

ORIGINAL INSTRUCTIONS

OPERATOR'S MANUAL

SR270B

SV340B

Tier 4B (final)

B Series Skid Steer Loader

PIN NPM446000 and after

TR340B

TV450B

Tier 4B (final)

B Series Compact Track Loader

PIN NPM446000 and after

Part number 92065524

1st edition English

July 2023



Contents

1 GENERAL INFORMATION

Note to the owner.....	1-1
Electro-Magnetic Compatibility (EMC)	1-3
Product identification	1-4
Operator's manual storage on the machine	1-7
Machine orientation.....	1-7
Machine components.....	1-8
Selective Catalytic Reduction (SCR) exhaust treatment - Product overview.....	1-15
Emissions overview	1-20

2 SAFETY INFORMATION

Safety rules and signal word definitions	2-1
Safety rules.....	2-2
Utility safety.....	2-7
Proper entry and exit	2-8
Starting and stopping precautions.....	2-10
Seat belt precautions	2-11
Specific precautions to this machine	2-13
Fire extinguisher.....	2-13
Roll Over Protective Structure (ROPS).....	2-14
Welding on the machine.....	2-15
Loader arm lock and cab tilt procedure - radial lift machines.....	2-16
Loader arm lock and cab tilt procedure - vertical lift machines.....	2-20
No engine power - loader arm up and down control	2-24
Emergency exit	2-25
Ecology and the environment	2-26
Safety signs	2-27

3 CONTROLS AND INSTRUMENTS

ACCESS TO OPERATOR'S PLATFORM

Door latches, cab	3-1
Window glass, cab	3-2
Windshield wiper and washer controls	3-3
Cab air louvers	3-4

OPERATOR'S SEAT

Standard seat.....	3-5
Mechanical suspension seat	3-5
Air seat	3-5
Seat belt operation	3-6
Shoulder belt	3-7
Restraint bar.....	3-7

MECHANICAL HYDRAULIC CONTROLS

Steering and travel	3-8
---------------------------	-----

Moving the machine	3-8
Turning the machine	3-9
Lift arm and bucket controls	3-10
Hand controls	3-10
Foot controls	3-10

ELECTRO-HYDRAULIC CONTROLS

Control pattern overview	3-11
Standard H control pattern	3-11
Standard ISO control pattern	3-12
Electro-hydraulic control handle adjustment	3-13
H control pattern steering and travel	3-14
Hand controls	3-14
Moving the machine	3-15
Turning the machine	3-16
H control pattern lift arm and bucket controls	3-17
Lift arm raise/lower control	3-17
Bucket curl/dump control	3-17
Bucket shake activation	3-18
ISO control pattern steering and travel	3-19
Moving the machine	3-19
Turning the machine	3-20
ISO control pattern lift arm and bucket controls	3-22
Lift arm and bucket controls	3-22
Bucket shake activation	3-23

CONTROL LEVERS

Switch configurations	3-24
Two-speed function	3-29

AUXILIARY HYDRAULICS

Standard auxiliary hydraulics	3-30
High flow auxiliary hydraulics	3-32
Enhanced High Flow (EHF) auxiliary hydraulics	3-34

RIGHT-HAND COLUMN SWITCH IDENTIFICATION

LCD multi-function display (if equipped)	3-36
Instrument Cluster (IC)	3-39
Instrument cluster navigation buttons	3-46
Instrument cluster main menu	3-48
Instrument cluster display setting	3-49
Auxiliary hydraulic interlock override (AUX OVRRD)	3-50
Temperature display selection	3-51
View or reset Job Timer (JTIME)	3-52
Anti-theft protection	3-53
Instrument cluster suspend time-out feature (SUSP TMOUT)	3-58
Crank enable/disable feature	3-59
Instrument cluster shutdown feature (IC SHTdN)	3-60

Instrument cluster time-out feature (IC TMOUT)	3-61
Selective Catalytic Reduction (SCR) exhaust treatment - Overview	3-62
ISO or H pattern control switch	3-72
Bluetooth® radio (if equipped).....	3-73

LEFT-HAND COLUMN SWITCH IDENTIFICATION

Left-hand column switch identification.....	3-74
---	------

4 OPERATING INSTRUCTIONS

COMMISSIONING THE UNIT

Operating Instructions	4-1
------------------------------	-----

STARTING THE UNIT

Engine operation	4-3
Operating in extreme temperatures	4-5
Throttle control	4-7
Booster battery procedure.....	4-8

STOPPING THE UNIT

Parking the machine and stopping the engine	4-9
---	-----

MOVING THE UNIT

Machine operation.....	4-10
------------------------	------

5 TRANSPORT OPERATIONS

SHIPPING TRANSPORT

Transporting the machine	5-1
--------------------------------	-----

RECOVERY TRANSPORT

Moving a disabled machine	5-10
---------------------------------	------

6 WORKING OPERATIONS

GENERAL INFORMATION

Mechanical attachment mounting systems.....	6-1
Hydraulic attachment mounting systems	6-4
Field operation.....	6-6
Operating the machine in water	6-11

7 MAINTENANCE

GENERAL INFORMATION

General safety before you service.....	7-1
Lubrication analysis program.....	7-3
Plastic and resin parts	7-3

Machine cleaning	7-4
Cab door removal and installation	7-5
Battery safety - check and cleaning	7-6
Battery removal and installation	7-8
Fire extinguisher	7-14
Engine hourmeter	7-14
Fluids and lubricants	7-15
Engine oils	7-16
Hydraulic oil viscosity	7-17
Organic Acid Technology (OAT) coolant	7-18
General specification - Diesel fuel	7-19
General specification - Biodiesel fuels	7-20
Lubrication and maintenance access	7-22
Selective Catalytic Reduction (SCR) exhaust treatment - Basic instructions	7-24
Fuses and relays	7-26

MAINTENANCE CHART

Maintenance chart	7-32
-------------------------	------

Initial 10 hours

Track tension check and adjustment	7-34
Tire pressure and wheel hardware torque	7-36

Every 10 hours or daily

Clean tracks and components	7-38
Engine and hydraulic coolers	7-39
Engine coolant level	7-40
Engine oil level	7-41
Loader arm pivot points, coupler pins, and cylinder pins - Vertical lift	7-42
Loader arm pivot points, coupler pins, and cylinder pins - Radial lift	7-42
Hydraulic oil level	7-43
Loader arm and bucket hydraulic interlock	7-45

Initial 50 hours

Roll Over Protective Structure (ROPS) mechanism and hardware check	7-46
--	------

Every 50 hours

Track tension check and adjustment	7-47
Tire pressure and wheel hardware torque	7-49
Cab intake filter	7-51
Seat restraints - Check	7-52

Initial 100 hours

Final drive oil (track models)	7-53
--------------------------------------	------

Every 250 hours

Drive chain tension check	7-54
---------------------------------	------

Fuel-water separator filter - drain fluid.....	7-55
--	------

Every 500 hours

Engine oil and oil filter - Change	7-56
Fuel-water separator filter element	7-61
Fuel filter.....	7-62
Diesel Exhaust Fluid (DEF)/AdBlue® tank filter	7-63
Hydraulic oil filter	7-66
Final drive chain tank oil.....	7-67
Air cleaner elements.....	7-68
Final drive oil (track models)	7-71
Cab door - Grease.....	7-72
Roll Over Protective Structure (ROPS) mechanism and hardware check	7-73

Every 1000 hours

Hydraulic oil and filter.....	7-74
Final drive chain tank oil.....	7-78
Diesel Exhaust Fluid (DEF)/AdBlue® tank suction filter - Replace.....	7-79
Belt - Replace	7-84

Every 1500 hours

Blow-by recirculation system	7-87
------------------------------------	------

Every 3600 hours or two years

Selective Catalytic Reduction (SCR) system - Replace supply module filter - Radial lift machines only	7-90
Selective Catalytic Reduction (SCR) system - Replace supply module filter – Vertical lift machines only	7-93

Every 4000 hours

Engine cooling system - Change fluid	7-96
--	------

As required

Hydrocarbon management	7-101
Window removal and cleaning	7-103
Hardware - loose or damaged.....	7-108

STORAGE

Storing the machine	7-109
---------------------------	-------

8 TROUBLESHOOTING

FAULT CODE RESOLUTION

Display warnings – Instrument Cluster (IC) only	8-1
Fault code index.....	8-2

9 SPECIFICATIONS

Fluids and lubricants 9-1

General specification 9-2

Product identification – attachments 9-12

Material weights 9-18

Units of measure and conversion 9-19

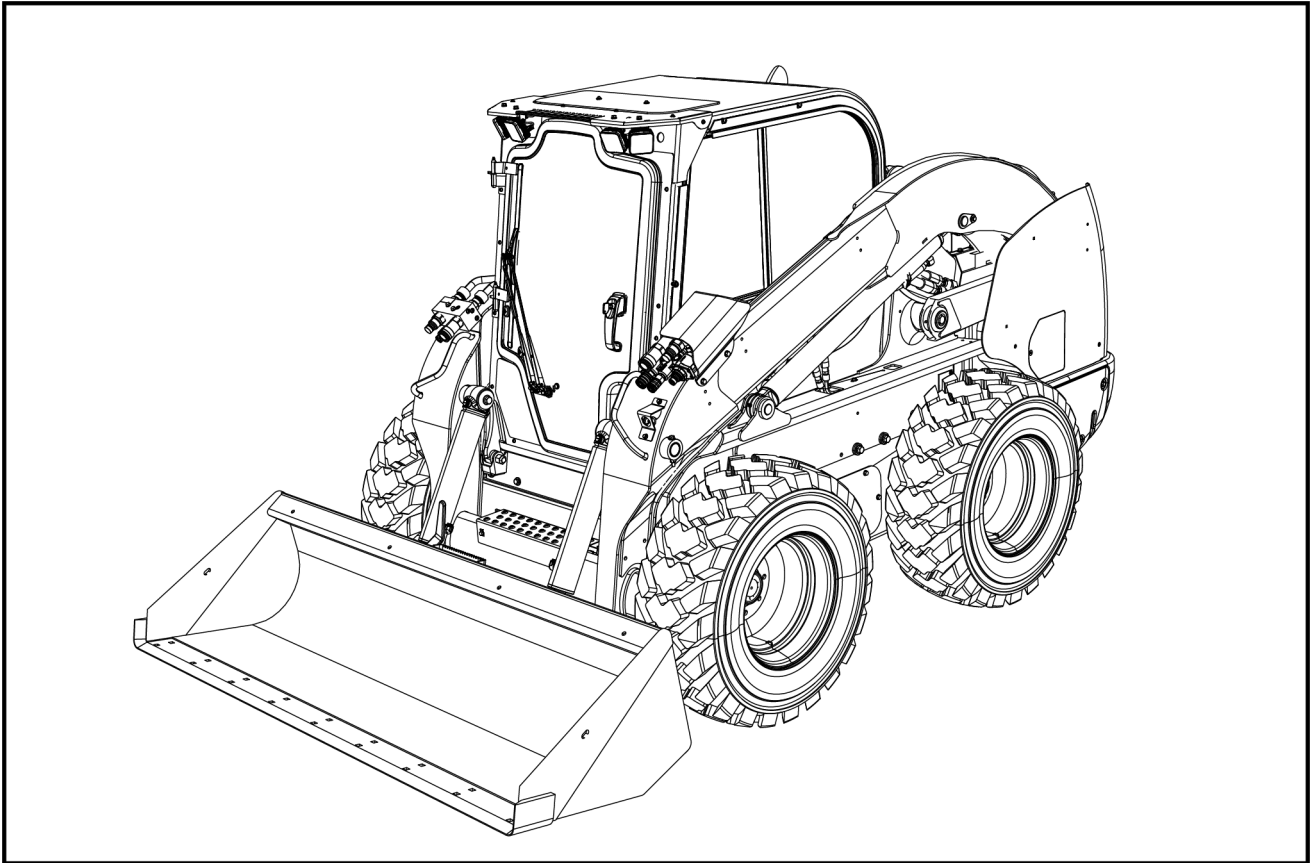
Torque charts - Minimum tightening torques for normal assembly 9-21

10 ACCESSORIES

Telematics - Overview with Case SiteWatch™ 10-1

1 - GENERAL INFORMATION

Note to the owner



RAIL23SSL0490UA 1

This manual contains important information about the safe operation, adjustment, and maintenance of your machine. Refer to the detailed INDEX at the end of this manual for locating specific items about your machine. Your machine conforms to current safety regulations. Use this manual as a guide. Your machine will remain a reliable working tool as long as it is kept in good working condition and serviced properly.

This machine, with standard equipment and authorized attachments, is intended for above ground material handling. Use only approved accessories and attachments designed for your machine.

DEALER'S STAMP OR CARD

--

CNH Industrial America LLC
P.O. Box 9228
Wichita, Kansas
U.S.A
67277

This operator's manual is to be stored in the manual compartment equipped on this machine. Make sure this manual is complete and in good condition. Contact your authorized dealer to obtain additional manuals. Contact your authorized dealer for any further information or assistance about your machine. Your authorized dealer has manufacturer approved service parts. Your authorized dealer has technicians with special training that know the best methods or repair and maintenance for your machine. Your authorized dealer is available for any further information. They will also provide any after-sales service you may need, and genuine CASE CONSTRUCTION spare parts, your guarantee of quality and match.

The information in this manual is provided on the basis of information that was available at the time that the manual was written. Settings, procedures, part numbers, software, and other items can change. These changes can affect the service that is given to the machine. Ensure that you have complete and current information from your dealer before you start any machine operation.

Personal safety



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual and on machine decals, you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

DO NOT operate or permit anyone to operate or service this machine until you or the other persons have read and understand the safety, operation, and maintenance instructions in this manual. Use only trained operators who have demonstrated the ability to operate and service this machine correctly and safely. All persons who will be operating this machine shall possess a valid local vehicle operating permit and/or other applicable local age work permit. The information in this manual is provided on the basis of information that was available at the time that the manual was written. Settings, procedures, part numbers, software, and other items can change. These changes can affect the service that is given to the machine. Ensure that you have complete and most current information from your dealer before you start your machine operation.

DO NOT use this machine for any purpose or in any manner other than as described in the manual, decals, or other product safety information provided with the machine. These materials define the machine's intended use.

Consult an authorized dealer on changes, additions, or modifications that can be required for this machine to comply with various country regulations and safety requirements. Unauthorized modifications will cause serious injury or death. Anyone making such unauthorized modifications is responsible for the consequences.

Use only approved accessories and attachments designed for your machine. Consult your dealer on changes, additions, or modifications that may be required for your machine. Do not make any unauthorized modifications to your machine.

ATTENTION: *The engine and fuel system on your machine is designed and built to government emissions standards. Tampering by dealers, customers and operators is strictly prohibited by law. Failure to comply could result in government fines, rework charges invalid warranty, legal action and possible confiscation of the machine until rework to original condition is completed. Engine service and or repairs must be done by a certified technician only!*

Electro-Magnetic Compatibility (EMC)

Interference may arise as a result of add-on equipment that may not necessarily meet the required standards. As such interference can result in serious malfunction of the unit and/or create unsafe situations, you must observe the following:

- The maximum power of emission equipment (radio, telephones, etc.) must not exceed the limits imposed by the national authorities of the country where you use the machine
- The add-on equipment must not interfere with the functioning of the on board electronics

Failure to comply with these rules will render the CASE CONSTRUCTION warranty null and void.

Product identification

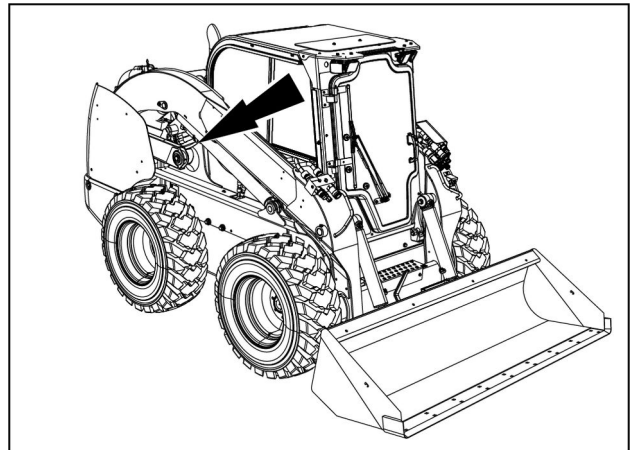
Write your machine model number, Product Identification Number (PIN), and serial numbers on the lines provided below. Always give these numbers and component plate numbers to your dealer when you need parts or information for your machine.

Make a record of the numbers. Keep this record and your manufacturer's statement of origin in a safe place. If the machine is stolen, report the numbers to your local law enforcement agency.

MACHINE
Machine Model and Type
Product Identification Number
Year of Build
Roll Over Protective Structure (ROPS) certification plate
Engine Serial Number
Hydrostatic Pump Serial Number
Bucket Serial Number

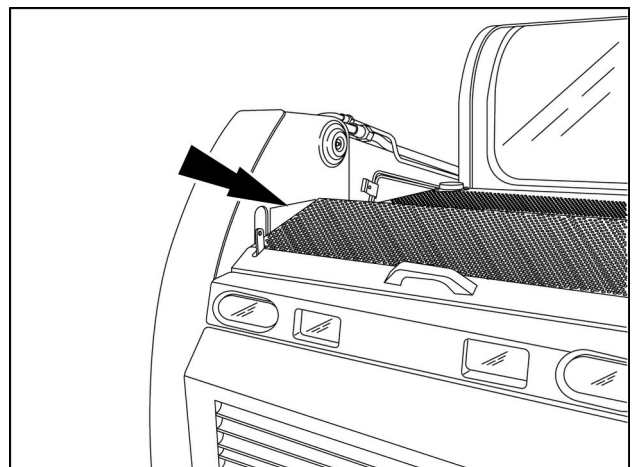
Product Identification Number (PIN)

- Outside right-hand side of chassis - vertical lift.



RAIL23SSL0243BA 1

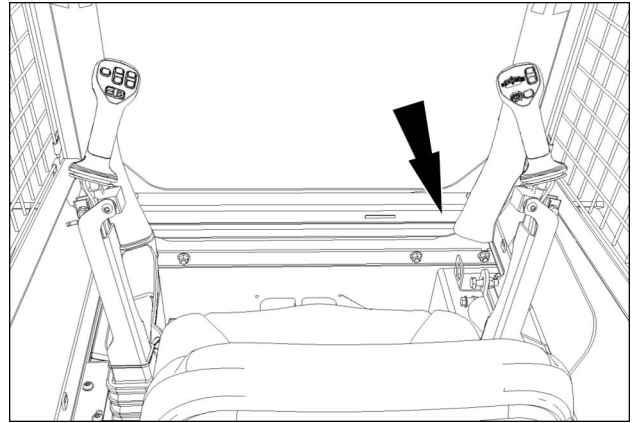
- Inside left-hand side loader arm tower - radial lift.



RAIL14SSL0713AA 2

Roll Over Protective Structure (ROPS) certification plate.

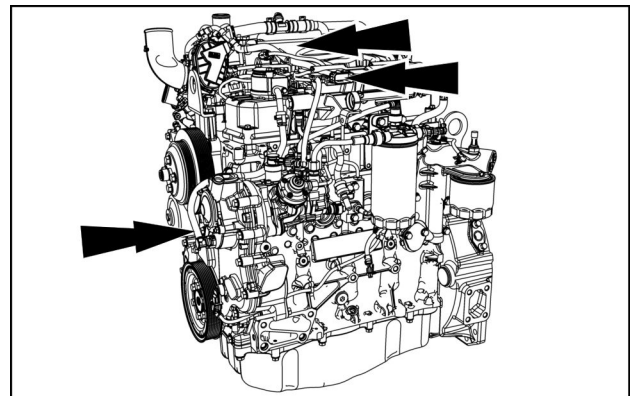
- Front edge (lower) inside cab.



RAIL19SSL0060BA 3

Engine serial number plate location

- On the side of the Exhaust Gas Recirculation (EGR) cooler.
- On top of the valve cover.
- The serial number is also stamped on the engine front cover.

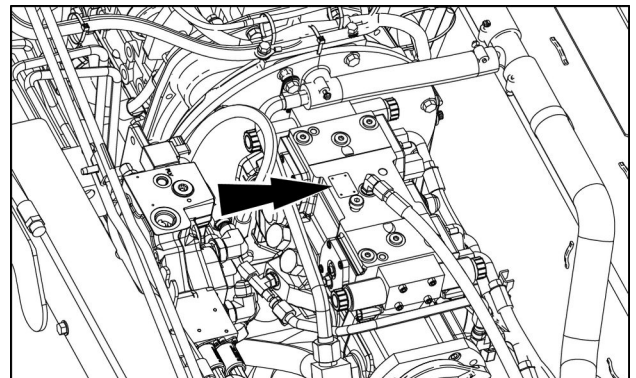


23119866 4

Hydrostatic pump

- Electro-Hydraulic (EH) hydrostatic pump

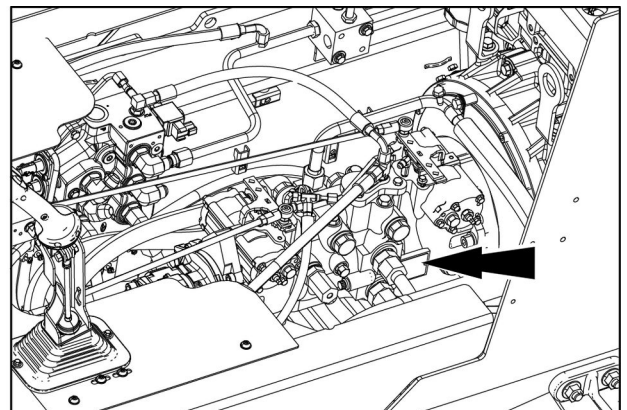
NOTE: You must tilt the cab forward to view the hydrostatic pump. Some items not shown for clarity.



RAIL15SSL0135BA 5

- Mechanical (Servo) hydrostatic pump

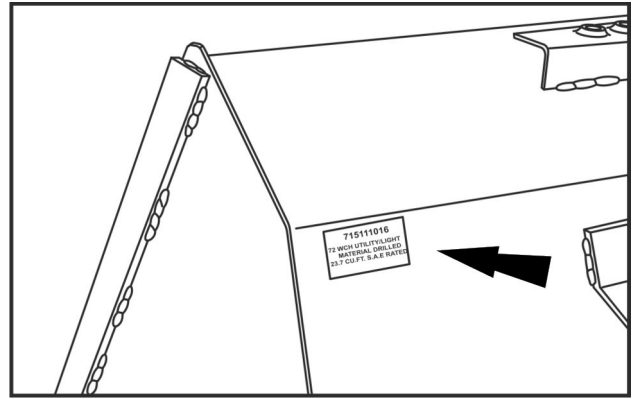
NOTE: You must tilt the cab forward to view the hydrostatic pump. Some items not shown for clarity.



RAIL15SSL0133BA 6

1 - GENERAL INFORMATION

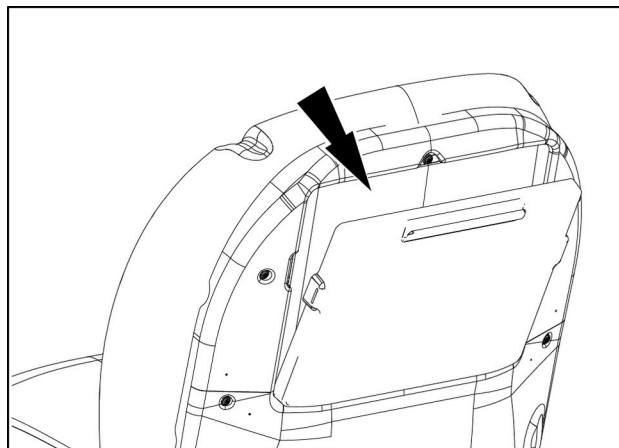
Bucket identification plate (part number and description)



BT04F026-01 7

Operator's manual storage on the machine

Keep the Operator's manual in the storage compartment behind the operator's seat. The Operator's manual must be available for use by all operators.

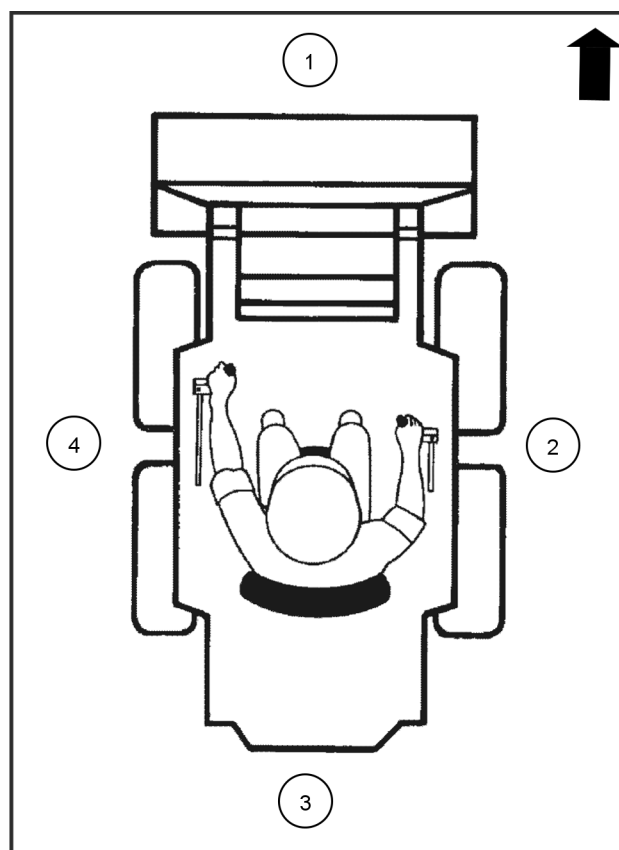


RAIL15SSL0131BA 1

Machine orientation

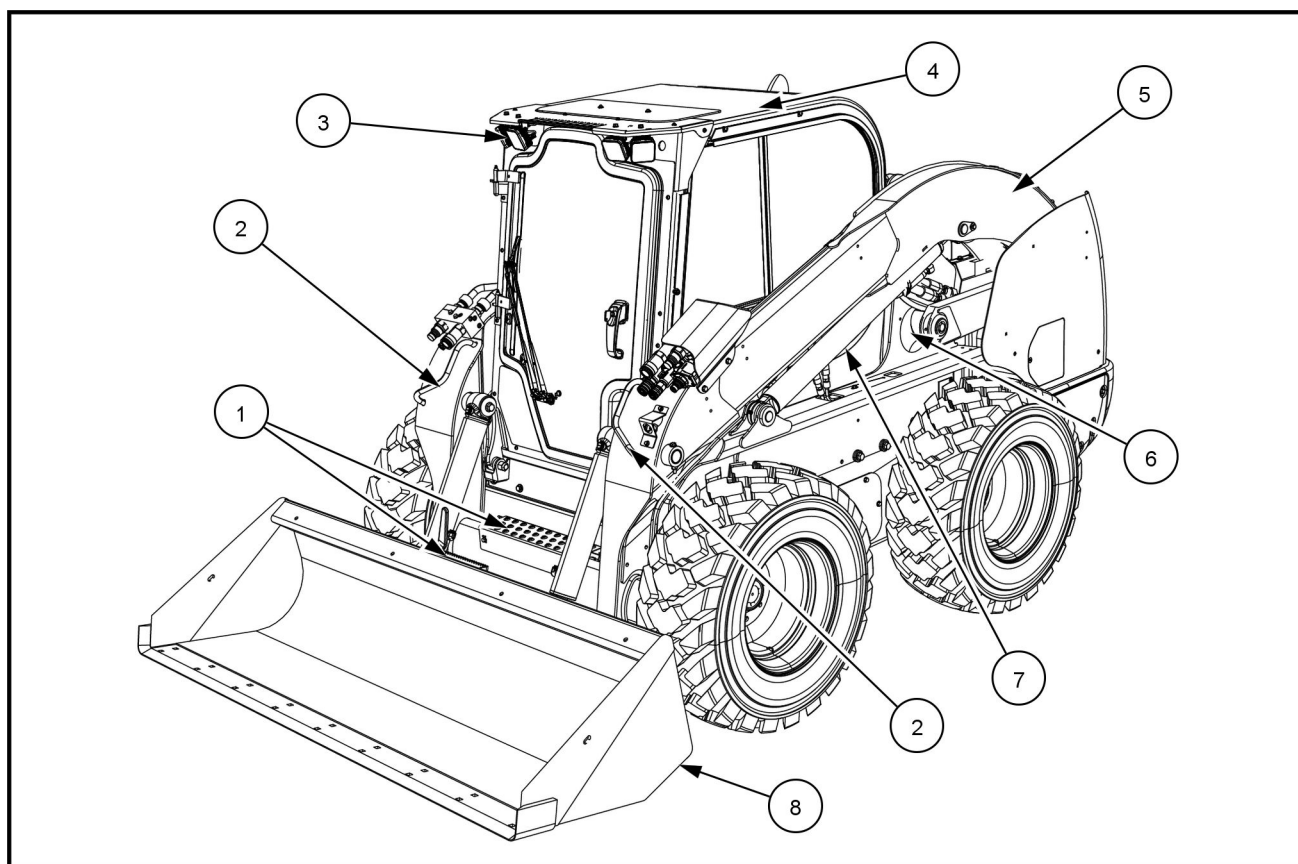
The terms are used in this manual to indicate the direction as seen from the operator's seat.

