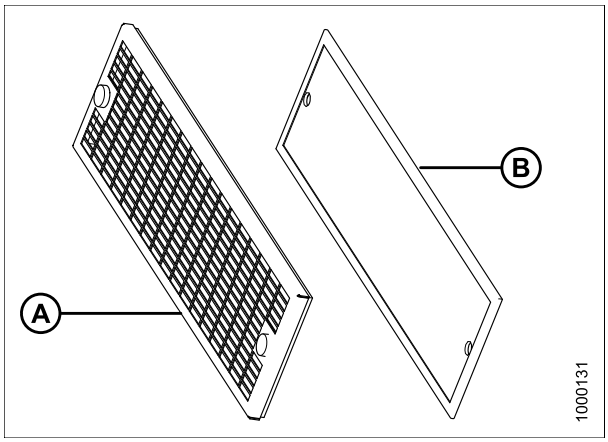


Figure 5.34: Return Air Filter

5. Secure filter assembly (B) to cab wall with knobs (A).

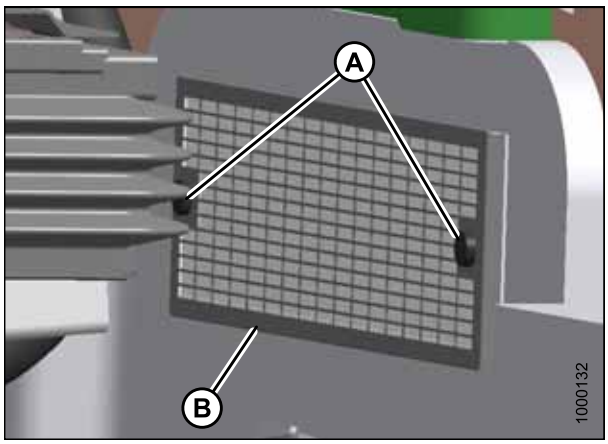


Figure 5.35: Return Air Filter

Cleaning Return Air Cleaner/Filter

Clean the electrostatic filter as follows:

1. Mix a solution of warm water and detergent in a suitable container and soak the filter (A) for a few minutes.
2. Agitate to flush out the dirt.
3. Rinse with clean water, and then dry with compressed air.
4. Inspect filter for damage, separation, and holes. Replace if damaged.

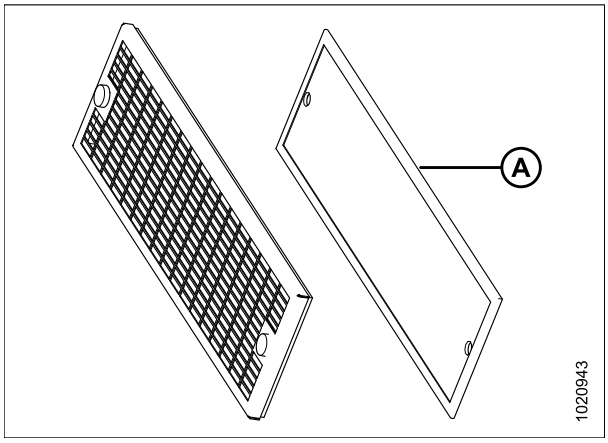


Figure 5.36: Return Air Filter

5.6.3 Air Conditioning Condenser

The air conditioning condenser should be cleaned daily with compressed air. More frequent cleaning may be necessary in severe conditions.

Cleaning the condenser can be done at the same time as the radiator, oil cooler, and charge air cooler. Refer to *5.8 Maintaining Engine Cooling Box, page 355*.

5.6.4 Air Conditioning (A/C) Evaporator Core

The A/C evaporator should be checked annually for cleanliness. If the A/C system produces insufficient cooling, a possible cause is clogged evaporator fins. Fins will clog up from the side opposite the blowers. The evaporator is located inside the heating air conditioning unit under the cab.

Removing Air Conditioning (A/C) Cover

WARNING

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

1. Stop the engine, and remove the key.
2. Loosen clamps (A) on the two drain hoses connected to the A/C drain tubes, and pull the hoses off the A/C drain tubes.

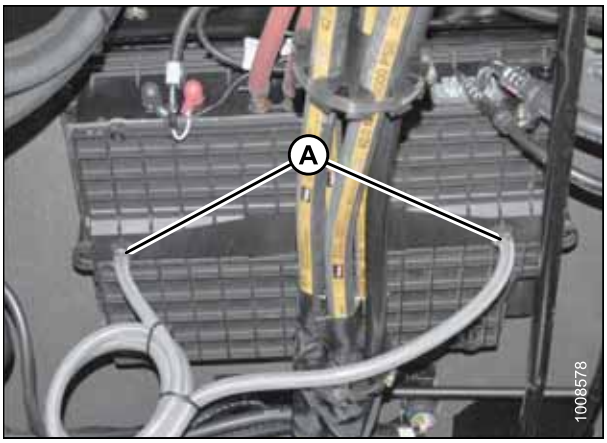


Figure 5.37: HVAC System

3. Remove the fasteners (A) that attach the cover to the housing. Remove the cover.

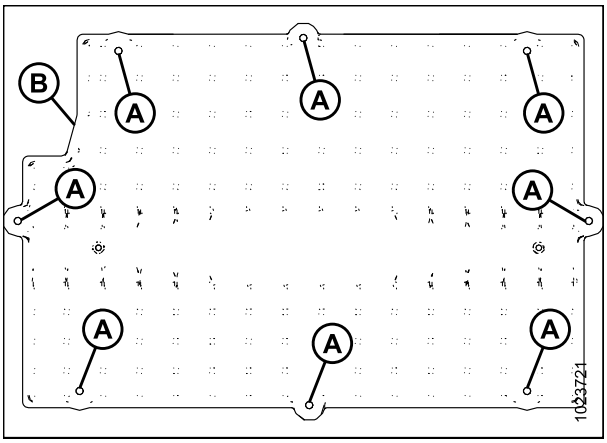


Figure 5.38: A/C Cover

Cleaning Air Conditioning (A/C) Evaporator Core

WARNING

To avoid cuts from evaporator fins, do NOT use bare hands to brush away clogs.

1. Use a vacuum cleaner or compressed air to remove dirt from inside the A/C unit.
2. Blow compressed air through the evaporator fins from blower side (A) first. Direct the air straight into the evaporator to prevent fin damage. A nozzle extension makes this procedure easier.
3. Repeat Step *2, page 310* at the side (B) opposite the blowers.

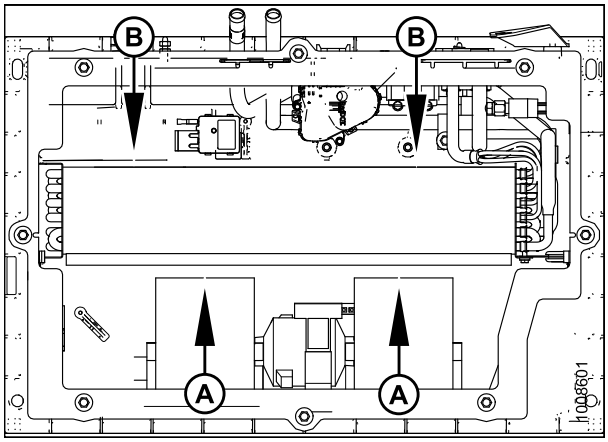


Figure 5.39: HVAC System

4. If you cannot feel the compressed air blowing through the evaporator core, proceed as follows:
   a. Protect blower motor (A) from water.
   b. Soak evaporator core (B) with warm water using a low pressure hose. Let soak for several minutes.
   c. Blow compressed air through the core from blower side (C).
   d. Repeat the soaking procedure until air blows through the evaporator freely.

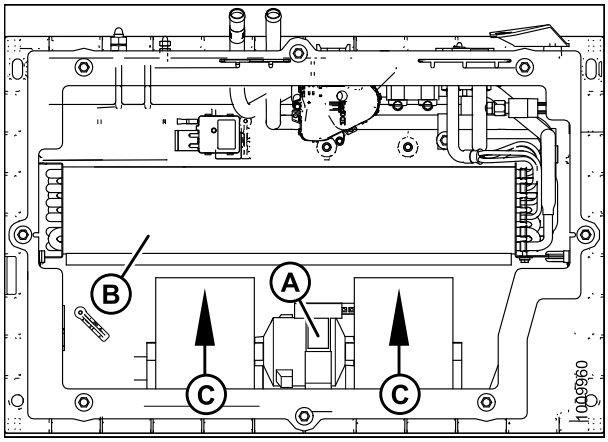


Figure 5.40: HVAC System

Installing Air Conditioning (A/C) Cover

1. Straighten any bent fins.
2. Position cover (B) onto A/C unit, and attach with eight screws (A).

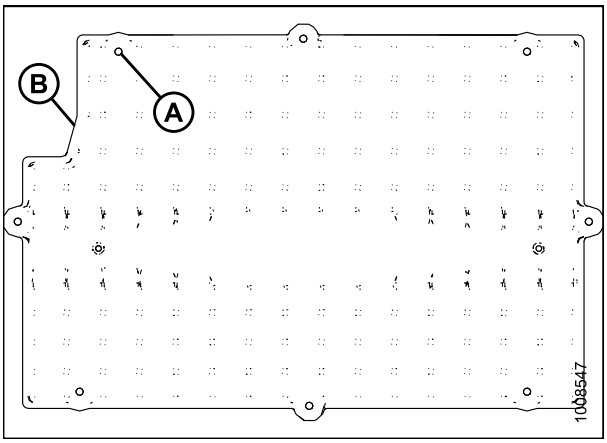


Figure 5.41: A/C Cover

3. Reattach drain hoses to drain tubes and secure with hose clamps (A).

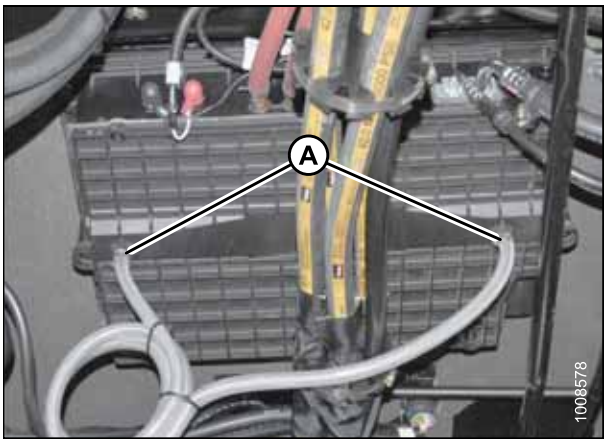


Figure 5.42: A/C Drains

5.6.5 Air Conditioning (A/C) Compressor

The compressor is protected from excessively low suction and high discharge pressures by two switches that shut down the compressor to prevent damage to the system. These switches do not require regular maintenance. Contact your MacDon Dealer if you suspect a problem with the switches.

The low pressure switch

The low pressure switch is closed when there is sufficient refrigerant in the system and the pressure is above 234 kPa (34 psi). The system remains pressurized at about 414–483 kPa (60–70 psi) with the compressor off.

When the A/C system is turned on, the compressor starts because the system pressure is above 234 kPa (34 psi). As the system gets colder, the suction pressure (low side) drops. At 24–86 kPa (3.5–12.5 psi) (for 2014 and prior: 14–55 kPa [2–8 psi]), the switch opens and shuts down the compressor.

When the pressure rises above 172 kPa (25 psi), the switch closes and the compressor restarts. The low pressure switch is located at the outlet of the evaporator (under cab in the A/C box).

The high pressure switch

The high pressure switch is closed when there is sufficient refrigerant in the system. The system remains pressurized at about 414–483 kPa (60–70 psi) with the compressor off.

If the pressure exceeds 2482–2620 kPa (360–380 psi) during operation, the valve opens. It will close when pressure falls below 1517–1931 kPa (220–280 psi). The high pressure switch is located on the receiver drier (right cab-forward frame rail, behind the fuse panel).

If the compressor cycles rapidly due to rapid pressure changes, the cab display module (CDM) displays a warning CHECK A/C SYSTEM. Contact your Dealer.

Servicing the Air Conditioning Compressor

Refer to *Replacing Air Conditioner (A/C) Compressor Belt, page 354* for belt replacement procedure.

See your MacDon Dealer for all other servicing procedures.

5.7 Engine

CAUTION

- **NEVER operate engine in a closed building. Proper ventilation is required to avoid exhaust gas hazards.**
- **Keep the engine clean. Straw and chaff on a hot engine are a fire hazard.**
- **NEVER use gasoline, naphtha, or any other volatile material for cleaning purposes. These materials are toxic and/or flammable.**

5.7.1 General Engine Inspection

Engine inspection should be performed by your MacDon Dealer.

Refer to your engine manual for further information (Owner's Manual QSB 4.5 and QSB 6.7 Engine Cummins #4021531 are supplied with your machine).

5.7.2 Turning the Engine Manually

To manually turn the engine with the flywheel, an access hole is provided on the left cab-forward side for a barring tool that is available from Cummins.

WARNING

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

1. Stop engine and remove ignition key.
2. Open the hood to the lowest position. For instructions, refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Open left cab-forward side platform. For instructions, refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

4. Remove positive (red) cables (A) from battery posts first, then remove negative (black) cables (B) from remaining battery posts.

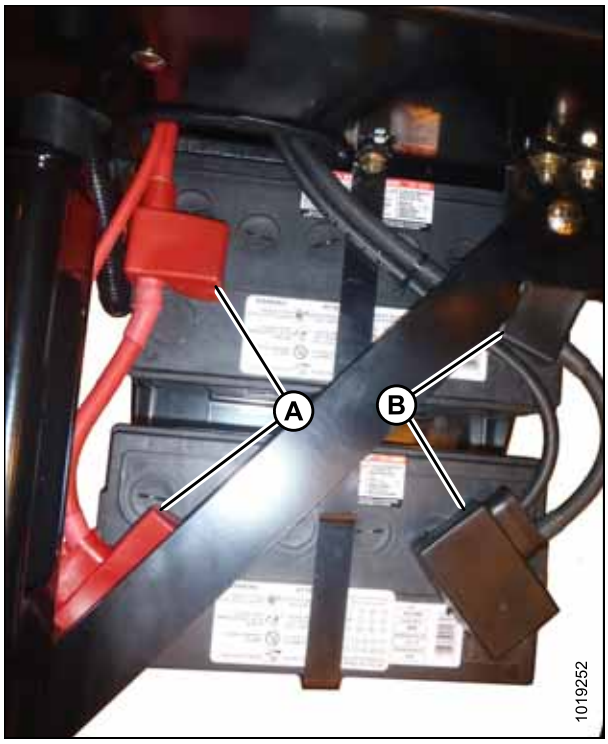


Figure 5.43: Batteries

5. Clean the area around the plastic cap on access hole (A). Remove the cap.

   IMPORTANT:

   Ensure nothing falls into gearbox oil reservoir.

6. Insert barring tool (B) into the flywheel housing until it engages the ring gear.
7. Attach a 1/2 in. square drive ratchet or breaker bar and turn.
8. Remove barring tool (B), and then clean oil from around access hole (A).
9. Clean plastic cap and reinstall in access hole (A) with silicone sealant.

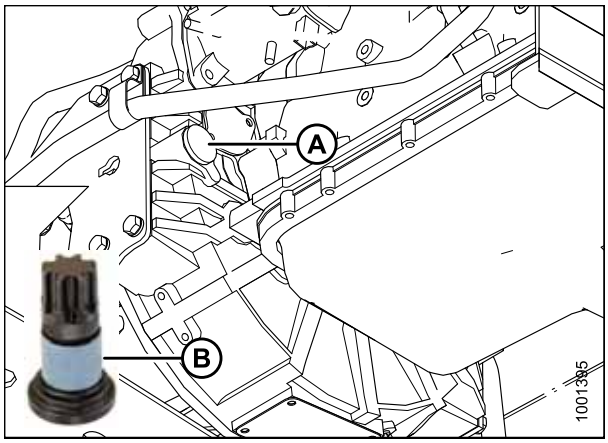


Figure 5.44: Access Hole Location for Barring Tool

IMPORTANT:

Batteries are negative grounded. Always connect starter cable to the positive (+) terminal of battery and battery ground cable to negative (–) terminal of battery. Reversed polarity in battery or alternator may result in permanent damage to electrical system.

10. Attach negative (black) cables (B) to negative posts on batteries, and tighten clamps. Then attach positive (red) cables (A) to positive post on batteries and tighten clamps.
11. Position plastic covers onto clamps.
12. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.
13. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

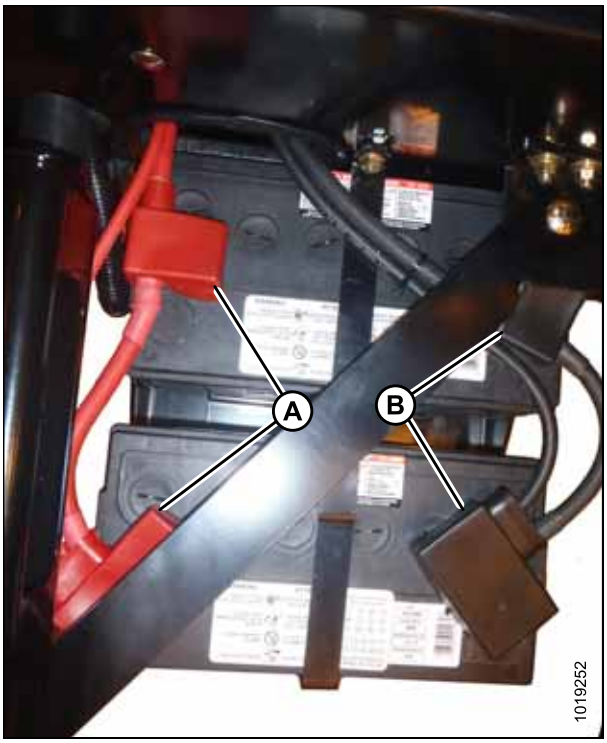


Figure 5.45: Batteries

5.7.3 Checking Engine Oil Level

Check engine oil level daily (every 10 hours) and watch for any signs of leakage.

CAUTION

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

NOTE:

During the break-in period, a higher than usual oil consumption should be considered normal.

1. Open the hood to the lowest position. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
2. Operate the engine at low idle and check for leaks at the filter and drain plug.
3. Stop the engine and remove the key. Wait about 5 minutes.

4. Remove dipstick (A) by turning it counterclockwise to unlock.
5. Wipe the dipstick clean and reinsert it into the engine.
6. Remove the dipstick again and check the oil level.

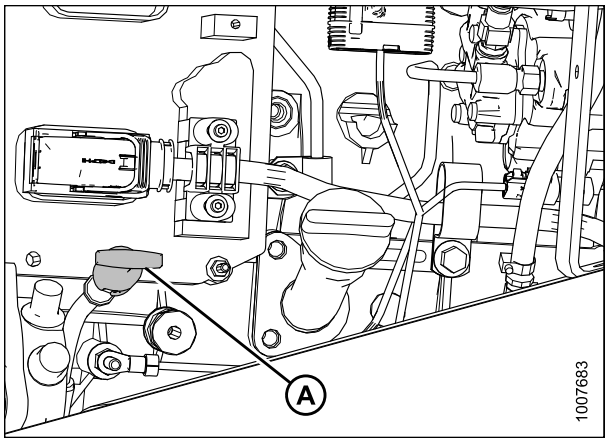


Figure 5.46: Engine Oil Level

7. Add oil if level is below low (L) mark. Refer to *Adding Engine Oil, page 318*.

   IMPORTANT:

   Oil level should be maintained between low (L) and high (H) mark on the dipstick.

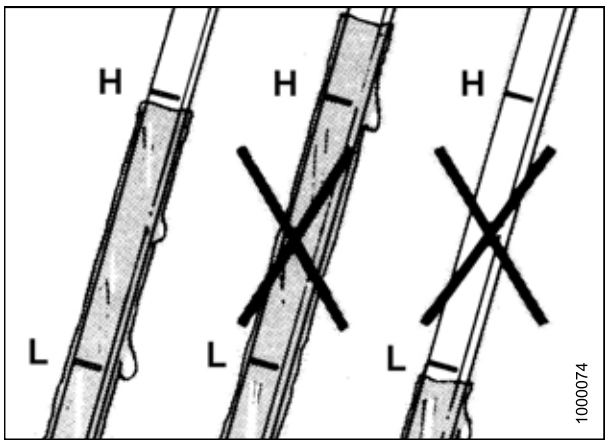


Figure 5.47: Engine Oil Level

8. Replace dipstick (A) and turn it clockwise to lock.
9. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

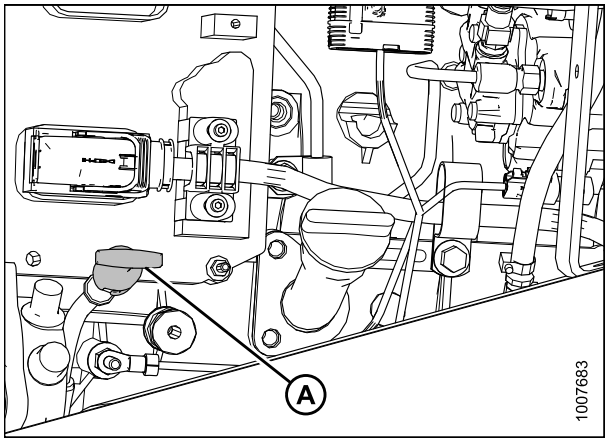


Figure 5.48: Engine Oil Level

5.7.4 Changing Engine Oil

Draining Engine Oil

WARNING

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

NOTE:

The engine should be warm when you change the oil.

1. Stop the engine and remove the key.
2. Place a drain pan with a capacity of about 24 liters (6 US gallons) under the engine oil drain.
3. Remove oil drain plug (A) and allow the oil to drain.
4. When all of the oil has drained out of the tank, replace drain plug (A).
5. Check the condition of the used oil. If either of the following is evident, have your Dealer correct the problem before starting the engine:
   - Thin black oil indicates fuel dilution.
   - Milky discoloration indicates coolant dilution.
6. Properly dispose of used oil.

   NOTE:

   Replace oil filter each time engine oil is changed. Refer to *Replacing Engine Oil Filter, page 317*.

   IMPORTANT:

   Do **NOT** run engine without oil in the crankcase. Refer to *Adding Engine Oil, page 318*.

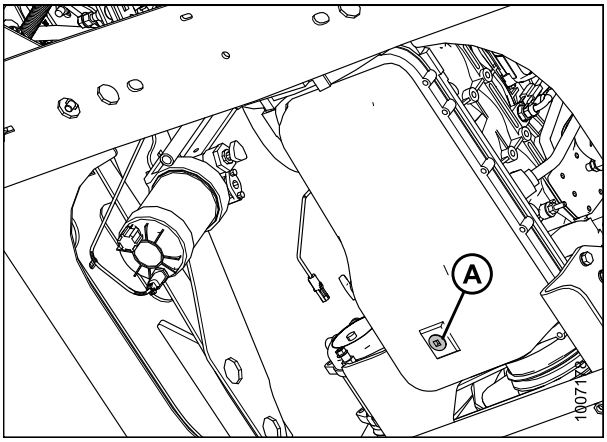


Figure 5.49: Engine Oil Drain Plug

Replacing Engine Oil Filter

NOTE:

Replace oil filter each time engine oil is changed. Refer to *8.1.4 Filter Part Numbers, page 453* for recommended oil filter to use.

1. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.

2. Clean around filter head (A).
3. Remove filter (B).
4. Clean gasket mating surface.
5. Apply a thin film of clean oil to the gasket on the new filter.
6. Screw the new filter onto the filter mount until the gasket contacts the filter head.
7. Tighten the filter an additional 1/2 to 3/4 turn by hand.

   IMPORTANT:
   Do **NOT** use a filter wrench to install the oil filter. Overtightening can damage the gasket and filter.
8. Properly dispose of used filter.

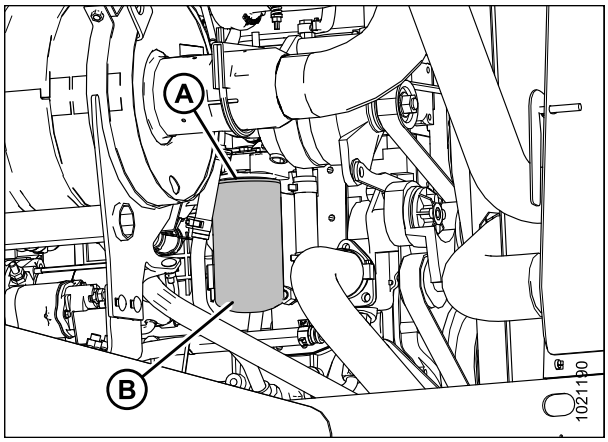


Figure 5.50: Engine Oil Filter

Adding Engine Oil

Refer to *8.1.3 Lubricants, Fluids, and System Capacities, page 452* for recommended lubricants.

DANGER

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

1. Stop the engine and remove the key. Wait about 5 minutes.
2. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Remove filler cap (A) by turning it counterclockwise.
4. Carefully pour in the new oil. Use a funnel to avoid spillage.

CAUTION

Do NOT fill above the HIGH mark.

5. Replace oil filler cap (A) and turn it clockwise until snug.
6. Check the oil level. Refer to *5.7.3 Checking Engine Oil Level, page 315*.
7. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

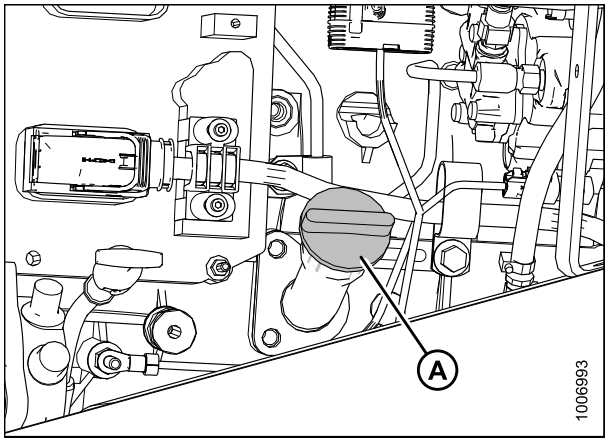


Figure 5.51: Oil Filler Cap

5.7.5 Air Intake System

IMPORTANT:

Do **NOT** run engine with air cleaner disconnected or disassembled.

Engine intake air is drawn through a duct (A) from the cooling box that precleans the air and then through a dual element filter (B).

The air cleaner canister is equipped with an aspirator (C) that removes dust continuously from the air cleaner housing.

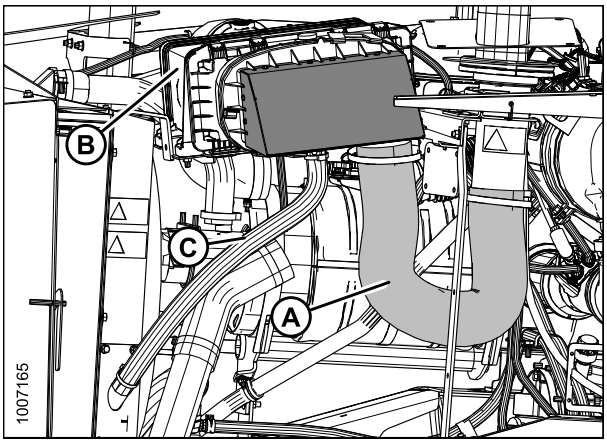


Figure 5.52: Air Intake System

The air cleaner is also equipped with a restriction switch (A) that activates a warning display and tone on the cab display module (CDM) when the filter system requires servicing.

After servicing the filter, the restriction switch must be reset by pushing the button at the end of the switch.

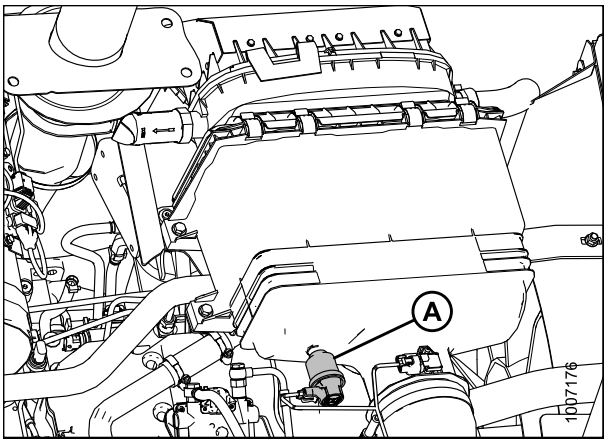


Figure 5.53: Air Restriction Indicator

If you need to replace filters, refer to *8.1.4 Filter Part Numbers, page 453*.

IMPORTANT:

- Do **NOT** run engine with air cleaner disconnected or disassembled.
- Over-servicing the filter element increases the risk of dirt being ingested by the engine and severely damaging the engine.
- Filter servicing should only be performed when the CDM indicates ENGINE AIR FILTER or at the specified interval. Refer to *5.12.1 Maintenance Schedule/Record, page 422*.

Removing Primary Air Filter

1. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
2. Open the maintenance platform on right cab-forward side. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

3. Unlatch the clips (A) that secure the cover (B) and plenum (C) to the air cleaner housing (D).

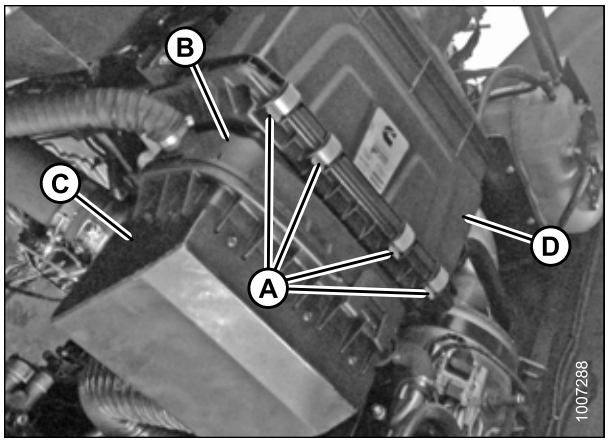


Figure 5.54: Air Cleaner Housing and Cover

4. Carefully move the cover (A) to dislodge it from the notches (B) at the bottom of the air cleaner housing (C).

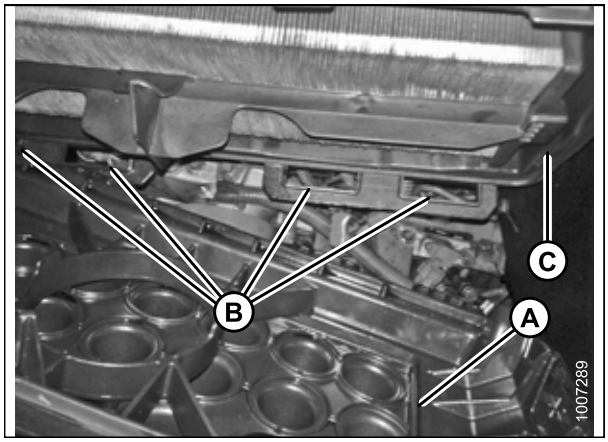


Figure 5.55: Air Cleaner Housing

5. Check the aspirator duct opening (A) for obstructions or damage. Clean if necessary.
6. Place cover (B) on windrower frame.

   NOTE:

   Hoses (C) can be left connected to the cover.

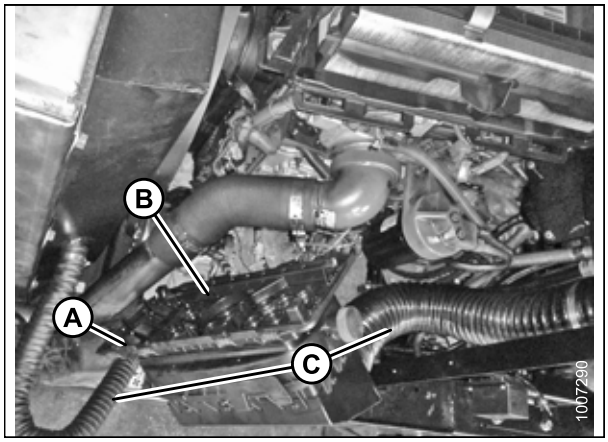


Figure 5.56: Air Cleaner

7. Pull out the primary filter (A).
8. If necessary, also change the secondary filter. Refer to *Replacing the Secondary Air Filter, page 323*.

   IMPORTANT:

   - Do **NOT** remove the secondary filter unless it needs replacing. It must never be cleaned.
   - Replace secondary filter annually or after every third primary filter change, even if it looks clean.
   - If the secondary filter looks dirty, a further inspection will be required. Examine filter canister for cracks and replace as necessary. Ensure canister retaining latches are secure.

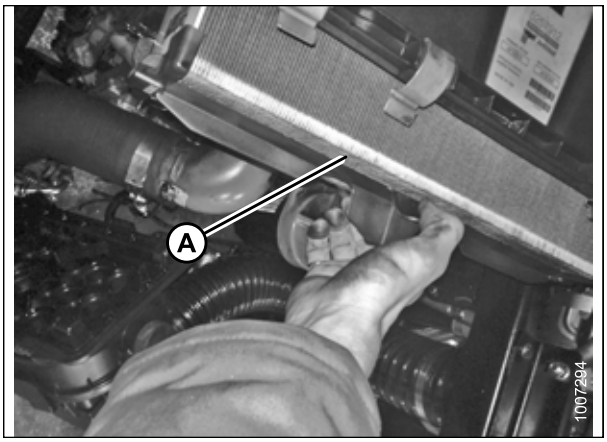


Figure 5.57: Air Cleaner Primary Filer

IMPORTANT:

Clean the inside of the housing and cover carefully. Dirt left in the air cleaner housing may be harmful to your engine.

- Use a clean, water-dampened cloth to wipe every surface clean.
- Check the housing visually to make sure it is clean before putting in a new filter.
- Always clean the gasket sealing surfaces of the housing. An improper gasket seal is one of the most common causes of engine contamination.
- Make sure that all hardened dirt ridges are completely removed wherever filter gaskets contact the cleaner housing.
- Check for uneven dirt patterns on your old filter. Your old filter is a valuable clue to potential dust leakage or gasket sealing problems. A pattern on the filter clean side is a sign that the old filter was not firmly sealed or that a dust leak exists.
- Make certain the cause of that leak is identified and rectified before replacing the filter.
- Recheck to see if the sealing surface in the housing is clean.

Installing Primary Air Filter

NOTE:

For the primary air filter replacement part number, refer to *8.1.4 Filter Part Numbers, page 453*.

1. Insert new primary filter (A) into canister and push into place, ensuring that element is firmly seated in canister.

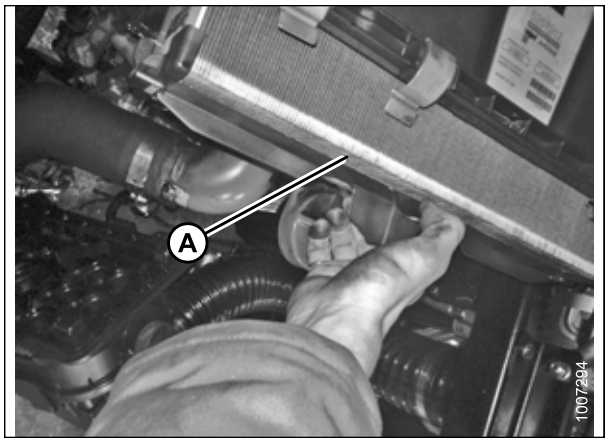


Figure 5.58: Air Cleaner Primary Filter

2. Seat the tabs at the bottom of the cover (A) to the notches (B) at the bottom of the air cleaner housing (C).

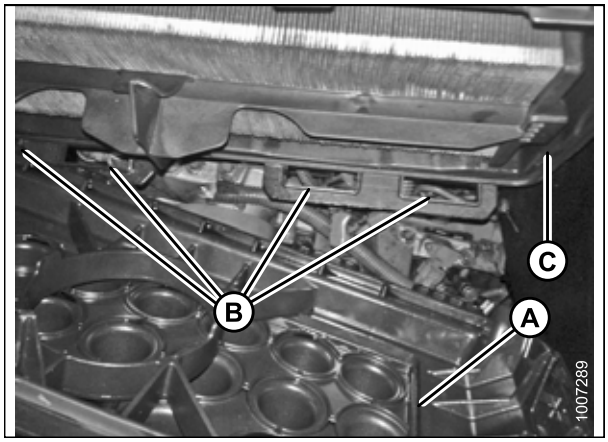


Figure 5.59: Air Cleaner

3. Secure cover (B) and plenum (C) to the air cleaner housing (D) using the four clips (A).

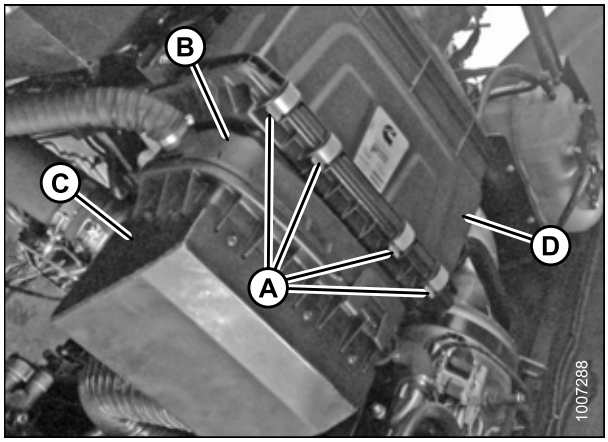


Figure 5.60: Air Cleaner Cover and Housing

4. Reset the restriction switch by pressing the button at the end of the switch (A).
5. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.
6. Close the maintenance platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

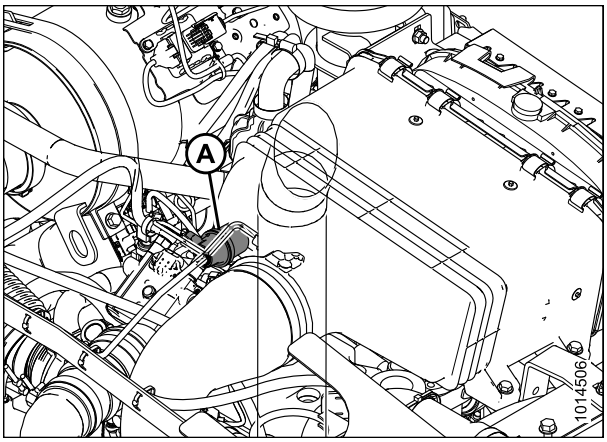


Figure 5.61: Air Cleaner Restriction Switch

Cleaning the Engine Air Cleaner's Primary Filter

The air cleaner's primary filter should be replaced after three cleanings or at the specified interval. The secondary element should be replaced every third time the primary element is changed. Refer to *5.12 Maintenance Schedule, page 422* for the required interval.

IMPORTANT:

- The secondary filter element should **NEVER** be cleaned, only replaced.
- **Air filter element cleaning is NOT recommended due to the possible degradation of the element material.** If cleaning is performed, there are several risks involved and the following steps should be followed. If any of the conditions described in these steps are found, the filter element **MUST** be replaced.

1. Hold a bright light inside element and check carefully for holes. Vibration would quickly wear a hole in the filter.
2. Check filter gasket for cracks, tears, or other signs of damage.
3. Check element for oil or soot contamination.
4. Check the secondary element for cleanliness. If there is visible dirt on the secondary element, replace both primary and secondary elements. Do **NOT** clean.
5. If secondary element passes inspection, use compressed air not exceeding 270 kPa (40 psi) and a dry element cleaner gun to clean the primary element. Hold nozzle next to inner surface only and move up and down on pleats.

   NOTE:

   After three cleanings (or at the specified interval), replace the primary element.
6. Repeat inspection before installing.

Replacing the Secondary Air Filter

For secondary filter replacement part number, refer to *8.1.4 Filter Part Numbers, page 453*.

Replace the secondary filter annually or after every third primary filter change, even if it appears clean. If you are changing the secondary filter because it looks dirty, further inspection is required. Examine the filter canister for cracks and replace as necessary. Ensure the canister's retaining latches (B) are secure. Ensure filter sealing surfaces are soft, flexible, and sealing properly. Poor seal performance will allow debris through to the secondary filter.

IMPORTANT:

The secondary filter (A) should never be cleaned, only replaced. Do **NOT** remove the secondary filter unless it needs replacing.

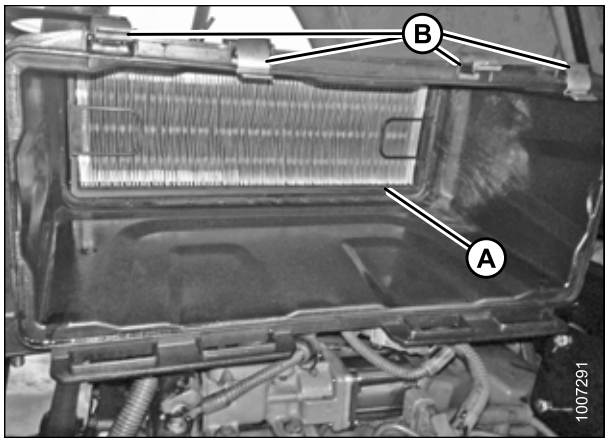


Figure 5.62: Secondary Air Filter

1. Remove the primary filter. Refer to *Removing Primary Air Filter, page 319*.

   IMPORTANT:

   When replacing secondary filter, reinsert new filter as soon as possible to prevent dirt and dust from entering the engine intake.

2. Pull handle (A) on each end of the secondary filter (B) until filter (B) is removed from the housing.

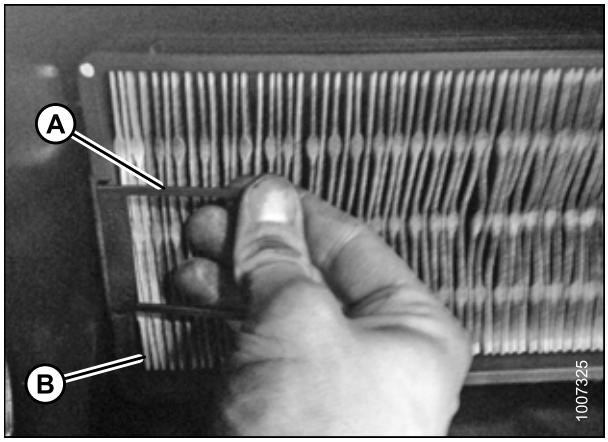


Figure 5.63: Secondary Air Filter

3. Insert new secondary filter (A) into the housing and push until filter is seated inside housing.
4. Install the primary filter. Refer to *Installing Primary Air Filter, page 321*.

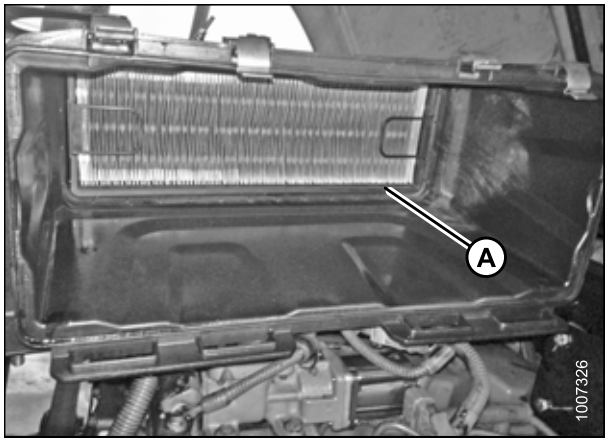


Figure 5.64: Secondary Air Filter

5.7.6 Charge Air Cooling

Charge air is routed through a cooler that is located in the cooling box (A), prior to entering the engine intake. The cooler should be cleaned daily with compressed air. Refer to *5.8.2 Cleaning Screens and Coolers, page 355* and *5.8.3 Cleaning Cooler Box Components, page 357*.

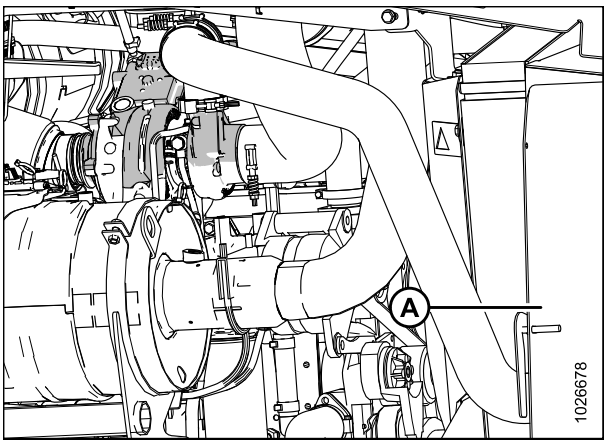


Figure 5.65: Engine Air Intake System

5.7.7 Fuel System

Replacing Fuel Tank Vent Filter

The fuel tank is vented by a hose that is connected to the filler tube. The hose is connected to a filter that should be changed every year.

For fuel tank vent filter replacement part number, refer to *8.1.4 Filter Part Numbers, page 453*.

WARNING

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

WARNING

To avoid personal injury or death from explosion or fire, do NOT smoke or allow flame or sparks near windrower when servicing.

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Open the left cab-forward side maintenance platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

4. Locate filter (A) on vent line against hydraulic oil reservoir.
5. Release hose tension clamps (B) and slide away from filter. Pull hoses off filter.
6. Position new filter through hole in frame and attach top hose onto filter. The IN marking on the filter should face down.

   NOTE:

   If filter has an arrow instead of an IN marking, arrow should point up.
7. Attach lower hose to filter and secure both hoses with tension clamps (B).

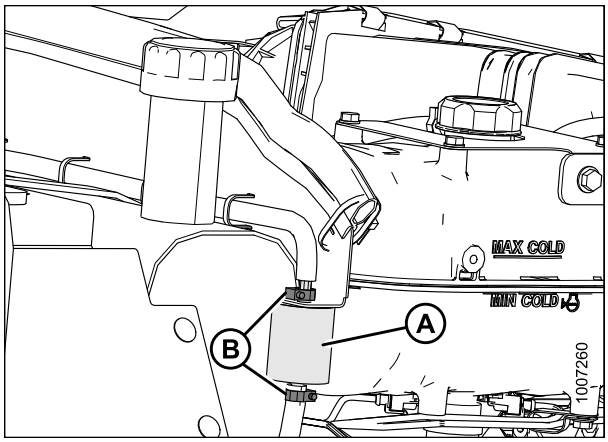


Figure 5.66: Fuel Tank Vent

8. Close hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.
9. Close the maintenance platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

Maintaining Fuel Filters

The windrower fuel system is equipped with primary (A) and secondary (B) screw-on cartridge type filters. The primary filter (A) is equipped with a separator that separates sediment and water from the fuel.

Refer to the following procedures:

- *Removing Primary Fuel Filter, page 326*
- *Installing Primary Fuel Filter, page 328*
- *Removing Secondary Fuel Filter, page 328*
- *Installing Secondary Fuel Filter, page 329*

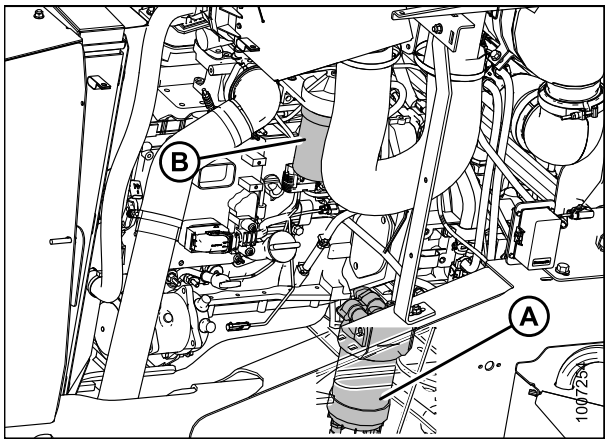


Figure 5.67: Fuel System Filters

Removing Primary Fuel Filter

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.

3. On the bottom of the fuel tank, locate fuel supply valve (A) and move it to the closed position.

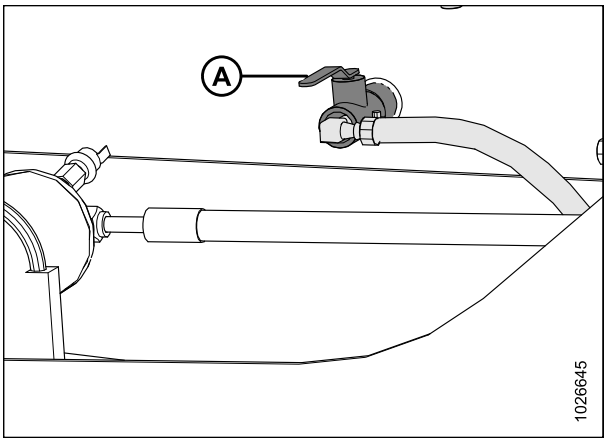


Figure 5.68: Fuel Shut-off Valve

4. Locate primary fuel filter (A) on the right cab-forward side of the windrower.

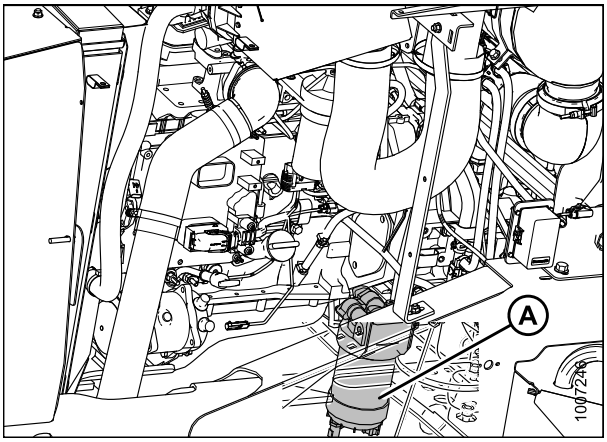


Figure 5.69: Primary Fuel Filter Location

5. Clean around primary filter (A) head.
6. Disconnect the water in fuel (WIF) sensor (B) from the bottom of the filter.
7. Turn valve (C) by hand counterclockwise and drain filter into a container.
8. Remove filter (A) with a 25.4 mm (1 in.) wrench using the drive feature located on the bottom of the filter.
9. Clean gasket mating surface.

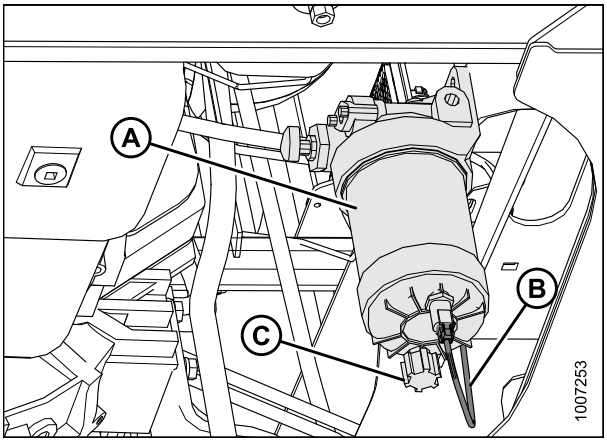


Figure 5.70: Primary Fuel Filter

Installing Primary Fuel Filter

For primary fuel filter replacement part number, refer to *8.1.4 Filter Part Numbers, page 453*.

IMPORTANT:

If possible, prefill new filters with clean fuel prior to assembly using the clean side block-off plug packed with the filter. To prevent unfiltered fuel from entering the system and damaging fuel system components, do **NOT** pour fuel directly in the center of the filter.

1. Lubricate the fuel filter O-ring with clean oil.
2. Screw the new filter (A) onto the filter mount until the gasket contacts the filter head.
3. Tighten the filter an additional 3/4 turn by hand. Use a 25.4 mm (1 in.) wrench and torque it to 38 Nm (28 lbf·ft).
4. Tighten the filter an additional 1/2 to 3/4 turn by hand.

   IMPORTANT:

   Do **NOT** use a filter wrench to install the filter. Overtightening can damage the gasket and filter.
5. Reconnect water in fuel (WIF) sensor (B).

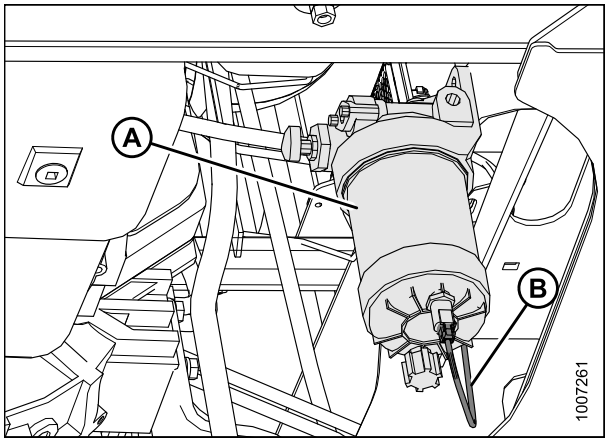


Figure 5.71: Primary Fuel Filter

Removing Secondary Fuel Filter

WARNING

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

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Clean around secondary filter head (A).
4. Place a container under the filter to catch spilled fluid.
5. Remove filter (B) with a filter wrench.
6. Clean gasket mating surface.

