MacDon

M1170*NT5*
Windrower

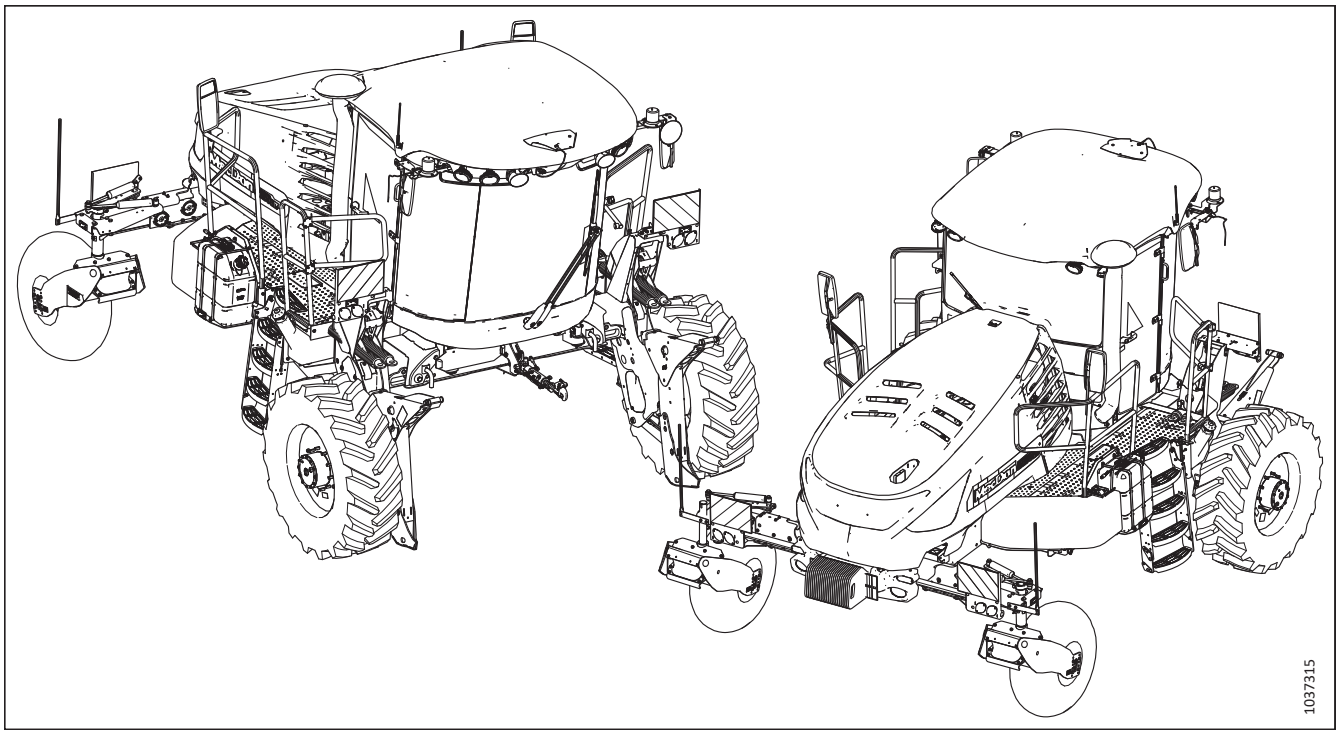
Operator's Manual

215922 Revision A

Original Instruction

The Harvesting Specialists.

This manual contains instructions for safety, operation, maintenance, and service for the MacDon M1170*NT5* Windrower, featuring Dual Direction® and CrossFlex™ rear suspension.



Published April 2022

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Declaration of Conformity

EC Declaration of Conformity

[1] MacDon

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

[2] Windrower

[3] MacDon M1170*NT5*

[4] As per Shipping Document

[5] June 11, 2021

[6] _____
Adrienne Tankeu
Product Integrity

EN

We, [1]

Declare, that the product:

Machine Type: [2]

Name & Model: [3]

Serial Number(s): [4]

fulfils all the relevant provisions of the Directive 2006/42/EC.

Harmonized standards used, as referred to in Article 7(2):

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

Place and date of declaration: [5]

Identity and signature of the person empowered to draw up the declaration: [6]

Name and address of the person authorized to compile the technical file:

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

BG

Ние, [1]

декларираме, че следният продукт:

Тип машина: [2]

Наименование и модел: [3]

Сериен номер(а) [4]

отговаря на всички приложими разпоредби на директива 2006/42/ЕО.

Използвани са следните хармонизирани стандарти според чл. 7(2):

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

Място и дата на декларацията: [5]

Име и подпис на лицето, упълномощено да изготви декларацията: [6]

Име и адрес на лицето, упълномощено да състави техническия файл:

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

CZ

My, [1]

Prohlašujeme, že produkt:

Typ zařízení: [2]

Název a model: [3]

Sériové(á) číslo)a): [4]

splňuje všechna relevantní ustanovení směrnice 2006/42/EC.

Byly použity harmonizované standardy, jak je uvedeno v článku 7(2):

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

Místo a datum prohlášení: [5]

Identita a podpis osoby oprávněné k vydání prohlášení: [6]

Jméno a adresa osoby oprávněné k vyplnění technického souboru:

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

DA

Vi, [1]

erklærer, at prduktet:

Maskintype [2]

Navn og model: [3]

Serienummer (-numre): [4]

Opfylder alle bestemmelser i direktiv 2006/42/EF.

Anvendte harmoniserede standarder, som henvist til i paragraf 7(2):

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

Sted og dato for erklæringen: [5]

Identitet på og underskrift fra den person, som er bemyndiget til at udarbejde erklæringen: [6]

Navn og adresse på den person, som er bemyndiget til at udarbejde den tekniske fil:

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

DE

Wir, [1]

Erklären hiermit, dass das Produkt:

Maschinentyp: [2]

Name & Modell: [3]

Seriennummer (n): [4]

alle relevanten Vorschriften der Richtlinie 2006/42/EG erfüllt.

Harmonisierte Standards wurden, wie in folgenden Artikeln angegeben, verwendet 7(2):

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

Ort und Datum der Erklärung: [5]

Name und Unterschrift der Person, die dazu befugt ist, die Erklärung auszustellen: [6]

Name und Anschrift der Person, die dazu berechtigt ist, die technischen Unterlagen zu erstellen:

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

ES

Nosotros [1]

declaramos que el producto:

Tipo de máquina: [2]

Nombre y modelo: [3]

Números de serie: [4]

cumple con todas las disposiciones pertinentes de la directriz 2006/42/EC.

Se utilizaron normas armonizadas, según lo dispuesto en el artículo 7(2):

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

Lugar y fecha de la declaración: [5]

Identidad y firma de la persona facultada para draw redactar la declaración: [6]

Nombre y dirección de la persona autorizada para elaborar el expediente técnico:

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

ET

Meie, [1]

deklareerime, et toode

Seadme tüüp: [2]

Nimi ja mudel: [3]

Seerianumbrid: [4]

vastab kõigile direktiivi 2006/42/EÜ asjakohastele sätetele.

Kasutatud on järgnevaid harmoniseeritud standardeid, millele on viidatud ka punktis 7(2):

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

Deklaratsiooni koht ja kuupäev: [5]

Deklaratsiooni koostamiseks volitatud isiku nimi ja allkiri: [6]

Tehnilise dokumendi koostamiseks volitatud isiku nimi ja aadress:

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

FR

Nous soussignés, [1]

Déclarons que le produit :

Type de machine : [2]

Nom et modèle : [3]

Numéro(s) de série : [4]

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

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

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

Lieu et date de la déclaration : [5]

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

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

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

1037097

The Harvesting Specialists MacDon

EC Declaration of Conformity

IT

Noi, [1]

Dichiariamo che il prodotto:

Tipo di macchina: [2]

Nome e modello: [3]

Numero(i) di serie: [4]

soddisfa tutte le disposizioni rilevanti della direttiva 2006/42/CE.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Luogo e data della dichiarazione: [5]

Nome e firma della persona autorizzata a redigere la dichiarazione: [6]

Nome e persona autorizzata a compilare il file tecnico:

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

HU

Mi, [1]

Ezennel kijelentjük, hogy a következő termék:

Gép típusa: [2]

Név és modell: [3]

Szériaszám(ok): [4]

teljesíti a következő irányelv összes vonatkozó előírásait: 2006/42/EK.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

A nyilatkozattétel ideje és helye: [5]

Azon személy kiléte és aláírása, aki jogosult a nyilatkozat elkészítésére: [6]

Azon személy neve és aláírása, aki felhatalmazott a műszaki dokumentáció összeállítására:

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

LT

Mes, [1]

Pareiškiame, kad šis produktas:

Mašinos tipas: [2]

Pavadinimas ir modelis: [3]

Serijos numeris (-iai): [4]

atitinka taikomus reikalavimus pagal Direktyvą 2006/42/EB.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Deklaracijos vieta ir data: [5]

Asmens tapatybės duomenys ir parašas asmens, įgalioto sudaryti šią deklaraciją: [6]

Vardas ir pavardė asmens, kuris įgaliotas sudaryti šį techninį failą:

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

LV

Mēs, [1]

Deklarējam, ka produkts:

Mašīnas tips: [2]

Nosaukums un modelis: [3]

Sērijas numurs(-i): [4]

Atbilst visām būtiskajām Direktīvas 2006/42/EK prasībām.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Deklarācijas parakstīšanas vieta un datums: [5]

Tās personas vārds, uzvārds un paraksts, kas ir pilnvarota sagatavot šo deklarāciju: [6]

Tās personas vārds, uzvārds un adrese, kas ir pilnvarota sastādīt tehnisko dokumentāciju:

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

NL

Wij, [1]

Verklaren dat het product:

Machinetype: [2]

Naam en model: [3]

Serienummer(s): [4]

voldoet aan alle relevante bepalingen van de Richtlijn 2006/42/EC.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Plaats en datum van verklaring: [5]

Naam en handtekening van de bevoegde persoon om de verklaring op te stellen: [6]

Naam en adres van de geautoriseerde persoon om het technisch dossier samen te stellen:

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

PO

My niżej podpisani, [1]

Oświadczamy, że produkt:

Typ urządzenia: [2]

Nazwa i model: [3]

Numer seryjny/numery seryjne: [4]

spełnia wszystkie odpowiednie przepisy dyrektywy 2006/42/WE.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Data i miejsce oświadczenia: [5]

Imię i nazwisko oraz podpis osoby upoważnionej do przygotowania deklaracji: [6]

Imię i nazwisko oraz adres osoby upoważnionej do przygotowania dokumentacji technicznej:

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

PT

Nós, [1]

Declaramos, que o produto:

Tipo de máquina: [2]

Nome e Modelo: [3]

Número(s) de Série: [4]

cumpre todas as disposições relevantes da Directiva 2006/42/CE.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Local e data da declaração: [5]

Identidade e assinatura da pessoa autorizada a elaborar a declaração: [6]

Nome e endereço da pessoa autorizada a compilar o ficheiro técnico:

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

RO

Noi, [1]

Declarăm, că următorul produs:

Tipul mașinii: [2]

Denumirea și modelul: [3]

Număr (numere) serie: [4]

corespunde tuturor dispozițiilor esențiale ale directivei 2006/42/EC.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Data și locul declarației: [5]

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

Numele și semnătura persoanei autorizate pentru întocmirea cărții tehnice:

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

SR

Mi, [1]

Izjavljujemo da proizvod

Tip mašine: [2]

Naziv i model: [3]

Serijski broj(evi): [4]

Ispunjava sve relevantne odredbe direktive 2006/42/EC.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Datum i mesto izdavanja deklaracije: [5]

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

Ime i adresa osobe ovlašæene za sastavljanje tehnièke datoteke:

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

SV

Vi, [1]

Intygar att produkten:

Maskintyp: [2]

Namn och modell: [3]

Serienummer: [4]

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

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Plats och datum för intyget: [5]

Identitet och signatur för person med befogenhet att upprätta intyget: [6]

Namn och adress för person behörig att upprätta den tekniska dokumentationen:

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

SL

Mi, [1]

izjavljamo, da izdelek:

Vrsta stroja: [2]

Ime in model: [3]

Serijska/-e številka/-e: [4]

ustreza vsem zadevnim določbam Direktive 2006/42/ES.

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Kraj in datum izjave: [5]

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

Ime in naslov osebe, pooblaščene za pripravo tehnične datoteke:

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

SK

My, [1]

týmto prehlasujeme, že tento výrobok:

Typ zariadenia: [2]

Názov a model: [3]

Výrobné číslo: [4]

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

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

EN ISO 4254-1:2013

EN ISO 4254-7:2009

Miesto a dátum prehlásenia: [5]

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

Meno a adresa osoby oprávnenej zostaviť technický súbor:

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

1037097

Introduction

This instruction manual contains information on the MacDon M1170*NT5* Windrower, which when coupled with one of MacDon's D1XL Series Draper Headers or D1X Series Draper Headers provides a package designed to cut and lay a variety of crops into fluffy, uniform windrows.

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

Use this manual as your first source of information about the machine. If you follow the instructions provided, it will work well for many years. Contact your Dealer if you need assistance, information, or additional copies of this manual.

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

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

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

The following conventions are used in this document:

- The M1170*NT5* Windrower is Dual Direction®, meaning the windrower can be driven in cab-forward or engine-forward modes. Right and left designations are therefore determined from 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.
- Unless otherwise noted, use the standard torque values provided in Chapter *8.1 Torque Specifications, page 399* of this document.

Keep this manual handy for frequent reference and to pass on to new Operators or Owners. A manual storage case is located in the cab.

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

This document is available in English only.

Summary of Changes

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

Section	Summary of Change	Internal Use Only
1.11 Safety Decal Locations, page 16	Topic title changed from Safety Sign Locations to Safety Decal Locations.	Technical Publications
1.11 Safety Decal Locations, page 16	• Added safety decal MD #310977. • Revised illustration to show the location of safety decal MD #310977.	ECN 61684
1.12 Understanding Safety Signs, page 18	Added safety decal MD #310977.	ECN 61684
3.15.1 Operator Console Buttons, page 72	Added topic.	Technical Publications
4.6.8 Adjusting Header Raise and Lower Rates, page 200	Revised topic.	Engineering
5.1.2 Coolant Specifications, page 231	Added topic.	Technical Publications
• *5.12.1 Removing and Installing Fuel Tank Vent Filter, page 306* • *Replacing Diesel Exhaust Fluid Tank Filter, page 310*	Revised illustrations to show new DEF tank.	Engineering
Replacing Bulbs in Standard Work Lights or Cab-Forward Headlights, page 346	Topic title changed from Replacing Bulbs in Standard Work Lights to Replacing Bulbs in Standard Work Lights or Cab-Forward Headlights.	Technical Publications

Whole Body and Hand-Arm Vibration Levels

Measured acceleration values depend on the ground roughness, operating speed, and the operator's experience, weight, and driving habits.

The weighted root mean square acceleration, to which the whole body is subjected, ranges from 0.423 to 0.707 m/s2 as measured in the vertical direction on a representative machine during typical operations and analyzed in accordance with ISO 5008. The values measured in longitudinal and lateral direction were less than 0.5m/s2.

The weighted root means square hand-arm vibration was less than 2.41 m/s2 when analyzed in accordance with ISO 5349.

Noise Levels

The sound pressure level depends upon the engine speed and load, field and crop conditions, and the type of platform used.

The average of the maximum values of the A-weighted sound pressure level inside the operator's station is 64.6 dB(A), as measured in accordance with Directive 2009/76/EC or method 2 of Regulation (EU) No 1322/2014.

Serial Numbers

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

Windrowers sold in all countries except France: Windrower serial number plate (A) is located on the left side of the main frame near the walking beam.

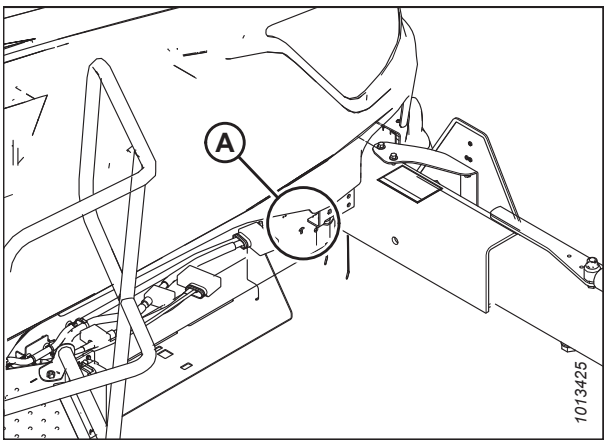


Figure 1: Windrower Serial Number Location

Windrowers sold in France: Refer to windrower serial number plate (A) on the right side of the main frame near the walking beam as shown.

Windrower Serial Number: _____

Model Year: _____

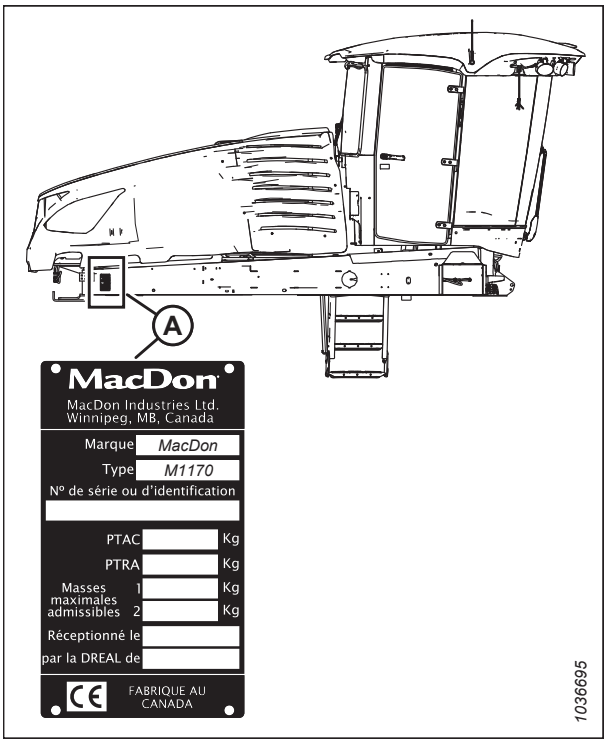


Figure 2: Windrower Serial Number Location – France Only

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

Engine Serial Number: _____

Model Year: _____



Figure 3: Engine Serial Number Location

Declaration of Conformity i
Introduction iii
Summary of Changes iv
Whole Body and Hand-Arm Vibration Levels v
Noise Levels vi
Serial Numbers vii

Chapter 1: Safety 1

1.1 Safety Alert Symbols 1
1.2 Signal Words 2
1.3 General Safety 3
1.4 Maintenance Safety 5
1.5 Hydraulic Safety 6
1.6 Tire Safety 7
1.7 Battery Safety 8
1.8 Welding Precaution 9
1.9 Engine Safety 13
1.9.1 High-Pressure Rail 13
1.9.2 Engine Electronics 14
1.10 Safety Signs 15
1.10.1 Installing Safety Decals 15
1.11 Safety Decal Locations 16
1.12 Understanding Safety Signs 18

Chapter 2: Product Overview 29

2.1 Definitions 29
2.2 Specifications 31
2.3 Windrower Dimensions 35
2.4 Component Location 36

Chapter 3: Operator's Station 39

3.1 Console 39
3.2 Operator Presence System 41
3.2.1 Header Drive 41
3.2.2 Engine and Transmission 41
3.3 Operator's Seat Adjustments 42
3.3.1 Armrest 42
3.3.2 Armrest Angle 43
3.3.3 Suspension and Height 43
3.3.4 Fore-Aft Slide Control 44
3.3.5 Fore-Aft Isolator Control 44
3.3.6 Tilt 45

3.3.7 Lumbar Support ... 45
3.3.8 Vertical Dampener ... 46
3.3.9 Cushion Tilt – Deluxe Cab Only ... 46
3.3.10 Cushion Extension – Deluxe Cab Only ... 47
3.3.11 Lateral Isolation Lockout – Deluxe Cab Only ... 47
3.3.12 Heating/Cooling – Deluxe Cab Only ... 47
3.4 Training Seat ... 49
3.5 Seat Belts ... 50
3.6 Adjusting Steering Column and Steering Wheel ... 52
3.7 Lighting ... 53
3.7.1 Cab-Forward Lighting – Field ... 53
3.7.2 Cab-Forward Lighting – Road ... 54
3.7.3 Engine-Forward Lighting – Road ... 55
3.7.4 Tail/Beacon Lighting ... 56
3.7.5 Turn Signal / Hazard Lighting ... 57
3.8 Windshield Wipers ... 59
3.9 Rear View Mirrors ... 60
3.10 Cab Temperature ... 61
3.10.1 Heater Shut-Off Valve ... 61
3.10.2 Air Distribution ... 61
3.10.3 Climate Controls ... 61
3.11 Operator Amenities ... 63
3.12 Sound System ... 65
3.12.1 AM/FM/CD/DVD Radio with Bluetooth® Wireless Technology ... 65
Activating Bluetooth® Feature ... 66
Pairing Bluetooth® Device ... 67
3.13 Horn ... 68
3.14 Engine Controls ... 69
3.14.1 Using Eco Engine Control ... 70
3.15 Windrower Controls ... 71
3.15.1 Operator Console Buttons ... 72
3.16 Header Controls ... 73
3.16.1 Header Engage Switch ... 73
3.16.2 Header Drive Reverse Button ... 73
3.16.3 Ground Speed Lever Switches ... 74
Header Position Six-Way Switch ... 75
Reel Position Four-Way Switch ... 76
Reel and Disc Speed Switch ... 76
One-Touch-Return Buttons ... 77
3.16.4 Console Header Buttons ... 78
Deck Shift / Float Presets ... 78
Conveyor Speed Adjustment Buttons ... 79
Auxiliary Lift Switches ... 80
F1 to F6 Function Buttons ... 80

3.17 Harvest Performance Tracker Display 81
3.17.1 Harvest Performance Tracker Screen Layout 81
3.17.2 Navigating Harvest Performance Tracker Display 84
Scroll Knob, Scroll Wheel, and Select Button 84
Home, Back, and Shift Buttons 85
Soft Keys 86
QuickMenu System 86
Main Menu 88
Menu Icons 88
Faults and Telltales 92
3.17.3 Setting up Harvest Performance Tracker Screen 93
Setting Screen Brightness 94
Setting Alarm Volume 95
Setting Time and Date 96
Setting Language and Units of Measurement 96
Resetting to Factory Defaults 97
3.17.4 Clearing Fault Codes 99
3.17.5 Setting Windrower Tire Size 100
3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker 101
3.17.7 Activating Control Locks 102
3.17.8 Machine Information Pages 103
Accessing Windrower Information 104
Accessing Header Information 105
Accessing Software Information 106
Accessing Performance Information 107

Chapter 4: Operation 109

4.1 Owner/Operator Responsibilities 109
4.2 Symbol Definitions 110
4.2.1 Windrower Operating Symbols 110
4.2.2 Harvest Performance Tracker Symbols 111
4.3 Operating Windrower 113
4.3.1 Operational Safety 113
4.3.2 Break-in Period 114
4.3.3 Preseason Checks / Annual Service 114
Air Conditioning Compressor Coolant Cycling 115
4.3.4 Daily Checks and Maintenance 116
Filling Fuel Tank 116
Filling Diesel Exhaust Fluid Tank 117
Checking Engine Oil Level 118
4.3.5 Engine Operation 119
Starting Engine 119
Programming Eco Engine Control 124
Shutting down Engine 125
Engine Temperature 125
Engine Oil Pressure 125
Exhaust System Cleaning 126
Operator Console Buttons 128
Entering and Exiting Windrower 129
Adjusting Ground Speed Limit 129

Driving Forward in Cab-Forward Mode 131
Driving in Reverse in Cab-Forward Mode 132
Driving Forward in Engine-Forward Mode 133
Driving in Reverse in Engine-Forward Mode 135
Spin Turning 136
Stopping 136
Viewing Performance Data 137
Viewing Engine Cooling Data 138
4.3.6 Transporting 139
Driving on Road in Engine-Forward Mode 139
Driving on Road in Cab-Forward Mode 142
Retracting Wheels – Narrow Transport 144
Extending Wheels – Field Mode 149
Towing Header with Windrower 154
Towing Windrower – Emergency 157
Engaging and Disengaging Wheel Drives 158
4.3.7 Storing Windrower 158
4.4 M1170*NT5* German Export Only – Features and Operation 160
4.4.1 Emergency Stopping - German Export Only 160
4.4.2 One-Touch-Return and Secondary Braking Buttons – German Export Only 161
4.4.3 Harvest Performance Tracker Screen Layout – German Export Only 163
4.5 Attaching and Detaching a Header to the Windrower 166
4.5.1 D1X or D1XL Series Draper Header 166
Attaching Draper Header Supports 166
Attaching D1X or D1XL Series Draper Header 167
Connecting D1X or D1XL Series Draper Header Hydraulics 173
Detaching D1X or D1XL Series Draper Header 176
4.5.2 Adjusting Header Settings on Harvest Performance Tracker 181
4.5.3 Header System Calibration 182
Calibrating Knife Drive on Harvest Performance Tracker Display 182
Calibrating Header Position Sensors on Harvest Performance Tracker Display 185
4.6 Operating Header 189
4.6.1 Engaging and Disengaging Header Safety Props 189
4.6.2 Header Float 190
Checking Float 190
Setting Float 191
Removing and Restoring Float 193
4.6.3 Header Drive 194
Engaging and Disengaging the Header 194
Reversing Header 195
4.6.4 Adjusting Header Angle 195
Checking Self-Locking Center-Link Hook 196
4.6.5 Setting Header Height 198
4.6.6 Double Windrowing 198
Double Windrow Attachment Deck Position 199
Double Windrow Attachment Conveyor Speed 199
4.6.7 One-Touch-Return 200
4.6.8 Adjusting Header Raise and Lower Rates 200
4.7 Operating with D1X or D1XL Series Draper Header 203

4.7.1 Header Position 203
4.7.2 Adjusting Reel Fore-Aft Position 203
4.7.3 Adjusting Reel Height 204
4.7.4 Leveling Header 205
4.7.5 Adjusting Reel Speed 207
Setting Reel Speed in Auto Mode 208
Setting Reel Speed in Manual Mode 209
Adjusting Reel Alarm Pressure 211
4.7.6 Adjusting Draper Speed 212
Setting Draper Speed in Auto Mode 213
Setting Draper Speed in Manual Mode 214
Adjusting Draper Alarm Pressure 216
Draper Slip Warning 217
4.7.7 Knife Speed 218
Setting Knife Speed 218
Adjusting Knife Alarm Pressure – Draper Header 220
Adjusting Knife Speed Alarm 221
4.7.8 Deck Shift Control 223
Shifting Decks 223
Setting Float Options with Deck Shift 223
4.7.9 Draper Header Run Screens 225
Run Screen 1 226
Run Screen 2 227
4.7.10 Swath Compressor 227
Swath Compressor Controls 227
Locking and Unlocking the Swath Compressor 229

Chapter 5: Maintenance and Servicing 231

5.1 Recommended Fuel, Fluids, and Lubricants 231
5.1.1 Storing Lubricants and Fluids 231
5.1.2 Coolant Specifications 231
5.1.3 Fuel Specifications 232
5.1.4 Lubricants, Fluids, and System Capacities 232
5.1.5 Filter Part Numbers 234
5.2 Windrower Break-In Inspections and Maintenance Schedule 235
5.2.1 Break-in Inspection Schedule 235
5.2.2 Maintenance Schedule/Record 236
5.2.3 Using Electronic Maintenance Tool 238
5.3 Engine Compartment 239
5.3.1 Opening Hood 239
5.3.2 Closing Hood 240
5.4 Platform 241
5.4.1 Opening Platform 241
5.4.2 Closing Platform 241
5.4.3 Adjusting Platform 242
5.4.4 Accessing Tool Box 243
5.5 System Maintenance Overviews 245

5.5.1 Diesel Exhaust Fluid System 245
Draining Diesel Exhaust Fluid Tank 245
Filling Diesel Exhaust Fluid Tank 246
5.5.2 Twin-Flow Cooling System 247
Engine Cooling 248
Inspecting Pressurized Coolant Tank Cap 248
Charge Air Cooler 249
Charge Air Cooling 250
Hydraulic Oil Cooler 250
Air Conditioning (A/C) 251
Condenser 251
5.5.3 Air Intake System 251
5.5.4 Hydraulic System 253
Hydraulic Oil Cooler 253
Knife/Disc Drive Hydraulics 254
Reel and Draper Hydraulics 254
Traction Drive Hydraulics 254
5.5.5 Electrical System 255
Module Layout 255
Master Controller 259
Extension Modules 259
Relay Modules 260
Preventing Electrical System Damage 261
5.6 Break-In Inspection Procedures 262
5.6.1 Tightening Drive Wheel Nuts 262
5.6.2 Tightening Caster Wheel Nuts 263
5.6.3 Tightening Caster Wheel Anti-Shimmy Dampeners 263
5.6.4 Tensioning Air Conditioner Compressor Belts 264
5.6.5 Changing Engine Gearbox Lubricant 264
5.6.6 Changing Wheel Drive Lubricant – 10 Bolt 265
5.6.7 Return Oil Filter 266
Removing Return Oil Filter 266
Installing Return Oil Filter 267
5.6.8 Charge Filter 268
Removing Charge Filter 268
Installing Charge Filter 269
5.7 Every 10 Hours or Daily 270
5.7.1 Checking Engine Oil Level 270
Adding Engine Oil 271
5.7.2 Fuel/Water Separator 271
Removing Water from Fuel System 272
5.7.3 Checking Hydraulic Oil 272
5.7.4 Checking Tire Pressure 273
5.7.5 Checking Engine Coolant Level 274
5.7.6 Hoses and Lines 274
5.7.7 Checking Engine Gearbox Lubricant Level and Adding Lubricant 275
5.8 Every 50 Hours 277
5.8.1 Fresh Air Intake Filter 277
Removing Fresh Air Intake Filter 277

Inspecting and Cleaning Fresh Air Intake Filter Element 278
Installing Fresh Air Intake Filter 278
5.8.2 Greasing Windrower 280
Greasing Procedure 280
Grease Points 281
5.9 Every 100 Hours 283
5.9.1 Servicing Return Air Filter 283
5.9.2 Cleaning Cooler Module 284
Cleaning Left Cooling Module 284
Cleaning Right Cooling Module 287
5.10 Every 250 Hours or Annually 289
5.10.1 Changing Engine Oil 289
Draining Engine Oil 289
Replacing Engine Oil Filter 289
Adding Engine Oil 290
5.10.2 Maintaining Engine Air Filters 291
Removing Engine Primary Air Filter 291
Installing Engine Primary Air Filter 292
Cleaning Primary Air Filter 294
Replacing Secondary Air Filter 294
5.10.3 Checking Wheel Drive Lubricant Level – 10 Bolt 295
5.10.4 Adding Wheel Drive Lubricant – 10 Bolt 296
5.10.5 Inspecting Exhaust System 297
5.10.6 Changing Engine Gearbox Lubricant 298
5.11 Every 500 Hours or Annually 300
5.11.1 Maintaining Fuel Filters 300
Removing Primary Fuel Filter 300
Installing Primary Fuel Filter 301
Removing Secondary Fuel Filter 301
Installing Secondary Fuel Filter 301
Priming Fuel System 302
5.11.2 Safety Systems 303
Checking Operator Presence System 303
Checking Engine Interlock 305
5.12 Every 1000 Hours 306
5.12.1 Removing and Installing Fuel Tank Vent Filter 306
5.12.2 Diesel Exhaust Fluid Supply Module Filter 308
Checking Diesel Exhaust Fluid Supply Module Filter 308
Removing Supply Module Filter 308
Cleaning and Inspecting Supply Module Filter 310
Installing Supply Module Filter 310
Replacing Diesel Exhaust Fluid Tank Filter 310
5.13 Every 2000 Hours 316
5.13.1 Changing Engine Coolant 316
Draining Coolant System 316
Adding Coolant after System Drain 317
5.13.2 Draining Hydraulic Oil 318
5.13.3 Filling Hydraulic Oil 319
5.13.4 Replacing Diesel Exhaust Fluid Vent Hose Filter 320

5.13.5 General Engine Inspection 321
5.14 Annual Service 322
5.14.1 Batteries 322
Maintaining Battery 322
Opening Battery Cover 322
Closing Battery Cover 323
Charging Battery 324
Boosting Battery 325
Removing Battery 327
Installing Battery 327
Disconnecting Battery 328
Connecting Batteries 328
Auxiliary Power Posts 330
5.14.2 Checking Steering Link Pivots 330
5.14.3 Air Conditioning Evaporator 332
Removing Air Conditioning Cover 332
Cleaning Air Conditioning Evaporator Core 333
Installing Air Conditioning Cover 334
5.14.4 Checking Engine Coolant Strength 334
5.15 Maintenance as Required 336
5.15.1 Seat Belts 336
5.15.2 Draining Fuel Tank 336
5.15.3 Draining Diesel Exhaust Fluid Tank 337
5.15.4 Belts 338
Tensioning Engine Fan Drive Belt 338
Replacing Engine Fan Drive Belt 338
Tensioning Air Conditioner Compressor Belts 339
Replacing Air Conditioner Compressor Belts 339
5.15.5 Engine Speed 340
5.15.6 Lighting 340
Aligning Headlights – Engine-Forward 340
Aligning Headlights – Cab-Forward 342
Adjusting Front Field Lights 343
Adjusting Rear Roof Work Lights 344
Adjusting Rear Swath Lights 345
Replacing Bulbs in Standard Work Lights or Cab-Forward Headlights 346
Replacing Headlight Bulb – Engine-Forward 347
Replacing LED Lights – Deluxe Cab Only 349
Replacing Amber and Marker Lights 351
Replacing Beacon Lights 354
Replacing Cabin Dome Bulb 354
Replacing Cabin Dome Light Assembly 355
Turn Signal Indicators 357
5.15.7 Accessing Circuit Breakers and Fuses 357
Checking and Replacing Fuses 359
Replacing Circuit Breakers and Relays 359
Fuse Panel and Relay Module Decals 361
Inspecting and Replacing 125A Main Fuses 366
5.15.8 Drive Wheels 367
Raising Drive Wheel 367
Removing Drive Wheels 368

Installing Drive Wheels 369
Lowering Drive Wheel 370
5.15.9 Caster Wheels 371
Setting Walking Beam Extension Limits 371
Installing Forked Caster Wheel 372
Removing Forked Caster Wheel 373
Lowering Caster Wheel 374
Raising Caster Wheel 374

Chapter 6: Options and Attachments 377

6.1 Hood 377
6.1.1 High Debris Cooler Intake – Hood Scoops 377
6.2 Cab 378
6.2.1 Automated Steering Systems 378
6.3 Header Operation 379
6.3.1 Booster Spring Kit – External 379
6.3.2 Center-Link Lifter 379
6.3.3 Swath Compressor 380
6.4 Transport 381
6.4.1 Ballast 381
6.4.2 Towing Harness 381
6.4.3 Weight Box 381

Chapter 7: Troubleshooting 383

7.1 Engine Troubleshooting 383
7.2 Electrical Troubleshooting 387
7.3 Hydraulics Troubleshooting 388
7.4 Header Drive Troubleshooting 389
7.5 Traction Drive Troubleshooting 390
7.6 Narrow Transport System Troubleshooting 392
7.7 Steering and Ground Speed Control Troubleshooting 393
7.8 Cab Air Troubleshooting 394
7.9 Operator's Station Troubleshooting 397

Chapter 8: Reference 399

8.1 Torque Specifications 399
8.1.1 Metric Bolt Specifications 399
8.1.2 Metric Bolt Specifications Bolting into Cast Aluminum 401
8.1.3 O-Ring Boss Hydraulic Fittings – Adjustable 402
8.1.4 O-Ring Boss Hydraulic Fittings – Non-Adjustable 403
8.1.5 O-Ring Face Seal Hydraulic Fittings 404
8.1.6 Tapered Pipe Thread Fittings 405
8.2 Conversion Chart 407
8.3 Windrower Fault Codes 408

8.4 Engine Fault Codes 443

Index 469

Lubricants, Fluids, and System Capacities 483

Chapter 1: Safety

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

1.1 Safety Alert Symbols

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

This symbol means:

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

Carefully read and follow the safety message accompanying this symbol.

Why is safety important to you?

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



Figure 1.1: Safety Symbol

1.2 Signal Words

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

Signal words are selected using the following guidelines:

DANGER

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

WARNING

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

CAUTION

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

IMPORTANT:

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

NOTE:

Provides additional information or advice.

1.3 General Safety

Protect yourself when assembling, operating, and servicing machinery.

CAUTION

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

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

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

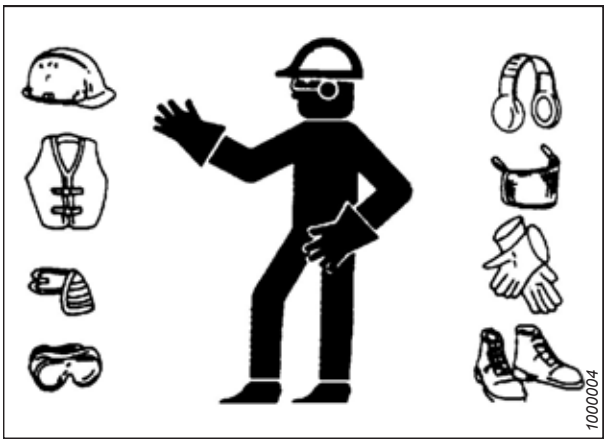


Figure 1.2: Safety Equipment

In addition, take the following precautions:

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



Figure 1.3: Safety Equipment

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

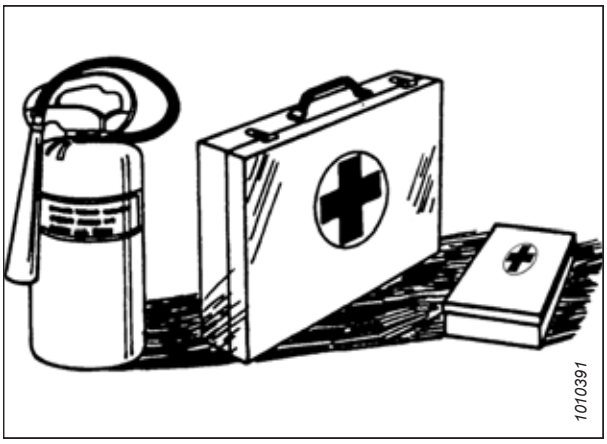


Figure 1.4: Safety Equipment

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



Figure 1.5: Safety around Equipment

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

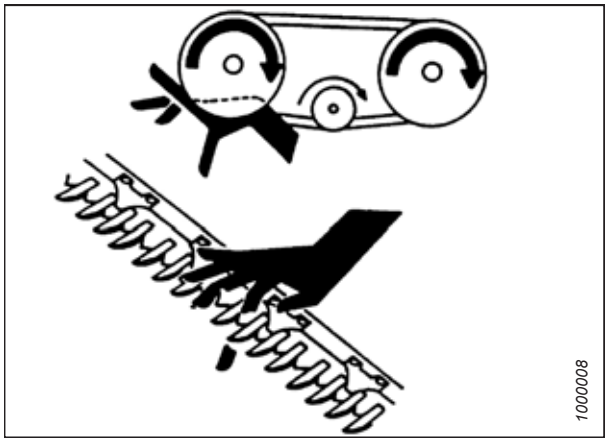


Figure 1.6: Safety around Equipment

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



Figure 1.7: Safety around Equipment

1.4 Maintenance Safety

Protect yourself when maintaining machinery.

To ensure your safety while maintaining the machine:

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



Figure 1.8: Safety around Equipment

- Relieve pressure from hydraulic circuits before servicing and/or disconnecting the machine.
- Ensure that all components are tight and that steel lines, hoses, and couplings are in good condition before applying pressure to hydraulic systems.
- Keep hands, feet, clothing, and hair away from all moving and/or rotating parts.
- Clear the area of bystanders, especially children, when carrying out any maintenance, repairs, or adjustments.
- Install the transport lock or place safety stands under the frame before working under the machine.
- If more than one person is servicing the machine at the same time, be aware that rotating a driveline or another mechanically driven component by hand (for example, accessing a lubricant fitting) will cause drive components in other areas (belts, pulleys, and knives) to move. Stay clear of driven components at all times.
- Wear protective gear when working on the machine.
- Wear heavy gloves when working on knife components.

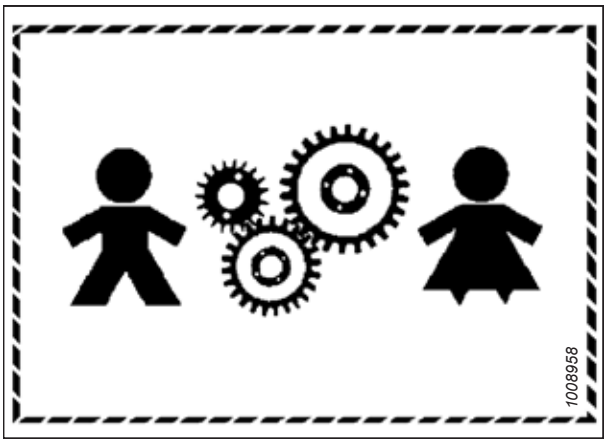


Figure 1.9: Equipment is NOT Safe for Children

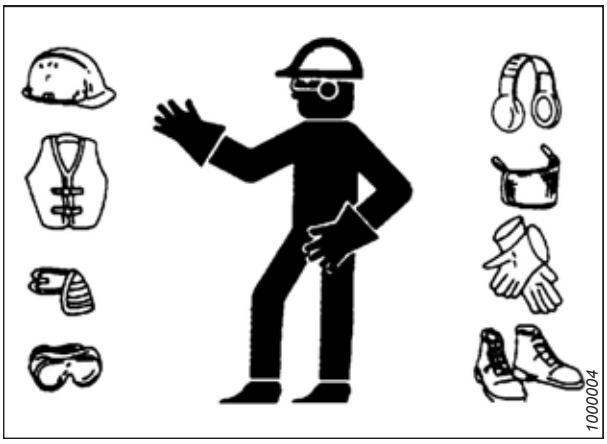


Figure 1.10: Safety Equipment

1.5 Hydraulic Safety

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

- Always place all hydraulic controls in Neutral before leaving the operator's seat.
- Make sure that all components in the hydraulic system are kept clean and in good condition.
- Replace any worn, cut, abraded, flattened, or crimped hoses and steel lines.
- Do **NOT** attempt any makeshift repairs to hydraulic lines, fittings, or hoses by using tapes, clamps, cements, or welding. The hydraulic system operates under extremely high pressure. Makeshift repairs can fail suddenly and create hazardous conditions.

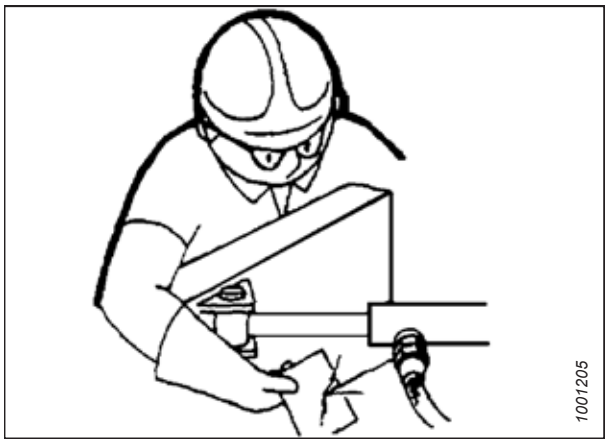


Figure 1.11: Testing for Hydraulic Leaks

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



Figure 1.12: Hydraulic Pressure Hazard

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

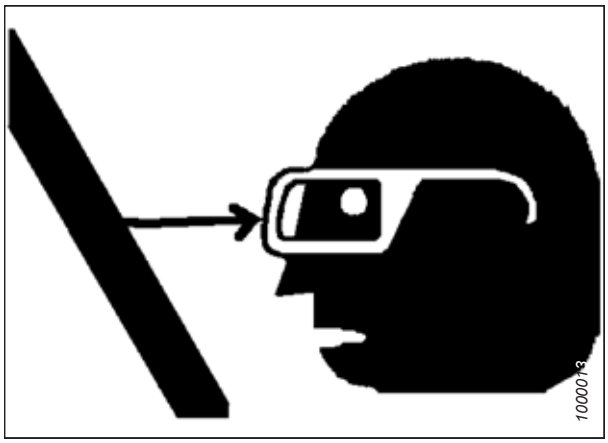


Figure 1.13: Safety around Equipment

1.6 Tire Safety

Service tires safely.

WARNING

- **A tire can explode during inflation, causing serious injury or death.**
- **Follow the proper procedures when mounting a tire. Failure to do so can produce an explosion, causing serious injury or death.**

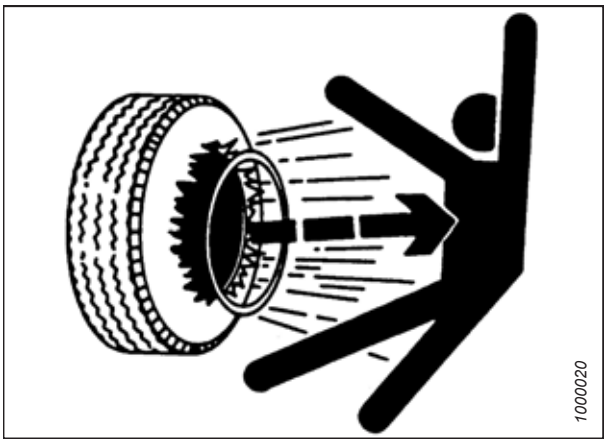


Figure 1.14: Overinflated Tire

WARNING

- **Do NOT remove, install, or repair a tire on a rim unless you have the proper equipment and experience to perform the task. Take the tire and rim to a qualified tire repair shop if necessary.**
- **Ensure that the tire is correctly seated on the rim before inflating it. If the tire is not correctly positioned on the rim or is overinflated, the tire bead can loosen on one side causing air to escape at high speed and with great force. An air leak of this nature can thrust the tire in any direction, endangering anyone in the area.**
- **Do NOT stand over the tire when inflating it. Use a clip-on chuck and extension hose when inflating a tire.**
- **Do NOT exceed the maximum inflation pressure indicated on the tire label.**



Figure 1.15: Safely Inflating Tire

- **Never use force on an inflated or partially-inflated tire.**
- **Ensure that all air is removed from the tire before removing the tire from the rim.**
- **Never weld a wheel rim.**
- **Replace tires that have defects. Replace wheel rims that are cracked, worn, or severely rusted.**

1.7 Battery Safety

Understand the risks of working with lead-acid batteries before performing installation or maintenance tasks.

WARNING

- **Keep all sparks and flames away from batteries. The electrolyte fluid in the battery cells emits an explosive gas which can build up over time.**
- **Ensure that there is adequate ventilation when charging the battery.**



Figure 1.16: Safety around Batteries

WARNING

- **Wear safety glasses when working near batteries.**
- **To avoid the loss of electrolyte fluid, do NOT tip a battery more than 45° off of its base.**
- **Battery electrolyte causes severe burns. Ensure that it does not contact your skin, eyes, or clothing.**
- **Electrolyte splashed into the eyes is extremely damaging. If you are treating this condition: force the eye open and flush it with cool, clean water for 5 minutes. Call a doctor immediately.**
- **If electrolyte is spilled or splashed on one's clothing or their body, neutralize it immediately with a solution of baking soda and water, then rinse the strained area with clean water.**

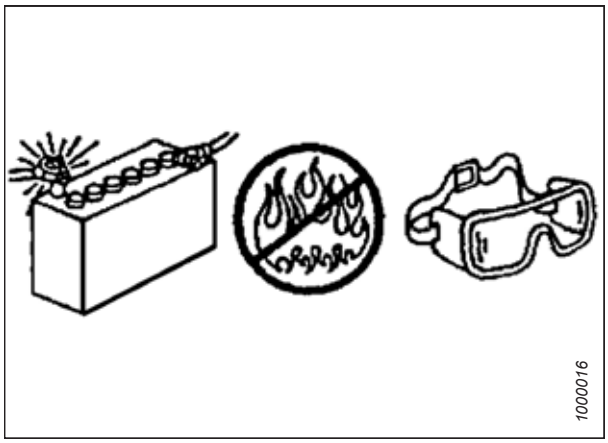


Figure 1.17: Safety around Batteries

WARNING

- **To avoid injury from a spark or short circuit, disconnect the battery ground cable before servicing any part of the electrical system.**
- **Do NOT operate the engine with the alternator or battery disconnected. With the battery cables disconnected and the engine running, a high voltage can be built up if the cable terminals touch the machine frame. Anyone touching the machine frame under these conditions may be electrocuted.**
- **When working around batteries, remember that all of the exposed metal parts are live. Never lay a metal object across the terminals; this will generate a powerful spark and can electrocute the holder of the tool if they are not properly grounded.**
- **Keep batteries out of reach of children.**

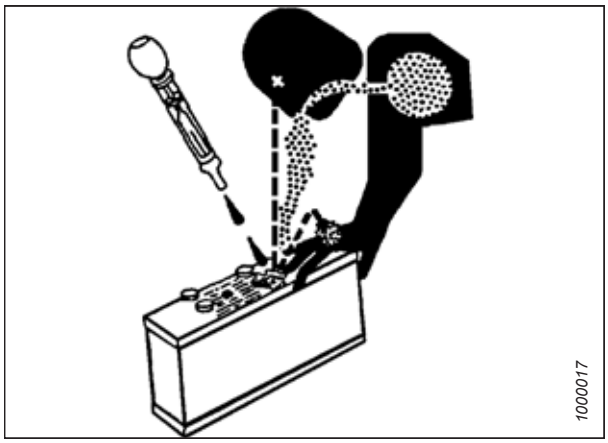


Figure 1.18: Safety around Batteries

1.8 Welding Precaution

Understand these critical precautions before attempting to weld anything on the windrower.

IMPORTANT:

If the procedures below are not followed, damage to the windrower's electronic components may result. Some components may only be partially damaged, which would result in some electrical components failing in an intermittent way. Such faults are very difficult to diagnose reliably.

The windrower is equipped with several sensitive electronic components. Therefore, components to be welded should be removed from the windrower whenever possible rather than welded in place.

When welding needs to be performed on a header, disconnect the header completely from the windrower before beginning. These same guidelines apply to plasma cutting, or any other high-current electrical operation performed on the machine.

IMPORTANT:

Ensure that the windrower is parked on a level surface, the ignition is turned off, and the key is removed before disconnecting anything.

The following items need to be disconnected:

- Negative battery terminals (A) (two connections)

  IMPORTANT:

  Always disconnect the battery terminals first, and reconnect them last.

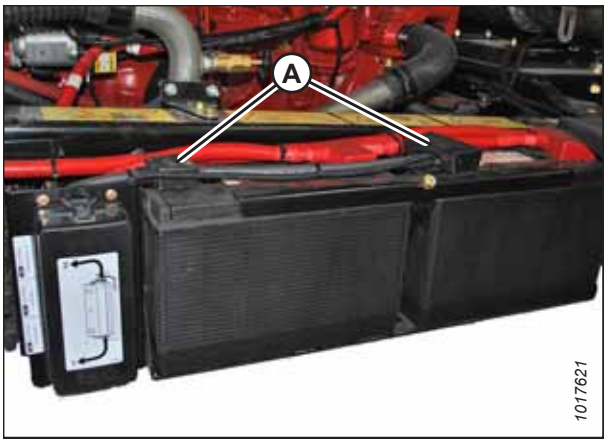


Figure 1.19: Negative Terminals

- Master controller (A)
  Four connectors: P231, P232, P233, and P234

  Location: Behind the cab, near the header lift/fan manifold

  To disconnect the connectors, press the two outer tabs, and pull the connector away from the master controller.

  IMPORTANT:

  When reconnecting these connectors, ensure that the connectors are fully seated into the master controller, and that the two locking tabs on each end of all four connectors have popped outward. If the tabs are not popped outward, the connector is not fully seated.

  IMPORTANT:

  Do **NOT** power up or operate the windrower until these connectors are locked into place.



Figure 1.20: Master Controller

- Firewall extension module (A)
  Two connectors: P235 and P236

  Location: Behind the cab, near the header lift/fan manifold

  To disconnect the connectors, insert the end of a a small 3–6 mm (1/8–1/4 in.) blade screwdriver into the connector's locking tab. Gently pry upward (no more than 6 mm [1/4 in.]) to unlock the connector tab, and then pull the connector away from the module.

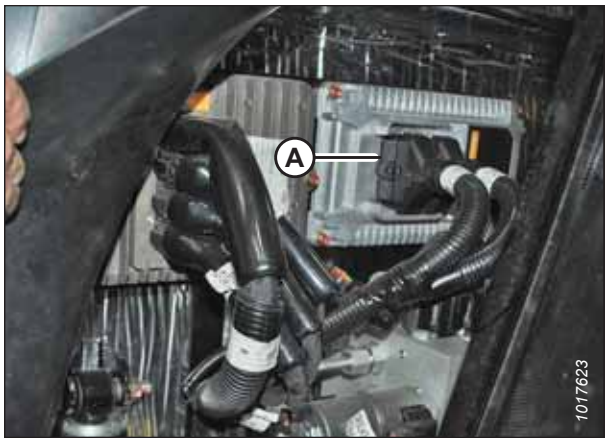


Figure 1.21: Firewall Extension Module

- Chassis extension module (A)
  Two connectors: P247 and P248

  Location: Under the cab, inside the left frame rail

  To disconnect the connectors, insert the end of a small 3–6 mm (1/8–1/4 in.) blade screwdriver into the connector's locking tab. Gently pry upward (no more than 6 mm [1/4 in.]) to unlock the connector tab, and then pull the connector away from the module.

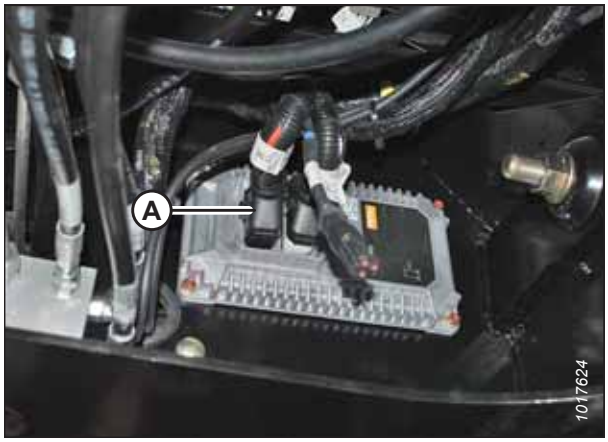


Figure 1.22: Chassis Extension Module

- Engine Control Module (ECM)
  Two connectors for Cummins: P100 (A) and J1 Cummins Proprietary ECM Connector (B)

  Location: On the engine

  To disconnect the connectors, pull the rubber boot off of the cover, unlock the latch, and undo the main over-center latch. Remove strain relief bolts (C) so that the connectors can be pulled away from the ECM.

  IMPORTANT:

  Be sure to disconnect both connectors. Note the connector locations for reinstallation.

  IMPORTANT:

  Be sure to reconnect the connectors in the proper locations. Do **NOT** cross connect the connectors.

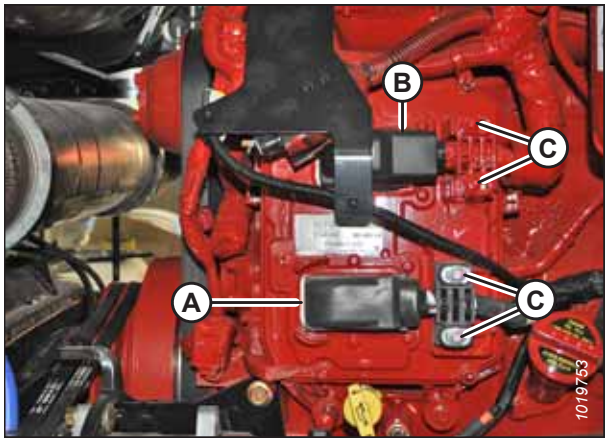


Figure 1.23: Engine Control Module

NOTE:

To disconnect the remaining circular Deutsch connectors, rotate the outer collar counterclockwise.

- Cab connectors (A)
  Two round connectors: C1 and C2

  Location: Under the cab

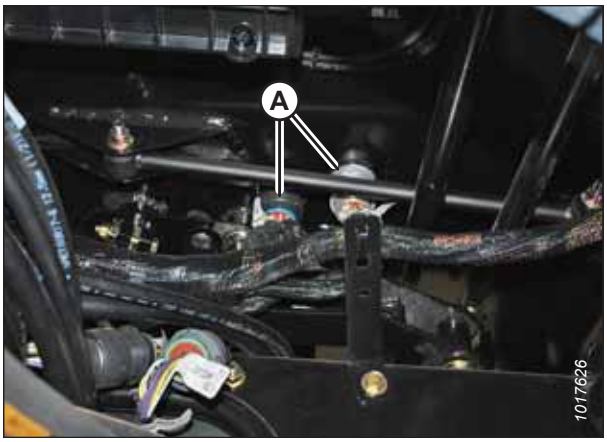


Figure 1.24: Cab Connectors

- Roof connectors (A)
  Four connectors: C10, C12, C13, and C14

  Location: Under the cab at the base of the left cab post

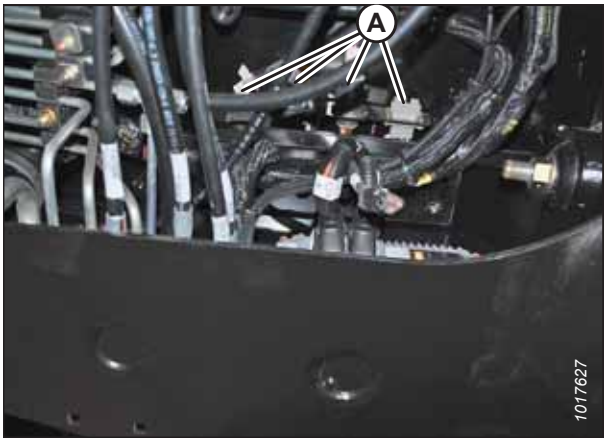


Figure 1.25: Roof Connectors

- Chassis relay module (A)
  Three connectors: P240, P241, and P242

  Location: Outside the left frame rail near the batteries

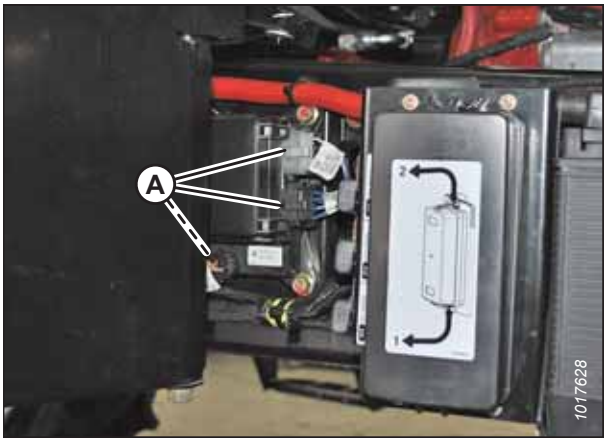


Figure 1.26: Chassis Relay Module

- Engine harness (A)
  Two round connectors: C30 and C31

  Location: Inside the left frame rail, at the rear of the windrower

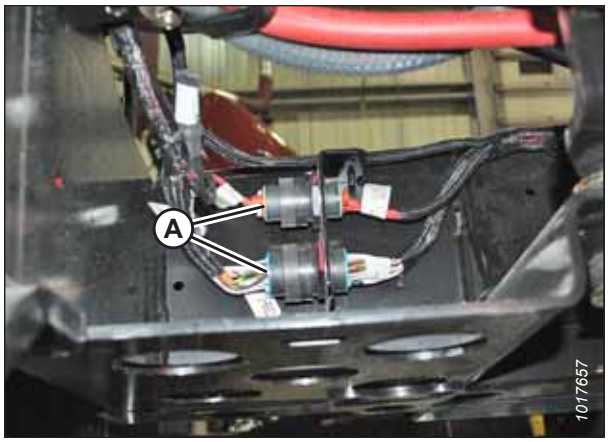


Figure 1.27: Engine Harness

- Air conditioning (A/C) box connectors (A)
  Two connectors: C15 and C16

  Location: Rear of the A/C box

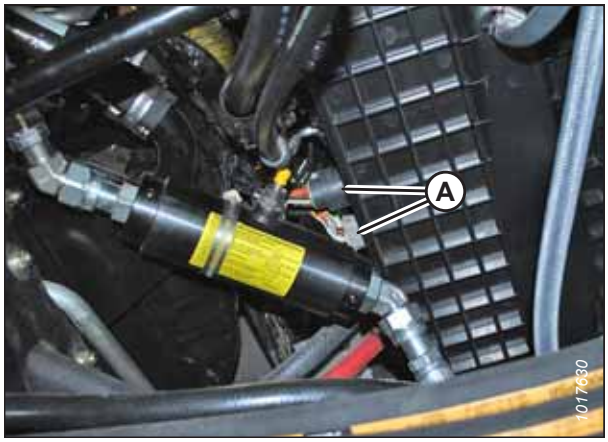


Figure 1.28: A/C Box Connectors

- Wheel motor connectors (A)
  Two round connectors: C25 and C26

  Location: Under the center of the frame, just behind the front cross member

  IMPORTANT:

  To connect the circular Deutsch connectors without bending the pins, fully align the plug with the receptacle before pressing the connector in.

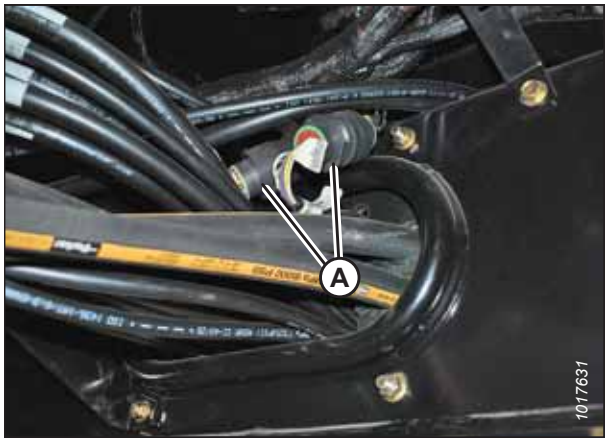


Figure 1.29: Wheel Motor Connectors

To align the connectors:

1. Observe the channel cuts and mating channel protrusions on the inner part of the circular walls of the connectors.
2. Face the mating connectors towards each other, and rotate the connectors so that the channels are aligned.
3. Press the connectors together while turning the outer connector clockwise until the collar locks.

1.9 Engine Safety

For the safety of yourself and others, understand the hazards associated with the engine before operating the machine, or before servicing the engine or nearby components.

WARNING

Do NOT use aerosol starting aids such as ether when attempting to start the engine. Use of these substances could result in an explosion.

CAUTION

- **When starting up a new, serviced, or repaired engine, always be ready to stop the engine to prevent overspeeding. Do this by shutting off the air and/or fuel supply to the engine.**
- **Do NOT bypass or disable automatic shutoff circuits. These circuits help prevent injury and damage to the engine. 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 bystanders are clear of the area.**
- **All protective guards and covers must be installed if the engine must be started to perform service procedures.**
- **Work around rotating parts carefully.**
- **If a warning tag is attached to the engine start switch or controls, do NOT start the engine or move the controls. Consult whoever attached the warning tag before starting the engine.**
- **Start the engine from the operator's station. Follow the procedure in the Starting Engine section of the operator's manual. Following the correct procedure will help 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) are working correctly, check the water temperature gauge and/or oil temperature gauge during heater operation.**
- **Engine exhaust contains combustion products, which can be harmful to your health. Always start and operate the engine in a well-ventilated area. If the engine is started in an enclosed area, vent the 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 the engine is running.**

NOTE:

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

Fuel is delivered to the engine under high pressure. Understand the hazards associated with the fuel delivery system before servicing it.

WARNING

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

1.9.2 Engine Electronics

For the safety of yourself and of others, and to prevent damage to the engine control module (ECM), understand the hazards associated with engine electronics.

WARNING

Tampering with the electronic system or the original equipment manufacturer (OEM) wiring installation is dangerous and could result in injury to people, death, or damage to the equipment.

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 touch the harness connector for the electronic unit injectors while the 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 certain conditions exceed their allowable range, the ECM will initiate immediate action.

The engine monitoring system can initiate the following actions:

- Warning
- Derate
- Shut down

Abnormalities in the following monitored conditions can limit engine speed and/or engine power:

- Engine coolant temperature
- Engine oil pressure
- Engine speed
- Intake manifold air temperature

1.10 Safety Signs

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

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

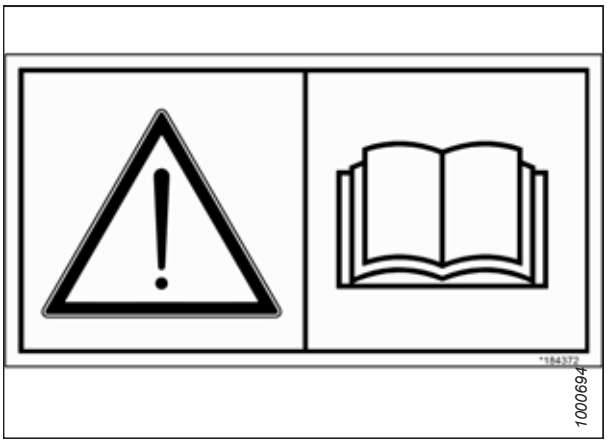


Figure 1.30: Operator's Manual Decal

1.10.1 Installing Safety Decals

Replace any safety decals that are worn or damaged.

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

1.11 Safety Decal Locations

Safety signs are factory-installed in many different locations on the windrower.

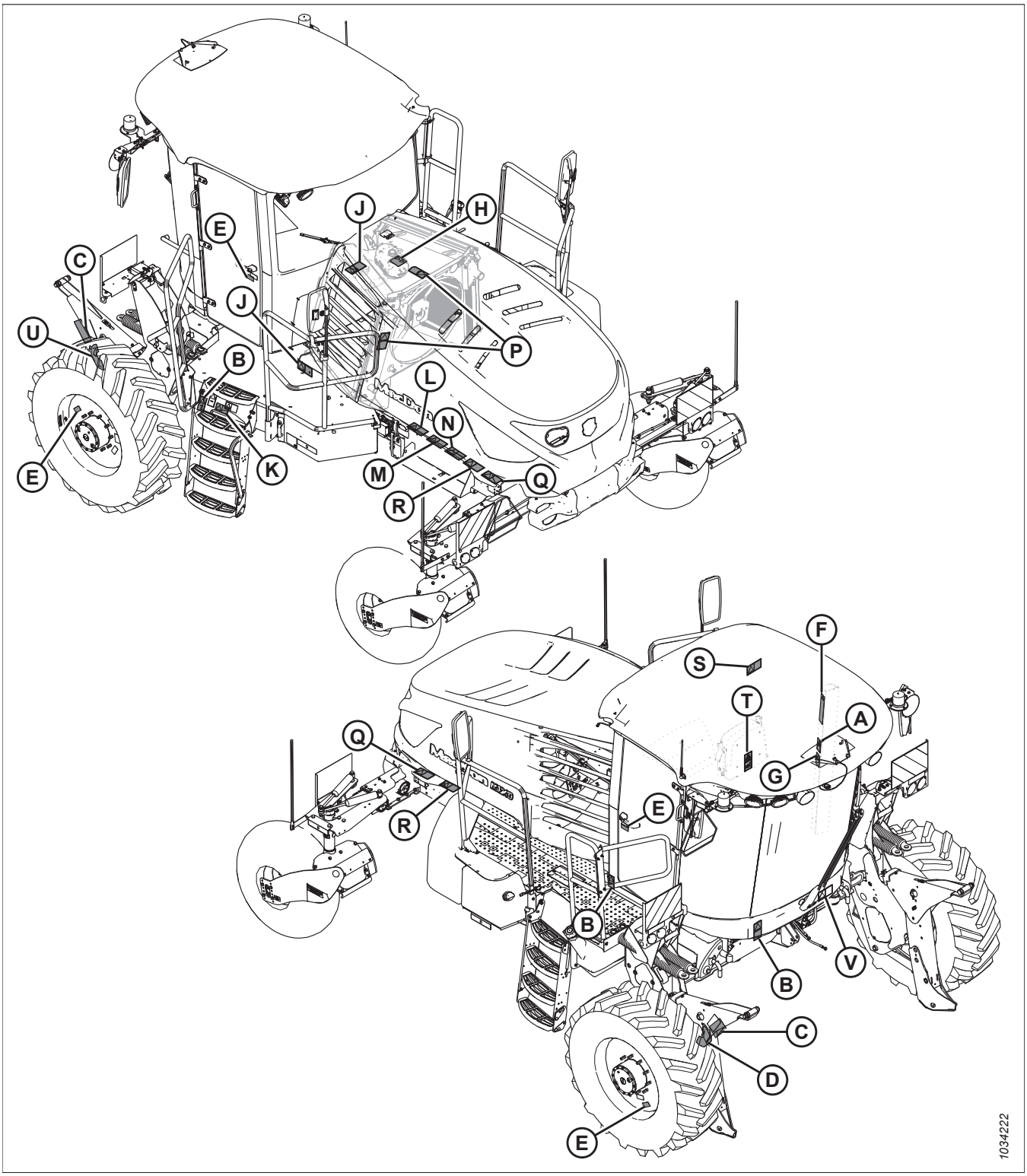


Figure 1.31: Safety Sign Locations

Table 1.1 Safety Sign Locations

Ref	MD Part Number	Safety Sign Description
A	166234	Decal – Warning (training seat and seat belts)
B	166425	Decal – Danger
C	306181	Decal – Header lock, 2 panel (both sides)
D	306180	Decal – Header lock, 2 panel (RH)
E	166454	Decal – Read manual
F	166457	Decal – Warning, read manual steering service
G	166463	Decal – Transport
H	166824	Decal – Fill rate
J	166832	Decal – High pressure fluid
K	166829	Decal – Caution, balance
L	166834	Decal – Warning, starter jump
M	166835	Decal – Warning, battery explode
N	166836	Decal – Warning, battery burn
P	166837	Decal – Danger, fan
Q	166838	Decal – Warning, hot surface
R	166839	Decal – Warning, belt
S	166843	Decal – Steering control
T	167502	Decal – Warning, pinch hazard
U	306179	Decal – Header lock, 2 panel (LH)
V	310977	Decal – Collision Hazard

NOTE:

For a more detailed illustration and description of safety signs, refer to *1.12 Understanding Safety Signs, page 18*.

1.12 Understanding Safety Signs

Refer to this topic to learn the hazards that each type of safety decal denotes.

MD #166234

Run-over hazard

DANGER

- The training seat is provided so that an experienced Operator can instruct a new Operator on how to use the machine.
- The training seat is **NOT** intended as a passenger seat or for use by children.
- The Operator and the Passenger must wear their safety belts when operating or riding in the machine.
- Keep all other riders off of the machine.



Figure 1.32: MD #166234

MD #166425

Run-over hazard

DANGER

To prevent the machine from moving when there is no Operator at the controls:

- Stop the engine and remove the key from the ignition before performing any maintenance or service on the steering linkage or the neutral interlock system.
- Refer to the windrower and header operator's manuals for inspection and maintenance instructions.



Figure 1.33: MD #166425

MD #166454

General hazard pertaining to machine operation and servicing

DANGER

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

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

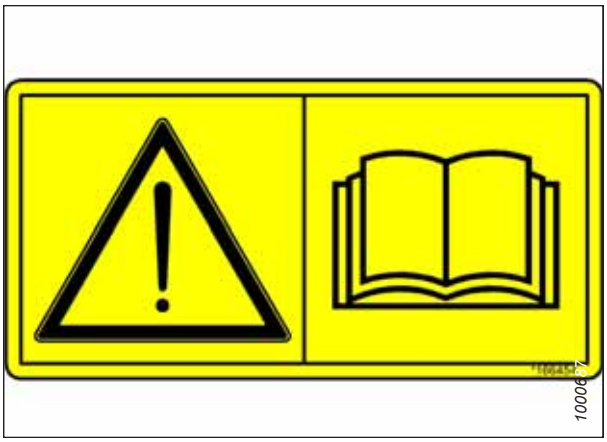


Figure 1.34: MD #166454

MD #166457

General hazard pertaining to machine operation and servicing

DANGER

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

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

Run-over hazard

DANGER

- The machine will move if the steering wheel is turned while the engine is running.
- Steering response is the opposite of what is normally expected when backing up the machine. Turn the bottom of the steering wheel in the direction you want to go.
- Always move the ground speed lever to the slow end of the range before shifting the high-low speed control.
- To prevent machine runaway: stop the engine and remove the key from the ignition before servicing, adjusting, lubricating, cleaning, or unplugging the machine, or before performing maintenance or service on the steering linkage or neutral interlock system.
- Refer to the windrower and header operator's manuals for inspection and maintenance instructions.

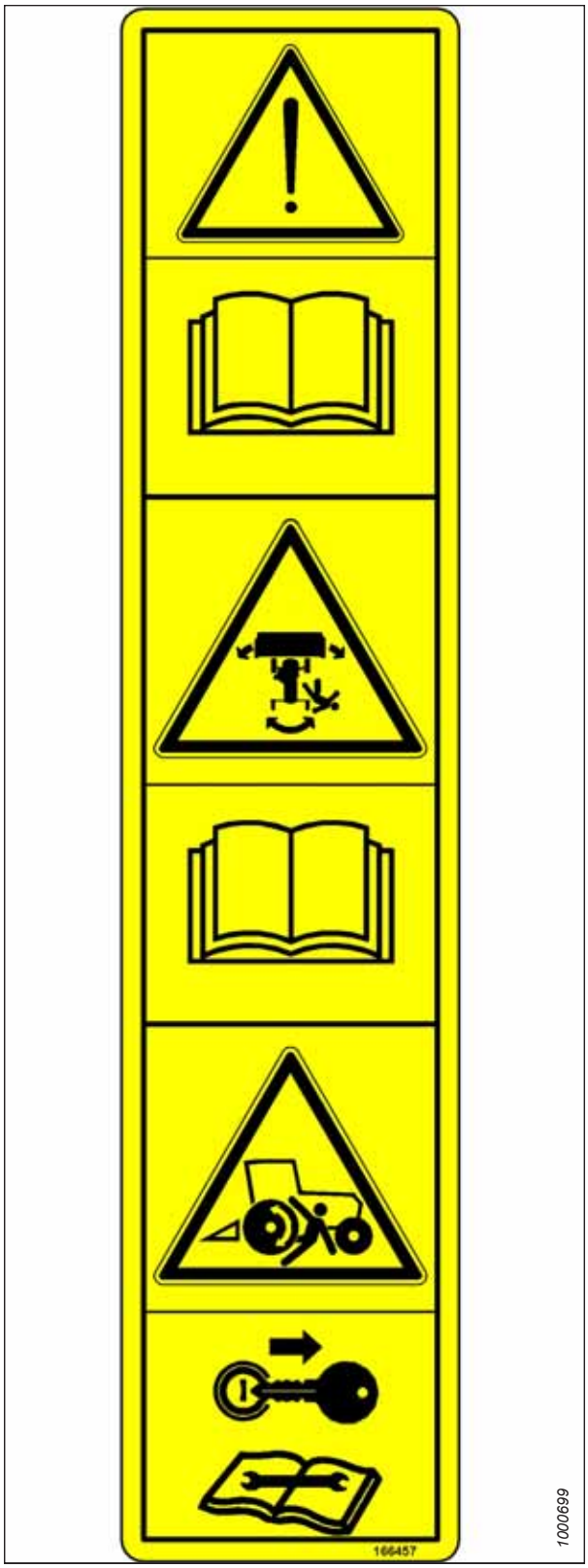


Figure 1.35: MD #166457

MD #166463

Collision hazard

DANGER

To prevent injury or death from a collision between the windrower and other vehicles when driving the windrower on public roadways:

- Obey all highway traffic regulations in your area. Use pilot vehicles in the front and the rear of the windrower (if required by law).
- Use a slow-moving vehicle emblem and activate the machine's warning lights, unless these actions are prohibited by law.
- If the width of the attached header impedes other vehicle traffic, remove the header and install a MacDon approved weight box onto the windrower. Refer to the windrower and header operator's manuals for instructions on safely towing the header.
- Adjust the drive wheel width and walking beam width for road transportation as required per local regulations (narrow transport option only available on some models). For instructions, refer to the operator's manual for safe procedure.



Figure 1.36: MD #166463

MD #166824

Hot fluid spray hazard and fluid fill rate information

CAUTION

Hydraulic fluid is under pressure, and can be extremely hot. To prevent injury:

- Do **NOT** remove the fluid fill cap when the engine is hot.
- Allow the engine to cool down before opening the fluid fill cap.
- Fill the tank slowly. Do **NOT** exceed a fill rate of 11 L/min (3 gpm).



Figure 1.37: MD #166824

MD #166829

Loss of control hazard

DANGER

To prevent serious injury or death from loss of control:

- It is essential that the machine be equipped such that weights are within the specified limits.
- The weight on the tail wheels should be greater than 1179 kg (2600 lb.) with the windrower positioned in the cab-forward direction.
- Ensure the recommended rear ballast kits are installed for proper machine balance. When operating in hilly conditions, additional rear ballast kits may be required.



Figure 1.38: MD #166829

MD #166832

High-pressure oil hazard

WARNING

To prevent serious injury, gangrene, or death:

- High-pressure oil can easily puncture skin. Hydraulic oil penetrating the skin can result in serious injury, gangrene, or death.
- Do **NOT** approach hydraulic oil leaks.
- Do **NOT** use any part of your body to check for oil leaks.
- Relieve the pressure in the hydraulic system before loosening any fittings.
- If hydraulic oil penetrates the skin, seek emergency medical help. Immediate surgery is required to remove the oil which has penetrated the skin to prevent the occurrence of gangrene..



Figure 1.39: MD #166832

MD #166834

Run-over hazard

DANGER

To prevent machine runaway:

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



Figure 1.40: MD #166834

MD #166835

Battery explosion hazard

WARNING

To prevent serious bodily injury caused by explosive battery gases:

- Keep sparks and flames away from the battery and do **NOT** connect boosting or charging cables incorrectly.
- Refer to the operator's manual for battery boosting and charging procedures.



Figure 1.41: MD #166835

MD #166836

Battery acid hazard

WARNING

To prevent injury from corrosive and poisonous battery acid:

- Wear protective clothing and personal protective devices when handling battery acid.
- Acid can severely burn your body and clothing.



Figure 1.42: MD #166836

MD #166837

Rotating fan hazard

WARNING

To prevent injury:

- Do **NOT** operate the engine with the engine hood open.
- Stop the engine and remove the key before opening the engine hood.

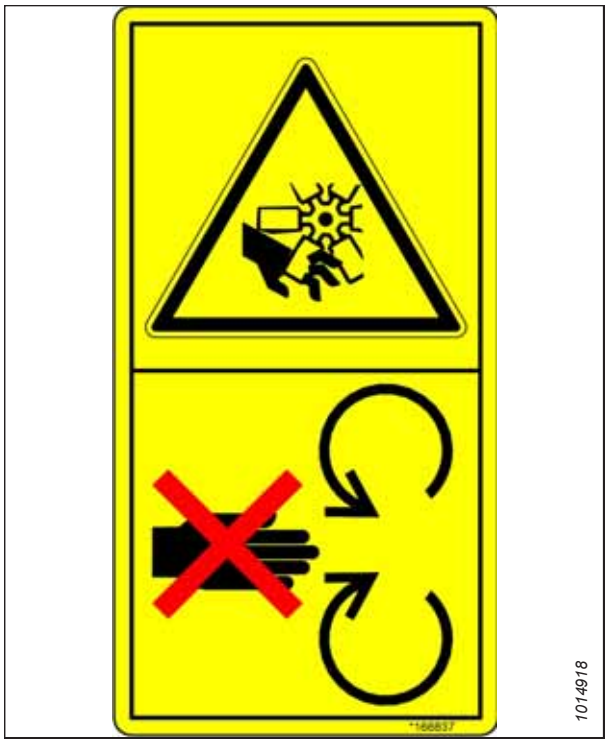


Figure 1.43: MD #166837

MD #166838

Hot surface hazard

CAUTION

To prevent injury:

- Keep a safe distance from hot surfaces.

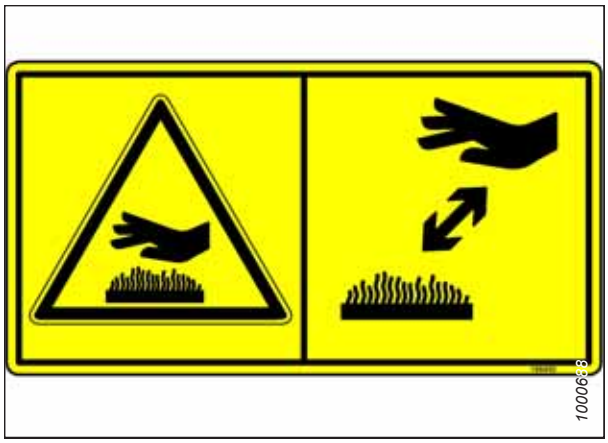


Figure 1.44: MD #166838

MD #166839

Hand and arm entanglement hazard

WARNING

To prevent injury:

- Do **NOT** operate the machine without the shields in place.
- Stop the engine and remove the key from the ignition before opening the shield.



Figure 1.45: MD #166839

MD #166843

Loss of control hazard

DANGER

To prevent serious injury or death from losing control of the machine:

- Do **NOT** make abrupt changes in the direction in which you are steering.
- Slow down before turning the machine.
- Do **NOT** make sudden, sharp changes to your speed while turning, such as hard braking.

When travelling on steep slopes:

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

When the windrower is operating without a header attached, weight must be added over the drive wheels so that you can maintain steering control. If you must drive the windrower without a header or without a MacDon weight system:

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

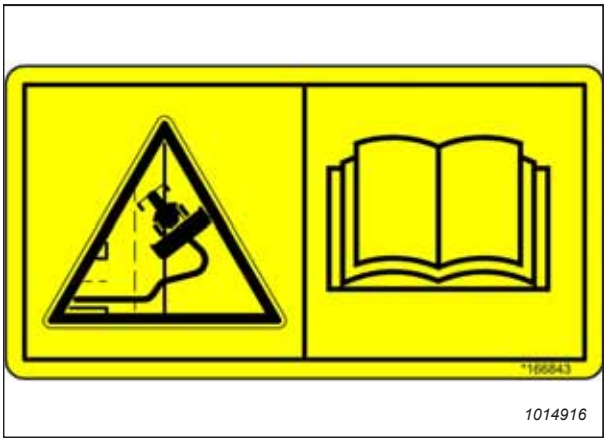


Figure 1.46: MD #166843

MD #167502

Pinch point hazard

CAUTION

To prevent injury:

- Do **NOT** reach into the pinch area.



Figure 1.47: MD #167502

MD #306179/306180/306181

Header crushing hazard

DANGER

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

- Fully raise the header, stop the engine, remove the key from the ignition, and engage the safety props before going under the header.

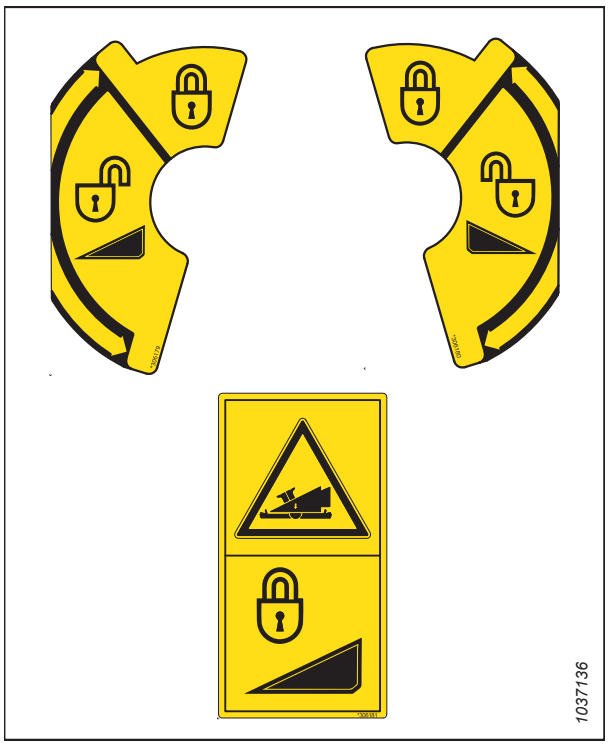


Figure 1.48: MD #306179/306180/306181

MD #310977

Collision hazard

DANGER

To prevent injury or death from a collision between the windrower and other vehicles when driving the windrower on narrow public roadways:

- Adjust the drive wheel legs and walking beam for narrow road transportation to reduce the overall windrower width as required per local regulations.
- Make certain everyone is clear of machine before starting the engine and during operation.
- Refer to the operator's manual instructions for safe procedure.
- Always ensure that the lockout pins are installed and the lockout valve is in the closed position before operating the machine.

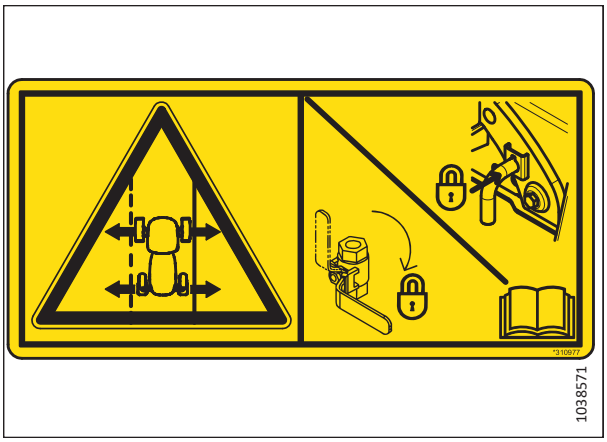


Figure 1.49: MD #310977

Chapter 2: Product Overview

Refer to this section to learn the definitions of the technical terms used in this manual, the machine's specifications, and the locations of key components.

2.1 Definitions

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

Term	Definition
A Series Header	MacDon A40D, A40DX, and Grass Seed auger headers
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
Bolt	A headed and externally threaded fastener designed to be paired with a nut
Cab-forward	Windrower operation mode, in which the Operator's seat faces the header
Center-link	A hydraulic cylinder connection between the header and the vehicle, which is used to change the angle of the header relative to the vehicle
CGVW	Combined gross vehicle weight
D1X Series Header	MacDon D115X, D120X, and D125X rigid draper headers for M1 Series Windrowers
D1XL Series Header	MacDon D130XL, D135XL, D140XL, and D145XL rigid draper headers for M1 Series Windrowers
DDD	Double-draper drive
DEF	Diesel exhaust fluid; also known as AdBlue in Europe, and AUS 32 in Australia
DEF supply module	A pump that supplies diesel exhaust fluid through the exhaust aftertreatment system
DK	Double knife
DKD	Double-knife drive
DOC	Diesel oxidation catalyst
DWA	Double Windrow Attachment
EEC	Eco engine control
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 in which the given sealing surfaces or components are making contact with each other and the fitting has been tightened by hand to a point where the fitting is no longer loose and cannot be tightened further by hand
GSS	Grass Seed
GVW	Gross vehicle weight
Hard joint	A joint made with use of a fastener where joining materials are highly incompressible
Header	A machine that cuts and lays crop into a windrow when attached to a windrower
Hex key	A tool of hexagonal cross-section used to drive bolts and screws that have a hexagonal socket in the head (internal-wrenching hexagon drive); also known as an Allen key
HDS	Hydraulic deck shift
hp	Horsepower
HPT display	Harvest Performance Tracker display module on an M1 Series Windrower
JIC	Joint Industrial Council: A standards body that developed standard sizing and shape for original 37° flared fitting
Knife	A cutting device found on a header's cutterbar which uses a reciprocating cutter (also called a sickle) to cut crop so that it can be fed into the header

Term	Definition
MDS	Mechanical Deck Shift
M1 Series Windrowers	MacDon M1170, M1170*NT*, M1170*NT5* and M1240 Windrowers
n/a	Not applicable
NPT	National Pipe Thread: A style of fitting used for low-pressure port openings. Threads on NPT fittings are uniquely tapered for an interference fit
Nut	An internally threaded fastener designed to be paired with a bolt
ORB	O-ring boss: A style of fitting commonly used in port openings on manifolds, pumps, and motors
ORFS	O-ring face seal: A style of fitting commonly used for connecting hoses and tubes. This style of fitting is also commonly called ORS, which stands for O-Ring Seal
PARK	The slot opposite the NEUTRAL position on operator's console of M1 Series windrowers
R1 SP Series	MacDon R113 and R116 Rotary Disc Headers for windrowers
R2 SP Series	MacDon R216 Rotary Disc Headers for windrowers
SAE	Society of Automotive Engineers
SCR	Selective catalytic reduction
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread when inserted into a mating part
SDD	Single-draper drive
SK	Single knife
SKD	Single-knife drive
Soft joint	A flexible joint made by use of a fastener in which the joining materials compress or relax over a period of time
spm	Strokes per minute
Tension	An axial load placed on a bolt or screw, usually measured in Newtons (N) or pounds (lb.). This term can also be used to describe the force a belt exerts on a pulley or sprocket
TFFT	Turns from finger tight
Torque	The product of a force * the length of a lever arm, usually measured in Newton-meters (Nm) or foot-pounds (lbf·ft)
Torque angle	A tightening procedure in which a fitting is assembled to a specified tightness (usually finger tight) and then the nut is turned farther by a specified number of degrees until it achieves its final position
Torque-tension	The relationship between the assembly torque applied to a piece of hardware and the axial load it induces in a bolt or screw
ULSD	Ultra-low sulphur diesel
Washer	A thin cylinder with a hole or a slot located in the center, used as a spacer, a load distribution element, or a locking mechanism
Windrower	The power unit for a header

2.2 Specifications

Consult this section to learn about the physical characteristics and specifications of your machine.

Table 2.1 M1170*NT5*

Engine		
Type		Cummins B4.5, 4 cylinder Stage 5 turbo, diesel (B20 bio-diesel approved)
Displacement		4.5 L (275 cu.in.)
Power	Rated	129 kW (173 hp) @ 2200 rpm
Maximum rpm (no load)		2300
Idle rpm		1000
Electrical System		
Battery (2)		12 Volt, maximum dimension – 334 x 188 x 232 mm (13 x 6.81 x 9.43 in.) Group rating 29H or 31A Heavy duty / off road / vibration resistant
Minimum CCA per battery (cold cranking amps)		750
Alternator		200 amp
Egress lighting		Standard
Starter		Wet type
Lighting package		12 lights: 4 halogen road, 8 LED work (2 LED work lights also used for egress)
Traction Drive		
Type		Hydrostatic, infinitely variable motors via electric shift
Speed	Field	0–29 km/h (18 mph)
	Reverse	9.6 km/h (6 mph)
	Transport	Engine-forward 0–43 km/h (27 mph)[1]
Transmission	Type	2 piston pumps – 1 per drive wheel
	Displacement	44 cc (2.65 cu. in.)
	Flow	167 L/min (40 U.S. gpm)
Final drive	Type	Planetary gearbox
	Ratio	Standard: 27.8 : 1
System Capacities		
Fuel tank		518 L (137 U.S. gallons)
Diesel exhaust fluid (DEF) tank capacity		49 L (13 U.S. gallons)
Coolant		30 L (7.9 U.S. gallons)
Hydraulic reservoir		60 L (15.8 U.S. gallons)

1. Maximum Engine Forward (road) speed varies by region based on local regulation. Limited regions: UK (32 km/h), France (25 km/h).

Table 2.1 M1170*NT5* (continued)

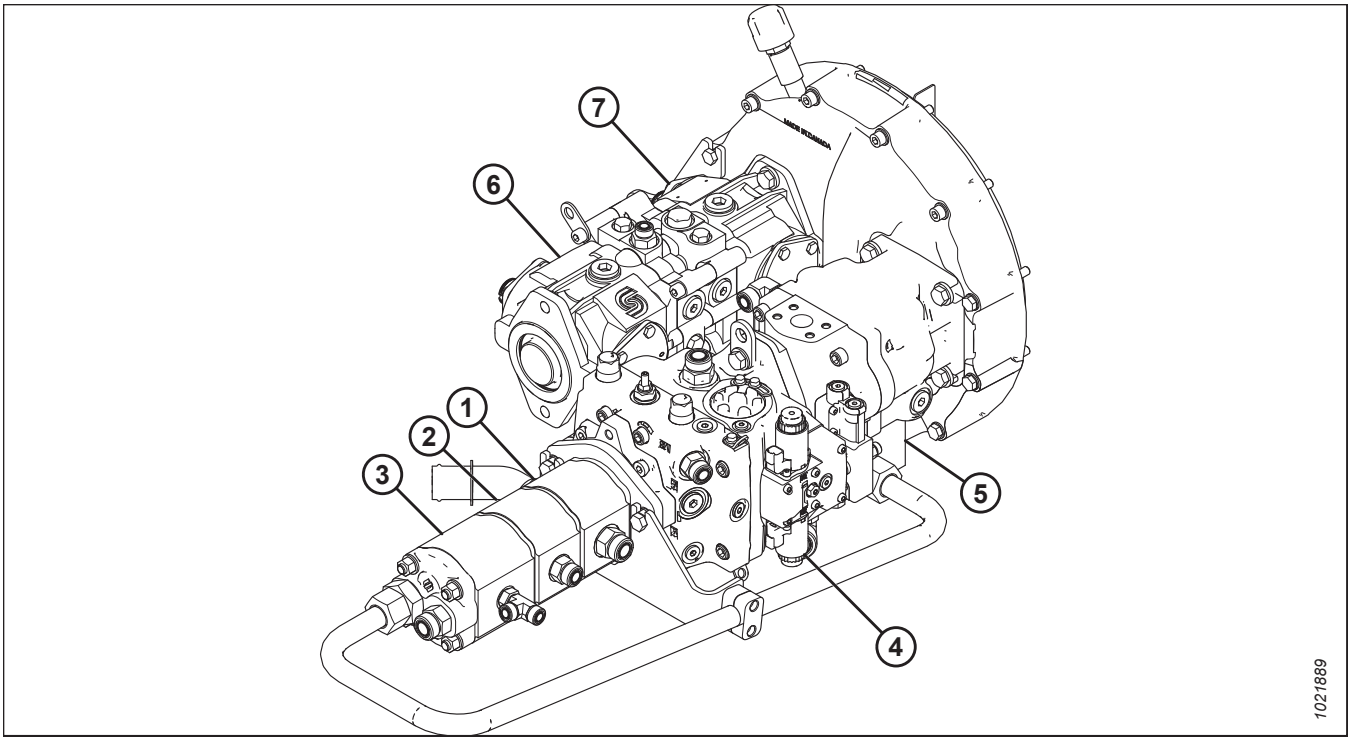
Header Drive		
Knife/Disc	Pump	Piston, 53 cc (3.23 cu. in.)
	Max pressure	37,921 kPa (5500 psi)
	Flow	151.4 L/min (40 gpm)
Reel	Pump	Gear, 25.2 cc (1.54 cu. in.)
	Max pressure	23,994 kPa (3480 psi)
	Flow	75.7 L/min (20 gpm)
Draper	Pump	Gear, 19.3 cc (1.18 cu. in.)
	Max pressure	23,994 kPa (3480 psi)
	Flow	53 L/min (14 gpm)
Lift/Fan Drive		
Pump		Piston, 60 cc (3.66 cu. in.)
Max pressure		22,063 kPa (3200 psi)
Flow		0–170.3 L/min (45 gpm)
Header Lift/Tilt		
Type		Hydraulic double acting cylinders
Max lift capacity		3810 kg (8400 lb.)
Header Float		
Adjustment		Fully in-cab adjustable
Automatic		Memory for 3 float settings (deck shift positions on draper)
Options		External booster spring (up to 2 per side)
Deluxe Cab		
Suspension		4 point spring/shock
Dimensions	Width	1767 mm (69.6 in.)
	Depth	1735 mm (68.3 in.)
	Height	1690 mm (66.5 in.)
Seat	Operator	Leather, adjustable air ride suspension, seat belt, heated/cooled, lateral isolation, adjustable front cushion
	Training	Leather, folding, cab mounted, seat belt
Windshield wiper	Front	990 mm (39 in.) blade, washer equipped
	Rear	560 mm (22 in.) frameless blade, washer equipped
Heater		11.10 kW (37,900 Btu/hr)
Air conditioning		8.73 kW (29,800 Btu/hr)
Electrical outlets	12 V DC	6
	USB	2
Radio		AM/FM/DVD/USB/Bluetooth radio, antenna, microphone, and two factory-installed speakers
Mirrors		Two power adjustable outside (field use), two manually adjustable (transport mode)
Sun shades		Front and rear

Table 2.1 M1170*NT5* (continued)

System Monitoring		
Display		179 mm (7 in.) LCD
Speeds		Ground (mph or km/h), engine (rpm), knife (spm), reel (rpm or mph/km/h), conveyor (rpm or mph/km/h), cooling fan (rpm)
Pressures		Knife or disc (psi or MPa), reel (psi or MPa), conveyor (psi or MPa), supercharge (psi or MPa)
Header position	Platform	Height, angle, float
	Reel	Height, fore-aft
Engine parameters		Fuel consumption, load
Tire Options		
Drive (Narrow Transport)	Bar	540-65R30
Caster	Suspended	16.5 L-16.1 with independent suspension
Frame and Structure		
Dimensions		Refer to *2.3 Windrower Dimensions, page 35*
Frame to ground (crop clearance)		1160 mm (45.7 in.)
Walking beam max width		3856 mm (151.8 in.) with 3422 mm
Weight[2]	Base	5942 kg (13,100 lb)
	Max GVW	10,660 kg (23,500 lb.)
	Max CGVW	11,794 kg (26,000 lb.)
Header compatibility	Draper	D1XL Series - limited to 10.7 m (35 ft.)
		D1X Series - limited to 10.7 m (35 ft.)
	Rotary	R1 Series
	Auger	A40DX [3]

2. Weights do not include options.
3. The forming shield is not compatible with the narrow transport system.

Figure 2.1: Pump Orientation



1 - Reel/Auger Drive Pump

2 - Draper Drive or Double Windrow (DWA) Drive Option[4]

3 - Charge Pressure Pump for Pumps 4, 5, 6, and 7

4 - Knife/Disc Drive (Closed Loop System)

5 - Fan Drive and Lift Functions (Open Loop System)

6 - Traction Drive Tandem Pump (Left Wheel)

7 - Traction Drive Tandem Pump (Right Wheel)

4. DWA is used only with an auger or disc header.

2.3 Windrower Dimensions

When transporting a windrower, it is sometimes important to know that windrower's outside dimensions.

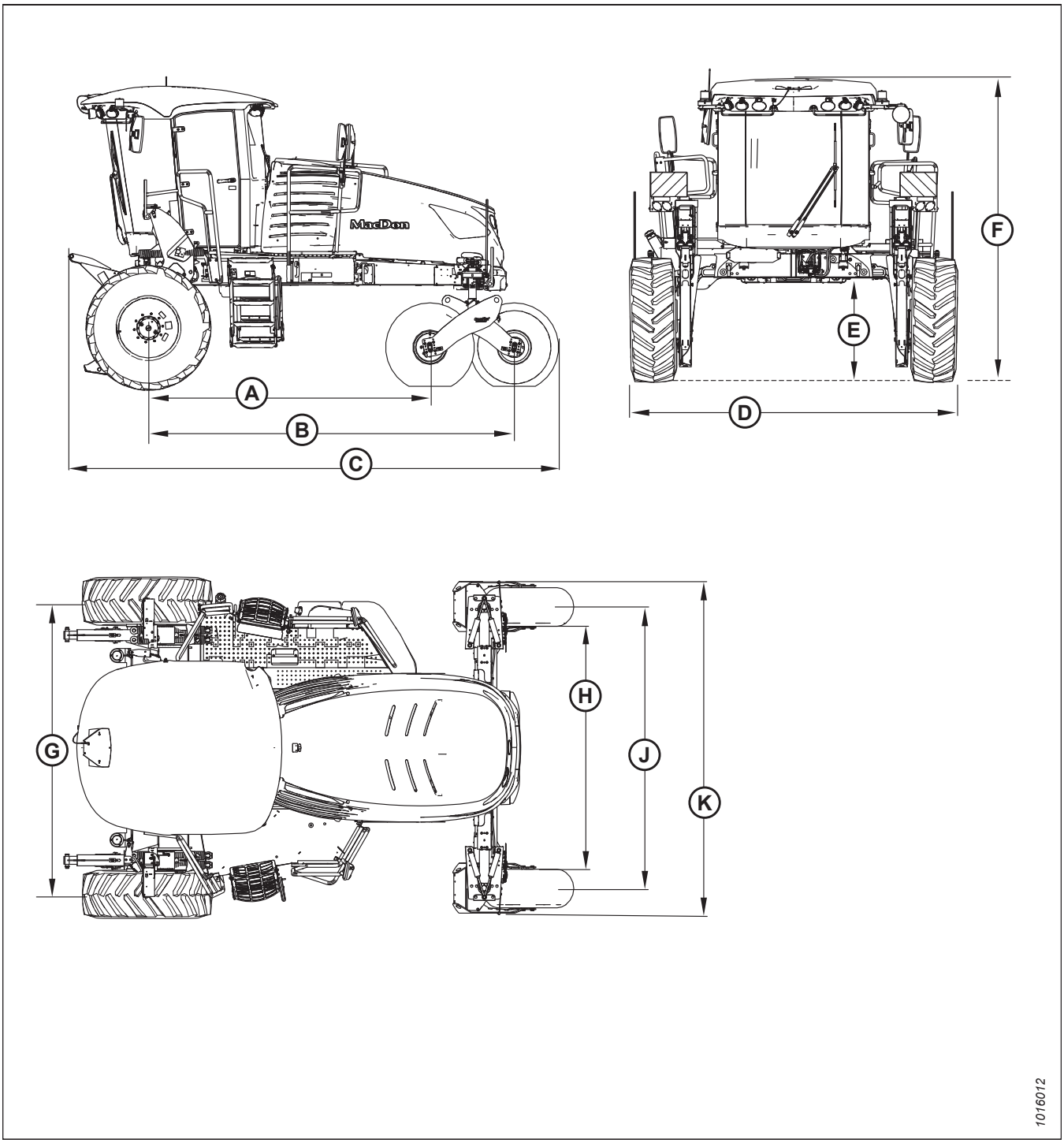


Figure 2.2: Windrower Dimensions

Field	Road	Field	Road	Field	Road
—	A - 3300 mm (130 in.)	B - 4290 mm (168 7/8 in.)	—	C - 5752 mm (226 7/16 in.)	C - 5140 mm (202 3/8 in.)
D - 3834 mm (150 15/16 in.)	D - 3489 mm (137 23/64 in.)	E - 1150 mm (45 9/32 in.)	—	F - 3480 mm (137 1/32 in.)	—
G - 3294 mm (129 11/16 in.)	G - 2934 mm (115 1/2 in.)	H - 3412 mm (134 1/3 in.)	H - 2170 mm (85 7/16 in.)	J - 3846 mm (151 7/16 in.) (Max)	—
K - 4403 mm (173 11/32 in.)	K - 3162 mm (124 1/2 in.)	—	—	—	—

2.4 Component Location

Maintaining and servicing the windrower is easier if you are familiar with the location of the windrower's main components.

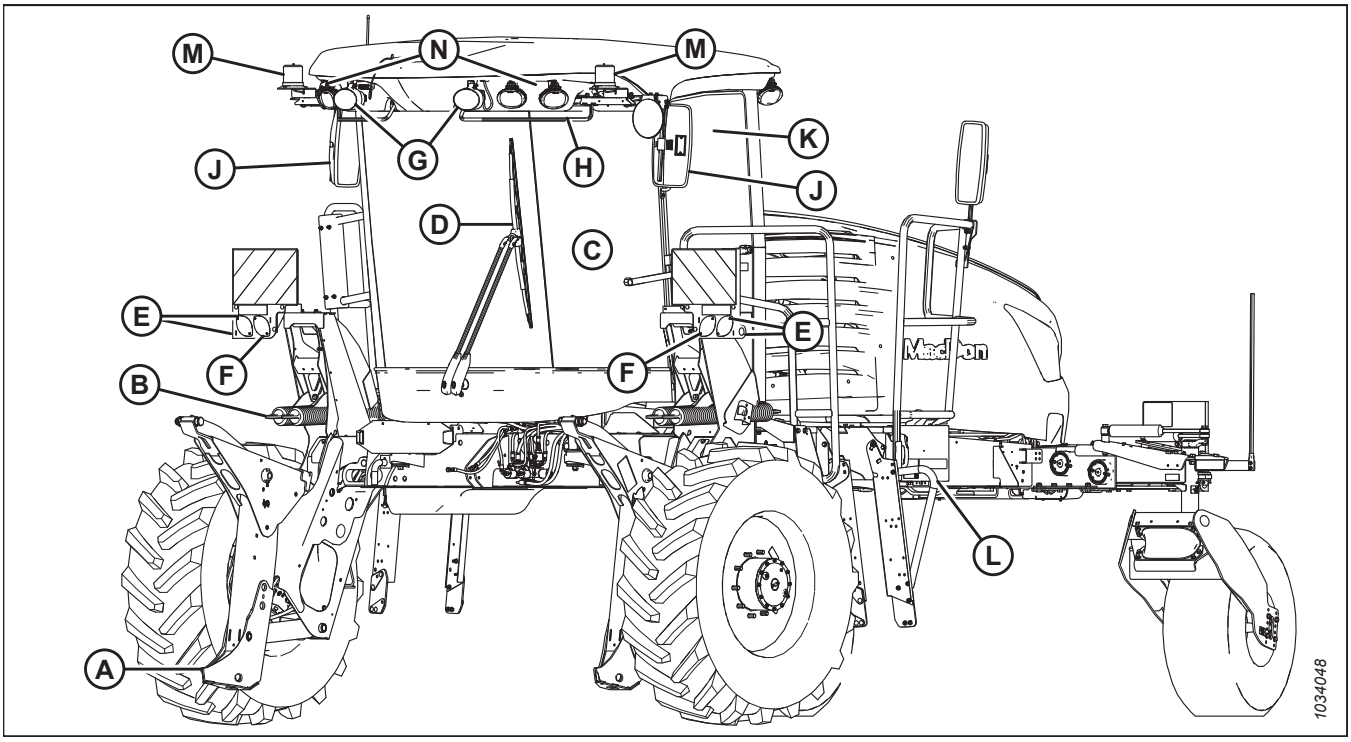


Figure 2.3: Cab-Forward View

A - Header Lift Leg
B - Header Float Springs
C - Operator's Station
D - Windshield Wiper
E - Turn Signals / Hazard Lights
F - Tail lights Engine-Forward
G - Field/Road Lights
H - Handholds
J - Mirror
K - Door
L - Maintenance Platform
M - Beacon Lights
N - Flood Lights x 4

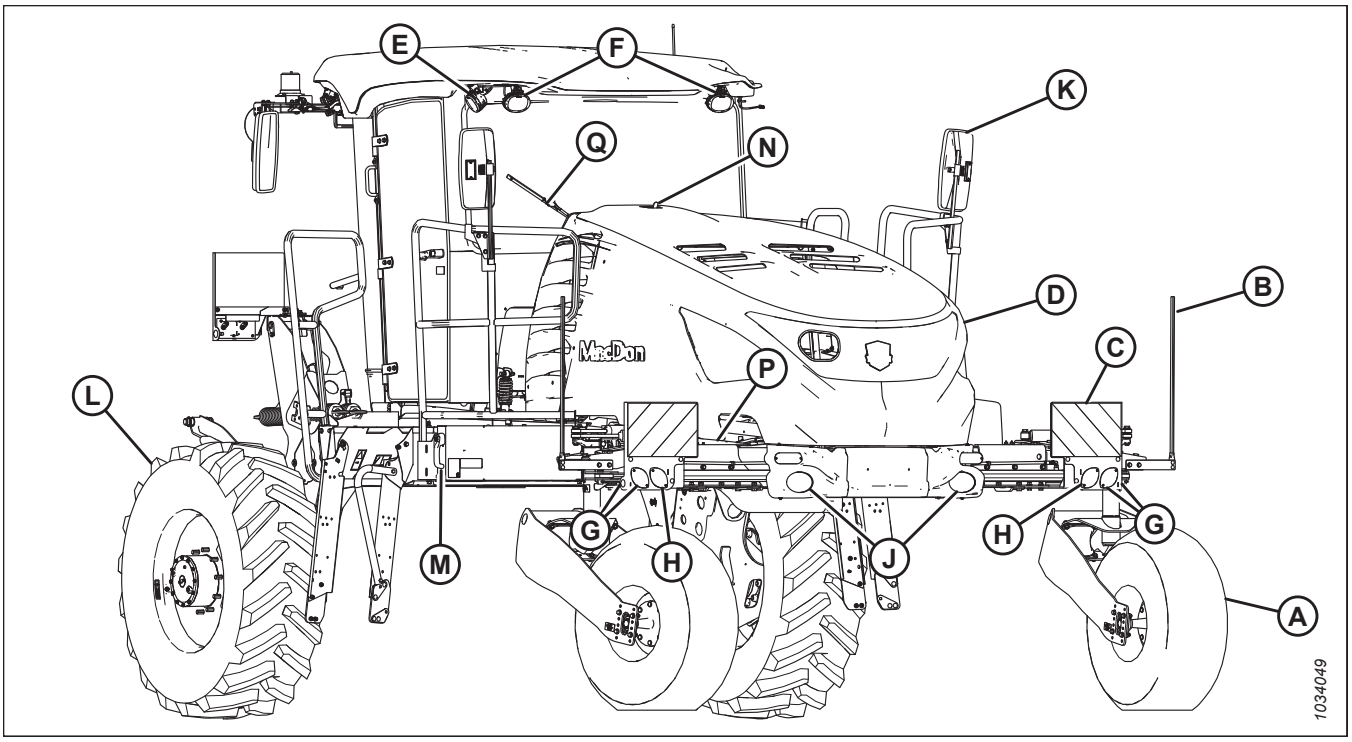


Figure 2.4: Engine-Forward View

A - Caster Wheel
B - End Marker Rod
C - Rear Deflectors
D - Engine Compartment Hood
E - Work Light
F - Field Lights
G - Turn Signals / Hazard Lights
H - Marker Lights
J - Field / Road Lights
K - Mirror
L - Drive Wheel
M - Tool Box
N - Hood Latch
P - Walking Beam
Q - Windshield Wiper

Chapter 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° so that the Operator maintains access to the windrower controls and gauges regardless of the direction of travel.

3.1 Console

The console contains controls to operate the windrower, as well as amenities for the Operator.

The console position is adjustable to suit each particular Operator. Operable parts of the console include:

- Ignition (A)
- Harvest Performance Tracker (HPT) display (B)
- Header controls (C)
- Ground speed lever (GSL) (D)
- Throttle (E)

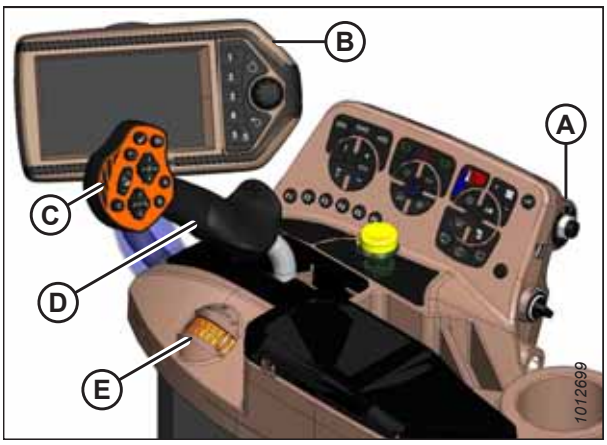


Figure 3.1: Console

1. Adjust the fore-aft and height as follows:
   a. Pull lever (A) and slide the console fore or aft to the desired position.
   b. Release the lever to lock the console.

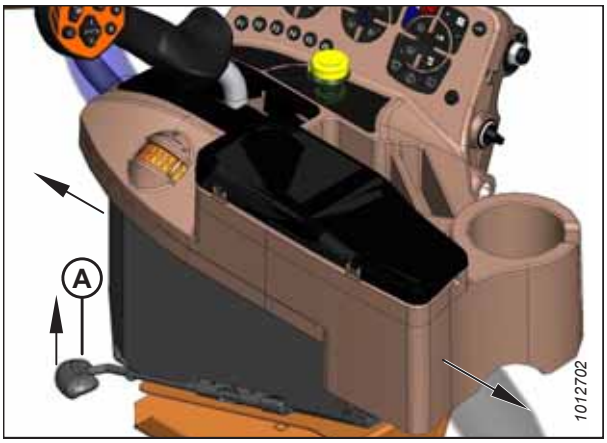


Figure 3.2: Console Fore-Aft/Height

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

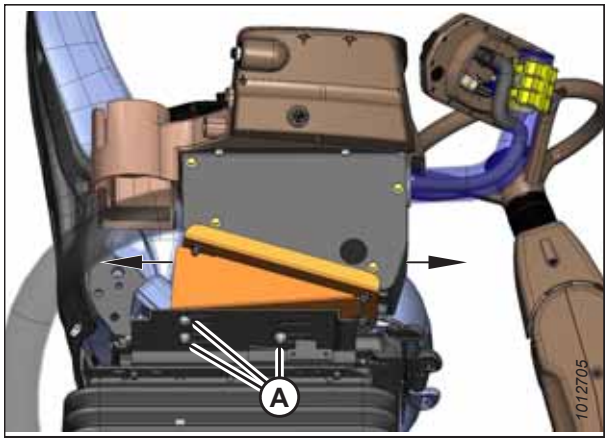


Figure 3.3: Console Fore-Aft

3.2 Operator Presence System

The Operator Presence System is a safety feature designed to deactivate selected systems or sound an alarm when an Operator is not seated at the operator's station.

These systems include:

- Header drive; refer to *3.2.1 Header Drive, page 41*
- Engine and transmission; refer to *3.2.2 Engine and Transmission, page 41*

3.2.1 Header Drive

The header is driven hydraulically from the windrower.

- Requires the Operator to be in the seat in order to engage the header drive.
- Power is maintained to the header drive for 5 seconds after the Operator leaves the seat, and then the header shuts down.
- After the header has shut down automatically, the HEADER ENGAGE switch must be moved to the OFF position and back to the ON position to restart the header.

3.2.2 Engine and Transmission

The windrower is powered by a diesel engine. The transmission then uses power from the engine to move the windrower.

- The engine will **NOT** start when the HEADER ENGAGE switch is engaged.
- The engine will shut down when the windrower is moving at 8 km/h (5 mph) or less, and the Operator leaves the seat, and the transmission is not locked in NEUTRAL. The Harvest Performance Tracker (HPT) will display NO OPERATOR DETECTED and ENGINE SHUT DOWN 5...4...3...2...1...0 accompanied by a steady tone. At 0, the engine shuts down.
- If the windrower is moving faster than 8 km/h (5 mph), and the Operator leaves the seat, after 2 seconds an alarm will sound and the HPT will display NO OPERATOR.
- When the seat is in between cab-forward and engine-forward positions, the engine will shut down if the transmission is not locked in the NEUTRAL position. The HPT will display LOCK SEAT BASE until the seat base is locked into position.

3.3 Operator's Seat Adjustments

The operator's seat can be adjusted in several ways to make the Operator more comfortable.

Refer to the following sections for a description and the location of each adjustment. Some seat features are only available with the deluxe cab option.

3.3.1 Armrest

The standard and deluxe seats are equipped with one armrest.

Raise the armrest for easier access to the seat.

Lower the armrest after the seat belt is buckled.

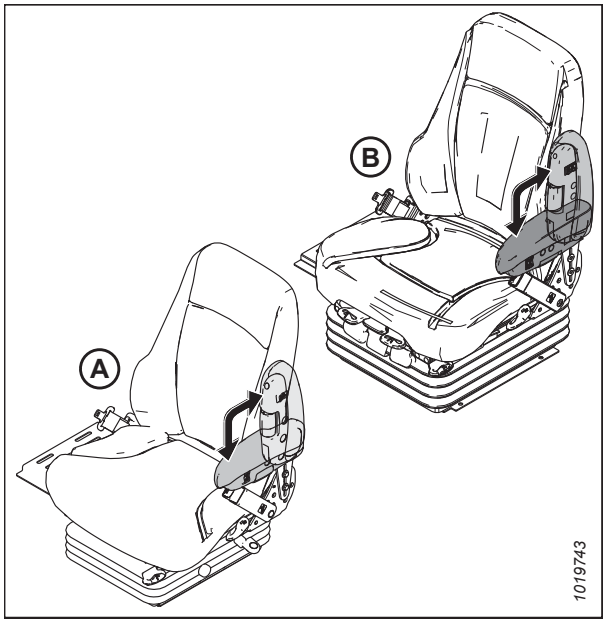


Figure 3.4: Operator's Seat Armrest

A - Standard Seat **B - Deluxe Seat**

3.3.2 Armrest Angle

Use the controls on the armrest to adjust the angle of the armrest.

- Rotate knob (A) clockwise to increase the armrest angle.
- Rotate knob (A) counterclockwise to decrease the armrest angle.



Figure 3.5: Operator's Seat Armrest Angle Controls

3.3.3 Suspension and Height

Use the controls on the side of the seat to adjust the height and stiffness of the seat suspension.

- Press upper switch (A) to increase the seat stiffness and height.
- Press lower switch (A) to decrease the seat stiffness and height.

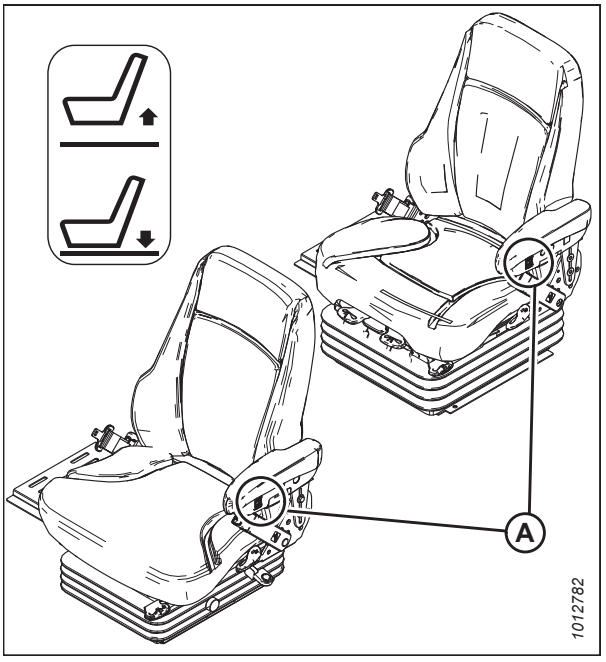


Figure 3.6: Operator's Seat Suspension and Height Controls

3.3.4 Fore-Aft Slide Control

Use the controls on the side of the seat to adjust the seat's fore-aft position.

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



Figure 3.7: Operator's Seat Fore-Aft Position Controls

3.3.5 Fore-Aft Isolator Control

Use the controls on the seat to lock the seat's fore-aft isolator.

- Push lever (A) down to lock
- Pull lever (A) up to unlock

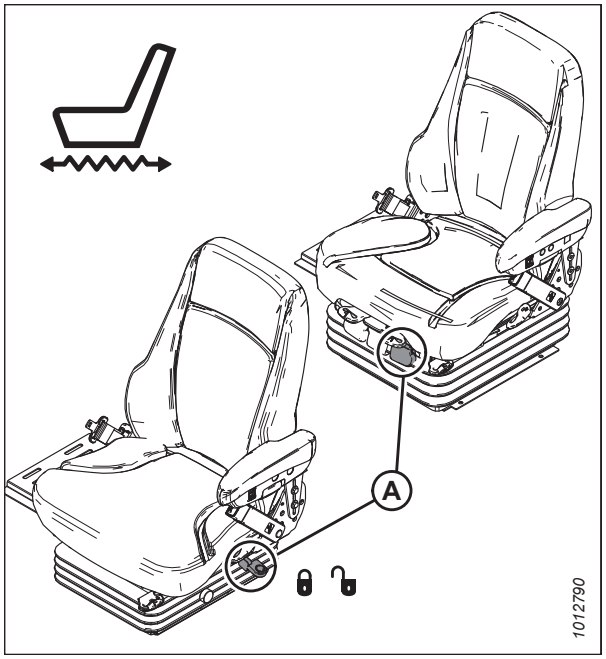


Figure 3.8: Operator's Seat Fore-Aft Isolator Controls

3.3.6 Tilt

Use the controls on the side of the seat to adjust the seat's tilt.

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

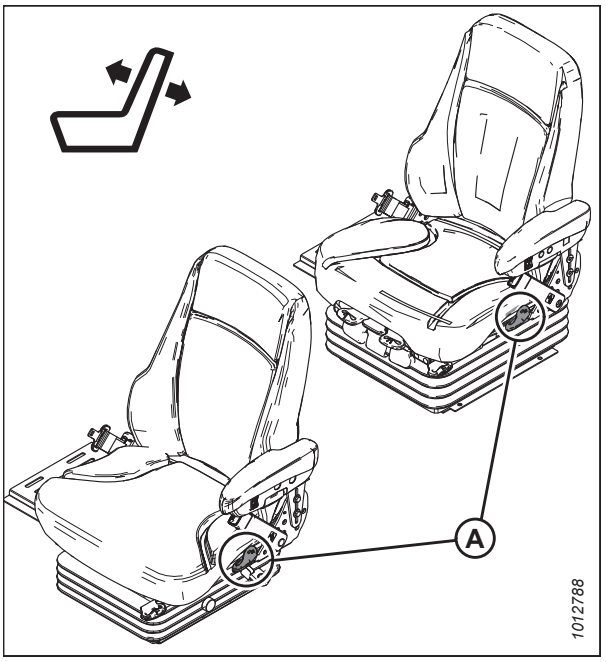


Figure 3.9: Operator's Seat Tilt Controls

3.3.7 Lumbar Support

Use the controls on the back of the seat adjust the stiffness of the seat's back.

- Rotate knob (A) clockwise to increase the lumbar support.
- Rotate knob (A) counterclockwise to decrease the lumbar support.

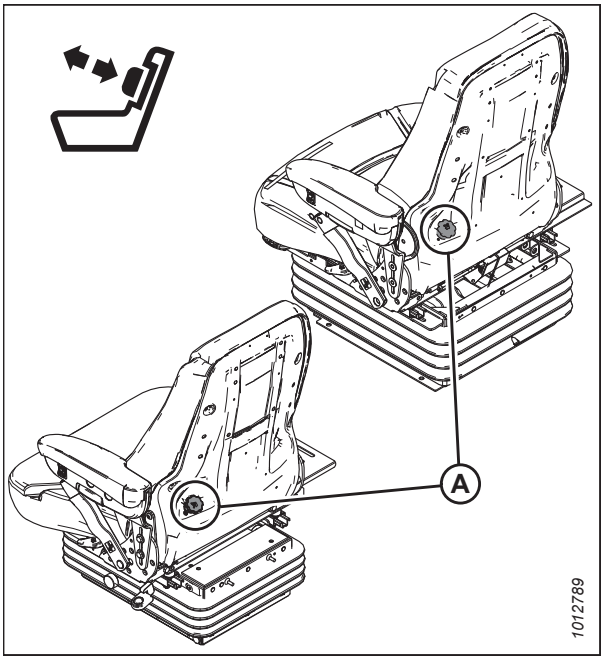


Figure 3.10: Operator's Seat Lumbar Support Controls

3.3.8 Vertical Dampener

Use the controls on the seat to adjust the seat's vertical suspension dampening.

- Turn knob (A) counterclockwise to increase vertical dampener.
- Turn knob (A) clockwise to decrease vertical dampener.



Figure 3.11: Operator's Seat Vertical Dampener Controls

3.3.9 Cushion Tilt – Deluxe Cab Only

Use the controls on the front of the seat to adjust the deluxe seat's cushion tilt.

1. Pull lever (A) up to release.
2. Tilt the seat cushion up or down.
3. Release lever (A).

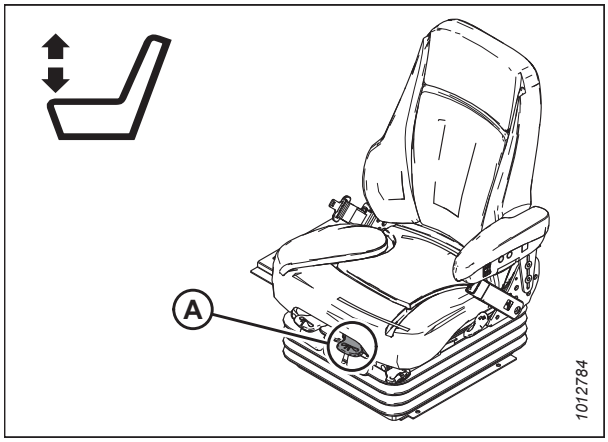


Figure 3.12: Deluxe Seat Cushion Tilt Controls

3.3.10 Cushion Extension – Deluxe Cab Only

Use the controls on the front of the seat to adjust seat cushion extension fore-aft.

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

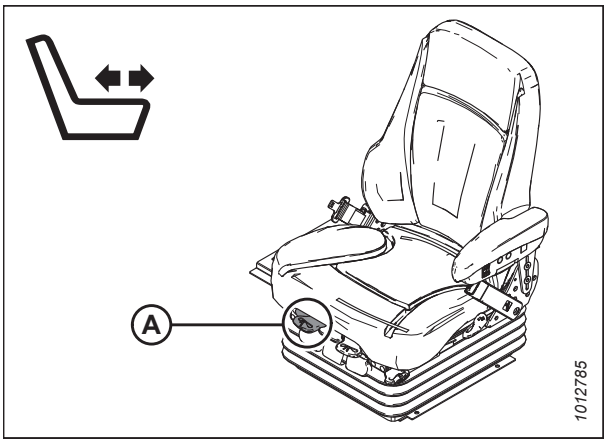


Figure 3.13: Deluxe Seat Cushion Extension Controls

3.3.11 Lateral Isolation Lockout – Deluxe Cab Only

Use the controls on the front of the seat to adjust the lateral isolation lockout.

Use controls (A) to lock or unlock the deluxe seat's lateral isolation lockout.

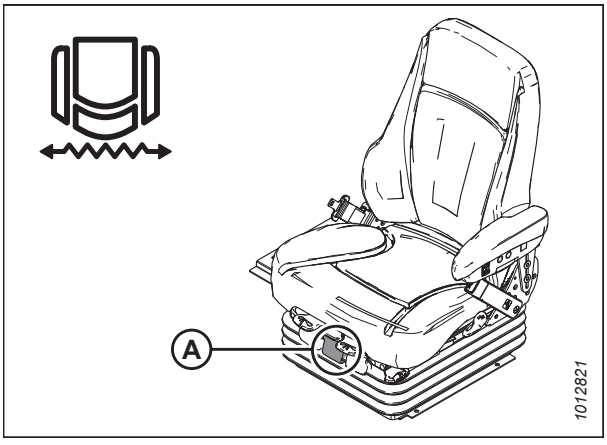


Figure 3.14: Deluxe Seat Lateral Isolation Controls

3.3.12 Heating/Cooling – Deluxe Cab Only

Use the controls on the side of the seat to adjust the heating/cooling of the deluxe operator's seat.

WARNING

- **Do NOT use the seat heating or cooling system if you have a diminished ability to sense temperature, a reduced ability to feel pain, or have sensitive skin. There is a possibility that some people may suffer heat-induced burns or excessive cooling when using the system.**
- **Do NOT place anything on the seat that insulates against heat or cooling, such as a blanket or cushion. These items may cause the seat heating or cooling system to overheat and cause a heat-induced burn to the seat occupant, or damage to the seat itself.**

Seat heating/cooling switch (A)

- Move the switch forward for COOL
- Move the switch backward for HEAT

Heating/cooling high/low/off switch (B)

- Move the switch up for HIGH
- Move the switch down for LOW
- Center the switch for OFF

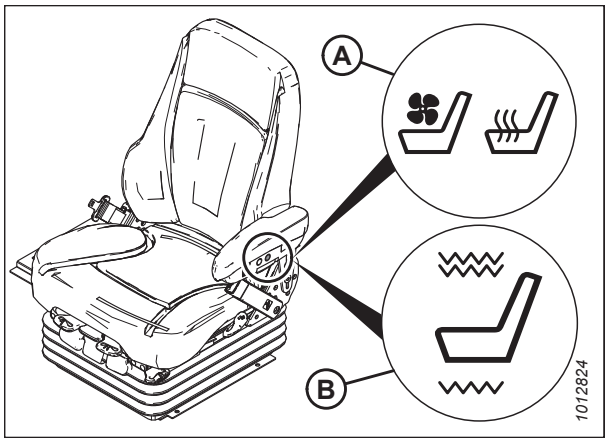


Figure 3.15: Deluxe Seat Heating and Cooling Controls

3.4 Training Seat

A folding wall-mounted training seat with a seat belt is provided in the cab.

WARNING

- **The training seat is provided for use by an experienced machine Operator, so that they can train a new Operator on the use of the machine.**
- **Never use the training seat when operating the windrower in engine-forward mode.**
- **The training seat is NOT intended as a passenger seat or for use by children. Use the seat belt whenever you are operating the machine or when you are riding as a Trainer.**
- **Keep all other riders off of the machine.**

To store the training seat, lift the seat and secure it with latch (A).

To lower the training seat, pull latch (A) and lower the seat.

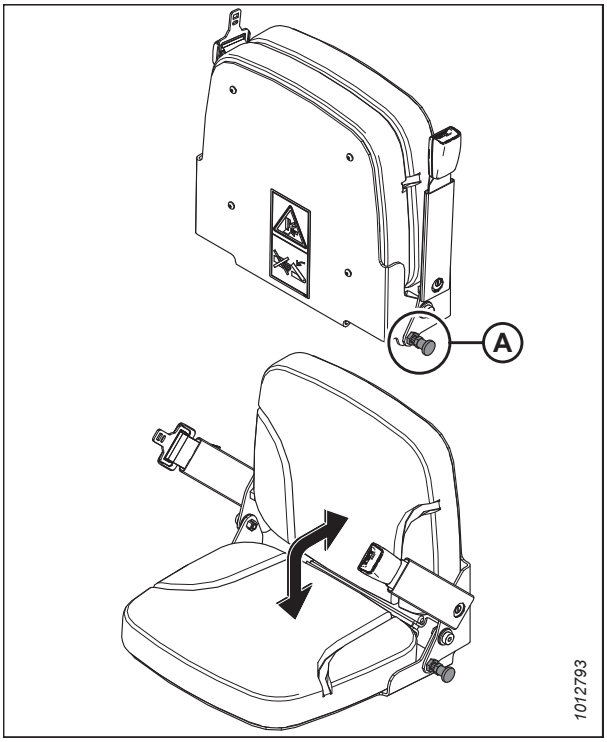


Figure 3.16: Training Seat

3.5 Seat Belts

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

WARNING

Seat belts can help ensure your safety when they are 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 leave any slack in the belt system. Never wear the belt in a twisted condition or pinched between the seat structural members.**

To fasten the seat belt:

1. Pull the belt with metal eye (A), at the right side of seat, 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.

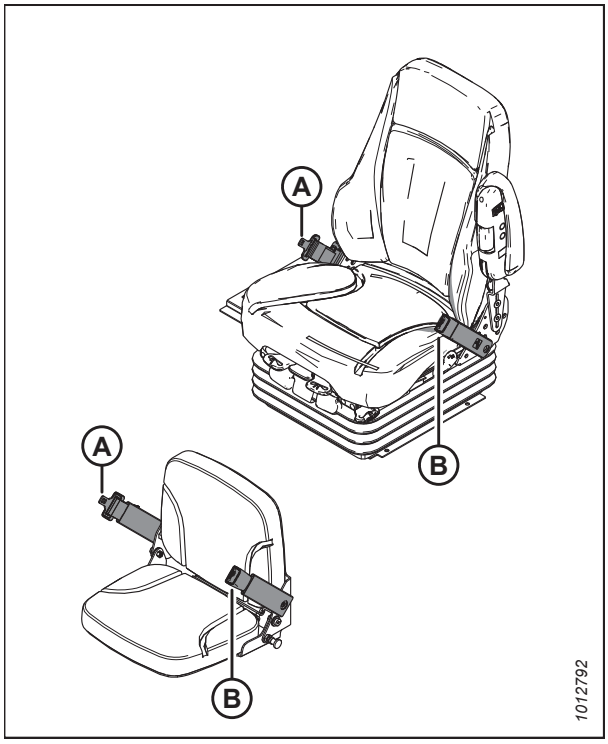


Figure 3.17: Seat Belt

To release the seat belt:

1. Push the red button on the end of buckle (B).
2. Separate buckle (B) from metal eye (A).

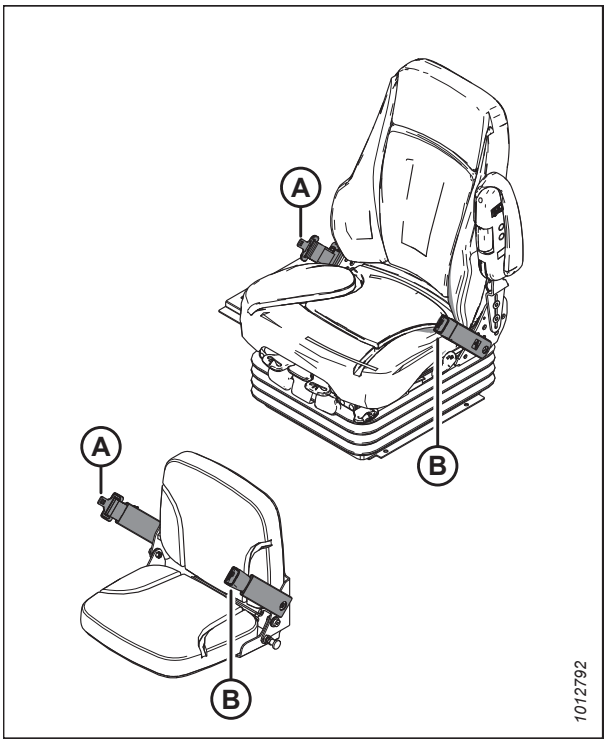


Figure 3.18: Seat Belt

3.6 Adjusting Steering Column and Steering Wheel

The steering column and steering wheel are adjustable for the operator's comfort and to make it easier to get in and out of the operator's seat.

To adjust the steering column:

1. Hold onto the steering wheel, lift handle (A), and move the steering column forward or backward into the desired position.
2. Release handle (A) to lock the steering column in position.

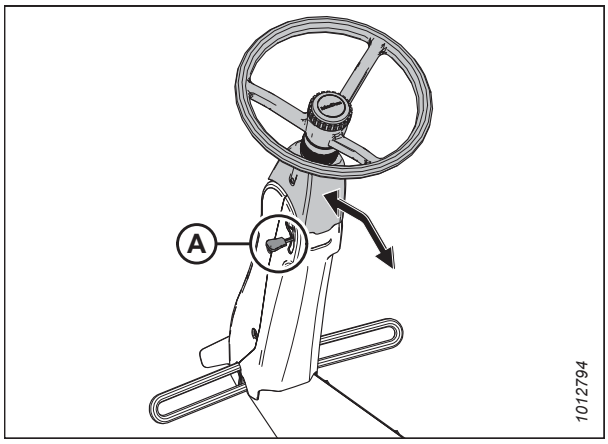


Figure 3.19: Steering Column

To adjust the steering wheel:

1. Hold onto the steering wheel, turn center cap (A) counterclockwise, and move the steering wheel up or down into the desired position.
2. Turn center cap clockwise (A) to lock the steering wheel in position.

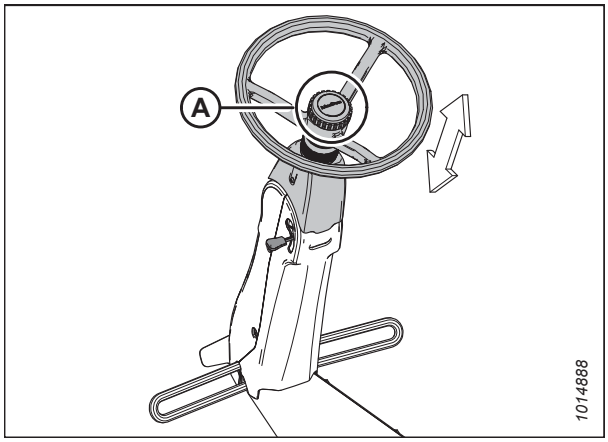


Figure 3.20: Steering Wheel

3.7 Lighting

The field and road light switches are located on the operator's console.

The position of the operator's station (cab-forward or engine-forward) automatically determines which lights are active when the lighting mode is selected.

NOTE:

When in engine-forward mode, field lights (B) do **NOT** turn on.

An LED on the switch changes from OFF to amber when the switch is on. The high beam switch has a blue LED that changes from OFF to blue when the switch is on.

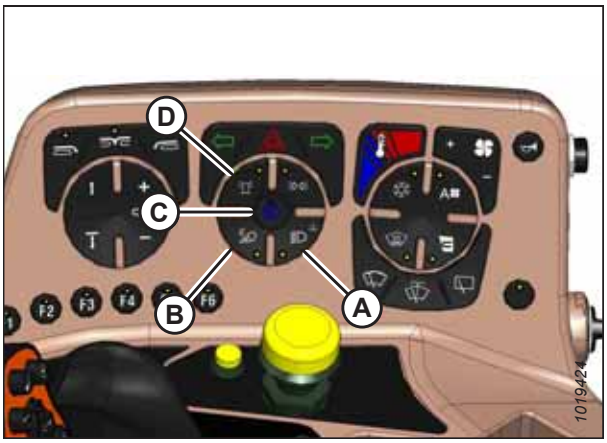


Figure 3.21: Light Switches

A - Road Lights
B - Field Lights
C - Low or High Beams
D - Beacons

3.7.1 Cab-Forward Lighting – Field

Field lights are used to illuminate the working area around the windrower.

The following lights are on when FIELD LIGHT button (A) is selected and the operator's station is locked in cab-forward mode:

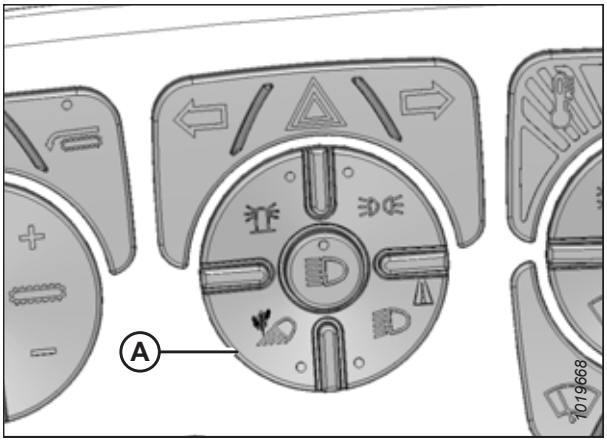


Figure 3.22: Field Light Button

- Cab-forward road lights (A) with low/high beams
- Engine-forward road lights (B) with low/high beams
- Inner work lights (C)
- Outer work lights (D)

  NOTE:

  Work lights (D) are also turned on when the high beams are activated in cab-forward mode.

- Rear roof work lights (E)
- Rear swath lights (F)

  NOTE:

  For adjustment procedures, refer to *Aligning Headlights – Cab-Forward, page 342*.