- front (1)
- right-hand side (2)
- rear (3)
- left-hand side (4)



RAPH12SSL0057BA 1

Machine components

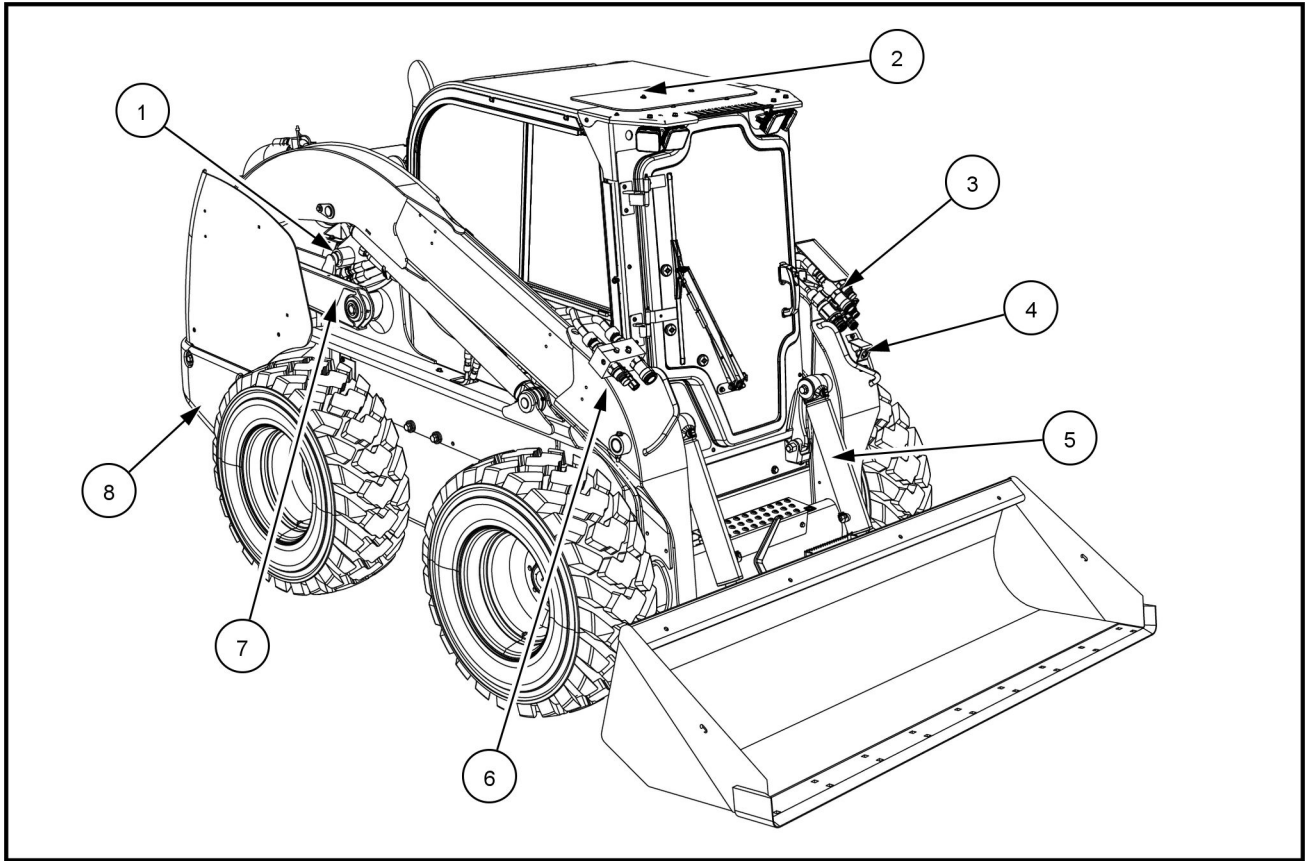


RAIL23SSL0490UA 1

- (1) Entry steps
- (2) Hand holds
- (3) Front work lights

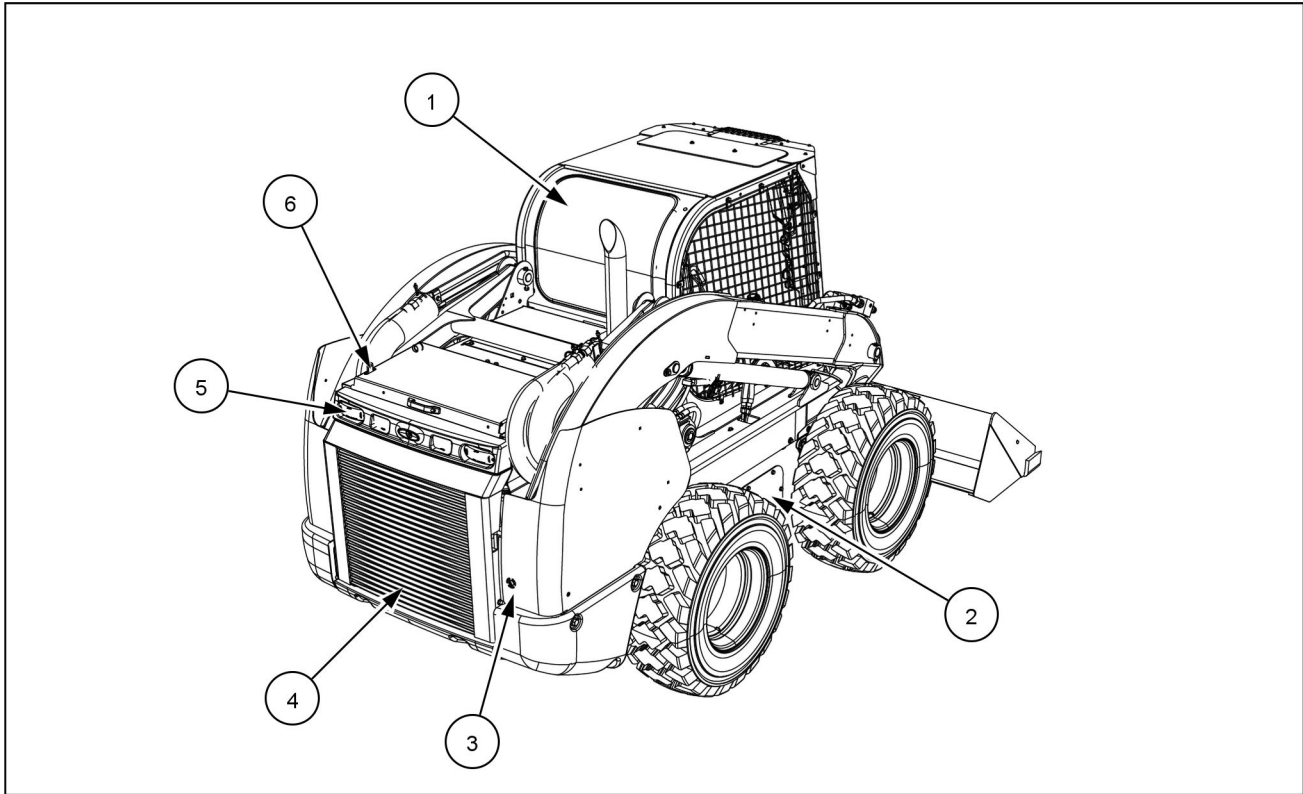
- (4) Tiltable operator's cab
- (5) Loader arm
- (6) Horn

- (7) Loader arm lift cylinder
- (8) Bucket



RAIL23SSL0489UA 2

- | | | |
|--|---|------------------------------|
| (1) Loader arm safety support pin | (4) Auxiliary attachment electrical connection (optional) | (7) Loader arm vertical link |
| (2) Roll Over Protective System (ROPS) | (5) Roll and curl (bucket) cylinder | (8) Counterweight |
| (3) Auxiliary hydraulics | (6) 2nd auxiliary hydraulics (optional) | |

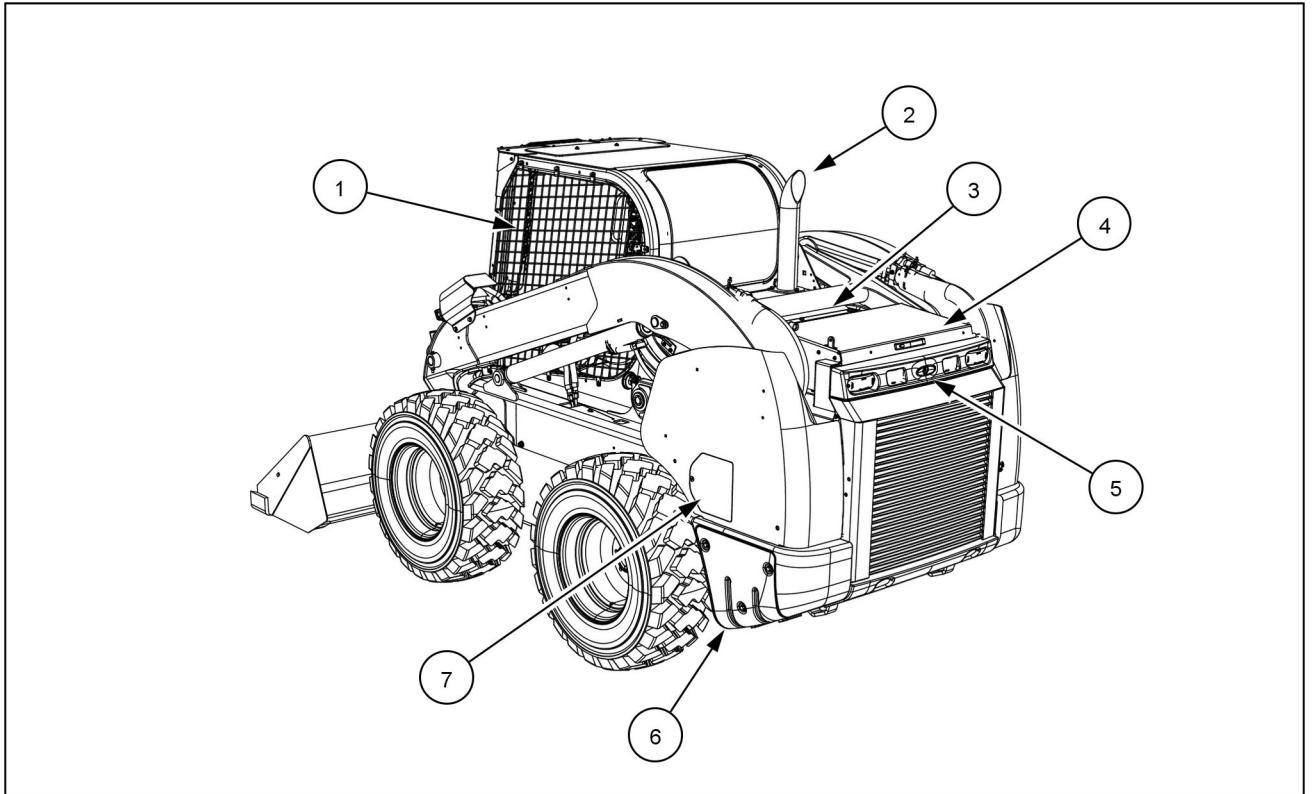


RAIL22SSL0289TA 3

(1) Rear window (emergency exit)
(2) Chain tank – both sides (SSL only)

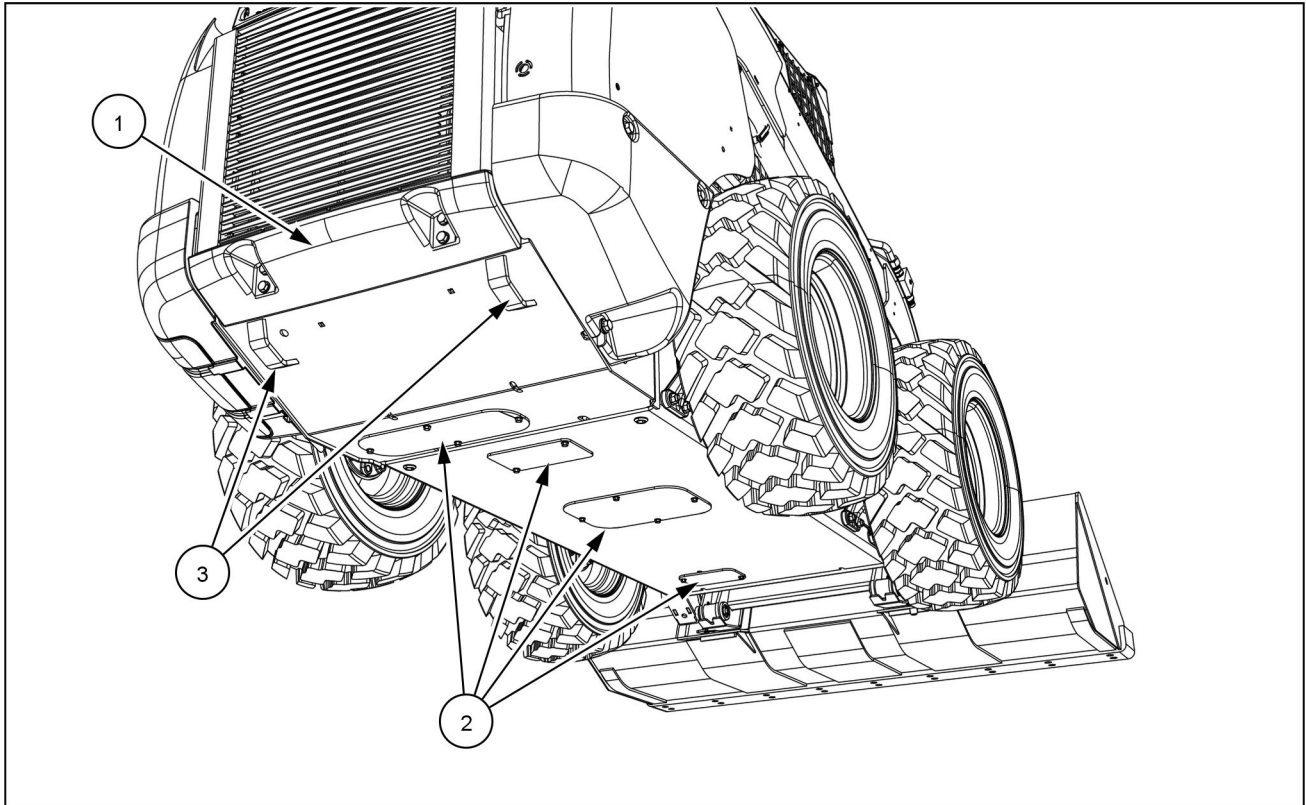
(3) Backup alarm
(4) Rear door

(5) Rear work lights
(6) Rear door and rear hood
(padlock lockable) latch



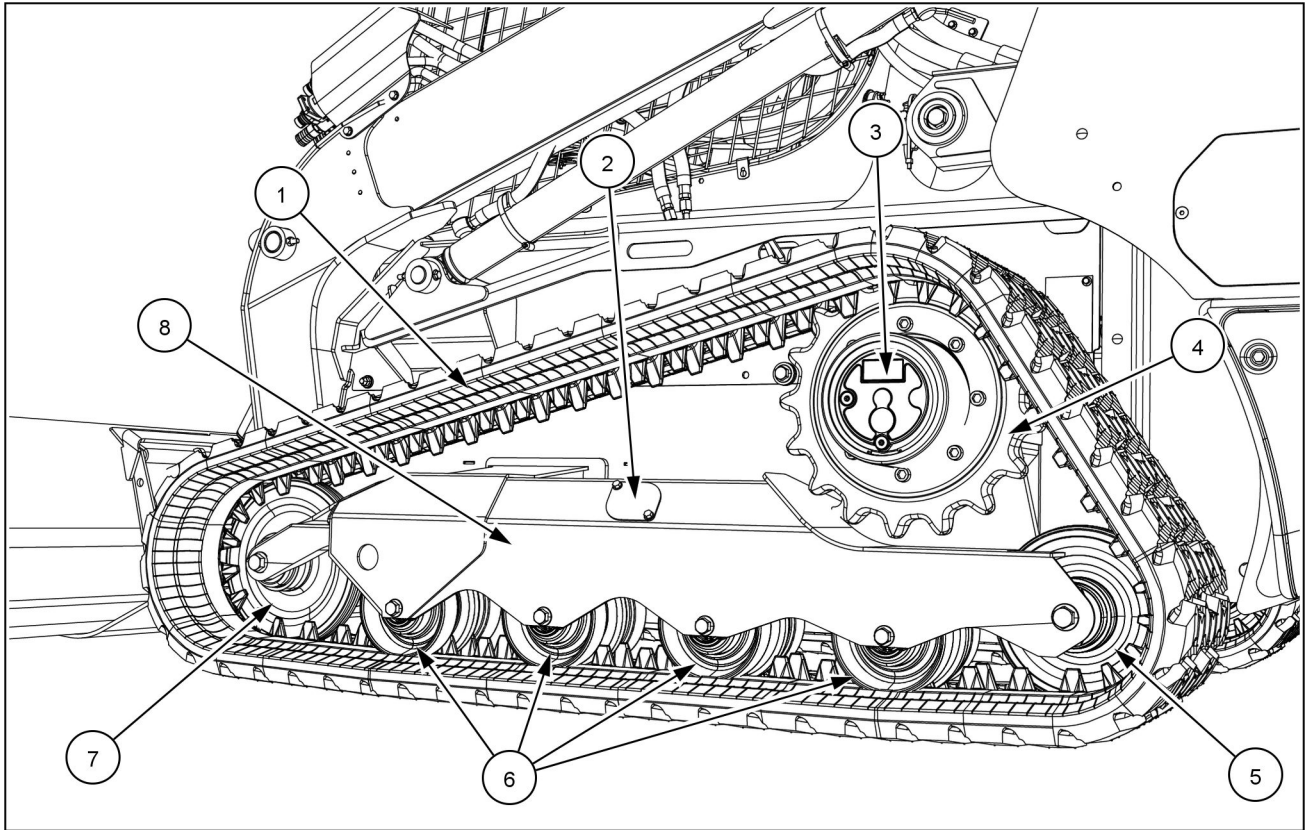
RAIL22SSL0291TA 4

- | | | |
|--|-------------------------------|--|
| (1) Side cage operator protection | (4) Tiltable rear hood | (6) Counterweight with engine oil filter access |
| (2) Exhaust | (5) Rear camera | (7) Battery compartment access |
| (3) Fixed rear hood | | |



RAIL22SSL0298TA 5

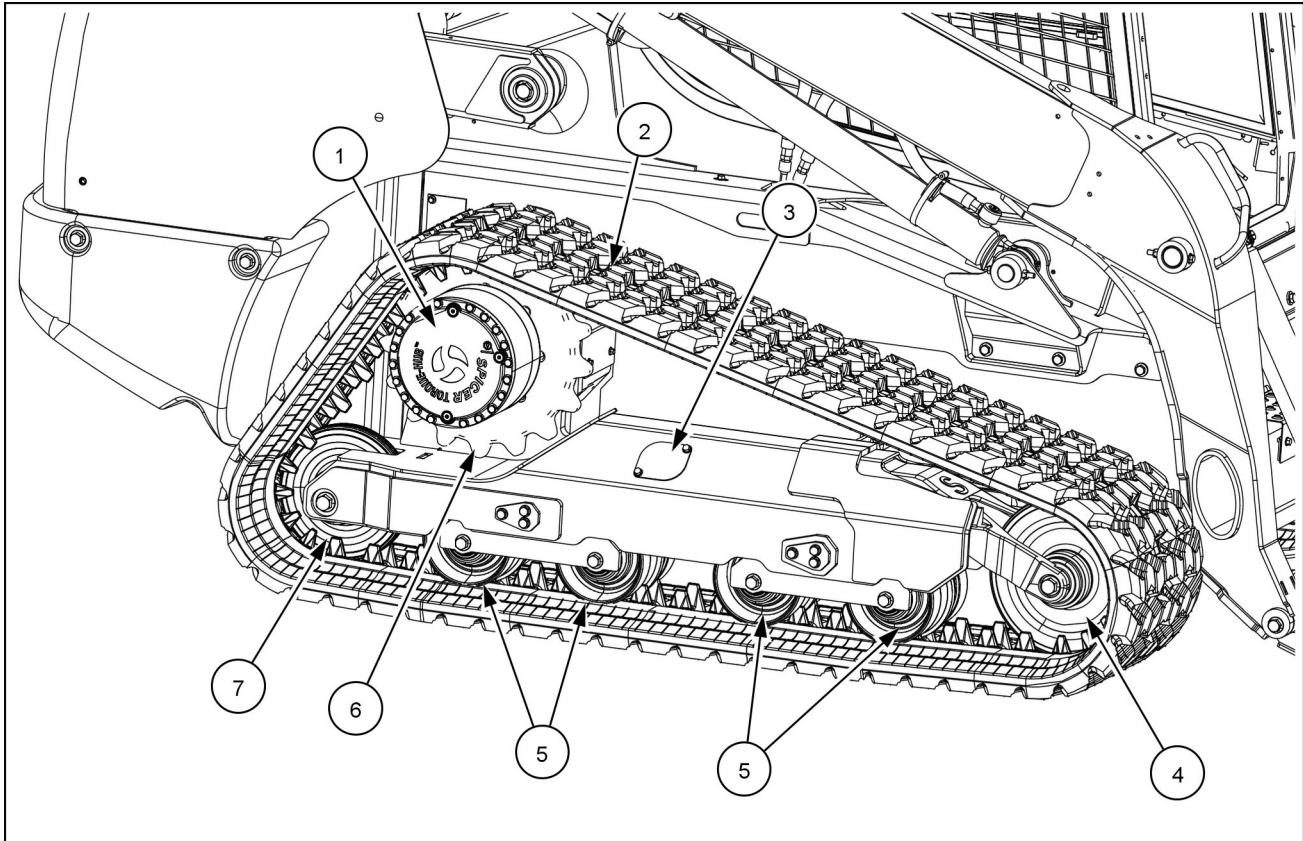
- (1)** Center counterweight
- (2)** Clean out and maintenance access covers
- (3)** Rear tie-down points



RAIL22SSL0299TA 6

Compact Track Loader (CTL) only (non-suspension undercarriage)

- | | | |
|--|----------------------|----------------------------------|
| (1) Rubber track | (4) Drive sprocket | (6) Track rollers |
| (2) Track tension adjuster cover plate | (5) Rear idler wheel | (7) Front adjustable idler wheel |
| (3) Drive motor | | |



RAIL23SSL0462TA 7

Compact Track Loader (CTL) only (suspension undercarriage)

- | | | |
|--|----------------------------------|--------------------------|
| (1) Drive motor | (4) Front adjustable idler wheel | (6) Drive sprocket wheel |
| (2) Rubber track | (5) Track rollers | (7) Rear idler wheel |
| (3) Track tension adjuster cover plate | | |

NOTE: The suspension undercarriage is only available on the TR340B and TV450B.

Selective Catalytic Reduction (SCR) exhaust treatment - Product overview

What is Selective Catalytic Reduction (SCR)?

Your FPT Industrial S.p.A. engine is equipped with additional components to comply with national and local exhaust emissions requirements. The main components of the SCR system include the SCR catalyst, the Diesel Exhaust Fluid (DEF)/AdBlue® injection unit, the **DEF/AdBlue®** tank, and the **DEF/AdBlue®** dosing control unit.

How does Selective Catalytic Reduction (SCR) work?

During combustion, harmful Nitrogen Oxide (NO_x) molecules are formed in the exhaust. By injecting a **DEF/AdBlue®** solution into the exhaust prior to a catalyst, the NO_x can be converted to harmless elemental Nitrogen and water. This happens when the NO_x molecules react inside the catalyst with the heat generated by the engine and the ammonia in the **DEF/AdBlue®** solution.

NOTICE: Prolonged idling of the machine with no load for more than **6 h** will cause damage to the SCR catalyst.

During cold engine operation at low engine coolant and ambient air temperatures, water vapor will be visible from the exhaust. This water vapor will resemble steam or light white smoke, and will dissipate as the engine and machine components warm. This water vapor is considered normal.

NOTE: After the engine is shut off you will hear a clapping or clicking sound for up to **90 s**. This is a normal function of the Selective Catalyst Reduction (SCR) system. A pump is draining the Diesel Exhaust Fluid (DEF) that is still in the supply lines back into the DEF tank. During this time, **DO NOT** cycle the master disconnect switch OFF until after the pump has finished the drain cycle.

What is Diesel Exhaust Fluid (DEF)/AdBlue®?

DEF/AdBlue® is a clear, colorless, non-toxic, aqueous urea solution (**32.5%**) with a slight ammonia odor. It is used to chemically reduce NO_x emissions from heavy-duty diesel-powered vehicles. **DEF/AdBlue®** is neither explosive nor harmful to the environment. **DEF/AdBlue®** is classified under the minimum-risk category of transportable fluids.

International standard **ISO 22241-1** defines **DEF/AdBlue®** quality. The American Petroleum Institute (API®) has a voluntary certification program for **DEF/AdBlue®**. To ensure that **DEF/AdBlue®** satisfies the requirements of ISO 22241, look for the **API® DEF Certification Mark™** whenever you purchase **DEF/AdBlue®**. API Diesel Exhaust Fluid Certification Mark is a registered trademark of API in the United States and or other countries.



Finding Diesel Exhaust Fluid (DEF)/AdBlue®

Your CASE CONSTRUCTION dealer is fully equipped to accommodate all your **DEF/AdBlue®** needs.