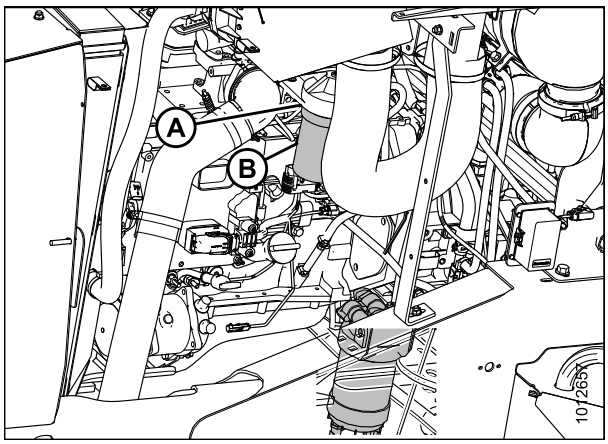


Figure 5.72: Secondary Fuel Filter

Installing Secondary Fuel Filter

For secondary fuel filter replacement part number, refer to *8.1.4 Filter Part Numbers, page 453*.

IMPORTANT:

If available, pre-fill new filters with clean fuel prior to assembly using the clean side block-off plug packed with the filter. Do **NOT** pour fuel directly in the center of the filter, since this will allow unfiltered fuel to enter the system and can cause damage to fuel system components.

1. Screw the new secondary filter (A) onto the filter mount until the gasket contacts the filter head.
2. Tighten the filter an additional 1/2 to 3/4 turn by hand.

   IMPORTANT:

   Do **NOT** use a filter wrench to install the filter. Overtightening can damage the gasket and filter.

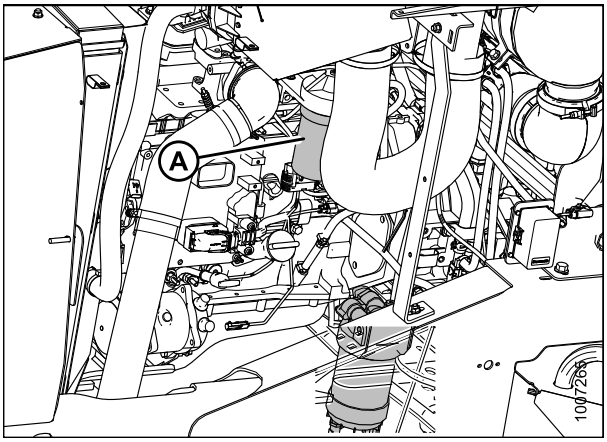


Figure 5.73: Secondary Fuel Filter

3. Open fuel valve (A) under fuel tank.
4. Prime the fuel system. Refer to *Priming Fuel System, page 333*.

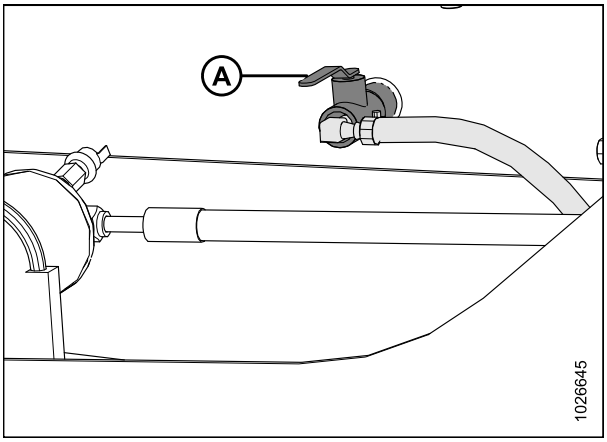


Figure 5.74: Fuel Shut-off Valve

Draining Fuel Tank

Draining the fuel tank is necessary to remove old or contaminated fuel.

WARNING

- **To avoid personal injury or death from explosion or fire, do NOT smoke or allow flame or sparks near fuel tank when refueling.**
- **NEVER refuel the windrower when the engine is hot or running.**
- **To avoid electric discharge and the risk of a fire or explosion, ensure that the fuel delivery system is properly bonded and grounded. A bonded fuel delivery system has an electrically conductive and unbroken connection between all components of the fuel delivery system (fuel supply tank, transfer pump, transfer hose, nozzle, and others). A wire connection from the fuel delivery system to the machine chassis will equalize the static electric potential between the two machines, further reducing the chance of a static electric discharge. A properly grounded fuel delivery system has an electrically conductive connection from the fuel delivery system tank to earth ground to allow static and electrical charge dissipation.**

WARNING

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

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Close fuel supply valve (A) located on the bottom of the fuel tank.

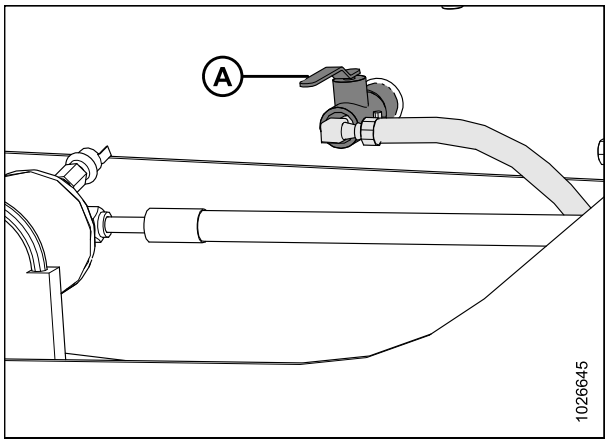


Figure 5.75: Fuel Shut-off Valve

4. Place a 20 liter (5 US gallon) drain pan under the fuel supply hose (A) at the primary filter.
5. Loosen clamp (B) and pull fuel supply hose (A) off fitting.

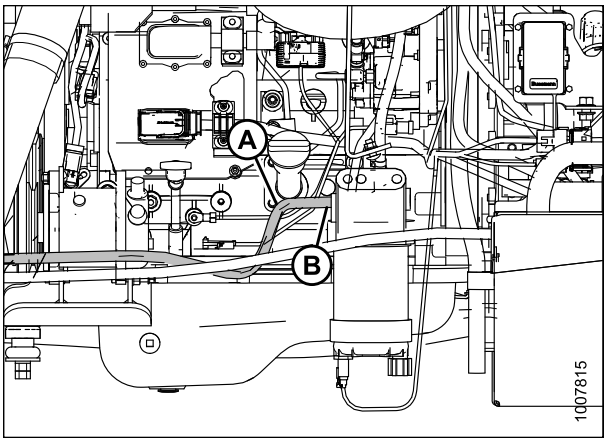


Figure 5.76: Fuel System (View from outside Frame)

6. Route hose to drain pan and open valve (A) to drain tank.

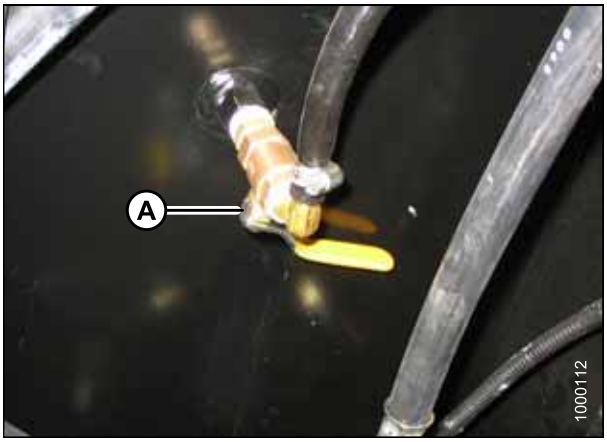


Figure 5.77: Bottom of Fuel Tank

7. Add some clean fuel to the tank to flush out any remaining contaminants.
8. Reattach fuel supply hose (A) to fitting. Install clamp (B) and tighten.

   NOTE:

   Do **NOT** refill the fuel tank if performing additional maintenance on fuel system. Refill it once work is completed. Refer to *Filling the Fuel Tank, page 332*.

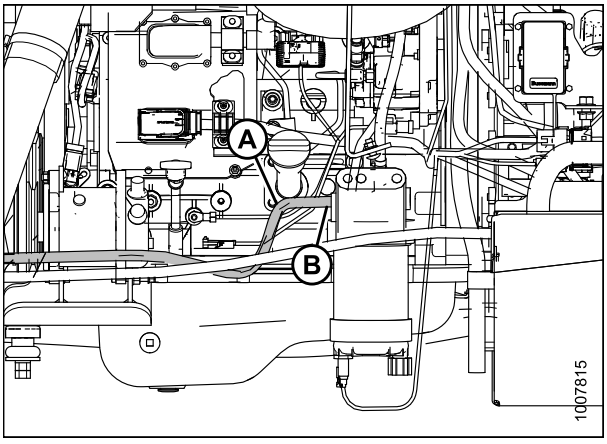


Figure 5.78: Fuel System (View from outside Frame)

Filling the Fuel Tank

Fill the fuel tank daily, preferably at the end of the day's operation to help prevent condensation in the tank.

⚠ WARNING

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

⚠ WARNING

- **To avoid personal injury or death from explosion or fire, do NOT smoke or allow flame or sparks near fuel tank when refueling.**
- **NEVER refuel the windrower when the engine is hot or running.**
- **To avoid electric discharge and the risk of a fire or explosion, ensure that the fuel delivery system is properly bonded and grounded. A bonded fuel delivery system has an electrically conductive and unbroken connection between all components of the fuel delivery system (fuel supply tank, transfer pump, transfer hose, nozzle, and others). A wire connection from the fuel delivery system to the machine chassis will equalize the static electric potential between the two machines, further reducing the chance of a static electric discharge. A properly grounded fuel delivery system has an electrically conductive connection from the fuel delivery system tank to earth ground to allow static and electrical charge dissipation.**

⚠ CAUTION

Do NOT allow tank to empty. Running out of fuel can cause air locks and/or contamination of the fuel system. Refer to *System Priming, page 333*.

1. Stop windrower and remove key.
2. Stand on either platform to access the fuel tank filler pipe.
3. Clean the area around filler cap (A).
4. Turn cap handle (B) counterclockwise until loose and then remove cap.
5. Fill tank with approved fuel. Refer to inside back cover for recommended fuel.

   IMPORTANT:

   Do **NOT** fill tank completely—space is required for expansion. A filled tank could overflow if exposed to a rise in temperature, such as direct sunlight.
6. Replace fuel tank cap (A) and turn cap handle (B) clockwise until snug.

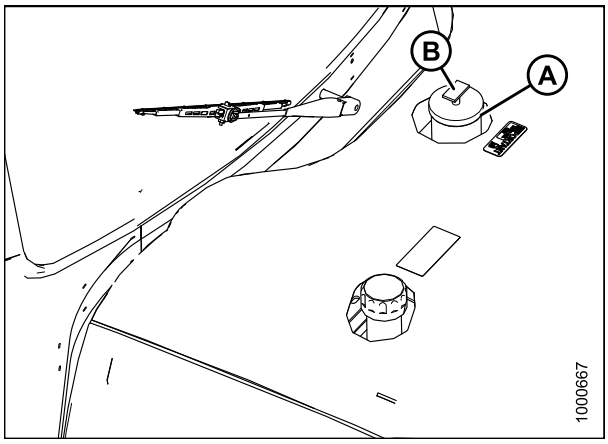


Figure 5.79: Fuel Filler Cap

Fuel/Water Separator

A fuel/water separator is incorporated into the primary fuel filter. The separator is equipped with a drain and a sensor that triggers a warning on the cab display module (CDM) if water is detected in the fuel. Drain the water and sediment from the separator daily or at any time the CDM water in fuel (WIF) light illuminates.

To remove water from the fuel system, refer to *Removing Water from Fuel System, page 333*.

Removing Water from Fuel System

Drain the water and sediment from the separator daily, or at any time the cab display module (CDM) water in fuel (WIF) light illuminates.

WARNING

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

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Place a container under filter (A) to catch spilled fluid.
4. Turn drain valve (B) by hand 1-1/2 to 2 turns counterclockwise until fluid drains out of the filter.
5. Drain the filter sump of water and sediment until clear fuel is visible.
6. Turn the valve clockwise to close the drain.
7. Dispose of fluid safely.
8. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

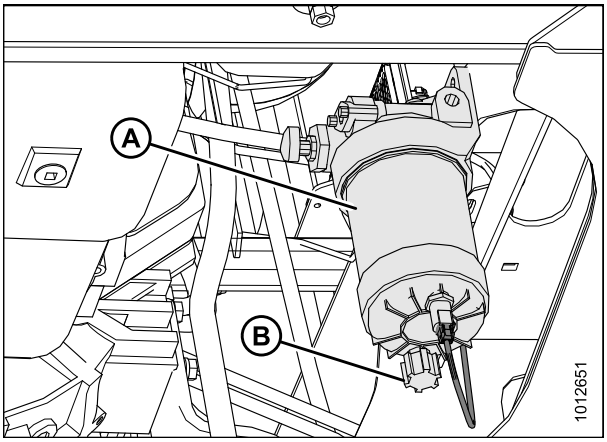


Figure 5.80: Primary Fuel Filter

System Priming

Controlled venting of air is provided at the injection pump through the fuel drain manifold. Small amounts of air, introduced by changing filters or injection pump supply line, will be vented automatically if the fuel filters are changed in accordance with instructions.

IMPORTANT:

Bleeding the fuel system is **NOT** recommended or required. Manual priming will be required if:

- Fuel filter is replaced
- Injection pump is replaced
- High-pressure fuel lines are replaced
- Engine is run until fuel tank is empty

Priming Fuel System

To prime the fuel system, follow these steps:

WARNING

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

WARNING

The fuel pump high-pressure fuel lines and fuel rail contain extremely high pressure fuel. Never loosen any fittings. Personal injury and property damage can result.

1. Stop the engine and remove the key.
2. Open the hood to lowest position. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Turn priming knob (A) counterclockwise to unlock the plunger on the primary filter head.
4. Pump approximately 120 times to pressurize the fuel system.
5. Lock the plunger by turning knob (A) clockwise until snug.
6. Try starting engine. If engine does **NOT** start, repeat priming.
7. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

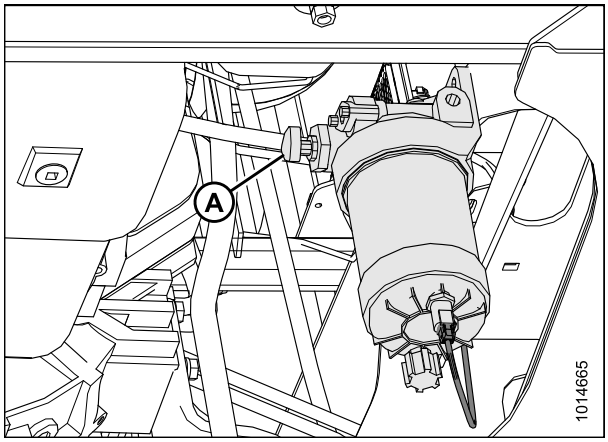


Figure 5.81: Primary Fuel Filter

5.7.8 Diesel Exhaust Fluid (DEF) System

IMPORTANT:

If the windrower is going to be in storage for periods longer than six months, the DEF tank should be drained to avoid damaging the tank. Refer to *Draining the Diesel Exhaust Fluid (DEF) Tank, page 334*.

IMPORTANT:

If the windrower temperature is going to be below 0°C (32°F), do **NOT** fill the DEF tank to a full level. It should be less than 75% full. When freezing, the DEF fluid will expand by approximately seven percent.

NOTE:

For DEF fluid specifications, refer to *8.1 Recommended Fuel, Fluids, and Lubricants, page 451*this manual's inside back cover.

Draining the Diesel Exhaust Fluid (DEF) Tank

Drain the DEF tank when it is contaminated or when the windrower is going to be stored for longer than six months.

WARNING

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

1. Stop the engine and remove the key.
2. Open the maintenance platform on right cab-forward side. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Place a drain pan under the DEF tank. Use a sufficiently large drain pan; tank capacity is 29 L (7.5 US gal).

   IMPORTANT:

   Any spilled DEF must be contained and absorbed by non-combustible absorbent material like sand, and then shoveled to a suitable container for disposal. DEF is corrosive. If spilled on tank or any surface of the vehicle, rinse thoroughly with water.

WARNING

Diesel Exhaust Fluid (DEF) contains urea. Do NOT get the substance in your eyes. In case of contact, immediately flush eyes with water for a minimum of 15 minutes. Do NOT swallow. In the event the DEF is ingested, contact doctor immediately.

4. Remove the drain plug (A) from under the tank (B) and drain.
5. Add some DEF to the tank (B) to flush out remaining contaminants.
6. Drain the DEF that was used to clean the tank.
7. Reinstall drain plug (A) in the tank (B).

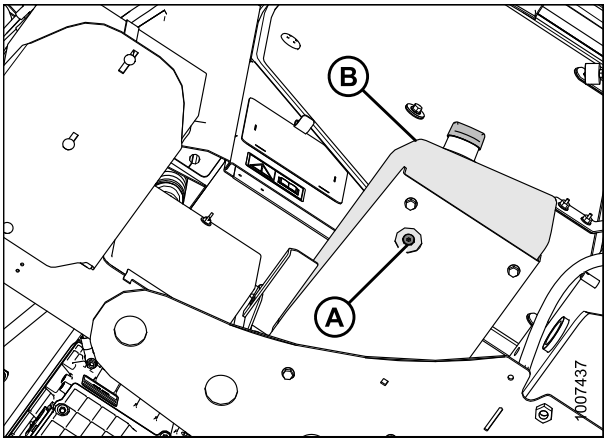


Figure 5.82: View from beneath Tank

8. Before operating the windrower, refill DEF tank. Refer to *Refilling the Diesel Exhaust Fluid (DEF) Tank, page 335*.

   NOTE:

   If windrower is going to be in storage for periods longer than 6 months, do not refill at this time.

9. Close the maintenance platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

Refilling the Diesel Exhaust Fluid (DEF) Tank

WARNING

Diesel Exhaust Fluid (DEF) contains urea. Do NOT get the substance in your eyes. In case of contact, immediately flush eyes with water for a minimum of 15 minutes. Do NOT swallow. In the event the DEF is ingested, contact doctor immediately.

Take the following precautions when handling DEF to prevent contamination:

- Avoid using funnels and containers that have been used with fuels or lubricants.
- Use only distilled water to rinse the components that store or deliver DEF; tap water can contaminate DEF.
- If distilled water is not available, use clean tap water, then rinse components with DEF.

1. Stop the engine and remove the key.
2. Open the maintenance platform on right cab-forward side. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

IMPORTANT:

Before refilling the DEF tank, read the following instructions from decal (A) located on the tank cover:

- Before storing machine for periods of time greater than six months, drain DEF tank to prevent degradation of fluid.
- Before storing the machine in temperatures below 0°C (32°F), ensure level of fluid in DEF tank is 75 % or lower.

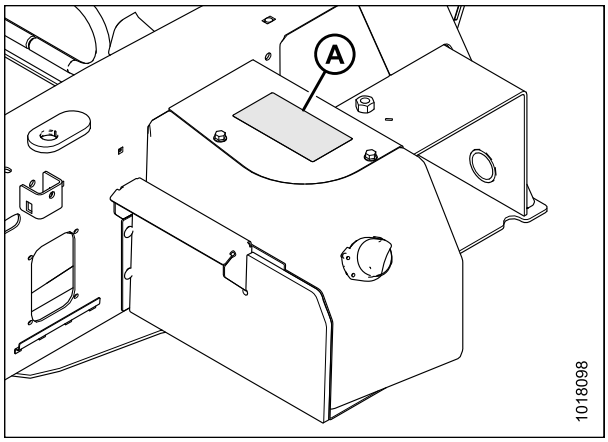


Figure 5.83: DEF Tank

3. Clean around filler cap (A).
4. Turn cap (A) counterclockwise until loose and remove cap.
5. Fill the tank with an approved DEF. Refer to *8.1.3 Lubricants, Fluids, and System Capacities, page 452*.

   IMPORTANT:

   Any spilled DEF must be contained and absorbed by non-combustible absorbent material like sand, and then shoveled to a suitable container for disposal. DEF is corrosive. If spilled on tank or any surface of the vehicle, rinse thoroughly with water.
6. Replace filler cap (A) and turn clockwise until tight.

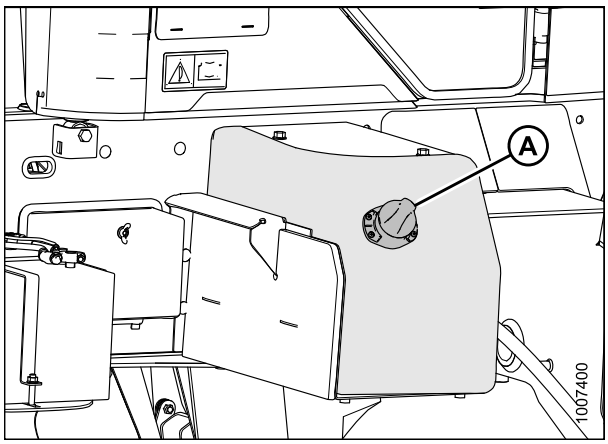


Figure 5.84: DEF Tank

7. Close the maintenance platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

Replacing the Diesel Exhaust Fluid (DEF) Vent Hose Filter

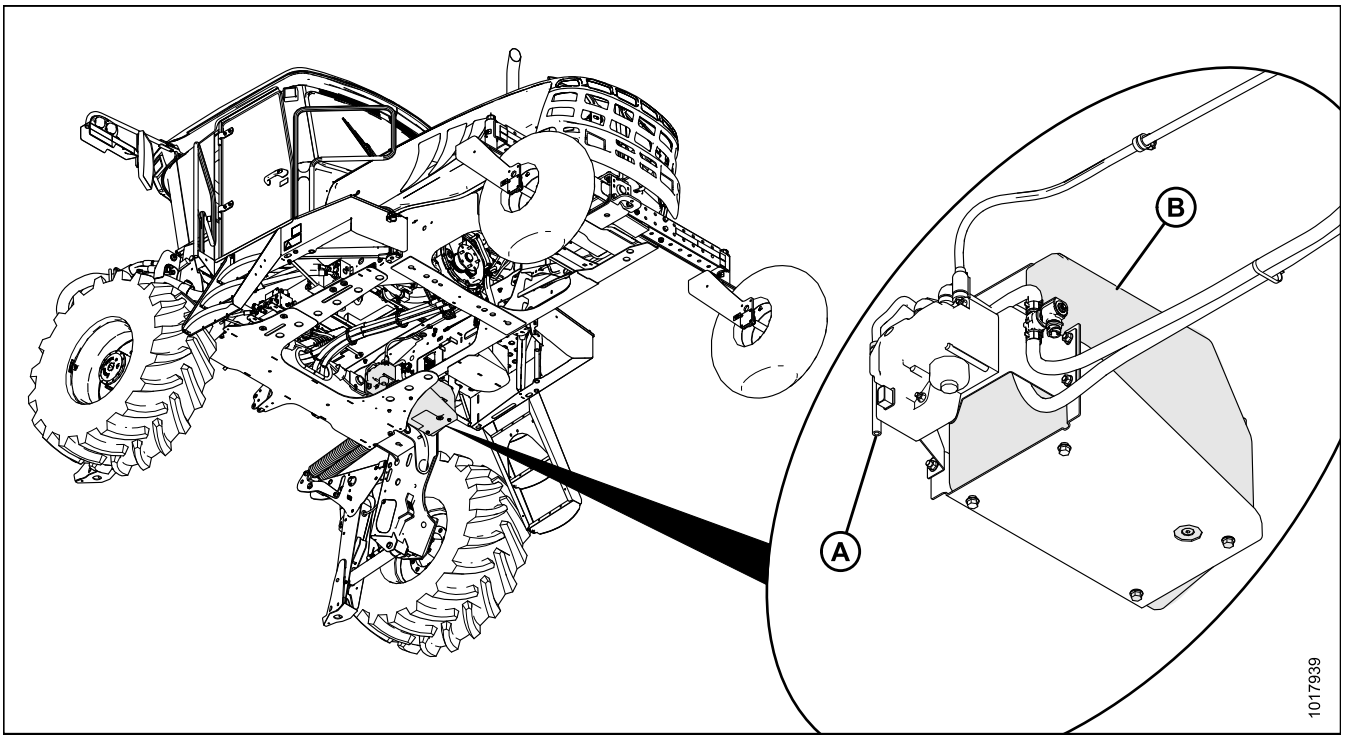
The DEF vent hose filter should be replaced every 2000 hours. Refer to *8.1.4 Filter Part Numbers, page 453* for replacement filter.

⚠ WARNING

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

1. Shut down the engine and remove the key.
2. Under the right side of the windrower, locate the DEF tank vent hose (A) behind the DEF tank (B).

Figure 5.85: DEF Vent Hose Location



3. Remove cable tie (A) securing vent hose filter to DEF vent hose.
4. Undo the two lined clamps (B) securing the filter to the vent hose (C).
5. Pull filter from vent hose (C).

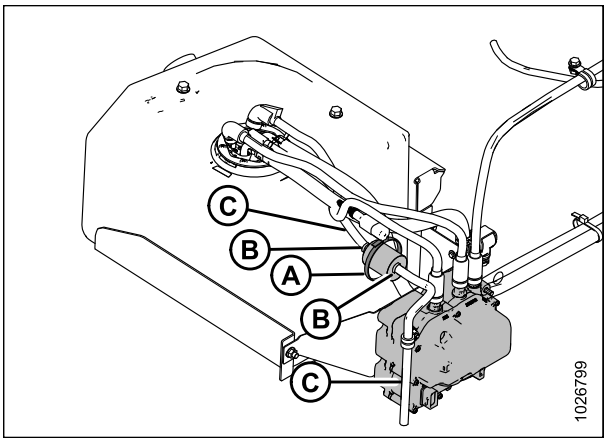


Figure 5.86: Vent Hose Filter (behind DEF Tank)

6. Install the new vent hose filter (A) onto the end of the DEF head hose and secure with a lined clamp (B).

   NOTE:

   Ensure arrow on the vent hose filter (A) points toward the DEF tank head.

7. Secure the vent hose (C) to the filter with a lined clamp (B).

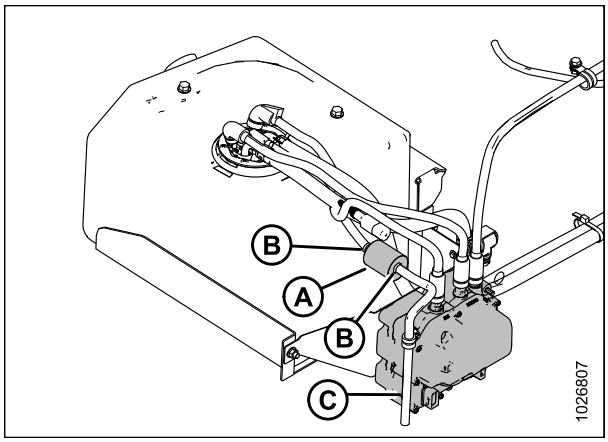


Figure 5.87: Vent Hose Filter

8. Secure vent hose filter (A) to the DEF suction hose (B) using a cable tie (C).

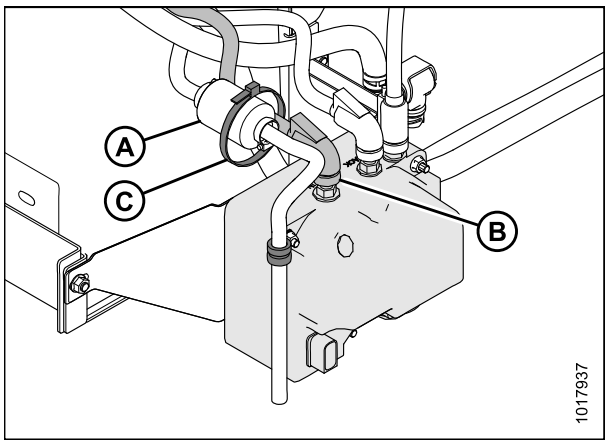


Figure 5.88: Vent Hose Filter

DEF Supply Module Filter

The supply module filter is designed to prevent debris that may be suspended in the diesel exhaust fluid (DEF) from entering the dosing system. Permanent damage to – and premature failure of – the DEF supply module can result from fluid debris.

Checking the Supply Module Filter

1. Locate the aftertreatment diesel exhaust fluid (DEF) supply module (A) behind the DEF tank.

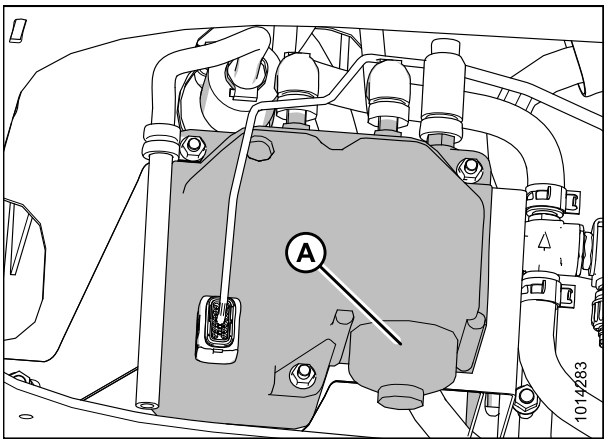


Figure 5.89: DEF Supply Module

2. Inspect the area around the seal and vent of the aftertreatment DEF supply module filter cap (A) for signs of leakage.

   NOTE:

   DEF fluid leaves a white deposit when dry. If there is evidence of leaking, remove the supply module filter, clean and inspect before replacing. For instructions, refer to *Cleaning and Inspecting the Supply Module Filter, page 341*.

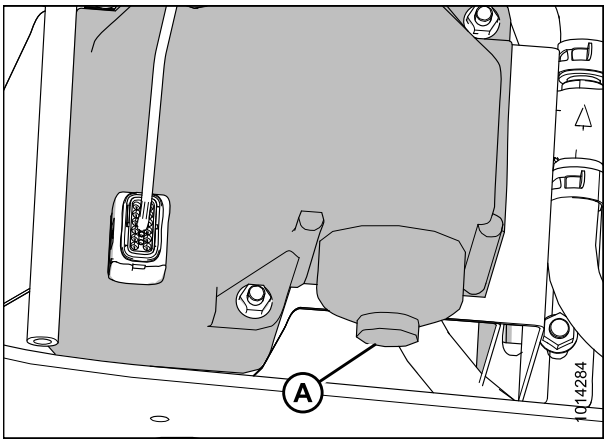


Figure 5.90: DEF Supply Module Filter Cap

Removing the Supply Module Filter

WARNING

Diesel Exhaust Fluid (DEF) contains urea. Do NOT get the substance in your eyes. In case of contact, immediately flush eyes with water for a minimum of 15 minutes. Do NOT swallow. In the event the DEF is ingested, contact doctor immediately.

WARNING

Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

WARNING

The DEF line connecting the aftertreatment DEF supply module to the aftertreatment DEF dosing module is under low pressure and should not be disconnected while the engine is running or before the system has completed the purge process after engine shutdown. Disconnecting the DEF line while under low pressure could cause DEF to spray.

WARNING

Wear appropriate eye and face protection when using compressed air. Flying debris and dirt can cause personal injury.

IMPORTANT:

Do **NOT** disconnect the windrower batteries until the DEF dosing system has completed the purge cycle. Before beginning to remove and/or disconnect any components, wait at least five minutes after the key switch is turned OFF for the aftertreatment DEF dosing system to purge the DEF from the system. The purge cycle is an automatic process and does not require intervention to occur. The aftertreatment DEF supply module will create an audible pumping noise during the purging process.

NOTE:

DO **NOT** power wash or steam clean this unit. Use compressed air to remove any loose debris.

1. Set battery switch to OFF. Refer to *Battery Main Disconnect Switch, page 361*.
2. Place a catch basin that can hold 29 liters (7.5 US gallons) under DEF filter cap to collect the remaining DEF in the filter housing.

   IMPORTANT:

   Any spilled DEF must be contained and absorbed by non-combustible absorbent material like sand, and then shoveled to a suitable container for disposal. DEF is corrosive. If spilled on tank or any surface of the vehicle, rinse thoroughly with water.
3. Unscrew the filter cap (A).
4. Remove the aftertreatment DEF filter equalizing element (B).
5. Remove the old aftertreatment DEF supply module filter element (D).

   NOTE:

   A disposable service tool (C) is included with the filter to aid in filter removal. Use the appropriate end of the tool to remove filter. When inserting the tool, a click sound can be heard which indicates proper engagement with the filter.
6. Discard and replace the filter and equalizing element if removed from the aftertreatment dosing unit.
7. Clean and inspect the supply module. Refer to *Cleaning and Inspecting the Supply Module Filter, page 341*.
8. Install new supply module filter. Refer to *Installing the Supply Module Filter, page 341*.

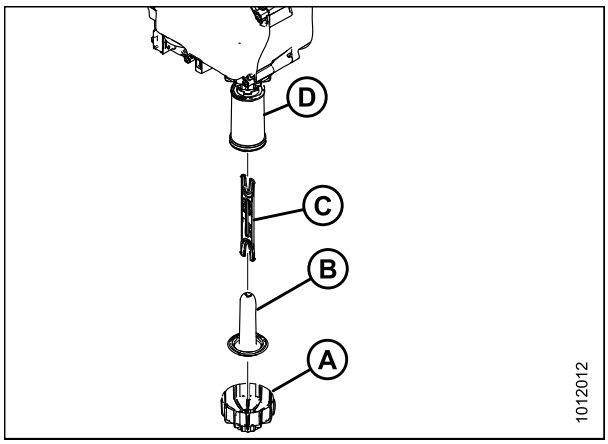


Figure 5.91: DEF Supply Module Filter

Cleaning and Inspecting the Supply Module Filter

WARNING

Diesel Exhaust Fluid (DEF) contains urea. Do NOT get the substance in your eyes. In case of contact, immediately flush eyes with water for a minimum of 15 minutes. Do NOT swallow. In the event the DEF is ingested, contact doctor immediately.

NOTE:

If there is the possibility that contaminated diesel exhaust fluid (DEF) has gone through the DEF dosing system, check the DEF filter prior to discarding the filter.

1. Check the DEF filter for evidence of contaminated DEF. Use visual and aroma characteristics of the filter to determine if contaminated fluid has passed through the dosing system.
2. Inspect the DEF filter for debris.
3. Discard the filter element and the equalizing element.
4. Inspect the aftertreatment DEF supply module filter cap for cracks or holes.
5. Check the condition of the threads on the aftertreatment DEF supply module cap.
6. If threads are damaged, replace the aftertreatment DEF supply module cap.
7. If cap threads are damaged, inspect the aftertreatment DEF supply module threads.
8. If threads of aftertreatment DEF supply module are damaged, replace the entire aftertreatment DEF supply module.
9. Clean the aftertreatment DEF supply module cap and threads on the supply module with warm water and clean cloth.

Installing the Supply Module Filter

For replacement supply module filter part numbers, refer to *8.1.4 Filter Part Numbers, page 453*.

WARNING

Diesel Exhaust Fluid (DEF) contains urea. Do NOT get the substance in your eyes. In case of contact, immediately flush eyes with water for a minimum of 15 minutes. Do NOT swallow. In the event the DEF is ingested, contact doctor immediately.

1. Slide the diesel exhaust fluid (DEF) filter equalizing element (A) into the DEF filter cartridge (B).
2. Insert the assembly into the aftertreatment DEF dosing unit (C).
3. Install cap (D) and torque to 20 Nm (15 lbf·ft).

WARNING

Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

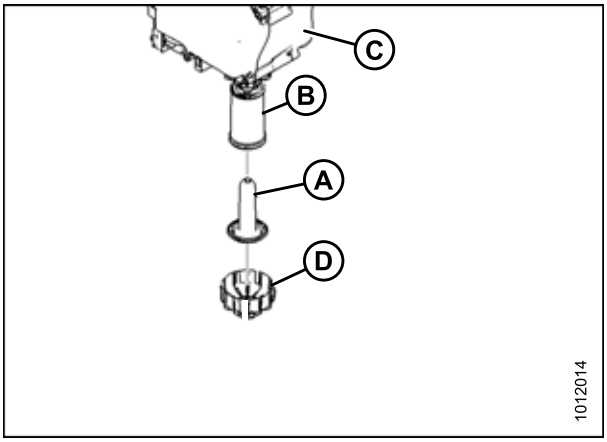


Figure 5.92: DEF Supply Module Filter

4. Connect the batteries. Refer to *Connecting Batteries, page 368*.
5. Start the engine and check for leaks.

   NOTE:

   The aftertreatment DEF dosing system will not prime until the correct Selective Catalytic Reduction (SCR) temperatures are reached. To verify that there are no DEF leaks, test drive the windrower for a minimum of 15 minutes to get the SCR system up to temperature.

5.7.9 Engine Cooling System

The engine cooling system is designed to maintain the engine operating temperature within the recommended operating range.

NOTE:

Antifreeze is essential in any climate. It broadens the operating temperature range by lowering the coolant freezing point and by raising its boiling point. Antifreeze also contains rust inhibitors and other additives to prolong engine life.

IMPORTANT:

If antifreeze strength is not adequate, do **NOT** drain cooling system to protect against freezing. The system may not drain completely, and damage from freezing could still result.

Refer to *8.1 Recommended Fuel, Fluids, and Lubricants, page 451* for detailed information.

Checking Coolant Level

WARNING

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

Check coolant level in the pressurized coolant tank daily.

NOTE:

Ensure the engine has cooled down prior to checking.

1. Stop the engine, and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Open the platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

4. The coolant level should be between the maximum (B) and minimum (C) line marker when cold. To add coolant, refer to *Adding Coolant, page 347*.
5. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.
6. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

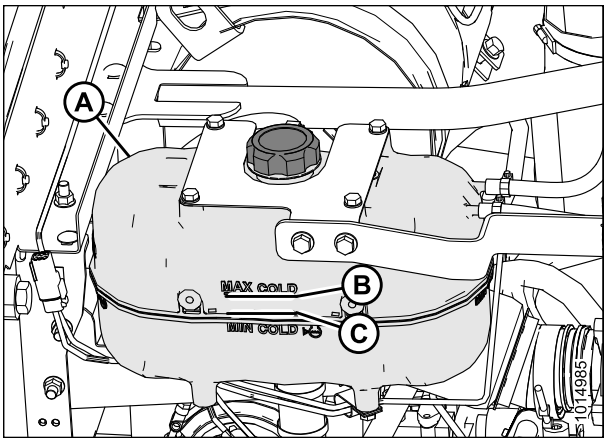


Figure 5.93: Engine Coolant Tank

Checking Engine Coolant Strength

Check the antifreeze in the pressurized coolant tank with a tester every year, preferably before off-season storage.

WARNING

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

CAUTION

To avoid personal injury from hot coolant, do NOT turn pressurized coolant tank cap until engine cools.

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Open the platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
4. Turn the pressurized coolant tank cap (A) counterclockwise to the first notch to relieve pressure before removing cap completely.
5. Turn cap (A) again and remove.
6. Check the coolant in the pressurized coolant tank using an antifreeze tester. Tester should indicate protection to temperatures of -34°C (-30°F).
7. Inspect the pressurized coolant tank cap before reinstalling. Refer to *Inspecting Pressurized Coolant Tank Cap, page 344*.
8. Reinstall pressurized coolant tank cap (A).
9. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.
10. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

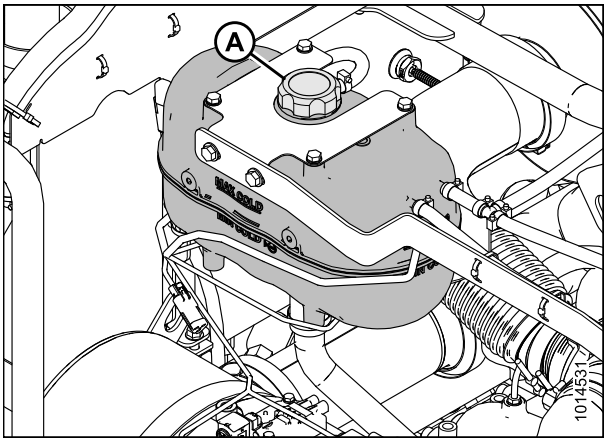


Figure 5.94: Engine Cooling System

Inspecting Pressurized Coolant Tank Cap

The pressurized coolant tank cap must fit tightly and the cap gasket must be in good condition to maintain the 97–124 kPa (14–18 psi) pressure in the cooling system. Check the condition of the cap every year when checking the engine coolant strength.

WARNING

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

CAUTION

To avoid personal injury from hot coolant, do NOT turn pressurized coolant tank cap until engine cools.

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Open the platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
4. Turn cap (A) counterclockwise to the first notch to relieve pressure before removing cap completely.
5. Turn cap (A) again and remove.
6. Check the gasket for cracks or deterioration and replace the cap if necessary.
7. Check that the spring in the cap moves freely.
8. Replace cap if spring is stuck.
9. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.
10. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

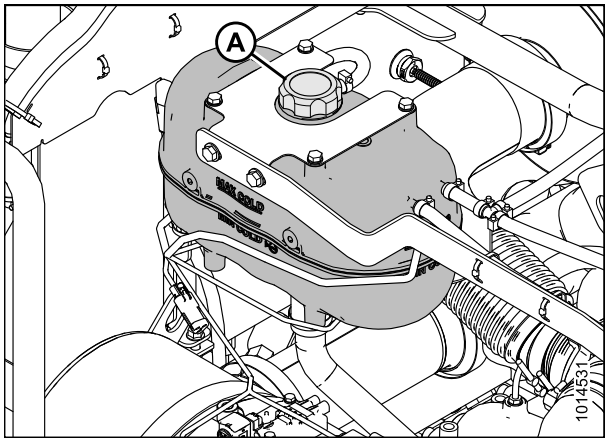


Figure 5.95: Engine Cooling System

Changing Coolant

Coolant should be drained and the system flushed and filled with new coolant every **2000 hours or 2 years**.

Refer to the following procedures:

- *Draining and Cleaning the Coolant Tank, page 344*
- *Adding Coolant, page 347*

Draining and Cleaning the Coolant Tank

WARNING

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

CAUTION

To avoid personal injury from hot coolant, do NOT turn pressurized coolant tank cap until engine cools.

1. Stop the engine and remove the key. Let the engine cool.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Open the platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
4. Turn the pressurized coolant tank cap (A) to the first notch to relieve pressure before removing cap completely.

   IMPORTANT:

   Place a drain pan (about 30 liters [8 US gallons] capacity) under the engine and radiator, and use a deflector or hose to prevent coolant running onto frame.

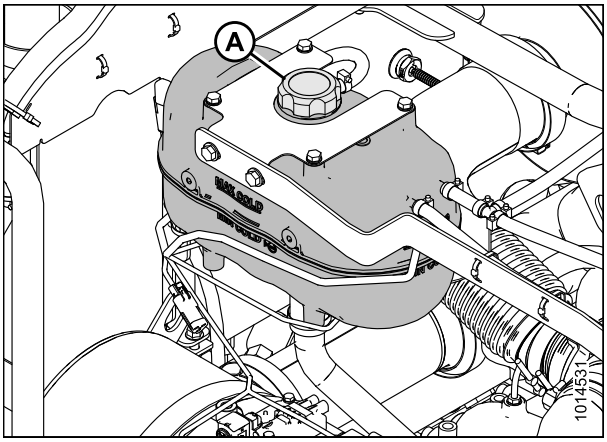


Figure 5.96: Coolant Recovery Tank

5. Remove the pressurized coolant tank cap and open radiator drain valve (A), located at the bottom of the engine side of the radiator lower tank.

   NOTE:

   Part of the lower left frame made transparent to show radiator drain valve location.

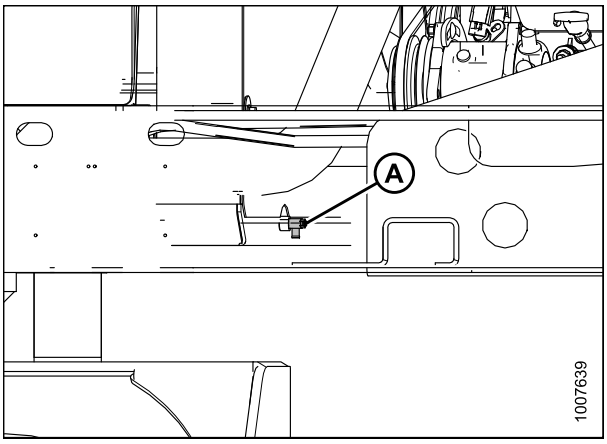


Figure 5.97: Radiator Drain Valve

6. Close the heater shut-off valve (A) and disconnect hose on heater side of valve.
7. Open valve to drain the block.
8. When system is drained, reattach hose on valve (A).

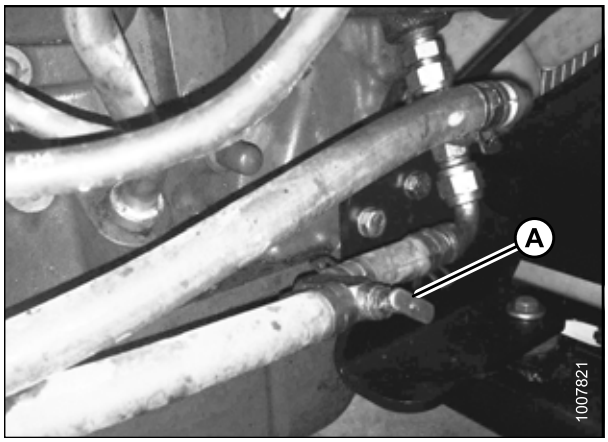


Figure 5.98: Heater Shut-Off Valve (2016 and Prior)

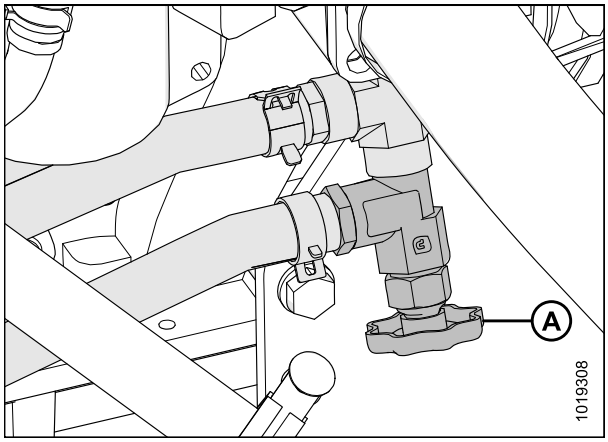


Figure 5.99: Heater Shut-Off Valve (2017)

9. Close radiator drain valve (A) at the bottom of the engine side of the radiator lower tank.

   NOTE:

   Part of the lower left frame made transparent to show radiator drain valve location.

10. Fill system with clean water through the pressurized coolant tank and replace the pressurized coolant tank cap.

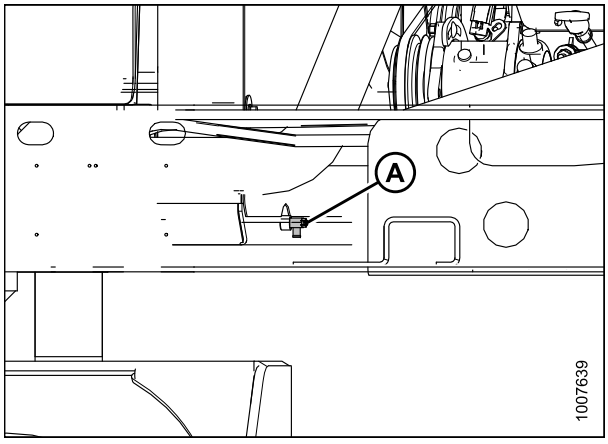


Figure 5.100: Radiator Drain Valve

11. Open heater shut-off valve (A).
12. Start engine and turn temperature control knob to HIGH. Run engine until normal operating temperature is reached.
13. Stop the engine and drain water out before rust or sediment settles. Repeat coolant removal procedure.
14. Close drain valves and fill system with a solution of clean water and a heavy duty radiator cleaner. Follow instructions provided with cleaner.
15. After using the cleaner solution, flush system with clean water again. Inspect radiator, hoses, and fittings for leaks.
16. Close drain valves and fill system. Refer to *Adding Coolant, page 347*.

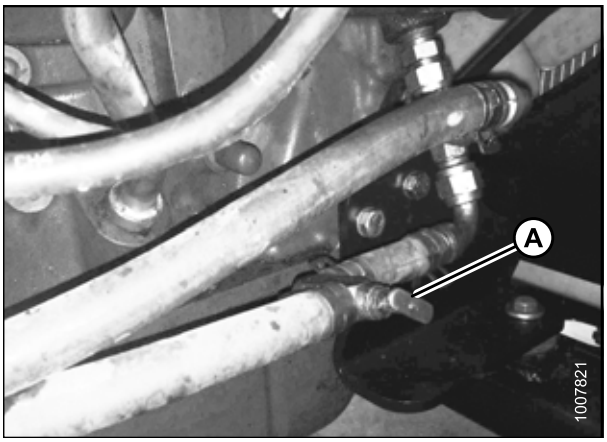


Figure 5.101: Heater Shut-Off Valve (2016 and Prior)

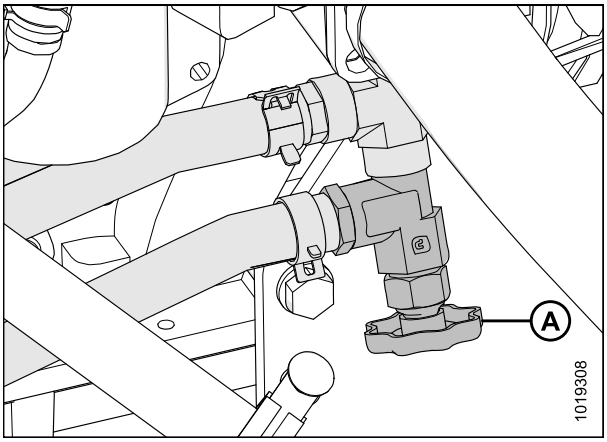


Figure 5.102: Heater Shut-Off Valve (2017)

17. Replace cap (B) on coolant recovery tank (A).
18. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.
19. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

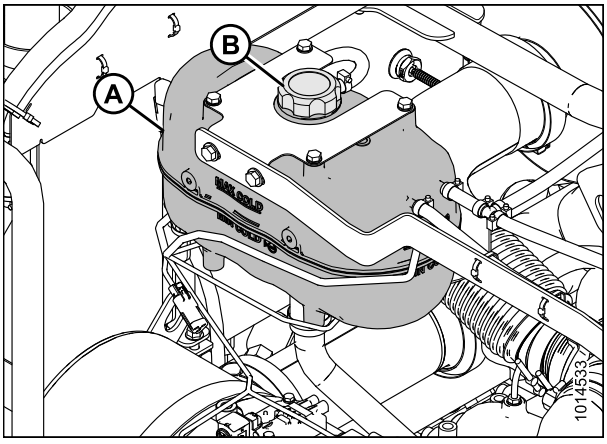


Figure 5.103: Coolant Recovery Tank

Adding Coolant

Check the coolant level in the pressurized coolant tank daily. Add coolant if the tank is less than one-half full.

NOTE:

For coolant specifications, refer to the inside back cover.

WARNING

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

CAUTION

To avoid personal injury from hot coolant, do NOT turn pressurized coolant tank cap until engine cools.

To add coolant to the pressurized coolant tank, follow these steps:

1. Stop the engine and remove the key.
2. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
3. Open the platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
4. Remove cap (B) from coolant recovery tank (A).
5. Add coolant at a rate not exceeding 3 gallons per minute until the recovery tank is one-half full.

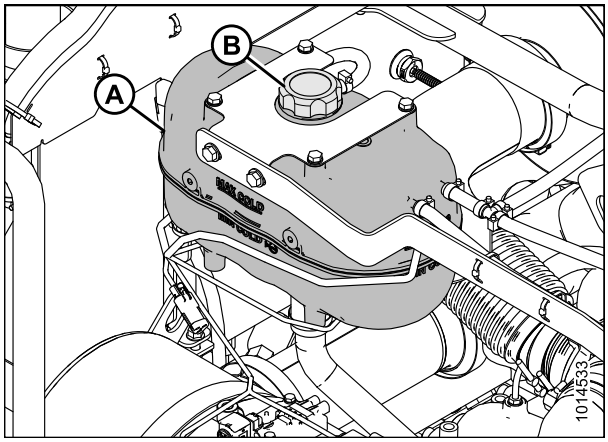


Figure 5.104: Coolant Recovery Tank

CAUTION

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

6. Start engine and run at high idle for approximately 20 minutes or until the engine temperature reaches 85°C (185°F).
7. Check the coolant level again and add coolant until the recovery tank is one-half full.
8. Replace cap (B).
9. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.
10. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

5.7.10 Gearbox

Checking Lubricant Level and Adding Lubricant

Lubricant level should be checked every 50 hours.