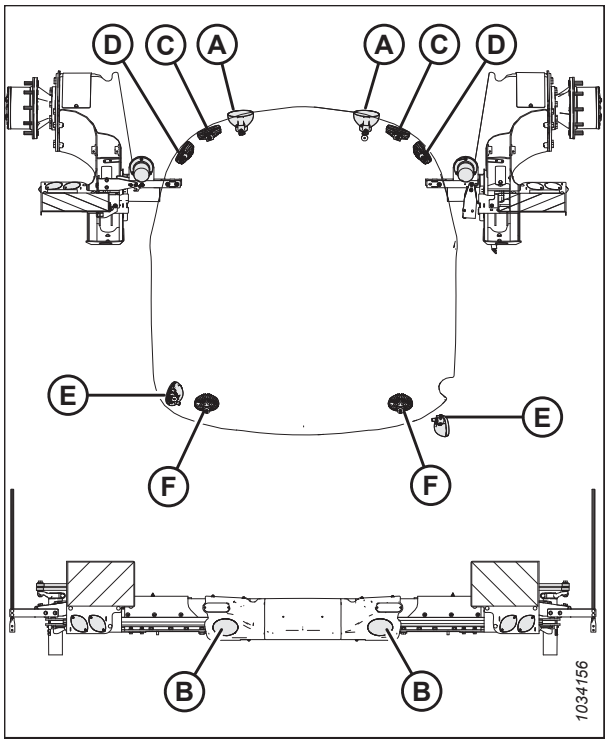


Figure 3.23: Windrower Lighting – Top View

3.7.2 Cab-Forward Lighting – Road

Road lights are used to light up the area ahead of the windrower.

The following lights are functional when ROAD LIGHT button (A) is selected and the operator's station is locked in the cab-forward mode:

- To toggle between the low and high beams, press HIGH BEAM button (B)
- To operate the hazard lights, press HAZARD LIGHT button (C)

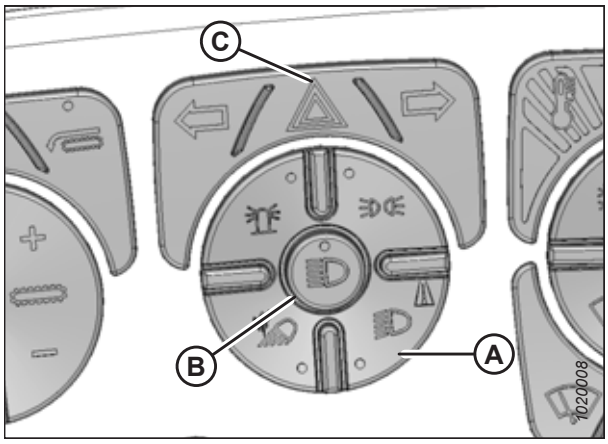


Figure 3.24: Road Light Button

- Headlights (A) with low/high beams
- Marker lights (B)
- Amber turn signals/hazard lights (C)
- Work lights (D) turn on only when high beams are on in cab-forward mode

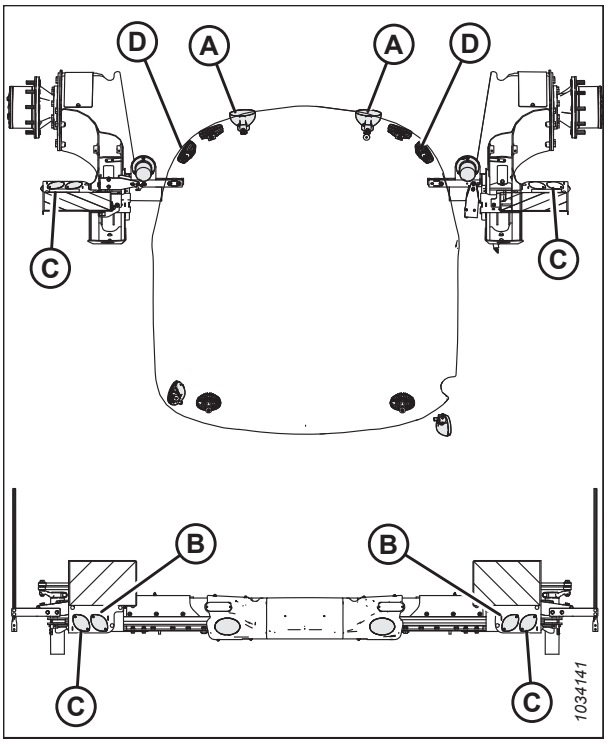


Figure 3.25: Windrower Lighting – Top View

3.7.3 Engine-Forward Lighting – Road

Road lights are used to light up the area ahead of the windrower.

The following lights are functional when ROAD LIGHT button (A) is pressed and the operator's station is locked in the engine-forward mode.

- To toggle between the low and high beams, press HIGH BEAM button (B)
- To operate the hazard lights press HAZARD LIGHT button (C)

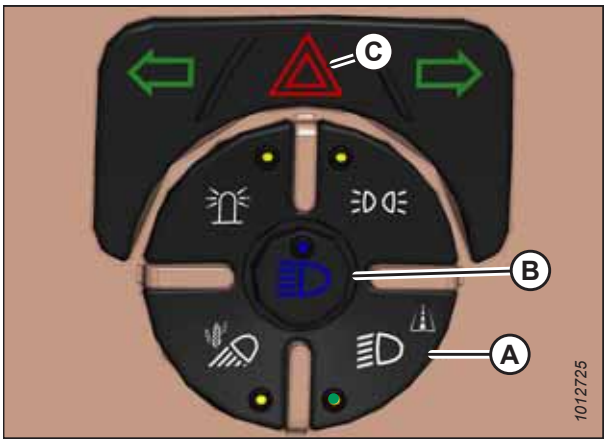


Figure 3.26: Road Light Button

- Engine-forward headlights (A) with low/high beams
- Red taillights (B) on front and rear placards
- Amber turn signals and hazard lights (C) on front and rear placards
- Work lights (D) turn on only when high beams are activated in engine-forward mode
- Marker Lights (E)

NOTE:

To align headlights (A), refer to *Aligning Headlights – Engine-Forward, page 340*.

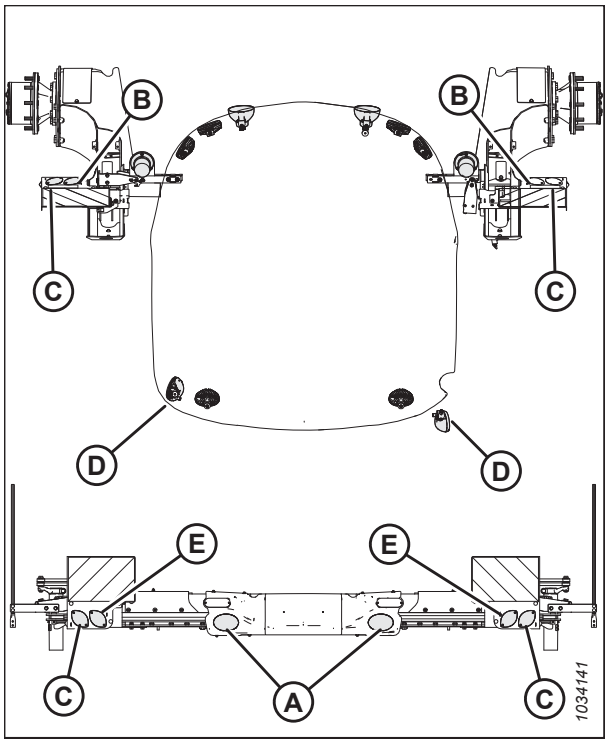


Figure 3.27: Windrower Lighting – Top View

3.7.4 Tail/Beacon Lighting

Beacons and tail lights are used in road travel to alert other drivers.

Beacons (A) are activated when the IGNITION is ON and BEACON button (B) is selected.

NOTE:

In some areas, the law requires the use of beacon lights when driving on the road.

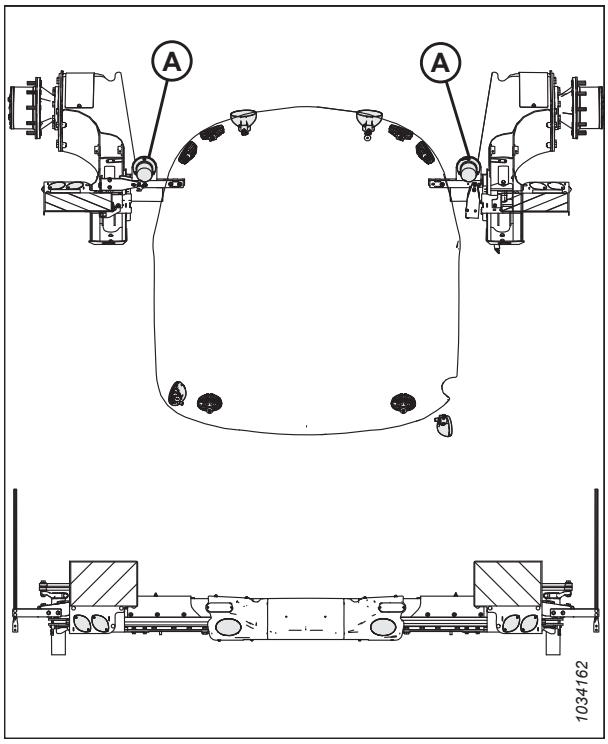


Figure 3.28: Windrower Lighting – Top View

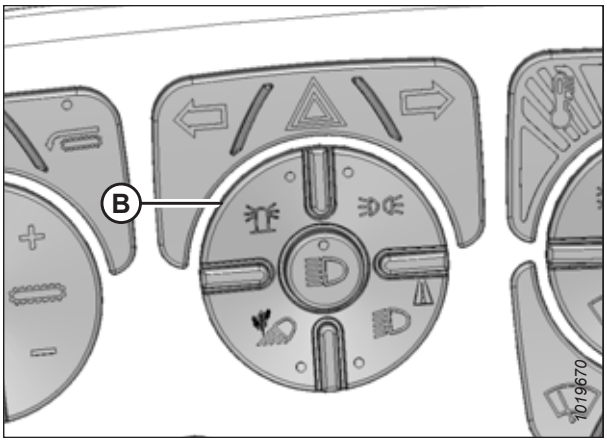


Figure 3.29: Beacon Light Button

3.7.5 Turn Signal / Hazard Lighting

Turn signal and hazard lights are used to alert other drivers.

Switches (A) activate the left and right turn signals. Press the switches again to turn the selected signal off.

NOTE:

Turn signals can also be controlled with the REEL/DISC SPEED switches on the ground speed lever (GSL) when the header is disengaged.

Switch (B) activates the hazard lights. Press the switch again to turn the lights off.

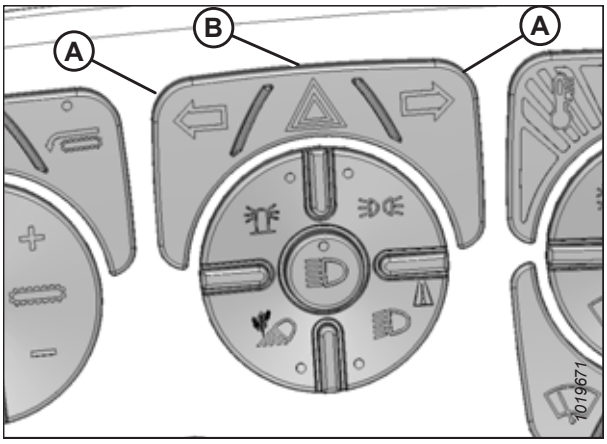


Figure 3.30: Turn Signal/Hazard Button

- Amber turn signals / hazard lights (C)

  NOTE:

  Amber turn / hazard repeater lights are located on the side of each hazard placard.

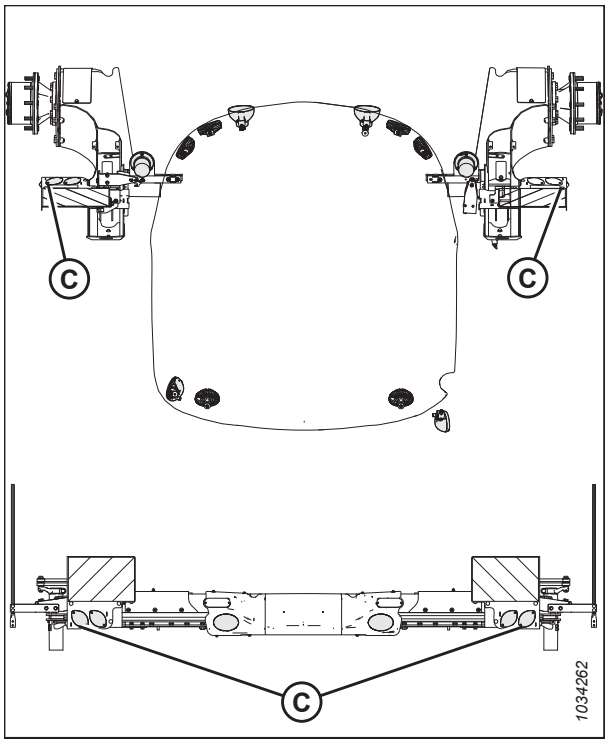


Figure 3.31: Windrower Lighting – Top View

3.8 Windshield Wipers

The windshield wiper controls are located on the console.

The illustration shows the controls in cab-forward mode.

Button (A) activates the front (cab-forward) wiper, and button (B) activates the rear wiper.

One window washer button (C) applies washer fluid to both the front and rear wipers as follows:

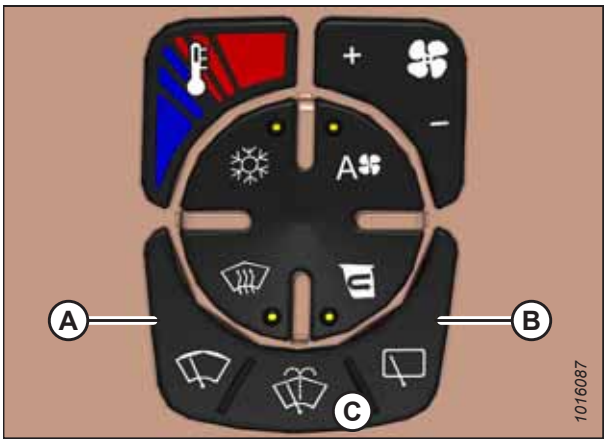


Figure 3.32: Wiper Controls

- If both wipers are on, pressing and holding window washer button (C) will spray washer fluid onto both windows. When the button is released, the washer fluid stops, but both wipers continue to operate.
- If both wipers are NOT on, pressing and holding window washer button (C) will spray washer fluid onto both windows, and both wipers will turn on. When the button is released, the washer fluid stops, but both wipers continue to operate for 4 seconds before automatically stopping.
- If only one wiper is on, pressing and holding window washer button (C) will activate the other wiper and spray washer fluid onto both windows. When the button is released, the washer fluid stops, and the active wiper will continue to operate while the activated wiper operates for only 4 seconds before automatically stopping.

You can aim rear wiper washer nozzle (A) by turning it with a flat head screwdriver.

NOTE:

The front wiper washer nozzle is not adjustable.

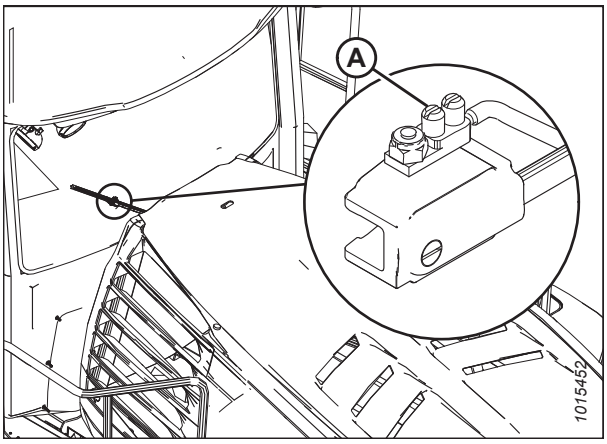


Figure 3.33: Rear Wiper Washer Nozzle

3.9 Rear View Mirrors

Mirrors provide a view behind the windrower whether the windrower is in cab- or engine-forward driving mode.

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

Two manually adjustable mirrors (B) provide a rear view in the engine-forward mode.

Mirror assemblies are designed to fold back if accidentally struck.

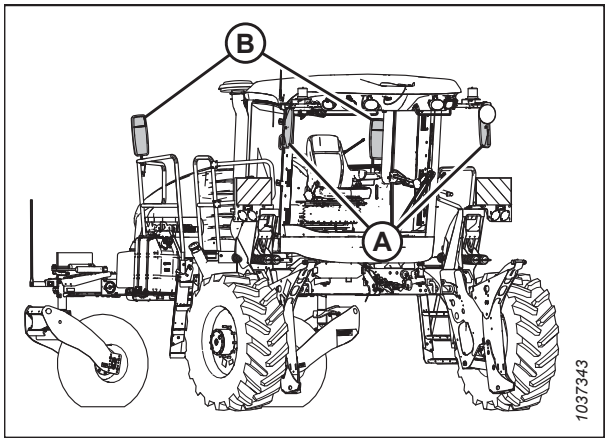


Figure 3.34: Mirrors

The cab is equipped with power adjustable exterior mirrors for cab-forward mode, which can be adjusted using knob (A) located next to the radio inside the cab.

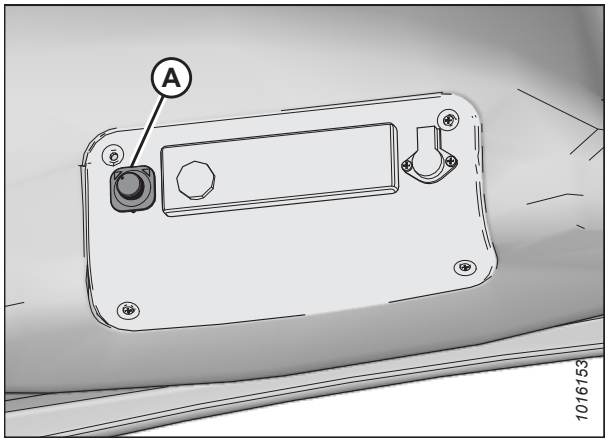


Figure 3.35: Mirror Adjustment Knob

3.10 Cab Temperature

The temperature in the windrower cab is regulated by a climate control system which can provide filtered cool or warm air. The heater shut-off valve must be open for the heater to work properly.

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

3.10.1 Heater Shut-Off Valve

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

Valve (A) must be open to provide heat to the cab, but can be closed for maximum cooling.

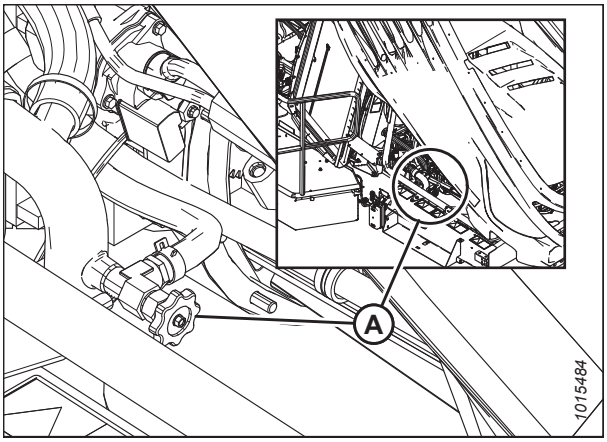


Figure 3.36: Heater Shut-Off Valve

3.10.2 Air Distribution

Cab air distribution is controlled through adjustable air vents located in the cab posts.

You can adjust vent (A) to open/close (B) or to change direction (C) of the air flow.

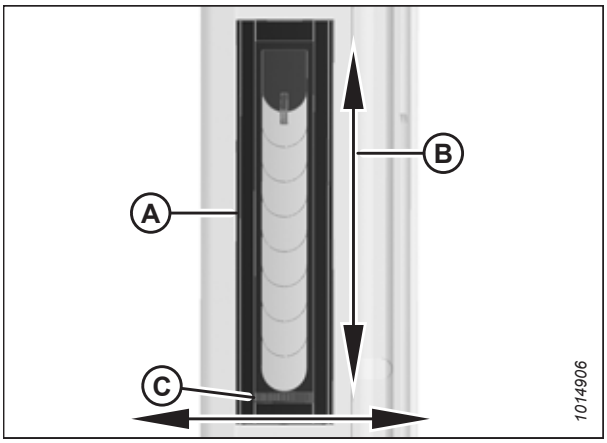


Figure 3.37: Adjustable Air Vents

3.10.3 Climate Controls

The climate controls are located on the console. Use them to change the temperature or adjust the air movement inside the cab.

NOTE:

When switches (A), (C), (D), and (E) are activated, the LED light on the switch will turn amber.

Auto fan speed switch (A)

Sets the climate control system to auto mode, which automatically adjusts the fan speed to maintain the set-point temperature.

Blower control toggle switch (B)

Controls the blower speed. Overrides auto fan control.

- Press + for more air flow
- Press – for less air flow

Recirculating air switch (C)

Controls the air source; stops the booster fan so that cab air is recirculated.

Windshield defog/defrost switch (D)

The windshield defog/defrost operates when air conditioning (A/C) switch (E) ON.

Air conditioning (A/C) switch (E)

Controls the A/C system.

The A/C operates with the blower switch ON and blower speed is set above 0.

Temperature control toggle switch (F)

Controls cab temperature.

- Press red (top) area to increase cab temperature.
- Press blue (bottom) area to decrease cab temperature.

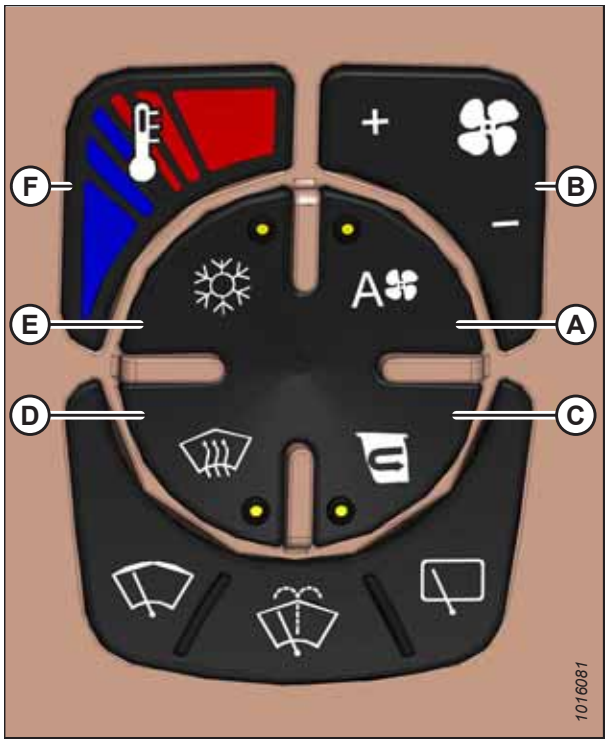


Figure 3.38: Climate Controls

IMPORTANT:

When starting the windrower after more than 1 week of storage, it may be necessary to distribute the refrigerant oil throughout the A/C system. For instructions, refer to *Air Conditioning Compressor Coolant Cycling, page 115*.

3.11 Operator Amenities

The operator's station in the windrower cab has multiple amenities to make operating the windrower more comfortable.

Operator's console

The operator's console has the following features:

- Auxiliary power outlets (A)
- USB jack (B)
- Utility tray under armrest (C)
- Utility tray (D)
- Cup holder (E)

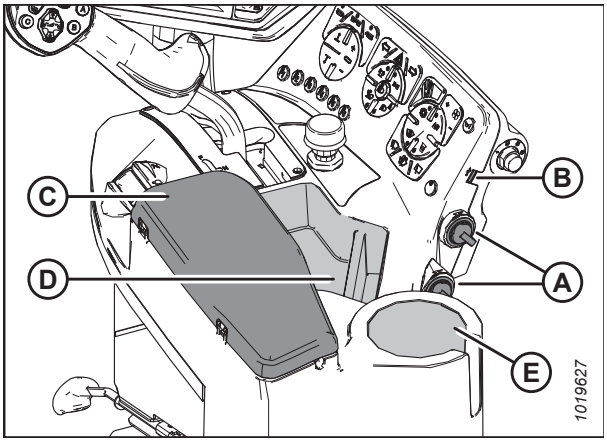


Figure 3.39: Console

Window shades

Retractable window shades (A) are located at the front and rear windows.

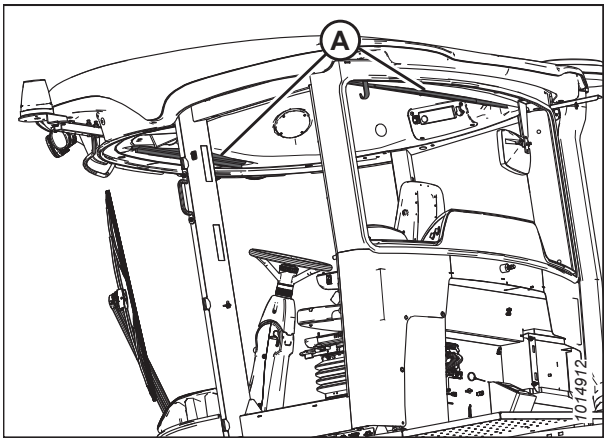


Figure 3.40: Window Shades

Manual storage

Plastic case (A) is located behind the training seat to store the windrower manuals.

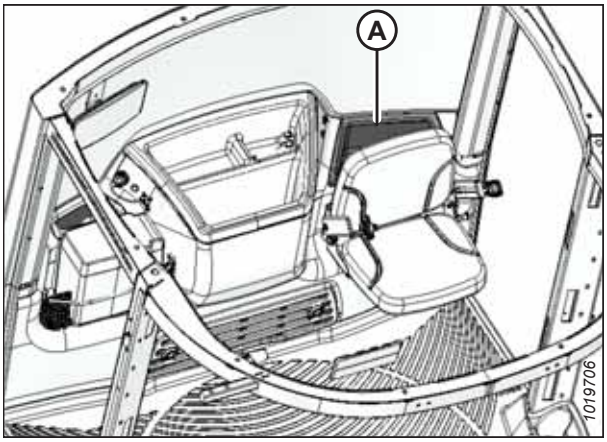


Figure 3.41: Manual Storage Location

Coat hook

Coat hook (A) is located above the training seat, to the left of the operator's seat.

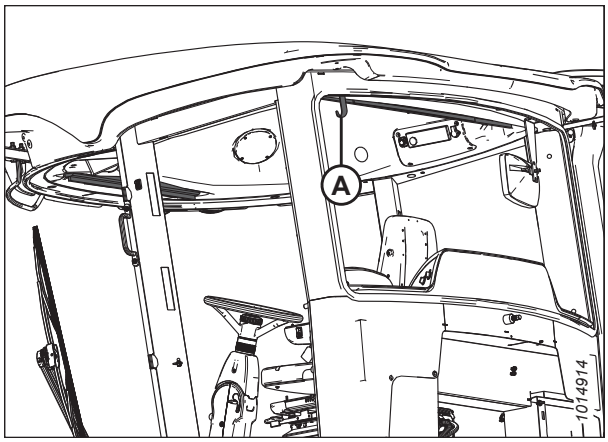


Figure 3.42: Coat Hook

3.12 Sound System

The M1170*NT5* Windrower comes equipped with an AM/FM/CD/DVD radio, with Bluetooth® and USB connectivity.

3.12.1 AM/FM/CD/DVD Radio with Bluetooth® Wireless Technology

The receiver allows you to play multiple media formats from multiple sources.

NOTE:

There is a USB charging (1.5 A) connection located on the back of the radio. A USB extension cable will be required to use the connection.

NOTE:

Refer to the radio operating instructions for information on the supported file types.

Radio (A) and two speakers (B) are factory-installed in the cab headliner. The radio operates in AM, FM, CD, DVD, and USB modes. It also supports Bluetooth® wireless technology audio streaming and hands-free calling. Operating instructions supplied with the radio.

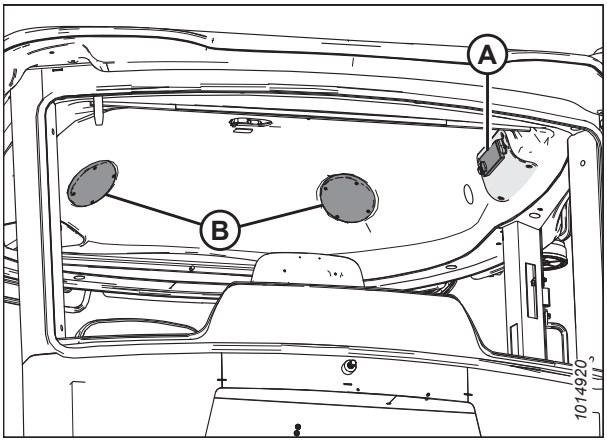


Figure 3.43: Radio and Speakers

To locate the operating instructions for the radio, follow this procedure:

1. Turn latch (A) to unlock relay module cover (B).
2. Retrieve the operating instructions for the radio from relay module cover (B) access panel in the cab's roof liner.

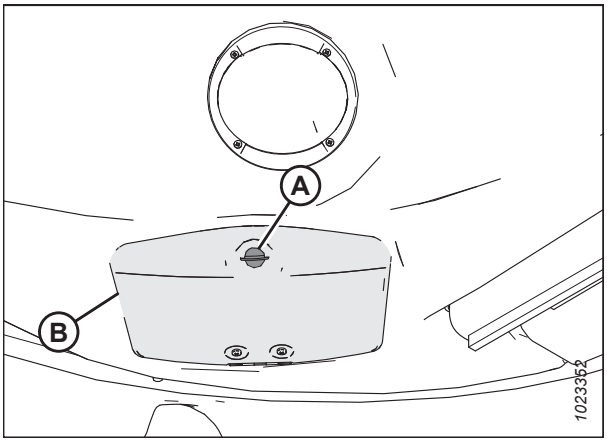


Figure 3.44: Relay Module Cover

3. When finished with the radio manual, place the manual in manual storage case (A) located behind the training seat.

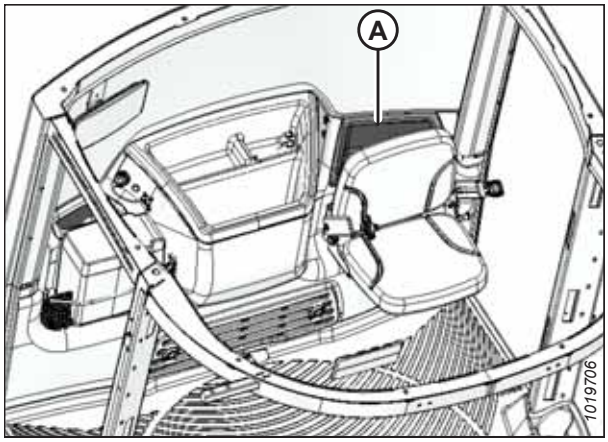


Figure 3.45: Manual Storage Location

4. Close relay module cover (B) and turn latch (A) to lock it.

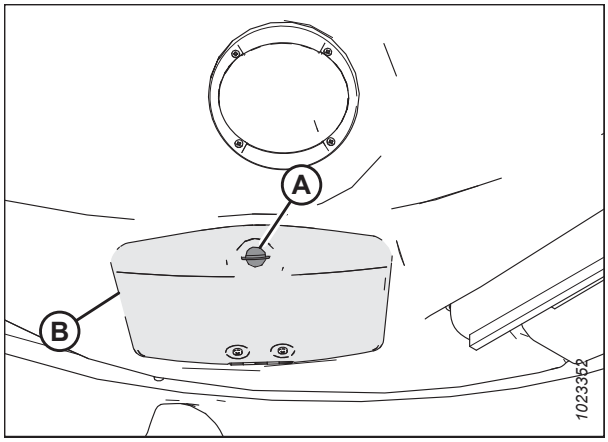


Figure 3.46: Relay Module Cover

Activating Bluetooth® Feature

The Bluetooth® feature must be activated on the receiver to allow mobile device pairing.

1. Press POWER button (A) to turn the radio on.
2. Press and hold VOL/SEL knob (B) for 2 seconds. MENU is displayed on screen (C).
3. Rotate VOL/SEL knob (B) to highlight BT SET menu and press the VOL/SEL knob to select. BLUETOOTH ON/OFF is displayed (C).
4. Press VOL/SEL knob (B) to select BLUETOOTH®.
5. Rotate VOL/SEL knob (B) to display ON and press VOL/SEL knob (B) to select. Bluetooth® icon (D) will appear on the screen.
6. Rotate VOL/SEL knob (B) and select DISCOVER.

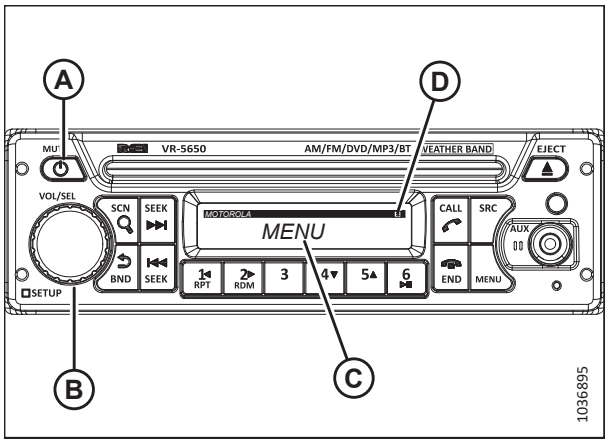


Figure 3.47: Bluetooth® Radio

7. Rotate VOL/SEL knob (B) to display ON and press VOL/SEL to select.

   NOTE:

   Bluetooth® discovery will be active every time the radio is turned off and back on.

Pairing Bluetooth® Device

The installed radio allows the operator to pair a Bluetooth® phone or audio device.

1. Check that Bluetooth® is enabled and that the radio has been set to DISCOVER mode. For instructions, refer to *Activating Bluetooth® Feature, page 66*.
2. Press POWER button (A) to turn the radio ON.

   This will set the radio to Bluetooth® discover mode if the Bluetooth® feature has been activated. If not, refer to the radio operator's manual for instructions to access the SETUP MENU, BT SET screen.
3. Turn the mobile device's Bluetooth® to ON. For instructions, refer to the device's operator's manual. The radio appears as a discoverable device.
4. Select VR-5650 on the mobile device.

   NOTE:

   A passkey is required to connect to the Bluetooth® radio. The default passkey is four zeros (0000).
5. Enter the default passkey 0000. The radio will display CONNECTED (B) and Bluetooth® icon (C) appears in the upper right corner of the screen.

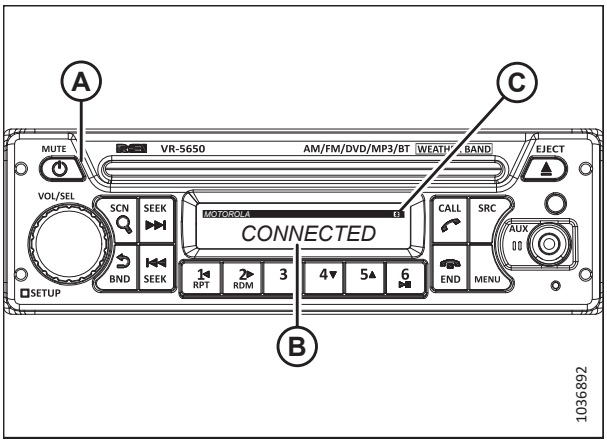


Figure 3.48: Radio Display

3.13 Horn

The horn is located under the front left corner of the cab floor when facing cab-forward.

The horn is activated by pushing button (A) located on the console.

Sound the horn three times prior to starting the engine.



Figure 3.49: Console

3.14 Engine Controls

The following engine controls are located on the operator's console.

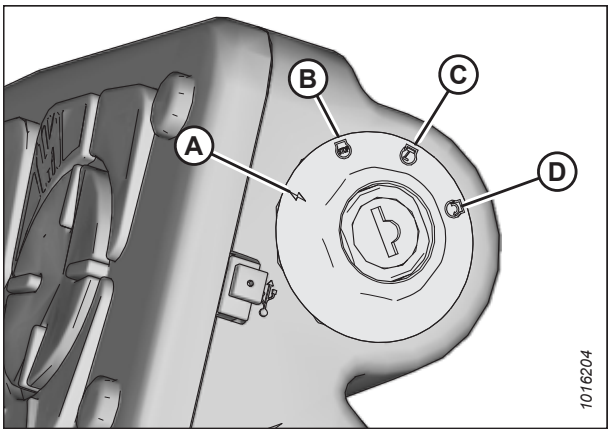


Figure 3.50: Ignition Switch on Operator's Console

Ignition switch

- ACC (A): The windrower's electrical accessories are turned ON without starting the engine
- OFF (B): All electrical systems are OFF
- RUN (C): Engine run position
- START (D): Turn fully clockwise to crank the engine, and release to return the switch to RUN position

IMPORTANT:

Remove the ignition key when the windrower is not in use. The ignition key also locks the doors and the tool box in the left platform.

Throttle (A)

Controls the engine speed range

- MAX: Push the lever forward
- MIN: Pull the lever back

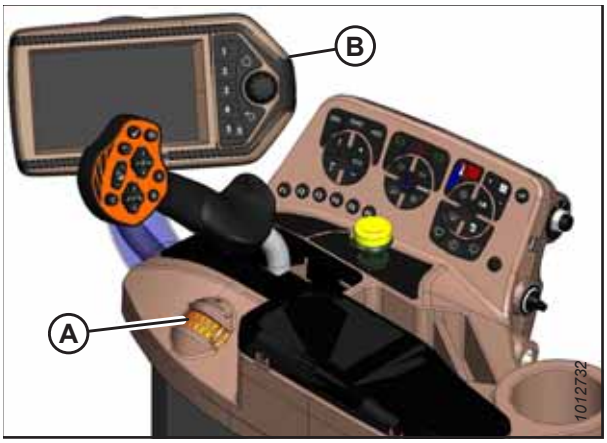


Figure 3.51: Engine Controls

Harvest Performance Tracker display (B)

- Fuel level monitoring
- DEF level monitoring
- High exhaust system temperature (HEST) indicator
- Exhaust system cleaning inhibit and forced indicator
- Speed monitoring (ground, engine, knife/disc, reel, conveyor, and cooling fan)
- Pressure monitoring (knife, reel, conveyor, and supercharge)
- Engine parameters (coolant temperature, fuel consumption, and engine load)
- Header position

For more information on the Harvest Performance Tracker, refer to *3.17 Harvest Performance Tracker Display, page 81*.

3.14.1 Using Eco Engine Control

Eco Engine Control (EEC) is useful in lighter crop conditions that do not require the maximum engine rpm. The reduced engine speed lowers fuel consumption, noise levels, and exhaust emissions in addition to reducing engine wear.

The EEC limits the engine to 1900–2300 rpm when the header is engaged, and is adjustable in 100 rpm increments. Activate this feature by using EEC button (A) on the operator's console. The EEC symbol will display on the Harvest Performance Tracker (HPT) screen over the right side of the tachometer.

The EEC feature will be active only when the header is engaged, but can be adjusted without the header running. When the header is disengaged, EEC will be canceled and engine rpm will return to the setting determined by the throttle.

Use the QuickMenu to adjust EEC rpm. For instructions, refer to *QuickMenu System, page 86*.

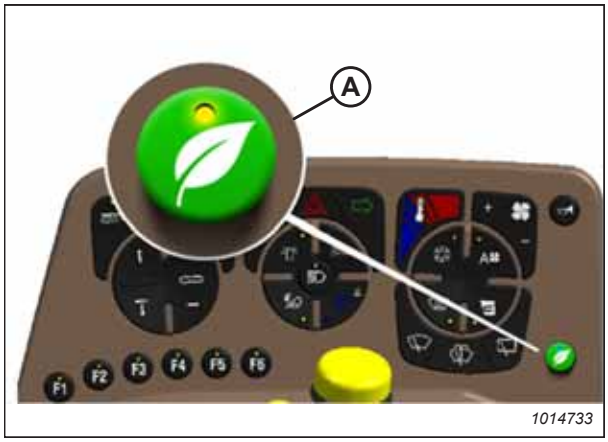


Figure 3.52: Eco Engine Control (EEC)

3.15 Windrower Controls

The controls to operate the windrower are located on the console.

Console controls:

Turn signals (A) – Activates turn signals on windrower and header.

- Push-ON/Push-OFF (activating the hazard switch also cancels the turn signal)

Ground speed lever (GSL) (B) – Controls speed and direction of movement.

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

Hazard warning lights (C) – Activates signals on windrower and header.

- Push-ON / Push-OFF

PARK (D) – Engages neutral interlock, and applies park brake when steering locked in center.

Horn (E)

Autosteer engagement button (F) – Engages/disengages the automated steering system (if installed).

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

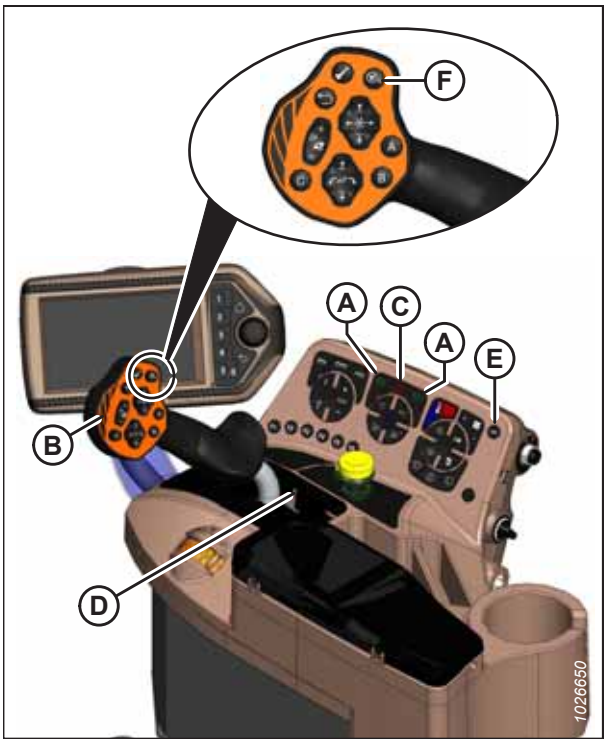


Figure 3.53: Console Controls and Autosteer

3.15.1 Operator Console Buttons

Windrower comfort, lighting, signals, and some header functions are controlled from the operator's console.

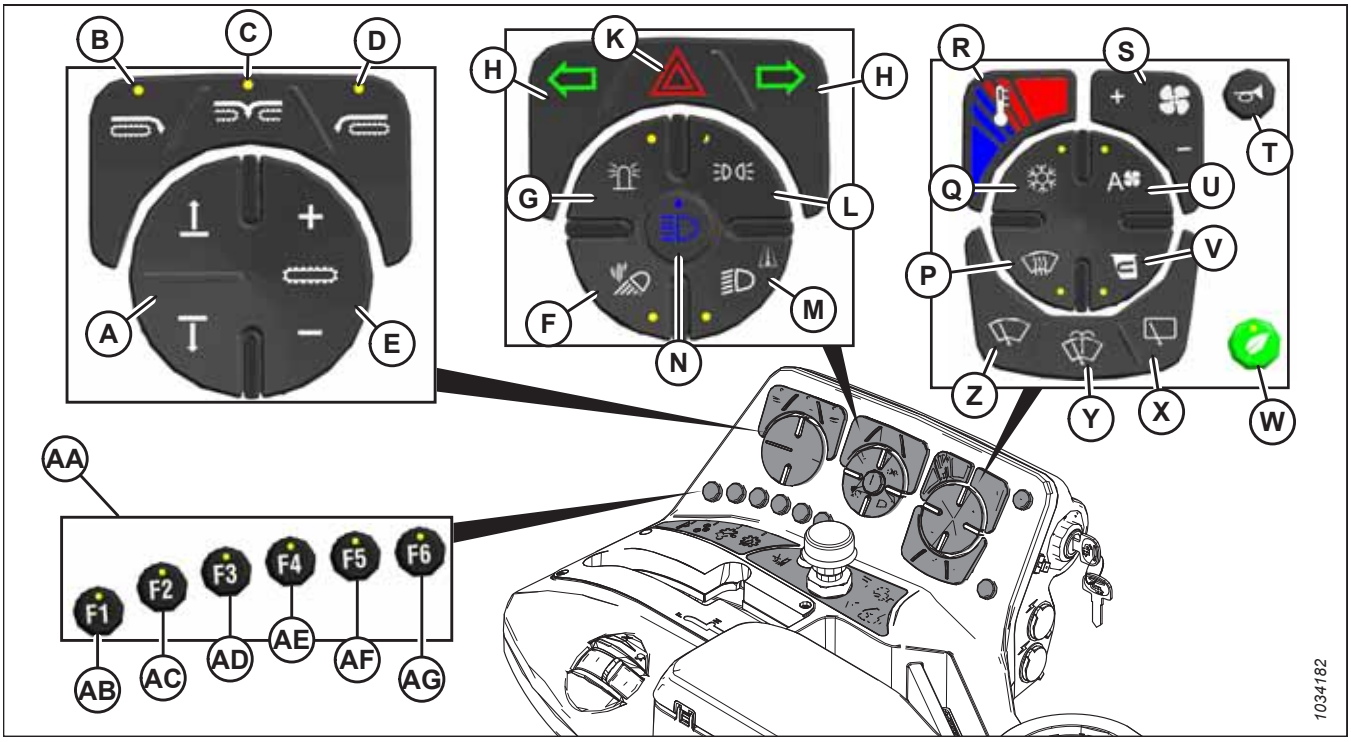


Figure 3.54: Operator Console Buttons

A - Double Window Attachment (DWA) / Swath Roller
B - Deck Shift Draper Right Side Delivery
C - Deck Shift Draper Center Delivery
D - Deck Shift Draper Left Side Delivery
E - Draper / Double Windrow Attachment (DWA) Speed
F - Cab-Forward Field Lights
G - Beacon Lights
H - Turn Signals
K - Hazard Lights
L - Clearance Lights
M - Road Lights
N - High Beams
P - Windshield Defog/Defrost
Q - Air Conditioning
R - Temperature
S - Blower Speed (Manual Mode)
T - Horn
U - Auto Fan Speed
V - Cab Air Recirculation
W - Eco Engine Control (EEC)
X - Windshield Wiper (Rear)
Y - Wiper Fluid
Z - Windshield Wiper (Front)
AA - Harvest Performance Tracker (HPT) Shortcuts
AB - Float Menu Shortcut
AC - One-Touch-Return Shortcut
AD - Windrower Settings Shortcut
AE - Header Settings Shortcut
AF - Drive Wheel Leg Adjust
AG - Walking Beam Adjust

3.16 Header Controls

All header controls are 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 may not be functional for certain headers.

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

3.16.1 Header Engage Switch

The header engage switch engages and disengages the header drive.

To engage the header: Push and hold HEADER ENGAGE switch (A) down while pulling up on collar (B).

To disengage the header: Push HEADER ENGAGE switch (A) down.

NOTE:

Although not required, it is good practice to move the throttle lever back to IDLE before engaging the header drive.

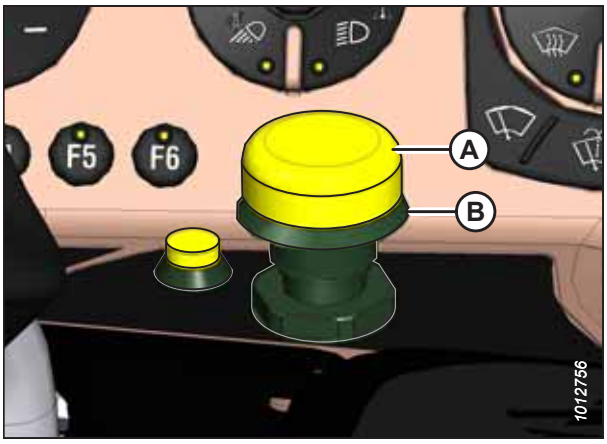


Figure 3.55: Header Engage Switch

3.16.2 Header Drive Reverse Button

The header drive reverse button allows certain functions on various headers to operate in reverse.

NOTE:

R1 Series Rotary Disc Headers do **NOT** have any reverse capability.

NOTE:

The following header systems have reverse capability:

- D1XL Series Draper Headers: knife
- D1X Series Draper Headers: knife
- A40DX Auger Headers: knife, conditioner, auger and reel
- A40DX GSS Auger Headers: knife, auger and reel

Reverse header systems as follows:

- ***Engage***: Push and hold reverser button (B) and engage header with switch (A).
- ***Disengage***: Release reverser button (B).

  NOTE:

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

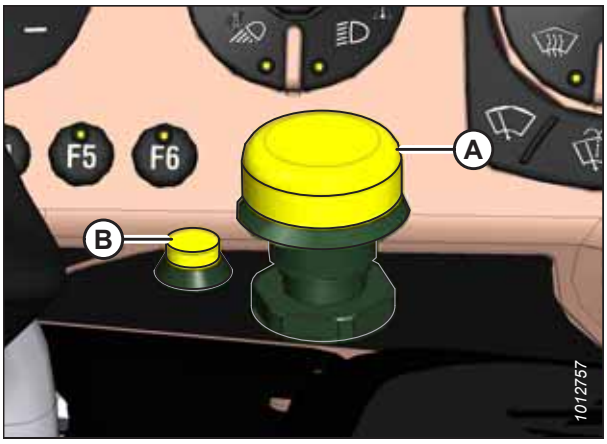


Figure 3.56: Header Drive Controls

3.16.3 Ground Speed Lever Switches

The switches on the ground speed lever (GSL) control the most common header functions.

The GSL (A) is located on the console.



Figure 3.57: GSL

GSL controls — front

- One-Touch-Return position switch (A)
- One-Touch-Return position switch (B)
- One-Touch-Return position switch (C)
- Reel or disc speed (D) (also operates turn signals when the header is disengaged)
- Reel position (E)
- Autosteer engagement (F) (if equipped)
- Header position (G)
- Back switch (H) – controls Harvest Performance Tracker (HPT) functions
- Select switch (J) – controls HPT functions

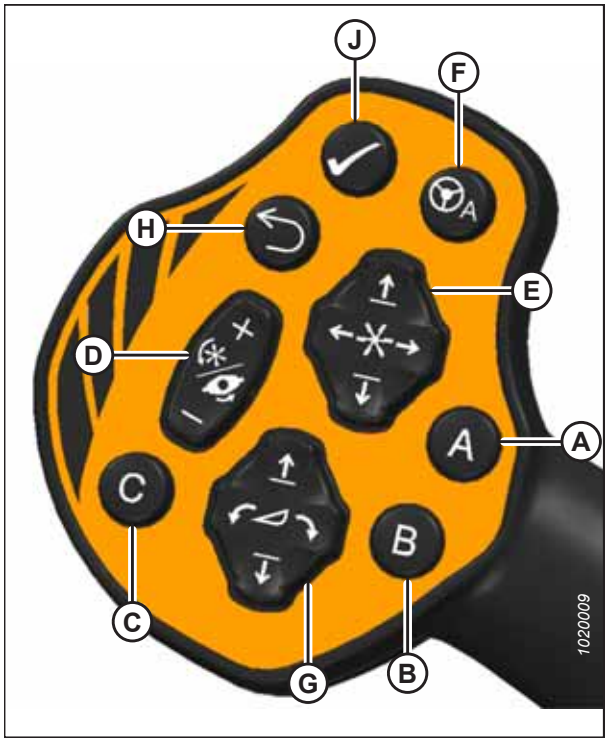


Figure 3.58: GSL Function Groups

GSL controls — rear

- Shift switch (A)
- Scroll wheel (B)

NOTE:

When the shift switch is used with another button it performs the following shortcut functions:

- SHIFT + BACK – Home page
- SHIFT + SELECT – Main menu access
- SHIFT + SCROLL – Adjust maximum ground speed

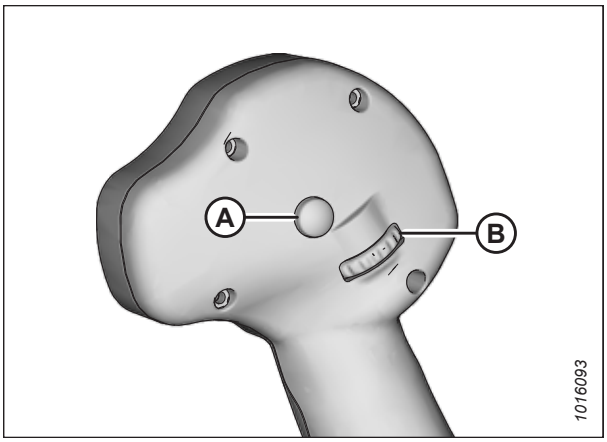


Figure 3.59: GSL Function Groups

Header Position Six-Way Switch

The six-way switch on the ground speed lever (GSL) raises, lowers, and tilts the header.

- To lower the header slowly, press (A) lightly
- To lower the header quickly, press (A) fully
- To raise the header slowly, press (C) lightly
- To raise the header quickly, press (C) fully
- To tilt the header downward, press (B)
- To tilt the header upward, press (D)

Release the switch when the header is at the desired position.

NOTE:

The header raise and lower rates are adjustable on the harvest performance tracker (HPT) display. For instructions, refer to *4.6.8 Adjusting Header Raise and Lower Rates, page 200* or header setup in *Menu Icons, page 88*.

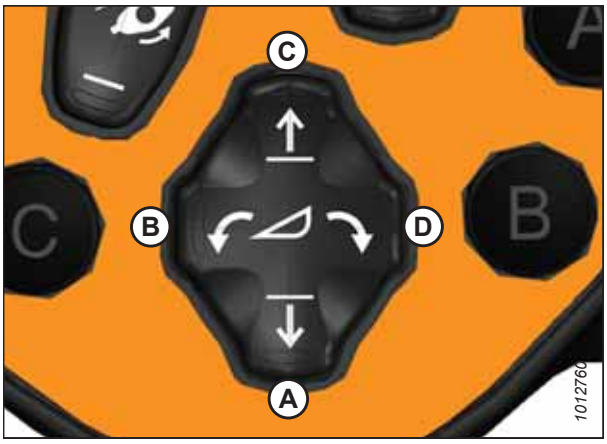


Figure 3.60: Ground Speed Lever

NOTE:

For detailed switch operating modes, refer to the section in this manual that is specific to your header.

Reel Position Four-Way Switch

The reel position four-way switch on the ground speed lever (GSL) performs different functions depending on the attached options.

For specific operating instructions, refer to the following sections:

- Reel fore-aft position and height on draper headers:
  - *4.7.2 Adjusting Reel Fore-Aft Position, page 203*
  - *4.7.3 Adjusting Reel Height, page 204*
- Center-link assist cylinder:
  - *4.5.1 D1X or D1XL Series Draper Header, page 166*
- Double Windrow Attachment (DWA) position:
  - *4.6.6 Double Windrowing, page 198*

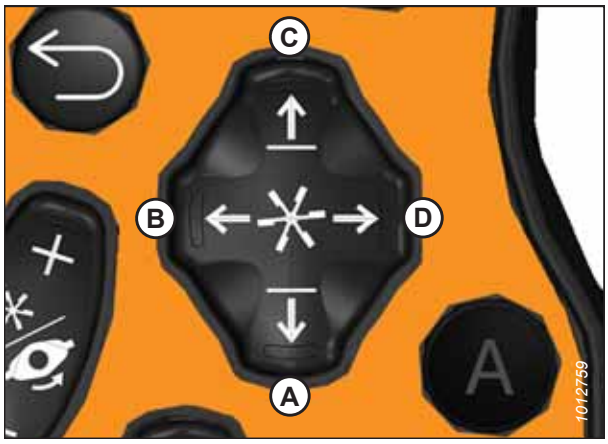


Figure 3.61: Ground Speed Lever

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

Reel and Disc Speed Switch

The reel and disc speed switch on the Ground Speed Lever (GSL) adjusts the reel or disc speed, depending on the type of header attached to the windrower. The switch can also operate the turn signals on the windrower when the header is not in use.

- Press and hold **+** button (A) to increase the reel or disc speed.
- Press and hold **–** button (B) to decrease the reel or disc speed.
- Release the button when the reel or disc is at the desired speed.

For instructions, refer to the applicable header topic for detailed use of these switches.



Figure 3.62: GSL Reel and Disc Speed Switch

NOTE:

The REEL and DISC SPEED switch can operate the turn signals when the header is not in use. For example, when driving in the engine-forward position, or when operating in the cab-forward position with the header disengaged.

NOTE:

The reel and auger speeds are hydraulically linked on the A40DX Auger Header. When the reel speed is changed, the auger speed changes automatically. Independent reel and auger adjustment is available on the A40DX GSS (Grass Seed) using the differential auger-reel control feature. It is also available on the A40DX (not Grass Seed) as an option: the Reel Speed Control kit (MD #B6604).

IMPORTANT:

The reel speed on an A40DX Auger Header **MUST NOT EXCEED** 85 rpm. The auger speed **MUST NOT EXCEED** 320 rpm.

One-Touch-Return Buttons

The One-Touch-Return buttons (A, B, C) on the ground speed lever (GSL) save header configuration settings and serve as presets for quickly returning the header to specific settings.

The One-Touch-Return buttons A, B, and C always save header height settings, but the following settings can also be saved depending on the header type:

- Header tilt
- Deck position/header float selection
- Double windrow attachment (DWA) or swath compressor raise/lower
- Double Windrow Attachment (DWA) speed
- Knife speed
- Draper speed
- Reel speed
- Reel height
- Reel fore-aft
- Disc speed



Figure 3.63: One-Touch-Return Buttons on GSL

To program the One-Touch-Return buttons, press and hold button A, B, or C on the GSL handle for 3 seconds until an audible tone is heard, indicating that the current header settings have been saved.

NOTE:

To return the header to a preset condition, tap the A, B, or C button quickly. Holding the One-Touch-Return button too long can inadvertently reprogram the current header settings.

Pressing a programmed A, B, or C button opens a run screen that shows corresponding letter (A) on the screen for the preset.



Figure 3.64: One-Touch-Return Buttons on GSL

3.16.4 Console Header Buttons

Buttons to control header functions are located on the console.

Console header buttons (A) adjust the following header functions:

- Deck shift/float preset
- Draper speed
- Double windrow attachment (DWA) or swath compressor lift functions



Figure 3.65: Console Header Buttons

Deck Shift / Float Presets

Buttons to control header functions are located on the console.

Draper header with deck shift option:

- Controls the draper deck position for double windrowing with a draper header.
- Set header float for each deck position. For instructions, refer to *Setting Float, page 191*.

NOTE:

The last float setting used in any deck shift position will be stored into memory automatically.

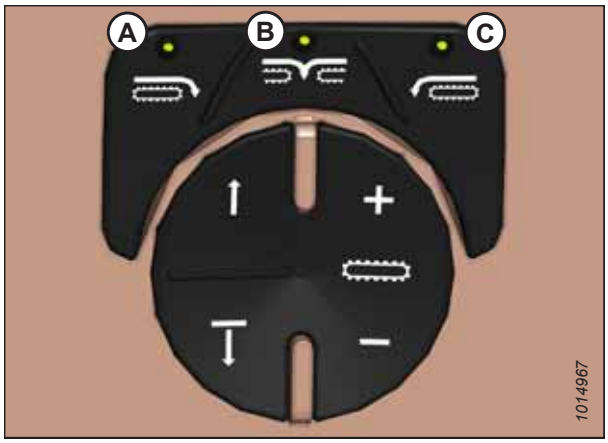


Figure 3.66: Header Deck Shift Buttons

A - Right-Side Delivery **B - Center Delivery**
C - Left-Side Delivery

Float presets:

When used with a rotary disc header, auger header, or draper header, these buttons select header float presets. For instructions, refer to to learn how to preset the float.

NOTE:

For detailed switch operating modes, refer to the section in this manual that is specific to your header.

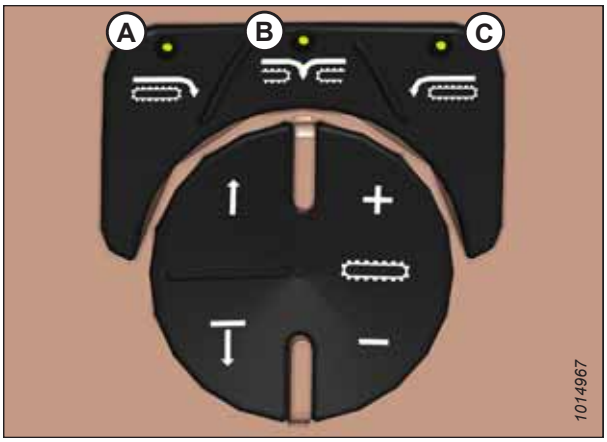


Figure 3.67: Header Switches

A - Float Preset 1 **B - Float Preset 2**
C - Float Preset 3

Conveyor Speed Adjustment Buttons

Buttons to control header functions are located on the console.

Adjust the header or Double Windrow Attachment (DWA) conveyor speed by pressing switch (A) to increase the speed, or switch (B) to decrease the speed.

Conveyor speed can be adjusted in either manual or auto modes. For instructions, refer to *4.7.6 Adjusting Draper Speed, page 212* for more information.

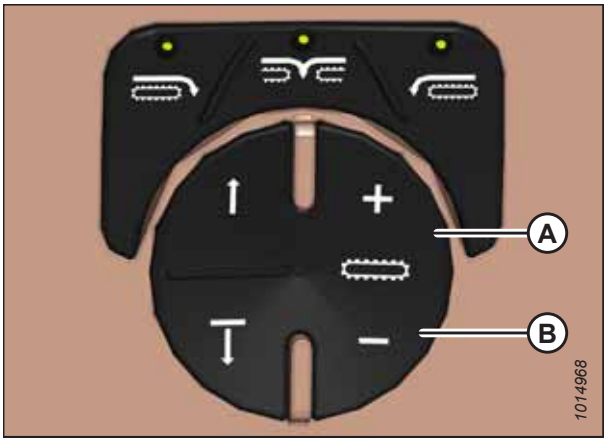


Figure 3.68: Operator's Console Conveyor Controls

Auxiliary Lift Switches

Buttons to control header functions are conveniently located on the console.

With Double Windrow Attachment (DWA):

- Raise the DWA deck by pressing button (A), or lower the deck by pressing button (B).

With swath compressor attachment:

- Raise the swath compressor by pressing button (A), or lower it by pressing button (B).

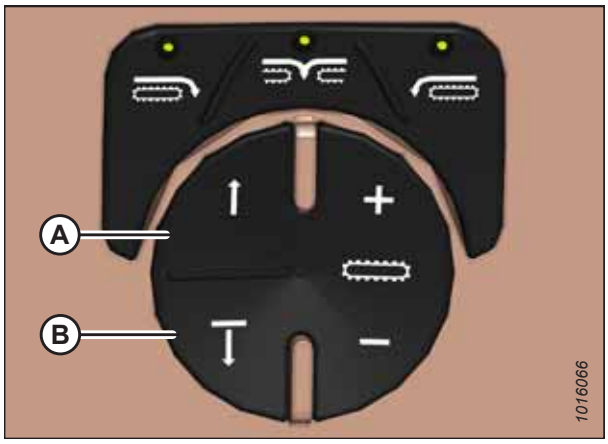


Figure 3.69: Operator's Console Auxiliary Controls

F1 to F6 Function Buttons

The function buttons are located on the console.

The following functions have been assigned to the function buttons on the operator's console:

- **F1** (A) – Float menu
- **F2** (B) – One-Touch-Return
- **F3** (C) – Windrower settings
- **F4** (D) – Header settings
- **F5** (E) – Narrow transport drive wheel legs extend/retract
- **F6** (F) – Narrow transport walking beam extend/retract

Press a function button to override the existing screen and display the function.

Press the function button again or press the Back button to return to the previous screen.

Press the HOME button on the Harvest Performance Tracker to return to the run screen.

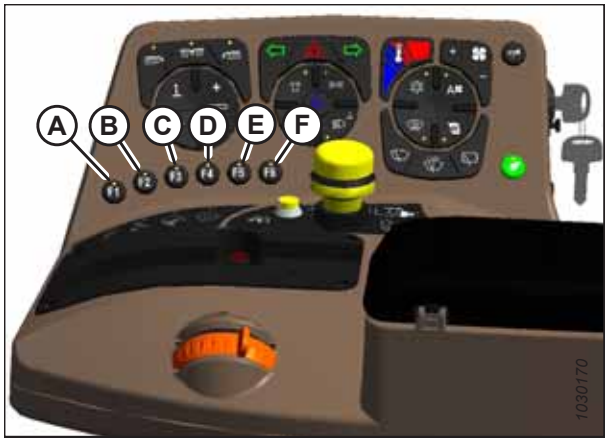


Figure 3.70: Operator's Console Shortcut Buttons

3.17 Harvest Performance Tracker Display

The Harvest Performance Tracker (HPT) display settings are preset at the factory. This section explains how to adjust the settings.

HPT (A) is located on the operator's console.



Figure 3.71: Operator's Console

3.17.1 Harvest Performance Tracker Screen Layout

The appearance and functions of the Harvest Performance Tracker (HPT) depend on the type of header attached.

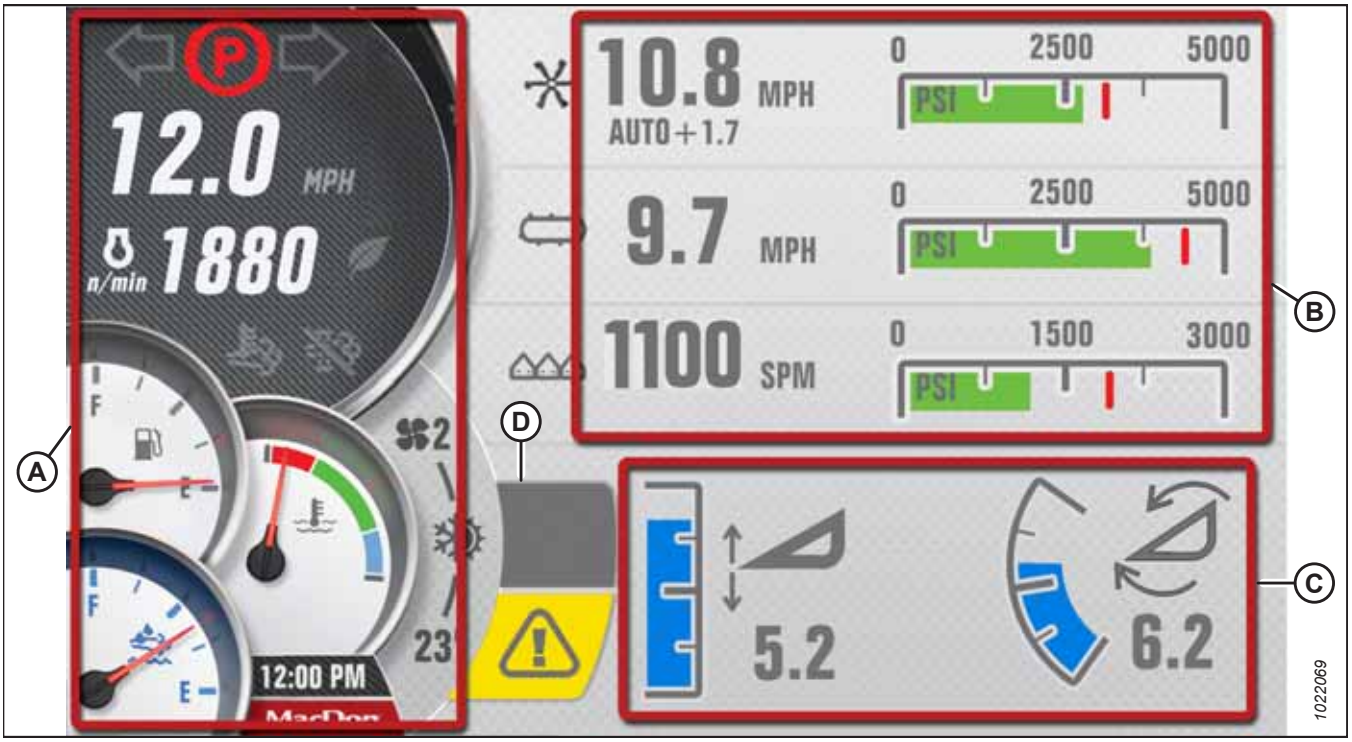


Figure 3.72: Run Screen 1 – Draper Header Shown

A - Left Gauge Cluster **B - Header Information** **C - Current Header Position** **D - Telltales**

The HPT display is separated into the following zones:

Left gauge cluster

- Ground speed
- Maximum ground speed
- Engine rpm
- Eco engine control (EEC) active/inactive
- High exhaust system temperature (HEST) light
- Inhibit status
- Park and turn signal status
- Level gauges for fuel and diesel exhaust fluid (DEF)
- Coolant temperature gauge
- Climate control temperature and blower speed
- Current time



Figure 3.73: Left Gauge Cluster

Header information:

The information displayed depends on the type of header attached to the windrower and which run screen is active.

- **Run screen #1:** Displays reel, draper, knife, disc, or auger speed and pressure; alarm point, and indexing (factory-set according to header)
- **Run screen #2:** Displays draper, knife, or disc speed and pressure; reel height and fore-aft position; hydraulic pressure; and load bar

  NOTE:

  Master controller software MCAK203587P (or later) required to accurately display changes in draper speed.
- **Run screen #3:** Displays fuel per hour/acre, acres per hour, and sub acres per hour (resettable)
- **Run screen #4:** Displays cooling fan speed, engine air intake temperature, hydraulic oil temperature, and engine coolant temperature



Figure 3.74: Draper Header Information

Current header position:

- Displays basic header functions: height and angle

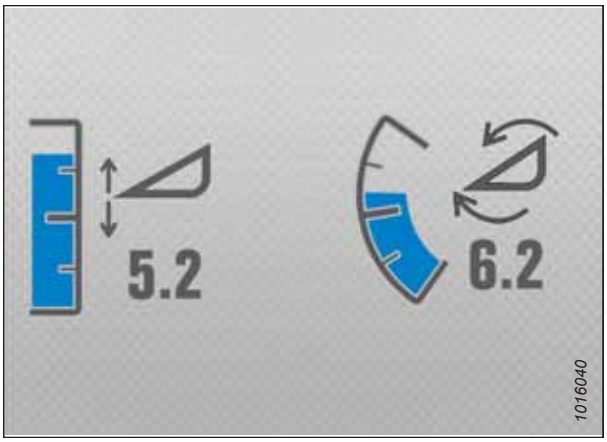


Figure 3.75: Current Header Position

Telltales:

- Telltales (A) indicate an engine or windrower fault
- Telltales are amber or red in color accompanied by a symbol for the fault
- Telltales display a short description (B) of the fault

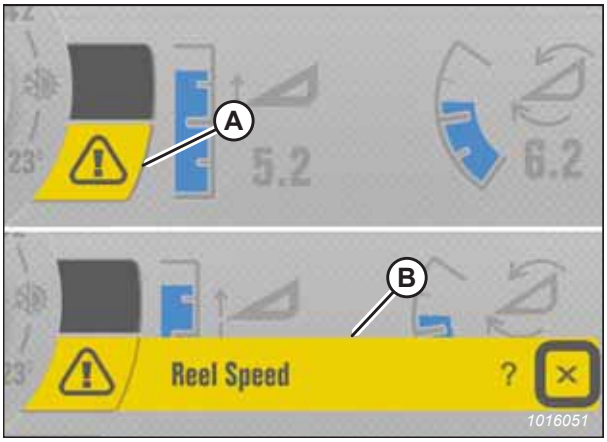


Figure 3.76: Faults/Telltales

Required maintenance indicator:

- An amber indicator (A) is displayed 50 hours before required maintenance is due
- The indicator only displays when header is disengaged
- The indicator flashes when maintenance is overdue by 50 hours



Figure 3.77: Maintenance Indicator

3.17.2 Navigating Harvest Performance Tracker Display

The Harvest Performance Tracker (HPT) display provides access to the windrower's electronic systems. To operate, maintain, and service the windrower, it is essential that you understand how to use the controls and navigate through the various menus and pages on the display.

Scroll Knob, Scroll Wheel, and Select Button

Turning scroll knob on the Harvest Performance Tracker (HPT) display highlights the available options within a menu and adjusts the settings. Pushing the scroll knob selects functions or menu items.

Scroll and select functions are duplicated on the ground speed lever (GSL) controls. Unless otherwise specified, both buttons will perform the same function. When SELECT is used in this document, either of these buttons can be used.

- Turn scroll knob (A) clockwise or counterclockwise to move the cursor to different selections on the display.
- Push scroll knob (A) to activate a selection.
- Turn scroll knob (A) to increase or decrease the settings on the activated selection.



Figure 3.78: HPT Scroll Knob

NOTE:

Scroll wheel (A) on the back of the GSL and SELECT button (B) on the front of the GSL perform the same functions as the HPT rotary scroll knob.

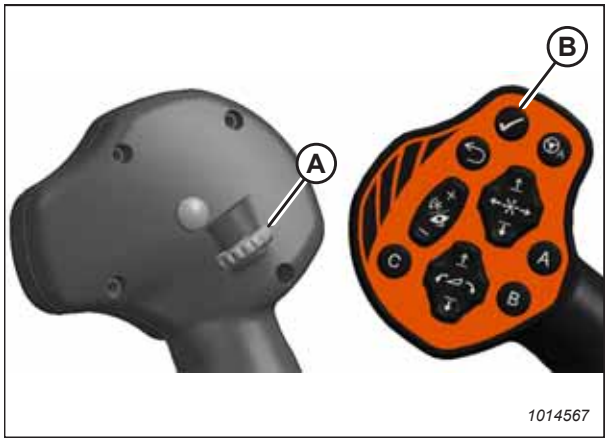


Figure 3.79: GSL Scroll Wheel and Select Button

Home, Back, and Shift Buttons

The HOME and BACK buttons on the Harvest Performance Tracker (HPT) and the BACK and SHIFT buttons on the ground speed lever (GSL) can be used to navigate through the HPT display.

- Press BACK button (A) on the HPT to return to the previous level within the menu structure.
- Press HOME button (B) on the HPT to return to the last selected run screen (or header disengaged screen).



Figure 3.80: HPT Home and Back Buttons

- Press BACK button (A) on the GSL to return to the previous level within the menu structure.
- Press SHIFT button (B) on the back of the GSL, and then press GSL BACK button (A) to return to the last selected run screen (or header disengaged screen). Pressing SHIFT (B) and BACK (A) buttons on the GSL at the same time produces the same result as pushing the HOME key on the HPT display.

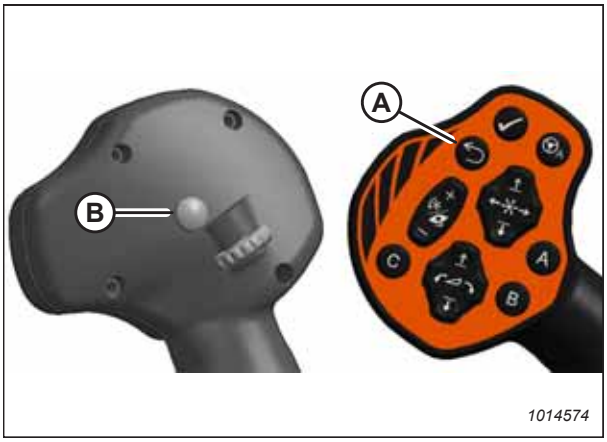


Figure 3.81: GSL Shift and Back Buttons

Soft Keys

Soft keys, located beside the screen on the Harvest Performance Tracker (HPT), can be used to navigate through the display.

- Soft keys 1–4 (A) on the HPT display run screens 1–4 respectively.
- Soft key 5 (B) displays the main menu.
- After a menu is open, soft keys 1–5 also function as buttons within menus.



Figure 3.82: HPT Soft Keys

QuickMenu System

The QuickMenu system allows you to change certain windrower and header functions directly on the screen of the Harvest Performance Tracker (HPT).

1. Press scroll knob (A) on the HPT or SELECT button (B) on the ground speed lever (GSL) while in any run screen to open the QuickMenu system.

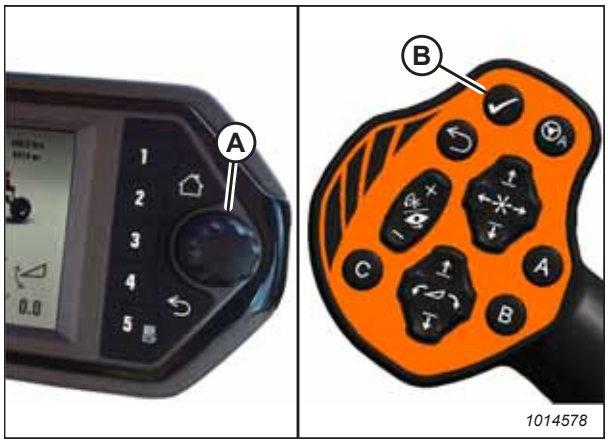


Figure 3.83: HPT Scroll Knob and GSL Select Button

2. Use the HPT scroll knob or the GSL scroll wheel to move red cursor (A) around the screen. The following selectable areas are highlighted in white and can be changed while in motion using the QuickMenu system:

   - Ground speed limit (A) – Refer to *Adjusting Ground Speed Limit, page 129*.
   - EEC throttle limit (B) – Refer to *Programming Eco Engine Control, page 124*.
   - Header float (C) – Refer to *Setting Float, page 191*.
   - Header adjustments (when header is running [not shown]) – Refer to *4.6 Operating Header, page 189*.
   - Knife speed – Refer to *4.7.7 Knife Speed, page 218*.
   - Access maintenance information – Refer to *3.17.8 Machine Information Pages, page 103*.
   - Adjust auto speed settings – Refer to *4.7 Operating with D1X or D1XL Series Draper Header, page 203*.
   - Define header alarm speeds – Refer to *4.7 Operating with D1X or D1XL Series Draper Header, page 203*.
   - Header Alarm pressure – Refer to *4.7 Operating with D1X or D1XL Series Draper Header, page 203*.
   - Manage telltales – Refer to *Faults and Telltales, page 92*.
   - Turn auto speeds ON/OFF – For instructions, refer to *4.7 Operating with D1X or D1XL Series Draper Header, page 203*.

3. Place the red cursor (red border [A]) over the function you want to adjust, and press the HPT scroll knob or GSL SELECT button to display a submenu containing the adjustable values within the selected function.

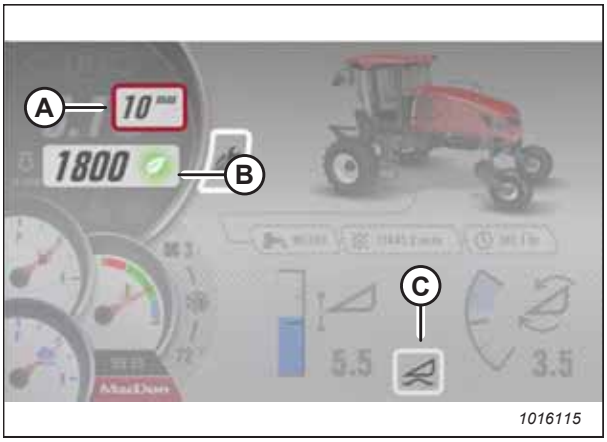


Figure 3.84: QuickMenu System

Main Menu

The main menu on the Harvest Performance Tracker (HPT) provides access to submenus for viewing and adjusting windrower and header settings.

To display the main menu and select functions, follow these steps:

1. Press soft key 5 (A) to open the main menu or press SHIFT and SELECT on the ground speed lever.
2. Use HPT scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown) to place red cursor (C) over the icon you want to select.

   NOTE:

   Using the scroll knob will activate titles that explain each selection.
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to select the highlighted icon.

   NOTE:

   Pressing the corresponding soft key will also work.

   The following submenus are accessible through the main menu:

   - Information
   - Settings
   - Maintenance
   - Diagnostics
   - Engine aftertreatment

   For instructions on navigating the submenus, refer to *Menu Icons, page 88*.

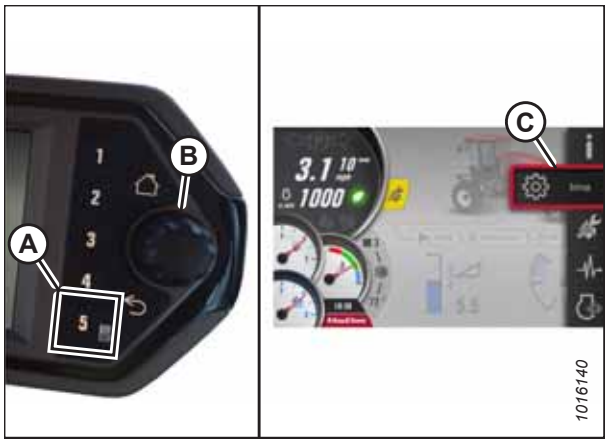


Figure 3.85: Opening the Main Menu

Menu Icons

Several menu icons are available in the main menu of the Harvest Performance Tracker (HPT). Selecting a menu icon will open submenu icons, menu lists, and radio buttons for viewing and adjusting windrower and header settings.

Information: Icon (A) displays the following submenu icons:

- Windrower Information (B)
- Header Information (C)
- Module Information (D)
- Performance Information (E)

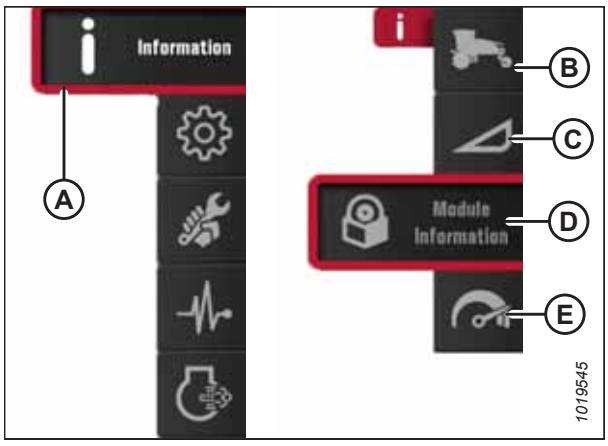


Figure 3.86: Information Icon and Information Submenu Icons

Setup: Icon (A) displays the following submenu icons:

- Screen Settings (B)
- Windrower Settings (C)
- Header Setup (D)
- One-Touch-Return Settings (E)

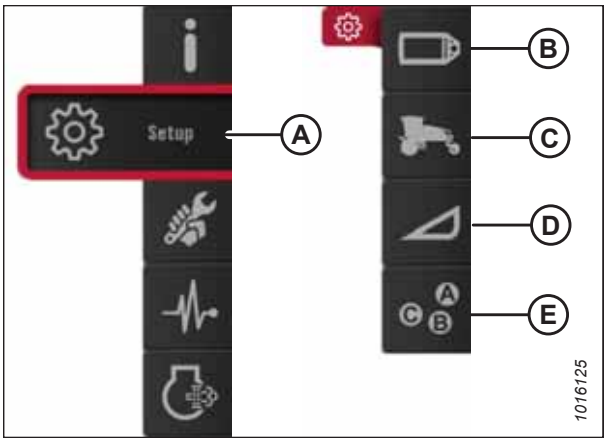


Figure 3.87: Settings Icon and Settings Submenu Icons

Screen Settings: Icon (A) displays the following submenu icons:

- Brightness and Volume (B)
- Time and Date (C)
- Language and Units (D)
- Reset to Defaults (E)

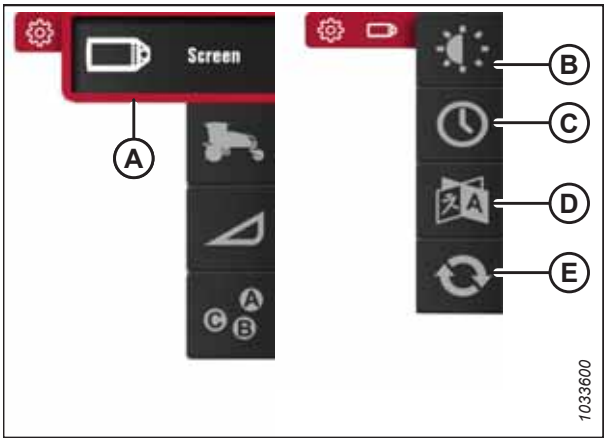


Figure 3.88: Screen Settings Icon and Display Settings Submenu Icons

Windrower Settings: Icon (A) displays the following submenu icons:

NOTE:

The F3 shortcut button on the operator's console also displays the windrower settings menu.

- Calibration (B)
- Tires and Transport Width (C)
- Lockout Functions (D)
- Sensors (E)

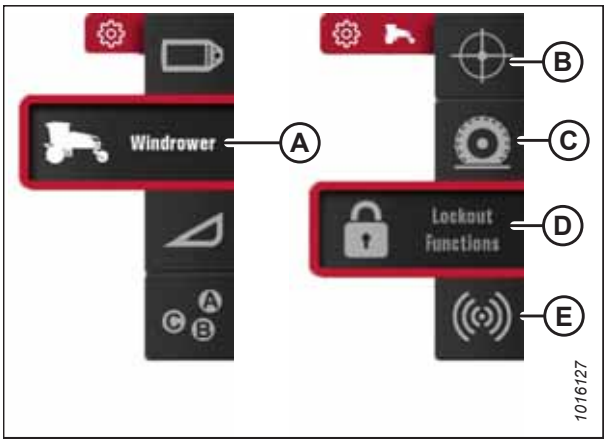


Figure 3.89: Windrower Settings Icon and Windrower Settings Submenu Icons

Header Setup: Icon (A) opens the HEADER SETUP menu list.

NOTE:

The F4 shortcut button on the operator's console also displays the HEADER SETUP menu list.

- Header Type (B)
- Hours Used (C)
- Total Acres (D)

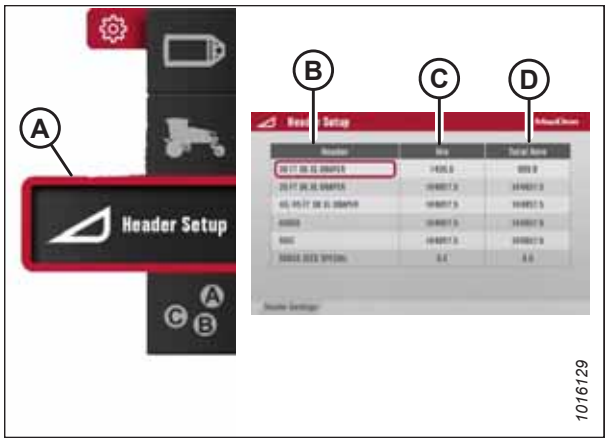


Figure 3.90: Header Setup Icon and Menu List

After the header is selected, the HEADER SETUP menu opens, which includes:

- Cut Width
- Raise/Lower Rates
- Attachments



Figure 3.91: Header Setup Menu

One-Touch-Return: Icon (A) displays the One-Touch-Return menu list.

NOTE:

The F2 shortcut button on the operator's console also displays the One-Touch-Return menu list.



Figure 3.92: One-Touch-Return Icon and One-Touch-Return Menu List

Maintenance: Icon (A) opens maintenance menu list (B). For instructions, refer to *5.2.3 Using Electronic Maintenance Tool, page 238*.

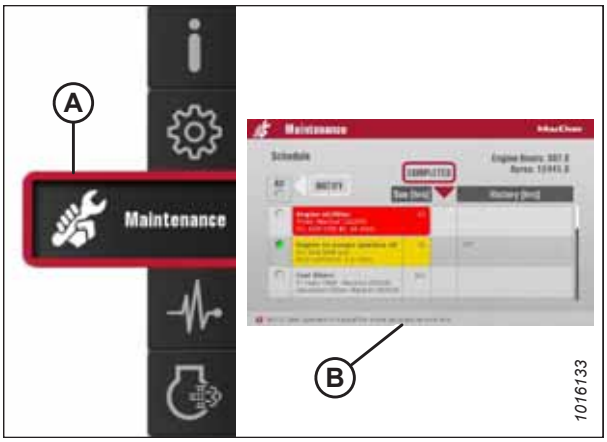


Figure 3.93: Maintenance Icon and Maintenance Menu List

Diagnostics: Icon (A) displays the following submenu icons:

- Windrower Fault Codes (B)
- Engine Fault Codes (C)
- Inputs/Outputs (D)
- Can Network (E)

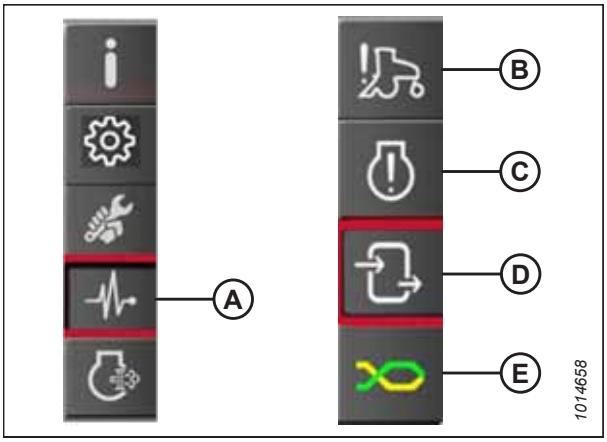


Figure 3.94: Diagnostics Icon and Diagnostics Submenu Icons

Engine Aftertreatment: Icon (A)

- Soft key 4 (B) activates the initiate manual SCR conditioning command, and initiate icon (D) will become highlighted on the display.
- Soft key 5 (C) activates the inhibit SCR conditioning command, and inhibit icon (E) will become highlighted on the display.

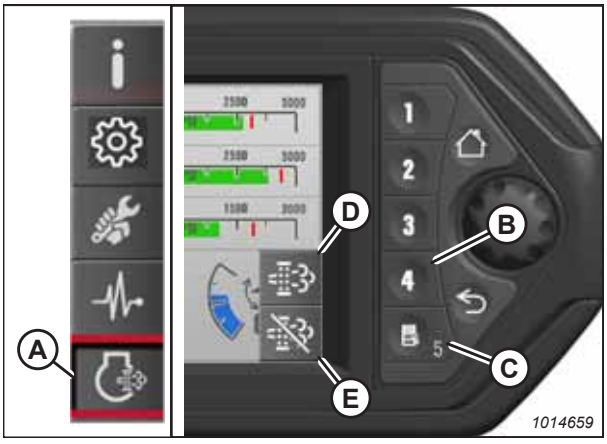


Figure 3.95: Engine Aftertreatment Icon and Soft Keys

Faults and Telltales

Faults and telltales displayed on the Harvest Performance Tracker (HPT) provide important information about the windrower and the engine.

Telltales (A) include a symbol indicating the affected area (refer to *4.2 Symbol Definitions, page 110*) and a short description of fault (B).

- Red faults (displayed on the top line) indicate that a major fault has occurred and will cause progressive damage or affect the safe operation of the machine. The machine should be shut down as soon as possible.
- Yellow faults (displayed on the bottom line) indicate that a failure has occurred, and the machine should be serviced as soon as possible to diagnose the failure.

Figure 3.96: HPT Run Screen Displaying Faults



To display a more detailed fault page, use HPT scroll knob (E) to select question mark symbol (C).

To close short description (B), use HPT scroll knob (E) to select close symbol (D). Telltales (A) remain on the screen until the fault is corrected.

NOTE:

Closing the short description of a yellow fault will mute the alarm tone associated with that fault. Alarm tones associated with red faults cannot be muted.

NOTE:

For instructions on clearing fault codes, refer to *3.17.4 Clearing Fault Codes, page 99*.

If multiple faults are detected, the number of faults will appear in the corner of telltale icon (A).



Figure 3.97: Telltale Icon – Multiple Faults Detected

Using the HPT scroll/select knob, select the question mark symbol next to the short description to display a detailed description of the fault. If there are multiple faults, telltale icons (A) will appear on screen in a row. To display a detailed description of each fault, use the HPT scroll/select knob to select the icon.

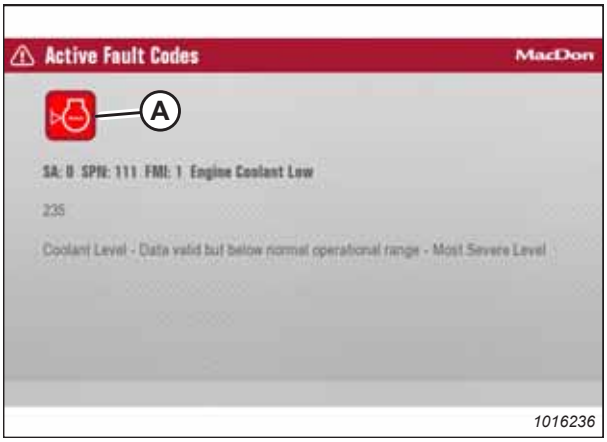


Figure 3.98: HPT Fault Description Page

3.17.3 Setting up Harvest Performance Tracker Screen

The screen menu configures the Harvest Performance Tracker (HPT) display and volume settings, and resets the HPT to factory defaults.

The following settings should be checked before initial operation of the windrower:

- Brightness and volume
- Time and date
- Language and units of measurement

The key must be turned to the ON position to enter the setup menu, but the engine does not have to be running.

Setting Screen Brightness

Screen brightness is shown with a 10-segment bar graph and is adjustable down to 10%. The brightness automatically adjusts for daytime and nighttime operation. Day mode is defined as having the headlights or work lights OFF (or having only the clearance lights ON). Night mode is defined as having either the headlights or work lights ON.

1. Navigate to the SETTINGS menu by pressing soft key 5 and the Harvest Performance Tracker (HPT) scroll knob. For instructions, refer to *3.17.2 Navigating Harvest Performance Tracker Display, page 84* if required.
2. Scroll to SCREEN icon (A) and select it.
3. Scroll to BRIGHTNESS AND VOLUME icon (B), and select it to open the adjustment window.



Figure 3.99: Brightness and Volume

4. Scroll through the following four brightness modes, and select the mode that requires adjustment:
   - DAY mode (A) (default setting is 70%)
   - NIGHT mode (B) (default setting is 20%)
   - KEYPAD DAY mode (C) (default setting is 70%)
   - KEYPAD NIGHT mode (D) (default setting is 20%)
5. Adjust the selected value by scrolling and previewing the brightness as you scroll.

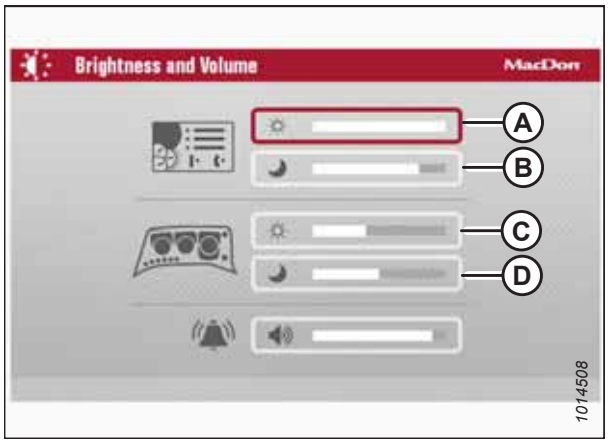


Figure 3.100: Brightness and Volume

Setting Alarm Volume

The volume control adjusts the audible alarms. It is depicted with a 10-segment bar graph and is adjustable down to 10%. The default volume is factory-set to 50%.

Adjust the volume as follows:

1. Navigate to SETUP Menu (C) by pressing soft key 5 (A) and HPT scroll knob (B). For instructions, refer to *3.17.2 Navigating Harvest Performance Tracker Display, page 84* if required.

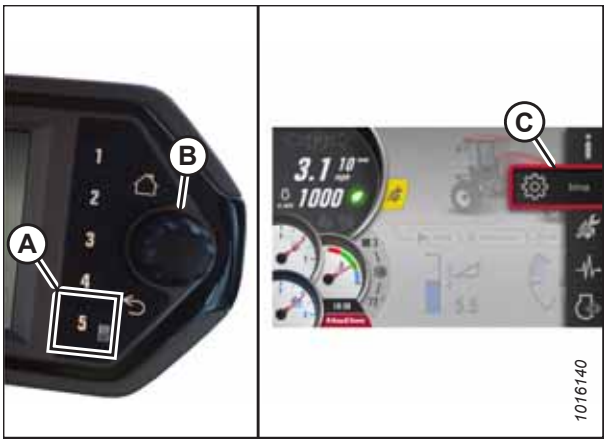


Figure 3.101: Main Menu

2. Scroll to SCREEN icon (A) and select it.
3. Scroll to BRIGHTNESS AND VOLUME icon (B), and select it to open the adjustment window.

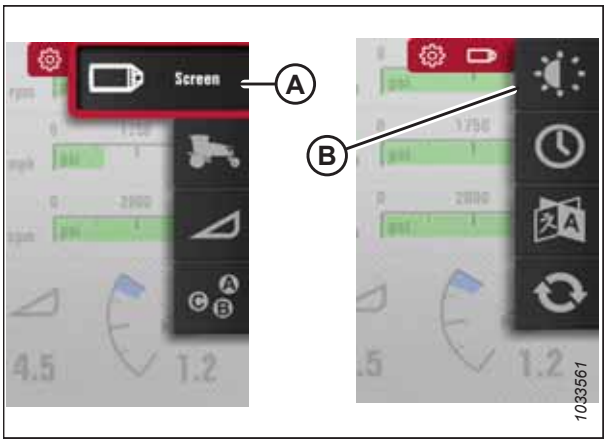


Figure 3.102: Brightness and Volume

4. Scroll to VOLUME option (A) and select it.
5. Adjust the volume by scrolling.

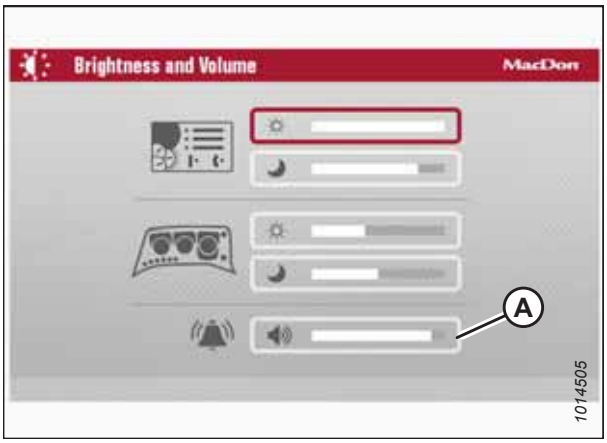


Figure 3.103: Brightness and Volume

Setting Time and Date

The time and date can be set in the Harvest Performance Tracker's (HPT) SETTINGS menu.

1. Navigate to the SETTINGS menu by pressing soft key 5 and the HPT scroll knob. For instructions, refer to *3.17.2 Navigating Harvest Performance Tracker Display, page 84*.
2. Scroll to SCREEN option (A) and select it.
3. Scroll to TIME AND DATE option (B), and select it to open the adjustment window.



Figure 3.104: Time and Date

4. Scroll through the available options on the HPT display, select the desired option, and rotate the scroll knob to make adjustments.



Figure 3.105: Time and Date

Setting Language and Units of Measurement

The language and unit of measurement options can be set in the Harvest Performance Tracker's (HPT) SETTINGS menu.

1. Navigate to the SETTINGS menu by pressing soft key 5 and the Harvest Performance Tracker (HPT) scroll knob. For instructions, refer to *3.17.2 Navigating Harvest Performance Tracker Display, page 84*.
2. Scroll to SCREEN icon (A) and select it.
3. Scroll to LANGUAGE AND UNITS icon (B), and select it to open the adjustment window.

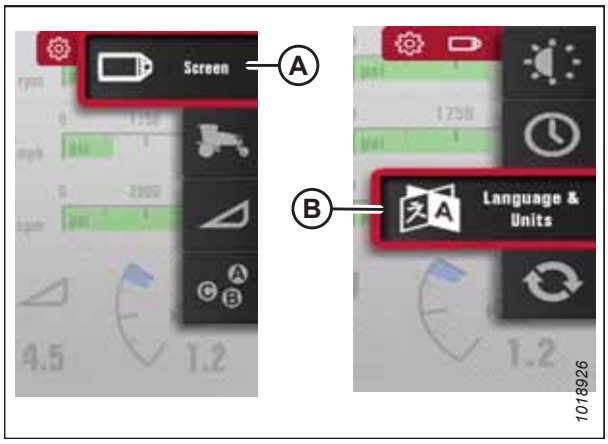


Figure 3.106: Language and Units

4. Scroll through the available options on the HPT, select the desired item, and rotate the scroll knob to move through the available options:

   - **LANGUAGE**
     - CZECH
     - DANISH
     - ENGLISH (default)
     - FRENCH
     - GERMAN
     - LATVIAN
     - SPANISH
   - **UNITS**
     - METRIC
     - USA (default)

   NOTE:

   Refer to *8.2 Conversion Chart, page 407* for a comprehensive list of U.S. and metric units.

Resetting to Factory Defaults

The Harvest Performance Tracker (HPT) can be reset to the defaults setting.

1. Press soft key 5 (A), and use HPT scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown) to place the red cursor over SETTINGS icon (C).
2. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to activate main menu (C).

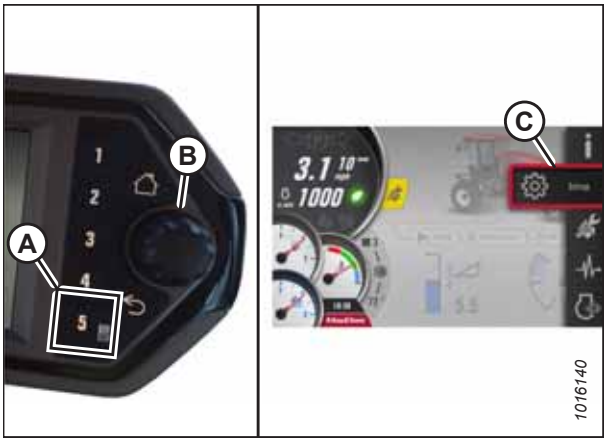


Figure 3.107: Opening the Main Menu

3. Scroll to DISPLAY SETTING icon (A) and press SELECT.
4. Scroll to RESET TO DEFAULTS icon (B), and press SELECT to open the adjustment window.

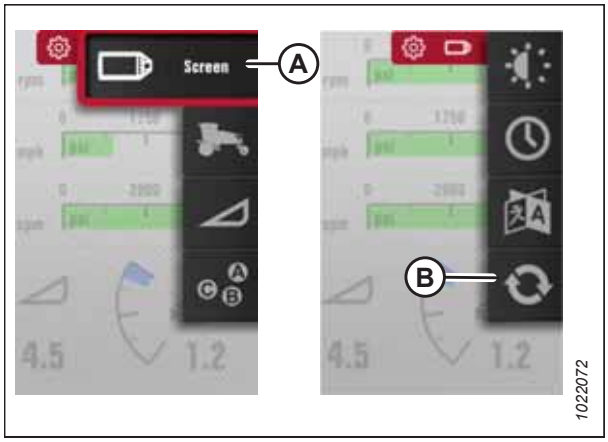


Figure 3.108: Opening the Reset to Defaults Page

5. Scroll through the available options, and press SELECT to reset to default. Refer to the following list for factory default options:
   - Select all
   - Display brightness
   - Keypad brightness by day
   - Display volume
   - Language (English)
   - Units (USA)
   - Eco engine control speed (4 and 6 cylinders have different speeds)
   - Max cab-forward speed 14 mph
   - Max engine-forward speed 27 mph
   - Header speed settings
   - Header alarm pressures
   - Knife alarm speed
   - Manual (not auto) knife speed mode
   - Manual (not auto) reel speed mode
   - Manual (not auto) draper speed mode
   - All functions unlocked
   - All sensors enabled
   - Cut width
   - Swath roller selection off
   - Max header raise/lower rates
   - One-touch-return presets (reset to default option available also within this menu)
   - DWA speed
   - DWA alarm pressure
6. Press the HOME or BACK button. The CONFIRM YES/NO dialog box is displayed.

7. Select YES to save changes and close the dialog box, or select NO to close the dialog box without saving changes.

3.17.4 Clearing Fault Codes

The lists of inactive fault codes stored on the Harvest Performance Tracker (HPT) can be cleared using the operator's console.

1. Turn the ignition key to the ACC or RUN position. Make sure the engine is not running.

   NOTE:

   You cannot clear fault codes if the engine is running, or if there are any active fault codes.

2. Press soft key 5 (A) to open the main menu or press SHIFT and SELECT on the ground speed lever (GSL).

3. Use Harvest Performance Tracker (HPT) scroll knob (B) or the GSL scroll wheel (not shown) to place red cursor (C) over the diagnostics icon.

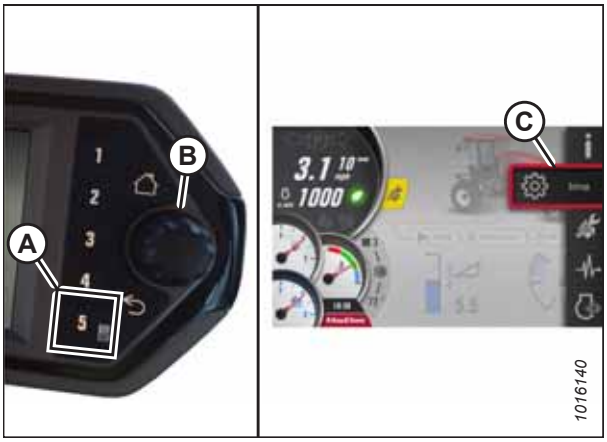


Figure 3.109: Opening the Main Menu

4. Scroll to windrower fault codes (A) or engine fault codes (B) and select it to open the fault window.

5. Verify on the screen that there are no active error messages. You must resolve all active fault codes before you can clear the fault codes.

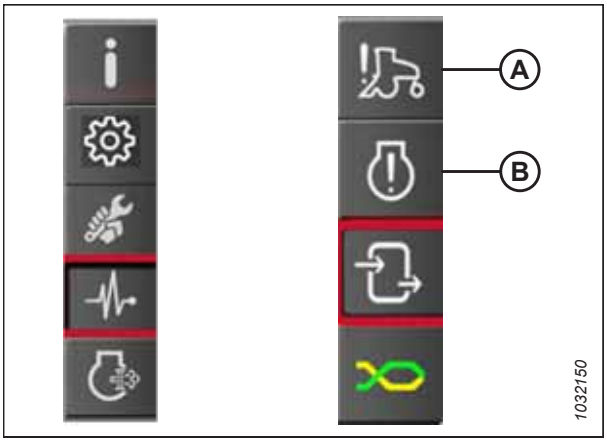


Figure 3.110: Diagnostics Icon and Diagnostics Submenu Icon

6. Press and hold eco engine control button (A) for 5 seconds. The CONFIRM YES/NO dialog box is displayed.
7. Select YES to save changes and close the dialog box, or select NO to close the dialog box without saving changes.

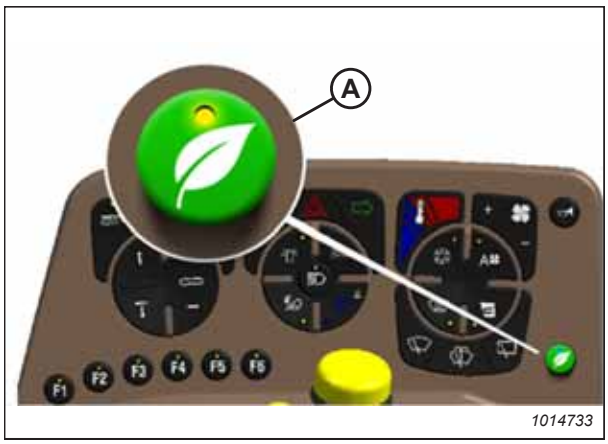


Figure 3.111: Eco Engine Control (EEC) Button

8. If previously activated, press eco engine control button (A) to reactivate this feature.

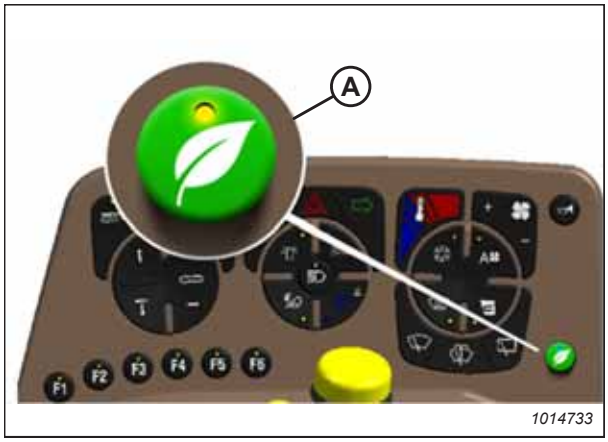


Figure 3.112: Eco Engine Control (EEC) Button

3.17.5 Setting Windrower Tire Size

The Harvest Performance Tracker (HPT) is factory-configured for 600/65R28 bar tires. If the windrower is equipped with a different type of tire, you will need to change this setting. Setting the proper tire size ensures that the HPT accurately tracks the windrower's ground speed, the area cut, and other productivity data.

1. Navigate to the SETTINGS menu by pressing soft key 5 and the HPT scroll knob. For instructions, refer to *3.17.2 Navigating Harvest Performance Tracker Display, page 84*.
2. Scroll to WINDROWER SETTINGS icon (A) and select it.
3. Scroll to TIRES icon (B), and select it to display the adjustment window.

   NOTE:

   The F3 shortcut button on the operator's console will also cause the WINDROWER SETTINGS menu to appear.

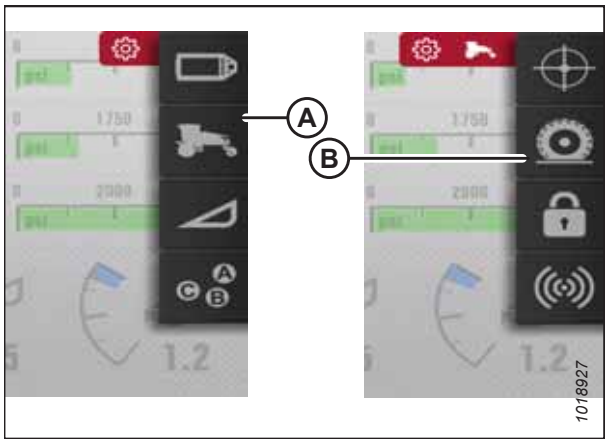


Figure 3.113: Tire Size

4. Scroll to highlight SELECT DRIVE TIRES menu (A).
5. Press the scroll knob to select the list.

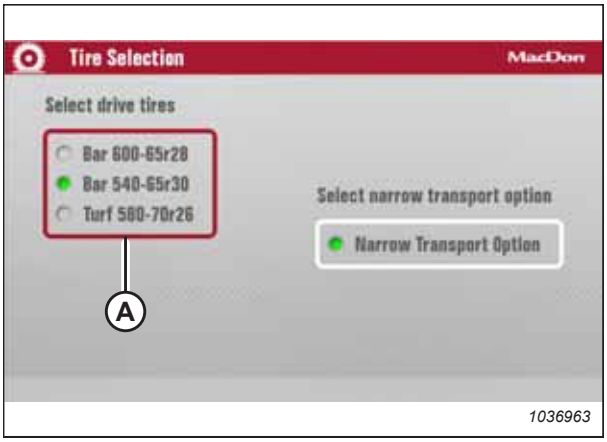


Figure 3.114: Tire Selection

6. Scroll until the correct tire size is highlighted (A).
7. Press the scroll knob. Make sure green radio button (B) appears beside the tire size.
8. The tire size is now enabled.
9. You can now either exit the menu by pressing the BACK button, or exit the TIRE SELECTION page by pressing the HOME button.

   NOTE:

   Pressing the BACK or HOME buttons will save the settings to memory.

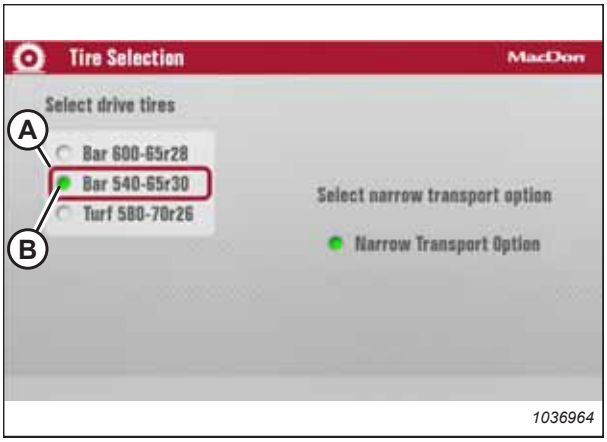


Figure 3.115: Tire Selection

3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker

The Harvest Performance Tracker (HPT) display includes a narrow transport menu option that must be enabled before extending or retracting the transport system.

1. Press MENU button 5 (A) to access the main menu.
2. Using SCROLL/SELECT wheel (B), select SETUP (C).

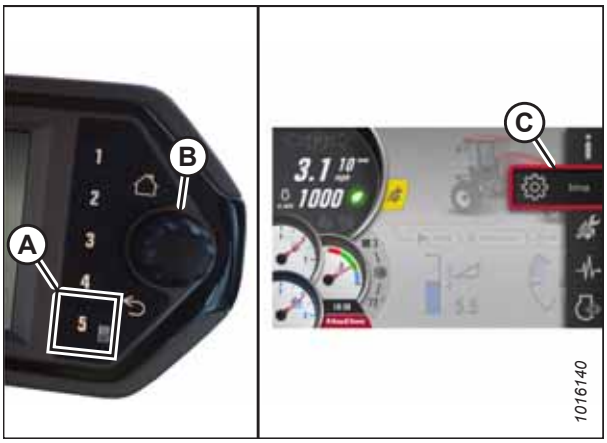


Figure 3.116: Narrow Transport Menu

3. Scroll and select WINDROWER icon (A).
4. Scroll and select TIRE SELECTION icon (B).

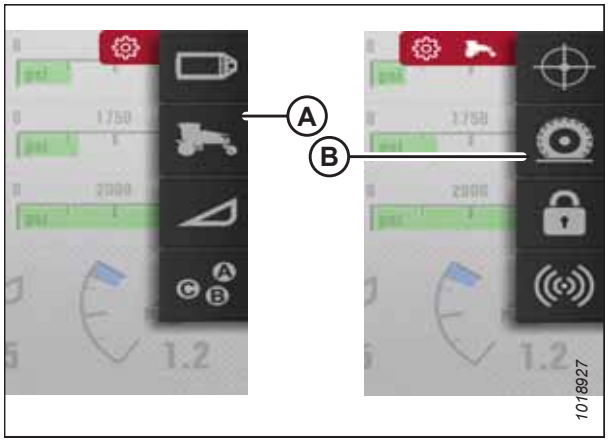


Figure 3.117: Narrow Transport Menu

5. On the Tire Selection page, scroll and select NARROW TRANSPORT radio button (A).
6. Press the HOME button on the HPT to exit the Setup Menu.

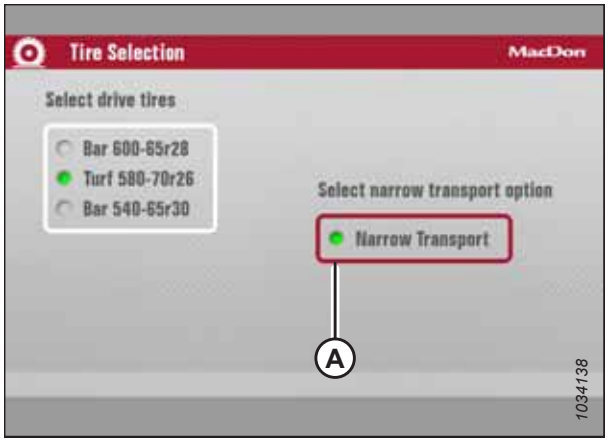


Figure 3.118: Narrow Transport Menu

3.17.7 Activating Control Locks

All header functions are factory-set to the unlocked position, but certain functions can be locked to prevent changes. This feature can be used to maintain preferred settings when there are multiple Operators.

1. Press soft key 5 (A) to display the main menu.
2. To scroll to setting icon (C), use the Harvest Performance Tracker (HPT) scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown).
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to activate the settings menu options.

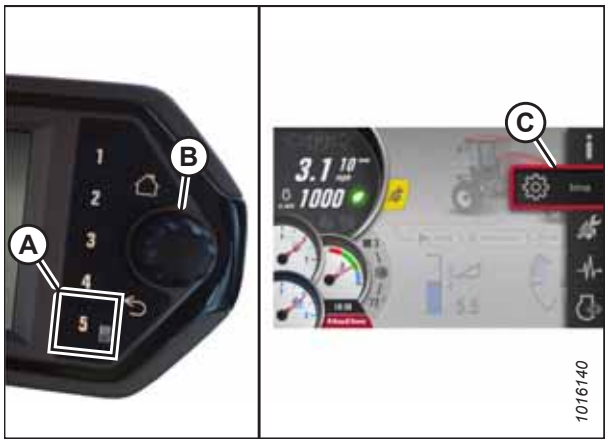


Figure 3.119: Displaying the Main Menu

4. Scroll to WINDROWER SETTINGS icon (A) and press SELECT.
5. Scroll to CONTROL LOCKS icon (B), and press SELECT to display the adjustment window.

   NOTE:

   The F3 shortcut button on the operator's console will also display the windrower settings menu.

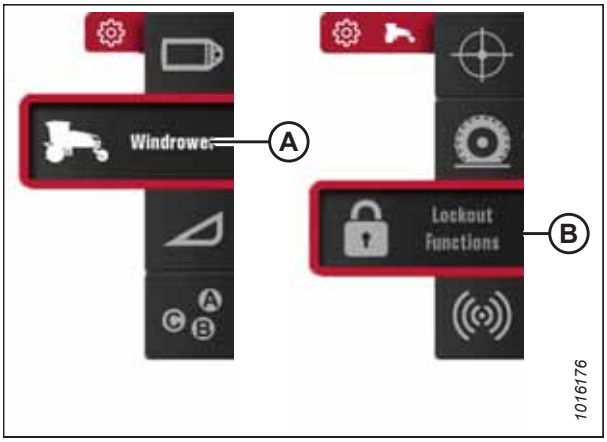


Figure 3.120: Windrower Settings Icon and Tires Submenu Icon

6. On the LOCKOUT FUNCTIONS page, use the scroll knob on the HPT to move cursor (A) to the desired function(s) to lock.
7. Press SELECT to activate the lock.

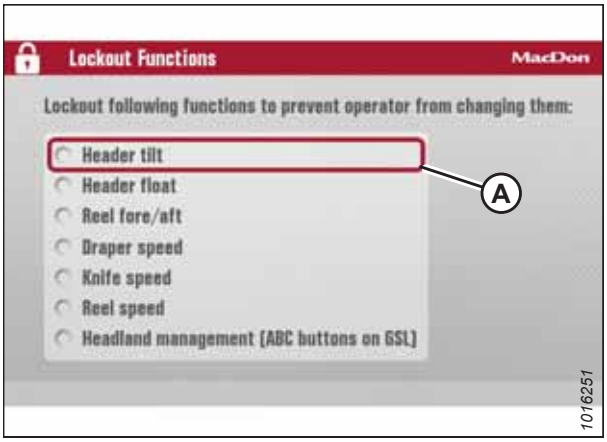


Figure 3.121: Lockout Functions Page

3.17.8 Machine Information Pages

The Harvest Performance Tracker can display various pages of information

Selecting INFORMATION icon (A) from the main menu provides access to the following submenu icons:

- Windrower information (B) – For more information, refer to *Accessing Windrower Information, page 104*.
- Header information (C) – For more information, refer to *Accessing Header Information, page 105*.
- Software information (D) – For more information, refer to *Accessing Software Information, page 106*.
- Performance information (E) – For more information, refer to *Accessing Performance Information, page 107*.

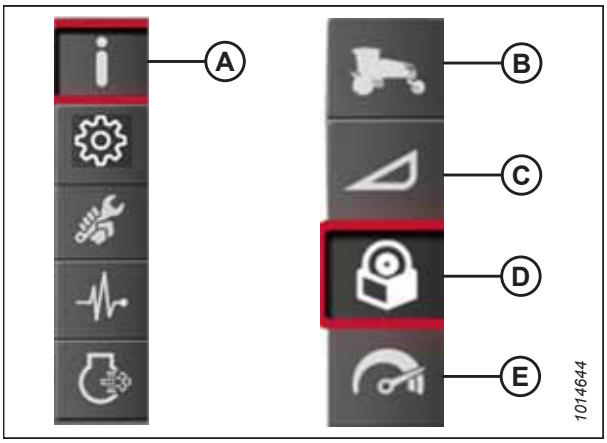


Figure 3.122: Information Icon and Information Submenu Icons

Accessing Windrower Information

The Harvest Performance Tracker can display windrower information.

1. Press soft key 5 (A) to open the main menu.
2. To scroll to INFORMATION icon (C), use Harvest Performance Tracker (HPT) scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown).
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to select the highlighted INFORMATION icon.



Figure 3.123: Opening the Main Menu

4. Scroll to WINDROWER INFORMATION submenu icon (A), and press SELECT to display the windrower information menu.

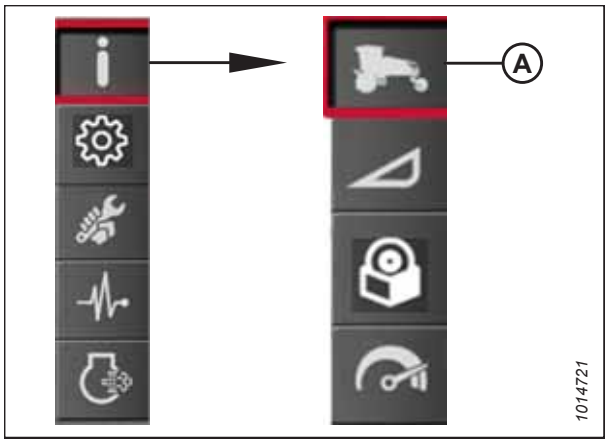


Figure 3.124: Windrower Information Submenu Icon

The windrower information menu displays the following information:

- Engine hours (A)
- Windrower total hours (B)
- Total acres (C)
- Windrower total header hours (D)

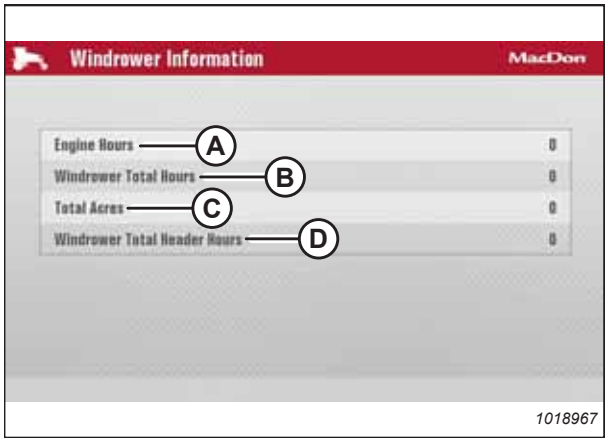


Figure 3.125: Windrower Information Menu

Accessing Header Information

Information about the header is stored in the Harvest Performance Tracker (HPT) display.

NOTE:

Adjusting the factory default HPT settings will change how some units of measurement appear on the display.

1. Press soft key 5 (A) to open the main menu.
2. To scroll to INFORMATION icon (C), use HPT scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown).
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to select the highlighted INFORMATION icon.



Figure 3.126: Opening the Main Menu

4. Scroll to HEADER INFORMATION submenu icon (A), and press SELECT to display the header information menu.

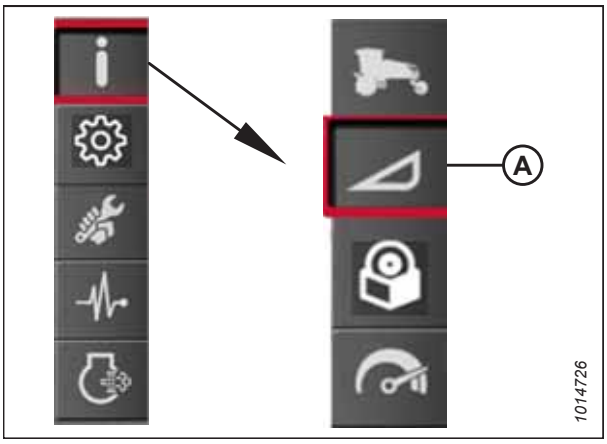


Figure 3.127: Header Information Submenu Icon

5. The header information menu displays the following information:
   - Header (A)
   - Header hours (B)
   - Total acres (C)
   - Sub acres (D) (resettable)

   NOTE:

   If you select any particular value (E), the message RESET YES/NO appears on the display. Select YES to reset the sub acres to zero and return to the same highlighted sub acres. Select NO or press the BACK or HOME button to dismiss the message without resetting the sub acres. The sub acres are also resettable from run screen 3. For instructions, refer to *Viewing Performance Data, page 137*.

   NOTE:

   The acre count is active when the header is engaged and the header height is in the lower 50% of its range.

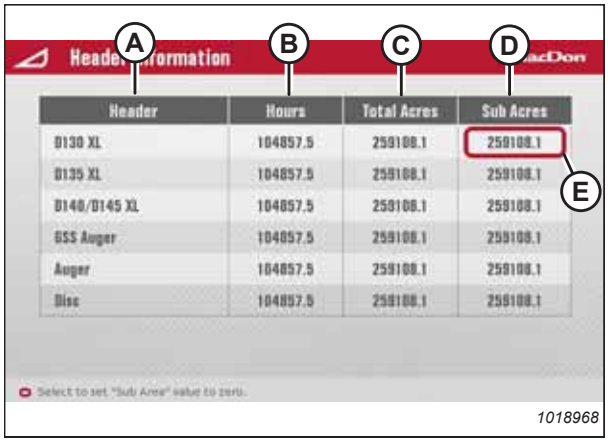


Figure 3.128: Header Information Menu

Accessing Software Information

1. Press soft key 5 (A) to open the main menu.
2. To scroll to INFORMATION icon (C), use HPT scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown).
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to select the highlighted INFORMATION icon.



Figure 3.129: Opening the Main Menu

4. Scroll to SOFTWARE INFORMATION submenu icon (A), and press SELECT to display the module information menu.

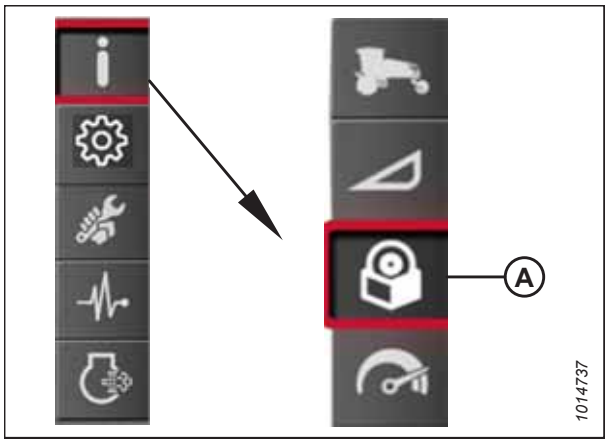


Figure 3.130: Software Information Submenu Icon

The HPT display reports the component make, software ID, and software installation date in the software information menu. In addition, the software versions and make, model, and serial numbers of the following modules are also displayed on the screen:

- Master controller (A)
- Display (B)
- Console (C)
- Ground speed lever (D)
- Engine control module (E)
- Roof relay module (F)
- Chassis relay module (G)
- HVAC module (not shown)
- Firewall extension module (not shown)

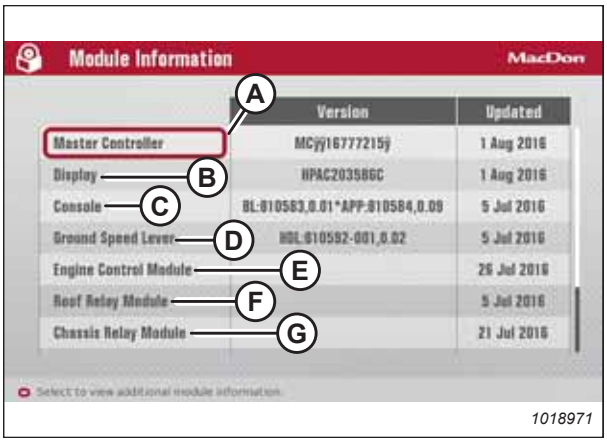


Figure 3.131: Software Information Menu

Accessing Performance Information

The performance information menu displays the accumulated data over time and the accumulated data per field.

1. Press soft key 5 (A) to open the main menu.
2. To scroll to INFORMATION icon (C), use Harvest Performance Tracker (HPT) scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown).
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to select the highlighted INFORMATION icon.



Figure 3.132: Opening the Main Menu

4. Scroll to WINDROWER PERFORMANCE submenu icon (A), and press SELECT to display the performance information menu.

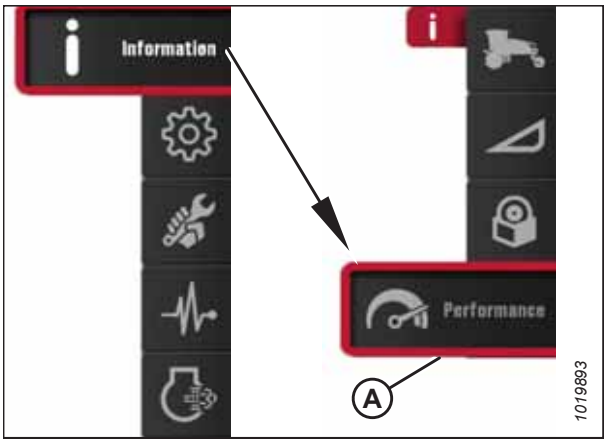


Figure 3.133: Performance Information Submenu Icon

The performance information menu displays two columns: one column displays the accumulated data over machine's lifetime (A) and is not resettable, the other displays data accumulated per field (B) and is resettable.

The performance information menu displays the following information:

- Engine hours (C)
- Engine % idle time (D)
- Average % load (E)
- Gal/Hr (F)
- Acres (G)
- Acres/Gal (H)
- Gal/Acre (J)
- Windrower header hours (K)

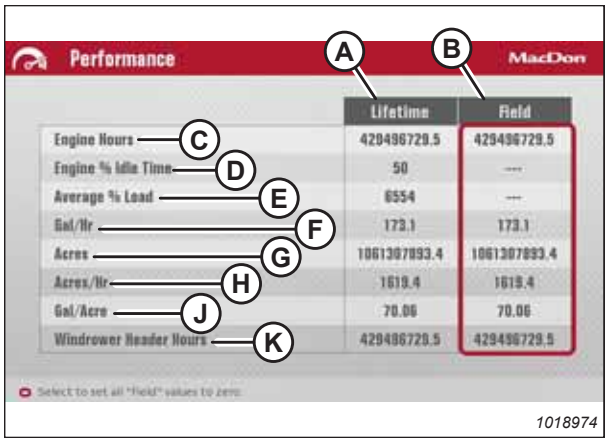


Figure 3.134: Performance Information Menu

NOTE:

To reset all of the field values to zero, use the scroll knob to highlight the FIELD column (B) and press the SELECT button.

Chapter 4: Operation

Safely operating your machine requires familiarizing yourself with its capabilities.

4.1 Owner/Operator Responsibilities

Owning and operating heavy equipment comes with certain duties.

CAUTION

- **It is your responsibility to read and understand this manual completely before operating the windrower. Contact your Dealer if an instruction is not clear to you.**
- **Follow all safety messages in this manual and on the safety signs on the windrower.**
- **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, ensure that they have been instructed in its safe and proper use.**
- **Review this manual and all other relevant safety information with all the windrower's 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 windrower. Unauthorized modifications may impair the functionality or the safety of the machine, and may reduce the windrower's service life.**
- **The safety information provided in this manual does NOT replace the safety codes, insurance requirements, or laws applicable to the region in which you will be operating the windrower. Ensure that your machine complies with all relevant regulations.**

4.2 Symbol Definitions

These symbols are used to provide at-a-glance information on critical windrower performance parameters.

Ensure that you are familiar with the meaning of these symbols before operating the windrower.

4.2.1 Windrower Operating Symbols

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

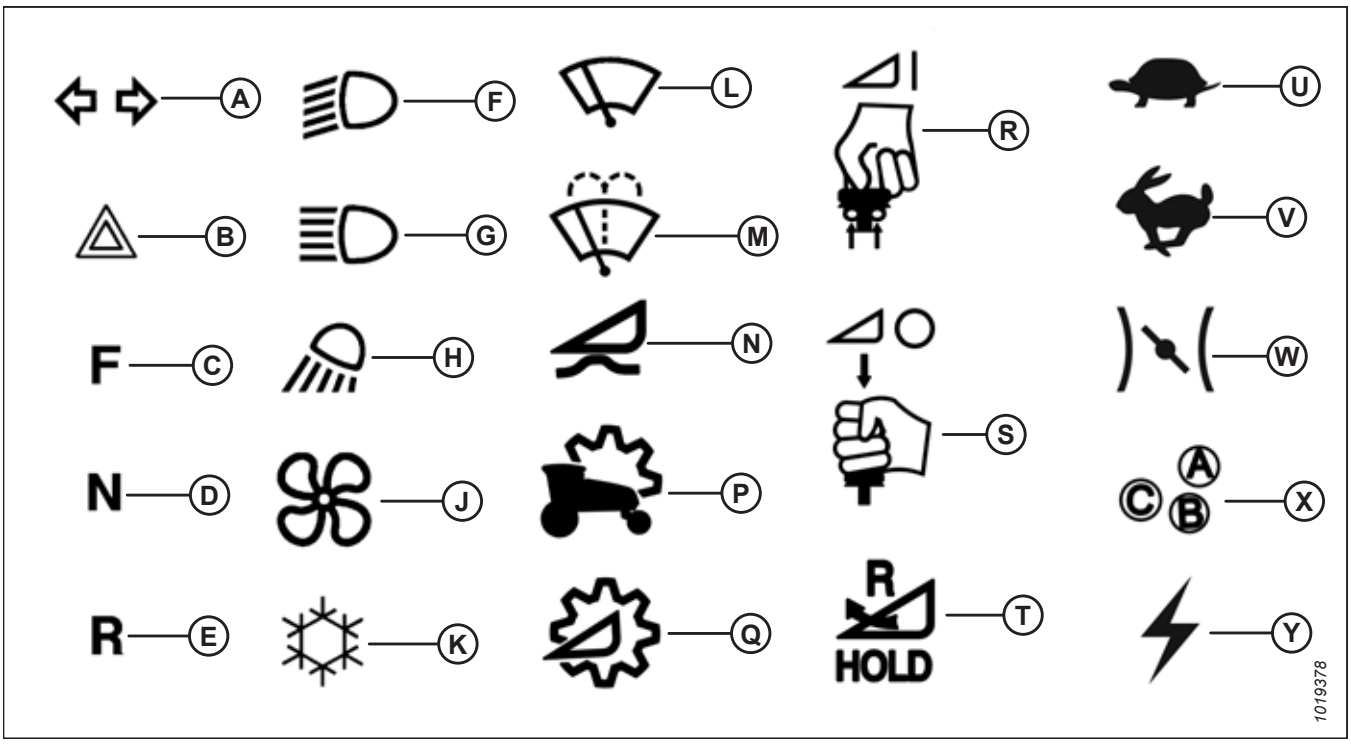


Figure 4.1: Windrower Operating Symbols

A - Signal Lights
B - Hazard Lights
C - Forward
D - Neutral
E - Reverse
F - Road Lights
G - High Beams
H - Cab-forward Field Lights
J - Blower Speed (Manual Mode)
K - Air Conditioning
L - Windshield Wiper
M - Wiper Fluid
N - Float Menu
P - Windrower Settings
Q - Header Settings
R - Header Engage
S - Header Disengage
T - Header Reverse
U - Slow
V - Fast
W - Engine Throttle
X - One-Touch-Return
Y - Electrical Power / Accessories

4.2.2 Harvest Performance Tracker Symbols

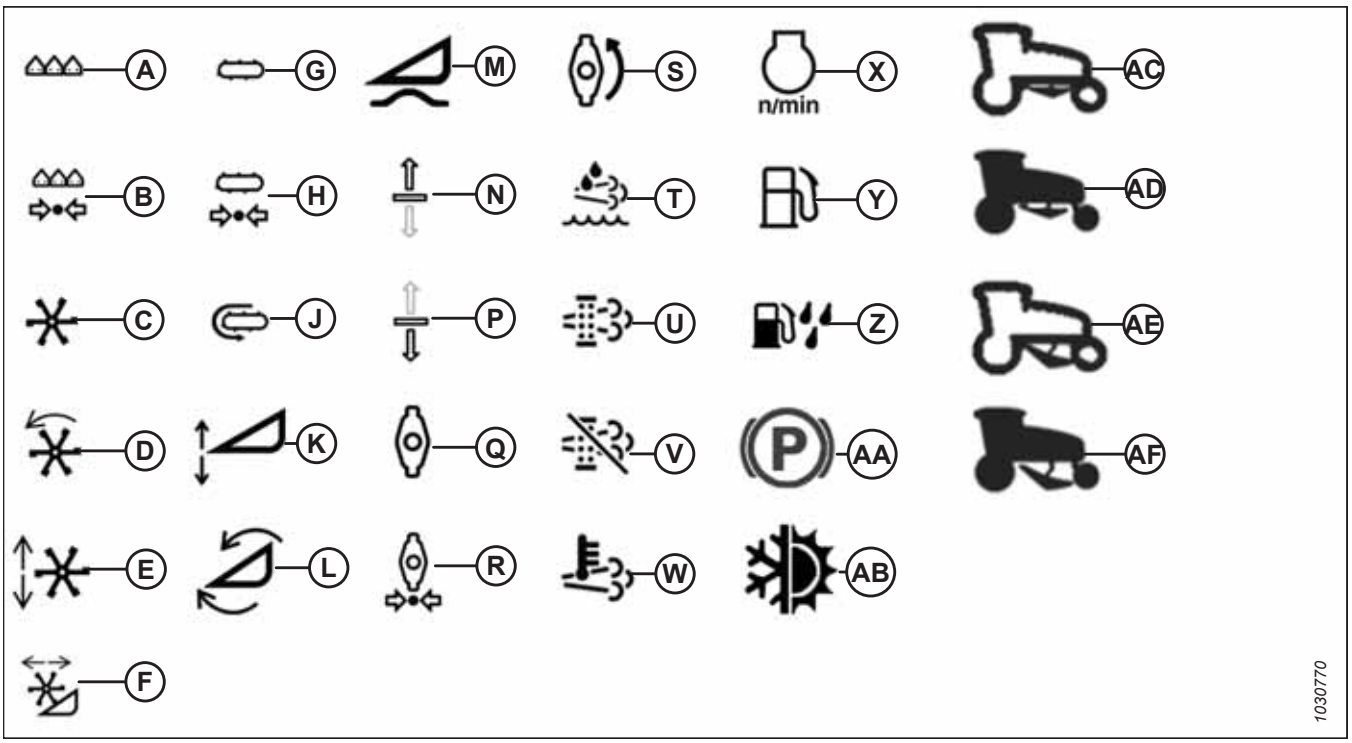


Figure 4.2: Harvest Performance Tracker (HPT) Symbols

A - Knife
B - Knife Pressure
C - Reel
D - Reel Speed
E - Reel Height
F - Reel Fore-Aft
G - Draper
H - Draper Pressure
J - Draper Speed
K - Header Height
L - Header Tilt
M - Header Float
N - DWA Raise
P - DWA Lower
Q - Disc
R - Disc Pressure
S - Disc Speed
T - DEF
U - SCR Conditioning Manual
V - SCR Conditioning Inhibit
W - High Exhaust System Temperature
X - Engine rpm
Y - Fuel
Z - Water in Fuel
AA - Parking Brake
AB - Climate Control
AC - Raising Swath Compressor
AD - Swath Compressor Raised
AE - Lowering Swath Compressor
AF - Swath Compressor Lowered

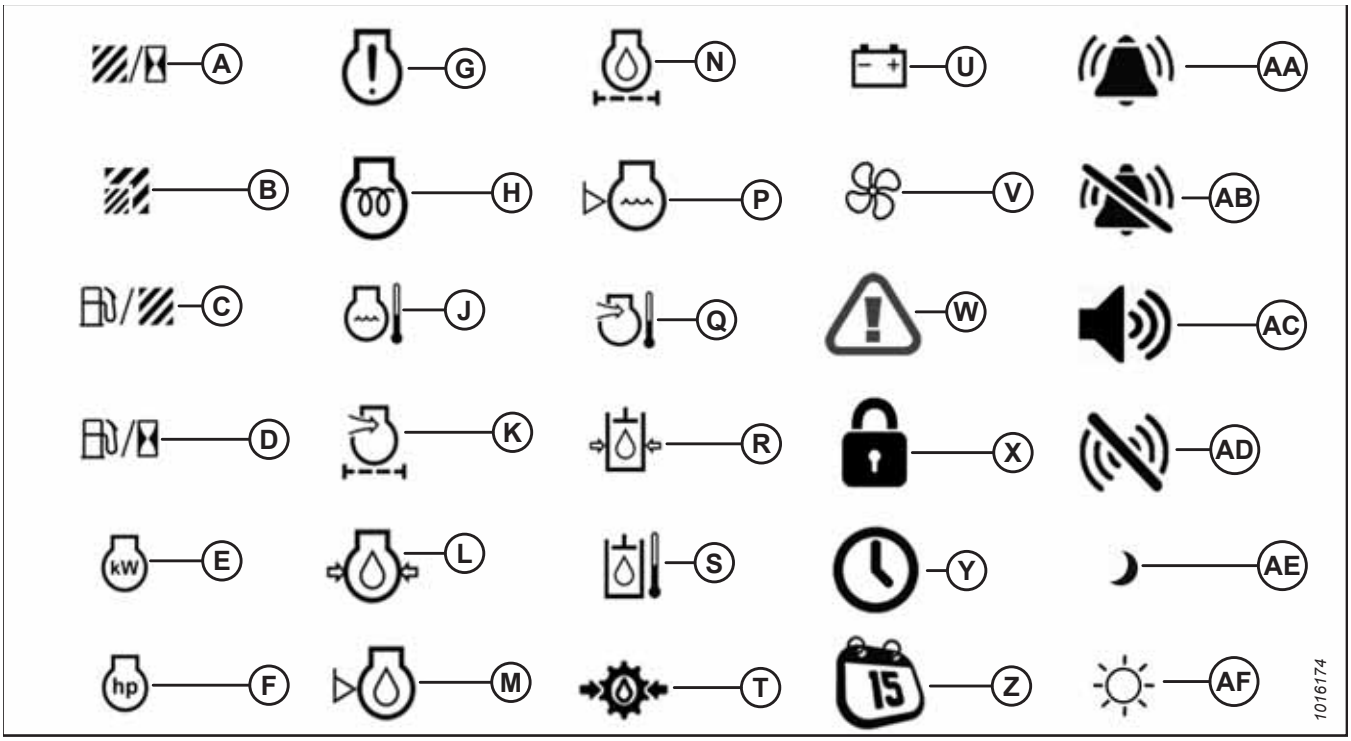


Figure 4.3: HPT Symbols

A - Acres/Hour
B - Sub Acres
C - Fuel/Acre
D - Fuel/Hour
E - Engine Power Kilowatt
F - Engine Power Horsepower
G - Engine Malfunction
H - Wait to Start
J - Engine Coolant Temperature
K - Engine Intake Air Filter
L - Engine Oil Pressure
M - Engine Oil Level
N - Engine Oil Filter
P - Engine Coolant Level
Q - Engine Air Intake Temperature
R - Hydraulic Oil Pressure
S - Hydraulic Oil Temperature
T - Transmission Oil Pressure
U - Battery/Voltage
V - Fan Speed
W - Caution (Yellow) / Danger (Red)
X - Function Locked
Y - Time
Z - Date
AA - Alarm
AB - Alarm Off
AC - Volume Level
AD - Sensor Disabled
AE - Night
AF - Day

4.3 Operating Windrower

Safely operating your machine requires familiarizing yourself with its capabilities.