Case IH Max Service: 1-877-422-7344 MaxService.na@cnh.com

Case Customer Assistance: 1-866-542-2736 casecustomerassistance.na@cnh.com

Storage, handling, and transport

NOTICE: Storage temperatures above 30 °C (86 °F) greatly reduce the shelf life of DEF/AdBLUE®.

DEF/AdBLUE® has a typical shelf life of 6-12 months. See the “Shelf life” table below. In order for DEF/AdBLUE® to remain in a useable condition, storage requirements must be met.

- Store between -11 °C (12 °F) and 30 °C (86 °F).
- Use only an approved DEF/AdBLUE® container. Contact your dealer to obtain proper storage container(s).
- Keep container tightly closed.
- Keep container in a cool, well-ventilated area.
- Keep away from heat and direct sunlight.

If the machine will exceed a four month shut down period:

1. Key OFF.

NOTE: Allow 2 – 5 min after Key OFF before disconnecting the batteries.

2. Drain the DEF/AdBLUE® tank.
3. Flush the tank with deionized water.
4. Drain the deionized water

NOTICE: Do not disconnect any electrical connections from the DEF/AdBLUE® system.

Machine start-up after extended shutdown:

1. Fill the DEF/AdBLUE® tank.
2. Replace the main filter in the supply module.
3. Start the machine.

Thawing

- Your CASE CONSTRUCTION machine is equipped with an internal tank heater to thaw frozen DEF/AdBLUE®. Your machine will still function until the DEF/AdBLUE® begins to flow. The SCR system will then function normally.

NOTE: You may notice a slight reduction in engine torque in high demand situations until the DEF/AdBLUE® is fully thawed.

- Do not heat DEF/AdBLUE® for long periods of time at temperatures above 30 °C (86 °F). This causes the solution to decompose, which very slowly decreases the expected shelf life.

NOTICE: Do not use an anti-gelling or freeze point improver in your DEF/AdBLUE®. The 32.5% solution is specifically designed to provide the optimum NOx reduction properties. Any further blending or adjusting of the DEF/AdBLUE® mixture will lessen its ability to perform correctly and may cause damage to the SCR components.

Handling and supply of additives, if any.

- Personal Protective Equipment (PPE) is not required under normal conditions. If splashing is likely, wear eye protection. For prolonged or repeated contact, impervious gloves are recommended. Follow the precautions listed in the SAFETY INFORMATION chapter when handling any service fluid.
- No additives are required.

NOTICE: Contaminated DEF/AdBLUE® can affect the performance of your machine. Follow all instructions in this manual when handling DEF/AdBLUE®.

Shelf life

Constant ambient storage temperature	Minimum shelf life
Less than or equal to 10 °C (50 °F)	36 months
Less than or equal to 25 °C (77 °F) ¹	18 months
Less than or equal to 30 °C (86 °F)	12 months
Less than or equal to 35 °C (95 °F)	6 months
Greater than 35 °C (95 °F)	– ²

¹ To prevent decomposition of DEF/AdBLUE®, prolonged transportation or storage above 25 °C (77 °F) should be avoided.

Constant ambient storage temperature	Minimum shelf life
² Significant loss of shelf life: check every batch before use. See your CASE CONSTRUCTION dealer for more information on testing.	

NOTE: The main factors taken into account to define the shelf life in the table above are the ambient storage temperature and the initial alkalinity of **DEF/AdBLUE®**. The difference in evaporation between vented and non-vented storage containers is an additional factor.

NOTE: The information in the Shelf life table is for reference only. Source: **ISO 22241-3** Diesel engines - NOx reduction agent AUS 32 - Part 3: Handling, transportation and storage.

NOTE: **DEF/AdBLUE®** that remains in the tank of the machine after the season does not require any special precautions unless storage exceeds the shelf life table above.

Disposal

- Dispose of **DEF/AdBLUE®** and any filter accumulations in accordance with all applicable Federal, State, and local laws governing waste disposal.

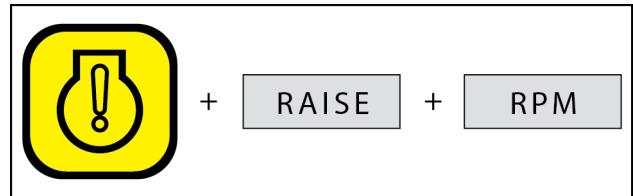
Hydrocarbon management [Instrument Cluster (IC)]

If the engine is run at low idle speed for a prolonged period of time, hydrocarbons can accumulate in the SCR catalyst. To manage this accumulation, your machine will monitor current conditions and will notify the operator to increase engine RPM or may automatically increase if an operator is not present.

NOTICE: Unless the Hydrocarbon (HC) level has reached the most critical level, running the unit under load is advantageous for quickly reducing the HC levels.

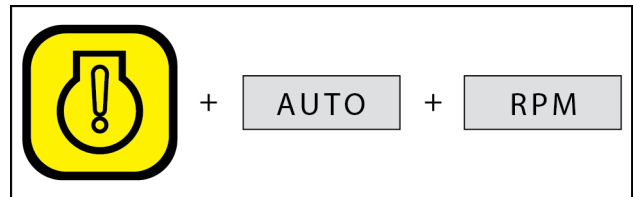
There are two indicators that can be displayed to inform you that hydrocarbon management is active. One will be an indicator lamp on the instrument cluster and the other one will alternate on the display screen:

- Low Idle Increase Recommended - The instrument cluster may request the engine speed be increased when operating at lower temperatures or with lighter engine loads in order to elevate SCR temperatures. Increase engine RPM and continue to operate the machine.



RAIL16SSL0018AA 1

- Automatic Low Idle Increase Active - The engine RPM may automatically increase if an operator is not present.



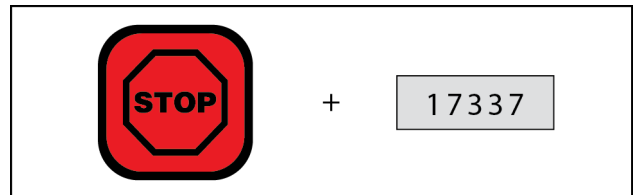
RAIL16SSL0024AA 2

- SCR Catalyst Full - The SCR catalyst has become clogged with hydrocarbon accumulation.

Park the machine and raise the engine RPM to a minimum of **1400 RPM** until the fault clears.

NOTE: This procedure may take up to **1 – 2 h** to complete depending on the ambient air temperature.

NOTICE: Do not turn off the engine, drive the machine, or increase the load on the machine to avoid damage to the catalyst. Failure to comply could cause component damage.



RAIL16SSL0025AA 3

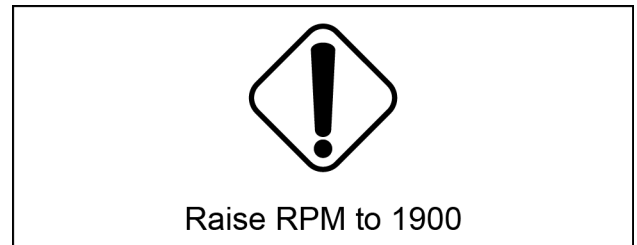
Hydrocarbon management (LCD multi-function display)

If the engine is run at low idle speed for a prolonged period of time, hydrocarbons can accumulate in the SCR catalyst. To manage this accumulation, your machine will monitor current conditions and will notify the operator to increase engine RPM or may automatically increase if an operator is not present.

NOTICE: Unless the Hydrocarbon (HC) level has reached the most critical level, running the unit under load is advantageous for quickly reducing the HC levels.

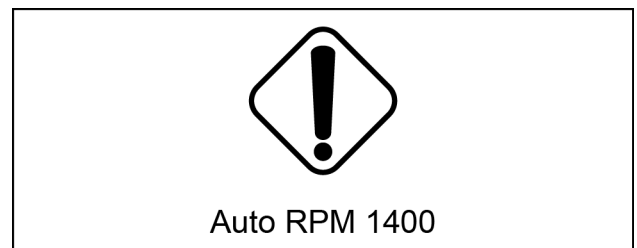
The display will inform you that hydrocarbon management is active:

- Low Idle Increase Recommended - The LCD multi-function display may request the engine speed be increased when operating at lower temperatures or with lighter engine loads in order to elevate SCR temperatures. Increase engine RPM to **1900 RPM** and continue to operate the machine.



RAIL19SSL0451AA 4

- Automatic Low Idle Increase Active - The engine RPM may automatically increase to **1400 RPM** if an operator is not present.



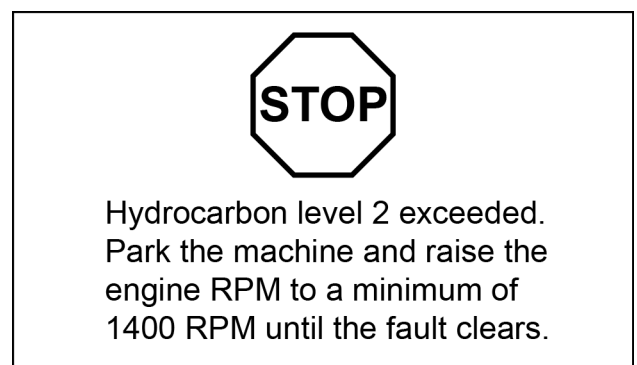
RAIL19SSL0450AA 5

- SCR Catalyst Full - The SCR catalyst has become clogged with hydrocarbon accumulation.

Hydrocarbon level 2 exceeded. Park the machine and raise the engine RPM to a minimum of **1400 RPM** until the fault clears.

NOTE: This procedure may take up to **1 – 2 h** to complete depending on the ambient air temperature.

NOTICE: Do not turn off the engine, drive the machine, or increase the load on the machine to avoid damage to the catalyst. Failure to comply could cause component damage.



RAIL19SSL0454AA 6

Emissions overview

US Environmental Protection Agency (EPA) Warranty Statement

FPT Industrial S.p.A. warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform with US Environmental Protection Agency (EPA) regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations for a period of:

- 2 years or 1,500 hours of operation, whichever occurs first, for engines less than **19 kW (25 Hp)**
- 5 years or 3,000 hours of operation, whichever occurs first, for engines greater than or equal to **19 kW (25 Hp)**

NOTE: *This warranty applies to all units operated in the United States or Canada.*

Coverage

The model year, class of diesel engine, and emission application determination for your engine are identified on the Emission Control Information Label. The warranty period begins on the date the new equipment is sold to the first retail purchaser. The presence of the emission control label is the indication that the engine conforms to the applicable standards. Any emission control system parts which are proven defective during normal use will be repaired or replaced during the warranty period.

The engine owner has responsibility to perform all the required maintenance listed in the Owner's Manual. FPT Industrial S.p.A. will not deny an emission warranty claim solely because no record of maintenance exists; however, a claim may be denied if failure to perform maintenance resulted in the failure of a warranted part.

It is recommended that replacement parts used for maintenance or repairs be FPT Industrial S.p.A. Service Parts to maintain the quality originally designed into your emission certified engine. The use of non- FPT Industrial S.p.A. parts does not invalidate the warranty on other components unless the use of such parts causes damage to warranted parts.

FPT Industrial S.p.A. is not liable for consequential damages to other engine components caused by the failure of any warranted emission control system part. FPT Industrial S.p.A. is not responsible for failures resulting from improper repair or the use of parts that are not genuine FPT Industrial S.p.A. or FPT Industrial S.p.A. approved parts.

Component Coverage

New engines certified for sale and registered will have the following items covered by the emission warranty, depending on the emission level of the engine, if the items were first installed on the new engine as original equipment:

EMISSION CONTROL WARRANTY PARTS LIST

Fuel injection system

- Fuel injection pump
- Fuel injectors
- Fuel injection lines

Air induction system

- Intake manifold
- Turbocharger system (includes exhaust manifold)
- Charge air cooler

Positive Crankcase Ventilation (PCV) system (if applicable)

- PCV valve
- Oil fill cap

Exhaust after treatment Devices (if applicable)

- Diesel Oxidation Catalyst (DOC)

- Diesel Particulate Filter (DPF)

- Selective Catalytic Reduction (SCR)

- Diesel Exhaust Fluid (DEF) tank and dispensing systems

Exhaust Gas Recirculation Systems (EGR)

- EGR valve assembly
- EGR cooler

Cold Start Enrichment Systems

Electronic Control Units, Sensors, Solenoids, and Wiring harnesses used in above systems

Miscellaneous items used in above systems, such as hoses, belts, connectors, tubing, gaskets, and mounting hardware.

Emission Control Information Labels

Emissions Warranty Does Not Cover

- Repairs arising from storage deterioration, failure to maintain the equipment, negligence, alteration, improper use of the equipment, collision or other accident, vandalism, or other casualty, or operation beyond rated capacity or specification.
- Repairs arising from abuse or neglect, including but not limited to: operation without adequate coolant or lubricants, adjustments to the fuel system outside equipment specifications, over-speeding, improper storage, starting, warm-up, or shutdown practices, incorrect fuel or contaminated fuel, oil or other fluids.
- Normal maintenance services, such as engine tune-ups, engine fuel system cleaning, checks, adjustments, shimming, etc.
- Items replaced due to customer demand.
- Labor charges performed by anyone except a dealer authorized by contract to repair the equipment, unless they qualify under special provisions (i.e. outside labor).
- Any and all travel costs for items such as towing, service calls, or transporting a unit to and from the place where the warranty service is performed.
- Normal maintenance costs, including but not limited to: lubricants, coolants, fluids, fuel, filters, and associated labor. Lubricants, filters, and coolants may qualify for warranty reimbursement if they require replacement as a DIRECT RESULT of a defect in material or workmanship.
- Claims involving the inspection or reconditioning of units after storage or prior use.
- Repairs arising from service performed by agents not approved by FPT Industrial S.p.A..
- Repairs arising from any unauthorized modification to the product or the use of non-FPT Industrial S.p.A. parts, implements or attachments.
- Removal, replacement, or installation of non-FPT Industrial S.p.A. optional equipment, attachments or components.
- Premiums charged for overtime labor costs or out of shop expenses.
- Economic loss including lost profits, crop loss, equipment rental, or other expense.
- Unauthorized modification or updating machines without a warrantable failure.
- Any and all costs of dealer shop supplies incurred with repairs, including but not limited to: solvents, cleaners, anti-seize lubricants, loctite™, sealant, adhesive, oil-dry, shop towels, etc.
- Failure of the machine, its implements or attachments caused by improper field application or loading.
- Any and all costs for coolant, fuel, or lube (oil) analysis including supplies and lab recommendations.
- Cost associated with cleaning of machine in preparation for servicing.

California Emission Control Warranty Statement

Your warranty rights and obligations

California Air Resources Board and FPT Industrial S.p.A. are pleased to explain the emission control system warranty on 2021 through 2023 off-road diesel engines. In California, new heavy-duty off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. FPT Industrial S.p.A. must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, FPT Industrial S.p.A. will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE:

The 2021-2023 heavy-duty off-road engines are warranted for 5 years or 3000 hours, whichever comes first. If any emission-related part on your engine is defective, the part will be repaired or replaced by FPT Industrial S.p.A.

OWNER'S WARRANTY RESPONSIBILITIES:

- As the off-road engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. FPT Industrial S.p.A. recommends that you retain all receipts covering maintenance on your off-road engine, but CASE CONSTRUCTION cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the off-road engine owner, you should however be aware that FPT Industrial S.p.A. may deny you warranty coverage if your off-road engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.
- Your engine is designed to operate on Ultra Low Sulfur Diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements.
- You are responsible for initiating the warranty process. The ARB suggests that you present your off-road engine to a CASE CONSTRUCTION dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact North American FPT Technical Service Group at (833) 458-1378 or email: fpt-na-warranty@fptindustrial.com.

CALIFORNIA EMISSION CONTROL WARRANTY PARTS LIST

Fuel injection system

- Fuel injection pump
- Fuel injectors
- Fuel injection lines

Air induction system

- Intake manifold
- Turbocharger system (includes exhaust manifold)
- Charge air cooler

Positive Crankcase Ventilation (PCV) system (if applicable)

- PCV valve
- Oil fill cap

Exhaust after treatment Devices (if applicable)

- Diesel Oxidation Catalyst (DOC)

- Diesel Particulate Filter (DPF)

- Selective Catalytic Reduction (SCR)

- Diesel Exhaust Fluid (DEF) tank and dispensing systems

Exhaust Gas Recirculation Systems (EGR)

- EGR valve assembly
- EGR cooler

Cold Start Enrichment Systems

Electronic Control Units, Sensors, Solenoids, and Wiring harnesses used in above systems

Miscellaneous items used in above systems, such as hoses, belts, connectors, tubing, gaskets, and mounting hardware.

Emission Control Information Labels

2 - SAFETY INFORMATION

Safety rules and signal word definitions

Personal safety



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual and on machine safety signs, you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 **DANGER** indicates a hazardous situation that, if not avoided, will result in death or serious injury. The color associated with DANGER is RED.

 **WARNING** indicates a hazardous situation that, if not avoided, could result in death or serious injury. The color associated with WARNING is ORANGE.

 **CAUTION** indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. The color associated with CAUTION is YELLOW.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: Notice indicates a situation that, if not avoided, could result in machine damage or property damage. The color associated with Notice is BLUE.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine damage or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Safety rules

General safety rules

Use caution when you operate the machine on slopes. Raised equipment, full tanks and other loads will change the center of gravity of the machine. The machine can tip or roll over when near ditches and embankments or uneven surfaces.

Never permit anyone other than the operator to ride on the machine.

Never operate the machine under the influence of alcohol or drugs, or while you are otherwise impaired.

When digging or using ground-engaging attachments, be aware of buried cables. Contact local utilities to determine the locations of services.

Pay attention to overhead power lines and hanging obstacles. High voltage lines may require significant clearance for safety.

Hydraulic oil or diesel fuel leaking under pressure can penetrate the skin, causing serious injury or infection.

- DO NOT use your hand to check for leaks. Use a piece of cardboard or paper.
- Stop the engine, remove the key (if applicable), and move the control handles around to relieve the pressure before you connect or disconnect fluid lines.
- Make sure that all components are in good condition. Tighten all connections before you start the engine or pressurize the system.
- If hydraulic fluid or diesel fuel penetrates the skin, seek medical attention immediately.
- Continuous long term contact with hydraulic fluid may cause skin cancer. Avoid long term contact and wash the skin promptly with soap and water.

Keep clear of moving parts. Loose clothing, jewelry, watches, long hair, and other loose or hanging items can become entangled in moving parts.

Wear protective equipment when appropriate.

DO NOT attempt to remove material from any part of the machine while it is being operated or while components are in motion.

Make sure that all guards and shields are in good condition and properly installed before you operate the machine. Never operate the machine with shields removed. Always close access doors or panels before you operate the machine.

Dirty or slippery steps, ladders, walkways, and platforms can cause falls. Make sure these surfaces remain clean and clear of debris.

A person or pet within the operating area of a machine can be struck or crushed by the machine or its equipment. DO NOT allow anyone to enter the work area.

Raised equipment and/or loads can fall unexpectedly and crush persons underneath. Never allow anyone to enter the area underneath raised equipment during operation.

Never operate the engine in enclosed spaces as harmful exhaust gases may build up.

Before you start the machine, be sure that all controls are in neutral or park lock position.

Start the engine only from the operator's seat. Do not connect or short across terminals on the starter solenoid. Attach jumper cables as described in the manual. Starting in gear may cause death or serious injury.

Always keep windows, mirrors, all lighting, and Slow-Moving Vehicle (SMV) emblem clean to provide the best possible visibility while you operate the machine.

Operate controls only when seated in the operator's seat, except for those controls expressly intended for use from other locations.

Before you leave the machine:

1. Park the machine on a firm, level surface.
2. Lower the loader arms and attachments to the ground.
3. Place all controls in the neutral position.
4. Press the Operate button on the instrument panel, this should disable the ground drive and the loader hydraulic controls.
5. Engage the park brake.
6. Check that the interlock system is functioning by moving the controls out of the neutral position. If any movement occurs do not operate the machine. Park the machine, turn off the engine, and contact your authorized dealer for assistance.
7. Turn off the engine and if applicable remove the key.
8. Exit the machine.
9. Use wheel chocks if required.

When, due to exceptional circumstances, you would decide to keep the engine running and leave the operator's station, then you must follow these precautions:

1. Bring the engine to low idle speed.
2. Lower the loader arms and attachments to the ground.
3. Place all controls in their neutral position.

4. Press the Operate button on the instrument panel, this should disable the ground drive and the loader hydraulic controls.

WARNING

Some components may continue to run down after you disengage drive systems. Make sure all drive systems are fully disengaged. Failure to comply could result in death or serious injury.

W0113A

5. Engage the park brake.
6. Check that the interlock system is functioning by moving the controls out of the neutral position. If any movement occurs do not operate the machine. Park the machine, turn off the engine, and contact your authorized dealer for assistance.
7. Exit the machine.

General maintenance safety

Keep the area used for servicing the machine clean and dry. Clean up spilled fluids.

Service the machine on a firm, level surface.

Install guards and shields after you service the machine.

Close all access doors and install all panels after servicing the machine.

Do not attempt to clean, lubricate, clear obstructions, or make adjustments to the machine while it is in motion or while the engine is running.

Always make sure that working area is clear of tools, parts, other persons and pets before you start operating the machine.

Unsupported hydraulic cylinders can lose pressure and drop the equipment, causing a crushing hazard. Do not leave equipment in a raised position while parked or during service, unless the equipment is securely supported.

Jack or lift the machine only at jack or lift points indicated in this manual.

Incorrect towing procedures can cause accidents. When you tow a disabled machine follow the procedure in this manual. Use only rigid tow bars.

Stop the engine, remove the key, and relieve pressure before you connect or disconnect fluid lines.

Stop the engine and remove the key before you connect or disconnect electrical connections.

Scalding can result from incorrect removal of coolant caps. Cooling systems operate under pressure. Hot coolant can spray out if you remove a cap while the system is hot. Allow the system to cool before you remove the cap. When you remove the cap, turn it slowly to allow pressure to escape before you completely remove the cap.

Replace damaged or worn tubes, hoses, electrical wiring, etc.

The engine, transmission, exhaust components, and hydraulic lines may become hot during operation. Take care when you service such components. Allow surfaces to cool before you handle or disconnect hot components. Wear protective equipment when appropriate.

When welding, follow the instructions in the manual. Always disconnect the battery before you weld on the machine. Always wash your hands after you handle battery components.

Wheels and tires

Make sure that tires are correctly inflated. Do not exceed any recommended load or pressure. Follow the instructions in the manual for proper tire inflation.

Tires are heavy. Handling tires without proper equipment could cause death or serious injury.

Always have a qualified tire technician service the tires and wheels. If a tire has lost all pressure, take the tire and wheel to a tire shop or your dealer for service. Explosive separation of the tire can cause serious injury.

DO NOT weld to a wheel or rim until the tire is completely removed. Inflated tires can generate a gas mixture with the air that can be ignited by high temperatures from welding procedures performed on the wheel or rim. Removing the air or loosening the tire on the rim (breaking the bead) will NOT eliminate the hazard. This condition can exist whether tires are inflated or deflated. The tire MUST be completely removed from the wheel or rim prior to welding the wheel or rim.

Driving on public roads and general transportation safety

Comply with local laws and regulations.

Use appropriate lighting to meet local regulations.

Make sure that the SMV emblem is visible.

Lift implements and attachments high enough above ground to prevent accidental contact with road.

When you transport equipment or a machine on a transport trailer, make sure that it is properly secured. Be sure the SMV on the equipment or machine is covered while being transported on a trailer.

Fire and explosion prevention

Fuel or oil that is leaked or spilled on hot surfaces or electrical components can cause a fire.

Crop materials, trash, debris, bird nests, or flammable material can ignite on hot surfaces.

Always have a fire extinguisher on or near the machine.

Make sure that the fire extinguisher(s) is maintained and serviced according to the manufacturer's instructions.

At least once each day and at the end of the day, remove all trash and debris from the machine especially around hot components such as the engine, transmission, exhaust, battery, etc. More frequent cleaning of your machine may be necessary depending on the operating environment and conditions.

At least once each day, remove debris accumulation around moving components such as bearings, pulleys,

General battery safety

Always wear eye protection when you work with batteries.

Do not create sparks or have open flame near a battery.

Ventilate the area when you charge a battery or use a battery in an enclosed area.

Disconnect the negative (-) terminal first and reconnect the negative (-) terminal last.

When you weld on the machine, disconnect both terminals of the battery.

Do not weld, grind, or smoke near a battery.

When you use auxiliary batteries or connect jumper cables to start the engine, use the procedure shown in the operator's manual. Do not short across terminals.

Operator presence system

Your machine is equipped with an operator presence system to prevent the use of some features while the operator is not in the operator's seat.

Never disconnect or bypass the operator presence system.

Be aware of overhead structures or power lines and make sure that the machine and/or attachments can pass safely under.

Travel speed should be such that you maintain complete control and machine stability at all times.

Slow down and signal before turning.

Pull over to allow faster traffic to pass.

belts, gears, cleaning fans, etc. More frequent cleaning of your machine may be necessary depending on the operating environment and conditions.

Inspect the electrical system for loose connections and frayed insulation. Repair or replace loose or damaged parts.

Do not store oily rags or other flammable material on the machine.

Do not weld or flame cut any items that contain flammable material. Clean items thoroughly with non-flammable solvents before welding or flame-cutting.

Do not expose the machine to flames, burning brush, or explosives.

Promptly investigate any unusual smells or odors that may occur during operation of the machine.

Follow the manufacturer's instructions when you store and handle batteries.

Battery post, terminals, and related accessories contain lead and lead compounds. Wash hands after handling.

Battery acid causes burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately.

Keep out of reach of children and other unauthorized persons.

If the operator presence system is inoperable, then it must be repaired. Follow the test procedure (7-45).

Reflectors and warning lights

You must use flashing amber warning lights when you operate equipment on public roads.

Air-conditioning system

The air-conditioning system is under high pressure. Do not disconnect any lines. The release of high pressure can cause serious injury.

The air-conditioning system contains gases that are harmful to the environment when released into the atmosphere. Do not attempt to service or repair the system.

Only trained service technicians can service, repair, or recharge the air-conditioning system.

Personal Protective Equipment (PPE)

Wear Personal Protective Equipment (PPE) such as hard hat, eye protection, heavy gloves, hearing protection, protective clothing, etc.

Do Not Operate tag

Before you start servicing the machine, attach a 'Do Not Operate' warning tag to the machine in an area that will be visible.

Operator protective structure

Your machine is equipped with an operator protective structure, such as: a Roll Over Protective Structure (ROPS), Falling Objects Protective Structure (FOPS), or a cab with a ROPS. A ROPS may be a can frame or a two-posted or four-posted structure used for the protection of the operator to minimize the possibility of serious injury. The mounting structure and fasteners forming the mounting connection with the machine are part of the ROPS.

The protective structure is a special safety component of your machine.

DO NOT attach any device to the protective structure for pulling purposes. DO NOT drill holes to the protective structure.

The protective structure and interconnecting components are a certified system. Any damage, fire, corrosion, or modification will weaken the structure and reduce your protection. If this occurs, THE PROTECTIVE STRUCTURE MUST BE REPLACED so that it will provide the same protection as a new protective structure. Contact your dealer for protective structure inspection and replacement.