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

WARNING

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

Check and add lubricant as follows:

1. Park the windrower on level ground, shut down engine, and remove key.
2. Remove check plug (A). The lubricant should be visible through the hole or slightly running out.
3. If required, add lubricant through the check plug hole (A) using a squeeze bottle.

   NOTE:

   To view lubricant specifications, refer to *8.1.3 Lubricants, Fluids, and System Capacities, page 452*.

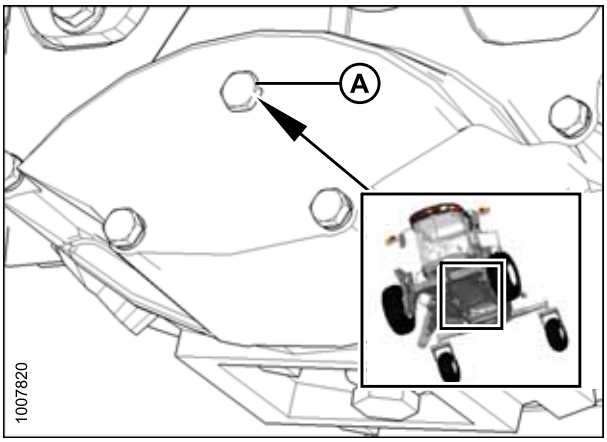


Figure 5.105: Gearbox Lubricant Check Plug

4. Add lubricant as follows:
   a. Remove breather cap and add lubricant until it runs out the check port. If refilling, add approximately 2.1 liters (2.2 US quarts).
   b. Replace check plug and breather cap and tighten.
   c. Operate the engine at low idle and check for leaks at the check plug and drain plug.

Changing Lubricant

Change gearbox lubricant after the first 50 hours, and then every 500 hours as follows:

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

WARNING

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

NOTE:

The engine should be warm when changing the oil.

1. Stop engine and remove key.
2. Place a 4 liter (1 US gallon) drain pan under the gearbox.

3. Remove drain plug (B) and allow oil to completely finish draining.
4. Install drain plug (B) and remove check plug (A).

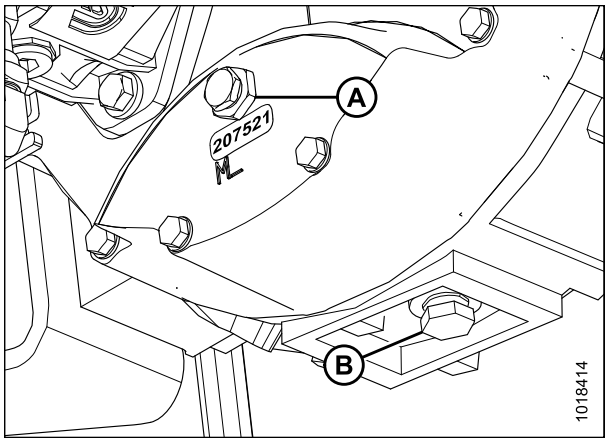


Figure 5.106: Gearbox Lubricant Drain Plug

5. Add lubricant as follows:
   a. Remove breather cap (A) and add lubricant until it runs out the check port. If refilling, add approximately 2.1 liters (2.2 US quarts).
   b. Replace check plug and breather cap and tighten.
   c. Operate the engine at low idle and check for leaks at the check plug and drain plug.

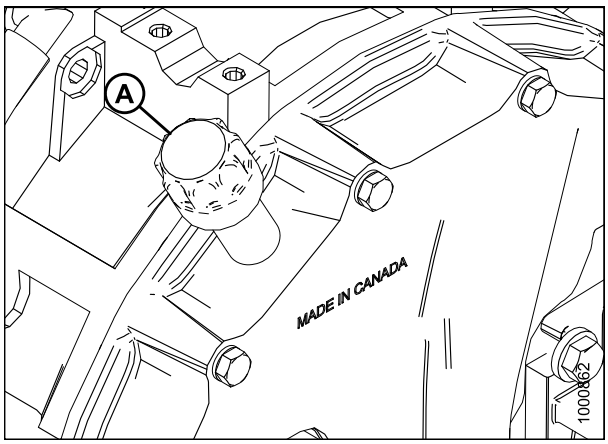


Figure 5.107: Gearbox Breather Cap

5.7.11 Inspecting Exhaust System

The system consists of a two main canisters for exhaust treatment. In between the two exhaust canisters is a tube with a dosing module (DM) for diesel exhaust fluid (DEF).

CAUTION

Engine exhaust stack may be hot. To avoid burns, do NOT touch exhaust canister when engine is running. Allow sufficient cooling time after shut-down.

The exhaust system requires no regular maintenance, but should be inspected periodically as follows:

1. Open the hood to its highest position. For instructions, refer to *5.2.3 Opening Hood (Highest Position), page 289*.

   IMPORTANT:

   Ensure the exhaust system is secure to eliminate vibration.

2. Check the following:

   - Exhaust canisters (A) and bellows tube (B) for dents, cracks, and wear

     NOTE:

     A damaged bellows tube may cause safety issues and derate the engine.

   - Straps (C) for tightness
   - U-bolt (D) and Marman clamps (E) for breakage, cracks, and rust

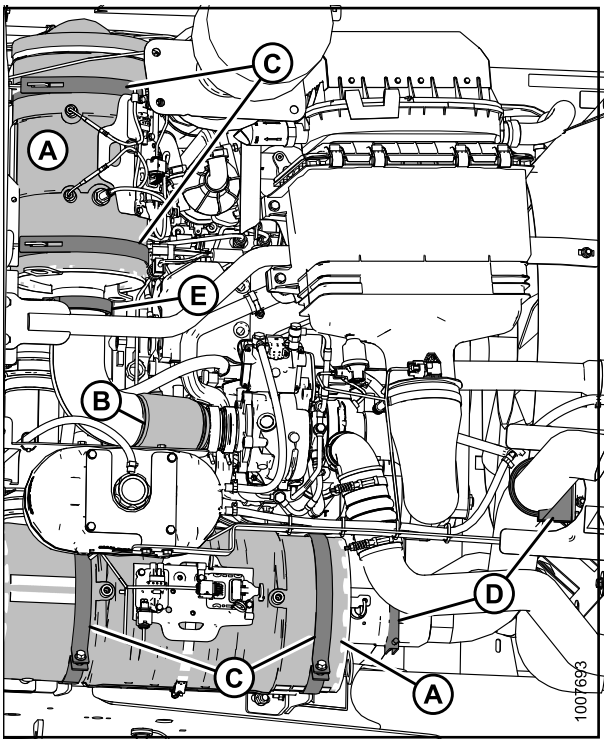


Figure 5.108: Exhaust System

3. Check the four Marman clamps (A) securing the tubes in between the two exhaust canisters.

   IMPORTANT:

   Do **NOT** change exhaust canister type, piping sizes, or exhaust configuration. See your Dealer for proper replacement parts.

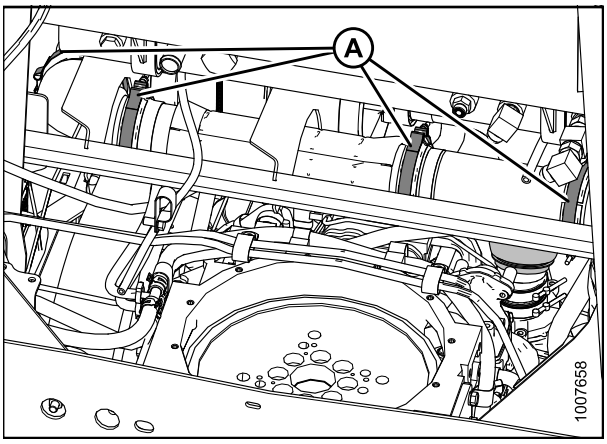


Figure 5.109: Exhaust Canister

4. Inspect the area around clamps (A) for breakage, cracks, and rust-through.

   IMPORTANT:

   If exhaust is leaking, tighten clamps to 12–15 Nm (9–11 lbf·ft). If leaking at Marman connection, replace seals (refer to the M155*E4* Parts Catalog). Contact your Dealer if the exhaust leak persists.

5. Check tubing for dents or crushed areas. Dents or crushed tubing creates exhaust flow restriction and increases back pressure significantly. Even relatively small dents will cause decreased fuel economy and increased turbo wear. If dents are relatively large, the higher exhaust temperature will increase bearing and cylinder wear.

5.7.12 Belts

Tensioning Alternator/Fan Belt

The alternator, water pump, and fan belt are automatically tightened. Manual adjustment is **NOT** required.

Replacing Fan Belt

WARNING

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

1. Shut down the engine and remove the key.
2. Open the left cab-forward platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
4. Loosen compressor mounting hardware (B) and push compressor towards engine to release tension.
5. Remove belt (A) from compressor.

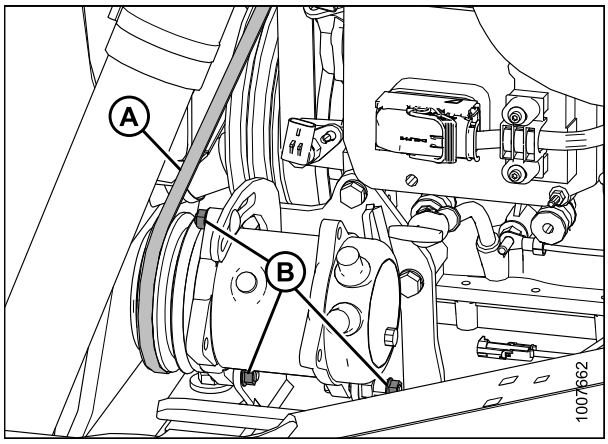


Figure 5.110: A/C Compressor

6. Insert the drive end of a 1/2 in. drive ratchet wrench into the belt tensioner (B).
7. Rotate tensioner counterclockwise until fan belt (A) can be slipped off pulley (C). Release tensioner and remove wrench.
8. Remove belt in order 1–2–3 as shown. Route fan belt around fan and remove belt.
9. Install new belt (A) around fan and onto pulleys in order 3–2–1.
10. Insert the drive end of a 1/2 in. drive ratchet wrench into the belt tensioner (B).
11. Rotate tensioner counterclockwise until belt (A) can be slipped onto pulley (C). Release tensioner and remove wrench.
12. Check that belt is properly seated in all pulley grooves.

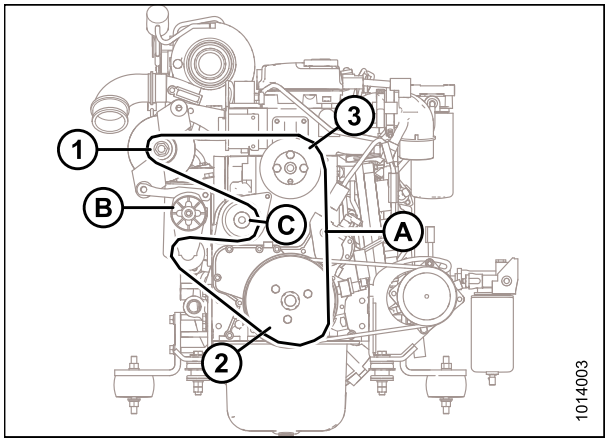


Figure 5.111: Engine Belts

13. Reinstall compressor belt (A).
14. Pry compressor away from engine so that a force of 35–55 N (8–12 lbf) deflects belt (A) 5 mm (3/16 in.) at mid-span.
15. Tighten compressor mounting hardware (B).
16. Recheck tension and adjust as required.
17. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.
18. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

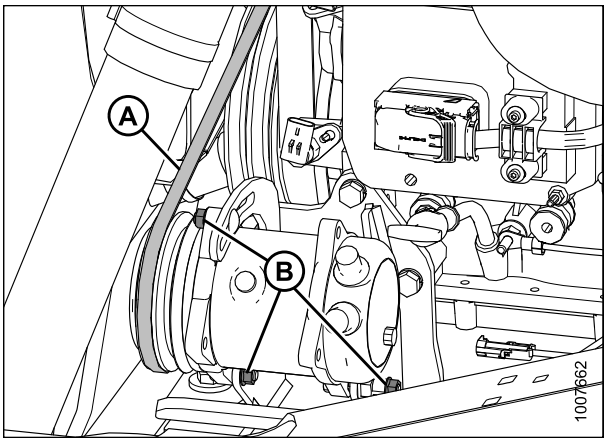


Figure 5.112: A/C Compressor

Tensioning Air Conditioner (A/C) Compressor Belt

WARNING

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

1. Shut down the engine and remove the key.
2. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Loosen compressor mounting hardware (B).
4. Pry compressor away from engine so that a force of 35–55 N (8–12 lbf) deflects belt (A) 5 mm (3/16 in.) at mid-span.
5. Tighten compressor mounting hardware (B).
6. Recheck tension and adjust as required.
7. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

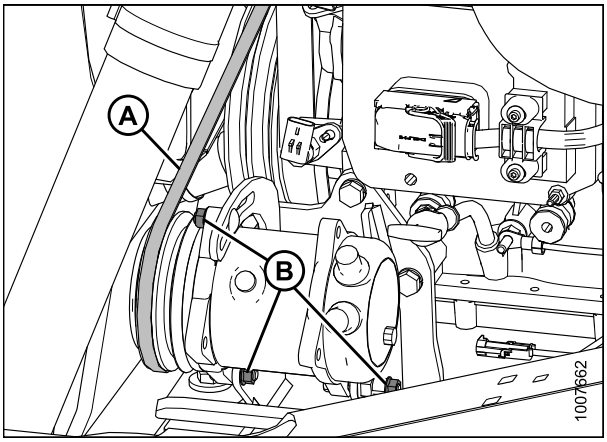


Figure 5.113: A/C Compressor

Replacing Air Conditioner (A/C) Compressor Belt

WARNING

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

1. Shut down the engine and remove the key.
2. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
3. Loosen compressor mounting hardware (B) and push compressor towards engine to release tension.
4. Remove belt (A) from compressor.
5. Install new compressor belt (A).
6. Pry compressor away from engine so that a force of 35–55 N (8–12 lbf) deflects belt (A) 5 mm (3/16 in.) at mid-span.
7. Tighten compressor mounting hardware (B).
8. Recheck tension and adjust as required.
9. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

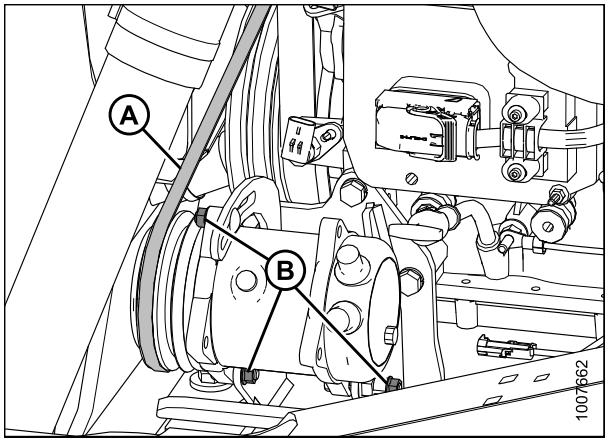


Figure 5.114: A/C Compressor

5.7.13 Engine Speed

The maximum and idle engine speeds are factory set.

Refer to *2.2 Specifications, page 30* for detailed information. If specified speeds cannot be maintained, see your MacDon Dealer.

IMPORTANT:

Do **NOT** remove any seals from injector pump. Removal of seals will void the engine warranty.

Refer to *Engine Intermediate Speed Control (ISC), page 170* for additional information about engine speed.

Throttle Adjustment

The engine speed is controlled by a throttle lever connected to an electronic sensor inside the console.

The throttle lever in the cab should move the throttle sensor the full range between slow speed stop and full rpm stop without contacting the console at either position.

If the throttle lever is contacting the console and interferes with specified engine speeds, the sensor position may need adjustment. See your MacDon Dealer.

5.8 Maintaining Engine Cooling Box

The engine cooling box components should be cleaned daily—more frequently in severe dust conditions. Refer to the following list of procedures before attempting to service the engine cooling box components:

5.8.1 Opening Cooler Box Screen

1. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
2. Push latch (A) and open screen assembly access door (B). Secure with rod, stored inside screen door.

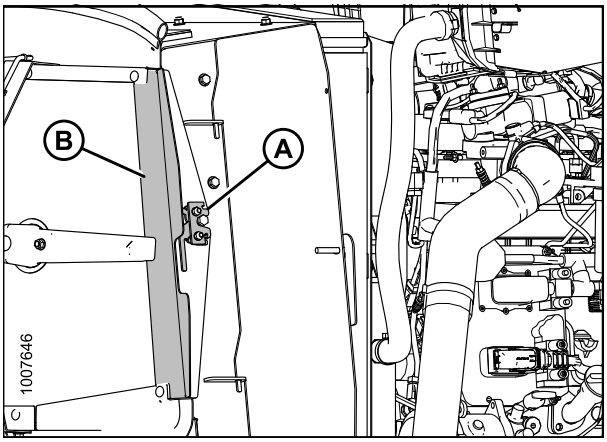


Figure 5.115: Engine Cooling System

5.8.2 Cleaning Screens and Coolers

When the engine is running, two electrically-driven rotors and suction from the engine's cooling fan sweep and vacuum debris away from the cooling box screen. If the screen is not being cleaned, the rotors or ducts may be plugged. Follow these steps to clear plugged rotors:

NOTE:

The following procedure is performed on one side, procedure also applies to the other side.

1. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.

2. Remove nuts (B).
3. Pivot screen cleaner assembly (C) away from screen.
4. Blow out debris from cleaner duct (A) with compressed air.
5. If duct is plugged, open the cooler box screen. Refer to *5.8.1 Opening Cooler Box Screen, page 355*.

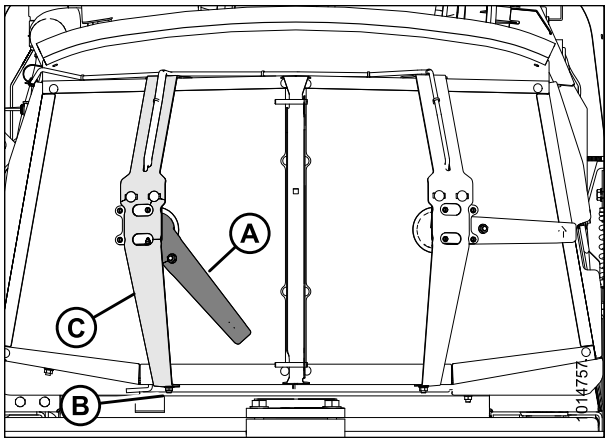


Figure 5.116: Screen Cleaner Assembly

6. Blow debris out of duct (A) with compressed air.
7. Clean screen with compressed air.

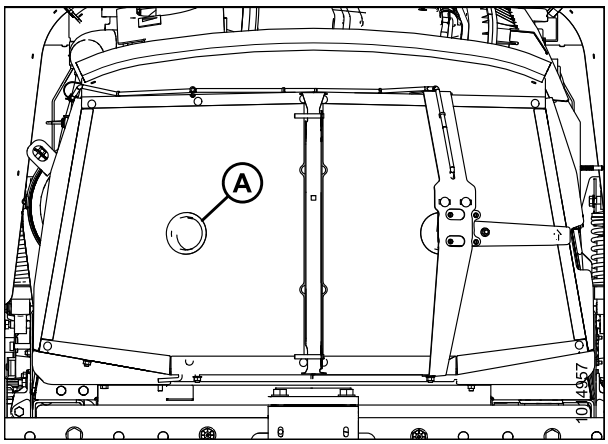


Figure 5.117: Cooler Box Screen

8. Move screen cleaner assembly (C) back into position and secure with bolts and nuts (B).
9. Check duct (A) clearance to screen. Refer to *5.8.4 Adjusting Screen Cleaner Rotor to Screen Clearance, page 359*.
10. Close the cooler box screen. Refer to *5.8.5 Closing Cooler Box Screen, page 359*.
11. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

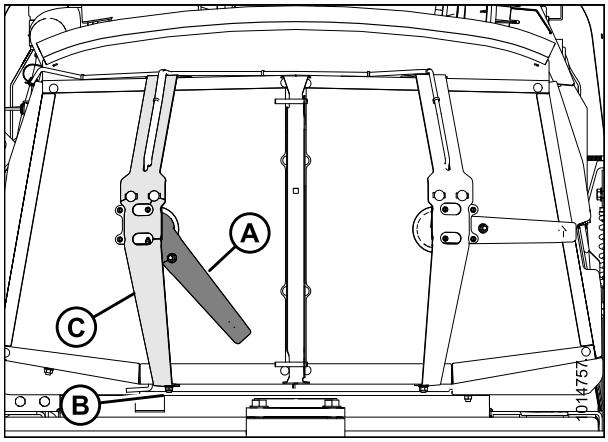


Figure 5.118: Screen Cleaner Assembly

5.8.3 Cleaning Cooler Box Components

The radiator and oil cooler should be cleaned daily with compressed air. More frequent cleaning may be necessary in severe conditions. The charge air cooler and air conditioning (A/C) condenser may also be cleaned at the same time.

To clean these components, proceed as follows:

1. Open cooler box screen. Refer to *5.8.1 Opening Cooler Box Screen, page 355*.
2. Lift latch (A) and open right access door (B).

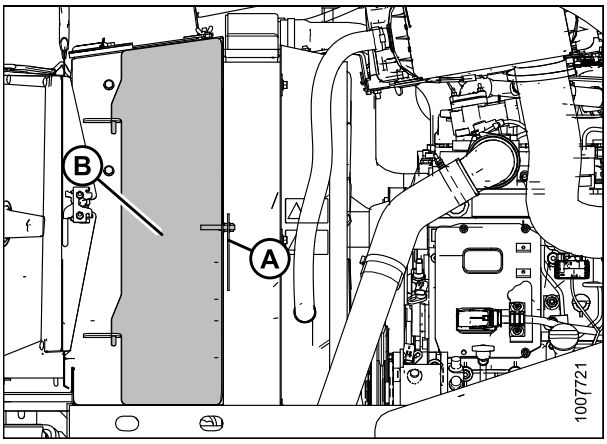


Figure 5.119: Right Cooler Access Door

3. Slide out the oil cooler / air conditioning (A/C) condenser assembly (A).

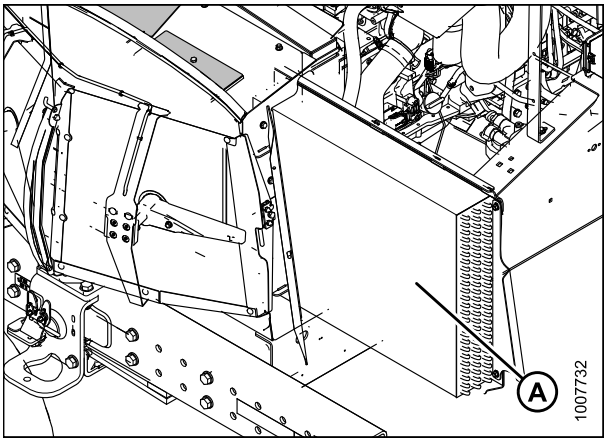


Figure 5.120: A/C Condenser Assembly

4. Lift latch (A) and open left access door (B).

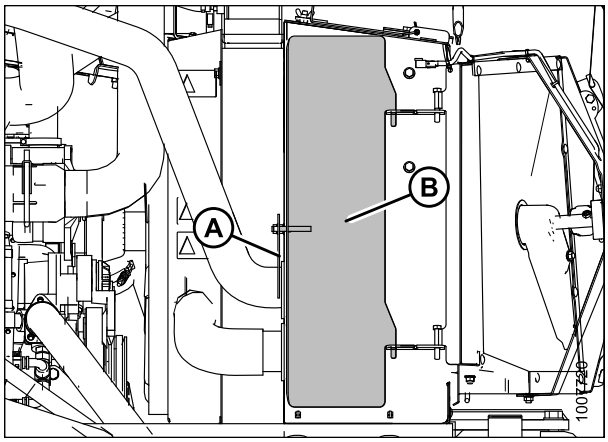


Figure 5.121: Left Cooler Access Door

5. Remove wing nut (A) and open access door (B) at top of cooling box.

   NOTE:

   Fins on coolers can be very easily bent which may interfere with its function. Exercise caution when cleaning.

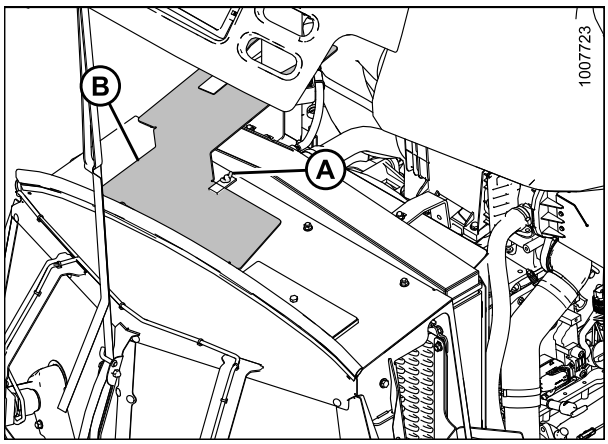


Figure 5.122: Cooling Box Access Door

6. Clean radiator (A) through access hole in cooling box with compressed air.
7. Clean oil cooler / air conditioning condenser (B), charge air cooler (C), and cooling box (D) with compressed air.
8. Inspect all lines and coolers for evidence of leaks and damage.
9. Slide oil cooler / air conditioning condenser (B) back into cooling box (D).
10. Close side access door and lock with lever.
11. Close access door on top of the cooling box and secure with wing nut.
12. Close cooler box screen. Refer to *5.8.5 Closing Cooler Box Screen, page 359*.

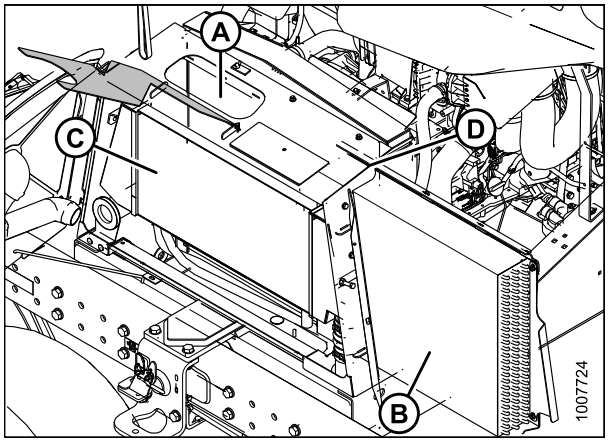


Figure 5.123: Engine Cooling System

5.8.4 Adjusting Screen Cleaner Rotor to Screen Clearance

The clearance between trailing edge of screen cleaner rotor and screen should be 1–8 mm (0.039–0.314 in.) at all locations when rotating.

WARNING

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

1. Shut down the engine and remove the key.
2. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.

   NOTE:

   Screen cleaner rotors rotate counterclockwise and may touch screen as long as they continue to rotate.
3. Loosen nut (B) on motor support (C).
4. Move support in or out until duct (A) is 2–6 mm (0.079–0.236 in.) from screen near the center.
5. Tighten nut (B).
6. Loosen the two motor mount bolts (D).
7. Move motor/duct assembly (E) to obtain 1–8 mm (0.039–0.314 in.) gap to screen at full rotation of the rotor.
8. Tighten nuts (D) on motor mount.
9. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

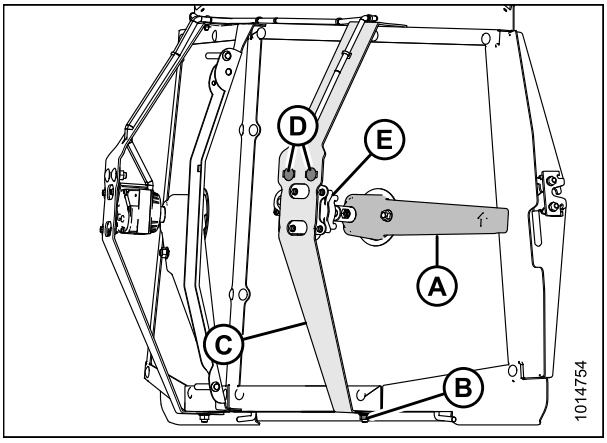


Figure 5.124: Screen Cleaner

5.8.5 Closing Cooler Box Screen

1. Unhook the support rod and store it in the screen door. Close screen access door (B) and engage latch (A).
2. Close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

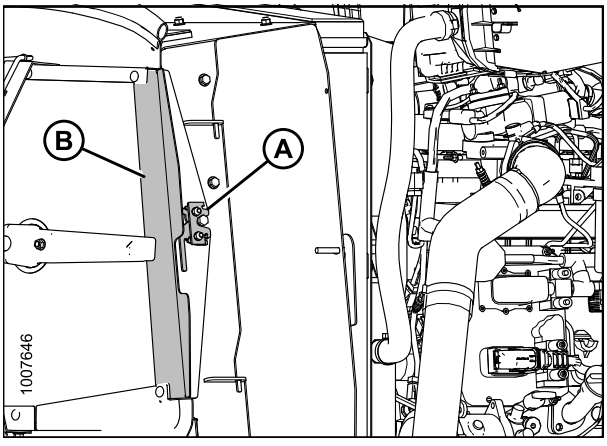


Figure 5.125: Engine Cooling System

5.9 Electrical System

5.9.1 Preventing Electrical System Damage

To prevent electrical system damage, take the following precautions:

- Carefully observe polarity when attaching booster battery.
- Do **NOT** short across battery or alternator terminals, or allow battery positive (+) cable or alternator wire to become grounded.
- Be sure alternator connections are correct before cables are connected to battery.
- When welding on any part of the machine, disconnect battery cables and alternator wire. Refer to *1.8 Welding Precautions, page 9*.
- Always disconnect battery ground cable when working with the alternator or regulator.
- Never attempt to polarize alternator or regulator.
- If wires are disconnected from the alternator, ensure that terminals (A) and (B) are connected properly.
- Never ground the alternator field terminal or field.
- Never connect or disconnect alternator or regulator wires with battery connected or alternator operating.
- Always disconnect cables from the battery when using a charger to charge battery in windrower.
- Ensure all cables are securely connected before operating engine.
- To avoid damage to circuit boards by static electricity, disconnect negative battery terminal when replacing electronic control modules. Additionally, when handling electronic control modules, avoid touching the connector pins directly.

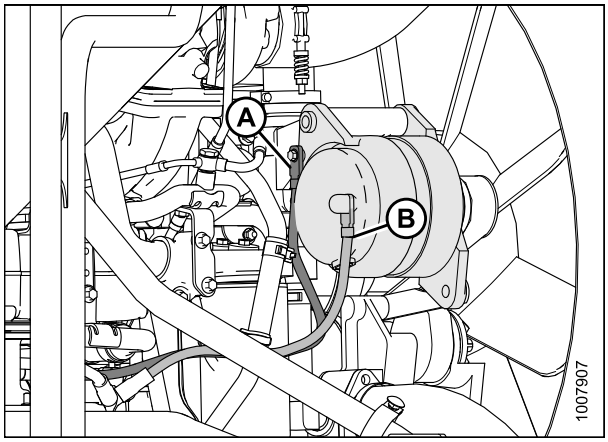


Figure 5.126: Alternator

A - Negative Terminal **B - Positive Terminal**

5.9.2 Battery

Maintaining Batteries

CAUTION

Do NOT attempt to service battery unless you have the proper equipment and experience to perform the job. Have it done by a qualified Dealer.

- Check battery charge once a year, or more often if operating in cold weather. Hydrometer readings should be 1.260 to 1.300. Readings below 1.250 indicate charging is required. Refer to *Charging the Batteries, page 361*. Add electrolyte if necessary. Refer to *Adding Electrolyte to the Battery, page 364*.
- Keep batteries clean by wiping with a damp cloth.

- Keep all connections clean and tight; remove any corrosion and wash terminals with a solution of baking soda and water. A light coating of grease on terminals (after cables are attached) will reduce corrosion.
- To prolong battery life, store batteries in a cool, dry area, in an upright position, fully charged at -7° to +26°C (+20° to +80°F).
- Do **NOT** stack batteries on top of each other unless they are in cartons.
- Test wet batteries every 4–6 months and recharge if necessary.

Battery Main Disconnect Switch

A battery main disconnect switch (A) is located on the right cab-forward side frame rail, just behind the batteries. It can be easily accessed by moving the maintenance platform.

Ensure the switch is in the POWER OFF position when servicing electrical components and to prevent loss of battery charge when the windrower will not be used for periods longer than 1 week.

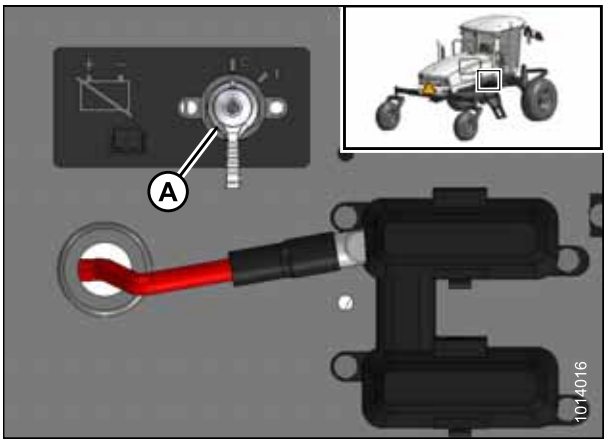


Figure 5.127: Batteries

Charging the Batteries

CAUTION

- **Ventilate the area where batteries are being charged.**
- **Do NOT charge a frozen battery. Warm to 16°C (60°F) before charging.**
- **Do NOT connect or disconnect live circuits. To prevent sparks, turn off charger and connect positive cable first. PROTECT YOUR EYES.**
- **If charging battery in windrower, disconnect POSITIVE battery cable before connecting charger cable, then connect ground cable last, away from battery.**
- **Stop or cut back charging rate if battery feels hot, or is venting electrolyte. Battery temperature must NOT exceed 52°C (125°F).**
- **The maximum charge rate in amperes should be NO MORE than 1/3 of the battery's reserve capacity minute rating. If the terminal voltage exceeds 16.0 volts while charging, reduce the charge rate.**
- **Continue charging and reduce the rate as needed until a 2-hour period results in no increase in voltage or decrease in current.**

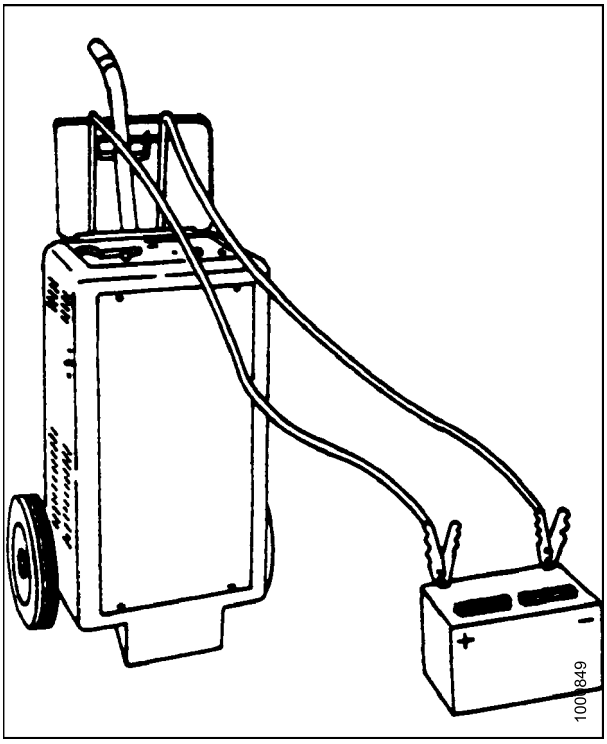


Figure 5.128: Charging Battery

Table 5.1 Voltage Chart

Voltage	State of Charge (%)	Approximate Battery Charging Time[29] to Full Charge at 27°C/80°F (Minutes)			
Standard Battery		Maximum Rate at (Amps)			
12 Volts		50	30	20	10
12.6	100	— FULL CHARGE —			
12.4	75	20	35	48	90
12.2	50	45	75	95	180
12.0	25	65	115	145	280
11.8	0	85	150	195	370

WARNING

- **Gel and AGM (Absorbed Glass Mat) batteries require a voltage-limited charger. Charging a Gel or AGM battery on a typical shop charger—even one time—may greatly shorten its life.**
- **If the electrolyte is accessible, verify that plates are covered before beginning to charge. At the end of charge, add distilled water as needed to bring levels to the proper height. If water is added, charge for an additional 30 minutes to mix. If electrolyte levels are low, but battery is not accessible, remove battery from service.**

CAUTION

Follow all instructions and precautions furnished by the battery charger manufacturer, including the following:

- **Charge at recommended rates and times.**
- **Turn off charger prior to hook up to avoid dangerous sparks. Wear proper eye protection.**
- **Reduce charge rate if the terminal voltage is higher than 16.0 volts while charging. The maximum charge rate in amperes should NOT exceed 1/3 of the battery's reserve capacity minute rating.**
- **Continue charging if there is no change in voltage or current for a period of 2 hours and reduce the rate as needed.**
- **If the battery case gets hot during charging or spews large amount of gasses, temporarily stop charging.**

IMPORTANT:

NEVER overcharge batteries. Excessive charging will shorten battery life.

To charge battery, follow these steps:

WARNING

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

29. Charging time depends upon battery capacity, condition, age, temperature, and efficiency of charger.

1. Stop the engine and remove the key.
2. Move platform on right cab-forward side of machine to open position to allow access to the batteries. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Remove red plastic covers (A) from positive cable clamps.
4. Remove black plastic covers (B) from negative terminals.
5. If charging battery in windrower, disconnect **positive** battery cable (A), then connect charger cable to positive post. Connect charger ground cable to the engine block last, away from battery.
6. Charge batteries in accordance with charger manufacturer's instructions.
7. Close platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

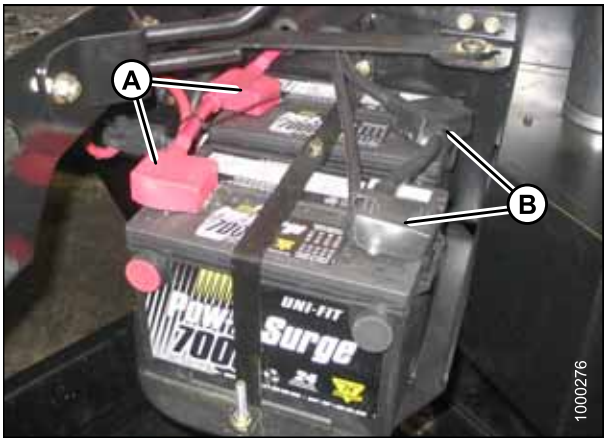


Figure 5.129: Battery Terminal Location

Boosting the Batteries

A 12-volt battery can be connected in parallel (+ to +) with the windrower battery. Use heavy-duty battery cables.

CAUTION

- **Gas given off by batteries is explosive. Keep sparks and flames away from batteries.**
- **Make last connection and first disconnection at the point furthest away from the batteries.**
- **Wear protective eye-wear when using a booster battery.**
- **Be sure everyone is clear of machine when starting engine. Start engine from operator's station only.**

1. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.
2. Remove red rubber cover from boost post (A) on windrower frame.
3. Attach one end of battery cable to positive (+) terminal of booster battery, and other end to positive boost post (A) on windrower frame.
4. Attach second cable to negative (-) terminal of booster battery, and then to ground post (B) on windrower frame.
5. Turn ignition switch in cab as with normal start up.
6. After engine starts, disconnect cable from windrower ground first, and then disconnect the other cables.
7. Replace rubber cover on boost post (A).
8. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

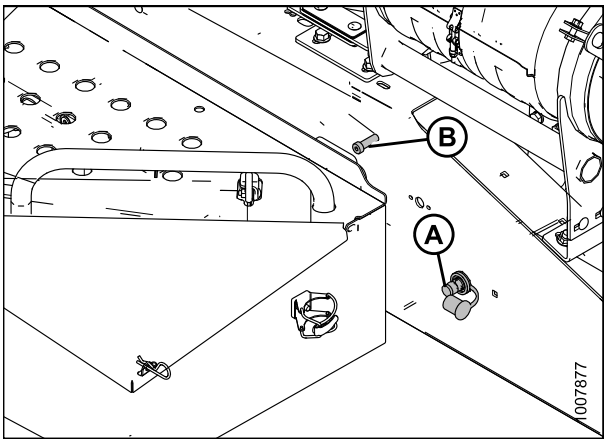


Figure 5.130: Battery Boost Posts

Adding Electrolyte to the Battery

Before servicing batteries, consult the battery manufacturer's instructions for proper procedures and safety precautions.

CAUTION

Do not attempt to service battery unless you have the proper equipment and experience to perform the job. Have it done by a qualified Dealer.

WARNING

Keep all smoking materials, sparks, and flames away from electrolyte container and battery. Gas given off by electrolyte is explosive.

Figure 5.131: Battery Safety Hazard

WARNING

- **Battery electrolyte causes severe burns. Avoid contact with skin, eyes, or clothing. Wear protective eyewear and heavy gloves.**
- **If electrolyte is spilled or splashed on clothing or on the body, neutralize it immediately with a solution of baking soda and water, then rinse with clean water.**
- **Electrolyte splashed into the eyes is extremely dangerous. Should this occur, force the eye open, and flood with cool, clean water for 5 minutes. Call a doctor immediately.**

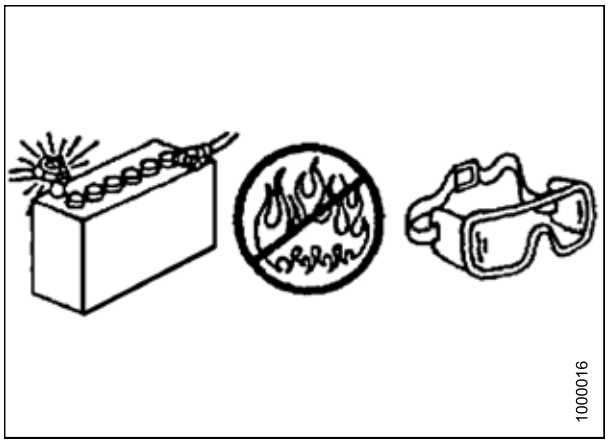


Figure 5.132: Battery Safety

WARNING

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

1. If the batteries are installed in the windrower, stop the engine and remove the key.
2. Open the platform (A) on the right side of the cab. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Add electrolyte in accordance with the battery manufacturer's instructions.
4. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

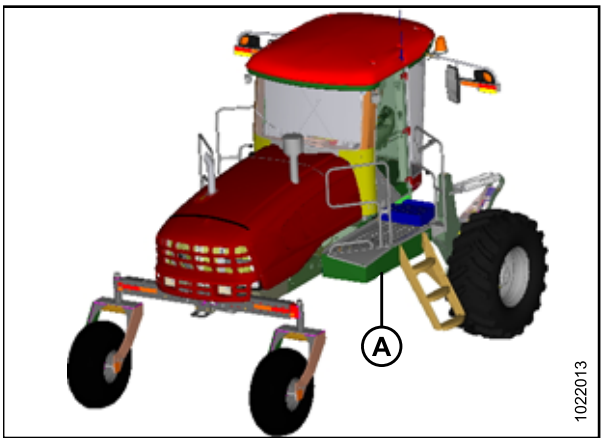


Figure 5.133: Platform Location

Removing Batteries

WARNING

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

CAUTION

Do not attempt to service battery unless you have the proper equipment and experience to perform the job. Have it done by a qualified Dealer.

1. Stop the engine and remove the key.
2. Open the right cab-forward platform to expose the batteries. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

3. Ensure the battery main disconnect switch (A) is turned to the POWER OFF position (the battery main disconnect switch is located on the right frame rail beside the batteries).

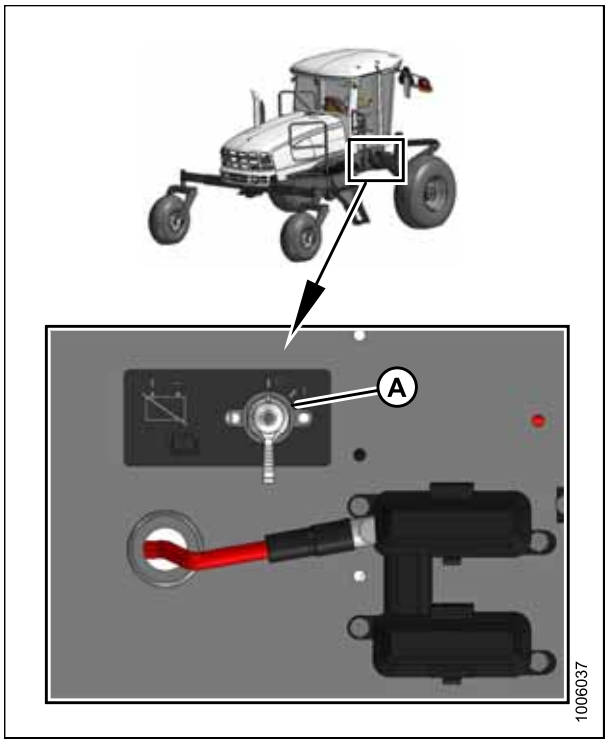


Figure 5.134: Battery Main Disconnect Switch

4. Remove bolt (A) that secures the platform arm to the platform. Swing arm (B) out of the way.
5. Remove the black plastic covers from the negative cable clamps (D). Loosen clamps and remove cable from batteries.
6. Remove the red plastic covers from positive cable clamps (C). Loosen the clamps and remove cable from batteries.
7. Remove bolts (E) securing strap (F) to frame, and remove strap.

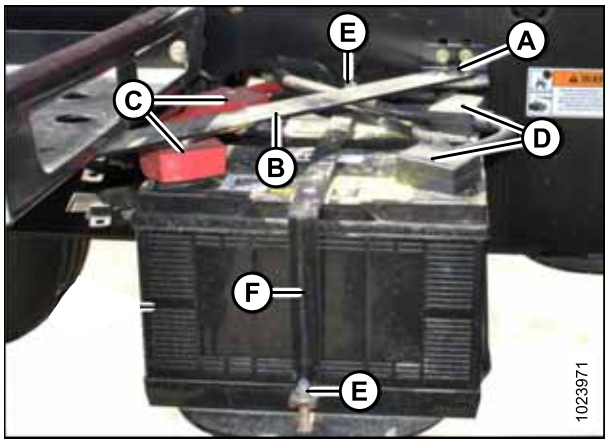


Figure 5.135: Batteries

8. Lift batteries off holder (A).

IMPORTANT:

- Store batteries in a cool, dry area in an upright position.
- Do **NOT** stack batteries on top of each other unless they are in cartons.
- Test wet batteries every 4–6 months and recharge if necessary.

NOTE:

Dual battery support can be removed from frame by simply lifting support, and pulling it away from frame.

Figure 5.136: Battery Holder

Installing Batteries

Replacement batteries must meet the specifications shown in the following table:

Table 5.2 Battery Specification

Rating	Group	CCA (min)	Volt	Maximum Dimension
Heavy duty, off-road, vibration resistant	BCI 29H or 31A	650	12	334 x 188 x 232 mm (13.25 x 7.37 x 9.44 in.)

1. Ensure the battery main disconnect switch (A) is turned to the POWER OFF position (the battery main disconnect switch is located on the right frame rail beside the batteries).
2. Open right cab-forward platform to expose batteries. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Remove cable ties securing battery cables to battery clamp.

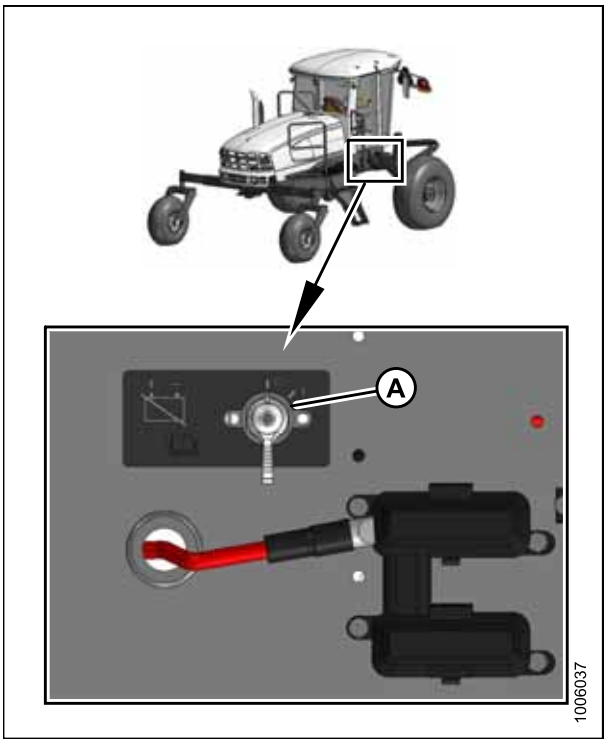


Figure 5.137: Battery Main Disconnect Switch

4. Position new batteries (G) on dual battery support.

   NOTE:

   Ensure that batteries are positioned so that the positive posts (C) face aft.

5. Install strap (F) with bolts (E).
6. Rotate bar (B) into position and secure with bolt (A).
7. Connect battery cables to positive (C) and negative (D) battery posts. Refer to *Connecting Batteries, page 368*.
8. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

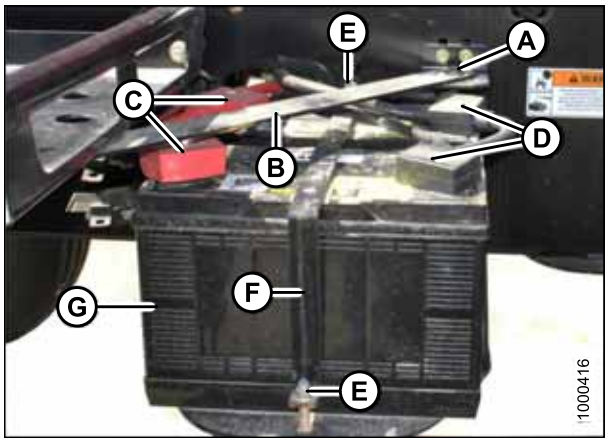


Figure 5.138: Battery

Connecting Batteries

WARNING

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

1. Open the right (cab-forward) maintenance platform. Refer to .
2. Ensure the battery main disconnect switch (A) is turned to the POWER OFF position (the battery main disconnect switch is located on the right frame rail beside the batteries).
3. Remove the cable ties securing the battery cables to the battery clamps.

   IMPORTANT:

   Batteries are negative grounded. Always connect red starter cables to the positive (+) terminals of the batteries and black ground cables to the negative (–) terminals of the batteries. Reversed polarity in the batteries or alternator may result in permanent damage to the electrical system.

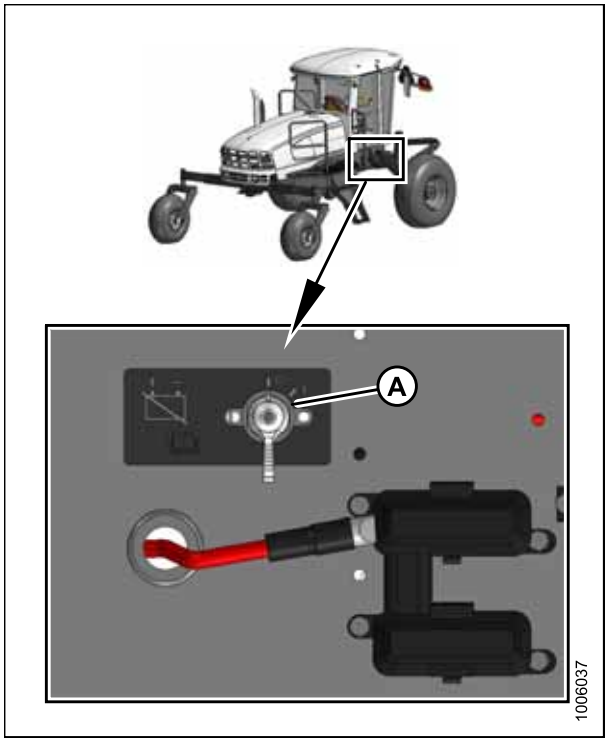


Figure 5.139: Battery Main Disconnect Switch

4. Remove the plastic caps from the battery posts.
5. Attach the red positive (+) cable terminals to the positive posts (A) on the batteries and tighten clamps. Reposition plastic covers onto clamps.
6. Attach the black negative (–) cable terminals to the negative posts (B) on the batteries and tighten clamps. Reposition plastic covers onto clamps.
7. Turn the battery switch to the POWER ON position.
8. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

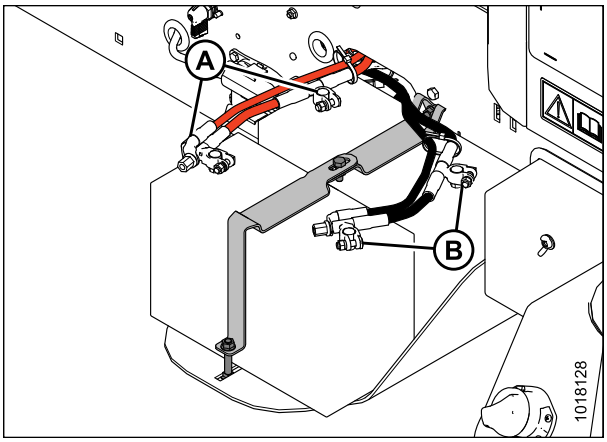


Figure 5.140: Batteries

5.9.3 Headlights: Engine-Forward

Aligning Headlights

WARNING

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

NOTE:

Header should be attached and raised to maintain proper windrower stance.