4.3.1 Operational Safety

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

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 throughout the day. DO NOT take chances. You may need:**
  - **A hard hat**
  - **Protective glasses or goggles**
  - **Heavy gloves**
  - **A respirator or filter mask**
  - **Wet weather gear**
- **Protect against noise. Wear suitable hearing protection such as ear muffs or ear plugs to protect against 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 the proper shutdown procedure. For instructions, refer to *Shutting down Engine, page 125*.**
- **Operate only in daylight or good artificial light.**

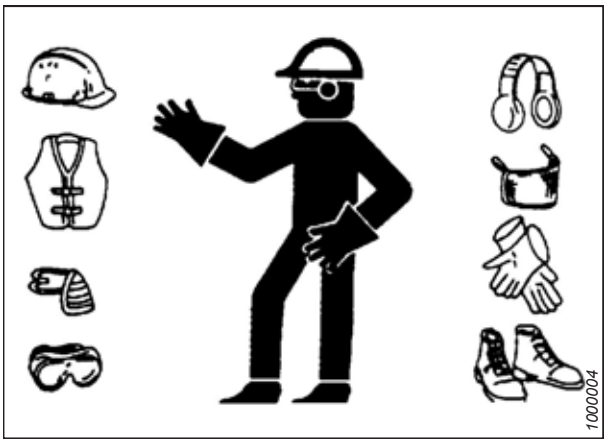


Figure 4.4: Safety Equipment

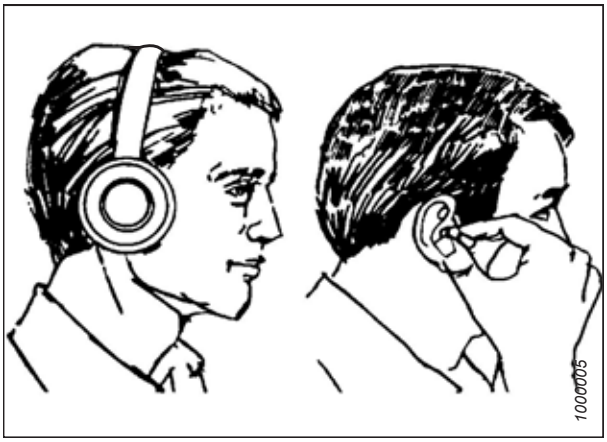


Figure 4.5: Safety Equipment

4.3.2 Break-in Period

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

DANGER

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

IMPORTANT:

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

- Avoid unnecessary idling. If the engine will be idling longer than 5 minutes after reaching operating temperature, turn the ignition key OFF to stop the engine.
- Before taking the GSL out of PARK, let the hydraulic oil warm up to 32°C (90°F). You can view the hydraulic oil temperature on Run Screen 4 on the Harvest Performance Tracker (HPT) display. For instructions, refer to *Viewing Engine Cooling Data, page 138*.
- Check the engine oil level frequently. Watch for any signs of leakage. If oil must be added, refer to *Checking Engine Oil Level, page 118*.
- Watch the coolant gauge in the cab for temperature rising beyond normal operating range. Check that the coolant level in the reserve tank (mounted next to the radiator) stays between the HOT and COLD marks on the tank. For instructions, refer to *5.7.5 Checking Engine Coolant Level, page 274*.

  NOTE:

  If overheating problems occur, check for coolant leaks.

- Perform the break-in inspections specified in *5.2.1 Break-in Inspection Schedule, page 235*.

NOTE:

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

NOTE:

If the windrower must be driven in cold weather (below freezing), let the engine idle for 3 minutes, and then operate the windrower at moderate speed until the oil has warmed up.

4.3.3 Preseason Checks / Annual Service

Follow these steps at the beginning of each season.

CAUTION

- **Review the 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. Drain off excess hydraulic oil added for storage. For instructions, refer to *5.13.2 Draining Hydraulic Oil, page 318*.
2. Remove any plastic bags and/or tape from all sealed openings (air cleaner intake, exhaust pipe, fuel tank).
3. Charge and install the batteries. Be sure the terminals are clean and cables are connected securely.

4. Adjust the tension on the air conditioning (A/C) compressor belt. For instructions, refer to *5.6.4 Tensioning Air Conditioner Compressor Belts, page 264*.

5. Distribute A/C refrigerant by cycling the A/C switch. For instructions, refer to *Air Conditioning Compressor Coolant Cycling, page 115*.

6. Check the entire A/C system for leakage.

7. Perform the annual maintenance procedure. For instructions, refer to *5.2 Windrower Break-In Inspections and Maintenance Schedule, page 235*.

Air Conditioning Compressor Coolant Cycling

Air conditioners use coolant in the system to remove the heat from inside the cab.

IMPORTANT:

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

1. Press the reduce (–) BLOWER SPEED switch (A) repeatedly until the lowest fan setting is reached.
2. Press the red area on TEMPERATURE CONTROL switch (F) repeatedly until maximum heating is reached.
3. Press A/C control (E) to OFF.
4. Start the engine.
5. Operate the windrower at low idle until the engine is warm.

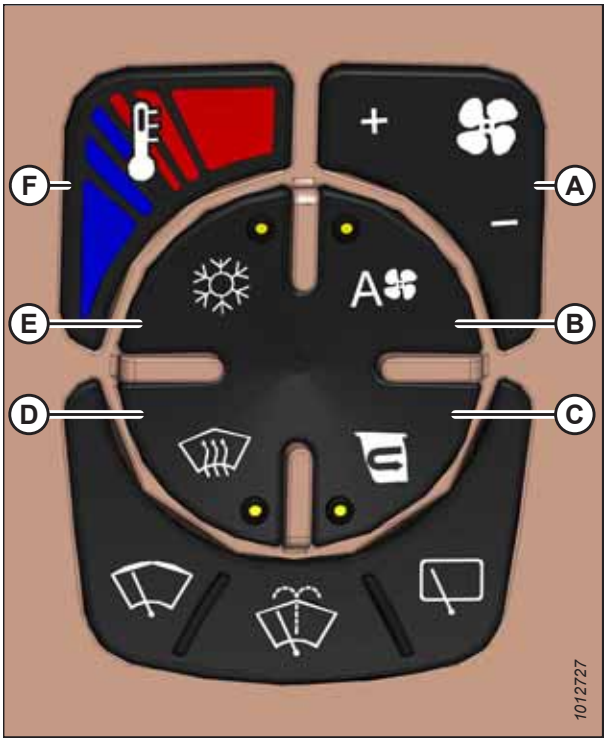


Figure 4.6: Climate Control

A - Blower Toggle Button
B - Outside Air Button
C - Recirculating Air Button
D - Windshield Defog/Defrost
E - Air Conditioning Button
F - 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 the proper procedure when searching for pressurized fluid leaks. For instructions, refer to *5.7.6 Hoses and Lines, page 274*.

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 the daily maintenance procedure. For instructions, refer to *5.2 Windrower Break-In Inspections and Maintenance Schedule, page 235*.

Filling Fuel Tank

The symbol inside the fuel gauge on the Harvest Performance Tracker (HPT) display will signal the Operator when the fuel level is low. Fill fuel tank daily, preferably at the end of the day's operation to help prevent condensation in the tank.

DANGER

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

WARNING

- **To prevent personal injury or death from an explosion or fire, do NOT allow open flames or sparks near the windrower when it is being refueled.**
- **Do NOT refuel the windrower when the engine is hot or running.**
- **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. A wire connection from the fuel delivery system to the machine chassis will equalize the static 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 the ground.**

IMPORTANT:

Do **NOT** allow the tank to empty. Running out of fuel can cause air locks and/or contamination of the fuel system. For instructions, refer to *Priming Fuel System, page 302*.

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

2. Clean the area around fuel filler cap (A).
3. Turn fuel filler cap (A) counterclockwise until it is loose. Remove the cap.
4. Fill the tank with approved fuel. For fuel type and quantity, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*.

   IMPORTANT:

   Do **NOT** completely fill the tank as space is required for expansion. A filled tank could overflow if exposed to a rise in temperature, such as direct sunlight.
5. Replace fuel tank filler cap (A), and turn the cap clockwise until it clicks.

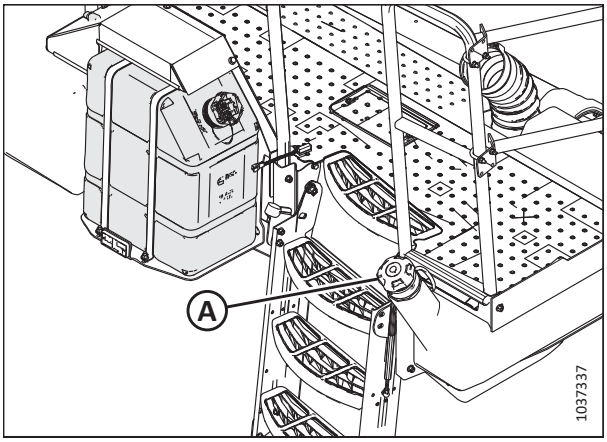


Figure 4.7: Fuel Tank Filler Cap

Filling Diesel Exhaust Fluid Tank

The symbol inside the diesel exhaust fluid (DEF) gauge on the Harvest Performance Tracker (HPT) display will signal when DEF level is low.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Clean around filler cap (A).
3. Turn cap (A) counterclockwise until it is loose and then remove the cap.

   NOTE:

   The filler cap for the DEF tank is blue and the nozzle dispenser is smaller than that of the fuel tank.

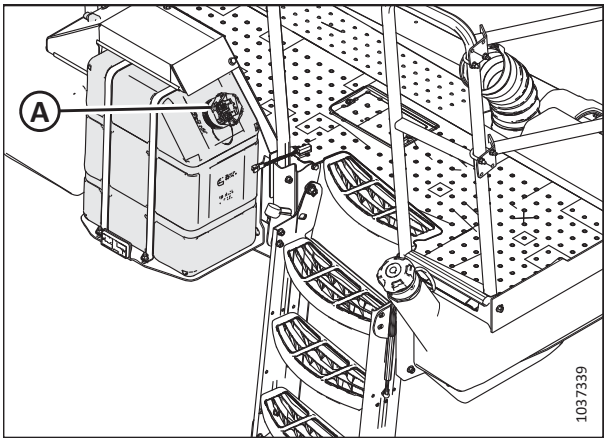


Figure 4.8: DEF Tank

CAUTION

Avoid contact with eyes. In case of contact, rinse immediately with water for 15 minutes.

4. Fill the tank with approved DEF. For specifications, refer to the inside back cover.

   IMPORTANT:

   DEF is corrosive. Spilled DEF must be contained and absorbed by non-combustible absorbent material like sand, and then shovelled into a suitable container for disposal. If spilled on the tank or any surface of the vehicle, rinse thoroughly with water.

   IMPORTANT:

   If the windrower temperature is going to be below 0°C (32°F), do **NOT** fill the DEF tank more than 75% full. When freezing, the DEF fluid will expand by approximately 7%. For storage information, refer to *5.1.1 Storing Lubricants and Fluids, page 231*.

5. Replace filler cap (A) and turn clockwise until tight.

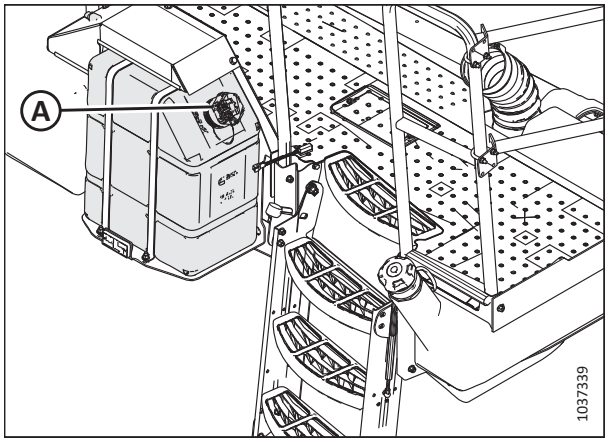


Figure 4.9: DEF Tank

Checking Engine Oil Level

Check the engine oil level frequently and watch for any signs of leakage.

DANGER

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

NOTE:

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

NOTE:

The engine oil level can be checked without opening the hood.

1. Operate the engine at low idle, and check for leaks at the filter and drain plug.
2. Shut down the engine, and remove the key from the ignition.
3. Wait about 5 minutes.

4. Locate the engine oil dipstick on the right side of the windrower. Remove dipstick (A) by turning it counterclockwise to unlock it.
5. Wipe the dipstick clean and reinsert it into the engine.

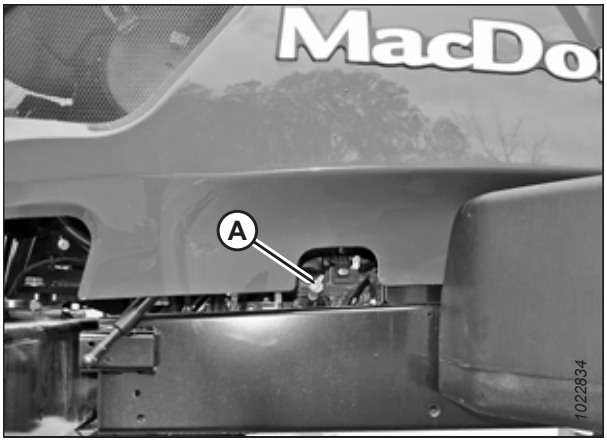


Figure 4.10: Engine Oil Dipstick Location

6. Remove the dipstick again and check the oil level. The oil level should be between the LOW (L) and HIGH (H) marks on the dipstick. If the oil level is below the LOW mark, you will need to add oil.

   NOTE:

   Adding 1.9 liters (2 U.S. quarts) of engine oil will raise the level from LOW to HIGH. To add oil, refer to *Adding Engine Oil, page 271*.

7. Replace the dipstick and turn it clockwise to lock it.

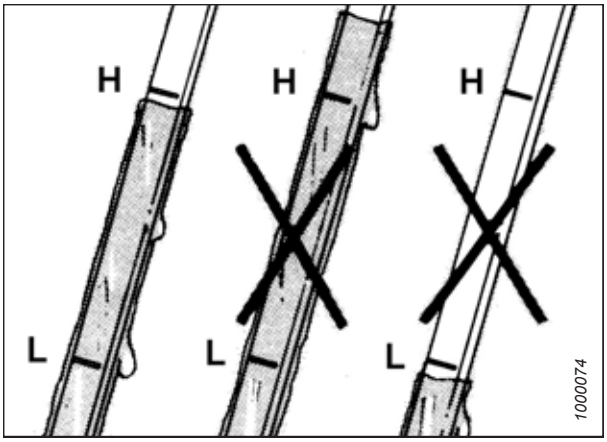


Figure 4.11: Engine Oil Level on Dipstick

4.3.5 Engine Operation

Refer to this section to learn how to start, operate, and shut down the windrower's engine.

Starting Engine

You can start the engine with the operator's seat in the cab-forward or the engine-forward position.

DANGER

- **Only start the engine in a well-ventilated space.**
- **Ensure that there are no bystanders present when starting the machine.**
- **This machine has safety devices which allow the engine to start only when the ground speed lever (GSL) is in PARK, the steering wheel is locked in the PARK position, and the HEADER ENGAGE switch is in the OFF position. Under NO circumstances are these devices to be deliberately rewired or adjusted so that the engine can be started when the GSL is out of the NEUTRAL position.**
- **Do NOT start the engine by shorting across the starter or starter relay terminals. If the normal starting circuitry is bypassed, the machine can start with the drive engaged and potentially start moving.**
- **Start the engine only from the operator's seat with the controls in PARK. NEVER start the engine while standing on the ground. NEVER try to start the engine with someone under or near the machine.**

IMPORTANT:

Before starting the windrower, check the levels of the following fluids, and add more if necessary:

- Engine oil – refer to *Checking Engine Oil Level, page 118*
- Hydraulic oil – refer to *5.7.3 Checking Hydraulic Oil, page 272*
- Gearbox oil – refer to *5.7.7 Checking Engine Gearbox Lubricant Level and Adding Lubricant, page 275*

IMPORTANT:

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

NOTE:

When the windrower console receives a wake-up signal, the console awakens from sleep mode and closes the battery disconnect relay. The Harvest Performance Tracker (HPT) goes into a boot-up sequence that takes approximately 40 seconds. The following items trigger a wake-up signal for the console:

- Key switch ignition or accessory positions
- Cab door switch
- Horn button
- Hazards button
- Field lights button
- Clearance lights button
- Road lights button
- High beam button

1. Before starting the engine, ensure that engine exhaust pipe (A) is not covered or obstructed.

   NOTE:

   Before taking the GSL out of PARK, let the hydraulic oil warm up to 32°C (90°F). You can view the hydraulic oil temperature on Run Screen 4 on the Harvest Performance Tracker (HPT) display. For instructions, refer to *Viewing Engine Cooling Data, page 138*.



Figure 4.12: Engine Exhaust

2. Ensure that cab-forward or engine-forward directional lock (A) is engaged at the base of the steering column.

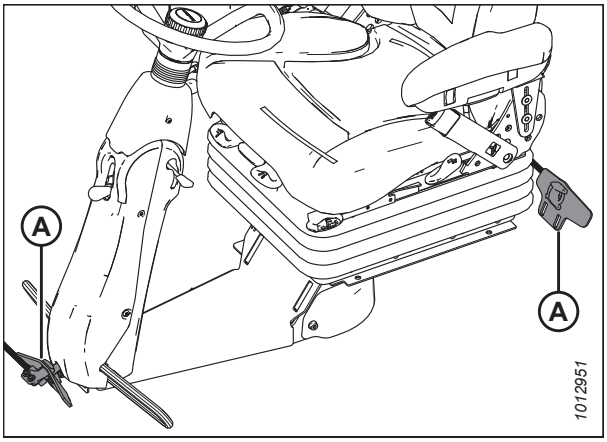


Figure 4.13: Direction Locks

3. Move GSL (A) into PARK (C).
4. Turn the 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 the locked position or damage to the steering system may occur.
5. Fasten the seat belt.
6. Push HEADER ENGAGE switch (B) to ensure it is in the OFF position.

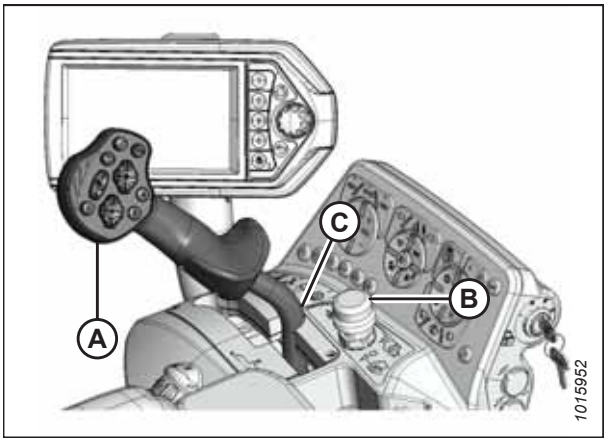


Figure 4.14: Operator Controls

7. Press HORN button (E) three times prior to starting the engine.

8. Turn IGNITION switch (A) to the ON position; HPT display (B) will light up. If the HPT is still booting up, wait for WAIT TO START (WTS) symbol (C) to disappear before trying to start the engine.

9. Ensure that red PARK symbol light (D) is ON and that there are no error messages on the screen.

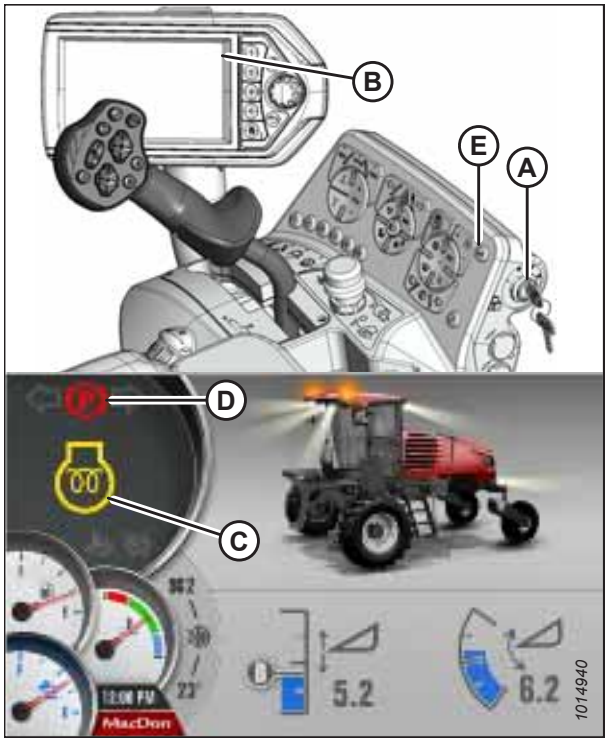


Figure 4.15: Console and HPT Run Screen

10. Turn the IGNITION switch to crank position (A).

    NOTE:

    When the engine starts and the header is not engaged, the HPT displays header disengaged page (B).

    IMPORTANT:

    - Do **NOT** operate the starter for longer than 15 seconds at a time.
    - If the engine does not start, wait at least 2 minutes before trying again.
    - If you crank the engine for more than 30 seconds within a 2-minute period, the engine will lock the starter circuit to prevent overheating, and a flashing WTS symbol will appear on the display. Wait for the WTS symbol to stop flashing before attempting to crank the engine again.
    - If the engine still does not start, refer to *Engine Start Troubleshooting Tips, page 123*.

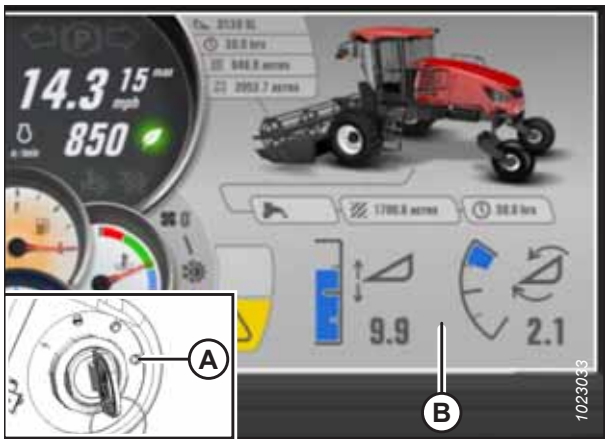


Figure 4.16: HPT Header Disengaged Screen

NOTE:

If you attempt to start the engine when the ambient temperature is below 5°C (40°F), the engine will cycle through a period during which it will sound as though it is struggling to stay running. This is the engine's warm-up mode. The throttle will be unresponsive while the engine is in warm-up mode. Warm-up mode lasts between 30 seconds and 3 minutes depending on the temperature. The throttle will become active after the engine has stabilized and is idling normally. Do **NOT** operate the engine above 1500 rpm until the HPT engine temperature gauge is above blue range (A).



Figure 4.17: HPT No Header Screen

Engine Start Troubleshooting Tips

If the windrower will not start normally, refer to the following troubleshooting table:

IMPORTANT:

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

Table 4.1 Engine Start Troubleshooting

Problem	Solution
Controls are not in the NEUTRAL position	• Move the GSL to NEUTRAL • Move the steering wheel to the locked (centered) position • Disengage the HEADER switch
Neutral interlock is out of adjustment	• Contact a MacDon Dealer
Fuel not reaching the engine	• Fill the fuel tank • Replace the fuel filter
Old fuel in the fuel tank	• Drain the fuel tank • Refill the fuel tank with fresh fuel
Water, dirt, or air in the fuel system	• Drain, flush, fill, and prime the fuel system
Improper type of fuel in the fuel tank	• Drain the fuel tank • Refill the fuel tank with the correct type of fuel
Crankcase oil too heavy	• Replace with recommended oil
Low voltage output from the battery	• Test the battery • Check the battery's electrolyte levels
Poor battery connection	• Clean and tighten loose battery connections
Faulty starter	• Contact a MacDon Dealer
Wiring is shorted or the circuit breaker is open	• Check the continuity of the wiring and the breaker; manually reset the circuit breaker
Faulty fuel injectors	• Contact a MacDon Dealer

Programming Eco Engine Control

The engine speed can be programmed to operate at reduced rpm to lower fuel and diesel exhaust fluid (DEF) consumption, and to reduce in-cab noise levels.

The set-point for the engine speed can be adjusted in increments of 100 rpm from 1800 to 2400 rpm in the Harvest Performance Tracker (HPT) QuickMenu. While the header is engaged, the system can easily be activated and deactivated (depending on field conditions) using the Eco Engine Control (EEC) button (A) on the console. When the engine is running at less than full speed, you will notice a small reduction in the maximum reel, draper, and ground speeds.

The EEC feature is turned ON or OFF by pressing EEC button (A) on the operator's console. EEC will only be available when the header is engaged. The GREEN LEAF symbol on the HPT display indicates that the EEC is active. If EEC is turned OFF, or the header is disengaged, the LEAF symbol will appear grayed out. The EEC throttle limit can be adjusted at any time.

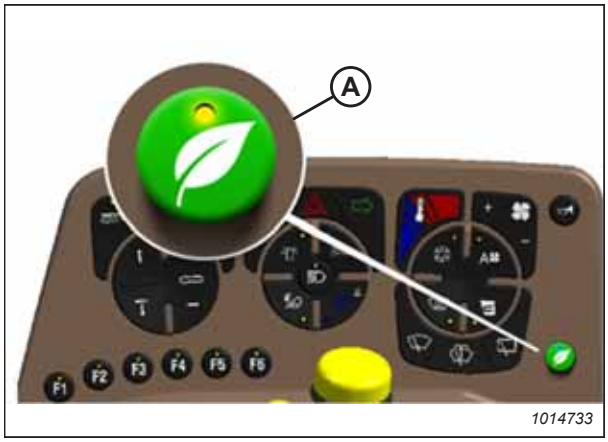


Figure 4.18: Eco Engine Control (EEC) Button

1. To open the QuickMenu system while in any run screen, press the scroll knob (A) on the HPT.



Figure 4.19: HPT Scroll Knob/Select Button

2. Use the HPT scroll knob to move the red cursor to ECO THROTTLE LIMIT value (A).
3. Press the HPT scroll knob to select ECO THROTTLE LIMIT adjustment function (A).
4. Adjust the ENGINE rpm value using the HPT scroll knob.
5. Press the HPT scroll knob to program the adjusted value.



Figure 4.20: HPT Display

Shutting down Engine

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever (GSL) in the PARK position, and the steering wheel in the locked position (centered). To confirm that the parking brake is engaged, wait for the HPT to beep and display a red P symbol.

IMPORTANT:

Before stopping the 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. Park the windrower on a level surface.
2. Lower the header.
3. Place ground speed lever (GSL) (B) into PARK.
4. Lock the steering wheel.
5. Turn ignition key (A) counterclockwise to the OFF position.

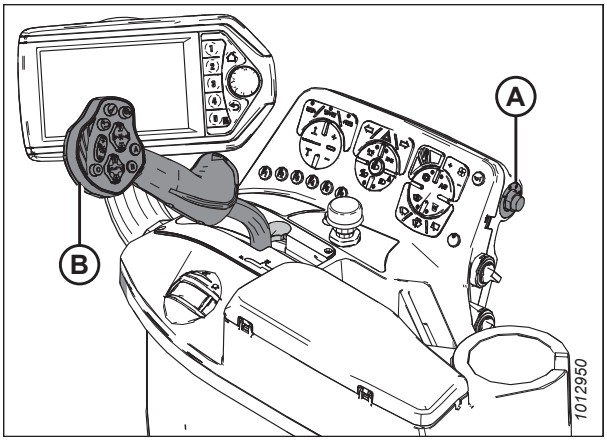


Figure 4.21: Console

Engine Temperature

The engine temperature gauge is displayed in the lower left corner of the Harvest Performance Tracker (HPT) display.

Normal engine operating temperature is indicated when the needle is in the green range of gauge (A).

If the engine temperature exceeds 105°C (221°F), the needle will move to the red range of the gauge. Depending on the temperature, the engine will trigger a fault code and an amber caution or red stop light will illuminate on the HPT display.

When the engine temperature is below 5°C (40°F), the engine will cycle through a period where it appears to labor until the engine warms up. Do **NOT** operate the engine above 1500 rpm until the HPT engine temperature gauge is above the blue range.

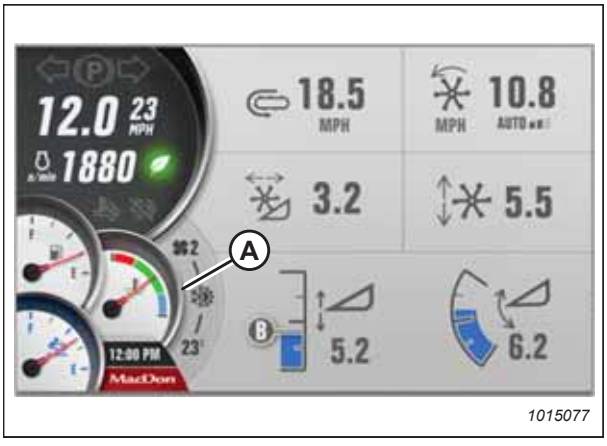


Figure 4.22: HPT Display – Engine Temperature Gauge

NOTE:

Before taking the ground speed lever (GSL) out of PARK, let the hydraulic oil warm up to 32°C (90°F). You can view the hydraulic oil temperature on Run Screen 4 on the Harvest Performance Tracker (HPT) display. For instructions, refer to *Viewing Engine Cooling Data, page 138*.

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 Harvest Performance Tracker (HPT) displays an engine telltale fault code to identify the issue.

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

If the amber CAUTION light illuminates, stopping immediately is optional. You may continue operations and investigate later, but you are **STRONGLY** advised to monitor the situation carefully.

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. However, prolonged use of DEF can lead to the buildup of crystallized DEF in the emission system. SCR technology is used to heat the exhaust system to remove crystallized DEF.

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 (for example, when the windrower is 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 windrower's computer will derate the engine's performance 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.

Activating the Exhaust Aftertreatment Functions

Follow these steps to access the exhaust aftertreatment functions on the Harvest Performance Tracker (HPT) display.

1. To display the main menu, press soft key 5 / menu button (A) on the HPT.
2. To display the manual / inhibit SCR conditioning switches, press soft key 5 / menu button (A) next to EXHAUST AFTERTREATMENT icon (B).

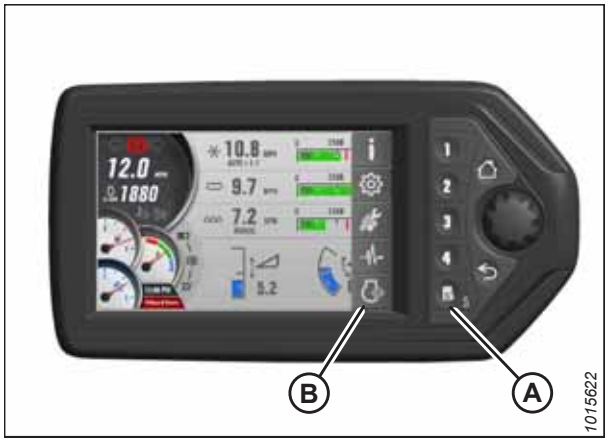


Figure 4.23: HPT Display

3. To inhibit SCR conditioning, press soft key 5 / menu button (A) next to INHIBIT SCR CONDITIONING icon (B), and hold for 3 seconds. SCR CONDITIONING INHIBIT icon (C) will appear under the engine rpm display.



Figure 4.24: HPT Display

4. To select manual SCR conditioning, press soft key 4 (A) next to MANUAL SCR CONDITIONING icon (B), and hold it for 3 seconds. High exhaust system temperature (HEST) icon (C) appears highlighted under the rpm display during system cleaning.

   NOTE:

   The HEST icon also appears during normal operation when the exhaust temperature exceeds the maximum temperature threshold. The icon remains on until the exhaust temperature drops below the minimum temperature threshold.



Figure 4.25: HPT Display

Operator Console Buttons

Windrower comfort, lighting, signals, and some header functions are controlled from the operator's console.

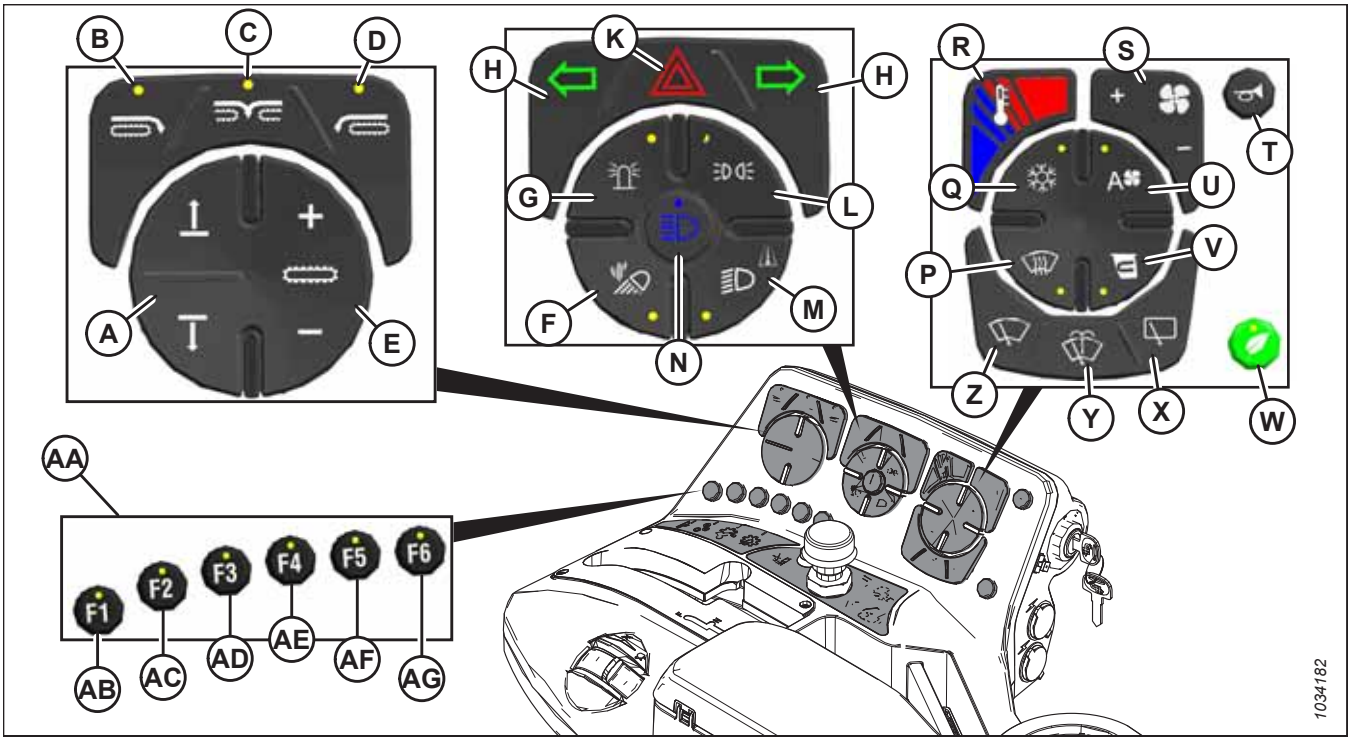


Figure 4.26: Operator Console Buttons

A - Double Window Attachment (DWA) / Swath Roller
B - Deck Shift Draper Right Side Delivery
C - Deck Shift Draper Center Delivery
D - Deck Shift Draper Left Side Delivery
E - Draper / Double Windrow Attachment (DWA) Speed
F - Cab-Forward Field Lights
G - Beacon Lights
H - Turn Signals
K - Hazard Lights
L - Clearance Lights
M - Road Lights
N - High Beams
P - Windshield Defog/Defrost
Q - Air Conditioning
R - Temperature
S - Blower Speed (Manual Mode)
T - Horn
U - Auto Fan Speed
V - Cab Air Recirculation
W - Eco Engine Control (EEC)
X - Windshield Wiper (Rear)
Y - Wiper Fluid
Z - Windshield Wiper (Front)
AA - Harvest Performance Tracker (HPT) Shortcuts
AB - Float Menu Shortcut
AC - One-Touch-Return Shortcut
AD - Windrower Settings Shortcut
AE - Header Settings Shortcut
AF - Drive Wheel Leg Adjust
AG - Walking Beam Adjust

Entering and Exiting 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 the windrower on a flat, level surface. Put the ground speed lever into the PARK position and center the steering wheel in the locked position. Wait for the HPT to beep and display a red P symbol to confirm that the parking brake is engaged.**
- **Fully lower the header and the reel (if applicable).**
- **Disengage the header drives.**
- **To prevent bodily injury or death from the unexpected startup of the machine, always stop the engine and remove the key from the ignition.**
- **Turn off the lights, unless their being on is required for inspection purposes.**
- **Release the seat belt.**
- **Turn off the wipers.**
- **Raise the armrest and steering wheel for easier exit and re-entry.**
- **Lock the cab door if you are leaving the windrower unattended.**

A swing-away platform with stairs (A) is provided on the left side of the windrower to accommodate cab-forward and engine-forward access to the operator's station as well as several maintenance tasks.

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.

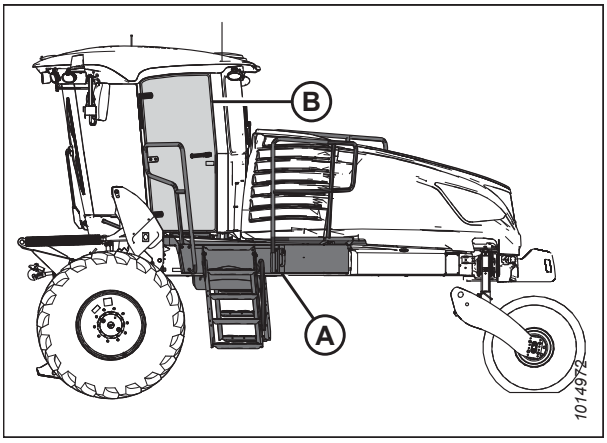


Figure 4.27: Platforms and Doors

Adjusting Ground Speed Limit

The windrower has the following selectable ground speed limits depending on seat position:

Table 4.2 Selectable Ground Speed Limits

Direction of Travel	Selectable Ground Speed Limits
Cab-forward (Standard drive wheel)[5]	16, 19, 23, 26, 29 km/h (10, 12, 14, 16, 18 mph)
Engine-forward (Standard drive wheel)[6]	16, 29, 43 km/h (10, 18, 27 mph)

5. The default setting is 16 km/h (10 mph).
6. The default setting is 43 km/h (27 mph). Maximum engine-forward (road) speed varies by region based on local regulation. The limited regions are: Germany (30 km/h), France (25 km/h).

Table 4.2 Selectable Ground Speed Limits (continued)

Direction of Travel	Selectable Ground Speed Limits
Cab-forward (High torque drive wheel)[7]	13, 19, 23, 26, 29 km/h (8, 12, 14, 16, 18 mph)
Engine-forward (High torque drive wheel)[8]	16, 34.6 km/h (10, 21.5 mph)

1. Press scroll knob (A) on the Harvest Performance Tracker (HPT) while in any run screen to open the QuickMenu system.



Figure 4.28: HPT Scroll Knob / Select Button

2. To scroll to GROUND SPEED LIMIT selectable area (A), use the HPT scroll knob to move the red cursor.
3. Press the HPT scroll knob to select, and scroll to adjust the ground speed limit values.

   NOTE:

   The ground speed limit is also changed by simultaneously pressing the GSL shift button on the back of the GSL and scrolling.



Figure 4.29: HPT Display

7. The default setting is 13 km/h (8 mph).
8. The default setting is 34.6 km/h (21.5 mph). Maximum engine-forward (road) speed varies by region based on local regulation. The limited regions are: Germany (30 km/h), France (25 km/h).

Driving Forward in Cab-Forward Mode

In cab-forward mode, the operator's station is facing away from the engine.

WARNING

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

WARNING

Outside of North America, do NOT drive the windrower on the road in cab-forward mode, as lighting/reflector visibility will not be compliant with road regulations.



Figure 4.30: Cab-Forward Mode

CAUTION

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

CAUTION

Park on a level surface with the ground speed lever (GSL) in the PARK position and the steering wheel in the locked (centered) position. Wait for the Harvest Performance Tracker (HPT) to beep and display a red P symbol to confirm that the parking brake is engaged.

1. Park the windrower on a level surface.
2. If the operator's seat is in the cab-forward position (facing away from the engine), proceed to Step *3, page 131*.

   If the operator's seat is facing the engine, swivel the operator's seat to the cab-forward position as follows:

   a. Place ground speed lever (GSL) (A) in PARK. The engine can be running.

      IMPORTANT:

      If the GSL is **NOT** in PARK, swivelling the operator's station may damage the GSL cable.

   b. Pull up on knob (B) and hold to release latch (C) at the base of the steering column.

   c. Turn the steering wheel counterclockwise to pivot the operator's station clockwise 180° until the pin engages the latch to secure the operator's station in the new position.

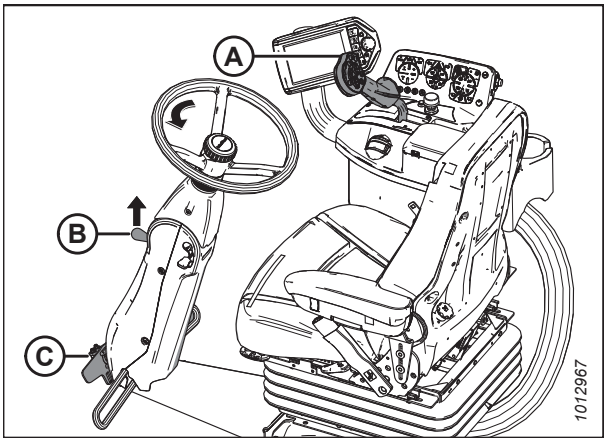


Figure 4.31: Operator Station

3. Ensure the seat belt is fastened.
4. Start the engine (if it is not already running). For instructions, refer to *Starting Engine, page 119*.
5. Set the desired ground speed limit. For instructions, refer to *Adjusting Ground Speed Limit, page 129*.

WARNING

Check to be sure all bystanders have cleared the area.

6. Slowly push throttle (A) to the full forward (operating speed).

7. Move GSL (B) out of PARK and slowly forward to the desired speed.

   NOTE:

   The transmission is most efficient with the engine at full speed and the GSL fully forward. The windrower can be equipped with an automatic steering system for use in the field. An automated steering system is available as an option and can be installed by a MacDon Dealer. The GSL has been pre-wired at the factory with a switch. For more information, refer to *6.2.1 Automated Steering Systems, page 378*.

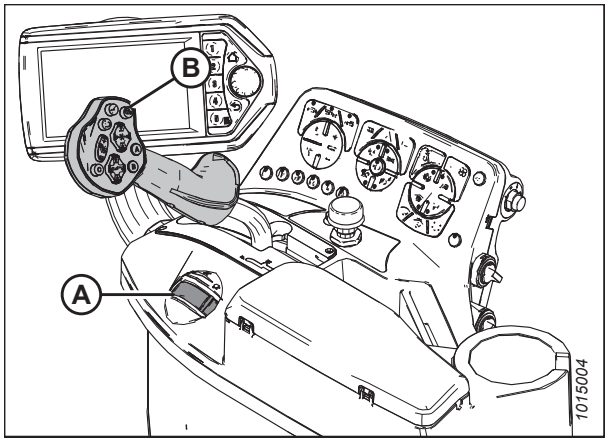


Figure 4.32: Console

Driving in Reverse in Cab-Forward Mode

WARNING

Back up slowly. Hold the steering wheel at the bottom and turn the wheel in the direction you want the rear of the machine to travel.

1. Move throttle lever (A) 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.

WARNING

Check to be sure all bystanders have cleared the area.

2. Move ground speed lever (GSL) (B) rearward to the desired speed.

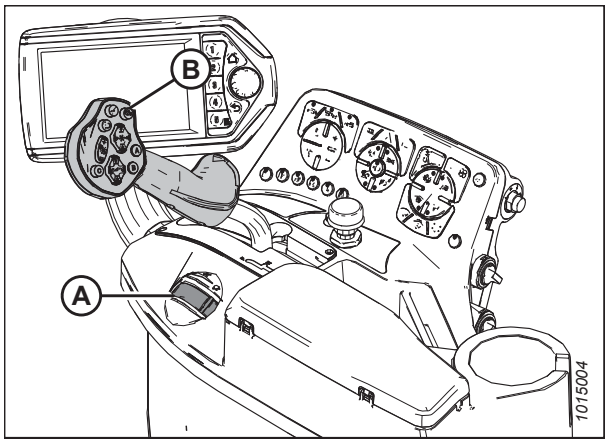


Figure 4.33: Console

3. Steer as shown.

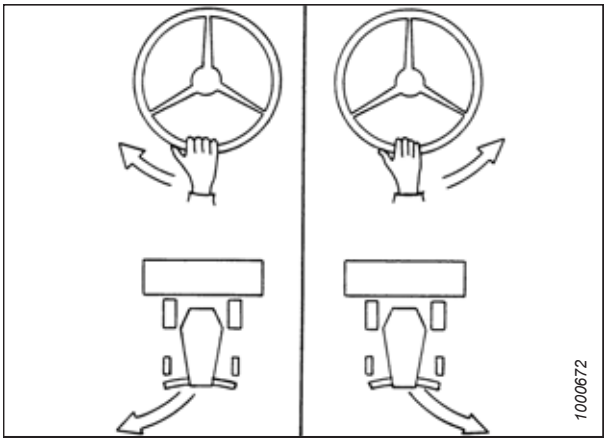


Figure 4.34: Cab-Forward Mode

Driving Forward in Engine-Forward Mode

In the engine-forward mode, the operator's station is facing toward the engine.

If necessary, swivel the operator's station to engine-forward position as follows:



Figure 4.35: Engine-Forward – Seat Faces Engine

CAUTION

Park on a level surface with the ground speed lever (GSL) in the PARK position and the steering wheel in the locked (centered) position. Wait for the Harvest Performance Tracker (HPT) to beep and display a red P symbol to confirm that the parking brake is engaged.

1. Park the windrower on a level surface.
2. If the operator's seat is facing the engine, skip to Step *3, page 134*.

   If the operator's seat is in the cab-forward position, swivel the operator's seat to the engine-forward position as follows:

   a. Place ground speed lever (GSL) (A) in PARK. The engine can be running.

      IMPORTANT:

      If the GSL is **NOT** in PARK, swivelling the operator's station may damage the GSL cable.

   b. Pull up on knob (B) and hold to release latch (C) at the base of the steering column.

   c. Turn the steering wheel counterclockwise to pivot the operator's station clockwise 180° until the pin engages the latch to secure the operator's station in the new position.

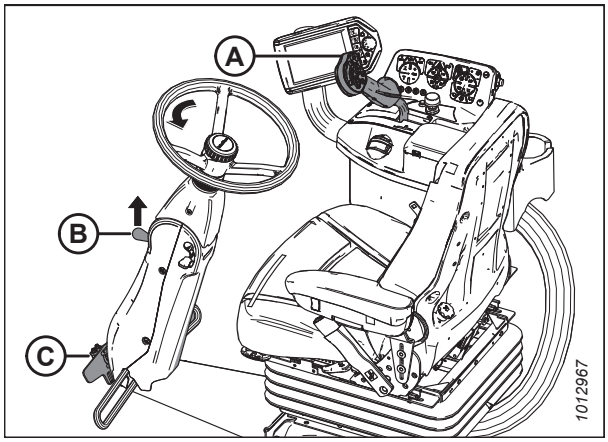


Figure 4.36: Operator Station

3. Ensure the seat belt is fastened.
4. Start the engine (if not already running). For instructions, refer to *Starting Engine, page 119*.
5. Use the Harvest Performance Tracker (HPT) to adjust the maximum speed setting to 43 km/h (27 mph). For instructions, refer to *Adjusting Ground Speed Limit, page 129*.
6. Slowly push throttle (A) to full forward (operating speed).

DANGER

Ensure that all bystanders have cleared the area.

7. Slowly move GSL (B) forward to the desired speed.

   NOTE:

   The transmission is most efficient with the engine at full speed and the GSL fully forward.

CAUTION

Operate both steering wheel and ground speed lever slowly while becoming familiar with the machine. Steering can be sensitive; avoid the tendency of new Operators to overcorrect.

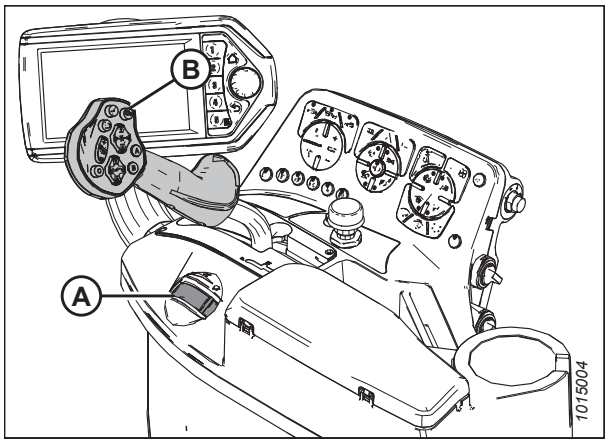


Figure 4.37: Console

8. If more tractive (lugging) power is required (e.g., when driving up a ramp, up a hill, or out of a ditch):
   a. Move GSL (A) closer to NEUTRAL.
   b. Reduce max speed setting to 16 km/h (10 mph) by holding the shift button on the GSL while scrolling downwards, or by reducing the max speed setting using the QuickMenu. For instructions, refer to *Adjusting Ground Speed Limit, page 129*.
9. Once the lugging condition no longer exists:
   a. Set GSL (A) to **NOT MORE THAN HALF** maximum forward speed.

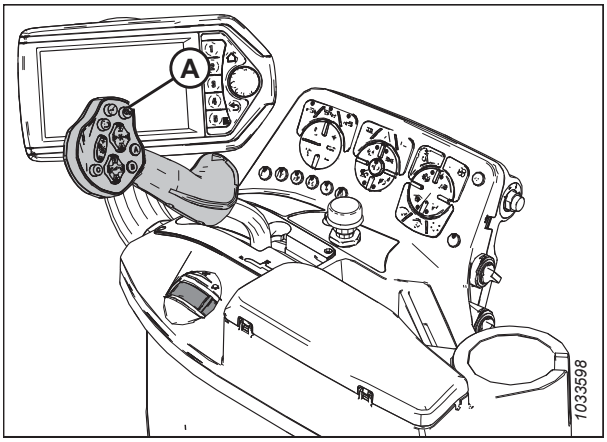


Figure 4.38: Console

Driving in Reverse in Engine-Forward Mode

WARNING

Back up slowly. Hold the steering wheel at the bottom and turn the wheel in the direction you want the rear of the machine to travel.

1. Move throttle lever (A) 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.

2. Move ground speed lever (GSL) (B) rearward to desired speed.

DANGER

Ensure that all bystanders have cleared the area.

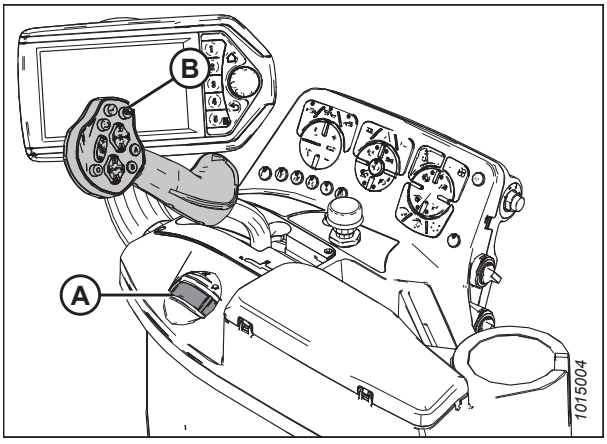


Figure 4.39: Console

3. Steer as shown.

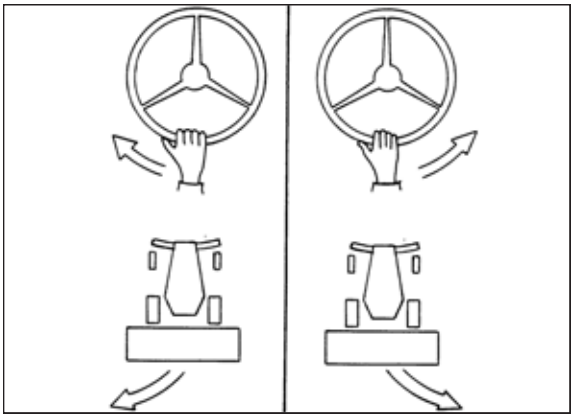


Figure 4.40: Steering the Windrower

Spin Turning

Hydrostatic steering provides significantly more maneuverability than mechanical steering.

CAUTION

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

1. Move ground speed lever (GSL) (A) out of PARK 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.

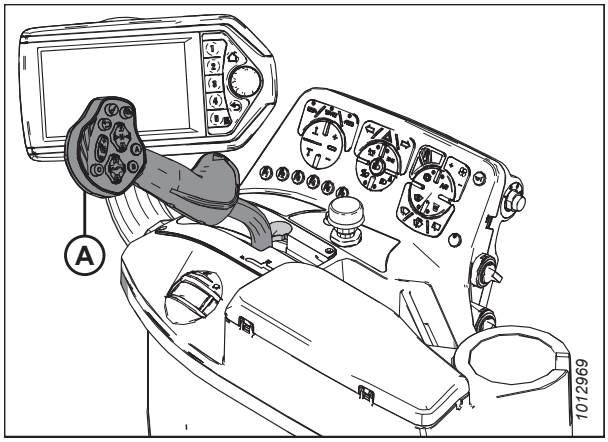


Figure 4.41: Console

Stopping

Move the ground speed lever on the console to the park position to stop.

WARNING

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

CAUTION

Park on a level surface with the ground speed lever (GSL) in the PARK position and the steering wheel in the locked (centered) position. Wait for the Harvest Performance Tracker (HPT) to beep and display a red P symbol to confirm that the parking brake is engaged.

1. Anticipate stopping and **SLOWLY** return the ground speed lever (GSL) (A) to NEUTRAL and into PARK.
2. Turn the steering wheel until it locks.

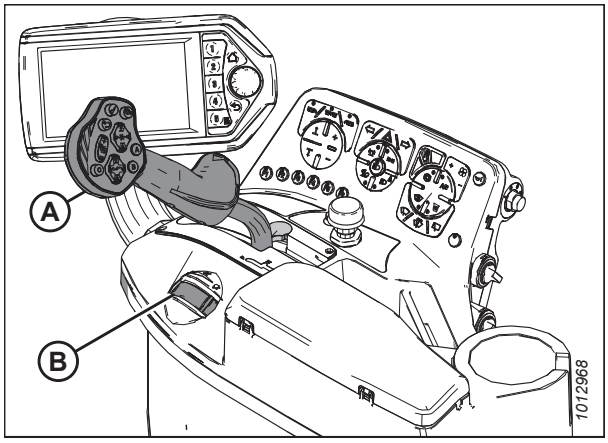


Figure 4.42: Console

3. Move throttle lever (B) to low-idle position.

   IMPORTANT:

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

   NOTE:

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

   NOTE:

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

4. Turn the ignition key counterclockwise to OFF position.

Viewing Performance Data

You can check the current performance information on Run Screen 3 on the Harvest Performance Tracker (HPT) display.

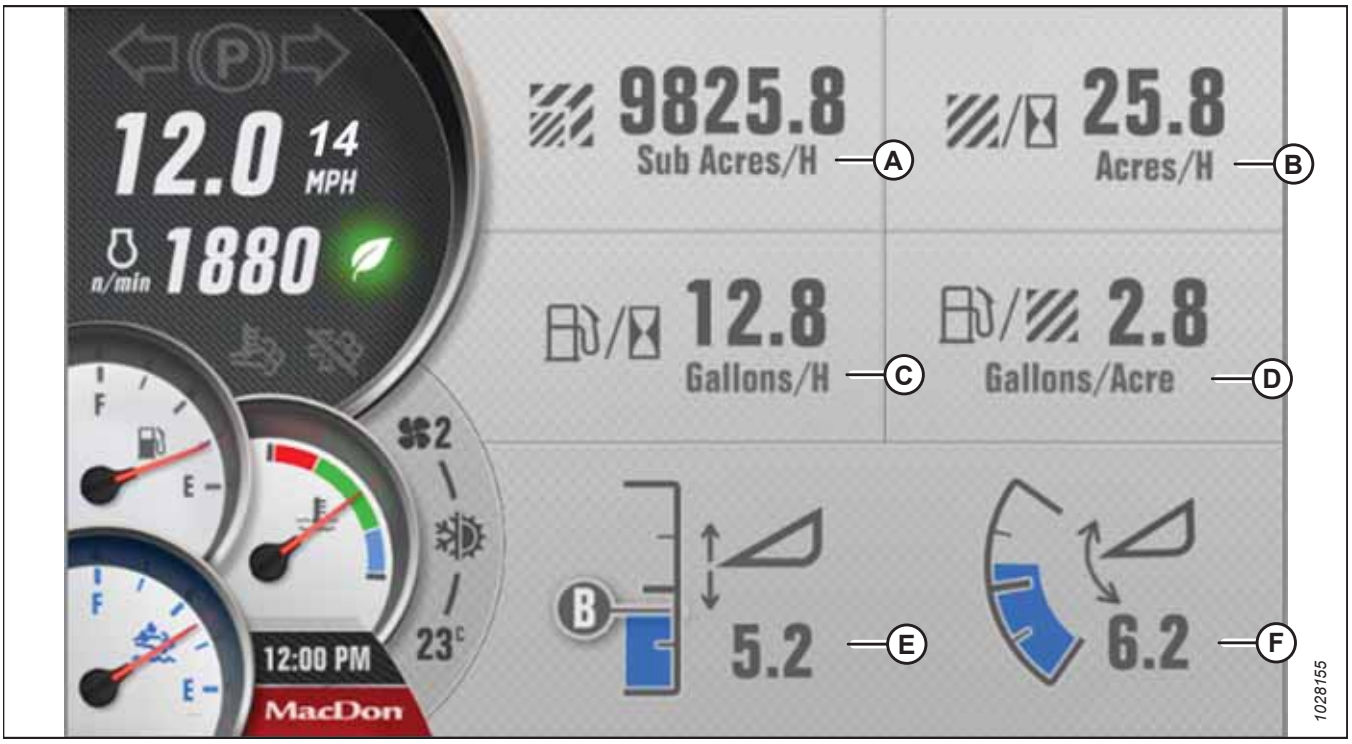


Figure 4.43: Run Screen 3 – Performance Data

A - Sub Acres
B - Acres per Hour
C - Fuel Used per Hour
D - Fuel Used per Acre
E - Header Height
F - Header Tilt

1. Press soft key 3 (A) on the Harvest Performance Tracker (HPT) to open the PERFORMANCE DATA display.

   NOTE:

   Soft keys 1–5 also function as buttons within menus.

   NOTE:

   The sub acres can also be reset from this screen. Press the HPT scroll knob to highlight and select the sub acres. If you press the HPT scroll knob a second time, the message RESET OR EXIT appears on the display. Select RESET to reset the sub acres to zero and return to the same highlighted sub acres. Select EXIT or press the BACK or HOME button to dismiss the message without resetting the sub acres.

   In this screen, you can view:

   - Sub acres (A)
   - Acres per hour (B)
   - Fuel used per hour (C)
   - Fuel used per acre (D)



Figure 4.44: HPT Display

Viewing Engine Cooling Data

You can check the current engine cooling information on Run Screen 4 on the Harvest Performance Tracker (HPT) display.



Figure 4.45: Run Screen 4 – Cooling Data

A - Fan Speed
B - Hydraulic Oil Temperature
C - Engine Air Intake Temperature
D - Engine Coolant Temperature
E - Header Height
F - Header Tilt

1. Press soft key 4 (A) on the Harvest Performance Tracker (HPT) to open the COOLING DATA display.

   NOTE:

   Soft keys 1–5 also function as buttons within menus.

   NOTE:

   The engine fan speed will increase or decrease, depending on the windrower's cooling requirements. A small fan icon will appear beside the icon of the parameter that is currently controlling the fan.

   NOTE:

   The engine fan will automatically reverse on a set time interval, or when one of the system temperatures gets high enough. No operator input is required to reverse the fan.

   In this screen, you can view:

   - Fan speed
   - Engine air intake temperature
   - Engine coolant temperature



Figure 4.46: HPT Display

4.3.6 Transporting

The windrower can be driven from one location to another. If correctly equipped, the windrower can also tow a header. The windrower should generally **NOT** be towed, however, as this can result in damage to the hydrostatic drives, though a procedure for emergency towing is provided.

Driving on Road in Engine-Forward Mode

The M1170*NT5* 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.

Windrowers sold in North America can also be driven on roads in cab-forward mode, with or without a header attached, but at a reduced speed, under restricted conditions. For instructions, refer to *Driving on Road in Cab-Forward Mode, page 142*.

CAUTION

Windrowers sold outside of North America: Do NOT drive the windrower on the road in cab-forward mode, as the lighting and marking will not be compliant with road regulations.

WARNING

A collision between the windrower and other vehicles may result in injury or death.

WARNING

When driving the windrower on public roadways:

- **Obey all highway traffic regulations in your area. Arrange to have pilot vehicles in the front and the rear of the windrower, if doing so is required by law.**
- **Display a slow-moving vehicle emblem and flashing warning lights, unless these actions are prohibited by law.**
- **If the width of the attached header impedes other vehicle traffic, remove the header and install a MacDon-approved weight box on the windrower. This will allow the windrower to be driven safely on roadways without an attached header.**

WARNING

Do NOT drive the 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

Familiarize yourself with the width regulations and lighting and marking requirements in your region before attempting to drive the windrower on a public road.

Before driving the windrower on a roadway:

1. Ensure header engage switch (A) is off (down position).
2. Clean the flashing amber lights, red tail lights, and head lights, and ensure they are working properly.
3. Clean all reflective surfaces and slow moving vehicle signs.
4. Adjust the interior rear view mirror and clean the windows.
5. Ensure the header (if attached) is fully raised and the header lift safety props are engaged.
6. If the width of the attached header impedes other vehicle traffic, remove the header and install a MacDon-approved weight box. For instructions, refer to *Preparing Windrower to Tow a Header, page 155*.

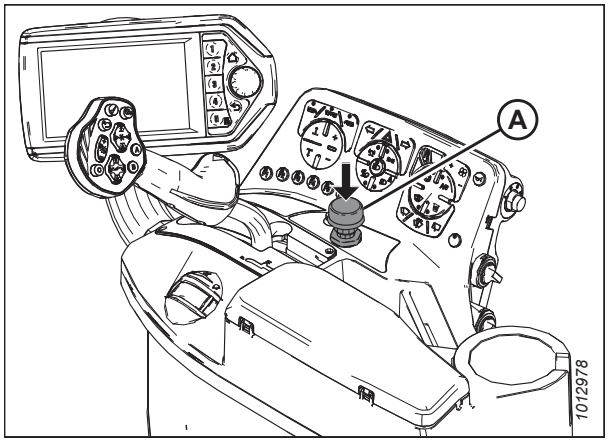


Figure 4.47: Header Engage Switch

7. If towing a header, refer to *Towing Header with Windrower, page 154*.
8. Press switch (A) for road lights. Always use these lights when driving windrower on roads.
9. Press switch (B) for high/low beams as required when other vehicles are approaching.

   IMPORTANT:

   Do **NOT** use field lights on the road; other drivers may be confused by them.
10. Press switch (C) to activate the beacons.
11. Press switch (D) to activate the hazard lights.

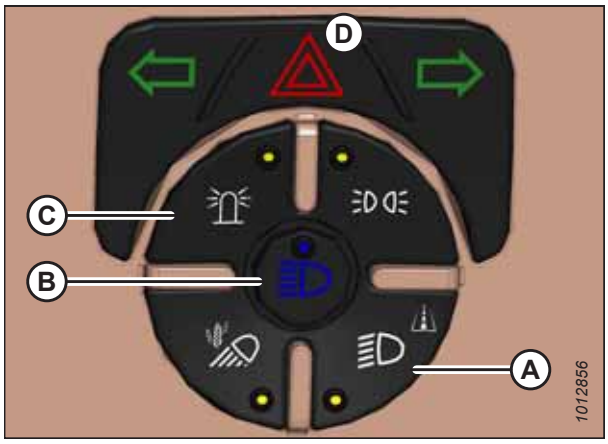


Figure 4.48: Light Switches

12. Set the desired maximum ground speed limit. For instructions, refer to *Adjusting Ground Speed Limit, page 129*.

    NOTE:

    Maximum ground speed can be set while the windrower is moving. Anticipate acceleration or deceleration if changing maximum speed while moving.

13. Slowly push throttle (A) to full forward (operating speed).

WARNING

Check to be sure all bystanders have cleared the area.

14. Move GSL (B) out of PARK and slowly forward to the desired speed.

15. If towing a header, refer to *Towing Header with Windrower, page 154*.

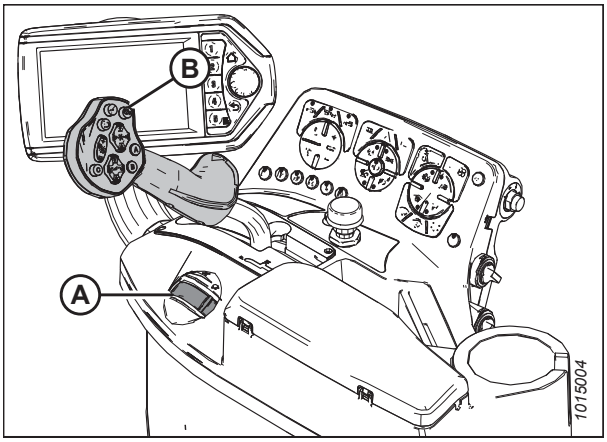


Figure 4.49: Console



Figure 4.50: Towing a Header

WARNING

To avoid serious injury or death from loss of control:

- **Do NOT make abrupt changes in steering direction.**
- **Anticipate turns and steep slopes by slowing down well in advance. Before making an abrupt turn, pull back on the ground speed lever (GSL) as steering is more responsive at reduced speeds.**
- **Do NOT rapidly accelerate or decelerate while turning.**

When traveling on steep slopes:

- **Move the GSL closer to NEUTRAL to reduce speed.**
- **Lower the header.**
- **If the ground speed is greater than or equal to 51 km/h (30 mph), the HPT will display a warning message (SLOW DOWN) with an audible alert. Move GSL closer to NEUTRAL to reduce speed.**

With the 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. (Max speed can be set on the HPT).**
- **Do not exceed 1500 rpm engine speed.**
- **Avoid loose gravel and slopes.**
- **Do NOT tow a header.**
- **If control of machine is lost, immediately pull the GSL to NEUTRAL, and turn key off.**

Driving on Road in Cab-Forward Mode

The M1170*NT5* Windrower is capable of being driven on the road in cab-forward mode, with or without a header attached, but at a reduced speed, under restricted conditions, and only for models sold in North America.

WARNING

Windrowers sold outside of North America: Do NOT drive windrower on the road in cab-forward mode, as lighting/ reflector visibility will not be compliant with road regulations.

WARNING

A collision between the windrower and other vehicles may result in injury or death.

WARNING

When driving the windrower on public roadways:

- **Obey all highway traffic regulations in your area. Arrange to have pilot vehicles in the front and the rear of the windrower, if doing so is required by law.**
- **Display a slow-moving vehicle emblem and flashing warning lights, unless these actions are prohibited by law.**
- **If the width of the attached header impedes other vehicle traffic, remove the header and install a MacDon-approved weight box on the windrower. This will allow the windrower to be driven safely on roadways without an attached header.**

WARNING

Do NOT drive the 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

Familiarize yourself with the width regulations and lighting and marking requirements in your region before attempting to drive the windrower on a public road.

Before driving the windrower on a roadway:

1. Clean the flashing amber lights, red tail lights, and head lights, and check that they work properly.
2. Clean all reflective surfaces and slow moving vehicle emblems.
3. Adjust the interior rear view mirror and clean windows.
4. Ensure header engage switch (A) is off (down position).

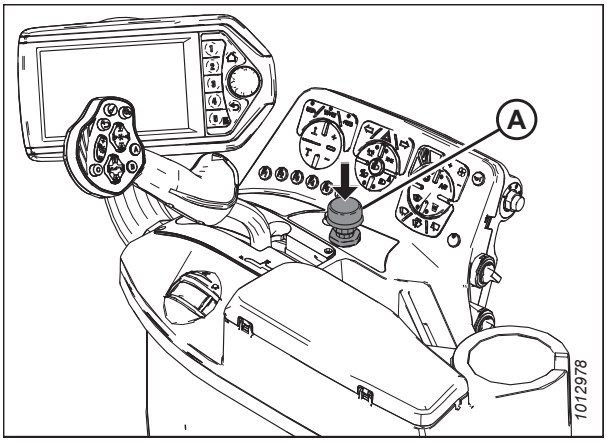


Figure 4.51: Header Engage Switch

CAUTION

Do NOT raise the header too high. Make sure you have good visibility out of the cab and that motorists are able to see the header lights.

5. Raise the header (if attached) enough to clear common obstacles, and then engage the header lift safety props.
6. If the width of attached header impedes other vehicle traffic, remove header and install a MacDon approved weight box. For instructions, refer to *Preparing Windrower to Tow a Header, page 155*.
7. Press switch (A) to turn on lights. Always use these lights on roads to provide warning to other vehicles.
8. Use high/low switch (B) as required when other vehicles are approaching.

   IMPORTANT:

   Do **NOT** use field lights on the road; they may confuse other drivers.
9. Press switch (C) to turn on the beacons.
10. Press switch (D) to turn on the hazard lights.

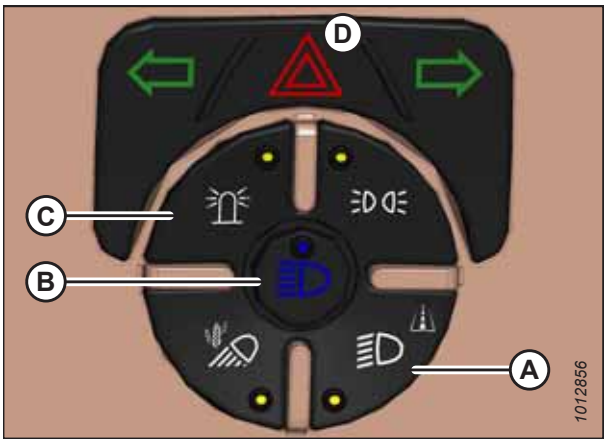


Figure 4.52: Light Switches

11. Set the desired maximum ground speed limit. For instructions, refer to *Adjusting Ground Speed Limit, page 129*.

    NOTE:

    Maximum ground speed can be set while the windrower is moving. Anticipate acceleration or deceleration if changing maximum speed while moving.

12. Slowly push throttle (A) to full forward (operating speed).

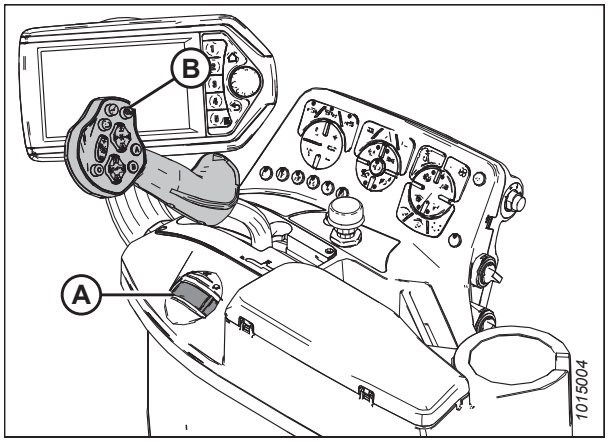


Figure 4.53: Console

WARNING

Check to be sure all bystanders have cleared the area.

13. Move the GSL (B) out of PARK and slowly forward to the desired speed.

WARNING

To avoid serious injury or death from loss of control:

- **Do NOT make abrupt changes in steering direction.**
- **Anticipate turns and steep slopes by slowing down well in advance. Before making an abrupt turn, pull back on the ground speed lever (GSL) as steering is more responsive at reduced speeds.**
- **Do NOT rapidly accelerate or decelerate while turning.**

When traveling on steep slopes:

- **Move GSL closer to NEUTRAL to reduce speed.**
- **Lower the header.**
- **If the ground speed is greater than or equal to 51 km/h (30 mph), the HPT will display a warning message (SLOW DOWN) with an audible alert. Move GSL closer to NEUTRAL to reduce speed.**

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

- **Do NOT exceed the minimum speed setting.**
- **Avoid loose gravel and slopes.**
- **Do NOT tow a header.**
- **If you lose control of machine, immediately pull the ground speed lever (GSL) to NEUTRAL.**

Retracting Wheels – Narrow Transport

The narrow transport feature allows the drive wheel legs and walking beam extensions to retract and reduce the overall width for transport.

DANGER

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

1. Ensure the narrow transport function is enabled on the Harvest Performance Tracker (HPT). Refer to *3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker, page 101*.

2. Disconnect the header or the weight box from the windrower. Refer to *4.5 Attaching and Detaching a Header to the Windrower, page 166*.

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

4. Retrieve the transport harness from holder (A), located behind the left platform, and connect it to electrical receptacle (B).

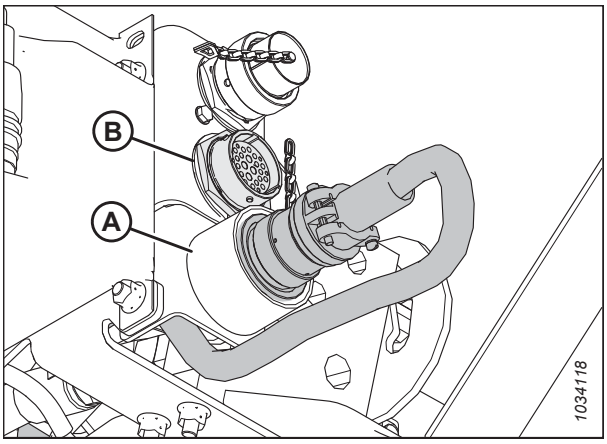


Figure 4.54: Transport Electrical Connector

5. Rotate left signal light placard (A) to the down (horizontal) position before driving in narrow transport mode.

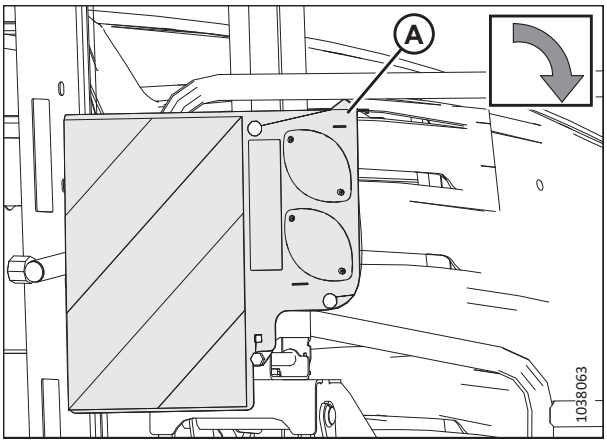


Figure 4.55: Left Signal Light Placard

6. At the front of the windrower, rotate walking beam lockout valve handle (A) to the open position (in line with the valve).

7. Remove lockout pins (B) from the sliding drive wheel legs.

WARNING

Check to be sure all bystanders have cleared the area.

8. Ensure bystanders have cleared the area, start the windrower, and set the idle to low.

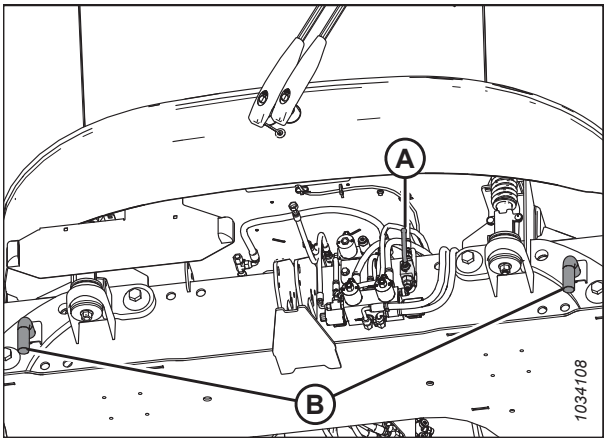


Figure 4.56: Transport Locks

9. Press F5 or F6 button (A) on the operator's console to activate the narrow transport controls. The HPT will display an Important Message (B) and sound an alarm.

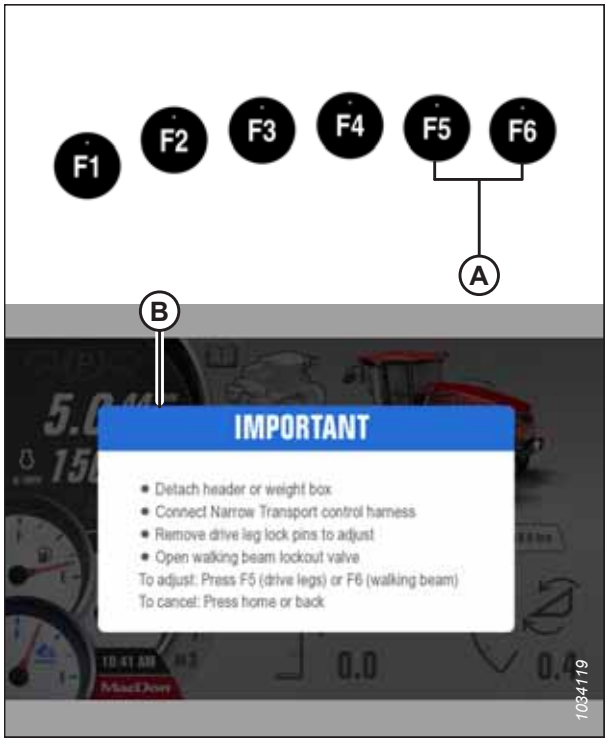


Figure 4.57: Narrow Transport Important Message

10. Press F5 button (A) on the operator's console to activate the drive wheel leg controls. The F5 page (B) will display on the HPT.

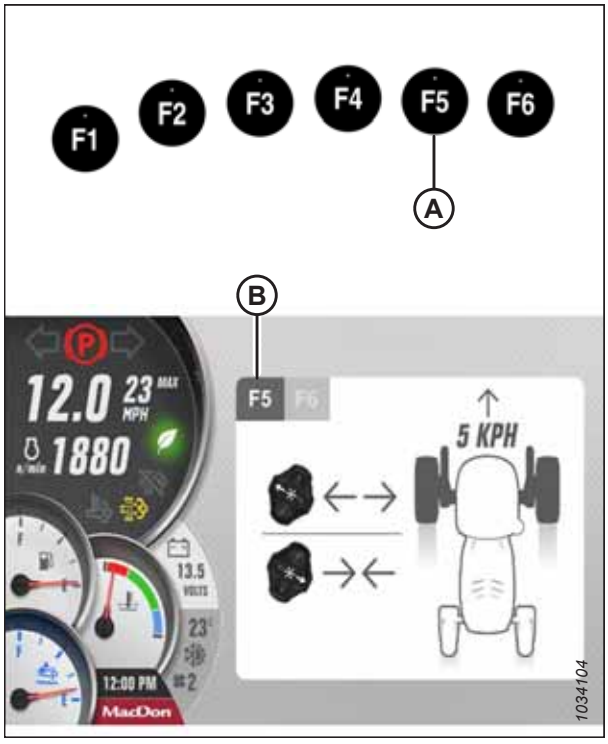


Figure 4.58: Narrow Transport Control Page

11. Move the ground speed lever (GSL) out of Park and slowly accelerate to 5–8 km/h (3–5 mph).
12. While moving, press and hold REEL AFT button (B) on the GSL to retract the drive wheel legs.
13. Bring the windrower to a complete stop, and place the GSL in PARK.

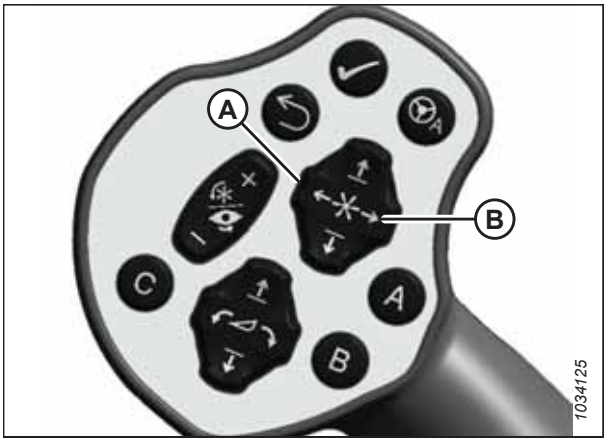


Figure 4.59: Transport Control Buttons

A - Reel Fore **B - Reel Aft**

14. Press F6 button (A) on the operator's console to activate the walking beam controls. The F6 page (B) will display on the HPT.
15. Pivot the windrower to turn the caster wheels sideways as shown on the F6 page (B).

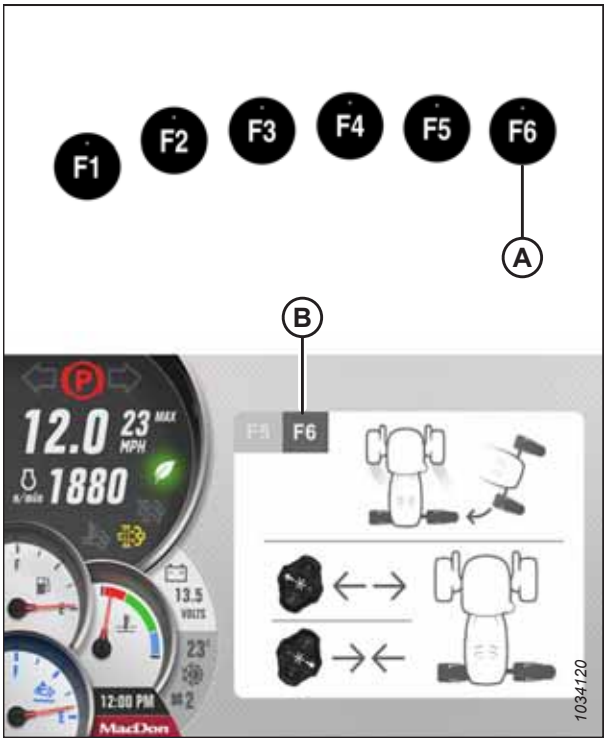


Figure 4.60: Narrow Transport Controls

16. Press and hold REEL AFT button (B) on GSL to retract the walking beam.

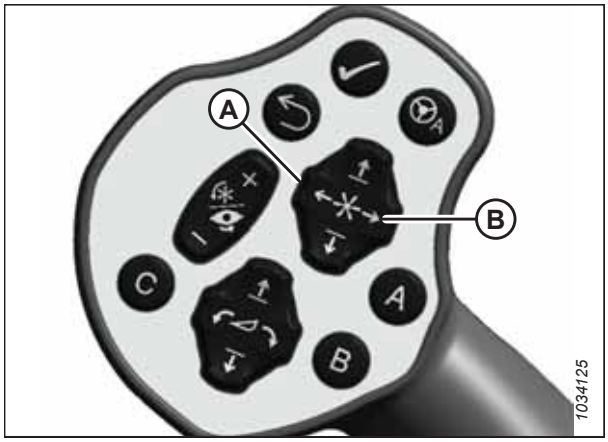


Figure 4.61: Transport Control Buttons

A - Reel Fore **B - Reel Aft**

17. When complete, exit the narrow transport control page by pressing button F5 or F6 again (which ever is active). The exit transport operation warning will display on the HPT.

    NOTE:

    Press F5 or F6 on the console, or HOME or RETURN on the HPT to cancel transport operation at any time.

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



Figure 4.62: Exit Transport Operation Warning

19. Reinstall lock pins (B) into the drive wheel legs.

20. Turn walking beam lockout valve (A) to the closed position (90° from valve).

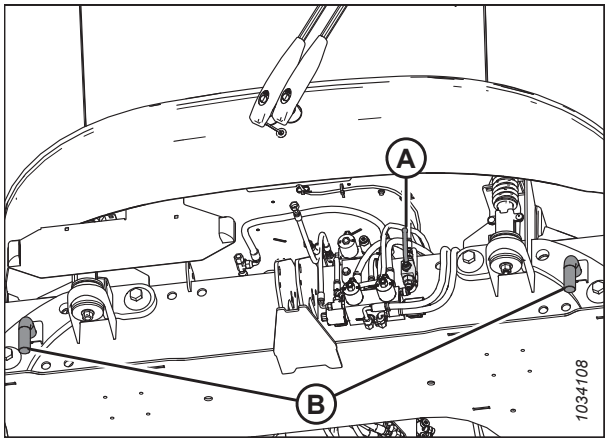


Figure 4.63: Narrow Transport Important Message

21. Disconnect the narrow transport electrical harness from connector (B) and return it to holder (A).

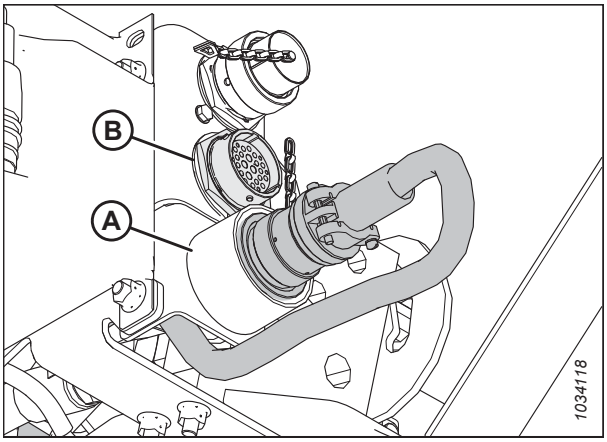


Figure 4.64: Transport Electrical Connector

Extending Wheels – Field Mode

The narrow transport feature allows the drive wheel legs and walking beam extensions to extend from narrow transport to field position.

DANGER

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

1. Ensure the narrow transport function is enabled on the Harvest Performance Tracker (HPT). For instructions, refer to *3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker, page 101*.

2. Disconnect the header or weight box from the windrower. Refer to *4.5 Attaching and Detaching a Header to the Windrower, page 166*.

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

4. Retrieve the transport harness from holder (A), located behind the left platform, and connect it to electrical receptacle (B).

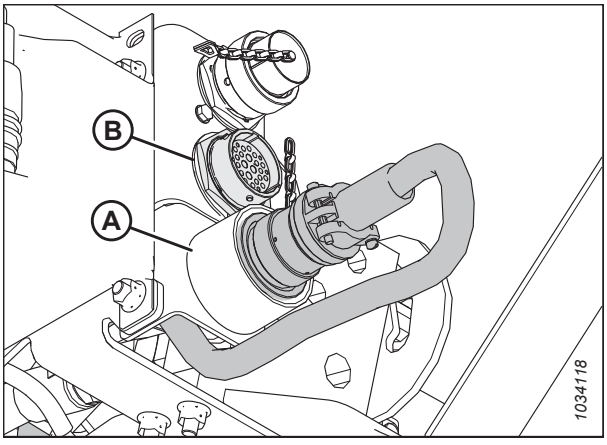


Figure 4.65: Transport Electrical Connector

5. Rotate left signal light placard (A) to the up (vertical) position before connecting to a header.

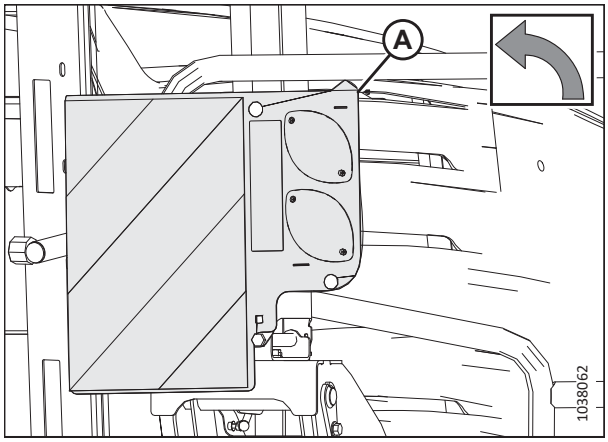


Figure 4.66: Left Signal Light Placard

6. At the front of the windrower, rotate walking beam lockout valve handle (A) to the open position (in line with the valve).
7. Remove lockout pins (B) from the sliding drive wheel legs.

WARNING

Check to be sure all bystanders have cleared the area.

8. Ensure bystanders have cleared the area, start the windrower, and set the idle to low.

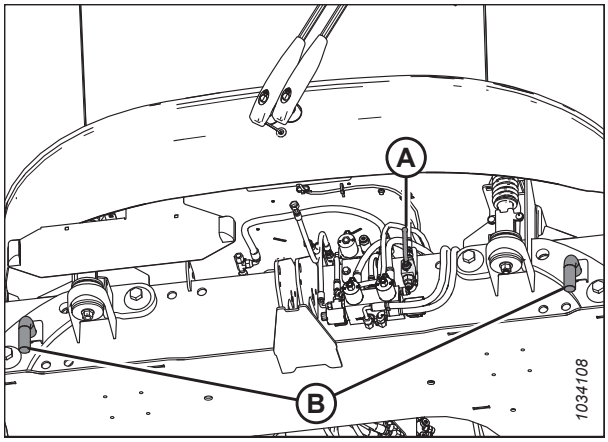


Figure 4.67: Transport Locks

9. Press F5 (drive wheel leg) or F6 (walking beam) button (A) on the operator's console to activate the narrow transport controls. The HPT will display an Important Message (B) and sound an alarm.

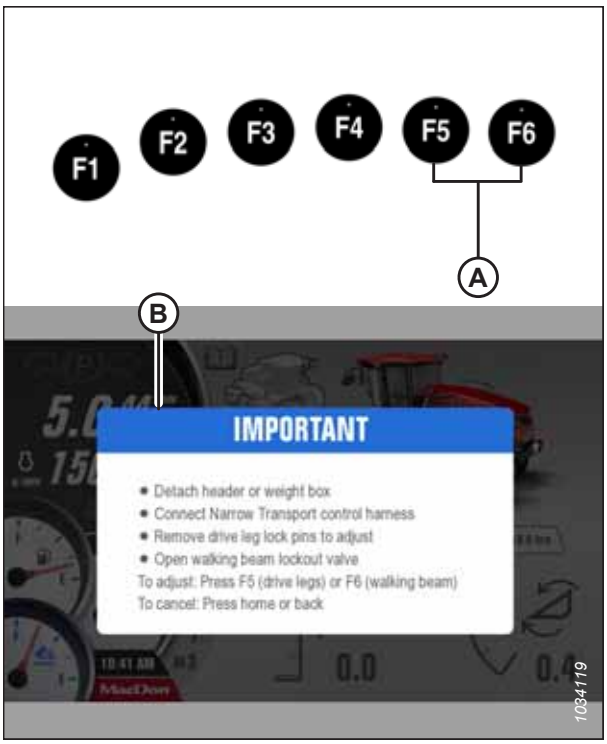


Figure 4.68: Narrow Transport Important Message

10. Press F5 button (A) on the operator's console to activate the drive wheel leg controls. The F5 page (B) will display on the HPT.

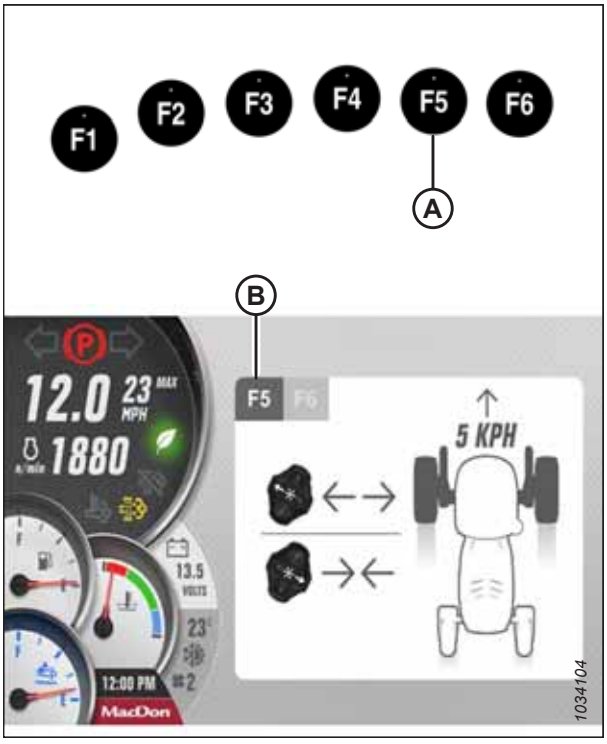


Figure 4.69: Narrow Transport Control Page

11. Move the ground speed lever (GSL) out of Park and slowly accelerate to 5–8 km/h (3–5 mph).
12. While moving, press and hold REEL FORE button (A) on the GSL to extend drive wheel legs.
13. Bring the windrower to a complete stop, and place the GSL in PARK.

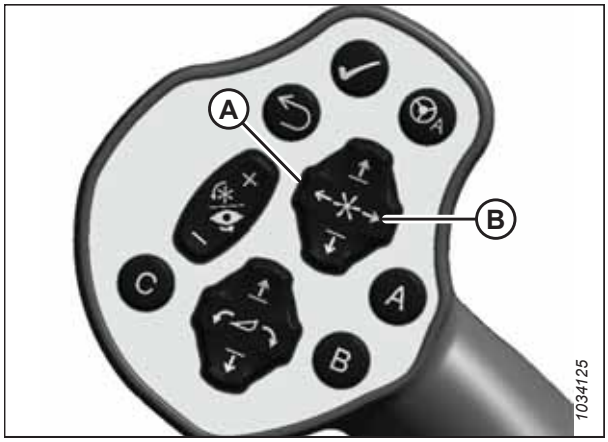


Figure 4.70: Transport Control Buttons

A - Reel Fore **B - Reel Aft**

14. Press F6 button (A) on the operator's console to activate the walking beam controls. The F6 page (B) will display on the HPT.
15. Pivot the windrower to turn the caster wheels sideways as shown on the F6 page (B).

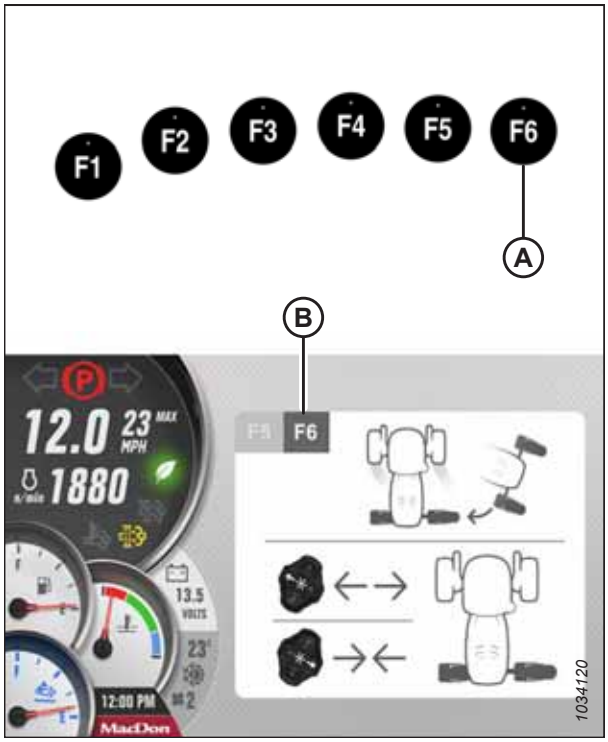


Figure 4.71: Narrow Transport Controls

16. Press and hold REEL FORE button (A) on GSL to extend the walking beam.

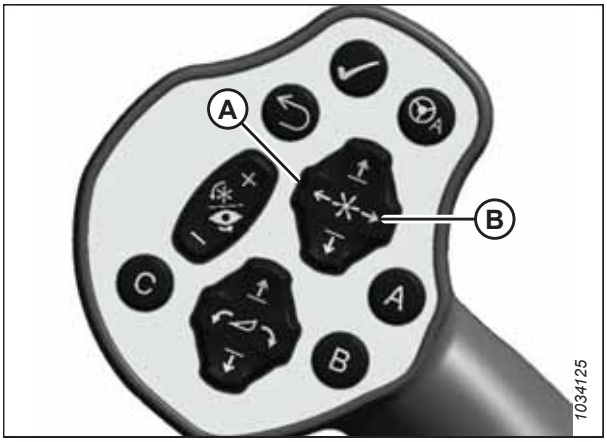


Figure 4.72: Transport Control Buttons

A - Reel Fore **B - Reel Aft**

17. When complete, exit the narrow transport control page by pressing button F5 or F6 again (whichever is active). The exit transport operation warning will display on the HPT.

    NOTE:

    Press F5 or F6 on the console, or HOME or RETURN on the HPT to cancel transport operation at any time.

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



Figure 4.73: Exit Transport Operation Warning

19. Reinstall lock pins (B) into the drive wheel legs.

20. Turn the walking beam lockout valve (A) to the closed position (90° from the valve).

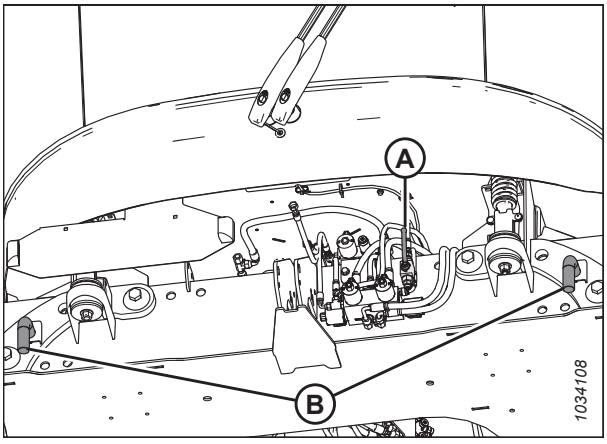


Figure 4.74: Transport Locks

21. Disconnect the narrow transport electrical harness from connector (B) and return it to holder (A).

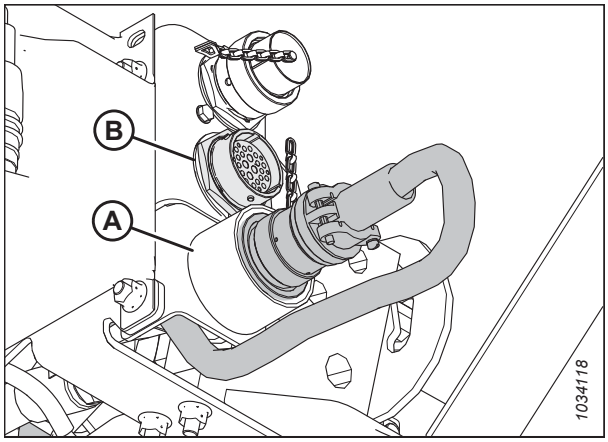


Figure 4.75: Transport Electrical Connector

Towing Header with Windrower

The windrower can be used to tow a MacDon draper header that has the Slow Speed Transport option installed.

IMPORTANT:

Ensure the optional weight box is installed on the windrower to transfer weight to the lift arms. For instructions, refer to *Preparing Windrower to Tow a Header, page 155*.

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).**

CAUTION

- **To tow a header with an M1170*NT5* Windrower, the header must be equipped with the appropriate equipment to comply with local regulations.**
- **Before towing, verify that the signal lighting and safety equipment is installed and functioning properly.**



Figure 4.76: Towing a Header

- **Do NOT exceed the combined gross vehicle weight (CGVW) specified in Table *4.3, page 155*.**
- **To prevent damage and/or loss of control, ensure the machine and attached equipment are within the following weight limits:**

Table 4.3 Maximum Weight

		kg	lb.
Maximum GVW (includes mounted implements)		10,660	23,500
Maximum CGVW (includes towed and mounted implements)		11,793	26,000
Weight on both drive wheels (A)	**Maximum**	8618	19,000
	Minimum	4568	10,070
Maximum weight on both caster tires (B)		2744	6050

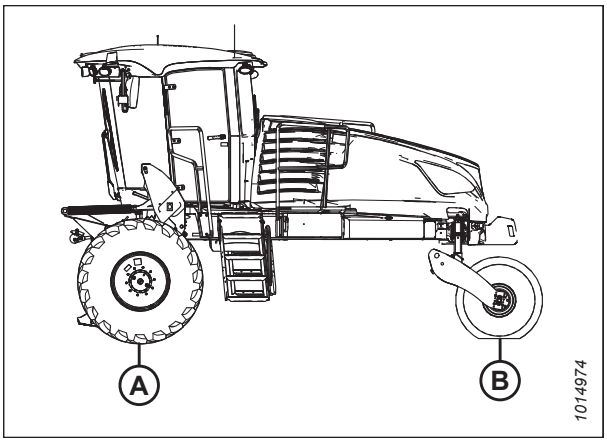


Figure 4.77: Maximum Weight

Preparing Windrower to Tow a Header

1. Attach the header to the windrower. For instructions, refer to *Attaching D1X or D1XL Series Draper Header, page 167*.



Figure 4.78: Windrower with Header

2. Convert the header to transport mode. For instructions, refer to header operator's manual.
3. Detach the header from the windrower. For instructions, refer to *Detaching D1X or D1XL Series Draper Header, page 176*.
4. Remove hairpin (D) and clevis pin (C) securing header support (B) to leg (A). Retain the pins for attaching the weight box.
5. Remove header support (B) from windrower lift leg (A).
6. Repeat previous step for the opposite support.
7. Retract windrower transport to road mode. Refer to *Retracting Wheels – Narrow Transport, page 144*.

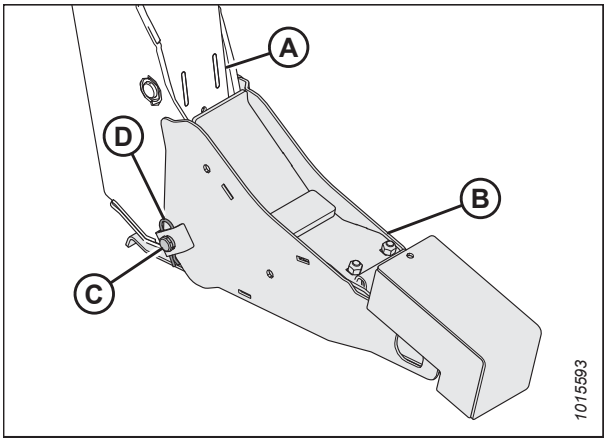


Figure 4.79: Draper Header Support

8. Rotate left signal light placard (A) to the down (horizontal) position before driving in narrow transport mode.

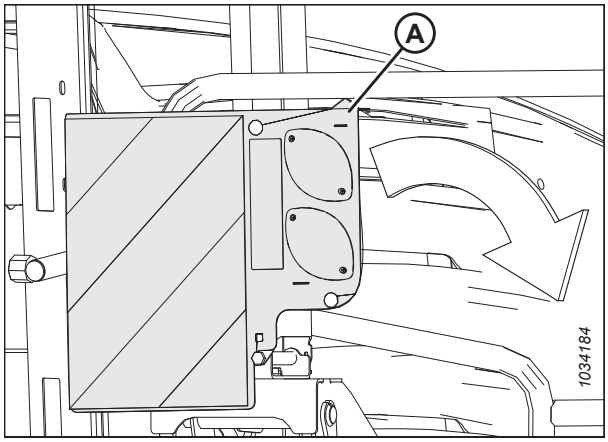


Figure 4.80: Left Signal Light Placard

9. Drive the windrower so that lift legs (A) are positioned in weight box pockets (B). Raise the lift legs slightly.
10. Shut down the engine, and remove the key from the ignition.
11. Install locking pin (C) into the pocket and secure it with hairpin (D). Repeat for the opposite leg.

    NOTE:

    The pins were previously removed from the header supports.

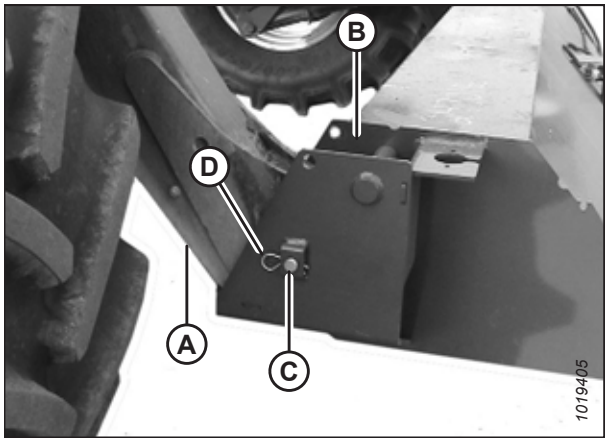


Figure 4.81: Windrower Lift Linkage

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

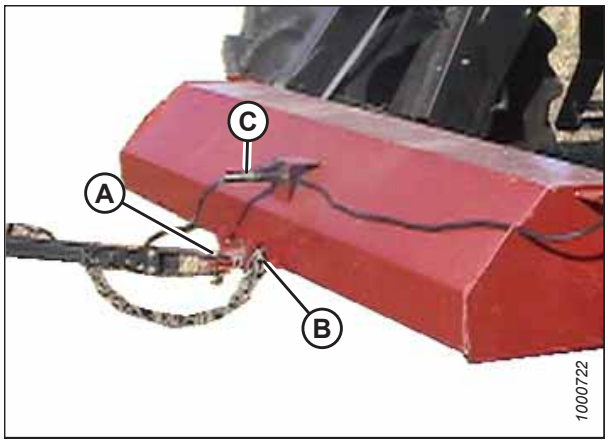


Figure 4.82: Weight Box

14. Start the engine.

15. Raise the weight box until the tow bar is level. The header is now ready for transport. For instructions, refer to *Towing Header with Windrower, page 154*.



Figure 4.83: Towing a Header

Towing Windrower – Emergency

Towing the windrower is generally **NOT** recommended. If the windrower gets stuck, or must be hauled onto a truck or trailer, follow these steps to do so safely.

IMPORTANT:

- **NEVER** attempt to start the windrower by towing it; damage to the wheel drives may occur.
- Failure to disengage the wheel drives before attempting to tow the header will result in transmission damage.
- Tow the windrower only for short distances, on level ground, and at slow speed.

DANGER

When the windrower's wheel drives are disengaged (turned inward), the windrower's brakes and steering will be nonfunctional, and the windrower will be able to roll away. After towing the windrower, place blocks under the front and rear wheels to prevent uncontrolled movement.

1. Before towing the vehicle, disengage the wheel drives. For instructions, refer to *Engaging and Disengaging Wheel Drives, page 158*.

2. Use attachment point (A) to tow the windrower if it gets stuck, or if it must be hauled onto a trailer for transport.

3. When towing is complete, place blocks under the front and rear wheels to prevent uncontrolled movement.

4. Engage the windrower's wheel drives. For instructions, refer to *Engaging and Disengaging Wheel Drives, page 158*.

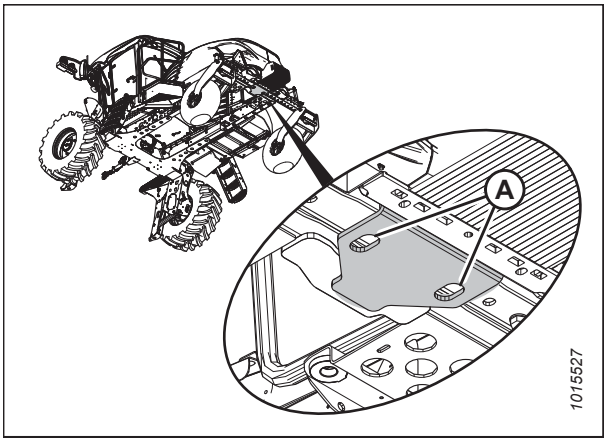


Figure 4.84: Emergency Towing

Engaging and Disengaging Wheel Drives

The wheel drives, along with the wheel drive motors, provide the motive force needed to turn the windrower's drive wheels. They may need to be disengaged for certain maintenance operations, or to tow the header.

WARNING

Park the windrower on a flat, level surface. Chock the wheels when disengaging the wheel drive to prevent the windrower from rolling away.

1. Park the windrower on a level surface.
2. Remove two bolts (A) at the center of the drive wheel.
3. Remove cap (B) and flip it over so that the convex side faces in. The cap depresses a pin which disengages the wheel drive.
4. Reinstall bolts (A) to secure cap (B).
5. Repeat Step *2, page 158* to Step *4, page 158* on the other drive wheel.
6. **To engage the wheel drives:** reverse cap (B). Ensure that the pin at the center of the wheel pops out to engage the wheel drive.

   NOTE:

   Engaging the wheel drives may require rocking the wheels slightly.

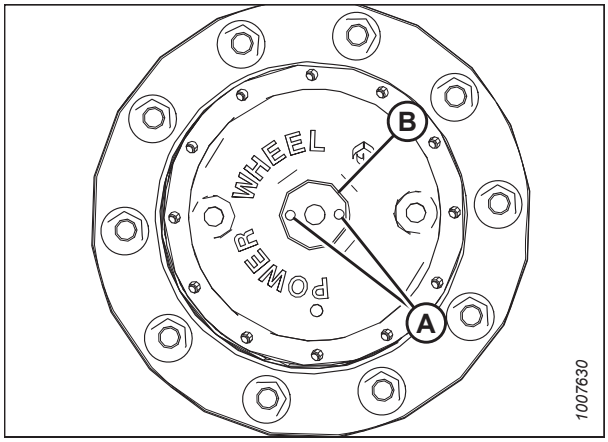


Figure 4.85: Wheel Drives – 10 Bolt

4.3.7 Storing Windrower

Follow these steps to prepare your windrower for storage at the end of the season.

WARNING

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

WARNING

NEVER operate the engine in an enclosed building. Proper ventilation is required to prevent exhaust gas hazards.

WARNING

When working with batteries, remove any worn metal jewelry. NEVER allow a metal object (such as a wrench) to touch across the battery terminals. A short circuit can produce an extremely hot spark, which can cause severe injuries.

1. Retract all cylinders to protect the cylinder rods from corrosion during storage, including:
   - Header lift cylinders
   - Float cylinders
   - Header tilt cylinder
2. Check for broken components and order replacements from your Dealer. Attending to these items right away will save time and effort at the beginning of the next season.
3. Tighten loose hardware and replace any missing hardware. Refer to *8.1 Torque Specifications, page 399*.

4. Clean the windrower thoroughly.
5. Repaint all worn or chipped painted surfaces to prevent rust.
6. Fill the fuel tank to prevent condensation.
7. When storing for **6 MONTHS OR LONGER**, drain the diesel exhaust fluid (DEF) tank. For instructions, refer to *Draining Diesel Exhaust Fluid Tank, page 245*.
8. Change the oil to remove acids and other by-products of combustion from the engine.
9. Test the engine coolant antifreeze concentration to ensure it is sufficient to protect the engine against the lowest expected temperature.
10. Drain the windshield washer tank or ensure the fluid can endure the lowest expected temperatures.
11. Lubricate the windrower thoroughly, leaving excess grease on fittings to keep moisture out of bearings. Apply grease to the exposed threads and the sliding surfaces of components.
12. Remove the batteries. For instructions, refer to *Removing Battery, page 327*. Bring the batteries to full charge, and store in a cool, dry place not subject to freezing.
13. If possible, block up the windrower to take weight off the tires. If this is not possible, increase the tire pressure by 25% for storage. Adjust to recommended operating pressure before next use.

    IMPORTANT:

    Do **NOT** exceed the maximum pressure specified on the tire sidewall.
14. Store the windrower in a dry, protected place.
15. If stored outside, seal the air cleaner intake and exhaust pipe with plastic bags and/or waterproof tape.
16. If stored outside, cover the windrower with a breathable cover. Avoid plastic covers that can trap humidity.

4.4 M1170*NT5* German Export Only – Features and Operation

M1170*NT5* windrowers that are exported for sale in Germany have features required to comply with German regulations.

4.4.1 Emergency Stopping - German Export Only

A secondary braking system is fitted to M1170*NT5* Windrowers exported to Germany. The system can only be engaged with the windrower in the engine-forward mode.

1. In the unlikely event of a primary braking system failure while operating in engine-forward mode, enable the secondary disc brake system by pressing BUTTON C (A) on the ground speed lever (GSL) and then gradually moving the GSL back to the neutral position.

   NOTE:

   - Once the secondary brake system is enabled, the disc brakes will actuate in proportion to the movement of the GSL back to neutral.
   - If the GSL is moved forward with the secondary brake enabled, the brakes will release.
   - The secondary brakes will remain on until the GSL is moved to PARK and the secondary brake button (A) is pressed to deactivate the system.

   NOTE:

   When enabled, secondary brake system icon (A) appears on the Harvest Performance Tracker (HPT) display.

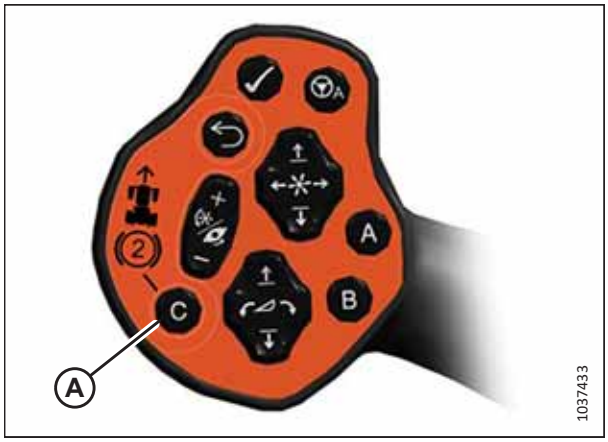


Figure 4.86: Secondary Brake System Enable Button – German Export Only



Figure 4.87: Secondary Brake System Icon – German Export Only

2. Move the GSL to the PARK position and press BUTTON C (A) again to disable the secondary brake system. The secondary brake icon turns off on the HPT display.

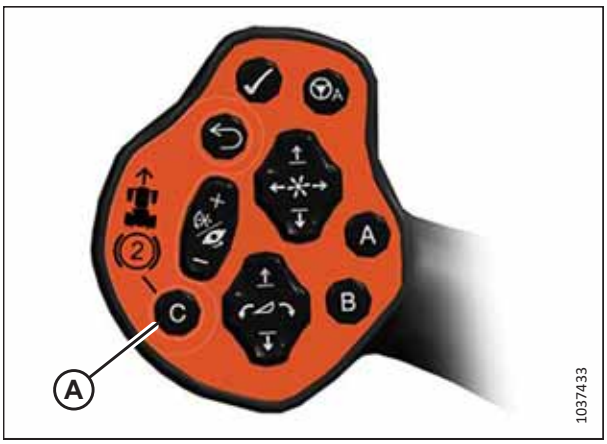


Figure 4.88: Secondary Brake System Enable Button – German Export Only

4.4.2 One-Touch-Return and Secondary Braking Buttons – German Export Only

For machines exported to Germany, the One-Touch-Return buttons (A, B, and C) on the Ground Speed Lever (GSL) save header configuration settings when the machine is in cab-forward mode. When the machine is in engine-forward mode, button “C” enables the secondary braking system.

The One-Touch-Return buttons **A** and **B**, always save header height settings, but the following settings can also be saved depending on the header type:

- Header tilt
- Deck position/header float selection
- Swath compressor raise/lower
- Knife speed
- Draper speed
- Reel speed
- Reel height
- Reel fore-aft
- Disc speed



Figure 4.89: One-Touch-Return Buttons on GSL

To program the One-Touch-Return buttons, press and hold button A, B, or C on the GSL handle for 3 seconds until an audible tone is heard, indicating the current header settings are saved to that button.

To return the header to a preset condition, tap the A, B, or C button quickly.

NOTE:

Holding the One-Touch-Return button too long can inadvertently reprogram the current header settings.

Pressing a programmed button opens a run screen that shows corresponding letter (A) on the screen for the preset.



Figure 4.90: One-Touch-Return Buttons on GSL

Secondary braking system

Pressing button “C” (A) while in the engine forward mode enables the secondary braking system.

While enabled, the secondary braking system icon (B) appears on the HPT.



Figure 4.91: Secondary Braking System Button on GSL

4.4.3 Harvest Performance Tracker Screen Layout – German Export Only

The appearance and functions of the Harvest Performance Tracker (HPT) depend on the type of header attached.

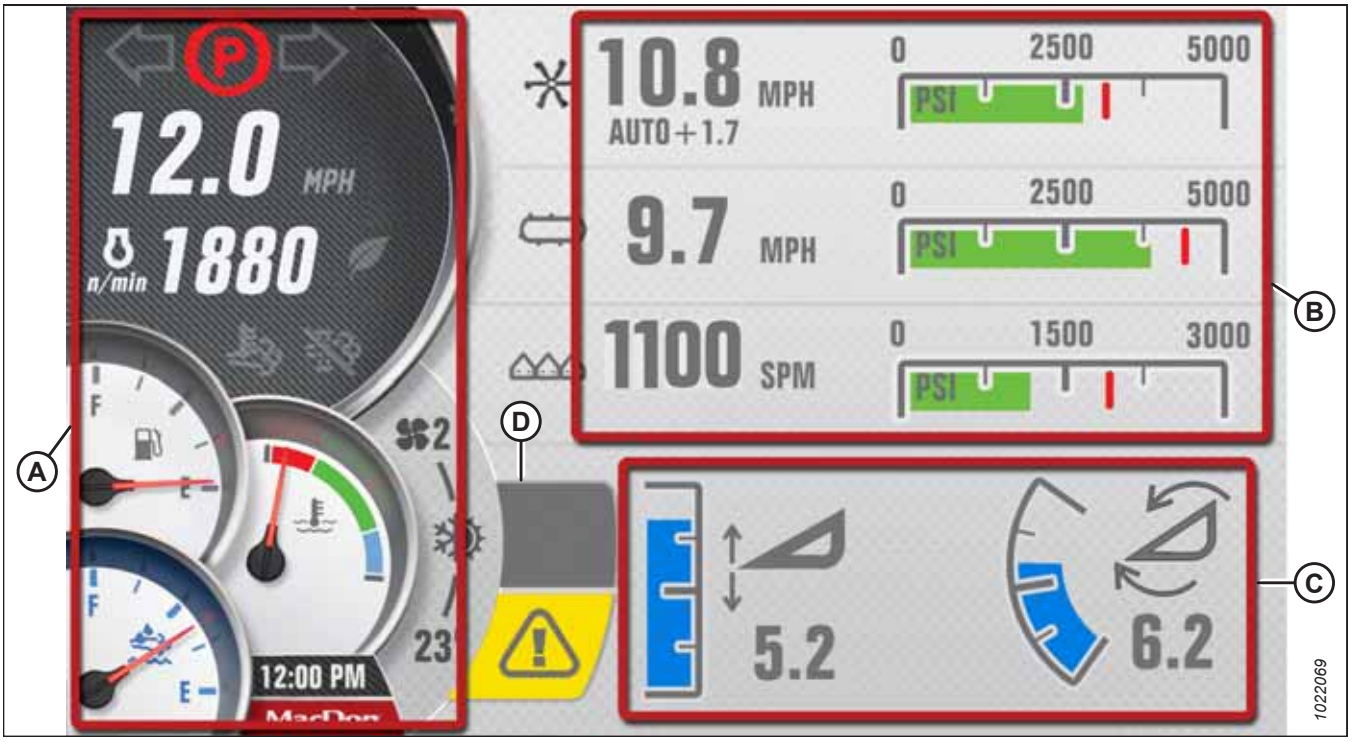


Figure 4.92: Run Screen 1 – Draper Header Shown

A - Left Gauge Cluster | B - Header Information | C - Current Header Position | D - Telltales

The HPT display is separated into the following zones:

Left gauge cluster:

- Ground speed (A)
- Maximum ground speed (B)
- Engine rpm (C)
- Eco engine control (EEC) active/inactive (D)
- High exhaust system temperature (HEST) light (E)
- Inhibit status (F)
- Park and turn signal status (G)
- Secondary brake system (H)
- Level gauges for fuel and diesel exhaust fluid (DEF) (J)
- Coolant temperature gauge (K)
- Climate control temperature and blower speed (L)
- Current time (M)

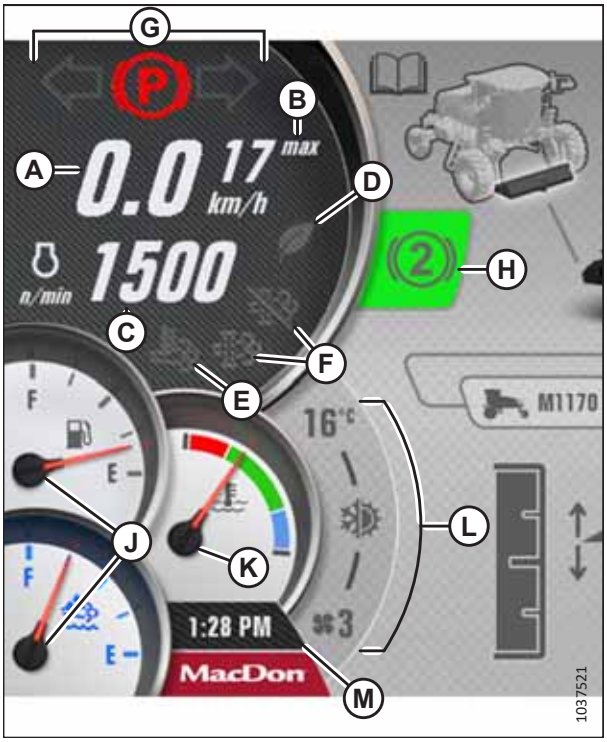


Figure 4.93: Left Gauge Cluster

Header information:

The information displayed depends on the type of header attached to the windrower and which run screen is active.

- **Run screen #1:** Displays reel, draper, knife, disc, or auger speed and pressure; alarm point; and indexing (factory-set according to header)
- **Run screen #2:** Displays draper, knife, or disc speed and pressure; reel height and fore-aft position; hydraulic pressure; and load bar

  NOTE:

  Master controller software MCAK203587P (or later) required to accurately display changes in draper speed.
- **Run screen #3:** Displays fuel per hour/acre, acres per hour, and sub acres per hour (resettable)
- **Run screen #4:** Displays cooling fan speed, engine air intake temperature, hydraulic oil temperature, and engine coolant temperature



Figure 4.94: Draper Header Information

Current header position:

- Displays basic header functions: height and angle

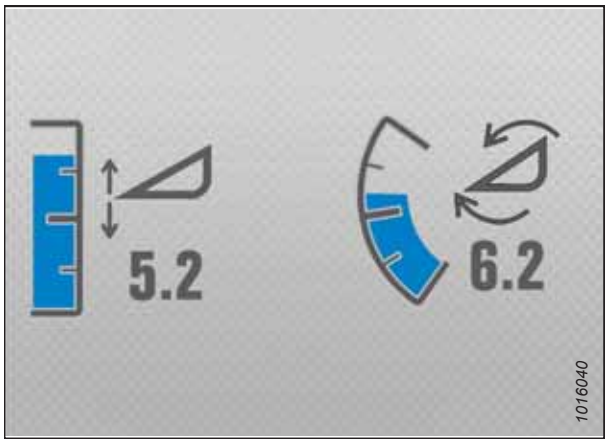


Figure 4.95: Current Header Position

Telltales:

- Telltales (A) indicate an engine or windrower fault
- Telltales are amber or red in color accompanied by a symbol for the fault
- Telltales display a short description (B) of the fault

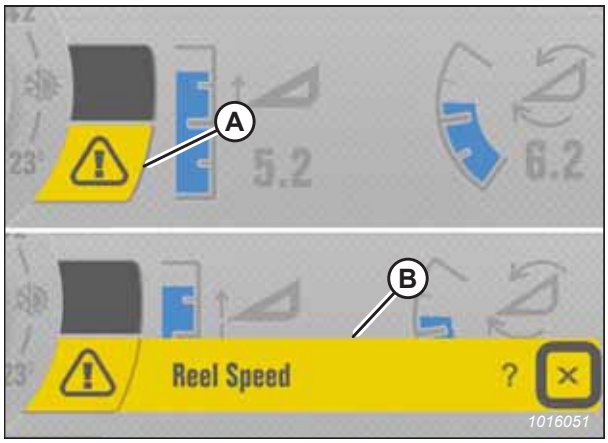


Figure 4.96: Faults/Telltales

Required maintenance indicator:

- An amber indicator (A) is displayed 50 hours before required maintenance is due
- The indicator only displays when header is disengaged
- The indicator flashes when maintenance is overdue by 50 hours



Figure 4.97: Maintenance Indicator

4.5 Attaching and Detaching a Header to the Windrower

This chapter specifies which headers are compatible with the windrower and provides instructions for attaching and detaching the header.

4.5.1 D1X or D1XL Series Draper Header

This section details the procedures necessary to physically attach a D1X or D1XL header to a windrower and to attach its hydraulic and electrical connections. The procedures may vary slightly depending on the configuration of the windrower.

Attaching Draper Header Supports

Draper header supports are required to attach the header to the windrower.Draper header supports are required to attach the header to the windrower.

DANGER

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

If not installed, attach the draper header support (supplied with the header) to the windrower lift linkage as follows:

1. Shut down the engine, and remove the key from the ignition.
2. Remove the hairpin from clevis pin (B) on draper header support (A). Remove clevis pin (B).

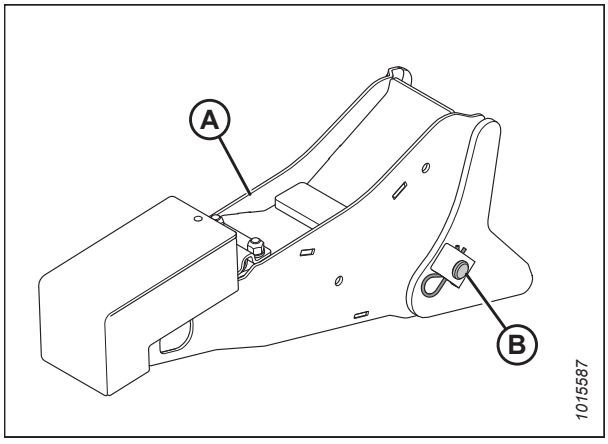


Figure 4.98: Draper Header Support

3. Position draper header support (B) on windrower lift linkage (A). Reinstall clevis pin (C).

   NOTE:

   To ensure that the pin doesn't snag the windrow, install the clevis pin on the outboard side of the draper header support.

4. Secure clevis pin (C) with hairpin (D).
5. Repeat Step *2, page 166* to Step *4, page 166* to install the remaining draper header support.

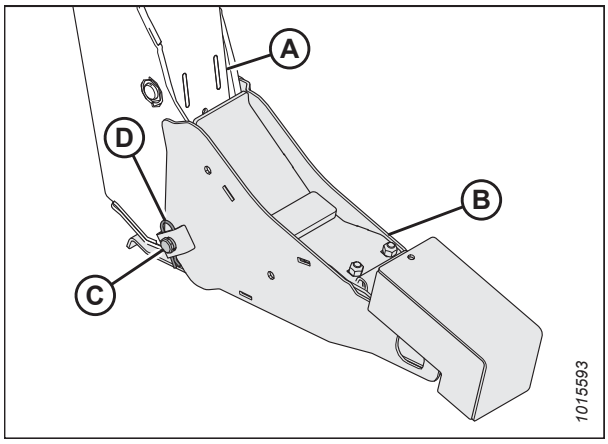


Figure 4.99: Draper Header Support

Attaching D1X or D1XL Series Draper Header

The windrower may have an optional self-aligning hydraulic center-link, which allows control over the vertical position of the center-link from the cab.

DANGER

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

NOTE:

Draper header supports must be installed onto the windrower lift linkage before starting this procedure. For instructions, refer to *Attaching Draper Header Supports, page 166*.

1. Shut down the engine, and remove the key from the ignition.
2. Extend the windrower transport into field mode. Refer to *Extending Wheels – Field Mode, page 149*.
3. **Windrowers without the self-aligning center-link kit:** Relocate pin (A) in the frame linkage as required to raise center-link (B) until the hook is above the attachment pin on the header.

   IMPORTANT:

   Ensure that the center-link is positioned high enough that it does not contact the header as the windrower approaches the header.

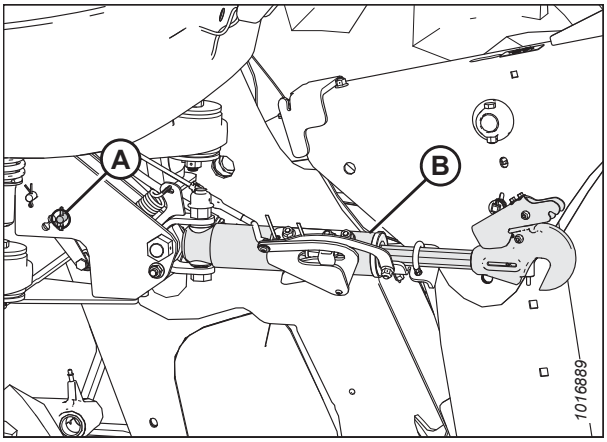


Figure 4.100: Center-Link without Self-Alignment

4. Rotate left signal light placard (A) to the up (vertical) position before connecting the windrower to a header.

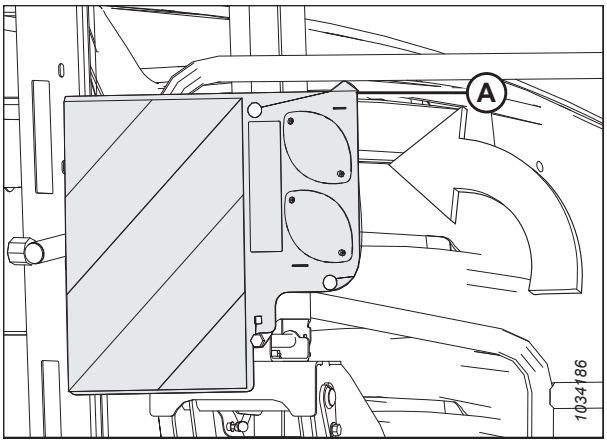


Figure 4.101: Left Signal Light Placard

5. Remove hairpin (A) from pin (B), and remove pin (B) from the header leg. Repeat this step on the opposite header leg.

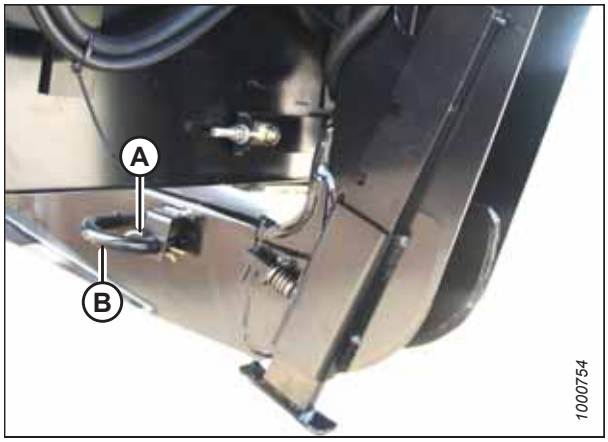


Figure 4.102: Header Leg

DANGER

Ensure that all bystanders have cleared the area.

6. Start the engine.

7. **If you are lowering the header lift legs WITH a header or weight box attached to the windrower**, proceed to Step *11, page 169*.

   If you are lowering the header lift legs WITHOUT a header or weight box attached to the windrower, fully release the tension in header float springs (A):

   - If prompted by the Harvest Performance Tracker (HPT) to remove the float, then remove the float and proceed to Step *11, page 169*.
   - If not prompted by the HPT to remove the float, then proceed to Step *8, page 169* to remove the float manually.

   IMPORTANT:

   When lowering the header lift legs without a header or weight box attached to the windrower, ensure that the tension on the float springs is fully released. This will prevent damage to the header lift linkages.

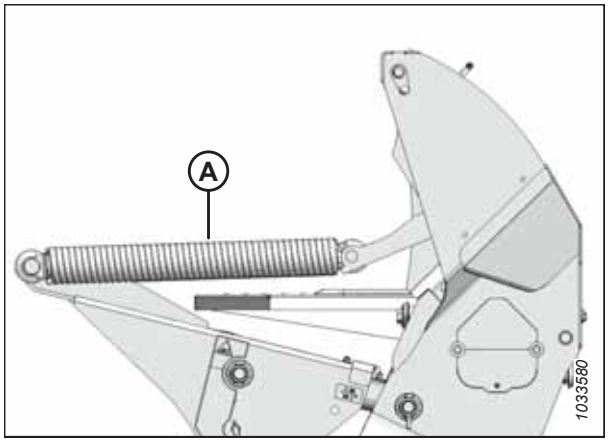


Figure 4.103: Header Float Springs

8. Press scroll knob (A) on the HPT to display the QuickMenu system.

9. Rotate scroll knob (A) to highlight HEADER FLOAT symbol (B), and press the scroll knob to select it.

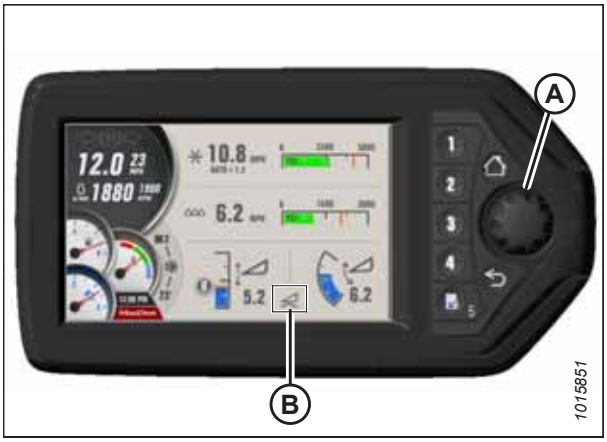


Figure 4.104: HPT Display

10. On the FLOAT ADJUST page, press soft key 3 (A) to remove the float.



Figure 4.105: HPT Display

11. **Windrowers equipped with the self-aligning center-link kit:**

    a. Press HEADER DOWN switch (E) on the ground speed lever (GSL) to fully retract the header lift cylinders.

    b. Press REEL UP switch (B) 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.

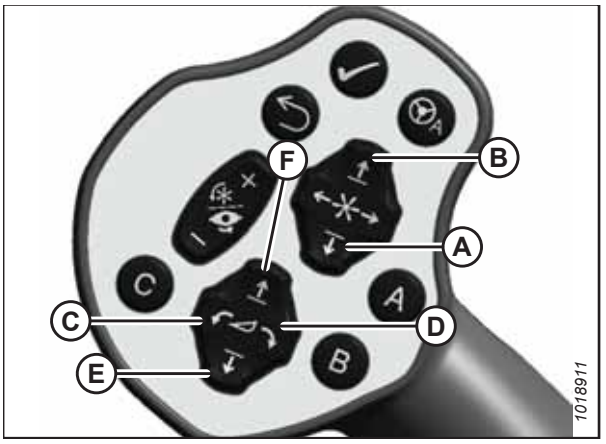


Figure 4.106: GSL Switches

A - Reel Down
B - Reel Up
C - Header Tilt Down
D - Header Tilt Up
E - Header Down
F - Header Up

12. Drive the windrower slowly forward until draper header supports (A) enter header legs (B). Continue driving slowly forward until the lift linkages contact the support plates in the header legs and the header is nudged forward.