After an accident, fire, tip over, or roll over, the following MUST be performed by a qualified technician before returning the machine to field or job-site operations:

- The protective structure MUST BE REPLACED.
- The mounting or suspension for the protective structure, operator's seat and suspension, seat belts and mounting components, and wiring within the operator's protective system MUST be carefully inspected for damage.
- All damaged parts MUST BE REPLACED.

DO NOT WELD, DRILL HOLES, ATTEMPT TO STRAIGHTEN, OR REPAIR THE PROTECTIVE STRUCTURE. MODIFICATION IN ANY WAY CAN REDUCE THE STRUCTURAL INTEGRITY OF THE STRUCTURE, WHICH COULD CAUSE DEATH OR SERIOUS INJURY IN THE EVENT OF FIRE, TIP OVER, ROLL OVER, COLLISION, OR ACCIDENT.

Seat belts are part of your protective system and must be worn at all times. The operator must be held to the seat inside the frame in order for the protective system to work.

Hazardous chemicals

If you are exposed to or come in contact with hazardous chemicals you can be seriously injured. The fluids, lubricants, paints, adhesives, coolant, etc. required for the function of your machine can be hazardous. They may be attractive and harmful to domestic animals as well as humans.

Material Safety Data Sheets (MSDS) provide information about the chemical substances within a product, safe handling and storage procedures, first aid measures, and procedures to take in the event of a spill or accidental release. MSDS are available from your dealer.

Before you service your machine check the MSDS for each lubricant, fluid, etc. used in this machine. This information indicates the associated risks and will help you service the machine safely. Follow the information in the MSDS, and on manufacturer containers, as well as the information in this manual, when you service the machine.

Dispose of all fluids, filters, and containers in an environmentally safe manner according to local laws and regulations. Check with local environmental and recycling centers or your dealer for correct disposal information.

Electrical storm safety

Do not operate machine during an electrical storm.

If you are on the ground during an electrical storm, stay away from machinery and equipment. Seek shelter in a permanent, protected structure.

Lifting and overhead loads

Never use loader buckets, forks, etc. or other lifting, handling, or digging equipment to lift persons.

Do not use raised equipment as a work platform.

Know the full area of movement of the machine and equipment and do not enter or permit anyone to enter the area of movement while the machine is in operation.

Never enter or permit anyone to enter the area underneath raised equipment. Equipment and/or loads can fall unexpectedly and crush persons underneath it.

Do not leave equipment in raised position while parked or during service, unless securely supported. Hydraulic cylinders must be mechanically locked or supported if they are left in a raised position for service or access.

Store fluids and filters in accordance with local laws and regulations. Use only appropriate containers for the storage of chemicals or petrochemical substances.

Keep out of reach of children or other unauthorized persons.

Applied chemicals require additional precautions. Obtain complete information from the manufacturer or distributor of the chemicals before you use them.

If an electrical storm should strike during operation, remain in the cab. Do not leave the cab or operator's platform. Do not make contact with the ground or objects outside the machine.

Loader buckets, forks, etc. or other lifting, handling, or digging equipment and its load will change the center of gravity of the machine. This can cause the machine to tip on slopes or uneven ground.

Load items can fall off the loader bucket or lifting equipment and crush the operator. Care must be taken when lifting a load. Use proper lifting equipment.

Do not lift load higher than necessary. Lower loads to transport. Remember to leave appropriate clearance to the ground and other obstacles.

Equipment and associated loads can block visibility and cause an accident. Do not operate with insufficient visibility.

Utility safety

YOU MUST FOLLOW safety precautions when you work near buried utility lines.

During operation, it is likely that you will be working around or near buried utility lines that may include, but are not limited to:

- Electrical power line
- Gas line
- Water line
- Communication line - telephone or cable television
- Sewer line

NOTE: Before construction work begins it is your responsibility to be aware of all utility lines in the area of your project and to avoid them.

ALWAYS have all local utility companies mark the location of their lines.

In U.S.A. and Canada call one of many One Call System Director services. If you do not know the local number, call the national number (U.S.A. and Canada only): 1-888-258-0808. This number will direct you to the state or regional utility that assists with excavation activity.

NOTE: Check with local authorities for laws, regulations, and/or strict penalties requiring you to locate and avoid existing utilities.

Call all utility companies before you perform any machine operation

After you locate any buried utility lines, carefully dig a hole to the utility line by hand and/or with automatic vacuum equipment. Verify the location and depth of the line.

Where applicable, know the utility color code.

Electric	Red
Gas, Oil, or Petroleum	Yellow
Communication, Telephone, Television	Orange
Water	Blue
Sewer	Green or Brown
Proposed Excavation	White
Surveying	Pink
Reclaimed Water and Slurry	Purple

Coordinate all excavation activity with the proper authorities and professionals before beginning.

Proper entry and exit

⚠ DANGER

Crushing hazard!

Do not enter or exit the operator's compartment while the loader arms are raised or unsupported. Rest the loader arms on the ground or verify that loader arm is being supported by the loader arm strut or loader arm lock pin before entering or exiting the operator's compartment.

Failure to comply will result in death or serious injury.

D0168A

⚠ WARNING

Fall hazard!

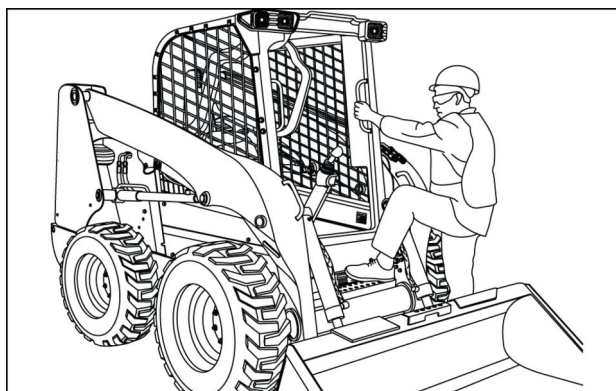
Jumping on or off the machine could cause an injury. Always face the machine, use the handrails and steps, and get on or off slowly. Maintain a three-point contact to avoid falling: both hands on the handrails and one foot on the step, or one hand on the handrail and both feet on the steps.

Failure to comply could result in death or serious injury.

W0141A

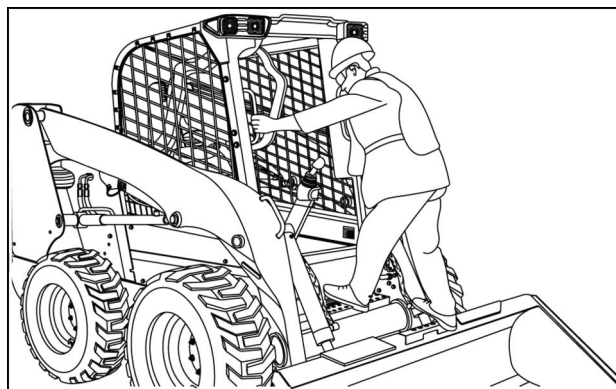
Enter the machine

1. Face the cab entry point.
2. If applicable, open the cab door.
3. Hand holds are provided on the loader arm, front cab posts, or on the inside of the cab door. Grab the hand holds.
4. Place one foot on the loader arm coupler step or on the bucket step.



93109352 1

5. Pull yourself up, face the machine, and stand on the step(s).
6. Position your hands so that you are comfortable with stepping into the cab.
7. Place one foot into the center area of the cab. A step area is provided between the foot pedals, if equipped.
8. Step into the cab, turn your body, and sit in the operator's seat.



93109353 2

⚠ DANGER

Crushing hazard!

Do not enter or exit the operator's compartment while the loader arms are raised or unsupported. Rest the loader arms on the ground or verify that loader arm is being supported by the loader arm strut or loader arm lock pin before entering or exiting the operator's compartment.

Failure to comply will result in death or serious injury.

D0168A

⚠ WARNING

Fall hazard!

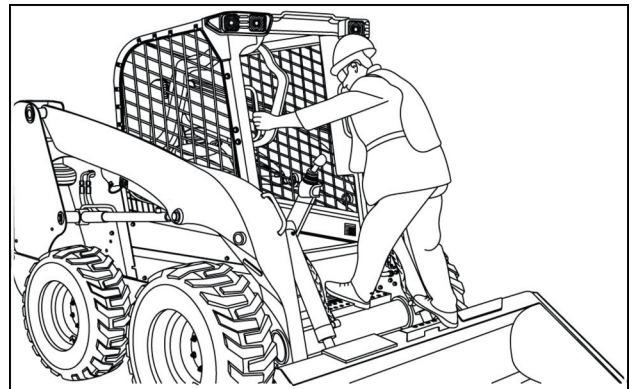
Jumping on or off the machine could cause an injury. Always face the machine, use the handrails and steps, and get on or off slowly. Maintain a three-point contact to avoid falling: both hands on the handrails and one foot on the step, or one hand on the handrail and both feet on the steps.

Failure to comply could result in death or serious injury.

W0141A

Exit the machine

1. Lower the loader arm and or attachments to the ground.
2. Stop the engine. The parking brake is automatically set.
3. Remove the seat belt and raise the seat restraint bar.
4. If applicable, open the cab door.
5. Grab the hand holds.
6. Pull yourself up and place one foot on the loader arm coupler step or on the bucket step.
7. Position your hands on the hand holds so that you are comfortable with stepping out of the cab.
8. Step out of the machine and turn your body so that you face the machine.
9. Look and make sure that the ground area is clear to step off of the machine.
10. Position your hands so that you are comfortable with stepping off of the machine.
11. Place one foot on the ground.
12. Place the other foot on the ground and safely move away from the machine.



93109353 3



93109352 4

Starting and stopping precautions

- Walk around the machine and attachments to warn all personnel who may be servicing the machine or are in the machine path prior to starting. Do not start until all personnel are clearly away from the machine. Sound the horn, if equipped, before starting.
- Walk around the machine and attachment. Ensure that all safety precautions / warnings are upheld and all safety devices are working as the attachment manufacturer states in their safety information.
- Check that the parking device is applied, place all controls in neutral or park as specified by the manufacturer, before starting the machine.
- Adjust, secure and latch the seat belt, and lower the restraint bar before starting the machine.
- To avoid potential serious injury by contact with the machines moving attachment, DO NOT rewire to bypass the seat or restraint bar switches (if equipped).
- Start and operate the machine only from the operator's seat.
- Use jumper cables only in the recommended manner. Improper use can result in battery explosion or unexpected machine motion. Ventilate the battery area before using jumper cables. Make sure that using jumper cables will not interfere or harm electronic devices.
- DO NOT operate the engine in an enclosed area without adequate ventilation.
- Park the machine on level ground whenever possible and apply the parking brake. On grades/slope, park the machine with the wheels or track securely blocked.
- Before leaving the operator station, lower the equipment to the ground and shut off the engine.
- Remove the starter key or lock the instrument panel, or turn the master disconnect switch (if equipped) to the OFF position when leaving the machine parked or unattended.

Seat belt precautions

⚠ Seat belts ⚠

Seat belts must be worn at all times.

Seat belt inspection and maintenance:

- Keep seat belts in good condition.
- Keep sharp edges and items that can cause damage away from the belts.
- Periodically check belts, buckles, retractors, tethers, slack take-up system, and mounting bolts for damage and wear.
- Replace all parts that have damage or wear.
- Replace belts that have cuts that can make the belt weak.
- Check that bolts are tight on the seat bracket or mounting.
- If belt is attached to seat, make sure seat or seat brackets are mounted securely.
- Keep seat belts clean and dry.
- Clean belts only with soap solution and warm water.
- Do not use bleach or dye on the belts because this can make the belts weak.

⚠ WARNING

Avoid injury!

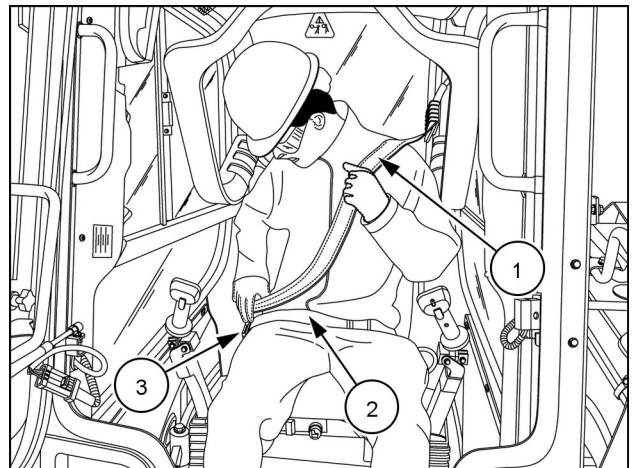
Before starting the engine, securely fasten the seat belt. The seat belt can help ensure your safety if it is properly used and maintained. Never wear a seat belt loosely or with slack in the belt system. Never wear the belt if it is twisted or pinched between the seat structures.

Failure to comply could result in death or serious injury.

W0142A

1. Pull the seat belt retractable half (2) across and buckle securely with the buckle half (3).
2. A shoulder belt (1) is available from your dealer. Some machine configurations are equipped with a shoulder belt.

NOTE: State or Local regulations may require a 7.6 cm (3 in) webbing seat belt available through Dealer Service Parts. This belt may be necessary in some industrial applications. Check your local codes.

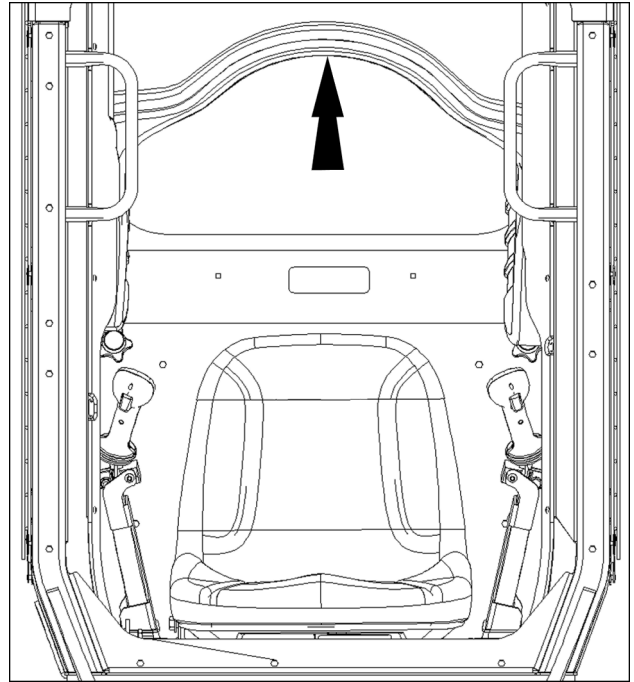


RAIL19SSL0001BA 1

Seat restraint bar

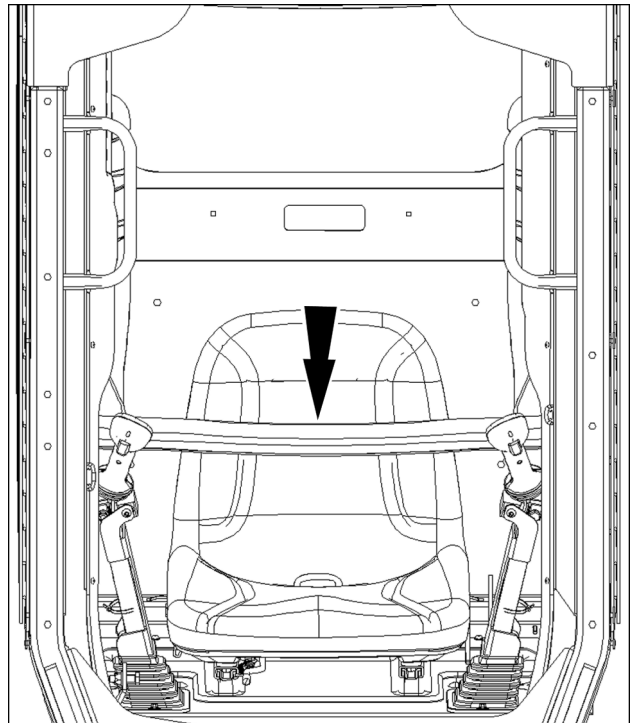
The restraint bar must be down in the operating position before starting.

Seat restraint bar in the raised position.



RAIL19SSL0056BA 2

Seat restraint bar in the operating position.



RAIL19SSL0055BA 3

Specific precautions to this machine

DANGER

Crushing hazard!

Do not enter or exit the operator's compartment while the loader arms are raised or unsupported. Rest the loader arms on the ground or verify that loader arm is being supported by the loader arm strut or loader arm lock pin before entering or exiting the operator's compartment.

Failure to comply will result in death or serious injury.

D0168A

Specific precautions to this machine:

- All machines are equipped with safety support features when service or maintenance of the machine is required. You may secure the loader arm in a raised position and secure the cab in a tilt position. These features allow greater access to the internal components of the machine. Read and understand the “Loader arm lock and cab tilt procedure - radial lift machines” page **2-16** or “Loader arm lock and cab tilt procedure - vertical lift machines” page **2-20** in this manual.
- Place all controls in neutral before leaving the cab and be careful not to engage them accidentally when entering or exiting the cab.
- Before leaving the operators compartment check the interlock system so movement of controls do not result in machine movement. Follow the “Loader arm and bucket hydraulic interlock” procedure on page **7-45**.
- Keep the load or tool as low as possible while moving the machine around the job site.
- Confirm that the coupler lock pins are engaged with the bucket or attachment retaining tabs.
- Do not over fill the bucket. Dirt, rocks and debris can enter the operator area.

Fire extinguisher

It is recommended that you have a fire extinguisher on your machine. Contact your dealer for the type and location of a fire extinguisher on this machine.

Roll Over Protective Structure (ROPS)

DANGER

Crushing hazard!

DO NOT operate the machine with the Roll-Over Protective Structure (ROPS) removed. Remove the ROPS only for service or replacement.

Failure to comply will result in death or serious injury.

D0032A

DANGER

Crushing hazard!

Do not change the Roll Over Protective Structure (ROPS) in any way. Unauthorized changes such as welding, drilling, or cutting will weaken the ROPS and decrease your protection. Have an authorized dealer replace the ROPS if damage of any kind occurs. **DO NOT TRY TO REPAIR THE ROPS.**

Failure to comply will result in death or serious injury.

D0037A

WARNING

Tip-over hazard!

Adding additional weight (buckets, attachments, etc.) to the machine can create a tipping hazard. **Do not** exceed the gross weight indicated by the machine specifications.

Failure to comply could result in death or serious injury.

W0153A

WARNING

Roll-over hazard!

Securely fasten the seat belt. Your machine is equipped with a Roll-Over Protective Structure (ROPS) cab, ROPS canopy, or ROPS frame for your protection. The seat belt can help ensure your safety if it is properly used and maintained. **Never** wear a seat belt loosely or with slack in the belt system.

Failure to comply could result in death or serious injury.

W0143A

Your machine has a Roll Over Protective Structure (ROPS). The ROPS or Cab Structural Frame (CSF) is a special safety component of your machine.

DO NOT attach any device to the ROPS or CSF for pulling purposes.

The ROPS or CSF is a certified structural support and any damage, fire, corrosion, or modification will weaken the structure and reduce your protection. If this occurs, the ROPS or CSF must be replaced so that it will provide the same protection as a new ROPS or CSF.

After an accident, fire, or rollover, the following **MUST** be performed before returning the machine to the field or job site:

- The ROPS or CSF structure **MUST** be replaced.
- The ROPS or CSF mounting or suspension, operator seat and suspension, seat belts and mounting components and wiring within the operator's protective system **MUST** be carefully inspected for damage.
- All damaged parts must be replaced.

Maintenance and inspection of the Roll Over Protective Structure (ROPS)

1. Check the torque of the ROPS mounting bolts. If necessary, tighten the bolts to the correct torque, for the front pivot bolts tighten them down to **42 N·m (31.0 lb ft)** and the rear bolts to **170 N·m (125.4 lb ft)**.
2. Check for cracks, rust, or holes in the ROPS and ROPS parts. Age, weather, and accidents can cause damage to the ROPS and ROPS parts. If you have any doubts about the ROPS system, see your dealer.
3. Check the operator's seat and the mounting parts for the seat belt. Tighten the bolts to the correct torque. Replace the parts that have wear or damage.

Seat belt

The seat belt is an important part of your ROPS. You must wear the seat belt at all times when you operate the machine.

Before you operate this machine, always make sure that the ROPS and operator's seat belt are correctly installed.

Welding on the machine

⚠ DANGER

Improper operation or service of this machine can result in an accident.

Any unauthorized modifications made to this machine can have serious consequences. Consult an authorized dealer on changes, additions, or modifications that may be required for this machine. Do not make any unauthorized modifications.

Failure to comply will result in death or serious injury.

D0030A

When you carry out a welding operation on the machine as authorized by the manufacturer and in accordance with the manufacturer's instructions

- Disconnect the batteries
- Disconnect the Engine Control Unit (ECU)
- If your machine is equipped with the Electro-Hydraulic controls option, disconnect the Universal Control Module (UCM)
- Disconnect the alternator B+ and D+ terminal wires
- Disconnect the display , instrument cluster, and/or the hidden instrument cluster (if equipped)
- Connect the ground cable from the welding apparatus to the component on which you will perform the welding operation.

Always connect the welding apparatus to the same structure that is being welded.

Never connect the welding apparatus ground to a component of the hydraulic system.

Loader arm lock and cab tilt procedure - radial lift machines

⚠ DANGER

Crushing hazard!

Do not enter or exit the operator's compartment while the loader arms are raised or unsupported. Rest the loader arms on the ground or verify that loader arm is being supported by the loader arm strut or loader arm lock pin before entering or exiting the operator's compartment.

Failure to comply will result in death or serious injury.

D0168A

⚠ DANGER

Crushing hazard!

The loader arm is unsupported during support strut removal. Do not enter or exit the operator's compartment with an unsupported loader arm. Two persons are required during storage. One person should remove and store the support strut while the operator remains in the operator's compartment.

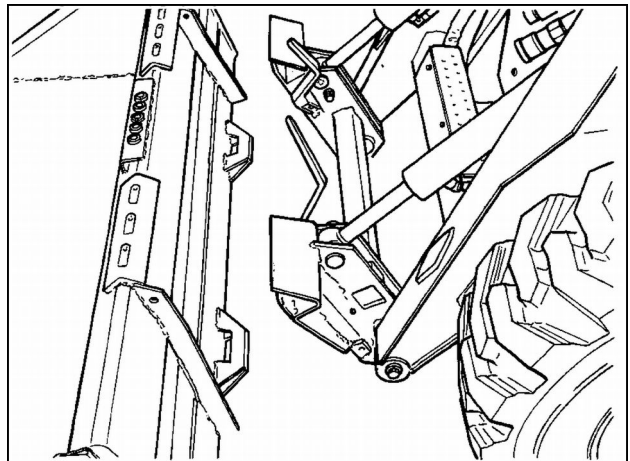
Failure to comply will result in death or serious injury.

D0021B

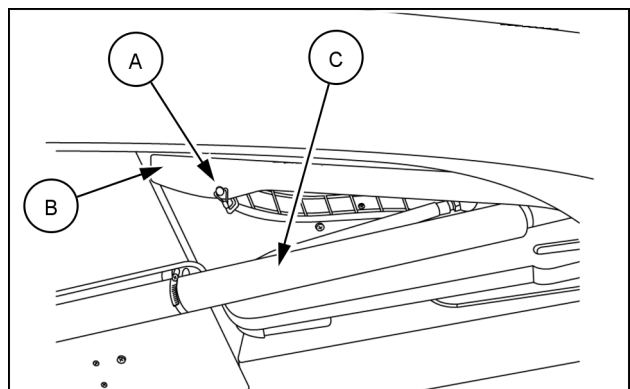
Raise and lock the loader arm for machine service

NOTE: An instructional decal on the inside of the right-hand loader arm, just above the support strut is also available. Understand the loader arm lock procedure before continuing.

1. Sit in the operator's seat, fasten the seat belt, pull down the restraint bar down, and start the engine.
2. Press the OPERATE button to enable the hydraulics.
3. Remove the bucket or attachment from the mounting plate. See "Mechanical attachment mounting systems" (6-1) or "Hydraulic attachment mounting systems" (6-4) for assistance.
4. Park the machine on firm and level surface.
5. If an assistant is not available, turn off the engine and exit the machine.
6. Remove the support strut pin (A) and let the support strut (B) rest on the lift cylinder barrel (C).

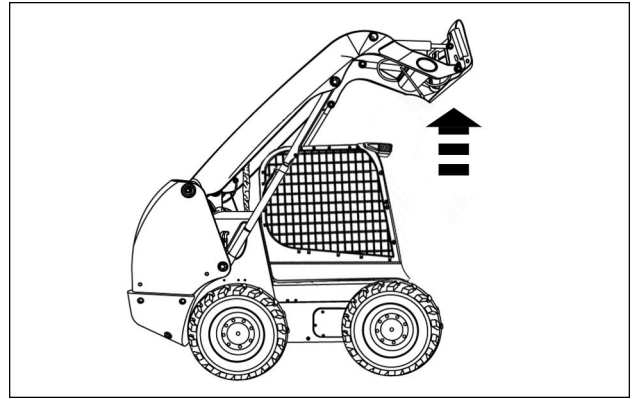


20092924 1



93106848A 2

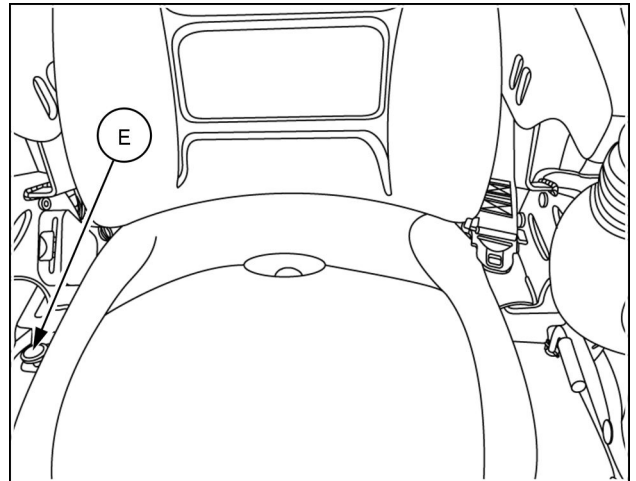
7. Slowly raise the loader arm until the support strut (B) falls onto the cylinder rod (D).
8. Stop the engine.



RAIL14SSL0418AA 3

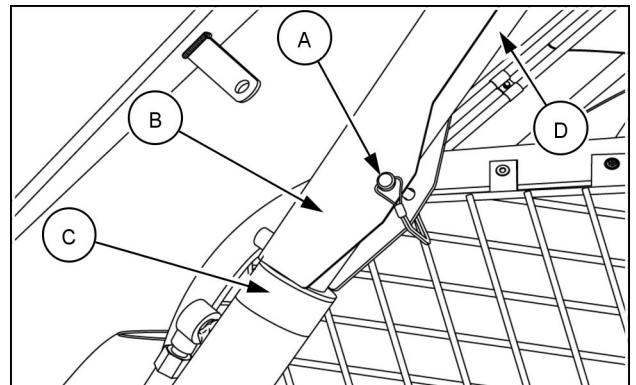
9. Pull up on the override control knob (E) (red control knob near the right-hand side of the operator's seat). The support strut (B) will brace against the top of the cylinder barrel (C) supporting the weight of the loader arm.

NOTICE: Only use the override control knob for emergency situations where engine power is not available or to lock the loader arm on to the support strut for servicing the machine.