1. Position windrower in engine-forward mode on level ground so that headlights are positioned 7.5 m (25 ft.) in front of a vertical surface.
2. Shut down engine and remove key.

3. Turn on ROAD lights (A) and switch to low beam (B).

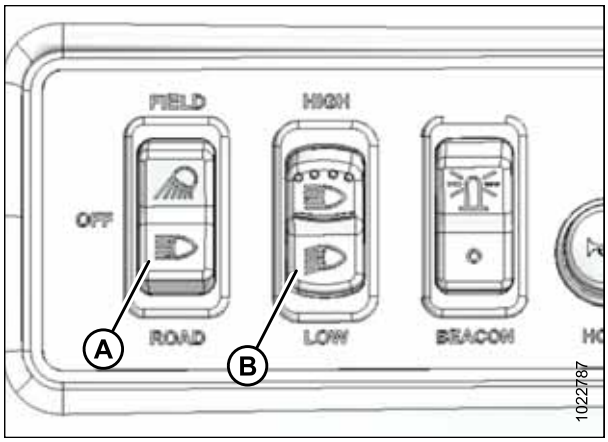


Figure 5.141: Road Light Switch (except Russia)

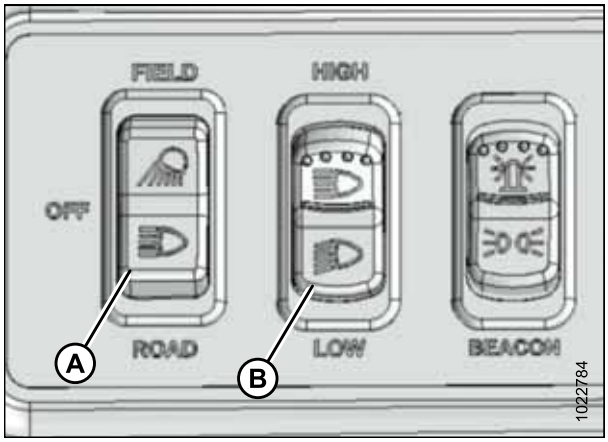


Figure 5.142: Road Light Switch (Russia Only)

4. Align the headlights to the following specifications by turning adjusting screws (A).
   - Adjustments are for low beam.
   - Light beams laterally centered on the direction of travel line from the headlights (that is, **NOT** skewed left or right).

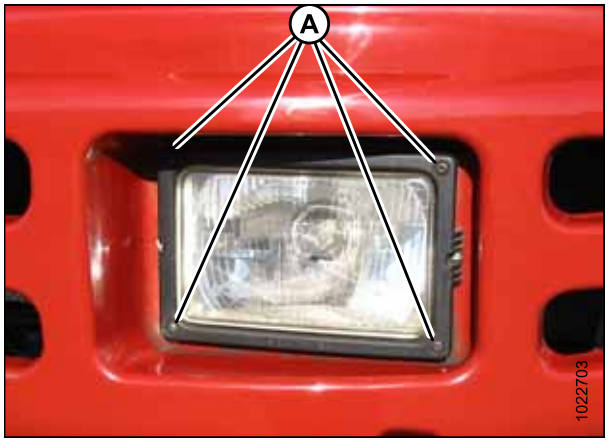


Figure 5.143: Headlights

- Upper limit of the beam **NOT** higher than 1263 mm (49-3/4 in.) above ground at a distance of 7.5 m (25 ft.) from the headlight.

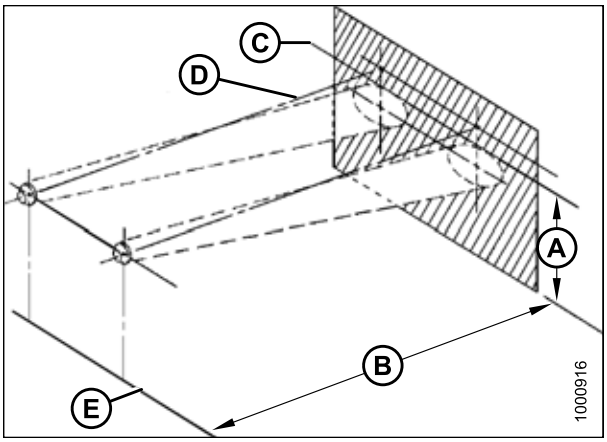


Figure 5.144: Headlight Beam Positioning

A - 1263 mm (49-3/4 in.) Maximum
B - 7.5 m (25 ft.)
C - Top Edge of Beam
D - Beam Centered on Direction of Travel Line
E - Ground

Replacing Headlight Bulb

Replacement bulb: MD #110267 (H4 12V 60/55W)

1. Remove two screws (A) and remove headlight assembly from hood.

Figure 5.145: Headlight

2. Pull wiring harness connector off the headlight assembly and remove rubber insulator boot (A).

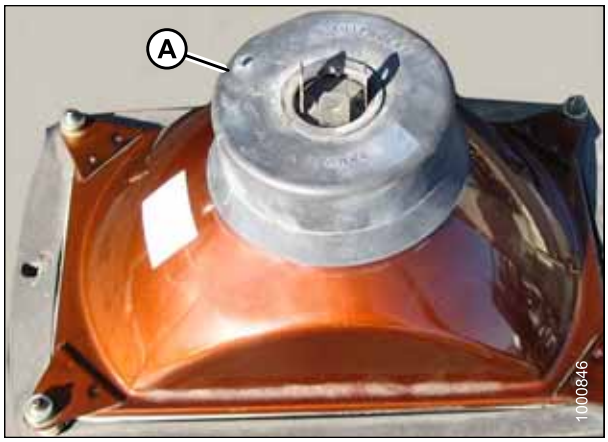


Figure 5.146: Headlight Assembly

3. Pinch wire retainer (A) and lift away from hooks.
4. Remove bulb (B) from body.

   IMPORTANT:

   Do **NOT** touch the glass of the halogen bulb as the oils or other chemicals from your skin will cause the bulb to fail prematurely.

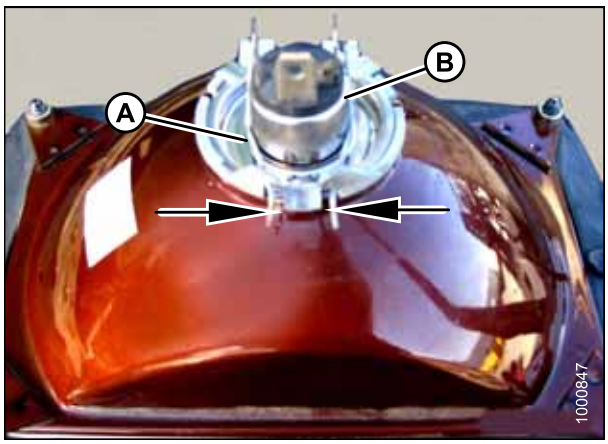


Figure 5.147: Headlight Assembly

5. Align lugs (B) on new bulb with slots (C) in body and push into place.
6. Secure bulb with wire retainer (A).

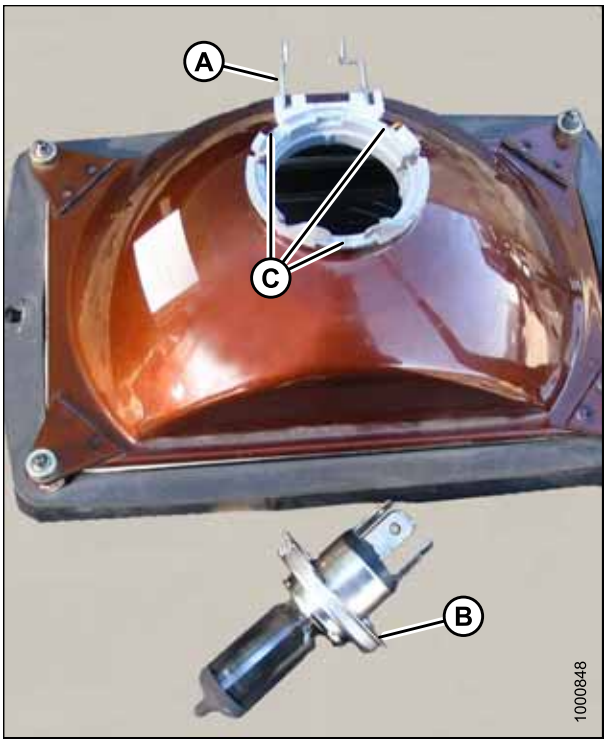


Figure 5.148: Headlight Assembly

7. Replace rubber insulator boot (A).
8. Push connector onto light bulb.

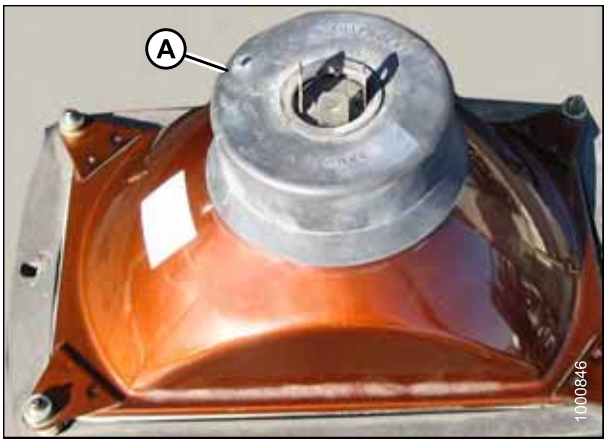


Figure 5.149: Headlight Assembly

9. Position headlight into light receptacle, ensuring top is up, and secure with screws (A). To align the headlights, refer to *Aligning Headlights, page 369*.

Figure 5.150: Headlight

5.9.4 Field Lights: Cab-Forward

Adjusting Field Lights

The field lights are best adjusted with the machine in the field (or equivalent) to suit Operator preference.

WARNING

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

1. Hold onto handholds (A) on the cab front corners, and stand on header anti-slip strips.

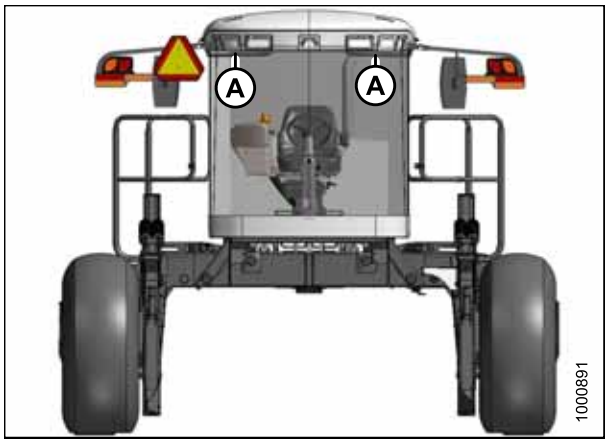


Figure 5.151: Windrower Cab-Forward

2. Adjust lights with screws (A).

Figure 5.152: Field Lights

Replacing Field Light Bulb

Replacement bulb: MD #110267 (H4 12V 60/55W)

1. Remove two screws (A), and remove light assembly.
2. Replace bulb as described in *Replacing Headlight Bulb, page 371*.

Figure 5.153: Field Lights

5.9.5 Floodlights: Forward

Adjusting Forward Floodlights

The forward floodlights are **NOT** adjustable.

Replacing Bulb in Cab-Forward Flood Light

Replacement bulb: MD #109113 (H3 12V 55W)

⚠ WARNING

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

Replace bulbs as follows:

1. Shut down engine and remove key. Turn lights OFF.

2. Hold onto handholds (A) on the cab front corners and stand on the header anti-slip strips when removing the forward field lights.
3. Remove two screws (B) and remove light bezel (C).
4. Remove light from receptacle.

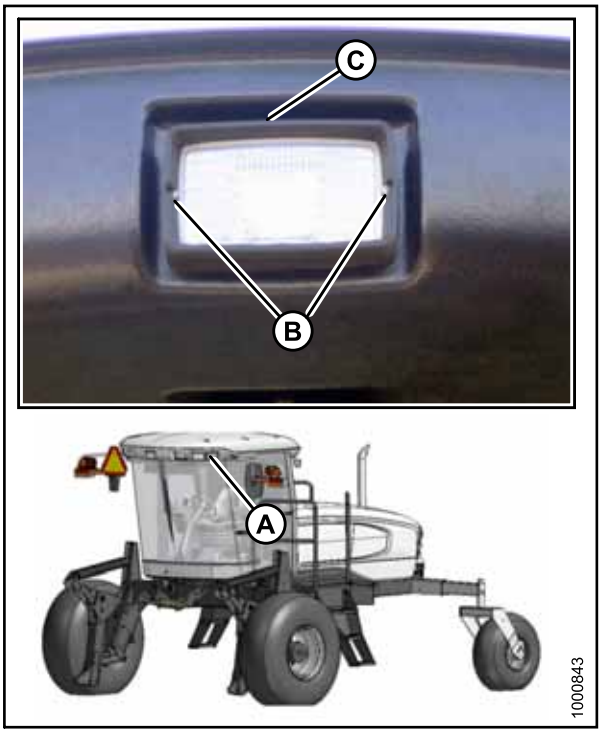


Figure 5.154: Forward Floodlights

5. Pinch wire retainer (A) and lift away from hooks.
6. Remove bulb (B) from body and pull wire from connector (C).

IMPORTANT:

Do **NOT** touch the glass of the halogen bulb as the oils or other chemicals from your skin will cause the bulb to fail prematurely.

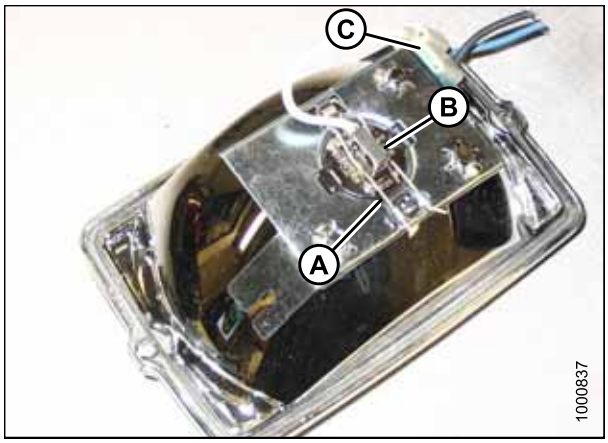


Figure 5.155: Floodlight Assembly

7. Match slots on new bulb (B) with lugs (D) in optical unit and insert bulb into unit.
8. Secure bulb with wire retainer (A).
9. Push wire into connector (C).

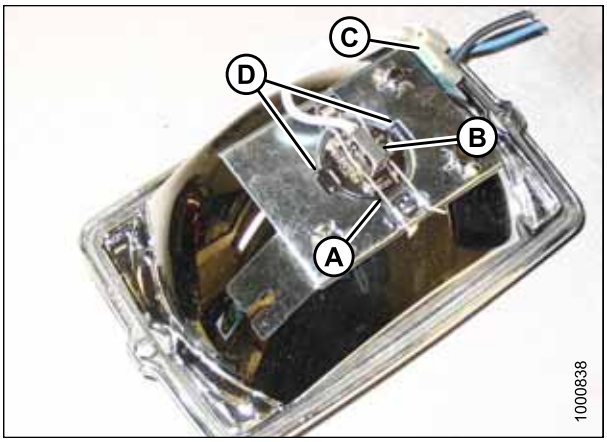


Figure 5.156: Floodlight Assembly

10. Position light into light receptacle, ensuring top is up and secure with bezel (C) and screws (B).

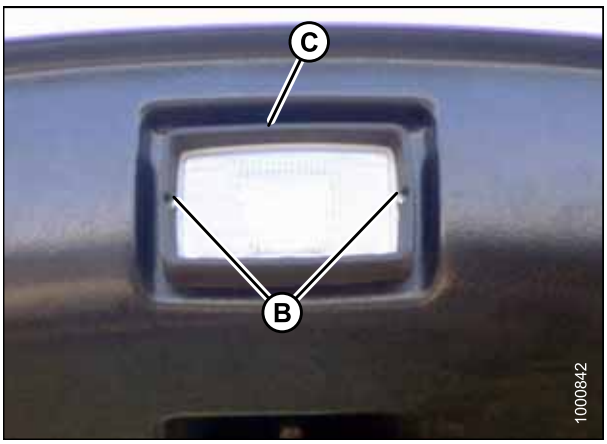


Figure 5.157: Forward Floodlight

5.9.6 High-Intensity Discharge (HID) Auxiliary Lighting (Optional – MD #B5596)

Two optional HID lights provide additional lighting during field operation. They operate only in cab-forward mode.

Replacing High-Intensity Discharge (HID) Auxiliary Lights (if Installed)

⚠ WARNING

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

To remove and replace the lamp only, follow these steps:

1. Shut down engine and remove key. Turn lights OFF.

   NOTE:

   Hold onto the handholds (A) on the cab front corners and stand on the header anti-slip strips, or stand on the maintenance platform when accessing the HID auxiliary lights.

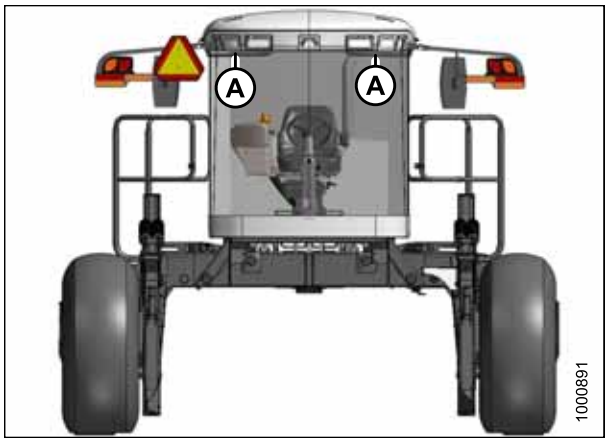


Figure 5.158: Cab-Forward Lights

2. Remove the nut, spring washer, and bolt (A) that secure the lamp (B) to lamp bracket (C).
3. Remove lamp (B).
4. Position the new lamp (B) in lamp bracket (C) and secure with bolt (A), spring washer, and nut.
5. Adjust lamp (B) to desired position and tighten bolt (A).

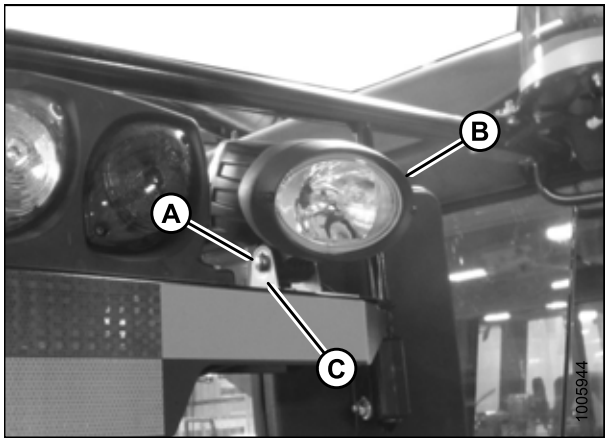


Figure 5.159: HID Auxiliary Lights

To remove and replace the HID lamp assembly, follow these steps:

6. Disconnect lamp connector (A) from electrical harness (B).

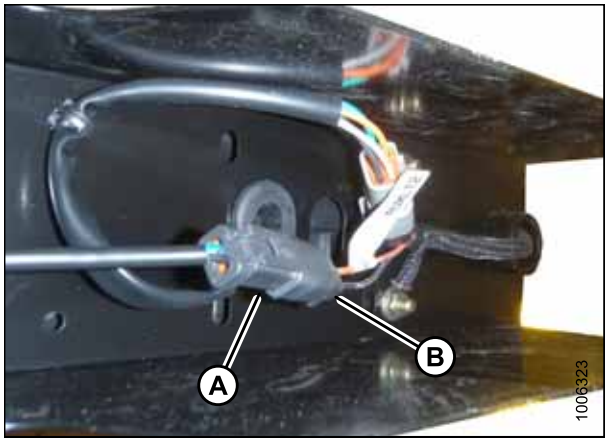


Figure 5.160: HID Auxiliary Light Harness

7. Remove grommet (A) from light support (B).
8. Remove nut (C) and spring washer from inside light support (B).
9. Remove the lamp assembly.

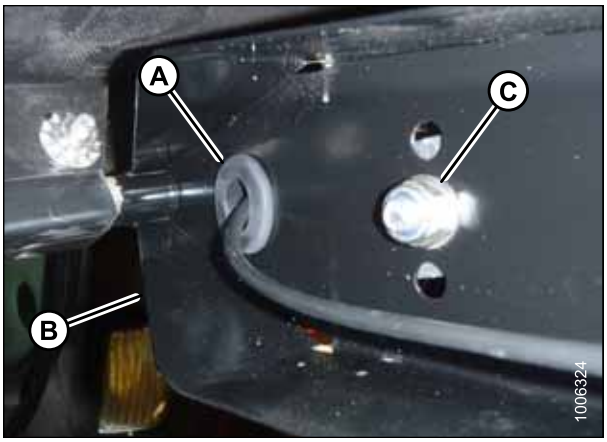


Figure 5.161: HID Light Assembly

10. Locate light in center hole in light support (B) and secure with hardware (C) provided with light assembly.
11. Adjust light assembly to desired position and tighten nut (C).
12. Route lamp harness through grommet (A) and slot in light support (B).
13. Reinstall grommet (A) in light support (B).

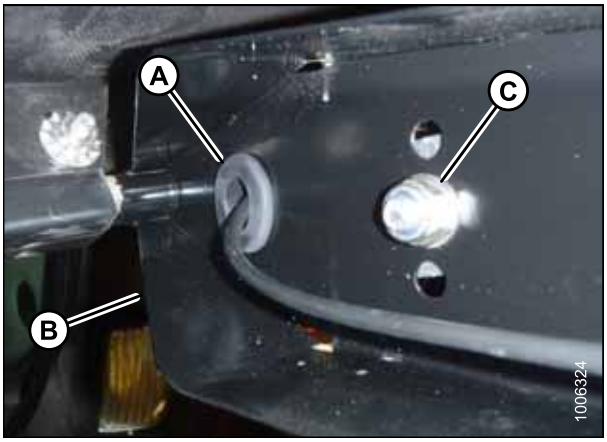


Figure 5.162: HID Light Assembly

14. Connect lamp plug (A) to main harness connector (B).

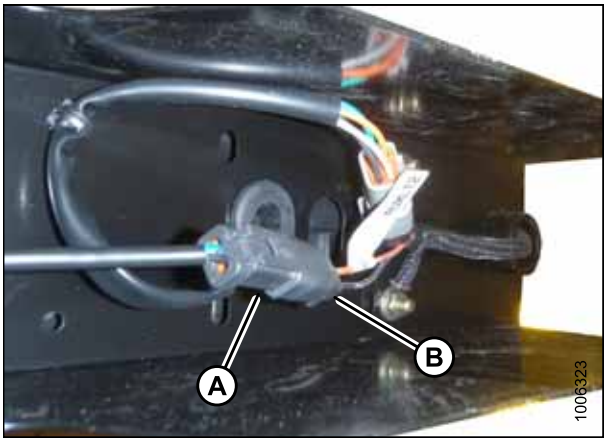


Figure 5.163: HID Auxiliary Light Harness

Adjusting High-Intensity Discharge (HID) Auxiliary Lights (if Installed)

If installed, HID auxiliary lights are best adjusted with the machine in the field (or equivalent) to suit Operator preference.

WARNING

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

1. Shut down engine and remove key. Turn lights ON.
2. Loosen bolt (A) and nut (C) (located inside the light/mirror support).
3. Position light (B) to desired position.
4. Tighten bolt and nut.

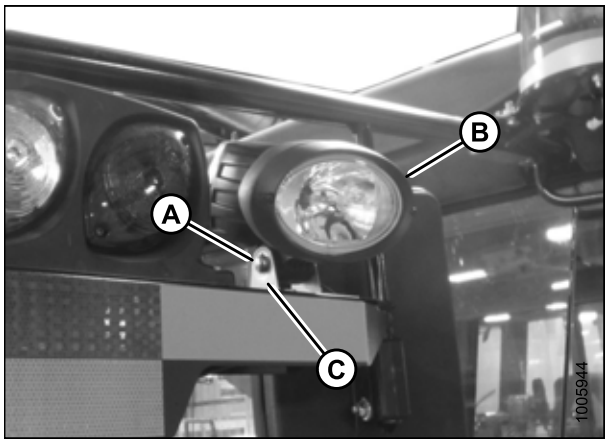


Figure 5.164: HID Auxiliary Lights

5.9.7 Floodlights: Rear

Adjusting Rear Floodlights

The rear floodlights are best adjusted with the machine in the field (or equivalent) to suit Operator preference.

WARNING

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

1. Shut down engine and remove key. Turn lights ON.
2. Loosen bolts (A) and (B).
3. Position light to desired position.
4. Tighten bolts (A) and (B).

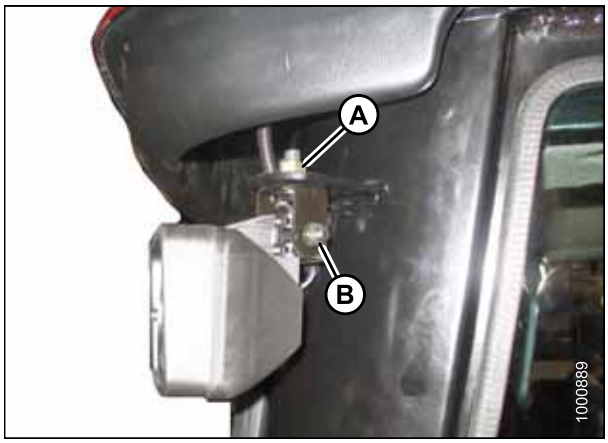


Figure 5.165: Rear Flood Light

Replacing Bulb in Rear Flood Light

Replacement bulb: MD #109113 (H3 12V 55W)

WARNING

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

1. Shut down engine and remove key. Turn lights OFF.
2. Remove two screws (A) and remove light bezel (B).
3. Remove light from receptacle.

   IMPORTANT:

   Do **NOT** touch the glass of the halogen bulb as the oils or other chemicals from your skin will cause the bulb to fail prematurely.

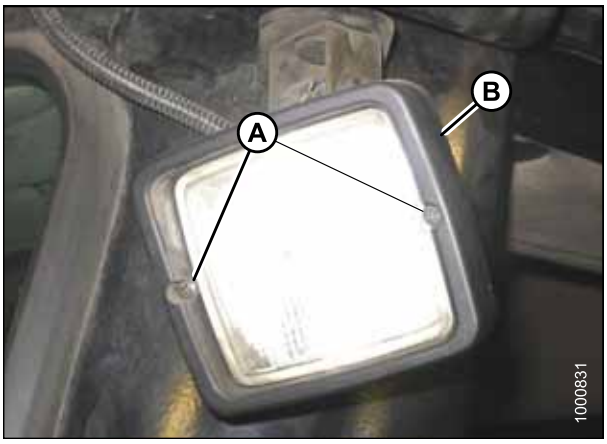


Figure 5.166: Rear Flood Light

4. Pinch the wire retainer (A) and lift away from hooks.
5. Remove bulb (B) from body and pull wire from connector (D).
6. Match slots on new bulb (B) with lugs (C) in optical unit and insert bulb into unit.
7. Secure bulb with wire retainer (A).
8. Push wire into connector (D).

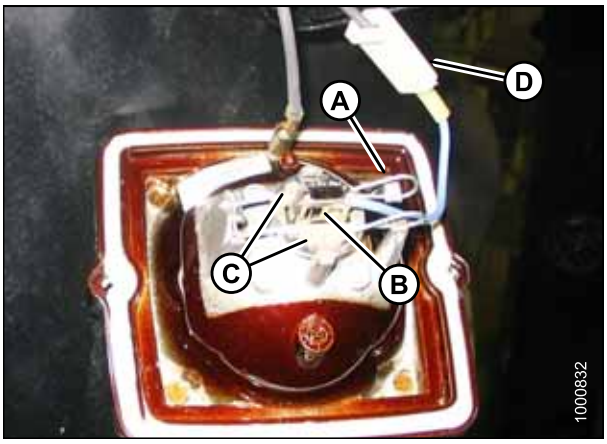


Figure 5.167: Rear Flood Light Assembly

9. Position light into light receptacle, ensuring top is up.
10. Secure with bezel (B) and screws (A).

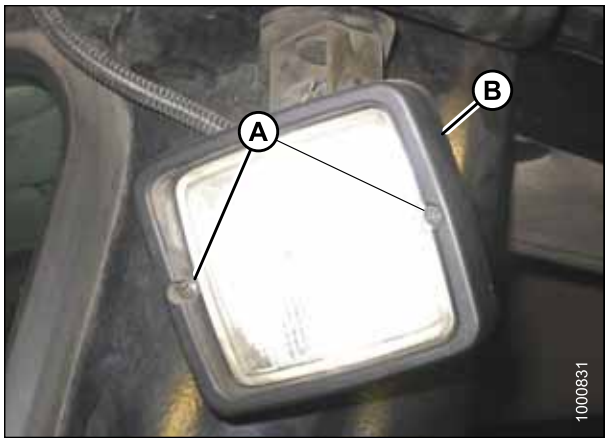


Figure 5.168: Rear Flood Light

5.9.8 Replacing Bulbs in Red and Amber Lights

To replace bulbs in red and amber lights, follow these steps:

WARNING

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

1. Shut down engine and remove key. Turn lights OFF.

   NOTE:

   Hold onto handholds (A) on the cab front corners and stand on the header anti-slip strips, or stand on the maintenance platform when accessing the red and amber lights.

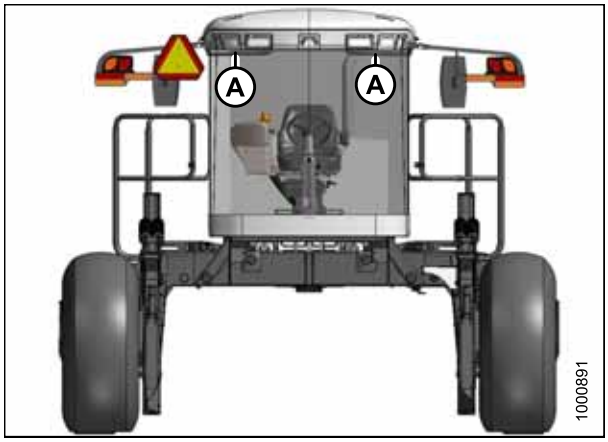


Figure 5.169: Windrower Cab-Forward

2. Remove two screws (A) from lens and remove lens.
3. Push and twist light bulb to remove from socket.
4. Install new bulb in socket ensuring that bulb base is properly engaged in socket.
   - Use Bulb Trade #1157 for red taillights
   - Use Bulb Trade #1156 for amber lights
5. Reinstall lens with screws (A).

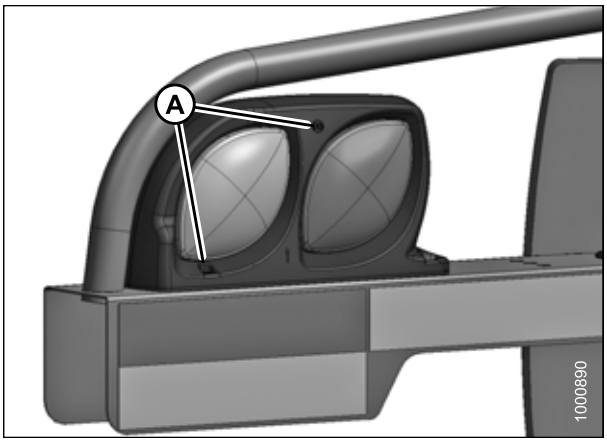


Figure 5.170: Red and Amber Lights

5.9.9 Replacing Red Taillights

Red taillights are included with the Lighting and Marking for Cab-Forward Road Travel Kit (MD #B5412). To replace the red taillights, follow these steps:

WARNING

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

1. Shut down the engine and remove the key.
2. Turn lights OFF.
3. In the grill of the hood, remove two screws (A) from light (B), and remove light.
4. Remove connector from light.
5. Connect wiring harness to new light (B) and install light with screws (A).

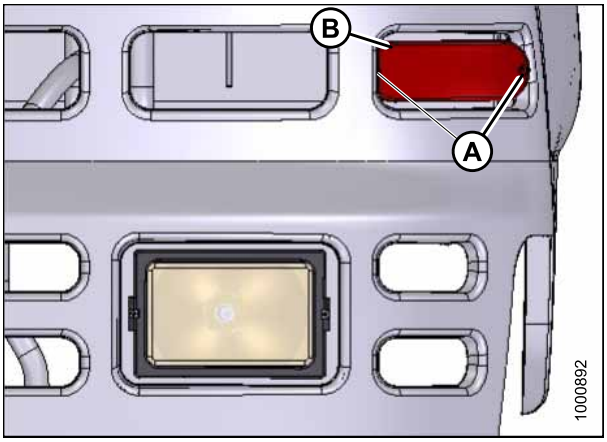


Figure 5.171: Red Taillights

5.9.10 Replacing the Bulbs in Beacon Lights

Replacement bulb: MD #160379 (H1 12V 55W)

WARNING

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

To replace the halogen bulb inside the beacon warning lights, follow these steps:

1. Shut down the engine and remove the key. Turn beacons OFF.

   NOTE:

   Hold onto handholds (B) on the cab front corners and stand on the header anti-slip strips, or stand on the maintenance platform when accessing beacons (A).

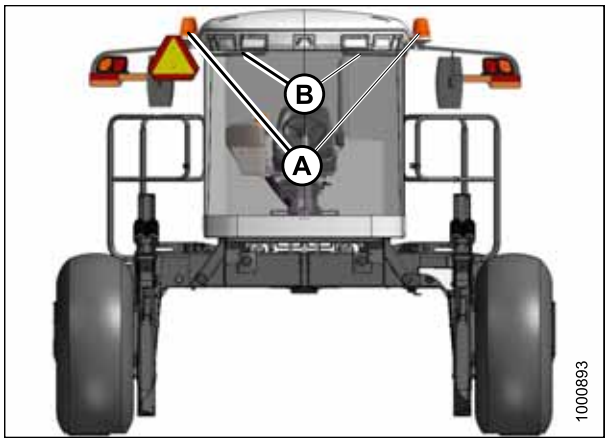


Figure 5.172: Warning Beacons

2. Turn lens (A) counterclockwise to unlock lens from base and remove lens.

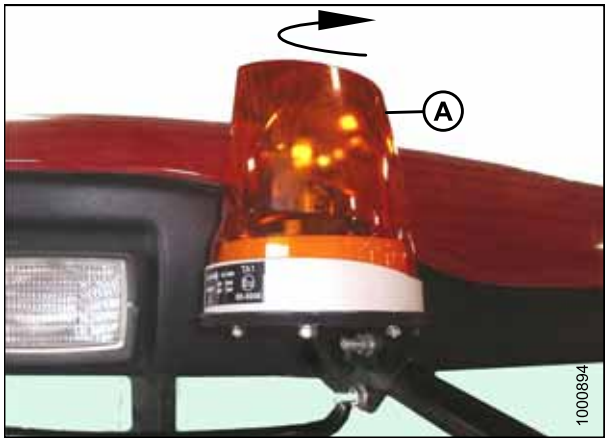


Figure 5.173: Warning Beacon

3. Pinch retainer (A) and remove it from lamp socket.
4. Pull lamp out of socket.

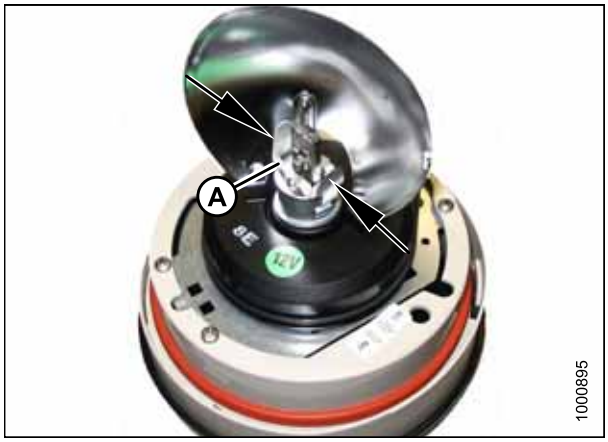


Figure 5.174: Beacon Lamp Assembly

5. Disconnect harness from lamp.

   IMPORTANT:

   Do **NOT** touch the glass (A) of the halogen bulb as the oils or other chemicals from your skin will cause the bulb to fail prematurely.

Figure 5.175: Beacon Lamp Assembly

6. Connect harness to new lamp, place lamp in socket, and line up the flat side on lamp with recess in socket (A).

Figure 5.176: Beacon Lamp Assembly

7. Place retainer (A) over lamp and pinch tabs to secure retainer to socket.

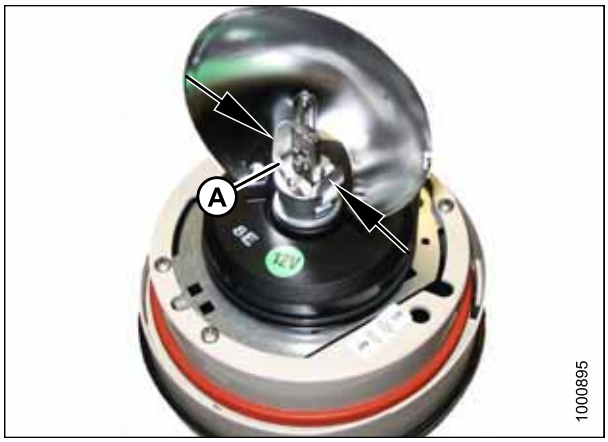


Figure 5.177: Beacon Lamp Assembly

8. Line up the three lugs (one is longer) in the base with slots in lens, and seat the lens against the rubber seal.

Figure 5.178: Beacon Lamp Assembly

9. Turn the lens (A) clockwise to lock it in place.

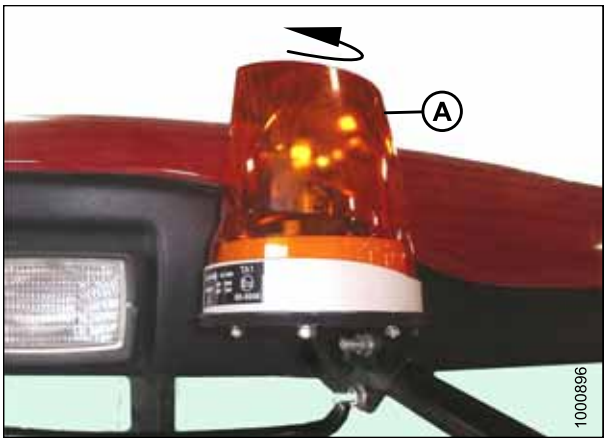


Figure 5.179: Warning Beacon

5.9.11 Replacing the Cabin Dome Light

To replace a cabin dome light in the headliner switch panel, follow these steps:

1. Remove two screws (A) from the dome light assembly and remove the assembly.
2. Disconnect the old dome light assembly from the wiring harness.
3. Connect the new dome light (MD #183413) to the wiring harness.
4. Install the new dome light with two screws (A).

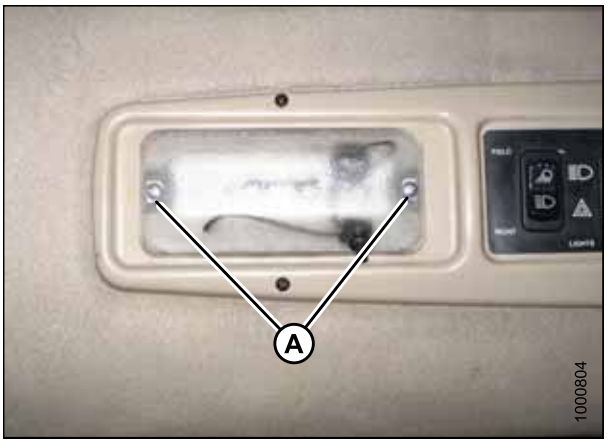


Figure 5.180: Cabin Dome Light

5.9.12 Replacing the Ambient Light Fixture

To replace the ambient light fixture, follow these steps:

1. Locate ambient light fixture (A) in the roof liner.

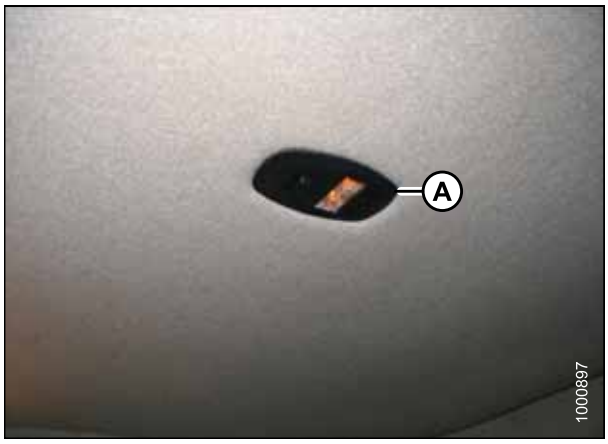


Figure 5.181: Ambient Light Fixture

2. Push against tabs (A) with a screwdriver and pull ambient light fixture out of cab roof.
3. Remove wires from connectors (B).
4. Connect wires to new light fixture.
5. Push into place in cab roof until tabs hold fixture in place.

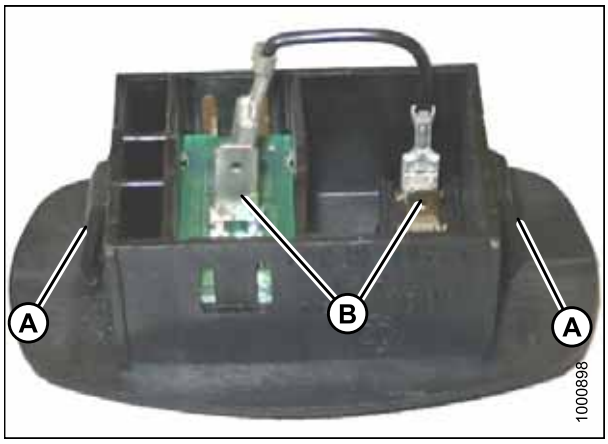


Figure 5.182: Ambient Light Fixture

5.9.13 Turn Signal Indicators

If the turn signal indicators on the operator console do not function, contact your MacDon Dealer.

5.9.14 Accessing Circuit Breakers and Fuses

WARNING

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

Access the breakers and fuses as follows:

1. Stop engine and remove key.
2. Move right (cab-forward) side platform rearward. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

3. Remove wing nut (A) and remove fuse box cover (B).
4. A cover may be installed over the circuit breaker. Remove it to access the breaker.

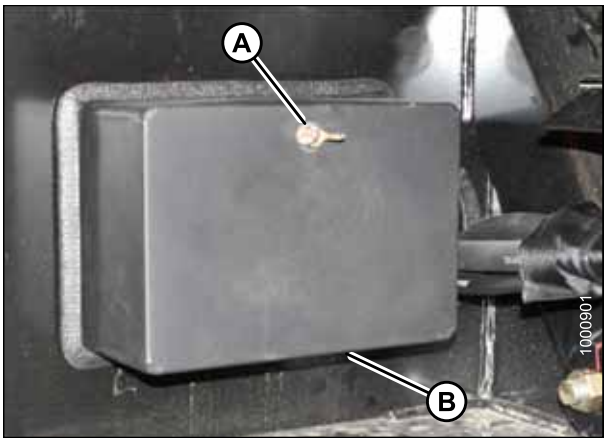


Figure 5.183: Fuse Box

Checking and Replacing Fuses

WARNING

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

1. Stop the engine and remove the key.
2. Open the right (cab-forward) side platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Remove fuse box cover. Refer to *5.9.14 Accessing Circuit Breakers and Fuses, page 388*.
4. Refer to the decal on inside of cover for identification of fuses and circuit breakers.
5. To check fuse, pull fuse out of receptacle and visually examine.
6. To replace fuse, insert new fuse into receptacle.

   IMPORTANT:

   Replacement fuses should match rating on decal shown on *Fuse Box Decal, page 391*.
7. Reinstall cover and secure with wing nut.

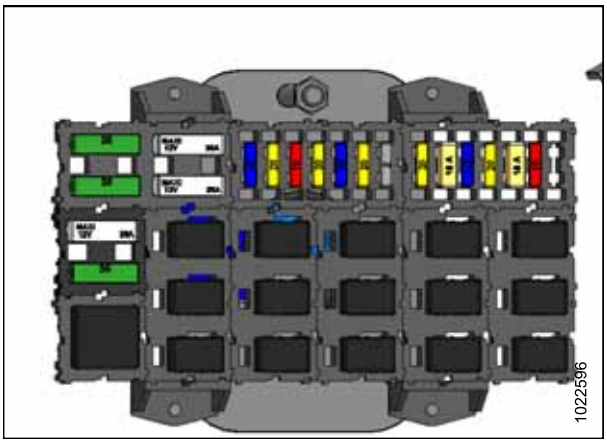


Figure 5.184: Fuses and Circuit Breakers

Replacing Circuit Breakers and Relays

WARNING

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

Replace breakers and relays as follows:

1. Stop engine and remove key.
2. Move right cab-forward side platform rearward (cab-forward).
3. Remove fuse box cover. Refer to *5.9.14 Accessing Circuit Breakers and Fuses, page 388*.
4. To replace circuit breaker (A), pull breaker out of receptacle and install new circuit breaker.
5. To replace relay (B), pull relay out of receptacle and install new relay.
6. Reinstall cover and secure with wing nut.

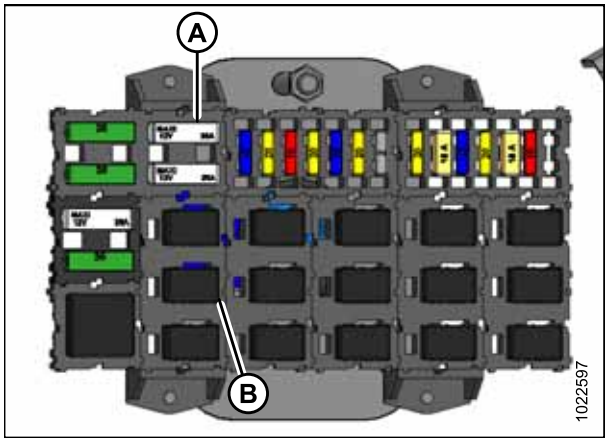
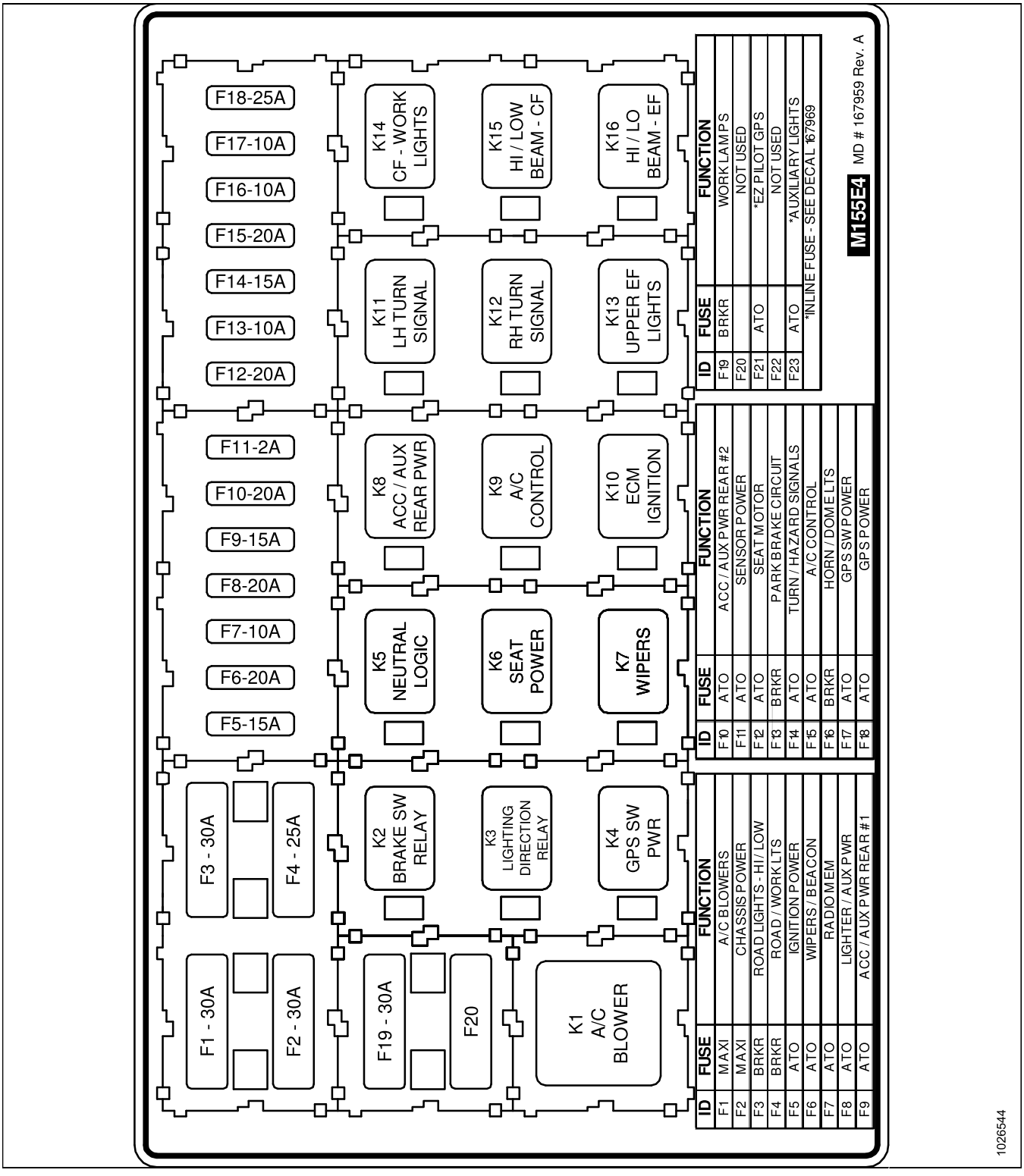


Figure 5.185: Relays and Breakers

Fuse Box Decal

Figure 5.186: Fuse Decal



Accessing T4 Specific Fuses

The M155*E4* carries a separate fuse and breaker box and an electronic control unit (ECU) power fuse dedicated to the diesel exhaust fluid (DEF) system.

The fuse box (A) and the electronic control unit (ECU) power fuse (B) are located below the exhaust canister on the right cab-forward side and secured above the side frame.

DANGER

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

Access the breakers and fuses as follows:

1. Stop engine and remove key.
2. Move right cab-forward side platform rearward (cab-forward). Refer to *5.3.3 Opening Platforms (Major Service Position), page 293*.
3. Raise hood to the highest position. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.

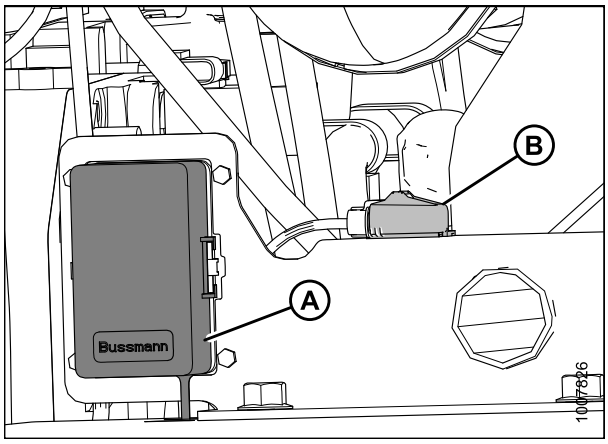


Figure 5.187: Fuse Box and ECU Power Fuse

4. Undo clips (A) on both sides of the fuse and breaker box.
5. Remove cover (B).

   NOTE:

   Refer to the decal on inside of cover for identification of fuses and relays.