13. Ensure that the lift linkages are properly engaged in the header legs and are in contact with the support plates.

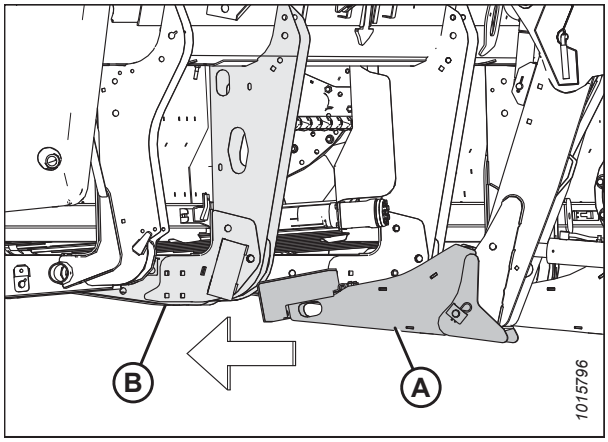


Figure 4.107: Header Leg and Draper Header Support

14. **Windrowers equipped with the self-aligning center-link kit:**

    a. Adjust the position of center-link cylinder (A) with the switches on the GSL until hook (B) is above the header attachment pin.

    IMPORTANT:

    Hook release (C) must be down to enable the self-locking mechanism to function.

    b. If hook release (C) is open (in the up position), shut down the engine, and remove the key from the ignition. Manually push hook release (C) down after the hook engages the header pin.

    c. Lower center-link (A) onto the header with the REEL DOWN switch on the GSL until the center-link locks into position and hook release (C) is down.

    d. Check that the center-link is locked onto the header by pressing the REEL UP switch on the GSL.

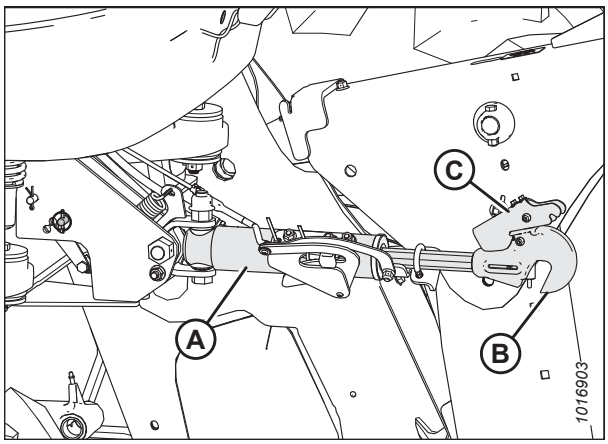


Figure 4.108: Hydraulic Center-Link

15. **Windrowers without the self-aligning center-link kit:**

    a. Press the HEADER TILT UP or HEADER TILT DOWN cylinder switches on the GSL to extend or retract the center-link cylinder until the hook is aligned with the header attachment pin.

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

    c. Push down on the rod end of link cylinder (B) until the hook engages and locks onto the header pin.

    IMPORTANT:

    The hook release must be down to enable the self-locking mechanism to function. If the hook release is open (in the up position), manually push it down after the hook engages the pin.

    d. Check that center-link (A) is locked onto the header by pulling upward on rod end (B) of the cylinder.

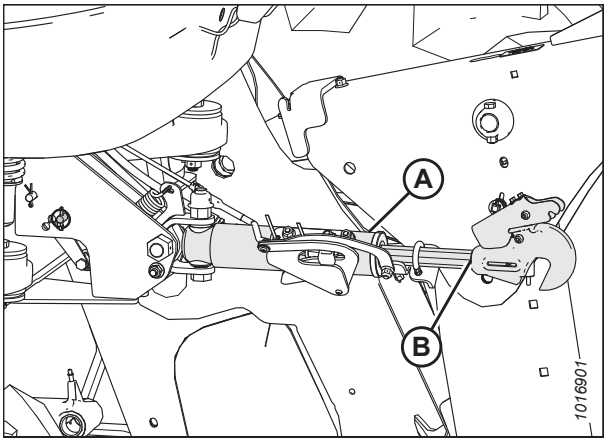


Figure 4.109: Hydraulic Center-Link

DANGER

Ensure that all bystanders have cleared the area.

e. Start the engine.

16. Press HEADER UP switch (A) to raise the header to its maximum height.

    NOTE:

    If one end of the header does **NOT** fully rise, rephase the lift cylinders as follows:

    a. Press and hold HEADER UP switch (A) until both cylinders stop moving.

    b. Continue to hold the switch for 3–4 seconds. The cylinders are now phased.

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

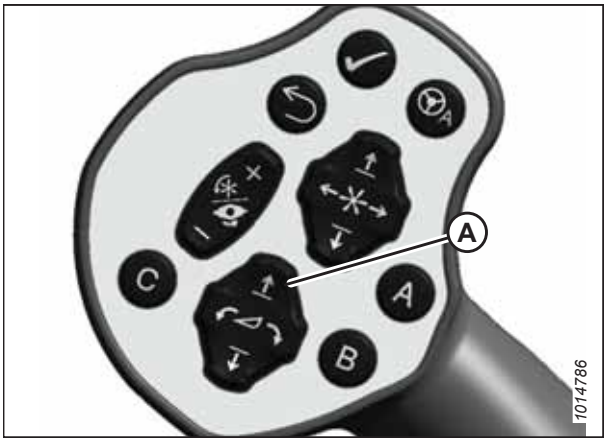


Figure 4.110: GSL

18. Engage the safety props on both lift cylinders as follows:

    a. Pull lever (A) toward you to release it, and then rotate it toward the header to lower the safety prop onto the cylinder.

    b. Repeat the previous step for the opposite lift cylinder.

    IMPORTANT:

    Ensure that the safety props engage over the cylinder piston rods. If the safety prop does **NOT** engage properly, raise the header until the safety prop fits over the rod.

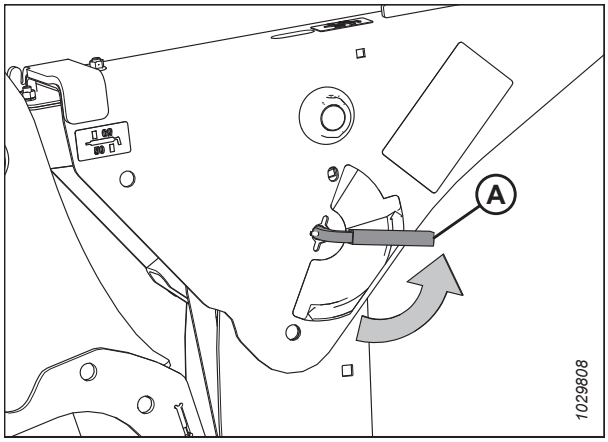


Figure 4.111: Safety Prop Lever

19. Install pin (B) through the header leg, ensuring that the pin engages the U-bracket in the draper header support and secure it with hairpin (A). Repeat this step on the other side of the header.

20. Raise header stand (D) to its storage position by pulling spring pin (C) and lifting the stand. Release the spring pin to secure the stand.

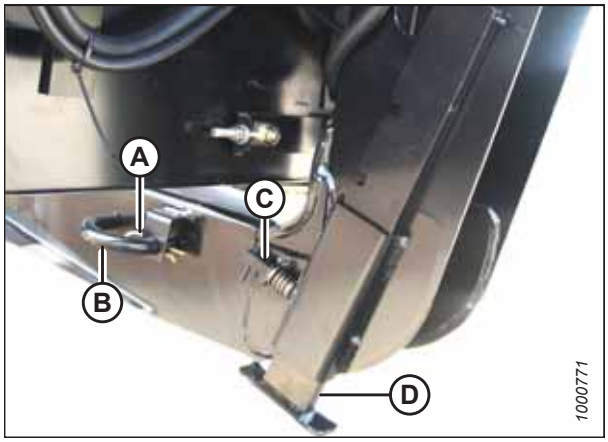


Figure 4.112: Header Leg

21. Disengage the safety props on both lift cylinders as follows:

    a. Turn lever (A) away from the header to raise the safety prop until the lever locks into the vertical position.

    b. Repeat the previous step for the opposite cylinder.

    NOTE:

    If the safety prop will **NOT** disengage, raise the header to release the prop.

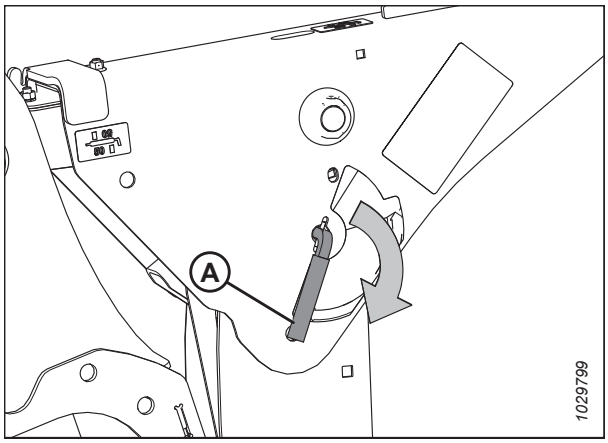


Figure 4.113: Safety Prop Lever

DANGER

Ensure that all bystanders have cleared the area.

22. Start the engine and press HEADER DOWN switch (A) on the GSL to fully lower the header.

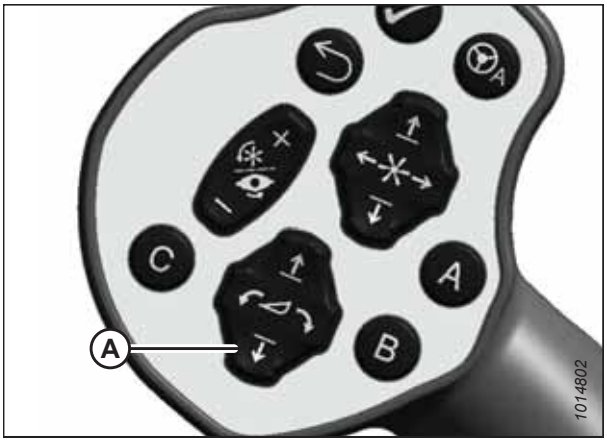


Figure 4.114: GSL

Connecting D1X or D1XL Series Draper Header Hydraulics

Connecting the header's hydraulics to the windrower is a simple procedure, thanks to the hydraulic hose management system. There is an additional step to perform if you are switching from using a rotary header to using a draper header.

IMPORTANT:

To prevent contamination of the hydraulic system, use a clean rag to remove dirt and moisture from all hydraulic couplers.

1. Push the link on latch (C) and pull handle (A) on hydraulic hose management system (B) rearward to disengage the arm from the latch.
2. Move hydraulic hose management system (B) toward the left cab-forward side of the windrower.

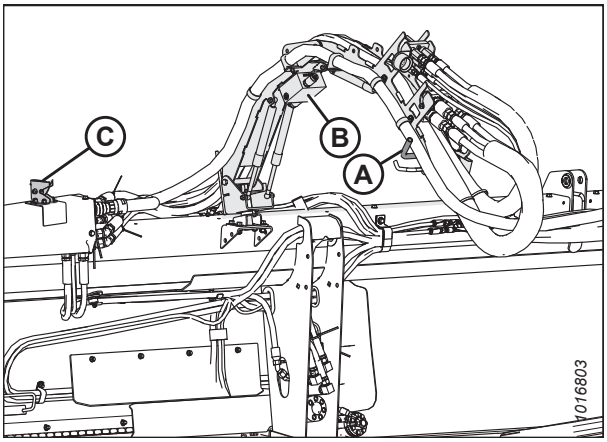


Figure 4.115: Hydraulic Hose Management System

3. Approach platform (A) on the left cab-forward side of the windrower and ensure the cab door is closed.
4. Push latch (B), and pull platform (A) toward the walking beam until it stops and the latch engages.

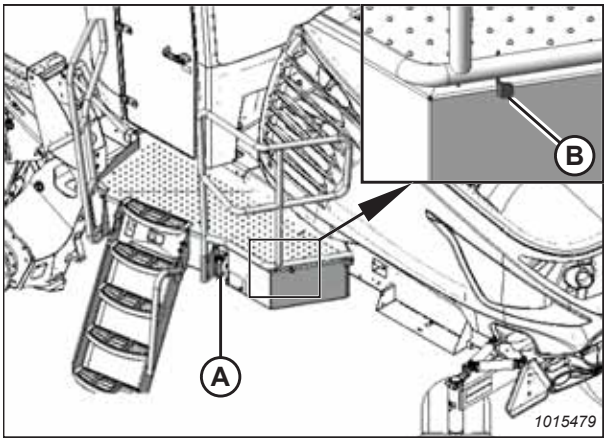


Figure 4.116: Left Cab-Forward Platform

5. Rotate left signal light placard (A) to the up (vertical) position before connecting the hose management system.

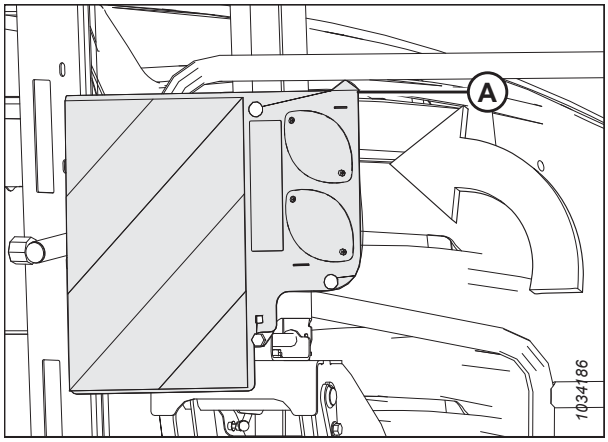


Figure 4.117: Left Signal Light Placard

6. Connect hydraulic hose management system (A) to the windrower by securing ball joint (B) to latch support (C) on the windrower leg.

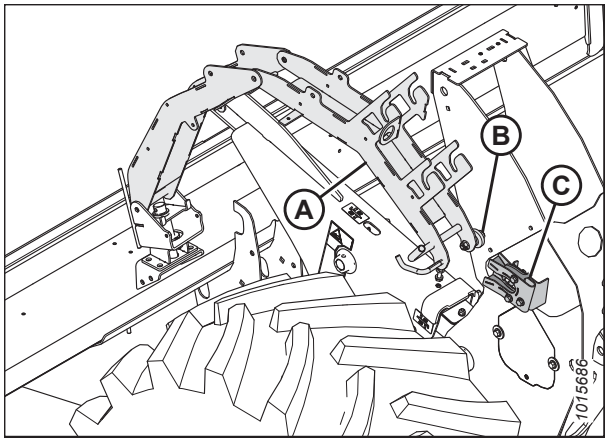


Figure 4.118: Hydraulic Hose Management System

7. Retrieve draper drive and reel control multicoupler (A) from the hydraulic hose management system.
8. Push knob (B) on the hydraulic receptacle and pull handle (C) fully away from the windrower.
9. Open cover (D) and position the coupler onto the receptacle. Align the pins in the coupler with the slots in handle (C) and push the handle toward the windrower so that the coupler locks onto the receptacle and knob (B) pops out.
10. Remove hose quick-disconnect (F) from the storage location and connect it to the receptacle on the frame.

    NOTE:

    Hose quick-disconnect (F) is only present on M1170*NT5* machines with the R1 Series Hydraulic Drive kit (MD #B6845) installed.

11. Remove the cover from electrical connector (E), push the electrical connector onto the receptacle, and secure it by turning the collar on the electrical connector clockwise.

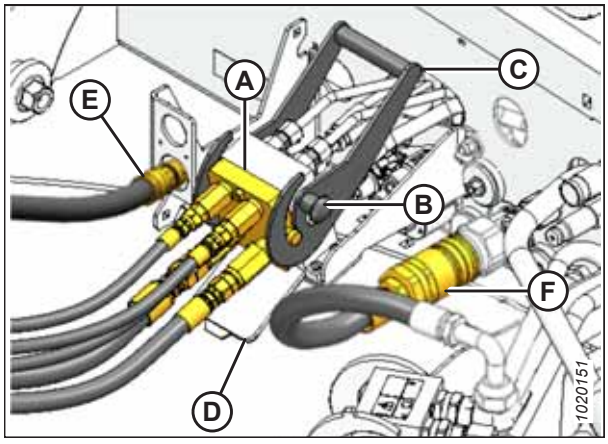


Figure 4.119: Draper/Reel Multicoupler

12. Retrieve knife and reel drive multicoupler (A) from the hydraulic hose management system.

13. Push knob (B) on the hydraulic receptacle and pull handle (C) fully away from the windrower.

14. Open cover (D) and position the coupler onto the receptacle. Align the pins in the coupler with the slots in handle (C), and push the handle toward the windrower so that the coupler locks onto the receptacle and knob (B) snaps out.

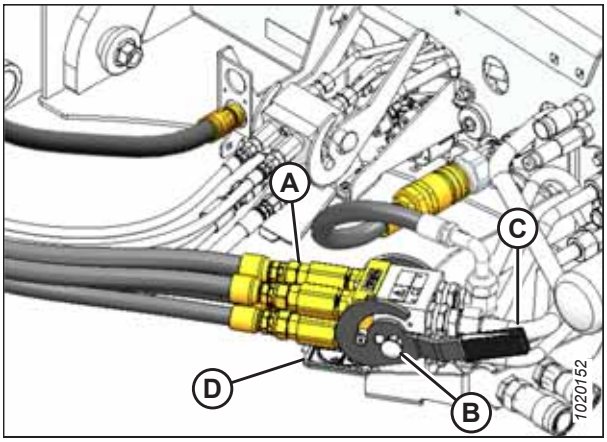


Figure 4.120: Knife/Reel Drive Multicoupler

15. Ensure that the hydraulic hose routing is as straight as possible.

    IMPORTANT:

    Straight routing will prevent abrasion damage to the hydraulic hoses.

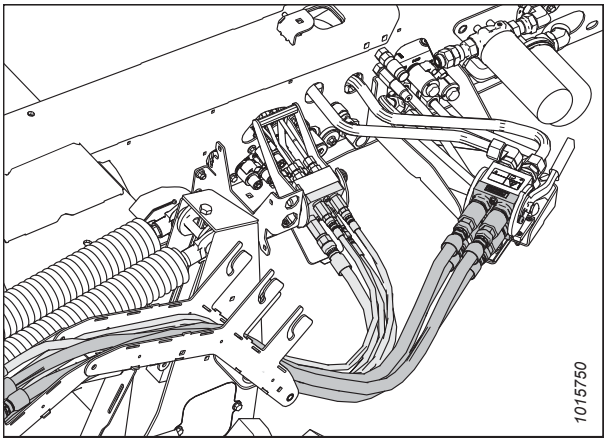


Figure 4.121: Hydraulic Multicouplers and Hose Routing

16. Push latch (A) to unlock platform (B).

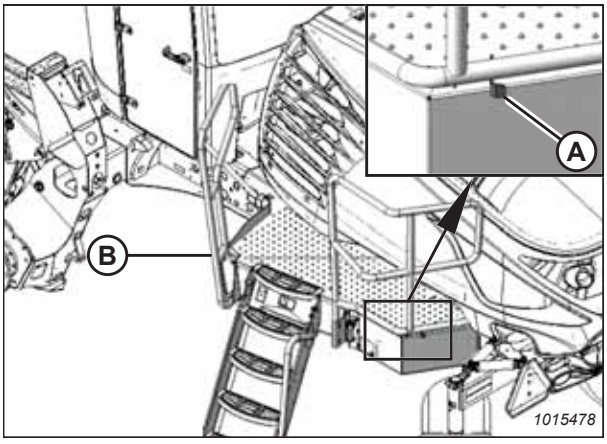


Figure 4.122: Left Cab-Forward Platform

17. Pull platform (A) towards the cab until it stops and the latch is engaged.

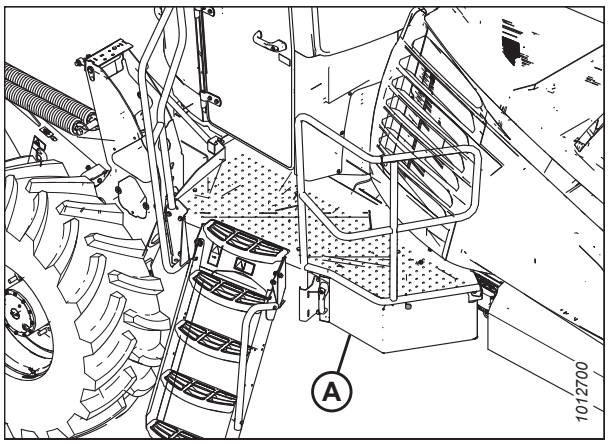


Figure 4.123: Left Cab-Forward Platform

Detaching D1X or D1XL Series Draper Header

DANGER

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

1. Lower the header fully.
2. Shut down the engine, and remove the key from the ignition.
3. Approach platform (A) on the left cab-forward side of the windrower and ensure the cab door is closed.
4. Push latch (B), and pull platform (A) toward the walking beam until it stops and the latch engages.

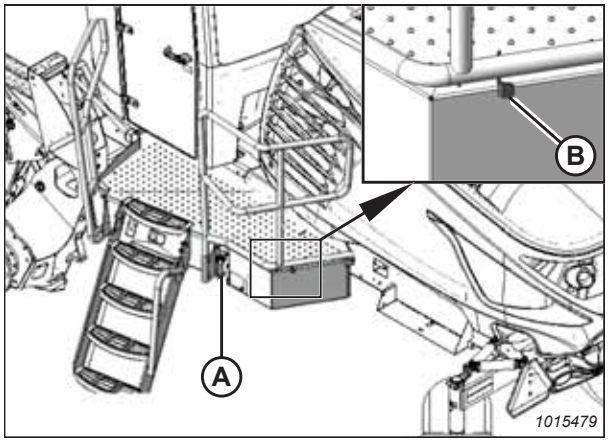


Figure 4.124: Left Cab-Forward Platform

5. Push lock button (A) and pull handle (B) to disengage multicoupler (C). Disconnect the hydraulics from the rear knife/reel drive receptacle.

   NOTE:

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

6. Route knife/reel drive hose bundle back to storage position (D) on the hydraulic hose management system.

7. Remove any debris that may have accumulated on the receptacle. Close cover (E).

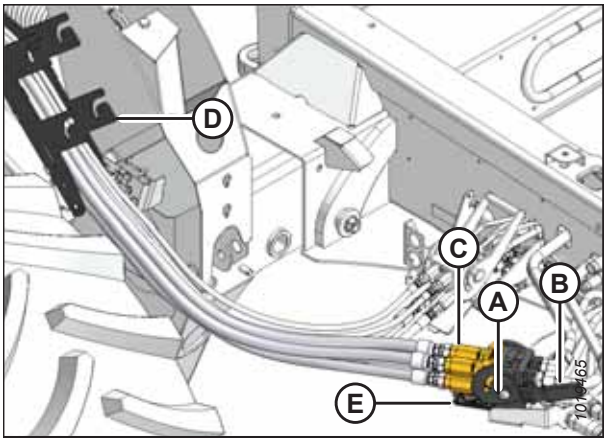


Figure 4.125: Knife/Reel Drive Multicoupler

8. Push lock button (B), and pull handle (C) to disengage multicoupler (A). Disconnect the hydraulics from the windrower draper drive/reel lift receptacle.

9. Disconnect electrical connector (E).

10. Remove any debris that may have accumulated on the windrower front receptacle, and close cover (D).

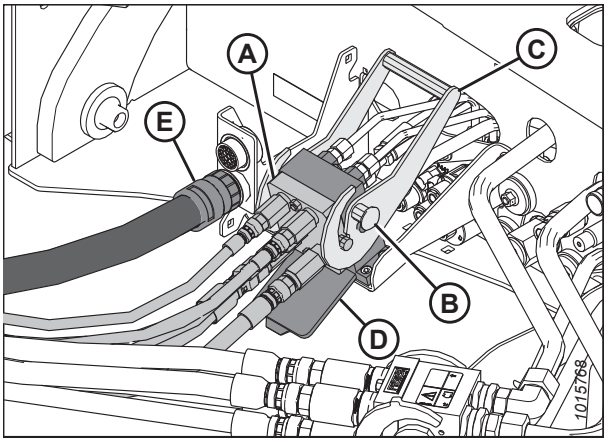


Figure 4.126: Draper/Reel Multicoupler

11. Route draper drive/reel hose bundle back to storage position (A) on hydraulic hose management system (B).

12. Insert electrical connector into storage cup (C).

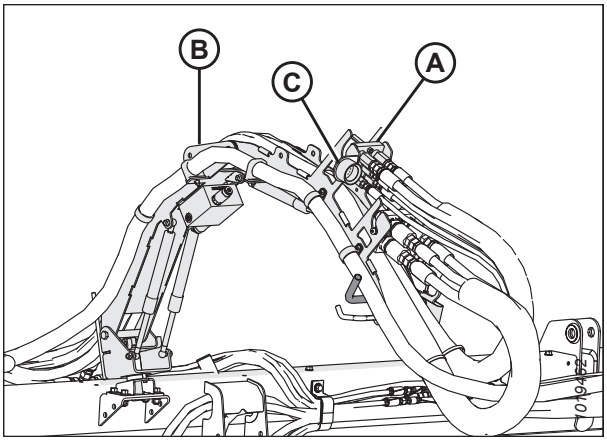


Figure 4.127: Hydraulic Hose Management System

13. Push latch (A) to unlock platform (B).

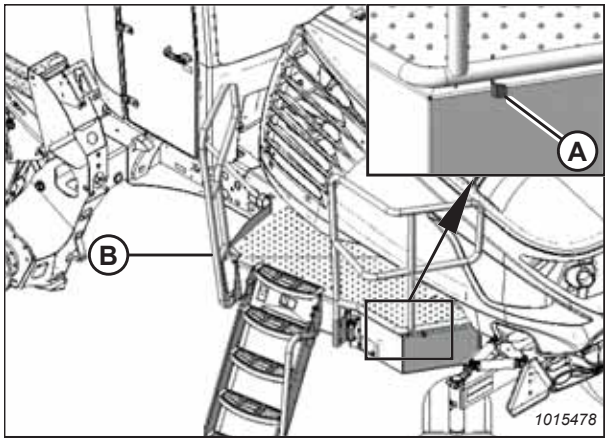


Figure 4.128: Left Cab-Forward Platform

14. Pull platform (A) towards the cab until it stops and the latch is engaged.

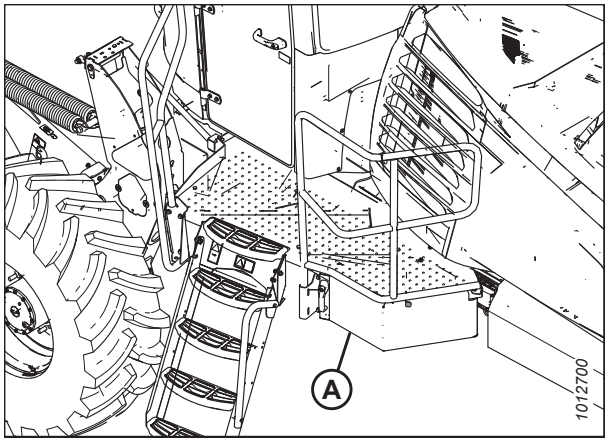


Figure 4.129: Left Cab-Forward Platform

15. Disconnect hose management system (A) from windrower by pulling latch lever (B) to open the latch. Keep latch open and move hose management system (A) away from header with handle (C).

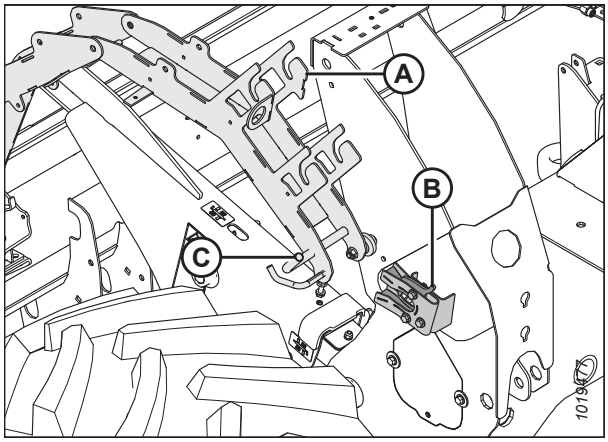


Figure 4.130: Hydraulic Hose Management System

16. Pivot hose management system (B) forward with handle (A), and engage hook (D) into latch (C) on header.

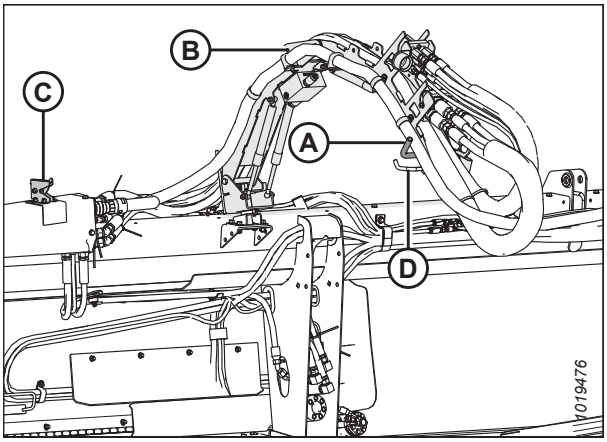


Figure 4.131: Hydraulic Hose Management System

17. Remove the header leg pin (B) by removing the hairpin (A) from header leg on both sides.

18. Lower header stand (D) by pulling spring loaded pin (C). Release spring pin to lock stand.

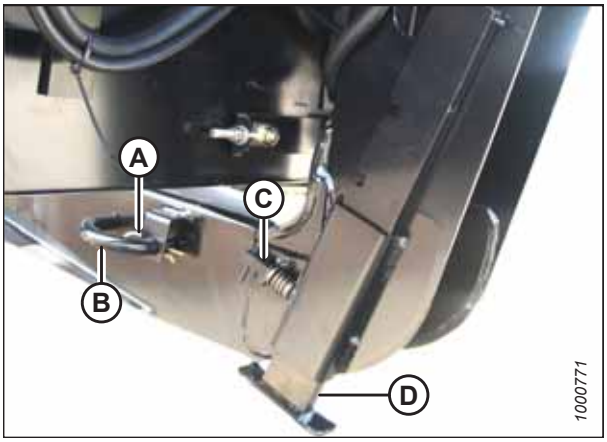


Figure 4.132: Header Stand

19. **Windrowers with self-aligning center-link:** Release center-link latch (A) before returning to the cab.

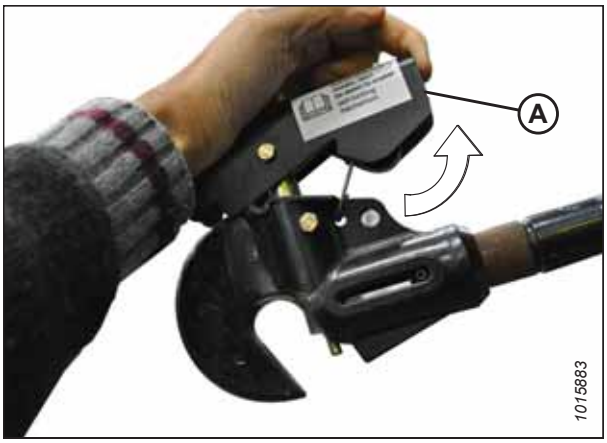


Figure 4.133: Center-Link

20. Disengage the safety props on both lift cylinders as follows:

    a. Turn lever (A) away from the header to raise the safety prop until the lever locks into the vertical position.

    b. Repeat the previous step for the opposite cylinder.

    NOTE:

    If the safety prop will **NOT** disengage, raise the header to release the prop.

21. Repeat for the opposite side.

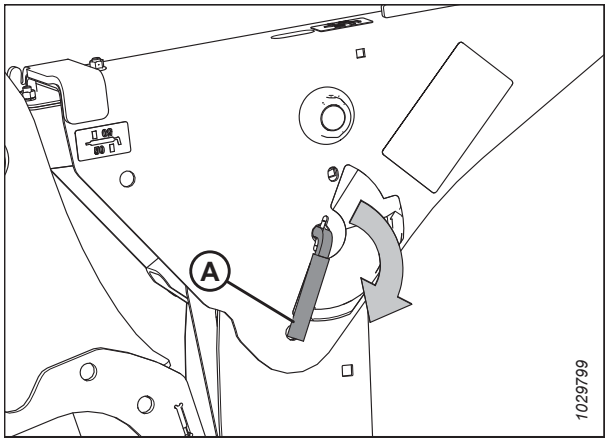


Figure 4.134: Safety Prop Lever

DANGER

Ensure that all bystanders have cleared the area.

22. Start the engine.

23. Remove header float when prompted by the Harvest Performance Tracker (HPT).

    NOTE:

    If not prompted by the HPT to remove float, remove float manually. For instructions, refer to *Removing and Restoring Float, page 193*.

24. Lower the header to the ground with HEADER DOWN switch (A).

25. Press HEADER TILT switches (B) as required on GSL to release load on center-link.

26. **Windrowers with self-aligning center-link:**

    a. Press REEL UP switch (C) to disengage center-link from header.

    b. Proceed to Step *28, page 181*.

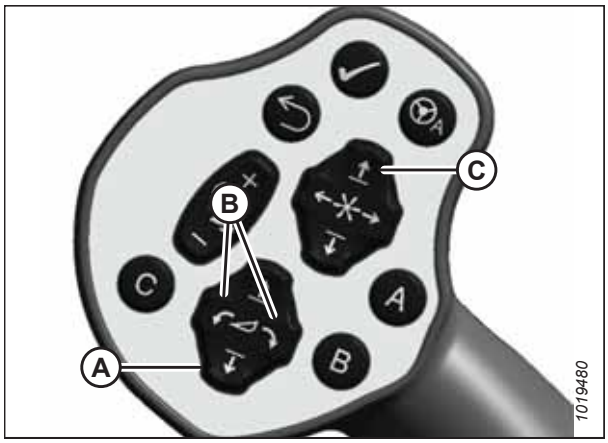


Figure 4.135: GSL

27. **Windrowers without self-aligning center-link:**

    a. Shut off the engine and remove the key.

    b. Disconnect center-link by lifting release (B) and lift hook (A) off header.

DANGER

Ensure that all bystanders have cleared the area.

    c. Start the engine.

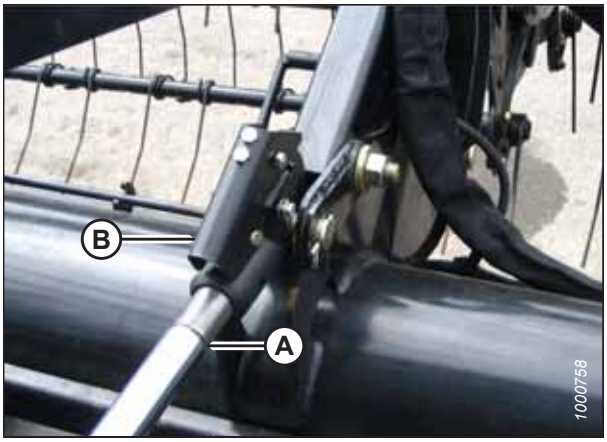


Figure 4.136: Hydraulic Center-Link

28. Back windrower away from header.

29. Reinstall pin (A) into header leg, and secure with hairpin (B). Repeat this step on the other header leg.

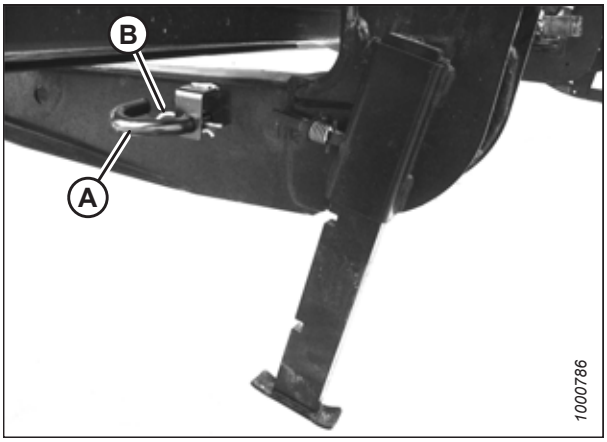


Figure 4.137: Header Stand

4.5.2 Adjusting Header Settings on Harvest Performance Tracker

Before operating the header, ensure that the Harvest Performance Tracker (HPT) settings are appropriate for your header.

1. Navigate to the SETTINGS menu using soft key 5 and the HPT scroll knob. For instructions, refer to *3.17.2 Navigating Harvest Performance Tracker Display, page 84*.

2. Scroll to SET-UP HEADER option (A) and press the scroll knob to select it.

   NOTE:

   The settings displayed will vary depending on the type of header attached to the windrower.

3. Scroll to highlight the appropriate option and press the scroll knob to select it.

   For example, if a draper header is attached, and ATTACHMENTS (B) is selected, the available choice is DOUBLE DRAPER DRIVE.

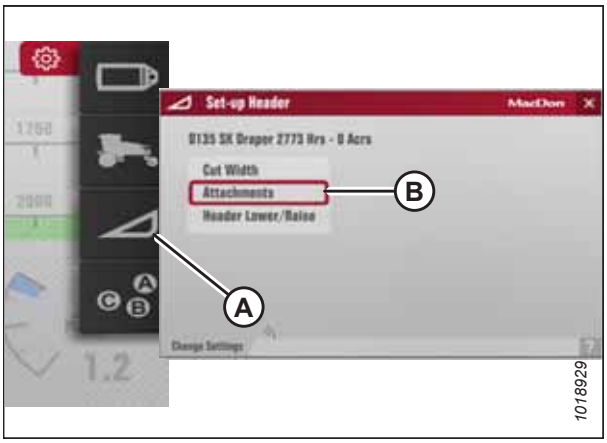


Figure 4.138: Header Settings

4. Press BACK button (A) on the HPT to return to the previous level within the menu structure.
5. Press HOME button (B) on the HPT to return to the last selected run screen (or header disengaged screen).



Figure 4.139: HPT Display

4.5.3 Header System Calibration

The Harvest Performance Tracker (HPT) recognizes when a header is attached to the windrower and determines which systems will require calibration.

The following sensors may require calibration, depending on the type of header attached to the windrower:

- Header height
- Header angle
- Header float left
- Header float right
- Reel height
- Reel fore-aft
- Swath compressor
- Knife drive

Recalibration is required in the following circumstances:

- The HPT is replaced
- A position sensor is replaced
- Sensor readouts are erratic
- A pump has been replaced
- A new header type or attachment is connected to the windrower

Refer to following topics for information on calibrating header systems:

- *Calibrating Knife Drive on Harvest Performance Tracker Display, page 182*
- *Calibrating Header Position Sensors on Harvest Performance Tracker Display, page 185*

Calibrating Knife Drive on Harvest Performance Tracker Display

When a header is attached to a windrower, the Harvest Performance Tracker (HPT) will recognize the header ID and configure the windrower accordingly. The header must be calibrated to ensure that the knife drive pump output is accurate.

DANGER

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

1. Start the engine.
2. Press soft key 5 (A) to open the Harvest Performance Tracker (HPT) main menu.

   NOTE:

   Calibrations **MUST** be performed with the engine running. Some calibrations will not be available with the engine off.
3. Use HPT scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown) to highlight SETTINGS icon (C).
4. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to activate the settings menu options.

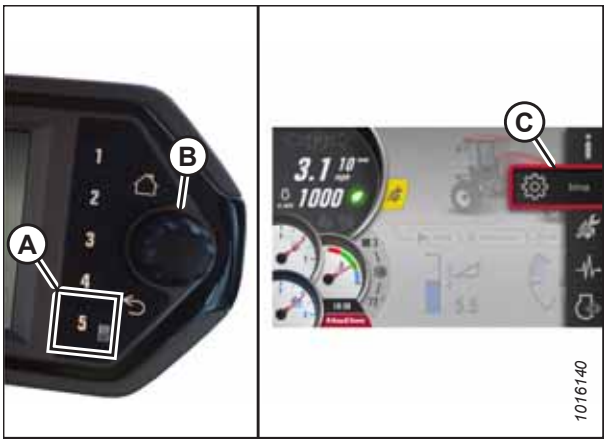


Figure 4.140: Opening the Main Menu

5. Scroll to WINDROWER SETTINGS icon (A) and press SELECT.
6. Scroll to CALIBRATION icon (B), and press SELECT to open the Calibration Selection screen.

   NOTE:

   The F3 shortcut button on the operator's console will also open the WINDROWER SETTINGS menu.

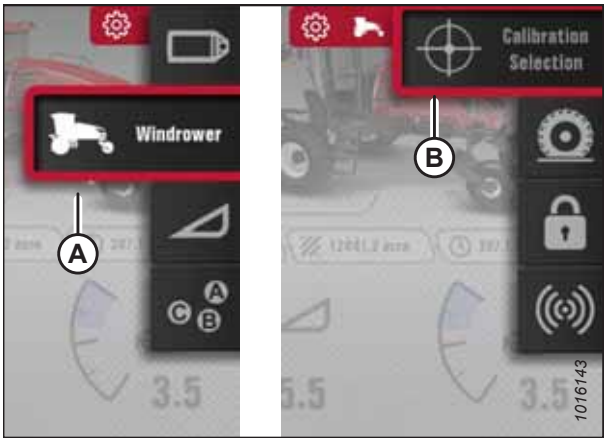


Figure 4.141: Windrower Settings Icon and Calibration Submenu Icon

7. In the Calibration Selection screen, scroll to KNIFE DRIVE (A) and press SELECT.
8. Engage the header.

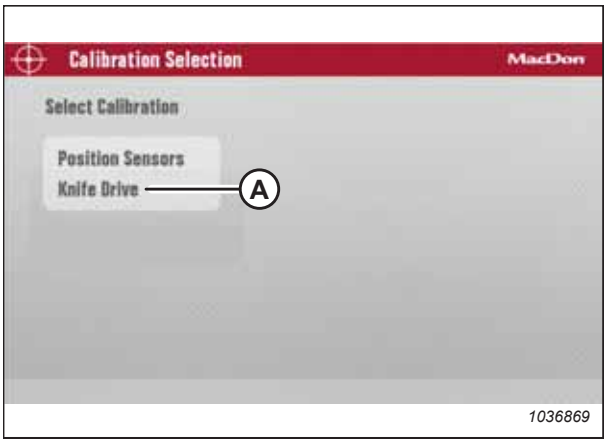


Figure 4.142: Calibration Selection Screen

NOTE:

If calibration is selected while the header is disengaged, WARNING (A) will appear. Engage the header. PLAY icon (B) appears after you engage the header.

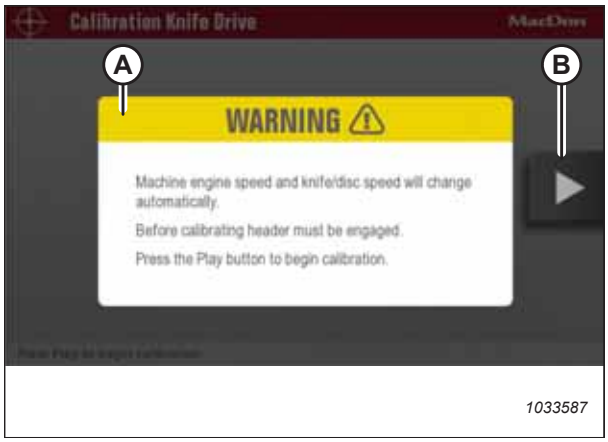


Figure 4.143: Engage Header Warning

9. Press the PLAY icon on the screen to begin the calibration process. The display on the screen changes to show that the calibration procedure has started.

   NOTE:

   If the engine speed is less than 1500 rpm prior to starting the calibration procedure, the system will raise the engine speed to 1500 rpm.



Figure 4.144: Calibration Screen

10. When Stage 1 of the calibration is complete, press PLAY icon (A) on the screen to continue with Stage 2 of the calibration process.

    NOTE:

    Knife drive calibration consists of nine stages.



Figure 4.145: Calibration Page

11. Press the PLAY icon to begin the calibration process.

NOTE:

During the calibration procedure, the windrower's computer will vary the engine rpm and header speed.

NOTE:

Press X icon (A) on the screen or use the HEADER DISENGAGE switch at any time during the calibration process to exit the calibration procedure without saving your progress. The engine speed will return to the original rpm prior to starting the calibration process.



Figure 4.146: Calibration Page

NOTE:

If error message (A) appears when calibrating the knife drive system, follow the instructions in the message to fix the error. Press X (B) to exit the message. If the knife calibration fails:

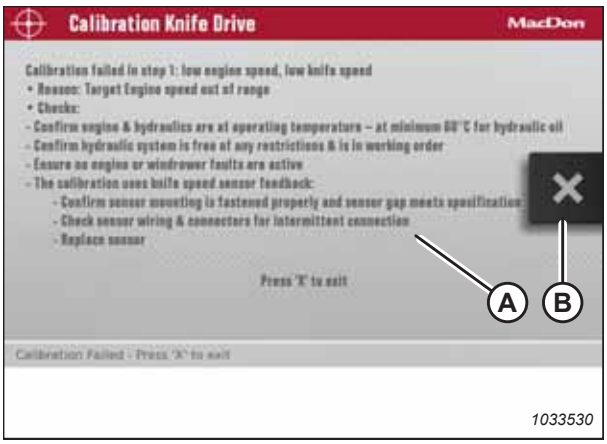


Figure 4.147: Calibration Page

- Confirm that the engine and hydraulics are at operating temperature.
- Confirm that the hydraulic system is free of any restrictions and is in working order.
- Confirm that the throttle is working:
  - Check the engine codes to confirm that engine is not de-rated or throttle-inhibited
  - The throttle is controlled via the powertrain's CAN network 1. Check the network's wiring and connectors for an open or intermittent connection
- Confirm that the sensor mounting is secured properly and that the sensor's gap is set correctly.
- Check the sensor wiring and connectors for an intermittent connection.
- Replace the sensor.

Calibrating Header Position Sensors on Harvest Performance Tracker Display

The header position sensors need to be recalibrated whenever the Harvest Performance Tracker (HPT) is replaced, a position sensor is replaced, sensor readouts are erratic, a pump has been replaced, or when a new header type or attachment is connected to the windrower.

DANGER

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

1. Start the engine.

2. Press soft key 5 (A) to open the Harvest Performance Tracker (HPT) main menu.

   NOTE:

   Calibrations **MUST** be performed with the engine running. Some calibrations will not be available with the engine off.

3. Use HPT scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown) to highlight SETTINGS icon (C).

4. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to activate the settings menu options.

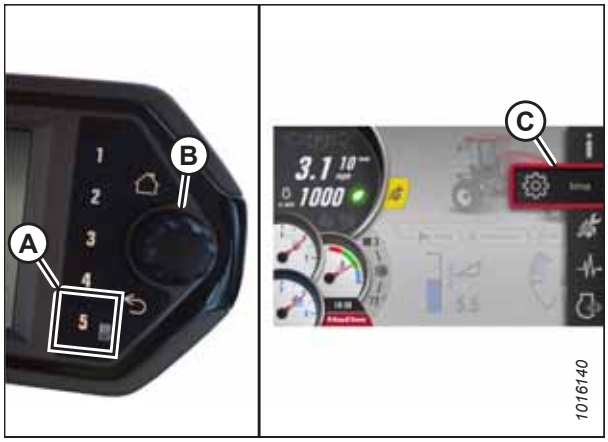


Figure 4.148: Opening the Main Menu

5. Scroll to WINDROWER SETTINGS icon (A) and press SELECT.

6. Scroll to CALIBRATION icon (B), and press SELECT to open the Calibration Selection screen.

   NOTE:

   The F3 shortcut button on the operator's console will also open the WINDROWER SETTINGS menu.

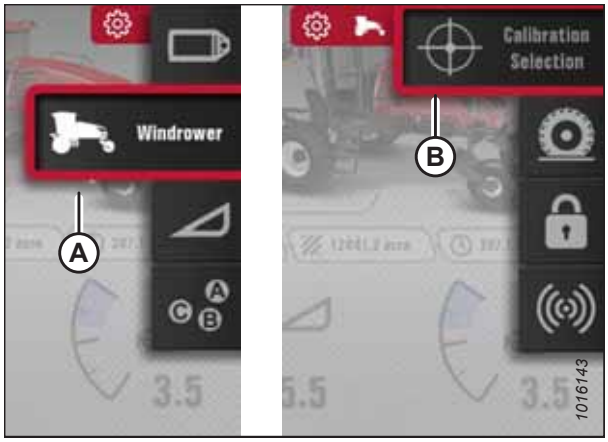


Figure 4.149: Windrower Settings Icon and Calibration Submenu Icon

7. In the Calibration Selection screen, scroll to POSITION SENSORS (A) and press SELECT.

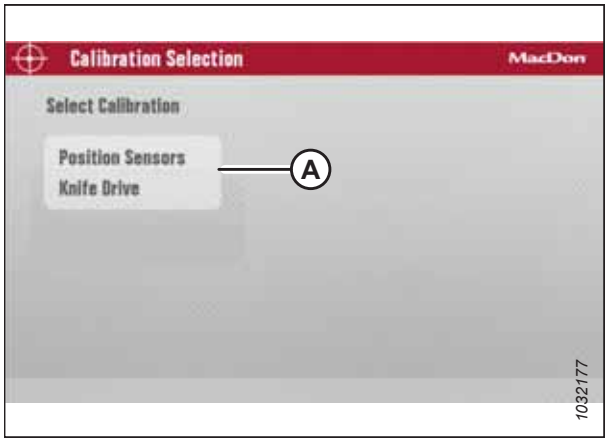


Figure 4.150: Calibration Selection Screen

NOTE:

Pressing X icon (A) on the screen (or pressing the HOME, BACK or any GSL button [buttons not shown]) at any time during the calibration process will EXIT the calibration procedure without saving your progress. The engine speed will also return to the original rpm prior to starting the calibration process.

NOTE:

If a sensor goes out of its normal operating range during the calibration process, calibration will stop and a message will appear on the screen indicating that a sensor is out of range.



Figure 4.151: Calibration Screen

8. When stage one of the calibration is complete, press PLAY icon (A) on the screen to continue with stage two of the calibration process.



Figure 4.152: Calibration Screen

9. When stage two of the calibration is complete, press RESUME icon (A) on the screen to configure the HEADER FLOAT setting, or press HOME or BACK button (not shown) to exit.

NOTE:

The engine speed returns to the speed prior to calibration when stage two calibration is complete.



Figure 4.153: Calibration Screen

NOTE:

If the voltage of any sensor falls below its acceptable range during calibration, a message appears after completing the calibration with a list of sensors reporting out-of-range voltages. Adjust the sensors as needed and repeat the calibration process from the beginning.



Figure 4.154: Sample of Failed Calibration Display Message

4.6 Operating Header

This section describes the operating instructions for the following header types when attached to a MacDon M1170*NT5* Windrower: D1XL Series Draper Headers and D1X Series Draper Headers.

A variety of header options and attachments are available for use on headers powered by an M1170*NT5* Windrower. Refer to the header operator's manual for a list of available options and attachments.

4.6.1 Engaging and Disengaging Header Safety Props

Safety props are located on both header lift cylinders on the windrower. Engage the props any time you are going to work on or around a raised header. When engaged, safety props prevent a header from dropping suddenly if the lift system hydraulics lose pressure.

DANGER

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

WARNING

Check to be sure all bystanders have cleared the area.

1. Start the engine.
2. Press HEADER UP switch (A) on the ground speed lever (GSL) to raise the header to its maximum height.

   NOTE:

   If one end of the header does **NOT** fully rise, rephase the lift cylinders as follows:

   a. Press and hold HEADER UP switch (A) until both cylinders stop moving.

   b. Continue to hold the switch for 3–4 seconds. The cylinders are now phased.
3. Shut down the engine, and remove the key from the ignition.

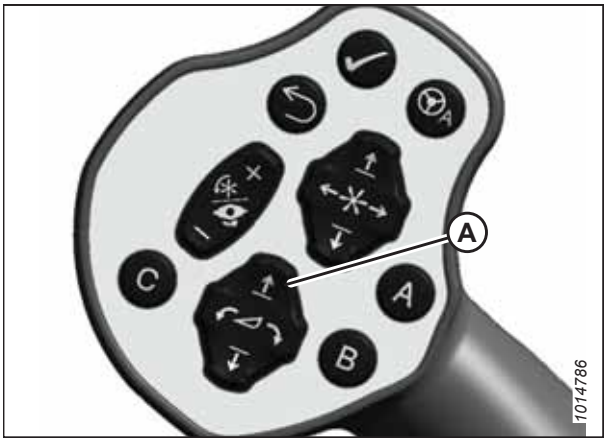


Figure 4.155: Ground Speed Lever

4. Engage the safety props on both lift cylinders as follows:

   a. Pull lever (A) toward you to release it, and then rotate it toward the header to lower the safety prop onto the cylinder.

   b. Repeat the previous step for the opposite lift cylinder.

   IMPORTANT:

   Ensure that the safety props engage over the cylinder piston rods. If the safety prop does **NOT** engage properly, raise the header until the safety prop fits over the rod.

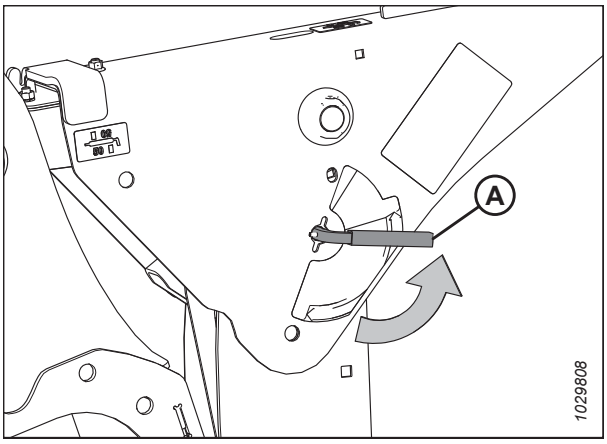


Figure 4.156: Safety Prop Lever

5. Disengage the safety props on both lift cylinders as follows:
   a. Turn lever (A) away from the header to raise the safety prop until the lever locks into the vertical position.
   b. Repeat the previous step for the opposite cylinder.

   NOTE:

   If the safety prop will **NOT** disengage, raise the header to release the prop.
6. Start the engine.
7. Lower the header fully.
8. Shut down the engine, and remove the key from the ignition.

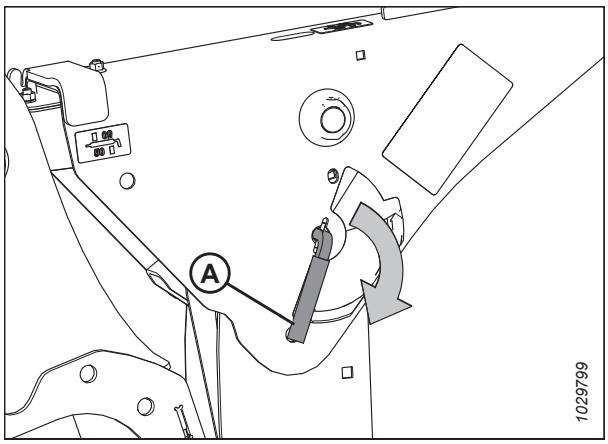


Figure 4.157: Safety Prop Lever

4.6.2 Header Float

The windrower is equipped with float springs that are fully adjustable with hydraulic cylinders. Spring tension is adjustable from zero to maximum tension through the Harvest Performance Tracker (HPT). The header float feature allows the header to follow the contours of the ground closely as the windrower moves forward. The header is able to respond to sudden changes in elevation or obstacles quickly. The float setting is ideal when the cutterbar rides along the ground with minimal bouncing, and without scooping or pushing soil.

IMPORTANT:

- Configure the header float setting to be as light as possible, while limiting the amount of bouncing produced by the header. Doing so will reduce the amount of wear placed on knife components, and will prevent the header from scooping soil.
- Prevent the header from bouncing excessively by operating at a slower ground speed when the float setting is light. A bouncing header results in raggedly cut crop.
- Before setting the header float, install all of the header kits (for example: upper cross auger; skid shoes; slow speed transport kit). If the Slow Speed Transport (SST) tow-bar will be stored on the header during operation, set the float with the tow bar in place.
- Adjust the float when adding or removing optional attachments which change the weight of the header.

Checking Float

Check the header float setting by measuring the force required to lift the header.

DANGER

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

DANGER

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

1. Start the engine.
2. Use HEADER TILT switches (A) on the ground speed lever (GSL) to set the center-link to the mid-range position (**5.0** on the Harvest Performance Tracker [HPT]).
3. If checking float with a draper header attached, set the reel to the normal operating position.
4. Using HEADER DOWN switch (B), lower the header fully. The header lift cylinders will fully retract.
5. Ensure the header is level with the ground with zero tilt.

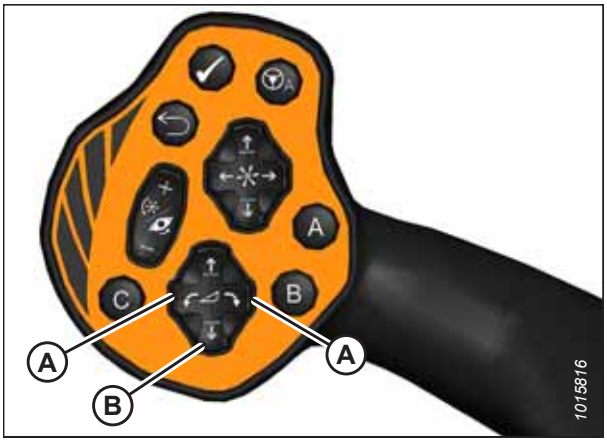


Figure 4.158: GSL

6. Shut down the engine, and remove the key from the ignition.
7. Grasp one end of the header and lift. The force required to lift the header should be the same at both ends (refer to Table *4.4, page 191*).

Table 4.4 Target Header Float Values

Header Type	Force Required to Lift Header at the Ends with Lift Cylinder Fully Retracted
Draper	335–380 N (75–85 lbf) with stabilizer/transport wheels raised (if equipped)

8. Restart the engine, and adjust float as required. For instructions, refer to *Setting Float, page 191*.

   NOTE:

   Increasing the float value on the HPT makes the header feel lighter.

Setting Float

The float can be set for windrowing with the cutterbar on the ground or with the cutterbar off the ground (normally used with the draper header).

Cutterbar on ground

The optimum float setting lets the header follow the contour of the terrain.

1. Set the center-link to the mid-range position (5.0 on the Harvest Performance Tracker [HPT]). For instructions, refer to *4.6.4 Adjusting Header Angle, page 195*.
2. Lower the header until the cutterbar is on the ground.

   NOTE:

   To minimize scooping rocks when operating at the flattest header angle, lower the header skid shoes. For instructions, refer to the header operator's manual.

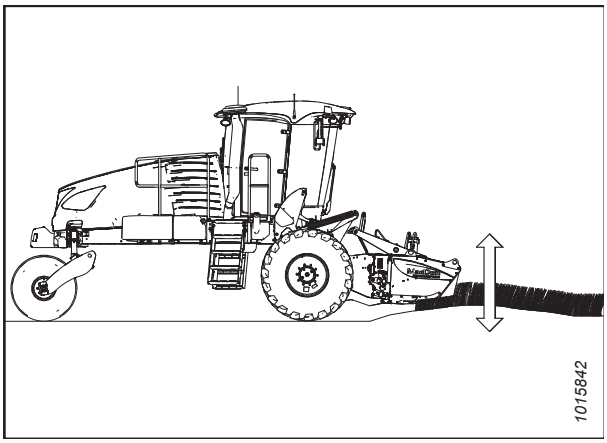


Figure 4.159: Header Float – Cutterbar on Ground

3. Press rotary scroll knob (A) on the HPT to display the QuickMenu system.
4. Rotate scroll knob (A) to highlight header float icon (B) and press the scroll knob to select.

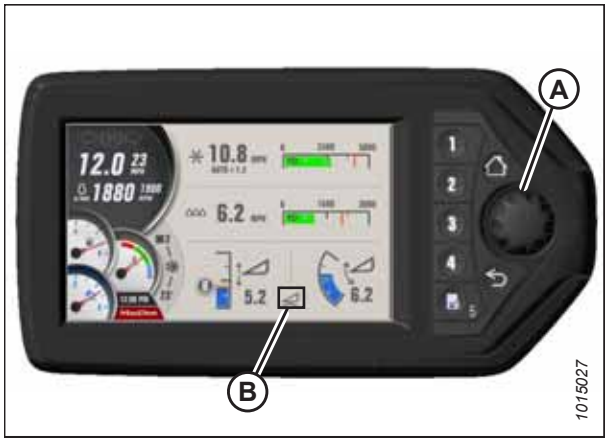


Figure 4.160: HPT Run Screen

5. Turn scroll knob (A) to highlight left (B) or right float (C) and press knob (A) to activate the selection.
6. Rotate scroll knob (A) to adjust the float setting and press the knob when finished.

   NOTE:

   Float adjustments of 1.0 (out of 10) change the header weight at the cutterbar by approximately 91 kg (200 lb.). Adjust the float in increments of 0.05 to optimize field performance.
7. Press soft key 3 (D) to remove or resume the header float.



Figure 4.161: HPT Float Settings

Cutterbar off ground – draper header only

The optimum float setting and stabilizer wheel setting lets the header cut the crop evenly with minimal bouncing.

1. Set the center-link to the mid-range position (5.0 on the Harvest Performance Tracker [HPT]). For instructions, refer to *4.6.4 Adjusting Header Angle, page 195*.
2. Set the cutting height with the header height controls on the GSL. For instructions, refer to *4.6.5 Setting Header Height, page 198*.

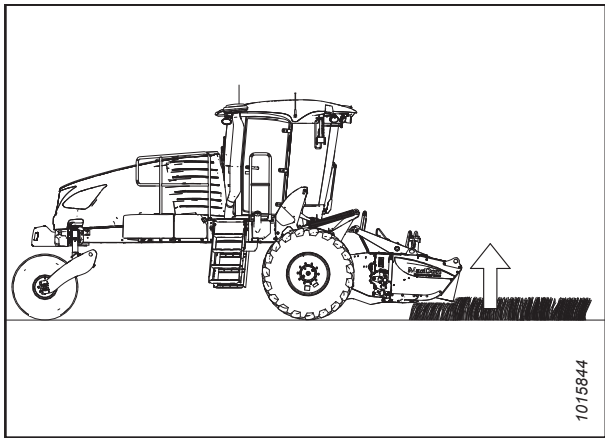


Figure 4.162: Header Float – Cutterbar off Ground

3. Press rotary scroll knob (A) on the HPT to display the QuickMenu system.
4. Rotate scroll knob (A) to highlight header float icon (B) and press the scroll knob to select.

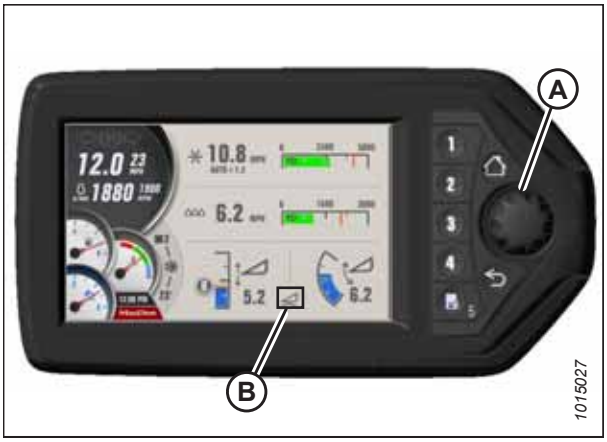


Figure 4.163: HPT Run Screen

5. Turn scroll knob (A) to highlight left float (B) or right float (C) and press knob (A) to activate the selection.
6. Turn scroll knob (A) to adjust the float setting and press the knob when finished.

   IMPORTANT:

   Float adjustments of 1.0 (out of 10) change the header weight at the cutterbar by approximately 91 kg (200 lb.). Adjust the float in increments of 0.05 to optimize field performance.
7. Press soft key 3 (D) to remove or resume header float.



Figure 4.164: HPT Float Settings

Removing and Restoring Float

1. To display the QuickMenu system, press rotary scroll knob (A) on the Harvest Performance Tracker (HPT) or press F1 on the console.
2. Rotate scroll knob (A) to highlight HEADER FLOAT icon (B) and press the scroll knob to select.

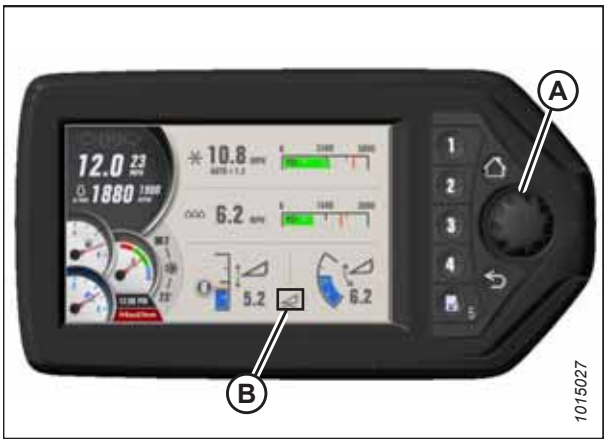


Figure 4.165: HPT Run Screen

3. Press soft key 3 (A) to remove or restore the header float.

   NOTE:

   If the header float is active, the icon at soft key 3 will say REMOVE FLOAT; if the header float has been removed, the icon will say RESTORE FLOAT.



Figure 4.166: HPT Display – Adjusting Float

4.6.3 Header Drive

All header drive 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

The HEADER ENGAGE switch engages and disengages the header drive.

DANGER

Ensure that all bystanders have cleared the area.

DANGER

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

1. Start the engine.
2. ***To engage the header:*** Push and hold HEADER ENGAGE switch (A) down, while pulling up on collar (B).

   To disengage the header: Push HEADER ENGAGE switch (A) down.

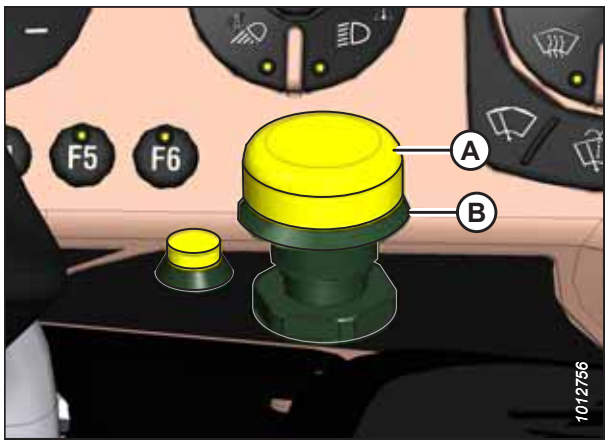


Figure 4.167: Header Engage Switch

Reversing Header

When reversing, the following header functions will turn in reverse:

- **D1XL Series:** knife
- **D1X Series:** knife
- **A40DX:** knife, conditioner, auger, and reel
- **A40DX GSS:** knife, auger, and reel

Reverse the header as follows:

1. Press and hold HEADER DRIVE REVERSE button (A).
2. Press and hold HEADER ENGAGE switch (B). Pull up on collar (C), until switch (B) is in the ENGAGED position.
3. When you are ready to return to forward operation, release HEADER DRIVE REVERSE button (A) to stop the header.
4. Push down HEADER ENGAGE switch (B) to OFF position. The header can now be restarted. For instructions, refer to *Engaging and Disengaging the Header, page 194*.

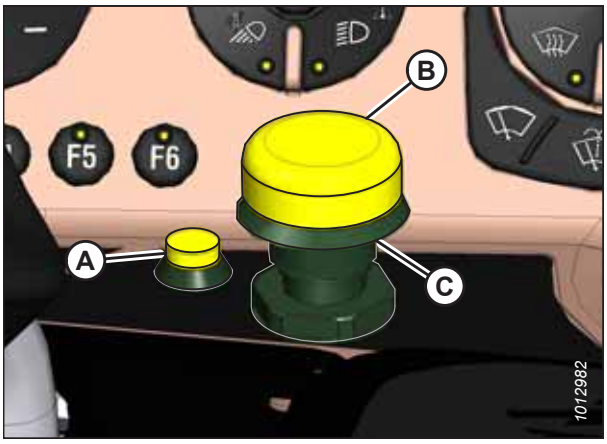


Figure 4.168: Header Drive Controls

4.6.4 Adjusting Header Angle

Header angle is the angle between the ground and the drapers/cutterbar. It is adjustable to accommodate crop conditions and soil types.

Refer to the appropriate header operator's manual for the range of adjustment and recommended settings for your particular header.

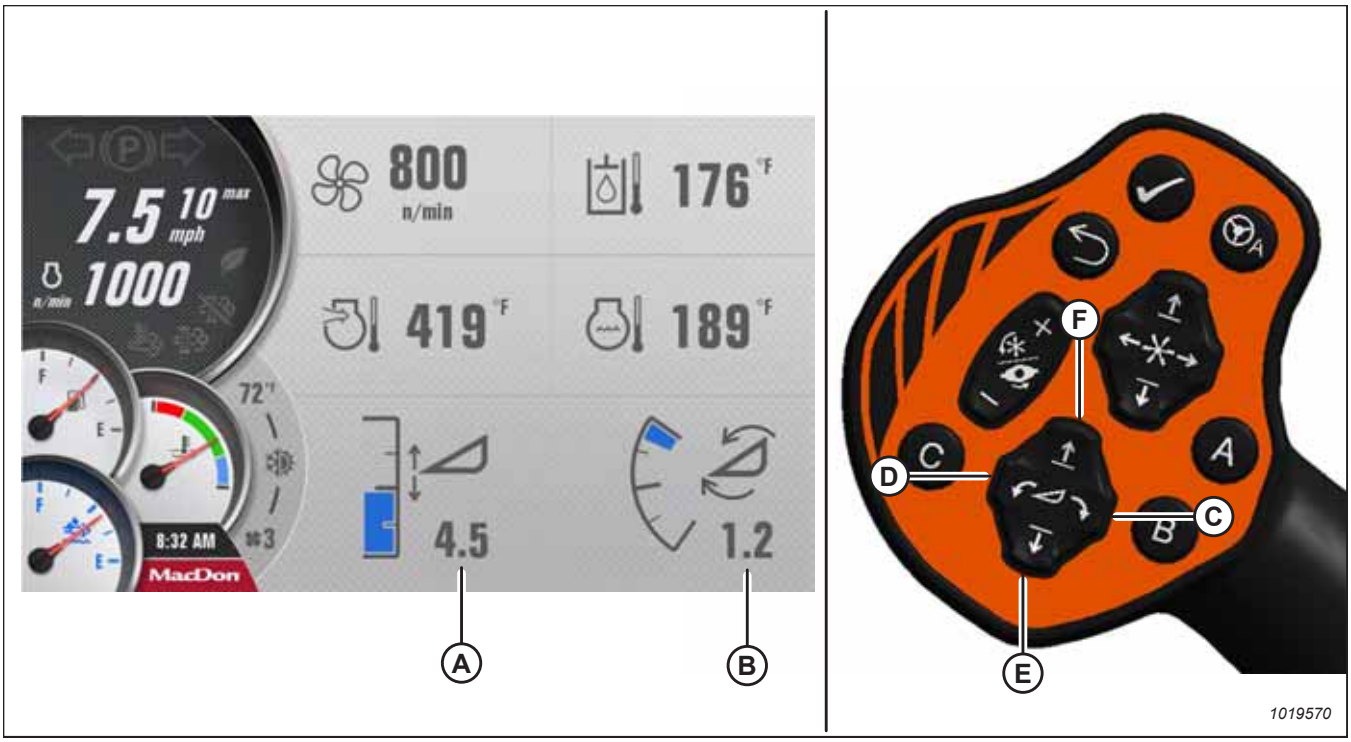


Figure 4.169: HPT Display and GSL

The header angle can be adjusted from the cab without shutting down the windrower. A readout on the Harvest Performance Tracker (HPT) display indicates HEADER HEIGHT (A) and HEADER ANGLE (B).

IMPORTANT:

- Changing the header angle affects the header float because it has the effect of making the header lighter or heavier. Adjust the float as required. For instructions, refer to *Setting Float, page 191*.
- To prevent excessive guard breakage when conditions are suited to the lighter float (e.g., rocky), do **NOT** use ground speed lever (GSL) TILT CONTROLS (C) and (D) while in motion. Instead, use HEADER HEIGHT CONTROLS (E) and (F).

Adjust the header angle as follows:

- To decrease (flatten) the header angle, operate HEADER TILT UP switch (C) on the GSL to retract the cylinder.
- To increase (steepen) the header angle, operate HEADER TILT DOWN switch (D) on the GSL to extend the cylinder.

NOTE:

HEADER TILT switches (C) and (D) can be locked out to prevent unintentional header angle changes when pressing HEADER HEIGHT control switches (E) and (F). For instructions, refer to *3.17.7 Activating Control Locks, page 102*.

Checking Self-Locking Center-Link Hook

Periodically check the operation of the hook locking mechanism to ensure that it is working properly.

DANGER

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

1. If a header is attached to the windrower, lower the header to the ground.
2. Shut down the engine, and remove the key from the ignition.
3. Pull up on handle (A) to release the locking device, and lift the hook off the header pin.

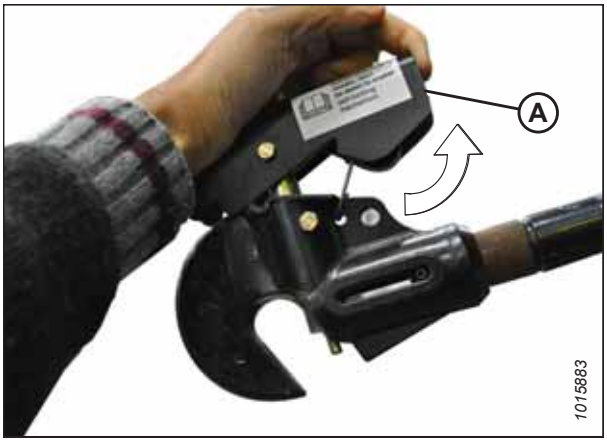


Figure 4.170: Center-Link

4. Lower handle (A) into the locked position.
5. Push up on lock pin (B) only (not actuator rod [C]). The handle should catch on the casting and the pin should **NOT** lift.

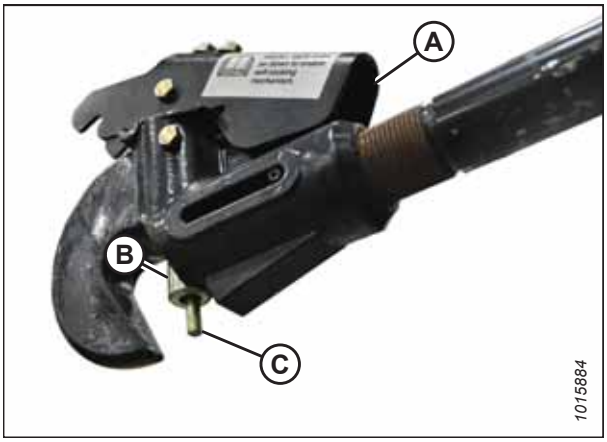


Figure 4.171: Center-Link Hook

6. Push up on the actuator rod. The lock pin should lift with the handle.



Figure 4.172: Center-Link Hook

4.6.5 Setting Header Height

Header height is adjusted by raising or lowering the header with the HEADER UP (A) or HEADER DOWN (B) switches on the ground speed lever (GSL).

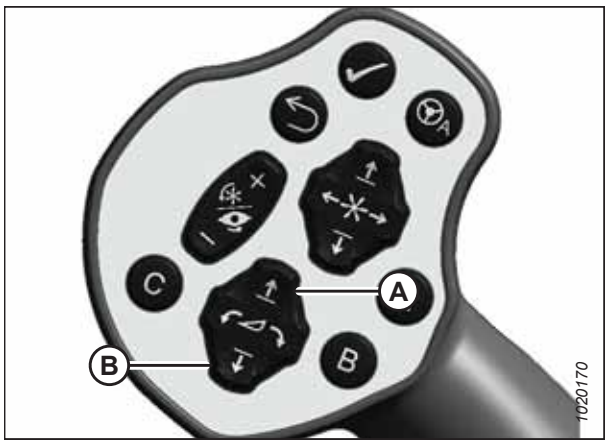


Figure 4.173: GSL

HEADER HEIGHT (A) is always displayed on the Harvest Performance Tracker (HPT) screen.

NOTE:

Draper headers: Settings for the fore-aft, reel height, and header height are limited as follows to prevent the reel from contacting the cab roof:

- If you increase header height (A) to greater than 7.0 while reel fore-aft (B) is greater than 5.0, and reel height (C) is greater than 7.0, the reel fore-aft will automatically move forward to 5.0 or less to avoid contacting the cab roof.
- After the reel fore-aft automatically moves, you will then have to manually adjust the fore-aft.
- For instructions about operating the reel fore-aft, refer to *4.7.2 Adjusting Reel Fore-Aft Position, page 203*.

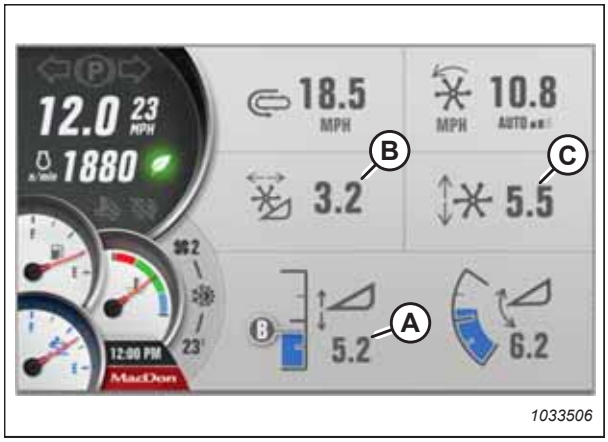


Figure 4.174: HPT Display – Draper Header Shown

4.6.6 Double Windrowing

The Double Windrow Attachment (DWA) allows two conditioned windrows from an A40DX Auger Header to be laid down side-by-side for faster pickup.

Conditioned crop is deposited onto the side delivery draper and delivered beside the windrower.

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 the MacDon Double Windrow Attachment (DWA) for M1 Series Windrowers manual for complete setup, operating, and maintenance instructions. The manual is shipped with the DWA kit.

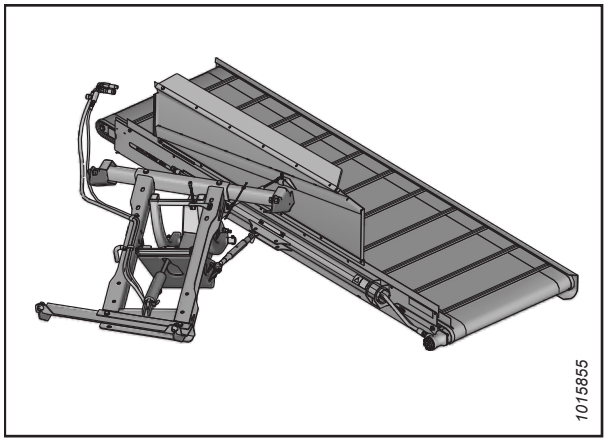


Figure 4.175: DWA

Double Windrow Attachment Deck Position

1. Raise and lower the Double Windrow Attachment (DWA) deck with REEL UP (A) and REEL DOWN (B) switches on ground speed lever (GSL), or on the operator's console.

   NOTE:

   This can also be done with the One-Touch-Return. For instructions, refer to *One-Touch-Return Buttons, page 77*.



Figure 4.176: GSL

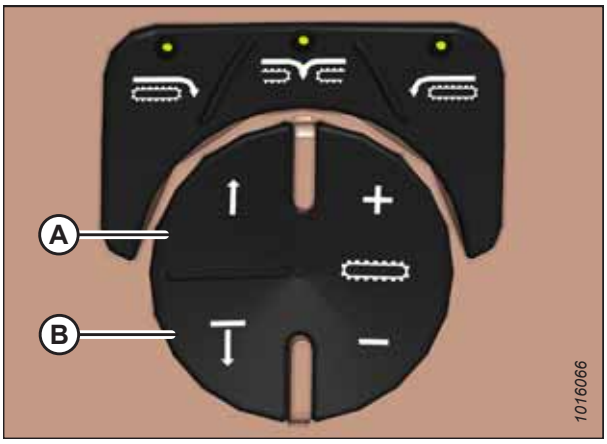


Figure 4.177: Operator's Console Draper Controls

Double Windrow Attachment Conveyor Speed

The Double Windrow Attachment (DWA) conveyor speed is adjustable from the operator's console. Press button (A) to increase the speed or button (B) to decrease the speed.

NOTE:

When the DWA is attached, the conveyor speed adjustment buttons also control header draper speeds.

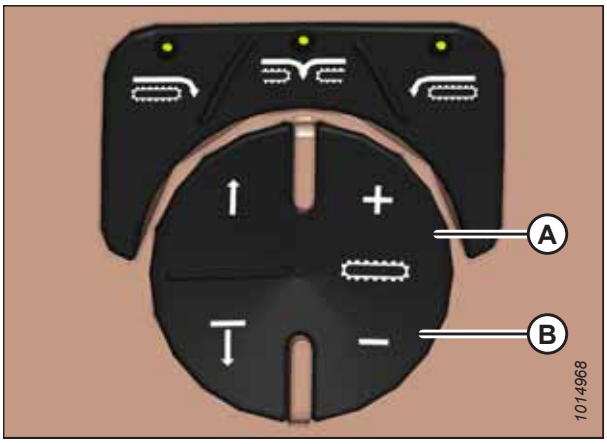


Figure 4.178: Operator's Console

The DWA conveyor speed is also adjustable with the reel fore-aft switches on the GSL. Press switch (A) to increase speed or switch (B) to decrease speed.

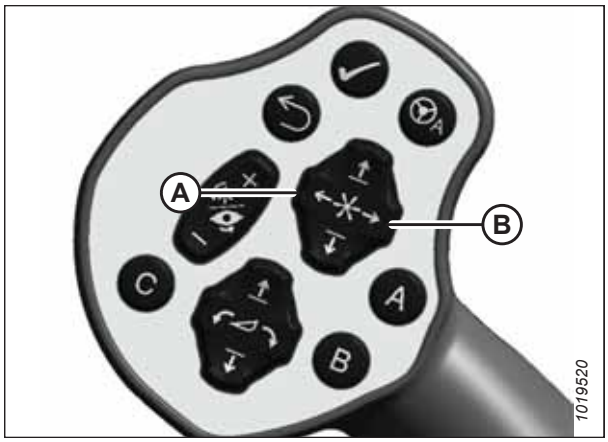


Figure 4.179: GSL

4.6.7 One-Touch-Return

One-Touch-Return allows you to choose and apply three presets to the A, B, and C keys (A) on the ground speed lever (GSL). The presets can be set to control variables such as height, tilt, reel position, and speeds. For instructions, refer to *One-Touch-Return Buttons, page 77*.



Figure 4.180: GSL

4.6.8 Adjusting Header Raise and Lower Rates

The header raise and lower rates control how fast a header is raised or lowered. Adjust the speed if it is not satisfactory.

1. On the Harvest Performance Tracker (HPT) press soft key 5 (A) to display the menu.
2. Use HPT scroll knob (B) to place the red cursor over SETTINGS icon (C), and press knob (B) to select.

   NOTE:

   In addition to the HPT scroll knob (B), the scroll wheel on the ground speed lever (not shown) can be used to highlight and select items on the HPT display.

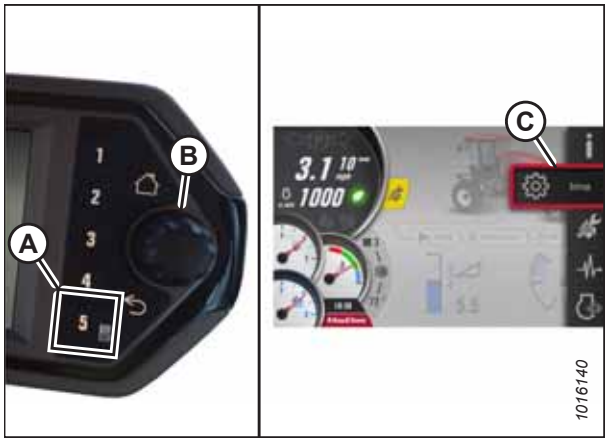


Figure 4.181: Opening the Main Menu

3. Use the HPT scroll knob to move the red cursor to HEADER SETTINGS icon (A).



Figure 4.182: Header Settings Icon

4. Press the HPT scroll knob. HEADER SETUP page (A) appears.

   NOTE:

   The F4 shortcut button on the operator's console also will display the HEADER SETUP page.

5. Scroll to RAISE LOWER RATES (B), and press SELECT. A menu for adjusting header lower/raise rates opens with the last header setting as the default starting point.



Figure 4.183: Set-Up Header Menu List

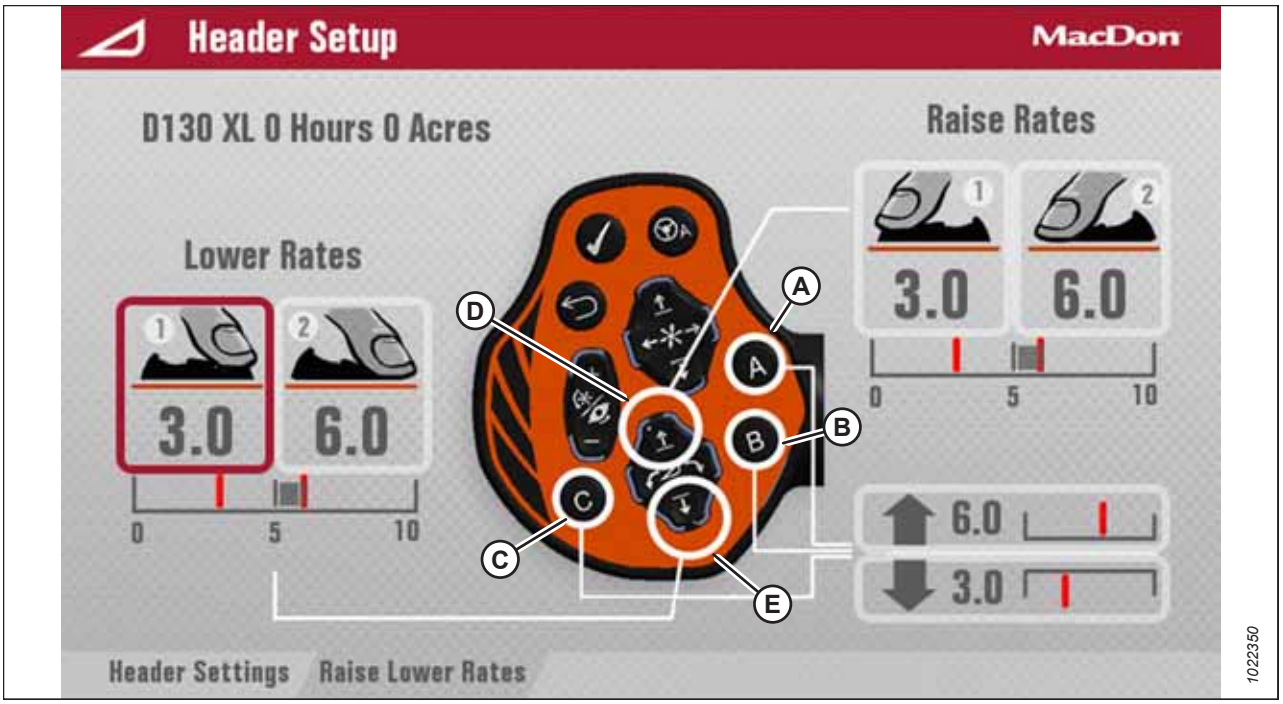


Figure 4.184: Header Raise and Lower Rates

6. The header lift/lower rate is adjustable in two stages: a half button press adjusts stage one (slow rate); a full button press adjusts stage two (fast rate).

   Scroll through the RAISE FIRST/RAISE SECOND and LOWER FIRST/LOWER SECOND menu selections, and program the following GSL buttons:

   - HEADER RAISE (D): half button press adjusts stage one (slow rate); full button press adjusts stage two (fast rate)
   - HEADER LOWER (E): half button press adjusts stage one (slow rate); full button press adjusts stage two (fast rate)
   - ONE-TOUCH-RETURN buttons (A), (B), and (C): trigger header raise or lower presets

4.7 Operating with D1X or D1XL Series Draper Header

For attachment instructions, refer to *Attaching D1X or D1XL Series Draper Header, page 167*.

4.7.1 Header Position

The header height, tilt angle, and float adjustments are used to optimize cutting characteristics for specific crops and conditions.

For procedures for controlling header height, header tilt, and float, refer to *4.6 Operating Header, page 189*.

4.7.2 Adjusting Reel Fore-Aft Position

Optimize header performance based on crop type and conditions by adjusting the reel fore-aft position. The reel fore-aft position is adjusted with the multi-function switches on the ground speed lever (GSL).

1. Press and hold the switch for the desired movement: FORWARD (A) or AFT (B).

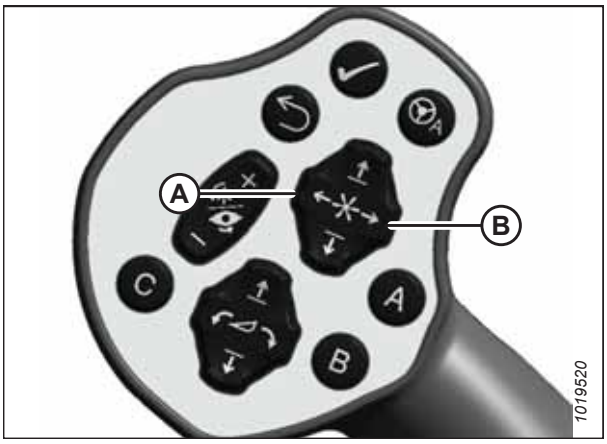


Figure 4.185: Ground Speed Lever

Settings for the fore-aft, reel height, and header height are limited as follows to prevent the reel from colliding with the cab roof:

- If reel height (C) and header height (A) are both greater than 7.0, reel fore-aft (B) will be limited to 5.0. If you try to move the reel fore-aft so the value would exceed 5.0, message (D) ("IMPORTANT: Reel position limited to prevent contacting roof") will show on the Harvest Performance Tracker (HPT) display. If you want a reel fore-aft value of greater than 5.0, lower the reel height and/or header height to a value of 7.0 or less.
- The reel fore-aft will automatically move forward to 5.0 or less If you increase the header height to greater than 7.0 while the reel fore-aft is greater than 5.0, and the reel height is greater than 7.0.

After the reel fore-aft automatically moves, you will then have to manually adjust the fore-aft.



Figure 4.186: HPT Display – Draper Header Shown

4.7.3 Adjusting Reel Height

Optimize header performance based on crop type and conditions by adjusting the reel height position. The reel height position is adjusted with the multi-function switches on the ground speed lever (GSL).

1. Press and hold the switch for the desired movement of the reel: UP (A) or DOWN (B).

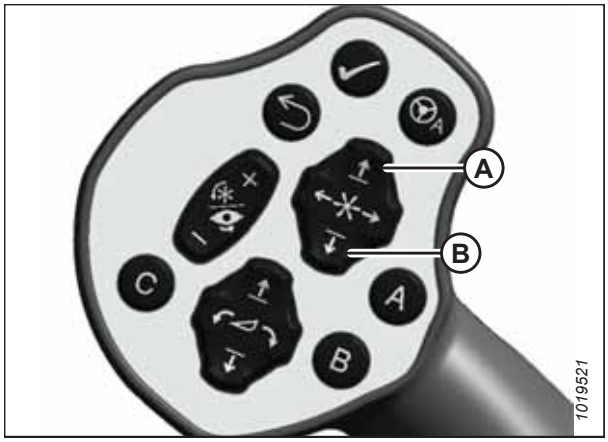


Figure 4.187: Ground Speed Lever

Settings for the fore-aft, reel height, and header height are limited as follows to prevent the reel from contacting the cab roof:

- If you increase the reel height (C) to greater than 7.0 while the reel fore-aft (B) is greater than 5.0, and the header height (A) is greater than 7.0, the reel fore-aft will automatically move forward to 5.0 or less to avoid colliding with the cab roof.
- After the reel fore-aft automatically moves, you will then have to manually adjust the fore-aft.
- For instructions about operating the reel fore-aft, refer to *4.7.2 Adjusting Reel Fore-Aft Position, page 203*.

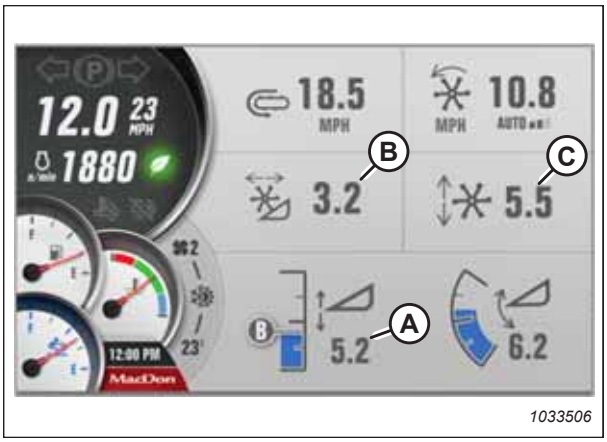


Figure 4.188: HPT Display – Draper Header Shown

4.7.4 Leveling Header

The windrower lift linkages are factory-set to provide the proper header level, and should not normally require adjustment. If leveling is required, follow these steps:

DANGER

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

1. Before adjusting the header level, remove the float spring tension to ensure that lift linkages are not affected by the springs.
2. Press rotary scroll knob (A) on the Harvest Performance Tracker (HPT) to display the QuickMenu system.
3. Rotate scroll knob (A) to highlight header float symbol (B) and press the scroll knob to select. The SET-UP FLOAT page displays.

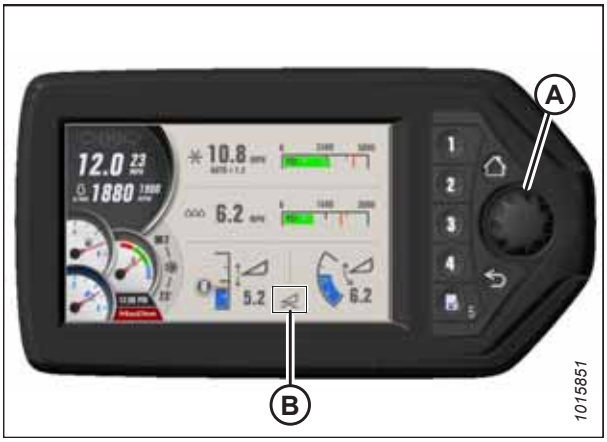


Figure 4.189: HPT Display

4. Press soft key 3 (A) to remove the float.



Figure 4.190: HPT Display

5. Park the windrower on level ground.
6. Press header raise button (A) on the ground speed lever (GSL) until the header reaches maximum height. Continue to hold the header raise button for 3–4 seconds to rephase the lift cylinders.

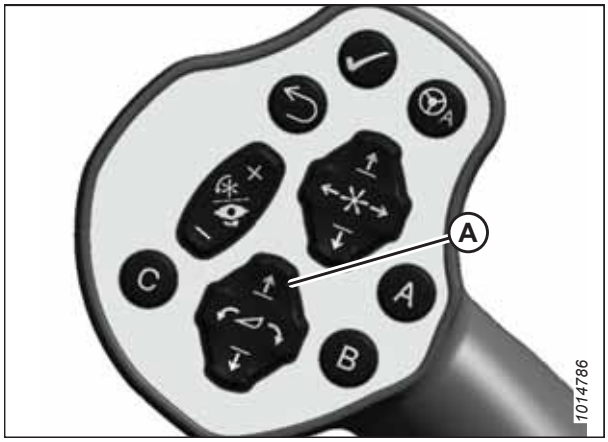


Figure 4.191: GSL

7. Lower the header to approximately 150 mm (6 in.) off the ground.
8. Ensure that member (A) is against link (B).
9. Shut down the engine, and remove the key from the ignition.
10. Measure the distance to the ground at both ends of the header to determine if the header is level.

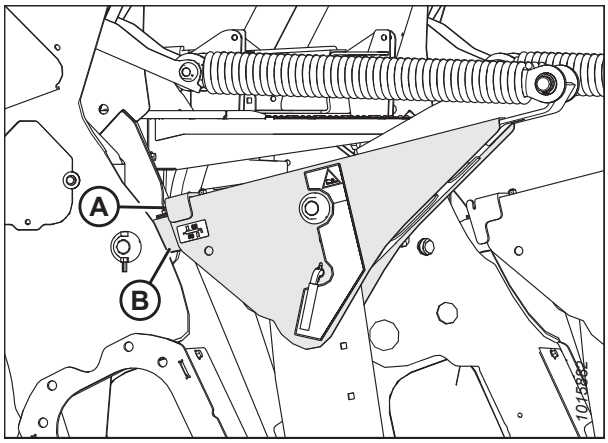


Figure 4.192: Lift Linkage

DANGER

Ensure that all bystanders have cleared the area.

11. If adjustment is necessary, start the engine and resume the float. Lower the header onto the ground until member (A) lifts away from link (B) on both sides.
12. Shut down the engine, and remove the key from the ignition.

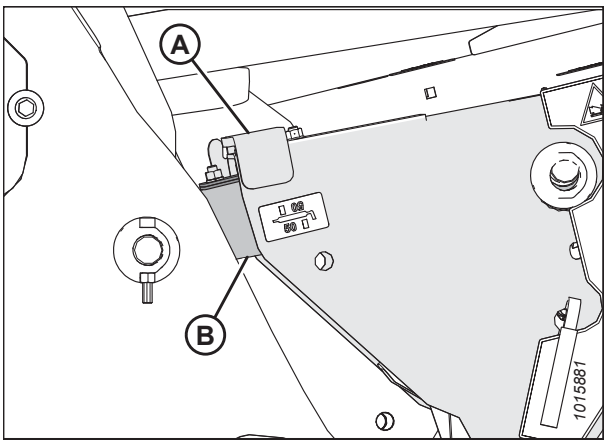


Figure 4.193: Lift Linkage

13. On the side that is higher, remove nut, washer, and bolt (A) that attaches shims (B) to the linkage.
14. Remove one or both of shims (B) and reinstall hardware (A).

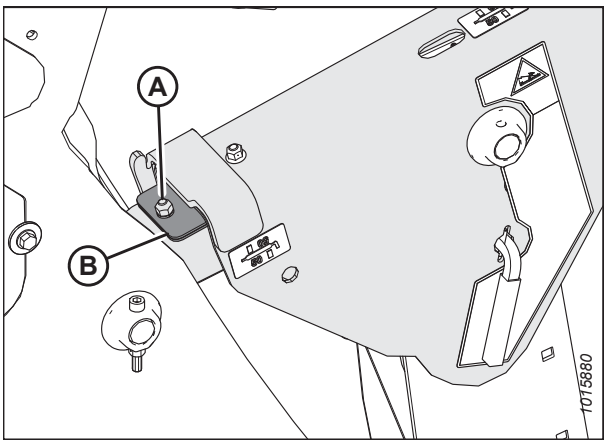


Figure 4.194: Lift Linkage Shims

DANGER

Ensure that all bystanders have cleared the area.

15. Repeat Step *6, page 206* to Step *10, page 206* to rephase the cylinders and check the header level.
16. If additional adjustment is required, repeat Step *11, page 207* to Step *14, page 207*, and install one of the removed shims on the opposite linkage.
17. Reset the header float. Refer to *Setting Float, page 191*.

NOTE:

Additional shims are available from your Dealer.

4.7.5 Adjusting Reel Speed

Reel speed is displayed in either rpm, mph, or km/h (depending on the global units selection). The default reel speed is 60 rpm and can be set to auto or manual mode.

- AUTO mode: Minimum reel speed and operating reel speed differential relative to ground speed are set, and reel speed is maintained relative to ground speed. For instructions, refer to *Setting Reel Speed in Auto Mode, page 208*.
- MANUAL mode: Reel speed is set and is maintained regardless of ground speed. For instructions, refer to *Setting Reel Speed in Manual Mode, page 209*.

NOTE:

Both speed modes work with the One-Touch-Return feature. For example, button A on the GSL can be set for MANUAL mode and button B can be set for AUTO mode. For instructions, refer to *One-Touch-Return Buttons, page 77*.

Setting Reel Speed in Auto Mode

This adjustment requires the header to be in operation.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.195: Header Run Screen 1

2. Press scroll knob (A) on the Harvest Performance Tracker (HPT) or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu system.

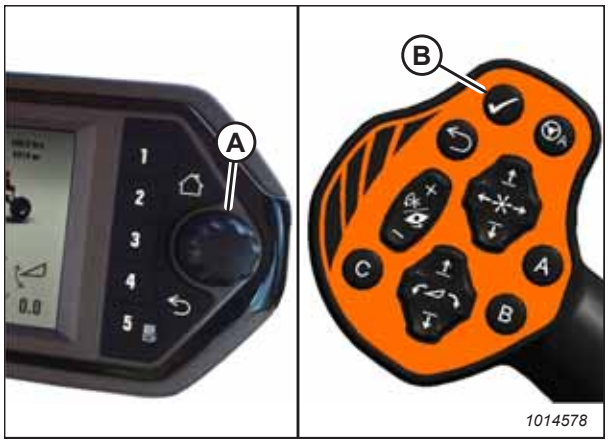


Figure 4.196: HPT Scroll Knob and GSL Select Button

3. Turn knob to scroll to REEL setting (A) on the QuickMenu, and press knob to select it. The next page opens.

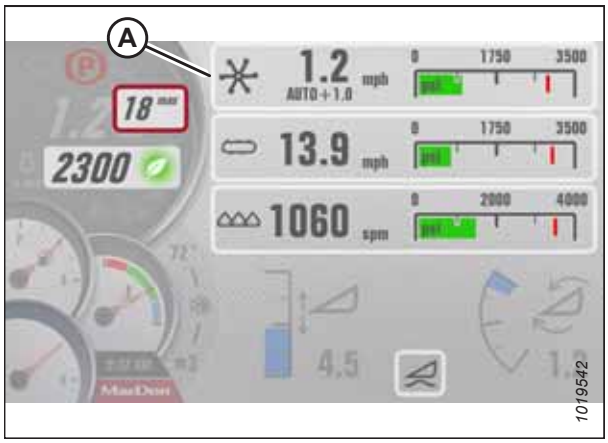


Figure 4.197: Header QuickMenu

4. Scroll to mode field (A) and select it.
5. Scroll in the pop-up window to AUTO and select it.

   NOTE:

   In AUTO mode, the speed is displayed in km/h or mph (B) and cannot be changed.

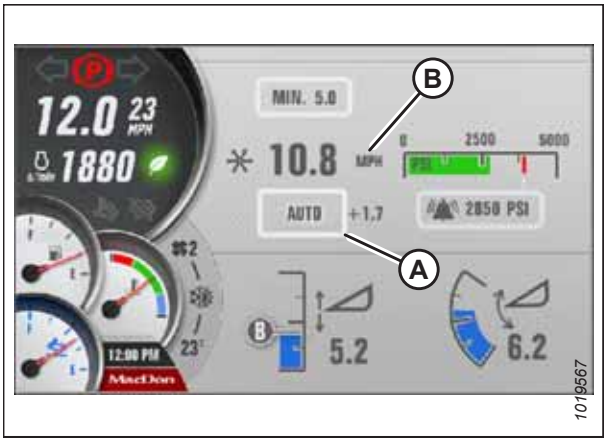


Figure 4.198: Draper Header Reel Page

6. Scroll to and select MINIMUM REEL SPEED setting (A) (this setting is grayed out in manual mode).
7. Turn the scroll knob to adjust the reel minimum speed to 1.6–8 km/h (1–5 mph) with 5 km/h (3.0 mph) as the default. Press the scroll knob to select the desired setting.
8. Scroll to INDEX value (C) and select it.
9. Turn the scroll knob to set the index value. The index range is +/- 8 km/h (5 mph) (zero, that is equal to ground speed, is the default). Press the scroll knob to select the desired setting.

   NOTE:

   The reel operates at the reel minimum speed when the ground speed is less than the set minimum speed. The minimum reel speed is displayed (A) and MIN will replace AUTO (B) +1.7 (C).

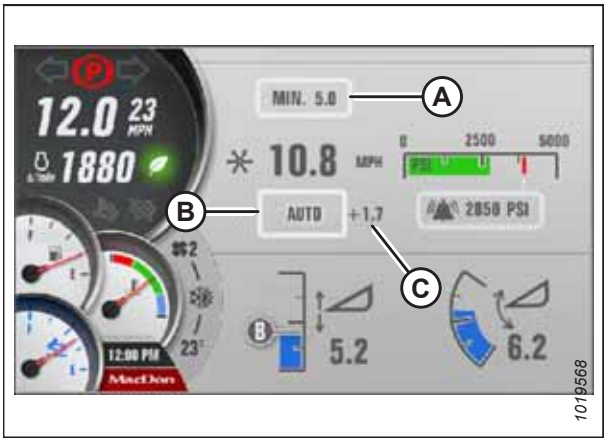


Figure 4.199: Draper Header Reel Page

Setting Reel Speed in Manual Mode

This adjustment requires the header to be in operation.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.200: Header Run Screen 1

2. Press scroll knob (A) or SELECT button (B) on the ground speed lever (GSL) to display the QUICKMENU PAGE.

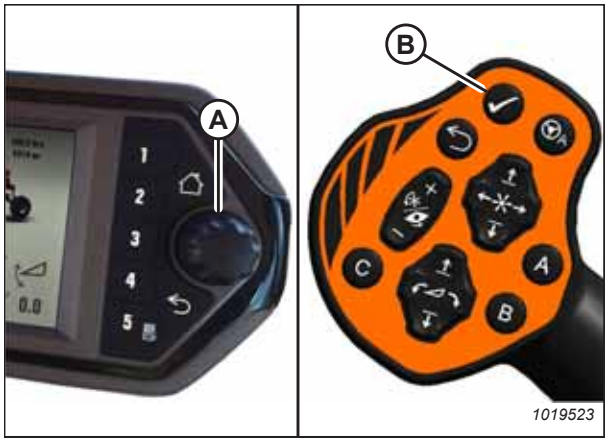


Figure 4.201: HPT and GSL

3. Turn the knob to scroll to REEL setting (A) on QuickMenu, and press the knob to select it. The next page opens.

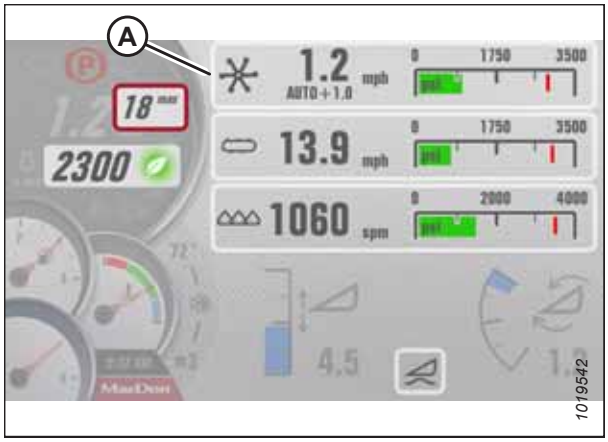


Figure 4.202: Header QuickMenu

4. Turn the scroll knob to mode window (A) and press the scroll knob to select it.
5. Scroll in the pop-up window to MANUAL and press the scroll knob to select it.
6. Scroll to units (B) and select the desired unit (rpm, mph, or km/h).
7. Proceed to the next step to adjust reel speed (C).



Figure 4.203: Draper Header Reel Page

8. Use reel speed switches (A) on GSL to set reel speed. The desired speed increases 1 rpm (or 0.1 mph or 0.2 km/h) per momentary press, or continuous scrolling if switch is pressed and held.

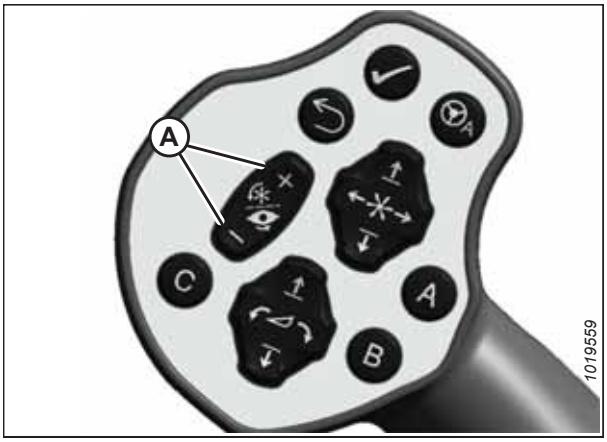


Figure 4.204: GSL

Adjusting Reel Alarm Pressure

Adjusting the reel alarm allows the Operator to set an alert to inform them that the reel is operating above the desired pressure. A lower setting will cause the alarm to be set off more often; a higher setting will allow the alarm to be set off less frequently. This adjustment requires the header to be in operation.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.205: Header Run Screen 1

2. Press scroll knob (A) on the Harvest Performance Tracker (HPT) or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu system.

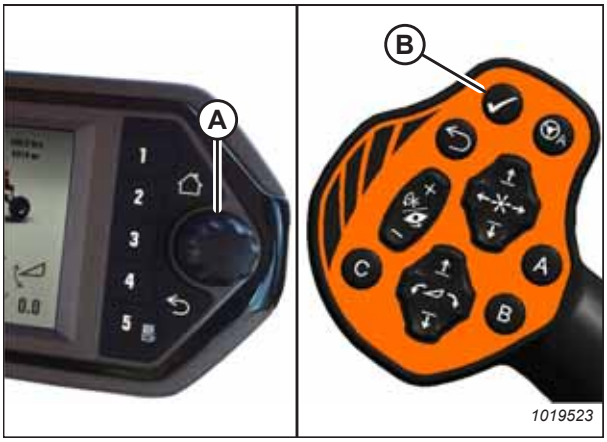


Figure 4.206: HPT Scroll Knob and GSL Select Button

3. Turn the knob to scroll to REEL setting (A) on QuickMenu, and press the knob to select it. The next page opens.

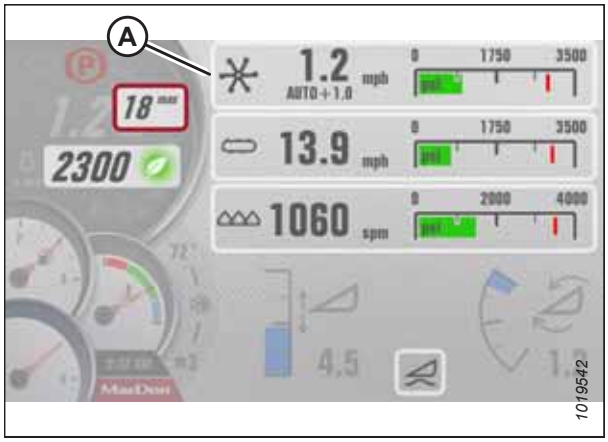


Figure 4.207: Header QuickMenu

4. Turn the scroll knob to highlight reel pressure ALARM (A), and press the knob to select it.
5. Turn the knob to change the ALARM set-point in window (A). Scrolling past the highest setting turns the alarm off. When the alarm point is off, the digital value is replaced with three dashed lines.
6. Adjust the reel alarm pressure set-point to the desired value, and press the knob to select it.

   NOTE:

   The factory setting is 19,995 kpa (2900 psi).



Figure 4.208: Draper Header Reel Page

4.7.6 Adjusting Draper Speed

Draper speed is displayed in mph or km/h (depending on the global units selection); the default is rpm, and can be set to auto or manual mode.

- AUTO mode: Draper speed is maintained relative to ground speed. For instructions, refer to *Setting Draper Speed in Auto Mode, page 213*.
- MANUAL mode: Draper speed is manually set and is maintained independently of ground speed. For instructions, refer to *Setting Draper Speed in Manual Mode, page 214*.

NOTE:

Both speed modes work with the One-Touch-Return feature. For example, button A on the GSL can be set for MANUAL mode and button B can be set for AUTO mode. For instructions, refer to *One-Touch-Return Buttons, page 77*.

Setting Draper Speed in Auto Mode

This adjustment requires the header to be in operation.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.209: Header Run Screen 1

2. Press scroll knob (A) on the Harvest Performance Tracker (HPT) or SELECT button (B) on the ground speed lever (GSL) while in any run screen to display the QuickMenu system.

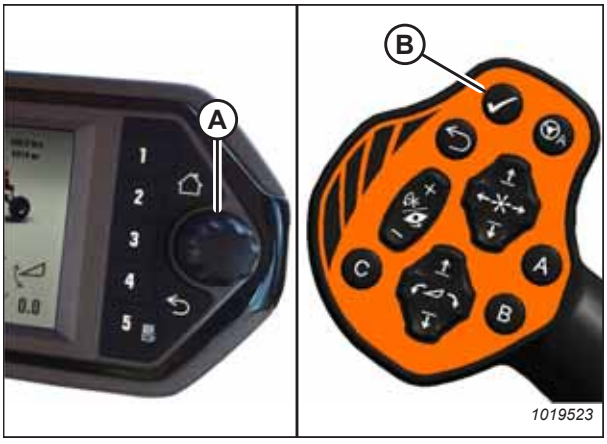


Figure 4.210: HPT Scroll Knob and GSL Select Button

3. Turn knob and scroll to DRAPER setting (A) on the QuickMenu, and press the knob to select it. The next page opens.

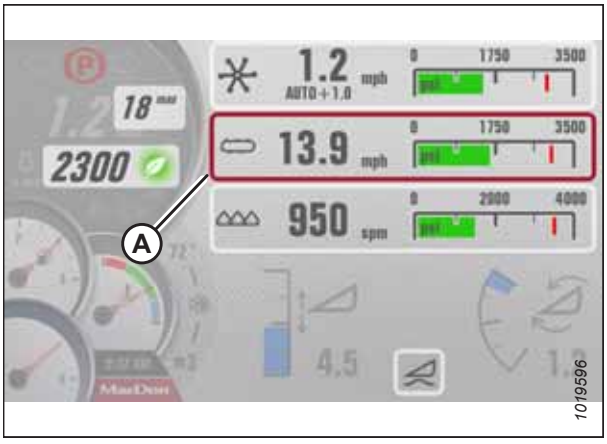


Figure 4.211: Header QuickMenu

4. Scroll to mode window (A) and select it.
5. Scroll in the pop-up window to AUTO and select it.

   NOTE:

   In AUTO mode, the speed is displayed in km/h or mph (B).

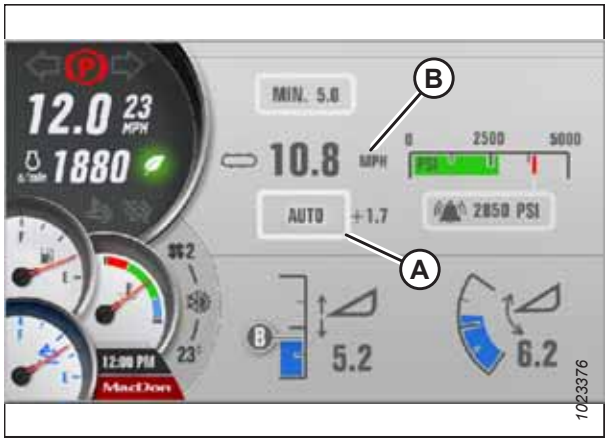


Figure 4.212: Draper Header Draper Page

6. Scroll to and select MINIMUM DRAPER SPEED setting (A) (this setting is grayed out in manual mode).
7. Turn the scroll knob to adjust draper minimum speed to 1.6–8 km/h (1–5 mph) with 5 km/h (3.0 mph) as the default). Press the knob to select the desired setting.
8. Scroll to INDEX value (C) and select it.
9. Turn the scroll knob to set the index value. The index range is +/- 8 km/h (5 mph) (zero, i.e. equal to the ground speed, is the default). Press the knob to select the desired setting.

   NOTE:

   The draper operates at MINIMUM SPEED when the ground speed plus the reel index value is less than the set minimum speed. The minimum reel speed is displayed (A) and MIN will replace the AUTO +1.7 (B).

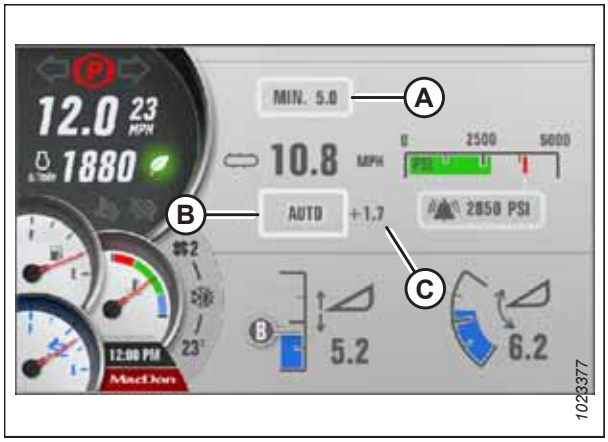


Figure 4.213: Draper Header Draper Page

Setting Draper Speed in Manual Mode

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.214: Header Run Screen 1

2. Press scroll knob (A) on the Harvest Performance Tracker (HPT) or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu page.

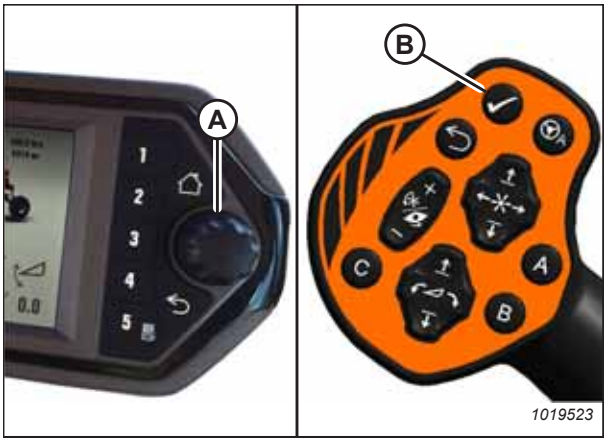


Figure 4.215: HPT Scroll Knob and GSL Select Button

3. Turn the knob to scroll to DRAPER setting (A) on QuickMenu, and press the knob to select it. The next page opens.



Figure 4.216: Draper Header QuickMenu

4. Turn the scroll knob to the mode window and press the scroll knob to select it.
5. Scroll in the pop-up window to MANUAL (A) and press the scroll knob to select it.



Figure 4.217: Draper Header Draper Page

6. Set the draper speed with the console controls as follows:
   a. Press and quickly release DRAPER SPEED switch (A) to increase the draper speed in 0.2 km/h (0.1 mph) increments.
   b. Press and hold DRAPER SPEED switch (A) to increase the draper speed in 2 km/h (1 mph) increments.
   c. Similarly decrease draper speed with switch (B).

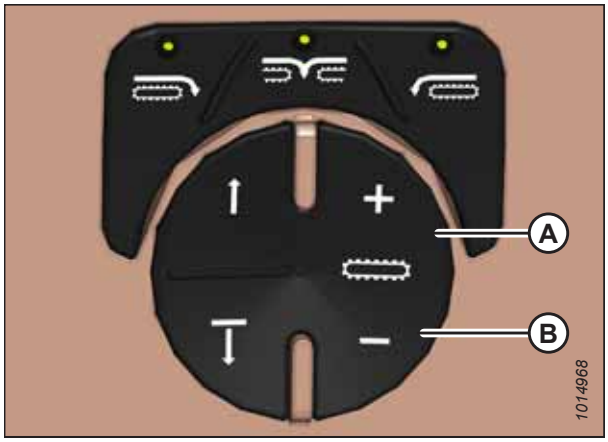


Figure 4.218: Operator's Console Draper Controls

Adjusting Draper Alarm Pressure

Adjusting the draper alarm allows the Operator to set an alert to inform them that the draper is operating above the desired pressure. A lower setting will cause the alarm to be set off more often; a higher setting will allow the alarm to be set off less frequently. This adjustment requires the header to be in operation.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.219: Header Run Screen 1

2. Press scroll knob (A) on the Harvest Performance Tracker (HPT) or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu page.

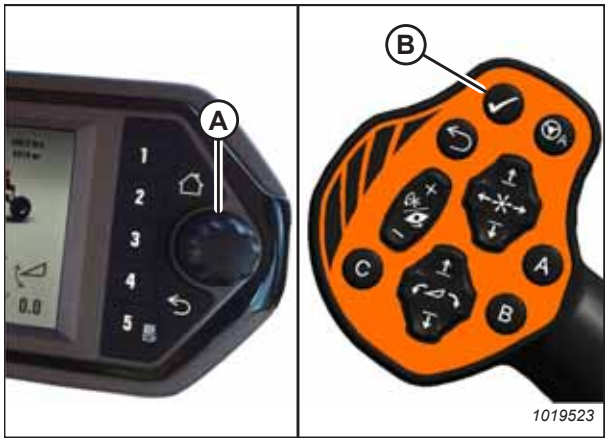


Figure 4.220: HPT Scroll Knob and GSL Select Button

3. Turn the knob to scroll to DRAPER setting (A) on the QuickMenu, and press the knob to select it. The next page opens.

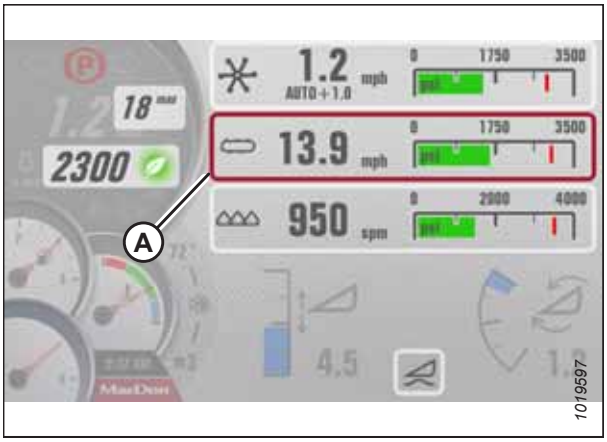


Figure 4.221: Draper Header QuickMenu

4. Scroll to DEFAULT DRAPER ALARM PRESSURE (A), and select it.
5. Change the alarm set-point by scrolling. Scrolling past the highest setting turns off the alarm. When the alarm point is off, the digital value is replaced with three dashed lines.
6. Adjust the draper alarm pressure set-point to the desired value, and press the knob to select it.

   NOTE:

   Factory setting is 19,995 kpa (2900 psi).



Figure 4.222: Draper Header Draper Page

Draper Slip Warning

A slipping draper can severely damage the draper belts. Slippage is typically caused by debris inside the draper.

If the left or right draper idler roller begins to slip, a warning tone will sound and one of the following messages (A) will appear on the Harvest Performance Tracker (HPT) screen:

- Left draper slipping. Disengage header.
- Right draper slipping. Disengage header.

The Operator cannot cancel the message.

NOTE:

A draper slip sensor failure will disable the sensor and a fault will appear on the Harvest Performance Tracker (HPT) screen. Contact your MacDon Dealer for service.

NOTE:

The draper slip warning is disabled when a double draper drive kit is installed.

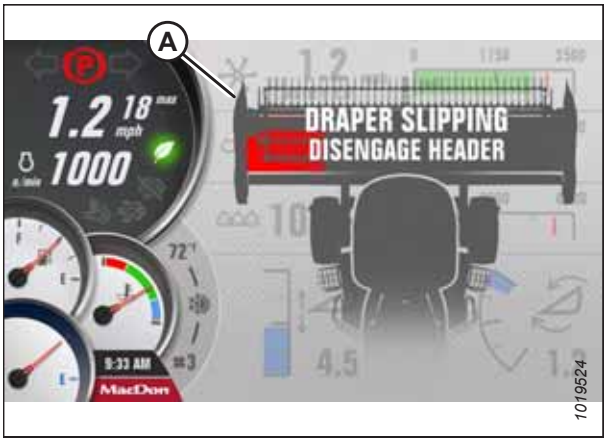


Figure 4.223: Draper Slip Warning

4.7.7 Knife Speed

The ideal cutting speed of the knife should achieve a clean cut. Crop types and conditions influence the knife and forward speeds.

Table 4.5 Knife Speed

Header Description		Knife Speed			
Type	Size m (ft.)	Minimum		Maximum	
		rpm[9]	spm[10]	rpm[9]	spm[10]
Draper with single knife	6.1 (20)	600	1200	700	1400
Draper with single knife	7.6 (25)	600	1200	700	1400
Draper with single knife	9.1 (30)	600	1200	700	1400
Draper with single knife	10.7 (35)	550	1100	650	1300
Draper with single knife	12.2 (40)	525	1050	600	1200
Draper with double knife	4.6 (15)	750	1500	950	1900
Draper with double knife	6.1 (20)	750	1500	950	1900
Draper with double knife	7.6 (25)	700	1400	850	1700
Draper with double knife	9.1 (30)	600	1200	800	1600
Draper with double knife	10.7 (35)	600	1200	700	1400

When the header is first attached to the windrower, the Harvest Performance Tracker (HPT) receives a code from the header that determines the knife speed range and the minimum speed.

The desired speed can be programmed and stored in the HPT so the knife will operate at the original set-point after the header is detached and reattached to the windrower.

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.

Setting Knife Speed

Knife speed is displayed in strokes per minute (spm).

DANGER

Ensure that all bystanders have cleared the area.

9. Revolutions per minute is the speed of knife drive box pulley
10. Strokes per minute of knife (rpm x 2)

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.224: Header Run Screen 1

2. Press scroll knob (A) on the HPT or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu page.

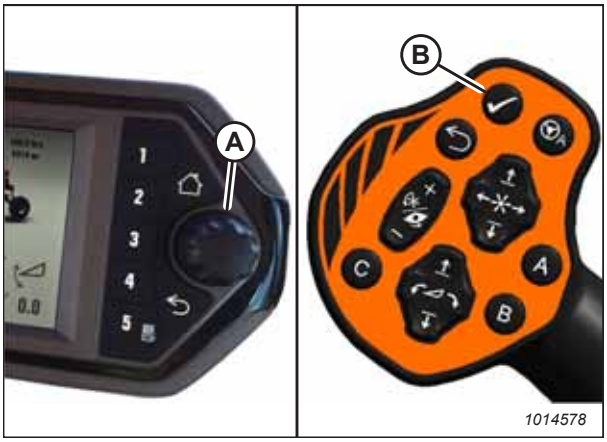


Figure 4.225: HPT Scroll Knob and GSL Select Button

3. Scroll to KNIFE setting (A) on the QuickMenu page, and select it.

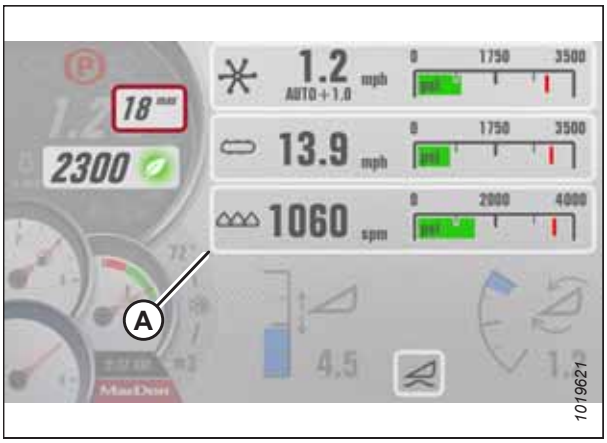


Figure 4.226: Draper Header QuickMenu

4. Scroll to and select KNIFE SPEED setting (A).
5. Adjust the knife speed using the HPT scroll knob.
6. Press the scroll knob to select.



Figure 4.227: Setting Knife Speed

Adjusting Knife Alarm Pressure – Draper Header

Adjusting the knife alarm allows the Operator to set an alert to inform them that the knife is operating above the desired pressure. A lower setting will cause the alarm to be set off more often; a higher setting will allow the alarm to be set off less frequently. This adjustment requires the header to be in operation.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.228: Header Run Screen 1

2. Press scroll knob (A) on the HPT, or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu page.

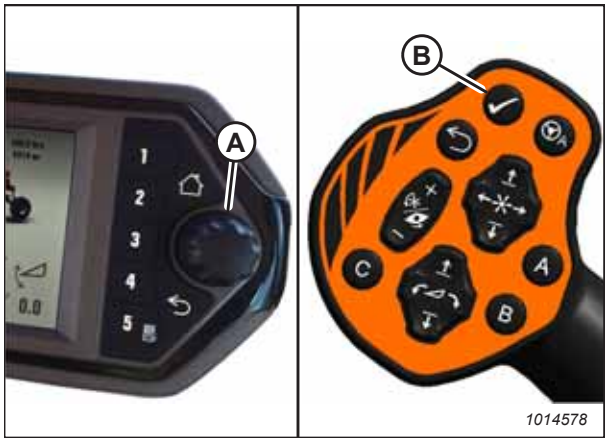


Figure 4.229: HPT Scroll Knob and GSL Select Button

3. Turn the knob to scroll to KNIFE setting (A) on the QuickMenu page, and press the knob to select it.

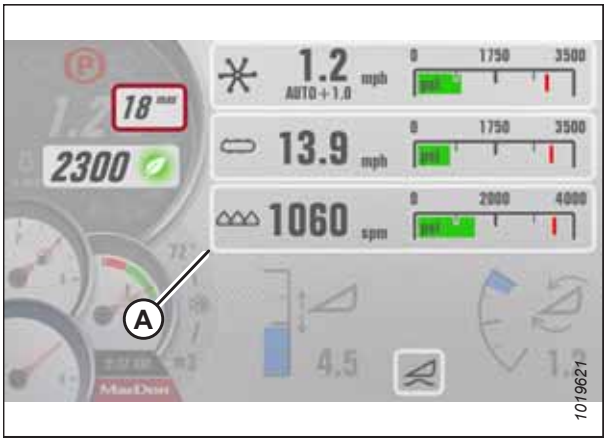


Figure 4.230: Draper Header QuickMenu

4. Scroll to knife alarm pressure setting (A), and press the knob to select it.
5. Turn the knob to change the ALARM set-point in window (A). Scrolling past the highest setting turns the alarm off. When the alarm point is off, the digital value is replaced with three dashed lines.
6. Adjust the knife alarm pressure set-point to the desired value, and press the knob to select it.

   NOTE:

   The factory setting is 23,442 kpa (3400 psi).



Figure 4.231: Adjusting Knife Alarm Pressure

Adjusting Knife Speed Alarm

The knife speed alarm informs the Operator when knife speed is outside the desired range. A lower setting will cause the alarm to be set off less often; a higher setting will cause the alarm to be set off more frequently. The header must be in operation for this adjustment.

1. If RUN SCREEN 1 is not already displayed, press soft key 1 (A) on the Harvest Performance Tracker (HPT) to display draper RUN SCREEN 1.



Figure 4.232: Header Run Screen 1

2. Press scroll knob (A) on the HPT or SELECT button (B) on the ground speed lever (GSL) to display the QuickMenu system.

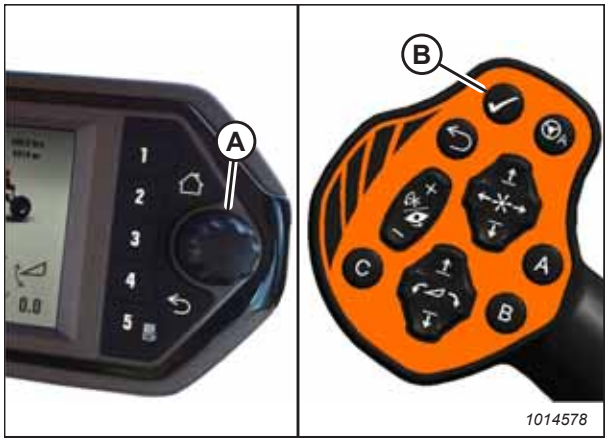


Figure 4.233: HPT Scroll Knob and GSL Select Button

3. Turn the knob to scroll to KNIFE setting (A) on the QuickMenu page, and press the knob to select it.

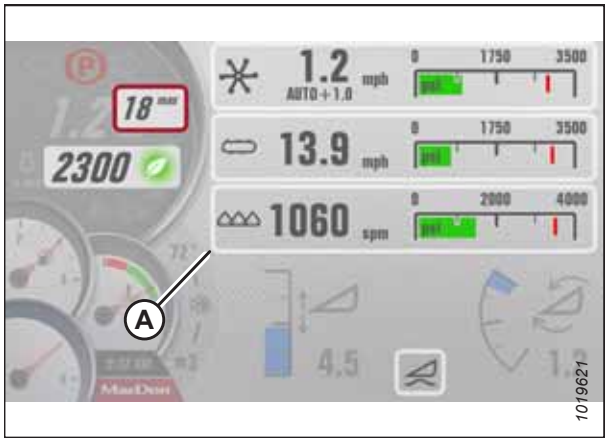


Figure 4.234: Draper Header QuickMenu

4. Scroll to and select KNIFE SPEED ALARM setting (A).

5. Turn the scroll knob to adjust the knife speed alarm as desired. The default is 70% and the minimum value is 50%. For example, at a setting of 75%, an alarm will sound when the knife speed decreases to 75% of the preset knife speed due to overload.

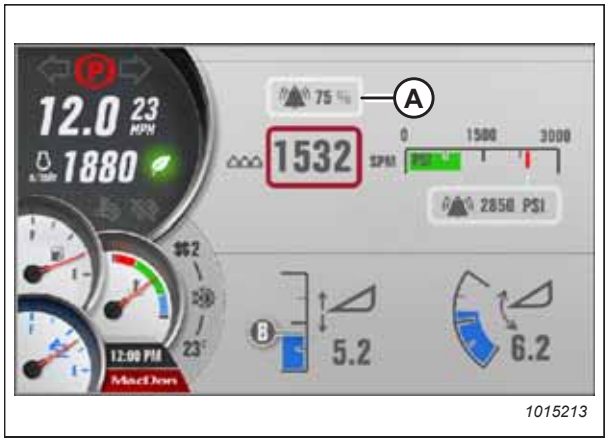


Figure 4.235: Adjusting Knife Speed Alarm

4.7.8 Deck Shift Control

On windrowers with an attached draper header equipped with the deck shift option, the Operator can choose to deliver crop to the left or right side of the header, in addition to being able to deliver the crop between the legs of the windrower.

Shifting Decks

Draper decks can be shifted from the windrower cab, as long as the header has deck shift.

DANGER

Ensure that all bystanders have cleared the area.

Shift decks as follows:

1. Engage header by pushing and holding HEADER ENGAGE switch (A) down, and pulling up on collar (B).

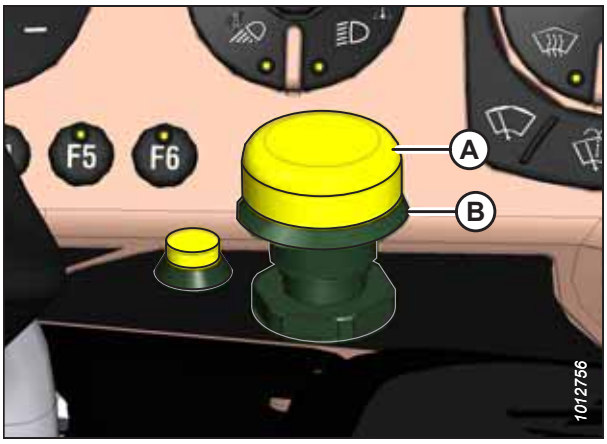


Figure 4.236: Header Engage Switch

2. Push the HEADER DECK SHIFT switch to the desired delivery position. Deck(s) will move and direction of drapers will change accordingly.

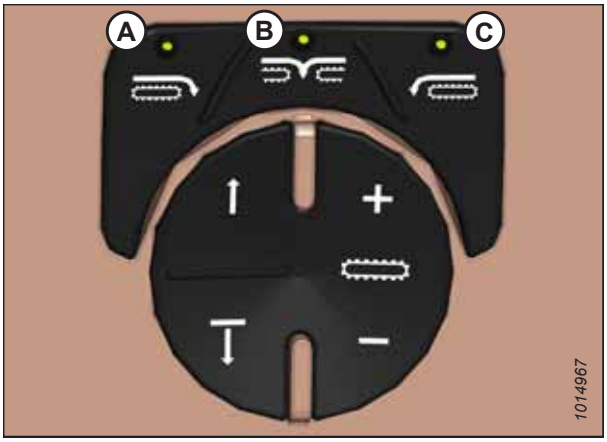


Figure 4.237: Header Deck Shift Switches

A - Right-Side Delivery **B - Center Delivery**
C - Left-Side Delivery

Setting Float Options with Deck Shift

Header float should be set for each deck position.

DANGER

Ensure that all bystanders have cleared the area.

To program a float setting for each of the deck shift positions, follow these steps:

1. Start the engine, and use HEADER TILT switches (A) and (B) on the ground speed lever (GSL) to set header tilt to the mid-range position.

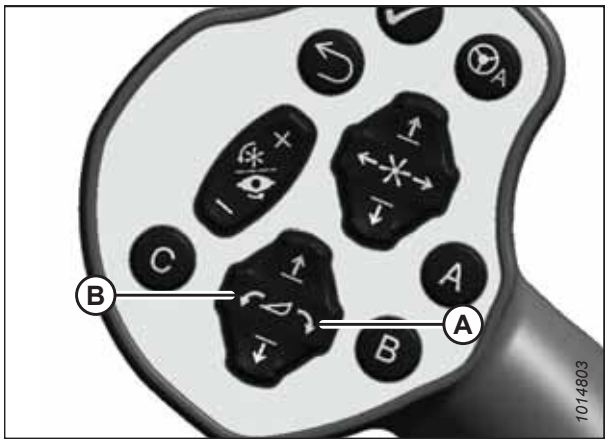


Figure 4.238: GSL

2. Engage the header by pushing and holding HEADER ENGAGE switch (A) down, and pulling up on collar (B).

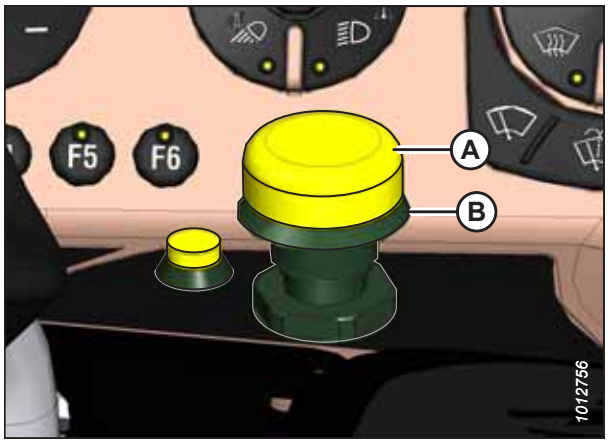


Figure 4.239: Header Engage Switch

3. Select one of the following deck positions using the DECK SHIFT switches on the operator's console:
   - Right-side delivery (A)
   - Center delivery (B)
   - Left-side delivery (C)

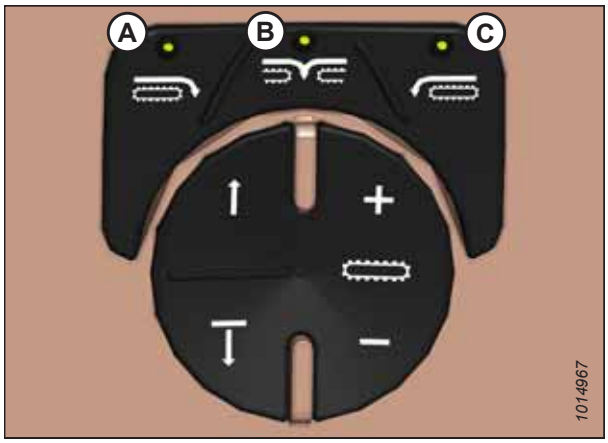


Figure 4.240: Header Deck Shift Switches

4. After the deck(s) have stopped moving, disengage the header with HEADER ENGAGE switch (A).
5. To adjust the float setting for the selected deck position refer to *Setting Float, page 191*.
6. Repeat above procedure for the other deck positions.