93107465A 4

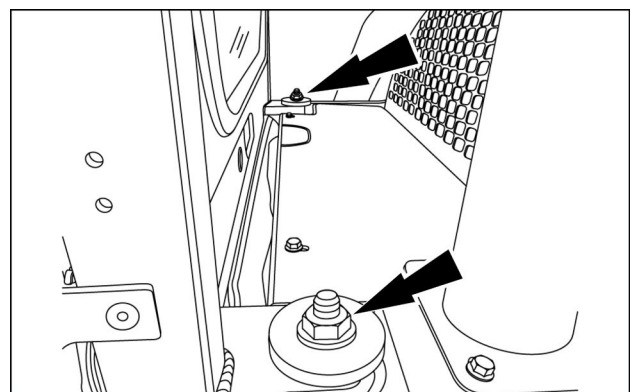
10. Ask an assistant to insert the pin (A) into the support strut (B). If an assistant is not available visually confirm that the support strut is braced against the top of the cylinder barrel before exiting the machine.



93106854A 5

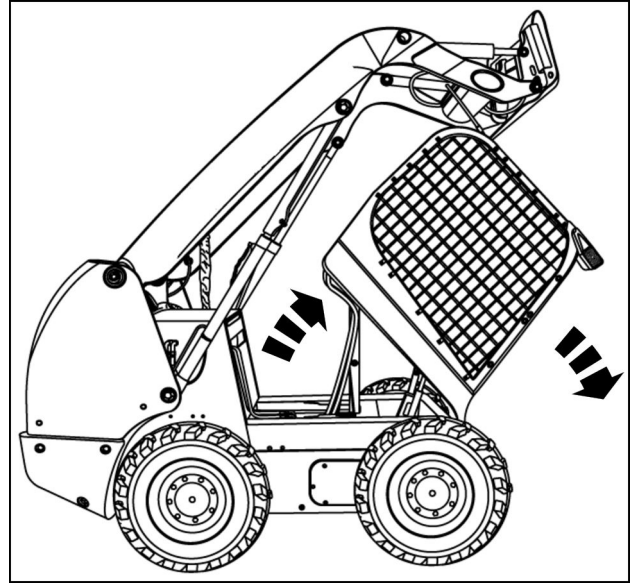
Tilt and lock the cab forward for machine service

1. Remove the two, rear retaining nuts, located at the rear of the cab.



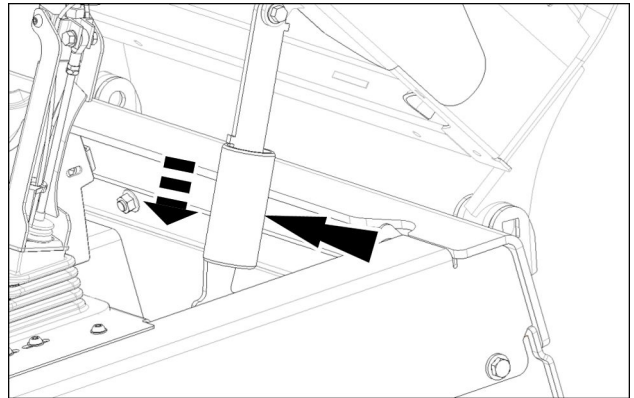
931001633 6

2. Pull on the hand holds at the front of the machine until the cab is completely tilted forward.



93107498 7

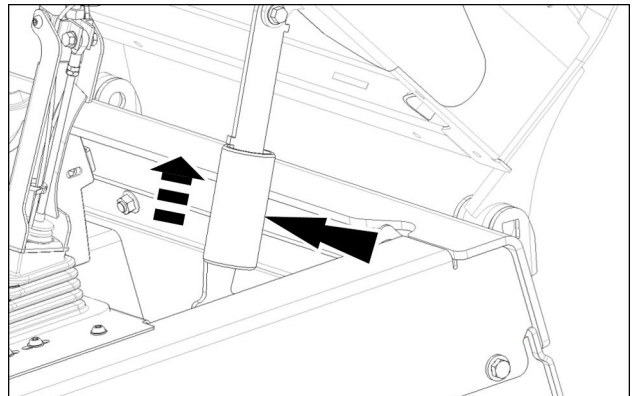
3. Confirm that the red lock tube has lowered over the cab pivot linkage. If it has, the cab tilt position is now secure.



RAIL19SSL0003AA 8

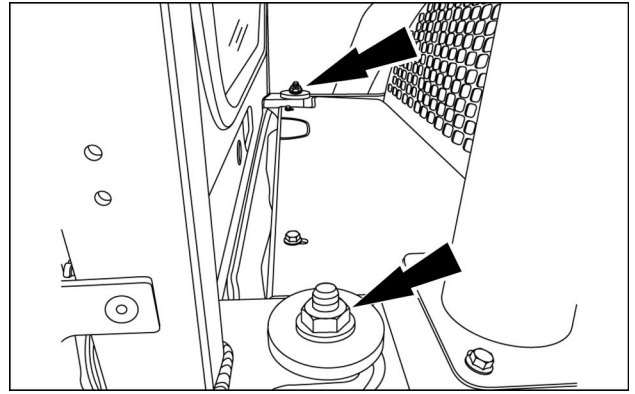
Tilt and secure the cab for machine operation

1. Raise the red lock tube exposing the cab pivot linkage.
2. Push the cab backward into the operation position.



RAIL19SSL0003AA 9

3. Install the retaining nuts. Torque the nuts to **170 N·m (125 lb ft)**.



931001633 10

Unlock and lower the loader arm for machine operation

⚠ DANGER

Crushing hazard!

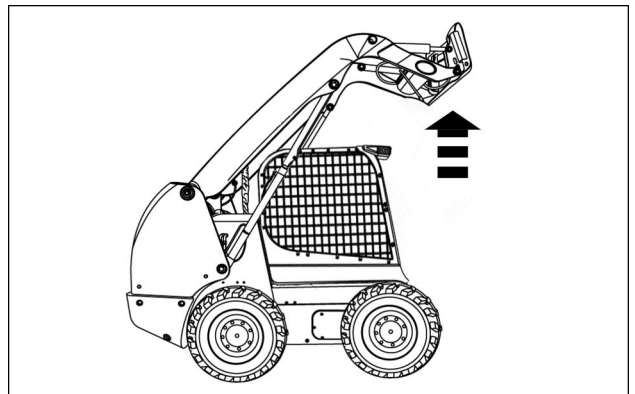
The loader arm is unsupported during support strut removal. Do not enter or exit the operator's compartment with an unsupported loader arm. Two persons are required during storage. One person should remove and store the support strut while the operator remains in the operator's compartment. Failure to comply will result in death or serious injury.

D0021B

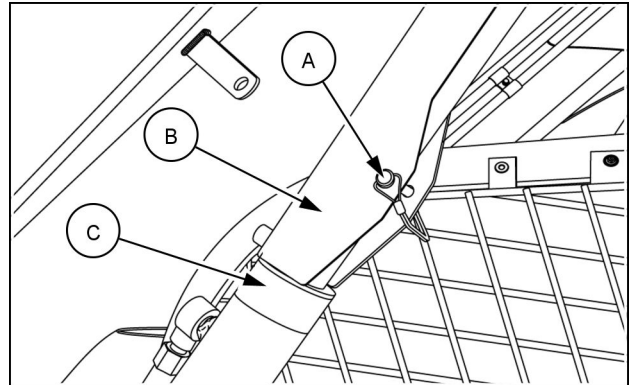
NOTE: An instructional decal on the inside of the right-hand loader arm, just above the support strut is also available. Understand the loader arm unlock procedure before continuing.

Placing the support strut in the storage position requires a second person. The operator must remain in the seat during this procedure.

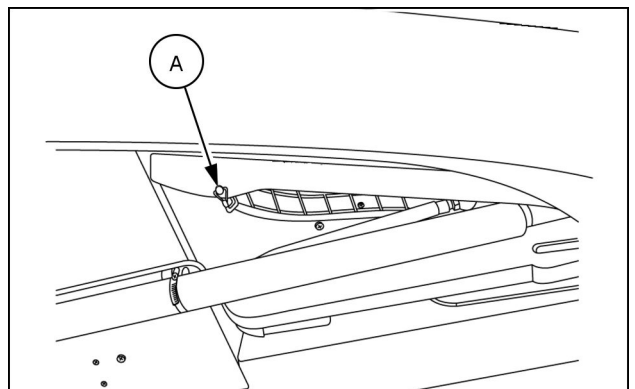
1. Sit in the operator's seat, fasten the seat belt, pull down the restraint bar down, and start the engine.
2. Press the operate button to enable the hydraulics.
3. Raise the loader arm until the support strut **(B)** is not resting on the end of the cylinder barrel **(C)**.
4. Instruct the second person to remove the support strut pin **(A)** and place the support strut in the stowed position and reinstall the support strut pin **(A)**. When the second person has cleared the area, the operator may now lower the loader arm.
5. Commence work operations or park the machine and stop the engine.



RAIL14SSL0418AA 11



93106854A 12



93106848A 13

Loader arm lock and cab tilt procedure - vertical lift machines

⚠ DANGER

Crushing hazard!

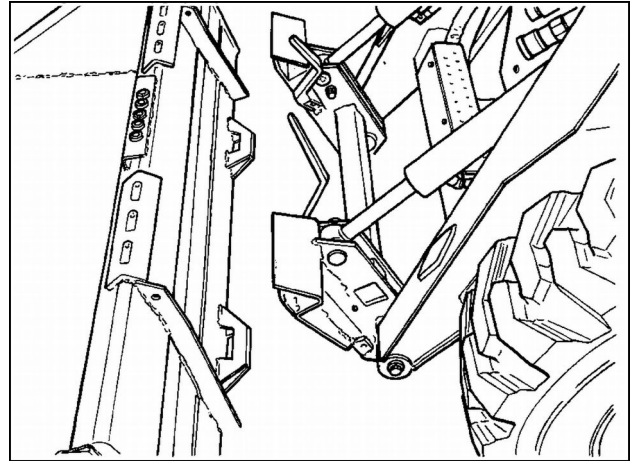
Do not enter or exit the operator's compartment while the loader arms are raised or unsupported. Rest the loader arms on the ground or verify that loader arm is being supported by the loader arm strut or loader arm lock pin before entering or exiting the operator's compartment.

Failure to comply will result in death or serious injury.

D0168A

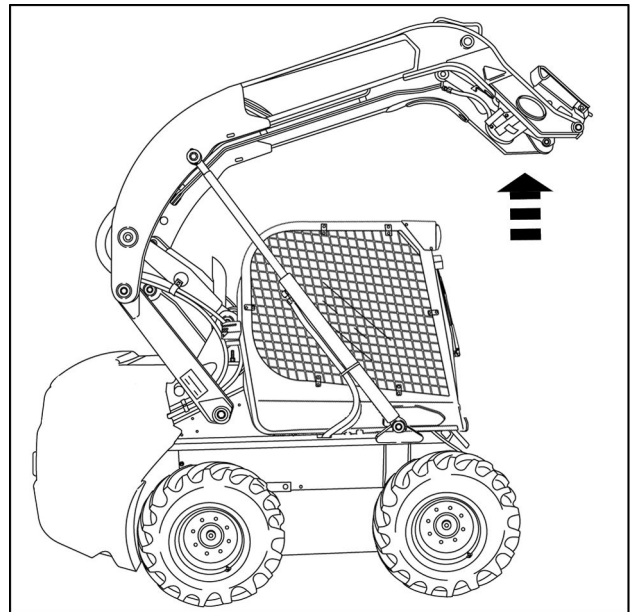
Raise and lock the loader arm for machine service

1. Sit in the operator's seat, fasten the seat belt, pull down the restraint bar down, and start the engine.
2. Press the operate button to enable the hydraulics.
3. Remove the bucket or attachment from the mounting plate. See "Mechanical attachment mounting systems" (6-1) or "Hydraulic attachment mounting systems" (6-4) for assistance.
4. Park the machine on a level surface.



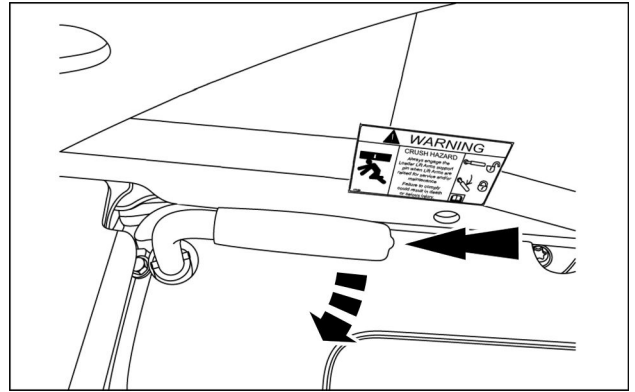
20092924 1

5. Fully raise the loader arm.



RAPH14SSL0351BA 2

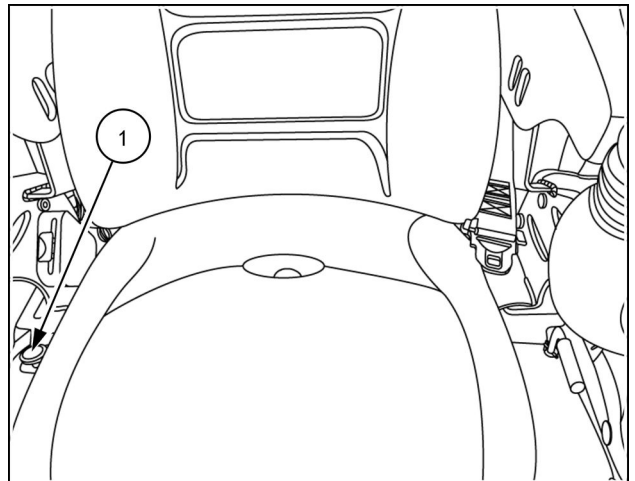
6. Locate the loader arm lock lever on the right-hand side of the operator's seat.
7. Rotate the lock lever toward the operator's seat (clockwise) to engage the lock support pin(s).
8. Stop the engine.



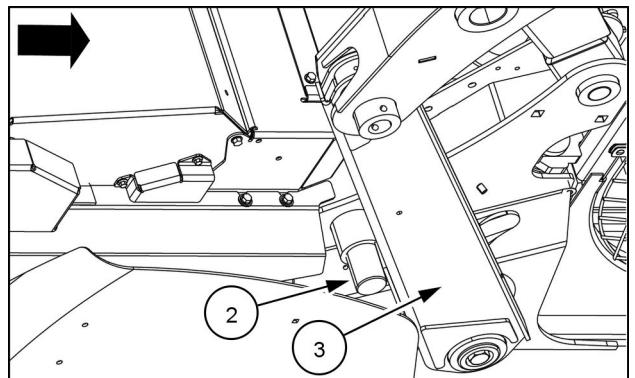
RAIL15SSL0353AA 3

9. Pull up on the override control knob (red control knob (1) near the right-hand side of the operator's seat). The loader arm (3) will brace against the lock support pin (2) and keep the loader arm in a raised position.

NOTE: Only use the override control knob to lower the loader arm in emergency situations when engine power is not available or to lower the loader arm onto the lock support pin for servicing the machine.



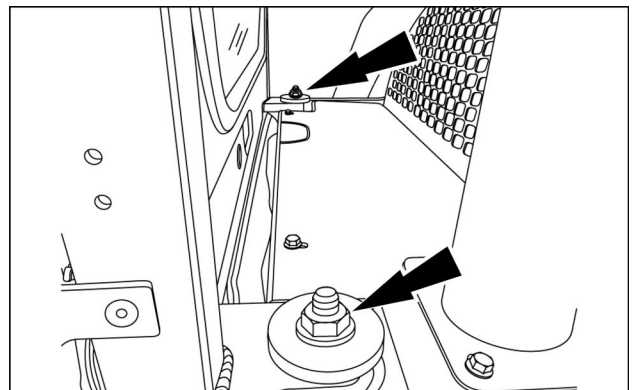
93107465A 4



RAIL17SSL0048BA 5

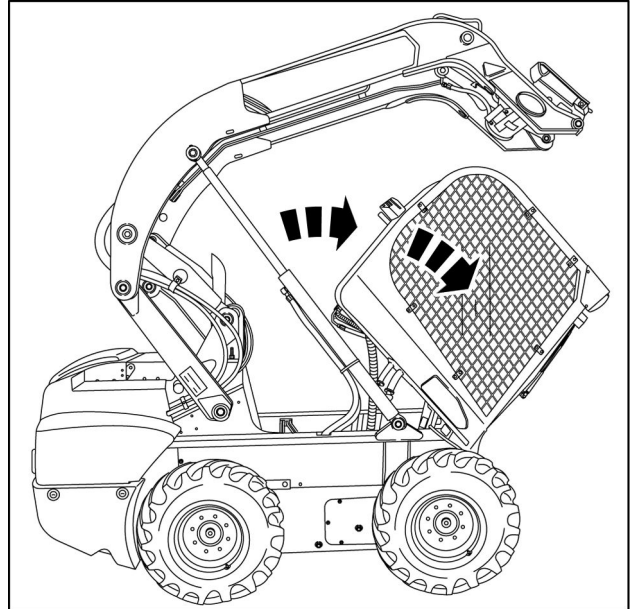
Tilt and lock the cab forward for machine service

1. Remove the two, rear retaining nuts, located at the rear of the cab.



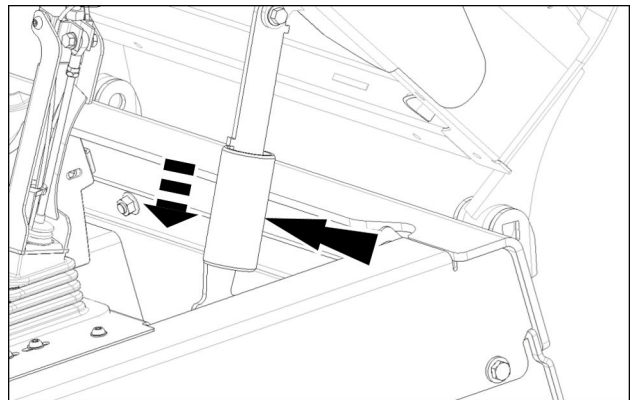
931001633 6

2. Pull on the hand holds at the front of the machine until the cab is completely tilted forward.



RAPH11SSL0016BA 7

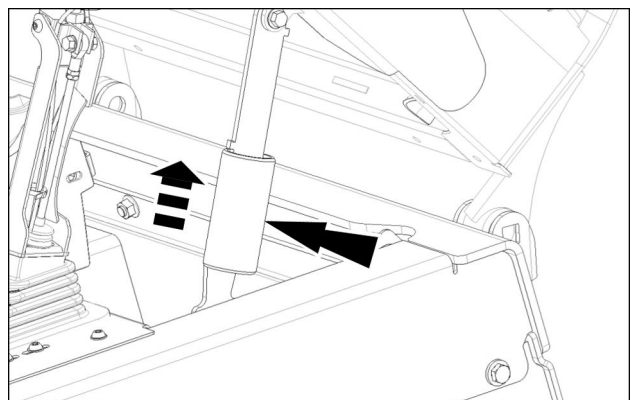
3. Confirm that the red lock tube has lowered over the cab pivot linkage. If it has, the cab tilt position is now secure.



RAIL19SSL0003AA 8

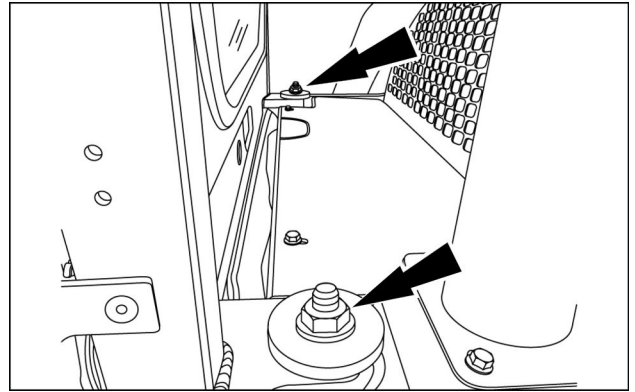
Tilt and secure the cab for machine operation

1. Raise the red lock tube exposing the cab pivot linkage.
2. Push the cab backward into the operation position.



RAIL19SSL0003AA 9

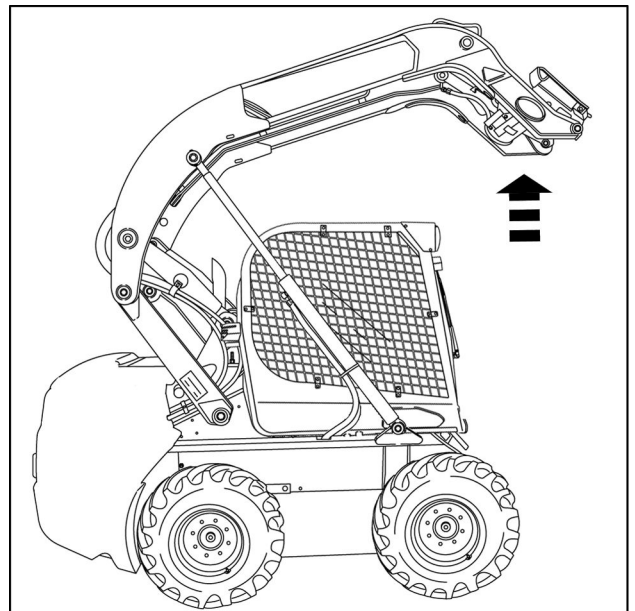
3. Install the retaining nuts. Torque the nuts to **170 N·m (125 lb ft)**.



931001633 10

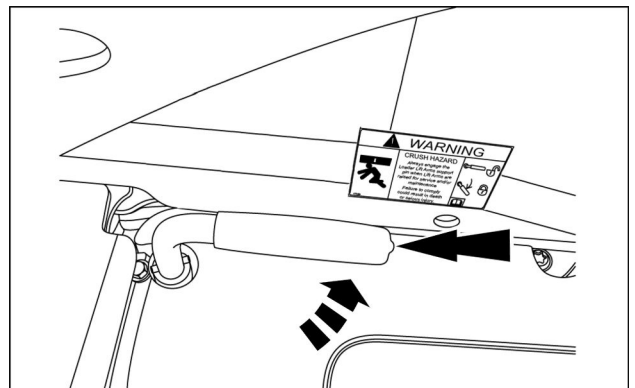
Unlock and lower the loader arm for machine operation

1. Sit in the operator's seat, fasten the seat belt, pull down the restraint bar down, and start the engine.
2. Press the operate button to enable the hydraulics.
3. Fully raise the loader arm.



RAPH14SSL0351BA 11

4. Rotate the lock lever away from the seat (counter clockwise) to retract the lock pin(s).
5. Lower the loader arm.
6. Commence work operations or park the machine and stop the engine.



RAIL15SSL0353AA 12

No engine power - loader arm up and down control

⚠ DANGER

Crushing hazard!

Do not enter or exit the operator's compartment while the loader arms are raised or unsupported. Rest the loader arms on the ground or verify that loader arm is being supported by the loader arm strut or loader arm lock pin before entering or exiting the operator's compartment.

Failure to comply will result in death or serious injury.

D0168A

NOTE: The override control knob is for service and emergency situations only and should not be used in day-to-day operations.

In the event of the loss of engine power, the override control knob will allow the operator to raise or lower the loader arm. See the decal on the override control knob **(1)** (red control knob on the right-hand side of the operator's seat).

Before attempting to raise or lower the loader arm/attachment on a machine that has lost engine power, alert personnel in the area of your intention. Do not leave the seat, or unfasten the seat belt or raise the restraint bar.

To lower the loader arm/attachment:

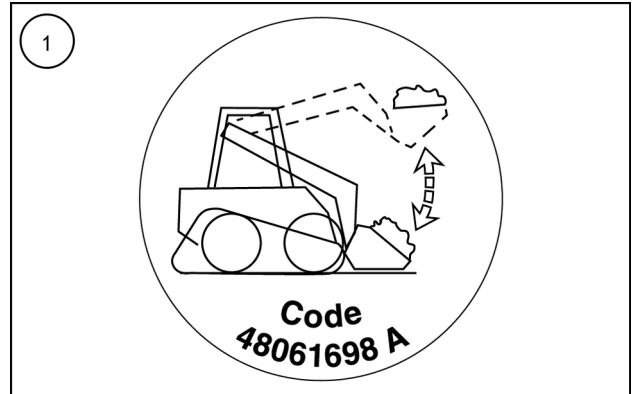
1. Confirm that personnel and obstacles are clear.
2. Pull the override control knob UP. The loader arm/attachment will start to lower.
3. To stop the loader arm/attachment from lowering, press the control knob DOWN at any time.
4. Once the loader arm/attachment is safely supported on the ground or on the loader arm lock support, make sure that the override control knob is completely in the DOWN position.

To raise the loader arm/attachment:

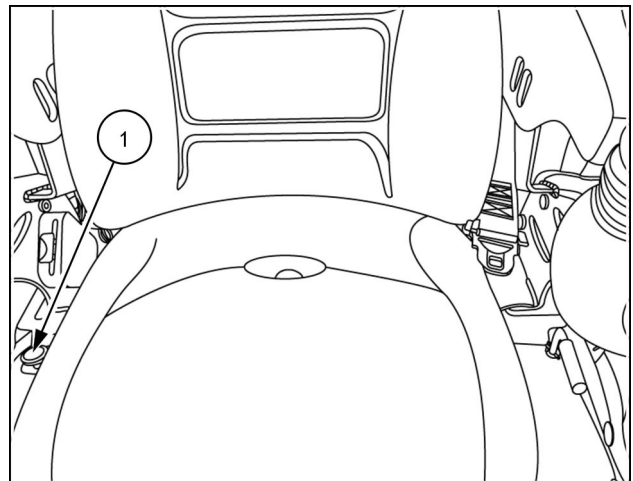
1. Have an assistant attach a secondary external lifting device to the front of the loader arm.

NOTICE: Do not attempt to move or lift the machine while raising the loader arms. You may damage the loader arm or attachment.

2. Confirm that personnel and obstacles are clear.
3. Pull the override control knob UP while the assistant raises the secondary external lifting device.
4. Engage the loader arm lock as shown on "Loader arm lock and cab tilt procedure - radial lift machines" page **2-16** or "Loader arm lock and cab tilt procedure - vertical lift machines" **2-20**.
5. Press the override control knob DOWN before disconnecting the external lifting device.



48061698A 1



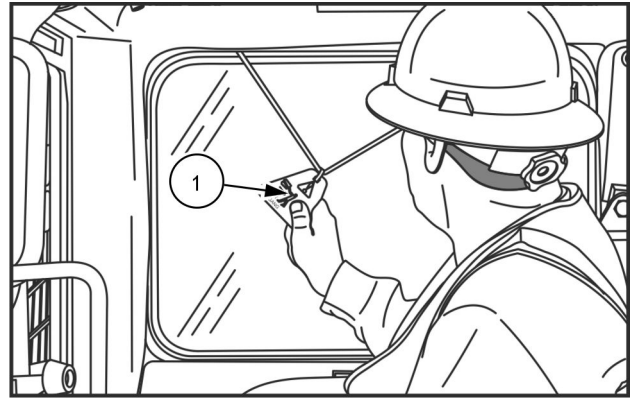
93107465A 2

Emergency exit

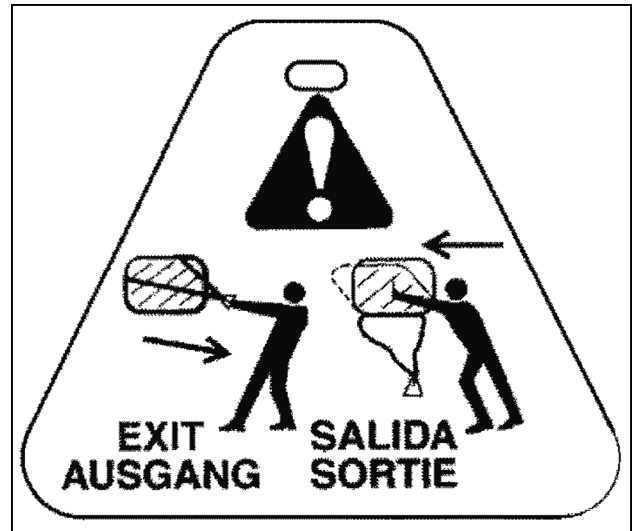
The rear window can be removed to provide an exit for the operator in the event the front exit is blocked.