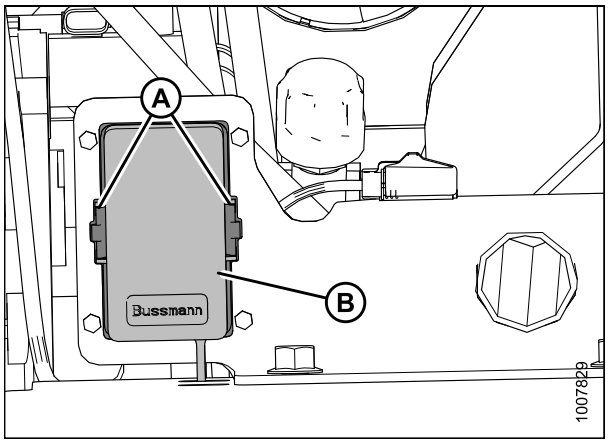


Figure 5.188: Fuse Box

6. Undo clip (A) on the ECU power fuse and pull cover (B) away.

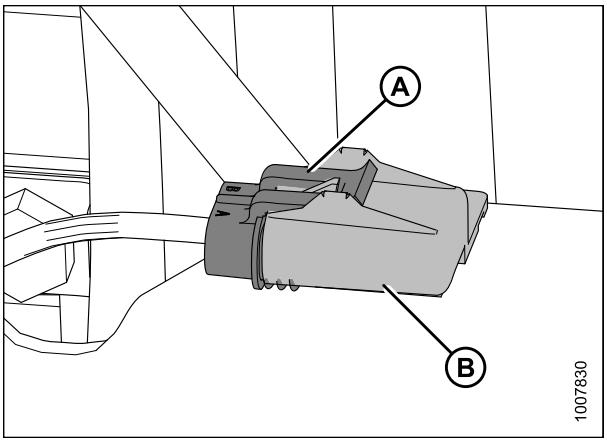
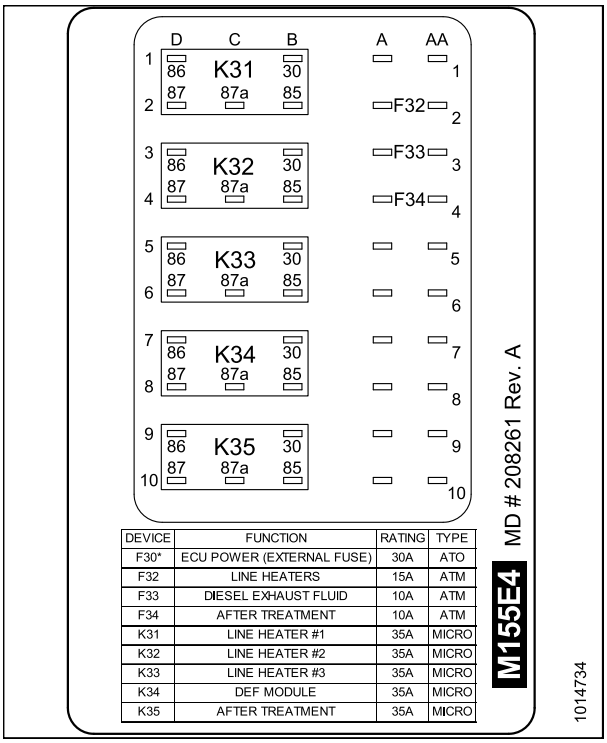


Figure 5.189: ECU Power Fuse

Checking and Replacing T4 Specific Fuses and Relays

1. **To Check and Replace Fuse**
   a. Pull fuse out of receptacle and visually examine.
   b. To replace fuse, insert new fuse into receptacle.
2. **To Replace Relay**
   a. Pull relay out of receptacle and install new relay.



DEVICE	FUNCTION	RATING	TYPE
F30*	ECU POWER (EXTERNAL FUSE)	30A	ATO
F32	LINE HEATERS	15A	ATM
F33	DIESEL EXHAUST FLUID	10A	ATM
F34	AFTER TREATMENT	10A	ATM
K31	LINE HEATER #1	35A	MICRO
K32	LINE HEATER #2	35A	MICRO
K33	LINE HEATER #3	35A	MICRO
K34	DEF MODULE	35A	MICRO
K35	AFTER TREATMENT	35A	MICRO

Figure 5.190: Fuses and Relays

Inspecting and Replacing 125A Main Fuses

The 125A main fuse holders are located on the frame under the right cab-forward side platform beside the battery.

WARNING

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

1. Stop engine and remove key.
2. Move right (cab-forward) side platform rearward.

NOTE:

There are three main fuses, two (A) are secured on the right cab-forward front frame and one is behind the frame secured by the two bolts and nuts (B).

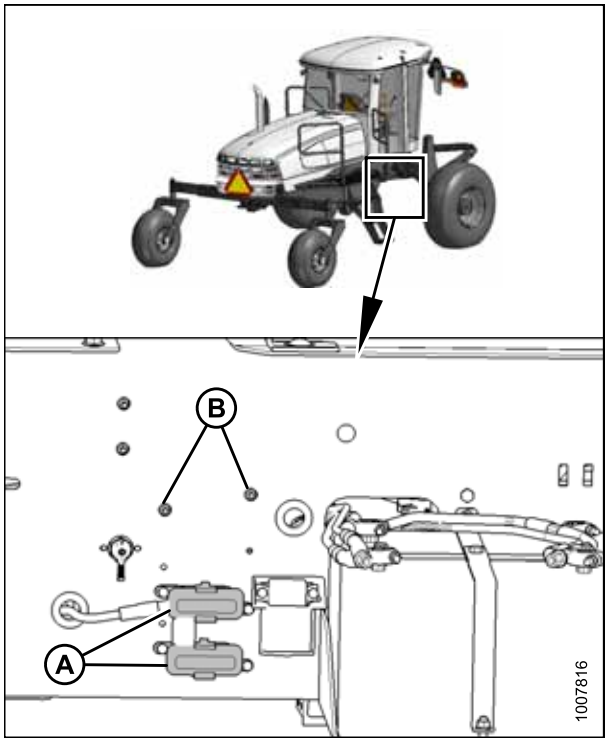


Figure 5.191: 125A Main Fuses

3. To check condition of fuse, pull tab (A) and open cover (B).

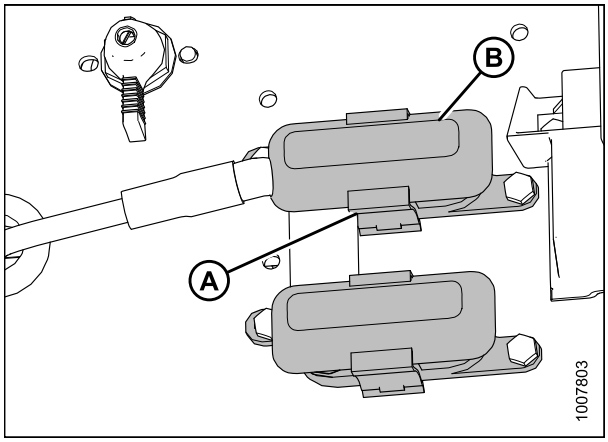


Figure 5.192: 125A Main Fuses

4. Visually examine fuse (B) for indications of melting.
5. To remove fuse (B), remove two nuts (C) and pull fuse free from holder (existing wiring may need to be pulled off the stud first).
6. Install new fuse on studs and any existing wiring that was removed.
7. Secure with nuts (C).

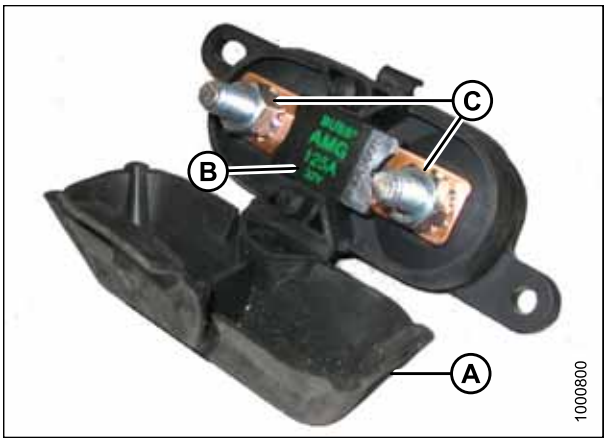


Figure 5.193: 125A Main Fuse

8. Close cover (B) and secure with tab (A).
9. Return platform to operating position. Ensure lock engages.

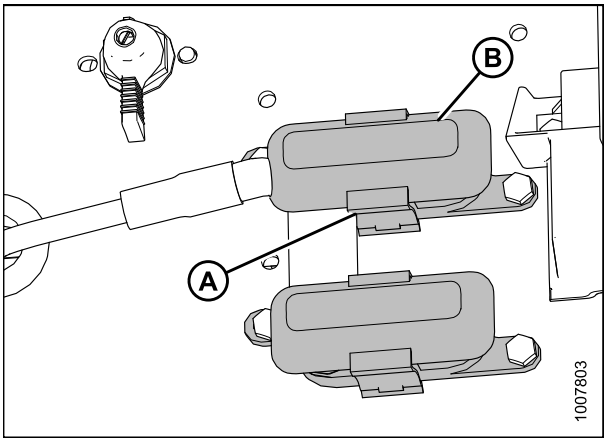


Figure 5.194: 125A Main Fuses

5.10 Hydraulic System

The M155*E4* windrower hydraulic system provides oil pressure for the header lift, the windrower drive, and header drive systems.

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.**

Figure 5.195: Hydraulic Pressure Hazard

WARNING

- **Use a piece of cardboard or paper to search for leaks.**
- **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.**

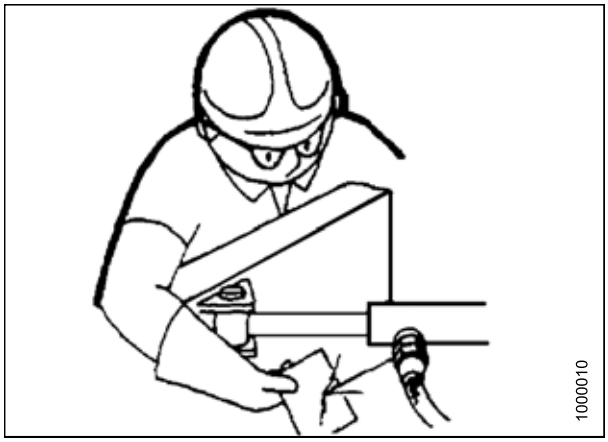


Figure 5.196: Checking Hydraulic Leaks

IMPORTANT:

Foreign materials such as dirt, dust, and water are the major cause of damage in the hydraulic system.

If hydraulic system components must be disconnected for service, protect the ends of hoses, tubing, and ports of components from contamination with clean, lint-free towels, or clean plastic bags.

Before installing any replacement hose, flush the inside with unused diesel fuel or unused commercial petroleum cleaning solvent for 10 seconds minimum. Do **NOT** use water, water soluble cleaners, or compressed air.

The hydraulic system components are built to very close tolerances and have been adjusted at the factory. Do **NOT** attempt to service these components except to maintain proper oil level, change oil and filters, and to adjust relief pressures as described in this manual.

See your MacDon Dealer for all other service.

5.10.1 Checking and Filling Hydraulic Oil

WARNING

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

1. Park windrower on level ground and lower header and reel so that lift cylinders are fully retracted.
2. Stop the engine and remove the key.
3. Open the hood. Refer to *5.2.1 Opening Hood (Lower Position), page 288*.

NOTE:

A sight glass (A) is provided under the hood on the right side of the tank. It indicates oil level and signs of contamination. No oil in the sight glass indicates oil level is below the add mark on the dipstick.

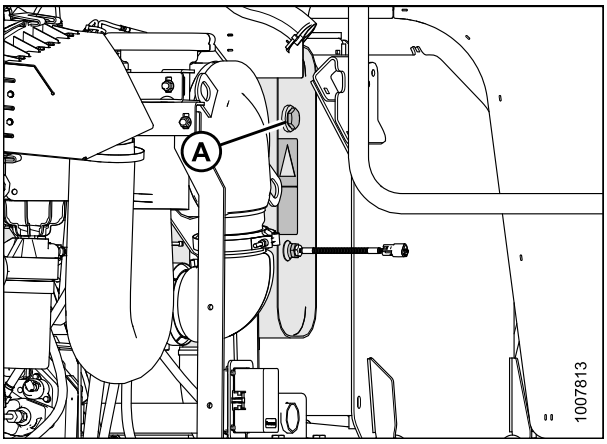


Figure 5.197: Hydraulic Oil Sight Glass

4. Stand on left (cab-forward side) platform to access the filler pipe.
5. Clean cap (A) and surrounding area.
6. Turn filler cap (A) counterclockwise to unlock cap and remove dipstick.

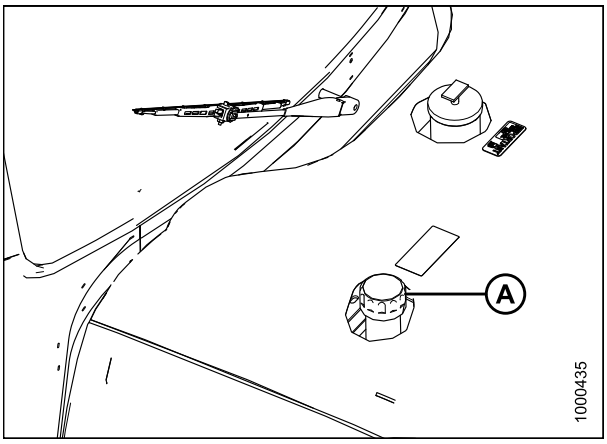


Figure 5.198: Engine Hood

7. If necessary, add oil to maintain a level between the low (L) and high (H) marks. Refer to inside back cover for hydraulic oil specifications and quantity.

   NOTE:

   When dipstick is showing low (L), approximately 4 liters (1 US gallon) is required to reach the full (H) mark.

   IMPORTANT:

   - Use new, good quality, prefiltered clean oil
   - Exercise care to prevent debris from falling into tank

8. Reinstall dipstick and filler cap, and turn clockwise to tighten and lock.
9. Close the hood. Refer to *5.2.2 Closing Hood (Lower Position), page 289*.

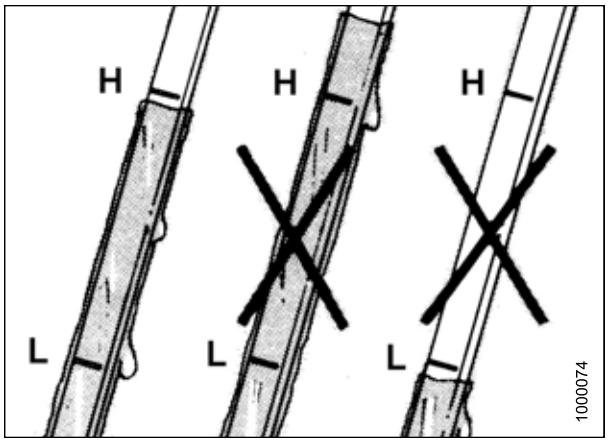


Figure 5.199: Hydraulic Oil Levels

5.10.2 Hydraulic Oil Cooler

The hydraulic oil cooler is located inside the cooling box behind the radiator.

It should be cleaned daily with compressed air. Refer to *5.8.3 Cleaning Cooler Box Components, page 357*.

5.10.3 Changing the Hydraulic Oil

⚠ WARNING

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

Hydraulic oil should be changed every 1500 hours or every 2 years.

To drain hydraulic oil, follow these steps:

1. Park the windrower on level ground, and lower the header and reel so that the lift cylinders are fully retracted.
2. Stop the engine and remove the key.
3. Open the hood. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
4. Place a clean container (at least 75 liters [20 US gallons]) under drain at the bottom of the hydraulic reservoir to collect the oil.

5. Remove drain plug (A) and allow oil to drain.
6. Inspect plug and clean off any metal debris that may have accumulated on magnetic plug. Wipe plug with a clean cloth. Check O-ring condition. Look for cracking, breakage, or deformation that may impede sealing ability and replace as required.
7. Install drain plug (A), and torque to 80 Nm (59 lbf·ft).
8. Fill hydraulic oil reservoir. Refer to *5.10.1 Checking and Filling Hydraulic Oil, page 397*.

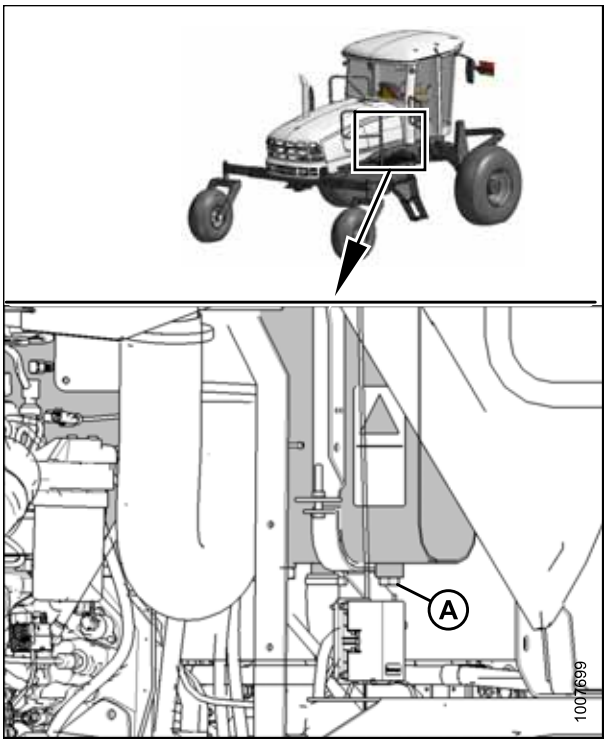


Figure 5.200: Hydraulic Oil Drain Plug (Some Parts Removed for Clarity)

5.10.4 Changing Hydraulic Oil Filters

Change hydraulic oil filters after the first 50 hours of operation, and every 500 hours thereafter. Filter (A) (MD #112419) and service kit for filter (B) (MD #183620) can be obtained from your Dealer.

The charge oil filter (A) and return oil filter (B) are located just inside the frame on the left side and are accessible from under the windrower.

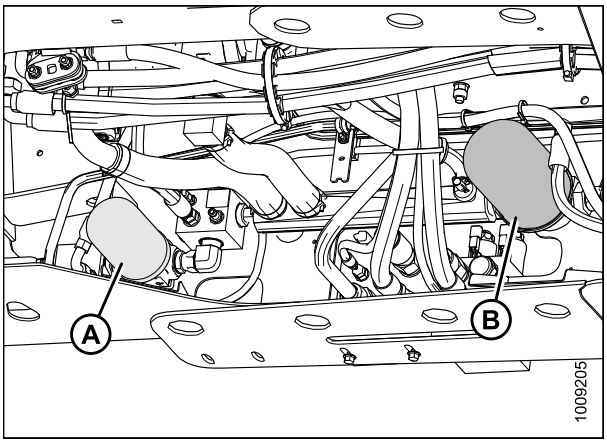


Figure 5.201: Hydraulic Oil Filters

Charge Oil Filter

The charge oil filter cleans the oil in the hydraulic charge circuit. The charge circuit replenishes oil losses that occur normally at the motor and pump case drains and associated circuits.

Removing Charge Oil Filter

⚠ WARNING

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

1. Stop the engine and remove the key.
2. Clean around head of the filter (A).
3. Place a container beneath the filter to collect any oil that may leak out.
4. Unscrew filter (A) with a filter wrench.
5. Dispose of used oil and filter in accordance with local legislation.

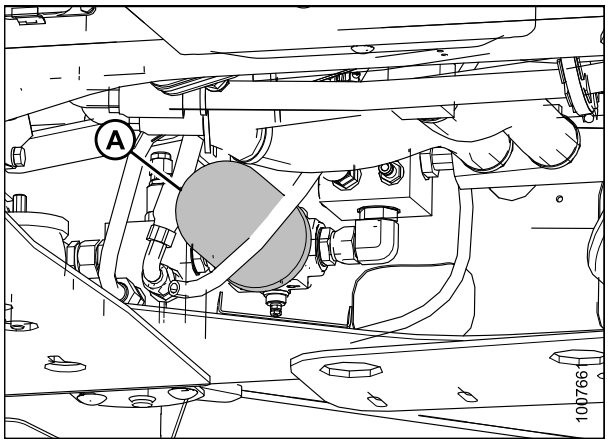


Figure 5.202: Charge Oil Filter

Installing Charge Oil Filter

NOTE:

For charge oil filter replacement part number, refer to *8.1.4 Filter Part Numbers, page 453*.

1. Clean the gasket surface of the filter head.
2. Apply a thin film of clean oil to the filter gasket.
3. Screw the new filter (A) onto the mount until the gasket contacts the filter head.
4. Tighten filter an additional 1/2 turn by hand.

   IMPORTANT:

   Do **NOT** use a filter wrench to install oil filter. Overtightening can damage gasket and filter.
5. Check hydraulic fluid levels and add fluid if needed. Refer to *5.10.1 Checking and Filling Hydraulic Oil, page 397*.

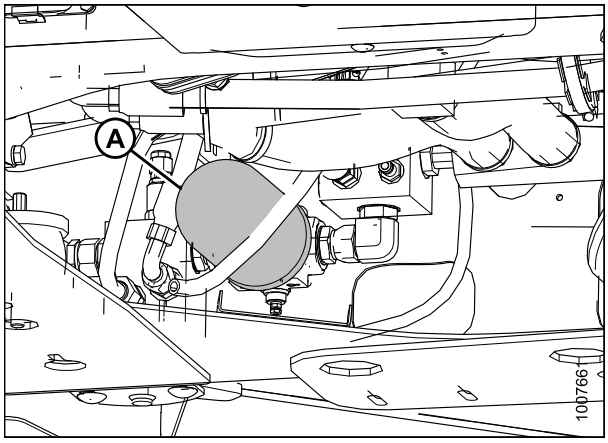


Figure 5.203: Charge Oil Filter

Return Oil Filter

The return oil filter filters the oil in the header drive systems and should be changed after the first 50 hours of operation, and then at 500 hour intervals.

Removing Return Oil Filter

WARNING

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

1. Stop the engine and remove the key.
2. Clean around head of filter (A).
3. Place a container beneath filter (A) to collect any oil that may leak out.
4. Unscrew filter (A) with a filter wrench.
5. Dispose of used oil and filter in accordance with local legislation.

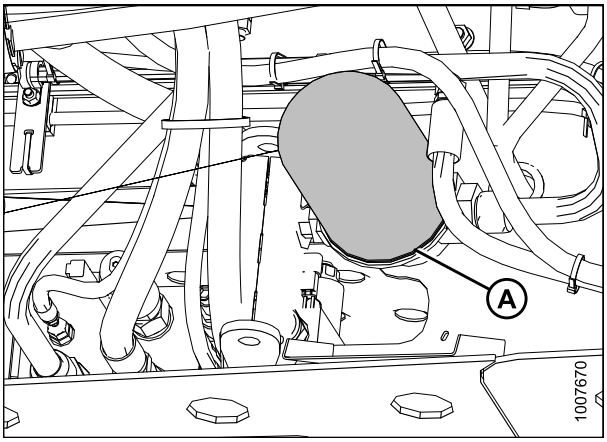


Figure 5.204: Return Oil Filter

NOTE:

Filter head removed to show component clarity.

6. Remove gasket (C) from groove (B) in filter head (A). Filter (D) shown for context.

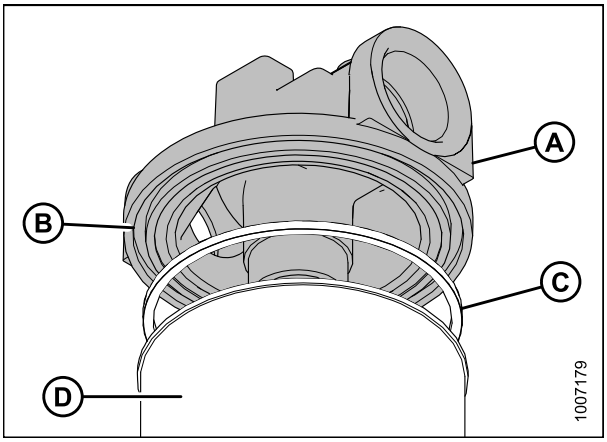


Figure 5.205: Return Oil Filter

Installing Return Oil Filter

NOTE:

For filter specifications, refer to *8.1.4 Filter Part Numbers, page 453*.

1. Clean the gasket groove (B) in the filter head (A). If O-ring is installed in groove, remove and discard it.
2. Apply a thin film of clean oil to the filter square cut gasket (C).
3. Install new square cut gasket (C) into the groove (B) in the filter head (A).
4. Screw the new filter (D) onto the filter head until the gasket contacts the filter.

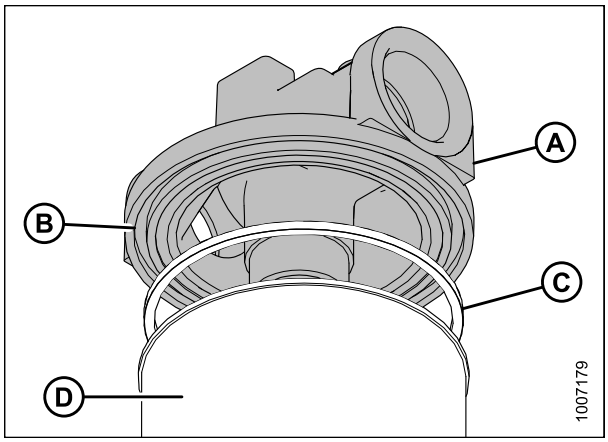


Figure 5.206: Return Oil Filter

5. Tighten filter (A) an additional 3/4 turn by hand.

   IMPORTANT:

   Do **NOT** use a filter wrench to install oil filter. Overtightening can damage gasket and filter.

6. Check hydraulic fluid levels. Refer to *5.10.1 Checking and Filling Hydraulic Oil, page 397*.

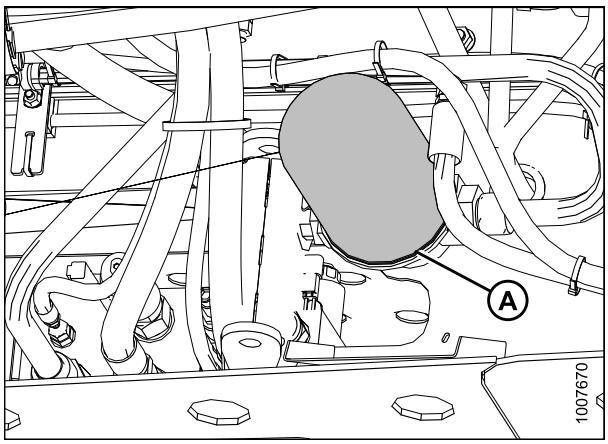


Figure 5.207: Return Oil Filter

5.10.5 Header and Reel Hydraulics

Pressure Compensator Valve

The pressure compensator valve protects the header drive pumps from overheating under very heavy loads.

When the operating pressure reaches the absolute pressure limit setting (refer to *5.3, page 403*) the compensator valve in the pump is activated and the header drive will slow down to avoid overheating the drive pumps. At this point, reduce the ground speed to maintain the correct system load and header drive operation.

NOTE:

An optional pressure sensor is available to monitor the knife or reel drive hydraulic pressure and provide a warning tone from the cab display module (CDM) if the system pressure approaches a preset limit. The system pressure limit is set during CDM programming. Refer to *6.3.6 Pressure Sensor Kit, page 430*. The warning tone is only heard if the pressure sensor is installed and enabled.

NOTE:

A warning tone is normal when the operating pressure is close to the compensator valve's pressure setting.

Table 5.3 Header Hydraulic Pressures

Header Model	Application/System	Windrower Absolute Pressure Limit Setting kPa (psi)	Suggested Overload Warning Setting kPa (psi)
R/R1 Series	Disc pressure	28,958 (4200)	27,579 (4000)
D/D1 Series	Reel/draper pressure	22,063 (3200)	20,684 (3000)
A Series	Knife/conditioner pressure	28,958 (4200)	27,579 (4000)

If lift and drive capacity problems develop, the pressure compensator valve may require adjusting. Contact your MacDon Dealer for assistance.

Flow Control Blocks

Two hydraulic valve blocks with multiple cartridges are used for the various windrower functions and are controlled by the windrower control module (WCM) according to the inputs from the Operator. The valve blocks are located behind the left cab-forward side platform.

The valve blocks do not require any scheduled maintenance other than to check for leaking fittings or loose electrical connections. If service is required, contact your MacDon Dealer.

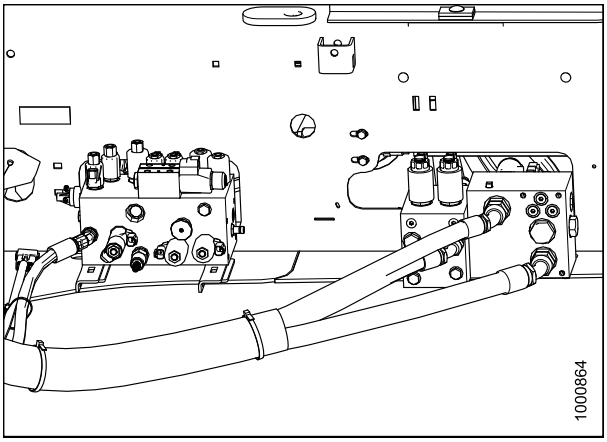


Figure 5.208: Hydraulic Valve Blocks

Adjusting Header Drop Rate

The header should lower gradually when the lower header switch is pressed. From fully raised to ground position, it should take approximately 3–4 seconds.

IMPORTANT:

Drop rate should **NOT** be less than 3–4 seconds as structural damage may result.

NOTE:

If drop rate is too slow (over 30 seconds), return to cut height, tilt, or float presets will deactivate to prevent overheating the hydraulic system.

⚠ WARNING

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

1. Lower header to ground, stop the engine, and remove the key.
2. Open left cab-forward side platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.

3. Loosen inner knob (B) on needle valve, and refer to the following options:
   - Turn outer knob (A) clockwise to decrease the drop rate
   - Turn outer knob (A) counterclockwise to increase the drop rate
4. Tighten inner knob (B).
5. Check the drop rate and readjust as required.
6. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

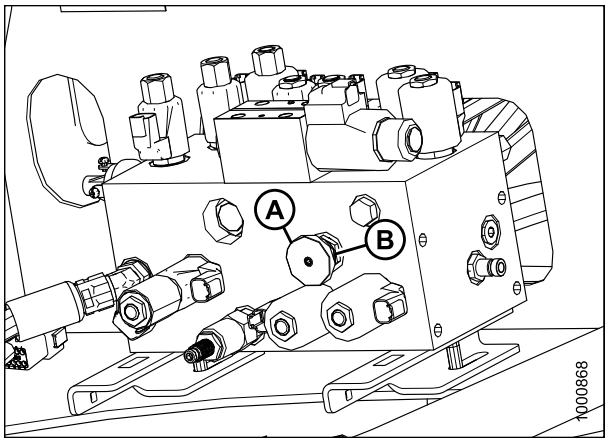


Figure 5.209: Multifunction Control Manifold

Adjusting Reel Drop Rate

The reel should lower gradually when the lower reel switch is pressed. From fully raised to fully lowered should take approximately 3–4 seconds. Drop rate is a customer preference and will vary based on crop type and cutting condition.

IMPORTANT:

Drop rate should **NOT** be less than 3–4 seconds as structural damage may result.

⚠ WARNING

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

1. Lower header to ground, stop the engine, and remove the key.
2. Open the left cab-forward side maintenance platform. Refer to *5.3.1 Opening Platforms (Standard Position), page 291*.
3. Locate valve (A) that controls the reel drop rate, installed at port D on the manifold.

   NOTE:

   This valve is installed on draper-ready windrowers and only affects draper headers.
4. Loosen setscrew (B), then refer to the following options:
   - Turn cap (C) clockwise to decrease the drop rate.
   - Turn cap (C) counterclockwise to increase the drop rate.
5. Check the drop rate and adjust as required.

   NOTE:

   To reset to factory specifications, fully close the needle valve and open it four turns counterclockwise.
6. Tighten setscrew (B).

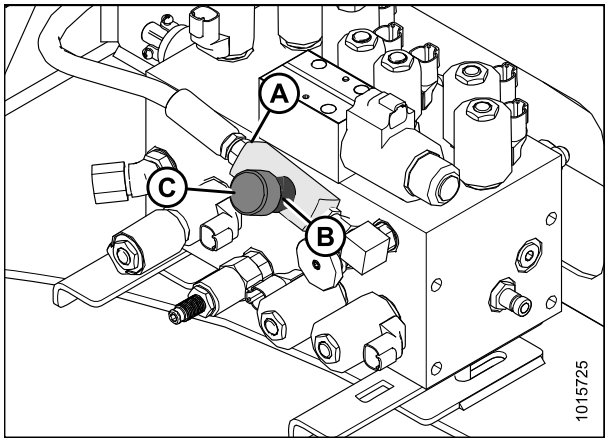


Figure 5.210: Multifunction Control Manifold

NOTE:

Decal (A) is provided on frame for easy reference.

7. Close the platform. Refer to *5.3.2 Closing Platforms (Standard Position), page 292*.

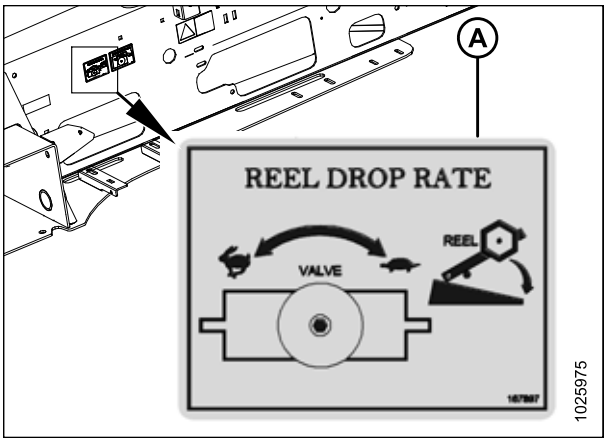


Figure 5.211: Decal

5.10.6 Traction Drive Hydraulics

The windrower transmission consists of two variable-displacement axial-piston hydraulic pumps—one for each drive wheel.

The pumps are driven through a gearbox from the engine. Each pump requires charge flow in order to:

- Make up for internal leakage
- Maintain positive pressure in the main circuit
- Provide flow for cooling
- Replace any leakage losses from external valving or auxiliary systems

The charge pressure is monitored. The cab display module (CDM) sounds a tone and displays a flashing warning if charge pressure drops below 1725 kPa (250 psi). Refer to *Display Warnings and Alarms, page 90*.

Checking Transmission Oil Pressure

IMPORTANT:

Rated charge pressure MUST be maintained under all conditions of operation to prevent damage to the transmission.

If the TRANS OIL PRESSURE warning is displayed, shut down the engine, and proceed as follows:

1. Check the hydraulic fluid level in the tank. Refer to *5.10.1 Checking and Filling Hydraulic Oil, page 397*.
2. Check the hoses and lines for leakage.
3. Check the charge pressure relief valve. Refer to *Checking Charge Pump Pressure, page 406*.
4. If charge pressure still cannot be maintained, do **NOT** operate the windrower. Contact your MacDon Dealer.

Checking Charge Pump Pressure

WARNING

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

Incorrect charge pressure settings may result in the inability to build required system pressure and/or inadequate loop flushing flows.

Correct charge pressure **MUST** be maintained under all conditions to maintain pump control performance and to operate the brake release.

Check charge pump pressure as follows:

1. Open hood fully. Refer to *5.2.3 Opening Hood (Highest Position), page 289*.
2. Attach a 0–4000 kPa (0–600 psi) pressure gauge to a hose that is long enough to allow pressure gauge to be read from the operator's seat.
3. Locate test port (A) on the charge filter head. Clean the test port fitting, and then attach hose to the fitting.
4. Start engine and leave at idle. Pressure should be 1655–2241 kPa (240–325 psi) with the hydraulic oil at 40°C (100°F) minimum.
5. Make note of the reading and shut down the windrower.
6. If pressure is **NOT** within this range, contact your MacDon Dealer.
7. If pressure is within range, remove the hose from the test port and close the hood. Refer to *5.2.4 Closing Hood (Highest Position), page 290*.

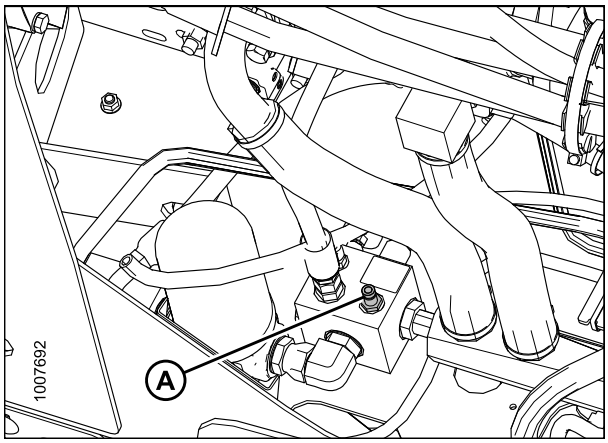


Figure 5.212: Charge Pump Test Port

5.10.7 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.**

Figure 5.213: Hydraulic Pressure Hazard

WARNING

- **Use a piece of cardboard or paper to search for leaks.**
- **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.**

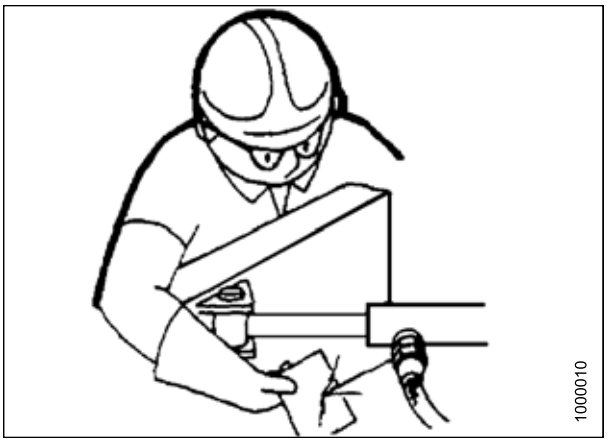


Figure 5.214: Checking Hydraulic Leaks

IMPORTANT:

- Keep hydraulic coupler tips and connectors clean. Dust, dirt, water, and foreign material are the major causes of hydraulic system damage.
- DO **NOT** attempt to service hydraulic system in the field. Precision fits require WHITE ROOM CARE during overhaul.

5.11 Wheels and Tires

5.11.1 Drive Wheels

Inflating Drive Wheel Tire

DANGER

- **Use a safety cage if available.**
- **Do NOT stand over tire. Use a clip-on chuck and extension hose.**
- **NEVER install a tube in a cracked wheel rim.**
- **NEVER weld a wheel rim.**
- **Do NOT exceed maximum inflation pressure as per label on tire.**
- **Make sure all the air is removed from a tire before removing the tire from the rim.**

Figure 5.215: Drive Tire Inflation

DANGER

- **NEVER use force on an inflated or partially inflated tire. Make sure the tire is correctly seated before inflating to operating pressure.**
- **Do NOT remove, install, or make repairs to 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.**
- **If the tire is NOT in the correct position on the rim or if overinflated, the tire bead can loosen on one side, causing air to leak 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.**

WARNING

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

Visually check daily that tires have not lost pressure. Adjust pressure as required. Underinflated drive tires can cause sidewall cracks. Check tire pressure every year.

Maintain tire pressure as follows:

1. Shut down the engine and remove key.
2. Determine the type and size of tire that is installed on your machine.
3. Refer to the following table to determine the appropriate tire pressure:

Table 5.4 Drive Wheel Tire Options (Ten Bolt)

18.4-26 Bar	600-65 R28 Bar	18.4-26 Turf	23.1-26 Turf
317 kPa (46 psi)	241 kPa (35 psi)	317 kPa (46 psi)	234 kPa (34 psi)

4. Adjust tire pressure as required.

   IMPORTANT:

   Check maximum inflation rating on tire sidewall. Do **NOT** exceed recommendation on tire.

Tightening Drive Wheel Nuts

At first use, or when a wheel is removed, torque drive wheel nuts after 1 hour of operation. Continue with torque procedure every hour until two consecutive checks produce no movement of the nuts.

IMPORTANT:

- To avoid damage to wheel rims and studs, tighten nuts by hand, do **NOT** use an impact gun, do **NOT** use lubricant or Never-Seez® compound (or equivalent), and do **NOT** overtighten wheel nuts.
- Ensure only the manufacture's specified wheel nuts are used.

Follow these steps to tighten the drive wheel nuts:

1. Tighten drive wheel nuts (A). Ensure nuts and studs are dry with **NO** lubricant or Never-Seez® compound (or equivalent). Torque each nut to 510 Nm (375 lbf·ft) using the tightening sequence shown at right.
2. Repeat tightening sequence two additional times at specified torque.
3. Repeat torque procedure every hour until two consecutive checks produce no movement of the nuts.

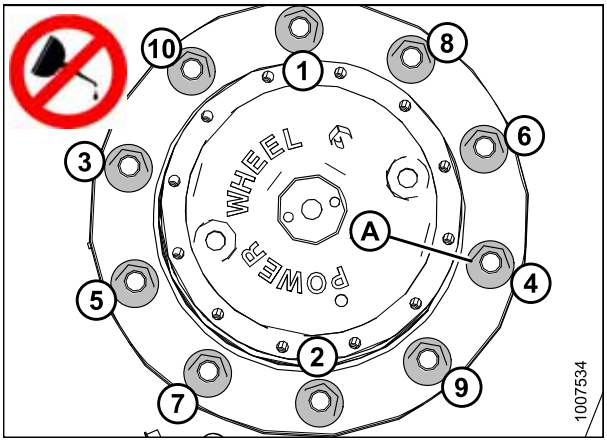


Figure 5.216: Wheel Nut Tightening Sequence

Servicing Drive Wheels

Raising Drive Wheel

This procedure can be used on both drive wheels.

⚠ WARNING

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

⚠ CAUTION

Header MUST be removed and NO weight box installed. Use a hydraulic jack with minimum lifting capacity of 2268 kg (5000 lb.) to provide adequate support for the machine.

1. Remove the header.
2. Park windrower on level ground and block all wheels.

3. Place ground speed lever (A) in N-DETENT (B), shut down engine, and remove key.

CAUTION

Jack stand must be capable of supporting a minimum of 2268 kg (5000 lb.).

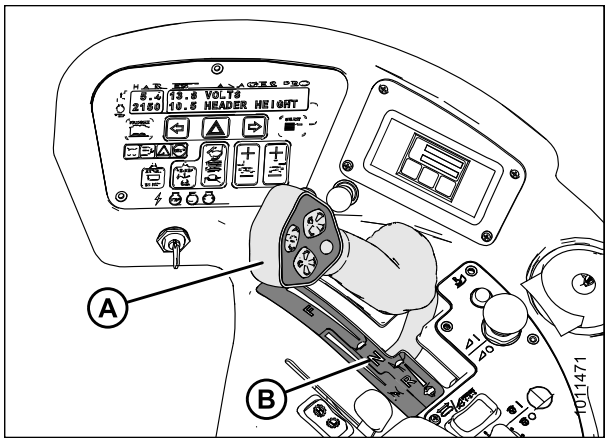


Figure 5.217: Ground Speed Lever

4. Place a jack under leg jack point (A), and raise the drive wheel until it is slightly off the ground. Place a jack stand beneath lift cylinder mount (B).

   NOTE:

   Do **NOT** place jack stand under the cylinder. Use a small metal plate on top of the jack stand.

5. Lower the windrower onto the jack stand.

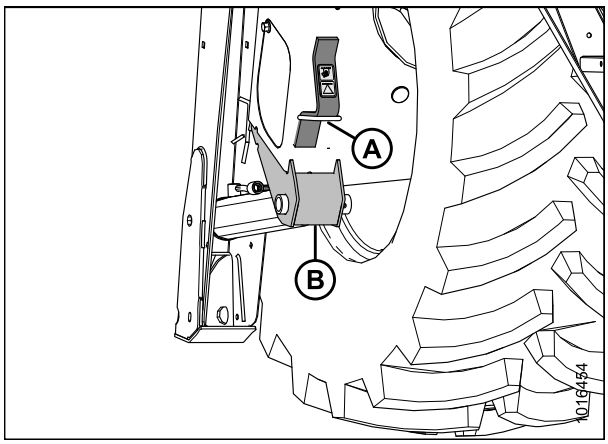


Figure 5.218: Drive Wheel Jack Point

Removing Drive Wheel

CAUTION

Use a suitable lifting device capable of supporting a minimum of 907 kg (2000 lb.) to lift the wheel assembly away from the windrower.

1. Raise windrower drive wheel (A) off the ground. Refer to *Raising Drive Wheel, page 409*.
2. Remove wheel nuts (B).
3. Use a suitable lifting device to remove drive wheel (A).

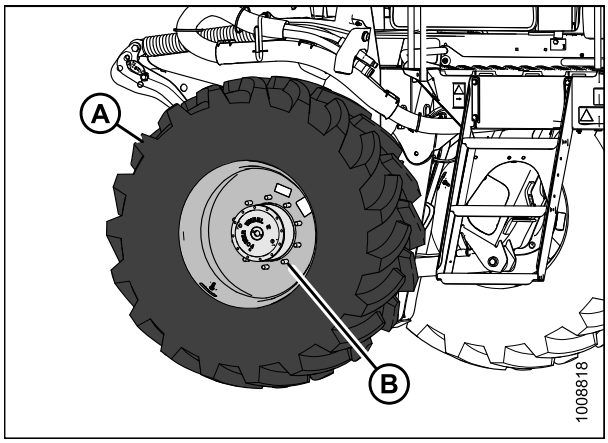


Figure 5.219: Drive Wheel

Installing Drive Wheel

CAUTION

Use a suitable lifting device capable of supporting a minimum of 907 kg (2000 lb.) to lift the wheel assembly away from the windrower.

1. Position drive wheel (A) against wheel drive hub (B) so air valve (C) is on the outside and tire tread (D) points in cab-forward direction.

   NOTE:

   For turf tires (diamond tread), be sure arrow on sidewall points in cab-forward rotation.

2. Lift wheel onto hub using a suitable lifting device.
3. Remove the lifting device.

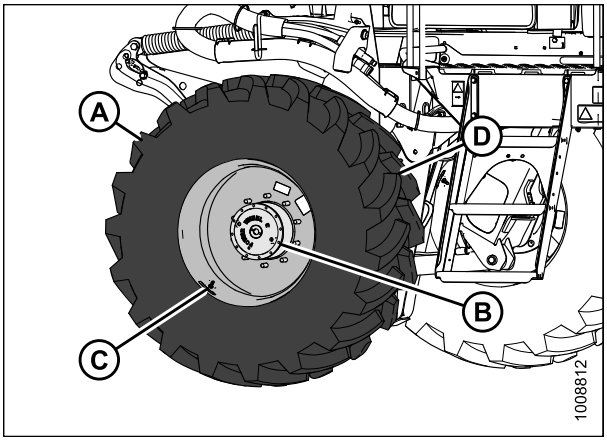


Figure 5.220: Drive Wheel

4. Line up the holes in the rim with the studs on the wheel drive hub and install wheel nuts (A).

   IMPORTANT:

   To avoid damage to wheel rims and studs, tighten nuts by hand. Do **NOT** use an impact gun, do **NOT** use lubricant or Never-Seez® compound, and do **NOT** overtighten wheel nuts.

5. Torque drive wheel nuts. Refer to *Tightening Drive Wheel Nuts, page 409*.
6. Lower the windrower, and remove jack. Refer to *Lowering Drive Wheel, page 411*.

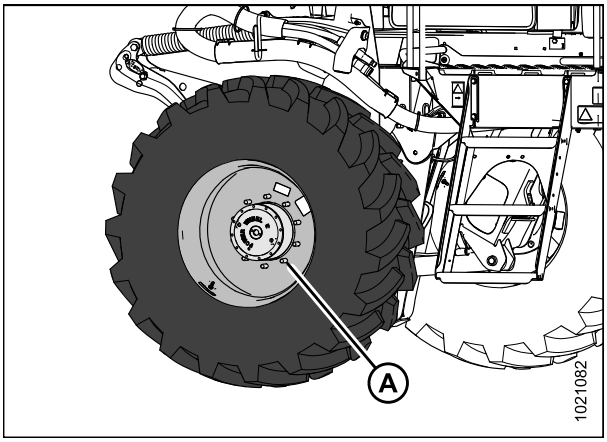


Figure 5.221: Drive Wheel Nuts

Lowering Drive Wheel

This procedure is for lowering the drive wheel when it is raised on a jack stand. This procedure can be used on both drive wheels.

CAUTION

Jack stand must be capable of supporting a minimum of 2268 kg (5000 lb.).

1. Place a jack under leg jack point (A), and raise the drive wheel slightly off the jack stand.
2. Remove the jack stand from under cylinder lift mount (B), and lower the drive wheel to the ground.
3. Remove the jack.

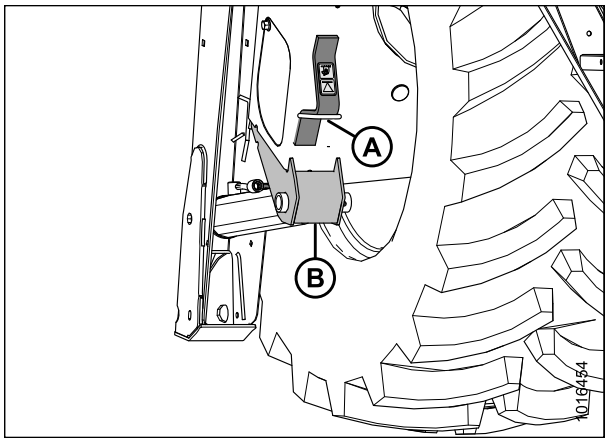


Figure 5.222: Drive Wheel Leg Jack Point

Lubrication

Checking Wheel Drive Lubricant Level

Check the wheel drive lubricant level every 250 hours or annually.

WARNING

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

1. Park the windrower on level ground.
2. Position windrower so plugs (A) and (B) are horizontally aligned with the center (C) of the hub.
3. Stop the engine, and remove the key.
4. Remove plug (A) or (B). The lubricant should be visible through the port or running out slightly. If lubricant needs to be added, refer to *Adding Wheel Drive Lubricant, page 413*.

   NOTE:

   The type of lubricant used after the first lubricant change is different from the factory supplied lubricant.
5. Reinstall plugs and tighten.

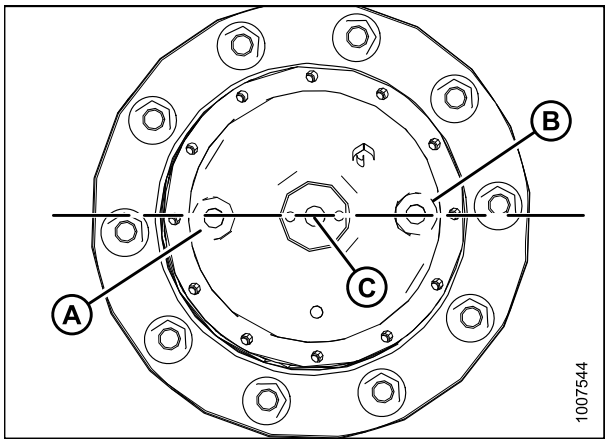


Figure 5.223: Drive Wheel Hub

Adding Wheel Drive Lubricant

WARNING

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

IMPORTANT:

Do **NOT** mix lubricants of different brands or characteristics.

1. Rotate the wheel drive so plugs (A) and (B) are horizontal with the center of the hub (C).
2. Stop windrower and remove key from ignition.
3. Remove the 2 plugs (A) and (B). The oil should be visible through the hole, or slightly running out.
4. If lubricant needs to be added, remove the second plug (B), and add lubricant until lubricant runs out at location (A). Refer to inside back cover.

   NOTE:

   The type of lubricant used after first lubricant change is different from factory-supplied lubricant.
5. Reinstall and tighten plugs (A) and (B).