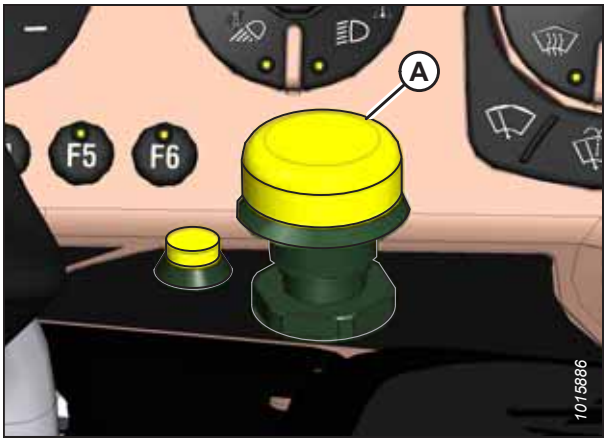


Figure 4.241: Header Engage Switch

4.7.9 Draper Header Run Screens

Two draper header-specific run screens are viewable when operating the windrower with a draper header attached. The screens are accessed by pressing the applicable soft keys on the Harvest Performance Tracker (HPT).

1. Press soft key 1 (A) to access RUN SCREEN 1.
2. Press soft key 2 (B) to access RUN SCREEN 2.



Figure 4.242: Harvest Performance Tracker

Run Screen 1

This is what Run Screen 1 looks like when operating a draper header.

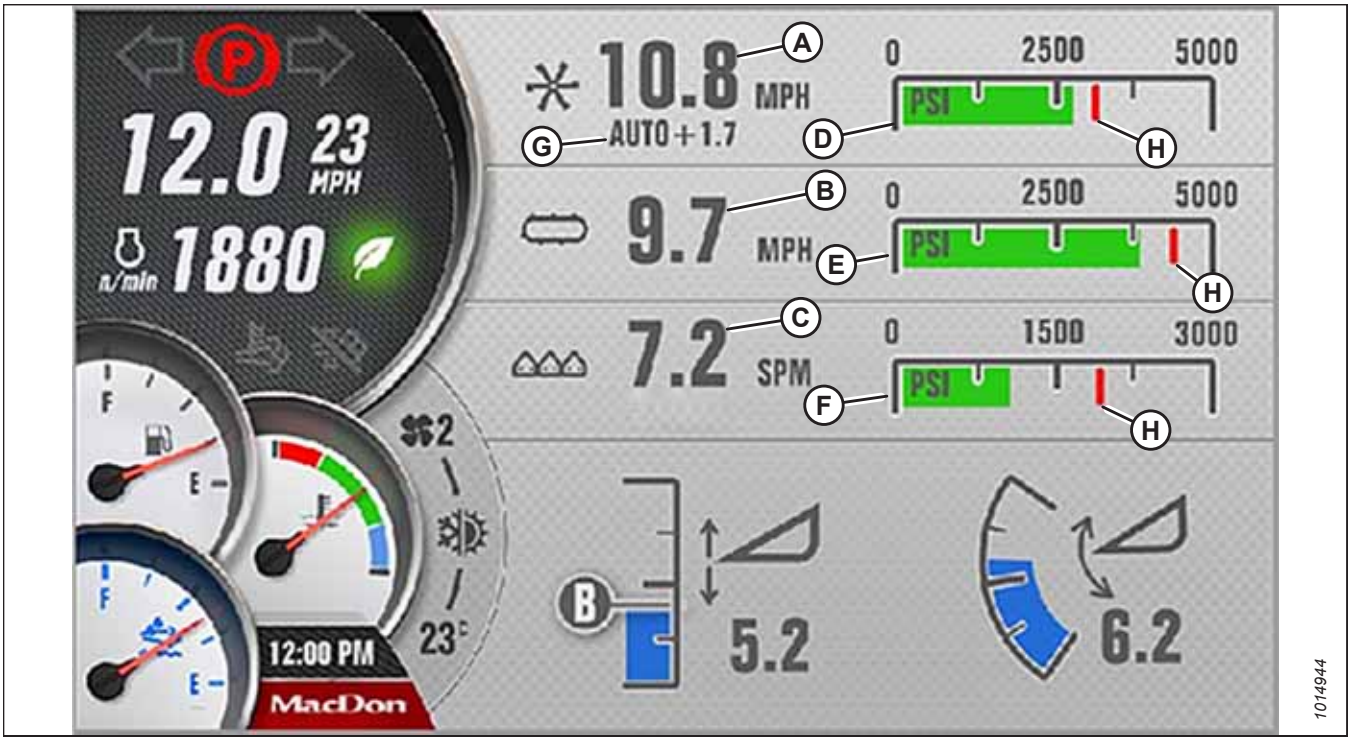


Figure 4.243: Run Screen 1 – Draper Header Display

A - Reel Speed

B - Draper Speed

C - Knife Speed

D - Reel Pressure

E - Draper Pressure

F - Knife Pressure

G - Indexing

H - Alarm Point

Run Screen 2

This is what Run Screen 2 looks like when operating a draper header.

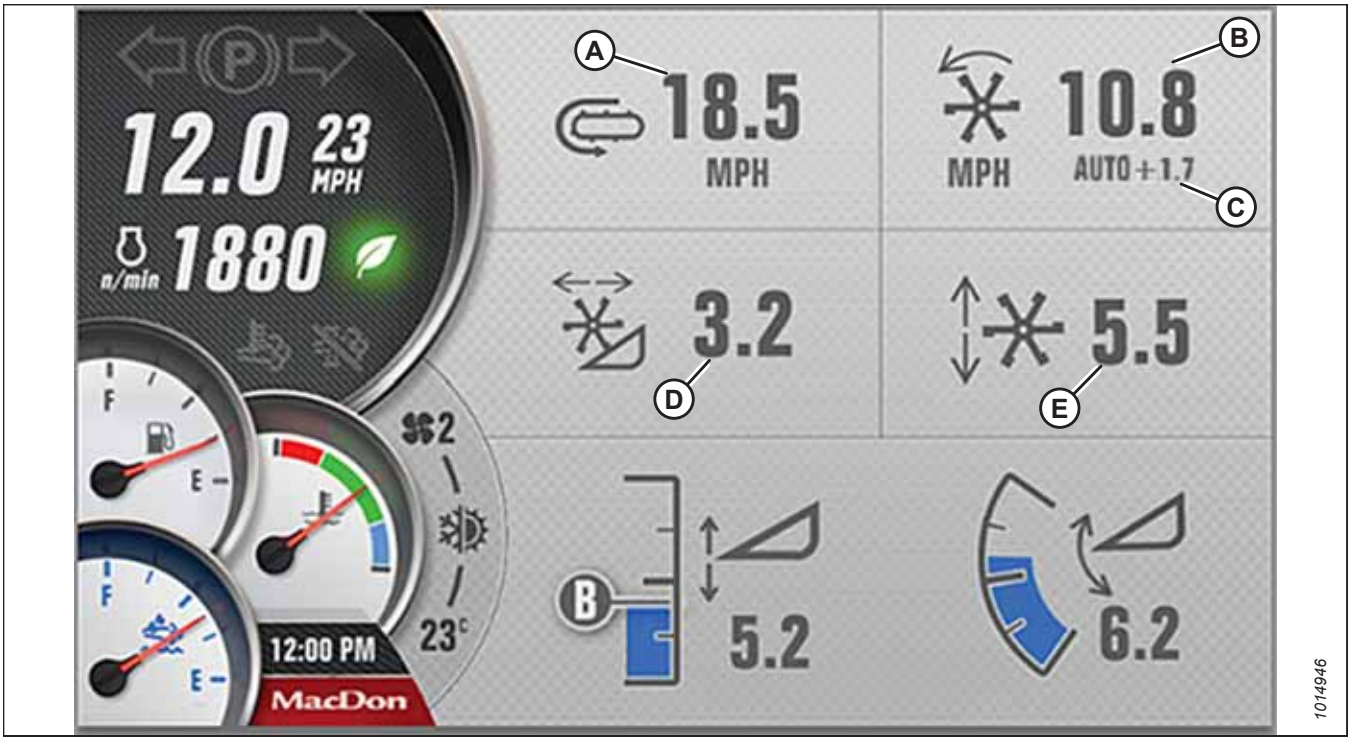


Figure 4.244: Run Screen 2 – Draper Header Display

A - Draper Speed **B - Reel Speed** **C - Indexing**

D - Reel Fore-Aft Position **E - Reel Height**

4.7.10 Swath Compressor

The swath compressor is a large, formed polyethylene sheet designed to mount to the underside of the windrower. The swath compressor is designed for use with D1X and D1XL Series Draper Headers cutting canola.

The swath compressor shapes the windrow and anchors it into the stubble behind the header to help prevent shelling and swath damage from wind. Excessive compression by a swath compressor or roller can increase losses from crop shelling, and may increase drying time; inadequate compression can leave a windrow prone to wind damage.

Swath Compressor Controls

The following topic explains how the windrower controls the swath compressor, and describes the automated raise/lower functions.

DANGER

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

Swath compressor height (A) is displayed on the Harvest Performance Tracker (HPT) with a scale from 0–10.

Swath compressor icon (B) is displayed on the HPT when the swath compressor is activated in the attachments menu. If the sensor is disabled, height number (A) is replaced by a sensor disabled icon. For instructions on enabling the sensor, refer to the Swath Compressor for M1 Series Windrowers Setup, Operation, and Parts Manual.



Figure 4.245: HPT Display

Switches (A) and (B) on the operator's console are used to adjust the position (height). Releasing the switch stops the movement.

Each momentary press of the switch changes the value by one. Pressing and holding changes the value by one increment per second.

The last position set with the console switches becomes the target height. When an adjustment is made, the display shows the target value. The system immediately adjusts to attain the target position. After the last adjustment, the display shows target value for 5 seconds then reverts to the actual position.

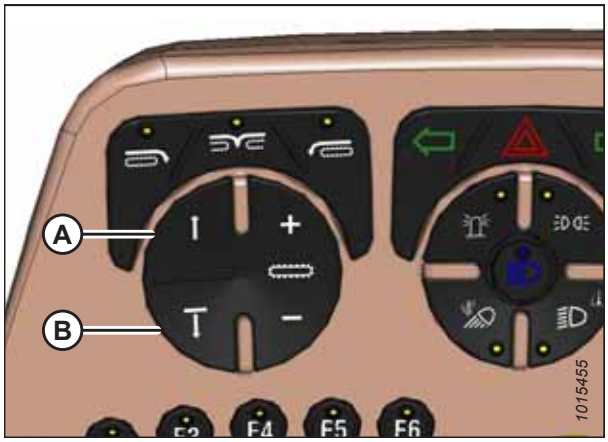


Figure 4.246: Operator's Console

Display functions

- As the swath compressor moves up or down, target value (A) changes, windrower icon (B) appears as an outline, and swath compressor icon (C) flashes.
- Windrower icon (B) is solid when the target height is achieved.
- Value (A) is 0, and image (B) is an outline with the swath compressor fully raised.
- Icon (B) is not visible and automation is disabled without a header attached. Swath compressor height can still be adjusted.



Figure 4.247: HPT Display

Swath compressor automated functions: header engaged

- The swath compressor lowers to target height at a ground speed higher than 2.5 km/h (1.6 mph).
- The swath compressor fully rises as the ground speed transitions through 1.6 km/h (1 mph) during deceleration.
- The swath compressor fully rises when the header is disengaged at a ground speed higher than 1.6 km/h (1 mph).

- An IMPORTANT message to raise the swath compressor appears on the HPT accompanied by a tone when the GSL is moved out of PARK in engine-forward mode if the swath compressor is not fully raised.

Engage the swath compressor lock when the swath compressor is not in use, or when the windrower is in engine-forward mode. For instructions, refer to *Locking and Unlocking the Swath Compressor, page 229*.

Locking and Unlocking the Swath Compressor

The swath compressor lock is located on the left cab-forward side of the swath compressor frame. When engaged, the lock prevents the compressor shield from lowering.

1. Turn lock handle (A) clockwise to engage the swath compressor lock under the following conditions:
   - Swath compressor is not in use
   - Windrower is being serviced
   - Windrower is in engine-forward mode
2. Turn handle (A) counterclockwise to disengage the lock before operating the swath compressor.

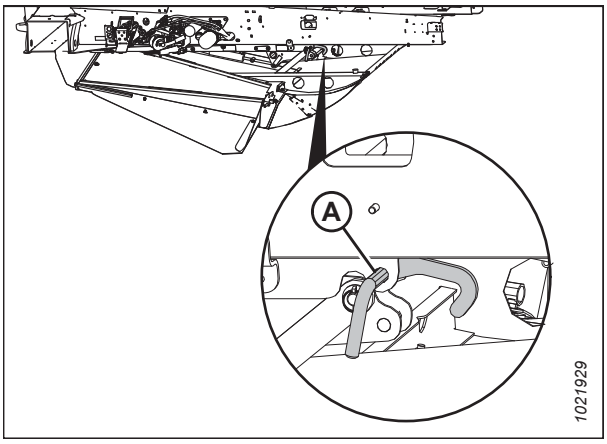


Figure 4.248: Swath Compressor Lock

Chapter 5: Maintenance and Servicing

This chapter contains the information necessary to perform routine maintenance and occasional servicing tasks on your machine. The word “maintenance” refers to scheduled tasks that help your machine operate safely and effectively; “service” refers to tasks that must be performed when a part needs to be repaired or replaced. For advanced service procedures, contact your Dealer.

5.1 Recommended Fuel, Fluids, and Lubricants

Use only the fuel, fluids, and lubricants specified in this manual.

5.1.1 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.
- Store containers 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 and keep the tank full 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 a lower shelf or on the floor.
- 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 DEF.

NOTE:

DEF will degrade over time depending on temperature and exposure to sunlight. Shelf life specifications, as defined by ISO Spec 22241-3, are the minimum expectations for shelf life when stored at constant temperatures. If stored between 12 to 32°C (10 to 90°F), shelf life will easily be one year. If the maximum temperature does not exceed approximately 24°C (75°F) for an extended period of time, the shelf life will be two years.

5.1.2 Coolant Specifications

Follow the specifications for coolant and water quality to optimize system performance and prevent damage to system components.

Recommended coolants: ASTM D-6210 and CES-14603, Peak Final Charge Global™ or Fleetguard ES Compleat™ OAT.

NOTE:

M1 Series Windrowers have Peak Final Charge Global™ coolant installed at the factory.

Mix equal parts of concentrated coolant to high quality, soft, deionized or distilled water as recommended by the supplier.

If Peak Final Charge Global™ or Fleetguard ES Compleat™ OAT is unavailable; use a coolant concentrate or prediluted coolant intended for use with heavy duty diesel engines with the following chemical and physical properties:

- Provides cylinder cavitation protection according to a 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
- Coolant **MUST** be nitrite-free and **MUST** be free of 2-Ethylhexanoic (2-EH) acid

The additive package must be part of 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 for 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.

5.1.3 Fuel Specifications

Follow the specifications for fuel quality to optimize system performance and prevent damage to the engine or fuel components.

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 5.1 Fuel Specifications

Fuel	Specification	Sulphur (by weight)	Water and Sediment (by volume)	Cetane No. °C (°F)	Lubricity
ULSD Grade No. 2	ASTM D975	0.5% maximum	0.05% maximum	40 (104) minimum	520 Microns
ULSD Grade No. 1 and 2 mix[11]	n/a	1% maximum 0.5% maximum preferred	0.1% maximum	45–55 (113–130) cold weather / high altitude	460 Microns

In extreme situations, when available fuels are of poor quality or problems exist which are particular 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.
- Diesel fuel conditioner can be used to increase the lubricity of fuels so that they meet the requirements given in Table *5.1, page 232*. Diesel fuel conditioner is available from your Dealer.

5.1.4 Lubricants, Fluids, and System Capacities

To prevent damage to the machine, do not exceed the stated capacity when filling a fluid reservoir.

WARNING

To avoid injury or death, do NOT allow ANY machine fluids to enter the body.

11. Optional when operating temperature is below 0°C (32°F).

Table 5.2 System Capacities

Lubricant/Fluid	Location	Description	Capacity
Diesel exhaust fluid (DEF)	Diesel exhaust fluid tank	Must meet ISO 22241 requirements.	49 liters (13 U.S. gallons)
Moly grease	Sliding drive legs	Lithium complex base - extreme pressure (EP2) molybdenum disulphide content: 1.5-5% (NLGI Grade: 2)	As required unless otherwise specified
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	As required unless otherwise specified
Diesel fuel	Fuel tank	Ultra low sulphur diesel (ULSD) Grade No. 2, or ULSD Grade No. 1 and 2 mix[12]; refer to *5.1.3 Fuel Specifications, page 232* for more information	518 liters (137 U.S. gallons)
Hydraulic oil	Hydraulic reservoir	Single grade transmission/hydraulic fluid (THF) Viscosity at 60.1 cSt @ 40°C Viscosity at 9.5 cSt @ 100°C	60 liters (15.8 U.S. gallons)[13]
Gear lubricant	Gearbox	SAE 75W-140 or 80W-140, API service class GL-5 fully synthetic gear lubricant (SAE J2360 preferred)	2.3 liters (2.4 U.S. quarts)
Gear lubricant	Standard wheel drive	SAE 75W-140 or 80W-140, API service class GL-5 fully synthetic gear lubricant (SAE J2360 preferred)	1.4 liters (1.5 U.S. quarts)
Gear lubricant	High torque wheel drive	SAE 85W-140, API service class GL-5 fully synthetic gear lubricant	4.5 liters (4.8 U.S. quarts)
Antifreeze	Engine cooling system	ASTM D-6210 and CES-14603, Peak Final Charge Global™ or Fleetguard ES Compleat™ OAT Refer to *5.1.2 Coolant Specifications, page 231* for more information	31 liters (8.2 U.S. gallons)
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 U.S. quarts)
Air conditioning refrigerant	Air conditioning system	R134A	2.38 kg (5.25 lb.)
Air conditioning refrigerant oil	Air conditioning system total capacity	PAG SP-15	240 cc (8.1 fl. oz.)
Windshield washer fluid	Windshield washer fluid tank	SAE J942 compliant	4 liters (1 U.S. gallon)

12. Optional when operating temperature is below 0°C (32°F).
13. Denotes capacity of a dry system. Refill capacity is 58 liters (15 U.S. gallons).

5.1.5 Filter Part Numbers

Replacement filters are available from your MacDon Dealer.

Table 5.3 M1170*NT5* Windrower Filter Part Numbers

Filter	Part Number
Engine oil filter	MD #111974
Hydraulic charge oil filter	MD #201713
Hydraulic return oil filter	MD #320360[14]
Primary fuel filter element	MD #205028
Secondary fuel filter element	MD #205029
Fuel strainer (fuel tank vent line) filter	MD #111608
Primary element (cab)	MD #111060
Primary air filter element	MD #111954
Secondary air filter element	MD #111955
Return air filter	MD #109797
Diesel exhaust fluid (DEF) – suction filter	MD #291162
Diesel exhaust fluid (DEF) – vent hose filter	MD #111608
DEF supply module filter kit	MD #207510

14. Part number 202986 is printed on the filter, but service the filter using kit MD #320360. The kit includes installation instructions.

5.2 Windrower Break-In Inspections and 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 *5.1 Recommended Fuel, Fluids, and Lubricants, page 231*.

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*.

5.2.1 Break-in Inspection Schedule

Break-in Inspections		
Hours	**Item**	**Check**
1	Drive wheel nuts	Torque: 510 Nm (375 lbf·ft) dry Repeat checks at one hour intervals until torque stabilizes at two consecutive checks
5	A/C compressor belt	Tension
5	Caster wheel nuts	Torque: 170 Nm (125 lbf·ft)
5	Caster wheel anti-shimmy dampener bolts	Inboard bolt torque: 136 Nm (100·lbf·ft) Outboard bolt torque: 244 Nm (182 lbf·ft) Outboard jam nut: 136 Nm (100 lbf·ft)
50	Drive wheel nuts	Torque: 510 Nm (375 lbf·ft) dry Repeat checks at one hour intervals until torque stabilizes at two consecutive checks
50	Hose clamps: air intake / radiator / heater / hydraulic	Hand-tighten unless otherwise noted
50	Caster wheel nuts	Torque: 170 Nm (125 lbf·ft)
50	Caster wheel anti-shimmy dampener bolts	Inboard bolt torque: 136 Nm (100 lbf·ft) Outboard bolt torque: 244 Nm (182 lbf·ft) Outboard jam nut: 136 Nm (100 lbf·ft)
50	Main gearbox oil	Change
50	Drive wheel lubricant	Change
50	Charge system oil filter	Change
50	Return oil filter	Change

5.2.2 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.

Refer to *5 Maintenance and Servicing, page 231* for information about each maintenance procedure.

Maintenance Record	Action:	✓ - Check				♦ - Lubricate					▲ - Change				✹ - Clean				+ - Add			
Hour meter reading																						
Date																						
Serviced by																						
First use, refer to *5.2.1 Break-in Inspection Schedule, page 235*																						
10 Hours or Daily[15]																						
✓	Engine oil level[16]																					
✓	Engine gearbox oil level[16]																					
✓	Engine coolant level at reserve tank[16]																					
✓	Fuel tank[16]																					
✓	Drain fuel filter water trap[16]																					
✓	Hydraulic hoses and lines for leaks[16]																					
✓	Hydraulic oil level[16]																					
✓	Tire inflation[16]																					
✓	Diesel exhaust fluid (DEF) level[16]																					
Annually[17]																						
✓	A/C blower																					
✓	Antifreeze concentration																					
✓	Battery charge																					
✓	Battery fluid level																					
✓	Steering linkages																					
50 Hours																						
✹	Cab fresh air intake filter																					
♦	Caster pivots																					
♦	Forked caster wheel bearings																					
✓	Engine-to-pumps gearbox oil level																					
♦	Top lift link pivots on lift arms (2 places on both sides [x4])																					
♦	Sliding walking beam (18 places)																					

15. Whichever occurs first.
16. A record of daily maintenance is not normally required but is at the Owner/Operator's discretion.
17. Perform annual maintenance prior to start of operating season.

100 Hours or Annually[15] , [17]																						
✹	A/C condenser																					
✹	Charge air cooler																					
✹	Hydraulic oil cooler																					
✹	Radiator																					
✹	Cab air return filter																					
250 Hours or Annually[15] , [17]																						
▲	Engine oil and filter																					
▲	Engine air cleaner primary filter element																					
♦	Sliding drive wheel legs Bushings and slot surfaces																					
✓	Drive wheel lubricant level																					
♦	Mud caster wheel hub bearings																					
✓	Exhaust system (visually inspect for leakage point, loose clamps or loose hose)																					
▲	Engine gearbox oil																					
500 Hours or Annually[15] , [17]																						
▲	Primary and secondary fuel filters																					
▲	Hydraulic return filter and charge filter																					
✓	Safety systems																					
1000 Hours																						
✹	DEF supply module filter																					
1000 Hours or Annually[15]																						
▲	Fuel tank vent line filter																					
▲	Wheel drive lubricant																					
2000 Hours																						
▲	Crankcase breather filter and gasket																					
▲	DEF tank vent hose filter																					
2000 Hours or Every Two Years[15]																						
▲	Engine coolant																					
✓	General inspection																					
2000 Hours or Every Three Years[15]																						
▲	Hydraulic oil																					
4500 Hours or Every Three Years[15]																						
▲	DEF supply module filter																					
5000 Hours or Every Two Years[15]																						
✓	Engine valve tappet clearance																					

5.2.3 Using Electronic Maintenance Tool

The Electronic Maintenance Tool contains a list of items requiring service after 250 hours or more of windrower operation.

1. Press soft key 5 (A) to display the main menu.
2. To select MAINTENANCE icon (C), use Harvest Performance Tracker (HPT) scroll knob (B) or the ground speed lever (GSL) scroll wheel (not shown).
3. Press HPT scroll knob (B) or the GSL SELECT button (not shown) to select the icon.



Figure 5.1: Opening the Main Menu

4. Select MAINTENANCE icon (A) to open maintenance menu (B). The following information can be viewed:
   - Completed maintenance
   - Selected maintenance notifications
   - Maintenance log

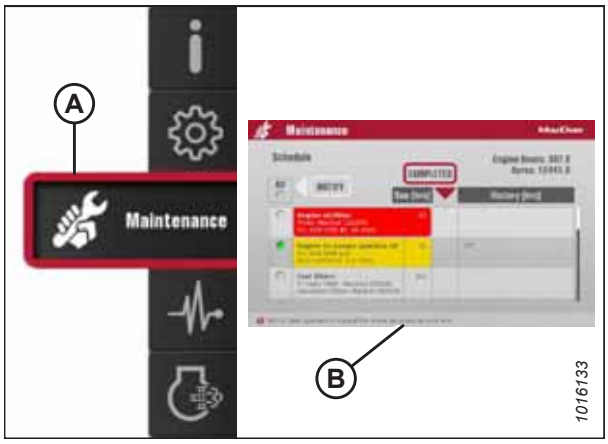


Figure 5.2: Maintenance Icon and Menu

5.3 Engine Compartment

Refer to this section for information on the maintenance and servicing of components in and around the windrower's engine compartment.

CAUTION

- **NEVER operate the engine in a closed building. Proper ventilation is required to prevent exhaust gas hazards.**
- **Keep the engine clean. Straw and chaff on a hot engine, for example, present a fire hazard.**
- **NEVER use gasoline, naphtha, or any other volatile material for cleaning purposes. These materials are toxic and/or flammable.**

5.3.1 Opening Hood

The hood will need to opened any time parts in the engine compartment require service.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Move latch (A) toward the right cab-forward side of the windrower.
3. Grasp louver (B), and lift the hood to open it.

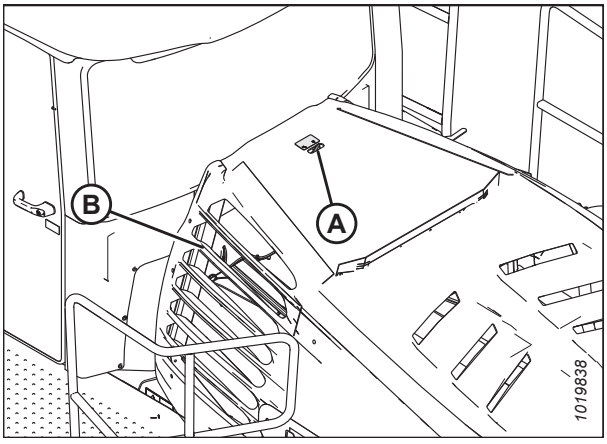


Figure 5.3: Hood

NOTE:

If the optional High Debris Cooler Intake kit (A) is installed, a louver can still be used to open the hood.

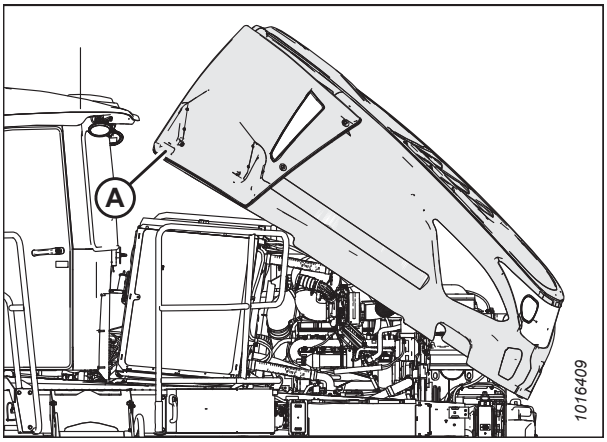


Figure 5.4: Hood with Optional High Debris Cooler Intake Kit

5.3.2 Closing Hood

When you have finished working in the engine compartment, close the hood.

1. Grasp the hood by louver (A) and lower it until the hood engages the latch.

   NOTE:

   Check that the latch lever is not tilted to ensure the hood is latched.

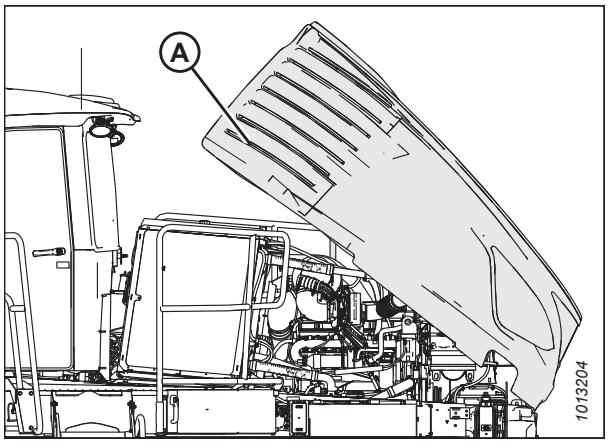


Figure 5.5: Engine Compartment

5.4 Platform

Swing-away platform and stair units are provided on the windrower for access to the operator's station and for engine bay maintenance.

5.4.1 Opening Platform

Only the left cab-forward side platform can be opened.

DANGER

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

CAUTION

Do NOT stand on an unlocked platform. It is unstable and may cause you to fall.

NOTE:

The procedure shown is for the M1170 and M1240 windrowers. The M1170*NT5* windrower is similar.

1. Approach platform (A) on the left cab-forward side of the windrower and ensure the cab door is closed.
2. Push latch (B), and pull platform (A) toward the walking beam until it stops and the latch engages.

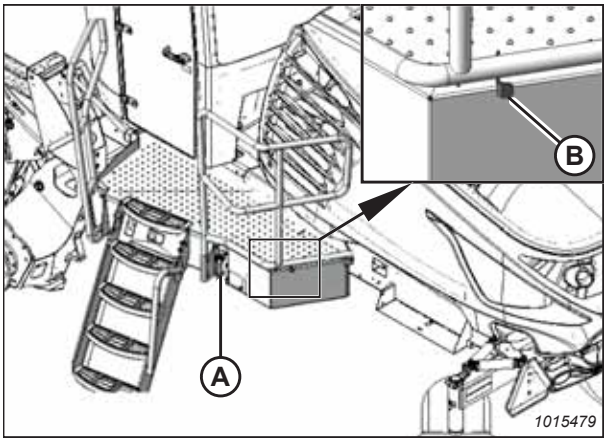


Figure 5.6: Left Cab-Forward Platform

5.4.2 Closing Platform

Close the platform after moving it to access the components behind it or the engine compartment.

DANGER

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

CAUTION

Do NOT stand on an unlocked platform. It is unstable and may cause you to fall.

NOTE:

The procedure shown is for the M1170 and M1240 windrowers. The M1170*NT5* windrower is similar.

1. Push latch (A) to unlock platform (B).

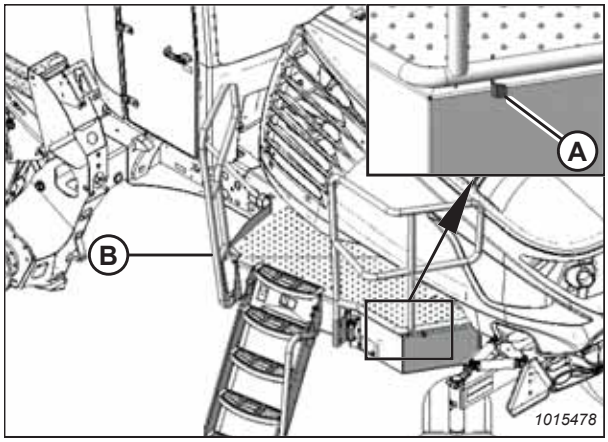


Figure 5.7: Left Cab-Forward Platform

2. Pull platform (A) towards the cab until it stops and the latch is engaged.

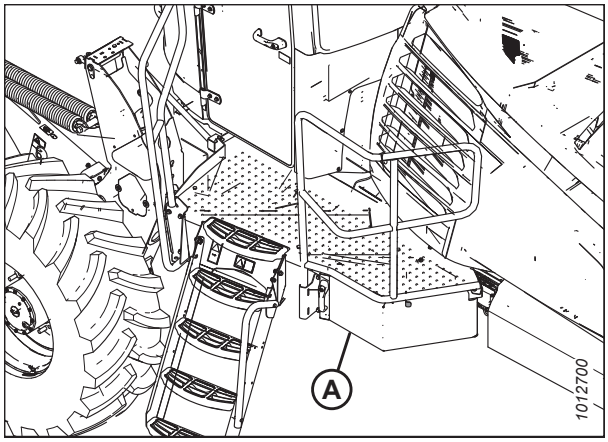


Figure 5.8: Left Cab-Forward Platform

5.4.3 Adjusting Platform

To achieve the proper gap between the platform and frame, latch adjustment may be required.

DANGER

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

1. Locate latch (B) beneath the platform.
2. Adjust the latch position by loosening bolts (A) and moving latch (B).
3. Retighten bolts (A) and close the platform.

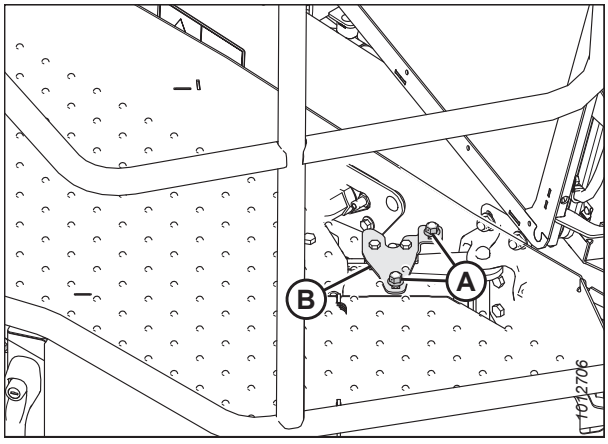


Figure 5.9: Left Platform

4. Rubber bumper (B) at the cab end of the platform should measure 52–60 mm (2–2 3/8 in.) when properly compressed against the frame. The platform should also sit firmly against front guide (A).

   NOTE:

   The top plate of the platform has been removed for clarity.

5. If adjustment is required, loosen two bolts (C) and slide the support as required.

6. Tighten bolts (C) to 39.5 Nm (29.1 lbf·ft).

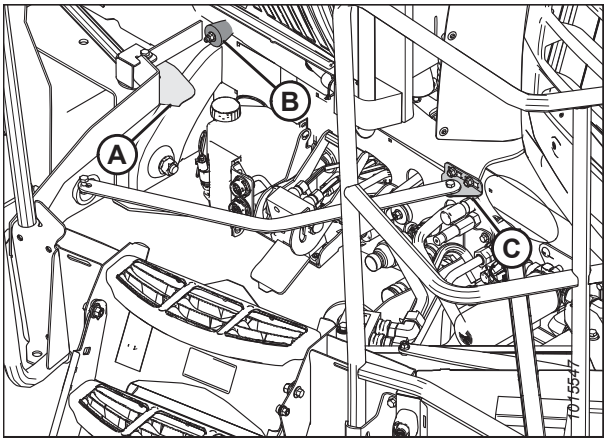


Figure 5.10: Left Platform

7. To adjust the horizontal position of the platform, loosen bolts (A) and adjust bolt (B).

8. Tighten bolts (A) to 68.5 Nm (50.5 lbf·ft).

9. Use bolts (C) to adjust the platform angle. Tighten bolts (C) to 68.5 Nm (50.5 lbf·ft) after adjustment is complete.

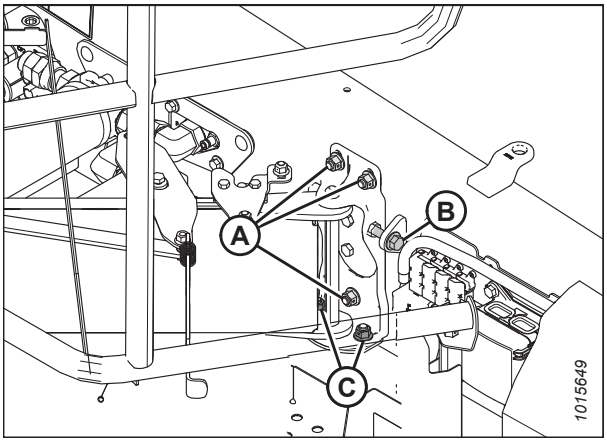


Figure 5.11: Left Platform

5.4.4 Accessing Tool Box

A tool box is located inside a storage compartment under the left cab-forward platform.

1. Grasp the handle on storage compartment (A) and press latch (B). Pull the unlatched handle to open the compartment.

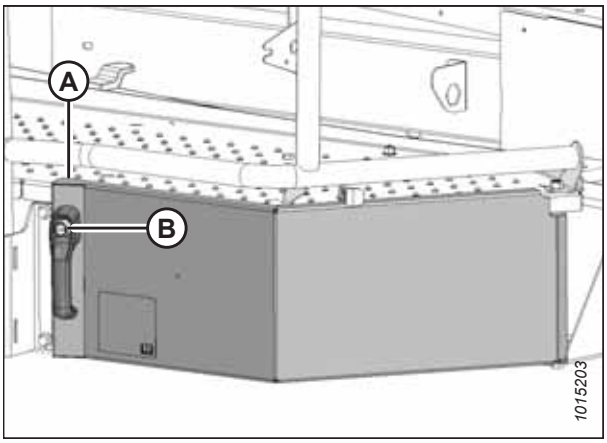


Figure 5.12: Tool Box

2. Tool box (A) is located inside storage compartment (B).

3. Swing compartment (B) under the platform to close it, and push on the handle to secure the latch.

   NOTE:

   The ignition key also locks the storage compartment.

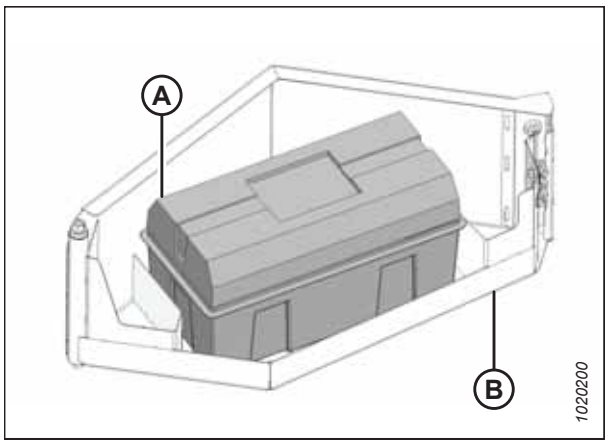


Figure 5.13: Tool Box

5.5 System Maintenance Overviews

5.5.1 Diesel Exhaust Fluid System

The diesel exhaust fluid (DEF) system injects DEF into the windrower's engine exhaust system. This fluid reacts with the exhaust gases over a catalyst, thereby reducing the damage that the engine's emissions do to the environment. The Operator may need to drain the DEF tank if the windrower will not be operated for a long period of time. The Operator will also need to ensure that the filters in the DEF system are changed according to the intervals specified in the maintenance schedule.

IMPORTANT:

If the windrower will be in storage for longer than six months, the diesel exhaust fluid (DEF) tank should be drained to prevent damage to the tank. For instructions, refer to *Draining Diesel Exhaust Fluid Tank, page 245*.

IMPORTANT:

If the windrower will be operated when the ambient temperature is below 0°C (32°F), do **NOT** fill the DEF tank to more than 75% of its capacity. When the ambient temperature is below freezing, DEF will expand in volume by approximately 7%.

NOTE:

For DEF specifications, refer to this manual's inside back cover.

Draining Diesel Exhaust Fluid Tank

It is necessary to drain the diesel exhaust fluid (DEF) tank when the DEF is contaminated or if storing the windrower for a period greater than 6 months.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Place a drain pan under DEF tank (B). The drain pan should be large enough to hold 28 liters (7.5 U.S. gallons).

   IMPORTANT:

   Spilled DEF must be contained and absorbed by non-combustible absorbent material like sand and then shovelled into a suitable container for disposal. If DEF is spilled on the tank or any surface of the vehicle, rinse the area thoroughly with water as DEF is corrosive.

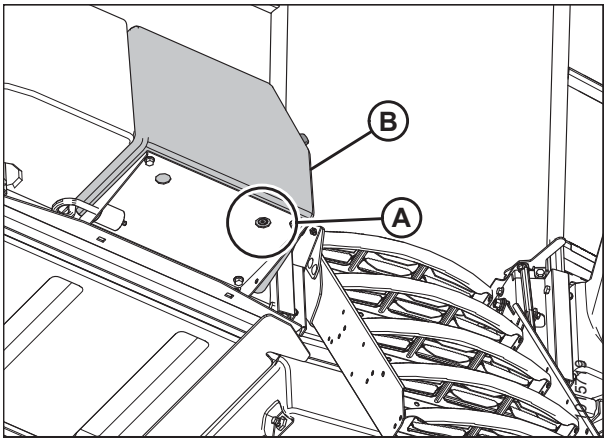


Figure 5.14: View from beneath DEF Tank

CAUTION

Avoid contact with eyes. In case of contact, rinse immediately with water for 15 minutes.

3. Remove drain plug (A) from under tank (B) and drain the DEF tank.
4. Add some distilled water to tank (B) to flush out remaining contaminants.
5. Drain the distilled water that was used to clean the tank.
6. Reinstall drain plug (A) into tank (B).

7. Refill the DEF tank. For instructions, refer to *Filling Diesel Exhaust Fluid Tank, page 246*.

   NOTE:

   Do **NOT** refill the tank if storing the windrower for **6 months** or longer.

Filling Diesel Exhaust Fluid Tank

The symbol inside the diesel exhaust fluid (DEF) gauge on the Harvest Performance Tracker (HPT) display will signal when DEF level is low.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Clean around filler cap (A).
3. Turn cap (A) counterclockwise until it is loose and then remove the cap.

   NOTE:

   The filler cap for the DEF tank is blue and the nozzle dispenser is smaller than that of the fuel tank.

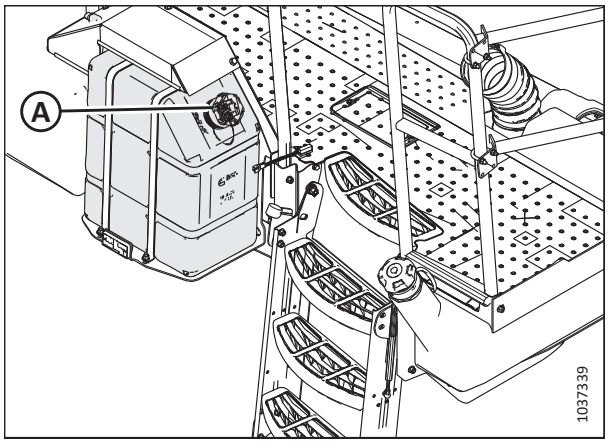


Figure 5.15: DEF Tank

CAUTION

Avoid contact with eyes. In case of contact, rinse immediately with water for 15 minutes.

4. Fill the tank with approved DEF. For specifications, refer to the inside back cover.

   IMPORTANT:

   DEF is corrosive. Spilled DEF must be contained and absorbed by non-combustible absorbent material like sand, and then shovelled into a suitable container for disposal. If spilled on the tank or any surface of the vehicle, rinse thoroughly with water.

   IMPORTANT:

   If the windrower temperature is going to be below 0°C (32°F), do **NOT** fill the DEF tank more than 75% full. When freezing, the DEF fluid will expand by approximately 7%. For storage information, refer to *5.1.1 Storing Lubricants and Fluids, page 231*.

5. Replace filler cap (A) and turn clockwise until tight.

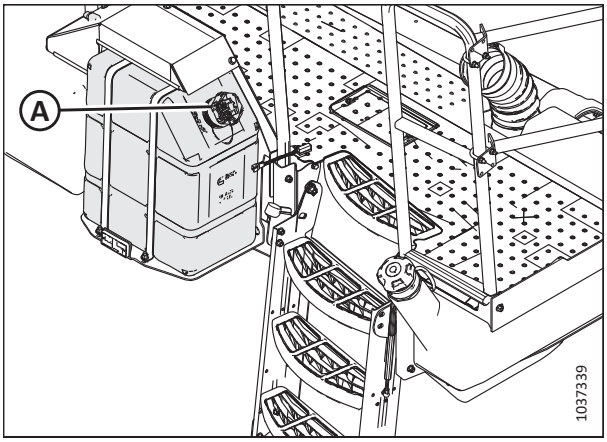


Figure 5.16: DEF Tank

5.5.2 Twin-Flow Cooling System

The engine cooling system is designed to maintain engine operating temperature within the specified operating range; it also has the ability to reverse and clear debris off the cooler screens.

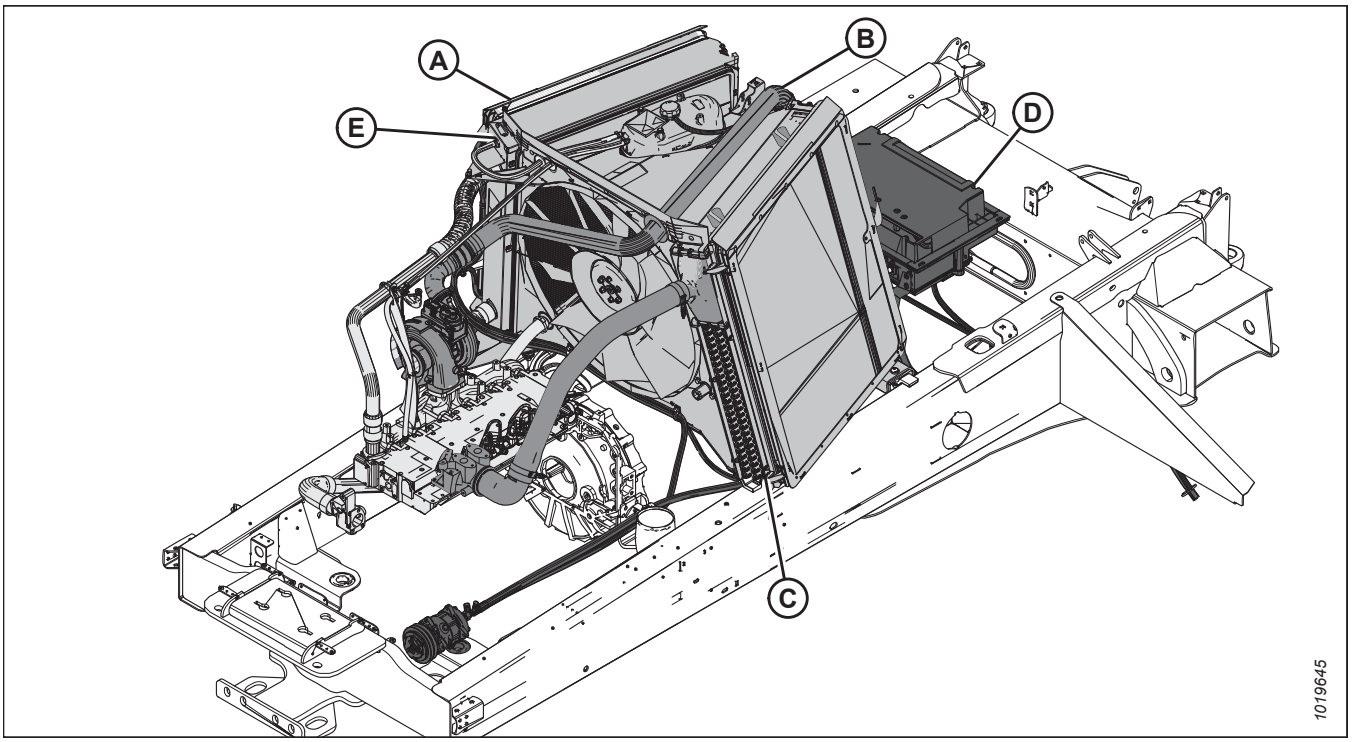


Figure 5.17: Twin-Flow Cooling System

A - Air Conditioning Condenser
B - Charge Air Cooler
C - Hydraulic Oil Cooler
D - Air Conditioning Box
E - Engine Radiator

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 the cooling system to protect against freezing. The system may not drain completely, and damage from freezing could still result.

Refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232* for detailed information.

Engine Cooling

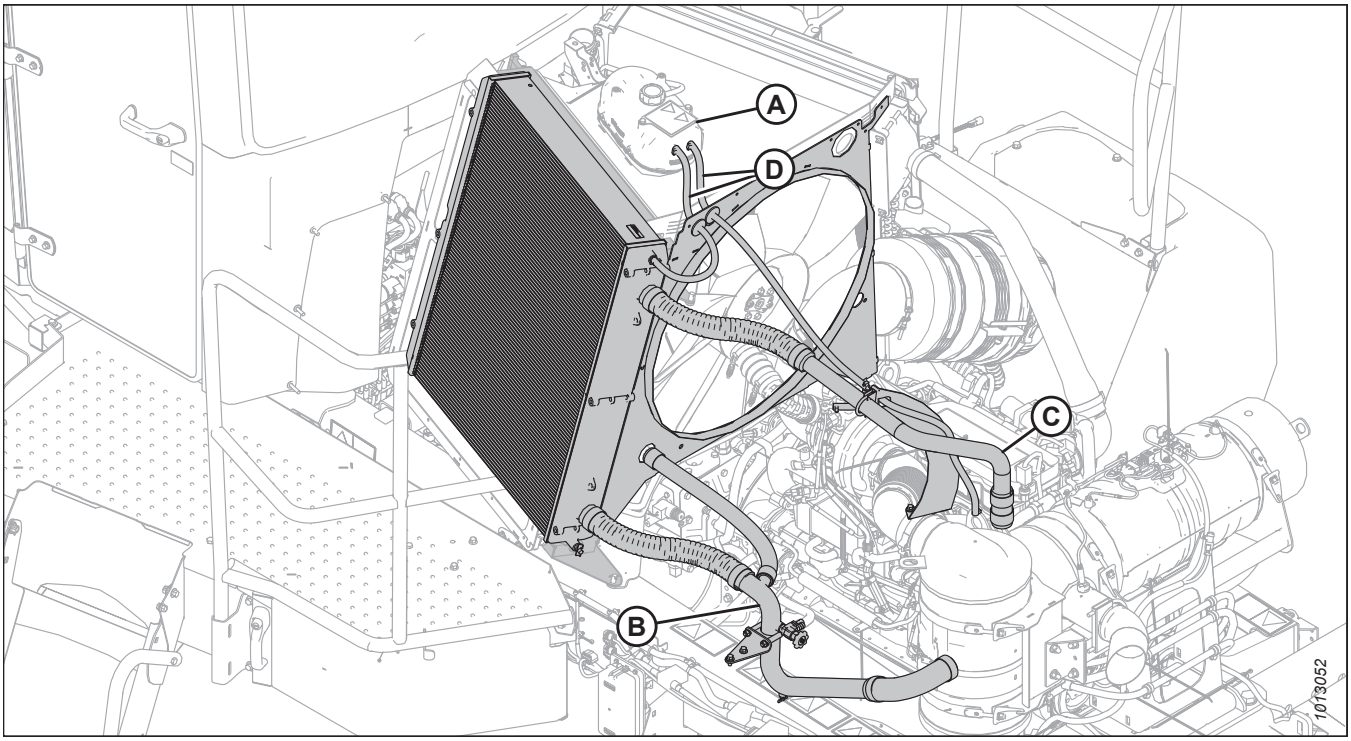


Figure 5.18: Engine Cooling

A - Pressurized Coolant Tank
B - Engine Inlet Hose
C - Engine Outlet Hose
D - Vent Hoses

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.

CAUTION

To avoid personal injury from hot coolant, do NOT attempt to open the pressurized coolant tank cap until the engine cools.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

3. Turn cap (A) counterclockwise to the first notch to relieve pressure before removing the cap completely.
4. Turn cap (A) again and remove it.
5. Check the gasket for cracks or deterioration, and replace the cap if necessary.
6. Check that the spring in the cap moves freely. Replace the cap if the spring is stuck.
7.
8. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

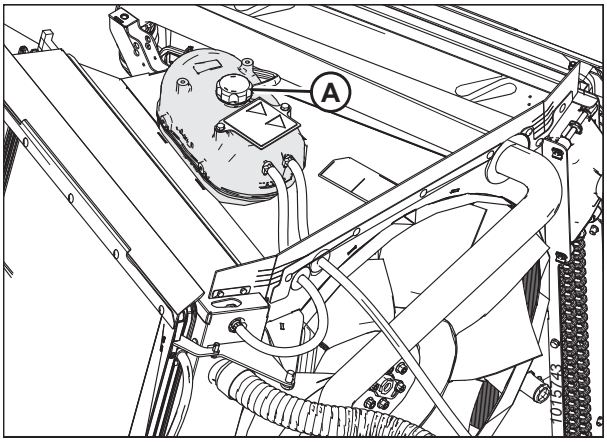


Figure 5.19: Coolant Tank

Charge Air Cooler

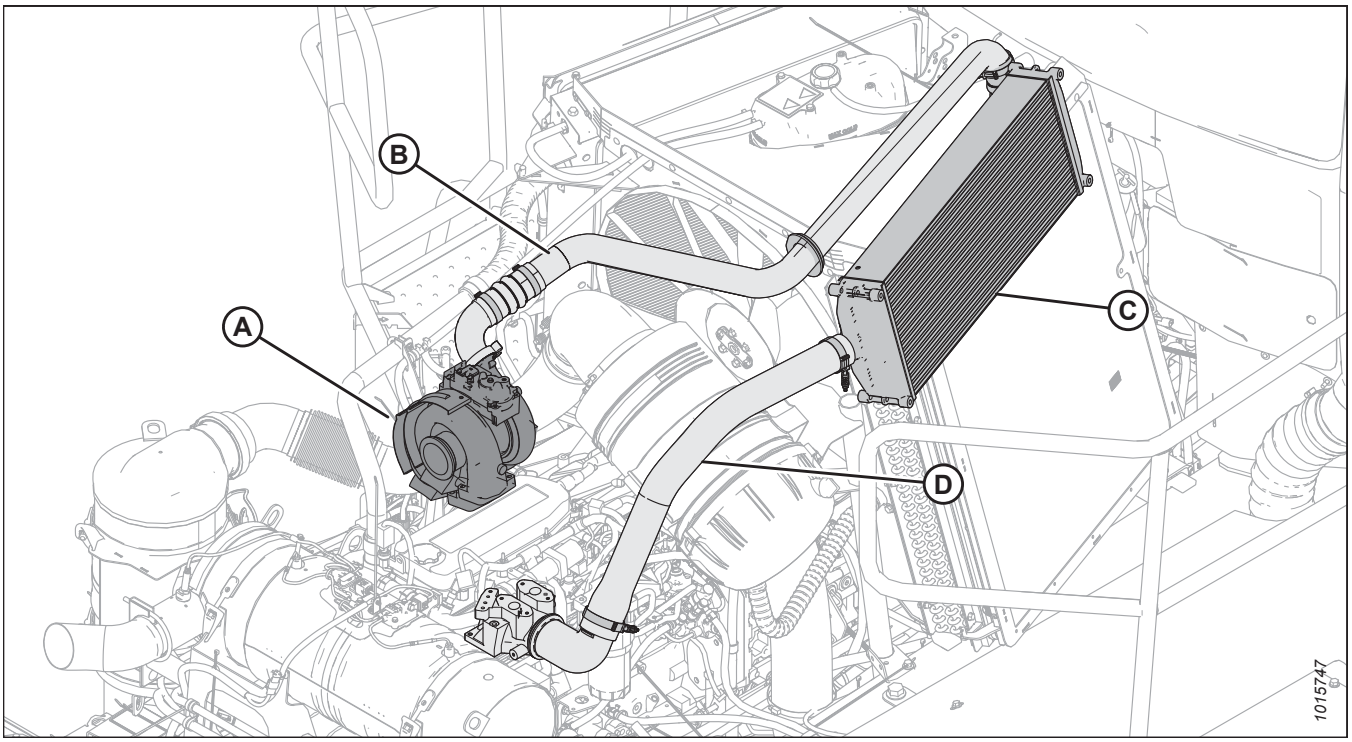


Figure 5.20: Charge Air Cooler (CAC)

A - Turbocharger

B - Charge Air Inlet Duct

C - Charge Air Cooler

D - Charge Air Outlet Duct

Charge Air Cooling

The cooler is located in the cooling box behind the cab.

After the intake air passes through the air filter, it passes through turbocharger (A), which boosts the air pressure. This process heats the air so it is passed through pipe (B) to cooler (C) before entering engine intake (D).

The cooler screens and components should be cleaned with compressed air every 100 hours of operation. Daily cleaning may be required if operating in heavy crop conditions. For instructions, refer to *5.9.2 Cleaning Cooler Module, page 284*.

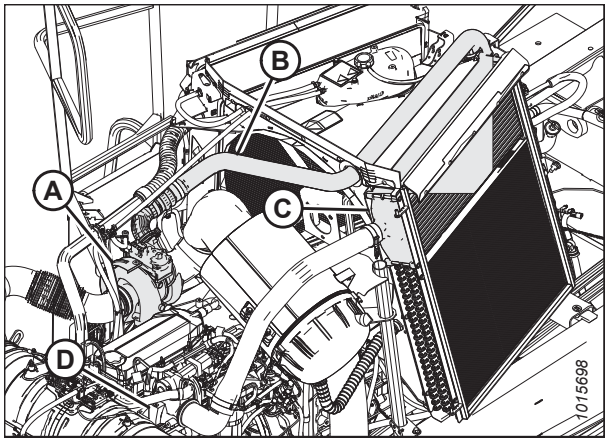


Figure 5.21: Engine Air Intake System

Hydraulic Oil Cooler

The hydraulic oil cooler is located inside the cooling box behind the radiator.

Clean cooler (A) with compressed air every 100 hours of operation. Daily cleaning may be required if operating in heavy debris conditions. For instructions, refer to *5.9.2 Cleaning Cooler Module, page 284*.

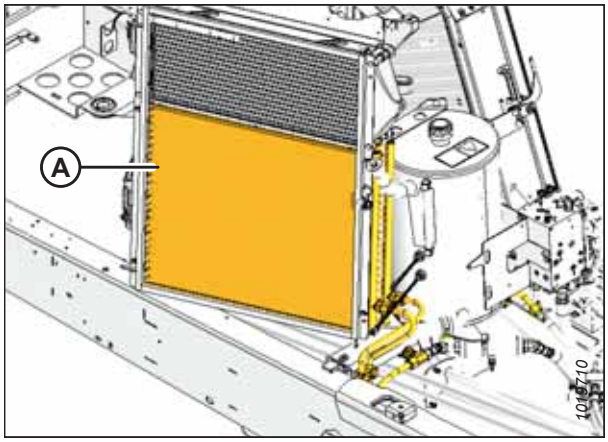


Figure 5.22: Hydraulic Oil Cooler

Air Conditioning (A/C)

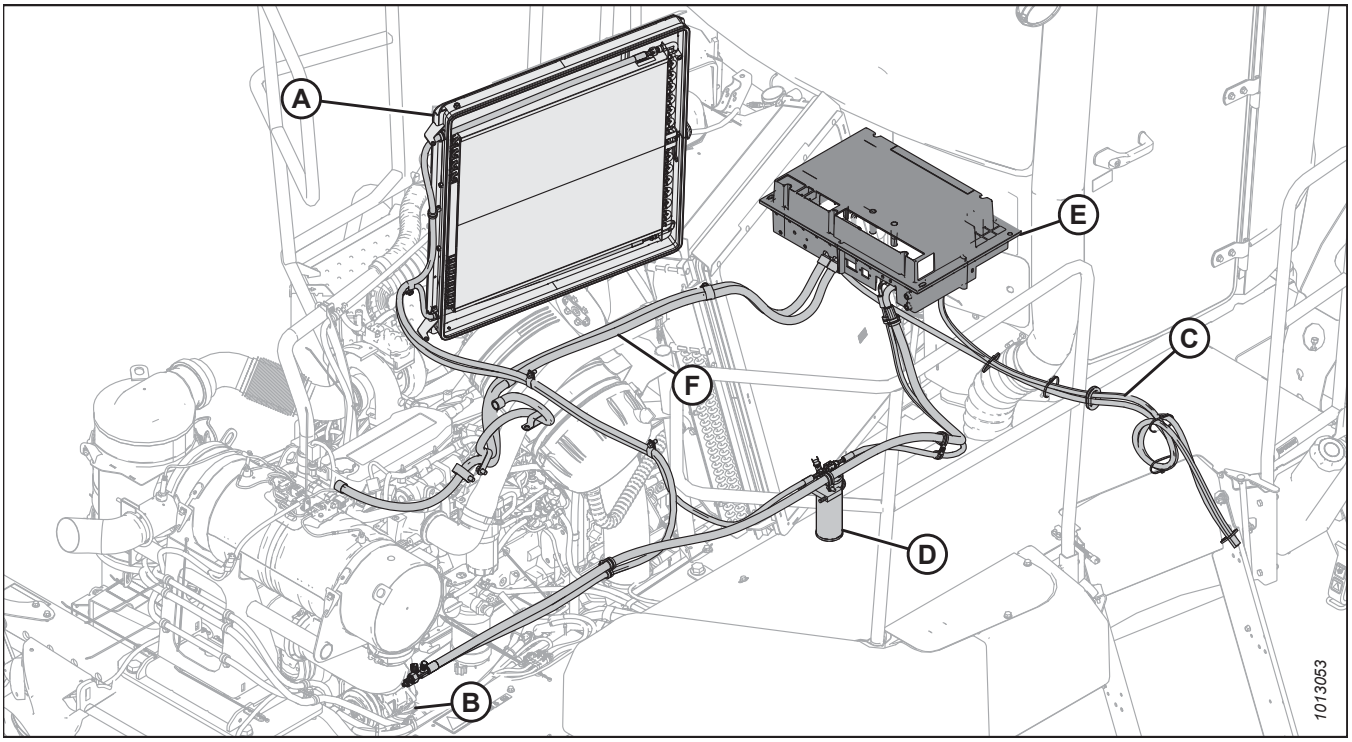


Figure 5.23: Air Conditioning

A - Condenser
B - Compressor
C - HVAC Drain Lines
D - Drier
E - HVAC Unit
F - Cab Heater Lines

Condenser

The air conditioning condenser should be cleaned with compressed air every 100 hours of operation. 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. For instructions, refer to *5.9.2 Cleaning Cooler Screens and Components, page 284*.

5.5.3 Air Intake System

The air intake system filters air used by the engine.

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 Harvest Performance Tracker (HPT) indicates ENGINE AIR FILTER or at the specified interval. For cleaning intervals, refer to *5.2.2 Maintenance Schedule/Record, page 236*.

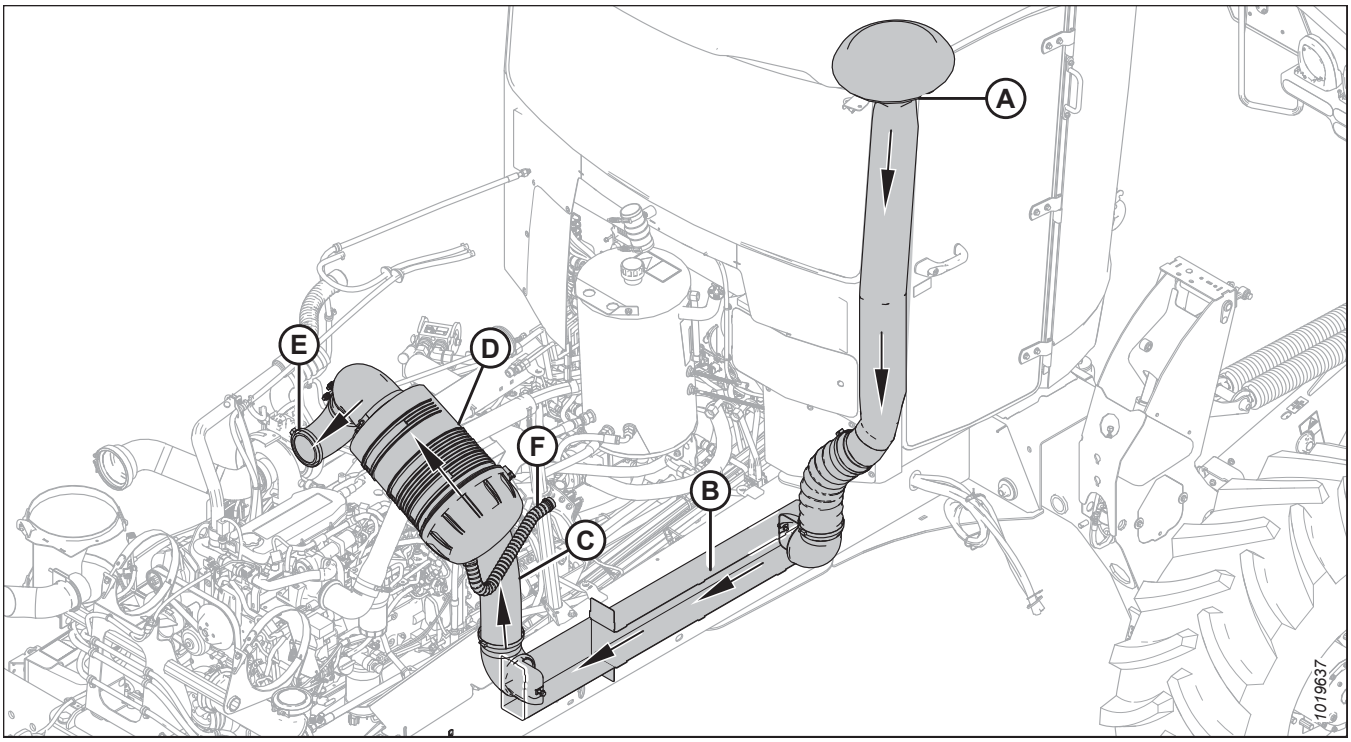


Figure 5.24: Air Intake System

A - Air Intake
B - Air Duct to Air Cleaner
C - Air Cleaner Intake
D - Air Cleaner
E - Turbocharger Intake
F - Aspirator Duct

Message (A) appears on the HPT when the engine air filter requires servicing.

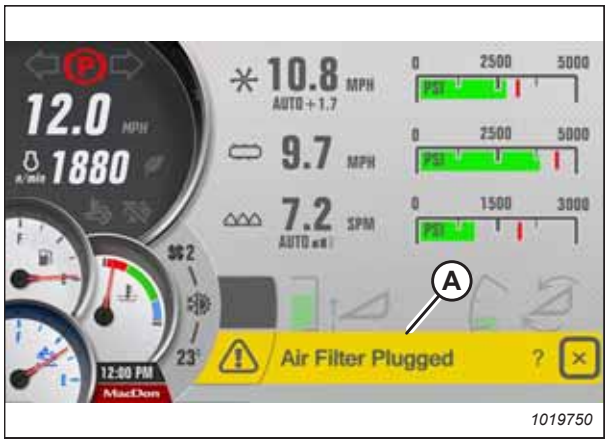


Figure 5.25: Filter Service Required Message

5.5.4 Hydraulic System

The M1170*NT5* Windrower hydraulic system operates the windrower drive system, header lift, header drive systems, cooling systems fan, and other lift 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 5.26: 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.**

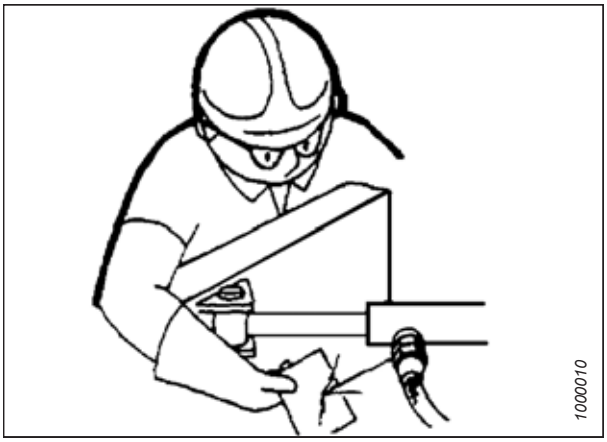


Figure 5.27: Checking Hydraulic Leaks

IMPORTANT:

Foreign material such as dirt, dust, and water is 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 ten 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, to change oil, and to change oil filters as described in this manual.

Contact your MacDon Dealer for all other service.

Hydraulic Oil Cooler

The hydraulic oil cooler is located inside the cooling box behind the radiator.

It should be cleaned with compressed air every 100 hours of operation. Daily cleaning may be required if operating in heavy debris conditions. For instructions, refer to *5.9.2 Cleaning Cooler Module, page 284*.

Knife/Disc Drive Hydraulics

A single piston hydraulic pump works in a closed-loop circuit providing oil to the knife/disc circuit. The pump will maintain knife/disc speed at all normal operating engine speeds (>1500 rpm), regardless of varying loads on the header.

The pump requires charge flow in order to:

- Replace oil from internal leakages
- Fill and maintain positive pressure in the work circuit
- Provide flushing flow for cooling, and introduce clean oil into the circuit.

Reel and Draper Hydraulics

The reel and draper circuits are powered by a gear pump. This allows independent oil flow to the reel and draper circuit and separates oil flow from the knife pump. The header drive manifold manages flow control and relief for these circuits.

Traction Drive Hydraulics

The windrower traction drive consists of two variable displacement axial piston hydraulic pumps, one for each drive wheel.

The pump's speeds are increased through a gearbox from the engine. Each pump requires charge flow in order to

- Replace oil from internal leakages
- Fill and maintain positive pressure in the work circuit
- Provide flushing flow for cooling (occurs at the motors), and introduce clean oil into the circuit.

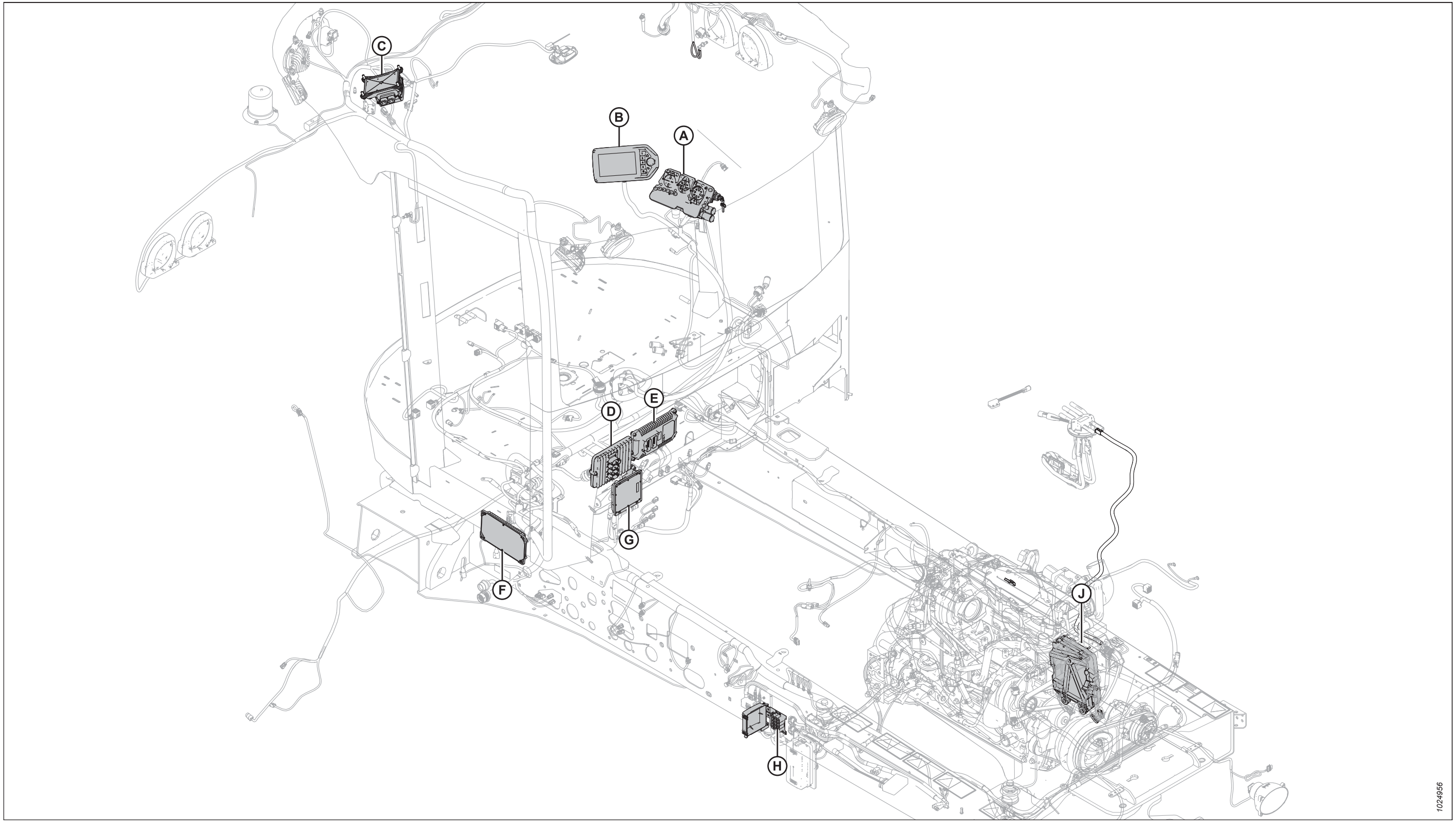
5.5.5 Electrical System

Refer to this section for information on maintaining the windrower's battery, lights, and the circuit breaker and fuses.

Module Layout

There are many different modules on the windrower. Refer to the following illustration to see there various locations.

Module Locations



Module Locations Legend

A - Console Module (MD #208808)

B - Harvest Performance Tracker Display (MD #306360)

C - Roof Relay Module (MD #208160)[18]

D - Master Control Module (MD #205941)

E - Firewall Extension Module (MD #201396)

F - Chassis Extension Module (MD #201396)

G - HVAC Controller Module (MD 208110)[18]

H - Chassis Relay Module (MD #208160)[18]

J - Engine Control Module (ECM)

18. For decal information, refer to *Fuse Panel and Relay Module Decals, page 361*.

Master Controller

The master controller houses the windrower software and communicates with all other electrical modules on the windrower.

The master controller is mounted behind the cab.

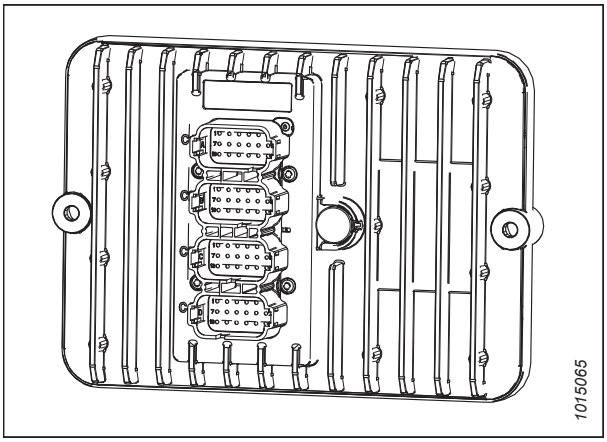


Figure 5.28: Master Controller

Extension Modules

Extension modules provide additional inputs and outputs for the master controller.

The M1170*NT5* Windrower has two extension modules. One is behind the cab, next to the master controller, and the other is located inside the left frame rail. They are used to provide inputs and outputs to various sensors and valve solenoids throughout the windrower.

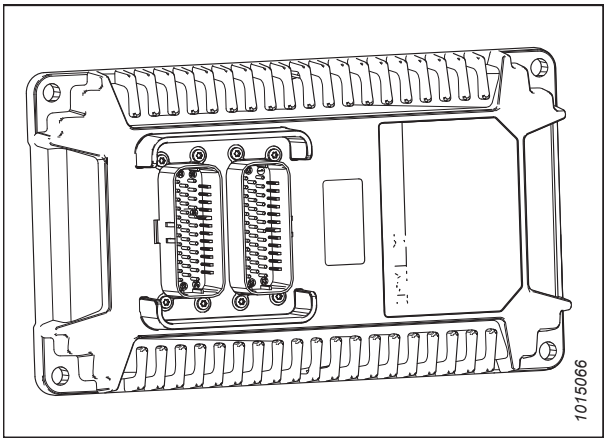


Figure 5.29: Extension Modules

Relay Modules

Relay modules contain electronic switches that are turned on/off by the master controller.

The M1170*NT5* Windrower has two relay modules. One is located on the chassis and the other inside the cab headliner. There are fuses and relays located in both relay modules.

The chassis relay module is located on the left (cab-forward) frame rail.

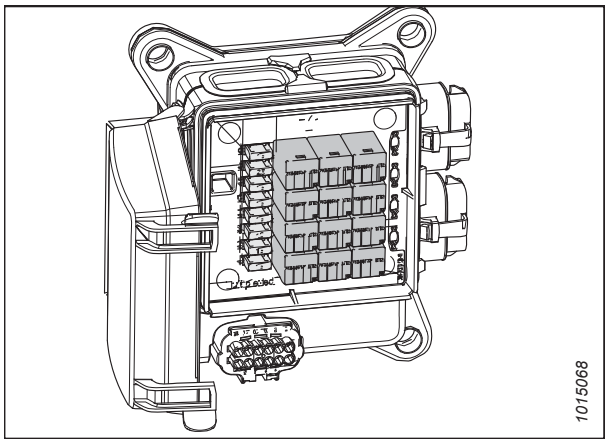


Figure 5.30: Chassis Relay Module

The roof relay module is located inside the cab's headliner.

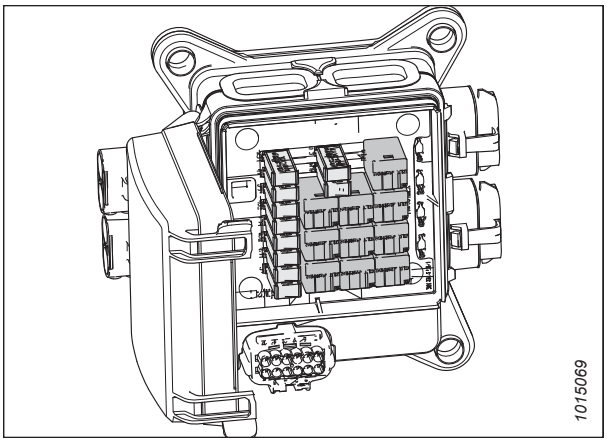


Figure 5.31: Roof Relay Module

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 (B) or alternator wire to become grounded.
- Be sure alternator connections are correct before connecting the cables to the battery.
- When welding on any part of the machine, disconnect battery cables. For instructions, refer to *1.8 Welding Precaution, page 9*.
- Always disconnect battery ground cables when working with the alternator or regulator.
- Never attempt to polarize alternator or regulator.
- If wires are disconnected from the alternator, refer to Figure *5.32, page 261* to ensure proper connection.
- 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 terminals when replacing electronic control modules. Furthermore, when handling electronic control modules, avoid touching the connector pins directly.

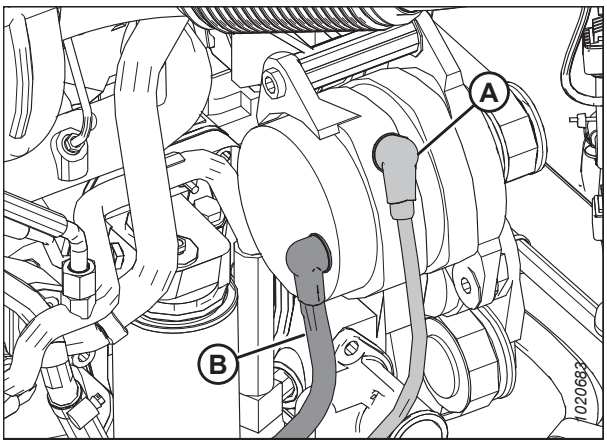


Figure 5.32: Alternator

A - Negative Terminal **B - Positive Terminal**

5.6 Break-In Inspection Procedures

For the break-in schedule, refer to *5.2.1 Break-in Inspection Schedule, page 235*.

5.6.1 Tightening Drive 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 every 200 hour intervals thereafter.

To tighten the drive wheel nuts, follow these steps:

IMPORTANT:

- To avoid damage to wheel rims and studs, tighten the nuts by hand. Threads must be clean and dry; do **NOT** apply any lubricant or anti-seize compound. Do **NOT** use an impact gun, and do **NOT** overtighten wheel nuts.
- Use only genuine, manufacturer-specified nuts.

1. Locate drive wheels (A).

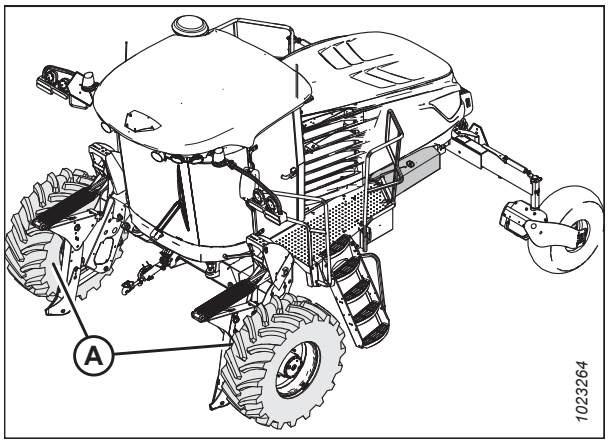


Figure 5.33: Drive Wheel Location

2. Torque each nut (A) to 510 Nm (375 lbf·ft) using the tightening sequence shown at right.
3. Repeat the tightening sequence two additional times, ensuring the specified torque is achieved each time.
4. Repeat the torque procedure every hour until two consecutive checks confirm that there is no movement of nuts (A).

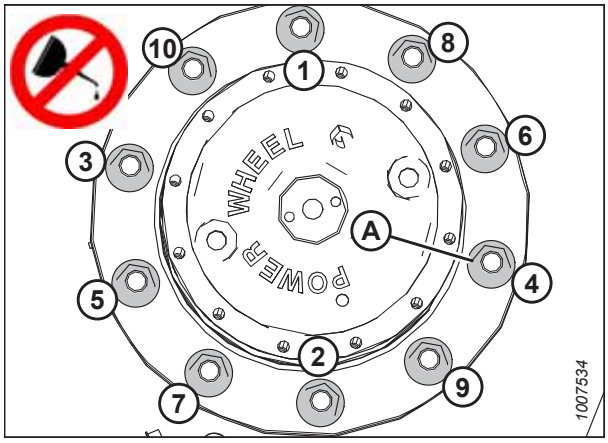


Figure 5.34: Drive Wheel — 10 Bolt

5.6.2 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 every 200 hour intervals thereafter.

1. Locate caster wheel assemblies (A).

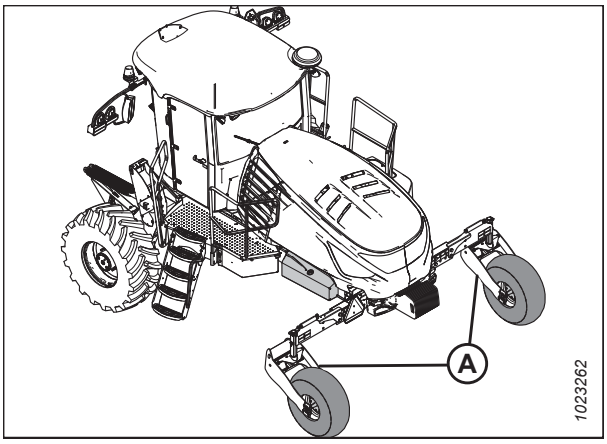


Figure 5.35: Caster Wheel Location

2. Tighten wheel nuts (A) to 163 Nm (120 lbf·ft) using the tightening sequence shown at right. Repeat the tightening sequence three times.

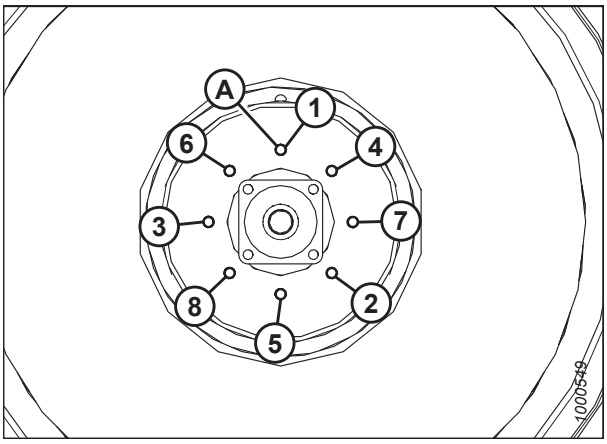


Figure 5.36: Forked Casters with Suspension

5.6.3 Tightening Caster Wheel Anti-Shimmy Dampeners

Each caster is equipped with two fluid-filled anti-shimmy dampeners (A).

Mounting bolts (B) and (C) need to be checked periodically for security. For inspection intervals, refer to *5.2.2 Maintenance Schedule/Record, page 236*.

- Two inboard bolts (B) should be tightened to 136 Nm (100 lbf·ft)
- Outboard bolt (C) should be tightened to 244 Nm (182 lbf·ft)
- Outboard jam nut (D) should be tightened to 136 Nm (100 lbf·ft)

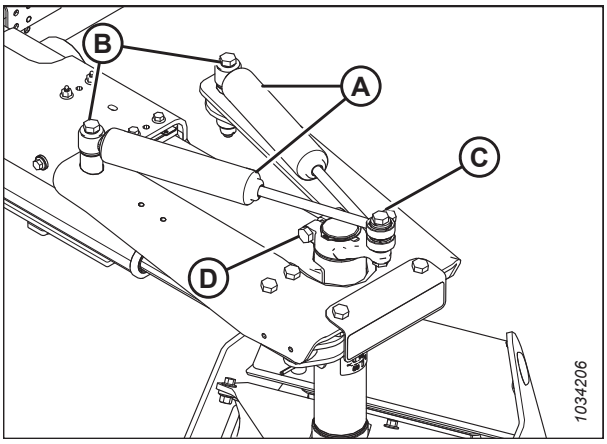


Figure 5.37: Anti-Shimmy Dampener

5.6.4 Tensioning Air Conditioner Compressor Belts

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Loosen compressor mounting hardware (A).
4. Pry compressor (B) away from the engine so that a force of 45 N (10 lbf) deflects belts (C) 5 mm (3/16 in.) at mid-span.

   NOTE:

   Tab (D) on bracket can be used as support for prying.
5. Tighten compressor mounting hardware (A).
6. Recheck the tension and readjust as required.
7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

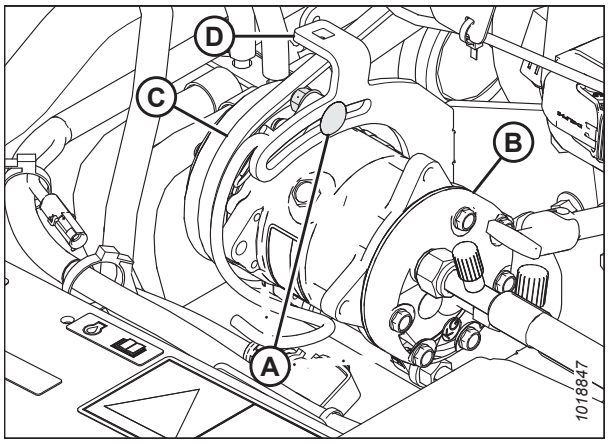


Figure 5.38: Air Conditioning (A/C) Compressor

5.6.5 Changing Engine Gearbox Lubricant

Change the engine gearbox lubricant after the first 50 hours, and then at every 250 hours or annually.

DANGER

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever (GSL) in the PARK position, and the steering wheel in the locked position (centered). To confirm that the parking brake is engaged, wait for the HPT to beep and display a red P symbol.

NOTE:

The engine should be warm when changing the lubricant.

1. Park the windrower on a level surface.
2. Shut down the engine, and remove the key from the ignition.
3. Place a 4 liter (1 U.S. gallon) drain pan under the gearbox.

4. Remove drain plug (A) and allow the lubricant to finish draining.
5. Inspect the drain plug. Small metal shavings are normal. If there are any larger metal pieces, an inspection of the gearbox will be required.
6. Install drain plug (A) and remove check plug (B).
7. Add lubricant until the oil level reaches check plug (B). For lubricant specifications, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*.
8. Replace check plug (B).
9. Operate the engine at low idle and check for leaks at the check plug and drain plug.

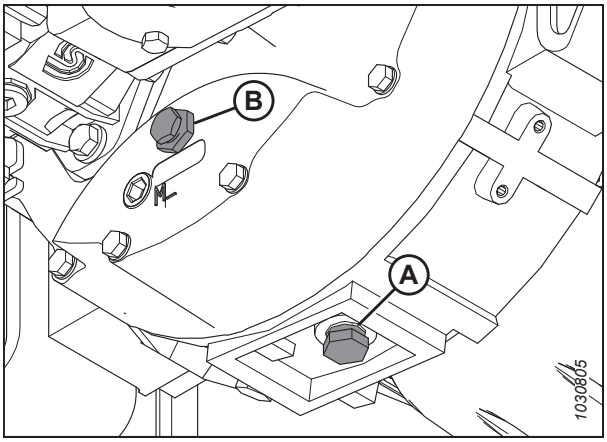


Figure 5.39: Engine Gearbox

5.6.6 Changing Wheel Drive Lubricant – 10 Bolt

The wheel drive lubricant should be changed after the first 50 hours and every 1000 hours or annually, whichever occurs first. Change the lubricant when it is warm.

DANGER

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

1. Park the windrower on level ground and position the windrower so drain plug (B) is at the lowest point.
2. Shut down the engine, and remove the key from the ignition.
3. Place a container (about 2 liters [2 quarts]) under lower drain plug (B).
4. Remove plugs (A) and (B), and drain the lubricant into the container.
5. Dispose of the oil in a manner that complies with local rules and regulations.

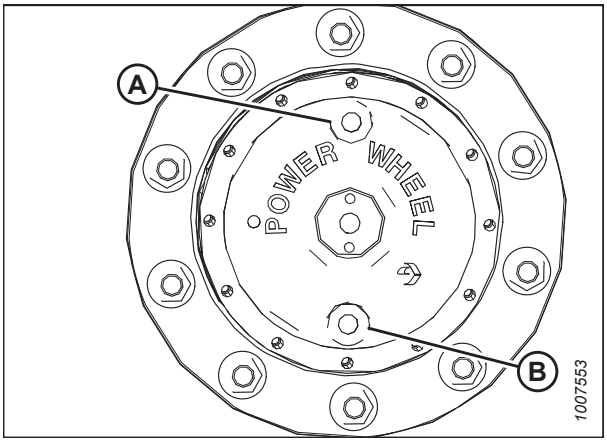


Figure 5.40: Drive Wheel

6. After the lubricant has drained completely, position the windrower so that ports (A) and (B) on the wheel are horizontally level with the center of hub (C) as shown.
7. Add lubricant. For instructions, refer to *5.10.4 Adding Wheel Drive Lubricant – 10 Bolt, page 296*.
8. Reinstall all plugs and torque to 24 Nm (18 lbf·ft).

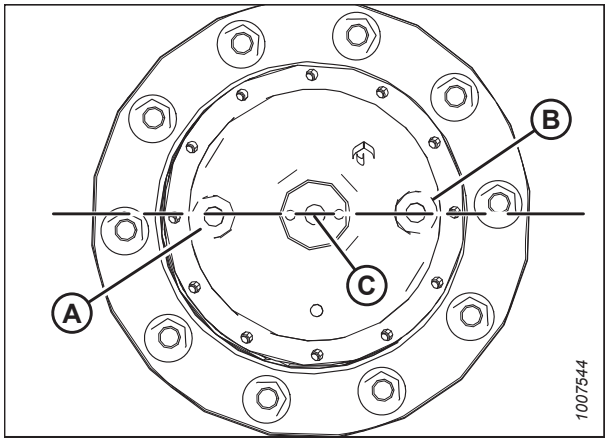


Figure 5.41: Drive Wheel

5.6.7 Return Oil Filter

The return oil filter removes particulate contaminants from the oil returning from the fan drive, lift circuits, and drive circuits. It must be changed after the first 50 hours and then at 500-hour intervals. Follow the service schedule on the Harvest Performance Tracker (HPT) display.

Removing Return Oil Filter

The return oil filter removes particulate contaminants from the oil returning from the fan drive, lift circuits, and drive circuits.

DANGER

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

DANGER

Avoid high-pressure fluids. Escaping fluid can penetrate the skin causing serious injury.

1. Shut down the engine, and remove the key from the ignition.
2. Locate return filter (A) under the left platform.
3. Clean around the head of filter (A).
4. Place a container beneath filter (A) to collect any oil that leaks out.
5. Unscrew filter (A) with a filter wrench.
6. Dispose of the used oil and filter in a manner that complies with local rules and regulations.

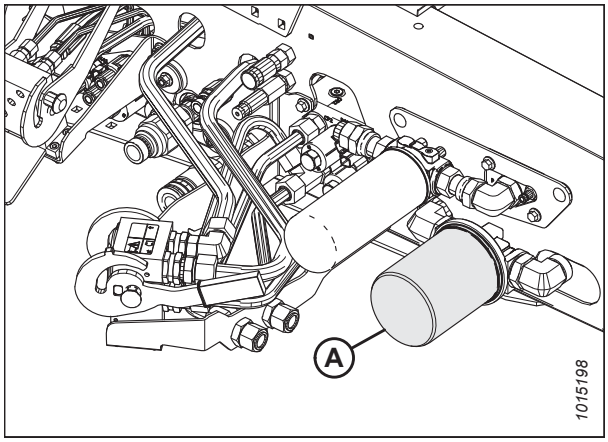


Figure 5.42: Return Filter

NOTE:

The image shows the filter head removed for component clarity.

7. Remove and discard gasket (C) from groove (B) in filter head (A).

NOTE:

Filter (D) is shown to provide context.

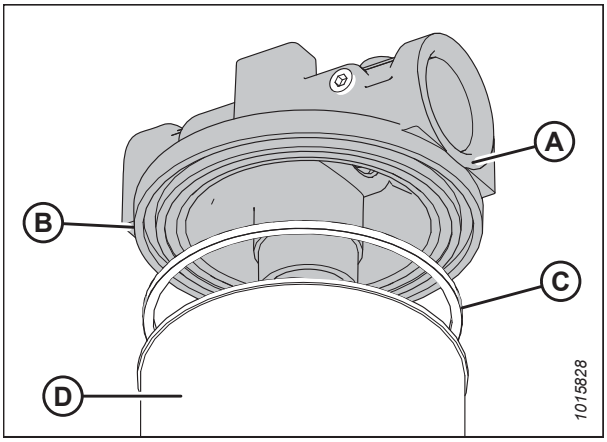


Figure 5.43: Return Filter

Installing Return Oil Filter

The return oil filter removes particulate contaminants from the oil returning from the fan drive, lift circuits, and drive circuits.

NOTE:

For filter specifications, refer to *5.1.5 Filter Part Numbers, page 234*.

NOTE:

The image shows the filter head removed for component clarity.

1. Clean gasket groove (B) in filter head (A).
2. Apply a thin film of clean oil to new filter gasket (C).

IMPORTANT:

Do **NOT** pre-fill the filter before installation as this may introduce unfiltered oil into the system.

3. Install new gasket (C) into groove (B) in filter head (A).
4. Screw new filter (D) onto the filter head until the gasket just contacts the filter.

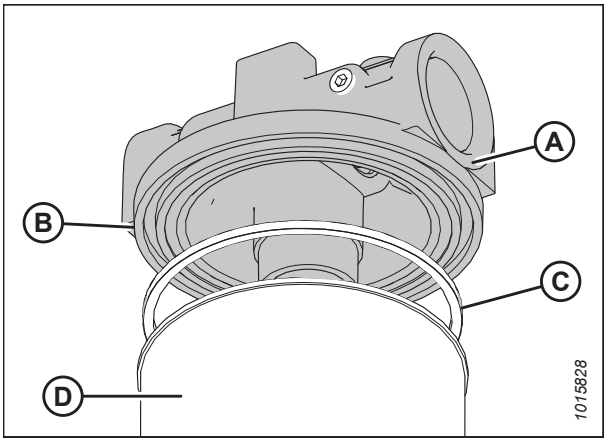


Figure 5.44: Return Filter

5. Tighten filter (A) an additional 3/4 turn by hand.

   IMPORTANT:

   Do **NOT** use a filter wrench to install the oil filter; overtightening can damage gasket and filter.

6. Check hydraulic fluid levels. For instructions, refer to *5.7.3 Checking Hydraulic Oil, page 272*. For capacity level, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*.

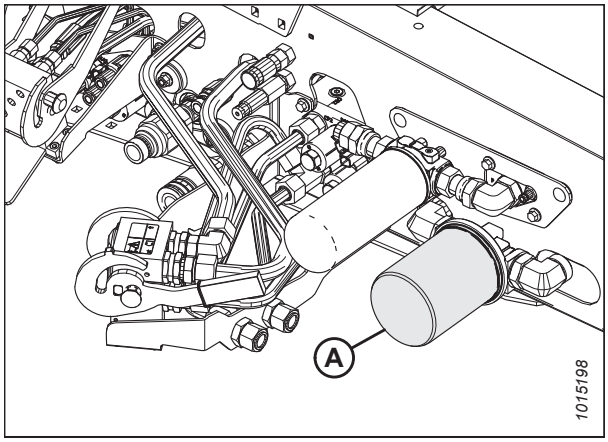


Figure 5.45: Return Filter

5.6.8 Charge Filter

The charge filter removes particulate contaminants from the oil before the oil is directed into the traction and header drive pumps. The oil maintains a positive pressure and is continuously supplied in these closed circuits during operation. The charge filter has a high-pressure bypass of 345 kPa (50 psi) that allows oil to bypass the filter element during cold temperatures and when the filter element is heavily loaded.

The charge filter must be replaced at regular intervals. The filter telltale is displayed on the Harvest Performance Tracker (HPT). The charge filter must be changed after the first 50 hours and every 500 hours thereafter. Follow the service schedule on the HPT.

Refer to the following procedures to change the charge filter:

- *Removing Charge Filter, page 268*.
- *Installing Charge Filter, page 269*.

Removing Charge Filter

The charge filter removes particulate contaminants from the oil before the oil is directed into the traction and header drive pumps.

DANGER

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

WARNING

Avoid high-pressure fluids. Escaping fluid can penetrate the skin causing serious injury.

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

2. Open the platform. For instructions, refer to *5.4.1 Opening Platform, page 241*.

3. Clean around the head of the filter.
4. Place a container beneath the filter to collect any oil that may leak out.
5. Unscrew filter (A) with a filter wrench.
6. Dispose of the used oil and filter in a manner that complies with local rules and regulations.

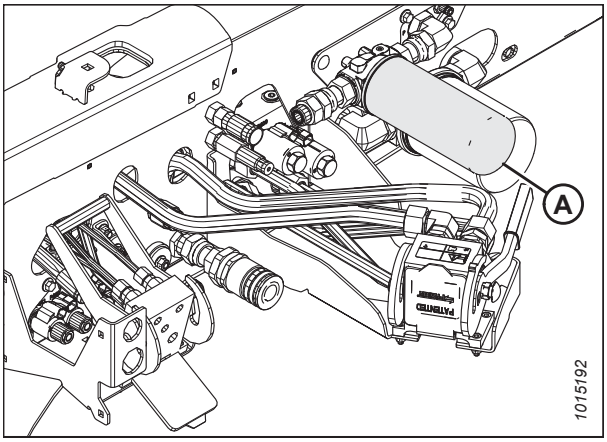


Figure 5.46: Charge Filter

Installing Charge Filter

The charge filter removes particulate contaminants from the oil before the oil is directed into the traction and header drive pumps.

NOTE:

For the charge filter replacement part number, refer to *5.1.5 Filter Part Numbers, page 234*.

1. Clean the gasket surface of the filter head.
2. Apply a thin film of clean oil to the filter gasket.

   IMPORTANT:

   Do **NOT** pre-fill the filter before installation as this may introduce unfiltered oil into the system.

3. Screw new filter (A) onto the mount until the gasket just contacts the filter head.
4. Tighten the filter an additional 1/2 turn by hand.

   IMPORTANT:

   Do **NOT** use a filter wrench to install the oil filter; overtightening can damage the gasket and filter.

5. Check hydraulic fluid levels. For instructions, refer to *5.7.3 Checking Hydraulic Oil, page 272*. For capacity level, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*.

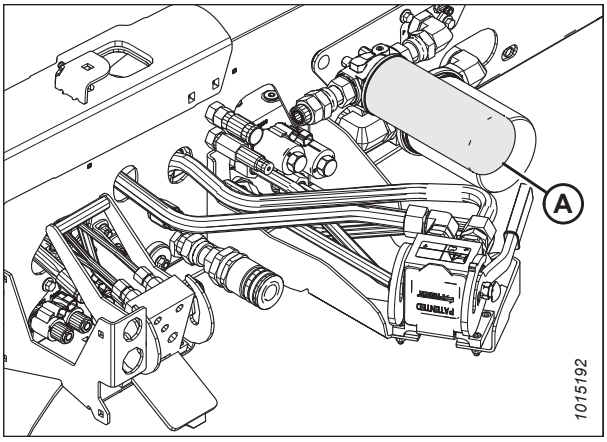


Figure 5.47: Charge Filter

5.7 Every 10 Hours or Daily

Complete the following maintenance tasks every 10 hours of operation or daily, whichever occurs first.

- Check the engine oil level. For instructions, refer to *5.7.1 Checking Engine Oil Level, page 270*.
- Check the engine coolant level. For instructions, refer to *5.7.5 Checking Engine Coolant Level, page 274*.
- Check the hydraulic oil level. For instructions, refer to *5.7.3 Checking Hydraulic Oil, page 272*.
- Check the tire inflation. For instructions, refer to *5.7.4 Checking Tire Pressure, page 273*.
- Check the hydraulic hoses and lines for leaks. For instructions, refer to *5.7.6 Hoses and Lines, page 274*.
- Drain the fuel filter water trap. For instructions, refer to *5.7.2 Fuel/Water Separator, page 271*.
- Clean the radiator, hydraulic oil cooler, charge air cooler, and A/C condenser. For instructions, refer to *5.9.2 Cleaning Cooler Module, page 284*.
- Fill the fuel tank. For instructions, refer to *Filling Fuel Tank, page 116*.
- Check the diesel exhaust fluid (DEF) level. For instructions, refer to *3.17 Harvest Performance Tracker Display, page 81*.

5.7.1 Checking Engine Oil Level

Check the engine oil level frequently and watch for any signs of leakage.

DANGER

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

NOTE:

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

NOTE:

The engine oil level can be checked without opening the hood.

1. Operate the engine at low idle, and check for leaks at the filter and drain plug.
2. Shut down the engine, and remove the key from the ignition.
3. Wait about 5 minutes.
4. Locate the engine oil dipstick on the right side of the windrower. Remove dipstick (A) by turning it counterclockwise to unlock it.
5. Wipe the dipstick clean and reinsert it into the engine.

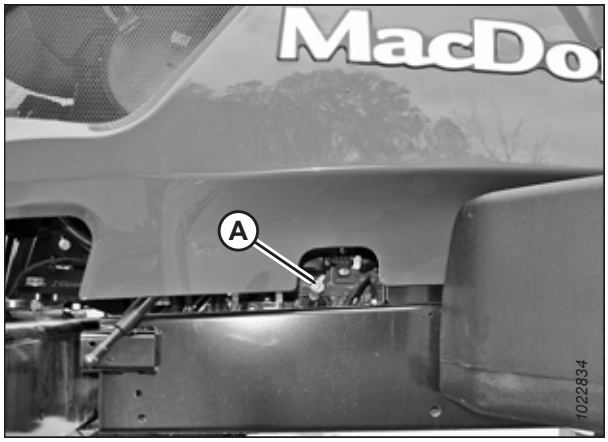


Figure 5.48: Engine Oil Dipstick Location

6. Remove the dipstick again and check the oil level. The oil level should be between the LOW (L) and HIGH (H) marks on the dipstick. If the oil level is below the LOW mark, you will need to add oil.

   NOTE:

   Adding 1.9 liters (2 U.S. quarts) of engine oil will raise the level from LOW to HIGH. To add oil, refer to *Adding Engine Oil, page 271*.

7. Replace the dipstick and turn it clockwise to lock it.

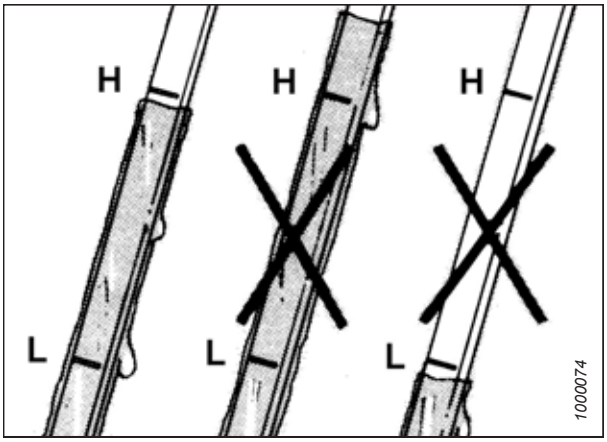


Figure 5.49: Engine Oil Level on Dipstick

Adding Engine Oil

DANGER

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

1. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
2. Shut down the engine, and remove the key from the ignition.
3. Clean the area around filler cap (A) and remove it by turning the cap counterclockwise.
4. Carefully pour in 11 L (11.6 US qts) of new oil. A funnel is recommended to avoid spillage. Refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232* for oil specifications.

CAUTION

Do NOT fill above the HIGH mark.

5. Replace oil filler cap (A) and turn it clockwise until snug.

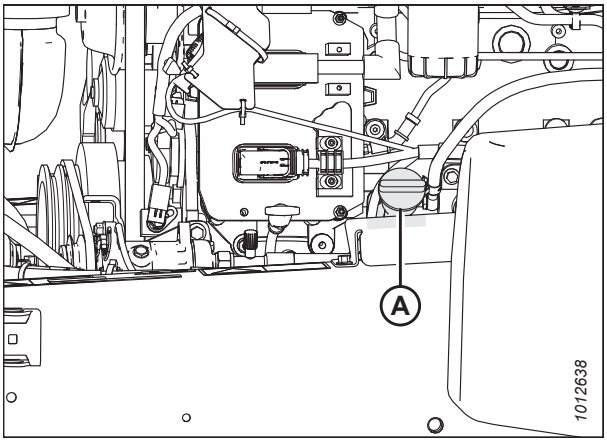


Figure 5.50: Oil Filler Cap

6. Check the oil level. For instructions, refer to *5.7.1 Checking Engine Oil Level, page 270*.
7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

5.7.2 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 detects water in the fuel and displays an alert on the HPT display. Drain the water and sediment from the separator daily or at any time the Water In Fuel (WIF) light illuminates on the HPT display.

To remove water from the fuel system, refer to *Removing Water from Fuel System, page 272*.

Removing Water from Fuel System

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Place a container under filter (A) to catch spilled fluid.
4. Turn drain valve (C) by hand 1 1/2 to 2 turns counterclockwise until draining occurs.
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. For instructions, refer to *5.3.2 Closing Hood, page 240*.

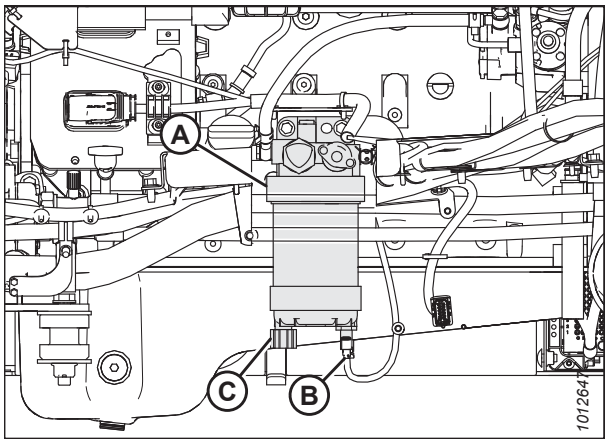


Figure 5.51: Fuel System

A - Primary Fuel Filter
B - Water in Fuel (WIF) Sensor
C - Drain Valve

5.7.3 Checking Hydraulic Oil

The hydraulic system will not work correctly if the hydraulic oil level is too low or too high. It is extremely important to avoid contamination of the hydraulic system when service and regular maintenance is performed.

DANGER

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

WARNING

Avoid high-pressure fluids. Escaping fluid can penetrate the skin causing serious injury.

1. Park the windrower on a level surface.
2. Lower the header fully.
3. Lower the reel fully.
4. Shut down the engine, and remove the key from the ignition.

5. Locate sight glass (A) on the right side of the hydraulic fluid tank.

   NOTE:

   The sight glass allows the operator to visually inspect the oil level and its quality. The sight glass can be seen with the hood open or closed.

6. Ensure that the hydraulic oil level is between the low and full indicator marks on the sight glass.

   IMPORTANT:

   If you do not see any oil in the sight glass, then the oil level is below the ADD mark on the dipstick. This problem should be addressed immediately.

7. If more oil is required to maintain the level between the low and full indicator marks, refer to *5.13.3 Filling Hydraulic Oil, page 319*.

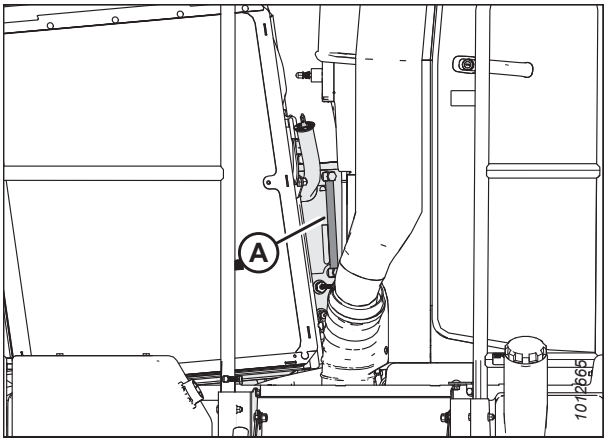


Figure 5.52: Hydraulic Oil Sight Glass

5.7.4 Checking Tire Pressure

The tires must be at the correct operating pressure. Check the pressure of the windrower tires using a tire pressure gauge.

Caster Wheel Tires: Inflate all caster wheel tires (B) to 110 kPa (16 psi).

Drive Wheel Tires: The maximum inflation pressure for the drive tires (A) is 241 kPa (35 psi).

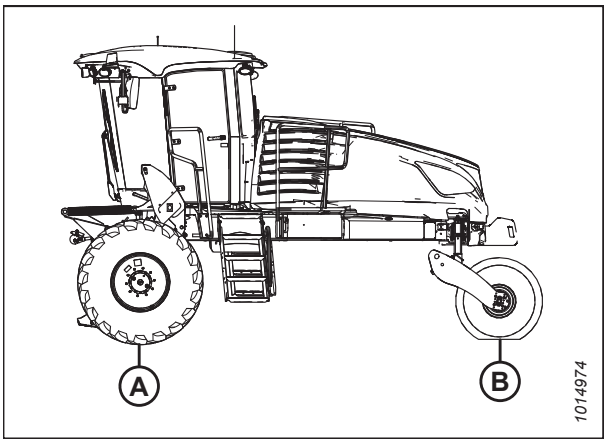


Figure 5.53: Windrower Tires

5.7.5 Checking Engine Coolant Level

Coolant is cycled through the engine to help reduce internal heat. The coolant must be at the appropriate level for the cooling system to work correctly. Check the coolant level in the pressurized coolant tank daily.

DANGER

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

NOTE:

Ensure the engine has cooled down prior to checking.

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Locate coolant recovery tank (A).
4. Visually inspect the coolant level. Ensure that the coolant level is at MAX COLD line (B). If the coolant level is too low, add more coolant. For instructions, refer to *Adding Coolant after System Drain, page 317*. For fluid quantities, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*. For coolant specifications, refer to *5.1.2 Coolant Specifications, page 231*.

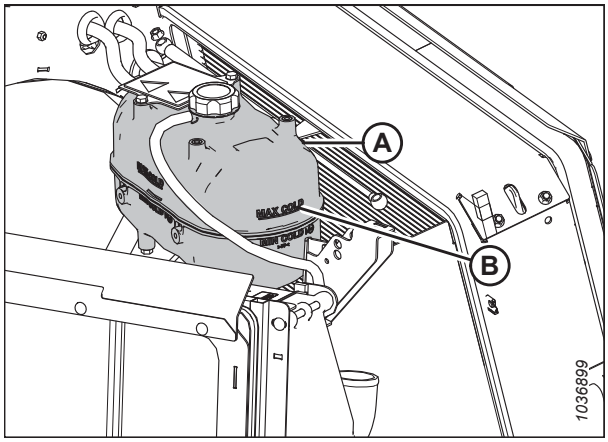


Figure 5.54: Coolant Recovery Tank

5. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

5.7.6 Hoses and Lines

Check hydraulic hoses and lines daily for signs of leaks.

WARNING

- **Avoid high-pressure fluids. Escaping fluid can penetrate the skin causing serious injury.**
- **Relieve pressure before disconnecting hydraulic lines. Tighten all connections before applying pressure.**
- **Keep hands and body away from pin-holes and nozzles which eject fluids under high pressure.**
- **If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a Doctor familiar with this type of injury or gangrene may result.**
- **Use a piece of cardboard or paper to search for leaks.**
- **Any service components must be genuine MacDon parts.**
- **All connections must be properly torqued. For specifications, refer to *8.1 Torque Specifications, page 399*.**



Figure 5.55: Hydraulic Pressure Hazard

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. Make every effort to prevent the hydraulic system from being contaminated during overhaul.

5.7.7 Checking Engine Gearbox Lubricant Level and Adding Lubricant

Ensure that the gearbox lubricant level is correct in order to maximize the service life of its components. Check the lubricant level daily.

DANGER

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever (GSL) in the PARK position, and the steering wheel in the locked position (centered). To confirm that the parking brake is engaged, wait for the HPT to beep and display a red P symbol.

1. Park the windrower on a level surface.
2. Shut down the engine, and remove the key from the ignition.

   NOTE:

   If the engine is hot, wait 10 minutes before checking the gearbox lubricant level to allow the lubricant to cool and settle in the gearbox's sump.

3. Open the hood. Refer to the operator's manual for instructions.
4. Locate gearbox oil level check plug (A) under the windrower.
5. Remove oil level check plug (A). The lubricant should be visible through the hole. Some lubricant may leak from the level check port.

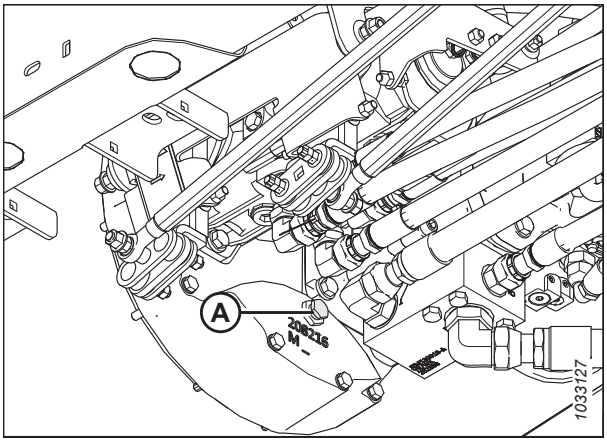


Figure 5.56: Gearbox Lubricant Check Plug

6. If lubricant is needed, remove breather cap (A) and add lubricant until it runs out of the level check port.

   NOTE:

   For oil requirements, refer to the inside back cover.

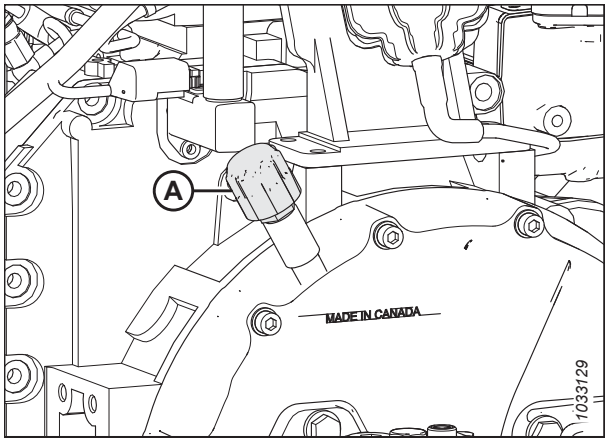


Figure 5.57: Gearbox Lubricant Filler

7. Replace oil level check plug (A) and the breather cap and tighten both.

8. Operate the engine at low idle and check for leaks at oil level check plug (A).

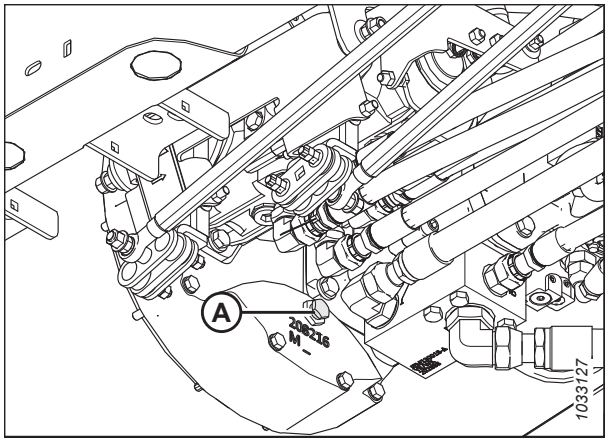


Figure 5.58: Gearbox Lubricant Check Plug

5.8 Every 50 Hours

Complete the following maintenance tasks every 50 hours of operation:

- Clean the cab fresh air intake filter. For instructions, refer to *5.8.1 Fresh Air Intake Filter, page 277*.
- Check the gearbox oil level. For instructions, refer to *5.7.7 Checking Engine Gearbox Lubricant Level and Adding Lubricant, page 275*.
- Grease the caster bearings and pivots. For instructions, refer to *5.8.2 Greasing Windrower, page 280*.
- Grease the top lift link pivots. For instructions, refer to *5.8.2 Greasing Windrower, page 280*.
- Grease the sliding walking beam points. For instructions refer to *5.8.2 Greasing Windrower, page 280*.

5.8.1 Fresh Air Intake Filter

The fresh air intake filter should be serviced every 50 hours under normal conditions and more frequently in severe conditions.

The fresh air intake filter is located outside the lower right rear of cab (A).

Refer to *5.1.5 Filter Part Numbers, page 234* for the appropriate part number.

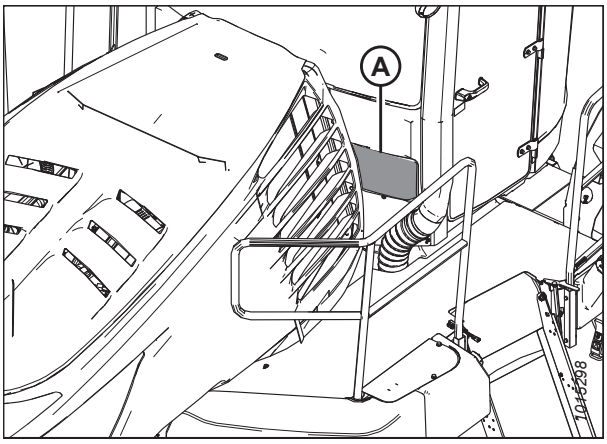


Figure 5.59: Fresh Air Intake Filter Location

Removing Fresh Air Intake Filter

The fresh air intake filter should be serviced every 50 hours under normal conditions and more frequently in severe conditions.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

3. Rotate latch (A) counterclockwise to remove fresh air filter door (B).

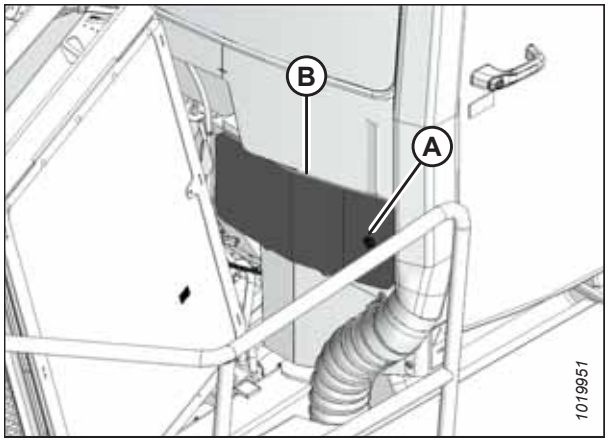


Figure 5.60: Fresh Air Filter Door

4. Turn knob (A) counterclockwise, and remove it.
5. Remove air filter retainer (B).
6. Remove air filter (C).

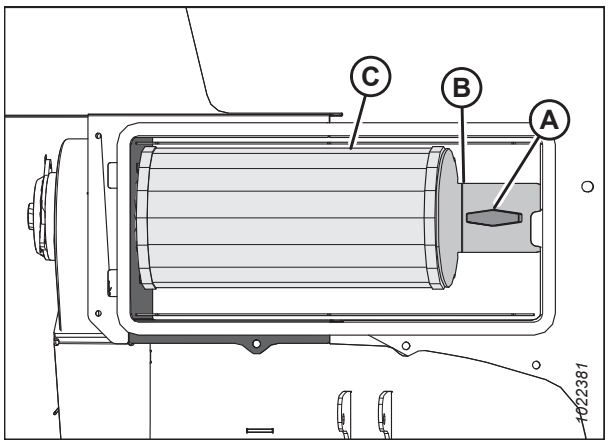


Figure 5.61: Fresh Air Intake Filter

Inspecting and Cleaning Fresh Air Intake Filter Element

1. Tap the sides of the filter element gently to loosen dirt. Do **NOT** tap the element against a hard surface.
2. Using a dry element cleaner gun, clean the element with compressed air.

IMPORTANT:

Air pressure must **NOT** exceed 414 kPa (60 psi). Do **NOT** direct air against the outside of the element, as dirt might be forced through to the inside.

3. Hold the air nozzle next to the filter element's inner surface, and move up and down the pleats.
4. Repeat the previous steps to remove additional 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 the outer screen for dents. Vibration would quickly wear a hole in the filter.
7. Check the filter gasket for cracks, tears, or other signs of damage. If the gasket is damaged or missing, replace the element.

Installing Fresh Air Intake Filter

Refer to *5.1.5 Filter Part Numbers, page 234* for the appropriate filter part number.

1. Clean the interior of fresh air intake box (A).

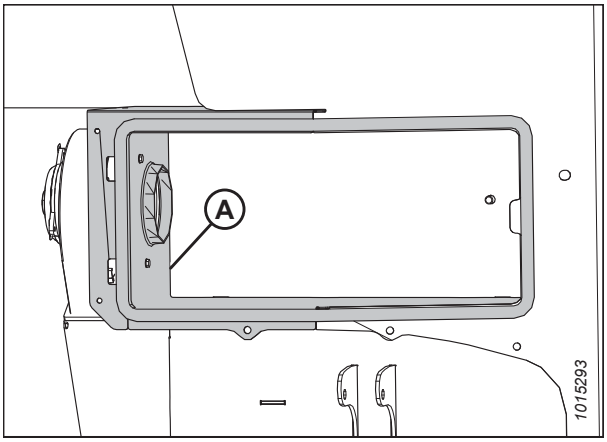


Figure 5.62: Fresh Air Intake Box

2. Install air filter (A) onto fresh air box panel (B).

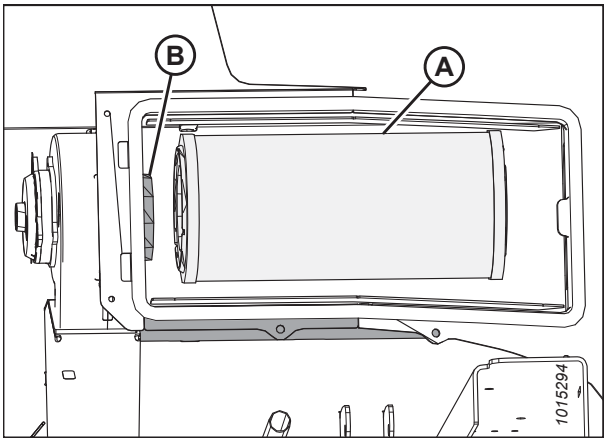


Figure 5.63: Fresh Air Intake Filter

3. Secure air filter (C) with retainer (B).
4. Install knob (A), and turn it clockwise to tighten.

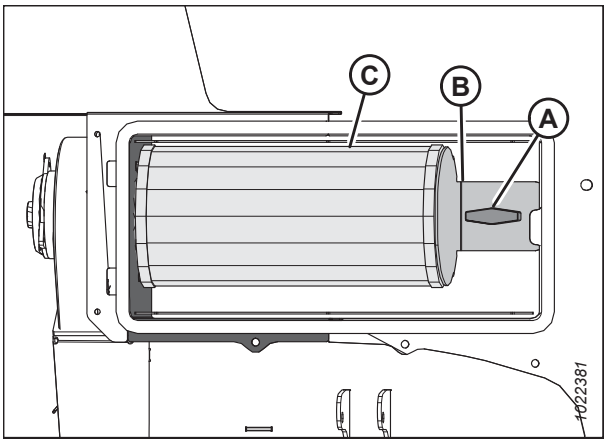


Figure 5.64: Fresh Air Intake Filter

5. Insert the tabs on fresh air filter door (B) into the slots on the fresh air box, and rotate latch (A) clockwise to secure the door.

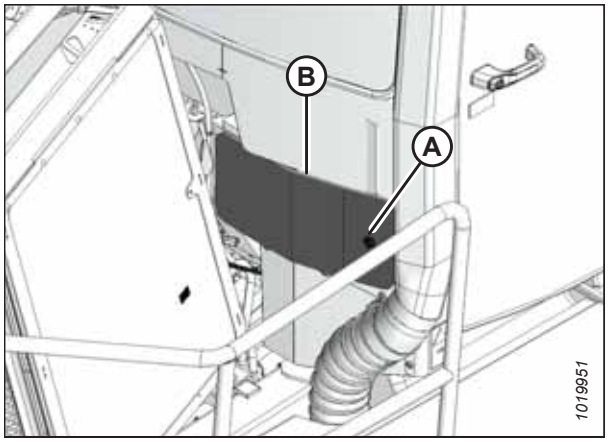


Figure 5.65: Fresh Air Intake Filter Cover

5.8.2 Greasing Windrower

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

WARNING

To avoid personal injury, before servicing the windrower or opening drive covers, follow procedures in *1 Safety, page 1*.

Log hours of operation and use the Maintenance Checklist provided to keep a record of scheduled maintenance. For more information, refer to *5.2.2 Maintenance Schedule/Record, page 236*.

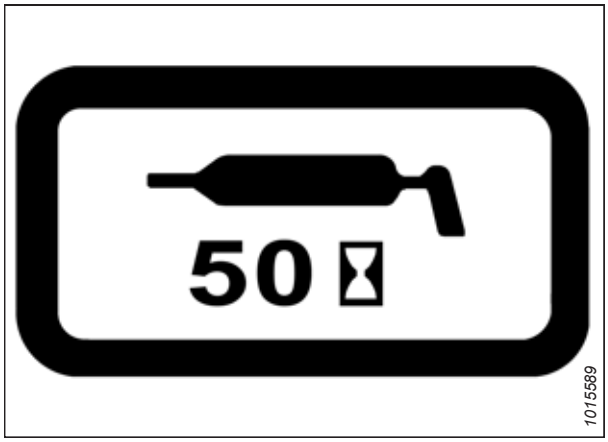


Figure 5.66: Greasing Interval Decal

Greasing Procedure

Add grease to these greasing points according to the maintenance schedule. Be sure to leave a small amount of grease on top of each fitting to prevent contamination.

DANGER

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

1. To avoid injecting dirt and grit, wipe each grease fitting with a clean cloth before greasing.
2. Inject grease through the fitting with a grease gun until the grease overflows the fitting, except where noted. For specifications, refer to the inside back cover.
3. Leave excess grease on the fitting to keep out dirt.

4. Replace any loose or broken fittings immediately.

5. If a fitting will **NOT** take grease, remove and clean it thoroughly. Also clean the grease passageway. Replace the fitting if necessary.

Grease Points

Add grease to these greasing points according to the maintenance schedule. Be sure to leave a small amount of grease on top of each fitting to prevent contamination.

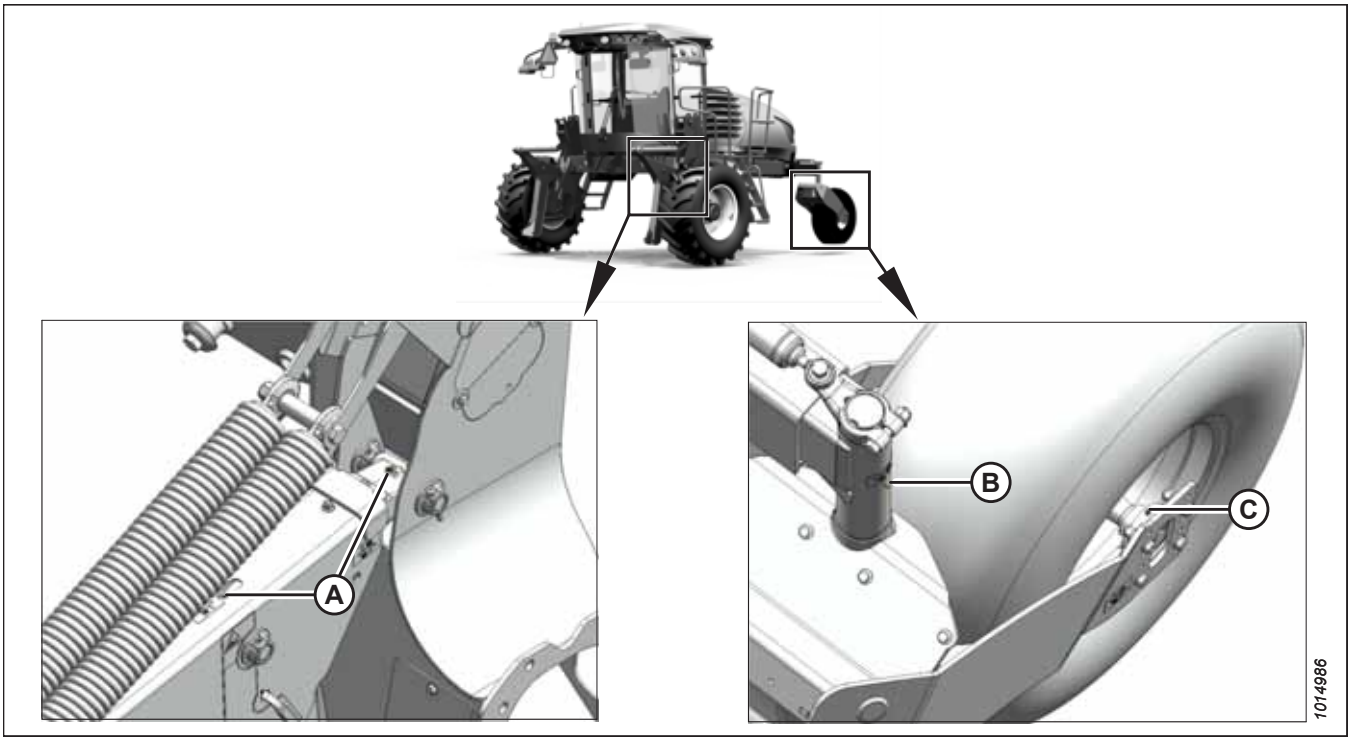


Figure 5.67: Grease Points

A - Top-Link (2 Places) (Both Sides) **B - Caster Pivot (Both Sides)** **C - Caster Wheel Hub (Both Sides)**[19]

19. Do **NOT** overgrease. Use 1 pump of grease.

Walking Beam and Drive Wheel Leg Extensions

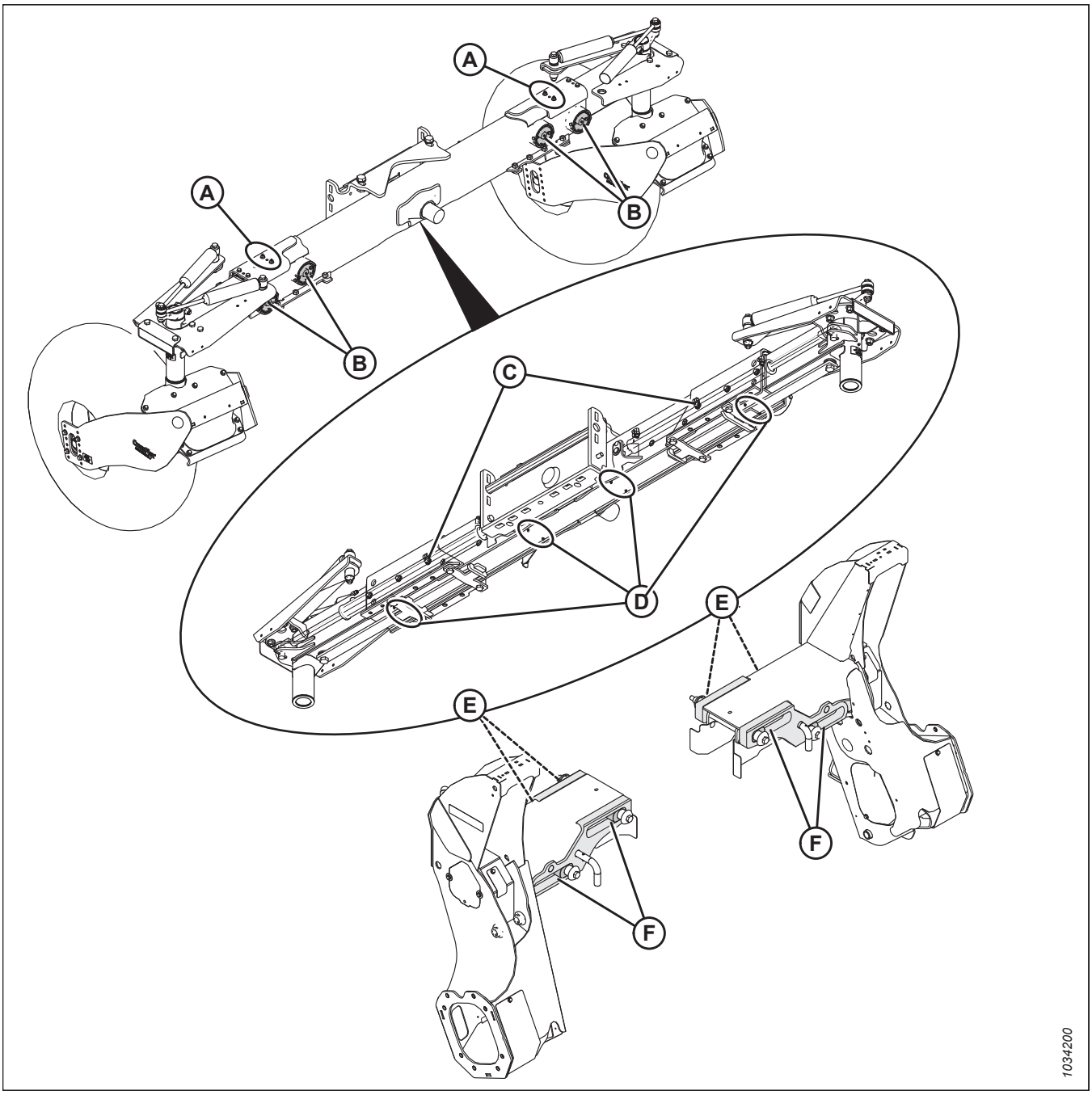


Figure 5.68: Wheel Extension Grease Points

A - Walking Beam – Top Side (2 Places) (Both Sides)
B - Walking Beam – Inward Facing (2 Places) (Both Sides)
C - Walking Beam – Outward Facing (2 Places)
D - Walking Beam – Underside (8 places)
E - Drive Wheel Legs – Inboard Bushings, Top Surfaces (2 Places) (Both Sides)
F - Outboard Front Bushings, Bottom Surfaces – Drive Wheel Legs (2 Places) (Both Sides)

IMPORTANT:

Grease the sliding drive wheel legs in the narrow position every 250 hours or annually. For moly grease specification, refer to the inside back cover.

5.9 Every 100 Hours

Complete the following maintenance tasks every 100 hours of operation:

- Clean the cab air return filter. For instructions, refer to *5.9.1 Servicing Return Air Filter, page 283*.
- Clean the radiator, hydraulic oil cooler, charge air cooler, and A/C condenser. For instructions, refer to *5.9.2 Cleaning Cooler Module, page 284*.

5.9.1 Servicing 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.

1. Unscrew two knobs (A) attaching the cover and the filter to the cab wall, and remove cover and filter assembly (B).

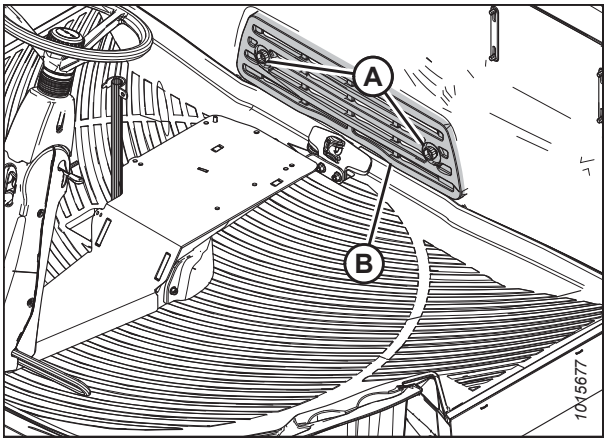


Figure 5.69: Return Air Filter

2. Separate filter (B) from cover (A).
3. Clean the electrostatic filter as follows:
   a. Mix a solution of warm water and detergent in a suitable container so that filter (B) can soak for a few minutes.
   b. Agitate the water to flush out the dirt.
   c. Rinse the filter with clean water, and then dry it with compressed air.
   d. Inspect the filter for damage, separation, and holes. Replace if damaged. Refer to *5.1.5 Filter Part Numbers, page 234* for part number.
4. Assemble cleaner (B) and cover (A), and position it on the cab wall over the opening.

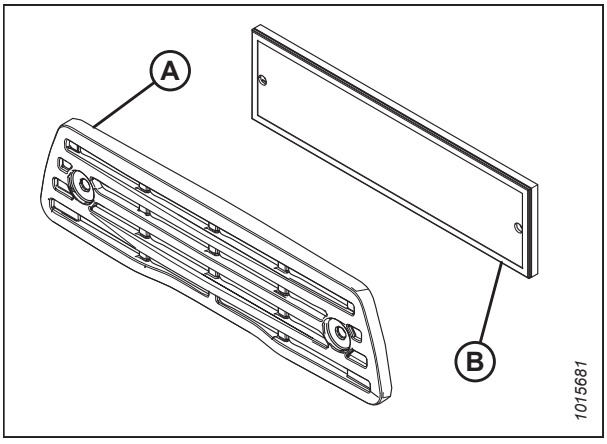


Figure 5.70: Return Air Filter

5. Secure filter assembly (B) to the cab wall with knobs (A).

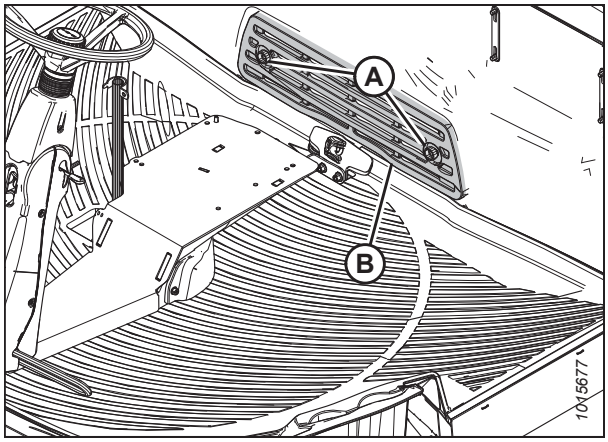


Figure 5.71: Return Air Filter

5.9.2 Cleaning Cooler Module

Clean the cooling module every 100 hours of operation. Daily cleaning may be required if operating in heavy crop conditions.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Proceed to the cleaning procedures. For instructions, refer to *Cleaning Right Cooling Module, page 287* or *Cleaning Left Cooling Module, page 284*.