To remove the rear window, pull on the tag **(1)** and remove the window molding strip. Push on the bottom half of the window to force it away from the molding.

NOTICE: If the rear window was removed for use as an exit, do the following before you operate the machine: Install the rear window and the molding. Secure the window in place with the locking strip.



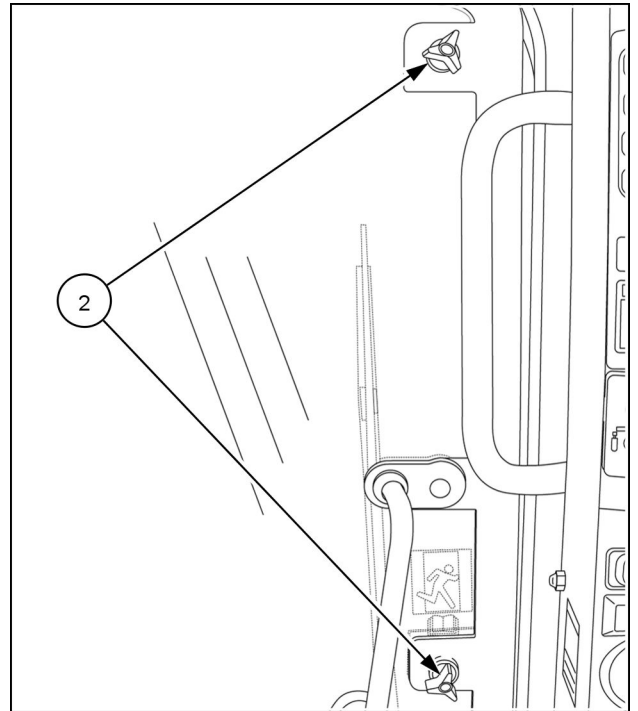
20100005 1



RAPH12SSL0289BA 2

The front door can be removed from the inside to provide an exit for the operator in the event the front door will not open. To remove the front door from inside the unit, unscrew and remove the two hand knobs **(2)** on the right side of the door window and push to remove the front door.

NOTICE: If the front door was removed for exiting, reinstall the front door before operating the skid steer.



RAIL13SSL0083BA 3

Ecology and the environment

Soil, air, and water quality is important for all industries and life in general. When legislation does not yet rule the treatment of some of the substances that advanced technology requires, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

Familiarize yourself with the relative legislation applicable to your country, and make sure that you understand this legislation. Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti-freeze, cleaning agents, etc., with regard to the effect of these substances on man and nature and how to safely store, use, and dispose of these substances. Your CASE CONSTRUCTION dealer can also provide assistance.

Helpful hints

- Avoid the use of cans or other inappropriate pressurized fuel delivery systems to fill tanks. Such delivery systems may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of these products contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when you drain fluids such as used engine coolant mixtures, engine oil, hydraulic fluid, brake fluid, etc. Do not mix drained brake fluids or fuels with lubricants. Store all drained fluids safely until you can dispose of the fluids in a proper way that complies with all local legislation and available resources.
- Do not allow coolant mixtures to get into the soil. Collect and dispose of coolant mixtures properly.
- Do not open the air-conditioning system yourself. It contains gases that should not be released into the atmosphere. Your CASE CONSTRUCTION dealer or air-conditioning specialist has a special extractor for this purpose and can recharge the system properly.
- Repair any leaks or defects in the engine cooling system or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.

Battery recycling

Batteries and electric accumulators contain several substances that can have a harmful effect on the environment if the batteries are not properly recycled after use. Improper disposal of batteries can contaminate the soil, groundwater, and waterways. CASE CONSTRUCTION strongly recommends that you return all used batteries to a CASE CONSTRUCTION dealer, who will dispose of the used batteries or recycle the used batteries properly. In some countries, this is a legal requirement.



NHIL14GEN0038AA 1

Mandatory battery recycling

NOTE: The following requirements are mandatory in Brazil.

Batteries are made of lead plates and a sulfuric acid solution. Because batteries contain heavy metals such as lead, CONAMA Resolution 401/2008 as amended by CONAMA Resolution 424/2010 requires you to return all used batteries to the battery dealer when you replace any batteries. Do not dispose of batteries in your household garbage.

Points of sale are obliged to:

- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling

Safety signs

⚠ WARNING

Avoid injury!

Make sure safety signs are legible. Clean safety signs regularly. Replace all damaged, missing, painted over, or illegible safety signs. See your dealer for replacement safety signs. If a safety sign is on a part that is replaced, make sure the new part has a safety sign.

Failure to comply could result in death or serious injury.

W0168A

The following safety signs are on your machine as a guide for your safety and for the safety of those working with you. Walk around the machine and note the content and the location of all safety signs before you operate your machine.

Keep all safety signs clean and legible. Clean safety signs with a soft cloth, water, and gentle detergent.

NOTICE: Do not use solvent, gasoline, or other harsh chemicals. Solvents, gasoline, and other harsh chemicals may damage or remove safety signs.

Replace all safety signs that are damaged, missing, painted over, or illegible. If a safety sign is on a part you or your dealer replaces, make sure that you or your dealer install the safety sign on the new part. See your dealer for replacement safety signs.

Read operator's manual symbol

Safety signs that display the "Read operator's manual" symbol direct you to the operator's manual for further information regarding maintenance, adjustments, or procedures for particular areas of the machine. When a safety sign displays this symbol, consult the appropriate page of the operator's manual.

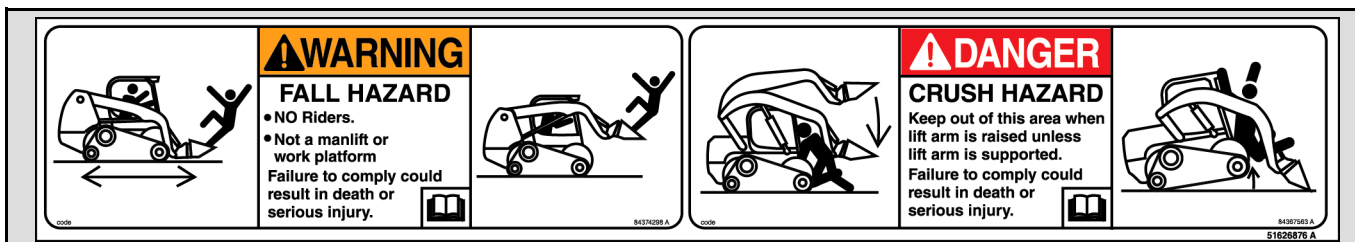


Read service manual symbol

Safety signs that display the "Read service manual" symbol direct you to the service manual. If you doubt your ability to perform service operations, contact your dealer.



Following is a listing of Safety Signs and locations. Read and understand them before operating the machine.

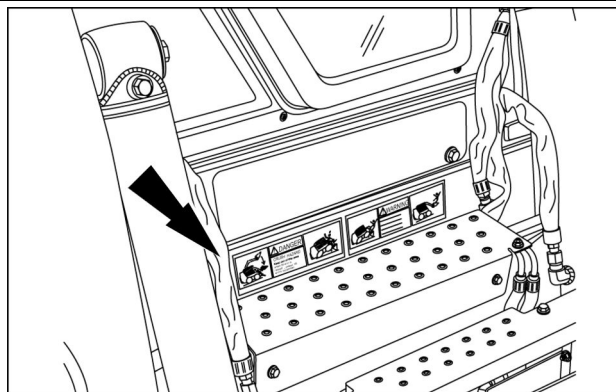


51626876 1

WARNING
FALL HAZARD
NO Riders. Not a man lift or work platform. Failure to comply could result in death or serious injury.

DANGER
CRUSH HAZARD
Keep out of this area when lift arm is raised, unless lift arm is supported. Failure to comply will result in death or serious injury.

Quantity: 1
English: 51626876
Pictorial: 51612553
Location:
Under the entry door way.



931002299 2

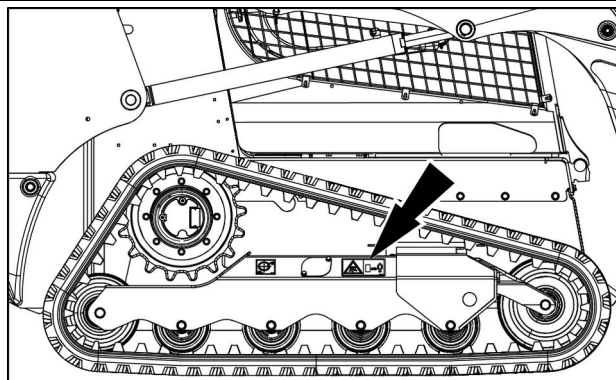
NOTE: Read and understand the "Loader arm lock and cab tilt procedure - radial lift machines" page 2-16 or "Loader arm lock and cab tilt procedure - vertical lift machines" page 2-20 in this manual.

CAUTION
Flying debris. Stay clear. Failure to comply could result in minor or moderate injury.



84004739 D 3

Quantity: 2
Pictorial: 84004739
Location:
On the track debris guard. One on each side of the machine.



RAIL15SSL0357AA 4

NOTE: Only applicable to Compact Track Loaders (CTL) models TR340B and TV450B.

WARNING

Read Operator's manual. Fasten seat belt. No riders. Keep others away. Not a man lift machine. Failure to comply could result in death or serious injury.

DANGER

CRUSH HAZARD

Before leaving seat:

Lower lift arm or engage lift arm lock pin or strut.

STOP engine.

Move loader controls to check for loader movement.

Failure to comply will result in death or serious injury.

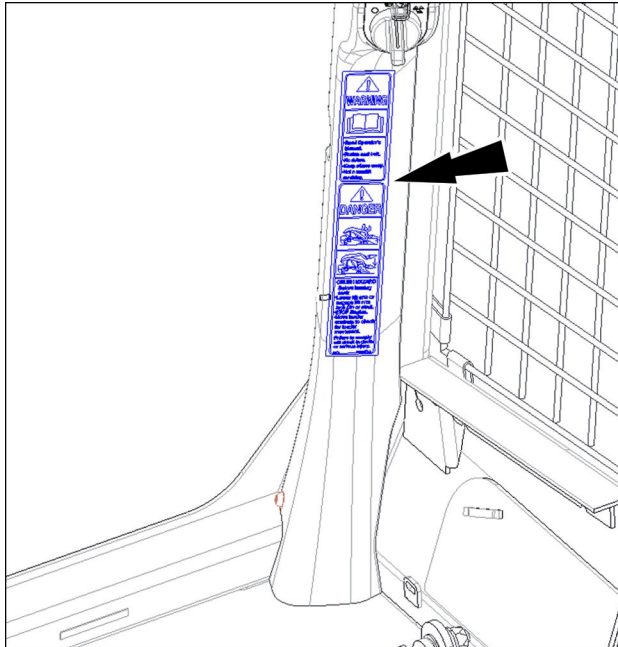
Quantity: 1

English: 84367570

Pictorial: 84367418

Location:

Under the right-hand side of the instrument cluster.



RAIL19SSL0054BA 5

NOTE: Read and understand the "Safety rules" on page 2-2.

NOTE: Read and understand the "Loader arm lock and cab tilt procedure - radial lift machines" page 2-16 or "Loader arm lock and cab tilt procedure - vertical lift machines" page 2-20 in this manual.



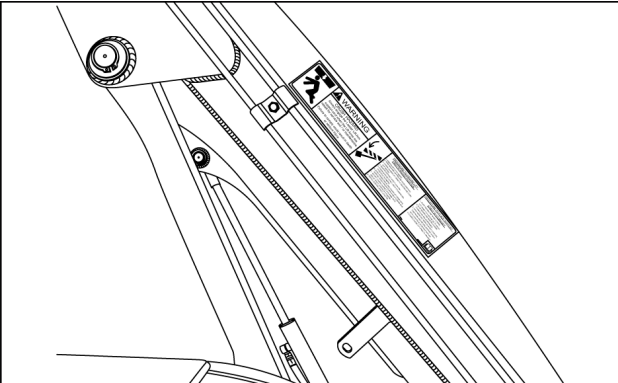
•Read Operator's Manual.
•Fasten seat belt.
•No riders.
•Keep others away.
•Not a manlift machine.

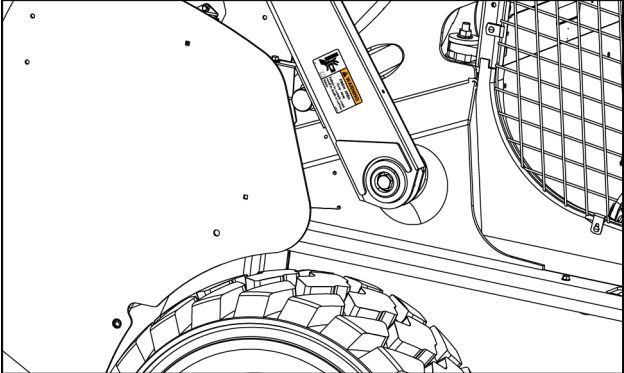


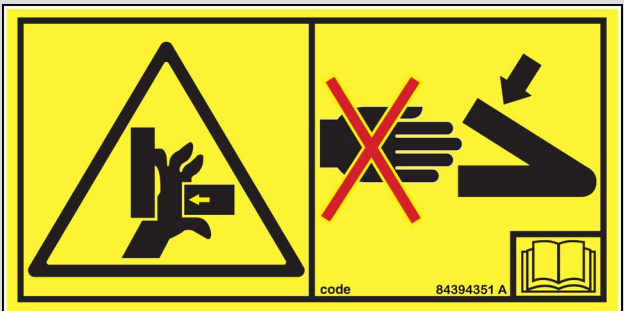
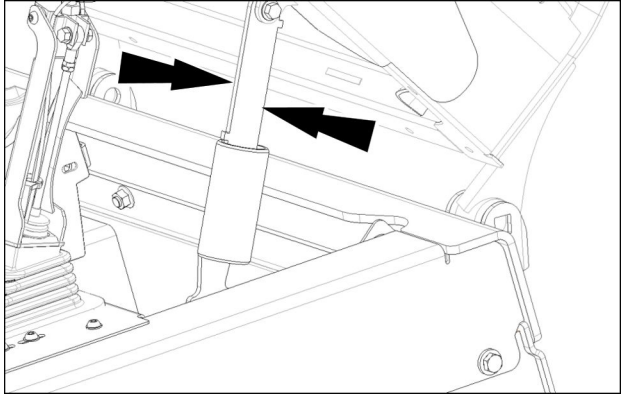
CRUSH HAZARD
Before leaving seat:
•Lower lift arm or engage lift arm lock pin or strut.
•STOP Engine.
•Move loader controls to check for loader movement.
Failure to comply will result in death or serious injury.

code 84367570 A

84367570_A 6

	WARNING CRUSH HAZARD Always engage the Loader Lift Arm support strut when the Lift Arms are raised for service and / or maintenance. Failure to comply could result in death or serious injury.		PROCEDURE TO SECURE LIFT ARMS IN RAISED POSITION 1. REMOVE ANY ATTACHMENT. 2. PARK MACHINE ON FIRM AND LEVEL SURFACE. 3. LOWER LOADER LIFT ARMS TO GROUND AND TURN OFF ENGINE. 4. REMOVE SUPPORT STRUT LOCK PIN. 5. LOWER SUPPORT STRUT ONTO CYLINDER AND HYDRAULIC PLUMBING. 6. START ENGINE AND SLOWLY RAISE LIFT ARMS UNTIL SUPPORT STRUT DROPS DOWN OVER CYLINDER ROD. 7. SLOWLY LOWER LOADER LIFTS ARMS UNTIL END OF STRUT CONTACTS CYLINDER. 8. INSTALL SUPPORT STRUT LOCK PIN.	PROCEDURE TO PLACE SUPPORT STRUT IN STORAGE 1. START ENGINE AND RAISE LOADER LIFT ARMS 1 TO 2 INCHES (25 TO 50mm). 2. STOP ENGINE AND ENSURE LOADER HYDRAULICS ARE INOPERABLE. 3. HAVE ASSISTANT REMOVE STRUT LOCK PIN, THEN RAISE AND SECURE SUPPORT STRUT WITH LOCK PIN IN STORAGE POSITION. 4. LOWER LOADER LIFT ARMS TO GROUND. code 84367429 A
84367429A 7				
WARNING CRUSH HAZARD Always engage the loader lift arm support strut when the lift arms are raised for service and / or maintenance. Failure to comply could result in death or serious injury.				
PROCEDURE TO SECURE LIFT ARMS IN RAISED POSITION 1. Remove any attachment. 2. Park machine on firm and level surface. 3. Lower loader lift arms to the ground and turn of engine. 4. Remove support strut lock pin. 5. Lower support strut onto cylinder and hydraulic plumbing. 6. Start engine and slowly raise lift arms until support strut drops over cylinder rod. 7. Slowly lower loader lift arms until end of strut contacts cylinder. 8. Install support strut lock pin.			PROCEDURE TO PLACE SUPPORT STRUT IN STORAGE 1. Start engine and raise loader lift arms 1 – 2 in(25 – 50 mm). 2. Stop engine and ensure loader hydraulics are inoperable. 3. Have assistant remove support strut lock pin, then raise and secure support strut with lock pin in storage position. 4. Lower loader lift arms to ground.	
Quantity: 1 English: 84367429 Pictorial: 84315533 Location: On the inside of lift arm above the support strut that is mounted on the right-hand side of the loader arm.				
93109382 8				
NOTE: Read and understand the “Loader arm lock and cab tilt procedure - radial lift machines” page 2-16 in this manual.				
NOTE: Only applicable to the SR270B and TR340B machines.				

WARNING PINCH AREA Keep away. Failure to comply could result in death or serious injury.	 code 86531262 9
Quantity: 2 Pictorial: 86531262 Location: On the right-hand side of the boom where it rests against the lift arm support pin. Also on the left-hand side of the boom.	 RAIL17SSL0054BA 10
NOTE: Read and understand the “Loader arm lock and cab tilt procedure - vertical lift machines” page 2-20 in this manual. NOTE: Only applicable to models SV340B and TV450B.	

WARNING PINCH HAZARD Keep clear. Failure to comply could result in death or serious injury.	 code 84394351 A
Quantity: 2 Pictorial: 84394351 Location: On each side of the upper link on the Roll Over Protective Structure (ROPS) lock mechanism.	 RAIL19SSL0003AA 12

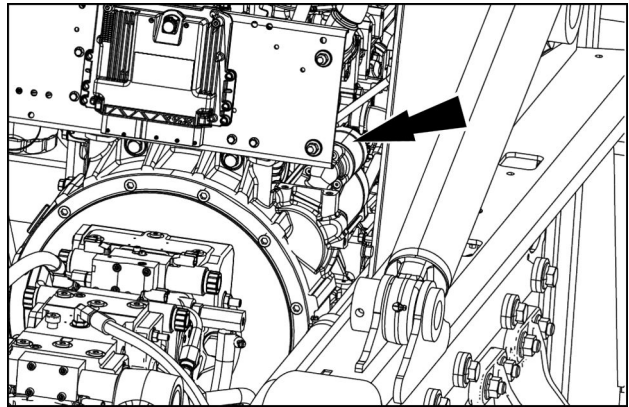
DANGER

Starting in gear can cause death. Start engine only from the operator seat with transmission control(s) in NEUTRAL. Failure to comply WILL result in death or serious injury.



47858283 13

Quantity: 1
English: 47858283
Pictorial: 175509A1
Location:
On the left-hand side of the engine on top of the starter.



RAIL15SSL0381BA 14

WARNING

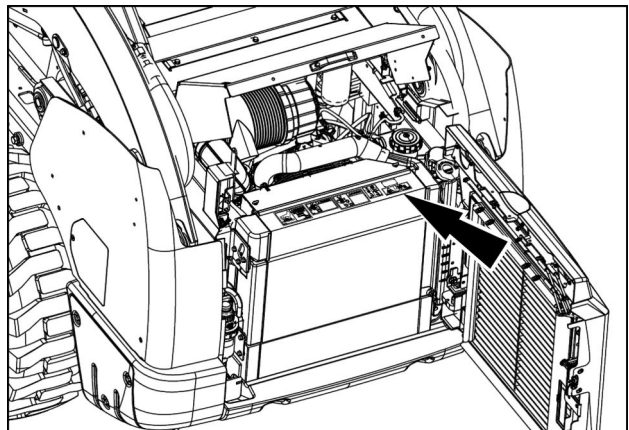
Explosion hazard!

DO NOT use ether. Failure to comply could result in death or serious injury.

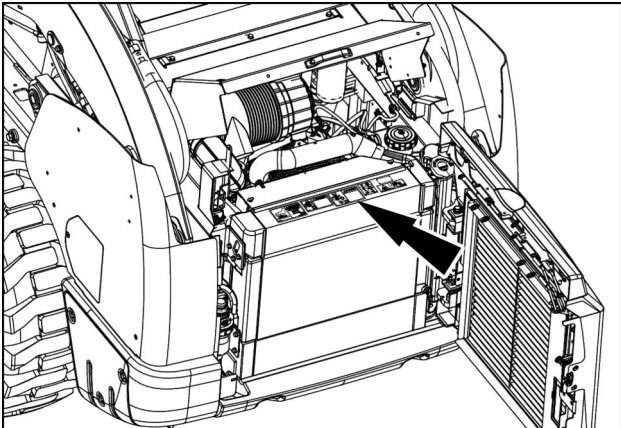


RAPH12SSL0074AA 15

Quantity: 1
Pictorial: 84535230
Location:
On top of the charge air cooler.



RAIL15SSL0376BA 16

 WARNING HOT SURFACE HAZARD STAY CLEAR code 47558201 A	 WARNING • DO NOT remove radiator cap. • CHECK coolant level in recovery tank. Failure to comply could result in death or serious injury. code 54516882 A	 WARNING Keep hands and clothing away from rotating fan and belts. Failure to comply could result in death or serious injury. code 98258251 H	 ACTIFULL OT code 47737230 A
WARNING Hot Surface Hazard. Stay clear. Failure to comply could result in death or serious injury.		WARNING Hot liquid under pressure! DO NOT remove radiator cap. CHECK coolant level in recovery tank. Failure to comply could result in death or serious injury.	
WARNING Entanglement hazard! Keep hands and clothing away from rotating fan and belts. Failure to comply could result in death or serious injury.		Organic Acid Technology (OAT) coolant is mandatory for all FPT engines compliant to Tier 4B (final) emissions using Selective Catalytic Reduction (SCR). NEVER mix OAT coolant with conventional coolant. Under no circumstances should you top off a cooling system with only water.	
Quantity: 1 English: 51626875 Pictorial: 51612550 Location: On top of the charge air cooler.			

RAIL15SSL0376BA 18

**WARNING
CRUSH HAZARD**

Check attachment for proper engagement before using. Failure to comply could result in death or serious injury.

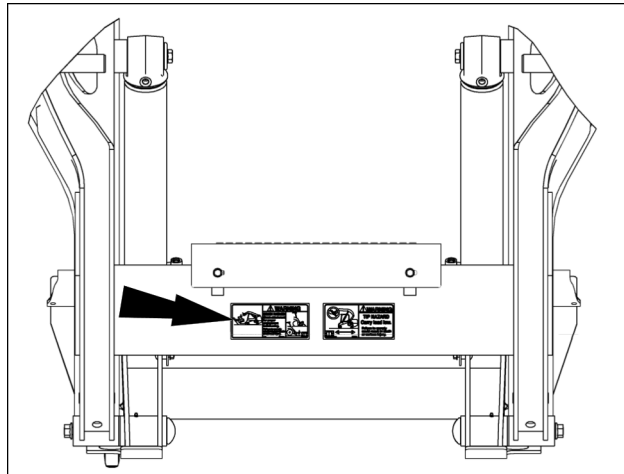
**WARNING
TIP HAZARD**

Carry load low. Failure to comply could result in death or serious injury.



51485885A 19

Quantity: 1
English: 51485885
Pictorial: 51485886
Location:
On the back side of the front loader arm cross tube.

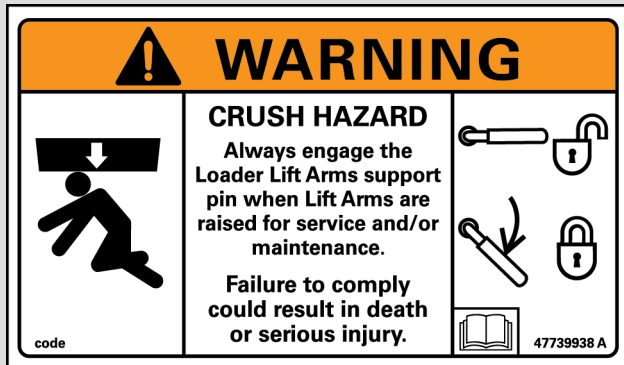


RAIL15SSL0374BA 20

NOTE: Read and understand the “Mechanical attachment mounting system” page 6-1 or “Hydraulic attachment mounting system” page 6-4 in this manual.

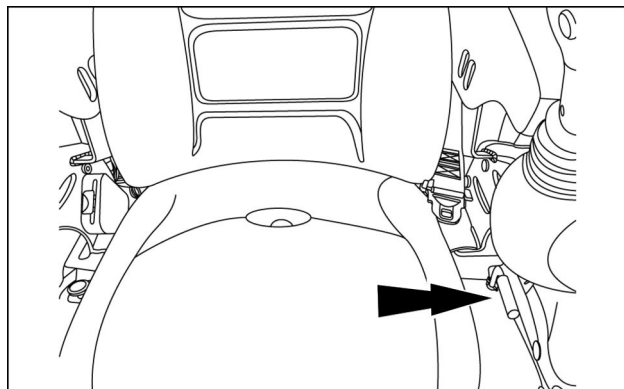
**WARNING
CRUSH HAZARD**

Always engage the Loader Lift Arms support pin when Lift Arms are raised for service and/or maintenance.
Failure to comply could result in death or serious injury.