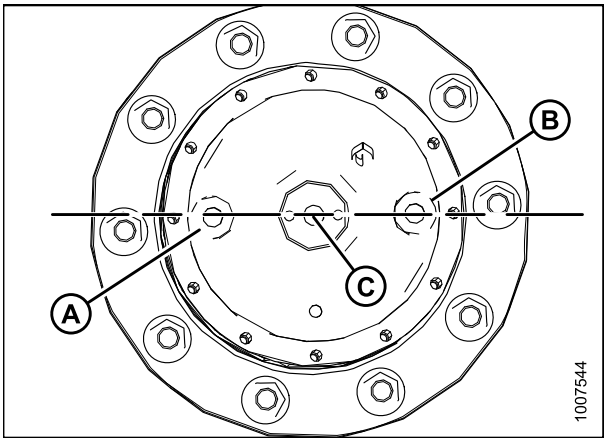


Figure 5.224: Drive Wheel Hub

6. Start up and operate the windrower for a few minutes, then stop and check the oil level. If necessary, add more oil.

Changing Wheel Drive Lubricant

The wheel drive lubricant should be changed after the first 50 hours and then changed after every 1000 hours. Change the lubricant when it is warm.

Check the level every 200 hours or annually.

WARNING

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever in N-DETENT position, and the steering wheel in locked position (centered). Wait for the CDM to beep and display an "In Park" message to confirm the park brakes have engaged.

1. Park windrower on level ground and position windrower so that one of the drain plugs (A) or (B) is at the lowest point on the drive wheel hub.
2. Shut down the windrower and remove key from ignition.
3. Place a container that can contain at least 2 liters (2 quarts) under the lower drain plug (B).
4. Remove both plugs (A) and (B), and drain lubricant into container.

CAUTION

Dispose of oil in a manner that complies with local rules and regulations.

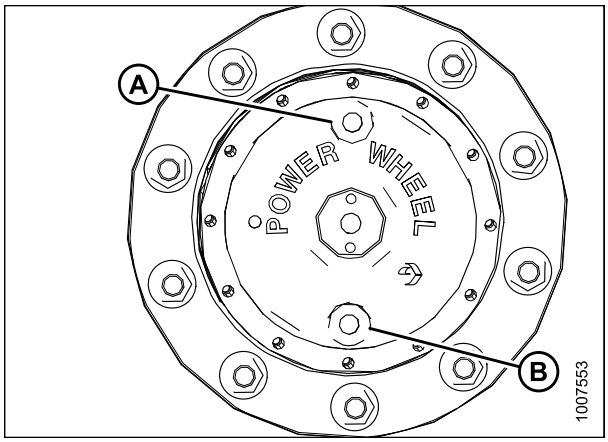


Figure 5.225: Drive Wheel Hub

5. After the lubricant has drained completely, start the windrower and position it so that ports (A) and (B) on wheel are level with the center of the hub (C) as shown.
6. Shut down the windrower and remove the key from the ignition.
7. Add lubricant. Refer to *Adding Wheel Drive Lubricant, page 413*.

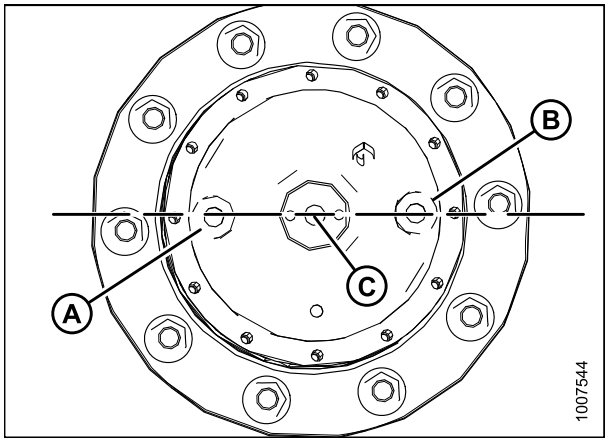


Figure 5.226: Drive Wheel Hub

5.11.2 Caster Wheels

Inflating Caster Tire

DANGER

- **Do NOT exceed maximum inflation pressure as per label on tire.**
- **Use a safety cage if available.**
- **Do NOT stand over tire. Use a clip-on chuck and extension hose.**
- **NEVER install a tube in a cracked wheel rim.**
- **NEVER weld a wheel rim.**
- **Make sure all the air is removed from a tire before removing the tire from the rim.**

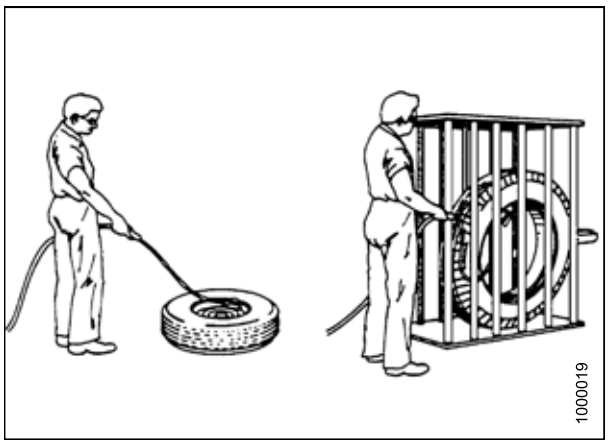


Figure 5.227: Safely Filling a Tire with Air

DANGER

- **NEVER use force on an inflated or partially inflated tire. Make sure the tire is correctly seated before inflating to operating pressure.**
- **Do NOT remove, install, or make repairs to 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.**
- **If the tire is NOT in the correct position on the rim or if too full of air, the tire bead can loosen on one side, causing air to leak 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.**
- **To avoid severe personal injury or death caused by machine runaway, shut off engine and remove key before performing any of the following checks and/or adjustments.**

Check tire pressure every year. Caster tire pressure should be 69 kPa (10 psi).

To maintain pressure, visually check daily that tires have not lost pressure, and adjust pressure as needed. Underinflation of tires can cause sidewall cracks.

NOTE:

Overinflation may cause caster wheels to shimmy.

Table 5.5 Caster Tire Options

Formed Caster	Forked Caster
7.5–16SL single rib, 10–16 front steer tire	16.5L–16.1 rib implement flotation, 10–16 front steer tire
69 kPa (10 psi)	69 kPa (10 psi)

Tightening Caster Wheel Nuts

At first use or when a wheel is removed, check wheel nut/bolt torque every 15 minutes on the road or 1 hour in the field until the specified torque is maintained.

Once specified torque is maintained, check wheel nut/bolt torque after 10 and 50 hours (field or road operation) and then at 200 hour intervals thereafter.

To tighten the caster wheel nuts on either forked or formed caster wheels, follow these steps:

1. Position wheel assembly on hub and install wheel bolts (A).
2. Tighten wheel nuts (A) to 163 Nm (120 lbf·ft) using the tightening sequence for the type of caster wheel shown in the illustrations at right. Repeat the tightening sequence 3 times.

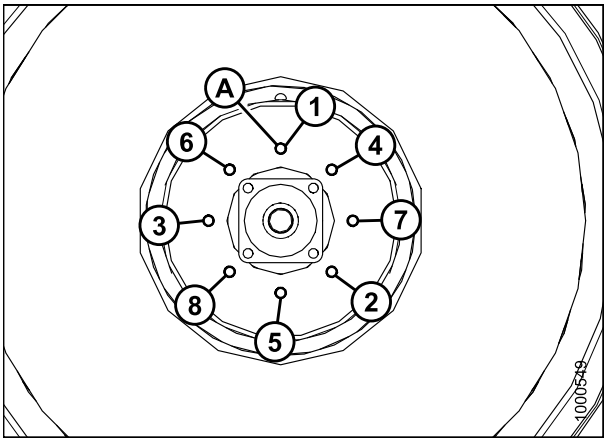


Figure 5.228: Forked Caster Wheel Nut Tightening Sequence

NOTE:

Wheel bolt (A) tightening sequence for a **formed** caster wheel (B) shown in Figure *5.229, page 416*.

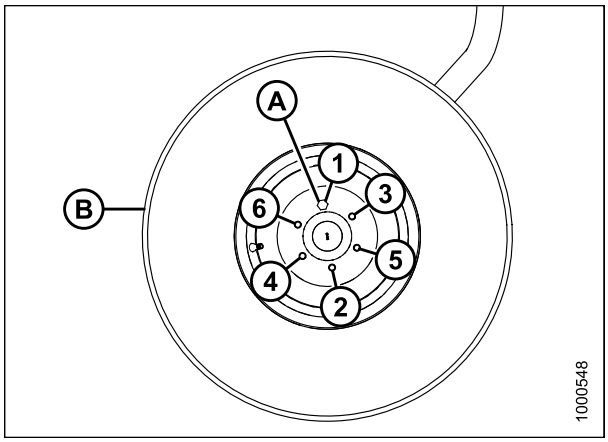


Figure 5.229: Formed Caster Wheel Nut Tightening Sequence

Servicing Caster Wheels

Raising Caster Wheel (Formed and Forked)

This procedure is the same for forked and formed caster wheels.

WARNING

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

CAUTION

Jack stand must be capable of supporting a minimum of 2268 kg (5000 lb.).

1. Park windrower on level ground and block the drive wheels.
2. Place the ground speed lever (GSL) (A) in N-DETENT (B), stop the engine, and remove the key.

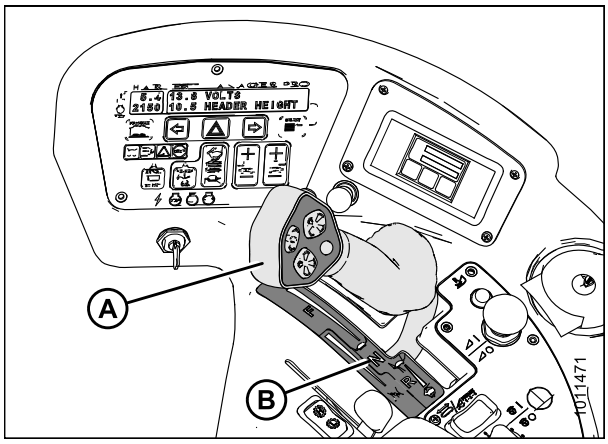


Figure 5.230: GSL Position

3. Raise the end of walking beam (A) until the caster wheel assembly (B) is slightly off the ground. Use a suitable lifting device, capable of lifting 2268 kg (5000 lb.) minimum.
4. Place a jack stand beneath the walking beam and lower the beam until resting on the stand.

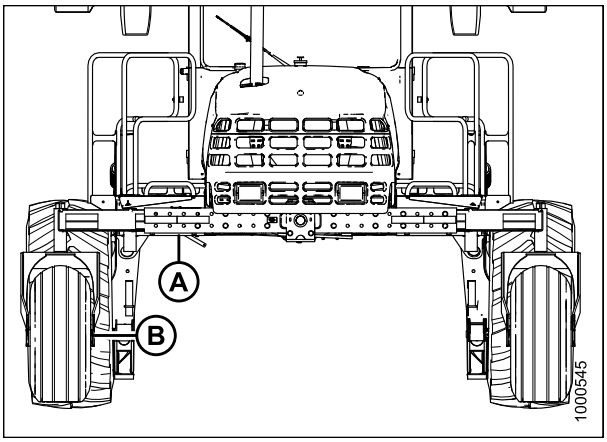


Figure 5.231: Caster Wheels and Walking Beam (Engine-Forward View)

Lowering Caster Wheel (Formed and Forked)

This procedure is for lowering the caster wheel when it is raised on a jack stand. This procedure is the same for forked and formed caster wheels.

CAUTION

Jack stand must be capable of supporting a minimum of 2268 kg (5000 lb.).

1. Raise the end of walking beam (A) slightly, using a suitable lifting device capable of lifting minimum 2268 kg (5000 lb.).
2. Remove the jack stand and lower the end of the walking beam until the caster wheel assembly (B) is on the ground.

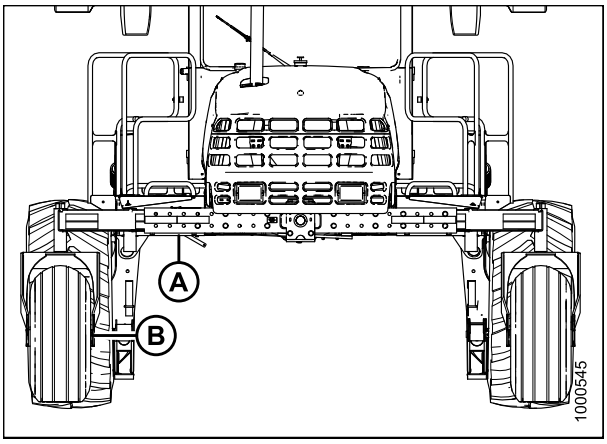


Figure 5.232: Caster Wheels and Walking Beam (Engine-Forward View)

Removing Forked Caster Wheel

CAUTION

Wheel assemblies are heavy. Support wheel assembly before removing axle bolts.

1. Raise caster wheel. Refer to *Raising Caster Wheel (Formed and Forked), page 416*.

2. Remove the 8 bolts (A) (4 on each side of caster) attaching axle (B) and cover (C) to forked caster (E), and remove wheel assembly (D) from caster (E).

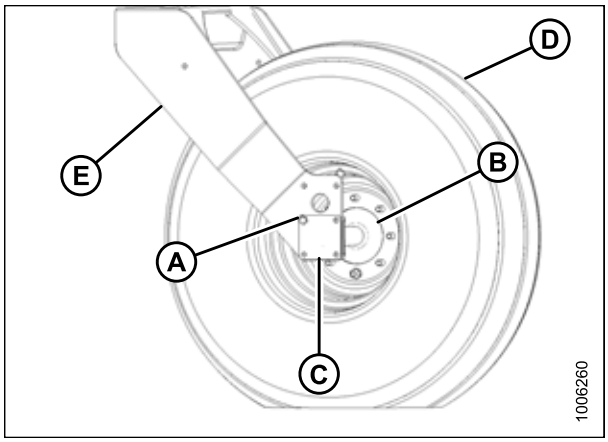


Figure 5.233: Forked Caster Wheel

3. Remove the 8 wheel nuts (A) that secure axle (B) to wheel (C).
4. Separate axle (B) and wheel (C).

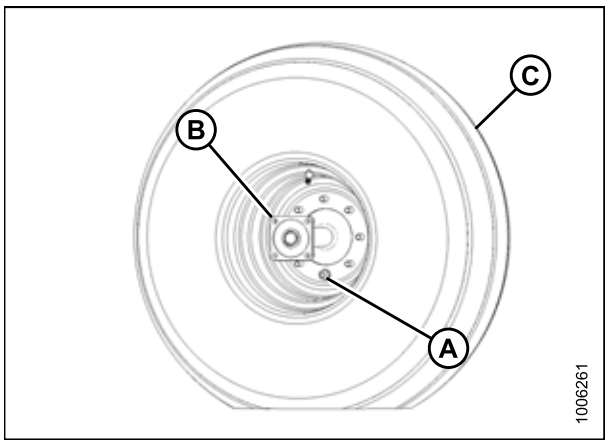


Figure 5.234: Forked Caster Wheel

Installing Forked Caster Wheel

CAUTION

Wheel assemblies are heavy. Support wheel assembly before removing axle bolts.

1. Position wheel assembly (C) on axle assembly (B) and install wheel nuts (A).
2. Torque wheel nuts (A). Refer to *Tightening Caster Wheel Nuts, page 415*.

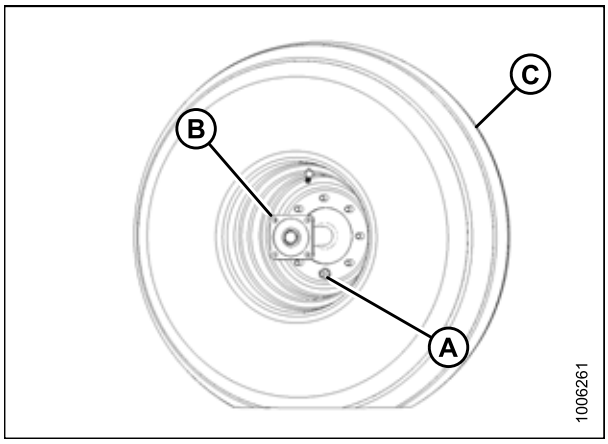


Figure 5.235: Forked Caster Wheel

3. Position wheel assembly (D) in forked caster (E).
4. Position cover plates (C) and install 8 bolts (A) (four on each side of caster) to secure axle (B) to caster (E). Torque bolts to 97–107 Nm (75–79 lbf·ft).
5. Lower caster wheel. Refer to *Lowering Caster Wheel (Formed and Forked), page 417*.

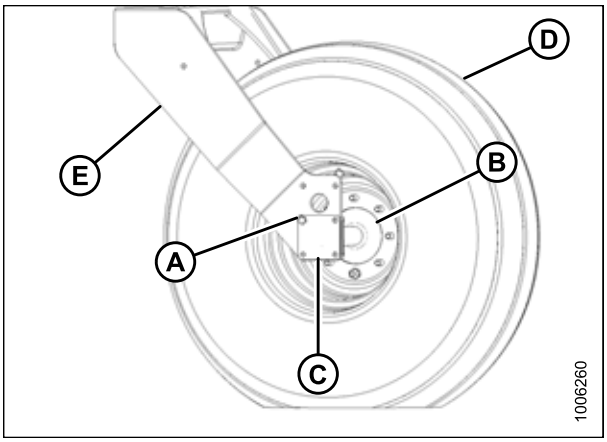


Figure 5.236: Forked Caster Wheel

Removing Formed Caster Wheel

CAUTION

Wheel assemblies are heavy. Support wheel assembly before removing axle bolts.

1. Raise caster wheel. Refer to *Raising Caster Wheel (Formed and Forked), page 416*.
2. Remove the 6 bolts (A) that secure wheel (B) to the hub.
3. Remove wheel (B).

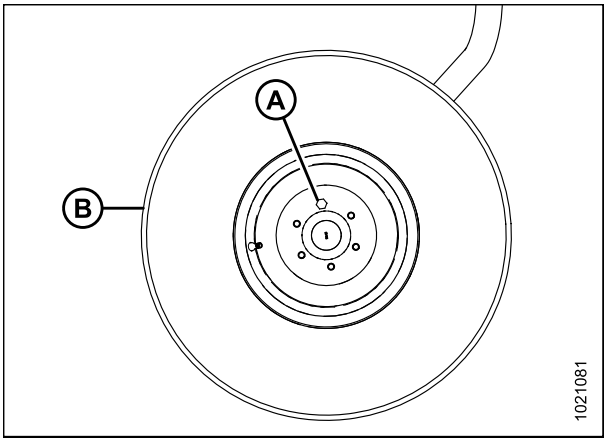


Figure 5.237: Formed Caster Wheel

Installing Formed Caster Wheel

CAUTION

Wheel assemblies are heavy. Support wheel assembly before removing axle bolts.

1. Position wheel assembly (B) on hub, and install 6 wheel bolts (A).
2. Refer to the tightening sequence at right, and torque bolts (A) to 163 Nm (120 lbf·ft).
3. Lower caster wheel. Refer to *Lowering Caster Wheel (Formed and Forked), page 417*.

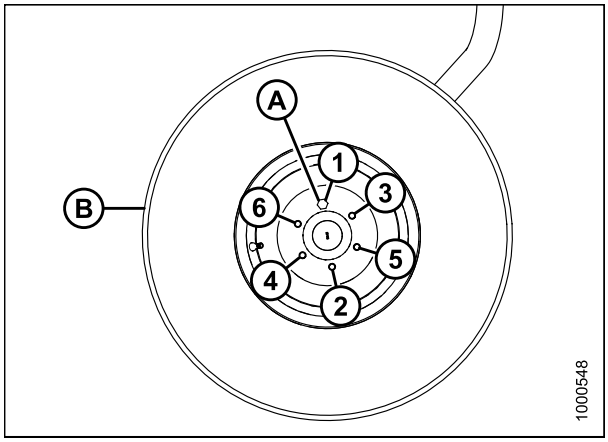


Figure 5.238: Formed Caster Wheel

Tightening Caster Wheel Anti-Shimmy Dampeners

Each caster is equipped with a fluid-filled anti-shimmy dampener (A).

The mounting bolts (B) need to be checked periodically for security. Refer to *5.12 Maintenance Schedule, page 422*.

- Inboard bolt should be tightened to 135 Nm (100 lbf·ft)
- Outboard bolt should be tightened to 115 Nm (85 lbf·ft)

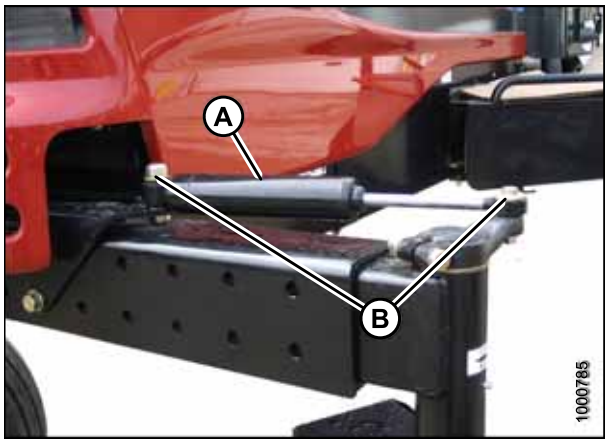


Figure 5.239: Anti-Shimmy Dampener

Ballast Requirements

Fluid ballasting of rear caster tires is recommended to provide adequate machine stability when using large headers on the windrower. The stability of the machine varies with different attachments, windrower options, terrain, and the operator's driving technique.

Ballast capability per tire is at a maximum fill of 75%, or when fluid is level with valve stem when the stem is positioned at 12 o'clock. Fluid can be added to any level up to maximum fill. Always add an equal amount of fluid on both sides.

Table 5.6 Recommended Ballast Weight

Header Description	Recommended Ballast		
	Level Ground	Hills	

Table 5.6 Recommended Ballast Weight (continued)

Type	Size	Per Tire	Both Tires	Per Tire	Both Tires	Recommended Tire Size
		liters (US Gal)	kg (lb.)[30]	liters (US Gal)	kg (lb.)[30]	
A Series	All	0				7.5 x 16 10 x 16 16.5 x 16.1
R Series	4.0 m (13-ft.) ONLY					
D Series	7.6 m (25-ft.) and smaller					
	9.1 m (30-ft.) single or double reel without conditioner 10.7 m (35-ft.) single reel	0	0	38 (10)	91 (200)	
	9.1 m (30-ft.) double reel steel fingers and conditioner 10.7 m (35-ft.) double reel (5 or 6-bat)	69 (18)	170 (380)	115 (30)	288 (630)	Level ground: 10 x 16 Level ground: 16.5 x 16.1 Hills: 16.5 x 16.1
	12.1 m (40-ft.)	115 (30)	288 (630)	158 (41)	377 (830)	16.5 x 16.1

30. Weights are given for typical calcium chloride and water mixtures. Weight is reduced by 20% if only water is used (for areas that do **not** require antifreeze protection).

5.12 Maintenance Schedule

The Maintenance Schedule specifies the recommended periodic maintenance procedures and service intervals. Regular maintenance is the best insurance against early wear and untimely breakdowns. Follow this schedule to maximize machine life.

For detailed instructions, refer to the various procedures in this chapter. Use the fluids and lubricants specified in *8.1 Recommended Fuel, Fluids, and Lubricants, page 451*.

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

IMPORTANT:

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

CAUTION

Carefully follow safety messages given in *1 Safety, page 1*.

5.12.1 Maintenance Schedule/Record

Windrower Serial Number: _____

Combine this record with the record in the header operator's manual. Make copies of this page to continue the record.

Action: ✓ Check ♦ Lubricate ▲ Change ✹ Clean																	
✎	Hour meter reading																
✎	Service date																
✎	Serviced by																
Preseason or Annual. Refer to *4.3.3 Preseason Checks / Annual Service, page 166*.																	
First hour[31]																	
✓	Drive wheel nuts																
	Refer to *Tightening Drive Wheel Nuts, page 409*.																
First 5 hours[31]																	
✓	A/C compressor belt																
	Refer to *Tensioning Air Conditioner (A/C) Compressor Belt, page 353*.																
✓	Caster wheel nuts																
	Refer to *Tightening Caster Wheel Nuts, page 415*.																
✓	Caster wheel anti-shimmy dampener																
	bolts. Refer to *Tightening Caster Wheel Anti-Shimmy Dampeners, page 420*.																
✓	Walking beam width adjustment bolts																

31. Begins from first use of machine.

Action: ✓ Check ♦ Lubricate ▲ Change ✹ Clean	
	Refer to *4.3.8 Adjusting Caster Tread Width, page 181*.
First 10 hours[32]	
✓	Walking beam width adjustment bolts Refer to *4.3.8 Adjusting Caster Tread Width, page 181*.
✓	Neutral adjustment[33]
Every 10 hours or daily[32]	
✹	A/C condenser[34] Refer to *5.8.3 Cleaning Cooler Box Components, page 357*.
✹	Charge air cooler[34] Refer to *5.8.3 Cleaning Cooler Box Components, page 357*.
✓	Engine oil level[34] Refer to *5.7.3 Checking Engine Oil Level, page 315*.
✓	Engine coolant level[34] Refer to *Checking Coolant Level, page 342*.
✓	Fuel tank[34] Refer to *Filling the Fuel Tank, page 332*.
✓	Fuel filter water trap[34] Refer to *Removing Water from Fuel System, page 333*.
✓	Hydraulic hoses and lines[34] Refer to *5.10.7 Hoses and Lines, page 406*.
✹	Hydraulic oil cooler[34] Refer to *5.10.2 Hydraulic Oil Cooler, page 398*.
✓	Hydraulic oil level[34] Refer to *5.10.1 Checking and Filling Hydraulic Oil, page 397*.
✹	Radiator[34] Refer to *5.8 Maintaining Engine Cooling Box, page 355*.
✓	Tire inflation[34] Refer to *Inflating Drive Wheel Tire, page 408*.
✓	Diesel exhaust fluid (DEF) level[34] Refer to *3.15.1 Fuel and Diesel Exhaust Fluid (DEF) Display Module, page 67*.

32. Begins from first use of machine.
33. Dealer adjusted.
34. A record of daily maintenance is not normally required but is at the Owner/Operator's discretion.

Action: ✓ Check ♦ Lubricate ▲ Change ✹ Clean																	
First 50 hours[35]																	
✓	Hose clamps: air intake/radiator/ heater/hydraulic[36]. Refer to specific hose clamp section.																
✓	Walking beam width adjustment bolts Refer to *4.3.8 Adjusting Caster Tread Width, page 181*.																
✓	Caster wheel anti-shimmy dampener bolts (if installed). Refer to *Tightening Caster Wheel Anti-Shimmy Dampeners, page 420*.																
▲	Main gearbox oil Refer to *Changing Lubricant, page 349*.																
▲	Drive wheel lubricant Refer to *Changing Wheel Drive Lubricant, page 413*.																
▲	Charge system oil filter Refer to *Charge Oil Filter, page 400*.																
▲	Return oil filter Refer to *Return Oil Filter, page 401*.																
Every 50 hours[35]																	
✹	Cab fresh air intake filter Refer to *Inspecting and Cleaning Fresh Air Filter Element, page 306*.																
♦	Caster pivots Refer to *5.4.2 Lubrication Points, page 297*.																
♦	Forked caster spindle bearings Refer to *5.4.2 Lubrication Points, page 297*.																
✓	Gearbox oil level Refer to *Checking Lubricant Level and Adding Lubricant, page 348*.																
♦	Top lift link pivots Refer to *5.4.2 Lubrication Points, page 297*.																
♦	Walking beam center pivot[37]																

35. Begins from first use of machine.
36. Hand-tighten unless otherwise noted.
37. 2014 and previous.

Action: ✓ Check ♦ Lubricate ▲ Change ✹ Clean	
Once a year[38] [39]	
✓	A/C blower Refer to *Air Conditioning (A/C) Compressor Coolant Cycling, page 167*.
✓	Antifreeze concentration Refer to *Checking Engine Coolant Strength, page 343*.
✓	Battery charge Refer to *Maintaining Batteries, page 360*.
✓	Battery fluid level Refer to *Charging the Batteries, page 361*.
▲	Fuel tank vent line filter Refer to *Replacing Fuel Tank Vent Filter, page 325*.
✓	Steering linkages Refer to *Checking Steering Link Pivots, page 302*.
Every 100 hours or once a year[40] [39]	
✹	Cab air return filter Refer to *Cleaning Return Air Cleaner/Filter, page 308*.
✓	Cab suspension limit straps Refer to *5.5.5 Cab Suspension Limit Straps, page 304*.
Every 250 hours or once a year[40] [39]	
▲	Engine oil and filter Refer to *5.7.4 Changing Engine Oil, page 317*.
▲	Engine air cleaner primary filter element. Refer to *Removing Primary Air Filter, page 319* and *Installing Primary Air Filter, page 321*.
♦	Formed caster wheel hub bearings Refer to *5.4.2 Lubrication Points, page 297*.
✓	Drive wheel lubricant Refer to *Checking Wheel Drive Lubricant Level, page 412*.
✓	Exhaust system Refer to *5.7.11 Inspecting Exhaust System, page 350*.

38. Begins from first use of machine.
39. It is recommended that annual maintenance be done prior to start of operating season.
40. Whichever occurs first, begins from first use of machine.

Action: ✓ Check ♦ Lubricate ▲ Change ✹ Clean																	
Every 500 hours or once a year[41] [42]																	
▲	Fuel filters Refer to *Maintaining Fuel Filters, page 326*.																
▲	Gearbox lubricant Refer to *Changing Lubricant, page 349*.																
▲	Charge system and return oil filters Refer to *5.10.4 Changing Hydraulic Oil Filters, page 399*.																
✓	Safety systems Refer to *5.5.2 Safety Systems, page 298*.																
Every 1000 hours[41]																	
▲	Drive wheel lubricant Refer to *Changing Wheel Drive Lubricant, page 413*.																
✹	Diesel exhaust fluid (DEF) supply module filter Refer to *Cleaning and Inspecting the Supply Module Filter, page 341*.																
1500 hours or every two years[41]																	
▲	Hydraulic oil Refer to *5.10.3 Changing the Hydraulic Oil, page 398*.																
2000 hours[41]																	
▲	Diesel Exhaust Fluid (DEF) vent hose filter. Refer to *Replacing the Diesel Exhaust Fluid (DEF) Vent Hose Filter , page 336*.																
▲	Engine crank case filter Refer to *Replacing Engine Oil Filter, page 317*.																
4500 hours or every 3 years[41]																	
▲	Diesel exhaust fluid (DEF) supply module filter Refer to *DEF Supply Module Filter, page 339*.																
5000 hours or every two years[41]																	
✓	Engine valve tappet clearance																

41. Begins from first use of machine.
42. It is recommended that annual maintenance be done prior to start of operating season.

6 Options and Attachments

6.1 Cab

6.1.1 AM/FM Radio

The cab is pre-wired for easy installation of a single DIN audio component available from your MacDon Dealer. Speakers are factory-installed.

In order to retain radio settings and preset memory with the battery disconnect turned off, select a radio with non-volatile memory.

For installation details, refer to the unloading and assembly instructions supplied with your windrower.

6.1.2 Automated Steering Systems

A MacDon-approved automated steering system is available from MacDon Dealers that provide Trimble® GPS installation and support services.

MacDon windrowers are partially pre-wired for either the Trimble® AutoPilot™ hydraulically integrated steering system or the Trimble® EZ-Pilot® wheel/column-based assisted steering system. The windrower's ground speed lever (GSL) has an automated steering (autosteer) engage switch and the Trimble® display mounting kit (MD #183348) is supplied in the cab.

The Trimble® AutoPilot™ system requires the MacDon automated steering hydraulic interface kit (MD #B5589). Installation instruction (MD #169539) is included in the bundle.

Other GPS providers may supply parts in their vehicle-specific installation packages or make installation kits available through MacDon Dealers.

6.1.3 High Intensity Discharge (HID) Auxiliary Lighting

This kit includes two cab-mounted high intensity discharge (HID) lamps that provide additional field lighting.

MD #B5596

Instruction MD #169621 is included in the bundle.

6.1.4 Windshield Shades

This kit includes retractable sun shades for front and rear windows. Attachment hardware is also included in the kit.

MD #B4866

Instruction MD #169218 is included in the bundle.

6.2 Engine

6.2.1 Engine Block Heater

Contact your nearest Cummins Engine Distributor, and provide your engine model and serial numbers to ensure the proper heater is supplied.

6.2.2 Engine Fan Air Baffle

The Engine Fan Air Baffle kit prevents the windrow from being disturbed by engine cooling fan air blast.

MD #B5440

Instruction MD #169443 is included in the bundle.

6.3 Header Operation

6.3.1 Double Windrow Attachment (DWA)

This kit allows headers to lay a double windrow when installed on a windrower. The kit includes a draper deck, linkage assembly, hydraulics, and installation instructions.

MD #C1987 consists of:

- MD #B4655 Deck
- MD #B5270 Linkage assembly
- MD #B5301 Hydraulic kit
- Double Windrow Attachment (DWA) manual

6.3.2 Draper Header Case Drain Kit

The Draper Header Case Drain kit must be installed when attaching a MacDon D50, D60, or D65 draper header with an upper cross auger (UCA), but without double draper drive. Case Drain kit (MD #B5842) is **NOT** required for double-draper drive headers equipped with kits MD #B5606 and MD #B5653.

MD #B5842

6.3.3 Draper Header Reel Drive and Lift Plumbing

This base kit is required to run a draper header. It includes draper header reel drive and lift plumbing (less valve) and reel fore-aft hydraulics.

NOTE:

If the last digit of windrower code is B, this bundle is already installed.

MD #B5577

Instruction MD #169537 is included in the bundle.

6.3.4 Header Drive Reverser

This kit allows the conditioner, knife, auger, and reel to reverse on the auger header, and the conditioner and knife to reverse on the draper header.

MD #B4656 [43, 44, 45, 46]

Instruction MD #169213 is included with the bundle.

6.3.5 Light Header Flotation

This kit is available for headers that do not require as much spring tension for header float.

MD #B4664

Instruction MD #169033 is included in the bundle.

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43. If installed on a windrower equipped with a D Series draper header, only the knife circuit will reverse.
44. If installed on a windrower equipped with an A Series auger header, the knife, reel, auger, and conditioner will reverse. Grass seed auger headers are not equipped with conditioners.
45. If installed on a windrower equipped with a D Series draper header and HC10 Hay Conditioner, knife and conditioner will reverse.
46. R Series disc headers cannot use the reversing feature.

6.3.6 Pressure Sensor Kit

This kit provides enhanced monitoring of the knife drive (or reel drive) hydraulic pressure, and warns of overload conditions.

MD #B5574

Instruction MD #169031 is included in the bundle.

6.3.7 R1 Disc Drive Kit

This kit includes a valve required to run an R1 Series Rotary Disc Header on an M155*E4* SP Windrower.

MD #B4657

6.3.8 R80 and R85 Rotary Header Drive Hydraulics (4.0 m [13 ft.])

This kit is required to allow operation of a 4.0 m (13 ft.) R80 or R85 Rotary Disc Header. The kit includes header drive plumbing and installation instructions.

MD #B5510

Instructions are included in the bundle.

- MD #169544 4.0 m (13 ft.) R80 and R85 attached to M150, M155, or M155*E4*

6.3.9 Self-Aligning Center-Link

This kit allows the center-link cylinder to be hydraulically positioned and connected to the header without leaving the operator's station.

Hydraulic center-link (MD #B4650) must be installed.

MD #B4802

Instruction MD #169004 included in the bundle.

6.3.10 Spring with External Booster Spring

This kit is available for headers over 2724 kg (6000 lb.) to increase the float capacity.

The Spring with External Booster Spring kit (MD #B4659) includes two springs (one for each side) and mounting brackets. Instruction MD #169032 is included in the bundle.

6.3.11 Spring with Internal Booster Spring

MacDon windrowers have two large diameter springs on each side—one is the outboard spring, and the other is the inboard spring. This kit (MD #B5303) replaces ONE of the large diameter springs (that does not already have an inner booster spring installed) with a new inboard spring assembly that comes with an internal booster spring inside.

The Spring with Internal Booster Spring kit (MD #B5303) includes one spring and castings for one side of the windrower.

Instruction MD #169316 is included in the bundle.

6.3.12 Swath Compressor

The MacDon Swath Compressor is a large, formed polyethylene sheet which is designed to mount to the underside of a MacDon M Series Self-Propelled Windrower. The MacDon Swath Compressor is designed for use with D Series Draper Headers cutting canola.

When lowered, the swath compressor helps prevent wind damage by shaping the windrow and anchoring it into the stubble behind the header using a smooth, gradual transition that helps prevent shelling in ripe conditions.

The Swath Compressor height is adjusted using a rocker switch on the operator's console and monitored on the Cab Display Module (CDM).

MD #C2061

Instruction MD #214752 and MD #214732 are included.

6.3.13 Swath Roller

An axle-mounted swath roller increases the windrow's resistance to wind disturbance, especially in canola or similar crops. It can be fitted with a hydraulic lift with in-cab controls.

Contact your MacDon Dealer for information.

6.4 Transport

6.4.1 Lighting and Marking for Cab-Forward Road Travel

This kit allows the windrower to be compliant with vehicle lighting regulations when travelling in the cab-forward mode on public roads. The kit includes red taillights, slow moving vehicle (SMV) markings, hardware, and installation instructions.

MD #B5412

Instruction MD #169426 is included in the bundle.

6.4.2 Towing Harness

The towing harness is used together with the weight box (refer to *6.4.3 Weight Box, page 432*) when towing a D Series Draper Header equipped with slow speed transport option behind the windrower.

MD #B5280 – Weight box harness only. Includes hitch pin and wiring for use with slow speed header transport option.

Instruction MD #169278 is included in the bundle.

6.4.3 Weight Box

A weight box installed onto the windrower header lift system is required to transport a header behind the windrower.

MD #B5238 – Weight box without harness

A towing harness is required to use the weight box. Refer to *6.4.2 Towing Harness, page 432* for more information.

7 Troubleshooting

7.1 Engine Troubleshooting

Symptom	Problem	Solution	Section
Engine hard to start or will not start	Controls not in NEUTRAL	Move GSL to NEUTRAL.	*Starting the Engine, page 168*
		Move steering wheel to locked position (centered).	
		Disengage header drive switch.	*4.4.4 Header Drive, page 207*
	NEUTRAL Interlock misadjusted	Contact Dealer.	Contact Dealer
	No fuel to engine	Fill empty fuel tank. Replace clogged filter.	*Filling the Fuel Tank, page 332* and *Maintaining Fuel Filters, page 326*
	Old fuel in tank	Drain tank. Refill with fresh fuel.	*5.7.7 Fuel System, page 325*
	Water, dirt, or air in fuel system	Drain, flush, fill, and prime system.	
	Improper type of fuel	Use proper fuel for operating conditions.	*8.1.2 Fuel Specifications, page 451*
	Crankcase oil too heavy	Use recommended oil.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
	Low battery output	Have battery tested. Check battery electrolyte level.	*5.9.2 Battery, page 360*
	Poor battery connection	Clean and tighten loose connections.	
	Faulty starter	Contact Dealer.	Contact Dealer
	Loose electrical connection at fuel pump	Ensure connector at pump is fully pushed in.	Contact Dealer
	Wiring shorted, circuit breaker open	Check continuity of wiring and breaker (manual reset).	*Checking and Replacing Fuses, page 389*
	ECM fuse (1 of 2) blown	Replace.	
	ECM Ignition relay faulty		
	NEUTRAL Logic relay faulty		
	Faulty injectors	Contact Dealer.	Contact Dealer
Engine knocks	Engine out of time	Contact Dealer.	Contact Dealer
	Insufficient oil	Add oil.	*Adding Engine Oil, page 318*

Symptom	Problem	Solution	Section
	Low or high coolant temperature	Contact Dealer.	Contact Dealer
	Improper fuel	Use proper fuel.	*8.1.2 Fuel Specifications, page 451*
Low oil pressure	Low oil level	Add oil.	*Adding Engine Oil, page 318*
	Improper type of oil	Drain and fill crankcase with proper oil.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
	Worn components	Contact Dealer.	Contact Dealer
High oil consumption	Internal parts worn		
	Crankcase oil too light	Use recommended oil.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
	Oil leaks	Check for leaks around gaskets, seals, and drain plugs.	*5.7.3 Checking Engine Oil Level, page 315*
Engine runs irregularly or stalls frequently	Unsteady fuel supply	Change filter on fuel tank vent line. Replace clogged fuel filter.	*Replacing Fuel Tank Vent Filter, page 325* and *5.7.7 Fuel System, page 325*
	Water or dirt in fuel system	Drain, flush, and fill fuel system.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
	Low coolant temperature	Remove and check thermostat.	Contact Dealer
	Air in fuel system	Contact Dealer.	
	Dirty or faulty injectors		
Lack of power	Incorrect timing	Contact Dealer.	Contact Dealer
	Engine oil viscosity too high	Use recommended oil.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
	Intake air restriction	Service air cleaner.	*5.7.5 Air Intake System, page 319*
	Clogged fuel filter	Replace primary fuel filter, and if necessary, replace secondary fuel filter.	*Maintaining Fuel Filters, page 326*

Symptom	Problem	Solution	Section
	High back pressure	Clean out or replace exhaust canisters.	*5.7.11 Inspecting Exhaust System, page 350*
	Improper type of fuel	Use proper fuel.	*8.1.2 Fuel Specifications, page 451*
	High or low engine temperature	Remove and check thermostat.	Contact Dealer
	Improper valve clearance	Contact Dealer.	
	Faulty injectors		
Engine temperature below normal	Defective thermostat	Remove and check thermostat.	
Warning alarm sounds	Engine overheated	Check coolant level.	*Checking Coolant Level, page 342*
		Check thermostat.	Contact Dealer
	Low engine oil pressure	Check oil level.	*5.7.3 Checking Engine Oil Level, page 315*
	Low transmission oil pressure		*5.10.1 Checking and Filling Hydraulic Oil, page 397*
Engine overheats	Low coolant level	Fill reserve tank to proper level. Check system for leaks.	*5.7.9 Engine Cooling System, page 342*
	Water only for coolant	Replace with antifreeze.	
	Engine overloaded	Reduce ground speed.	*Driving Forward in Cab-Forward Mode, page 175*
	Defective pressurized coolant tank cap	Replace cap.	*Inspecting Pressurized Coolant Tank Cap, page 344*
	Defective fan belt	Replace belt	*Replacing Fan Belt, page 352*
	Dirty radiator screen, rotors turning	Check for obstructions in ducting from screen to fan shroud.	*5.8 Maintaining Engine Cooling Box, page 355*
	Dirty radiator screen, rotors not turning	Check connections to rotor electric motor.	
	Dirty radiator core	Clean radiator.	*5.7.9 Engine Cooling System, page 342*
	Cooling system dirty	Flush cooling system.	

Symptom	Problem	Solution	Section
	Defective thermostat	Remove and check thermostat.	Contact Dealer
	Defective temperature gauge or sender	Check coolant temperature with thermometer. Replace gauge if necessary.	
	Defective water pump	Contact Dealer.	
High fuel consumption	Clogged or dirty air cleaner	Service air cleaner.	*5.7.5 Air Intake System, page 319*
	Engine overloaded	Reduce ground speed.	*Driving Forward in Cab-Forward Mode, page 175*
	Improper valve clearance	Contact Dealer.	Contact Dealer
	Engine out of time		
	Dirty injector nozzles		
	Low engine temperature	Check thermostat.	
	Improper type of fuel	Use proper fuel.	*8.1.2 Fuel Specifications, page 451*
Starter cranks slowly or will not operate	Low battery output	Check battery charge.	*Maintaining Batteries, page 360*
	Loose or corroded battery connections	Clean and tighten loose connections.	
	Controls not in NEUTRAL	Move GSL to NEUTRAL.	*Driving Forward in Cab-Forward Mode, page 175*
		Move steering wheel to CENTER position.	*Driving Reverse in Cab-Forward Mode, page 176*
		Disengage header.	*Engaging and Disengaging the Header, page 207*
	Relay not functioning	Check relay and wire connections.	*5.9 Electrical System, page 360*
	Main fuse defective/blown	Replace main fuse.	
	Key power fuse blown	Replace.	
	Key switch worn or terminals loose	Contact Dealer.	Contact Dealer
	Switch at Interlock not closed or defective	Adjust switch or replace. Contact your Dealer.	
	Crankcase oil too high viscosity	Use recommended oil.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
Air filters require frequent cleaning	Aspirator plugged	Clean out aspirator.	*5.7.5 Air Intake System, page 319*

7.2 Diesel Exhaust Fluid (DEF) System Troubleshooting

Symptom	Problem	Solution
Engine cranks, but fails to run	No fuel No power	• Check fuel level. • Check fuel supply to pump inlet. • Verify air intake is clear of debris. • Confirm 12V between ignition pin 5 and ground when key is in the ON position.
DEF supply module fails to prime or purge	No DEF supply	• Check DEF tank level. • Check connection on DEF supply module. Detach and inspect connection for contamination or damage. • Check DEF lines to and from the DEF dosing module for signs of leakage. DEF forms a white deposit around leaking fittings. Replace if necessary. • Remove and inspect DEF lines for clogging. Soak in warm water to remove blockages.
Aftertreatment DEF supply module–mechanical system not responding	Supply module injector	Remove the DEF injector, and clean gently with warm water, removing crystallized DEF.
Aftertreatment sensor (NOx level, DOC temp, SCR temp)	Sensor failure	• Ensure connector to the sensor in question is plugged in and locking tabs are locked. • Contact your MacDon Dealer. • Confirm power supply and ground to sensor in question. • If continuity check fails, locate discontinuity and repair/replace harness (MD #202550).

Symptom	Problem	Solution
Several simultaneous aftertreatment codes on the CDM	CAN communication error Electronics system	Contact your MacDon Dealer.
System derate	DEF tank empty	Fill tank using approved DEF. Refer to *Refilling the Diesel Exhaust Fluid (DEF) Tank, page 335*.
System derate	DEF tank sensor wiring damage or unplugged	Check sensor connection on the DEF Tank. Inspect connection for contamination or damage.
DEF quality inadequate, causing system derate	DEF contamination DEF too old	Ensure diesel exhaust fluid meets ISO 22241-1 / DIN 70070 standards and has not been contaminated.
System out NO_X high, causing system derate	No DEF supply	• Fill tank using approved DEF. Refer to *Refilling the Diesel Exhaust Fluid (DEF) Tank, page 335*. • Urea flow inadequate. Inspect tank and supply module filters, replace if necessary. Refer to *DEF Supply Module Filter, page 339*. • Inspect DEF lines for clogging. Soak in warm water to remove blockages.

7.3 Electrical Troubleshooting

Problem	Solution	Reference
Symptom: Low voltage and/or battery will not charge		
Defective battery	Have battery tested.	*5.9.2 Battery, page 360*
Loose or corroded connections	Clean and tighten battery connections.	*Maintaining Batteries, page 360*
Defective alternator belt	Replace worn belt.	*Replacing Fan Belt, page 352*
Alternator or voltage regulator not connected properly	Connect properly.	*5.9.2 Battery, page 360*
Dirty or defective alternator, defective voltage regulator, or high resistance in circuit	Contact Dealer.	Contact Dealer
Symptom: Lights dim		
Defective light switch	Contact Dealer.	Contact Dealer
High resistance in circuit or poor ground on lights	Check the wiring circuit for a break in a wire or a poor ground.	—
Symptom: Lights do not light		
Burned out or defective light bulb	Replace light bulb.	*Replacing Headlight Bulb, page 371*
Burned out or defective light bulb	Replace light bulb.	*Replacing Bulb in Cab-Forward Flood Light, page 375*
Burned out or defective light bulb	Replace light bulb.	*Replacing Bulb in Rear Flood Light, page 381*
Broken wiring	Check wiring for broken wire or shorts.	—
Poor ground on lights	Clean and tighten ground wires.	—
Open or defective circuit breaker	Check circuit breaker.	*5.9.14 Accessing Circuit Breakers and Fuses, page 388*
Defective relay	Replace relay.	*Replacing Circuit Breakers and Relays, page 390*
Defective light switch	Contact Dealer.	Contact Dealer
Symptom: Turn signals or indicators showing wrong direction		
Reversed wires	Contact Dealer.	Contact Dealer
Symptom: No current to cab		
Broken or disconnected wire	Contact Dealer.	Contact Dealer
Circuit breaker tripped	Breaker automatically resets.	—
Battery disconnect switch is OFF	Turn battery disconnect switch ON.	*Battery Main Disconnect Switch, page 361*

7.4 Hydraulics Troubleshooting

Problem	Solution	Reference
Symptom: Header or reel not lifting		
Appropriate solenoids not being energized by activating switch	Contact Dealer.	Contact Dealer
Contaminant in relief valve	Clean relief valve at cylinder control valve.	Contact Dealer
Relief pressure too low or contaminant in relief valve	Check/adjust/clean relief valve at cylinder control valve.	Contact Dealer
Symptom: Reel and/or conveyor not turning		
HEADER DRIVE switch not engaged	Engage HEADER DRIVE switch.	*Engaging and Disengaging the Header, page 207*
Flow controls adjusted too low	Toggle speed controls on CDM to increase flow.	D Series and D1 SP Series: *4.6.6 Draper Speed, page 267*, and *4.6.5 Reel Speed, page 264* A Series: *4.7.1 Auger Speed, page 276*
Appropriate solenoid on flow control block not being energized	Contact Dealer.	Contact Dealer
Symptom: Reel and/or conveyor turns but lacks power		
Relief pressure too low	Check/adjust/clean relief valve.	Contact Dealer
Symptom: Hydraulic oil high-temperature alarm		
Hydraulic oil cooling system not working properly	Check/clean cooling box.	*5.8 Maintaining Engine Cooling Box, page 355*
Faulty bypass valve	Clean or replace.	Contact Dealer
Symptom: Hydraulic oil low-temperature alarm		
Hydraulic oil too cold	Run engine until hydraulic oil warms up.	—
Symptom: Header or reel lifts unevenly		
Air in system	Fully raise header or reel and hold switch.	*4.4.1 Engaging and Disengaging Header Safety Props: M Series Self-Propelled Windrower, page 197*

7.5 Header Drive Troubleshooting

Problem	Solution	Reference
Symptom: Header drive not engaging		
HEADER DRIVE switch in cab not engaged	Engage HEADER DRIVE switch.	*Engaging and Disengaging the Header, page 207*
Operator Presence switch not closed or faulty	Occupy operator's seat or replace switch. Contact your Dealer.	Contact Dealer
Appropriate solenoid not being energized by activating switch	Contact Dealer.	Contact Dealer
Symptom: Header drive lacks power		
Relief valve setting too low	Contact Dealer.	Contact Dealer
Hydraulic couplers/unions not properly connected	Ensure hoses are connected correctly and hose couplers/unions are tight.	Refer to the header operator's manual.
Header drive overload	Reduce ground speed.	—
Symptom: Warning alarm sounds		
Header drive overload	Reduce ground speed.	—
Relief valve setting too low	Contact Dealer.	Contact Dealer

7.6 Traction Drive Troubleshooting

Problem	Solution	Reference
Symptom: Warning alarm sounds and transmission oil light is on		
Low hydraulic oil level	Stop engine, and add oil to hydraulic system.	*5.10.1 Checking and Filling Hydraulic Oil, page 397*
Low hydraulic pressure	Contact Dealer.	Contact Dealer
Foreign material shorting sender	Contact Dealer.	Contact Dealer
Short in alarm wiring	Contact Dealer.	Contact Dealer
Faulty sender	Contact Dealer.	Contact Dealer
Symptom: Wheels lack pulling ability on a grade or pulling out of a ditch		
Internal pump or motor damage	Contact Dealer.	Contact Dealer
Insufficient torque at drive wheels	Move ground speed range control to field position, and reduce ground speed.	*Driving Forward in Engine-Forward Mode, page 177*
Loose or worn controls	Check controls.	*5.5.3 Ground Speed Lever (GSL) Adjustments, page 300*
Air in system	Use proper oil.	*8.1.3 Lubricants, Fluids, and System Capacities, page 452*
Air in system	Check oil level and leaks.	*5.10.1 Checking and Filling Hydraulic Oil, page 397*
Air in system	Check hydraulic oil filters.	*5.10 Hydraulic System, page 396*
Brakes binding or not releasing fully	Check pressure on brake release valve (min. 1379 kPa [200 psi]).	Contact Dealer
Relief valve in tandem pump dirty or damaged	Replace relief valve.	Contact Dealer
Symptom: With steering wheel centered, one wheel pulls more than the other		
Leakage at pump or motor	Contact Dealer.	Contact Dealer
Wheels not in same speed range	Contact Dealer.	Contact Dealer
Faulty relief valve	Repair or replace valve. Contact Dealer.	Contact Dealer
Symptom: Both wheels will not pull in forward or reverse		
Pump arms have broken shaft or loose hardware	Repair or tighten.	Contact Dealer
Brakes binding or not releasing fully	Check pressure on brake release valve (min. 1379 kPa [200 psi]).	Contact Dealer
Low oil level	Check oil reservoir level.	*5.10.1 Checking and Filling Hydraulic Oil, page 397*

Problem	Solution	Reference
Power hubs disengaged	Engage final drives.	*Engaging and Disengaging Final Drives, page 195*
Damaged hydraulic lines preventing proper oil flow	Replace damaged lines.	Contact Dealer
Ground speed range control not working	Contact Dealer.	Contact Dealer
Steering controls worn or defective	Check GSL and steering for loose, worn or damaged ball joints and connecting rods.	*5.5.3 Ground Speed Lever (GSL) Adjustments, page 300* and *5.5.4 Steering Adjustments, page 302*
Charge pressure relief valve misadjusted or damaged	Check the valve adjustment. Check valve parts and seat.	*Checking Charge Pump Pressure, page 406*
Failed pump or motor	Contact Dealer.	Contact Dealer
Symptom: One wheel does not pull in forward or reverse		
Broken pump arm or shaft	Contact Dealer.	Contact Dealer
One final drive disengaged	Engage final drive.	*Engaging and Disengaging Final Drives, page 195*
Steering controls worn or defective	Check GSL and steering for loose, worn or damaged ball joints and connecting rods.	*5.5.3 Ground Speed Lever (GSL) Adjustments, page 300* and *5.5.4 Steering Adjustments, page 302*
High pressure relief valve stuck open, damaged seat	Check valve, and clean or replace.	Contact Dealer
Brakes binding or not releasing fully	Check pressure on brake release valve (min. 1379 kPa [200 psi]).	Contact Dealer
Damaged hydraulic lines preventing proper oil flow	Contact Dealer.	Contact Dealer
Ground speed range control not working	Contact Dealer.	Contact Dealer
Failed pump, motor, or power hub	Contact Dealer.	Contact Dealer
Symptom: Excessive noise from drive system		
Mechanical interference in steering or ground speed linkage	Adjust, repair, and replace.	*5.5.3 Ground Speed Lever (GSL) Adjustments, page 300* and *5.5.4 Steering Adjustments, page 302*
Brakes binding or not releasing fully	Check pressure on brake release valve (min. 1379 kPa [200 psi]).	Contact Dealer
Faulty pump or motor	Contact Dealer.	Contact Dealer
Air in system	Check lines for leakage.	—
Hydraulic line clamps loose	Tighten clamps.	—

Problem	Solution	Reference
Symptom: Hydraulic oil filter leaks at seal		
Not properly tightened	Tighten filter element.	*5.10.4 Changing Hydraulic Oil Filters, page 399*
Damaged seal or threads	Replace filter or filter head.	*5.10.4 Changing Hydraulic Oil Filters, page 399*

7.7 Steering and Ground Speed Control Troubleshooting

Problem	Solution	Reference
Symptom: Machine will not steer straight		
Linkage worn or loose	Adjust steering chain tension. Replace worn parts. Adjust linkage.	*5.5.4 Steering Adjustments, page 302*
Symptom: Machine moves on flat ground with controls in neutral		
Neutral interlock misadjusted	Contact Dealer.	Contact Dealer
Parking brake not functioning	Contact Dealer.	Contact Dealer
GSL servo misadjusted	Contact Dealer.	Contact Dealer
GSL cable misadjusted	Contact Dealer.	Contact Dealer
Transmission interlock misadjusted	Contact Dealer.	Contact Dealer
Symptom: Steering wheel will not unlock		
Transmission interlock cylinder not working	Contact Dealer.	Contact Dealer
Symptom: Insufficient road speed		
Ground speed range control in field position	Move to road position.	*Driving on the Road, page 182*
Symptom: Steering is too stiff or too loose		
Steering chain tension is out of adjustment	Adjust steering chain tension.	*5.5.4 Steering Adjustments, page 302*

7.8 Cab Air Troubleshooting

Problem	Solution	Reference
Symptom: Blower fan will not run		
Burned out motor	Contact Dealer.	Contact Dealer
Burned out switch	Contact Dealer.	Contact Dealer
Motor shaft tight or bearings worn	Contact Dealer.	Contact Dealer
Faulty wiring—loose or broken	Contact Dealer.	Contact Dealer
Blower rotors in contact with housing	Contact Dealer.	Contact Dealer
Symptom: Blower fan operating but no air coming into cab		
Dirty fresh air filter	Clean fresh air filter.	*Inspecting and Cleaning Fresh Air Filter Element, page 306*
Dirty recirculating air filter	Clean recirculating filter.	*Cleaning Return Air Cleaner/ Filter, page 308*
Evaporator clogged	Clean evaporator.	*Cleaning Air Conditioning (A/C) Evaporator Core, page 310*
Air flow passage blocked	Remove blockage.	—
Symptom: Heater not heating		
Heater shut-off valve at engine closed	Open valve.	*3.9.1 Heater Shut-Off, page 57*
Defective thermostat in engine water outlet manifold	Replace thermostat.	Contact Dealer
Heater temperature control defective	Replace control.	Contact Dealer
No thermostat in engine water outlet manifold	Install thermostat.	Contact Dealer
Symptom: Odor from air louvers		
Plugged drainage hose	Blow out hose with compressed air.	—
Dirty filters	Clean filters.	*Cleaning Return Air Cleaner/ Filter, page 308*
Symptom: Air conditioning not cooling		
Low refrigerant level	Add refrigerant. Contact Dealer.	Contact Dealer
Clutch coil burned out or disconnected	Contact Dealer.	Contact Dealer
Blower motor disconnected or burned out	Contact Dealer.	Contact Dealer
Switch contacts in thermostat burned excessively, or sensing element defective	Replace thermostat.	Contact Dealer.
Compressor partially or completely seized	Remove compressor for service or replacement.	Contact Dealer.