Cleaning Left Cooling Module

The engine radiator, air conditioning condenser, and screen in the left cab-forward cooling module must be cleaned to ensure the best performance.

1. At the left cab-forward cooler module, push latch (A) and open engine radiator door (B).

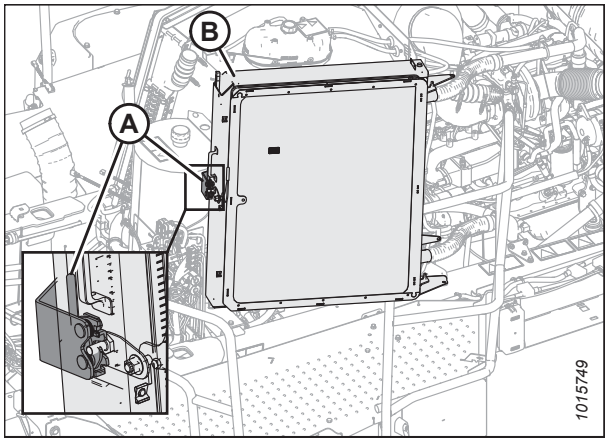


Figure 5.72: Left Cooler Module

2. Lower lever (A) to release screen/condenser door (B) from radiator (C), and open screen/condenser door (B).

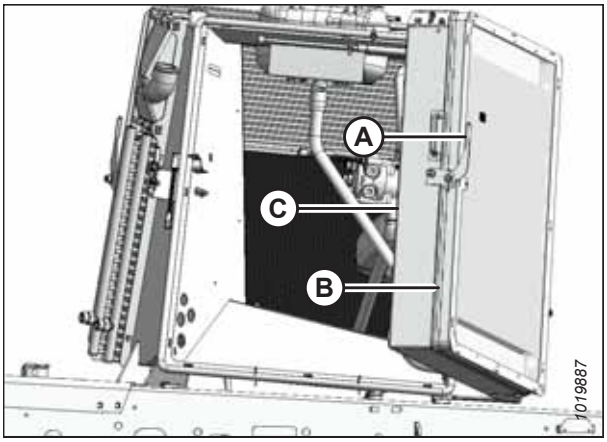


Figure 5.73: Left Cooler Module

3. Pull lever (A) up to partially open condenser (B) away from screen (C).

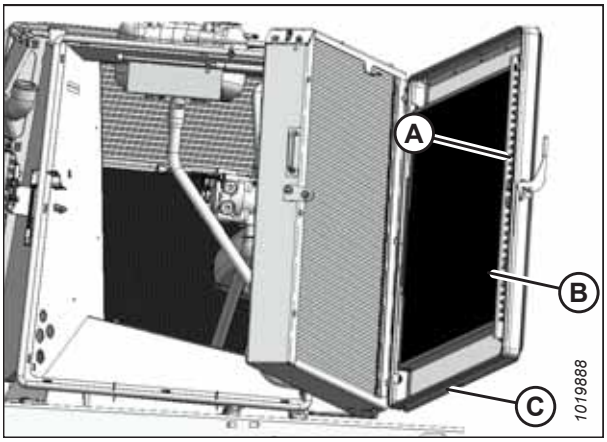


Figure 5.74: Left Cooler Module

4. Secure condenser (A) with bracket (B).

5. Clean debris from radiator (D), condenser (A), and screen (C) with compressed air.

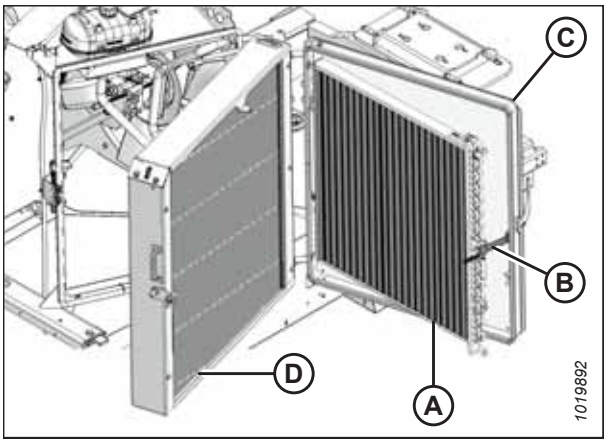


Figure 5.75: Left Cooler Module

6. Close condenser (B) into screen (C) and secure with bracket (A).

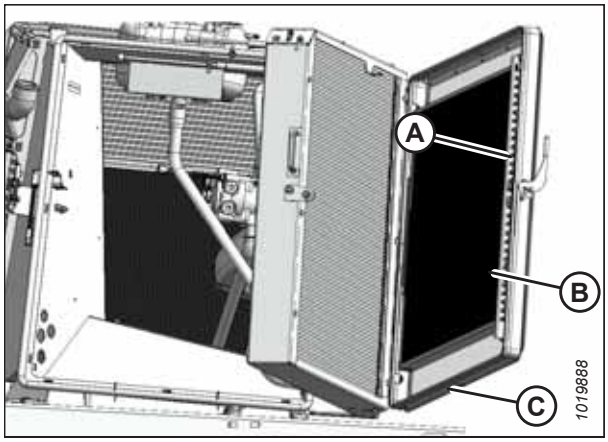


Figure 5.76: Left Cooler Module

7. Close screen/condenser door (B) onto radiator door (C) and secure with lever (A).

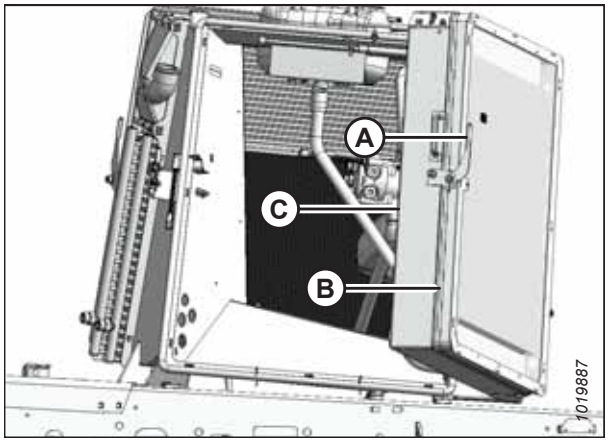


Figure 5.77: Left Cooler Module

8. Close radiator door (B) and push until latch (A) secures door (B).

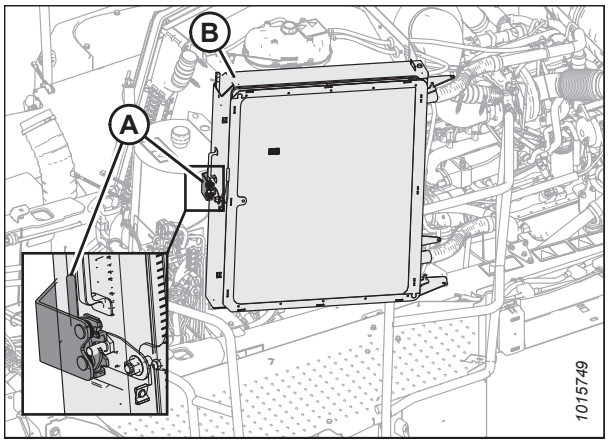


Figure 5.78: Left Cooler Module

Cleaning Right Cooling Module

The coolers at the right cab-forward side of the windrower must be cleaned to ensure the best performance.

1. At the right (cab-forward) cooler module, pull latch handle (A) and open screen (B).

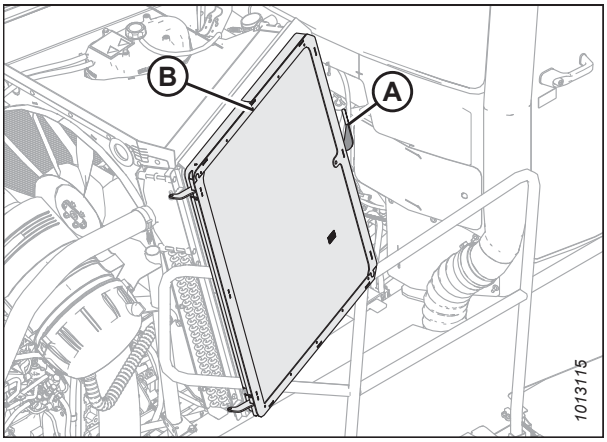


Figure 5.79: Right Cooler Module

2. At the left (cab-forward) cooler module, push latch (A) and open engine radiator door (B) to allow access inside the cooler module.

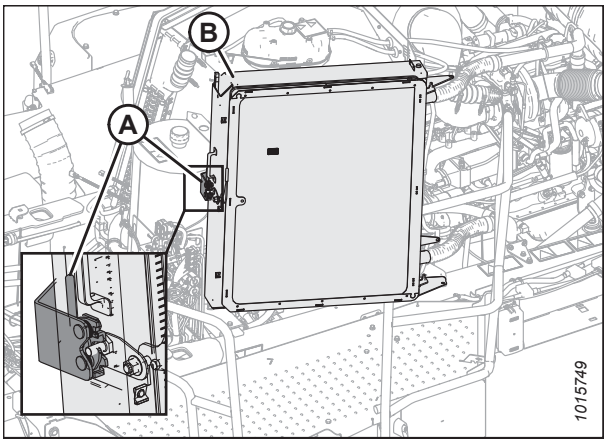


Figure 5.80: Engine Radiator Door

3. Use compressed air to clean debris from inside cooler box (A), charge air cooler (B), and hydraulic oil cooler (C).

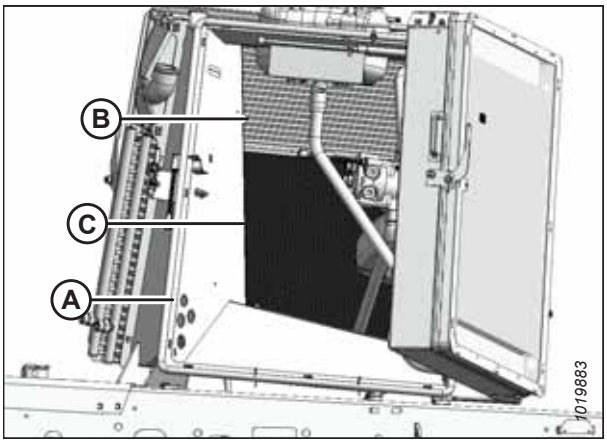


Figure 5.81: View from Inside Module – Left Side

4. At the right (cab-forward) cooler module, with the screen door open, clean the debris from screen (A) with compressed air.

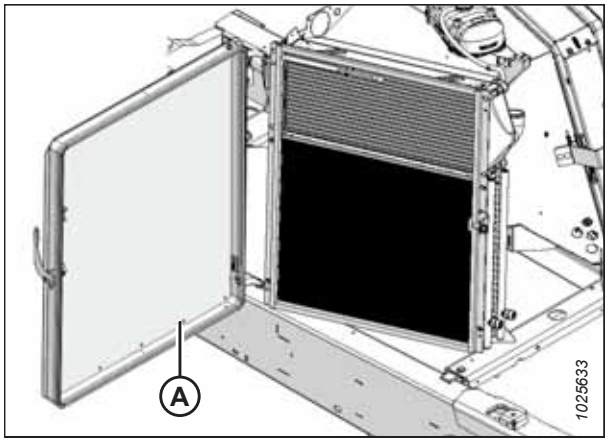


Figure 5.82: Right Cooler Module

5. Close screen door (B) and secure it with latch (A).

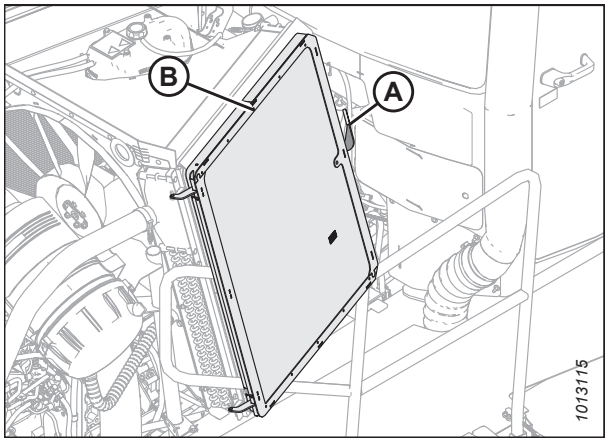


Figure 5.83: Right Cooler Module

5.10 Every 250 Hours or Annually

Complete the following maintenance tasks every 250 hours of operation or annually, whichever occurs first:

- Change the engine oil and filter. For instructions, refer to *5.10.1 Changing Engine Oil, page 289*.
- Change the engine primary air filter. For instructions, refer to *5.10.2 Maintaining Engine Air Filters, page 291*.
- Check the wheel drive lubricant level. For instructions, refer to *5.10.3 Checking Wheel Drive Lubricant Level – 10 Bolt, page 295*.
- Inspect the exhaust system. For instructions, refer to *5.10.5 Inspecting Exhaust System, page 297*.
- Change the engine gearbox oil. For instructions, refer to *5.10.6 Changing Engine Gearbox Lubricant, page 298*.

5.10.1 Changing Engine Oil

The engine oil should be changed according to the interval specified in the windrower's Maintenance Schedule. The oil filter should be changed whenever the engine oil is changed.

Draining Engine Oil

DANGER

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

NOTE:

The engine should be warm prior to changing the oil.

1. Shut down the engine, and remove the key from the ignition.
2. Place a drain pan with a capacity of about 24 liters (6 U.S. gallons) under the engine oil drain.
3. Remove oil drain plug (A) and allow the oil to finish draining.
4. 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. Dispose of the used oil in a manner that complies with local rules and regulations.

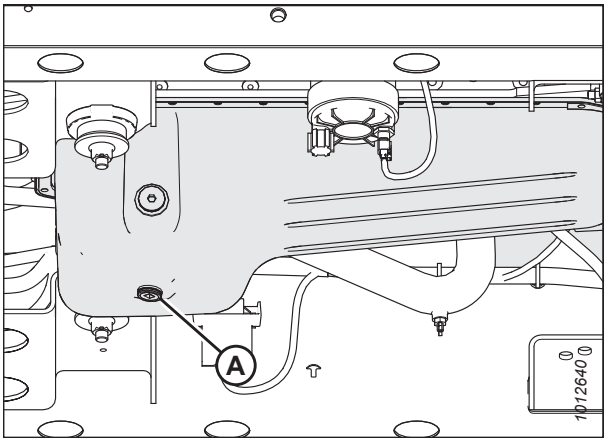


Figure 5.84: Engine Oil Drain Plug

Replacing Engine Oil Filter

NOTE:

Replace the oil filter each time the engine oil is changed.

1. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
2. Place an oil pan below the filter.

3. Clean around filter head (A) and remove the filter.

   NOTE:

   Check that the gasket is removed from the filter head.

4. Clean the gasket mating surface.

5. Apply a thin film of clean oil to the gasket on the new filter. Refer to *5.1.5 Filter Part Numbers, page 234* for the recommended oil 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 the used oil filter.

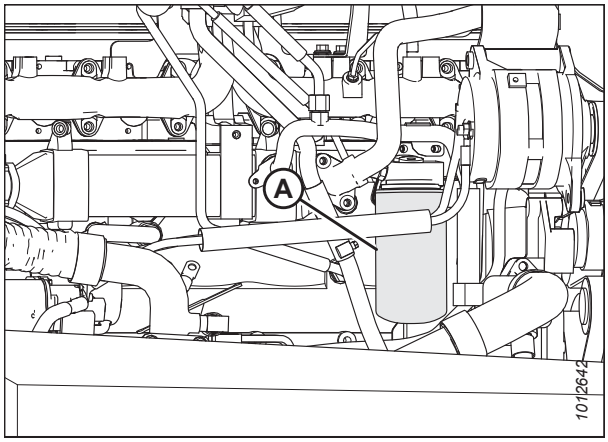


Figure 5.85: Engine Oil Filter

Adding Engine Oil

DANGER

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

1. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

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

3. Clean the area around filler cap (A) and remove it by turning the cap counterclockwise.

4. Carefully pour in 11 L (11.6 US qts) of new oil. A funnel is recommended to avoid spillage. Refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232* for oil specifications.

CAUTION

Do NOT fill above the HIGH mark.

5. Replace oil filler cap (A) and turn it clockwise until snug.

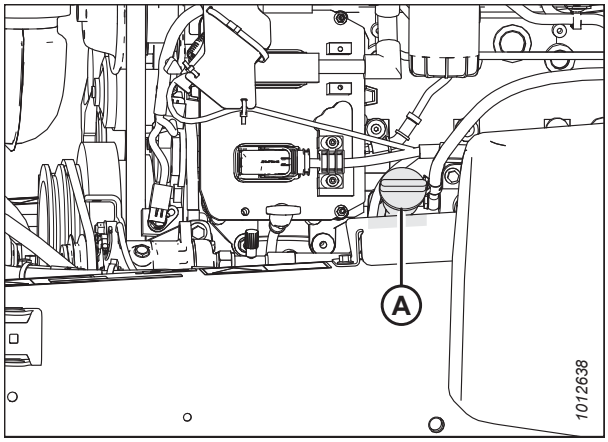


Figure 5.86: Oil Filler Cap

6. Check the oil level. For instructions, refer to *5.7.1 Checking Engine Oil Level, page 270*.

7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

5.10.2 Maintaining Engine Air Filters

Removing Engine Primary Air Filter

1. Stand on the right service platform.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Slightly lift catch (A) at the side of end cap (B). Rotate the end cap counterclockwise until it stops.

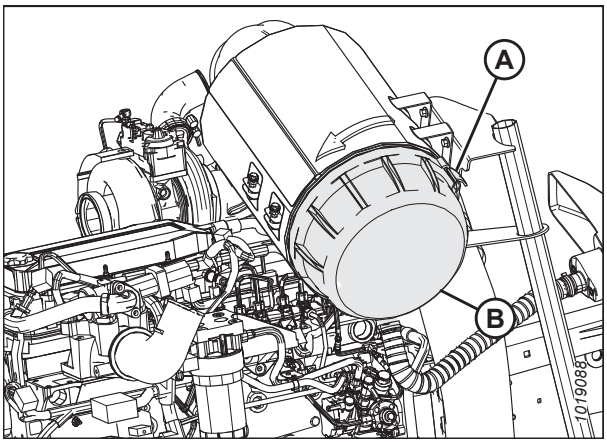


Figure 5.87: Air Filter Housing

4. Make sure arrow (A) lines up with the UNLOCK symbol on the end cap.
5. Pull off the end cap.



Figure 5.88: Air Filter

6. Check aspirator duct opening (A) for obstructions or damage. Clean if necessary.
7. Place the cover on the platform.

   NOTE:

   Hoses can be left connected to the cover.

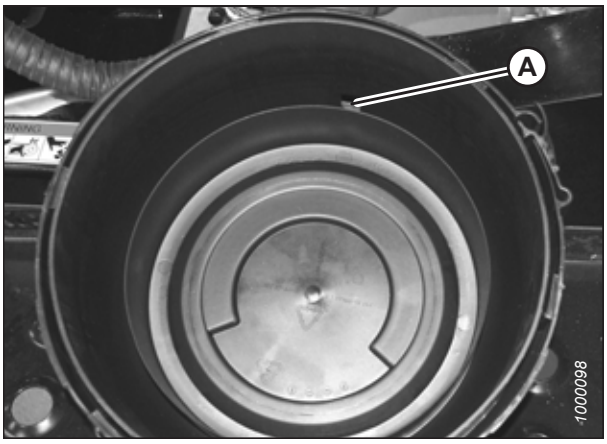


Figure 5.89: Air Filter

8. Pull out primary filter element (A).

   IMPORTANT:

   Be extremely careful with the dirty element until it is completely out of the housing. Accidentally bumping it while still inside may cause dirt and dust to contaminate the clean side of the filter housing.

9. If necessary, also change secondary filter (B). For instructions, refer to *Replacing Secondary Air Filter, page 294*.

   IMPORTANT:

   - Do **NOT** remove the secondary filter unless it needs replacing. It must never be cleaned.
   - Replace the secondary filter annually or after every third primary filter change, even if it looks clean.
   - If the secondary filter looks dirty, a further inspection is required.
   - Examine the filter canister for cracks and replace as necessary.
   - Ensure the canister retaining latches are secure.

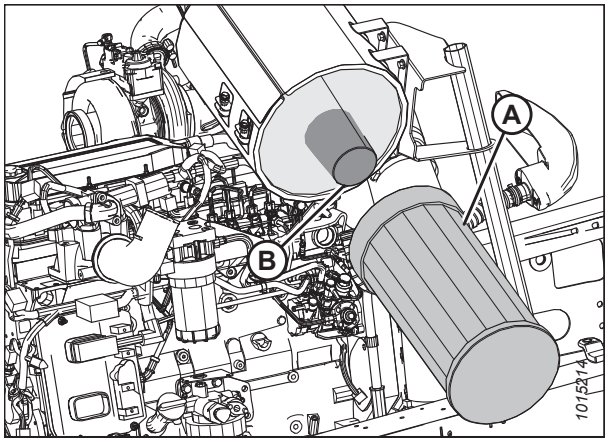


Figure 5.90: Air Filter

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 it visually to make sure it is clean before putting in a new element.
- 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 element. Your old element is a valuable clue to potential dust leakage or gasket sealing problems.

- A pattern on the element clean side is a sign that the old element was not firmly sealed or that a dust leak exists.
- Make certain the cause of that leak is identified and rectified before replacing the element.
- Recheck to see if the sealing surface in the housing is clean.

Installing Engine Primary Air Filter

NOTE:

For primary air filter replacement part number, refer to *5.1.5 Filter Part Numbers, page 234*.

1. Insert new primary filter (A) into the canister and push it into place, ensuring that the element is firmly seated in the canister.

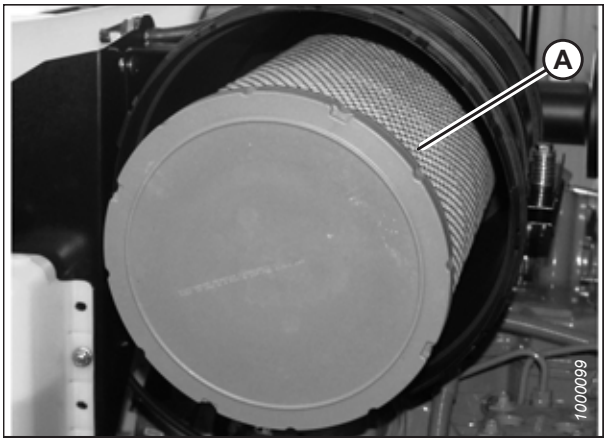


Figure 5.91: Air Filter

2. Align arrow (A) to the UNLOCK position on the end cap, and push the end cap fully onto the housing.
3. Rotate the end cap clockwise until catch (A) engages the housing to prevent the end cap from turning.



Figure 5.92: Air Filter

4. Position end cap (B) onto the filter housing with the aspirator pointing approximately down.
5. Secure the end cap onto the filter housing by closing latch (A).
6. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.
7. Close the platform. For instructions, refer to *5.4.2 Closing Platform, page 241*.

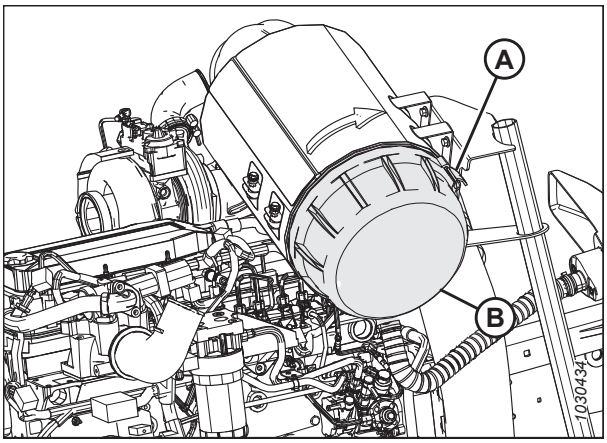


Figure 5.93: Air Filter

Cleaning Primary Air Filter

The engine 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 *5.2 Windrower Break-In Inspections and Maintenance Schedule, page 235* for the required interval.

1. Hold a bright light inside the element and check carefully for holes. Vibration will quickly wear a hole in the filter.
2. Check the filter gasket for cracks, tears, or other signs of damage.
3. Check the element for oil or soot contamination.
4. Check the secondary element for cleanliness. If there is visible dirt on the secondary element, replace both the primary and secondary elements. Do **NOT** clean the secondary element.

   IMPORTANT:

   - The secondary filter element should **NEVER** be cleaned, only replaced.
   - **Primary 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.

5. If the 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 the nozzle next to the inner surface only and move it up and down on the pleats.

   NOTE:

   After three cleanings (or at the specified interval), replace the primary element.

6. Repeat the inspection before installation. For instructions, refer to *Installing Engine Primary Air Filter, page 292*.

Replacing Secondary Air Filter

The secondary element should be replaced every third time the primary element is changed.

IMPORTANT:

- The secondary filter element should **NEVER** be cleaned, only replaced. Do **NOT** remove the secondary filter element unless it needs replacing.
- Replace the secondary element annually or after every third primary filter change, even if it appears clean.
- If replacing the secondary element, a further inspection may be necessary.
- Examine the filter canister for cracks and replace it as necessary.
- Ensure the canister retaining latches are secure. Ensure the filter sealing surfaces are soft, flexible, and sealing, not hard and allowing debris through to the secondary filter.

1. Remove the primary filter. For instructions, refer to *Removing Engine Primary Air Filter, page 291*.

   IMPORTANT:

   When replacing secondary filter (A), reinsert the new filter as soon as possible to prevent dirt from entering the engine intake.

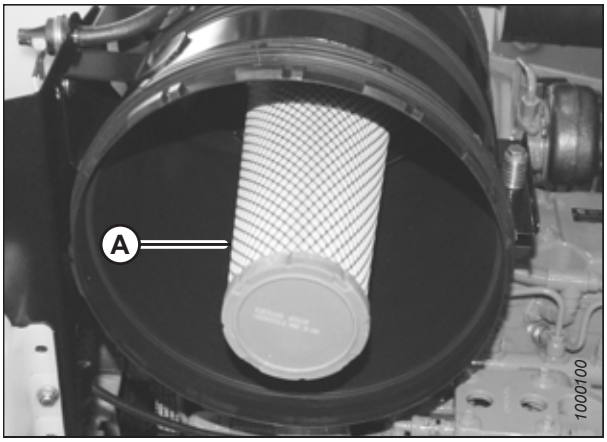


Figure 5.94: Secondary Air Filter

2. Remove secondary filter element (A) from the canister.

   NOTE:

   If replacing the filter, refer to *5.1.5 Filter Part Numbers, page 234*.

3. Insert new secondary filter element (A) into the canister, seal first, and push it until the seal is seated inside the canister.

4. Install the primary filter. For instructions, refer to *Installing Engine Primary Air Filter, page 292*.

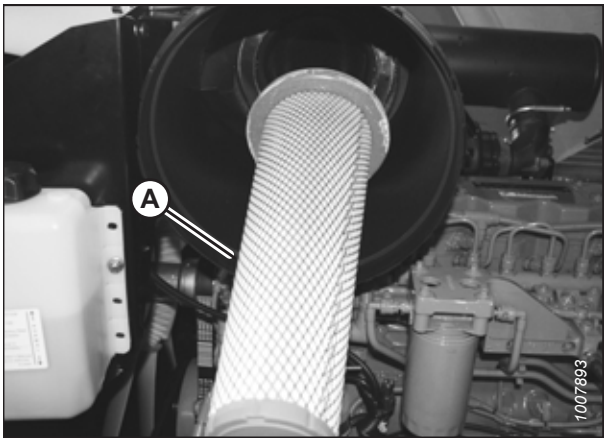


Figure 5.95: Secondary Air Filter

5.10.3 Checking Wheel Drive Lubricant Level – 10 Bolt

Check the wheel drive lubricant level every 250 hours or annually.

DANGER

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

1. Park the windrower on level ground.
2. Position windrower so that plugs (A) and (B) are horizontally aligned with center (C) of the hub.

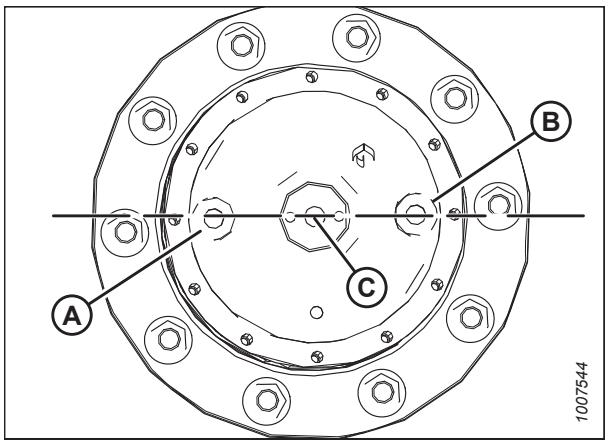


Figure 5.96: Drive Wheel

WARNING

Use caution when removing plug as there may be pressure in the drive.

3. 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 *5.10.4 Adding Wheel Drive Lubricant – 10 Bolt, page 296*.

   NOTE:

   The type of lubricant used after the first lubricant change is different from the factory supplied lubricant.

4. Reinstall the plugs and torque to 24 Nm (18 lbf·ft).

5.10.4 Adding Wheel Drive Lubricant – 10 Bolt

NOTE:

Do **NOT** mix lubricants of different brands or characteristics.

NOTE:

For lubricant specifications, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*.

DANGER

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

1. Rotate the wheel drive so plugs (A) and (B) are horizontally aligned with center (C) of the hub.
2. Shut down the engine, and remove the key from the ignition.
3. Remove either plug (A) or (B).

   NOTE:

   PRIOR TO FIRST CHANGE: Use SAE 85W-140, API service, class GL-5, extreme pressure gear lubricant (non-synthetic).

   NOTE:

   AFTER FIRST CHANGE: Use SAE 75W-140 or 80W-140, API service, class GL-5, fully synthetic transmission lubricant (SAE J2360 preferred).

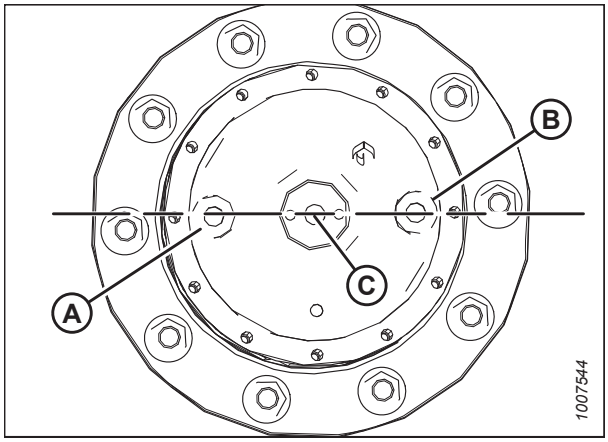


Figure 5.97: Wheel Drive

4. Add lubricant through one of the ports until the lubricant reaches the bottom of the ports and begins to run out.
5. Reinstall and tighten plug (A) or (B). Torque plug to 24 Nm (18 lbf·ft).
6. Start up and operate the windrower for a few minutes, then stop and check the oil level. For specifications, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*. If necessary, add more oil.

5.10.5 Inspecting Exhaust System

The exhaust system consists of two main canisters for exhaust treatment. Between the two exhaust canisters is a tube with a dosing module (DM) for diesel exhaust fluid (DEF).

CAUTION

The engine exhaust stack may be hot. To avoid burns, do NOT touch the exhaust canister while the engine is running. Allow the exhaust stack to cool before attempting to service it.

The exhaust system requires no regular maintenance, but it should be inspected periodically as follows:

1. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

IMPORTANT:

Ensure the exhaust system is secure to eliminate vibration.

2. Check the following:
   a. Exhaust canisters (A) and bellow tube (B) for dents, cracks, and wear.
   b. Straps (C) for tightness.
   c. U-bolt (D) and band clamps (E) for breakage, cracks, and rust.

      IMPORTANT:

      Damaged exhaust piping, clamps, or components can lead to exhaust leaks and engine derate.

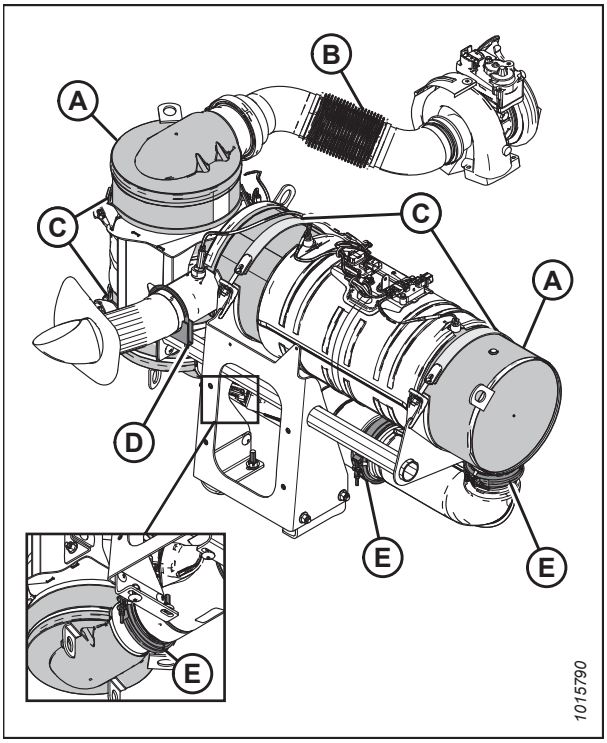


Figure 5.98: Exhaust System

3. Check three band clamps (A) securing the tubes in between the two exhaust canisters.

   IMPORTANT:

   Do **NOT** change exhaust canister type, piping sizes, or exhaust configuration. Contact your Dealer for proper replacement parts.

4. Inspect the area around clamps (A) for breakage, cracks, and rust-through.

   IMPORTANT:

   If the exhaust is leaking, tighten clamps to 12–15 Nm (9–11 lbf·ft). If it is leaking at the band connection, replace the seals. Contact your Dealer if the exhaust leak persists.

5. Check the tubing for dents or crushed areas.

   IMPORTANT:

   Dents or crushed portions of any tubing create exhaust flow restriction and increase back pressure significantly. Even relatively small dents will cause decreased fuel economy and increased turbo wear. If dents are relatively large, increased bearing and cylinder wear will occur due to increased exhaust temperature.

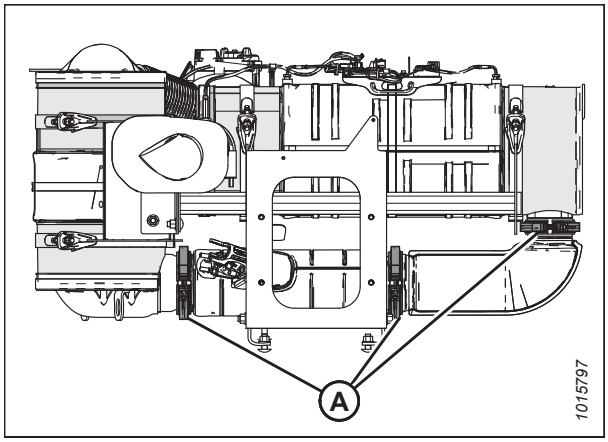


Figure 5.99: Exhaust Canister

5.10.6 Changing Engine Gearbox Lubricant

Change the engine gearbox lubricant after the first 50 hours, and then at every 250 hours or annually.

DANGER

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

CAUTION

Park on a flat, level surface with the header on the ground, the ground speed lever (GSL) in the PARK position, and the steering wheel in the locked position (centered). To confirm that the parking brake is engaged, wait for the HPT to beep and display a red P symbol.

NOTE:

The engine should be warm when changing the lubricant.

1. Park the windrower on a level surface.
2. Shut down the engine, and remove the key from the ignition.
3. Place a 4 liter (1 U.S. gallon) drain pan under the gearbox.

4. Remove drain plug (A) and allow the lubricant to finish draining.
5. Inspect the drain plug. Small metal shavings are normal. If there are any larger metal pieces, an inspection of the gearbox will be required.
6. Install drain plug (A) and remove check plug (B).
7. Add lubricant until the oil level reaches check plug (B). For lubricant specifications, refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232*.
8. Replace check plug (B).
9. Operate the engine at low idle and check for leaks at the check plug and drain plug.

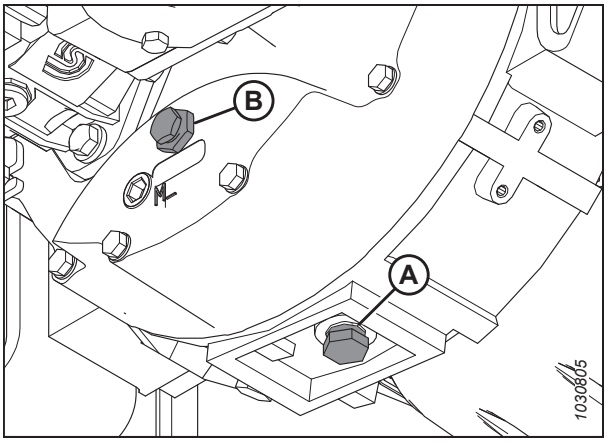


Figure 5.100: Engine Gearbox

5.11 Every 500 Hours or Annually

Complete the following maintenance tasks every 500 hours of operation or annually, whichever occurs first:

- Change the primary and secondary fuel filters. For instructions, refer to *5.11.1 Maintaining Fuel Filters, page 300*.
- Change the hydraulic return filter and charge filter. For instructions, refer to *5.6.7 Return Oil Filter, page 266* and *5.6.8 Charge Filter, page 268*.
- Check the safety systems. For instructions, refer to *5.11.2 Safety Systems, page 303*.

5.11.1 Maintaining Fuel Filters

The windrower's fuel system is equipped with primary (A) and secondary (B) screw-on cartridge type filters. Primary filter (A) is equipped with a separator that separates sediment and water from the fuel.

NOTE:

The bottom part of the image was made transparent to show primary filter (A).

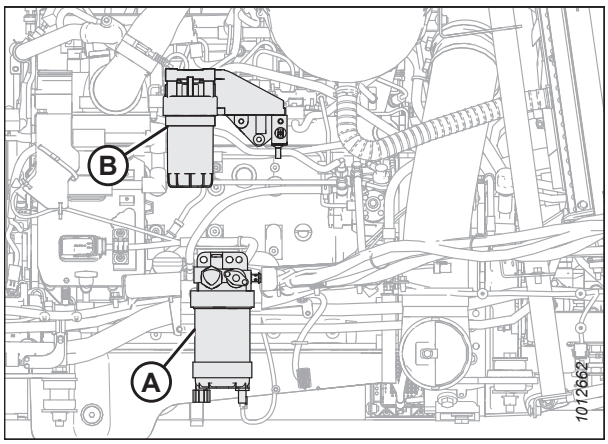


Figure 5.101: Fuel System

Removing Primary Fuel Filter

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Locate primary fuel filter (A) on the right cab-forward side of the windrower.

   NOTE:

   The bottom part of the image has been made transparent to show the location of the primary filter.
4. Clean around primary filter head (A).
5. Disconnect water in fuel (WIF) sensor (B) from the bottom of the filter.
6. Turn drain valve (C) by hand counterclockwise until draining occurs, and drain the filter into a container.
7. Remove filter (A) with a filter wrench.
8. Clean the gasket mating surface.

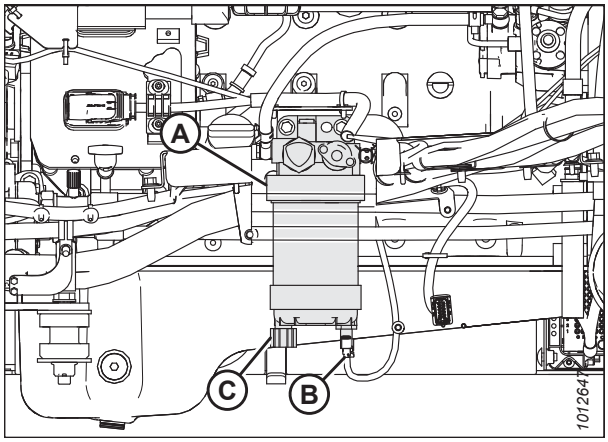


Figure 5.102: Fuel System

Installing Primary Fuel Filter

IMPORTANT:

Do **NOT** pre-fill the filter with fuel. Pre-filling can contaminate the fuel system.

NOTE:

If replacing the filter, refer to *5.1.5 Filter Part Numbers, page 234*.

1. Apply some diesel fuel to the filter gasket, and screw new filter (A) onto the filter mount until the gasket contacts the filter head.
2. Reconnect water in fuel (WIF) sensor (B).
3. 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.

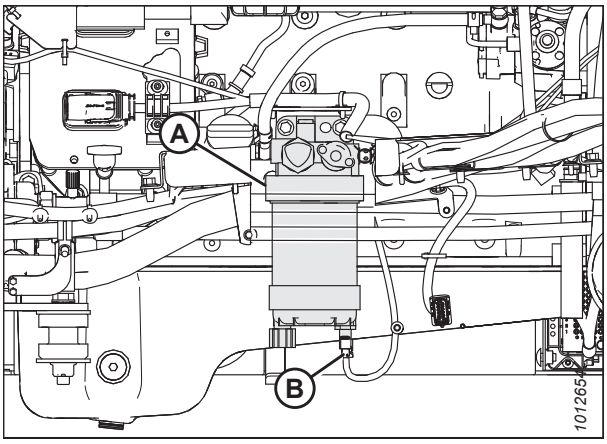


Figure 5.103: Fuel System

Removing Secondary Fuel Filter

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
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 the gasket mating surface.

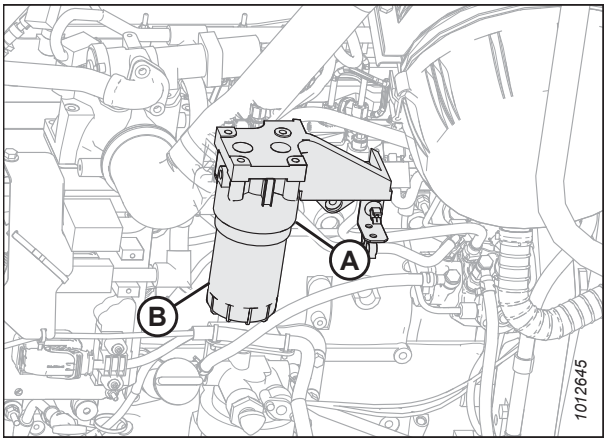


Figure 5.104: Fuel System

Installing Secondary Fuel Filter

IMPORTANT:

Do **NOT** pre-fill the filter with fuel. Pre-filling can contaminate the fuel system.

NOTE:

If replacing the filter, refer to *5.1.5 Filter Part Numbers, page 234*.

1. Screw 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.
3. Prime the fuel system. For instructions, refer to *Priming Fuel System, page 302*.

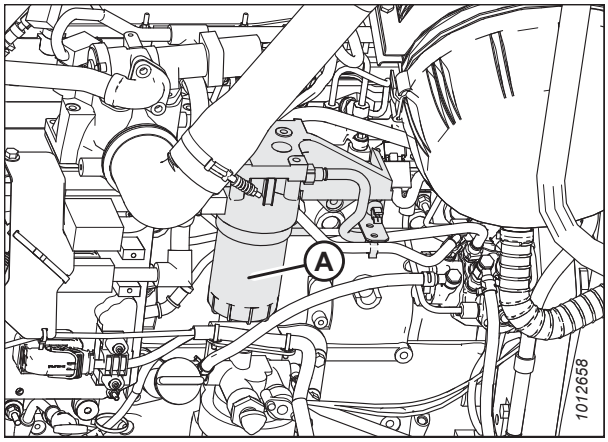


Figure 5.105: Fuel System

Priming Fuel System

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:

Do **NOT** bleed the fuel system. 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

DANGER

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

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. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

3. Locate primary fuel filter assembly (A).
4. Turn priming knob (B) counterclockwise to unlock the plunger on the primary filter head.
5. Pump until the hand pump becomes firm.
6. Push the plunger in and lock it by turning knob (B) clockwise until snug.
7. Try starting the engine. If the engine does **NOT** start, or starts then shuts down, repeat the priming procedure.
8. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

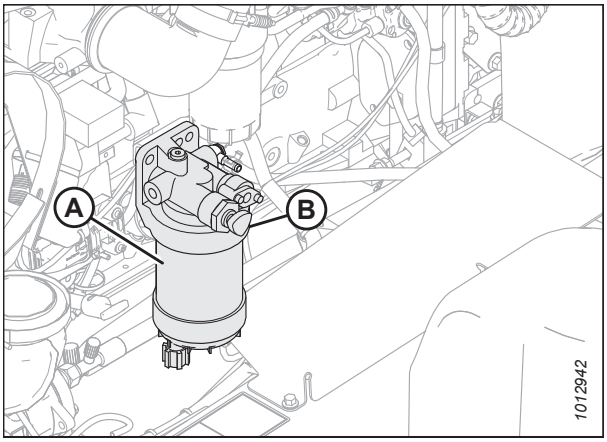


Figure 5.106: Primary Fuel Filter

5.11.2 Safety Systems

Checking Operator Presence System

The Operator Presence System is a safety feature designed to deactivate selected systems or sound an alarm when an Operator is not seated at the operator's station.

The Operator Presence System is designed to function as described in *3.2 Operator Presence System, page 41*.

Perform the following checks on the Operator Presence System every year or every 500 hours—whichever occurs first:

Checking the Operator Presence System switch status on the Harvest Performance Tracker (HPT) display:

1. Turn the key in the windrower ignition to the ON position.
2. Access the windrower menus by pressing soft key 5 (A).
3. Access the diagnostic menu by pressing soft key 4 (B).
4. Access the Input/Output list by pressing soft key 3 (C).

   NOTE:

   The screen will display two options: ABNORMAL STATUS and SYSTEM.
5. Scroll to the SYSTEM option and press the scroll knob to select it.



Figure 5.107: HPT Soft Keys

6. Scroll to INTERLOCK-NEUTRAL (A) in the Input/Output List and press the scroll knob to select.

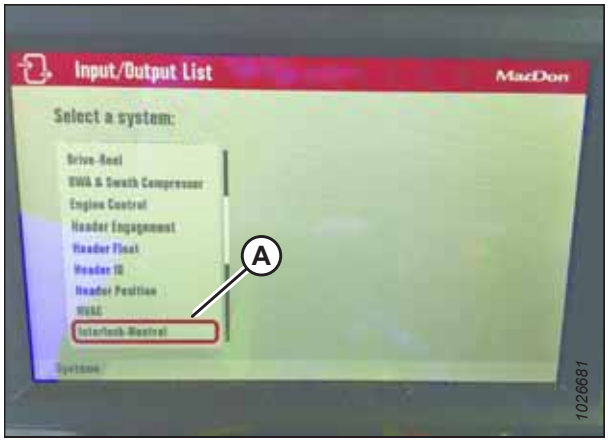


Figure 5.108: Input/Output List

7. Scroll to OPERATOR PRESENT (A) and check the following conditions:
   - The status must be ON when the Operator is sitting on the seat.
   - The status must be OFF when the Operator is not sitting on the seat.

   NOTE:

   If the two conditions listed above are **NOT** true, the Operator Presence System requires adjustment. Contact your MacDon Dealer.

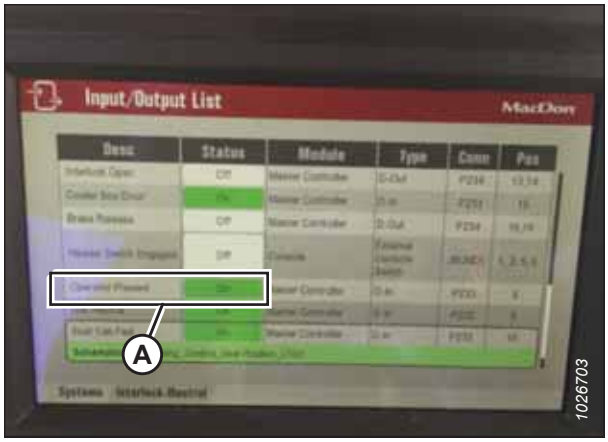


Figure 5.109: Operator Present Status (Set to ON)

Perform the following checks on the Operator Presence System every 5 years.

Checking the Operator Presence System and engine lock-out systems:

CAUTION

Park on a level surface with the ground speed lever (GSL) in the PARK position and the steering wheel in the locked (centered) position. Wait for the Harvest Performance Tracker (HPT) to beep and display a red P symbol to confirm that the parking brake is engaged.

DANGER

Ensure that all bystanders have cleared the area.

1. With the windrower engine running, place the ground speed lever (GSL) in PARK and center the steering wheel until it locks.
2. With everyone clear of the machine, engage the HEADER ENGAGE switch:
   a. After the header drives are running, stand up out of the seat. In approximately 5 seconds, the header should shut off.
   b. If **NOT**, the Operator Presence System requires adjustment. Contact your MacDon Dealer.

NOTE:

To restart the header, move the HEADER ENGAGE switch to OFF position and then back to the ON position.

3. With the windrower moving at less than 8 km/h (5 mph):
   a. Stand up out of the seat.
   b. The Harvest Performance Tracker (HPT) display will flash NO OPERATOR DETECTED, ENGINE SHUT DOWN IN 5…4…3…2…1… accompanied by a steady tone. At 0, the engine shuts down.
   c. If the engine does **NOT** shut down, the Operator Presence System requires adjustment. Contact your MacDon Dealer.
4. With the windrower moving at more than 8 km/h (5 mph):
   a. Stand up out of the seat.
   b. After a 2 second delay, the HPT will display NO OPERATOR DETECTED along with a tone.
   c. If **NOT**, the Operator Presence System requires adjustment. Contact your MacDon Dealer.

Checking Engine Interlock

Perform the following checks on the engine lock-out system every year or every 500 hours—whichever occurs first.

DANGER

Ensure that all bystanders have cleared the area.

1. With the engine shut down and HEADER ENGAGE switch (A) engaged, try to start the engine. If the engine turns over, the system requires adjustment. Contact your MacDon Dealer.
2. With the engine shut down, the steering wheel **NOT** centered, and ground speed lever (GSL) (B) in NEUTRAL (but **NOT** in PARK), try to start the engine. The Harvest Performance Tracker (HPT) will flash NOT IN NEUTRAL and CENTER STEERING WHEEL, accompanied by a short beep with each flash and the engine should **NOT** turn over. If the engine turns over, the system requires adjustment. Contact your MacDon Dealer.

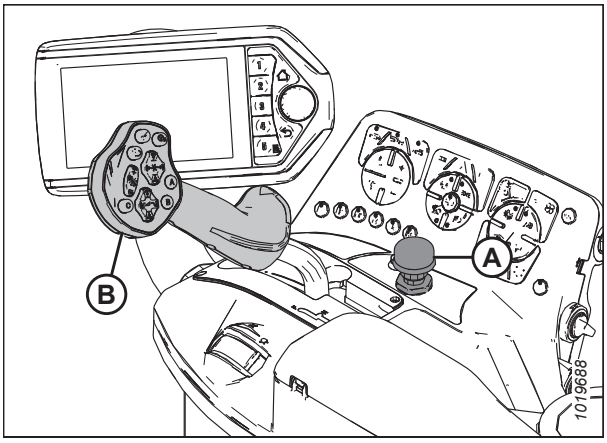


Figure 5.110: Console

A properly functioning system should operate as follows (if not, contact your MacDon Dealer):

- The starter should engage **ONLY** when the GSL is in PARK, the steering wheel is locked in the CENTER position, and the HEADER ENGAGE switch is in the OFF position.
- Under the above conditions, the brake should engage and the machine should **NOT** move after engine start-up.
- The steering wheel should **NOT** lock with the engine running and the GSL out of PARK.
- When the GSL is pulled straight out of PARK (**NOT** in forward or in reverse), the machine should **NOT** move with the engine running and with the steering wheel still centered.

5.12 Every 1000 Hours

Complete the following maintenance tasks every 1000 hours of operation:

- Change the fuel tank vent filter. For instructions, refer to *5.12.1 Removing and Installing Fuel Tank Vent Filter, page 306*.
- Clean the DEF supply module filter. For instructions, refer to *5.12.2 Diesel Exhaust Fluid Supply Module Filter, page 308*.
- Change the wheel drive lubricant. For instructions, refer to *5.6.6 Changing Wheel Drive Lubricant – 10 Bolt, page 265*.

5.12.1 Removing and Installing Fuel Tank Vent Filter

The fuel tank is vented by a hose and filter in the platform rail. Change the filter every 1000 hours or annually, whichever occurs first.

Change the filter as follows:

DANGER

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

WARNING

To avoid personal injury or death from explosion or fire, do NOT smoke or allow flame or sparks near windrower when servicing.

1. Shut down the engine, and remove the key from the ignition.
2. Remove five bolts (A) and DEF tank cover (B) on the right service platform.

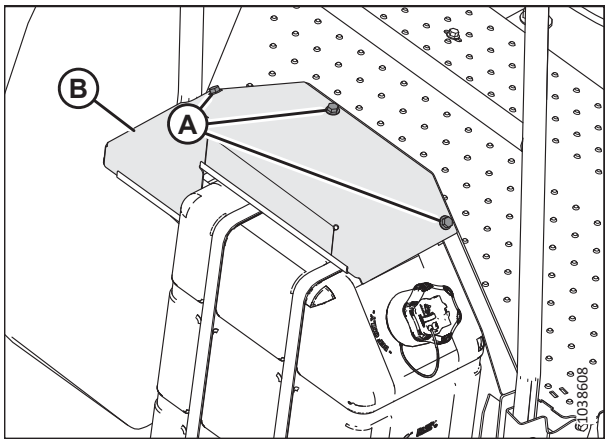


Figure 5.111: Right Service Platform

3. Release hose tension clamps (A) and slide away from filter (B).

4. Pull hoses off filter (B) and remove the filter.

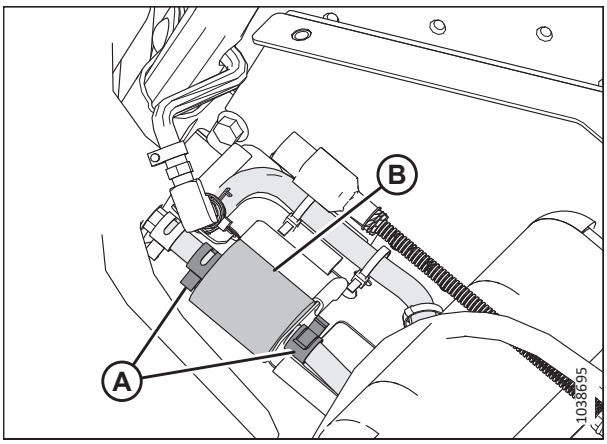


Figure 5.112: Fuel Tank Vent and Filter

5. Position new filter (A) and attach to fuel tank hose (B). The IN marking on the filter should face away from the fuel tank hose.

   NOTE:

   If filter has an arrow instead of an IN marking, arrow should point toward the fuel tank hose.

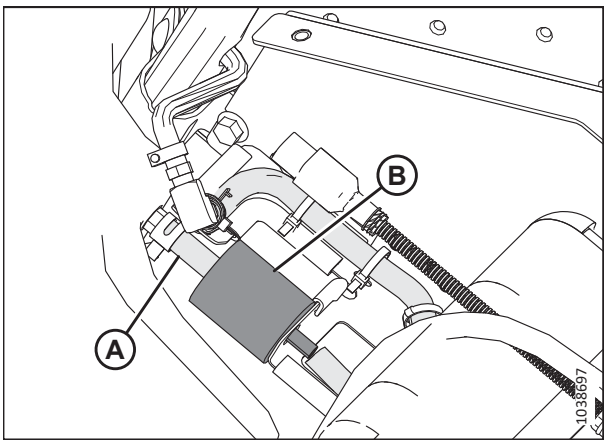


Figure 5.113: Fuel Tank Vent and Filter

6. Attach fuel vent hose (A) to filter (B) and secure both hoses with tension clamps (C).

7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

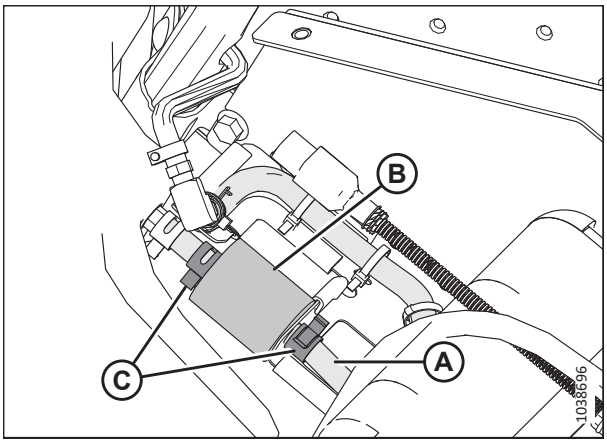


Figure 5.114: Fuel Tank Vent and Filter

5.12.2 Diesel Exhaust Fluid 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 system. Permanent damage to—and premature failure of—the DEF supply module can result from fluid debris.

Checking Diesel Exhaust Fluid Supply Module Filter

1. Locate aftertreatment diesel exhaust fluid (DEF) supply module (A) on the inside of the right platform by the engine oil dipstick.

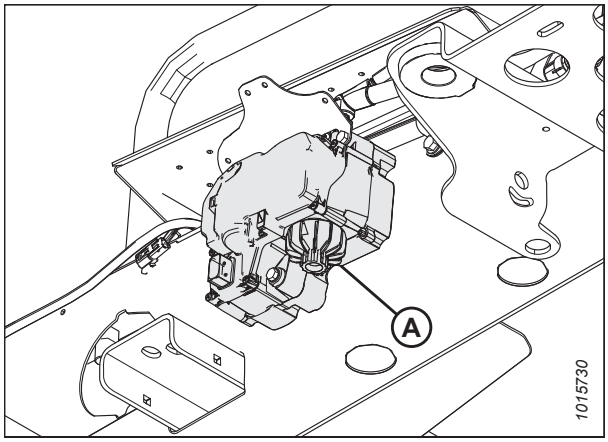


Figure 5.115: DEF Supply Module

2. Inspect the area around the seal and vent of aftertreatment DEF supply module filter cap (A) for signs of leakage.
3. DEF fluid leaves a white deposit when dry. If there is evidence of leaking, remove the supply module filter, clean and inspect it before replacing it. For instructions, refer to *Cleaning and Inspecting Supply Module Filter, page 310*.

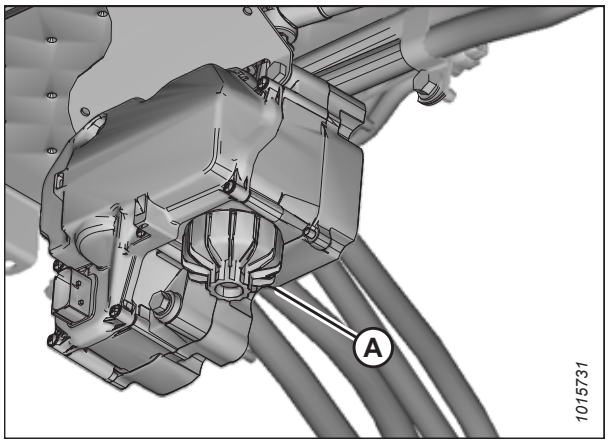


Figure 5.116: DEF Supply Module Filter Cap

Removing Supply Module Filter

WARNING

Batteries emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of electrical arcing, remove the negative (–) battery cable first and attach the negative (–) battery cable last.

WARNING

Diesel exhaust fluid (DEF) contains urea, which can irritate the skin, eyes, digestive, and respiratory systems. Do NOT get the substance in your eyes. In case of contact, immediately flush your eyes with water for a minimum of 15 minutes. Do NOT ingest DEF. If DEF is ingested, contact a doctor immediately.

WARNING

The DEF line connecting the aftertreatment DEF dosing unit to the aftertreatment DEF dosing valve 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.

DANGER

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

IMPORTANT:

Any spilled diesel exhaust fluid (DEF) must be contained and absorbed by a non-combustible absorbent material such as sand. The contaminated absorbent should then be placed into a leak-proof container and disposed of. DEF is corrosive. If DEF is spilled on the DEF tank or on any other surface of the vehicle, rinse the contaminated surface thoroughly with water.

IMPORTANT:

Do **NOT** disconnect the windrower batteries until the diesel exhaust fluid (DEF) dosing system has completed its purge cycle. Before removing or disconnecting any components of the DEF system, wait at least five minutes after the windrower's ignition switch is turned to the OFF position for the aftertreatment DEF dosing system to purge the DEF from the system. The purge cycle is an automatic process and does not require the Operator's intervention. The aftertreatment DEF supply module emits an audible pumping noise during the purging process.

NOTE:

DO **NOT** power wash or steam clean the filter. Use compressed air to remove any loose debris.

1. Shut down the engine, and remove the key from the ignition.
2. Wait 3 minutes for DEF system to complete purge cycle.
3. Place a catch basin under DEF filter cap to collect the remaining DEF in the filter housing.
4. Unscrew filter cap (A).
5. Remove the aftertreatment DEF filter equalizing element (B).
6. 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.
7. Discard and replace the filter and equalizing element if removed from the aftertreatment supply module.

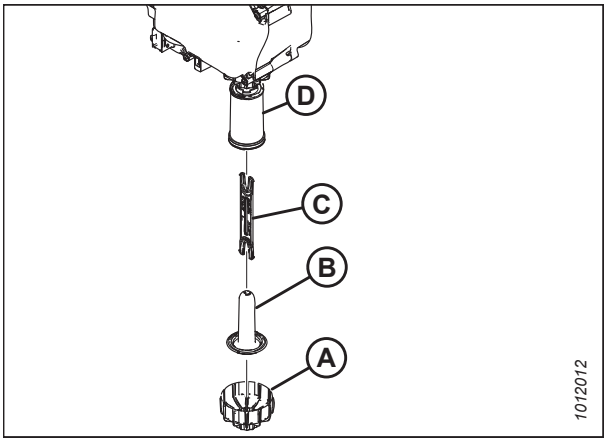


Figure 5.117: DEF Supply Module Filter

Cleaning and Inspecting Supply Module Filter

NOTE:

If there is the possibility that contaminated diesel exhaust fluid (DEF) has gone through the DEF supply system, check the DEF filter prior to discarding the filter.

1. Check the diesel exhaust 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 diesel exhaust 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 the threads are damaged, replace the aftertreatment DEF supply module cap.
7. If the cap threads are damaged, inspect the aftertreatment DEF supply module threads.
8. If the threads of the 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 Supply Module Filter

1. Slide DEF filter equalizing element (A) into DEF filter cartridge (B).
2. Insert the assembly into aftertreatment DEF supply module (C).
3. Install cap (D) and torque to 20 Nm (15 lbf·ft).

   NOTE:

   The aftertreatment DEF dosing system will not prime until the correct selective catalytic reduction (SCR) catalyst 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.
4. Operate the engine and check for leaks.

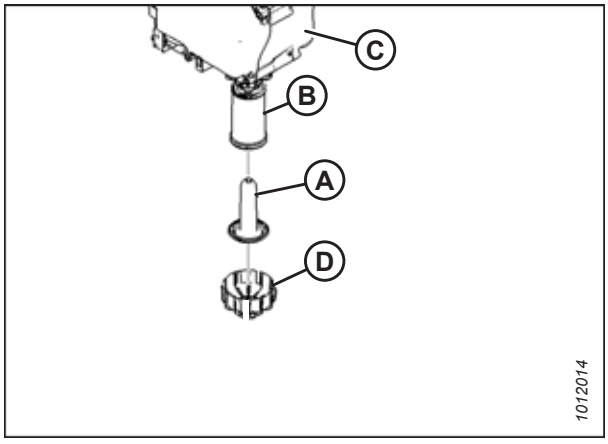


Figure 5.118: DEF Supply Module Filter

Replacing Diesel Exhaust Fluid Tank Filter

The DEF tank fluid filter housing is located inside the DEF tank attached to the DEF head suction line. There is no scheduled replacement of the tank fluid filter as long as the tank remains clean. If contamination enters the tank, you may need to replace the fluid filter housing (MD #291162) which includes a 40 micron filter. If there is no obvious contamination, change it every 2 years.

DANGER

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

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

2. Remove three bolts (B) and DEF tank cover (A) on the right platform.

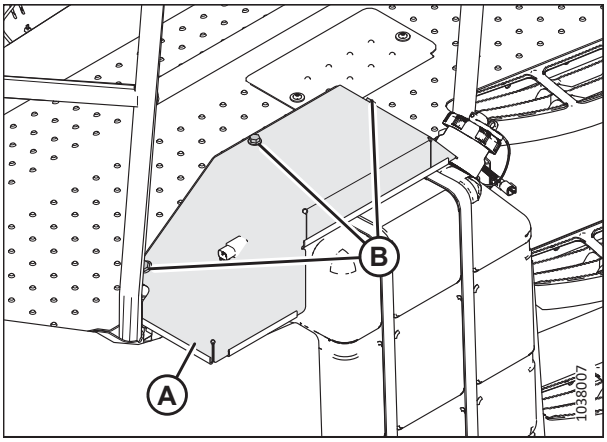


Figure 5.119: Right Platform

3. Disconnect electrical harness (A) from the DEF (diesel exhaust fluid) head.
4. Prepare to plug the hoses to prevent coolant loss, and then disconnect coolant pressure (C) and coolant return (B) hoses from the DEF head.
5. Label DEF suction hose (E) and DEF backflow hose (D), and then disconnect hoses (E) and (D) from the DEF head.
6. Disconnect vent hose (F) from the DEF head.

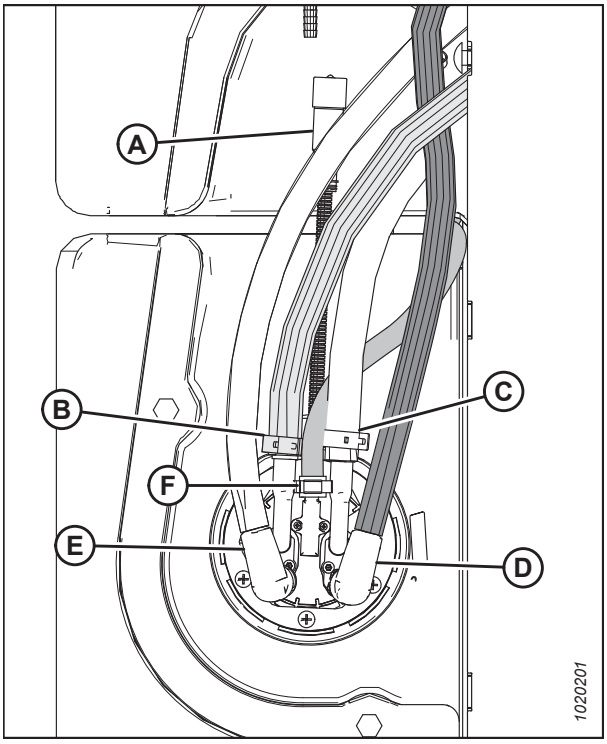


Figure 5.120: DEF Head

7. DEF hoses are held on with plastic retaining clips (A). Push the middle of retaining clip (A) to release, and pull the hoses away from the connector to remove them.

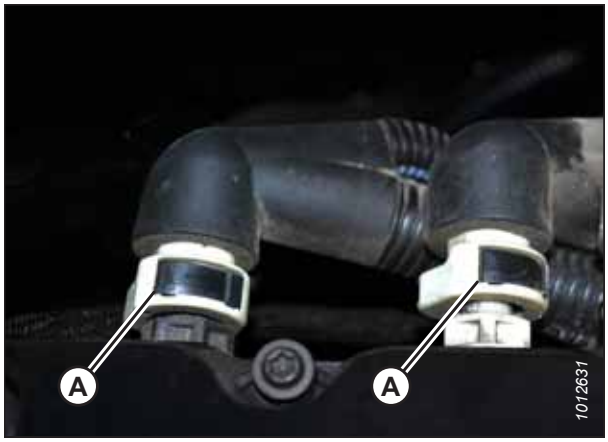


Figure 5.121: DEF Hose Connector

8. Remove six screws (B) that secure DEF head (A) to the DEF tank, and remove the DEF head.

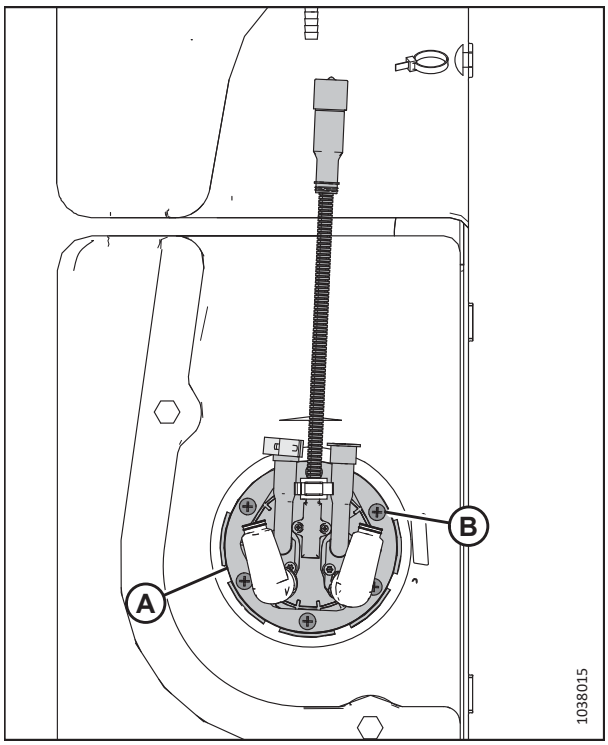


Figure 5.122: DEF Tank Head – Top View

9. Remove and discard clip (A) that secures fluid filter housing (B).
10. Pull old fluid filter housing (B) off of the suction line.
11. Remove and discard existing O-ring (C).

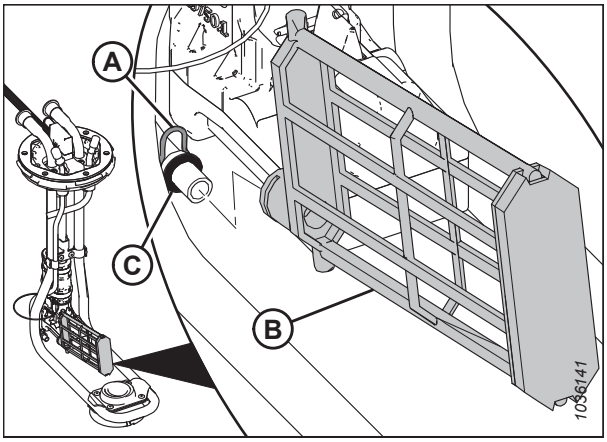


Figure 5.123: DEF Fluid Filter Housing

12. Install new O-ring (C) (supplied with filter housing) onto the supply line.

    NOTE:

    The DEF tank fluid filter housing (MD #291162) includes O-ring (C), clip (A), and a 40 micron filter (not shown).

13. Push new DEF tank liquid filter housing (B) onto the line and secure it with new clip (A).

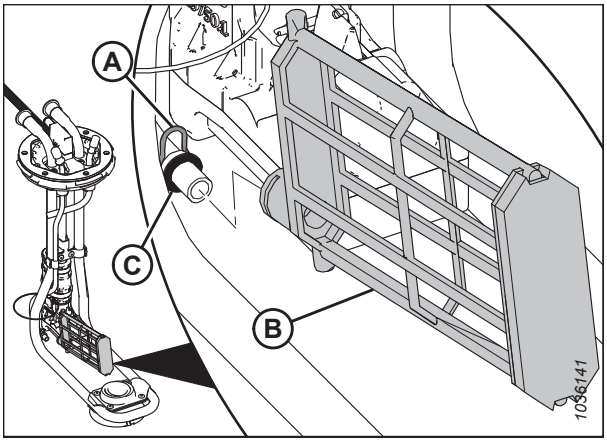


Figure 5.124: DEF Fluid Filter Housing

14. Insert DEF head (A) into the DEF tank and align the screw holes with the hose connectors facing the windrower.
15. Secure the DEF head to the tank with six screws (B).

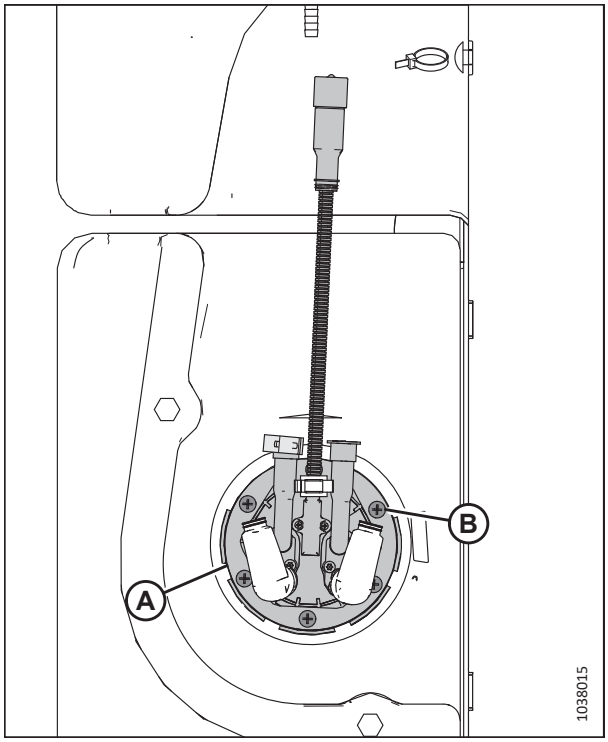


Figure 5.125: DEF Tank Head – Top View

16. Connect electrical harness (A).

    IMPORTANT:

    Correct hose connections to the DEF tank head, DEF supply module, and aftertreatment system are important. Improper connections will result in a loss of suction, causing the engine to derate (lose power).

17. Connect coolant pressure line (C) and coolant return line (B) to the DEF head.
18. Connect DEF suction line (E) and DEF backflow line (D) to the DEF head.
19. Connect vent hose (F) to the DEF head.

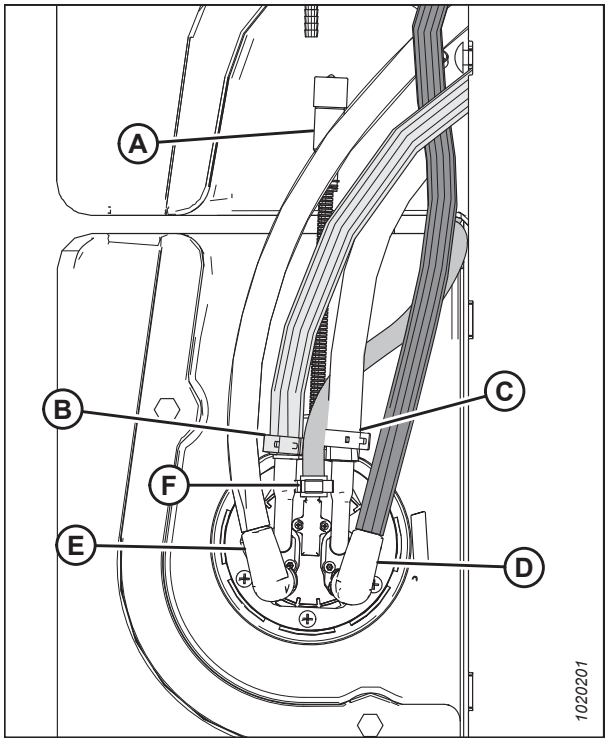


Figure 5.126: DEF Tank Head

20. Reinstall the DEF hoses and ensure they are secured with retaining clips (A).

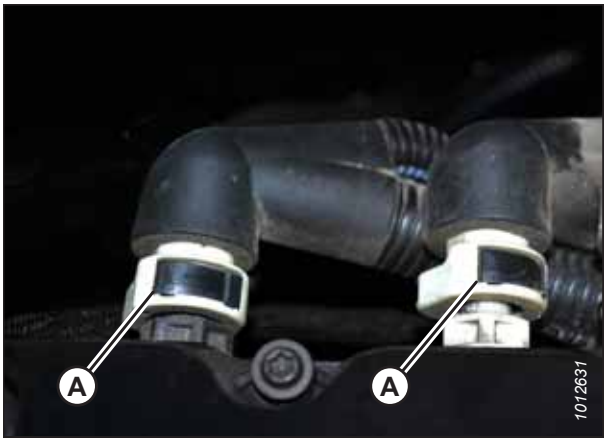


Figure 5.127: DEF Hose Connection

21. Install DEF tank cover (A).
22. Install three bolts (B).

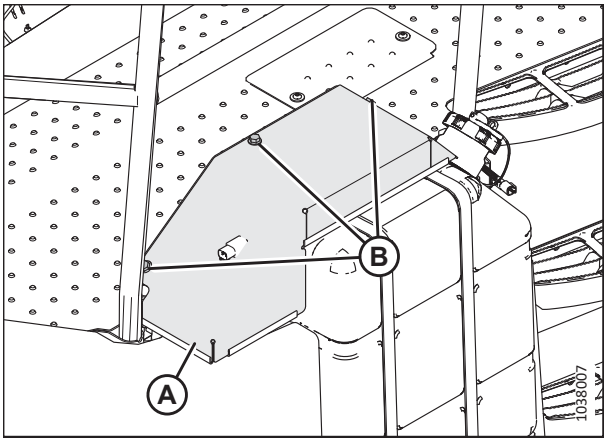


Figure 5.128: Right Platform

5.13 Every 2000 Hours

Complete the following maintenance tasks every 2000 hours of operation:

- Change the engine coolant. For instructions, refer to *5.13.1 Changing Engine Coolant, page 316*.
- Change the hydraulic oil. For instructions, refer to *5.13.2 Draining Hydraulic Oil, page 318*.
- Change the DEF tank vent hose filter. For instructions, refer to *5.13.4 Replacing Diesel Exhaust Fluid Vent Hose Filter, page 320*.
- General engine inspection. For instructions, refer to *5.13.5 General Engine Inspection, page 321*.

5.13.1 Changing Engine Coolant

Change the engine coolant after every 2000 hours of operation or two years, whichever occurs first.

Draining Coolant System

Coolant is cycled through the engine to help reduce internal heat.

DANGER

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

CAUTION

To avoid personal injury from hot coolant, do NOT turn pressurized coolant tank cap until engine cools.

1. Shut down the engine, and remove the key from the ignition.
2. Let the engine cool.
3. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
4. Turn pressurized coolant tank cap (A) to the first notch to relieve pressure before removing the cap completely.
5. Remove the pressurized coolant tank cap.

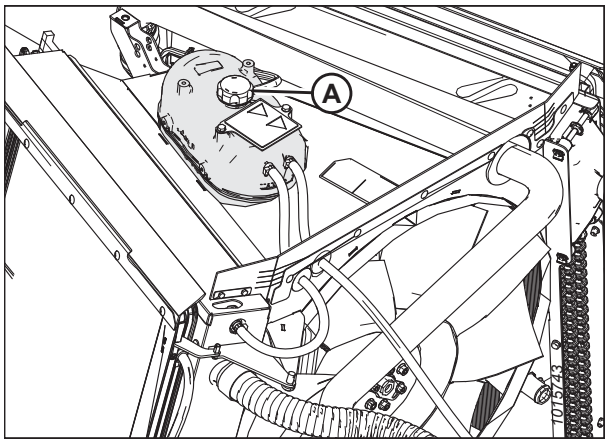


Figure 5.129: Coolant Recovery Tank

6. Locate radiator drain valve (B) on radiator inlet tube (A). It is located inside the frame beside the engine.
7. Place a drain pan (about 30 liters [8 U.S. gallons] capacity) under the drain valve, and then open radiator drain valve (B).
8. When the system has been completely drained, close radiator drain valve (B).
9. Shut down the engine, and remove the key from the ignition.
10. Add coolant after a system drain. For instructions, refer to *Adding Coolant after System Drain, page 317*.

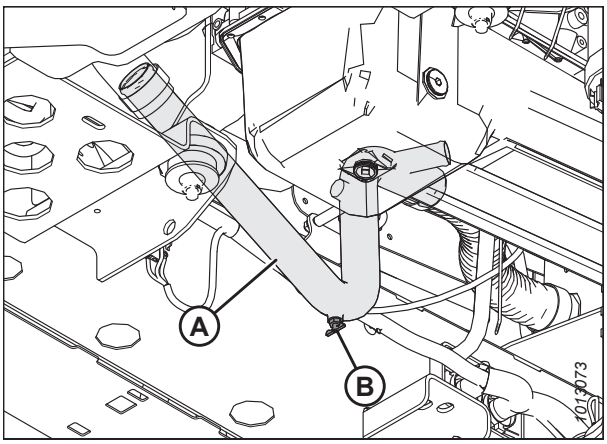


Figure 5.130: Radiator Drain Valve

11. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

Adding Coolant after System Drain

Coolant is cycled through the engine to help reduce internal heat. The coolant tank should be at least one-half full. If it's less, add coolant.

CAUTION

To avoid personal injury from hot coolant, do NOT attempt to open the pressurized coolant tank cap until the engine cools.

1. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
2. Remove pressurized cap (A) from the coolant recovery tank.

   NOTE:

   For coolant specifications, refer to. *5.1.4 Lubricants, Fluids, and System Capacities, page 232*..
3. Add coolant at a rate not exceeding 11 L/min (3 gpm) until the recovery tank is one-half full.

   NOTE:

   When adding coolant, use MAX COLD line (B) on the side of tank that faces the cab for an accurate measurement.

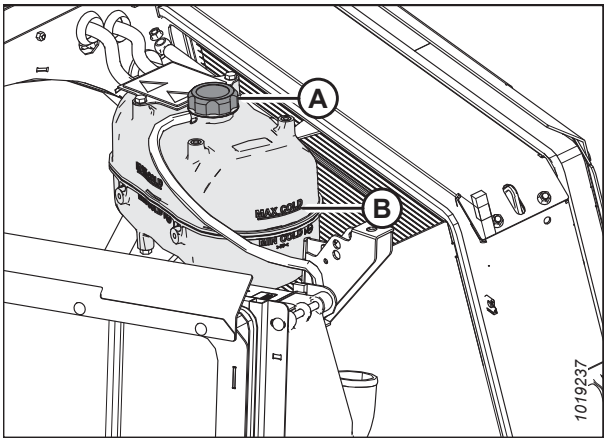


Figure 5.131: Coolant Recovery Tank

DANGER

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

4. With the pressurized cap off, start the engine and run at high idle for approximately 20 minutes or until the engine temperature reaches 85°C (185°F).
5. Add coolant until the recovery tank is one-half full. Check the coolant level again. For instructions, refer to *5.7.5 Checking Engine Coolant Level, page 274*.
6. Replace pressurized cap (A).
7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

5.13.2 Draining Hydraulic Oil

Hydraulic oil should be changed every 2000 hours of operation or 3 years, whichever comes first.

DANGER

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

CAUTION

If machine is running, oil may be hot. Burns can result from contact with hot oil. This procedure can be performed when the oil is cold, but first run the machine to stir the oil up before draining.

1. Park the windrower on a level surface.
2. Shut down the engine, and remove the key from the ignition.
3. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
4. Place a container (at least 65 liters [17 U.S. gallons] capacity) under drain at the bottom of the hydraulic reservoir to collect the oil.
5. On the hydraulic oil tank, turn plug handle (A) counterclockwise until loose, and then remove the plug (this will allow air to enter tank).

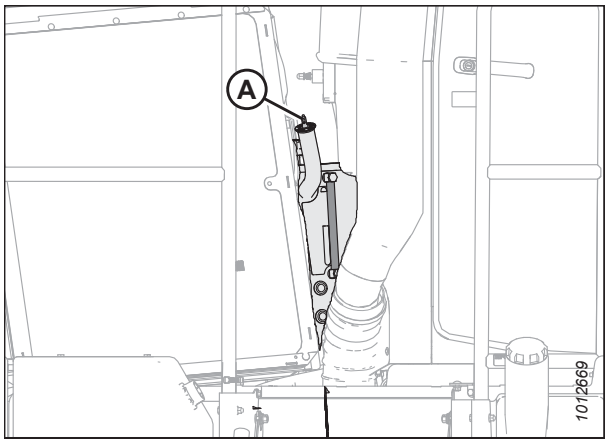


Figure 5.132: Reservoir Plug

6. From beneath the windrower, locate hose (A) that connects to inlet manifold (B).
7. Remove hose (A) from the elbow fitting and allow the hose to drain into a clean container.
8. Once the tank is empty, reattach the hose to the elbow.

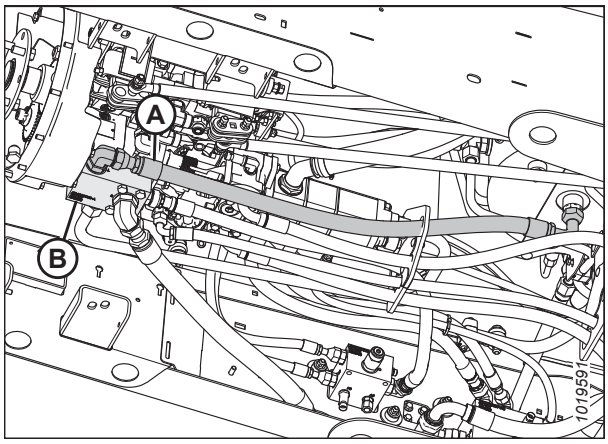


Figure 5.133: Inlet Manifold

9. Locate and remove magnetic drain plug (A) that is underneath the hydraulic oil tank.

   NOTE:

   Pull the traction drive hoses out of the way to allow oil to drop straight down into the catch pan.

10. Inspect and clean the magnetic drain plug for any debris.

11. Reinstall the drain plug. Torque the plug to 75–82 Nm (55–60 lbf·ft).

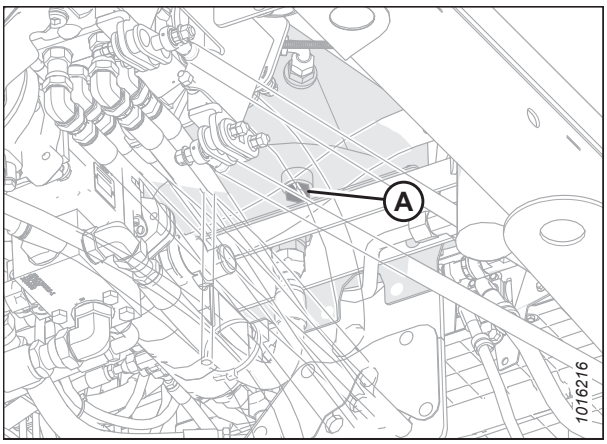


Figure 5.134: Hydraulic Oil Drain

12. Reinstall plug (A) on the hydraulic oil tank.

13. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

14. Dispose of used oil in a manner that complies with local rules and regulations.

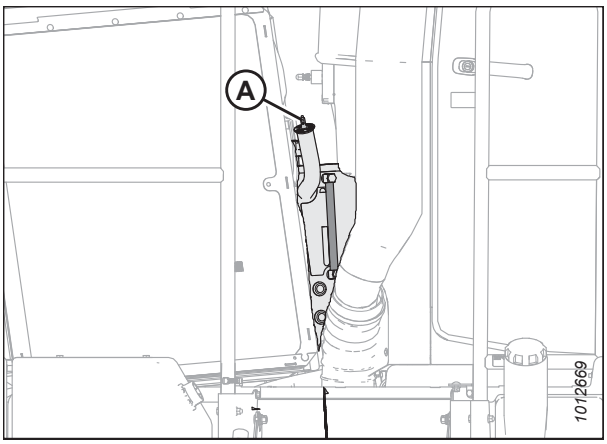


Figure 5.135: Reservoir Plug

5.13.3 Filling Hydraulic Oil

DANGER

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

1. Park the windrower on a level surface.

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

3. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

4. Turn plug handle (A) counterclockwise until loose and then remove the plug by pulling it straight out.

   NOTE:

   When filling oil at a fast rate, the screen element in the fill tube restricts the oil and makes it difficult for air to escape.

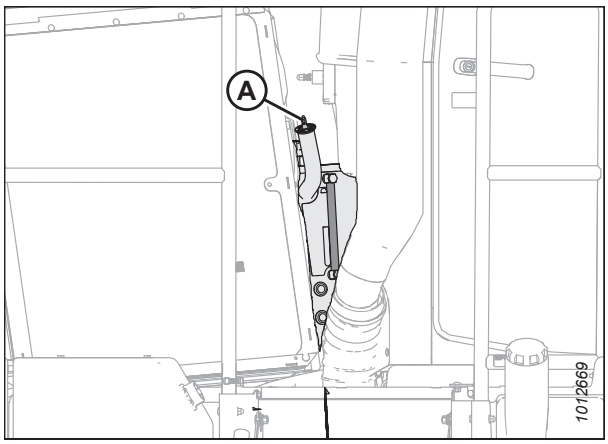


Figure 5.136: Plug Handle

5. To improve oil fill rate through the screen, open breather cap (A) at the top of the tank to allow air to escape.

   IMPORTANT:

   Whenever the breather cap is opened, clean the area and take care to prevent debris from entering the tank through the opening.

6. Add oil to maintain the level between the low and full indicator marks. Refer to *5.1.4 Lubricants, Fluids, and System Capacities, page 232* for hydraulic oil specifications and quantity.

   NOTE:

   When the sight glass is showing LOW, approximately 4 liters (1 U.S. gallon) is required to reach FULL.

7. Reinstall the plug, and turn plug handle (B) clockwise until the plug is secure.

8. Close breather cap (A).

9. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

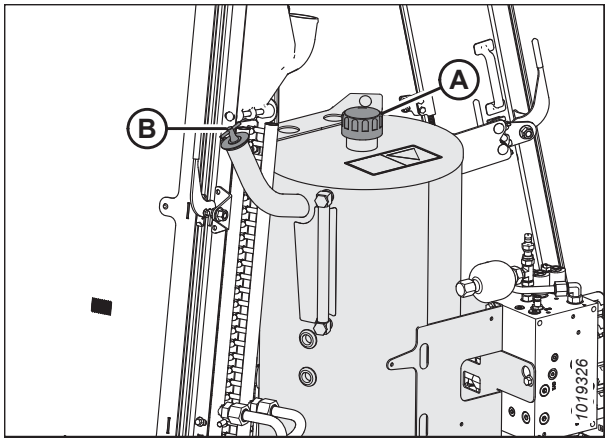


Figure 5.137: Hydraulic Oil Tank

5.13.4 Replacing Diesel Exhaust Fluid Vent Hose Filter

The diesel exhaust fluid (DEF) vent hose filter should be replaced every 2000 hours.

DANGER

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

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

2. Locate vent hose filter (B) below DEF tank (A).

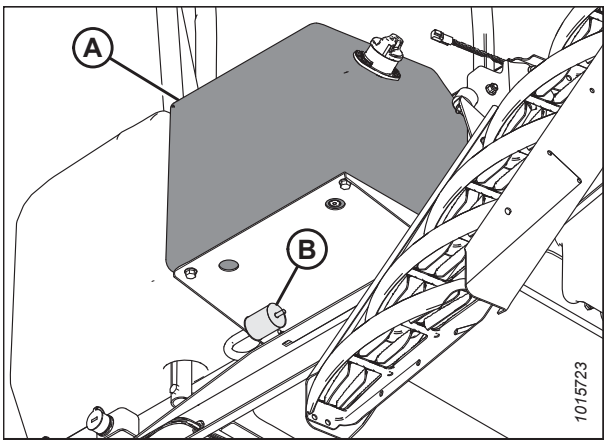


Figure 5.138: Vent Filter below DEF Tank

3. Pull vent hose filter (A) from the DEF tank vent hose.
4. Install new vent hose filter (A).

   NOTE:

   Ensure arrow on vent hose filter (A) points towards the DEF tank.

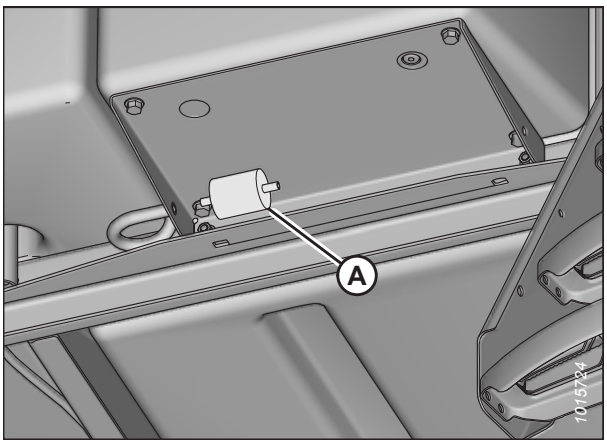


Figure 5.139: Vent Hose Filter below DEF Tank

5.13.5 General Engine Inspection

Engine inspection should be performed by your MacDon Dealer.

Refer to your engine manual for further information.

NOTE:

Owner’s Manual QSB 4.5 and QSB 6.7 Engine Cummins #4021531 are supplied with your machine.

5.14 Annual Service

Complete the following maintenance tasks annually. It is recommended that annual maintenance be done prior to start of operating season.

- Check the battery charge and fluid level. For instructions, refer to *5.14.1 Batteries, page 322*.
- Check the steering linkages. For instructions, refer to *5.14.2 Checking Steering Link Pivots, page 330*.
- Check the A/C blower. For instructions, refer to *5.14.3 Air Conditioning Evaporator, page 332*.
- Check the antifreeze concentration. For instructions, refer to *5.14.4 Checking Engine Coolant Strength, page 334*.

5.14.1 Batteries

A pair of vehicle batteries powers the windrower's electrical system. Ensure that replacement batteries are of the correct type.

Install only the type of batteries specified in the table below onto the windrower:

Table 5.4 Battery Specifications

Rating	Group	CCA (min)	Volt	Maximum Dimension
Heavy duty, off-road, vibration resistant	29H or 31A	760	12	334 x 188 x 232 mm (13 x 7.4 x 9.13 in.)

Maintaining Battery

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 the battery charge **once a year**, and more often if operating in cold weather. Hydrometer readings should be 1.260 to 1.300. Readings below 1.250 indicate charging is required. For instructions, refer to *Charging Battery, page 324*.
- Keep the batteries clean by wiping them with a damp cloth.
- Keep all connections clean and tight. Remove any corrosion and wash the terminals with a solution of baking soda and water. A light coating of grease on the terminals (after the cables are attached) will reduce corrosion.
- To prolong battery life, store batteries fully charged and at -7° to +26°C (+20° to +80°F). Check the voltage after storage and recharge the batteries as needed according to battery and charger manufacturer recommendations.
- Do **NOT** stack storage batteries on top of each other.
- Test the batteries every 4–6 months and recharge them if necessary.
- Disconnect the battery ground if storing the windrower for more than 3 months.

Opening Battery Cover

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

3. Lift up on the cab-end of cover (A) to disengage it from retaining tab (B), and swing the cover away from the frame.

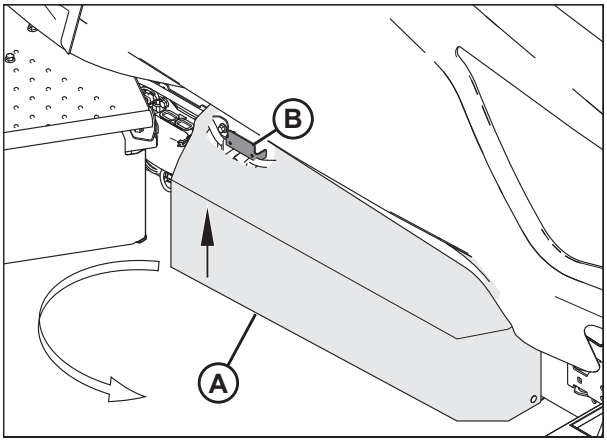


Figure 5.140: Battery Cover

Closing Battery Cover

1. Swing cover (A) towards the windrower frame. Lift up on the cab-end of the cover until it is secured by retaining tab (B) on the frame.

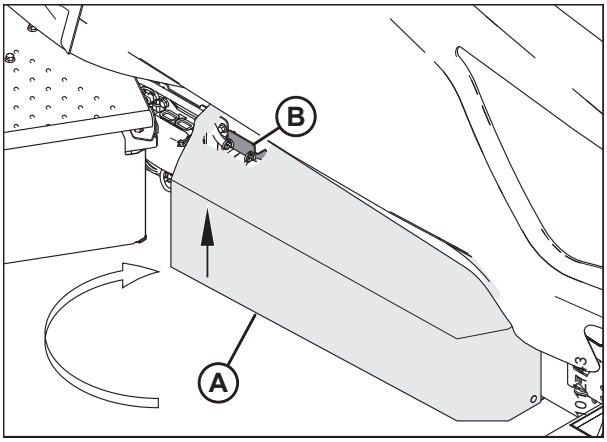


Figure 5.141: Battery Cover

Charging Battery

CAUTION

- **Ventilate the area where the 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 the charger and connect the positive cable first. PROTECT YOUR EYES.**
- **If charging the battery in windrower, disconnect the POSITIVE battery cable before connecting the charger cable, then connect the ground cable last, away from the battery.**
- **Stop or cut back the charging rate if the battery feels hot, or is venting electrolyte. The 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 two-hour period results in no increase in voltage or decrease in current.**

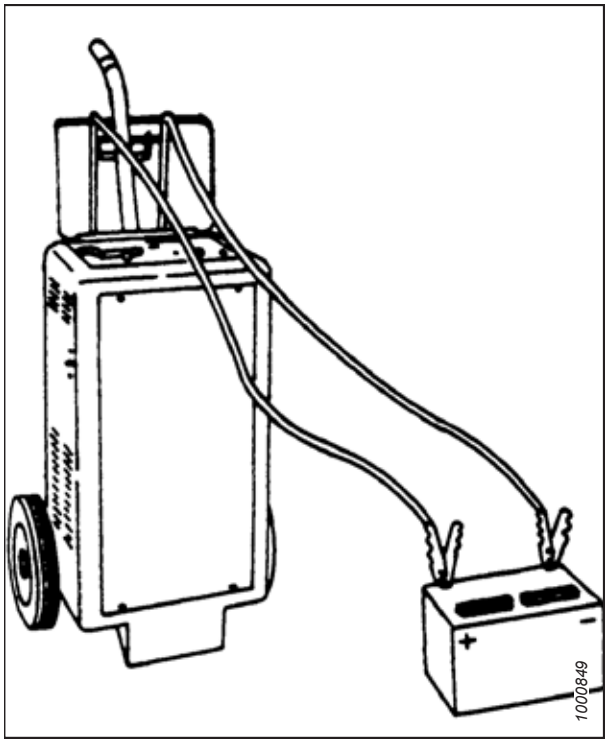


Figure 5.142: Battery Charging

Table 5.5 Voltage Chart

OCV[20]	State of Charge (%)	50 Amps	30 Amps	20 Amps	10 Amps
		Approximate battery charging time (minutes) to full charge at 27°C/80°F.[21]			
12.6	100	— Fully charged —			
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

- **Follow all battery manufacturers' instructions and precautions.**
- **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 the electrolyte levels are low, but the battery is not accessible, remove the battery from service.**

20. Open circuit voltage with no charging/discharging for 8 hours or more.
21. Charging time depends on the battery capacity, condition, age, temperature, and the efficiency of the charger.

CAUTION

Follow all instructions and precautions supplied by the battery charger manufacturer, including the following:

- **Charge at the recommended rates and times.**
- **Turn off the charger prior to hook up to avoid dangerous sparks. Wear proper eye protection.**
- **Reduce the 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 two-hour period, 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 the batteries. Excessive charging will shorten the battery life.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the battery cover. For instructions, refer to *Opening Battery Cover, page 322*.
3. Remove the red plastic covers from positive cable clamps (B).
4. Remove the black plastic covers from negative terminals (A).
5. If charging the battery in the windrower, disconnect **positive** battery cable (C), then connect the charger cable to the positive post. Connect the charger ground cable to the engine block last, away from the battery.
6. Charge the batteries in accordance with the charger manufacturer's instructions.

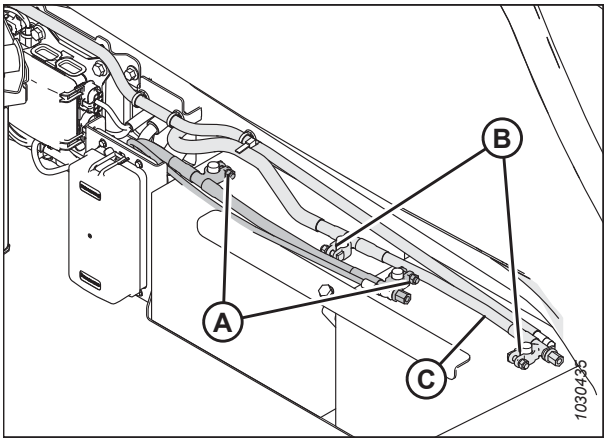


Figure 5.143: Batteries

Boosting Battery

When a battery boost is required, connecting the boost cables correctly reduces the risk of injury and machine damage.

WARNING

- **Gas given off by batteries is explosive. Keep sparks and flames away from the batteries.**
- **Make the last connection and the first disconnection at the point farthest away from the batteries.**
- **Wear protective eyewear when using a booster battery.**
- **Be sure everyone is clear of the machine when starting the engine. Start the engine from operator's station only.**

CAUTION

Spark hazard. When connecting or disconnecting booster cables, do NOT allow the cable clamps to touch each other.

Connecting booster cables

1. To access the windrower batteries, remove the battery cover. For instructions, refer to *Opening Battery Cover, page 322*.
2. Pull back the red rubber battery terminal cover and connect one end of the positive (+) booster cable to positive (+) post (A) on the dead battery.
3. Connect the other end of the positive (+) booster cable to positive (+) post (B) on the booster battery.
4. Connect one end of the negative (–) booster cable to negative (–) post (C) on the booster battery.
5. Connect the other end of negative (–) booster cable (D) to a clean, unpainted, solid metal part on the engine of the dead unit.

WARNING

To minimize the chance of an explosion, avoid connecting the negative boosting cable to the negative post on the dead battery.

6. Turn the ignition switch in the cab as with normal start-up.

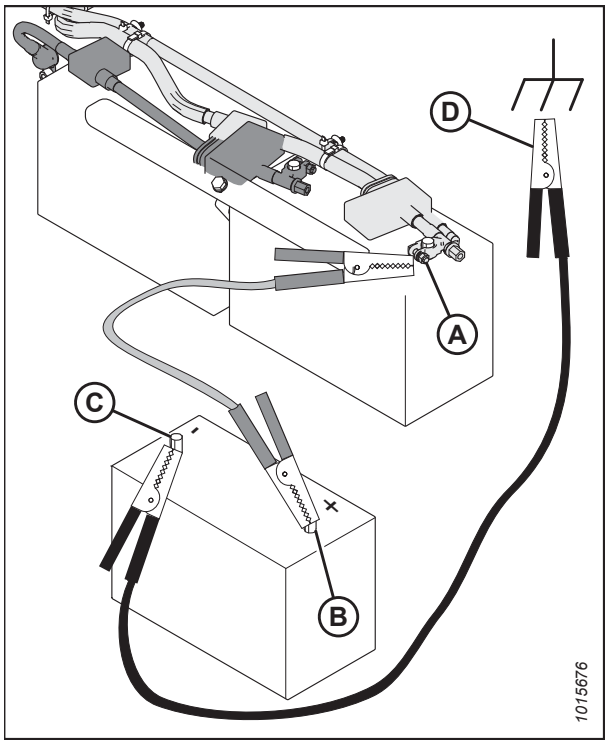


Figure 5.144: Attaching Booster Cables

Removing booster cables

1. Disconnect negative (–) booster cable (A) from the engine of the unit that was boosted.
2. Disconnect the other end of the negative (–) booster cable from negative (–) battery post (B) of the booster battery.
3. Disconnect the positive (+) booster cable from positive (+) battery post (C) of the booster battery.
4. Disconnect the other end of the positive (+) booster cable from positive (+) battery post (D) of the boosted battery.
5. Replace the black and red rubber battery terminal covers.
6. Close the battery cover. For instructions, refer to *Closing Battery Cover, page 323*.

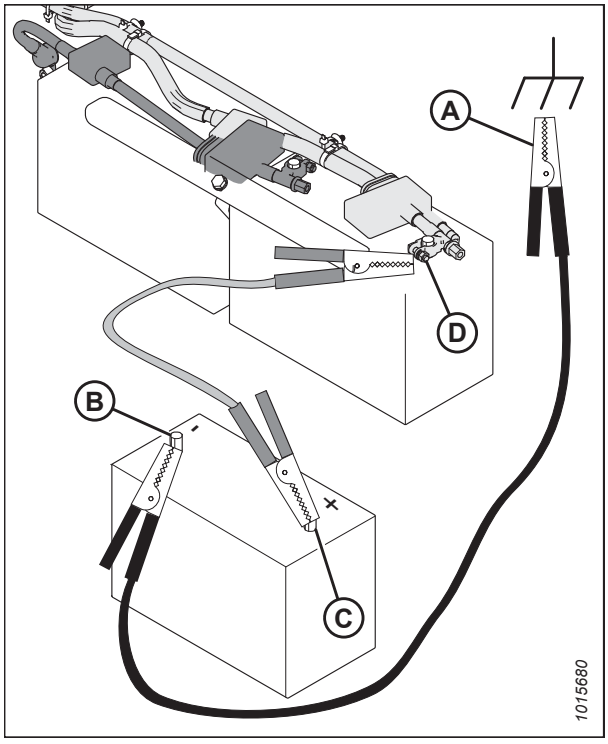


Figure 5.145: Removing Booster Cables

Removing Battery

CAUTION

Do NOT attempt to service a battery unless you have the proper equipment and training for the task. Have the windrower's batteries serviced by a MacDon Dealer.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the battery cover. For instructions, refer to *Opening Battery Cover, page 322*.
3. Disconnect the battery harness. For instructions, refer to *Disconnecting Battery, page 328*.
4. Loosen bolt (A) until securing strap (B) can be removed.
5. Lift the batteries off the support.

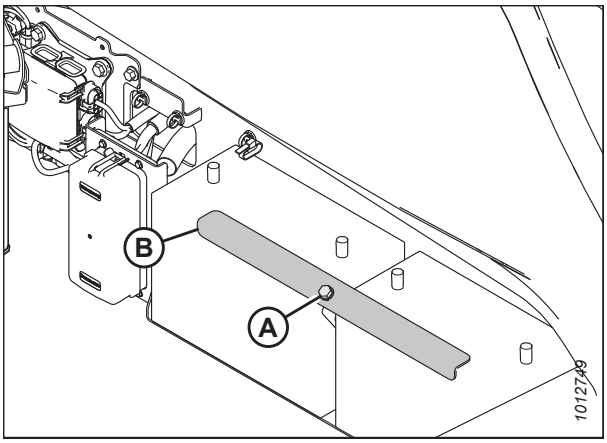


Figure 5.146: Battery Location

Installing Battery

Table 5.6 Battery Specifications

Rating	Group	CCA (min)	Volt	Maximum Dimension
Heavy duty, off-road, vibration resistant	31A	760	12	334 x 188 x 232 mm (13 x 7.4 x 9.13 in.)

1. Position the new batteries on the battery support.

   NOTE:

   Ensure that positive terminal is positioned on the right side of the battery when facing them.
2. Install strap (B) and secure with bolt (A).
3. Connect the battery cables. For instructions, refer to *Connecting Batteries, page 328*.
4. Close the battery cover. For instructions, refer to *Closing Battery Cover, page 323*.

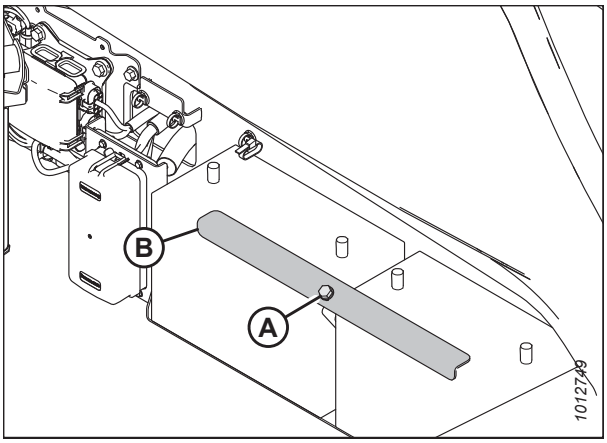


Figure 5.147: Battery Location

Disconnecting Battery

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the battery cover. For instructions, refer to *Opening Battery Cover, page 322*.
3. Remove the black plastic covers from negative cable clamps (A). Loosen the clamps and remove the cable from the batteries.
4. Remove the red plastic covers from positive cable clamps (B). Loosen the clamps and remove the cable from the batteries.

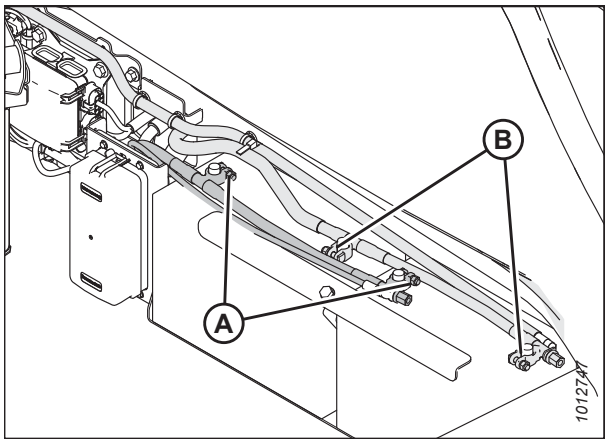


Figure 5.148: Battery Location

Connecting Batteries

Connecting the batteries provides electrical power to the windrower.

DANGER

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

1. Move latch (A) towards the right cab-forward side of the windrower.
2. Grasp louver (B) and lift the hood to open it.

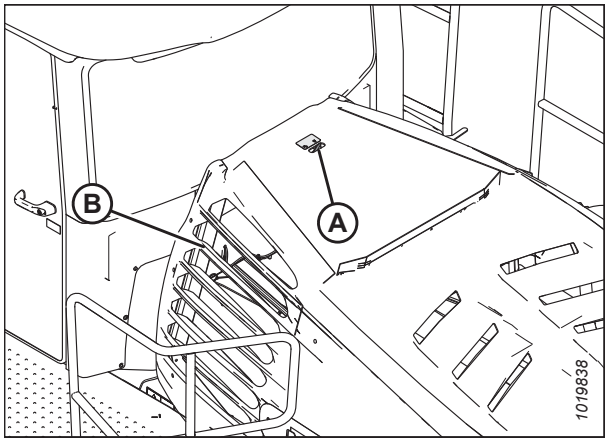


Figure 5.149: Engine Compartment Hood

3. Lift up on the cab-end of cover (A) to disengage it from retaining tab (B), and swing the cover away from the frame.

4. If you are installing a new battery, remove the plastic caps from the battery posts.

   IMPORTANT:

   The batteries are negative grounded. Always connect the starter cable to the positive (+) terminal of the battery and the battery ground cable to the negative (–) terminal of the battery. Reversed polarity in the battery or alternator may result in permanent damage to the electrical system.

   NOTE:

   Before connecting the electrical harness to the batteries, ensure that the positive terminal is positioned on the right side of the battery when the battery is installed on the battery support.

5. Attach the red positive (+) cable terminals to positive posts (B) on the batteries and tighten their clamps. Reposition the plastic covers onto the clamps.

6. Attach the black negative (–) cable terminals to negative posts (A) on the batteries and tighten their clamps. Reposition the plastic covers onto the clamps.

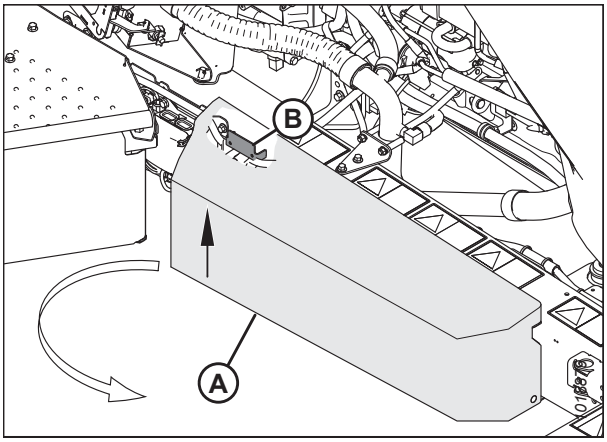


Figure 5.150: Battery Location

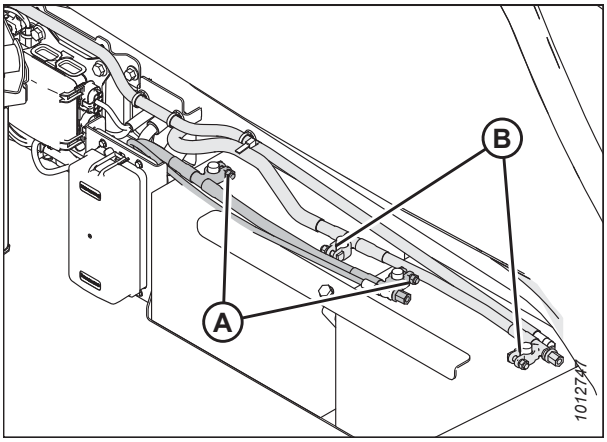


Figure 5.151: Battery Cables Installed

7. Swing cover (A) towards the windrower frame. Lift up on the cab-end of the cover until it is secured by retaining tab (B) on the frame.

8. Grasp the hood by louver (C) and lower it until the hood engages the latch.

   IMPORTANT:

   To ensure that the hood is latched, make sure that the latch lever is not tilted.

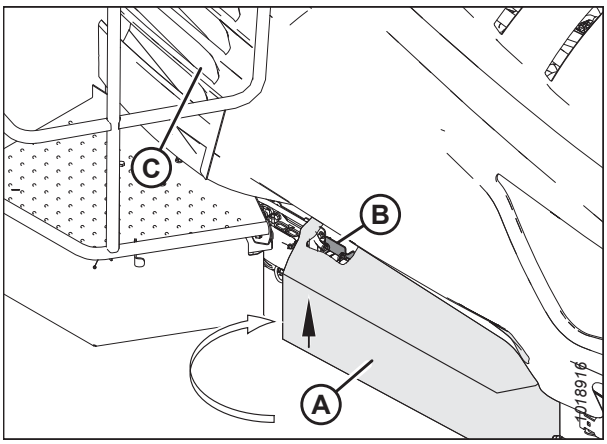


Figure 5.152: Battery Cover Secured

Auxiliary Power Posts

The auxiliary power posts are a convenient way to connect remote auxiliary fuel pumps for in-field filling of the windrower fuel tank, trickle charging, or maintaining a battery charge.

IMPORTANT:

The auxiliary power posts are **NOT** meant for continuous duty. Remote fill pump motors have a high gallons per minute (GPM) rate, and most models can fill the windrower fuel tank within 10–15 minutes.

IMPORTANT:

The auxiliary power posts are **NOT** to be used as battery boost posts. Boosting a battery from these posts can result in blowing the auxiliary power posts' positive terminal fuse.

IMPORTANT:

Ensure the device being connected to the power posts has an amperage rating less than that of the maximum fuse rating listed on the auxiliary power posts' decal (A). 30 Amp loads and smaller are recommended as anything larger may blow the fuse if the device has a high in-rush current characteristic.

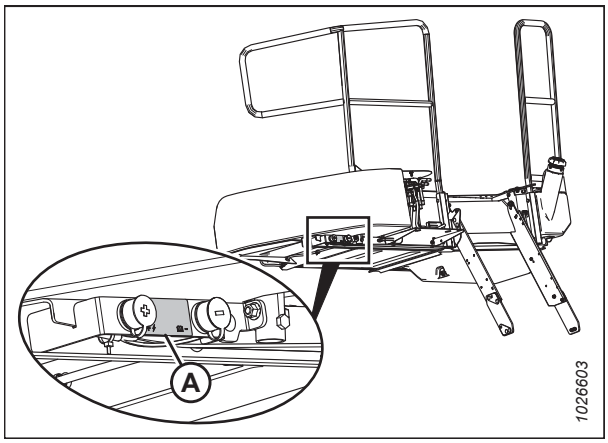


Figure 5.153: Auxiliary Power Posts Decal

5.14.2 Checking Steering Link Pivots

The following checks should be performed every year:

DANGER

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

1. Place ground speed lever (GSL) (A) in PARK, shut down the engine, and remove the key.

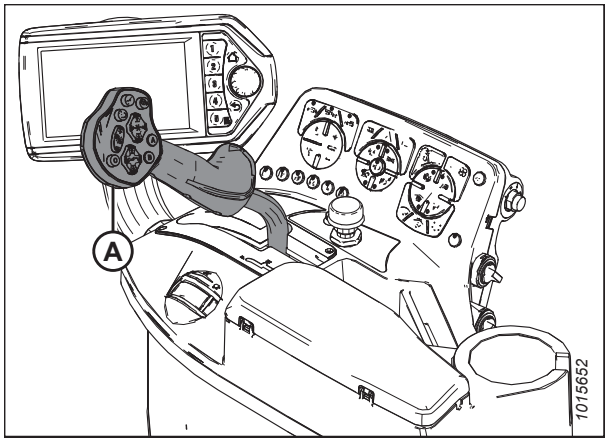


Figure 5.154: Console

2. Check steering rod bolts (A) for looseness.
3. Ensure ball joints (B) feel firm, but can be moved by hand.

   NOTE:

   Ball joints that are excessively loose or too stiff to pivot by hand should be replaced.

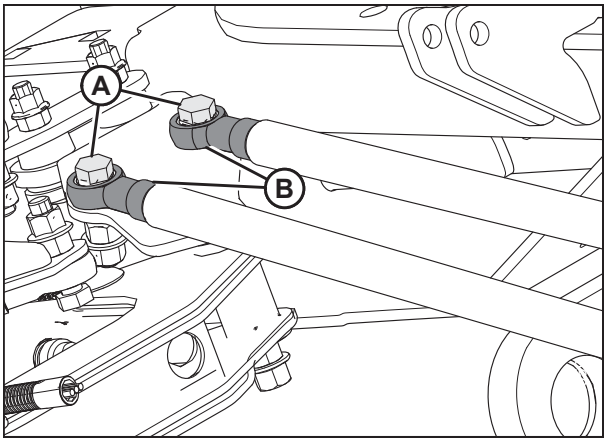


Figure 5.155: Steering Rods beneath the Cab

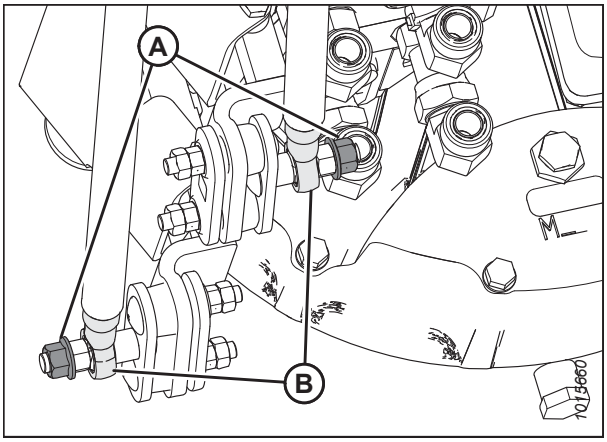


Figure 5.156: Steering Rods – Pump End

4. Check steering link bolts (A) for looseness.
5. Ensure ball joints (B) feel firm but can be moved by hand.

   NOTE:

   Ball joints that are excessively loose or too stiff to pivot by hand should be replaced.

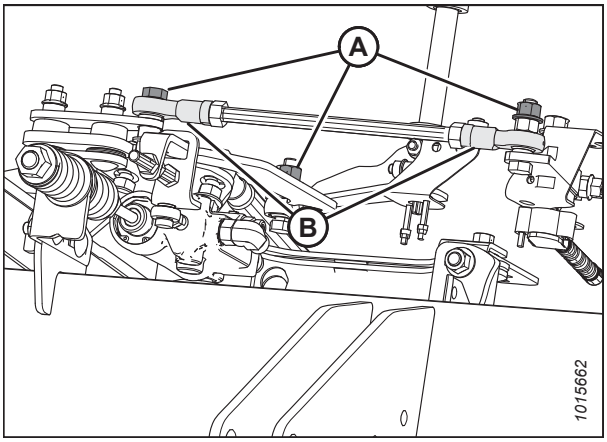


Figure 5.157: Steering Link

6. If bolts are loose:
   a. Back off jam nut (A).
   b. Tighten inside nut (B) to 65–72 Nm (48–53 lbf·ft).
   c. Hold inside nut (B) and tighten jam nut (A) to 65–72 Nm (48–53 lbf·ft).
7. See your MacDon Dealer to replace any loose steering link ball joints or steering rod ball joints.
8. After replacing parts or making adjustments, perform checks for the neutral interlock and the steering lock. For instructions, refer to *5.11.2 Safety Systems, page 303*.

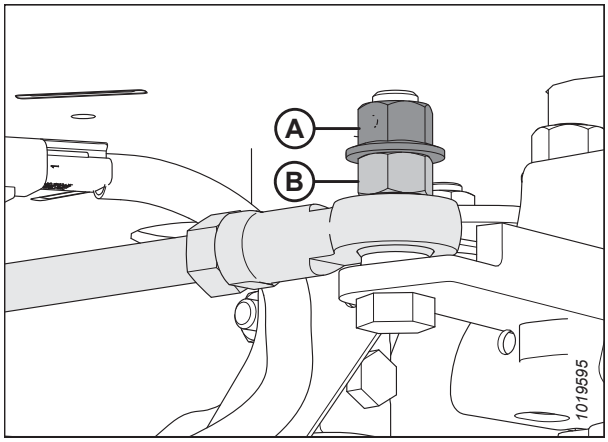


Figure 5.158: Steering Link

5.14.3 Air Conditioning Evaporator

Check the air conditioning evaporator for cleanliness every year. If the air conditioning system produces insufficient cooling, the evaporator fins may be clogged. Fins will clog up from the side opposite the blowers. The evaporator is located inside the heating air conditioning unit under the cab. To access the evaporator, remove the cover from the air conditioning unit.

Removing Air Conditioning Cover

DANGER

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

1. Loosen clamps (A) on the two drain hoses and pull the hoses off the air conditioning (A/C) drain tubes.

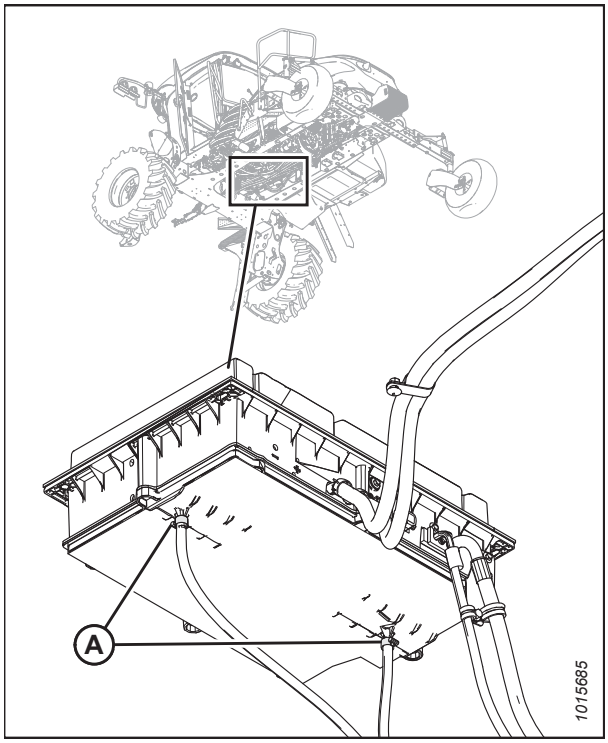


Figure 5.159: A/C Evaporator Box

2. Remove eight fasteners (A) that attach the cover to the housing. Remove cover (B).

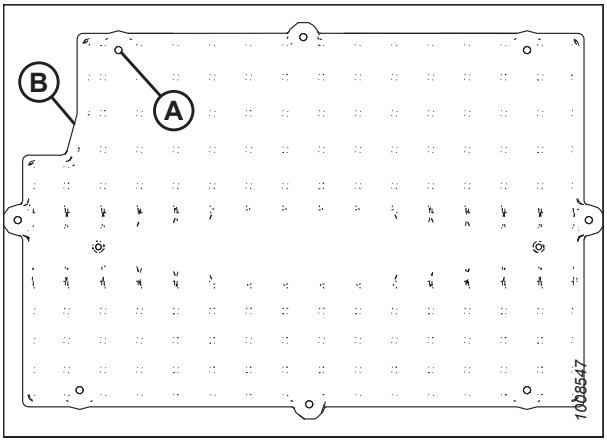


Figure 5.160: A/C Cover

Cleaning Air Conditioning Evaporator Core

WARNING

To avoid cuts from evaporator fins, do NOT use bare hands to brush away clogs.

1. Remove the air conditioning (A/C) cover. For instructions, refer to *Removing Air Conditioning Cover, page 332*.
2. Use a vacuum cleaner or compressed air to remove dirt from inside the housing.
3. Blow compressed air through the evaporator fins from blower side (A) first as shown. Direct the air straight into the evaporator to prevent fin damage. A nozzle extension makes this procedure easier.
4. Repeat the previous step from side (B) opposite the blowers.

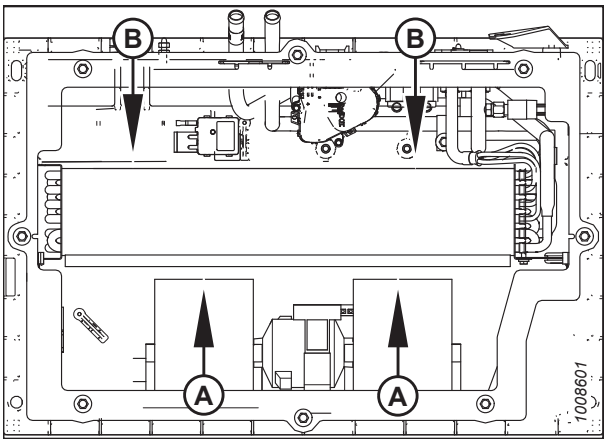


Figure 5.161: A/C Evaporator Core

5. If you can't 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.

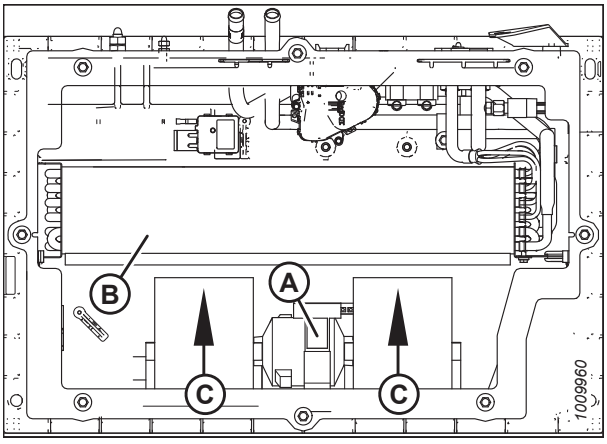


Figure 5.162: A/C Evaporator Core

Installing Air Conditioning Cover

1. Straighten any bent fins.
2. Position cover (B) and attach with eight screws (A).

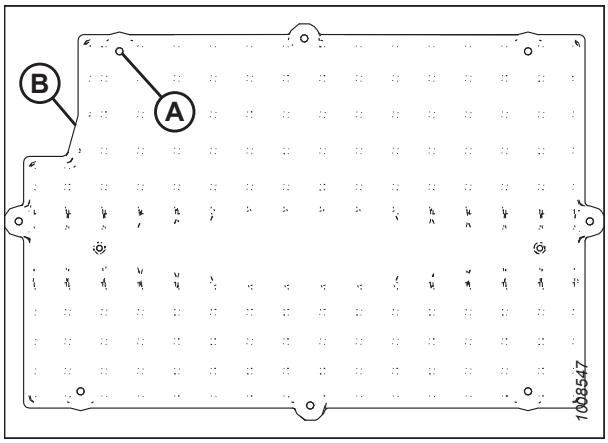


Figure 5.163: Air Conditioning Cover

3. Reattach drain hoses to drain tubes and secure with hose clamps (A). Tighten the bolts to 7–7.8 Nm (40–45 lbf·in).

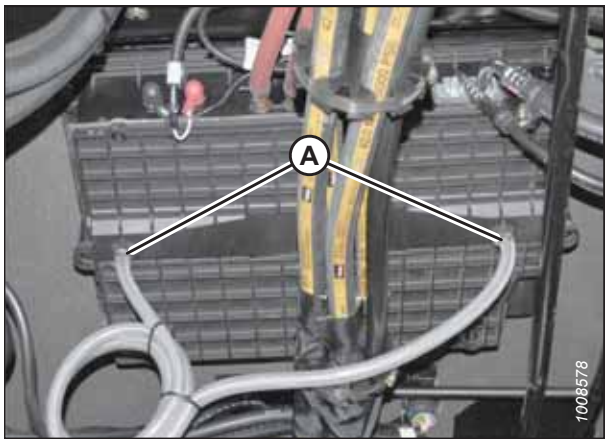


Figure 5.164: Air Conditioning Cover

5.14.4 Checking Engine Coolant Strength

Check the antifreeze in the pressurized coolant tank with a tester every year, preferably before off-season storage. 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.

CAUTION

To avoid personal injury from hot coolant, do NOT attempt to open the pressurized coolant tank cap until the engine cools.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

   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.

3. Remove pressurized coolant tank cap (A).

   IMPORTANT:

   Turn cap (A) counterclockwise to the first notch to relieve pressure before removing the cap completely.

4. Check the coolant in the pressurized coolant tank using an antifreeze tester. The tester should indicate protection to temperatures of -34°C (-30°F).
5. Inspect the pressurized coolant tank cap as follows before reinstalling it:
   a. Check the gasket for cracks or deterioration, and replace the cap if necessary.
   b. Check that the spring in the cap moves freely. Replace the cap if the spring is stuck.
6. Install pressurized coolant tank cap (A).
7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

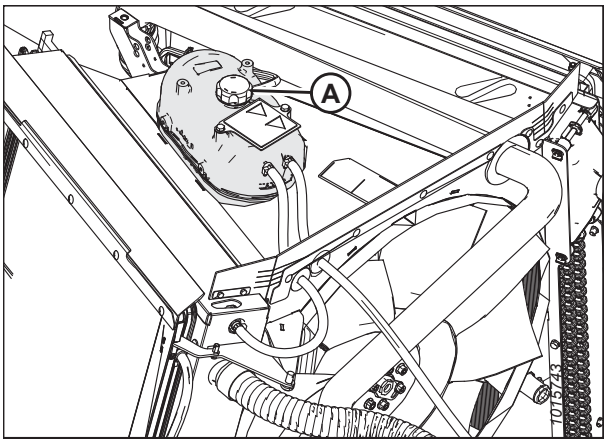


Figure 5.165: Coolant Tank

5.15 Maintenance as Required

This section details service procedures that should be done as they are required.

5.15.1 Seat Belts

The windrower is equipped with an operator safety belt that should be regularly inspected to ensure it can function properly in the event of an accident.

- Keep sharp edges and items that can cause damage away from the belts.
- Check the belts, buckles, retractors, tethers, slack take-up system, and mounting bolts for damage.
- Check that bolts are tight on the seat bracket or the mounting.
- Replace all parts that have damage or wear.
- Replace belts that have cuts that can weaken the belt.
- Keep the 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.

5.15.2 Draining Fuel Tank

Draining the fuel tank is necessary to remove old or contaminated fuel.

DANGER

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

WARNING

- **To prevent personal injury or death from an explosion or fire, do NOT allow open flames or sparks near the windrower when it is being refueled.**
- **Do NOT refuel the windrower when the engine is hot or running.**
- **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. A wire connection from the fuel delivery system to the machine chassis will equalize the static 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 the ground.**

1. Shut down the engine, and remove the key from the ignition.
2. Locate the fuel tank on the right side of the windrower frame.

3. Place a container under plug (A). The fuel tank holds 518 liters (137 gallons) total.
4. Loosen plug (A), and drain the tank.
5. Add some clean fuel to tank to flush out any remaining contaminants.

   NOTE:

   Do **NOT** refill the fuel tank if you need to work on the system. Refill the tank when work is completed. For instructions, refer to *Filling Fuel Tank, page 116*.

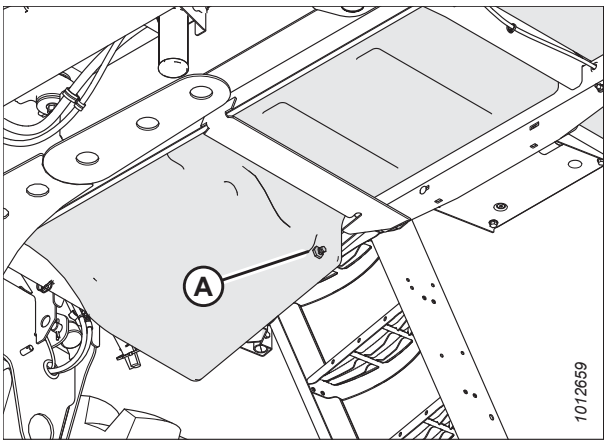


Figure 5.166: Drain Plug

5.15.3 Draining Diesel Exhaust Fluid Tank

The diesel exhaust fluid (DEF) tank must be drained when the DEF is contaminated or if storing the windrower for a period greater than 6 months.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Place a drain pan under DEF tank (B). The drain pan should be large enough to hold 49 liters (13 U.S. gallons).

   IMPORTANT:

   Spilled DEF must be contained and absorbed by non-combustible absorbent material like sand and then shovelled into a suitable container for disposal. If spilled on tank or any surface of the vehicle, rinse thoroughly with water as DEF is corrosive.

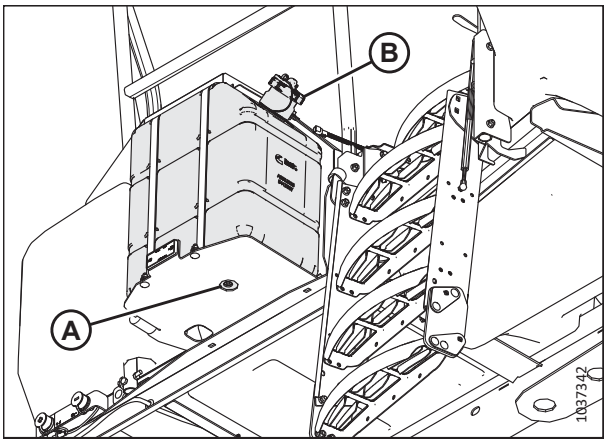


Figure 5.167: View from beneath Tank

CAUTION

Avoid contact with eyes. In case of contact, rinse immediately with water for 15 minutes.

3. Remove drain plug (A) from under tank (B) and drain the DEF tank.
4. Add some distilled water to tank (B) to flush out remaining contaminants.
5. Drain the distilled water that was used to clean the tank.
6. Reinstall drain plug (A) into tank (B).
7. Refill the DEF tank. For instructions, refer to *Filling Diesel Exhaust Fluid Tank, page 246*.

   NOTE:

   Do **NOT** refill the tank if storing it for **6 months** or longer.

5.15.4 Belts

The fan belt and the air conditioner compressor belt will need to be inspected and replaced from time to time.

Tensioning Engine Fan Drive Belt

The engine fan drive belt is automatically tightened. Manual adjustment is **NOT** required.

Replacing Engine Fan Drive Belt

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Loosen compressor mounting hardware (A) and rotate compressor (B) towards the engine to release tension on the belts.
4. Remove belts (C) from compressor (B).

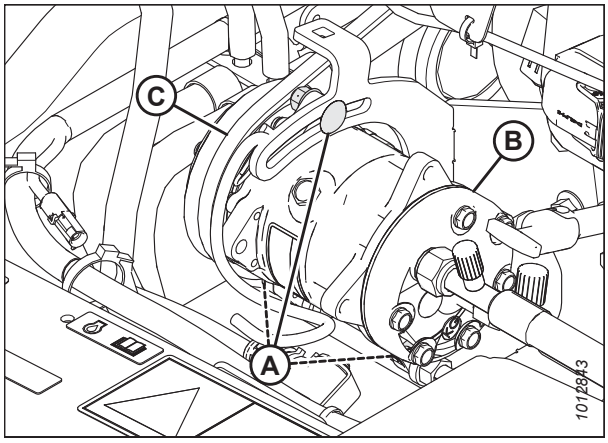


Figure 5.168: Air Conditioning (A/C) Compressor

5. Insert the drive end of a 1/2 in. drive ratchet wrench into belt tensioner (A).
6. Rotate tensioner counterclockwise until fan belt (B) can be slipped off pulley (C). Release the tensioner and remove the wrench.
7. Remove the belt in order 1, 2, 3, as shown in Figure *5.169, page 338*.
8. Insert the drive end of a 1/2 in. drive ratchet wrench into belt tensioner (A).
9. Rotate the tensioner counterclockwise until belt (B) can be slipped onto pulley (C). Release the tensioner and remove the wrench.
10. Check that the belt is properly seated in all pulley grooves.

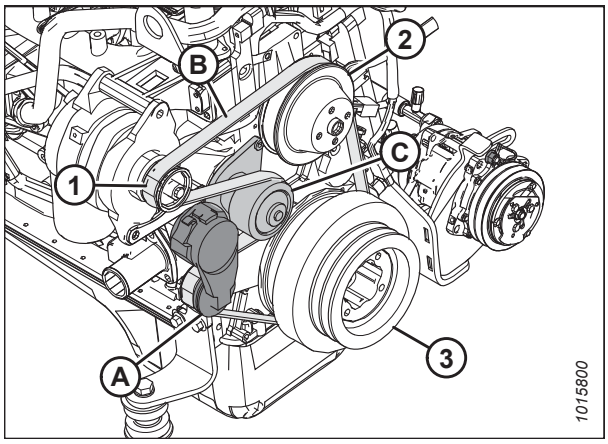


Figure 5.169: Engine Belt

11. Install compressor belts (C).
12. Pry compressor (B) away from the engine so that a force of 45 N (10 lbf) deflects belts (C) 5 mm (3/16 in.) at mid-span.

    NOTE:

    Tab (D) on bracket can be used as support for prying.
13. Tighten compressor mounting hardware (A).
14. Recheck the tension and readjust it as required.
15. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

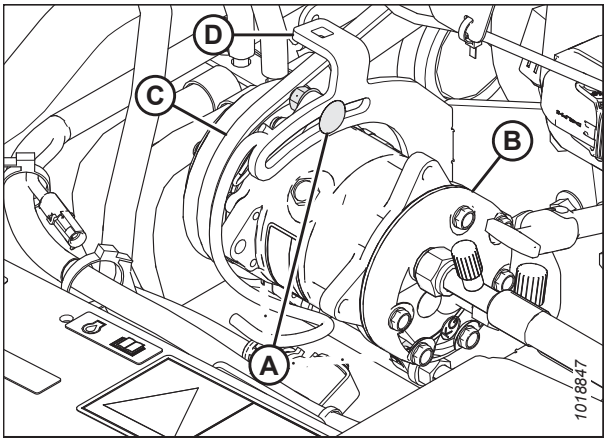


Figure 5.170: Air Conditioning (A/C) Compressor

Tensioning Air Conditioner Compressor Belts

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.
3. Loosen compressor mounting hardware (A).
4. Pry compressor (B) away from the engine so that a force of 45 N (10 lbf) deflects belts (C) 5 mm (3/16 in.) at mid-span.