47739938 21

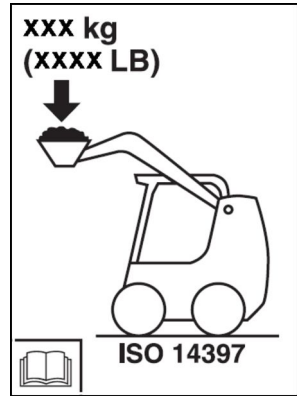
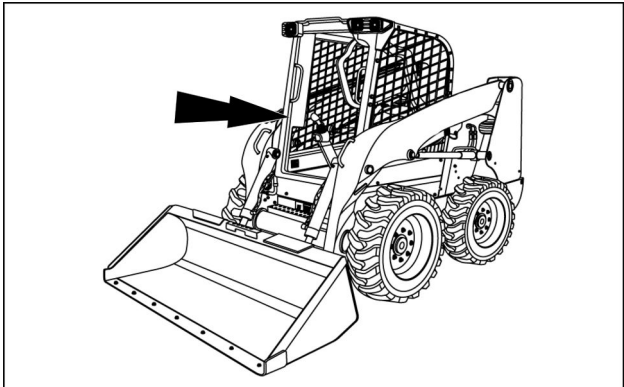
Quantity: 1
English: 47739938
Pictorial: 47739940
Location:
On the lower left-hand side of the operators seat, attached to the ROPS.



93107465 22

NOTE: Read and understand the “Loader arm lock and cab tilt procedure - vertical lift machines” page 2-20 in this manual.

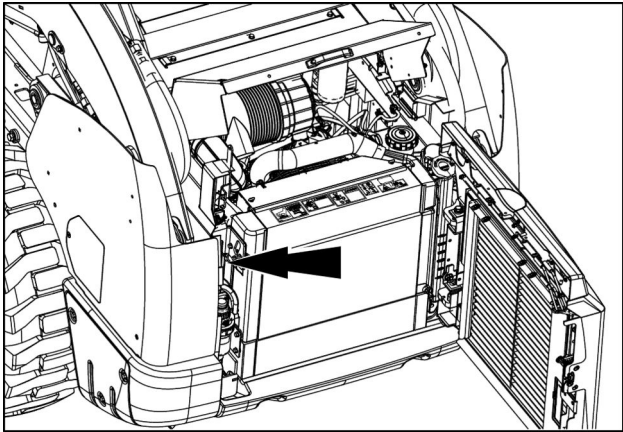
NOTE: Only applicable to SV340B and TV450B.

Model		SAE Rated Operating Capacity (ROC)	Decal part number	Decal/placement location
SSL	*SR270B	1225 kg (2701 lb)	47619502	 93109348 23
	*SV340B	1540 kg (3395 lb)	47914943	
CTL	*TR340B	1082 kg (2385 lb)	47716629	 RCPH11SSL021AAP 24
	*TV450B	1429 kg (3150 lb)	48171703	

Location:
On right-hand console (post).

NOTE: *The Compact Track Loaders (CTL) are rated at 35% of tipping capacity and the Skid Steer Loaders (SSL) are rated at 50% of tipping capacity.

Only fill the DEF/AdBlue® tank with approved DEF/AdBlue® solution. Do not fill with diesel fuel or water. Refer to the Operator's Manual.	 84284896 C 25
--	---

Quantity: 1 Pictorial: 84284896 Location: On the left-hand side of the engine compartment.	 RAIL15SSL0376BA 26
---	--

Only use Ultra-Low Sulfur Diesel (ULSD) fuel with a sulfur content of less than 10 mg/kg.



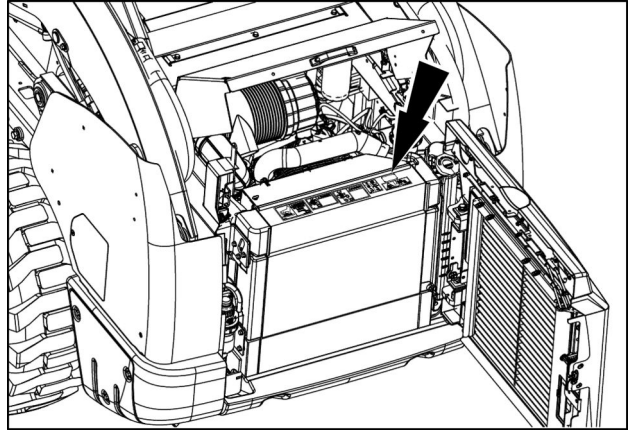
S<10mg/kg

code

84319035

84319035_A 27

Quantity: 1
Pictorial: 84319035
Location:
On top of the charge air cooler.



RAIL15SSL0376BA 28

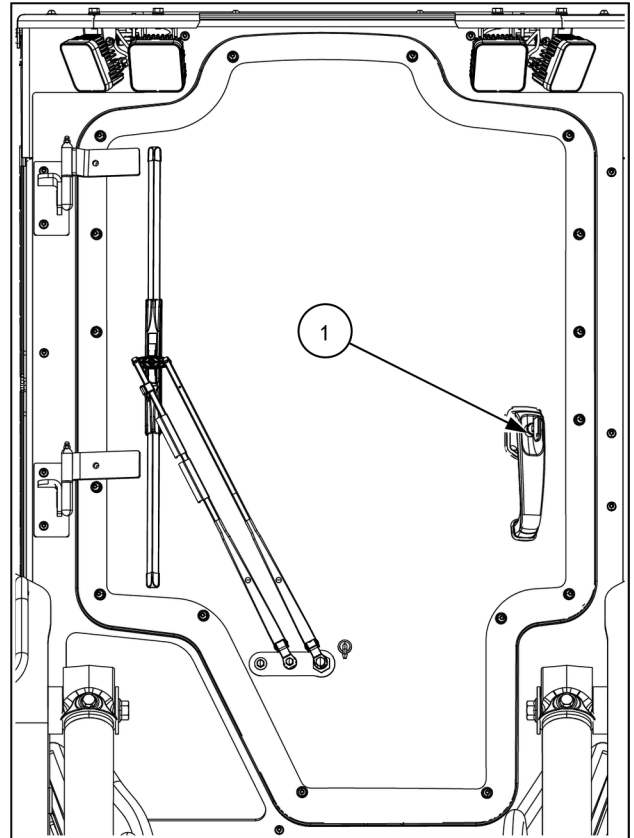
3 - CONTROLS AND INSTRUMENTS

ACCESS TO OPERATOR'S PLATFORM

Door latches, cab

Exterior door latch

Push on the knob (1) to release the door for entry. The starter switch key may be used to lock the door.

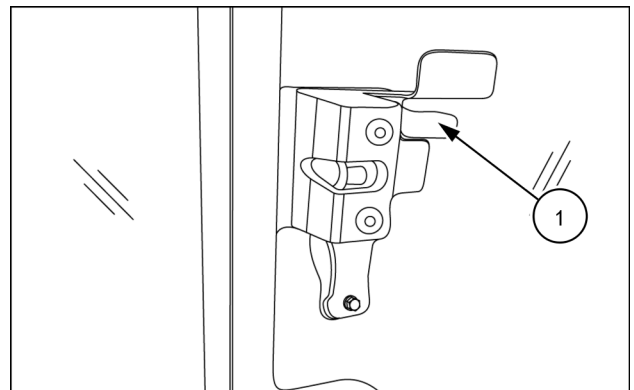


RAIL23SSL0226BA 1

Interior door latch

Push on the lever (1) to release the door latch and open door.

NOTICE: Do not raise or lower loader lift arm until you have confirmed the door is fully closed. Damage may occur to the door assembly.

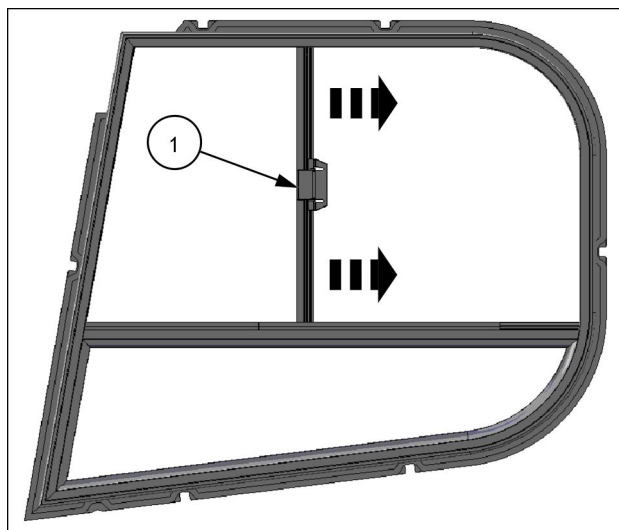


93106894 2

Window glass, cab

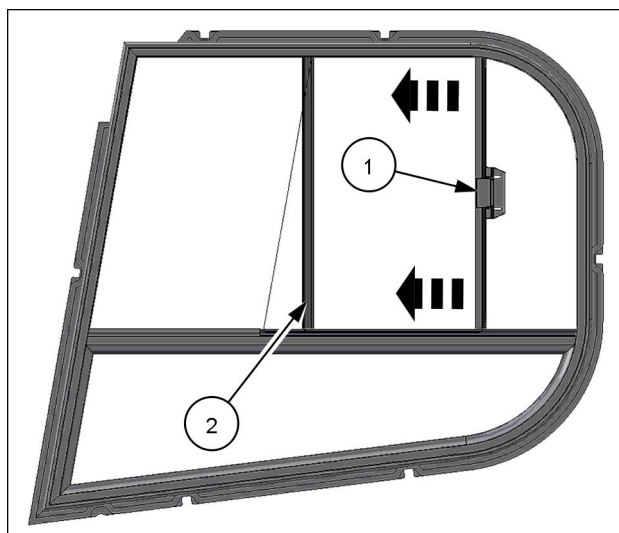
Opening and closing side window glass

To open the window. Pull the front part of the window latch **(1)** and slide the window into the desired position. The window will maintain that spot.



RAIL17SSL0039BA 1

To close the window. Pull the front part of the window latch **(1)** and slide the window forward until the latch can engage the vertical rail of the fixed window **(2)**.

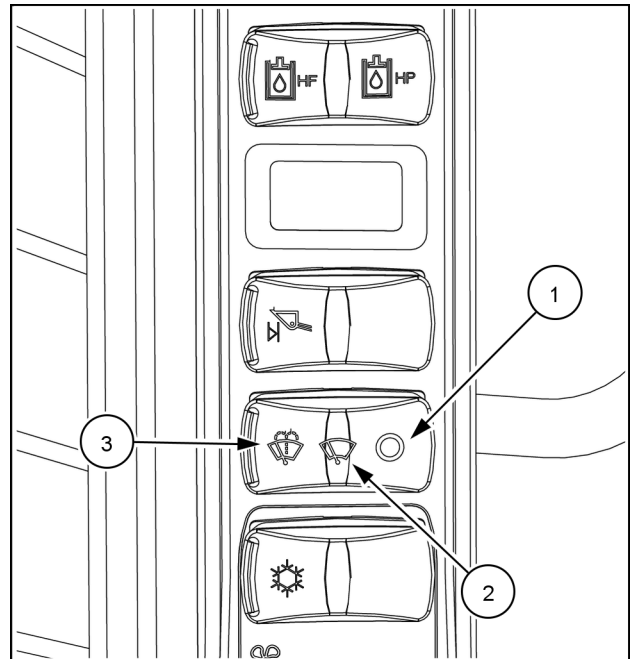


RAIL17SSL0038BA 2

Windshield wiper and washer controls

Windshield wiper switch

- This three position switch located on the left "A" post console turns the wiper ON, OFF and operates the washer fluid spray.
- Off position **(1)**.
- Center, on position **(2)**.
- Momentary spray- when released, switch returns to ON position **(3)**.

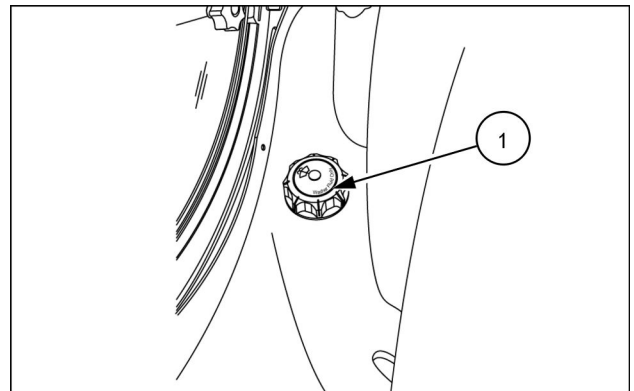


RAIL23SSL0234BA 1

Windshield washer reservoir **(1)**.

- The windshield washer reservoir is located in the lower right hand side of the cab behind the operators elbow.

NOTICE: Never operate the windshield washer motor without fluid in the reservoir. Damage to the motor could occur.

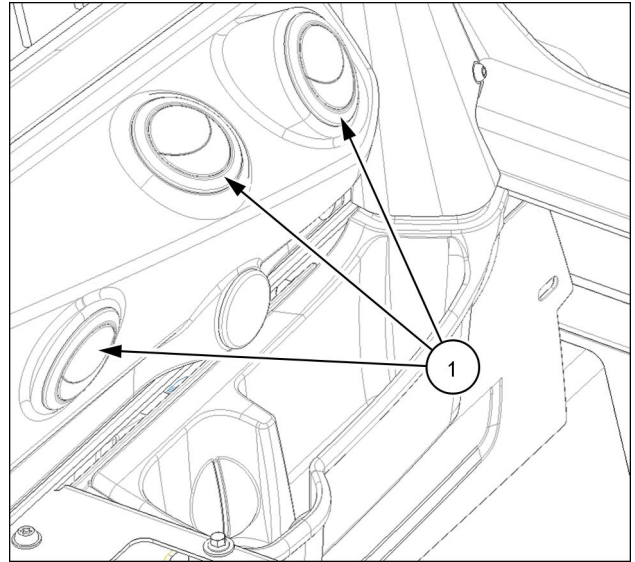


93109373 2

Cab air louvers

The air louvers **(1)** are located to the lower right and left of the operator and are adjustable for operator comfort. Air flow, direction, and volume can be adjusted.

For maximum defrosting, point louvers in direction of desired defrost area. Air louvers can rotate **360°** and tilt up and down, to achieve the direction of operator's desire.

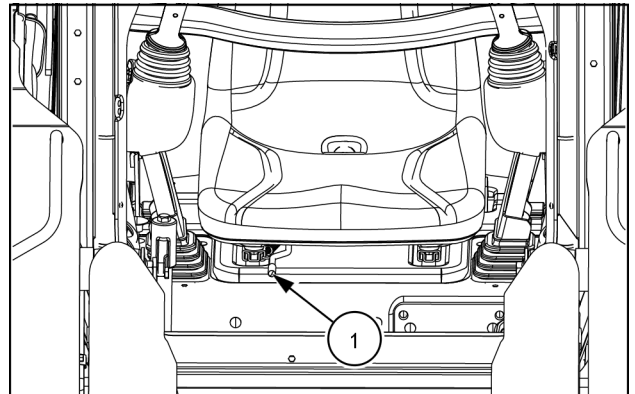


RAIL19SSL0052BA 1

OPERATOR'S SEAT

Standard seat

The standard seat is adjustable fore and aft using adjustment lever **(1)**.

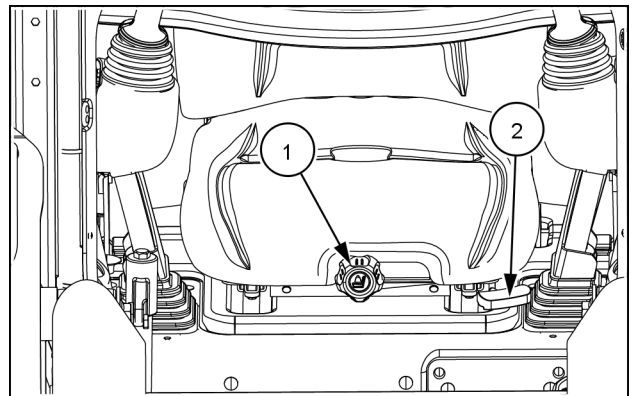


RAIL19SSL0026AA 1

Mechanical suspension seat

The mechanical suspension seat is adjustable fore and aft using adjustment lever **(2)**.

The mechanical suspension seat has a weight adjustment system. Sit in the seat and turn the knob **(1)** counter-clockwise to decrease the pressure for lighter operators or turn clockwise to increase the pressure for heavier operators.



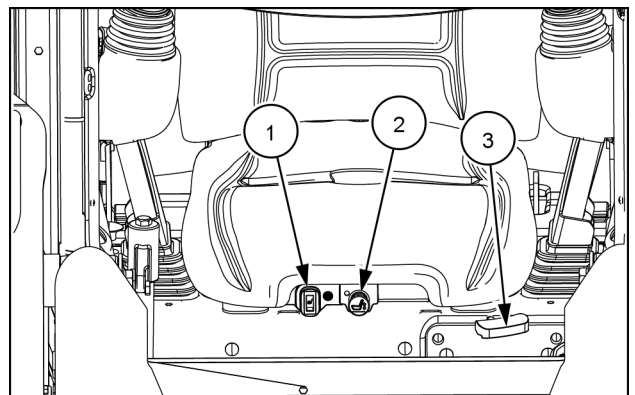
RAIL19SSL0024AA 1

Air seat

The air seat is adjustable fore and aft using adjustment lever **(3)**.

The weight adjustment system uses an air pressure adjustment switch **(2)** that can be activated for operator preference. Push to release pressure for lighter operators, and pull to add air pressure for heavier operators.

This seat also has a heating element. Turn the heating element ON or OFF with the rocker switch **(1)**.



RAIL19SSL0025AA 1

Seat belt operation

⚠ WARNING

Avoid injury!

Before starting the engine, securely fasten the seat belt. The seat belt can help ensure your safety if it is properly used and maintained. Never wear a seat belt loosely or with slack in the belt system. Never wear the belt if it is twisted or pinched between the seat structures. Failure to comply could result in death or serious injury.

W0142A

⚠ WARNING

Equipment failure could cause accident or injury!

Always fasten the seat belt securely before you operate the machine. Inspect seat belt parts for wear and damage. Replace any and all worn or damaged parts of the seat belt prior to operation. Failure to comply could result in death or serious injury.

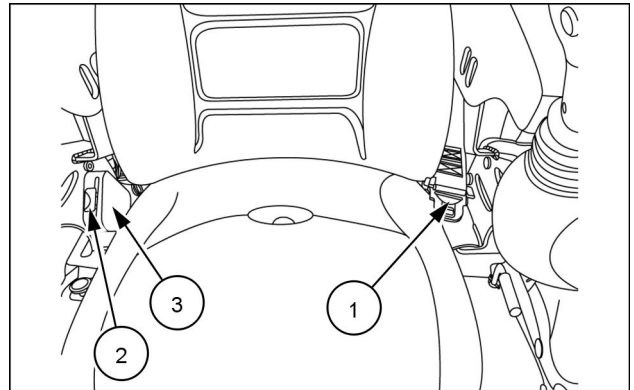
W0046C

Overview

The unit is equipped with a retractable seat belt (1) that should be worn at all times.

Always securely fasten your seat belt before operating the machine. Carefully inspect the seat belts at regular six-month intervals for proper fit and function, oil-soaked or stained webbing, web fraying and corrosion. Replace the seat belt assembly immediately if damage such as worn or damaged hardware, nicked or frayed strap, buckle or retractor malfunction, or loose stitching is found. If such damage or wear is not found, some seat belt manufacturers recommend replacement of the seat belt every three years.

The belt can be cleaned with clean, soapy water. Do not use solvents, bleach, or dye on the belt as they may weaken it.

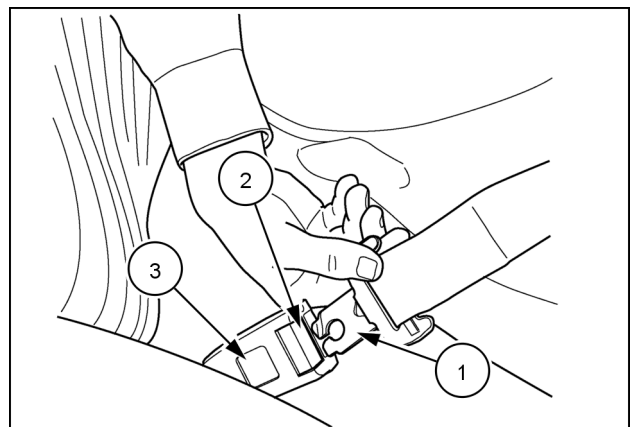


93107465 1

Seat belt

To fasten the belt, pull it from the reel and push the tongue end (1) into the buckle end (3) until a "click" indicates it is fully engaged.

To release the belt, push the red release button (2) on the buckle and pull the tongue from the buckle.



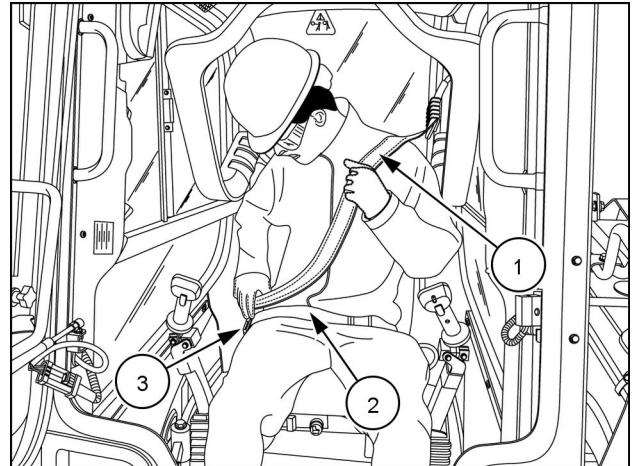
10041220 2

Shoulder belt

Pull the seat belt retractable half **(2)** across the operator and buckle securely with the buckle half **(3)**.

A shoulder belt **(1)** is available from your dealer. Some machine configurations are equipped with a shoulder belt.

NOTE: State or Local regulations may require a 3 in webbing seat belt available through Dealer Service Parts. This belt may be necessary in some industrial applications. Check your local codes.

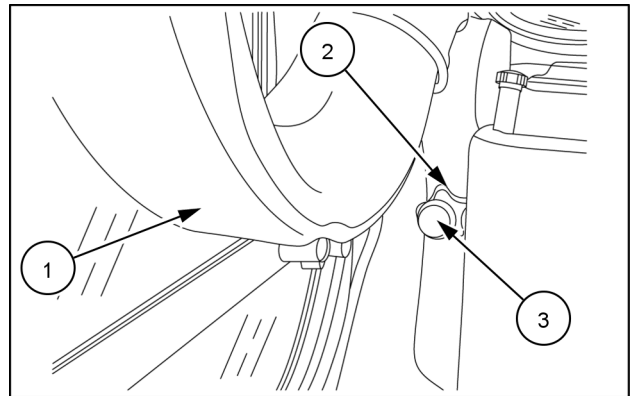


RAIL19SSL0001BA 1

Restraint bar

The restraint bar can be adjusted for operator comfort.

1. Adjust the height of the restraint bar **(1)** by loosening the two lock knobs **(2)** located on each side where the restraint bar rests on the back of the cab.
2. Turn the adjusting stops **(3)** out to raise the resting position of the restraint bar and in to lower the position.
3. Adjust the stops **(3)** so the restraint bar rests on both of the stops evenly.
4. Tighten the lock knobs **(2)**.



RAPH12SSL0066AA 1

MECHANICAL HYDRAULIC CONTROLS

Steering and travel

Moving the machine

⚠ WARNING

Loss of control hazard!

Keep hands and feet on the appropriate controls at all times to maintain control of the machine. Failure to comply could result in death or serious injury.

W0237A

⚠ WARNING

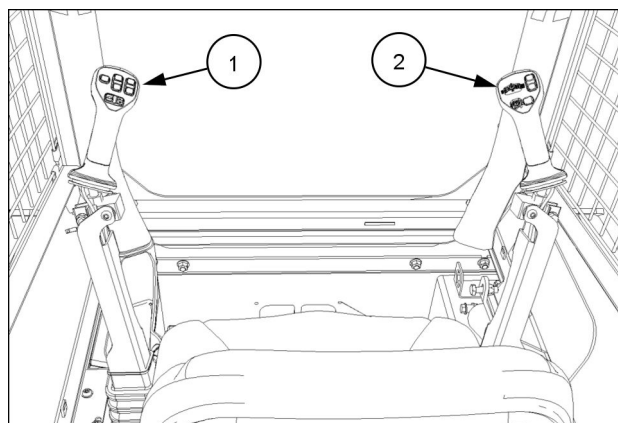
Collision hazard!

Always make sure the area behind the machine is clear of all persons, animals, and obstructions BEFORE backing up. Failure to comply could result in death or serious injury.

W0232A

Push both the left-hand control lever **(1)** and the right-hand control lever **(2)** forward, from neutral, to move the machine forward. Pull both of the control levers rearward, from neutral, to move the machine in the reverse direction. Move the control levers forward a short distance for maximum power and slow speed. Move the control levers completely forward for maximum speed.

Move both control levers to the neutral position to stop movement of the machine.

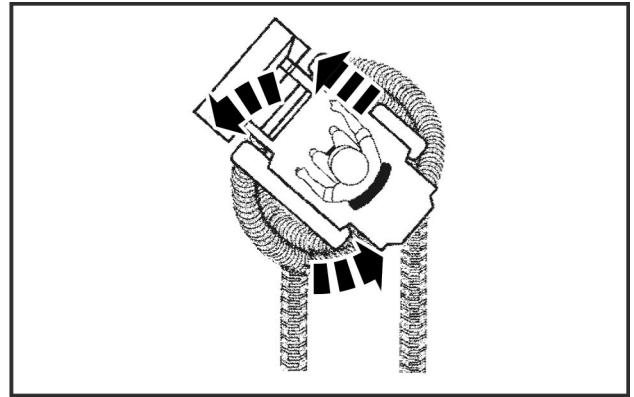


RAIL19SSL0060BA 1

Turning the machine

Pivot turn - power to only one side

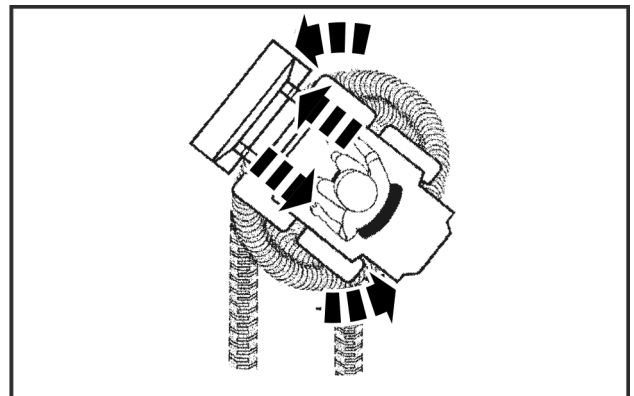
- To make a pivot turn left: hold the left steering control lever in neutral and move the right steering control lever forward.
- To make a pivot turn right: hold the right steering control lever in neutral and move the left steering control lever forward.
- To make a pivot turn in reverse left: after confirming that all personnel and objects are clear, hold the left steering control lever in neutral and move the right steering control lever rearward.
- To make a pivot turn in reverse right: after confirming that all personnel and objects are clear, hold the right steering control lever in neutral and move the left steering control lever rearward.



BT06G022 1

Counter rotation turn - power to both sides in opposing directions

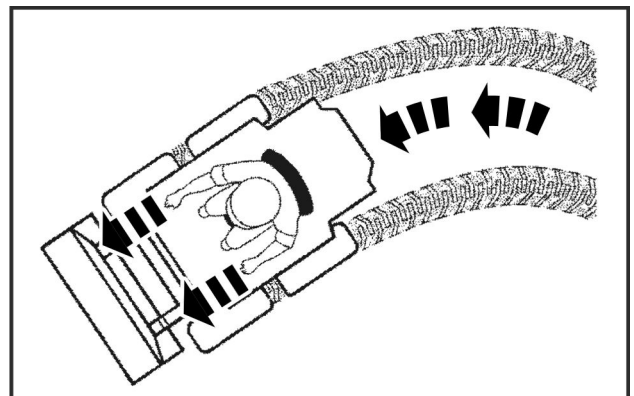
- To counter rotate left: move the left steering control lever rearward and push the right steering control lever forward.
- To counter rotate right: move the right steering control lever rearward and push the left steering control lever forward.