Problem	Solution	Reference
Condenser fins plugged	Clean condenser.	*5.6.3 Air Conditioning Condenser, page 309*
Loose or broken compressor drive belt	Replace drive belt and/or tighten to specifications.	*Tensioning Air Conditioner (A/C) Compressor Belt, page 353* and *Replacing Air Conditioner (A/C) Compressor Belt, page 354*
Dirty filters	Clean fresh air and recirculation filters.	*Cleaning the Engine Air Cleaner's Primary Filter, page 323* and *Cleaning Return Air Cleaner/Filter, page 308*
Broken or disconnected electrical wire	Check all terminals for loose connections; check wiring for hidden breaks.	—
Broken or disconnected ground wire	Check ground wire to see if loose, broken, or disconnected.	—
Expansion valve stuck in open or closed position	Contact Dealer.	Contact Dealer
Broken refrigerant line	Contact Dealer.	Contact Dealer
Leak in system	Contact Dealer.	Contact Dealer
Compressor shaft seal leaking	Contact Dealer.	Contact Dealer
Clogged screen in receiver-drier; plugged hose or coil	Contact Dealer.	Contact Dealer
Symptom: Air conditioning not producing sufficient cooling.[47]		
Compressor clutch slipping	Remove clutch assembly for service or replacement.	Contact Dealer
Thermostat defective or improperly adjusted	Replace thermostat.	Contact Dealer
Clogged air filters	Remove air filters, and clean or replace as necessary.	*Cleaning the Engine Air Cleaner's Primary Filter, page 323* and *Cleaning Return Air Cleaner/Filter, page 308*
Heater circuit is open	Close temperature control in cab, and valve on engine.	*3.9.3 Climate Controls, page 58* and *3.9.1 Heater Shut-Off, page 57*
Insufficient air circulation over condenser coil; fins clogged with dirt or insects	Clean condenser.	*5.6.3 Air Conditioning Condenser, page 309*
Evaporator fins clogged	Clean evaporator fins (under cab floor).	*Cleaning Air Conditioning (A/C) Evaporator Core, page 310*

47. Sufficient cooling defined as when air temperature in cab, measured at louvered vent, can be maintained at 25°F [14°C] below ambient air temperature.

Problem	Solution	Reference
Refrigerant low	Contact Dealer.	Contact Dealer
Clogged expansion valve	Contact Dealer.	Contact Dealer
Clogged receiver-drier	Contact Dealer.	Contact Dealer
Excessive moisture in system	Contact Dealer.	Contact Dealer
Air in system	Contact Dealer.	Contact Dealer
Blower motor sluggish in operation	Contact Dealer.	Contact Dealer
Symptom: Air conditioning cools intermittently		
Unit icing up due to thermostat adjusted too low	Adjust thermostat.	Contact Dealer
Unit icing up due to excessive moisture in system	Contact Dealer.	Contact Dealer
Unit icing up due to incorrect super-heat adjustment in the expansion valve	Contact Dealer.	Contact Dealer
Thermostat defective	Contact Dealer.	Contact Dealer
Defective blower switch or blower motor	Contact Dealer.	Contact Dealer
Partially open, improper ground or loose connection in compressor clutch coil	Contact Dealer.	Contact Dealer
Compressor clutch slipping	Contact Dealer.	Contact Dealer
Symptom: Air conditioning system too noisy		
Defective winding or improper connection in compressor clutch coil or relay	Contact Dealer.	Contact Dealer
Excessive charge in system	Contact Dealer.	Contact Dealer
Low charge in system	Contact Dealer.	Contact Dealer
Excessive moisture in system	Contact Dealer.	Contact Dealer
Loose or excessively worn drive belt	Tighten or replace as required.	*Tensioning Air Conditioner (A/C) Compressor Belt, page 353* and *Replacing Air Conditioner (A/C) Compressor Belt, page 354*
Noisy clutch	Remove clutch for service or replacement as required.	Contact Dealer
Noisy compressor	Check mountings and repair. Remove compressor for service or replacement.	Contact Dealer
Compressor oil level low	Add SP-15 PAG refrigerant oil.	Contact Dealer
Blower fan noisy due to excessive wear	Remove blower motor for service or replacement as necessary.	Contact Dealer

Problem	Solution	Reference
Symptom: Windows fog up		
High humidity	Run A/C to dehumidify air and heater to control temperature.	*3.9.3 Climate Controls, page 58*

7.9 Operator's Station Troubleshooting

Problem	Solution	Reference
Symptom: Rough ride		
Seat suspension not adjusted for operator's weight	Adjust seat suspension.	*3.3 Operator's Seat Adjustments, page 42*
High air pressure in tires	Deflate to proper pressure.	*Inflating Drive Wheel Tire, page 408* and *Inflating Caster Tire, page 414*
Cab suspension too stiff	Adjust suspension.	Contact Dealer

8 Reference

8.1 Recommended Fuel, Fluids, and Lubricants

8.1.1 Storing Lubricants and Fluids

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

- Buy good quality, clean fuel from a reputable Dealer.
- Use clean containers to handle fuel and lubricants.
- Keep containers full to avoid condensation issues.
- Store in an area protected from dust, moisture, and other contaminants.
- Avoid storing fuel over long periods of time. If you have a slow fuel turnover in the windrower or supply tank, add fuel conditioner to avoid condensation problems.
- Store fuel in a convenient place away from buildings.
- Diesel exhaust fluid (DEF) should be stored in a cool, dry, well ventilated area, out of direct sunlight, on lower shelf or on floor. The shelf life of DEF depends on exposure to sunlight and temperature. If storage area temperature is between -12° and 32°C (10° and 90°F), the shelf life will be approximately one year. If the maximum temperature does not exceed 24°C (75°F) for extended periods, the shelf life will be two years.
- Diesel exhaust fluid (DEF) should be drained if storing machine longer than 6 months to prevent degradation of fluid.
- Machine should never be stored with a tank full of diesel exhaust fluid (DEF) in freezing conditions. Ensure level of fluid in DEF tank is 75% of lower.
- Diesel exhaust fluid (DEF) is corrosive to some metals and should only be stored in polyethylene, polypropylene, or stainless steel containers.
- DEF containers should be sealed to prevent contamination and the evaporation of water which will affect the specified water to urea ratio.
- Diesel fuel should never be mixed with diesel exhaust fluid (DEF).

8.1.2 Fuel Specifications

Use only ultra low sulphur diesel (ULSD) from a reputable supplier. For most year-round service, No.2 ULSD fuel meeting ASTM specification D975 Grade S15 will provide good performance.

If the vehicle is exposed to extreme cold (below −7°C [20°F]) or is required to operate at colder-than-normal conditions for prolonged periods, use climatized No.2 diesel fuel, or dilute the No.2 ULSD fuel with 50% No.1 ULSD fuel. This will provide better protection from fuel gelling or wax-plugging of the fuel filters.

Table 8.1 Fuel Specification

Fuel	Specification	Sulphur (by weight)	Water and Sediment (by volume)	Cetane No.	Lubricity
ULSD Grade no. 2	ASTM D975	0.5% maximum	0.05% maximum	40°C (104°F) minimum	520 microns
ULSD Grade no. 1 and 2 mix[48]	n/a	1% maximum 0.5% maximum preferred	0.1% maximum	45–55°C (113–131°F) cold weather / high altitude	460 microns

In extreme situations, when available fuels are of poor quality or problems exist which are peculiar to certain operations, additives can be used; however, the engine manufacturer recommends consultation with the fuel supplier or engine manufacturer before using fuel additives. Situations where additives are useful include:

- A cetane improver additive can be used with low cetane fuels.
- A wax crystal modifier can help with fuels with high cold filter plugging points (CFPP).
- An anti-icer can help prevent ice formation in wet fuel during cold weather.
- An antioxidant or storage stability additive can help with fuel system deposits and poor storage stability.
- A lubricity enhancer can be used to increase the lubricity of fuels so that they meet the requirements given in the Table *8.1, page 452*. Diesel fuel conditioner is available from your Dealer.

8.1.3 Lubricants, Fluids, and System Capacities

WARNING

To avoid injury or death, do NOT allow ANY machine fluids to enter the body.

Table 8.2 System Capacities

Lubricant/Fluid	Location	Description	Capacity
Diesel exhaust fluid (DEF)	Diesel exhaust fluid tank	Must meet ISO 22241 requirements	29 L (7.5 US gal)
Grease	As required unless otherwise specified	SAE multi-purpose high temperature extreme pressure (EP2) performance with 1% max Molybdenum Disulphide (NLGI Grade 2) lithium base	—
Diesel fuel	Fuel tank	Ultra low sulphur diesel (ULSD) Grade No. 2, or ULSD Grade No. 1 and 2 mix[48]; refer to *8.1.2 Fuel Specifications, page 451* for more information	378 L (97 US gal)
Hydraulic oil	Hydraulic reservoir	SAE 15W-40 compliant with SAE specs for API class SJ and CH-4 engine oil.	65 L (17.2 US gal)
Gear lubricant	Gearbox	SAE 80W-140[49], API service class GL-5. Fully synthetic gear lubricant, (SAE J2360 preferred)	2.1 L (2.2 US qt.)

48. Optional when operating temperature is below 0°C (32°F).
49. SAE 75W-140 may be substituted for SAE 80W-140 if necessary.

Table 8.2 System Capacities (continued)

Lubricant/Fluid	Location	Description	Capacity
Gear lubricant	Wheel drive[50]	SAE 75W-90, API service class GL-5. Fully synthetic gear lubricant, (SAE J2360 preferred)	1.4 L (1.5 US qt.)
Antifreeze	Engine cooling system	ASTM D-6210 and Fleetguard ES Compleat®. See below	27.5 L (7.3 US gal)[51]
Engine oil	Engine oil pan	SAE 15W-40 compliant with SAE specs for API class SJ and CJ-4 engine oil	11 L (11.6 US qt.)
Air conditioning refrigerant	Air conditioning system	R134A	2.27 kg (5 lb.)
Air conditioning refrigerant oil[52]	Air conditioning system total capacity	PAG SP-15	240 cc (8.1 fl. oz.)

NOTE:

If Fleetguard® ES Compleat™ is unavailable, use a coolant concentrate or prediluted coolant intended for use with heavy duty diesel engines. Ensure coolant meets a minimum of the following chemical and physical properties:

- Provides cylinder cavitation protection according to fleet study run at or above 60% load capacity.
- Protects the cooling system metals (cast iron, aluminum alloys, and copper alloys such as brass) from corrosion.

An additive package should contain one of the following coolant mixtures:

- Ethylene glycol or propylene glycol base prediluted (40–60%) heavy duty coolant.
- Ethylene glycol or propylene glycol base heavy duty coolant concentrate in a 40–60% mixture of concentrate with quality water.

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

IMPORTANT:

Do **NOT** use cooling system sealing additives or antifreeze that contains sealing additives. Ethylene glycol and propylene glycol may alter the freeze temperature. Verify that the mixture meets the freeze protection criteria of it's intended use.

8.1.4 Filter Part Numbers

Table 8.3 M155*E4* Filter Part Numbers

Filter	Part Number
Engine oil filter	MD #111974
Charge oil filter	MD #112419
Return oil filter	MD #183620

50. SAE 85W-140 API Service Class GL-5. Extreme Pressure Gear Lubricant is used before initial change.
51. Equal parts with water, high quality, soft, de-ionized or distilled water as recommended by Supplier.
52. New compressor (MD #183515) comes filled.

Table 8.3 M155*E4* Filter Part Numbers (continued)

Filter	Part Number
Primary fuel filter element	MD #205028
Secondary fuel filter element	MD #205029
Fuel strainer filter (breather)	MD #207200
Fuel filler filter	MD #163989
Primary element (cab)	MD #111060
Primary air filter element	MD #203621
Secondary air filter element	MD #203622
Return air filter	MD #109797
Diesel exhaust fluid (DEF) – tank suction filter	MD #207478
Diesel exhaust fluid (DEF) – vent hose filter	MD #111608
Diesel exhaust fluid (DEF) supply module filter kit	MD #207510

8.2 Recommended Torques

8.2.1 Torque Specifications

The following tables provide correct torque values for various bolts, cap screws, and hydraulic fittings.

- Tighten all bolts to torque values specified in charts (unless otherwise noted throughout this manual).
- Replace hardware with same strength and grade of bolt.
- Use torque value tables as a guide and periodically check tightness of bolts.
- Understand torque categories for bolts and cap screws by using their identifying head markings.

Jam nuts

When applying torque to finished jam nuts, multiply the torque applied to regular nuts by f=0.65.

Self-tapping screws

Standard torque is to be used (**NOT** to be used on critical or structurally important joints).

SAE Bolt Torque Specifications

Torque values shown in following tables are valid for non-greased, or non-oiled threads and heads; therefore, do **NOT** grease or oil bolts or cap screws unless otherwise specified in this manual.

Table 8.4 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

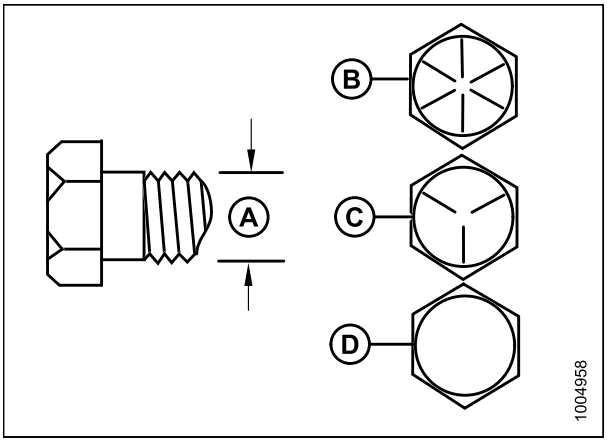

Figure 8.1: Bolt Grades

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

Table 8.5 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

Table 8.6 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

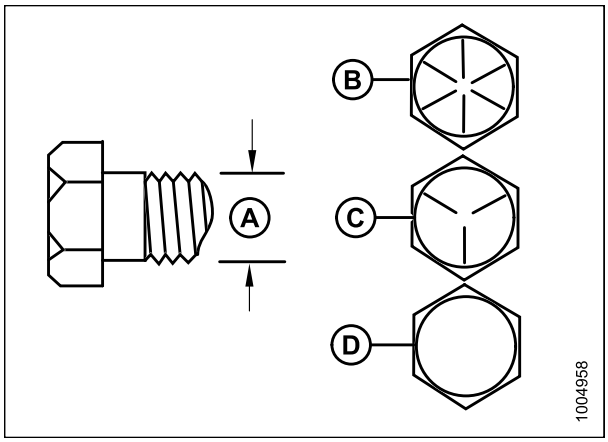

Figure 8.2: Bolt Grades

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

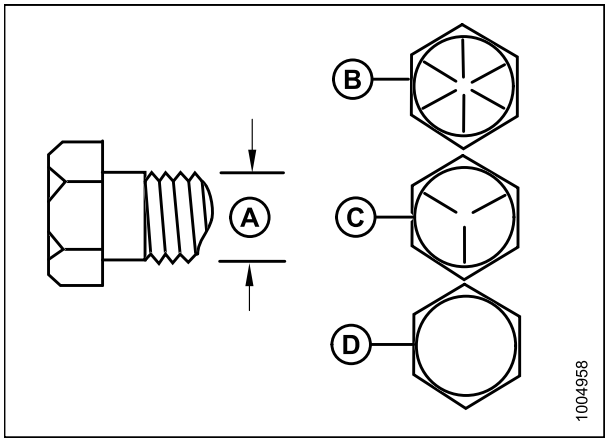

Figure 8.3: Bolt Grades

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

Table 8.7 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

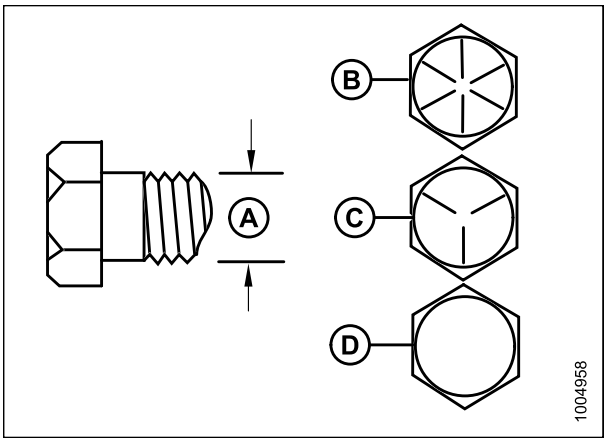

Figure 8.4: Bolt Grades

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

Metric Bolt Specifications

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

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

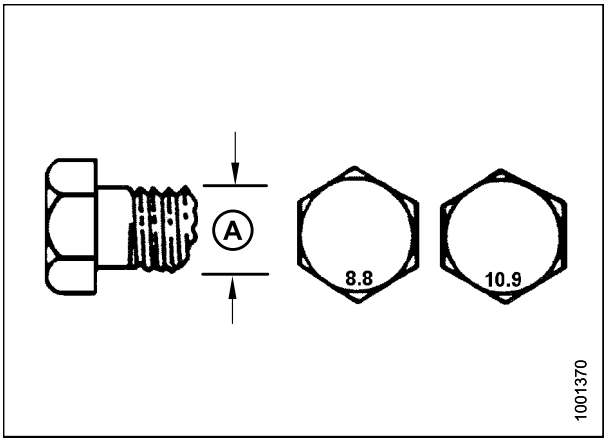

Figure 8.5: Bolt Grades

Table 8.9 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

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

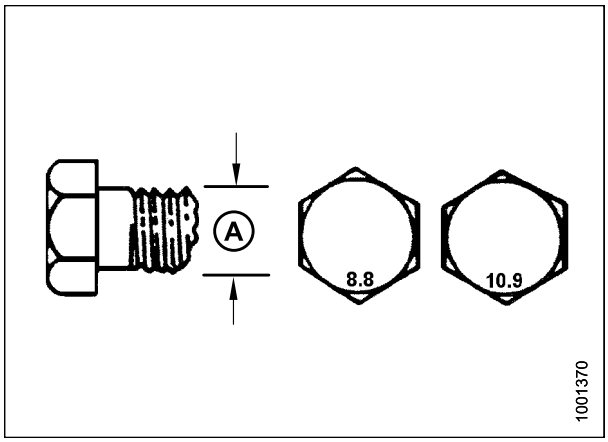

Figure 8.6: Bolt Grades

Table 8.10 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

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

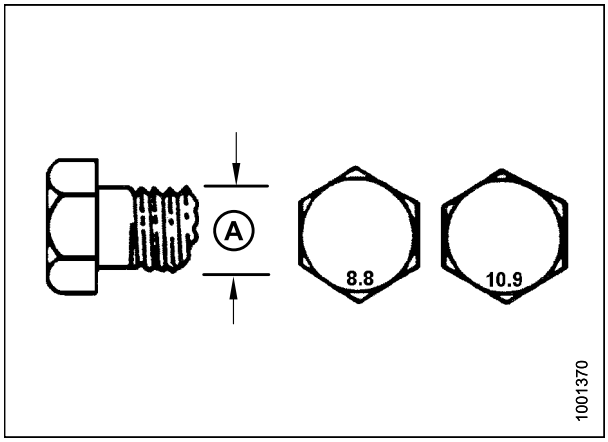

Figure 8.7: Bolt Grades

Table 8.11 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

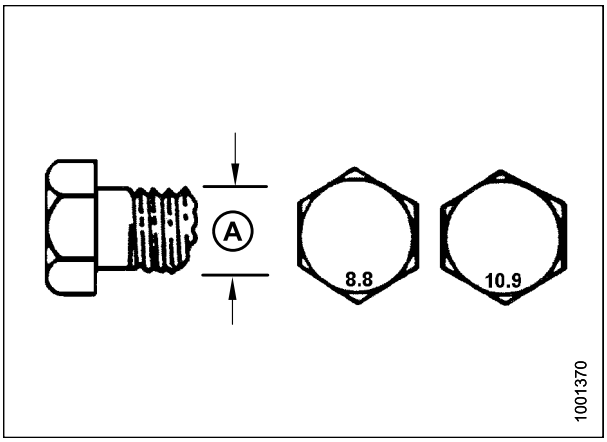

Figure 8.8: Bolt Grades

Metric Bolt Specifications Bolting into Cast Aluminum

Table 8.12 Metric Bolt Bolting into Cast Aluminum

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

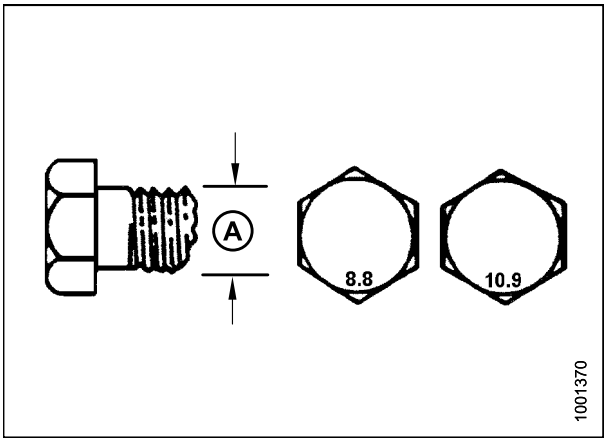

Figure 8.9: Bolt Grades

Flare-Type Hydraulic Fittings

1. Check flare (A) and flare seat (B) for defects that might cause leakage.
2. Align tube (C) with fitting (D) and thread nut (E) onto fitting without lubrication until contact has been made between flared surfaces.
3. Torque fitting nut (E) to specified number of flats from finger tight (FFFT) or to a given torque value in Table *8.13, page 460*.
4. Use two wrenches to prevent fitting (D) from rotating. Place one wrench on fitting body (D), and tighten nut (E) with other wrench to torque shown.
5. Assess final condition of connection.

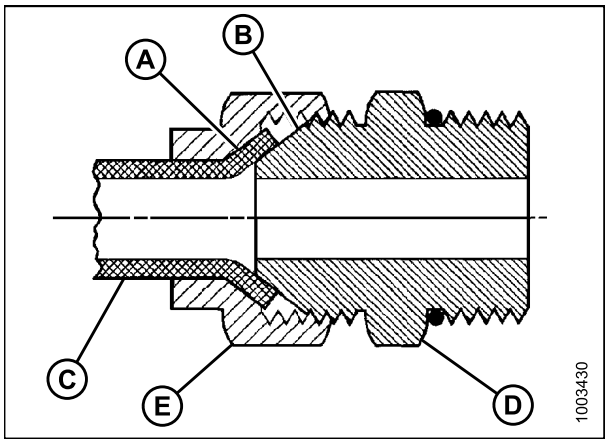

Figure 8.10: Hydraulic Fitting

Table 8.13 Flare-Type Hydraulic Tube Fittings

SAE Dash Size	Thread Size (in.)	Torque Value[53]		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
-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

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

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

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

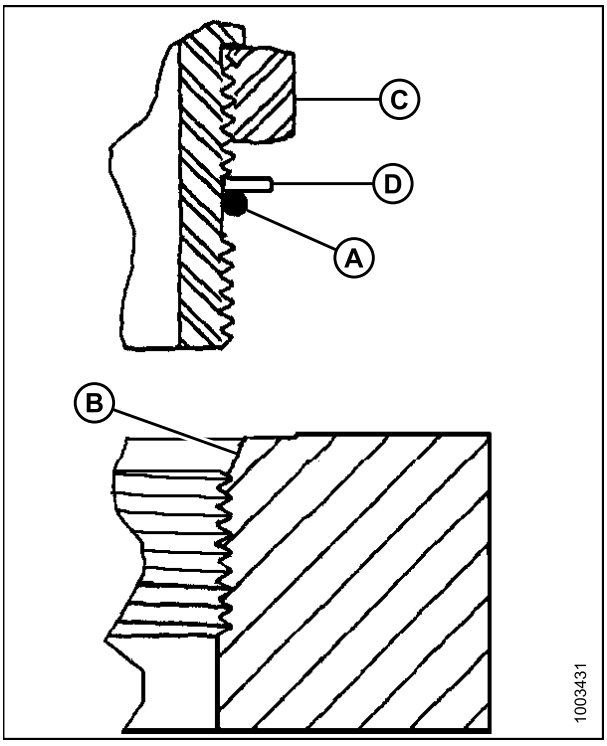

Figure 8.11: Hydraulic Fitting

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

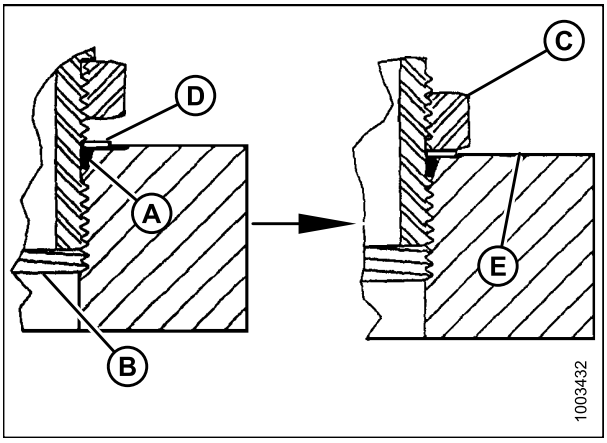

Figure 8.12: Hydraulic Fitting

Table 8.14 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)

SAE Dash Size	Thread Size (in.)	Torque Value[54]	
		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

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

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

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Check that O-ring (A) is **NOT** on threads and adjust if necessary.
3. Apply hydraulic system oil to O-ring.
4. Install fitting (C) into port until fitting is hand-tight.
5. Torque fitting (C) according to values in Table *8.15, page 463*.
6. Check final condition of fitting.

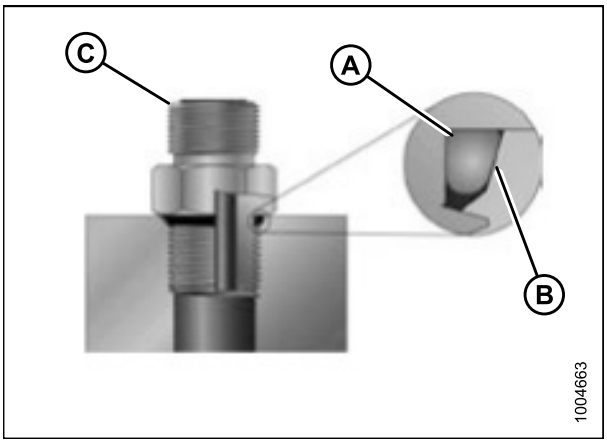

Figure 8.13: Hydraulic Fitting

Table 8.15 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)

SAE Dash Size	Thread Size (in.)	Torque Value[55]	
		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

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

O-Ring Face Seal (ORFS) Hydraulic Fittings

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

Figure 8.14: Hydraulic Fitting

2. Apply hydraulic system oil to O-ring (B).
3. Align tube or hose assembly so that flat face of sleeve (A) or (C) comes in full contact with O-ring (B).
4. Thread tube or hose nut (D) until hand-tight. The nut should turn freely until it is bottomed out.
5. Torque fittings according to values in Table *8.16, page 464*.

   NOTE:

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

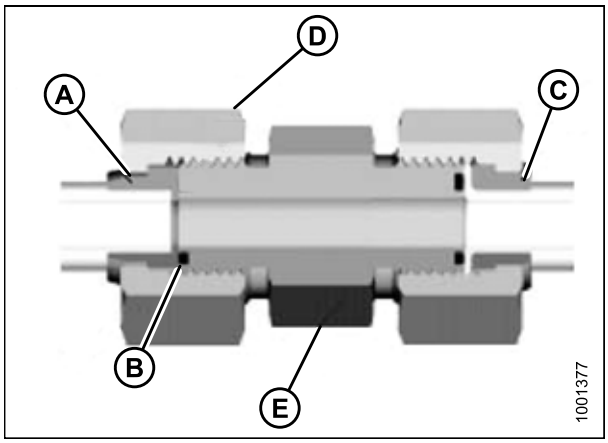

Figure 8.15: Hydraulic Fitting

Table 8.16 O-Ring Face Seal (ORFS) Hydraulic Fittings

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value[56]	
			Nm	lbf·ft
-3	Note[57]	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note[57]	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

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

Table 8.16 O-Ring Face Seal (ORFS) Hydraulic Fittings (continued)

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value[58]	
			Nm	lbf·ft
-14	Note[57]	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

Tapered Pipe Thread Fittings

Assemble pipe fittings as follows:

1. Check components to ensure that fitting and port threads are free of burrs, nicks and scratches, or any form of contamination.
2. Apply pipe thread sealant (paste type) to external pipe threads.
3. Thread fitting into port until hand-tight.
4. Torque connector to appropriate torque angle. The Turns From Finger Tight (TFFT) values are shown in Table *8.17, page 465*. Make sure that tube end of a shaped connector (typically 45 degree or 90 degree) is aligned to receive incoming tube or hose assembly. Always finish alignment of fitting in tightening direction. Never back off (loosen) pipe threaded connectors to achieve alignment.
5. Clean all residue and any excess thread conditioner with appropriate cleaner.
6. Assess final condition of fitting. Pay special attention to possibility of cracks to port opening.
7. Mark final position of fitting. If a fitting leaks, disassemble fitting and check for damage.

   NOTE:

   Overtorque failure of fittings may not be evident until fittings are disassembled.

Table 8.17 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

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

8.3 Conversion Chart

Table 8.18 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	ºC	(ºC x 1.8) + 32 =	degrees Fahrenheit	ºF
Velocity	meters per minute	m/min	x 3.2808 =	feet per minute	ft/min
Velocity	meters per second	m/s	x 3.2808 =	feet per second	ft/s
Velocity	kilometers per hour	km/h	x 0.6214 =	miles per hour	mph
Volume	liter	L	x 0.2642 =	US gallon	US gal
Volume	milliliter	ml	x 0.0338 =	ounce	oz.
Volume	cubic centimeter	cm^3 or cc	x 0.061 =	cubic inch	$in.^3$
Weight	kilogram	kg	x 2.2046 =	pound	lb.

8.4 Engine Error Codes

The following example explains the segments of an error code:

If the cab display module (CDM) displays the Error Code 629S 12F 28C

629S : S represents the J1939 SPN column. Locate code 629 in that column.

12F : F represents the FMI column. Locate code 12 in that column.

28C : C represents the occurrences (count); 28 is the quantity.

J1939 SPN description : Controller #1. The Cummins description of this is engine control module critical internal failure — Bad intelligent device or component.

The Cummins Dealer will request the fault code that corresponds with the number that you have located in the J1939 SPN column.

Table 8.19 Engine Error Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[59]
2272	27	4	Amber	Engine exhaust gas recirculation 1 valve position	EGR valve position circuit - voltage below normal, or shorted to low source
6497	51	3	None	Engine intake throttle actuator position sensor circuit	Engine intake throttle actuator position sensor circuit - voltage above normal, or shorted to high source
6498	51	4	None	Engine intake throttle actuator position sensor circuit	Engine intake throttle actuator position sensor circuit - voltage above normal, or shorted to low source
241	84	2	Amber	Wheel-based vehicle speed	Wheel-based vehicle speed - data erratic, intermittent or incorrect
148	91	0	Red	Accelerator pedal position 1	Accelerator pedal or lever position sensor 1 - data valid but above normal operational range - most severe level
147	91	1	Red	Accelerator pedal position 1	Accelerator pedal or lever position 1 sensor circuit frequency - data valid but below normal operating range
1242	91	2	Red	Accelerator pedal position 1	Accelerator pedal or lever position sensor 1 - data erratic, intermittent or incorrect
131	91	3	Red	Accelerator pedal position 1	Accelerator pedal or lever position sensor 1 circuit - voltage above normal, or shorted to high source
1358	91	3	Amber	Accelerator pedal position 1	Accelerator pedal or lever position sensor 1 circuit - voltage above normal, or shorted to high source
132	91	4	Red	Accelerator pedal position 1	Accelerator pedal or lever position sensor 1 circuit - voltage below normal, or shorted to low source

59. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[60]
1359	91	4	Amber	Accelerator pedal position 1	Accelerator pedal or lever position sensor 1 circuit - voltage below normal, or shorted to low source
3326	91	9	Red	Accelerator pedal position 1	SAE J1939 multiplexed accelerator pedal or lever sensor system - abnormal update rate
1515	91	19	Red	Accelerator pedal position 1	SAE J1939 multiplexed accelerator pedal or lever sensor system - received network data in error
546	94	3	Amber	Engine fuel delivery pressure	Fuel delivery pressure sensor circuit - voltage above normal, or shorted to high source
547	94	4	Amber	Engine fuel delivery pressure	Fuel delivery pressure sensor circuit - voltage below normal, or shorted to low source
2372	95	16	Amber	Engine fuel filter differential pressure	Fuel filter differential pressure - data valid but above normal operating range - moderately severe level
428	97	3	Amber	Water in fuel indicator	Water in fuel indicator sensor circuit - voltage above normal, or shorted to high source
429	97	4	Amber	Water in fuel indicator	Water in fuel indicator sensor circuit - voltage below normal, or shorted to low source
418	97	15	Amber (Blinking)	Water in fuel indicator	Water in fuel indicator - data valid but above normal operating range - least severe level
1852	97	16	Amber	Water in fuel indicator	Water in fuel indicator - data valid but above normal operating range - moderately severe level
415	100	1	Red	Engine oil pressure	Engine oil rifle pressure - data valid but below normal operational range - most severe level
435	100	2	Amber	Engine oil pressure	Engine oil rifle pressure - data erratic, intermittent or incorrect
135	100	3	Amber	Engine oil pressure	Engine oil rifle pressure 1 sensor circuit - voltage above normal, or shorted to high source
141	100	4	Amber	Engine oil pressure	Engine oil rifle pressure 1 sensor circuit - voltage below normal, or shorted to low source
143	100	18	Amber	Engine oil pressure	Engine oil rifle pressure - data valid but below normal operating range - moderately severe level
556	101	0	Red	Engine crankcase pressure	Crankcase pressure - data valid but above normal operational range - most severe level
1942	101	2	Amber	Engine crankcase pressure	Crankcase pressure - data erratic, intermittent or incorrect
1843	101	3	Amber	Engine crankcase pressure	Crankcase pressure circuit - voltage above normal, or shorted to high source
1844	101	4	Amber	Engine crankcase pressure	Crankcase pressure circuit - voltage below normal, or shorted to low source

60. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[61]
1974	101	15	Amber (Blinking)	Engine crankcase pressure	Crankcase pressure - data valid but above normal operating range - least severe level
555	101	16	Amber	Engine crankcase pressure	Crankcase pressure - data valid but above normal operating range - moderately severe level
122	102	3	Amber	Engine intake manifold #1 pressure	Intake manifold 1 pressure sensor circuit - voltage above normal, or shorted to high source
123	102	4	Amber	Engine intake manifold #1 pressure	Intake manifold 1 pressure sensor circuit - voltage below normal, or shorted to low source
2288	103	15	None	Engine turbocharger 1 speed	Turbocharger 1 speed - data valid but above normal operating range - least severe level
595	103	16	Amber	Engine turbocharger 1 speed	Turbocharger 1 speed - data valid but above normal operating range - moderately severe level
687	103	18	Amber	Engine turbocharger 1 speed	Turbocharger 1 speed - data valid but below normal operating range - moderately severe level
155	105	0	Red	Engine intake manifold 1 temperature	Intake manifold 1 temperature - data valid but above normal operational range - most severe level
153	105	3	Amber	Engine intake manifold 1 temperature	Intake manifold 1 temperature sensor circuit - voltage above normal, or shorted to high source
154	105	4	Amber	Engine intake manifold 1 temperature	Intake manifold 1 temperature sensor circuit - voltage below normal, or shorted to low source
2964	105	15	None	Engine intake manifold 1 temperature	Intake manifold 1 temperature - data valid but above normal operating range - least severe level
488	105	16	Amber	Engine intake manifold temperature	Intake manifold 1 temperature - data valid but above normal operating range - moderately severe level
5576	107	15	Amber	Engine air filter 1 differential pressure	Engine air filter differential pressure - data valid but above normal operating range - least severe level
3341	107	16	Amber	Engine air filter 1 differential pressure	Engine air filter differential pressure - data valid but above normal operating range - moderately severe level
151	110	0	Red	Engine coolant temperature	Engine coolant temperature - data valid but above normal operational range - most severe level
144	110	3	Amber	Engine coolant temperature	Engine coolant temperature 1 sensor circuit - voltage above normal, or shorted to high source

61. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[62]
145	110	4	Amber	Engine coolant temperature	Engine coolant temperature 1 sensor circuit - voltage below normal, or shorted to low source
146	110	16	Amber	Engine coolant temperature	Engine coolant temperature - data valid but above normal operating range - moderately severe level
2646	110	31	Amber	Engine coolant temperature	Engine coolant temperature - condition exists
2659	110	31	None	Engine coolant temperature	Engine coolant temperature - condition exists
235	111	1	Red	Engine coolant level	Coolant level - data valid but below normal operational range - most severe level
195	111	3	Amber	Engine coolant level	Coolant level sensor 1 circuit - voltage above normal, or shorted to high source
6522	111	3	None	Engine coolant level	Coolant level sensor 1 circuit - voltage above normal, or shorted to high source
196	111	4	Amber	Engine coolant level	Coolant level sensor 1 circuit - voltage below normal, or shorted to low source
6523	111	4	None	Engine coolant level	Coolant level sensor 1 circuit - voltage below normal, or shorted to low source
2448	111	17	Amber (Blinking)	Engine coolant level	Coolant level - data valid but below normal operating range - least severe level
197	111	18	Amber	Engine coolant level	Coolant level - data valid but below normal operating range - moderately severe level
449	157	0	Red	Engine injector metering rail 1 pressure	Injector metering rail 1 pressure - data valid but above normal operational range - most severe level
451	157	3	Amber	Engine injector metering rail 1 pressure	Injector metering rail 1 pressure sensor circuit - voltage above normal, or shorted to high source
452	157	4	Amber	Engine injector metering rail 1 pressure	Injector metering rail 1 pressure sensor circuit - voltage below normal, or shorted to low source
553	157	16	Amber	Engine injector metering rail 1 pressure	Injector metering rail 1 pressure - data valid but above normal operating range - moderately severe level
559	157	18	Amber	Engine injector metering rail 1 pressure	Injector metering rail 1 pressure - data valid but below normal operating range - moderately severe level
6256	168	15	None	Battery potential / power input 1	Battery 1 voltage - data valid but above normal operating range - least severe level

62. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[63]
442	168	16	Amber	Battery potential / power input 1	Battery 1 voltage - data valid but above normal operating range - moderately severe level
3724	168	17	Amber	Battery potential / power input 1	Battery 1 voltage - data valid but below normal operating range - least severe level
6257	168	17	None	Battery potential / power input 1	Battery 1 voltage - data valid but below normal operating range - moderately severe level
441	168	18	Amber	Battery potential / power input 1	Battery 1 voltage - data valid but below normal operating range - moderately severe level
6524	175	3	None	Engine oil temperature 1	Engine oil temperature sensor 1 circuit - voltage above normal, or shorted to high source
6525	175	4	None	Engine oil temperature 1	Engine oil temperature sensor 1 circuit - voltage below normal, or shorted to low source
234	190	0	Red	Engine speed	Engine crankshaft speed/position - data valid but above normal operational range - most severe level
689	190	2	Amber	Engine speed	Engine crankshaft speed/position - data erratic, intermittent or incorrect
2321	190	2	None	Engine speed	Engine crankshaft speed/position - data erratic, intermittent or incorrect
2468	190	16	Amber	Engine speed	Engine crankshaft speed/position - data valid but above normal operating range - moderately severe level
4517	237	13	Amber	Vehicle identification number	Vehicle identification number - out of calibration
1866	411	2	Amber	Engine exhaust gas recirculation 1 differential pressure	Exhaust gas recirculation differential pressure - data erratic, intermittent or incorrect
2273	411	3	Amber	Engine exhaust gas recirculation 1 differential pressure	Exhaust gas recirculation differential pressure sensor circuit - voltage above normal, or shorted to high source
2274	411	4	Amber	Engine exhaust gas recirculation 1 differential pressure	Exhaust gas recirculation differential pressure sensor circuit - voltage below normal, or shorted to low source
2375	412	3	Amber	Engine exhaust gas recirculation 1 temperature	Exhaust gas recirculation temperature sensor circuit - voltage above normal, or shorted to high source
2376	412	4	Amber	Engine exhaust gas recirculation 1 temperature	Exhaust gas recirculation temperature sensor circuit - voltage below normal, or shorted to low source

63. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[64]
2961	412	15	None	Engine exhaust gas recirculation 1 temperature	Exhaust gas recirculation temperature - data valid but above normal operating range - least severe level
2962	412	16	Amber	Engine exhaust gas recirculation 1 temperature	Exhaust gas recirculation temperature - data valid but above normal operating range - moderately severe level
293	441	3	Amber	Auxiliary temperature 1	Auxiliary temperature sensor input 1 circuit - voltage above normal, or shorted to high source
294	441	4	Amber	Auxiliary temperature 1	Auxiliary temperature sensor input 1 circuit - voltage below normal, or shorted to low source
292	441	14	Red	Auxiliary temperature 1	Auxiliary temperature sensor input 1 - special instructions
431	558	2	Amber	Accelerator pedal 1 low idle switch	Accelerator pedal or lever idle validation switch - data erratic, intermittent or incorrect
432	558	13	Red	Accelerator pedal 1 low idle switch	Accelerator pedal or lever idle validation switch circuit - out of calibration
3527	558	19	Red	Accelerator pedal 1 low idle switch	Accelerator pedal or lever idle validation switch - received network data in error
3488	563	9	Amber	Anti-lock braking (ABS) active	Anti-lock braking (ABS) controller - abnormal update rate
4215	563	31	None	Anti-lock braking (ABS) active	Anti-lock braking (ABS) active - condition exists
115	612	2	Red	System diagnostic code #2	Engine magnetic speed/position lost both of two signals - data erratic, intermittent or incorrect
291	625	9	Red	Proprietary datalink	Proprietary datalink error (OEM/vehicle datalink) - abnormal update rate
111	629	12	Red	Controller #1	Engine control module critical internal failure - bad intelligent device or component
343	629	12	Amber	Controller #1	Engine control module warning internal hardware failure - bad intelligent device or component
3697	630	12	Red	Engine control module calibration memory	Engine control module calibration memory - bad intelligent device or component
2311	633	31	Amber	Engine fuel actuator 1 control command	Electronic fuel injection control valve circuit - condition exists

64. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[65]
285	639	9	Amber	J1939 network #1, primary vehicle network (previously SAE J1939 data link)	SAE J1939 multiplexing PGN timeout error - abnormal update rate
286	639	13	Amber	J1939 network #1, primary vehicle network (previously SAE J1939 data link)	SAE J1939 multiplexing configuration error - out of calibration
2387	641	7	Amber	Engine variable geometry turbocharger actuator #1	VGT actuator driver circuit (motor) - mechanical system not responding or out of adjustment
1894	641	9	Amber	Engine variable geometry turbocharger actuator #1	VGT actuator driver circuit - abnormal update rate
2636	641	9	Red	Engine variable geometry turbocharger actuator #1	VGT actuator driver circuit - abnormal update rate
2198	641	11	Amber	Engine variable geometry turbocharger actuator #1	VGT actuator driver circuit - root cause not known
2634	641	12	Red	Engine variable geometry turbocharger actuator #1	VGT actuator controller - bad intelligent device or component
1898	641	13	Amber	Engine variable geometry turbocharger actuator #1	VGT actuator controller - out of calibration
2449	641	13	Red	Engine variable geometry turbocharger actuator #1	VGT actuator controller - out of calibration
1962	641	15	Amber	Engine variable geometry turbocharger actuator #1	VGT actuator driver over temperature (calculated) - data valid but above normal operating range - least severe level

65. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[66]
1976	641	15	None	Engine variable geometry turbocharger actuator #1	VGT actuator driver over temperature (calculated) - data valid but above normal operating range - least severe level
2635	641	31	Red	Engine variable geometry turbocharger actuator #1	VGT actuator driver circuit - condition exists
237	644	2	Amber	Engine external speed command input	External speed command input (multiple unit synchronization) - data erratic, intermittent or incorrect
2377	647	3	Amber	Engine fan clutch 1 output device driver	Fan control circuit - voltage above normal, or shorted to high source
6263	647	3	None	Engine fan clutch 1 output device driver	Fan control circuit - voltage above normal, or shorted to high source
245	647	4	Amber	Engine fan clutch 1 output device driver	Fan control circuit - voltage below normal, or shorted to low source
6264	647	4	None	Engine fan clutch 1 output device driver	Fan control circuit - voltage below normal, or shorted to low source
322	651	5	Amber	Engine injector cylinder #01	Injector solenoid driver cylinder 1 circuit - current below normal or open circuit
331	652	5	Amber	Engine injector cylinder #02	Injector solenoid driver cylinder 2 circuit - current below normal or open circuit
1141	652	7	Amber	Engine injector cylinder #02	Injector solenoid driver cylinder 2 - mechanical system not responding or out of adjustment
324	653	5	Amber	Engine injector cylinder #03	Injector solenoid driver cylinder 3 circuit - current below normal or open circuit
1142	653	7	Amber	Engine injector cylinder #03	Injector solenoid driver cylinder 3 - mechanical system not responding or out of adjustment
332	654	5	Amber	Engine injector cylinder #04	Injector solenoid driver cylinder 4 circuit - current below normal or open circuit
1143	654	7	Amber	Engine injector cylinder #04	Injector solenoid driver cylinder 4 - mechanical system not responding or out of adjustment
584	677	3	Amber	Engine starter motor relay	Starter relay driver circuit - voltage above normal, or shorted to high source
585	677	4	Amber	Engine starter motor relay	Starter relay driver circuit - voltage below normal, or shorted to low source
2557	697	3	Amber	Auxiliary PWM driver #1	Auxiliary PWM driver 1 circuit - voltage above normal, or shorted to high source

66. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[67]
2558	697	4	Amber	Auxiliary PWM driver #1	Auxiliary PWM driver 1 circuit - voltage below normal, or shorted to low source
4734	701	14	Red	Auxiliary I/O #01	Auxiliary input/output 1 - special instructions
778	723	2	Amber	Engine speed 2	Engine camshaft speed / position sensor - data erratic, intermittent or incorrect
2322	723	2	None	Engine speed 2	Engine camshaft speed / position sensor - data erratic, intermittent or incorrect
731	723	7	Amber	Engine speed 2	Engine speed / position camshaft and crankshaft misalignment - mechanical system not responding or out of adjustment
2555	729	3	Amber	Engine intake air heater driver #1	Engine intake air heater 1 circuit - voltage above normal, or shorted to high source
6556	729	3	None	Engine intake air heater driver #1	Engine intake air heater 1 circuit - voltage above normal, or shorted to high source
2556	729	4	Amber	Engine intake air heater driver #1	Engine intake air heater 1 circuit - voltage below normal, or shorted to low source
6557	729	4	None	Engine intake air heater driver #1	Engine intake air heater 1 circuit - voltage below normal, or shorted to low source
3641	748	9	Amber	Transmission output retarder	Transmission output retarder - abnormal update rate
6336	862	3	None	Crankcase breather heater circuit	Crankcase breather filter heater circuit - voltage above normal, or shorted to high source
6337	862	4	None	Crankcase breather heater circuit	Crankcase breather filter heater circuit - voltage below normal, or shorted to low source
133	974	3	Red	Remote accelerator pedal position	Remote accelerator pedal or lever position sensor 1 circuit - voltage above normal, or shorted to high source
134	974	4	Red	Remote accelerator pedal position	Remote accelerator pedal or lever position sensor 1 circuit - voltage below normal, or shorted to low source
288	974	19	Red	Remote accelerator pedal position	SAE J1939 multiplexing remote accelerator pedal or lever position sensor system - received network data in error
6563	976	2	None	PTO governor state	Auxiliary intermediate (PTO) speed switch validation - data erratic, intermittent or incorrect
6418	1072	3	None	Engine (compression) brake output #1	Engine brake actuator driver 1 circuit - voltage above normal, or shorted to high source

67. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[68]
6419	1072	4	None	Engine (compression) brake output #1	Engine brake actuator driver 1 circuit - voltage below normal, or shorted to low source
6421	1073	3	None	Engine (compression) brake output #2	Engine brake actuator driver output 2 circuit - voltage above normal, or shorted to high source
6422	1073	4	None	Engine (compression) brake output #2	Engine brake actuator driver output 2 circuit - voltage below normal, or shorted to low source
6258	1075	3	None	Engine electric lift pump for engine fuel supply	Electric lift pump for engine fuel supply circuit - voltage above normal, or shorted to high source
6259	1075	4	None	Engine electric lift pump for engine fuel supply	Electric lift pump for engine fuel supply circuit - voltage below normal, or shorted to low source
3555	1081	9	Amber	Engine wait to start lamp	Engine wait to start lamp - abnormal update rate
691	1172	3	Amber	Engine turbocharger 1 compressor intake temperature	Turbocharger 1 compressor intake temperature circuit - voltage above normal, or shorted to high source
692	1172	4	Amber	Engine turbocharger 1 compressor intake temperature	Turbocharger 1 compressor intake temperature circuit - voltage below normal, or shorted to low source
743	1176	2	Amber	Engine turbocharger 1 compressor intake pressure	Turbocharger 1 compressor intake pressure - data erratic, intermittent or incorrect
741	1176	3	Amber	Engine turbocharger 1 compressor intake pressure	Turbocharger 1 compressor intake pressure circuit - voltage above normal, or shorted to high source
742	1176	4	Amber	Engine turbocharger 1 compressor intake pressure	Turbocharger 1 compressor intake pressure circuit - voltage below normal, or shorted to low source
3298	1194	13	Red	Anti-theft encryption seed present indicator	Anti-theft encryption seed - out of calibration
2554	1209	2	Amber	Engine exhaust gas pressure 1	Exhaust gas pressure 1 - data erratic, intermittent or incorrect
2373	1209	3	Amber	Engine exhaust gas pressure 1	Exhaust gas pressure sensor 1 circuit - voltage above normal, or shorted to high source

68. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[69]
2374	1209	4	Amber	Engine exhaust gas pressure 1	Exhaust gas pressure sensor 1 circuit - voltage below normal, or shorted to low source
3329	1231	2	None	J1939 network #2	J1939 network #2 - data erratic, intermittent or incorrect
3331	1235	2	None	J1939 network #3	J1939 network #3 - data erratic, intermittent or incorrect
1654	1323	31	Amber	Engine misfire cylinder #1	Engine misfire cylinder 1 - condition exists
1655	1324	31	Amber	Engine misfire cylinder #2	Engine misfire cylinder 2 - condition exists
1656	1325	31	Amber	Engine misfire cylinder #3	Engine misfire cylinder 3 - condition exists
1657	1326	31	Amber	Engine misfire cylinder #4	Engine misfire cylinder 4 - condition exists
272	1347	3	Amber	Engine fuel pump pressurizing assembly #2	Engine fuel pump pressurizing assembly 1 circuit - voltage above normal, or shorted to high source
271	1347	4	Amber	Engine fuel pump pressurizing assembly #1	Engine fuel pump pressurizing assembly 1 circuit - voltage below normal, or shorted to low source
281	1347	7	Amber	Engine fuel pump pressurizing assembly #3	Engine fuel pump pressurizing assembly 1 - mechanical system not responding or out of adjustment
483	1349	3	Amber	Engine injector metering rail 2 pressure	Injector metering rail 2 pressure sensor circuit - voltage above normal, or shorted to high source
649	1378	31	Amber (Blinking)	Engine oil change interval	Engine oil change interval - condition exists
297	1388	3	Amber	Auxiliary pressure #2	Auxiliary pressure sensor input 2 circuit - voltage above normal, or shorted to high source
298	1388	4	Amber	Auxiliary pressure #2	Auxiliary pressure sensor input 2 circuit - voltage below normal, or shorted to low source
296	1388	14	Red	Auxiliary pressure #2	Auxiliary pressure sensor input 2 - special instructions
3714	1569	31	Amber	Engine protection torque derate	Engine protection torque derate - condition exists
4789	1639	0	Amber	Fan speed	Fan speed - data valid but above normal operational range - most severe level

69. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[70]
4791	1639	1	Amber	Fan speed	Fan speed - data valid but below normal operational range - most severe level
6469	1639	2	None	Fan speed	Fan speed – data erratic, intermittent, or incorrect
6467	1639	15	None	Fan speed	Fan speed - data valid but above normal operational range - least severe level
6468	1639	17	None	Fan speed	Fan speed - data valid but below normal operational range - most severe level
4437	1668	2	None	J1939 network #4 - data erratic	J1939 network #4 - data erratic, intermittent or incorrect
3737	1675	31	None	Engine starter mode	Engine starter mode overcrank protection - condition exists
1673	1761	1	Amber	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level - data valid but below normal operational range - most severe level
1669	1761	3	Amber	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level sensor circuit - voltage above normal, or shorted to high source
1668	1761	4	Amber	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level sensor circuit - voltage below normal, or shorted to low source
4677	1761	9	Amber	Aftertreatment 1 diesel exhaust fluid tank level	Sae J1939 multiplexing PGN timeout error - abnormal update rate
4769	1761	10	Amber	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level sensor - abnormal rate of change
4739	1761	11	Amber	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level sensor - root cause not known
6562	1761	11	None	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level sensor - root cause not known
6526	1761	13	None	Aftertreatment 1 diesel exhaust fluid tank temperature	Aftertreatment 1 diesel exhaust fluid tank level sensor - out of calibration
3497	1761	17	Amber (Blinking)	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level - data valid but below normal operating range - least severe level
3498	1761	18	Amber (Blinking)	Aftertreatment 1 diesel exhaust fluid tank level	Aftertreatment 1 diesel exhaust fluid tank level - data valid but below normal operating range - moderately severe level

70. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[71]
1239	2623	3	Amber	Accelerator pedal #1 channel 2	Accelerator pedal or lever position sensor 2 circuit - voltage above normal, or shorted to high source
1241	2623	4	Amber	Accelerator pedal #1 channel 2	Accelerator pedal or lever position sensor 2 circuit - voltage below normal, or shorted to low source
2346	2789	15	None	Engine turbocharger 1 calculated turbine intake temperature	Turbocharger turbine intake temperature - data valid but above normal operating range - least severe
2349	2791	5	Amber	Engine exhaust gas recirculation 1 (EGR1) valve control	EGR valve control circuit - current below normal or open circuit
2353	2791	6	Amber	Engine exhaust gas recirculation 1 (EGR1) valve control	EGR valve control circuit - current above normal or grounded circuit
2357	2791	7	Amber	Engine exhaust gas recirculation 1 (EGR1) valve control	EGR valve control circuit - mechanical system not responding or out of adjustment
6555	2791	7	None	Engine exhaust gas recirculation 1 (EGR1) valve control	EGR valve control circuit - mechanical system not responding or out of adjustment
1896	2791	13	Amber	Engine exhaust gas recirculation 1 (EGR1) valve control	EGR valve controller - out of calibration
1961	2791	15	Amber	Engine exhaust gas recirculation 1 (EGR1) valve control	EGR valve control circuit over temperature - data valid but above normal operating range - least severe level
1679	3031	2	Amber	Aftertreatment 1 diesel exhaust fluid tank temperature	Aftertreatment 1 diesel exhaust fluid tank temperature - data erratic, intermittent or incorrect
1678	3031	3	Amber	Aftertreatment 1 diesel exhaust fluid tank temperature	Aftertreatment 1 diesel exhaust fluid tank temperature sensor - voltage above normal, or shorted to high source
1677	3031	4	Amber	Aftertreatment 1 diesel exhaust fluid tank temperature	Aftertreatment 1 diesel exhaust fluid tank temperature sensor - voltage below normal, or shorted to low source

71. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[72]
6559	3031	4	None	Aftertreatment 1 diesel exhaust fluid tank temperature	Aftertreatment 1 diesel exhaust fluid tank temperature sensor - voltage below normal, or shorted to low source
4572	3031	9	Amber	Aftertreatment 1 diesel exhaust fluid tank temperature	Aftertreatment 1 diesel exhaust fluid tank temperature - abnormal update rate
3228	3216	2	Amber	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - data erratic, intermittent or incorrect
1885	3216	4	Amber	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor circuit - voltage below normal, or shorted to low source
3232	3216	9	Amber	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - abnormal update rate
3725	3216	10	Amber	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - abnormal rate of change
6621	3216	10	None	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - abnormal rate of change
3718	3216	13	Amber	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx - out of calibration
3748	3216	20	Amber	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - data not rational - drifted high
6458	3216	20	None	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - data not rational - drifted high
6459	3216	21	None	Aftertreatment 1 intake NOx	Aftertreatment 1 intake NOx sensor - data not rational - drifted high
3682	3218	2	Amber	Aftertreatment 1 intake gas sensor power status	Aftertreatment 1 intake NOx sensor power supply - data erratic, intermittent or incorrect
1694	3226	2	Amber	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - data erratic, intermittent or incorrect
6464	3226	2	None	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - data erratic, intermittent or incorrect
1887	3226	4	Amber	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor circuit - voltage below normal, or shorted to low source
6521	3226	4	None	Aftertreatment outlet NOx sensor circuits	Aftertreatment 1 outlet NOx sensor circuit - voltage below normal, or shorted to low source
2771	3226	9	Amber	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - abnormal update rate
3545	3226	10	Amber	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - abnormal rate of change

72. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[73]
6565	3226	10	None	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - abnormal rate of change
3717	3226	13	Amber	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - out of calibration
3749	3226	20	Amber	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - data not rational - drifted high
6462	3226	20	None	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - data not rational - drifted high
6463	3226	21	None	Aftertreatment 1 outlet NOx	Aftertreatment 1 outlet NOx sensor - data not rational - drifted high
3681	3228	2	Amber	Aftertreatment 1 outlet gas sensor power status	Aftertreatment 1 outlet NOx sensor power supply - data erratic, intermittent or incorrect
2976	3361	2	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit	Aftertreatment 1 diesel exhaust fluid dosing unit temperature - data erratic, intermittent or incorrect
3558	3361	3	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit	Aftertreatment 1 diesel exhaust fluid dosing unit - voltage above normal, or shorted to high source
3559	3361	4	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit	Aftertreatment 1 diesel exhaust fluid dosing unit - voltage below normal, or shorted to low source
1682	3362	31	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit input lines	Aftertreatment 1 diesel exhaust fluid dosing unit input lines - condition exists
1683	3363	3	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - voltage above normal, or shorted to high source
6479	3363	3	None	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - voltage above normal, or shorted to high source
1684	3363	4	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - voltage below normal, or shorted to low source
6481	3363	4	None	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - voltage below normal, or shorted to low source
3242	3363	7	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - mechanical system not responding or out of adjustment

73. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[74]
6475	3363	7	None	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - mechanical system not responding or out of adjustment
1713	3363	16	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - data valid but above normal operating range - moderately severe level
1712	3363	18	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - data valid but below normal operating range - moderately severe level
6476	3363	18	None	Aftertreatment 1 diesel exhaust fluid tank 1 heater	Aftertreatment 1 diesel exhaust fluid tank heater - data valid but below normal operating range - moderately severe level
3866	3364	1	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - data valid but below normal operational range - most severe level
3878	3364	2	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - data erratic, intermittent or incorrect
1686	3364	3	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality sensor circuit - voltage above normal, or shorted to high source
6493	3364	3	None	Electronic throttle control actuator driver circuit	Electronic throttle control actuator driver circuit -voltage above normal, or shorted to high source
1685	3364	4	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality sensor circuit - voltage below normal, or shorted to low source
6494	3364	4	None	Electronic throttle control actuator driver circuit	Electronic throttle control actuator driver circuit -voltage above normal, or shorted to low source
6496	3364	5	None	Electronic throttle control actuator driver circuit	Electronic throttle control actuator driver circuit - current below normal or open circuit
3876	3364	7	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality sensor - mechanical system not responding or out of adjustment
3868	3364	9	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - abnormal update rate

74. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[75]
4277	3364	10	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - abnormal rate of change
1715	3364	11	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - root cause not known
1714	3364	13	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - out of calibration
4842	3364	15	None	Aftertreatment diesel exhaust fluid quality	Aftertreatment diesel exhaust fluid quality - data valid but above normal operating range - least severe level
3867	3364	18	Amber	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - data valid but below normal operating range - moderate severe level
6752	3364	18	None	Aftertreatment 1 diesel exhaust fluid tank 1 quality	Aftertreatment diesel exhaust fluid quality - data valid but below normal operating range - moderate severe level
386	3509	3	Amber	Sensor supply voltage 1	Sensor supply 1 circuit - voltage above normal, or shorted to high source
352	3509	4	Amber	Sensor supply voltage 1	Sensor supply 1 circuit - voltage below normal, or shorted to low source
227	3510	3	Amber	Sensor supply voltage 2	Sensor supply 2 circuit - voltage above normal, or shorted to high source
187	3510	4	Amber	Sensor supply voltage 2	Sensor supply 2 circuit - voltage below normal, or shorted to low source
239	3511	3	Amber	Sensor supply voltage 3	Sensor supply 3 circuit - voltage above normal, or shorted to high source
238	3511	4	Amber	Sensor supply voltage 3	Sensor supply 3 circuit - voltage below normal, or shorted to low source
2185	3512	3	Amber	Sensor supply voltage 4	Sensor supply 4 circuit - voltage above normal, or shorted to high source
2186	3512	4	Amber	Sensor supply voltage 4	Sensor supply 4 circuit - voltage below normal, or shorted to low source
1695	3513	3	Amber	Sensor supply voltage 5	Sensor supply 5 - voltage above normal, or shorted to high source
1696	3513	4	Amber	Sensor supply voltage 5	Sensor supply 5 - voltage below normal, or shorted to low source

75. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[76]
515	3514	3	Amber	Sensor supply voltage 6	Sensor supply 6 circuit - voltage above normal, or shorted to high source
516	3514	4	Amber	Sensor supply voltage 6	Sensor supply 6 circuit - voltage below normal, or shorted to low source
4743	3515	5	Amber	Aftertreatment 1 diesel exhaust fluid temperature 2	Aftertreatment 1 diesel exhaust fluid temperature 2 sensor circuit - current below normal or open circuit
4744	3515	6	Amber	Aftertreatment 1 diesel exhaust fluid temperature 2	Aftertreatment 1 diesel exhaust fluid temperature 2 sensor circuit - current above normal or grounded
4243	3515	10	Amber	Aftertreatment 1 diesel exhaust fluid temperature 2	Aftertreatment 1 diesel exhaust fluid temperature 2 - abnormal rate of change
6619	3515	10	None	Aftertreatment 1 diesel exhaust fluid temperature 2	Aftertreatment 1 diesel exhaust fluid temperature 2 - abnormal rate of change
4745	3515	11	Amber	Aftertreatment 1 diesel exhaust fluid temperature 2	Aftertreatment 1 diesel exhaust fluid temperature 2 - root cause not known
4768	3521	11	Amber	Aftertreatment 1 diesel exhaust fluid property	Aftertreatment 1 diesel exhaust fluid property - root cause not known
1117	3597	2	None	ECU power output supply voltage #1	Power supply lost with ignition on - data erratic, intermittent or incorrect
351	3597	12	Amber	ECU power output supply voltage #1	Injector power supply - bad intelligent device or component
6499	3597	17	None	ECU power output supply voltage #1	ECU power output supply voltage 1 - data valid but below normal operating range - moderately severe level
1938	3597	18	Amber	ECU power output supply voltage #1	ECU power output supply voltage 1 - data valid but below normal operating range - moderately severe level
4213	3695	2	Amber	Aftertreatment regeneration inhibit switch	Aftertreatment regeneration inhibit switch - data erratic, intermittent or incorrect
6568	3695	2	None	Aftertreatment regeneration inhibit switch	Aftertreatment regeneration inhibit switch - data erratic, intermittent or incorrect
5938	3750	14	Amber	Diesel particulate filter 1 conditions not	Diesel particulate filter 1 conditions not met for active regeneration – condition exists

76. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[77]
				met for active regeneration	
3547	4096	31	Amber	NOx limits exceeded due to empty diesel exhaust fluid tank	Aftertreatment diesel exhaust fluid tank empty - condition exists
1427	4185	31	Amber	Overspeed shutdown relay driver	Overspeed shutdown relay driver diagnostic has detected an error - condition exists
1428	4186	31	Amber	Low oil pressure shutdown relay driver	Low oil pressure (LOP) shutdown relay driver diagnostic has detected an error - condition exists
1429	4187	31	Amber	High engine temperature shutdown relay driver	High engine temperature (HET) shutdown relay driver diagnostic has detected an error - condition exists
1431	4188	31	Amber	Pre-low oil pressure indicator relay driver	Pre-low oil pressure warning relay driver diagnostic has detected an error - condition exists
1432	4223	31	Amber	Pre-high engine temperature warning relay driver	Pre-high engine temperature warning relay driver diagnostic has detected an error - condition exists
3596	4334	2	Amber	Aftertreatment 1 diesel exhaust fluid doser absolute pressure	Aftertreatment 1 diesel exhaust fluid pressure sensor - data erratic, intermittent or incorrect
3571	4334	3	Amber	Aftertreatment 1 diesel exhaust fluid doser absolute pressure	Aftertreatment 1 diesel exhaust fluid pressure sensor - voltage above normal, or shorted to high source
3572	4334	4	Amber	Aftertreatment 1 diesel exhaust fluid doser absolute pressure	Aftertreatment 1 diesel exhaust fluid pressure sensor - voltage below normal, or shorted to low source
3575	4334	16	Amber	Aftertreatment 1 diesel exhaust fluid doser absolute pressure	Aftertreatment 1 diesel exhaust fluid pressure sensor - data valid but above normal operating range
3574	4334	18	Amber	Aftertreatment 1 diesel exhaust fluid doser absolute pressure	Aftertreatment 1 diesel exhaust fluid pressure sensor - data valid but below normal operating range

77. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[77]
4249	4337	10	Amber	Aftertreatment 1 diesel exhaust fluid dosing temperature	Aftertreatment 1 diesel exhaust fluid dosing temperature - abnormal rate of change
3237	4340	3	Amber	Aftertreatment 1 diesel exhaust fluid line heater 1 state	Aftertreatment 1 diesel exhaust fluid line heater 1 circuit - voltage above normal, or shorted to high source
6531	4340	3	None	Aftertreatment 1 diesel exhaust fluid line heater 1 state	Aftertreatment 1 diesel exhaust fluid line heater 1 circuit - voltage above normal, or shorted to high source
3238	4340	4	Amber	Aftertreatment 1 diesel exhaust fluid line heater 1 state	Aftertreatment 1 diesel exhaust fluid line heater 1 circuit - voltage below normal, or shorted to low source
6532	4340	4	None	Aftertreatment 1 diesel exhaust fluid line heater 1 state	Aftertreatment 1 diesel exhaust fluid line heater 1 circuit - voltage below normal, or shorted to low source
3258	4340	5	Amber	Aftertreatment 1 diesel exhaust fluid line heater 1 state	Aftertreatment 1 diesel exhaust fluid line heater 1 circuit - current below normal or open circuit
6482	4340	5	None	Aftertreatment 1 diesel exhaust fluid line heater 1 state	Aftertreatment 1 diesel exhaust fluid line heater 1 circuit - current below normal or open circuit
3239	4342	3	Amber	Aftertreatment 1 diesel exhaust fluid line heater 2 state	Aftertreatment 1 diesel exhaust fluid line heater 2 circuit - voltage above normal, or shorted to high source
6533	4342	3	None	Aftertreatment 1 diesel exhaust fluid line heater 2 state	Aftertreatment 1 diesel exhaust fluid line heater 2 circuit - voltage above normal, or shorted to high source
3241	4342	4	Amber	Aftertreatment 1 diesel exhaust fluid line heater 2 state	Aftertreatment 1 diesel exhaust fluid line heater 2 circuit - voltage below normal, or shorted to low source
6534	4342	4	None	Aftertreatment 1 diesel exhaust fluid line heater 2 state	Aftertreatment 1 diesel exhaust fluid line heater 2 circuit - voltage below normal, or shorted to low source
3261	4342	5	Amber	Aftertreatment 1 diesel exhaust fluid line heater 2 state	Aftertreatment 1 diesel exhaust fluid line heater 2 circuit - current below normal or open circuit
6483	4342	5	None	Aftertreatment 1 diesel exhaust fluid line heater 2 state	Aftertreatment 1 diesel exhaust fluid line heater 2 circuit - current below normal or open circuit
3422	4344	3	Amber	Aftertreatment 1 diesel exhaust fluid line heater 3 state	Aftertreatment diesel exhaust fluid line heater 3 circuit - voltage above normal, or shorted to high source

77. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[78]
6535	4344	3	Amber	Aftertreatment 1 diesel exhaust fluid line heater 3 state	Aftertreatment diesel exhaust fluid line heater 3 circuit - voltage above normal, or shorted to high source
3423	4344	4	Amber	Aftertreatment 1 diesel exhaust fluid line heater 3 state	Aftertreatment diesel exhaust fluid line heater 3 circuit - voltage below normal, or shorted to low source
6536	4344	4	Amber	Aftertreatment 1 diesel exhaust fluid line heater 3 state	Aftertreatment diesel exhaust fluid line heater 3 circuit - voltage below normal, or shorted to low source
3425	4344	5	Amber	Aftertreatment 1 diesel exhaust fluid line heater 3 state	Aftertreatment diesel exhaust fluid line heater 3 circuit - current below normal or open circuit
6484	4344	5	None	Aftertreatment 1 diesel exhaust fluid line heater 3 state	Aftertreatment diesel exhaust fluid line heater 3 circuit - current below normal or open circuit
3229	4360	0	Red	Aftertreatment 1 SCR catalyst intake gas temperature	Aftertreatment 1 SCR intake temperature - data valid but above normal operational range - most severe level
3144	4360	2	Amber	Aftertreatment 1 SCR catalyst intake gas temperature	Aftertreatment 1 SCR intake temperature sensor - data erratic, intermittent or incorrect
3142	4360	3	Amber	Aftertreatment 1 SCR catalyst intake gas temperature	Aftertreatment 1 SCR intake temperature sensor circuit - voltage above normal, or shorted to high source
3143	4360	4	Amber	Aftertreatment 1 SCR catalyst intake gas temperature	Aftertreatment 1 SCR intake temperature sensor circuit - voltage below normal, or shorted to low source
3164	4360	15	None	Aftertreatment 1 SCR catalyst intake gas temperature	Aftertreatment 1 SCR intake temperature - data valid but above normal operating range - least severe
3231	4360	16	Red	Aftertreatment 1 SCR catalyst intake gas temperature	Aftertreatment 1 SCR intake temperature - data valid but above normal operating range - moderately severe level
3165	4363	0	Red	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature - data valid but above normal operational range - most severe
3148	4363	2	Amber	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature sensor - data erratic, intermittent or incorrect

78. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[79]
3146	4363	3	Amber	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature sensor circuit - voltage above normal, or shorted to high source
6569	4363	3	None	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature sensor circuit - voltage above normal, or shorted to high source
3147	4363	4	Amber	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature sensor circuit - voltage below normal, or shorted to low source
6571	4363	4	None	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature sensor circuit - voltage below normal, or shorted to low source
3235	4363	16	Red	Aftertreatment 1 SCR catalyst outlet gas temperature	Aftertreatment 1 SCR outlet temperature - data valid but above normal operating range - moderately severe level
6517	4364	17	None	Aftertreatment 1 SCR conversion efficiency	Aftertreatment SCR catalyst conversion efficiency - data valid but below normal operating range - moderately severe level
3582	4364	18	Amber	Aftertreatment 1 SCR conversion efficiency	Aftertreatment SCR catalyst conversion efficiency - data valid but below normal operating range - moderately severe level
3577	4376	3	Amber	Aftertreatment 1 diesel exhaust fluid return valve	Aftertreatment diesel exhaust fluid return valve - voltage above normal, or shorted to high source
3578	4376	4	Amber	Aftertreatment 1 diesel exhaust fluid return valve	Aftertreatment diesel exhaust fluid return valve - voltage below normal, or shorted to low source
4157	4376	7	Amber	Aftertreatment 1 diesel exhaust fluid return valve	Aftertreatment diesel exhaust fluid return valve - mechanical system not responding or out of adjust
6527	4376	7	None	Aftertreatment 1 diesel exhaust fluid return valve	Aftertreatment diesel exhaust fluid return valve - mechanical system not responding or out of adjust
3315	4765	2	Amber	Aftertreatment diesel oxidation catalyst intake temperature	Aftertreatment 1 diesel oxidation catalyst intake temperature - data erratic, intermittent or incorrect
6539	4765	2	None	Aftertreatment diesel oxidation catalyst intake temperature	Aftertreatment 1 diesel oxidation catalyst intake temperature - data erratic, intermittent or incorrect

79. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[80]
3314	4765	3	Amber	Aftertreatment diesel oxidation catalyst intake temperature	Aftertreatment 1 diesel oxidation catalyst intake temperature sensor circuit - voltage above normal, or shorted to high source
3313	4765	4	Amber	Aftertreatment diesel oxidation catalyst intake temperature	Aftertreatment 1 diesel oxidation catalyst intake temperature sensor circuit - voltage below normal, or shorted to low source
3251	4765	16	Red	Aftertreatment diesel oxidation catalyst intake temperature	Aftertreatment 1 diesel oxidation catalyst intake temperature - data valid but above normal operating range
5387	4766	0	Red	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature - data valid but above normal operating range - most severe level
5386	4766	2	Amber	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature - data erratic, intermittent, or incorrect
4533	4766	3	Amber	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature sensor circuit	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature sensor circuit - voltage above normal, or shorted to high source
4534	4766	4	Amber	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature sensor circuit	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature sensor circuit - voltage below normal, or shorted to low source
5389	4766	15	Amber	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature - data valid but above normal operating range - least severe level
5388	4766	16	Red	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature	Aftertreatment 1 diesel oxidation catalyst outlet gas temperature - data valid but above normal operating range - moderately severe level
3751	4792	7	None	Aftertreatment SCR catalyst system	Aftertreatment SCR catalyst system - mechanical system not responding or out of adjustment
4585	4792	14	Red	Aftertreatment SCR catalyst system	Aftertreatment 1 SCR catalyst system - special instructions

80. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[81]
3151	4794	31	Amber	Aftertreatment 1 SCR catalyst system	Aftertreatment 1 SCR catalyst system missing - condition exists
1664	4796	31	Amber	Aftertreatment 1 diesel oxidation catalyst missing	Aftertreatment 1 diesel oxidation catalyst missing - condition exists
6726	4796	31	None	Aftertreatment 1 diesel oxidation catalyst missing	Aftertreatment 1 diesel oxidation catalyst missing - condition exists
2637	5018	11	None	Aftertreatment diesel oxidation catalyst	Aftertreatment 1 diesel oxidation catalyst face plugged - root cause not known
3649	5024	10	Amber	Aftertreatment 1 intake gas NOx sensor heater ratio	Aftertreatment 1 intake NOx sensor heater - abnormal rate of change
3583	5031	10	Amber	Aftertreatment 1 outlet gas NOx sensor heater ratio	Aftertreatment 1 outlet NOx sensor heater - abnormal rate of change
6581	5031	10	None	Aftertreatment 1 outlet gas NOx sensor heater ratio	Aftertreatment 1 outlet NOx sensor heater - abnormal rate of change
3419	5125	3	Amber	Sensor supply voltage 7	Sensor supply 7 circuit - voltage above normal, or shorted to high source
3421	5125	4	Amber	Sensor supply voltage 7	Sensor supply 7 circuit - voltage below normal, or shorted to low source
4863	5245	31	Amber	Aftertreatment selective catalytic reduction operator inducement active	Aftertreatment diesel exhaust fluid tank low level indicator
3712	5246	0	Red	Aftertreatment SCR operator inducement severity	Aftertreatment SCR operator inducement - data valid but above normal operational range - most severe level
2638	5298	17	None –Amber QSF3.8	Aftertreatment 1 diesel oxidation catalyst conversion efficiency	Aftertreatment 1 diesel oxidation catalyst conversion efficiency - data valid but below normal operating range - moderately severe level
1691	5298	18	Amber	Aftertreatment 1 diesel oxidation catalyst conversion efficiency	Aftertreatment 1 diesel oxidation catalyst conversion efficiency - data valid but below normal operating range - moderately severe level

81. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[82]
3755	5394	2	None	Aftertreatment diesel exhaust fluid dosing valve	Aftertreatment diesel exhaust fluid dosing valve - data erratic, intermittent or incorrect
3567	5394	5	Amber	Aftertreatment diesel exhaust fluid dosing valve	Aftertreatment diesel exhaust fluid dosing valve - current below normal or open circuit
3568	5394	7	Amber	Aftertreatment diesel exhaust fluid dosing valve	Aftertreatment diesel exhaust fluid dosing valve - mechanical system not responding or out of adjustment
3633	5484	3	Amber	Engine fan clutch 2 output device driver	Engine fan clutch 2 control circuit - voltage above normal, or shorted to high source
6456	5484	3	None	Engine fan clutch 2 output device driver	Engine fan clutch 2 control circuit - voltage above normal, or shorted to high source
3634	5484	4	Amber	Engine fan clutch 2 output device driver	Engine fan clutch 2 control circuit - voltage below normal, or shorted to low source
6457	5484	4	None	Engine fan clutch 2 output device driver	Engine fan clutch 2 control circuit - voltage below normal, or shorted to low source
3562	5491	3	Amber	Aftertreatment 1 diesel exhaust fluid line heater relay	Aftertreatment diesel exhaust fluid line heater relay - voltage above normal, or shorted to high source
6477	5491	3	None	Aftertreatment 1 diesel exhaust fluid line heater relay	Aftertreatment diesel exhaust fluid line heater relay - voltage above normal, or shorted to high source
3563	5491	4	Amber	Aftertreatment 1 diesel exhaust fluid line heater relay	Aftertreatment diesel exhaust fluid line heater relay - voltage below normal, or shorted to low source
6478	5491	4	None	Aftertreatment 1 diesel exhaust fluid line heater relay	Aftertreatment diesel exhaust fluid line heater relay - voltage below normal, or shorted to low source
6537	5491	7	None	Aftertreatment 1 diesel exhaust fluid line heater relay	Aftertreatment 1 diesel exhaust fluid line heater relay - mechanical system not responding or out of adjustment
3741	5571	0	Amber	High pressure common rail fuel pressure relief valve	High pressure common rail fuel pressure relief valve - data valid but above normal operational range
3727	5571	7	None	High pressure common rail fuel pressure relief valve	High pressure common rail fuel pressure relief valve - mechanical system not responding or out of adjustment

82. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[83]
5585	5571	15	Amber	High pressure common rail fuel pressure relief valve	High pressure common rail fuel pressure relief valve - data valid but above normal operating range - least severe level
4158	5742	12	Amber	Aftertreatment diesel particulate filter temperature sensor module	Aftertreatment diesel particulate filter temperature sensor module - bad intelligent device or component
4164	5743	3	Amber	Aftertreatment selective catalytic reduction temperature sensor module	Aftertreatment selective catalytic reduction temperature sensor module - voltage above normal, or shorted to high source
4165	5743	4	Amber	Aftertreatment selective catalytic reduction temperature sensor module	Aftertreatment selective catalytic reduction temperature sensor module - voltage below normal, or shorted to low source
4152	5743	9	Amber	Aftertreatment selective catalytic reduction temperature sensor module	Aftertreatment selective catalytic reduction temperature sensor module - abnormal update rate
4261	5743	11	Amber	Aftertreatment selective catalytic reduction temperature sensor module	Aftertreatment selective catalytic reduction temperature sensor module - root cause not known
4159	5743	12	Amber	Aftertreatment selective catalytic reduction temperature sensor module	Aftertreatment selective catalytic reduction temperature sensor module - bad intelligent device or component
4166	5743	16	Amber	Aftertreatment selective catalytic reduction temperature sensor module	Aftertreatment selective catalytic reduction temperature sensor module - data valid but above normal
4168	5745	3	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit heater	Aftertreatment 1 diesel exhaust fluid dosing unit heater - voltage above normal, or shorted to high
4169	5745	4	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit heater	Aftertreatment 1 diesel exhaust fluid dosing unit heater - voltage below normal, or shorted to low source

83. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[84]
6513	5745	17	None	Aftertreatment 1 diesel exhaust fluid dosing unit heater	Aftertreatment 1 diesel exhaust fluid dosing unit heater - data valid but below normal operating range
4171	5745	18	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit heater	Aftertreatment 1 diesel exhaust fluid dosing unit heater - data valid but below normal operating range
4155	5746	3	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit heater relay	Aftertreatment 1 diesel exhaust fluid dosing unit heater relay - voltage above normal, or shorted to high source
6529	5746	3	None	Aftertreatment 1 diesel exhaust fluid dosing unit heater relay	Aftertreatment 1 diesel exhaust fluid dosing unit heater relay - voltage above normal, or shorted to high source
4156	5746	4	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit heater relay	Aftertreatment 1 diesel exhaust fluid dosing unit heater relay - voltage below normal, or shorted to low source
4251	5798	10	Amber	Aftertreatment 1 diesel exhaust fluid dosing unit heater temperature	Aftertreatment 1 diesel exhaust fluid dosing unit heater temperature - abnormal rate of change
6511	6655	3	None	ECU power lamp	Maintain ECU power lamp - voltage above normal, or shorted to high source
6512	6655	4	None	ECU power lamp	Maintain ECU power lamp - voltage below normal, or shorted to low source
6473	6799	2	None	Engine fan blade pitch	Fan blade pitch – data erratic, intermittent, or incorrect
5183	6799	3	Amber	Engine fan blade pitch	Fan blade pitch position sensor circuit - voltage above normal, or shorted to high source
6471	6799	3	None	Engine fan blade pitch	Fan blade pitch position sensor circuit - voltage above normal, or shorted to high source
5184	6799	4	Amber	Engine fan blade pitch	Fan blade pitch position sensor circuit - voltage below normal, or shorted to low source
6472	6799	4	None	Engine fan blade pitch	Fan blade pitch position sensor circuit - voltage below normal, or shorted to low source
5185	6799	7	Amber	Engine fan blade pitch	Fan blade pitch - mechanical system not responding or out of adjustment
5278	6802	31	Amber	Engine fan blade pitch	Aftertreatment 1 diesel exhaust fluid dosing system frozen - condition exists

84. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[85]
5653	6881	9	Amber	SCR operator inducement override switch	SCR operator inducement override switch - abnormal update rate
5654	6881	13	Amber	SCR operator inducement override switch	SCR operator inducement override switch - out of calibration
5393	6882	3	Amber	Aftertreatment diesel oxidation catalyst temperature sensor module	Aftertreatment diesel oxidation catalyst temperature sensor module - voltage above normal or shorted to high source
5394	6882	4	Amber	Aftertreatment diesel oxidation catalyst temperature sensor module	Aftertreatment diesel oxidation catalyst temperature sensor module - voltage below normal or shorted to low source
5391	6882	9	Amber	Aftertreatment diesel oxidation catalyst temperature sensor module	Aftertreatment diesel oxidation catalyst temperature sensor module - abnormal update rate
5395	6882	11	Amber	Aftertreatment diesel oxidation catalyst temperature sensor module	Aftertreatment diesel oxidation catalyst temperature sensor module - root cause not known
5392	6882	12	Amber	Aftertreatment diesel oxidation catalyst temperature sensor module	Aftertreatment diesel oxidation catalyst temperature sensor module - bad intelligent device or component
5396	6882	16	Amber	Aftertreatment diesel oxidation catalyst temperature sensor module	Aftertreatment diesel oxidation catalyst temperature sensor module - data valid but above normal operating range - moderately severe level
5632	6918	31	Maintenance	SCR system cleaning inhibited due to inhibit switch	SCR system cleaning inhibited due to inhibit switch - condition exists
5631	6928	31	None	SCR system cleaning inhibited due to system timeout	SCR system cleaning inhibited due to system timeout - condition exists
6597	6928	31	Amber	SCR system cleaning inhibited due to system timeout	SCR system cleaning inhibited due to system timeout - condition exists

85. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

Table 8.19 Engine Error Codes (continued)

Fault Code	J1939 SPN	J1939 FMI	Lamp	J1939 SPN Description	Cummins Description[86]
6634	7848	14	Amber	Aftertreatment 1 SCR system conditions not met for active cleaning	Aftertreatment 1 SCR system conditions not met for active cleaning - special instructions
5939	520968	9	Amber		Machine constrained operation - abnormal update rate. No communication or an invalid data transfer rate has been detected on the J1939 data link between the ECM and the machine electronic control unit.
5941	520968	19	None		Machine constrained operation - received network data in error. The received J1939 datalink message was not valid.
5617	524286	31	Amber	Aftertreatment 1 diesel oxidation catalyst system	Aftertreatment 1 diesel oxidation catalyst system - special instruction

86. The descriptions of Cummins J1939 SPN codes are subject to change at their discretion.

8.5 Diesel Exhaust Fluid (DEF) Supply Module Fault Codes

SPN	FMI	Description	
3361	2	DEF dosing unit temperature	Data erratic, intermittent, or incorrect
3361	3	DEF dosing unit	Voltage above normal or shorted to high source
3559	4	DEF dosing unit	Voltage below normal or shorted to low source
4094	31		Nox limits exceeded due to insufficient reagent quality—condition exists
4334	3	DEF pressure sensor	Voltage above normal or shorted to high source
4334	4	DEF pressure sensor	Voltage below normal or shorted to low source
4334	16	DEF pressure sensor	Data valid but above normal operating range
4334	18	DEF pressure sensor	Data valid but below normal operating range
4337	3	DEF dosing temperature sensor	Voltage above normal or shorted to high
4337	4	DEF dosing temperature sensor	Voltage below normal or shorted to low
4337	10	DEF dosing temperature	Abnormal rate of change
4376	3	DEF return valve	Voltage above normal or shorted to high source
4376	4	DEF return valve	Voltage below normal or shorted to low source
4376	7	DEF return valve	Mechanical system not responding or out of adjustment
5394	7	DEF dosing valve	Mechanical system not responding or out of adjustment
5745	3	DEF dosing unit heater	Voltage above normal or shorted to high source
5745	4	DEF dosing unit heater	Voltage below normal or shorted to low source
5745	18	DEF dosing unit heater	Data valid but below normal operating range
5746	3	DEF dosing unit heater relay	Voltage above normal or shorted to high source
5746	4	DEF dosing unit heater relay	Voltage below normal or shorted to low source
5798	2	DEF dosing unit heater temperature	Data erratic, intermittent, or incorrect
5798	10	DEF dosing unit heater temperature	Abnormal rate of change

8.6 Diesel Exhaust Fluid (DEF) Tank and Sensor Associated Fault Codes

SPN	FMI	Description	
1761	1	DEF tank level	data valid but below normal operating range—most severe level
1761	2	DEF tank level	data erratic, intermittent, or incorrect
1761	3	DEF tank level sensor circuit	voltage above normal or shorted to high source
1761	4	DEF tank level sensor circuit	voltage below normal or shorted to low source
1761	5	DEF tank level sensor circuit	current below normal or open circuit
1761	6	DEF tank level	current above normal or grounded circuit
1761	10	DEF tank level	abnormal rate of change
1761	11	DEF tank level	root cause not known
1761	13	DEF tank level	out of calibration
1761	17	DEF tank level	data valid but below normal operating range—least severe level
1761	18	DEF tank level	data valid but below normal operating range—moderately severe level
3031	2	DEF tank temperature sensor	data erratic, intermittent, or incorrect
3031	3	DEF tank temperature sensor	voltage above normal or shorted to high source
3031	4	DEF tank temperature sensor	voltage below normal or shorted to low source
3031	5	DEF tank temperature sensor	current below normal or open circuit
3031	6	DEF tank temperature sensor	current above normal or grounded circuit
3031	9	DEF tank temperature sensor	abnormal update rate
3031	11	DEF tank temperature	root cause not known
3031	13	DEF tank temperature sensor	out of calibration
3363	3	DEF tank heater	voltage above normal or shorted to high source
3363	4	DEF tank heater	voltage below normal or shorted to low source
3363	7	DEF tank heater	mechanical system not responding or out of adjustment
3363	16	DEF tank heater	data valid but above normal operating range—moderately severe level

SPN	FMI	Description	
3363	18	DEF tank heater	data valid but below normal operating range—moderately severe level
3364	1	DEF tank quality sensor	data valid but below normal operating range—most severe level
3364	2	DEF tank quality sensor	data erratic, intermittent, or incorrect
3364	3	DEF tank quality sensor	voltage above normal or shorted to high source
3364	4	DEF tank quality sensor	voltage below normal or shorted to low source
3364	5	DEF tank quality sensor	current below normal or open circuit
3364	6	DEF tank quality sensor	current above normal or grounded circuit
3364	7	DEF tank quality sensor	mechanical system not responding or out of adjustment
3364	9	DEF tank quality sensor	abnormal update rate
3364	10	DEF tank quality sensor	abnormal rate of change
3364	11	DEF tank quality sensor	root cause not known
3364	12	DEF tank quality sensor	bad intelligent device or component
3364	13	DEF tank quality sensor	out of calibration
3364	18	DEF tank quality sensor	data valid but below normal operating range—moderately severe
4094	31		NOx limits exceeded due to insufficient regent quality—condition exists
4096	31		DEF tank empty—condition exists

8.7 Cab Display Module (CDM) / Windrower Control Module (WCM) Error Codes

8.7.1 Cab Display Module (CDM) Error Codes

The CDM displays error codes when there is a fault with one of the sensors that monitor and control windrower operation. Use the list of error codes to help identify a specific problem with the windrower.

NOTE:

In the case of dual codes being shown for an item (primarily the solenoid valves), the first code indicates a SHORT CIRCUIT condition, while the second code indicates an OPEN CIRCUIT condition. That is, E41 would be a SHORT in the reel aft solenoids (P55, P59), while E141 would indicate an OPEN circuit.

Codes		CDM Display	Description
E1			
E2		RTCH NOT ALLOWED	Return to cut height activated with the header off.
E3		CDM CANBUS ERROR	CANBUS error with CDM. Check electrical connections.
E4		HDR DRV NOT ALLOWED	Header engage switch activated while in engine-forward.
E5		CHECK HEADER ID	Header ID change has been detected while the header was engaged.
E6		TEMP GAUGE SHORT	Wiring/connection problem.
E7		SPEED STICK SHORT	Wiring/connection problem.
E8		HEADER ENABLE SHORT	Wiring/connection problem.
E9		WCM ENABLE SHORT	Wiring/connection problem.
E10		CDMI NTERNAL ERROR	Internal hardware or software problem.
E11		CDM POWER UP	CDM did not power up correctly.
E12		WCM POWER UP	WCM did not power up correctly.
E13		FUEL SOLENOID	WCM fuel solenoid output fault detected.
E14			
E15		KNIFE DRIVE PWM P68	Knife drive—PWM solenoid P68 drive fault detected.
E16		DRAPER DRV PWM P69	Draper drive—PWM solenoid P69 drive fault detected.
E17		REEL DRIVE PWM P70	Reel drive—PWM solenoid P70 drive fault detected.
E18			
E19	E119	LOAD SENSE P75	Disc block valve—Solenoid P75 drive fault detected—short circuit/open circuit
E20			
E21	E121	REVERSER P106	Reverser solenoid P106 fault detected—short circuit/open circuit
E22			
E23	E123	REVERSER	Reverser solenoids (P65,P66,P67) fault detected—short circuit/open circuit

Codes		CDM Display	Description
E24	E124	DECK SHFT RIGHT P95	Right deck shift solenoid P95 fault detected—short circuit/ open circuit
E25	E125	DECK SHFT LEFT P96	Left deck shift solenoid P96 fault detected—short circuit/open circuit
E26	E126	DWA UP	DWA raise solenoid P72, P73 fault detected—short circuit/ open circuit
E27	E127	DWA DOWN	DWA lower solenoid P72, P73 fault detected—short circuit/ open circuit
E28	E128	TILT RETRACT	Header tilt retract solenoid P54 fault detected—short circuit/ open circuit
E29	E129	TILT EXTEND	Header tilt extend solenoid P53, P54 fault detected—short circuit/open circuit
E30	E130	4 WAY VALVE P62	Four-way valve solenoid P62 fault detected—short circuit/ open circuit
E31	E131	BYPASS VALVE P52	Bypass valve solenoid P52 fault detected—short circuit/open circuit
E32	E132	HEADER UP/DOWN P57	Header up/down solenoid P57 fault detected—short circuit/ open circuit
E33	E133	SCREEN CLEANERS	Screen cleaner output fault detected—short circuit/open circuit
E34	E134	RIGHT STOP LAMP	Right stop lamp output fault detected—short circuit/open circuit
E35	E135	LEFT STOP LAMP	Left stop lamp output fault detected—short circuit/open circuit
E36	E136	RIGHT TURN LAMP	Right turn lamp output fault detected—short circuit/open circuit
E37	E137	LEFT TURN LAMP	Left turn lamp output fault detected—short circuit/open circuit
E38	E138	MAIND RIVE	Main header drive solenoid P71 fault detected—short circuit/ open circuit
E39	E139	LOW RANGE P61	Low range solenoid P61 fault detected—short circuit/open circuit
E40	E140	HIGH RANGE P60	High range solenoid P60 fault detected—short circuit/open circuit
E41	E141	REEL AFT	Reel aft solenoid P55, P59 fault detected—short circuit/open circuit
E42	E142	REEL FORE	Reel fore solenoid P55, P59 fault detected—short circuit/ open circuit
E43	E143	REEL UP/DOWN P58	Reel up/down solenoid P58 fault detected—short circuit/open circuit
E44	E144	FLOAT RHS P64	Right float solenoid P64 fault detected—short circuit/open circuit
E45	E145	FLOAT LHS P63	Left float solenoid P63 fault detected—short circuit/open circuit

Codes		CDM Display	Description
E46		SENSOR VOLTS HIGH	WCM's 9V sensor voltage output high (wire 5)
E47		SENSOR VOLTS LOW	WCM's 9V sensor voltage output low (wire 5)
E48		WCM OVER TEMP	WCM over temp fault.
E49		WCM LOW TEMP	WCM low temp fault.
E50		BATT + OUT OF RANGE	System voltage above 15.5 VDC.
E51	E151	DISK DRIVE PWM P68	Disk header drive solenoid P68 fault detected—short circuit/ open circuit
E52			
E53			
E54			
E55		DISK SPD OVERLOAD	Low disk speed detected < setpoint
Error codes E56 to E63 not allocated			
E64		HEADER OIL PRESSURE	Header drive charge pressure low (switch 228 on hydraulic schematic)
E65		KNIFE OVERLOAD	Low knife speed detected < setpoint
E66		##.# LOW VOLTS	Low system voltage <11.5 VDC
E67		TRANS OIL PRESSURE	Supercharge pressure low (switch 202 on hydraulic schematic)
E68		HYDRAULIC OIL HOT	Oil tank temp >230 deg F / 110 deg C
E69		ENGINE AIR FILTER	Engine air filter plugged
E70		HYDRAULIC FILTER	Hydraulic filture pressure too high (switch 227 on hydraulic schematic)
E71		LOW HYDRAULIC OIL	Low hydraulic oil level sensor tripped (switch 225 on hydraulic schematic)
E72		##.# HIGH VOLTS	System voltage above 15.5 VDC.
Error codes E73 to E100 not allocated			
E101		SPI ERROR	Internal error
E102		CAN ERROR	J1939 Can error
E103		EEPROM READ ERROR	Internal error
E104		EEPROM WRITE ERROR	Internal error
E105		TEMP SENSOR ERROR	Internal temperature sensor error.

8.7.2 Miscellaneous Information / Error Codes

CDM Display	Description
ENGINE OIL PRESSURE	Engine oil pressure warning
ENGINE TEMPERATURE	Engine coolant temperature warning
CANBUSS ERROR	J1939 Can error
KNIFE SPD OVERLOAD	Low knife speed detected (less than programmed overload speed)
NO OPERATOR	Operator not detected in seat (~3 second delay before message)
NO HEADER	No header ID detected—not hooked up or wiring error
LOCK SEAT BASE	Seat base not detected in either cab- or engine-forward position
DISENGAGE HEADER	Header engage switch ON when ignition turned ON
xxxxS xxF xxC	Engine error code configuration (CANBUS)—refer to *8.4 Engine Error Codes, page 467*
CENTER STEERING	GSL or pintle switches not closed with the key ON/engine OFF
NOT IN PARK	GSL or pintle switches not closed with the key ON/engine OFF
BRAKE ON	Engine running GSL out of PARK brake is still engaged
PLACE GSL INTO "N"	GSL or pintle switches not closed with the key ON/engine OFF
BRAKE SW FAILURE	Ignition on/engine not running—brake switch and relay closed
BRAKE OFF	Engine running, GSL in N-DETENT— brake pressure switch or brake switch relay fault
CHECK SEAT SWITCHES	System detects that both seat switches are active
CAB FORWARD SW ON	If both switches are to be activated than the display
ENG FORWARD SW ON	Will alternate between these messages

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Lubricants, Fluids, and System Capacities

CAUTION

To avoid injury or death, do NOT allow ANY machine fluids to enter the body.

Lubricant/Fluid	Location	Description	Capacity
Diesel exhaust fluid (DEF)	Diesel exhaust fluid tank	Must meet ISO 22241 requirements	29 liters (7.5 US gallons)
Grease	As required unless otherwise specified	SAE multi-purpose high temperature extreme pressure (EP2) performance with 1% max Molybdenum Disulphide (NLGI Grade 2) lithium base	—
Diesel fuel	Fuel tank	Ultra low sulphur diesel (ULSD) Grade No.2, or ULSD Grade No.1 and 2 mix[87]; refer to *8.1.2 Fuel Specifications, page 451* for more information	378 liters (97 US gallons)
Hydraulic oil	Hydraulic reservoir	SAE 15W-40 compliant with SAE specs for API class SJ and CH-4 engine oil.	65 liters (17.2 US gallons)
Gear lubricant	Gearbox	SAE 80W-140[88], API service class GL-5. Fully synthetic gear lubricant, (SAE J2360 preferred)	2.1 liters (2.2 US quarts)
Gear lubricant	Wheel drive[89]	SAE 75W-90, API service class GL-5. Fully synthetic gear lubricant, (SAE J2360 preferred)	1.4 liters (1.5 US quarts)
Antifreeze	Engine cooling system	ASTM D-6210 and Fleetguard ES Compleat®; refer to *8.1.3 Lubricants, Fluids, and System Capacities, page 452*	27.5 liters (7.3 US gallons)[90]
Engine oil	Engine oil pan	SAE 15W-40 compliant with SAE specs for API class SJ and CJ-4 engine oil	11 liters (11.6 US quarts)
Air conditioning refrigerant	Air conditioning system	R134A	2.27 kg (5 lb.)
Air conditioning refrigerant oil[91]	Air conditioning system total capacity	PAG SP-15	240 cc (8.1 fl. oz.)

87. Optional when operating temperature is below 0°C (32°F).
88. SAE 75W-140 may be substituted for SAE 80W-140 if necessary.
89. SAE 85W-140 API Service Class GL-5. Extreme Pressure Gear Lubricant is used before initial change.
90. Equal parts with water, high quality, soft, de-ionized or distilled water as recommended by Supplier.
91. New compressor (MD #203013) comes filled.

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