    NOTE:

    Tab (D) on bracket can be used as support for prying.
5. Tighten compressor mounting hardware (A).
6. Recheck the tension and readjust as required.
7. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

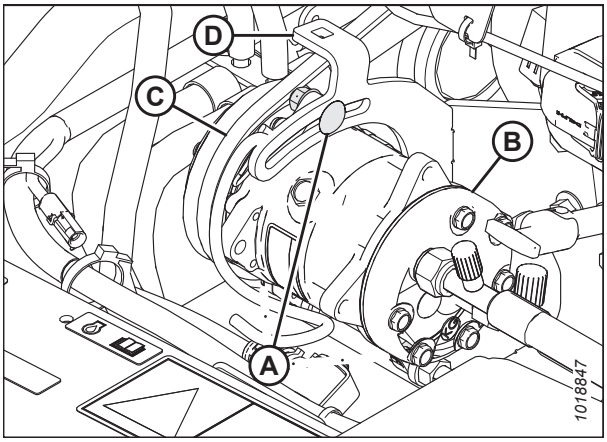


Figure 5.171: Air Conditioning (A/C) Compressor

Replacing Air Conditioner Compressor Belts

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the platform. For instructions, refer to *5.4.1 Opening Platform, page 241*.
3. Open the hood. For instructions, refer to *5.3.1 Opening Hood, page 239*.

4. Loosen compressor mounting hardware (A) and rotate compressor (B) towards the engine to release tension on the belts.
5. Remove belts (C) from compressor (B).
6. Install compressor belts (C).
7. Pry compressor (B) away from the engine so that a force of 45 N (10 lbf) deflects belts (C) 5 mm (3/16 in.) at mid-span.

   NOTE:

   Tab (D) on bracket can be used as support for prying.
8. Tighten compressor mounting hardware (A).
9. Recheck the tension and readjust as required.
10. Close the hood. For instructions, refer to *5.3.2 Closing Hood, page 240*.

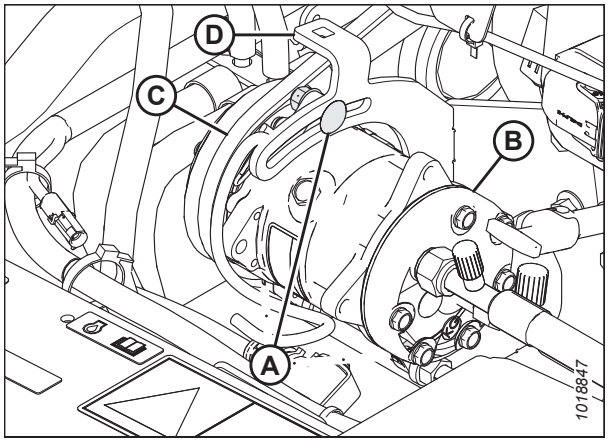


Figure 5.172: Air Conditioning (A/C) Compressor

5.15.5 Engine Speed

The maximum and idle engine speeds are factory set.

Refer to *2.2 Specifications, page 31* for detailed information. If specified speeds cannot be maintained, see your MacDon Dealer.

IMPORTANT:

To avoid voiding engine warranty, contact Cummins before removing components or starting repairs.

5.15.6 Lighting

Aligning Headlights – Engine-Forward

DANGER

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

NOTE:

The header should be attached and raised to maintain the proper windrower stance.

1. Position the windrower on level ground 7.5 m (25 ft.) (A) in front of a vertical surface as shown.

   NOTE:

   Check that the casters are positioned underneath the windrower to properly align the headlights.

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

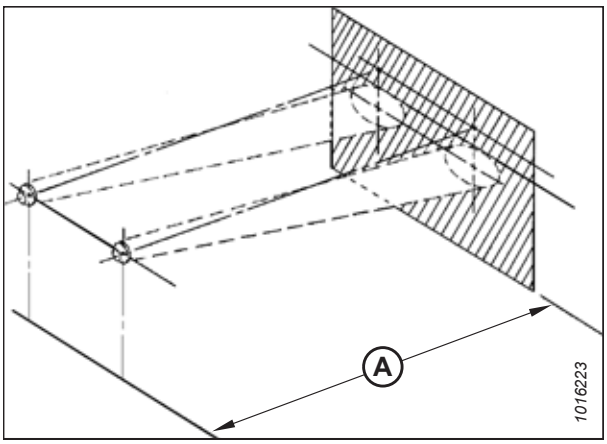


Figure 5.173: Windrower Headlight Positioning

3. Turn on ROAD lights (A) and switch to LOW BEAM.

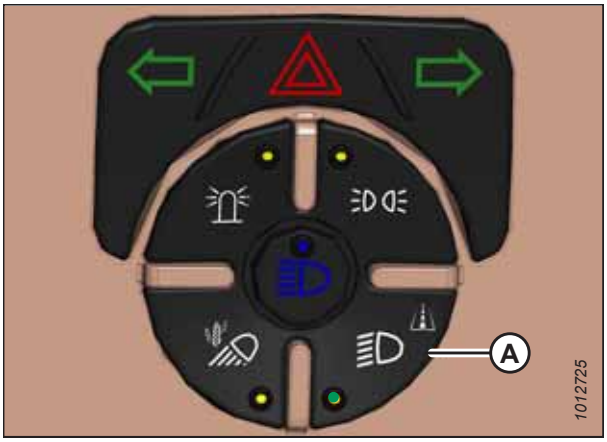


Figure 5.174: Road Light Switch

4. Adjust headlight (A) with adjusting bolts (B) so that the beam's maximum height above the ground does not exceed 1263 mm (49 3/4 in.) (C). Access the bolts by reaching under the headlight bezel (D).

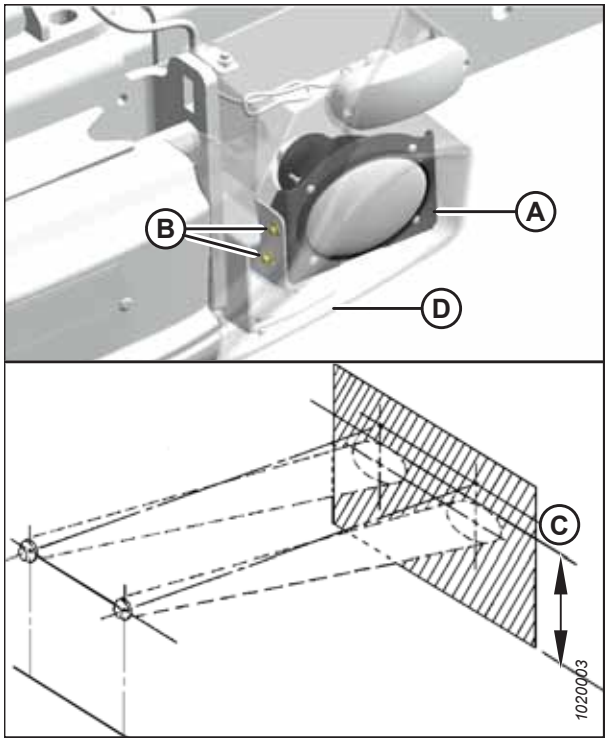


Figure 5.175: Left Engine-Forward Headlight – Right Opposite

Aligning Headlights – Cab-Forward

Adjust field lights when in the field (or equivalent) to suit Operator preference.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Hold onto handholds (A) on the cab front corners, and stand on the header anti-slip strips.

   NOTE:

   The header is not shown in the illustration.

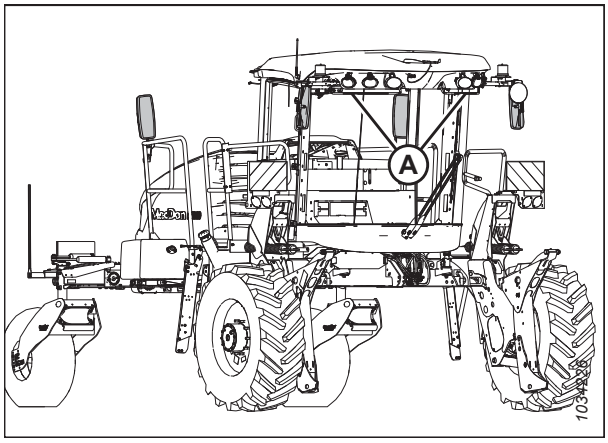


Figure 5.176: Windrower in Cab-Forward

3. Adjust the lights by hand as required. Loosen/tighten nuts if necessary:
   - Tighten hinge nut (A) to 7.5 Nm (6 lbf·ft).
   - Tighten mounting nuts (B) to27 Nm (20 lbf·ft).

   NOTE:

   Tightening mounting nuts (B) requires **two people**. To access mounting nuts (B), remove the cab-forward sun shade, and then open the access panel in the headliner.

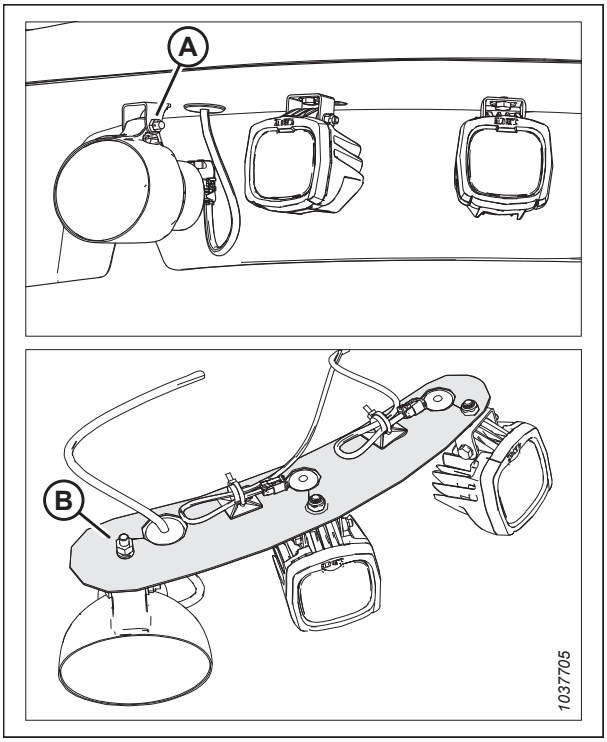


Figure 5.177: Left Cab-Forward Headlight – Right Opposite

Adjusting Front Field Lights

Adjust field lights when in the field (or equivalent) to best suit Operator preference.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Hold onto handholds (A) on the cab front corners, and stand on the header anti-slip strips.

   NOTE:

   The header is not shown in the illustration.

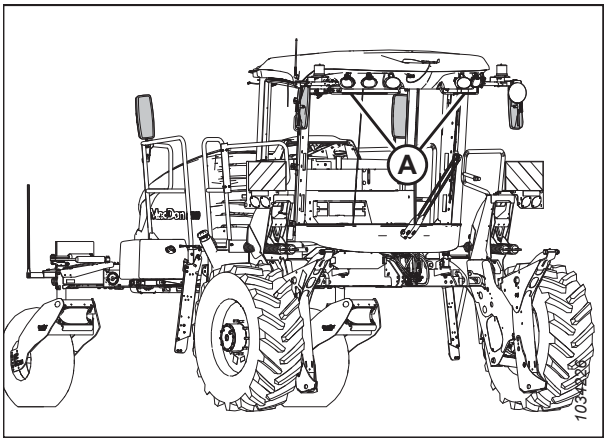


Figure 5.178: Windrower in Cab-Forward

3. Adjust the lights by hand as required. Loosen nuts (A) if necessary and retighten.

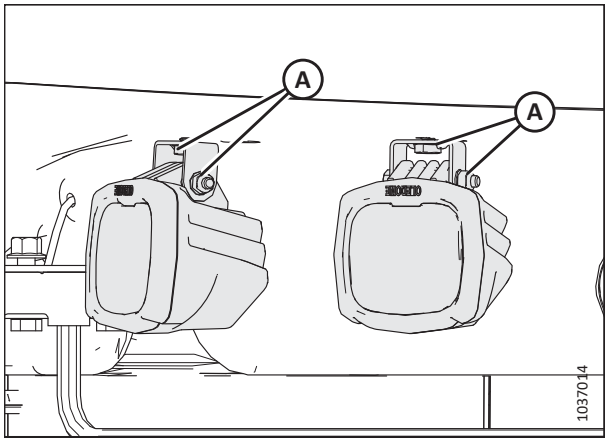


Figure 5.179: Right Cab-Forward Lights – Left Opposite

Adjusting Rear Roof Work Lights

Adjust the lights to best suit Operator preference.

DANGER

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

1. Stand on left or right platform (B) to access rear roof work lights (A).

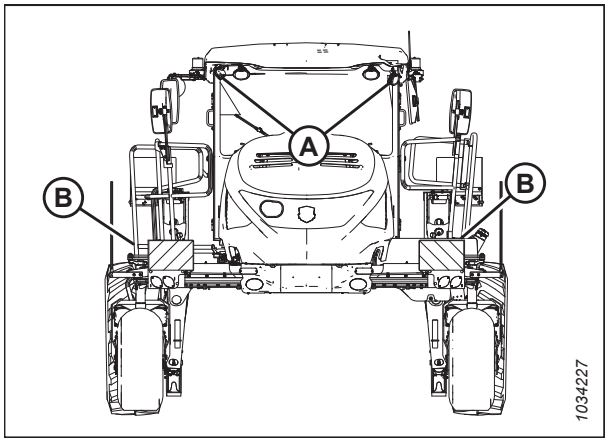


Figure 5.180: Rear Roof Work Lights

2. Adjust the light by hand. Loosen or tighten bolts (A) if necessary.

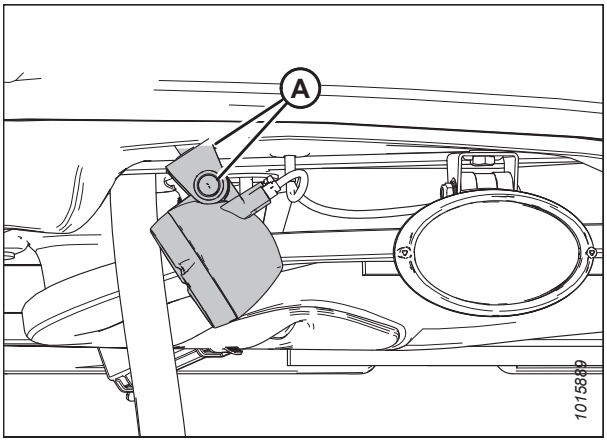


Figure 5.181: Left Rear Roof Work Light – Right Opposite

Adjusting Rear Swath Lights

Adjust the rear swath lights to best suit Operator preference.

1. Stand on left or right platform (B) to access rear swath lights (A).

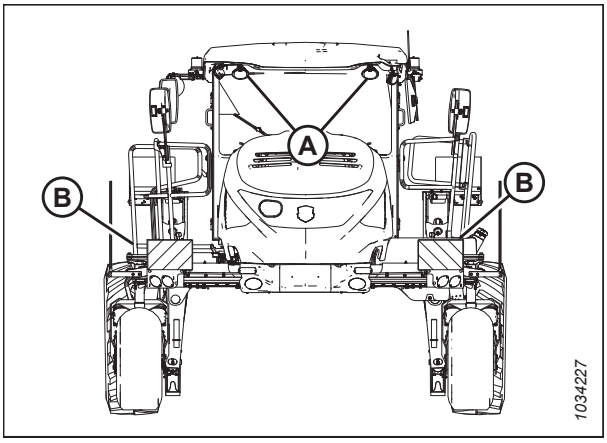


Figure 5.182: Rear Swath Lights

2. Adjust the light position using bolts (A).

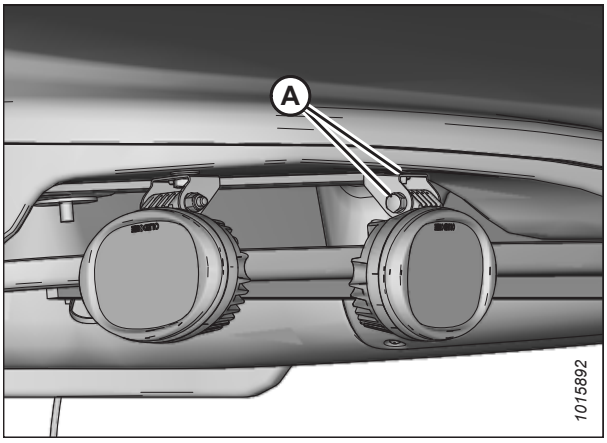


Figure 5.183: Left Rear Swath Light – Right Opposite

Replacing Bulbs in Standard Work Lights or Cab-Forward Headlights

Lights are an important safety feature of the windrower. Replace damaged or malfunctioning bulbs or lamps immediately.

The following procedure applies to all halogen bulbs shown in Figure *5.184, page 346*. If replacing the engine-forward headlight bulbs, refer to *Replacing Headlight Bulb – Engine-Forward, page 347*.

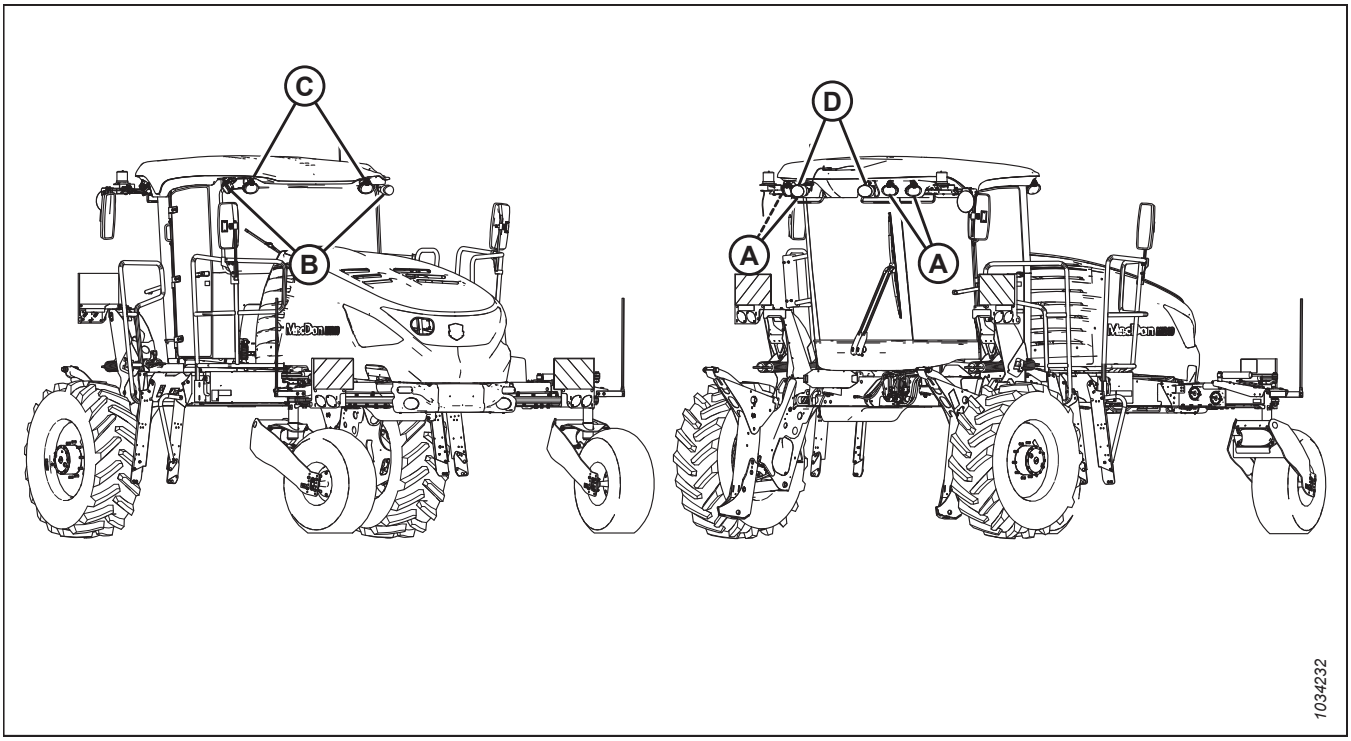


Figure 5.184: Halogen Bulb Locations

A - Front Work Lights (Field) **B - Stubble Lights (Rear)** **C - Rear Work Lights** **D - Headlights (Cab-Forward)**

DANGER

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

NOTE:

Front work light shown.

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

2. Disconnect wiring harness (A).
3. Remove rubber insulator boot (B).
4. Remove the bulb from the 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.

5. Align the lugs on the new bulb with the slots in the housing and push the bulb into place.
6. Install insulator boot (B) and wiring harness (A).

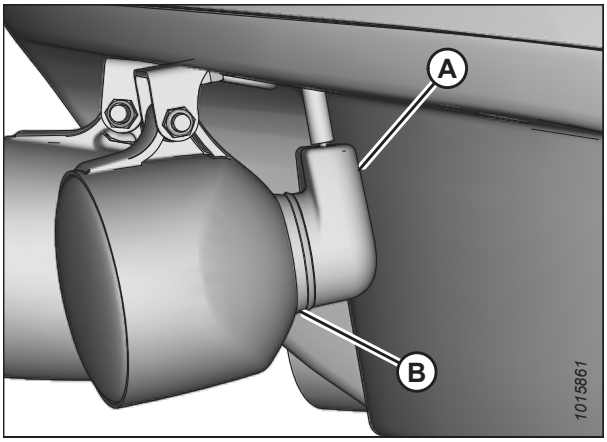


Figure 5.185: Front Work Light

Replacing Headlight Bulb – Engine-Forward

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Remove eight hex flange bolts (A), then remove headlight bezel assembly (B). Retain the hardware.
3. Remove the electrical connectors from red tail lights (C) to fully remove bezel (B).

   NOTE:

   Not applicable to the M1170*NT5* bezel configuration.

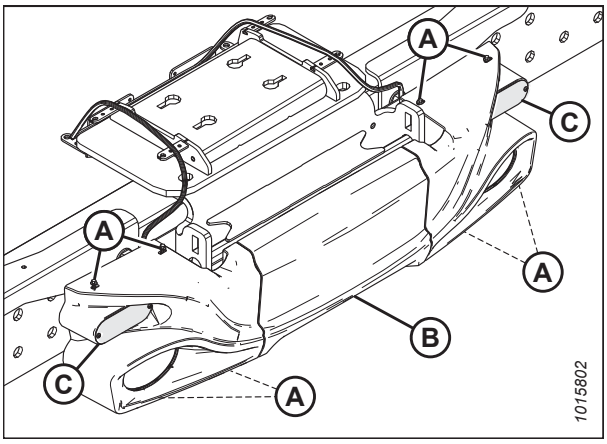


Figure 5.186: Headlight Bezel Assembly

4. Remove two bolts (A) holding headlight bracket assembly (B) in place and slide the bracket forward.
5. Pull the wiring harness connector off the headlight and remove assembly (B).

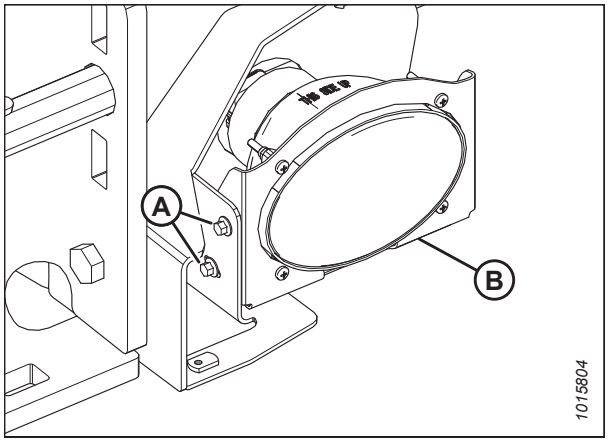


Figure 5.187: Right Headlight Shown – Left Similar

6. Remove four machine screws (A) and nylon nuts (B) and retain the hardware.
7. Remove the old headlight from the bracket and replace it with a new headlight.

   IMPORTANT:

   Do **NOT** touch the glass of the halogen bulb as oils or other chemicals from your skin will cause the bulb to fail prematurely.
8. Attach the headlight to the bracket using four retained machine screws (A) and nylon nuts (B). Torque the screws to 2.0–2.7 Nm (18–24 lbf·in).

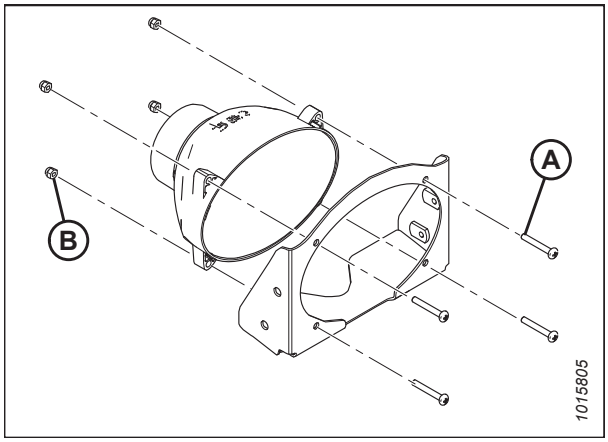


Figure 5.188: Right Headlight Shown – Left Similar

9. Connect the wiring harness connector to the headlight.
10. Attach headlight bracket assembly (B) using retained bolts (A).
11. Align the new headlight. For instructions, refer to *Aligning Headlights – Engine-Forward, page 340*.

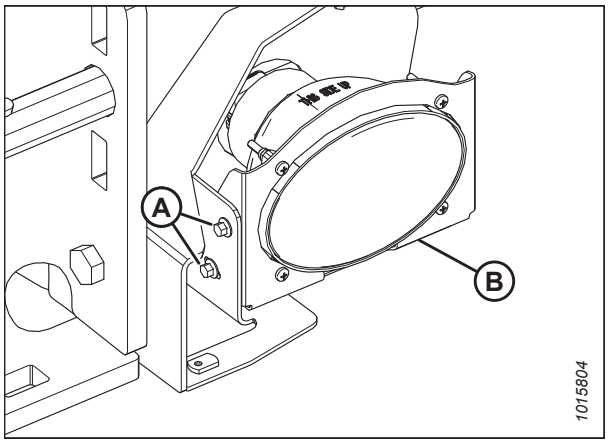


Figure 5.189: Right Headlight Shown – Left Similar

12. Attach the electrical connectors to red tail lights (C).

13. Attach headlight bezel assembly (B) to the frame using the eight retained hex flange bolts (A). Torque the bolts to 2.0–2.7 Nm (18–24 lbf·in).

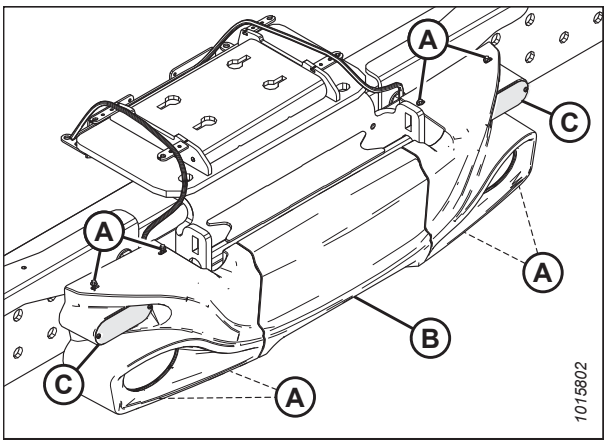


Figure 5.190: Headlight Bezel Assembly

Replacing LED Lights – Deluxe Cab Only

DANGER

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

The deluxe cab is equipped with the following LED lights:

- Four LED field lights (A)
- Two LED stubble lights (B)
- Two LED rear work lights (C)

NOTE:

The bulb of an LED light cannot be replaced. For replacement parts, refer to the windrower parts catalog or contact your MacDon Dealer. To replace the LED lamp assembly, proceed to Step *1, page 351*.

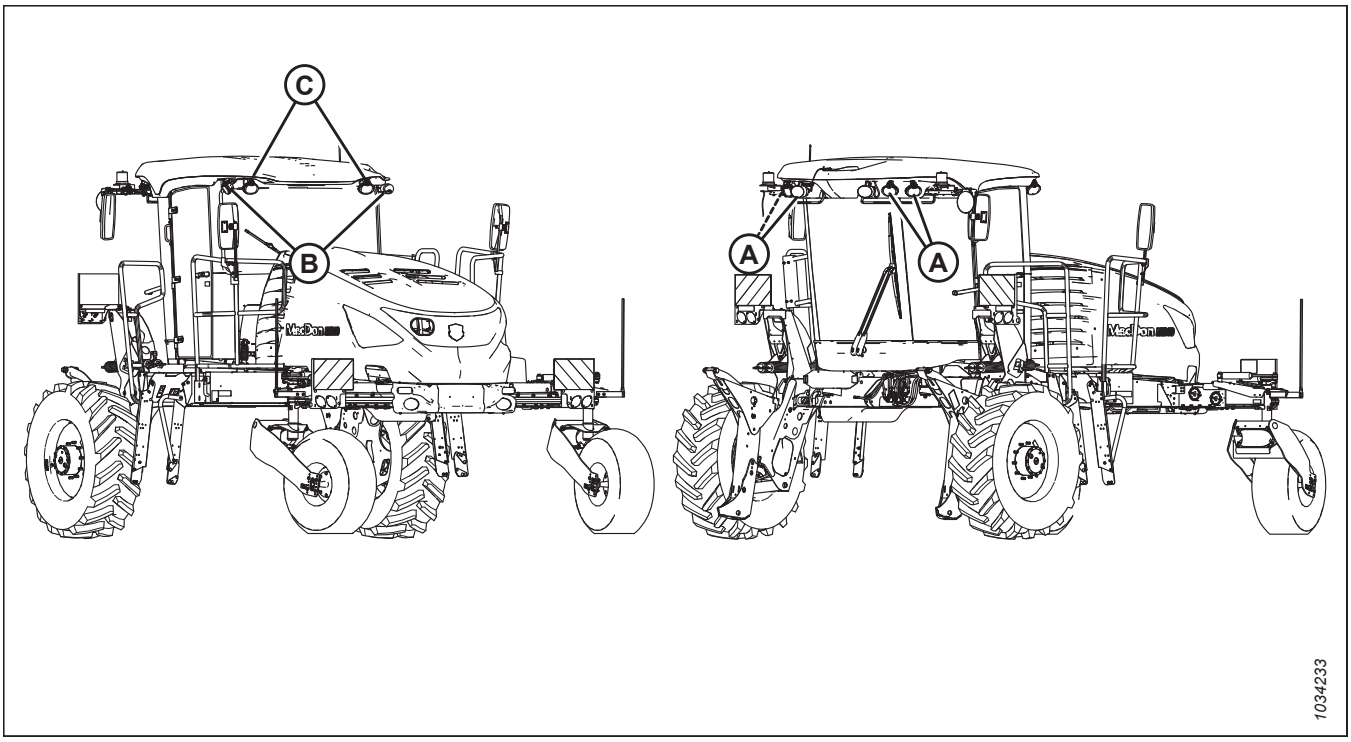


Figure 5.191: LED Light Locations – Deluxe Cab Only

1. Shut down the engine, and remove the key from the ignition.
2. Disconnect wiring harness (A).

   NOTE:

   If you do **NOT** have to also replace hinge bracket (C), then follow Step *3, page 351* to Step *7, page 351*. If you have to also replace hinge bracket (C), then remove mounting nut (E) inside the cab roof. **This task requires two people:**

   - All cab-forward work lights: Remove the cab-forward sun shade. Open the access panel in the headliner to access the work light mounting nuts. Tighten the mounting nuts to 27 Nm (20 lbf·ft).
   - Two rear right work lights: One work light is mounted externally and is readily accessible. To remove the mounting hardware for the other work light, remove the radio panel from the cab. Tighten the mounting nuts to 15 Nm (11 lbf·ft).
   - Two rear left work lights: Contact your MacDon dealer to have the headliner removed.
3. Remove bolt and nut (B) from hinge bracket (C).
4. Remove LED lamp assembly (D).
5. Mount new LED assembly (with its hinge bracket removed) to existing hinge bracket (C) using bolt and nut (B).
6. Tighten the hinge nut to 7.5 Nm (6 lbf·ft).
7. Reconnect the wiring harness.

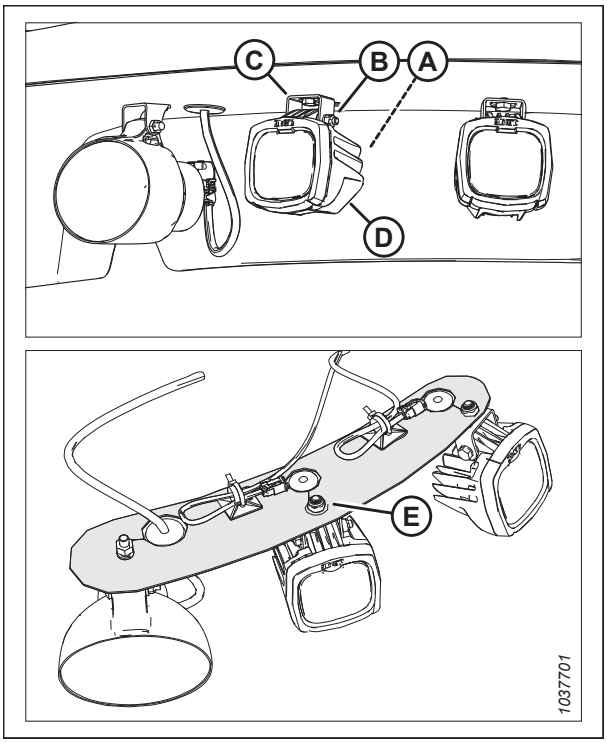


Figure 5.192: Front LED Work Light

Replacing Amber and Marker Lights

The amber LED signal and marker lights should be replaced immediately if damaged or malfunctioning.

DANGER

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

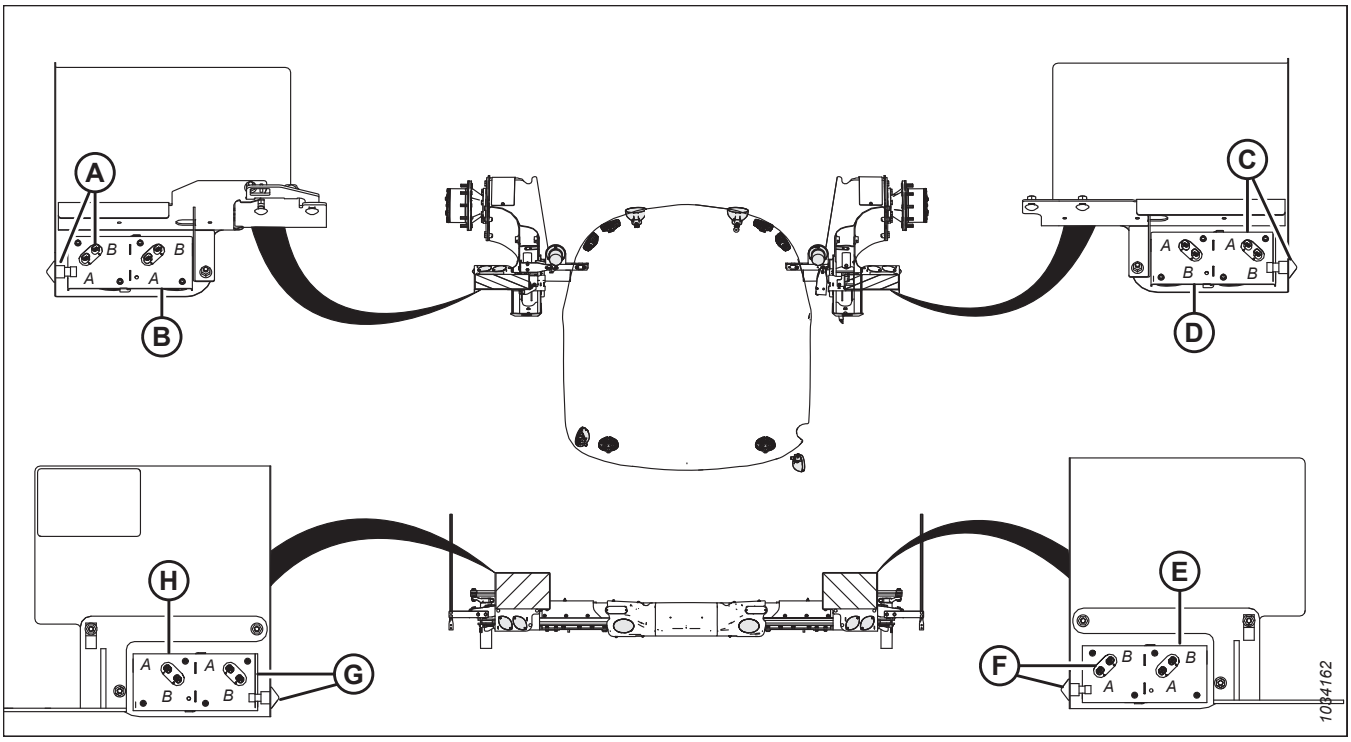


Figure 5.193: Amber and Marker Light Locations

The brake/marker lights and the amber turn signal/hazard lights are located on the four hazard placards. Each lamp connector is labeled A or B (the side turn signal repeaters have one connector). When replacing a lamp, refer to the following list for the harness plug location:

Table 5.7 Harness Plug Locations

Left Side	Connector A	Connector B	Right Side	Connector A	Connector B
Front turn signal/hazard (A)	P295	—	Front turn signal/hazard	P295	—
Front side repeater (A)	P295S	—	Front side repeater	P295S	—
Front brake/marker (B)	P267A	P267B	Front brake/marker (D)	P267A	P267B
Rear turn signal/hazard (G)	P293	—	Rear turn signal/hazard (F)	P294	—
Rear side repeater (G)	P293S	—	Rear side repeater (F)	P294S	—
Rear marker (H)	P265	—	Rear marker (E)	P266	—

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

2. Turn the lights OFF.

3. To remove amber turn/hazard lamp (A) or red marker lamp (B), disconnect the electrical harness connector from the rear of lamp, remove screws (C) with washer and bolts, and press the lamp away from the placard.

4. To remove signal repeater (D), disconnect the electrical harness from the lamp.

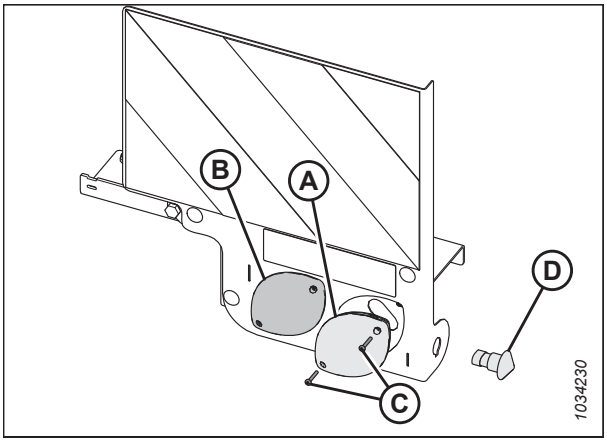


Figure 5.194: Amber and Marker Lights – Front View

5. Rotate the lamp connector to align tab (A) with the slot in the placard. Press tab (A) and push the lamp out from the placard.

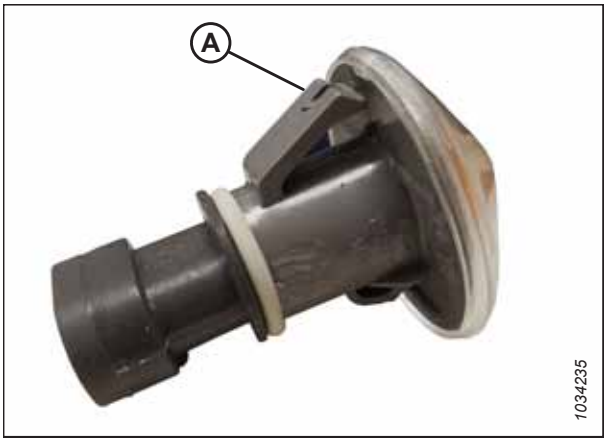


Figure 5.195: Signal Repeater

6. To install amber turn/hazard lamp (A) or marker lamp (B), secure the lamp with two screws, washers, and bolts (C), and connect the electrical harness to the receptacle on lamp. For plug locations, refer to Table *5.7, page 352*.

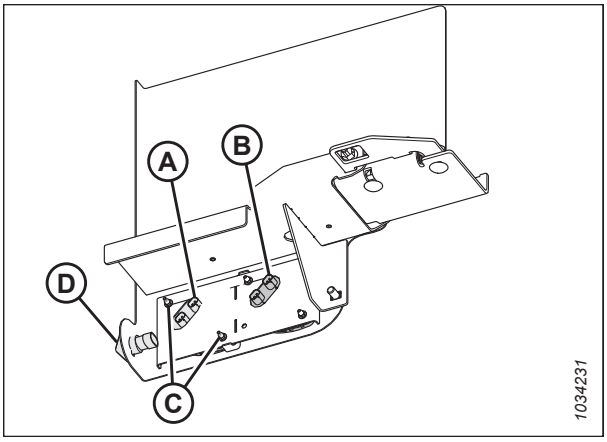


Figure 5.196: Amber and Marker Lights – Front View

7. To install turn/hazard repeater lamp (D) shown in Figure *5.196, page 353*, align lamp tab (A) with the slot in the placard, gently push the lamp into the placard, and rotate it to secure it.
8. Connect the electrical harness to the receptacle on the rear of the lamp.



Figure 5.197: Signal Repeater

Replacing Beacon Lights

1. Disconnect wiring (A) from the harness.
2. Remove nuts (B) and remove beacon (C). Discard the defective beacon and hardware.
3. Clean any residue from support (D) mounting surface.
4. Install new beacon (C) with gasket (E) onto the support. Secure it with bolts (F), washers (G), and nuts (B).
5. Torque the nuts to 0.65 Nm (0.48 lbf·ft).

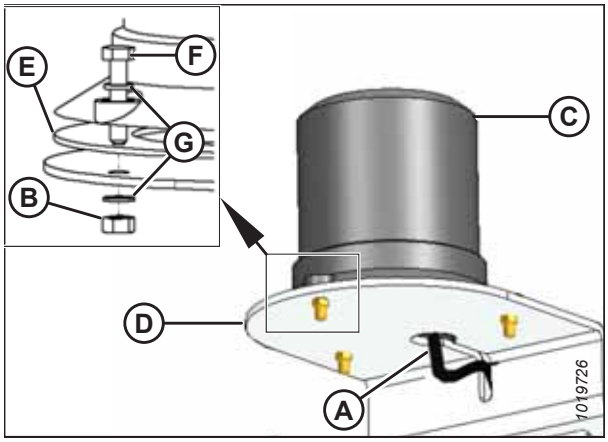


Figure 5.198: Beacon Light Assembly

Replacing Cabin Dome Bulb

DANGER

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

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

2. Insert a slotted screwdriver (or similar prying tool) into slot (A). Gently pry the lens cover until retaining tabs (B) are free of the dome light bezel.
3. Remove the lens cover.

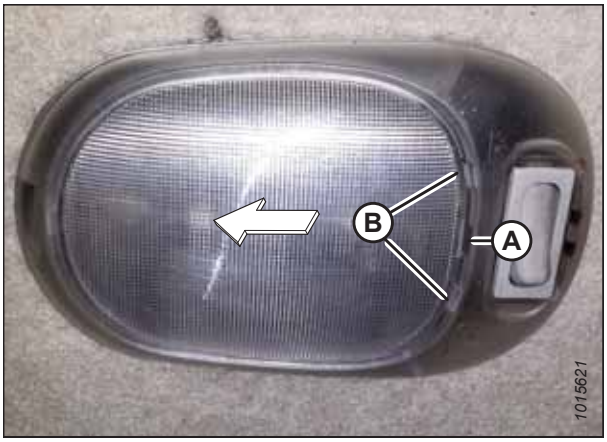


Figure 5.199: Cabin Dome Light

4. Replace bulb (A) (MD #208191).

   IMPORTANT:
   Do **NOT** touch the glass with your fingers.



Figure 5.200: Cabin Dome Light with Cover Removed

5. Insert single retaining tab (A) into the dome light bezel.
6. Insert a slotted screwdriver (or similar prying tool) into slot (B), and gently pry the lens cover until retaining tabs (C) engage into the dome light bezel.

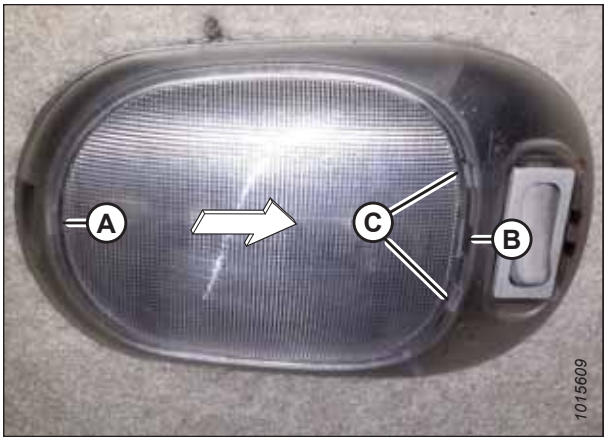


Figure 5.201: Cabin Dome Light

Replacing Cabin Dome Light Assembly

DANGER

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

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

2. Insert a slotted screwdriver (or similar prying tool) into slot (A). Gently pry the lens cover until retaining tabs (B) are free of the dome light bezel.
3. Remove the lens cover.

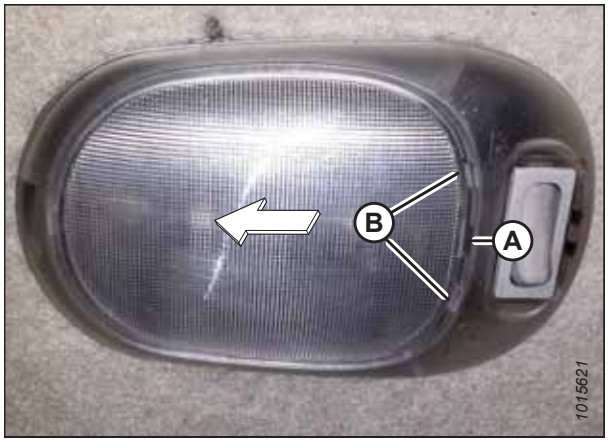


Figure 5.202: Cabin Dome Light

4. Remove two screws (A) from the dome light bezel.



Figure 5.203: Cabin Dome Light with Cover Removed

5. Carefully insert a slotted screwdriver (or similar prying tool) between the roof liner and the dome light assembly on the side of the light with the ON/OFF switch.
6. Gently depress retaining clip (A), and swing the dome light assembly downwards to disengage retaining tab (B).
7. Disconnect the old dome light assembly from the wiring harness.
8. Connect the new dome light (MD #201707) to the wiring harness.
9. Engage retaining tab (B), and swing the dome light assembly upwards until retaining clip (A) snaps into place and secures the assembly.

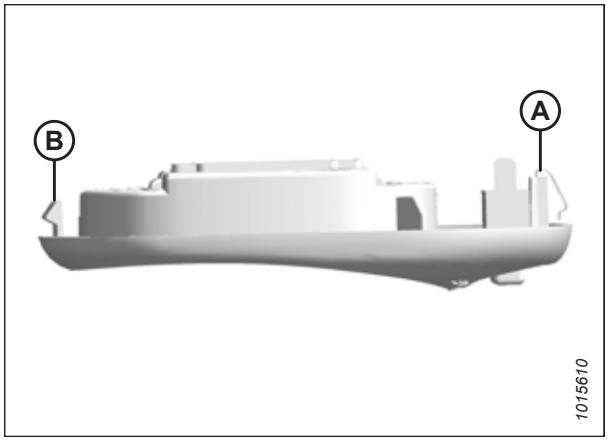


Figure 5.204: Cabin Dome Light Assembly

10. Secure the dome light assembly with two screws (A).

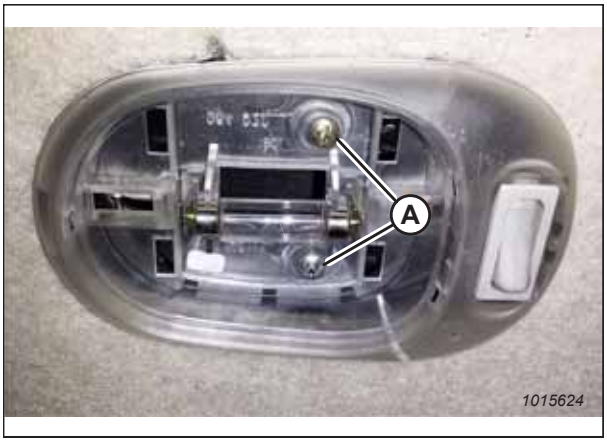


Figure 5.205: Cabin Dome Light with Cover Removed

11. Insert single retaining tab (A) into the dome light bezel.
12. Insert a slotted screwdriver (or similar prying tool) into slot (B), and gently pry the lens cover until retaining tabs (C) engage into the dome light bezel.

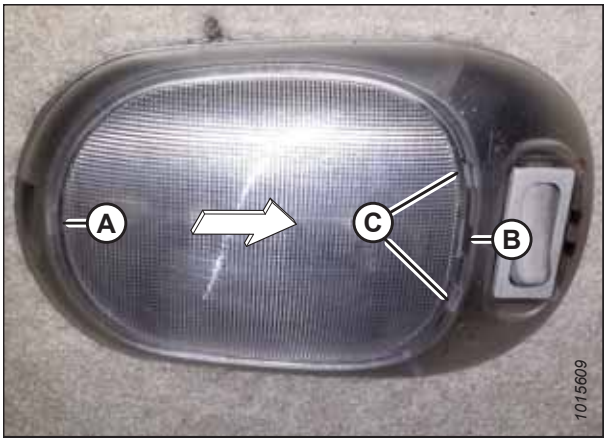


Figure 5.206: Cabin Dome Light

Turn Signal Indicators

The turn signal indicator lights can be found on the operator's console. If the turn signal indicators are not working correctly, contact your MacDon Dealer for more information.

5.15.7 Accessing Circuit Breakers and Fuses

Most circuit breakers and fuses are located inside a fuse box mounted on the left (cab-forward) side of the frame, behind the platform and inside the battery cover.

NOTE:

The circuit breakers automatically reset. Fuses are the plastic blade type.

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open battery cover (A) to access the fuse box. For instructions, refer to *Opening Battery Cover, page 322*.

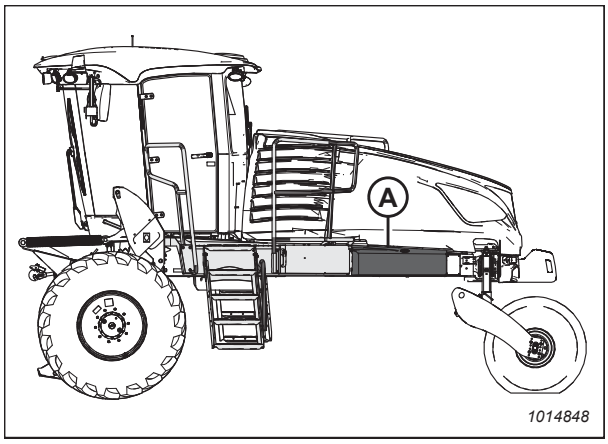


Figure 5.207: Fuse Box Location

3. Lift latch (A) at top of fuse box cover (B) to disengage the tab, and then lower the cover.
4. Check and replace the fuses as required. For instructions, refer to *Checking and Replacing Fuses, page 359*.
5. Position cover (B) onto the fuse panel, ensuring that the hooks at the bottom of the cover have engaged the fuse panel.
6. Push latch (A) to engage the tab at top of the fuse box.
7. Close the battery cover and move the platform to working position. For instructions, refer to *5.4.2 Closing Platform, page 241*.

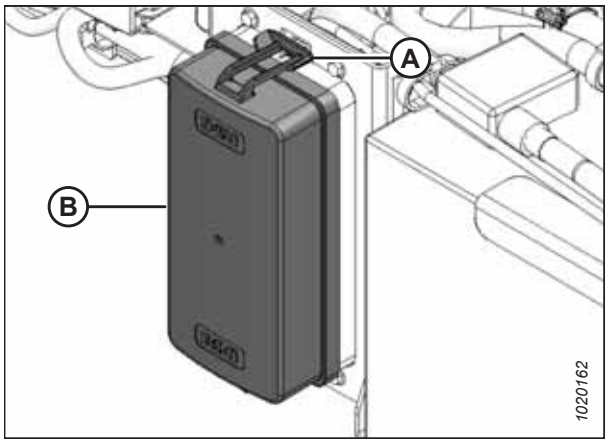


Figure 5.208: Fuse Box Cover

Checking and Replacing Fuses

1. To check a fuse, pull fuse (A) out of the receptacle and visually examine it.
2. To replace a fuse, insert a new fuse into the receptacle.

   IMPORTANT:

   Replacement fuses should match the rating on the decal shown on *Fuse Panel and Relay Module Decals, page 361*.

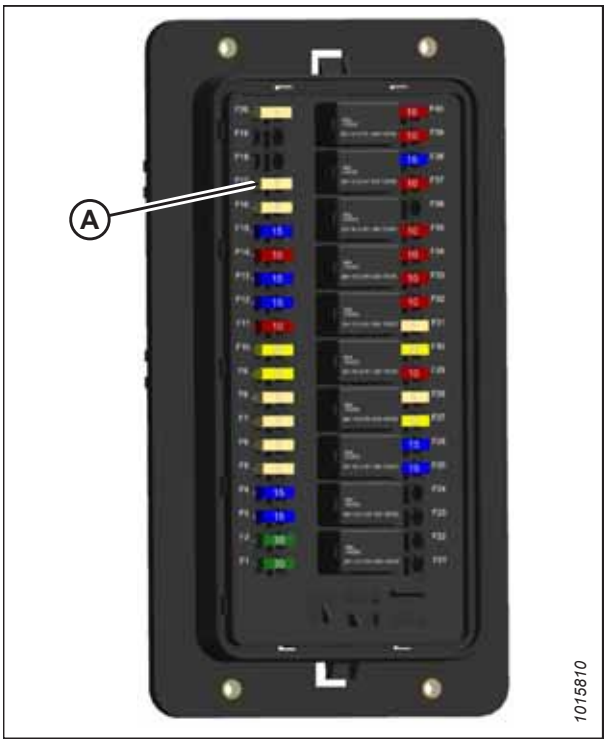


Figure 5.209: Fuses

Replacing Circuit Breakers and Relays

DANGER

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

1. Shut down the engine, and remove the key from the ignition.
2. Open the fuse box cover. For instructions, refer to *5.15.7 Accessing Circuit Breakers and Fuses, page 357*.

3. To replace relay (A), pull the relay out of the receptacle and install a new relay.

4. Reinstall the cover.

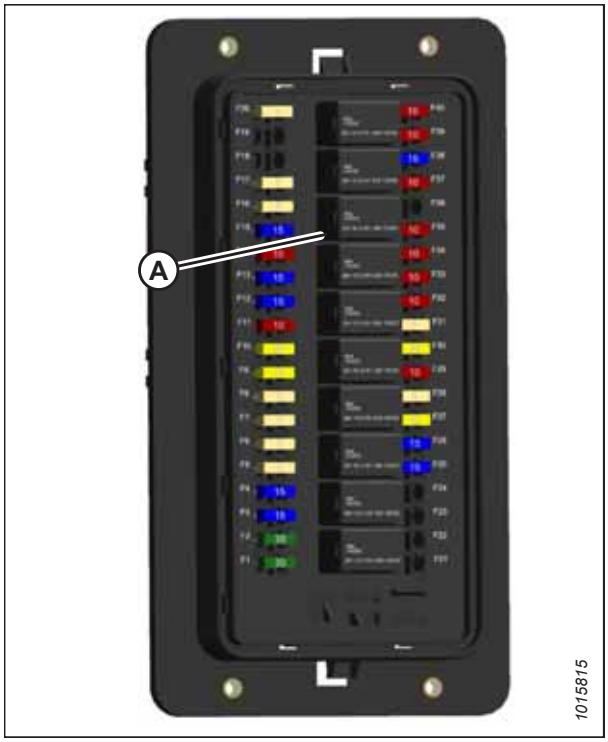


Figure 5.210: Fuse Box – Cover Removed

Fuse Panel and Relay Module Decals

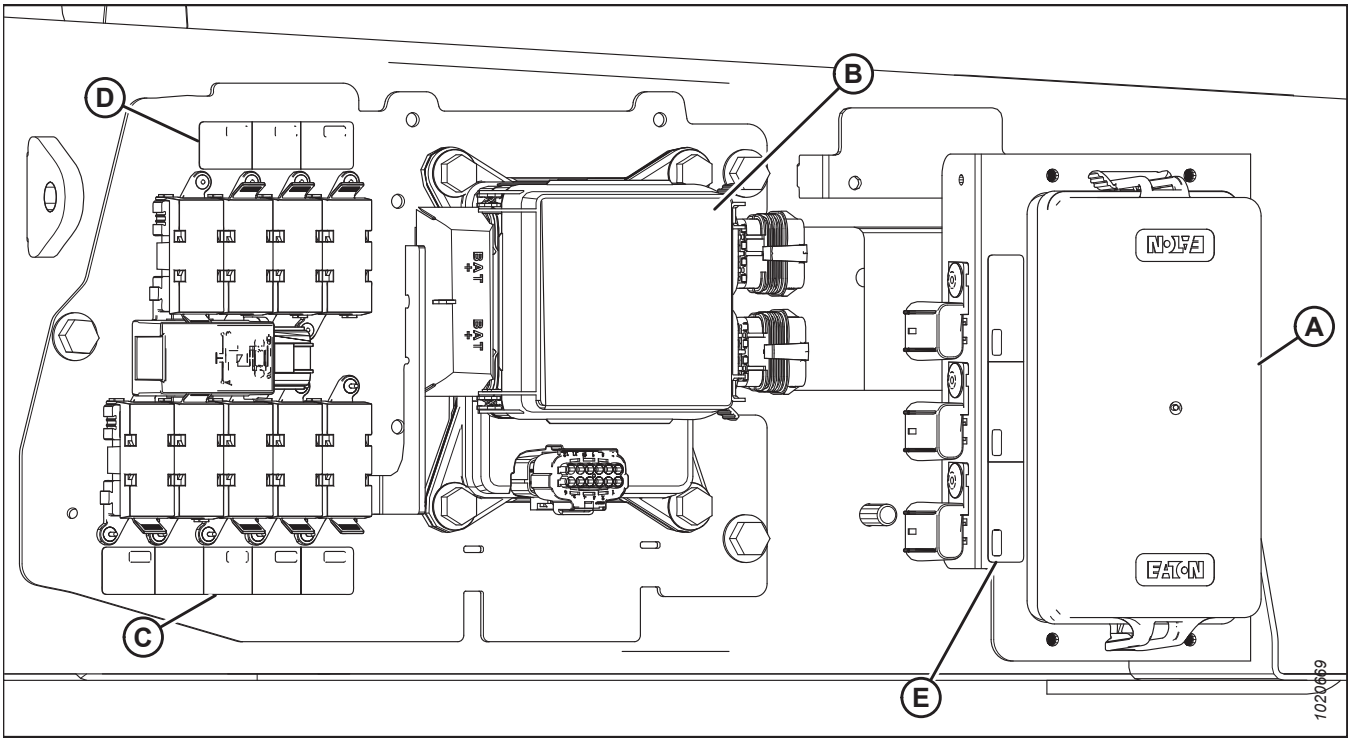


Figure 5.211: Left Rail Fuse Decal Locations

A - Main Fuse Panel Decal (MD #306417) (Located inside Fuse Cover) (Group A)

B - Chassis Relay Module Fuse Decal (MD #207816) (Located inside Fuse Cover) (Group B)

C - Lower AMI Group Fuse Decal (MD #291378) (Group D)

D - Upper AMI Group Fuse Decal (MD #207818) (Group D)

E - ATO Group Fuse Decal (MD #291465) (Group C)

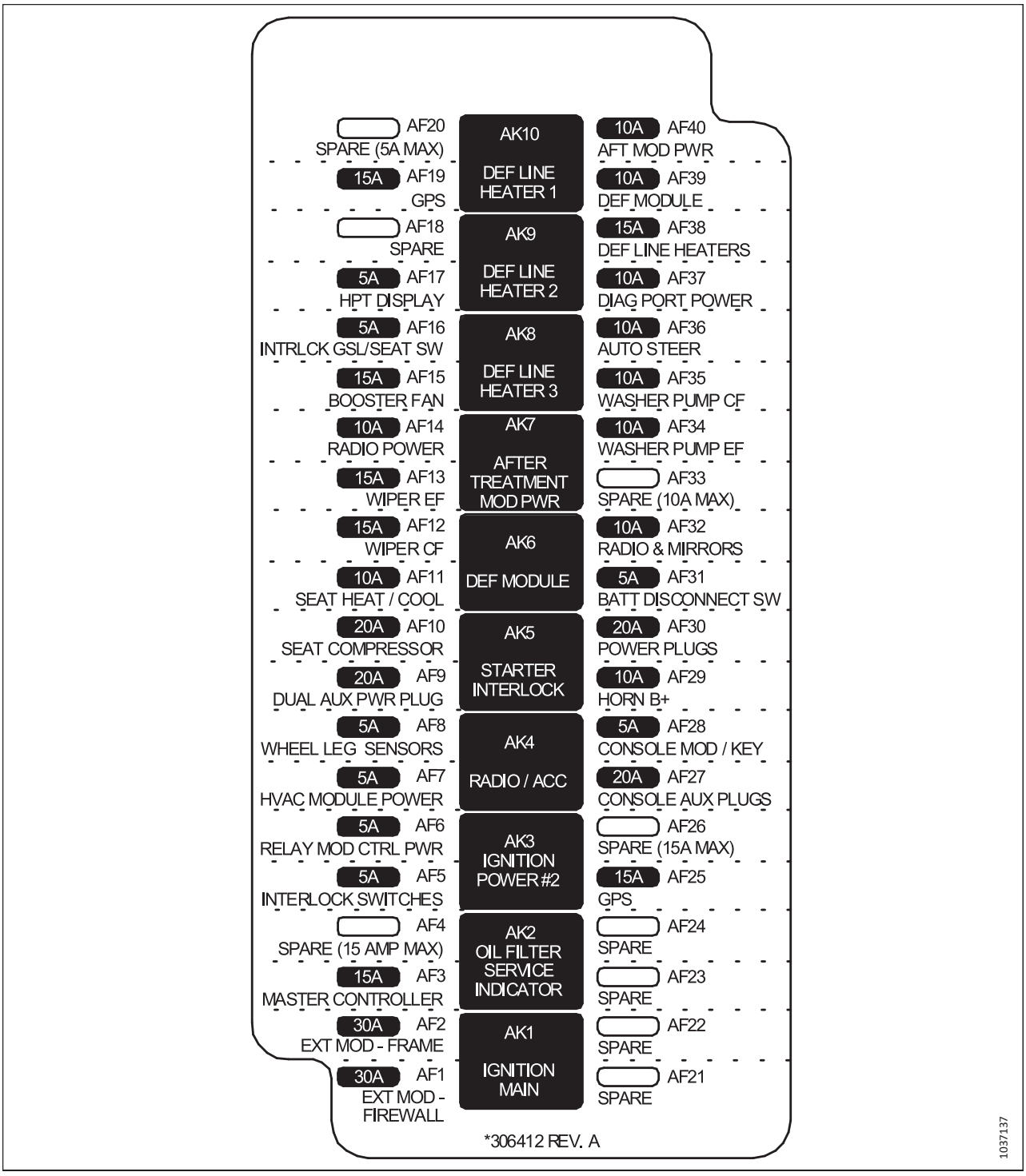


Figure 5.212: Main Fuse Panel Decal (MD #306417) – Group A

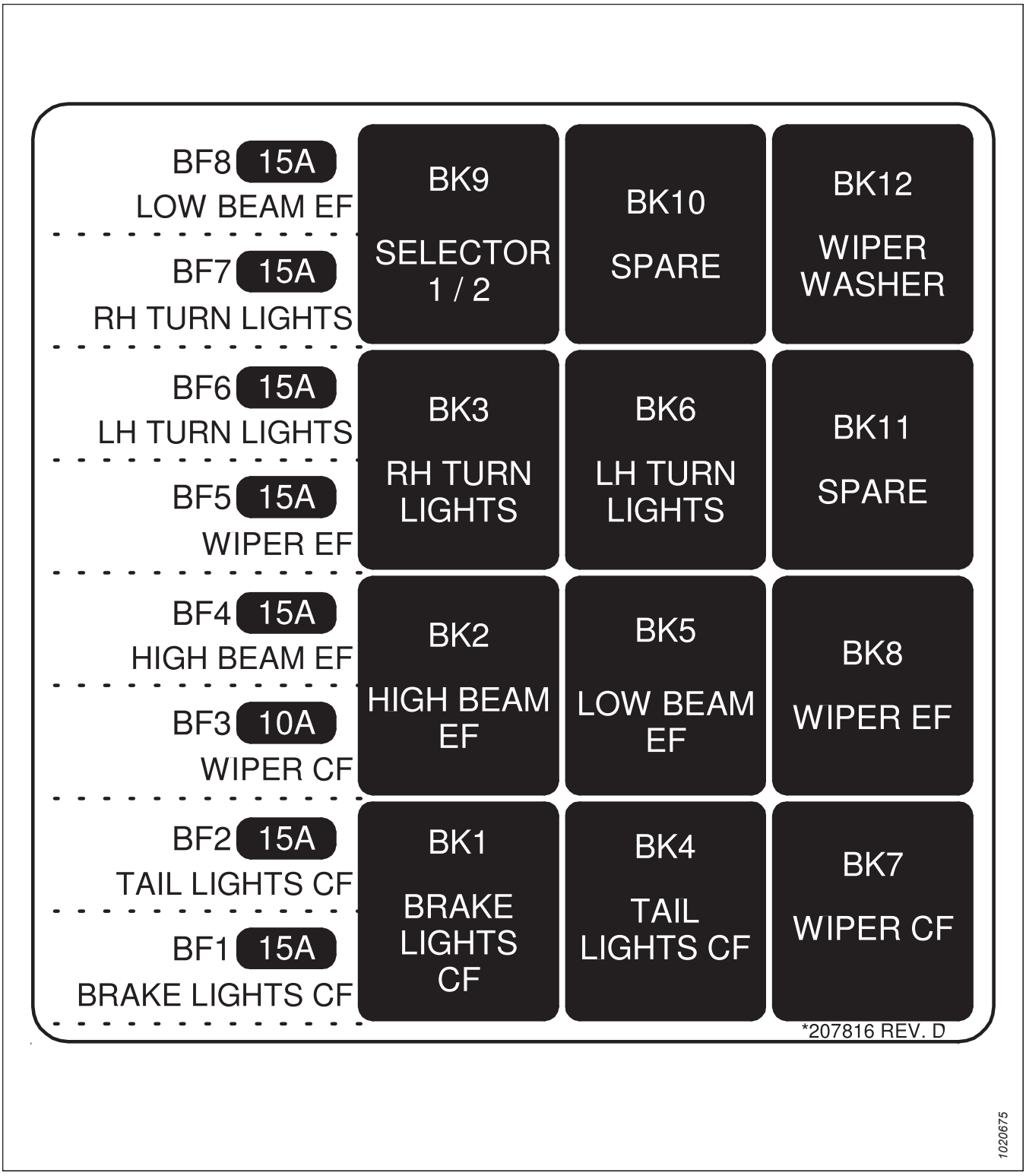


Figure 5.213: Chassis Relay Module Fuse Panel Decal (MD #207816) – Group B

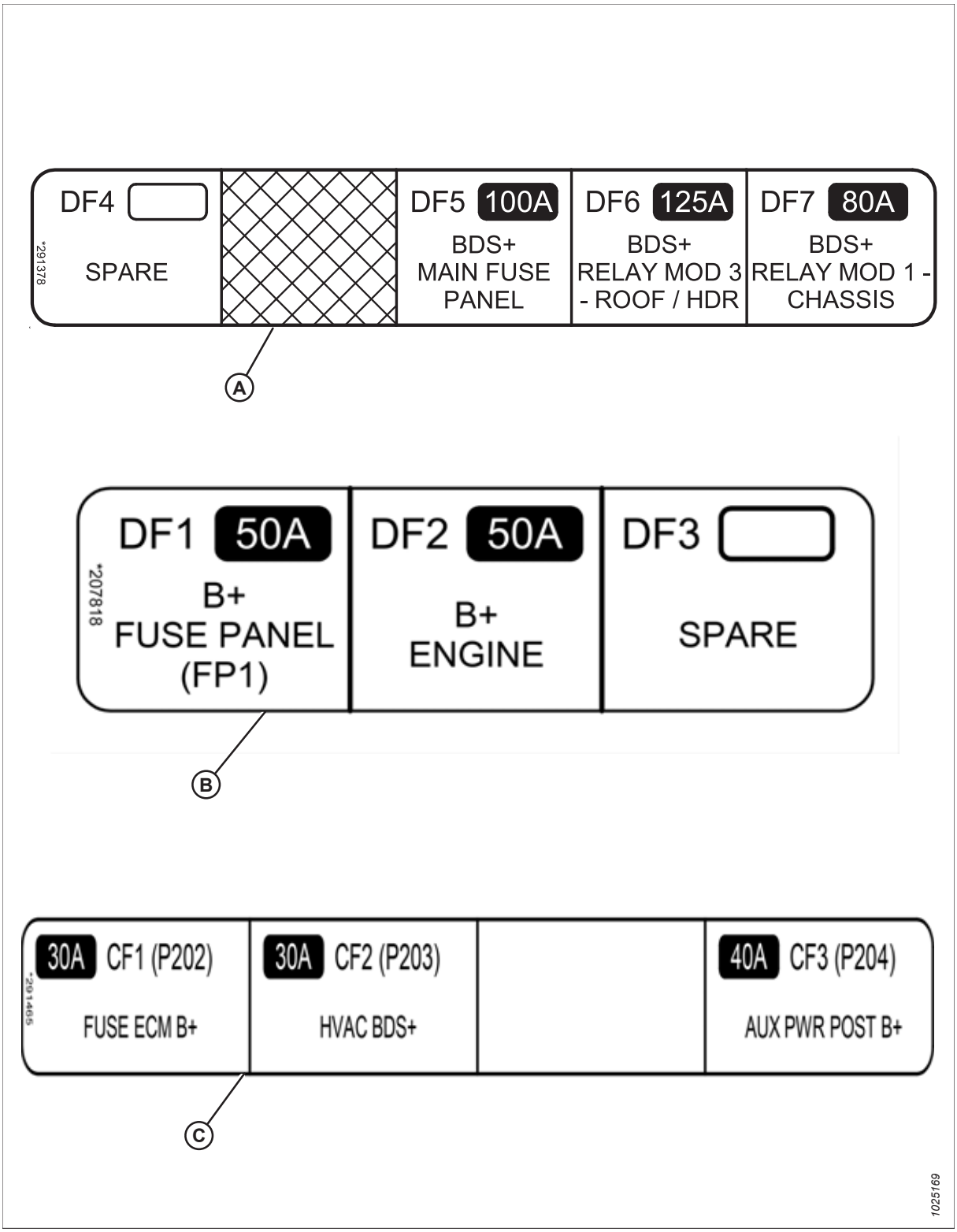


Figure 5.214: ATO (Group C) and AMI (Group D) Fuse Decals

A - Lower AMI Group Fuse Decal (MD #291378) **B - Upper AMI Group Fuse Decal (MD #207818)** **C - ATO Group Fuse Decal (MD #291465)**

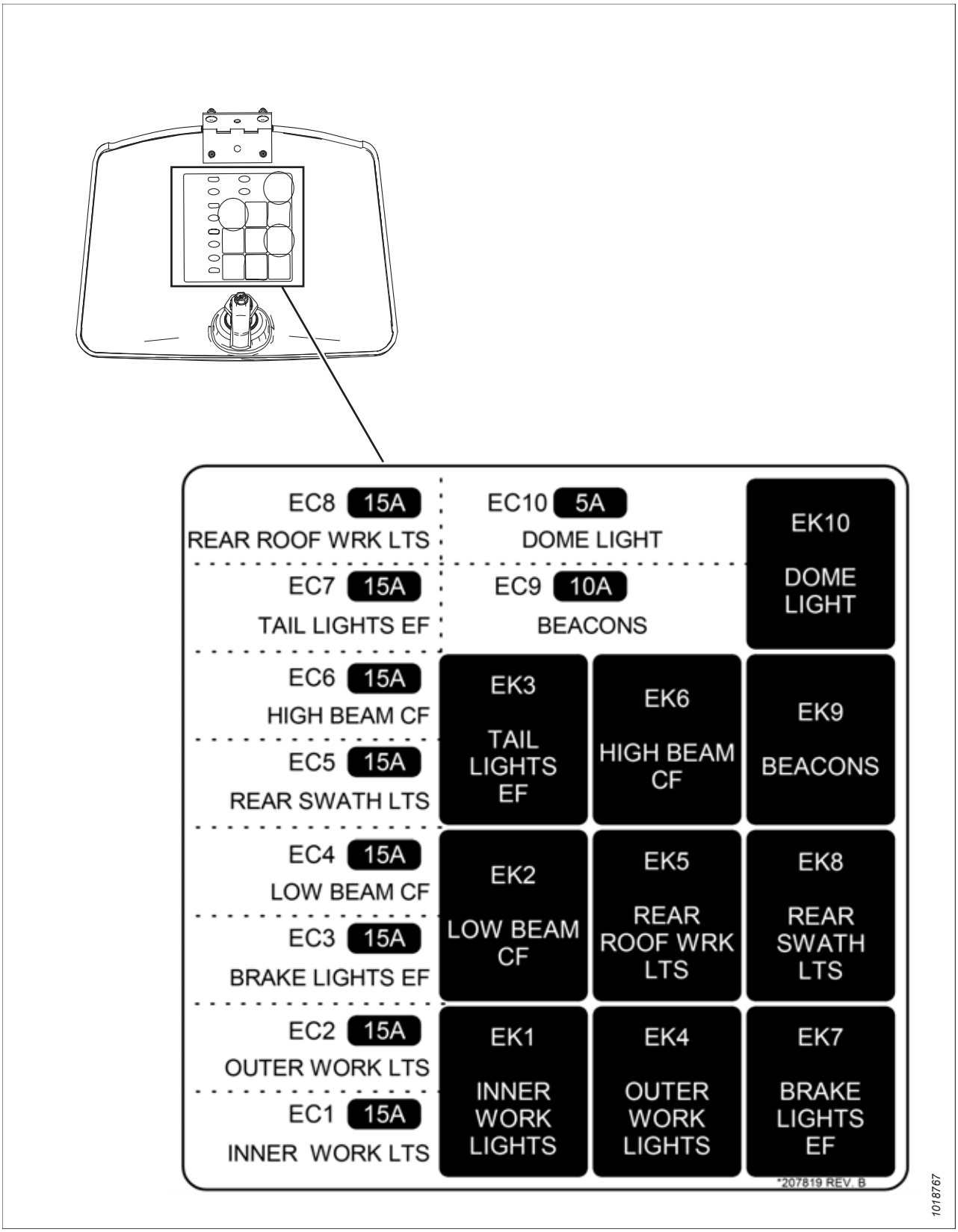


Figure 5.215: Roof Headliner Fuse Decal (MD #207819) – Group E

Inspecting and Replacing 125A Main Fuses

The 125A main fuse holders are located on the frame on the left cab-forward side platform beside the battery.

DANGER

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

Access the 125A main fuses as follows:

1. Shut down the engine, and remove the key from the ignition.
2. Open the platform. For instructions, refer to *5.4.1 Opening Platform, page 241*.
3. Remove the negative battery terminal.
4. Locate the five main fuses (A) secured to the left cab-forward front frame.

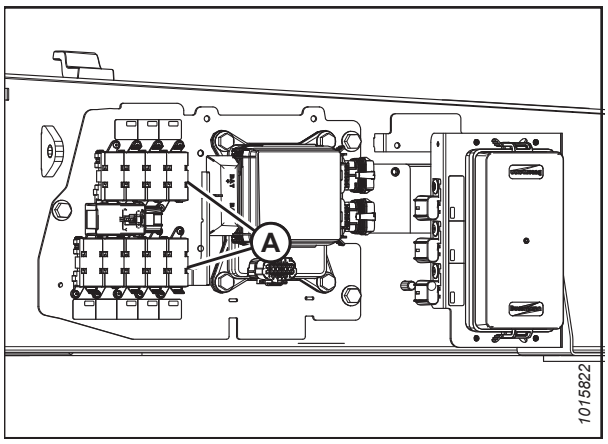


Figure 5.216: Main Fuses

5. To check the condition of the fuse, pull tab (A) and open cover (B).

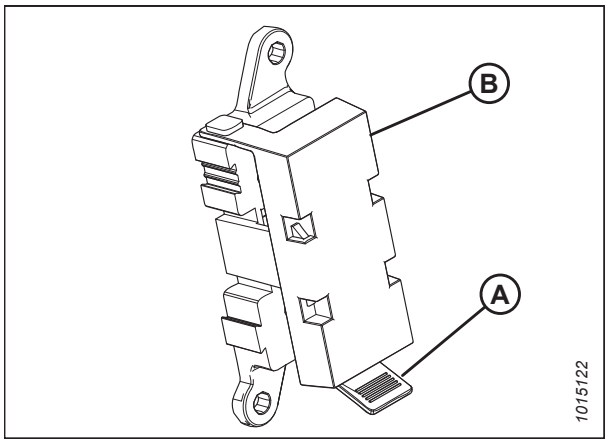


Figure 5.217: 125A Main Fuse

6. Examine fuse (A) for indications of melting.
7. To remove fuse (A), remove two nuts (B) and pull the fuse free from the holder (existing wiring may need to be pulled off the stud first).
8. Install the new fuse on the studs and install any existing wiring that was removed.
9. Secure the fuse with nuts (B).

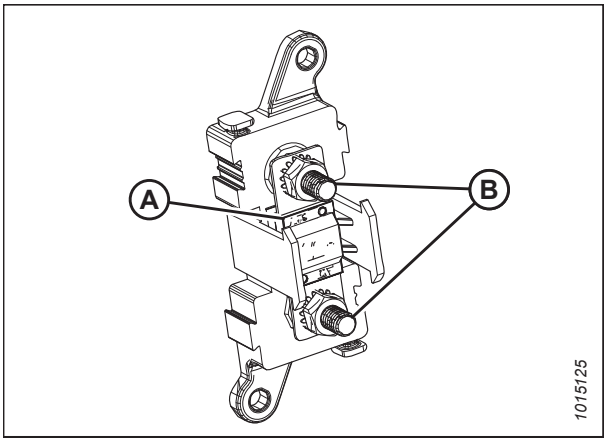


Figure 5.218: 125A Main Fuse

10. Close cover (B) and secure it with tab (A).
11. Close the platform. For instructions, refer to *5.4.2 Closing Platform, page 241*.

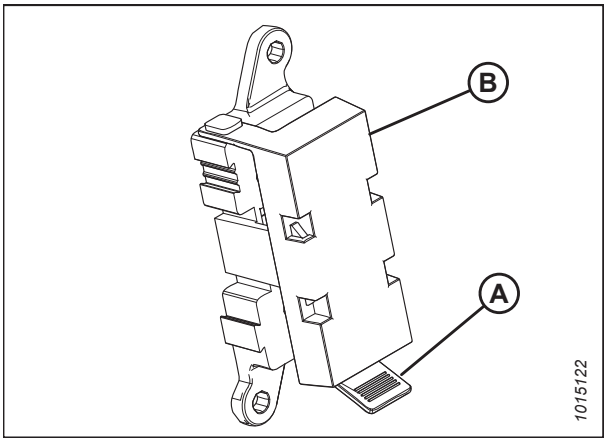


Figure 5.219: 125A Main Fuse

5.15.8 Drive Wheels

The drive wheels are hydraulically driven by the wheel drive motors. The tire pressure, wheel nut torque, and wheel drive lubrication level should be inspected regularly.

Raising Drive Wheel

This procedure applies to both drive wheels.

DANGER

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

CAUTION

Detach the header or weight box, if these are attached to the windrower. Use a jack with a minimum lifting capacity of 2268 kg (5000 lb.) to provide adequate support for the windrower.

1. Detach the header.
2. Park the windrower on a level surface.
3. Block the wheels.

4. Place ground speed lever (GSL) (A) in PARK.
5. Shut down the engine, and remove the key from the ignition.

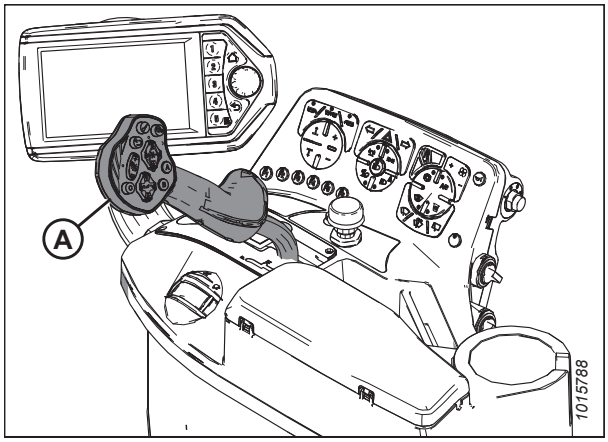


Figure 5.220: Ground Speed Lever

6. Place a jack under the leg jack point (A). Raise the drive wheel until it is slightly off the ground.
7. Place a jack stand beneath lift cylinder mount (B).

   NOTE:

   Do **NOT** place the jack stand under the cylinder. Use a small metal plate on top of the jack stand.
8. Lower the windrower onto the jack stand.

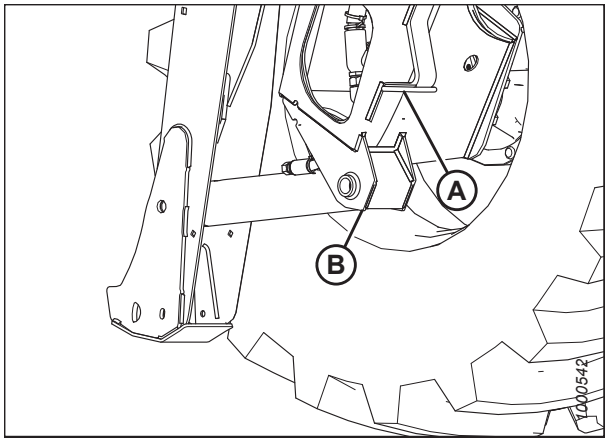


Figure 5.221: Drive Wheel Jack Point

Removing Drive Wheels

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. For instructions, refer to *Raising Drive Wheel, page 367*.
2. Remove wheel nuts (B).
3. Remove drive wheel (A).

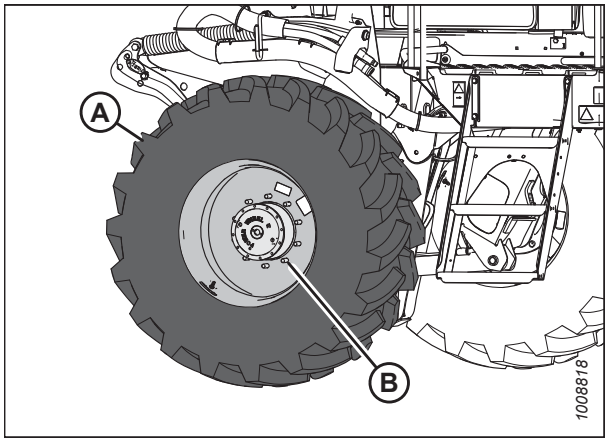


Figure 5.222: Drive Wheel Assembly

Installing Drive Wheels

Be sure to check the wheel nut torque again once the windrower has begun operation.

CAUTION

Use a lifting device capable of supporting a minimum of 907 kg (2000 lb.) to lift the wheel assembly.

IMPORTANT:

The windrower must be supported off the ground with stands while the drive wheels are being installed. For instructions, refer to *Raising Drive Wheel, page 367*.

1. Using a forklift, lift the cab end of the windrower approximately 130 cm (51 in.) (B) off of the ground, or enough so that left cab-forward drive wheel assembly (A) can be positioned as shown. Place stand (C) under the windrower frame.
2. Clean the mounting surface on the wheel drive and the rim.
3. For 540-65R30 tires, install the spacer on the wheel drive.

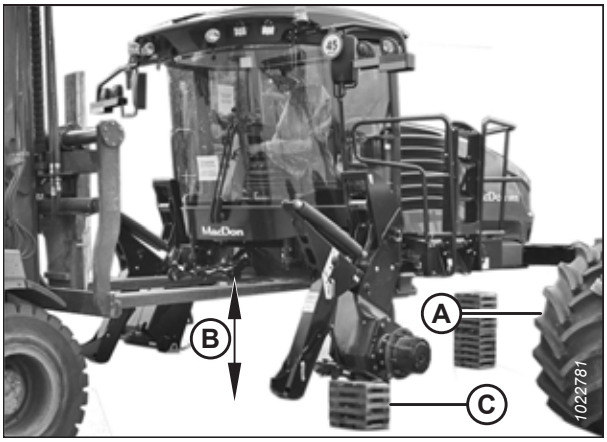


Figure 5.223: Windrower Supports in Place

4. **M1170*NT5* Windrowers sold in Germany:** If replacing a rim on a windrower equipped with a secondary set of brakes, remove the spacer plate as follows:
   a. Remove two nuts (A) and bolts (C) attaching spacer plate (B) to the inside of the wheel rim.
   b. Discard nuts (A), spacer plate (B), and bolts (C).

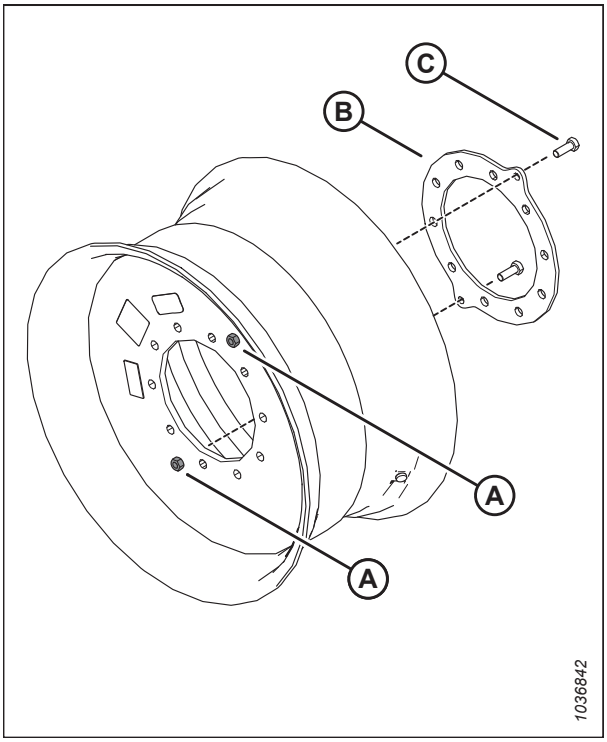


Figure 5.224: Drive Wheel

5. Position lifting device (A) under the wheel and raise the wheel slightly.
6. Position the wheel against the wheel drive hub so that air valve (B) is on the outside while tread (C) points cab-forward.

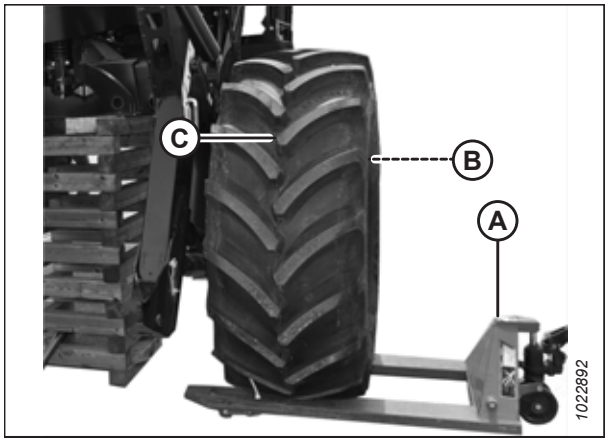


Figure 5.225: Drive Wheel Ready for Installation

7. Align the wheel rim with the studs on the hub. Push the wheel onto the hub.
8. Install and hand-tighten wheel nuts (A).

   IMPORTANT:

   To avoid damage to the wheel rims and studs, do **NOT** use an impact wrench to tighten the nuts. The stud threads must be clean and dry. Do **NOT** apply lubricant or anti-seize compound to the stud threads. Do **NOT** overtighten the wheel nuts.
9. Torque the drive wheel nuts. For instructions, refer to *5.6.1 Tightening Drive Wheel Nuts, page 262*.

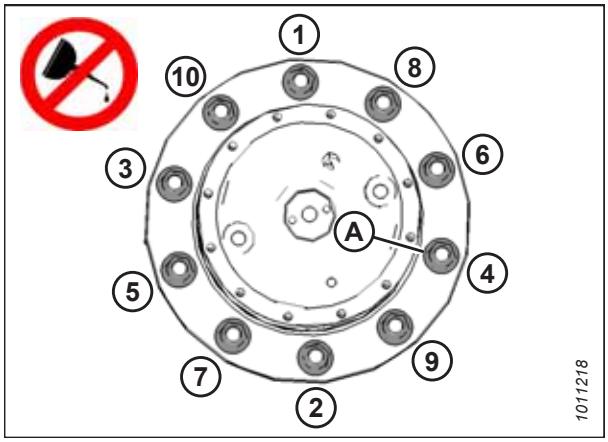


Figure 5.226: Tightening Sequence – 10-Bolt Wheel

10. Repeat the tightening sequence two additional times, ensuring that the specified torque is achieved each time.
11. Repeat Step *2, page 369* to Step *10, page 370* in order to install the right drive wheel.
12. Raise the windrower, remove the stand, and lower the windrower to the ground.
13. Lower the windrower. Remove the jack. For instructions, refer to *Lowering Drive Wheel, page 370*.
14. Repeat the torque procedure every hour of operation until two consecutive checks confirm that there is no movement of the nuts.

Lowering Drive Wheel

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). Lower the drive wheel to the ground.
3. Remove the jack.

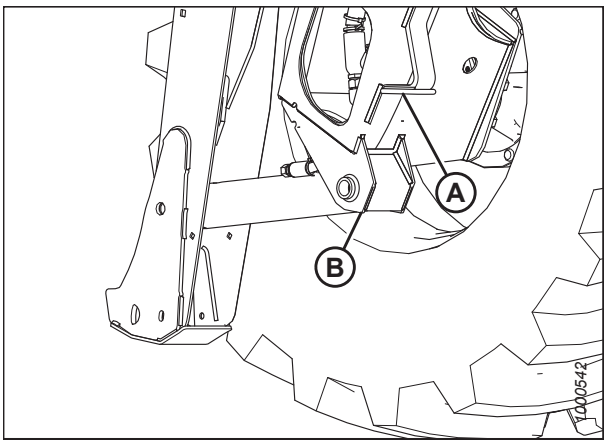


Figure 5.227: Drive Wheel Leg Jacking Point

5.15.9 Caster Wheels

The casters wheels' tire pressure, wheel nut torque, and the anti-shimmy dampeners should be inspected regularly.

Setting Walking Beam Extension Limits

The walking beam extensions allow the caster wheels to retract for narrow transport or extend for normal/field operation. The amount of extension is controlled with adjustable limit stops.

DANGER

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

1. Ensure the narrow transport function is enabled on the Harvest Performance Tracker (HPT). For instructions, refer to *3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker, page 101*.
2. Retract the walking beam extensions to the narrowest position. For instructions, refer to *Retracting Wheels – Narrow Transport, page 144*.
3. Shut down the engine, and remove the key from the ignition.
4. Remove bolts (A) and move extension limit stops (1 per side) to desired position: 1, 2, 3, or storage position. By installing the limit stops with center tab facing inboard or outboard, the limit stops provide 6 different position options.

   Limit stop position examples:
   - Limit stop (B) shown in storage position outside the welded stop: walking beam has maximum extension.
   - Limit stop (C) in position 3: walking beam has minimum extension (center tab shown facing inboard).
   - Limit stop (D) in position 2: walking beam in a middle position (center tab shown facing outboard).
5. Ensure the extension limit stop positions are the same on both sides of the walking beam and reinstall using bolts (A).

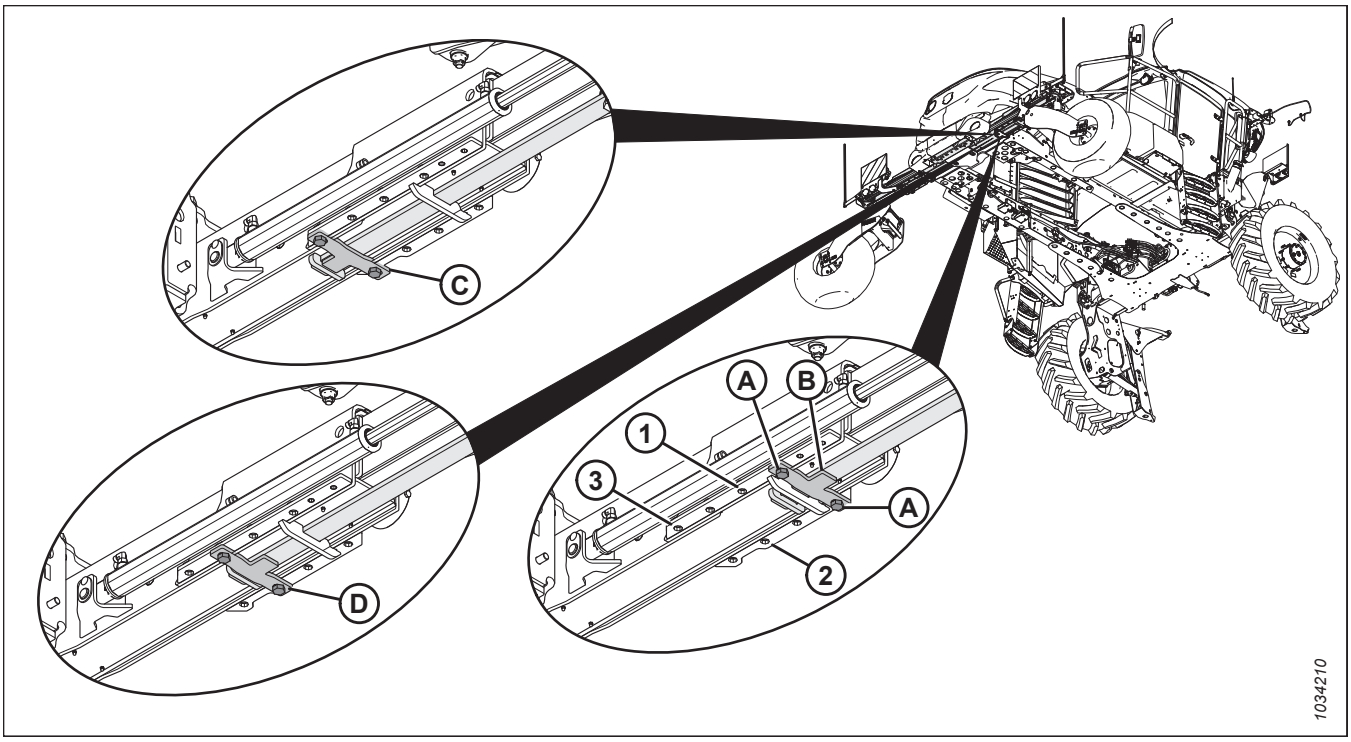


Figure 5.228: Walking Beam Extension Limit Stops – Right Side Shown

Installing Forked Caster Wheel

1. Position axle assembly (B) into wheel (C) and secure it with wheel nuts (A).

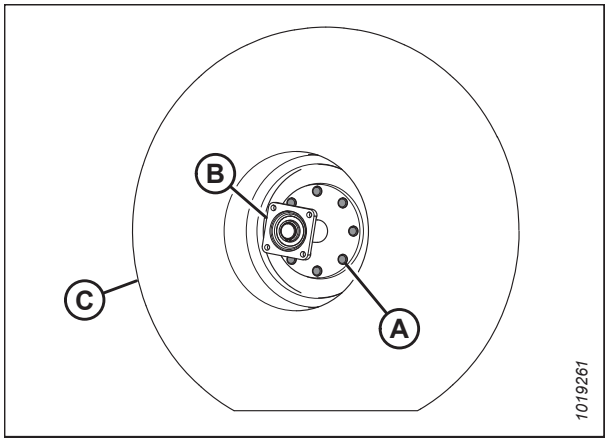


Figure 5.229: Caster Wheel Assembly

2. Tighten wheel nuts (A) to 163 Nm (120 lbf·ft) using the tightening sequence shown at right. Repeat the tightening sequence three times.

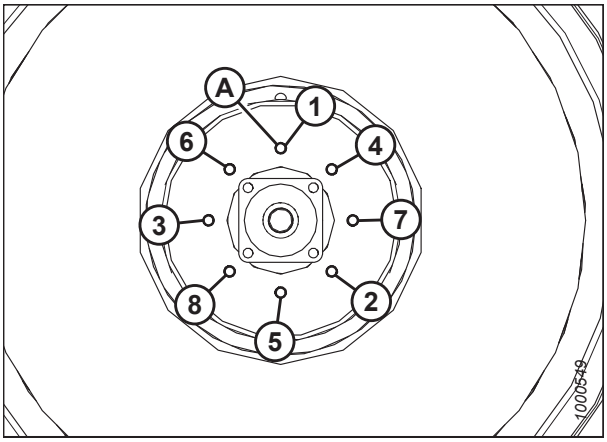


Figure 5.230: Caster Wheel Tightening Sequence

3. Position wheel assembly (D) in forked caster (C).
4. Install eight bolts (A) and nuts (four on each side of caster) to secure axle (B) to caster (C). Torque the nuts to 102 Nm (77 lbf·ft).
5. Lower the caster wheel. For instructions, refer to *Lowering Caster Wheel, page 374*.

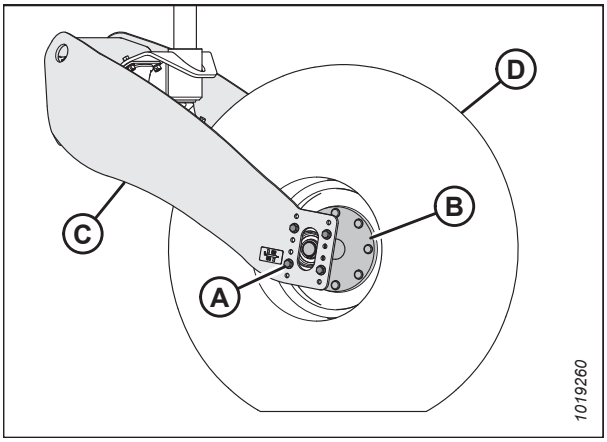


Figure 5.231: Caster Wheel Assembly

Removing Forked Caster Wheel

CAUTION

A wheel assembly is heavy. Support the wheel assembly before removing the axle bolts.

1. Raise the caster wheel. For instructions, refer to *Raising Caster Wheel, page 374*.
2. Remove eight bolts (A) and nuts (four of each on each side of caster) attaching axle (B) to forked caster (C), and remove wheel assembly (D) from caster (C).

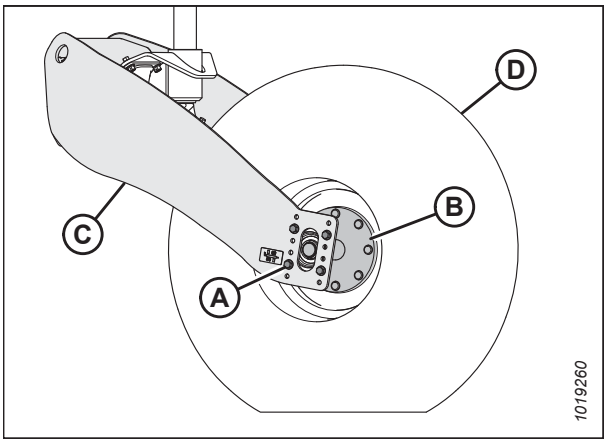


Figure 5.232: Caster Wheel Assembly

3. Remove eight wheel nuts (A) that secure axle (B) to wheel (C).
4. Separate axle (B) and wheel (C).

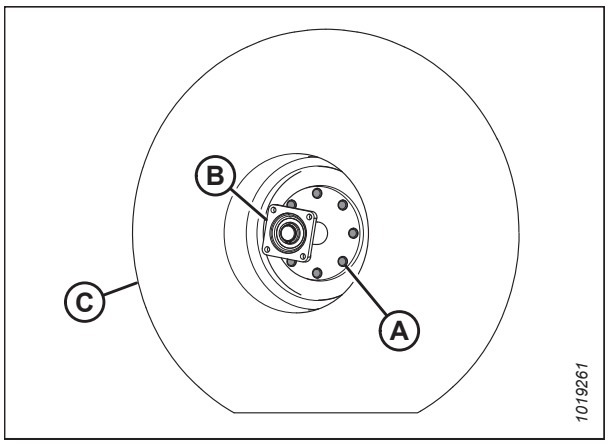


Figure 5.233: Caster Wheel Assembly

Lowering Caster Wheel

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 caster wheel assembly (B) is on the ground.
3. Remove the blocks from the drive tires.

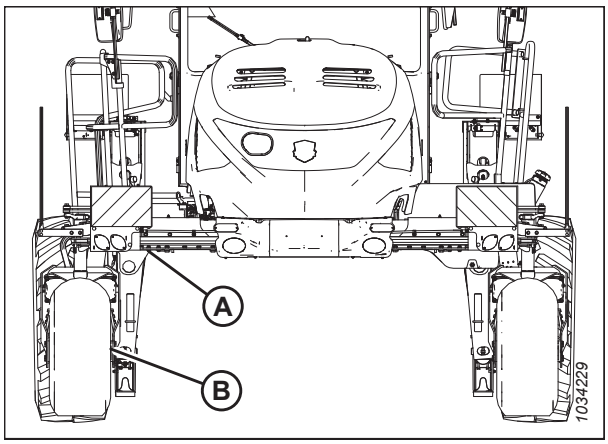


Figure 5.234: Caster Wheel Assembly

Raising Caster Wheel

This procedure is for raising the caster wheel. This procedure applies to both caster wheels.

1. Park the windrower on a level surface.
2. Block the wheels.

3. Place ground speed lever (GSL) (A) in PARK.

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

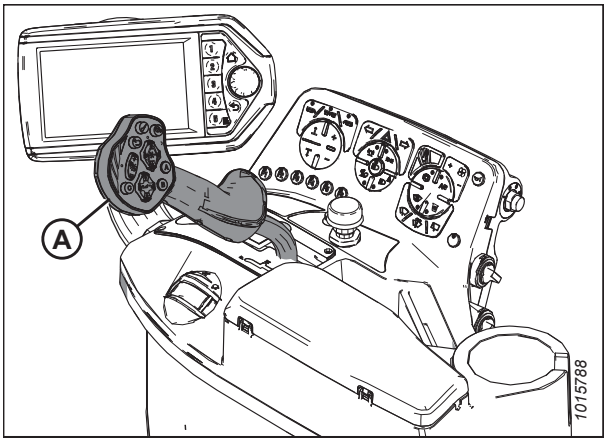


Figure 5.235: GSL Position

5. Raise the end of walking beam (A) until caster wheel assembly (B) is slightly off the ground. Use a suitable lifting device, capable of lifting 2268 kg (5000 lb.) minimum.

6. Place a jack stand beneath the walking beam and lower the beam until resting on the stand.

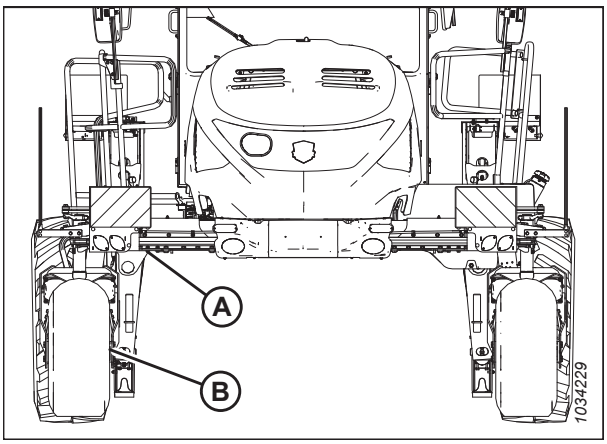


Figure 5.236: Caster Wheel Assembly

Chapter 6: Options and Attachments

Several optional kits and attachments are available for your windrower, depending on your specific performance needs.

6.1 Hood

6.1.1 High Debris Cooler Intake – Hood Scoops

The High Debris Cooler Intake kit contains air intake ducts designed to pull cooling system air from a less debris-prone area.

MD #B6055

Instruction MD #147859 is included with the bundle.

6.2 Cab

Several cab amenities are available which can make using the windrower more convenient for the Operator.

6.2.1 Automated Steering Systems

A MacDon-approved automated steering system is available from any MacDon Dealer which provides Trimble® global positioning system (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.

The Trimble® EZ-Pilot® system for model year 2019 and later machines requires the MacDon EZ-Pilot® Ready kit (MD #B6602). Installation instructions (MD #214623) are included in the bundle.

The Trimble® AutoPilot™ system for model year 2019 and later machines requires the MacDon Trimble® Autopilot™ Ready kit (MD #B6601). Installation instruction (MD #214624) 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.

6.3 Header Operation

Several kits are available which can augment the capabilities of the header attached to the windrower, or which allow the windrower to be used with different types of headers.

6.3.1 Booster Spring Kit – External

This kit increases the float capacity of the windrower. Install this kit on windrowers paired with headers which weigh more than 2812 kg (6200 lb.).

MD #B6047 – Booster Spring kit (external) includes two springs (one for each side) and mounting brackets. Kit instruction MD #147825 is included in the bundle.

Table 6.1 Available Float Spring Kits for Different Header Types and Configurations

Header Type	Description	Header Configuration	Additional Float Spring Kits
D130XL	9.1 m (30 ft.) single reel, double knife, timed	Transport	—
D130XL	9.1 m (30 ft.) single reel, double knife, timed	Transport Upper Cross Auger Vertical Knives	MD #B6047
D135XL	10.8 m (35 ft.) single reel, double knife, untimed	Base	—
D135XL	10.8 m (35 ft.) single reel, double knife, untimed	Transport	MD #B6047
D135XL	10.8 m (35 ft.) single reel, double knife, untimed	Transport Upper Cross Auger Vertical Knives	MD #B6047
D135XL	10.8 m (35 ft.) double reel, double knife, untimed	Base	—
D135XL	10.8 m (35 ft.) double reel, double knife, untimed	Transport	MD #B6047
D135XL	10.8 m (35 ft.) double reel, double knife, untimed	Transport Upper Cross Auger Vertical Knives	MD #B6047

6.3.2 Center-Link Lifter

This kit allows the Operator to remotely position the center-link cylinder without leaving the operator's station.

MD #B6617

Instruction MD #214701 included in the bundle.

6.3.3 Swath Compressor

The MacDon Swath Compressor is a large, formed polyethylene sheet which is designed to mount to the underside of a MacDon M1170*NT5* Windrower. The MacDon Swath Compressor is designed for use with D1XL and D1X 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. This reduces the occurrence of shelling in the windrow.

The swath compressor height can be adjusted and monitored with the Harvest Performance Tracker (HPT) display. Height can be adjusted for crop ripeness, yield, and the amount of compression required. The swath compressor will automatically lift up if the Operator stops or reverses the windrower.

Preferred height can be saved under a One-Touch-Return preset.

MD #B6995

Instructions are included with the kit.

6.4 Transport

Several kits are available which facilitate moving the header from field to field.

6.4.1 Ballast

Ballast kits are for draper headers only.

Initial rear ballast package (MD #B6053): 1 unit (163 kg [360 lb.])

Installation instructions are included.

Table 6.2 Ballast

Header Type	Description	Installed Options	Base Kit	Additional Kits	Additional Float Springs
D125X	25 foot, single reel, double knife, timed	–	0	0	0
D130XL	30 foot, single reel, double knife, timed	Transport	1	0	0
D130XL	30 foot, single reel, double knife, timed	Transport + upper cross auger + vertical knives	1	0	MD #B6047
D135XL	35 foot, single reel, double knife, untimed	Base	1	0	0
D135XL	35 foot, single reel, double knife, untimed	Transport	1	0	MD #B6047
D135XL	35 foot, single reel, double knife, untimed	Transport + upper cross auger + vertical knives	1	0	MD #B6047
D135XL	35 foot, double reel, double knife, untimed	Base	1	0	0
D135XL	35 foot, double reel, double knife, untimed	Transport	1	0	MD #B6047
D135XL	35 foot, double reel, double knife, untimed	Transport + upper cross auger + vertical knives	1	0	MD #B6047

6.4.2 Towing Harness

The towing harness is used together with the weight box (refer to *6.4.3 Weight Box, page 381*) when towing a D1XL or D1X Series Draper Header equipped with slow speed transport option behind the windrower.

MD #B6048 – Weight box harness only. Includes hitch pin and wiring for use with slow speed header transport option.

Instruction MD #147868 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 #B6974 – Weight box, narrow transport

A towing harness is required to use the weight box. Refer to *6.4.2 Towing Harness, page 381* for more information.

Chapter 7: Troubleshooting

Refer to these topics if you encounter problems while operating the windrower.

7.1 Engine Troubleshooting

Problem	Solution	Section
Symptom: Engine won't crank.		
Controls not in NEUTRAL	Move ground speed lever (GSL) to NEUTRAL.	*Starting Engine, page 119*
Controls not in NEUTRAL	Move steering wheel to locked (centered) position.	*Starting Engine, page 119*
Controls not in NEUTRAL	Disengage HEADER ENGAGE switch.	*3.2.1 Header Drive, page 41*
Symptom: Engine hard to start or will not start.		
NEUTRAL interlock misadjusted	Contact Dealer.	Contact Dealer
No fuel to engine	Fill empty fuel tank. Replace clogged filter.	*Filling Fuel Tank, page 116* and *5.11.1 Maintaining Fuel Filters, page 300*
Old fuel in tank	Drain tank. Refill with fresh fuel.	*5.15.2 Draining Fuel Tank, page 336*
Water, dirt, or air in fuel system	Drain, flush, fill, and prime system.	*Priming Fuel System, page 302*
Improper type of fuel	Use proper fuel for operating conditions.	*5.1.3 Fuel Specifications, page 232*
Crankcase oil too heavy	Use recommended oil.	*5.1.4 Lubricants, Fluids, and System Capacities, page 232*
Low battery output	Have battery tested. Check battery electrolyte level.	*5.14.1 Batteries, page 322*
Poor battery connection	Clean and tighten loose connections.	*5.14.1 Batteries, page 322*
Faulty starter	Contact Dealer.	–
Loose electrical connection at fuel pump	Ensure connector at pump is fully pushed in.	–
Wiring shorted, circuit breaker open	Check continuity of wiring and breaker (manual reset).	*Checking and Replacing Fuses, page 359*
ECM fuse (1 of 2) blown	Replace.	*Checking and Replacing Fuses, page 359*
ECM Ignition relay faulty	Replace.	*Checking and Replacing Fuses, page 359*
Faulty injectors	Contact Dealer.	–
Symptom: Engine knocks.		
Engine out of time	Contact Dealer.	–
Insufficient oil	Add oil.	*Adding Engine Oil, page 290*
Low or high coolant temperature	Contact Dealer.	–
Improper fuel	Use proper fuel.	*5.1.3 Fuel Specifications, page 232*

Problem	Solution	Section
Symptom: Low oil pressure.		
Low oil level	Add oil.	*Adding Engine Oil, page 290*
Improper type of oil	Drain and fill crankcase with proper oil.	*5.1.4 Lubricants, Fluids, and System Capacities, page 232*
Worn components	Contact Dealer.	–
Symptom: High oil consumption.		
Internal parts worn	Contact Dealer.	–
Crankcase oil too light	Use recommended oil.	*5.1.4 Lubricants, Fluids, and System Capacities, page 232*
Oil leaks	Check for leaks around gaskets, seals, and drain plugs.	*5.7.1 Checking Engine Oil Level, page 270*
Symptom: Engine runs irregularly or frequently stalls.		
Unsteady fuel supply	Change filter on fuel tank vent line. Replace clogged fuel filter.	*5.12.1 Removing and Installing Fuel Tank Vent Filter, page 306* and *5.11.1 Maintaining Fuel Filters, page 300*
Water or dirt in fuel system	Drain, flush, and fill fuel system.	*5.1.4 Lubricants, Fluids, and System Capacities, page 232*
Low coolant temperature	Remove and check thermostat.	Contact Dealer
Air in fuel system	Contact Dealer.	–
Dirty or faulty injectors	Contact Dealer.	–
Symptom: Lack of power.		
Incorrect timing	Contact Dealer.	–
Engine oil viscosity too high	Use recommended oil.	*5.1.4 Lubricants, Fluids, and System Capacities, page 232*
Intake air restriction	Service air cleaner.	*Cleaning Primary Air Filter, page 294*
Clogged fuel filter	Replace primary fuel filter, and if necessary, replace secondary fuel filter.	*5.11.1 Maintaining Fuel Filters, page 300*
High back pressure	Clean out or replace exhaust canisters.	*5.10.5 Inspecting Exhaust System, page 297*
Improper type of fuel	Use proper fuel.	*5.1.3 Fuel Specifications, page 232*
High or low engine temperature	Remove and check thermostat.	Contact Dealer
Improper valve clearance	Contact Dealer.	–
Faulty injectors	Contact Dealer.	–
Symptom: Engine temperature is below normal.		
Defective thermostat	Remove and check thermostat.	–
Symptom: Warning alarm sounds.		
Engine overheated	Check thermostat.	Contact Dealer
Engine overheated	Check coolant level.	*5.7.5 Checking Engine Coolant Level, page 274*
Low engine oil pressure	Check oil level.	*5.7.1 Checking Engine Oil Level, page 270*
Low charge oil pressure	Check oil level.	*5.7.3 Checking Hydraulic Oil, page 272*

Problem	Solution	Section
Symptom: Engine overheats.		
Low coolant level	Fill reserve tank to proper level. Check system for leaks.	*Adding Coolant after System Drain, page 317*
Water only for coolant	Replace with antifreeze.	*Adding Coolant after System Drain, page 317*
Engine overloaded	Reduce ground speed.	*Driving Forward in Cab-Forward Mode, page 131*
Defective radiator cap	Replace cap.	*Inspecting Pressurized Coolant Tank Cap, page 248*
Dirty radiator screen	Clean screen.	*5.9.2 Cleaning Cooler Module, page 284*
Dirty radiator core	Clean radiator.	*5.9.2 Cleaning Cooler Module, page 284*
Cooling system dirty	Flush cooling system.	*5.13.1 Changing Engine Coolant, page 316*
Defective thermostat	Remove and check thermostat.	Contact Dealer
Defective temperature gauge or sender	Check coolant temperature with thermometer. Replace gauge if necessary.	Contact Dealer
Defective water pump	Contact Dealer.	–
Symptom: High fuel consumption.		
Clogged or dirty air cleaner	Service air cleaner.	*Cleaning Primary Air Filter, page 294*
Engine overloaded	Reduce ground speed.	*Driving Forward in Cab-Forward Mode, page 131*
Improper valve clearance	Contact Dealer.	–
Engine out of time	Contact Dealer.	–
Dirty injector nozzles	Contact Dealer.	–
Low engine temperature	Check thermostat.	Contact Dealer
Improper type of fuel	Use proper fuel.	*5.1.3 Fuel Specifications, page 232*
Symptom: Starter cranks slowly or will not operate.		
Low battery output	Check battery charge.	*Maintaining Battery, page 322*
Loose or corroded battery connections	Clean and tighten loose connections.	*Maintaining Battery, page 322*
Controls not in NEUTRAL	Move GSL to NEUTRAL.	*Starting Engine, page 119*
Controls not in NEUTRAL	Move steering wheel to locked (centered) position.	*Driving in Reverse in Cab-Forward Mode, page 132*
Controls not in NEUTRAL	Disengage header.	*Engaging and Disengaging the Header, page 194*
Relay not functioning	Check relay and wire connections.	*Checking and Replacing Fuses, page 359*
Main fuse defective/blown	Replace main fuse.	*Checking and Replacing Fuses, page 359*
Key power fuse blown	Replace.	*Checking and Replacing Fuses, page 359*
Key switch worn or terminals loose	Contact Dealer.	–

Problem	Solution	Section
Switch at Interlock not closed or defective	Adjust switch or replace Contact your Dealer.	Contact Dealer
Crankcase oil too high viscosity	Use recommended oil.	*5.1.4 Lubricants, Fluids, and System Capacities, page 232*

7.2 Electrical Troubleshooting

Problem	Solution	Section
Symptom: Low voltage and/or the battery will not charge.		
Defective battery	Have battery tested.	*5.14.1 Batteries, page 322*
Loose or corroded connections	Clean and tighten battery connections.	*Maintaining Battery, page 322*
Defective alternator belt	Replace worn belt.	*Replacing Engine Fan Drive Belt, page 338*
Alternator or voltage regulator not connected properly	Connect properly.	*5.14.1 Batteries, page 322*
Dirty or defective alternator, defective voltage regulator, or high resistance in circuit	Contact Dealer.	—
Symptom: Lights dim.		
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 – Engine-Forward, page 347*
Burned out or defective light bulb	Replace light bulb.	*Replacing Bulbs in Standard Work Lights or Cab-Forward Headlights, page 346*
Burned out or defective light bulb	Replace light bulb.	*Replacing LED Lights – Deluxe Cab Only, page 349*
Burned out or defective light bulb	Replace light bulb.	*Replacing Amber and Marker Lights, page 351*
Burned out or defective light bulb	Replace light bulb.	*Replacing Beacon Lights, page 354*
Burned out or defective light bulb	Replace light bulb.	*Replacing Cabin Dome Bulb, page 354*
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.	*5.15.7 Accessing Circuit Breakers and Fuses, page 357*
Defective relay	Replace relay.	*Replacing Circuit Breakers and Relays, page 359*
Symptom: Wrong turn signal/indicator lights activated.		
Reversed wiring	Contact Dealer.	—
Symptom: No current to tab.		
Broken or disconnected wire	Contact Dealer.	—
Circuit breaker tripped	Breaker automatically resets.	—

7.3 Hydraulics Troubleshooting

Problem	Solution	Section
Symptom: Header or reel is not lifting.		
Appropriate solenoids not being energized by activating switch	Contact Dealer.	—
Symptom: Reel and/or conveyor is not turning.		
Flow controls adjusted too low	Toggle speed controls on Harvest Performance Tracker (HPT) display to increase flow.	*Conveyor Speed Adjustment Buttons, page 79* and *Reel and Disc Speed Switch, page 76*
Flow controls adjusted too low	Toggle speed controls on Harvest Performance Tracker (HPT) display to increase flow.	*Conveyor Speed Adjustment Buttons, page 79* and *Reel and Disc Speed Switch, page 76*
Appropriate solenoid on flow control block not being energized	Contact Dealer.	—
Relief pressure too low	Check/adjust/clean relief valve.	—
Symptom: Hydraulic oil high-temperature alarm activates.		
Hydraulic oil cooling system not working properly	Check/clean cooling box.	*5.9.2 Cleaning Cooler Module, page 284*

7.4 Header Drive Troubleshooting

Problem	Solution	Section
Symptom: Header drive is not engaging.		
OPERATOR PRESENCE switch not closed or faulty	Occupy operator's seat or replace switch. Contact your Dealer.	Contact Dealer
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.	—
Couplers not connected	Contact Dealer.	—
Faulty pump or flow controls	Contact Dealer.	—
Control solenoids disconnected	Contact Dealer.	—
Header ID not detected	Attach header or check wiring. Contact your Dealer.	Contact Dealer
Symptom: Header drive lacks power.		
Relief valve setting too low	Contact Dealer.	—
Header drive overload	Reduce ground speed.	—
Symptom: Warning alarm sounds.		
Header drive overload	Reduce ground speed.	—
Relief valve setting too low	Contact Dealer.	—

7.5 Traction Drive Troubleshooting

Problem	Solution	Section
Symptom: The warning alarm sounds and the low charge pressure warning appears on the Harvest Performance Tracker (HPT).		
Low hydraulic oil level	Shut down engine, and add oil to hydraulic system.	*5.7.3 Checking Hydraulic Oil, page 272*
Low hydraulic pressure	Contact Dealer.	—
Faulty sender	Contact Dealer.	—
Symptom: Wheels lack necessary ability to pull on a grade or when pulling out of a ditch.		
Internal pump or motor damage	Contact Dealer.	—
Insufficient torque at drive wheels	Maintain engine rpm, decrease GSL setting.	—
Loose or worn controls	Check controls.	Contact Dealer
Brakes binding or not releasing fully	Check charge pressure.	Contact Dealer
Relief valve in tandem pump dirty or damaged	Replace relief valve.	Contact Dealer
Symptom: With the steering wheel centered, one wheel pulls more than the other wheel.		
Leakage at pump or motor	Contact Dealer.	—
Binding or interference with controls under cab	Contact Dealer.	—
Faulty relief valve	Repair or replace valve Contact Dealer.	Contact Dealer
Symptom: Both wheels will not pull in forward or in reverse.		
Loose hardware on pump controls	Repair or tighten.	Contact Dealer
Brakes binding or not releasing fully	Check charge pressure.	Contact Dealer
Low oil level and low charge pressure	Check oil reservoir level.	*5.7.3 Checking Hydraulic Oil, page 272*
Wheel drives disengaged	Engage wheel drives.	Contact Dealer
Servo input loose	Check servo.	Contact Dealer
Failed pump	Contact Dealer.	—
Symptom: One wheel will not pull in forward or in reverse.		
Broken pump arm or shaft	Contact Dealer.	—
Steering controls worn or defective	Check GSL and steering for loose, worn or damaged ball joints and connecting rods.	Contact Dealer
High pressure relief valve stuck open, damaged seat	Contact Dealer.	—
Brakes binding or not releasing fully	Check charge pressure.	Contact Dealer
Failed pump, motor or final drive	Contact Dealer.	—
Symptom: Excessive noise from the drive system.		
Mechanical interference in steering or ground speed linkage	Remove interference.	Contact Dealer
Brakes binding or not releasing fully	Check charge pressure.	Contact Dealer
Faulty pump or motor	Contact Dealer.	—
Air in system	Check lines for leakage.	—
Hydraulic line clamps loose	Tighten clamps.	—

Problem	Solution	Section
Ball joints are worn	Replace worn parts.	—
Symptom: The hydraulic oil filter leaks at a seal.		
Not properly tightened	Tighten filter element.	*Installing Return Oil Filter, page 267* or *Installing Charge Filter, page 269*
Damaged seal or threads	Replace filter or filter head.	*Removing Return Oil Filter, page 266* or *Removing Charge Filter, page 268*

7.6 Narrow Transport System Troubleshooting

This table can be used to help diagnose and solve any problems with the narrow transport system.

Problem	Solution	Section
Symptom: drive wheel legs unable to extend or retract		
Narrow transport feature not enabled	Enable narrow transport feature	*3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker, page 101*
Wheel leg lockout pins still in place	Remove wheel leg lockout pins	*Retracting Wheels – Narrow Transport, page 144* or *Extending Wheels – Field Mode, page 149*
Electrical harness disconnected	Connect electrical harness	*Retracting Wheels – Narrow Transport, page 144* or *Extending Wheels – Field Mode, page 149*
Electrical harness damaged	Inspect harness and repair it	—
Console or ground speed lever buttons unresponsive due to wear/ damage	Replace components	Contact Dealer
Windrower not moving during the extend or retract operation.	Move GSL out of PARK and slowly drive forward 5–8 km/h (3–5 mph) while extending or retracting the drive wheel legs	—
Symptom: leg extend or retract operation is slow		
Insufficient lubrication	Apply moly grease to drive wheel leg slots	*Grease Points, page 281*
Symptom: walking beam extensions unable to extend or retract		
Narrow transport feature not enabled	Enable narrow transport feature	*3.17.6 Enabling Narrow Transport System in the Harvest Performance Tracker, page 101*
Lockout valve closed	Open lockout valve	*Retracting Wheels – Narrow Transport, page 144* or *Extending Wheels – Field Mode, page 149*
Electrical harness disconnected	Connect electrical harness	*Retracting Wheels – Narrow Transport, page 144* or *Extending Wheels – Field Mode, page 149*
Electrical harness damaged	Inspect harness and repair it	—
Console or ground speed lever buttons are unresponsive due to wear/damage	Replace components	Contact Dealer
Symptom: caster wheels not aligned with walking beam		
Insufficient lubrication	• Align casters • Apply moly grease to the walking beam	*Grease Points, page 281*
Symptom: walking beam extend or retract operation is slow		
Insufficient lubrication	Apply moly grease to the walking beam	*Grease Points, page 281*

7.7 Steering and Ground Speed Control Troubleshooting

Problem	Solution	Section
Symptom: The machine will not steer straight.		
Linkage worn or loose	Adjust steering chain tension. Replace worn parts. Adjust linkage.	—
Symptom: The machine moves on flat ground with controls set to neutral.		
Neutral interlock misadjusted	Contact Dealer.	—
Parking brake not functioning	Contact Dealer.	—
Ground speed lever (GSL) servo misadjusted	Contact Dealer.	—
GSL cable misadjusted	Contact Dealer.	—
Symptom: Steering wheel will not lock with the GSL set to PARK.		
Transmission interlock misadjusted	Contact Dealer.	—
Faulty GSL neutral switch	Contact Dealer.	—
Interlock springs not pulling interlock closed	Replace or reattach springs.	—
Faulty switch on PARK	Replace switch or adjust.	—
Symptom: Insufficient road speed.		
Ground speed limit is too low	Increase limit.	*Adjusting Ground Speed Limit, page 129*
Symptom: Maximum ground speed is too slow.		
Servo not adjusted properly	Contact Dealer.	—
Fault with wheel motor control	Contact Dealer.	—
GSL position sensor not calibrated or damaged	Contact Dealer.	—
Maximum speed limit is set at 16 km/hr (10 mph)	Increase speed limit.	*Adjusting Ground Speed Limit, page 129*
Symptom: Steering is too stiff or too loose.		
Steering chain tension is out of adjustment	Adjust steering chain tension.	—
Ball joints or steering linkage pivot stiff	Replace or repair.	—

7.8 Cab Air Troubleshooting

Problem	Solution	Section
Symptom: The blower fan will not run.		
Burned out motor	Contact Dealer.	—
Burned out switch	Contact Dealer.	—
Motor shaft tight or bearings worn	Contact Dealer.	—
Faulty wiring—loose or broken	Contact Dealer.	—
Blower rotors in contact with housing	Contact Dealer.	—
Burned out motor	—	—
Symptom: The blower fan is operating, but air doesn't blow into the cab.		
Dirty fresh air filter	Clean fresh air filter.	*Inspecting and Cleaning Fresh Air Intake Filter Element, page 278*
Dirty recirculating air filter	Clean return air filter.	*5.9.1 Servicing Return Air Filter, page 283*
Evaporator clogged	Clean evaporator.	*Cleaning Air Conditioning Evaporator Core, page 333*
Air flow passage blocked	Remove blockage.	—
Symptom: Heater is not heating.		
Heater shut-off valve at engine closed	Open valve.	*3.10.1 Heater Shut-Off Valve, page 61*
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: Air louvers emitting odor.		
Plugged drainage hose	Blow out hose with compressed air.	—
Dirty filters	Clean filters.	Contact Dealer.
Symptom: Air conditioning is not cooling.		
Low refrigerant level	Add refrigerant.	Contact Dealer.
Clutch coil burned out or disconnected	Contact Dealer.	—
Blower motor disconnected or burned out	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.
Condenser fins plugged	Clean condenser.	*Cleaning Left Cooling Module, page 284*

Problem	Solution	Section
Loose or broken compressor drive belt	Replace drive belt and/or tighten to specifications.	*Tensioning Air Conditioner Compressor Belts, page 339* and *Replacing Air Conditioner Compressor Belts, page 339*
Dirty filters	Clean fresh air and recirculation filters.	*5.9.1 Servicing Return Air Filter, page 283*
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.	—
Broken refrigerant line	Contact Dealer.	—
Leak in system	Contact Dealer.	—
Compressor shaft seal leaking	Contact Dealer.	—
Clogged screen in receiver-drier; plugged hose or coil	Contact Dealer.	—
Symptom: Air conditioning is not producing sufficient cooling (meaning that air temperature in the windrower cab, measured at the louvered vent, can be maintained at 14°C [57°F] below ambient air temperature)		
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.	*5.9.1 Servicing Return Air Filter, page 283*
Heater circuit is open	Lower temperature control in cab, and close valve on engine.	*3.10.3 Climate Controls, page 61* and *3.10.1 Heater Shut-Off Valve, page 61*
Insufficient air circulation over condenser coil; fins clogged with dirt or insects	Clean condenser.	*Cleaning Left Cooling Module, page 284*
Evaporator fins clogged	Clean evaporator fins (under cab floor).	*Cleaning Air Conditioning Evaporator Core, page 333*
Refrigerant low	Contact Dealer.	—
Clogged expansion valve	Contact Dealer.	—
Clogged receiver-drier	Contact Dealer.	—
Excessive moisture in system	Contact Dealer.	—
Air in system	Contact Dealer.	—
Blower motor sluggish in operation	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.	—
Unit icing up due to incorrect super-heat adjustment in the expansion valve	Contact Dealer.	—

Problem	Solution	Section
Thermostat defective	Contact Dealer.	—
Defective blower switch or blower motor	Contact Dealer.	—
Partially open, improper ground or loose connection in compressor clutch coil	Contact Dealer.	—
Compressor clutch slipping	Contact Dealer.	—
Symptom: Air conditioning system too noisy.		
Defective winding or improper connection in compressor clutch coil or relay	Contact Dealer.	—
Excessive charge in system	Contact Dealer.	—
Low charge in system	Contact Dealer.	—
Excessive moisture in system	Contact Dealer.	—
Loose or excessively worn drive belt	Tighten or replace as required.	*Tensioning Air Conditioner Compressor Belts, page 339* and *Replacing Air Conditioner Compressor Belts, page 339*
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.
Symptom: Cab windows fog up.		
High humidity	Run A/C to dehumidify air and heater to control temperature.	*3.10.3 Climate Controls, page 61*

7.9 Operator's Station Troubleshooting

Problem	Solution	Section
Rough ride.		
Seat suspension not adjusted for operator's weight	Adjust seat suspension.	*3.3.3 Suspension and Height, page 43*
High air pressure in tires	Deflate to proper pressure.	*5.7.4 Checking Tire Pressure, page 273*
Cab suspension too stiff	Adjust suspension.	Contact Dealer.

Chapter 8: Reference

The reference section provides additional information on topics such as lubricants, fluids and their system capacities, fuel and torque specifications, and converting between metric and SAE measurements.

8.1 Torque Specifications

The following tables provide torque values for various bolts, cap screws, and hydraulic fittings. Use these values only when no other torque value has been specified in a given procedure.

- Tighten all bolts to the torque values specified in the charts below, unless you are directed otherwise in this manual.
- Replace removed hardware with hardware of the same strength and grade.
- Use the torque value tables as a guide when periodically checking the tightness of bolts.
- Understand the torque categories for bolts and cap screws by reading the markings on their heads.

Jam nuts

Jam nuts require less torque than nuts used for other purposes. When applying torque to finished jam nuts, multiply the torque applied to regular nuts by 0.65 to obtain the modified torque value.

Self-tapping screws

Use the standard torque values when installing self-tapping screws. Do **NOT** install self-tapping screws on structural or otherwise critical joints.

8.1.1 Metric Bolt Specifications

The torque values provided in the following metric bolt torque tables apply to hardware installed dry; that is, hardware with no grease, oil, or threadlocker on the threads or heads. Do **NOT** grease or oil bolts or cap screws unless directed to do so in this manual.

Table 8.1 Metric Class 8.8 Bolts and Class 9 Free Spinning Nut

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

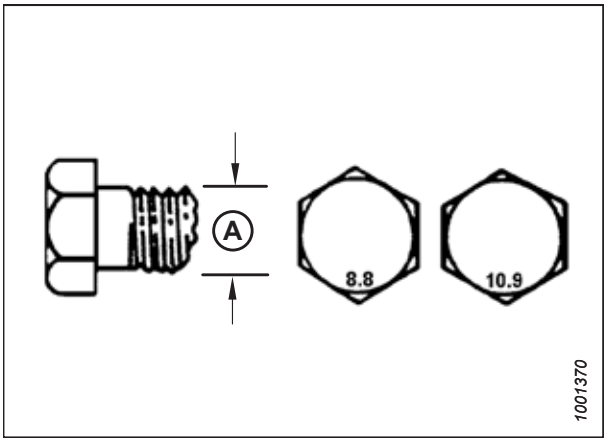


Figure 8.1: Bolt Grades

Table 8.2 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

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

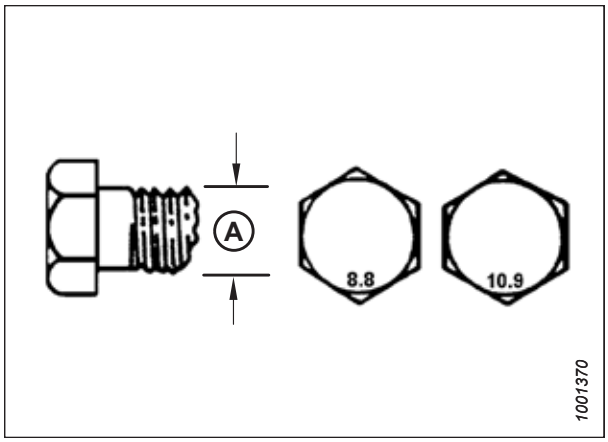


Figure 8.2: Bolt Grades

Table 8.3 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

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

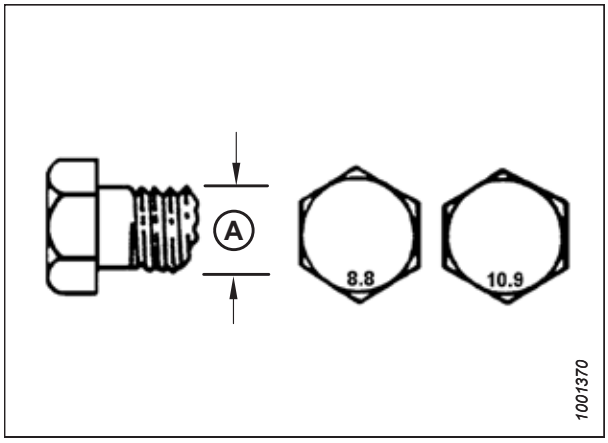


Figure 8.3: Bolt Grades

Table 8.4 Metric Class 10.9 Bolts and Class 10 Distorted Thread Nut

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

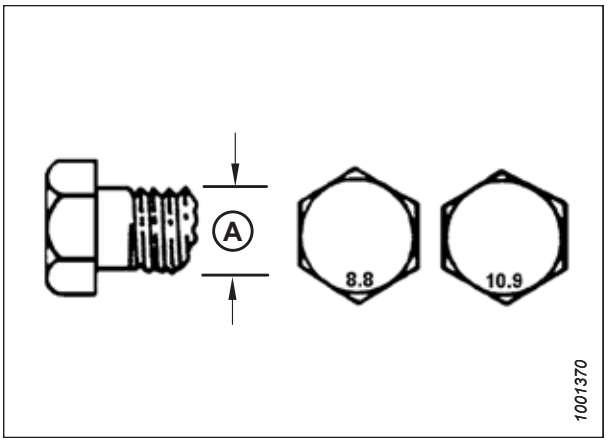


Figure 8.4: Bolt Grades

8.1.2 Metric Bolt Specifications Bolting into Cast Aluminum

The torque values provided in the following metric bolt torque tables apply to hardware installed dry; that is, hardware with no grease, oil, or threadlocker on the threads or heads. Do **NOT** grease or oil bolts or cap screws unless directed to do so in this manual.

Table 8.5 Metric Bolt Bolting into Cast Aluminum

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

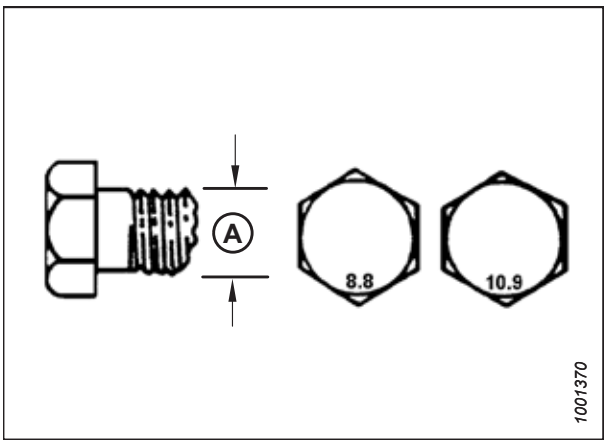


Figure 8.5: Bolt Grades

8.1.3 O-Ring Boss Hydraulic Fittings – Adjustable

The standard torque values are provided for adjustable hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, use the value specified in the procedure instead.

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

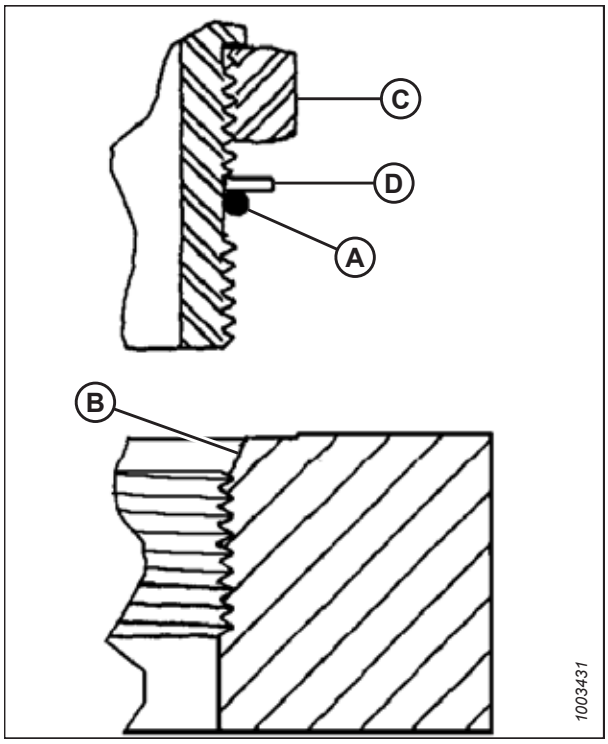


Figure 8.6: Hydraulic Fitting

5. Install fitting (B) into the port until backup washer (D) and O-ring (A) contact part face (E).
6. Position the angle fittings by unscrewing no more than one turn.
7. Turn lock nut (C) down to washer (D) and tighten it to the torque value indicated in the table. Use two wrenches, one on fitting (B) and the other on lock nut (C).
8. Check the final condition of the fitting.

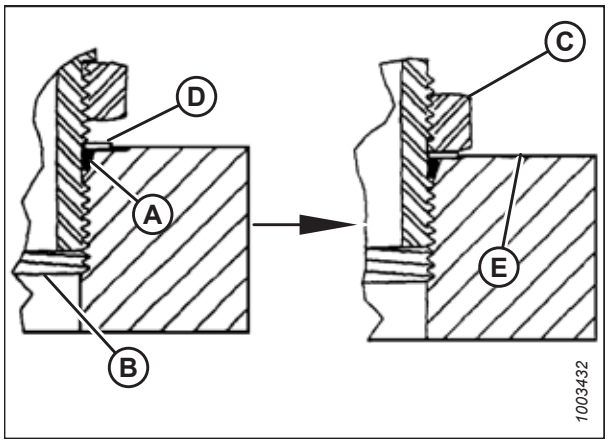


Figure 8.7: Hydraulic Fitting

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

SAE Dash Size	Thread Size (in.)	Torque Value[22]	
		Nm	lbf·ft (*lbf·in)
-2	5/16–24	6–7	*53–62
-3	3/8–24	12–13	*106–115

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

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

SAE Dash Size	Thread Size (in.)	Torque Value[23]	
		Nm	lbf·ft (*lbf·in)
-4	7/16–20	19–21	14–15
-5	1/2–20	21–33	15–24
-6	9/16–18	26–29	19–21
-8	3/4–16	46–50	34–37
-10	7/8–14	75–82	55–60
-12	1 1/16–12	120–132	88–97
-14	1 3/8–12	153–168	113–124
-16	1 5/16–12	176–193	130–142
-20	1 5/8–12	221–243	163–179
-24	1 7/8–12	270–298	199–220
-32	2 1/2–12	332–365	245–269

8.1.4 O-Ring Boss Hydraulic Fittings – Non-Adjustable

The standard torque values are provided for non-adjustable hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, use the value specified in the procedure instead.

Torque values are shown in the table below.

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Check that O-ring (A) is **NOT** on the threads. Adjust O-ring (A) if necessary.
3. Apply hydraulic system oil to the O-ring.
4. Install fitting (C) into the port until the fitting is hand-tight.
5. Torque fitting (C) according to values in Table *8.7, page 404*.
6. Check the final condition of the fitting.

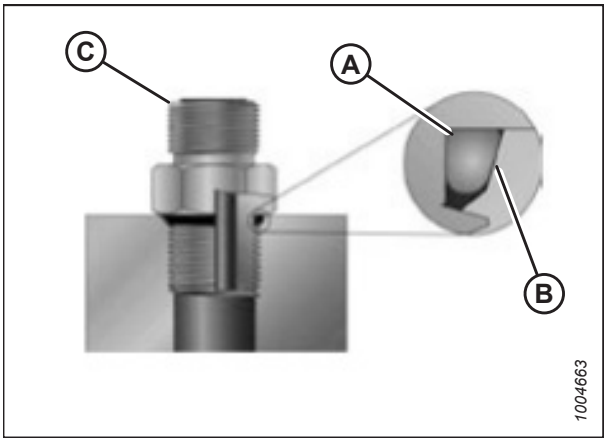


Figure 8.8: Hydraulic Fitting

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

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

SAE Dash Size	Thread Size (in.)	Torque Value[24]	
		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

8.1.5 O-Ring Face Seal Hydraulic Fittings

The standard torque values are provided for O-ring face seal hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, use the value specified in the procedure instead.

Torque values are shown in the table below.

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



Figure 8.9: Hydraulic Fitting

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

2. Apply hydraulic system oil to O-ring (B).
3. Align the tube or hose assembly so that the flat face of sleeve (A) or (C) comes into full contact with O-ring (B).
4. Thread tube or hose nut (D) until it is hand-tight. The nut should turn freely until it bottoms out.
5. Torque the fittings according to values in Table *8.8, page 405*.

   NOTE:

   If applicable, hold the hex flange on fitting body (E) to prevent the rotation of the fitting body and the hose when tightening fitting nut (D).
6. Use three wrenches when assembling unions or joining two hoses together.
7. Check the final condition of the fitting.

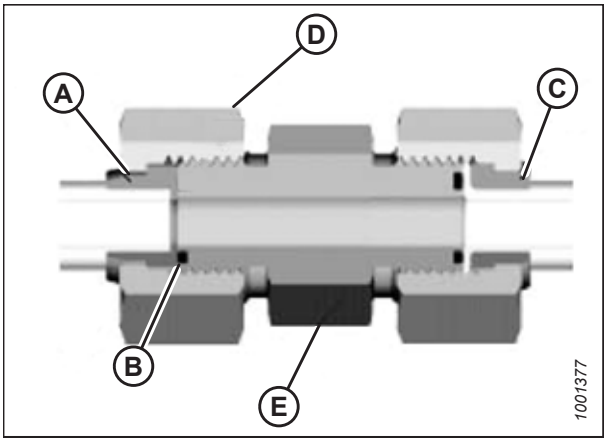


Figure 8.10: Hydraulic Fitting

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

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value[25]	
			Nm	lbf·ft
-3	Note[26]	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note[26]	5/16	–	–
-6	11/16	3/8	40–44	29–32
-8	13/16	1/2	55–61	41–45
-10	1	5/8	80–88	59–65
-12	1 3/16	3/4	115–127	85–94
-14	Note[26]	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

8.1.6 Tapered Pipe Thread Fittings

The standard torque values are provided for tapered pipe thread fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, use the value specified in the procedure instead.

Assemble pipe fittings as follows:

1. Check the components to ensure that the fitting and the port threads are free of burrs, nicks, scratches, and any other form of contamination.
2. Apply paste-type pipe thread sealant to the external pipe threads.
3. Thread the fitting into the port until it is hand-tight.

25. Torque values and angles shown are based on lubricated connection as in reassembly.
26. O-ring face seal type end not defined for this tube size.

4. Torque the connector to the appropriate torque angle. The turns from finger tight (TFFT) and flats from finger tight (FFFT) values are shown in Table *8.9, page 406*. Make sure that the tube end of a shaped connector (typically a 45° or 90° elbow) is aligned to receive the incoming tube or hose assembly. Always finish the alignment of the fitting in the direction of tightening. Never back off (i.e., loosen) the threaded connectors to achieve alignment.

5. Clean all residue and any excess thread conditioner with an appropriate cleaner.

6. Assess the final condition of the fitting. Pay special attention to the possibility of cracks in the port opening.

7. Mark the final position of the fitting. If a fitting leaks, disassemble the fitting and check it for damage.

   NOTE:

   The failure of fittings due to overtorquing may not be evident until the fittings are disassembled and inspected.

Table 8.9 Hydraulic Fitting Pipe Thread

Tapered Pipe Thread Size	Recommended TFFT	Recommended FFFT
1/8–27	2–3	12–18
1/4–18	2–3	12–18
3/8–18	2–3	12–18
1/2–14	2–3	12–18
3/4–14	1.5–2.5	12–18
1–11 1/2	1.5–2.5	9–15
1 1/4–11 1/2	1.5–2.5	9–15
1 1/2–11 1/2	1.5–2.5	9–15
2–11 1/2	1.5–2.5	9–15

8.2 Conversion Chart

Both SI units (including metric) and US customary units (sometimes referred to as standard units) of measurement are used in this manual. A list of those units along with their abbreviations and conversion factors is provided here for your reference.

Table 8.10 Conversion Chart

Quantity	SI Units (Metric)		Factor	US Customary Units (Standard)	
	Unit Name	Abbreviation		Unit Name	Abbreviation
Area	hectare	ha	x 2.4710 =	acre	acres
Flow	liters per minute	L/min	x 0.2642 =	US gallons per minute	gpm
Force	Newton	N	x 0.2248 =	pound force	lbf
Length	millimeter	mm	x 0.0394 =	inch	in.
Length	meter	m	x 3.2808 =	foot	ft.
Power	kilowatt	kW	x 1.341 =	horsepower	hp
Pressure	kilopascal	kPa	x 0.145 =	pounds per square inch	psi
Pressure	megapascal	MPa	x 145.038 =	pounds per square inch	psi
Pressure	bar (Non-SI)	bar	x 14.5038 =	pounds per square inch	psi
Torque	Newton meter	Nm	x 0.7376 =	pound feet or foot pounds	lbf·ft
Torque	Newton meter	Nm	x 8.8507 =	pound inches or inch pounds	lbf·in
Temperature	degrees Celsius	°C	(°C x 1.8) + 32 =	degrees Fahrenheit	°F
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.

8.3 Windrower Fault Codes

The Harvest Performance Tracker (HPT) displays the windrower fault codes as a sequence of three numbers (AAA.BBBBBB.CC). The sequence is defined as follows:

- AAA = The Source Address (SA) defines which module generated the fault.
- BBBBBB = The SPN is the description of the unique fault value.
- CC = The FMI indicated the fault's level of severity.

Source address (SA) numbers refer to the following locations:

- 23: Harvest Performance Tracker (HPT) display
- 25: HVAC box
- 104: Master controller and connected extension modules
- 176: Roof relay module
- 178: Chassis relay module
- 190: Console and ground speed lever (GSL)

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
23	521489	1	Electrical System	Master Module Offline	CAN 1 Offline	Check Module connectors; if ok, Contact Dealer
23	521489	2	Electrical System	Master Module Offline	CAN 2 Offline	Check Module connectors; if ok, Contact Dealer
23	521489	3	Electrical System	Master Module Offline	CAN 1 & 2 Offline	Check Module connectors; if ok, Contact Dealer
23	521489	4	Electrical System	Master Module Offline	CAN 3 Offline	Check Module connectors; if ok, Contact Dealer
23	521489	5	Electrical System	Master Module Offline	CAN 1 & 3 Offline	Check Module connectors; if ok, Contact Dealer
23	521489	6	Electrical System	Master Module Offline	CAN 2 & 3 Offline	Check Module connectors; if ok, Contact Dealer
23	521489	7	Electrical System	Master Module Offline	CAN 1 & 2 & 3 Offline	Check Module connectors & Module fuse; if ok, Contact Dealer
23	521490	1	Electrical System	Ext. Module Offline	Firewall Extension Module Offline	Check Module connectors & Module fuse; if ok, Contact Dealer
23	521491	1	Electrical System	Ext. Module Offline	Chassis Extension Module Offline	Check Module connectors & Module fuse; if ok, Contact Dealer
23	521492	1	Electrical System	Display Offline	CAN 1 Offline	Check Module connectors; if ok, Contact Dealer
23	521492	2	Electrical System	Display Offline	CAN 2 Offline	Check Module connectors; if ok, Contact Dealer
23	521492	3	Electrical System	Display Offline	CAN 1 & 2 Offline	Contact Dealer
23	521493	1	Electrical System	Relay Module Offline	Roof Relay Module Offline	Check Module connectors & Module fuse; if ok, Contact Dealer
23	521494	1	Electrical System	Relay Module Offline	Chassis Relay Module Offline	Check Module connectors & Module fuse; if ok, Contact Dealer
23	521495	1	Electrical System	Console Offline	Console Offline	Check Module connectors & Module fuse; if ok, Contact Dealer
23	521496	1	Electrical System	HVAC ECU Offine	HVAC ECU Offine	Check Module connectors & Module fuse; if ok, Contact Dealer

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
23	521497	1	Electrical System	Engine ECM Offline	Engine Control Module Offline	First check if cooling module door is open or cooling module door sensor is defective. If not then check engine control module connectors & module fuse; if ok, Contact Dealer.
23	521498	1	Electrical System	CAN 1 Offline	CAN 1 Offline	Check CAN Harnessing; if ok, Contact Dealer
23	521499	1	Electrical System	CAN 2 Offline	CAN 2 Offline	Windrower lighting and HVAC will not be operational. Check CAN Harnessing; if ok, Contact Dealer.
23	521500	1	Electrical System	CAN 3 Offline	CAN 3 Offline	Check CAN Harnessing; if ok, Contact Dealer
23	521515	1	Windrower	Water In Fuel	Water In Fuel Detected	Water in the fuel can do extensive damage to the fuel system, due to the tight tolerances of the fuel system components.The fuel filter must be drained immediately.
25	168	1	Electrical System	HVAC	Low voltage - Below normal, most severe	Check HVAC power supply. Contact dealer.
25	170	3	Electrical System	HVAC	Cab temp open circuit - Voltage above normal	Inspect cab temperature and wiring. Contact Dealer
25	170	4	Electrical System	HVAC	Cab temp shorted - Voltage below normal	Inspect cab temperature and wiring. Contact Dealer
25	442	3	Electrical System	HVAC	Duct temp open circuit - Voltage above normal	Check HVAC duct temperature sensor wiring. Contact Dealer.
25	442	4	Electrical System	HVAC	Duct temp shorted - Voltage below normal	Check HVAC duct temperature sensor wiring. Contact Dealer.
25	520193	5	Electrical System	HVAC	Clutch low amps - Current below normal	Inspect A/C clutch wiring for damage. Contact Dealer.
25	520193	6	Electrical System	HVAC	Clutch high amps - Current above normal	Inspect A/C clutch wiring for damage. Contact Dealer.
25	520194	3	Electrical System	HVAC	Evaporator temp open circuit - Voltage above normal	Check temperature sensor and wiring at the evaporator. Contact dealer.
25	520194	4	Electrical System	HVAC	Evaporator temp shorted - Voltage below normal	Check temperature sensor and wiring at the evaporator. Contact dealer.
34	521517	1	Header System	LH Knife Sensor	ETDK Sensor Fault	LH knife speed sensor fault. Sensor output not responding as expected relative to knife pressure

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
34	521518	1	Header System	LH Knife Speed	ETDK Knife Over Speed	LH knife speed has exceeded 200SPM
34	521519	1	Header System	LH Knife Valve	ETDK Bypass Valve	LH bypass valve at 100%. Verify valve is functional
34	521521	1	Header System	RH Knife Sensor	ETDK Sensor Fault	RH knife speed sensor fault. Sensor output not responding as expected relative to knife pressure
34	521522	1	Header System	RH Knife Speed	ETDK Over Speed	RH knife speed has exceeded 200SPM
34	521523	1	Header System	RH Knife Valve	ETDK Bypass Valve	RH bypass valve at 100%. Verify valve is functional
34	521525	1	Header System	Knife Control	ETDK Open Loop	ETDK Knife speed control is in open loop control
34	521528	1	Header System	STW Controller Offline	STW Controller Offline	The controller is offline. Check CAN harness.
34	521536	1	Header System	Knife Control	ETDK Max Knife pressure	Knife pressure at maximum (3000 PSI)
34	521537	2	Header System	Knife Control	ETDK Min Knife pressure	Knife pressure below minimum (200 PSI), with knife speed sensor reporting a speed.
104	521000	3	Electrical System	Fuel Level Sender	Low Alarm	Sensor voltage below 0.4V. Check sensor power supply. Replace sensor if necessary.
104	521000	4	Electrical System	Fuel Level Sender	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Replace sensor if necessary.
104	521000	5	Electrical System	Fuel Level Sender	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Check for wiring damage. Replace sensor if necessary.
104	521000	6	Electrical System	Fuel Level Sender	High Error	Sensor voltage above 4.95 V. Check for wiring damage. Replace sensor if necessary.
104	521000	8	Electrical System	Fuel Level Sender	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521003	3	Electrical System	GSL Position	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Replace sensor if necessary.
104	521003	4	Electrical System	GSL Position	High Alarm	Sensor voltage above 4.65 V. Check for wiring damage. Replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521003	5	Electrical System	GSL Position	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Check for wiring damage. Replace sensor if necessary.
104	521003	6	Electrical System	GSL Position	High Error	Sensor voltage above 4.95 V. Check for wiring damage. Replace sensor if necessary.
104	521003	8	Electrical System	GSL Position	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521006	5	Electrical System	Hyd Oil Temp Sensor	Low Error	Sensor voltage 0.0V. Check sensor power supply. Replace sensor if necessary.
104	521006	6	Electrical System	Hyd Oil Temp Sensor	High Error	Sensor voltage above 3.1V. Check for wiring damage. Replace sensor if necessary.
104	521006	8	Electrical System	Hyd Oil Temp Sensor	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521021	3	Electrical System	Reel Height	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521021	4	Electrical System	Reel Height	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521021	5	Electrical System	Reel Height	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521021	6	Electrical System	Reel Height	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521021	8	Electrical System	Reel Height	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521024	3	Electrical System	Reel Fore-Aft	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521024	4	Electrical System	Reel Fore-Aft	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521024	5	Electrical System	Reel Fore-Aft	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521024	6	Electrical System	Reel Fore-Aft	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521024	8	Electrical System	Reel Fore-Aft	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521027	3	Electrical System	Lateral Tilt	Low Alarm	Sensor voltage below 0.5V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521027	4	Electrical System	Lateral Tilt	High Alarm	Sensor voltage above 4.5 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521027	5	Electrical System	Lateral Tilt	Low Error	Sensor voltage below 0.5V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521027	6	Electrical System	Lateral Tilt	High Error	Sensor voltage above 4.5 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521027	8	Electrical System	Lateral Tilt	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521030	3	Electrical System	LH Float Cyl.	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521030	4	Electrical System	LH Float Cyl.	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521030	5	Electrical System	LH Float Cyl.	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521030	6	Electrical System	LH Float Cyl.	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521030	8	Electrical System	LH Float Cyl.	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521033	3	Electrical System	Converyor Pressure	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply and replace sensor as necessary. Ensure that DWA option (in Attachments menu) is checked off only if it is in fact installed.
104	521033	4	Electrical System	Conveyor Pressure	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage and replace sensor as necessary. Ensure that DWA option (in Attachments menu) is checked off only if it is in fact installed.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521033	5	Electrical System	Conveyor Pressure	Low Error	Sensor voltage below 0.025V. Check sensor power supply and replace sensor as necessary. Ensure that DWA option (in Attachments menu) is checked off only if it is in fact installed.
104	521033	6	Electrical System	Conveyor Pressure	High Error	Sensor voltage above 4.9 V. Check for wiring damage and replace sensor as necessary. Ensure that DWA option (in Attachments menu) is checked off only if it is in fact installed.
104	521033	8	Electrical System	Conveyor Pressure	Vref Error	Reference voltage error. Check sensor wiring for damage. Ensure that DWA option (in Attachments menu) is checked off only if it is in fact installed.
104	521036	3	Electrical System	RH Float Cyl.	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521036	4	Electrical System	RH Float Cyl.	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521036	5	Electrical System	RH Float Cyl.	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521036	6	Electrical System	RH Float Cyl.	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521036	8	Electrical System	RH Float Cyl.	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521039	3	Electrical System	Knife Pressure	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Replace sensor if necessary.
104	521039	4	Electrical System	Knife Pressure	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Replace sensor if necessary.
104	521039	5	Electrical System	Knife Pressure	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Replace sensor if necessary.
104	521039	6	Electrical System	Knife Pressure	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Replace sensor if necessary.
104	521039	8	Electrical System	Knife Pressure	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521042	3	Electrical System	Reel Pressure	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521042	4	Electrical System	Reel Pressure	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Replace sensor if necessary.
104	521042	5	Electrical System	Reel Pressure	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Replace sensor if necessary.
104	521042	6	Electrical System	Reel Pressure	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Replace sensor if necessary.
104	521042	8	Electrical System	Reel Pressure	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521045	3	Electrical System	Header Tilt	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521045	4	Electrical System	Header Tilt	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521045	5	Electrical System	Header Tilt	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521045	6	Electrical System	Header Tilt	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521045	8	Electrical System	Header Tilt	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521048	3	Electrical System	Header Height	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521048	4	Electrical System	Header Height	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521048	5	Electrical System	Header Height	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521048	6	Electrical System	Header Height	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521048	8	Electrical System	Header Height	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521051	3	Electrical System	Charge Pressure	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521051	4	Electrical System	Charge Pressure	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Replace sensor if necessary.
104	521051	5	Electrical System	Charge Pressure	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Replace sensor if necessary.
104	521051	6	Electrical System	Charge Pressure	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Replace sensor if necessary.
104	521051	8	Electrical System	Charge Pressure	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521063	1	Windrower	Hyd Oil Level Low	Low Hydraulic Oil Level	Low Hydraulic Oil Level, or oil level switch failed or open wiring circuit. Shut off engine and check oil level. Check sensor wiring and replace sensor if necessary.
104	521071	2	Electrical System	LH Wheel Motor	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521071	3	Electrical System	LH Wheel Motor	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521072	2	Electrical System	RH Wheel Motor	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521072	3	Electrical System	RH Wheel Motor	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521073	2	Electrical System	Knife/Disc Speed	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521073	3	Electrical System	Knife/Disc Speed	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521073	31	Electrical System	Knife/Disc Speed	Condition Exists	No knife/disc speed feedback. Estimated speed will be used, This will exclude knife/disc speed changes when selecting buttons A, B and C on ground speed lever.
104	521074	2	Electrical System	Reel Speed	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521074	3	Electrical System	Reel Speed	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521074	31	Electrical System	Reel Speed	Condition Exists	No reel speed feedback. This will exclude reel speed changes when selecting buttons A, B and C on ground speed lever. It will also disable the auto-reel speed feature.
104	521075	2	Electrical System	Cooling Fan Spd	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521075	3	Electrical System	Cooling Fan Spd	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521076	2	Electrical System	LH Draper Idler Spd	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary. If a double draper drive kit is installed, select it from the Settings > Header > Attachments menu.
104	521076	3	Electrical System	LH Draper Idler Spd	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521076	31	Electrical System	LH Draper Idler Spd	Condition Exists	No draper slip feedback. Draper slip detection is no longer active. If a double draper drive kit is installed, select it from the Settings > Header > Attachments menu.
104	521077	2	Electrical System	RH Draper Idler Spd	Low Alarm	Input frequency lower than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary. If a double draper drive kit is installed, select it from the Settings > Header > Attachments menu.
104	521077	3	Electrical System	RH Draper Idler Spd	High Alarm	Input frequency higher than expected. Check sensor alignment, power supply, ground, and signal path. Replace sensor if necessary.
104	521077	31	Electrical System	RH Draper Idler Spd	Condition Exists	No draper slip feedback. Draper slip detection is no longer active. If a double draper drive kit is installed, select it from the Settings > Header > Attachments menu.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521078	4	Electrical System	Knife Drive	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521078	3	Electrical System	Knife Drive	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521079	4	Electrical System	LH Wheel Motor	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521079	3	Electrical System	LH Wheel Motor	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521080	4	Electrical System	RH Wheel Motor	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521080	3	Electrical System	RH Wheel Motor	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521081	4	Electrical System	Cooling Fan Speed	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521081	3	Electrical System	Cooling Fan Speed	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521082	4	Electrical System	Header Raise/Lower	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521082	5	Electrical System	Header Raise/Lower	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521083	4	Electrical System	Header Tilt	Open Load	Check circuit for damage. Contact dealer.
104	521083	5	Electrical System	Header Tilt	Over Load	Check circuit for damage. Contact dealer.
104	521085	4	Electrical System	Reel Drive PWM	Open Load	Check circuit for damage. Contact dealer.
104	521085	5	Electrical System	Reel Drive PWM	Over Load	Check circuit for damage. Contact dealer.
104	521086	4	Electrical System	Conveyor Drive PWM	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521086	5	Electrical System	Conveyor Drive PWM	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521087	3	Electrical System	Master Controller	High Temperature	Module has exceeded max operating temperature. Allow module to cool down before continuing operation.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521087	4	Electrical System	Master Controller	Low Batt Voltage	Battery voltage is low. Contact dealer to check charging system.
104	521087	5	Electrical System	Master Controller	High Batt Voltage	Battery voltage is high. Contact dealer.
104	521087	7	Electrical System	Master Controller	Vref Error	Reference voltage error. Check wiring for damage.The following sensors may be affected:Left Hand Wheel SpeedRight Hand Wheel SpeedFuel LevelGround Speed Lever Position
104	521087	8	Electrical System	Master Controller	Address Error	CAN Address Error. Contact Dealer. The Master Controller uses 1 kOhm resistor housed in connector assembly D281 that connects to connector P281 and results in Master Controller address #2 in the control software.
104	521092	2	Electrical System	Ext. Module, Firewall	High Temperature	Module has exceeded max operating temperature. Allow module to cool down before continuing operation.
104	521092	3	Electrical System	Ext. Module, Firewall	Low Batt Voltage	Battery voltage is low. Contact dealer to check charging system.
104	521092	4	Electrical System	Ext. Module, Firewall	High Batt Voltage	Battery voltage is high. Contact dealer.
104	521092	6	Electrical System	Ext. Module, Firewall	Address Error	CAN Address Error. Contact Dealer. Extension Module, Firewall uses VBatt Switched Power to put 12V on an address pin at P248-34; results in address #1 in the control software.
104	521092	7	Electrical System	Ext. Module, Firewall	Vref error	Reference voltage error. Check wiring for damage.
104	521097	2	Electrical System	Ext. Module, Chassis	High Temperature	Module has exceeded max operating temperature. Allow module to cool down before continuing operation.
104	521097	3	Electrical System	Ext. Module, Chassis	Low Batt Voltage	Battery voltage is low. Contact dealer to check charging system.
104	521097	4	Electrical System	Ext. Module, Chassis	High Batt Voltage	Battery voltage is high. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521097	6	Electrical System	Ext. Module, Chassis	Address Error	CAN Address Error. Contact Dealer. Extension Module, Chassis uses VBatt Switched Power to put 12V on an address pin at P248-29; results in address #0 in the control software.
104	521097	7	Electrical System	Ext. Module, Chassis	Vref error	Reference voltage error. Check wiring for damage.
104	521357	3	Electrical System	Interlock Open	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521357	4	Electrical System	Interlock Open	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521359	3	Electrical System	Brake Release	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521359	4	Electrical System	Brake Release	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521361	3	Electrical System	Batt. Disc. Open	Open Load	Check wiring for damage or breaks. Contact dealer. This circuit is an output from the Master Controller and is connected to the Battery Disconnect Relay "OFF" coil. This alarm will come on if the wiring, connectors or Battery Disconnect Relay coil is damaged.
104	521361	4	Electrical System	Batt. Disc. Open	Over Load	High current on circuit. Check wiring for damage. Contact dealer. This circuit is an output from the Master Controller and is connected to the Battery Disconnect Relay "OFF" coil. This alarm will come on if the wiring, connectors or Battery Disconnect Relay coil is damaged.
104	521364	3	Electrical System	Ignition	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521364	4	Electrical System	Ignition	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521366	3	Electrical System	Starter Relay	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521366	4	Electrical System	Starter Relay	Over Load	High current on circuit. Check wiring for damage. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521368	3	Electrical System	12V Sensor Pwr	Firewall 12V Sensor Power - Open Load	Check wiring for damage or breaks. Contact dealer. The following sensors may be affected:Hydrauilic Oil TemperatureHydraulic Oil LevelCooling Fan SpeedHydraulic Oil Filter
104	521368	4	Electrical System	12V Sensor Pwr	Firewall 12V Sensor Power - Over Load	High current on circuit. Check wiring for damage. Contact dealer. The following sensors may be affected: Hydrauilic Oil TemperatureHydraulic Oil LevelCooling Fan SpeedHydraulic Oil Filter
104	521369	3	Electrical System	Cooling Fan Reverse	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521369	4	Electrical System	Cooling Fan Reverse	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521370	3	Electrical System	Reel/Aux Lift Selector	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521370	4	Electrical System	Reel/Aux Lift Selector	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521371	3	Electrical System	Reel Retract O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521371	4	Electrical System	Reel Retract O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521372	3	Electrical System	Reel Extend O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521372	4	Electrical System	Reel Extend O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521373	3	Electrical System	Reel Raise O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521373	4	Electrical System	Reel Raise O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521374	3	Electrical System	Reel Lower O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521374	4	Electrical System	Reel Lower O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521375	3	Electrical System	12V Sensor Pwr	Chassis 12V Sensor Power - Open Load	Check wiring for damage or breaks. Contact dealer. The following sensors may be affected:DWA PositionHeader Tilt PositionSwath Compressor Position
104	521375	4	Electrical System	12V Sensor Pwr	Chassis 12V Sensor Power - Over Load	High current on circuit. Check wiring for damage. Contact dealer. The following sensors may be affected: DWA PositionHeader Tilt PositionSwath Compressor Position
104	521376	3	Electrical System	Deck Shift Left O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521376	4	Electrical System	Deck Shift Left O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521377	3	Electrical System	Deck Shift Right O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521377	4	Electrical System	Deck Shift Right O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521378	3	Electrical System	LH Lateral Tilt O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521378	4	Electrical System	LH Lateral Tilt O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521379	3	Electrical System	RH Lateral Tilt O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521379	4	Electrical System	RH Lateral Tilt O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521380	3	Electrical System	RH Float Adjust O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521380	4	Electrical System	RH Float Adjust O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521381	3	Electrical System	LH Float Adjust O/P	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521381	4	Electrical System	LH Float Adjust O/P	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521383	15	Windrower	Hydraulic Oil Hot	Above Normal Least Severe	Clean cooler cores with compressed air. If condition persists with clean cores, contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521383	0	Windrower	Hyd Oil Very Hot	Above Normal Most Severe	Clean cooler cores with compressed air. If condition persists with clean cores, contact dealer. Continued operation may lead to machine damage.
104	521387	0	Windrower	Oil Charge Press High	Above Normal Most Severe	Check charge pressure relief valve. Contact Dealer.
104	521387	17	Windrower	Oil Charge Press Low	Below Normal Least Severe	Check charge pressure relief valve. Contact Dealer.
104	521387	1	Windrower	Oil Charge Press Low	Below Normal Most Severe	Shut down engine. Check charge pressure relief valve. Contact Dealer.
104	521390	0	Windrower	Knife Speed	Above Norm Most Severe	Knife speed above max allowable for header type. Contact dealer.
104	521391	0	Windrower	Cooling Fan Spd High	Above Norm Most Severe	Fan speed readout high. Safe mode activated. Fan will default to full rpm at high idle. Contact dealer.
104	521391	31	Windrower	Cooling Fan Speed	Condition Exists	No cooling fan speed feedback.
104	521391	1	Windrower	Cooling Fan Spd Low	Below Normal Most Severe	Control system is unable to adjust fan speed. Beware that there is the potential for engine overheat if fan speed is too low. Safe mode activated. Fan will default to full rpm at high idle. Contact dealer.
104	521460	1	Windrower	Wheel Speed	LH Wheel Speed Sensor	Check LH wheel speed sensor and wiring. Reading speed off RH wheel only. Auto-reel and auto-draper speed performance will be impacted while turning.
104	521460	2	Windrower	Wheel Speed	RH Wheel Speed Sensor	Check RH wheel speed sensor and wiring. Reading speed off LH wheel only. Auto-reel and auto-draper speed performance will be impacted while turning.
104	521460	3	Windrower	Wheel Speed	LH & RH Wheel Speed Sensor	Check RH and LH wheel speed sensors and wiring. Acre tracking, auto-reel and auto-draper speed features will be disabled.
104	521501	3	Electrical System	Swath Compressor	Low Alarm	Sensor voltage below 0.45V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521501	4	Electrical System	Swath Compressor	High Alarm	Sensor voltage above 4.7 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521501	5	Electrical System	Swath Compressor	Low Error	Sensor voltage below 0.025V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521501	6	Electrical System	Swath Compressor	High Error	Sensor voltage above 4.9 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521501	8	Electrical System	Swath Compressor	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521502	3	Electrical System	AHHC Left-out Sensor	Low Alarm	Sensor voltage below 0.35V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521502	4	Electrical System	AHHC Left-out Sensor	High Alarm	Sensor voltage above 4.5 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521502	5	Electrical System	AHHC Left-out Sensor	Low Error	Sensor voltage below 0.175V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521502	6	Electrical System	AHHC Left-out Sensor	High Error	Sensor voltage above 4.75 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521502	8	Electrical System	AHHC Left-out Sensor	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521503	3	Electrical System	AHHC Left-in Sensor	Low Alarm	Sensor voltage below 0.35V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521503	4	Electrical System	AHHC Left-in Sensor	High Alarm	Sensor voltage above 4.5 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521503	5	Electrical System	AHHC Left-in Sensor	Low Error	Sensor voltage below 0.175V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521503	6	Electrical System	AHHC Left-in Sensor	High Error	Sensor voltage above 4.75 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521503	8	Electrical System	AHHC Left-in Sensor	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521504	3	Electrical System	AHHC Right-in Sensor	Low Alarm	Sensor voltage below 0.35V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521504	4	Electrical System	AHHC Right-in Sensor	High Alarm	Sensor voltage above 4.5 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521504	5	Electrical System	AHHC Right-in Sensor	Low Error	Sensor voltage below 0.175V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521504	6	Electrical System	AHHC Right-in Sensor	High Error	Sensor voltage above 4.75 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521504	8	Electrical System	AHHC Right-in Sensor	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521505	3	Electrical System	AHHC Right-out Sensor	Low Alarm	Sensor voltage below 0.35V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521505	4	Electrical System	AHHC Right-out Sensor	High Alarm	Sensor voltage above 4.5 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521505	5	Electrical System	AHHC Right-out Sensor	Low Error	Sensor voltage below 0.175V. Check sensor power supply. Adjust and re-calibrate or replace sensor if necessary.
104	521505	6	Electrical System	AHHC Right-out Sensor	High Error	Sensor voltage above 4.75 V. Check for wiring damage. Adjust and re-calibrate or replace sensor if necessary.
104	521505	8	Electrical System	AHHC Right-out Sensor	Vref Error	Reference voltage error. Check sensor wiring for damage.
104	521506	3	Electrical System	VREF Ext. Mod, Firewall	Open Load	Check wiring for damage or breaks. Contact dealer. The following sensors may be affected:Knife SpeedReel SpeedLeft Hand Draper SpeedRight Hand Draper SpeedHeader IdentificationReel Height PositionReel Fore-Aft Position
104	521506	4	Electrical System	VREF Ext. Mod, Firewall	Over Load	High current on circuit. Check wiring for damage. Contact dealer. The following sensors may be affected: Knife SpeedReel SpeedLeft Hand Draper SpeedRight Hand Draper SpeedHeader IdentificationReel Height PositionReel Fore-Aft Position
104	521507	3	Electrical System	VREF Ext. Mod, Chassis	Open Load	Check wiring for damage or breaks. Contact dealer. The follwing sensors may be affected:Knife PressureReel PressureDraper PressureSupercharge PressureLeft Hand Float PositionRight Hand Float Position
104	521507	4	Electrical System	VREF Ext. Mod, Chassis	Over Load	High current on circuit. Check wiring for damage. Contact dealer. The follwing sensors may be affected: Knife PressureReel PressureDraper PressureSupercharge PressureLeft Hand Float PositionRight Hand Float Position

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521508	1	Windrower	Lift/Fan Hyd Unstable	Instability Detected	If condition persists, contact dealer. Continued operation may lead to machine damage.
104	521509	1	Windrower	Gearbox Oil Level Low	Low Gearbox Oil Level	Low Gearbox Oil Level, or oil level switch failed or open wiring circuit. Shut off engine and check oil level. Check sensor wiring and replace sensor if necessary.
104	521510	1	Windrower	Gearbox Oil Level High	High Gearbox Oil Level	High Gearbox Oil Level, or oil level switch failed. Shut off engine and check oil level. Check sensor wiring and replace sensor if necessary.
104	521513	1	Electrical System	Steering Sensor	Faulty Sensor Values	At least one of the steering sensors is faulty and related features have been disabled. Check the sensors and wiring.
104	521514	4	Electrical System	Arm Deployment PWM AHHC	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521514	5	Electrical System	Arm Deployment PWM AHHC	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521516	4	Electrical System	Reel Bi-pass PWM	Open Load	Check wiring for damage or breaks. Contact dealer.
104	521516	5	Electrical System	Reel Bi-pass PWM	Over Load	High current on circuit. Check wiring for damage. Contact dealer.
104	521529	15	Windrower	Gearbox Temperature	Above Normal Least Severe	Gearbox temperature is too high.
104	521530	1	Windrower	Reel Pressure High	Above Normal Least Severe	Reel circuit is operating at high pressure. This condition stems from blocked orifices in port OR2 of the Reel Drive Manifold. Continued operation with header uncoupled may lead to pump damage. Contact dealer for assistance.
104	521531	1	Windrower	Conveyor Pressure High	Above Normal Least Severe	Conveyor circuit is operating at high pressure. This condition stems from blocked orifices in port OR2 of the Draper Drive Manifold. Continued operation with header uncoupled may lead to pump damage. Contact dealer for assistance.
104	521555	1	Electrical System	GSL Sensor1	Out of Range	Sensor not in expected range relative to other GSL position sensors. Check GSL Position sensor mounting, connection and harness. Contact Dealer for assistance.
104	521555	2	Electrical System	GSL Sensor2	Out of Range	Sensor not in expected range relative to other GSL position sensors. Check GSL Position sensor mounting, connection and harness. Contact Dealer for assistance.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
104	521555	4	Electrical System	GSL Bowden Sensor	Out of Range	Sensor not in expected range relative to other GSL position sensors. Check GSL Position sensor mounting, connection and harness. Verify Bowden cable is functioning as expected. Contact Dealer for assistance.
104	521556	1	brk_press	Possible Brake Drag	Above Normal Least Severe	Secondary brake pressure is higher then expected with braking not applied. Brake wear is possible. Contact Dealer for assistance.
104	521556	2	brk_press	Brake Pressure High	Above Normal Most Severe	Secondary brake pressure has exceeded maximum. Damage may occur. Contact Dealer for assistance.
104	521558	1	brk_press	Brake Pressure Low	Below Normal Most Severe	Secondary brake pressure below nominal during brake test. Secondary braking power may be reduced. Contact Dealer for assistance.
176	521104	1	Electrical System	Inner Work Lights	EK1 Relay coil open or not present	Check roof relay module
176	521104	2	Electrical System	Inner Work Lights	EK1 Relay Coil shorted or failed relay driver	Check roof relay module
176	521104	3	Electrical System	Inner Work Lights	EK1 Relay Normally Open contact is open	Check roof relay module
176	521104	4	Electrical System	Inner Work Lights	EK1 Relay Normally Closed contact is open	Check roof relay module
176	521104	5	Electrical System	Inner Work Lights	EK1 Relay coil is not receiving power	Check wiring to roof relay module EK1. Contact dealer.
176	521104	6	Electrical System	Inner Work Lights	EK1 Relay Normally open contact is shorted	Check roof relay module
176	521104	7	Electrical System	Inner Work Lights	EK1 Relay Normally closed contact is shorted	Check roof relay module
176	521111	1	Electrical System	Low Beam Light Cab Fwd	EK2 Relay coil open or not present	Check roof relay module
176	521111	2	Electrical System	Low Beam Light Cab Fwd	EK2 Relay Coil shorted or failed relay driver	Check roof relay module
176	521111	3	Electrical System	Low Beam Light Cab Fwd	EK2 Relay Normally Open contact is open	Check roof relay module
176	521111	4	Electrical System	Low Beam Light Cab Fwd	EK2 Relay Normally Closed contact is open	Check roof relay module

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
176	521111	5	Electrical System	Low Beam Light Cab Fwd	EK2 Relay coil is not receiving power	Check wiring to roof relay module EK2. Contact dealer.
176	521111	6	Electrical System	Low Beam Light Cab Fwd	EK2 Relay Normally open contact is shorted	Check roof relay module
176	521111	7	Electrical System	Low Beam Light Cab Fwd	EK2 Relay Normally closed contact is shorted	Check roof relay module
176	521119	1	Electrical System	Tail Lights Engine Fwd	EK3 Relay coil open or not present	Check roof relay module
176	521119	2	Electrical System	Tail Lights Engine Fwd	EK3 Relay Coil shorted or failed relay driver	Check roof relay module
176	521119	3	Electrical System	Tail Lights Engine Fwd	EK3 Relay Normally Open contact is open	Check roof relay module
176	521119	4	Electrical System	Tail Lights Engine Fwd	EK3 Relay Normally Closed contact is open	Check roof relay module
176	521119	5	Electrical System	Tail Lights Engine Fwd	EK3 Relay coil is not receiving power	Check wiring to roof relay module EK3. Contact dealer.
176	521119	6	Electrical System	Tail Lights Engine Fwd	EK3 Relay Normally open contact is shorted	Check roof relay module
176	521119	7	Electrical System	Tail Lights Engine Fwd	EK3 Relay Normally closed contact is shorted	Check roof relay module
176	521127	1	Electrical System	Outer Work Lights	EK4 Relay coil open or not present	Check roof relay module
176	521127	2	Electrical System	Outer Work Lights	EK4 Relay Coil shorted or failed relay driver	Check roof relay module
176	521127	3	Electrical System	Outer Work Lights	EK4 Relay Normally Open contact is open	Check roof relay module
176	521127	4	Electrical System	Outer Work Lights	EK4 Relay Normally Closed contact is open	Check roof relay module
176	521127	5	Electrical System	Outer Work Lights	EK4 Relay coil is not receiving power	Check wiring to roof relay module EK4. Contact dealer.
176	521127	6	Electrical System	Outer Work Lights	EK4 Relay Normally open contact is shorted	Check roof relay module
176	521127	7	Electrical System	Outer Work Lights	EK4 Relay Normally closed contact is shorted	Check roof relay module

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
176	521135	1	Electrical System	Rear Roof Work Lights	EK5 Relay coil open or not present	Check roof relay module
176	521135	2	Electrical System	Rear Roof Work Lights	EK5 Relay Coil shorted or failed relay driver	Check roof relay module
176	521135	3	Electrical System	Rear Roof Work Lights	EK5 Relay Normally Open contact is open	Check roof relay module
176	521135	4	Electrical System	Rear Roof Work Lights	EK5 Relay Normally Closed contact is open	Check roof relay module
176	521135	5	Electrical System	Rear Roof Work Lights	EK5 Relay coil is not receiving power	Check wiring to roof relay module EK5. Contact dealer.
176	521135	6	Electrical System	Rear Roof Work Lights	EK5 Relay Normally open contact is shorted	Check roof relay module
176	521135	7	Electrical System	Rear Roof Work Lights	EK5 Relay Normally closed contact is shorted	Check roof relay module
176	521143	1	Electrical System	High Beam Lights CF	EK6 Relay coil open or not present	Check roof relay module
176	521143	2	Electrical System	High Beam Lights CF	EK6 Relay Coil shorted or failed relay driver	Check roof relay module
176	521143	3	Electrical System	High Beam Lights CF	EK6 Relay Normally Open contact is open	Check roof relay module
176	521143	4	Electrical System	High Beam Lights CF	EK6 Relay Normally Closed contact is open	Check roof relay module
176	521143	5	Electrical System	High Beam Lights CF	EK6 Relay coil is not receiving power	Check wiring to roof relay module EK6. Contact dealer.
176	521143	6	Electrical System	High Beam Lights CF	EK6 Relay Normally open contact is shorted	Check roof relay module
176	521143	7	Electrical System	High Beam Lights CF	EK6 Relay Normally closed contact is shorted	Check roof relay module
176	521151	1	Electrical System	Brake Lights, Eng Fwd	EK7 Relay coil open or not present	Check roof relay module
176	521151	2	Electrical System	Brake Lights, Eng Fwd	EK7 Relay Coil shorted or failed relay driver	Check roof relay module
176	521151	3	Electrical System	Brake Lights, Eng Fwd	EK7 Relay Normally Open contact is open	Check roof relay module

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
176	521151	4	Electrical System	Brake Lights, Eng Fwd	EK7 Relay Normally Closed contact is open	Check roof relay module
176	521151	5	Electrical System	Brake Lights, Eng Fwd	EK7 Relay coil is not receiving power	Check wiring to roof relay module EK7. Contact dealer.
176	521151	6	Electrical System	Brake Lights, Eng Fwd	EK7 Relay Normally open contact is shorted	Check roof relay module
176	521151	7	Electrical System	Brake Lights, Eng Fwd	EK7 Relay Normally closed contact is shorted	Check roof relay module
176	521159	1	Electrical System	Rear Swath Lights	EK8 Relay coil open or not present	Check roof relay module
176	521159	2	Electrical System	Rear Swath Lights	EK8 Relay Coil shorted or failed relay driver	Check roof relay module
176	521159	3	Electrical System	Rear Swath Lights	EK8 Relay Normally Open contact is open	Check roof relay module
176	521159	4	Electrical System	Rear Swath Lights	EK8 Relay Normally Closed contact is open	Check roof relay module
176	521159	5	Electrical System	Rear Swath Lights	EK8 Relay coil is not receiving power	Check wiring to roof relay module EK8. Contact dealer.
176	521159	6	Electrical System	Rear Swath Lights	EK8 Relay Normally open contact is shorted	Check roof relay module
176	521159	7	Electrical System	Rear Swath Lights	EK8 Relay Normally closed contact is shorted	Check roof relay module
176	521167	1	Electrical System	Beacon Lights	EK9 Relay coil open or not present	Check roof relay module
176	521167	2	Electrical System	Beacon Lights	EK9 Relay Coil shorted or failed relay driver	Check roof relay module
176	521167	3	Electrical System	Beacon Lights	EK9 Relay Normally Open contact is open	Check roof relay module
176	521167	4	Electrical System	Beacon Lights	EK9 Relay Normally Closed contact is open	Check roof relay module
176	521167	5	Electrical System	Beacon Lights	EK9 Relay coil is not receiving power	Check wiring to roof relay module EK9. Contact dealer.
176	521167	6	Electrical System	Beacon Lights	EK9 Relay Normally open contact is shorted	Check roof relay module

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
176	521167	7	Electrical System	Beacon Lights	EK9 Relay Normally closed contact is shorted	Check roof relay module
176	521175	1	Electrical System	Dome Light, Cab	EK10 Relay coil open or not present	Check roof relay module
176	521175	2	Electrical System	Dome Light, Cab	EK10 Relay Coil shorted or failed relay driver	Check roof relay module
176	521175	3	Electrical System	Dome Light, Cab	EK10 Relay Normally Open contact is open	Check roof relay module
176	521175	4	Electrical System	Dome Light, Cab	EK10 Relay Normally Closed contact is open	Check roof relay module
176	521175	5	Electrical System	Dome Light, Cab	EK10 Relay coil is not receiving power	Check wiring to roof relay module EK10. Contact dealer.
176	521175	6	Electrical System	Dome Light, Cab	EK10 Relay Normally open contact is shorted	Check roof relay module
176	521175	7	Electrical System	Dome Light, Cab	EK10 Relay Normally closed contact is shorted	Check roof relay module
176	521185	1	Electrical System	Inner Work Lights	EC1 Circuit Breaker Blown	Check roof relay module
176	521185	2	Electrical System	Inner Work Lights	EC1 Circuit Breaker Not Powered	Check wiring to roof relay module EC1 circuit breaker. Contact dealer.
176	521288	1	Electrical System	Outer Work Lights	EC2 Circuit Breaker Blown	Check roof relay module
176	521288	2	Electrical System	Outer Work Lights	EC2 Circuit Breaker Not Powered	Check wiring to roof relay module EC2 circuit breaker. Contact dealer.
176	521291	1	Electrical System	Brake Lights, Eng Fwd	EC3 Circuit Breaker Blown	Check roof relay module
176	521291	2	Electrical System	Brake Lights, Eng Fwd	EC3 Circuit Breaker Not Powered	Check wiring to roof relay module EC3 circuit breaker. Contact dealer.
176	521294	1	Electrical System	Low Beam Light Cab Fwd	EC4 Circuit Breaker Blown	Check roof relay module
176	521294	2	Electrical System	Low Beam Light Cab Fwd	EC4 Circuit Breaker Not Powered	Check wiring to roof relay module EC4 circuit breaker. Contact dealer.
176	521297	1	Electrical System	Rear Swath Lights	EC5 Circuit Breaker Blown	Check roof relay module

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
176	521297	2	Electrical System	Rear Swath Lights	EC5 Circuit Breaker Not Powered	Check wiring to roof relay module EC5 circuit breaker. Contact dealer.
176	521300	1	Electrical System	High Beam Lights CF	EC6 Circuit Breaker Blown	Check roof relay module
176	521300	2	Electrical System	High Beam Lights CF	EC6 Circuit Breaker Not Powered	Check wiring to roof relay module EC6 circuit breaker. Contact dealer.
176	521303	1	Electrical System	Tail Lights Engine Fwd	EC7 Circuit Breaker Blown	Check roof relay module
176	521303	2	Electrical System	Tail Lights Engine Fwd	EC7 Circuit Breaker Not Powered	Check wiring to roof relay module EC7 circuit breaker. Contact dealer.
176	521306	1	Electrical System	Rear Roof Work Lights	EC8 Circuit Breaker Blown	Check roof relay module
176	521306	2	Electrical System	Rear Roof Work Lights	EC8 Circuit Breaker Not Powered	Check wiring to roof relay module EC8 circuit breaker. Contact dealer.
176	521309	1	Electrical System	Beacon Lights	EC9 Circuit Breaker Blown	Check roof relay module
176	521309	2	Electrical System	Beacon Lights	EC9 Circuit Breaker Not Powered	Check wiring to roof relay module EC9 circuit breaker. Contact dealer.
176	521312	1	Electrical System	Dome Light, Cab	EC10 Circuit Breaker Blown	Check roof relay module
176	521312	2	Electrical System	Dome Light, Cab	EC10 Circuit Breaker Not Powered	Check wiring to roof relay module EC10 circuit breaker. Contact dealer.
178	521186	1	Electrical System	Brake Lights, Cab Fwd	BK1 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521186	2	Electrical System	Brake Lights, Cab Fwd	BK1 Relay Coil shorted or failed relay driver	Replace relay
178	521186	3	Electrical System	Brake Lights, Cab Fwd	BK1 Relay Normally Open contact is open	Replace relay
178	521186	4	Electrical System	Brake Lights, Cab Fwd	BK1 Relay Normally Closed contact is open	Replace relay
178	521186	5	Electrical System	Brake Lights, Cab Fwd	BK1 Relay coil is not receiving power	Contact Dealer
178	521186	6	Electrical System	Brake Lights, Cab Fwd	BK1 Relay Normally open contact is shorted	Replace relay

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
178	521186	7	Electrical System	Brake Lights, Cab Fwd	BK1 Relay Normally closed contact is shorted	Replace relay
178	521194	1	Electrical System	High Beam, Engine Fwd	BK2 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521194	2	Electrical System	High Beam, Engine Fwd	BK2 Relay Coil shorted or failed relay driver	Replace relay
178	521194	3	Electrical System	High Beam, Engine Fwd	BK2 Relay Normally Open contact is open	Replace relay
178	521194	4	Electrical System	High Beam, Engine Fwd	BK2 Relay Normally Closed contact is open	Replace relay
178	521194	5	Electrical System	High Beam, Engine Fwd	BK2 Relay coil is not receiving power	Contact Dealer
178	521194	6	Electrical System	High Beam, Engine Fwd	BK2 Relay Normally open contact is shorted	Replace relay
178	521194	7	Electrical System	High Beam, Engine Fwd	BK2 Relay Normally closed contact is shorted	Replace relay
178	521202	1	Electrical System	Wiper, Cab Fwd	BK7 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521202	2	Electrical System	Wiper, Cab Fwd	BK7 Relay Coil shorted or failed relay driver	Replace relay
178	521202	3	Electrical System	Wiper, Cab Fwd	BK7 Relay Normally Open contact is open	Replace relay
178	521202	4	Electrical System	Wiper, Cab Fwd	BK7 Relay Normally Closed contact is open	Replace relay
178	521202	5	Electrical System	Wiper, Cab Fwd	BK7 Relay coil is not receiving power	Contact Dealer
178	521202	6	Electrical System	Wiper, Cab Fwd	BK7 Relay Normally open contact is shorted	Replace relay
178	521202	7	Electrical System	Wiper, Cab Fwd	BK7 Relay Normally closed contact is shorted	Replace relay
178	521210	1	Electrical System	Low Beam Lights, EF	BK5 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521210	2	Electrical System	Low Beam Lights, EF	BK5 Relay Coil shorted or failed relay driver	Replace relay

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
178	521210	3	Electrical System	Low Beam Lights, EF	BK5 Relay Normally Open contact is open	Replace relay
178	521210	4	Electrical System	Low Beam Lights, EF	BK5 Relay Normally Closed contact is open	Replace relay
178	521210	5	Electrical System	Low Beam Lights, EF	BK5 Relay coil is not receiving power	Contact Dealer
178	521210	6	Electrical System	Low Beam Lights, EF	BK5 Relay Normally open contact is shorted	Replace relay
178	521210	7	Electrical System	Low Beam Lights, EF	BK5 Relay Normally closed contact is shorted	Replace relay
178	521218	1	Electrical System	LH Turn Signal Lights	BK6 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521218	2	Electrical System	LH Turn Signal Lights	BK6 Relay Coil shorted or failed relay driver	Replace relay
178	521218	3	Electrical System	LH Turn Signal Lights	BK6 Relay Normally Open contact is open	Replace relay
178	521218	4	Electrical System	LH Turn Signal Lights	BK6 Relay Normally Closed contact is open	Replace relay
178	521218	5	Electrical System	LH Turn Signal Lights	BK6 Relay coil is not receiving power	Contact Dealer
178	521218	6	Electrical System	LH Turn Signal Lights	BK6 Relay Normally open contact is shorted	Replace relay
178	521218	7	Electrical System	LH Turn Signal Lights	BK6 Relay Normally closed contact is shorted	Replace relay
178	521226	1	Electrical System	RH Turn Signal Lights	BK3 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521226	2	Electrical System	RH Turn Signal Lights	BK3 Relay Coil shorted or failed relay driver	Replace relay
178	521226	3	Electrical System	RH Turn Signal Lights	BK3 Relay Normally Open contact is open	Replace relay
178	521226	4	Electrical System	RH Turn Signal Lights	BK3 Relay Normally Closed contact is open	Replace relay
178	521226	5	Electrical System	RH Turn Signal Lights	BK3 Relay coil is not receiving power	Contact Dealer

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
178	521226	6	Electrical System	RH Turn Signal Lights	BK3 Relay Normally open contact is shorted	Replace relay
178	521226	7	Electrical System	RH Turn Signal Lights	BK3 Relay Normally closed contact is shorted	Replace relay
178	521234	1	Electrical System	Hydraulic Selector 1/2	BK9 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521234	2	Electrical System	Hydraulic Selector 1/2	BK9 Relay Coil shorted or failed relay driver	Replace relay
178	521234	3	Electrical System	Hydraulic Selector 1/2	BK9 Relay Normally Open contact is open	Replace relay
178	521234	4	Electrical System	Hydraulic Selector 1/2	BK9 Relay Normally Closed contact is open	Replace relay
178	521234	5	Electrical System	Hydraulic Selector 1/2	BK9 Relay coil is not receiving power	Contact Dealer
178	521234	6	Electrical System	Hydraulic Selector 1/2	BK9 Relay Normally open contact is shorted	Replace relay
178	521234	7	Electrical System	Hydraulic Selector 1/2	BK9 Relay Normally closed contact is shorted	Replace relay
178	521242	1	Electrical System	Wiper, Engine Fwd	BK8 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521242	2	Electrical System	Wiper, Engine Fwd	BK8 Relay Coil shorted or failed relay driver	Replace relay
178	521242	3	Electrical System	Wiper, Engine Fwd	BK8 Relay Normally Open contact is open	Replace relay
178	521242	4	Electrical System	Wiper, Engine Fwd	BK8 Relay Normally Closed contact is open	Replace relay
178	521242	5	Electrical System	Wiper, Engine Fwd	BK8 Relay coil is not receiving power	Contact Dealer
178	521242	6	Electrical System	Wiper, Engine Fwd	BK8 Relay Normally open contact is shorted	Replace relay
178	521242	7	Electrical System	Wiper, Engine Fwd	BK8 Relay Normally closed contact is shorted	Replace relay
178	521250	1	Electrical System	Tail Lights, Cab Fwd	BK4 Relay coil open or not present	Check chassis module for missing relay. Replace relay.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
178	521250	2	Electrical System	Tail Lights, Cab Fwd	BK4 Relay Coil shorted or failed relay driver	Replace relay
178	521250	3	Electrical System	Tail Lights, Cab Fwd	BK4 Relay Normally Open contact is open	Replace relay
178	521250	4	Electrical System	Tail Lights, Cab Fwd	BK4 Relay Normally Closed contact is open	Replace relay
178	521250	5	Electrical System	Tail Lights, Cab Fwd	BK4 Relay coil is not receiving power	Contact Dealer
178	521250	6	Electrical System	Tail Lights, Cab Fwd	BK4 Relay Normally open contact is shorted	Replace relay
178	521250	7	Electrical System	Tail Lights, Cab Fwd	BK4 Relay Normally closed contact is shorted	Replace relay
178	521266	1	Electrical System	SPARE	BK11 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521266	2	Electrical System	SPARE	BK11 Relay Coil shorted or failed relay driver	Replace relay
178	521266	3	Electrical System	SPARE	BK11 Relay Normally Open contact is open	Replace relay
178	521266	4	Electrical System	SPARE	BK11 Relay Normally Closed contact is open	Replace relay
178	521266	5	Electrical System	SPARE	BK11 Relay coil is not receiving power	Contact Dealer
178	521266	6	Electrical System	SPARE	BK11 Relay Normally open contact is shorted	Replace relay
178	521266	7	Electrical System	SPARE	BK11 Relay Normally closed contact is shorted	Replace relay
178	521274	1	Electrical System	Wiper washer	BK12 Relay coil open or not present	Check chassis module for missing relay. Replace relay.
178	521274	2	Electrical System	Wiper washer	BK12 Relay Coil shorted or failed relay driver	Replace relay
178	521274	3	Electrical System	Wiper washer	BK12 Relay Normally Open contact is open	Replace relay
178	521274	4	Electrical System	Wiper washer	BK12 Relay Normally Closed contact is open	Replace relay

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
178	521274	5	Electrical System	Wiper washer	BK12 Relay coil is not receiving power	Contact Dealer
178	521274	6	Electrical System	Wiper washer	BK12 Relay Normally open contact is shorted	Replace relay
178	521274	7	Electrical System	Wiper washer	BK12 Relay Normally closed contact is shorted	Replace relay
178	521315	1	Electrical System	Brake Lights, Cab Fwd	BF1 Fuse Blown	Replace blown fuse in chassis relay module.
178	521315	2	Electrical System	Brake Lights, Cab Fwd	BF1 Fuse Not Powered	Contact Dealer
178	521318	1	Electrical System	Tail Lights, Cab Fwd	BF2 Fuse Blown	Replace blown fuse in chassis relay module.
178	521318	2	Electrical System	Tail Lights, Cab Fwd	BF2 Fuse Not Powered	Contact Dealer
178	521321	1	Electrical System	Wiper, Cab Fwd	BF3 Fuse Blown	Replace blown fuse in chassis relay module.
178	521321	2	Electrical System	Wiper, Cab Fwd	BF3 Fuse Not Powered	Contact Dealer
178	521324	1	Electrical System	High Beam Lights, EF	BF4 Fuse Blown	Replace blown fuse in chassis relay module.
178	521324	2	Electrical System	High Beam Lights, EF	BF4 Fuse Not Powered	Contact Dealer
178	521327	1	Electrical System	Wiper, EF	BF5 Fuse Blown	Replace blown fuse in chassis relay module.
178	521327	2	Electrical System	Wiper, EF	BF5 Fuse Not Powered	Contact Dealer
178	521330	1	Electrical System	LH Turn Signal Lights	BF6 Fuse Blown	Replace blown fuse in chassis relay module.
178	521330	2	Electrical System	LH Turn Signal Lights	BF6 Fuse Not Powered	Contact Dealer
178	521333	1	Electrical System	RH Turn Signal Lights	BF7 Fuse Blown	Replace blown fuse in chassis relay module.
178	521333	2	Electrical System	RH Turn Signal Lights	BF7 Fuse Not Powered	Contact Dealer

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
178	521336	1	Electrical System	Low Beam Lights, EF	BF8 Fuse Blown	Replace blown fuse in chassis relay module.
178	521336	2	Electrical System	Low Beam Lights, EF	BF8 Fuse Not Powered	Contact Dealer
190	444	1	Electrical System	Console 12V Low	The +12V input is below the minimum operation voltage	Contact Dealer
190	1043	2	Electrical System	Console 2.5V Low	Failure of the 2.5V A/D converter reference voltage.	Check console wiring for damage. Contact dealer.
190	2662	3	Electrical System	Throttle Voltage High	Throttle input has a voltage too high.	Check console wiring for damage. Contact dealer.
190	2662	4	Electrical System	Throttle Voltage Low	Throttle input has a voltage too low	Check console wiring for damage. Contact dealer.
190	3509	2	Electrical System	Console 5V Low	The 5V internal voltage has fallen below 4.5V.	Check console wiring for damage. Contact dealer.
190	521392	3	Electrical System	LH Turn Signal	Switch Error	Check switch for damage or binding. Contact dealer.
190	521393	3	Electrical System	RH Turn Signal	Switch Error	Check switch for damage or binding. Contact dealer.
190	521394	3	Electrical System	Hazard	Switch Error	Check switch for damage or binding. Contact dealer.
190	521395	3	Electrical System	DWA/Swath Roller Up	Switch Error	Check switch for damage or binding. Contact dealer.
190	521396	3	Electrical System	DWA/Swath Roller Dn	Switch Error	Check switch for damage or binding. Contact dealer.
190	521397	3	Electrical System	Deck Shift Right	Switch Error	Check switch for damage or binding. Contact dealer.
190	521398	3	Electrical System	Deck Shift Center	Switch Error	Check switch for damage or binding. Contact dealer.
190	521399	3	Electrical System	Deck Shift Left	Switch Error	Check switch for damage or binding. Contact dealer.
190	521400	3	Electrical System	Draper Speed Decrease	Switch Error	Check switch for damage or binding. Contact dealer.
190	521401	3	Electrical System	Draper Speed Increase	Switch Error	Check switch for damage or binding. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
190	521402	3	Electrical System	Road Lights	Switch Error	Check switch for damage or binding. Contact dealer.
190	521403	3	Electrical System	High Beam	Switch Error	Check switch for damage or binding. Contact dealer.
190	521404	3	Electrical System	F1 Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521405	3	Electrical System	Beacons	Switch Error	Check switch for damage or binding. Contact dealer.
190	521406	3	Electrical System	Clearance Lights	Switch Error	Check switch for damage or binding. Contact dealer.
190	521407	3	Electrical System	Wiper EF	Switch Error	Check switch for damage or binding. Contact dealer.
190	521408	3	Electrical System	Washer	Switch Error	Check switch for damage or binding. Contact dealer.
190	521409	3	Electrical System	Wiper CF	Switch Error	Check switch for damage or binding. Contact dealer.
190	521410	3	Electrical System	Field Lights	Switch Error	Check switch for damage or binding. Contact dealer.
190	521411	3	Electrical System	F2 Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521412	3	Electrical System	AC Fan Spd Decrease	Switch Error	Check switch for damage or binding. Contact dealer.
190	521413	3	Electrical System	AC Fan Spd Increase	Switch Error	Check switch for damage or binding. Contact dealer.
190	521414	3	Electrical System	AC Recirc	Switch Error	Check switch for damage or binding. Contact dealer.
190	521415	3	Electrical System	F3 Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521416	3	Electrical System	F4 Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521417	3	Electrical System	AC On/Off	Switch Error	Check switch for damage or binding. Contact dealer.
190	521418	3	Electrical System	AC Defrost	Switch Error	Check switch for damage or binding. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
190	521419	3	Electrical System	AC Auto Fan Spd	Switch Error	Check switch for damage or binding. Contact dealer.
190	521420	3	Electrical System	AC Cold	Switch Error	Check switch for damage or binding. Contact dealer.
190	521421	3	Electrical System	AC Hot	Switch Error	Check switch for damage or binding. Contact dealer.
190	521422	3	Electrical System	Horn	Switch Error	Check switch for damage or binding. Contact dealer.
190	521423	3	Electrical System	EEC Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521424	3	Electrical System	F5 Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521425	3	Electrical System	F6 Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521426	3	Electrical System	Header Stop NC	Switch Error	Check switch for damage or binding. Contact dealer.
190	521427	3	Electrical System	Header Reverse	Switch Error	Check switch for damage or binding. Contact dealer.
190	521429	3	Electrical System	Operator Present	Switch Error	Check switch for damage or binding. Contact dealer.
190	521430	3	Electrical System	Keyswitch - Ignition	Switch Error	Check switch for damage or binding. Contact dealer.
190	521431	3	Electrical System	Keyswitch - Accessory	Switch Error	Check switch for damage or binding. Contact dealer.
190	521432	3	Electrical System	Keyswitch - Crank	Switch Error	Check switch for damage or binding. Contact dealer.
190	521433	3	Electrical System	Door Switches	Switch Error	Check switch for damage or binding. Contact dealer.
190	521434	3	Electrical System	Throttle	Switch Error	Check switch for damage or binding. Contact dealer.
190	521435	3	Electrical System	Batt Disc. Close	Switch Error	Check switch for damage or binding. Contact dealer.
190	521436	3	Electrical System	Horn	Switch Error	Check switch for damage or binding. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
190	521438	3	Electrical System	AutoSteer Engage	Switch Error	Check switch for damage or binding. Contact dealer.
190	521439	3	Electrical System	A Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521440	3	Electrical System	B Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521441	3	Electrical System	C Button	Switch Error	Check switch for damage or binding. Contact dealer.
190	521442	3	Electrical System	Select	Switch Error	Check switch for damage or binding. Contact dealer.
190	521443	3	Electrical System	Escape	Switch Error	Check switch for damage or binding. Contact dealer.
190	521444	3	Electrical System	Autosteer	Switch Error	Check switch for damage or binding. Contact dealer.
190	521445	3	Electrical System	Tilt Extend	Switch Error	Check switch for damage or binding. Contact dealer.
190	521446	3	Electrical System	Tilt Retract	Switch Error	Check switch for damage or binding. Contact dealer.
190	521447	3	Electrical System	Header Raise 1	Switch Error	Check switch for damage or binding. Contact dealer.
190	521448	3	Electrical System	Header Raise 2	Switch Error	Check switch for damage or binding. Contact dealer.
190	521449	3	Electrical System	Header Lower 1	Switch Error	Check switch for damage or binding. Contact dealer.
190	521450	3	Electrical System	Header Lower 2	Switch Error	Check switch for damage or binding. Contact dealer.
190	521451	3	Electrical System	Reel/Knf Spd -	Switch Error	Check switch for damage or binding. Contact dealer.
190	521452	3	Electrical System	Reel/Knf Spd +	Switch Error	Check switch for damage or binding. Contact dealer.
190	521453	3	Electrical System	Reel Fore	Switch Error	Check switch for damage or binding. Contact dealer.
190	521454	3	Electrical System	Reel Aft	Switch Error	Check switch for damage or binding. Contact dealer.

Fault Codes			Telltale	Short Description	Full Fault Description	Recommended Fix/Check Message
SA	SPN	FMI				
190	521455	3	Electrical System	Reel Raise	Switch Error	Check switch for damage or binding. Contact dealer.
190	521456	3	Electrical System	Reel Lower	Switch Error	Check switch for damage or binding. Contact dealer.
190	521457	3	Electrical System	GSL Shift Switch	Switch Error	Check switch for damage or binding. Contact dealer.
190	521459	3	Electrical System	Wheel Position	Switch Error	Check switch for damage or binding. Contact dealer.
190	524129	31	Electrical System	GSL Handle Offline	Communications lost with the GSL Handle.	Contact Dealer
190	524130	31	Electrical System	GSL Button Stuck	There is a stuck button on the handle at power up.	Check GSL switches for failure or binding. Contact dealer.
190	524131	31	Electrical System	Console Button Stuck	There is a stuck button on the console at power up.	Check console switches for failure or binding. Contact dealer.
190	524265	6	Electrical System	Horn Current High	The horn output is drawing more than 6A.	Contact Dealer

8.4 Engine Fault Codes

Example: Harvest Performance Tracker (HPT) displays the Fault Code 629S 16F 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 is occurrences, 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.

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
27	4	Check Engine	Amber	2272	Engine Exhaust Gas	EGR Valve Position Circuit - Voltage below normal, or shorted to low source
51	3	Check Engine	None	6497	Engine Intake Throttle Actuator Position Sensor Circuit	Engine Intake Throttle Actuator Position Sensor Circuit - Voltage above normal, or shorted to high source
51	4	Check Engine	None	6498	Engine Intake Throttle Actuator Position Sensor Circuit	Engine Intake Throttle Actuator Position Sensor Circuit - Voltage above normal, or shorted to low source
84	2	Check Engine	Amber	241	Wheel-Based Vehicle Speed	Wheel-Based Vehicle Speed - Data is erratic, intermittent, or incorrect
91	0	Stop Engine	Red	148	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 - Data valid but above normal operational range - Most Severe Level
91	1	Stop Engine	Red	147	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position 1 Sensor Circuit Frequency - Data valid but below normal operating range
91	2	Stop Engine	Red	1242	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 - Data is erratic, intermittent, or incorrect
91	3	Check Engine	Amber	1358	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source
91	4	Check Engine	Amber	1359	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
91	9	Stop Engine	Red	3326	Accelerator Pedal Position 1	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal update rate

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
91	19	Stop Engine	Red	1515	Accelerator Pedal Position 1	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received network data in error
94	3	Check Engine	Amber	546	Engine Fuel Delivery Pressure	Fuel Delivery Pressure Sensor Circuit - Voltage above normal, or shorted to high source
94	4	Check Engine	Amber	547	Engine Fuel Delivery Pressure	Fuel Delivery Pressure Sensor Circuit - Voltage below normal, or shorted to low source
95	16	Check Engine	Amber	2372	Engine Fuel Filter Differential Pressure	Fuel Filter Differential Pressure - Data valid but above normal operating range - Moderately Severe Level
97	3	Check Engine	Amber	428	Water In Fuel Indicator	Water in Fuel Indicator Sensor Circuit - Voltage above normal, or shorted to high source
97	4	Check Engine	Amber	429	Water In Fuel Indicator	Water in Fuel Indicator Sensor Circuit - Voltage below normal, or shorted to low source
97	15	Water in Fuel	Amber (Blinking)	418	Water In Fuel Indicator	Water in Fuel Indicator - Data valid but above normal operating range - Least Severe Level
97	16	Water in Fuel	Amber	1852	Water In Fuel Indicator	Water in Fuel Indicator - Data valid but above normal operating range - Moderately Severe Level
100	1	Eng Oil Press	Red	415	Engine Oil Pressure	Engine Oil Rifle Pressure - Data valid but below normal operational range - Most Severe Level
100	2	Check Engine	Amber	435	Engine Oil Pressure	Engine Oil Rifle Pressure - Data is erratic, intermittent, or incorrect
100	3	Check Engine	Amber	135	Engine Oil Pressure	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage above normal, or shorted to high source
100	4	Check Engine	Amber	141	Engine Oil Pressure	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage below normal, or shorted to low source
100	18	Check Engine	Amber	143	Engine Oil Pressure	Engine Oil Rifle Pressure - Data valid but below normal operating range - Moderately Severe Level
101	0	Stop Engine	Red	556	Engine Crankcase Pressure	Crankcase Pressure - Data valid but above normal operational range - Most Severe Level
101	2	Check Engine	Amber	1942	Engine Crankcase Pressure	Crankcase Pressure - Data is erratic, intermittent, or incorrect
101	3	Check Engine	Amber	1843	Engine Crankcase Pressure	Crankcase Pressure Circuit - Voltage above normal, or shorted to high source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
101	4	Check Engine	Amber	1844	Engine Crankcase Pressure	Crankcase Pressure Circuit - Voltage below normal, or shorted to low source
101	15	Check Engine	Amber (Blinking)	1974	Engine Crankcase Pressure	Crankcase Pressure - Data valid but above normal operating range - Least Severe Level
101	16	Check Engine	Amber	555	Engine Crankcase Pressure	Crankcase Pressure - Data valid but above normal operating range - Moderately Severe Level
102	3	Check Engine	Amber	122	Engine Intake Manifold #1 Pressure	Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
102	4	Check Engine	Amber	123	Engine Intake Manifold #1 Pressure	Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
103	15	Check Engine	None	2288	Engine Turbocharger 1 Speed	Turbocharger 1 Speed - Data valid but above normal operating range - Least Severe Level
103	16	Check Engine	Amber	595	Engine Turbocharger 1 Speed	Turbocharger 1 Speed - Data valid but above normal operating range - Moderately Severe Level
103	18	Check Engine	Amber	687	Engine Turbocharger 1 Speed	Turbocharger 1 Speed - Data valid but below normal operating range - Moderately Severe Level
105	0	Check Engine	Red	155	Engine Intake Manifold 1	Intake Manifold 1 Temperature - Data valid but above normal operational range - Most Severe Level
105	3	Check Engine	Amber	153	Engine Intake Manifold 1	Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal, or shorted to high source
105	4	Check Engine	Amber	154	Engine Intake Manifold 1	Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal, or shorted to low source
105	15	Check Engine	None	2964	Engine Intake Manifold #1	Intake Manifold 1 Temperature - Data valid but above normal operating range - Least Severe Level
105	16	Check Engine	Amber	488	Engine Intake Manifold	Intake Manifold 1 Temperature - Data valid but above normal operating range - Moderately Severe Level
107	15	Eng Air Filter	Amber	5576	Engine Air Filter 1 Differential Pressure	Engine Air Filter Differential Pressure - Data valid but above normal operating range - Least Severe Level

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
107	16	Eng Air Filter	Amber	3341	Engine Air Filter 1 Differential Pressure	Engine Air Filter Differential Pressure - Data valid but above normal operating range - Moderately Severe Level
110	0	Eng coolant temp	Red	151	Engine Coolant Temperature	Engine Coolant Temperature - Data valid but above normal operational range - Most Severe Level
110	3	Check Engine	Amber	144	Engine Coolant Temperature	Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal, or shorted to high source
110	4	Check Engine	Amber	145	Engine Coolant Temperature	Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal, or shorted to low source
110	16	Eng coolant temp	Amber	146	Engine Coolant Temperature	Engine Coolant Temperature - Data valid but above normal operating range - Moderately Severe Level
110	31	Check Engine	None	2659	Engine Coolant Temperature	Engine Coolant Temperature - Condition exists
111	1	Coolant Level	Red	235	Engine Coolant Level	Coolant Level - Data valid but below normal operational range - Most Severe Level
111	3	Check Engine	None	6522	Engine Coolant Level	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source
111	4	Check Engine	None	6523	Engine Coolant Level	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source
111	17	Coolant Level	Amber (Blinking)	2448	Engine Coolant Level	Coolant Level - Data valid but below normal operating range - Least Severe Level
111	18	Coolant Level	Amber	197	Engine Coolant Level	Coolant Level - Data valid but below normal operating range - Moderately Severe Level
157	0	Stop Engine	Red	449	Engine Injector Metering Rail 1	Injector Metering Rail 1 Pressure - Data valid but above normal operational range - Most Severe Level
157	3	Check Engine	Amber	451	Engine Injector Metering Rail 1	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
157	4	Check Engine	Amber	452	Engine Injector Metering Rail 1	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
157	16	Check Engine	Amber	553	Engine Injector Metering Rail 1	Injector Metering Rail 1 Pressure - Data valid but above normal operating range - Moderately Severe Level

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
157	18	Check Engine	Amber	559	Engine Injector Metering Rail 1	Injector Metering Rail 1 Pressure - Data valid but below normal operating range - Moderately Severe Level
168	15	Battery	None	6256	Battery Potential / Power Input 1	Battery 1 Voltage - Data valid but above normal operating range - Moderately Severe Level
168	16	Battery	Amber	442	Battery Potential / Power Input 1	Battery 1 Voltage - Data valid but above normal operating range - Moderately Severe Level
168	17	Battery	None	6257	Battery Potential / Power Input 1	Battery 1 Voltage - Data valid but below normal operating range - Moderately Severe Level
168	18	Check Engine	Amber	249	Battery Potential / Power Input 1	Battery 1 Voltage - Data valid but below normal operating range - Moderately Severe Level
175	3	Check Engine	None	689	Engine Oil Temperature 1	Engine Oil Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
175	4	Check Engine	None	6525	Engine Oil Temperature 1	Engine Oil Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source
190	0	Stop Engine	Red	234	Engine Speed	Engine Crankshaft Speed/Position - Data valid but above normal operational range - Most Severe Level
190	2	Check Engine	None	2321	Engine Speed	Engine Crankshaft Speed/Position - Data is erratic, intermittent, or incorrect
190	16	Check Engine	Amber	2468	Engine Speed	Engine Crankshaft Speed/Position - Data valid but above normal operating range - Moderately Severe Level
237	13	Check Engine	Amber	4517	Vehicle Identification Number	Vehicle Identification Number - Out of Calibration
411	2	Check Engine	Amber	1866	Engine Exhaust Gas	Exhaust Gas Recirculation Differential Pressure - Data is erratic, intermittent, or incorrect
411	3	Check Engine	Amber	2273	Engine Exhaust Gas Recirculation 1 Differential Pressure	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above normal, or shorted to high source
411	4	Check Engine	Amber	2274	Engine Exhaust Gas Recirculation 1 Differential Pressure	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below normal, or shorted to low source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
412	3	Check Engine	Amber	2375	Engine Exhaust Gas	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal, or shorted to high source
412	4	Check Engine	Amber	2376	Engine Exhaust Gas	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal, or shorted to low source
412	15	Check Engine	None	2961	Engine Exhaust Gas	Exhaust Gas Recirculation Temperature - Data valid but above normal operating range - Least Severe Level
412	16	Check Engine	Amber	2962	Engine Exhaust Gas	Exhaust Gas Recirculation Temperature - Data valid but above normal operating range - Moderately Severe Level
441	3	Check Engine	Amber	293	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 Circuit - Voltage above normal, or shorted to high source
441	4	Check Engine	Amber	294	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 Circuit - Voltage below normal, or shorted to low source
441	14	Check Engine	Amber	6583	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 - Special Instructions
558	2	Check Engine	Amber	431	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch - Data is erratic, intermittent, or incorrect
558	13	Stop Engine	Red	432	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch Circuit - Out of Calibration
558	19	Stop Engine	Red	3527	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch - Received Network Data In Error
563	9	Check Engine	Amber	3488	Anti-Lock Braking (ABS) Active	Anti-Lock Braking (ABS) Controller - Abnormal update rate
563	31	Check Engine	None	4215	Anti-Lock Braking (ABS) Active	Anti-Lock Braking (ABS) Active - Condition Exists
612	2	Stop Engine	Red	115	System Diagnostic Code #2	Engine Magnetic Speed/Position Lost Both of Two Signals - Data is erratic, intermittent, or incorrect
625	9	Stop Engine	Red	291	Proprietary Datalink	Proprietary Datalink Error (OEM/ Vehicle Datalink) - Abnormal update rate
629	12	Check Engine	Amber	343	Controller #1	Engine Control Module Warning Internal Hardware Failure - Bad intelligent device or component
630	12	Stop Engine	Red	3697	Engine Control Module Calibration Memory	Engine Control Module Calibration Memory - Bad intelligent device or component

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
633	31	Check Engine	Amber	2311	Engine Fuel Actuator 1 Control Command	Electronic Fuel Injection Control Valve Circuit - Condition exists
639	9	Check Engine	Amber	285	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate
639	13	Check Engine	Amber	286	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	SAE J1939 Multiplexing Configuration Error - Out of Calibration
641	7	Check Engine	Amber	2387	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit (Motor) - Mechanical system not responding or out of adjustment
641	9	Check Engine	Amber	1894	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit - Abnormal update rate
641	11	Check Engine	Amber	2198	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit - Root cause not known
641	12	Stop Engine	Red	2634	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Controller - Bad intelligent device or component
641	13	Stop Engine	Red	2449	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Controller - Out of Calibration
641	15	Check Engine	None	1976	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Over Temperature (Calculated) - Data valid but above normal operating range - Least Severe Level
641	31	Stop Engine	Red	2635	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit - Condition exists
644	2	Check Engine	Amber	237	Engine External Speed Command Input	External Speed Command Input (Multiple Unit Synchronization) - Data is erratic, intermittent, or incorrect
647	3	Check Engine	None	6263	Engine Fan Clutch 1 Output Device Driver	Fan Control Circuit - Voltage above normal, or shorted to high source
647	4	Check Engine	None	6264	Engine Fan Clutch 1 Output Device Driver	Fan Control Circuit - Voltage below normal, or shorted to low source
651	5	Check Engine	Amber	322	Engine Injector Cylinder #01	Injector Solenoid Driver Cylinder 1 Circuit - Current below normal or open circuit
652	5	Check Engine	Amber	331	Engine Injector Cylinder #02	Injector Solenoid Driver Cylinder 2 Circuit - Current below normal or open circuit
652	7	Check Engine	Amber	1141	Engine Injector Cylinder #02	Injector Solenoid Driver Cylinder 2 - Mechanical system not responding or out of adjustment

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
653	5	Check Engine	Amber	324	Engine Injector Cylinder #03	Injector Solenoid Driver Cylinder 3 Circuit - Current below normal or open circuit
653	7	Check Engine	Amber	1142	Engine Injector Cylinder #03	Injector Solenoid Driver Cylinder 3 - Mechanical system not responding or out of adjustment
654	5	Check Engine	Amber	332	Engine Injector Cylinder #04	Injector Solenoid Driver Cylinder 4 Circuit - Current below normal or open circuit
654	7	Check Engine	Amber	1143	Engine Injector Cylinder #04	Injector Solenoid Driver Cylinder 4 - Mechanical system not responding or out of adjustment
677	3	Check Engine	Amber	584	Engine Starter Motor Relay	Starter Relay Driver Circuit - Voltage above normal, or shorted to high source
677	4	Check Engine	Amber	585	Engine Starter Motor Relay	Starter Relay Driver Circuit - Voltage below normal, or shorted to low source
697	3	Check Engine	Amber	2557	Auxiliary PWM Driver #1	Auxiliary PWM Driver 1 Circuit - Voltage above normal, or shorted to high source
697	4	Check Engine	Amber	2558	Auxiliary PWM Driver #1	Auxiliary PWM Driver 1 Circuit - Voltage below normal, or shorted to low source
701	14	Stop Engine	Red	4734	Auxiliary I/O #01	Auxiliary Input/Output 1 - Special Instructions
723	2	Check Engine	None	2322	Engine Speed 2	Engine Camshaft Speed / Position Sensor - Data is erratic, intermittent, or incorrect
723	7	Check Engine	Amber	731	Engine Speed 2	Engine Speed / Position Camshaft and Crankshaft Misalignment - Mechanical system not responding or out of adjustment
729	3	Check Engine	None	6556	Engine Intake Air Heater Driver #1	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source
729	4	Check Engine	None	6557	Engine Intake Air Heater Driver #1	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source
748	9	Check Engine	Amber	3641	Transmission Output Retarder	Transmission Output Retarder - Abnormal update rate
862	3	Check Engine	None	6336	Crankcase breather Heater Circuit	Crankcase Breather Filter Heater Circuit - Voltage above normal, or shorted to high source
862	4	Check Engine	None	6337	Crankcase breather Heater Circuit	Crankcase Breather Filter Heater Circuit - Voltage below normal, or shorted to low source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
974	3	Stop Engine	Red	133	Remote Accelerator Pedal Position	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source
974	4	Stop Engine	Red	134	Remote Accelerator Pedal Position	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
974	19	Stop Engine	Red	288	Remote Accelerator Pedal Position	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Position Sensor System - Received network data in error
976	2	Check Engine	None	6563	PTO Governor State	Auxiliary Intermediate (PTO) Speed Switch Validation - Data is erratic, intermittent, or incorrect
1072	3	Check Engine	None	6418	Engine (Compression) Brake Output #1	Engine Brake Actuator Driver 1 Circuit - Voltage above normal, or shorted to high source
1072	4	Check Engine	None	6419	Engine (Compression) Brake Output #1	Engine Brake Actuator Driver 1 Circuit - Voltage below normal, or shorted to low source
1073	3	Check Engine	None	6421	Engine (Compression) Brake Output #2	Engine Brake Actuator Driver Output 2 Circuit - Voltage above normal, or shorted to high source
1073	4	Check Engine	None	6422	Engine (Compression) Brake Output #2	Engine Brake Actuator Driver Output 2 Circuit - Voltage below normal, or shorted to low source
1075	3	Check Engine	None	6258	Engine Electric Lift Pump for Engine Fuel Supply	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage above normal, or shorted to high source
1075	4	Check Engine	None	6259	Engine Electric Lift Pump for Engine Fuel Supply	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage below normal, or shorted to low source
1081	9	Check Engine	Amber	3555	Engine Wait to Start Lamp	Engine Wait to Start Lamp - Abnormal update rate
1172	3	Check Engine	Amber	691	Engine Turbocharger 1 Compressor Intake Temperature	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source
1172	4	Check Engine	Amber	692	Engine Turbocharger 1 Compressor Intake Temperature	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage below normal, or shorted to low source
1176	2	Check Engine	Amber	743	Engine Turbocharger 1 Compressor Intake Pressure	Turbocharger 1 Compressor Intake Pressure - Data is erratic, intermittent, or incorrect

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
1176	3	Check Engine	Amber	741	Engine Turbocharger 1 Compressor Intake Pressure	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage above normal, or shorted to high source
1176	4	Check Engine	Amber	742	Engine Turbocharger 1 Compressor Intake Pressure	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage below normal, or shorted to low source
1194	13	Stop Engine	Red	3298	Anti-theft Encryption Seed Present Indicator	Anti-theft Encryption Seed - Out of Calibration
1209	2	Check Engine	Amber	2554	Engine Exhaust Gas Pressure 1	Exhaust Gas Pressure 1 - Data is erratic, intermittent, or incorrect
1209	3	Check Engine	Amber	2373	Engine Exhaust Gas Pressure 1	Exhaust Gas Pressure Sensor 1 Circuit - Voltage above normal, or shorted to high source
1209	4	Check Engine	Amber	2374	Engine Exhaust Gas Pressure 1	Exhaust Gas Pressure Sensor 1 Circuit - Voltage below normal, or shorted to low source
1231	2	Check Engine	None	3329	J1939 Network #2	J1939 Network #2 - Data is erratic, intermittent, or incorrect
1235	2	Check Engine	None	3331	J1939 Network #3	J1939 Network #3 - Data is erratic, intermittent, or incorrect
1323	31	Check Engine	Amber	1654	Engine Misfire Cylinder #1	Engine Misfire Cylinder 1 - Condition exists
1324	31	Check Engine	Amber	1655	Engine Misfire Cylinder #2	Engine Misfire Cylinder 2 - Condition exists
1325	31	Check Engine	Amber	1656	Engine Misfire Cylinder #3	Engine Misfire Cylinder 3 - Condition exists
1326	31	Check Engine	Amber	1657	Engine Misfire Cylinder #4	Engine Misfire Cylinder 4 - Condition exists
1347	3	Check Engine	Amber	272	Engine Fuel Pump Pressurizing Assembly #2	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage above normal, or shorted to high source
1347	4	Check Engine	Amber	271	Engine Fuel Pump Pressurizing Assembly #1	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage below normal, or shorted to low source
1347	7	Check Engine	Amber	281	Engine Fuel Pump Pressurizing Assembly #3	Engine Fuel Pump Pressurizing Assembly 1 - Mechanical system not responding or out of adjustment
1349	3	Check Engine	Amber	483	Engine Injector Metering Rail 2 Pressure	Injector Metering Rail 2 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
1378	31	Check Engine	Amber (Blinking)	649	Engine Oil Change Interval	Engine Oil Change Interval - Condition exists

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
1388	3	Check Engine	Amber	297	Auxiliary Pressure #2	Auxiliary Pressure Sensor Input 2 Circuit - Voltage above normal, or shorted to high source
1388	4	Check Engine	Amber	298	Auxiliary Pressure #2	Auxiliary Pressure Sensor Input 2 Circuit - Voltage below normal, or shorted to low source
1388	14	Check Engine	Amber	6584	Auxiliary Pressure #2	Auxiliary Pressure Sensor Input 2 - Special Instructions
1569	31	Check Engine	Amber	3714	Engine Protection Torque Derate	Engine Protection Torque Derate - Condition exists
1639	0	Check Engine	Amber	4789	Fan Speed	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level
1639	1	Check Engine	Amber	4791	Fan Speed	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level
1639	2	Check Engine	None	6469	Fan Speed	Fan Speed – Data is erratic, intermittent, or incorrect
1639	15	Check Engine	None	6467	Fan Speed	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level
1639	17	Check Engine	None	6468	Fan Speed	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level
1668	2	Check Engine	None	4437	J1939 Network #4 - Data erratic	J1939 Network #4 - Data is erratic, intermittent, or incorrect
1675	31	Check Engine	None	3737	Engine Starter Mode	Engine Starter Mode Overcrank Protection - Condition exists
1761	1	DEF	Amber	1673	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data valid but below normal operational range - Most Severe Level
1761	3	Check Engine	Amber	1669	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage above normal, or shorted to high source
1761	4	Check Engine	Amber	1668	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage below normal, or shorted to low source
1761	9	Check Engine	Amber	4677	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate
1761	10	Check Engine	Amber	4769	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Abnormal rate of change
1761	11	Check Engine	None	6562	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Root cause not known

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
1761	13	Check Engine	None	6526	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Out of Calibration
1761	17	DEF	Amber (Blinking)	3497	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data valid but below normal operating range - Least Severe Level
1761	18	DEF	Amber (Blinking)	3498	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data valid but below normal operating range - Moderately Severe Level
2623	3	Check Engine	Amber	1239	Accelerator Pedal #1 Channel 2	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal, or shorted to high source
2623	4	Check Engine	Amber	1241	Accelerator Pedal #1 Channel 2	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below normal, or shorted to low source
2789	15	Check Engine	None	2346	Engine Turbocharger 1 Calculated Turbine Intake Temperature	Turbocharger Turbine Intake Temperature - Data valid but above normal operating range - Least Severe
2791	5	Check Engine	Amber	2349	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit - Current below normal or open circuit
2791	6	Check Engine	Amber	2353	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit - Current above normal or grounded circuit
2791	7	Check Engine	None	6555	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit - Mechanical system not responding or out of adjustment
2791	13	Check Engine	Amber	1896	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Controller - Out of Calibration
2791	15	Check Engine	Amber	1961	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit Over Temperature - Data valid but above normal operating range - Least Severe Level
3031	2	Check Engine	Amber	1679	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Data is erratic, intermittent, or incorrect
3031	3	Check Engine	Amber	1678	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage above normal, or shorted to high source
3031	4	Check Engine	None	6559	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage below normal, or shorted to low source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
3031	9	Check Engine	Amber	4572	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Abnormal Update Rate
3216	2	Check Engine	Amber	3228	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data is erratic, intermittent, or incorrect
3216	4	Check Engine	Amber	1885	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor Circuit - Voltage below normal, or shorted to low source
3216	9	Check Engine	Amber	3232	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Abnormal update rate
3216	10	Check Engine	None	6621	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Abnormal rate of change
3216	13	Check Engine	Amber	3718	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx - Out of Calibration
3216	16	Check Engine	Amber	3726	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx - Data valid but above normal operating range - Moderately Severe Level
3216	20	Check Engine	None	6458	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High
3216	21	Check Engine	None	6459	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High
3218	2	Check Engine	Amber	3682	Aftertreatment 1 Intake Gas Sensor Power Status	Aftertreatment 1 Intake NOx Sensor Power Supply - Data is erratic, intermittent, or incorrect
3226	2	Check Engine	None	6464	Aftertreatment 1 Intake NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
3226	4	Check Engine	None	6521	Aftertreatment Outlet NOx Sensor Circuits	Aftertreatment Outlet NOx Sensor Circuit- Voltage below normal or shorted to low source
3226	9	Check Engine	Amber	2771	Aftertreatment 1 Intake NOx	Aftertreatment 1 Outlet NOx Sensor - Abnormal update rate
3226	10	Check Engine	None	6565	Aftertreatment 1 Intake NOx	Aftertreatment 1 Outlet NOx Sensor - Abnormal rate of change
3226	13	Check Engine	Amber	3717	Aftertreatment 1 Intake NOx	Aftertreatment 1 Outlet NOx Sensor - Out of Calibration
3226	20	Check Engine	None	6462	Aftertreatment 1 Intake NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
3226	21	Check Engine	None	6463	Aftertreatment 1 Intake NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
3228	2	Check Engine	None	6582	Aftertreatment 1 Outlet Gas Sensor Power Status	Aftertreatment 1 Outlet NOx Sensor Power Supply - Data is erratic, intermittent, or incorrect
3361	2	Check Engine	Amber	2976	Aftertreatment 1 Diesel Exhaust Fluid Supply Module	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Temperature - Data is erratic, intermittent, or incorrect
3361	3	Check Engine	Amber	3558	Aftertreatment 1 Diesel Exhaust Fluid Supply Module	Aftertreatment 1 Diesel Exhaust Fluid Supply Module - Voltage above normal, or shorted to high source
3361	4	Check Engine	Amber	3559	Aftertreatment 1 Diesel Exhaust Fluid Supply Module	Aftertreatment 1 Diesel Exhaust Fluid Supply Module - Voltage below normal, or shorted to low source
3362	31	Check Engine	Amber	1682	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Input Lines	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Input Lines - Condition exists
3363	3	Check Engine	None	6479	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage above normal, or shorted to high source
3363	4	Check Engine	None	6481	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage below normal, or shorted to low source
3363	7	Check Engine	None	6475	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Mechanical system not responding or out of adjustment
3363	16	Check Engine	Amber	1713	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
3363	18	Check Engine	None	6476	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
3364	1	Check Engine	Amber	3866	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data valid but below normal operational range - Most Severe Level
3364	2	Check Engine	Amber	3878	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data is erratic, intermittent, or incorrect
3364	3	Check Engine	Amber	1686	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage above normal, or shorted to high source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
3364	4	Check Engine	Amber	1685	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage below normal, or shorted to low source
3364	5	Check Engine	Amber	4741	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current below normal or open circuit
3364	6	Check Engine	Amber	4742	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current above normal or grounded circuit
3364	7	Check Engine	Amber	3876	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor - Mechanical system not responding or out of adjustment
3364	9	Check Engine	Amber	3868	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal update rate
3364	10	Check Engine	Amber	4277	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal rate of change
3364	11	Check Engine	Amber	1715	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Root cause not known
3364	13	Check Engine	Amber	1714	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Out of Calibration
3364	15	Check Engine	None	4842	Aftertreatment Diesel Exhaust Fluid Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data valid but above normal operating range - Least Severe Level
3364	18	Check Engine	None	6752	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data valid but below normal operating range - Moderate Severe Level
3364	19	Check Engine	Amber	4241	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Received network data in error
3464	3	Check Engine	None	6493	Electronic Throttle Control Actuator Driver Circuit	Electronic Throttle Control Actuator Driver Circuit - Voltage above normal, or shorted to high source
3464	4	Check Engine	None	6494	Electronic Throttle Control Actuator Driver Circuit	Electronic Throttle Control Actuator Driver Circuit - Voltage above normal, or shorted to low source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
3464	5	Check Engine	None	6496	Electronic Throttle Control Actuator Driver Circuit	Electronic Throttle Control Actuator Driver Circuit - Voltage above normal, or shorted to high source
3509	3	Check Engine	Amber	386	Sensor supply voltage 1	Sensor Supply 1 Circuit - Voltage above normal, or shorted to high source
3509	4	Check Engine	Amber	352	Sensor supply voltage 1	Sensor Supply 1 Circuit - Voltage below normal, or shorted to low source
3510	3	Check Engine	Amber	227	Sensor supply voltage 2	Sensor Supply 2 Circuit - Voltage above normal, or shorted to high source
3510	4	Check Engine	Amber	187	Sensor supply voltage 2	Sensor Supply 2 Circuit - Voltage below normal, or shorted to low source
3511	3	Check Engine	Amber	239	Sensor supply voltage 3	Sensor Supply 3 Circuit - Voltage above normal, or shorted to high source
3511	4	Check Engine	Amber	238	Sensor supply voltage 3	Sensor Supply 3 Circuit - Voltage below normal, or shorted to low source
3512	3	Check Engine	Amber	2185	Sensor supply voltage 4	Sensor Supply 4 Circuit - Voltage above normal, or shorted to high source
3512	4	Check Engine	Amber	2186	Sensor supply voltage 4	Sensor Supply 4 Circuit - Voltage below normal, or shorted to low source
3513	3	Check Engine	Amber	1695	Sensor supply voltage 5	Sensor Supply 5 - Voltage above normal, or shorted to high source
3513	4	Check Engine	Amber	1696	Sensor supply voltage 5	Sensor Supply 5 - Voltage below normal, or shorted to low source
3514	3	Check Engine	Amber	515	Sensor supply voltage 6	Sensor Supply 6 Circuit - Voltage above normal, or shorted to high source
3514	4	Check Engine	Amber	516	Sensor supply voltage 6	Sensor Supply 6 Circuit - Voltage below normal, or shorted to low source
3515	5	Check Engine	Amber	4743	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current below normal or open circuit
3515	6	Check Engine	Amber	4744	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current above normal or grounded
3515	10	Check Engine	None	6619	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 - Abnormal Rate of Change

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
3515	11	Check Engine	Amber	4745	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 - Root Cause Not Known
3521	11	Check Engine	Amber	4768	Aftertreatment 1 Diesel Exhaust Fluid Property	Aftertreatment 1 Diesel Exhaust Fluid Property - Root Cause Not Known
3597	2	Check Engine	None	1117	ECU Power Output Supply Voltage #1	Power Supply Lost With Ignition On - Data is erratic, intermittent, or incorrect
3597	12	Check Engine	Amber	351	ECU Power Output Supply Voltage #1	Injector Power Supply - Bad intelligent device or component
3597	17	Check Engine	None	6499	ECU Power Output Supply Voltage #1	ECU Power Output Supply Voltage 1 - Data valid but below normal operating range - Moderately Severe Level
3597	18	Check Engine	Amber	1938	ECU Power Output Supply Voltage #1	ECU Power Output Supply Voltage 1 - Data valid but below normal operating range - Moderately Severe Level
3695	2	Check Engine	None	6568	Aftertreatment Regeneration Inhibit Switch	Aftertreatment Regeneration Inhibit Switch - Data is erratic, intermittent, or incorrect
3750	14	Check Engine	Amber	5938	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration – Condition exists
4096	31	Check Engine	Amber	3547	NOx limits exceeded due to Empty Diesel Exhaust Fluid Tank	Aftertreatment Diesel Exhaust Fluid Tank Empty - Condition exists
4185	31	Check Engine	Amber	1427	Overspeed Shutdown Relay Driver	Overspeed Shutdown Relay Driver Diagnostic has detected an error - Condition exists
4186	31	Check Engine	Amber	1428	Low Oil Pressure Shutdown Relay Driver	Low Oil Pressure (LOP) Shutdown Relay Driver Diagnostic has detected an error - Condition exists
4187	31	Check Engine	Amber	1429	High Engine Temperature Shutdown Relay Driver	High Engine Temperature (HET) Shutdown Relay Driver Diagnostic has detected an error - Condition exists
4188	31	Check Engine	Amber	1431	Pre-Low Oil Pressure Indicator Relay Driver	Pre-Low Oil Pressure Warning Relay Driver Diagnostic has detected an error - Condition exists
4223	31	Check Engine	Amber	1432	Pre-High Engine Temperature Warning Relay Driver	Pre-High Engine Temperature Warning Relay Driver Diagnostic has detected an error - Condition exists
4334	2	Check Engine	Amber	3596	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data is erratic, intermittent, or incorrect

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
4334	3	Check Engine	Amber	3571	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage above normal, or shorted to high source
4334	4	Check Engine	Amber	3572	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage below normal, or shorted to low source
4334	16	Check Engine	Amber	3575	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data valid but above normal operating range
4334	18	Check Engine	Amber	3574	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data valid but below normal operating range
4337	10	Check Engine	Amber	4249	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature - Abnormal Rate of Change
4340	3	Check Engine	None	6531	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
4340	4	Check Engine	None	6532	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
4340	5	Check Engine	None	6482	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal or open circuit
4342	3	Check Engine	None	6533	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
4342	4	Check Engine	None	6534	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
4342	5	Check Engine	None	6483	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal or open circuit
4344	3	Check Engine	None	6535	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

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
4344	4	Check Engine	None	6536	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
4344	5	Check Engine	None	6484	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal or open circuit
4360	0	Stop Engine	Red	3229	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature - Data valid but above normal operational range - Most Severe Level
4360	2	Check Engine	Amber	3144	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature Sensor - Data is erratic, intermittent, or incorrect
4360	3	Check Engine	Amber	3142	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4360	4	Check Engine	Amber	3143	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4360	15	Check Engine	None	3164	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature - Data valid but above normal operating range - Least Severe
4360	16	Stop Engine	Red	3231	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature - Data valid but above normal operating range - Moderately Severe Level
4363	0	Stop Engine	Red	3165	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature - Data valid but above normal operational range - Most Severe
4363	2	Check Engine	Amber	3148	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor - Data is erratic, intermittent, or incorrect
4363	3	Check Engine	None	6569	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4363	4	Check Engine	None	6571	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4363	16	Stop Engine	Red	3235	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature - Data valid but above normal operating range - Moderately Severe Level

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
4364	17	Check Engine	None	6517	Aftertreatment 1 SCR Conversion Efficiency	Aftertreatment SCR Catalyst Conversion Efficiency - Data valid but below normal operating range - Moderately Severe Level
4364	18	Check Engine	Amber	3582	Aftertreatment 1 SCR Conversion Efficiency	Aftertreatment SCR Catalyst Conversion Efficiency - Data valid but below normal operating range - Moderately Severe Level
4376	3	Check Engine	Amber	3577	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage above normal, or shorted to high source
4376	4	Check Engine	Amber	3578	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage below normal, or shorted to low source
4376	7	Check Engine	None	6527	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Mechanical system not responding or out of adjust
4765	2	Check Engine	None	6539	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data is erratic, intermittent, or incorrect
4765	3	Check Engine	Amber	3314	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4765	4	Check Engine	Amber	3313	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4765	16	Stop Engine	Red	3251	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data Valid But Above Normal Operating range
4766	0	Stop Engine	Red	5387	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
4766	2	Check Engine	Amber	5386	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data is erratic, intermittent, or incorrect
4766	3	Check Engine	Amber	4533	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

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
4766	4	Check Engine	Amber	4534	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
4766	15	Check Engine	Amber	5389	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
4766	16	Stop Engine	Red	5388	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
4792	7	Check Engine	None	3751	Aftertreatment SCR Catalyst System	Aftertreatment SCR Catalyst System - Mechanical system not responding or out of adjustment
4792	14	Stop Engine	Red	4585	Aftertreatment 1 SCR Catalyst System	Aftertreatment 1 SCR Catalyst System - Special Instructions
4794	31	Check Engine	Amber	3151	Aftertreatment 1 SCR Catalyst System	Aftertreatment 1 SCR Catalyst System Missing - Condition exists
4796	31	Check Engine	None	6621	Aftertreatment 1 Diesel Oxidation Catalyst Missing	Aftertreatment 1 Diesel Oxidation Catalyst Missing - Condition exists
5018	11	Check Engine	None	2637	Aftertreatment Diesel Oxidation Catalyst	Aftertreatment 1 Diesel Oxidation Catalyst Face Plugged - Root cause not known
5024	10	Check Engine	Amber	3649	Aftertreatment 1 Intake Gas NOx Sensor Heater Ratio	Aftertreatment 1 Intake NOx Sensor Heater - Abnormal rate of change
5031	10	Check Engine	None	6581	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio	Aftertreatment 1 Outlet NOx Sensor Heater - Abnormal rate of change
5125	3	Check Engine	Amber	3419	Sensor supply voltage 7	Sensor Supply 7 Circuit - Voltage above normal, or shorted to high source
5125	4	Check Engine	Amber	3421	Sensor supply voltage 7	Sensor Supply 7 Circuit - Voltage below normal, or shorted to low source
5245	31	Check Engine	Amber	4863	Aftertreatment Selective Catalytic Reduction Operator Inducement Active	Aftertreatment Diesel Exhaust Fluid Tank Low Level Indicator
5246	0	Stop Engine	Red	3712	Aftertreatment SCR Operator Inducement Severity	Aftertreatment SCR Operator Inducement - Data valid but above normal operational range - Most Severe Level

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
5298	17	Check Engine	None	2638	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data valid but below normal operating range - Moderately Severe Level
5298	18	Check Engine	Amber	1691	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data valid but below normal operating range - Moderately Severe Level
5394	2	Check Engine	None	3755	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Data is erratic, intermittent, or incorrect
5394	5	Check Engine	Amber	3567	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Current below normal or open circuit
5394	7	Check Engine	Amber	3568	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Mechanical system not responding or out of adjustment
5484	3	Check Engine	None	6456	Engine Fan Clutch 2 Output Device Driver	Engine Fan Clutch 2 Control Circuit - Voltage above normal, or shorted to high source
5484	4	Check Engine	None	6457	Engine Fan Clutch 2 Output Device Driver	Engine Fan Clutch 2 Control Circuit - Voltage below normal, or shorted to low source
5491	3	Check Engine	None	6477	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal, or shorted to high source
5491	4	Check Engine	None	6478	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal, or shorted to low source
5491	7	Check Engine	None	6537	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay - Mechanical system not responding or out of adjustment
5571	0	Check Engine	Amber	3741	High-Pressure Common Rail Fuel Pressure Relief Valve	High-Pressure Common Rail Fuel Pressure Relief Valve - Data valid but above normal operational range
5571	7	Check Engine	None	3727	High-Pressure Common Rail Fuel Pressure Relief Valve	High-Pressure Common Rail Fuel Pressure Relief Valve - Mechanical system not responding or out of adjustment
5571	15	Check Engine	Amber	5585	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

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
5742	12	Check Engine	Amber	4158	Aftertreatment Diesel Particulate Filter Temperature Sensor Module	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Bad intelligent device or component
5743	3	Check Engine	Amber	4164	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage above Normal, or shorted to high source
5743	4	Check Engine	Amber	4165	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage below normal, or Shorted to low source
5743	9	Check Engine	Amber	4152	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Abnormal update rate
5743	11	Check Engine	Amber	4261	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Root cause not known
5743	12	Check Engine	Amber	4159	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Bad intelligent device or component
5743	16	Check Engine	Amber	4166	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Data valid, but above normal
5745	3	Check Engine	Amber	4168	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater - Voltage above normal, or shorted to high
5745	4	Check Engine	Amber	4169	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater - Voltage below normal, or shorted to low source
5745	17	Check Engine	None	6513	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater - Data valid, but below normal operating range
5745	18	Check Engine	Amber	4171	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater - Data valid, but below normal operating range
5746	3	Check Engine	None	6529	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater Relay - Voltage above normal, or shorted to high source

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
5746	4	Check Engine	Amber	4156	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater Relay - Voltage below normal, or shorted to low source
5798	10	Check Engine	Amber	4251	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater Temperature	Aftertreatment 1 Diesel Exhaust Fluid Supply Module Heater Temperature - Abnormal rate of change
6655	3	Check Engine	None	6511	ECU Power Lamp	Maintain ECU Power Lamp - Voltage above normal, or shorted to high source
6655	4	Check Engine	None	6512	ECU Power Lamp	Maintain ECU Power Lamp - Voltage below normal, or shorted to low source
6799	2	Check Engine	None	6473	Engine Fan Blade Pitch	Fan Blade Pitch - Mechanical system not responding or out of adjustment
6799	3	Check Engine	None	6471	Engine Fan Blade Pitch	Fan Blade Pitch Position Sensor Circuit - Voltage above normal, or shorted to high source
6799	4	Check Engine	None	6472	Engine Fan Blade Pitch	Fan Blade Pitch Position Sensor Circuit - Voltage below normal, or shorted to low source
6799	7	Check Engine	Amber	5185	Engine Fan Blade Pitch	Fan Blade Pitch - Mechanical system not responding or out of adjustment
6802	31	Check Engine	Amber	5278		Aftertreatment 1 Diesel Exhaust Fluid Dosing System Frozen - Condition exists
6881	9	Check Engine	Amber	5653	SCR Operator Inducement Override Switch	SCR Operator Inducement Override Switch - Abnormal Update Rate
6881	13	Check Engine	Amber	5654	SCR Operator Inducement Override Switch	SCR Operator Inducement Override Switch - Out of Calibration
6882	3	Check Engine	Amber	5393	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage above normal or shorted to high source
6882	4	Check Engine	Amber	5394	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage below normal or shorted to low source
6882	9	Check Engine	Amber	5391	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Abnormal Update Rate

J1939 SPN	J1939 FMI	Telltale	Lamp	Cummins Fault Code	J1939_SPN Description	Detail
6882	11	Check Engine	Amber	5395	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Root cause not known
6882	12	Check Engine	Amber	5392	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Bad intelligent device or component
6882	16	Check Engine	Amber	5396	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Data valid but above normal operating range - Moderately Severe Level
6918	31	Check Engine	Mainte-nance	5632	SCR System Cleaning Inhibited Due to Inhibit Switch	SCR System Cleaning Inhibited Due to Inhibit Switch - Condition exists
6928	31	Check Engine	Amber	6597	SCR System Cleaning Inhibited Due to System Timeout	SCR System Cleaning Inhibited Due to System Timeout - Condition exists
7848	31	Check Engine	Amber	6634	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration - Condition exists
520968	9	Check Engine	Amber	5939		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.
520968	19	Check Engine	None	5941		Machine Constrained Operation - Received network data in error. The received J1939 datalink message was not valid.
524286	31	Check Engine	Amber	5617	Aftertreatment 1 Diesel Oxidation Catalyst System	Aftertreatment 1 Diesel Oxidation Catalyst System - Special Instruction

Index

A

A Series headers
  definition 29
A40DX Auger Headers
  disc speed switch 76
aftertreatment
  DEF suction filter
    replacing 310
aftertreatment functions
  activating 126
air conditioning
  cleaning evaporator core 333
  compressor
    replacing belts 339
    tensioning belts 264, 339
  filters
    fresh air intake filter 277
      inspecting and cleaning 278
      installing filter 278
      removing filter 277
  installing cover 334
  removing cover 332
  testing/troubleshooting
    cab air 394
air conditioning box connectors
  welding precautions 9
air filters, *See* filters
alarm volume 95
annual service 114
anti-shimmy dampeners
  location 36
antifreeze 334
API
  definition 29
armrest 42
ASTM
  definition 29
attaching/detaching headers
  D1X or D1XL Series Draper Headers
    attaching draper header supports 166
    connecting center-link 167
    connecting hydraulics 173
    detaching from windrower 176
    hydraulic center-link with optional self-alignment kit 167
    hydraulic center-link without optional self-alignment kit 167
automated steering systems 378
  autosteer engagement button 71, 74
autosteer, *See* automated steering systems

B

ballast kits 381
batteries
  auxiliary power posts 330
  battery cable 325
  battery cover
    closing 323
    opening 322
  battery safety 8
  battery specification 322
  boosting 325
  charging 324
  connecting 328
  disconnecting 328
  installing 327
  maintaining 322
  removing 327
  troubleshooting 387
  welding precautions 9
beacon lights 56
  location 36
  switch 53
belts 338
  A/C compressor belt
    replacing 339
  engine fan drive belt
    replacing 338
    tensioning 338
  seat belts 50
  tensioning A/C compressor belt 264, 339
bolts
  definition 29
booster spring kit 379
brakes
  Germanyemergency stopping 160
  Germanysecondary brakes 160
break-in inspections
  schedule 235
break-in period 114

C

cab
  entering 129
  exiting 129
  troubleshooting cab air 394
cab connectors
  welding precautions 9
cab temperature, *See* HVAC systems
cab-forward
  definition 29
calibration

header 182
windrower 182
caster wheels, *See* wheels and tires
adjust extension limits 371
center-links
definition 29
location 36
self-locking center-link hook mechanism 196
CGVW
definition 29
charge filters
installing 269
chassis extension module
welding precautions 9
chassis relay module
welding precautions 9
circuit breakers
accessing circuit breakers 357
replacing 359
climate controls 61, 81, 163
See also HVAC systems
component locations 36
compressors
replacing compressor belts 339
tensioning belts 264, 339
consoles 39
conversion chart 407
conveyor speed adjustment buttons 79
coolant
adding to engine after drain 317
checking level in engine 274
coolant specifications 231
coolant temperature gauges 81
coolant temperature gauges 163
cooling system
twin-flow cooling system 247

D

D Series headers
definition 29
D1 SP Series
definition 29
D1X Series Draper Headers
adjusting reel alarm pressure 211
attaching to windrower
draper header supports 166
deck shift 223
float options with deck shift 223
setting float options 223
definition 29
detaching from windrower
units with hydraulic center-link 176
draper run screens 225
run screen 1 226
run screen 2 227
draper speed
adjusting 212
adjusting draper alarm pressure 216
draper slip warning 217
setting draper speed in auto mode 213
setting draper speed in manual mode 214
header float
float options with deck shift 223
hydraulic center-link with optional self-alignment kit
attaching to M1170NT5 Windrower 167
hydraulic center-link without self-alignment kit
attaching to M1170NT5 Windrower 167
knife speed 218
knife speed alarm
adjusting alarm 221
adjusting pressure 220
setting knife speed 218
operating 203
reel speed
adjusting reel speed 207
setting reel speed in auto mode 208
setting reel speed in manual mode 209
D1XL Series Draper Headers
adjusting reel alarm pressure 211
attaching to windrower
draper header supports 166
deck shift 223
float options with deck shift 223
setting float options 223
detaching from windrower
units with hydraulic center-link 176
draper run screens 225
run screen 1 226
run screen 2 227
draper speed
adjusting 212
adjusting draper alarm pressure 216
draper slip warning 217
setting draper speed in auto mode 213
setting draper speed in manual mode 214
header float
float options with deck shift 223
header position 203
reel fore-aft position 203
reel height 204
hydraulic center-link with optional self-alignment kit
attaching to M1170NT5 Windrower 167
hydraulic center-link without self-alignment kit
attaching to M1170NT5 Windrower 167
knife speed 218
knife speed alarm
adjusting alarm 221
adjusting pressure 220
setting knife speed 218

operating 203
reel speed
adjusting reel speed 207
setting reel speed in auto mode 208
setting reel speed in manual mode 209
date setting on HPT 96
decals
fuse box and relay module decals 361
location of safety signs 16
deck shift 78, 223
controls 78
deck shift control 223
DEF, *See* diesel exhaust fluid system
DEF gauges 81, 163
definition of terms 29
diesel exhaust fluid system 245
DEF tank
draining the tank 245, 337
filling the tank 117, 246
exhaust system cleaning 126
filters
changing vent hose filter 320
supply module filter 308
checking filter 308
cleaning and inspecting filter 310
installing filter 310
removing filter 308
suction filter
replacing 310
disc brakes
Germanyemergency stopping 160
disc speed switch 76
DK
definition 29
DM
definition 29
DOC
definition 29
doors
location 36
double windrow attachments 78, 198
conveyor speed adjustment buttons 79
deck position 199
draper speed 199
raising deck 80
double windrowing 198
draper headers
operating a D1X or D1XL Series Draper Header 203
draper pressure
viewing 226
draper speed 78
D1X and D1XL Series Draper Headers
setting in manual mode 214
setting in auto mode 213
viewing 226–227
draper speed controls 79
drive wheels, *See* wheels and tires
driving the windrower
adjusting ground speed limit 129
driving on road 139, 142
engine-forward operation 133
entering/exiting the windrower 129
forward in cab-forward mode 131
forward in engine-forward mode 139
reverse in cab-forward mode 132
reverse in engine-forward mode 135
spin turn 136
stopping 136
DWA, *See* double windrow attachments

E

EC declaration of conformity i
eco engine control (EEC)
programming the EEC 124
using the EEC 70
ECU
definition 29
electrical systems 255
auxiliary power posts 330
battery
battery cover
closing 323
opening 322
boosting 325
charging 324
connecting 328
disconnecting 328
installing 327
maintaining 322
removing 327
extension modules 259
fuses and relays 361
checking and replacing fuses 359
inspecting/replacing 125A main fuses 366
relay modules 260
chassis relay 260
roof relay 260
replacing circuit breakers/relays 359
master controller 259
module layout 255
preventing damage to electrical systems 261
troubleshooting 387
emergency stopping
German export
ground speed lever buttons 161
engaging the header 194
engine air intake temperatures 138
engine control module
welding precautions 9

engine coolant temperatures 138
engine cooling
description 248
engine cooling system
air conditioning (A/C) 251
charge air cooler (CAC) 249
cooling module
cleaning screens and components 284, 287
engine coolant
adding coolant after drain 317
checking coolant level 274
checking coolant strength 334
draining coolant 316
hydraulic oil cooler 250
pressurized coolant tank cap
inspecting pressurized coolant tank cap 248
engine harness
welding precautions 9
engine interlock 305
engine operation
engine aftertreatment switches
manual SCR conditioning/inhibit switches 126
engine speed 340
engine temperature 125
exhaust aftertreatment system
exhaust system cleaning 126
fueling 116
oil pressure 125
shutting down the engine 125
engine rpm 81, 163
engine-forward
definition 29
engines
adding coolant after drain 317
adding oil 271, 290
air intake system 251
belts 338
charge air cooling 250
checking coolant level 274
checking cooling data 138
checking interlock 305
checking oil level 118, 270
cooling system
twin-flow cooling system 247
eco engine control (EEC)
programming the EEC 124
using the EEC 70
electronics 14
engine air filter
changing secondary air filter 294
cleaning primary air filter 294
installing primary air filter 292
maintaining filters 291
removing primary air filter 291
engine compartment 239
engine controls 69
engine exhaust system
inspecting exhaust system 297
engine gearbox maintenance
adding lubricant 275
changing lubricant 264, 298
checking lubricant level 275
engine oil change 289
draining oil 289
engine oil filter 289
engine operation
eco engine control programming 124
starting the engine 119
troubleshooting 123
fault codes 443
faults and telltales 92
general engine inspection 321
manuals 321
power 14
removing water from fuel system 272
safety 13
speed 14
troubleshooting 383
engine start 123
entering the cab 129
evaporator 332
evaporator core
cleaning 333
exhaust
DEF suction filter
replacing 310
exhaust aftertreatment system
activating 126
exhaust system
cleaning 126
inspecting 297
exiting the cab 129
Export
Germanyfeatures and operation 160
external booster spring kit 379

F

fan speeds 138
fault codes
clearing 99
engine fault codes 443
windrower fault codes 408
faults 92
FFFT
definition 29
field lights
location 36
switch 53
symbol 110

filters
charge filter 268
installing 269
removing 268
DEF suction filter
replacing 310
DEF supply module filter 308
checking filter 308
cleaning and inspecting filter 310
installing filter 310
removing filter 308
DEF vent hose filter
changing DEF vent hose filter 320
engine air filter
changing secondary air filter 294
cleaning primary filter element 294
installing primary air filter 292
removing primary air filter 291
engine oil filter
replacing engine oil filter 289
fresh air intake filter 277
fuel filters
maintaining fuel filters 300
primary fuel filter
installing 301
removing 300
removing/installing fuel tank vent filter 306
secondary fuel filter
installing 301
removing 301
HVAC filters
fresh air intake filter
inspecting and cleaning 278
installing filter 278
removing filter 277
return oil filter
installing 267
removing 266
finger tight
definition 29
firewall extension module
welding precautions 9
float, *See* header float
float booster springs
spring with external booster spring kit 379
float preset 78
float springs
location 36
flood lights
location 36
fluids, fuel, and lubricants 231
fuel gauges 81, 163
fuel systems
fluids, fuel, and lubricants 231
fuel filters
maintaining fuel filters 300
primary fuel filter
installing 301
removing 300
secondary fuel filter
installing 301
removing 301
fuel specifications 232
fuel tank
draining the fuel tank 336
filling the fuel tank 116
fuel/water separator 271
removing water from fuel system 272
removing/installing fuel tank vent filter 306
priming 302
function buttons 80
fuse panel 361
fuses
accessing fuses 357
checking and replacing 359
inspecting/replacing 125A main fuses 366

G

gearboxes
engine
changing lubricant 264, 298
glossary 29
GPS automated steering systems 378
ground speed control
troubleshooting 393
ground speed lever 71
function group switches 74
German export
One-Touch-Return positions 161
header position six-way switch 75
header raise and lower rates 200
home, back, and select buttons 85
location 39
One-Touch-Return positions 77
reel and disc speed switch 76
reel position four-way switch 76
scroll knob, scroll wheel, and select button 84
ground speed limit 129
ground speeds 81, 163
GSL, *See* ground speed lever
GVW
definition 29

H

handholds
location 36
hard joint

definition 29
Harvest Performance Tracker
calibrating header position sensors 185
calibrating knife drive 182
calibrating windrower and header 182
checking float 190
clearing fault codes 99
fault codes
engine fault codes 443
windrower fault codes 408
faults and telltales 92
function buttons
F1 to F6 80
home, back, select buttons 85
HPT display 69, 81
machine information
accessing header information 105
accessing performance information 107
accessing software information 106
accessing windrower information 104
main menu 88
menu icons 88
navigating the display 84
QuickMenu 86
resetting to factory defaults 97
run screen 1
draper headers 226
run screen 2
draper headers 227
run screen 3 137
run screen 4 138
screen layout 81, 163
scroll knob, scroll wheel, select button 84
setting alarm volume 95
setting display brightness 94
setting display language and units 96
setting display time and date 96
setting float 191
setting up the display 93
settings
control locks 102
narrow transport 101
windrower tire size 100
soft keys 86
symbols
definitions 111
viewing machine information 103
Harvest Performance Tracker display
checking header settings 181
location 39
hazard lights 55, 57, 71
location 36
HDS
definition 29
header angles 195
header controls 73
console header buttons 78
deck shift/float presets 78
draper speed 79
DWA 80
German export
One-Touch-Return positions 161
GSL buttons 74
header position six-way switch 75
One-Touch-Return positions 77
reel and disc speed switch 76
reel position four-way switch 76
header drive reverse button 73
header engage/drive switch 73
header drive 194
header engage switch 73
header float 190
checking float 190
float operating guidelines 191
float options with deck shift (D1X Series) 223
float options with deck shift (D1XL Series) 223
preset controls 78
removing and restoring float 193
setting float 191
header height 198
header hours 105
header information 81, 163
header lift legs
location 36
header operation
center-link
checking self-locking center-link hook 196
disengaging the header 194
engaging the header 194
header angles
adjusting header angle 195
header drive 194
header float
float operating guidelines 191
header height 198
knife/disc drive hydraulics 254
operating with a header 189
D1X Series Draper Header 203
D1XL Series Draper Header 203
header float 190
reel and draper hydraulics 254
reversing the header 195
header position sensors
calibrating 185
header positions 74, 81, 163
headers
accessing information on the HPT 105
adjusting raise and lower rates 200
D1X Series Draper Headers
attaching header

non-self-aligning hydraulic center-link 167
self-aligning hydraulic center-link 167
attaching to windrower
draper header supports 166
detaching from windrower
units with hydraulic center-link 176
D1XL Series
attaching header
non-self-aligning hydraulic center-link 167
with self-aligning hydraulic center-link 167
attaching to windrower
draper header supports 166
detaching from windrower
units with hydraulic center-link 176
definition 29
towing with windrower 154
headlights 54–55
aligning 340
heater shut-off valves 61
height
operator's seat 43
hex keys
definition 29
high beams
switch 53
symbol 110
hoods
closing 240
location 36
opening to lowest position 239
horn
horn button location 71
horns 68
location 36
hp
definition 29
HPT, *See* Harvest Performance Tracker
HVAC system
A/C compressor
coolant cycling 115
replacing belts 339
tensioning belts 264, 339
A/C condenser 251
A/C cover
installing cover 334
removing cover 332
A/C evaporator 332
cleaning evaporator core 333
air distribution 61
fresh air intake filter 277
inspecting and cleaning 278
installing filter 278
removing filter 277
heater shut-off valve 61
return air cleaner/filter 283
testing/troubleshooting
cab air 394
hydraulic oil temperatures 138
hydraulic system 253
hydraulic oil cooler 253
knife/disc drive hydraulics 254
reel and draper hydraulics 254
traction drive hydraulics 254
hydraulics
connecting
D1X Series Headers 173
D1XL Series Headers 173
filters
charge filter 268
installing 269
removing 268
part numbers 234
return oil filter
installing 267
removing 266
fittings
O-ring boss (ORB) adjustable 402
O-ring boss (ORB) non-adjustable 403
O-ring face seal (ORFS) 404
tapered pipe thread fittings 405
hydraulic hoses and lines 274
hydraulic oil
checking and adding hydraulic oil 272
draining hydraulic oil 318
filling hydraulic oil 319
hydraulic safety 6
traction drive hydraulics 254
troubleshooting 388
warnings 253

I

ignition switch 69
location 39
inhibit status 81, 163
ISC
definition 29

J

JIC
definition 29

K

knife
definition 29
knife drive
calibrating 182

knife pressure
viewing 226
knife speed
D1X Series Draper Headers
knife alarm pressure..... 220
setting knife speed..... 218
D1XL Series Draper Headers
knife alarm pressure..... 220
setting knife speed..... 218
knife speed chart 218
viewing 226

L

language setting on HPT 96
lighting 53
amber and marker lights
replacing 351
beacons..... 56
replacing lights 354
cab-forward mode
field..... 53
road lights 54
engine-forward mode
road lights 55
field lights
cab-forward mode 53
flood lights
adjusting front work lights (field) 343
headlights
aligning headlights (cab-forward)..... 342
aligning headlights (engine-forward) 340
replacing headlight bulb (engine-forward)..... 347
interior lights
dome bulb..... 354
dome light assembly 355
LED lights
replacing LED lights (deluxe cab)..... 349
rear roof work lights
adjusting rear roof work lights 344
rear swath lights
adjusting rear swath lights..... 345
troubleshooting 387
turn signal / hazard lights 57
turn signal indicators 357
work lights
standard cab (model year 2021 and prior)..... 346
locks
lock and unlock swath compressor..... 229
lubricants
adding to engine gearbox 275
changing in engine gearbox.....264, 298
checking engine gearbox level 275
lubricating the windrower
recommended fuel, fluids, and lubricants 231
lubrication..... 280
grease points and intervals 281
greasing procedure..... 280
lubricants/fluids/system capacities..... 232
lubricating wheel drive
adding lubricant – 10 bolt 296
changing wheel drive lubricant..... 265
checking lubricant levels 295
storing lubricants and fluids 231
lumbar support 45

M

maintenance and servicing
A/C compressor belt
replacing 339
tensioning 264, 338–339
break-in inspection schedule..... 235
break-in inspections
procedures 262
break-in period..... 114
checking safety systems 303
engine interlock..... 305
operator presence system 303
cycling air conditioning compressor coolant..... 115
daily checks and maintenance 116
electrical system 255
batteries 322
module layout..... 255
electronic maintenance tool..... 238
engine
air intake system 251
charge air cooling 250
engine belt 338
engine oil
checking 118, 270
gearbox..... 275
general engine inspection 321
engine air filters..... 291
engine coolant..... 316
engine exhaust system
inspecting..... 297
engine oil..... 289
filter part numbers 234
fuel system
fuel filters..... 300
fuel, fluids, and lubricants..... 231
greasing the windrower..... 280
hydraulic oil
checking and adding hydraulic oil 272
draining hydraulic oil..... 318
filling hydraulic oil..... 319
lighting..... 340
adjusting field/work/flood lights (front) 343
adjusting rear swath lights..... 345

adjusting roof work lights (rear) 344
aligning headlights (cab-forward)..... 342
aligning headlights (engine-forward) 340
replacing amber and marker lamps 351
replacing beacon lights 354
replacing cabin dome bulb 354
replacing dome light assembly 355
replacing headlight bulb (engine forward) 347
replacing LED lights (deluxe cab)..... 349
standard cab (model year 2021 and prior)..... 346
lubricants
fluids and system capacities..... 232
maintenance schedule 235
maintenance schedule/record 236
platform operation, *See* platforms
preseason checks/annual service 114
safety.....5
service intervals
10 hours or daily..... 270
100 hours..... 283
1000 hours 306
2000 hours 316
250 hours or annually..... 289
50 hours..... 277
500 hours or annually..... 300
annual service 322
as required 336
steering link pivots 330
system overviews..... 245
air intake system 251
diesel exhaust fluid system 245
electrical system 255
engine cooling system
twin-flow cooling system 247
hydraulic system..... 253
wheels and tires
caster wheels..... 371
drive wheels 367
maintenance indicator..... 81, 163
maintenance platforms
location..... 36
manuals
engine owner's manual..... 321
manual storage location 63
MDS
definition..... 29
menu icons
HPT 88
metric bolts
torque specifications 399
mirrors
location..... 36

N

N-DETENT
definition..... 29
n/a
definition..... 29
narrow transport
extend 149
retract..... 144
troubleshooting 392
drive wheel legs 392
walking beam extensions 392
walking beam extension limits..... 371
NPT
definition..... 29
nut
definition..... 29

O

oil pressure 125
oils (engine)
adding.....271, 290
checking level.....118, 270
draining oil..... 289
replacing engine oil filter 289
One-Touch-Return 200
operating symbols 110
operating the windrower
accessing header information..... 105
accessing performance information..... 107
accessing software information 106
accessing windrower information..... 104
adjusting header raise and lower rates..... 200
break-in period 114
daily checks..... 116
data
run screen 3 – performance data..... 137
run screen 4 – cooling data..... 138
double windrowing..... 198
deck position 199
draper speed 199
driving the windrower
forward in cab-forward mode 131
forward in engine-forward mode..... 133
reverse in cab-forward mode 132
reverse in engine-forward mode..... 135
spin turn 136
stopping..... 136
engine starting 119
filling the fuel tank 116
One-Touch-Return..... 200
operating with a header 189
D1X Series Draper Header 203
D1XL Series Draper Header..... 203

header safety props 189
operational safety 113
overview 103
preseason checks/annual service 114
distributing A/C compressor coolant 115
shutting down the engine 125
operations 113
See also engine operation
See also header operation
header float 190
owner/operator responsibilities 109
safety props – M1 Series Windrowers 189
symbols 110
operator presence system 41
checking 303
engine and transmission 41
header drive 41
operator's seat adjustments 42
armrest 42
armrest angle 43
cushion extension fore-aft (deluxe cab) 47
cushion tilt (deluxe cab) 46
fore-aft isolator control 44
fore-aft position 44
heating/cooling switch (deluxe cooling) 47
lateral isolation (deluxe cab) 47
lumbar support 45
seat tilt 45
suspension and seat height 43
vertical dampener 46
operator's station 39
AM/FM/CD/DVD Bluetooth®-equipped radio 65
checking engine interlock 305
climate control system
fan and temperature controls 61
console 39
engine controls 69
eco engine control (EEC) 70
header controls, *See* header controls
horn 68
lighting 53
cab-forward – field 53
cab-forward – road 54
engine-forward – road 55
tail / beacon lights 56
turn signal / hazard lights 57
location 36
operator amenities
coat hook 63
manual storage 63
operator's console 63
window shades 63
operator console 72, 128
operator presence system 41, 303
engine and transmission 41
header drive 41
rear view mirrors 60
safety systems 303
seat belts 50, 336
steering column and wheel 52
training seat 49
windrower controls 71
windshield wipers 59
options and attachments 377
automated steering systems 378
ballast packages for draper headers 381
booster spring kit (external) 379
center-link lifter 379
high debris cooler intake (hood scoops) 377
swath compressor 380
transport
towing harness 381
weight box 381
ORB
definition 29
ORFS
definition 29
owner/operator responsibilities 109

P

park 71
performance data 137
platforms 241
adjusting platform 242
closing platform 241
opening platform 241
precleaners
location 36
predelivery checks
tire pressure 273
preseason checks 114
pressurized coolant tank
inspecting pressurized coolant tank cap 248
priming
fuel system 302
product overview 29

Q

QuickMenu system 86

R

R Series headers
definition 29
R1 Series Rotary Disc Headers
disc speed switch 76
radios

AM/FM/CD/DVD Bluetooth®-equipped radio 65
rear view mirrors 60
reel
D1X and D1XL Series Draper Headers
adjusting reel alarm pressure 211
troubleshooting 388
reel alarm pressure
D1X and D1XL Series Draper Headers 211
reel fore-aft position
viewing 227
reel height
viewing 227
reel position
four-way switch 76
reel pressure
viewing 226
reel speed
D1X and D1XL Series Draper Headers
adjusting 207
setting in auto mode 208
setting in manual mode 209
viewing 226–227
relay module 361
relays
replacing 359
return oil filter
installing 267
removing 266
reverse 73
symbol 110
reversing
in cab-forward mode 132
in engine-forward mode 135
reversing the header 195
road lights 54
aligning headlights 340
location 36
switch 53
symbol 110
RoHS
definition 29
roof connectors
welding precautions 9
rpm
definition 29

S

SAE
definition 29
safety 1
battery safety 8
checking engine interlock 305
checking operator presence system 303
engine safety 13
engine electronics 14
high-pressure rail 13
general safety 3
hydraulic safety 6
maintenance safety 5
operational safety 113
safety alert symbols 1
safety sign decals 15
installing decals 15
interpreting decals 18
sign location 16
signal words 2
tire safety 7
welding precautions 9
safety props
M1 Series Windrowers 189
safety systems 303
screen brightness 94
screen layouts
HPT 81, 163
screws
definition 29
scroll wheel 74
SDD
definition 29
seat belts 50
maintaining seat belts 336
secondary brake
status
German export only 163
serial numbers
engine serial number location vii
windrower serial number location vii
shutting down the engine 125
SKD
definition 29
Slow Speed Transport option 154
soft joints
definition 29
soft keys 86
software 106
sound system
activating Bluetooth® 66
pairing a Bluetooth® device 67
specifications 31
battery specification 322
coolant 231
filter part numbers 234
fuel 232
torque specifications 399
windrower dimensions 35
spin turning 136
spm
definition 29
starting the engine 119

steering
adjustments
steering column ... 52
steering wheel ... 52
automated steering systems (option) ... 378
checking steering link pivots ... 330
troubleshooting ... 393
stopping ... 136
storing windrowers ... 158
supply module
cleaning and inspecting filter ... 310
installing filter ... 310
removing filter ... 308
suspension
operator's seat ... 43
swath compressors ... 78
description ... 227
operating ... 227
raising ... 80
switches
auxiliary lift ... 80
disc speed ... 74, 76
ground speed lever ... 74
header engage ... 73
header position ... 75
lighting ... 53
One-Touch-Return switches ... 74
reel position ... 74
reel position four-way switch ... 76
reel speed ... 74, 76
reel speed switch ... 76
select button ... 84
select switch ... 74, 84
shift switch ... 74, 84
symbols
definitions ... 110
HPT ... 111
HPT menu icons ... 88
windrower operating symbols ... 110

T

taillights ... 54–56
location ... 36
telltales ... 81, 92, 163
temperature
cab ... 61
temperatures
cab ... 61
engine ... 125
engine air intake ... 138
engine coolant ... 138
hydraulic oil ... 138
seat ... 47
tension
definition ... 29
TFFT
definition ... 29
throttle ... 69, 73
location ... 39
time setting on HPT ... 96
tires, *See* wheels and tires
torque
definition ... 29
torque angles
definition ... 29
torque specifications ... 399
metric bolt specifications ... 399
bolting into cast aluminum ... 401
O-ring boss (ORB) hydraulic fittings – adjustable ... 402
O-ring boss (ORB) hydraulic fittings – non-adjustable ... 403
O-ring face seal (ORFS) fittings ... 404
tapered pipe thread fittings ... 405
torque-tension
definition ... 29
towing harness ... 381
towing headers ... 154
preparing ... 155
weight box ... 381
towing windrower ... 157
engaging and disengaging wheel drives ... 158
traction drive
troubleshooting ... 390
training seats ... 49
Trimble® automated steering systems ... 378
troubleshooting
batteries ... 387
cab air ... 394
electrical ... 387
engine ... 383
engine start ... 123
header drive ... 389
hydraulics ... 388
lighting ... 387
narrow transport ... 392
operator's station ... 397
reel ... 388
steering and ground speed control ... 393
traction drive ... 390
turn signals ... 387
wheels ... 390
turn signals ... 54–55, 57, 71
indicators ... 357
location ... 36
status ... 81, 163
symbol ... 110
troubleshooting ... 387
turning the windrower ... 136
twin-flow cooling system ... 247

U

UCA
definition 29
ULSD
definition 29
units of measurement setting on HPT 96

W

walking beams
location 36
washers
definition 29
water
removing from fuel system 272
WCM
definition 29
weight boxes 139, 142, 154, 381
welding precautions 9
wheel drives 158
wheel motor connectors
welding precautions 9
wheels and tires
caster wheels 371
caster wheel nut torque 263
installing forked caster wheel 372
location 36
lowering caster wheel (all) 374
raising caster wheel (all) 374
removing forked caster wheel 373
tightening anti-shimmy dampener 263
checking tire pressure 273
drive wheels
installing drive wheels 369
location 36
lowering drive wheels 370
raising drive wheel 367
removing drive wheel 368
tightening drive wheel nuts 262
narrow transport
extend 149
retract 144
safety 7
setting tire size in Harvest Performance Tracker 100
tires
checking pressure 273
troubleshooting 390
wheel drive
adding lubricant – 10 bolt 296
changing lubricant 265
checking lubricant levels 295
windrower faults
fault codes 408
faults and telltales 92
windrowers
definition 29
windshield wipers 59
location 36
symbol 110
work lights 54–55
wot
definition 29

Lubricants, Fluids, and System Capacities

Table .11 System Capacities

Lubricant/Fluid	Location	Description	Capacity
Diesel exhaust fluid (DEF)	Diesel exhaust fluid tank	Must meet ISO 22241 requirements.	49 liters (13 U.S. gallons)
Moly grease	Sliding drive legs	Lithium complex base - extreme pressure (EP2) molybdenum disulphide content: 1.5-5% (NLGI Grade: 2)	As required unless otherwise specified
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	As required unless otherwise specified
Diesel fuel	Fuel tank	Ultra low sulphur diesel (ULSD) Grade No. 2, or ULSD Grade No. 1 and 2 mix[27]; refer to *5.1.3 Fuel Specifications, page 232* for more information	518 liters (137 U.S. gallons)
Hydraulic oil	Hydraulic reservoir	Single grade transmission/hydraulic fluid (THF) Viscosity at 60.1 cSt @ 40°C Viscosity at 9.5 cSt @ 100°C	60 liters (15.8 U.S. gallons)[28]
Gear lubricant	Gearbox	SAE 75W-140 or 80W-140, API service class GL-5 fully synthetic gear lubricant (SAE J2360 preferred)	2.3 liters (2.4 U.S. quarts)
Gear lubricant	Standard wheel drive	SAE 75W-140 or 80W-140, API service class GL-5 fully synthetic gear lubricant (SAE J2360 preferred)	1.4 liters (1.5 U.S. quarts)
Gear lubricant	High torque wheel drive	SAE 85W-140, API service class GL-5 fully synthetic gear lubricant	4.5 liters (4.8 U.S. quarts)
Antifreeze	Engine cooling system	ASTM D-6210 and CES-14603, Peak Final Charge Global™ or Fleetguard ES Compleat™ OAT Refer to *5.1.2 Coolant Specifications, page 231* for more information	31 liters (8.2 U.S. gallons)
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 U.S. quarts)
Air conditioning refrigerant	Air conditioning system	R134A	2.38 kg (5.25 lb.)
Air conditioning refrigerant oil	Air conditioning system total capacity	PAG SP-15	240 cc (8.1 fl. oz.)
Windshield washer fluid	Windshield washer fluid tank	SAE J942 compliant	4 liters (1 U.S. gallon)

27. Optional when operating temperature is below 0°C (32°F).
28. Denotes capacity of a dry system. Refill capacity is 58 liters (15 U.S. gallons).

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Printed in Canada