BT06G023 2

Gradual turn - power to both sides in the same direction

- To make a gradual turn left: move the right steering control lever further forward while pushing the left steering control lever partially forward.
- To make a gradual turn right: move the left steering control lever further forward while pushing the right steering control lever partially forward.



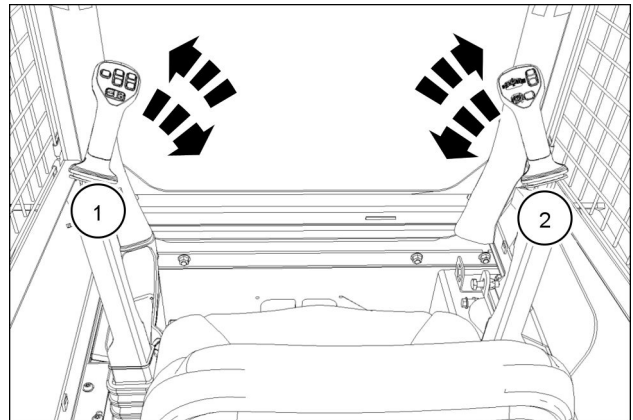
BT06G024 3

Lift arm and bucket controls

Hand controls

Lift arm raise and lower control.

- The left-hand control lever **(1)** controls the lift arm. The lift arm will raise by pivoting the handle “UP” to the outside of the cab. Pivoting the handle “DOWN” to the inside of the cab will lower the lift arm.
- The lift arm spool is equipped with a detent “FLOAT” circuit if the operator wants the lift arm to float over changing ground contour. To put the valve in “FLOAT” position, pivot the left handle “DOWN” until a slight “jump” is felt. In this position, the handle is locked in float and does not return to the neutral position unassisted, but will do so when light pressure is applied to the handle to pivot it “UP”.



Bucket dump and curl control.

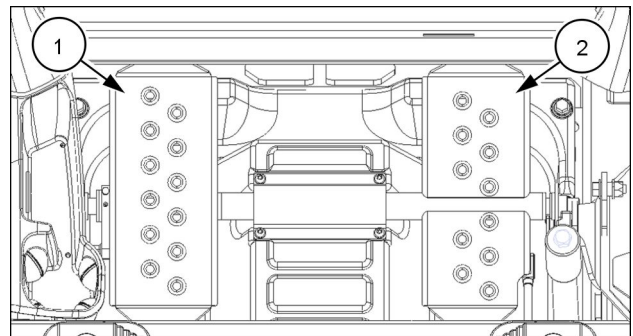
- The right hand control lever **(2)** controls the bucket. The bucket will dump by pivoting the handle “UP” to the outside of the cab. Pivoting the handle “DOWN” to the inside of the cab and the bucket will roll back (curl).

NOTE: There is no detent or float position on the bucket dump or curl spools.

Foot controls

Lift arm raise and lower control.

- The lift arm is controlled by the left foot pedal **(1)** located on the floor and is marked with a decal. The lift arm is raised by depressing the heel (rear) of the pedal. The lift arm is lowered by depressing the toe (front) of the pedal.
- The lift arm spool is equipped with a detent FLOAT circuit if the operator wants the lift arm to float over changing ground contour. To put the valve in FLOAT position, depress the toe of the pedal until a slight jump is felt. In this position, the pedal is locked in float and does not return to the neutral position unassisted, but will do so when light pressure is applied to the heel of the pedal.



Bucket dump and curl control.

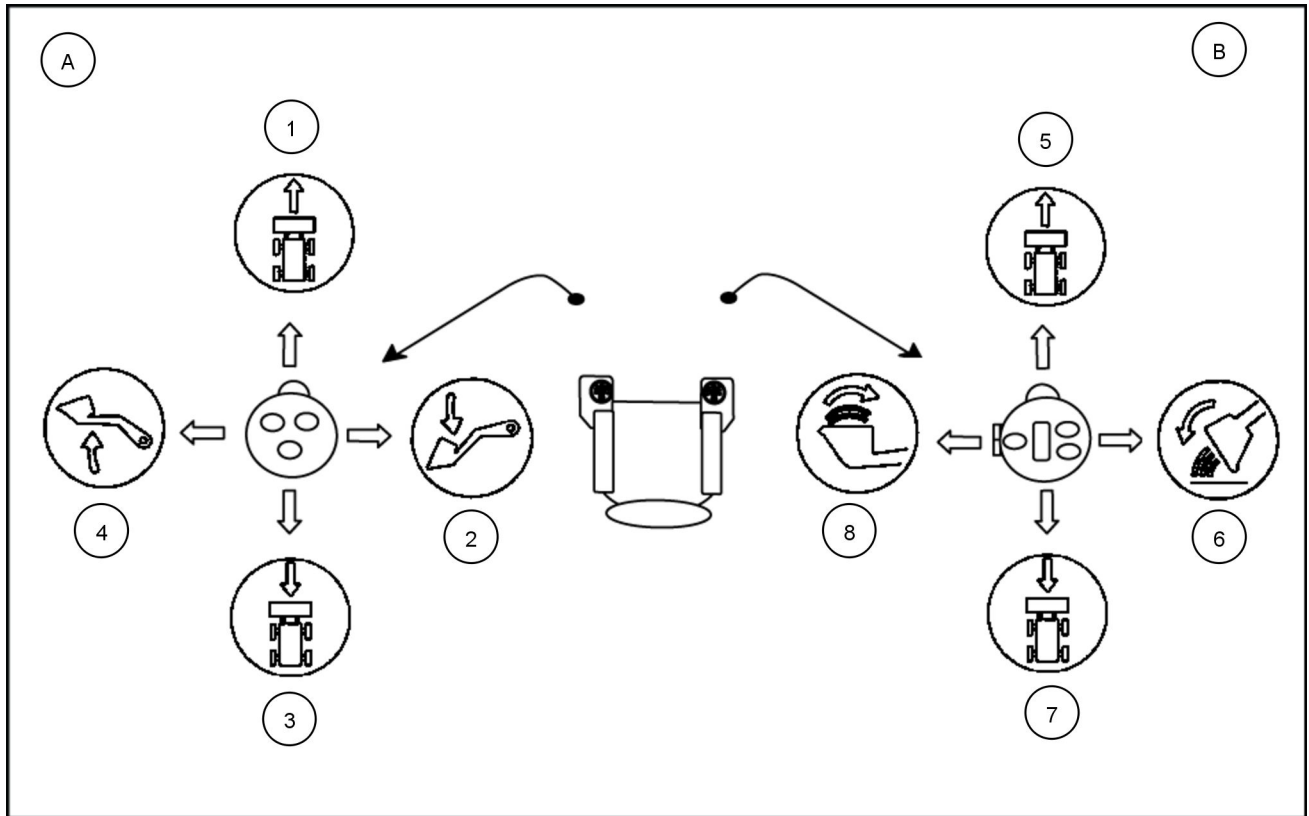
- The bucket is tilted by activation of the right foot pedal **(2)** located on the floor and is marked with a decal. For dumping, depress the toe end of the pedal. To achieve rollback (curl), push the pedal downward at the heel.

NOTE: There is no detent or float position on the bucket dump and curl spool.

ELECTRO-HYDRAULIC CONTROLS

Control pattern overview

Standard H control pattern



93100555 A1 1

The chart below will give a description of the control lever functions. The left-hand control lever is represented by the letter (A) and the right-hand control lever by letter (B).

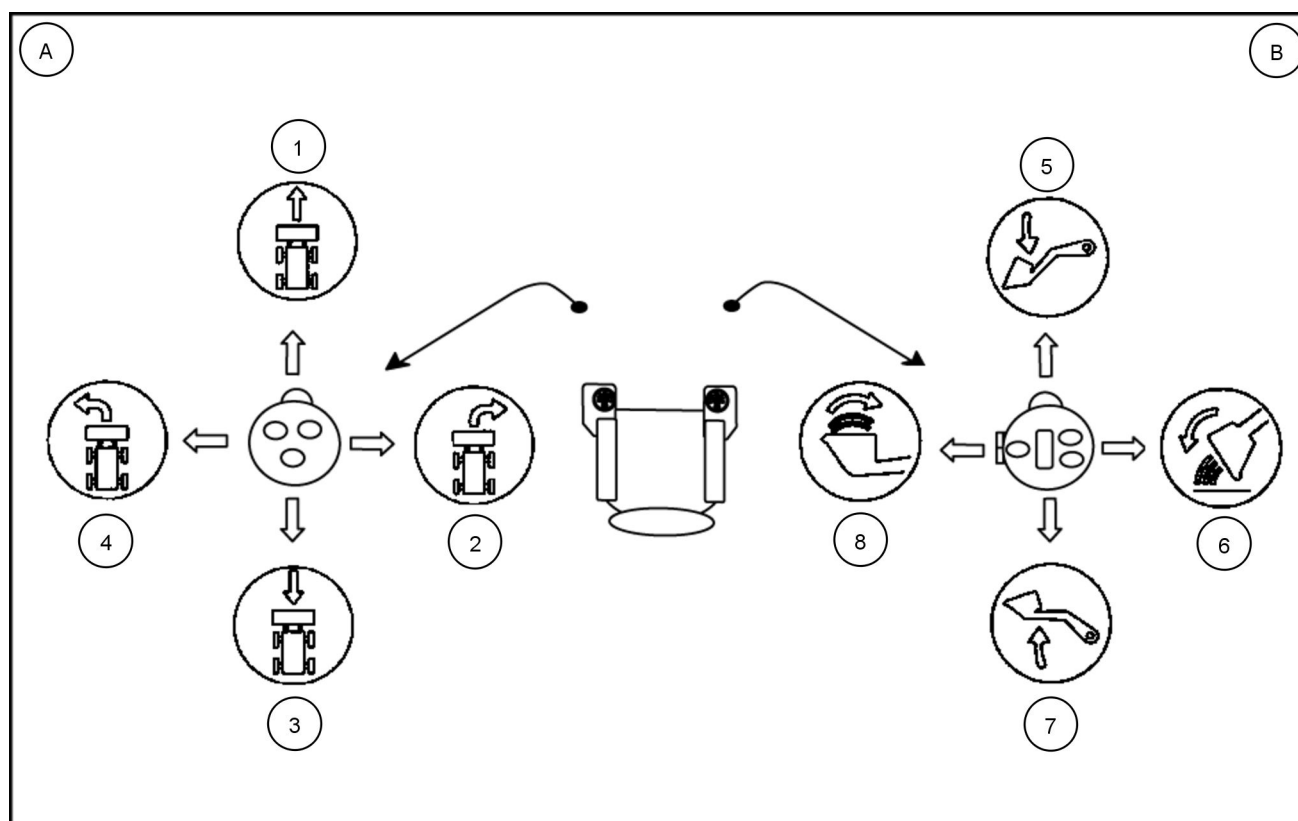
(A) Left-hand control lever	
(1)	Left side drive forward.
(2)	Loader arm lower.
(3)	Left side drive reverse.
(4)	Loader arm raise.

(B) Right-hand control lever	
(5)	Right side drive forward.
(6)	Bucket dump.
(7)	Right side drive reverse.
(8)	Bucket rollback (curl).

NOTE: The standard H control pattern uses both left-hand and right-hand control levers for ground drive functions.

NOTICE: Do not operate the unit until the hydraulic oil is at sufficient operating temperature.

Standard ISO control pattern



RAIL14SSL0314FA 1

The chart below will give a description of the control lever functions. The left-hand control lever is represented by the letter (A) and the right-hand control lever by letter (B).

(A) Left-hand control lever	
(1)	Drive forward.
(2)	Turn right, clockwise rotate.
(3)	Reverse.
(4)	Turn left, counter-clockwise rotate.

(B) Right-hand control lever	
(5)	Loader arm lower.
(6)	Dump bucket.
(7)	Loader arm raise.
(8)	Rollback bucket (curl).

NOTE: The standard ISO control pattern uses the left-hand control lever for ground drive functions and the right-hand control lever for loader arm and bucket functions.

NOTICE: Do not operate the unit until the hydraulic oil is at sufficient operating temperature.

Electro-hydraulic control handle adjustment

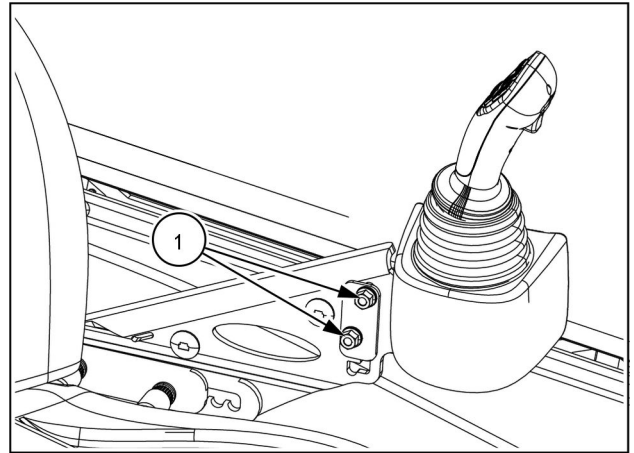
The control levers can be adjusted for operator comfort.

1. Adjust the height of the control lever by loosening two nuts **(1)** and moving the control lever assembly into one of the three notches provided in the mounting bracket. Tighten the two nuts **(1)**.

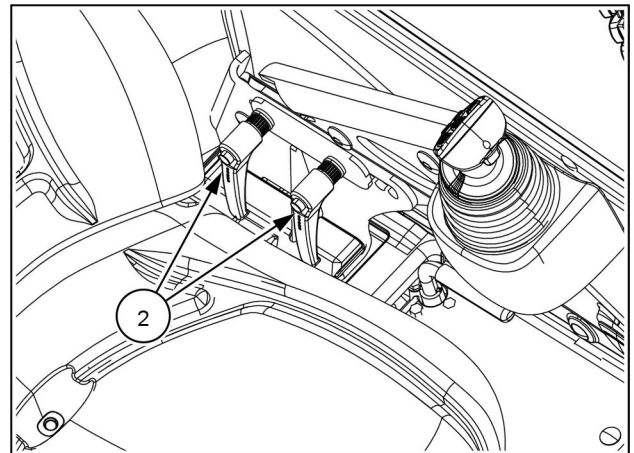
NOTE: The levers **(2)** can be loosened or tightened like a ratchet.

NOTE: Once the levers are tightened you may change the position of the levers without loosening. Pull out on the levers and rotate them to the desired position and then release. The levers are spring loaded.

2. Adjust the forward and rearward position of the control lever by loosening two hand levers **(2)** and sliding the control lever assembly to one of the six notched position. Tighten the hand levers **(2)**.



RAIL23SSL0228BA 1



RAIL23SSL0227BA 2

H control pattern steering and travel

Hand controls

⚠ WARNING

Loss of control hazard!

Keep hands and feet on the appropriate controls at all times to maintain control of the machine.
Failure to comply could result in death or serious injury.

W0237A

⚠ WARNING

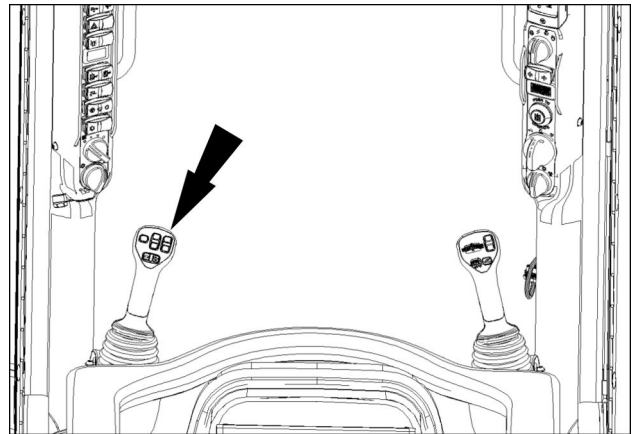
Collision hazard!

Always make sure the area behind the machine is clear of all persons, animals, and obstructions **BEFORE** backing up.
Failure to comply could result in death or serious injury.

W0232A

Left-hand control lever

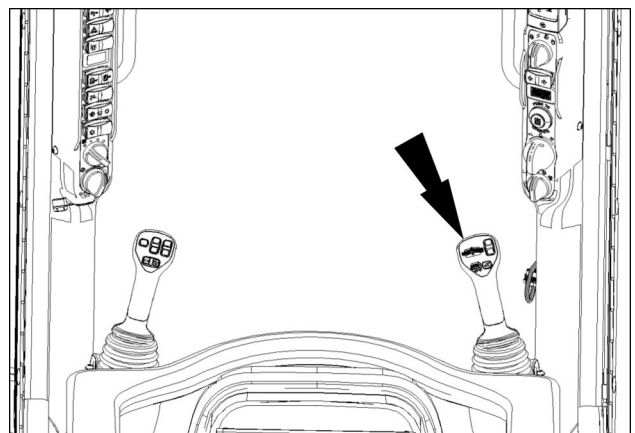
By moving the left-hand control lever forward from neutral, the left-hand side tires will rotate forward. When the left-hand control lever is moved rearward from neutral, the left-hand side tires will rotate in reverse.



RAIL19SSL0057BA 1

Right-hand control lever

By moving the right-hand control lever forward from neutral, the right-hand side tires will move forward. When the right-hand control lever is moved rearward from neutral, the right-hand side tires will move in reverse.

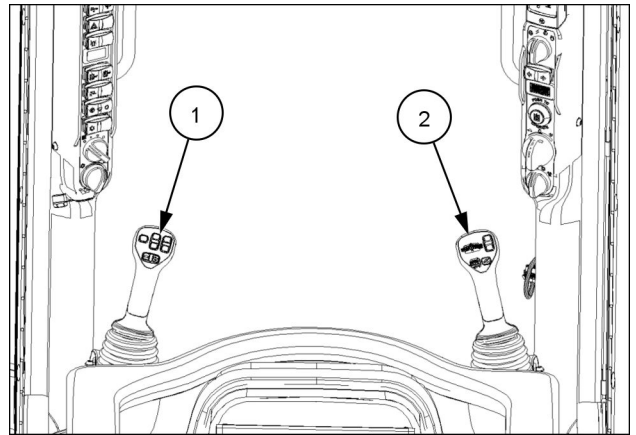


RAIL19SSL0057BA 2

Moving the machine

Push both the left-hand control lever **(1)** and the right-hand control lever **(2)** forward, from neutral, to move the machine forward. Pull both of the control levers rearward from neutral, to move the machine in reverse. Move the control levers forward a short distance for maximum power and slow speed. Move the control levers completely forward for maximum speed.

Move both control levers to NEUTRAL to stop movement of the machine.

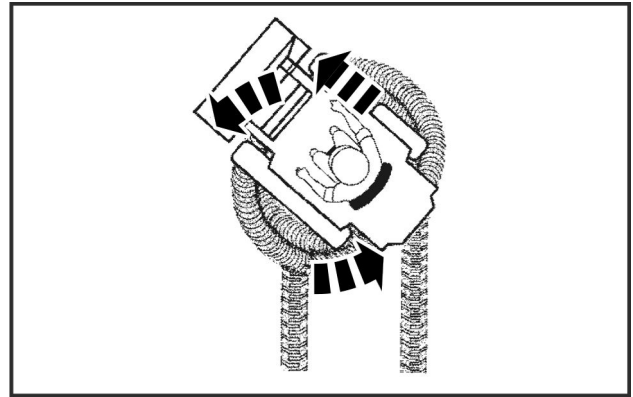


RAIL19SSL0057BA 1

Turning the machine

Pivot turn - power to only one side

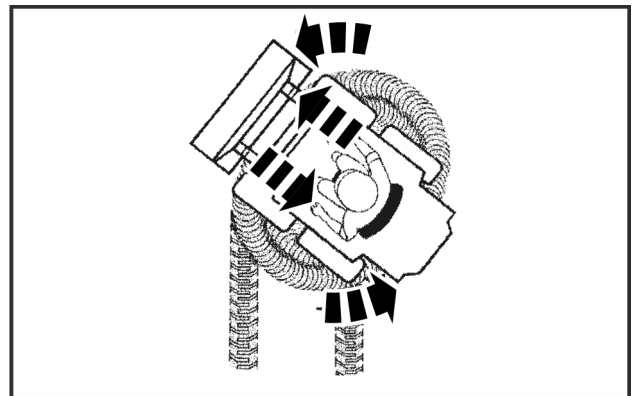
- To make a pivot turn left: hold the left-hand control lever in neutral and move the right-hand control lever forward.
- To make a pivot turn right: hold the right-hand control lever in neutral and move the left-hand control lever forward.
- To make a pivot turn in reverse left: after confirming that all personnel and objects are clear, hold the left-hand control lever in neutral and move the right-hand control lever rearward.
- To make a pivot turn in reverse right: after confirming that all personnel and objects are clear, hold the right-hand control lever in neutral and move the left-hand control lever rearward.



BT06G022 1

Counter rotation turn - power to both sides in opposing directions

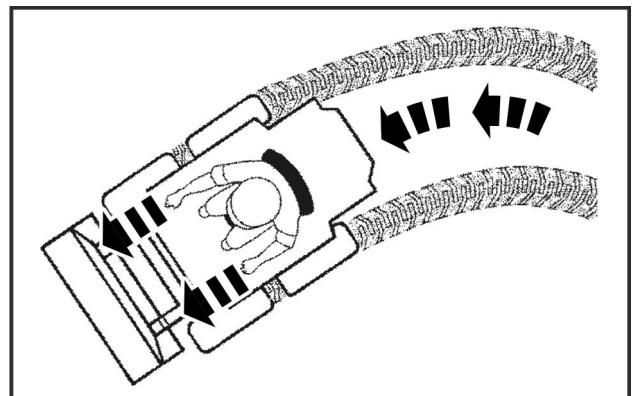
- To counter rotate left: move the left-hand control lever rearward and push the right-hand control lever forward.
- To counter rotate right: move the right-hand control lever rearward and push the left-hand control lever forward.



BT06G023 2

Gradual turn - power to both sides in the same direction

- To make a gradual turn left: move the right-hand control lever further forward while pushing the left-hand control lever partially forward.
- To make a gradual turn right: move the left-hand control lever further forward while pushing the right-hand control lever partially forward.



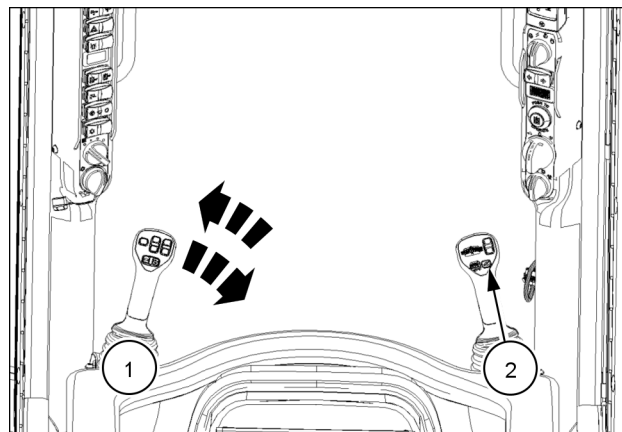
BT06G024 3

H control pattern lift arm and bucket controls

Lift arm raise/lower control

Lift arm raise and lower control:

- The left-hand control lever (1) controls the lift arm. The lift arm will raise by pivoting the handle "UP" to the outside of the cab. Pivoting the handle "DOWN" to the inside of the cab will lower the lift arm.
- The lift arm spool is equipped with a detent "FLOAT" circuit if the operator wants the lift arm to float over changing ground contour. For the Electro-Hydraulic (EH) system, the float is engaged by pressing the float button on the right-hand control lever (2) and pushing the left-hand control lever (1) partially to the down stroke position and then pressing the float button, the float will engage. To disengage the float, pull the left-hand control lever to the up stroke slightly.



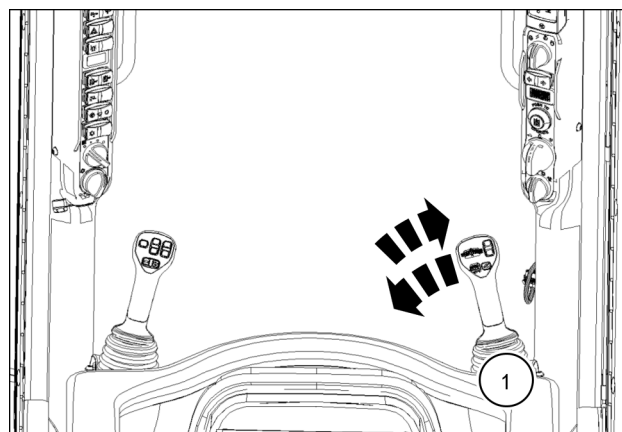
RAIL19SSL0057BA 1

Bucket curl/dump control

Bucket dump and curl control.

- The right-hand control lever (1) controls the bucket. The bucket will dump by pivoting the handle "UP" to the outside of the cab. Pivoting the handle "DOWN" to the inside of the cab and the bucket will roll back (curl).

NOTE: There is no detent or float position on the bucket dump or curl spools.



RAIL19SSL0057BA 1

Bucket shake activation

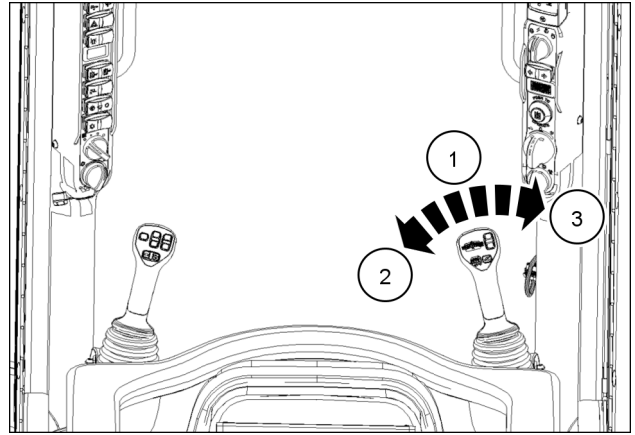
The bucket shake feature is only available on machines with Electro-Hydraulic (EH) controls. The operator can activate the Universal Control Module (UCM) to rapidly shake the bucket to help the operator either clear the bucket or to fill the bucket. The operator's action must be deliberate to activate the bucket shake feature.

Bucket dump shake activation (quickly empty the bucket)

- The operator must quickly move the right-hand control lever from the "Roll" position **(2)** to the "Dump" position **(3)** three full cycles. The control lever must travel more than **10°** from the "Neutral" position **(1)** in both directions.

Bucket roll (curl) shake activation (quickly flip the bucket to fill)

- The operator must quickly move the right-hand control lever from the "Dump" position **(3)** to the "Roll" position **(2)** three full cycles. The control lever must travel more than **10°** from the "Neutral" position **(1)** in both directions.



RAIL19SSL0057BA 1

ISO control pattern steering and travel

Moving the machine

⚠ WARNING

Loss of control hazard!

Keep hands and feet on the appropriate controls at all times to maintain control of the machine.
Failure to comply could result in death or serious injury.

W0237A

⚠ WARNING

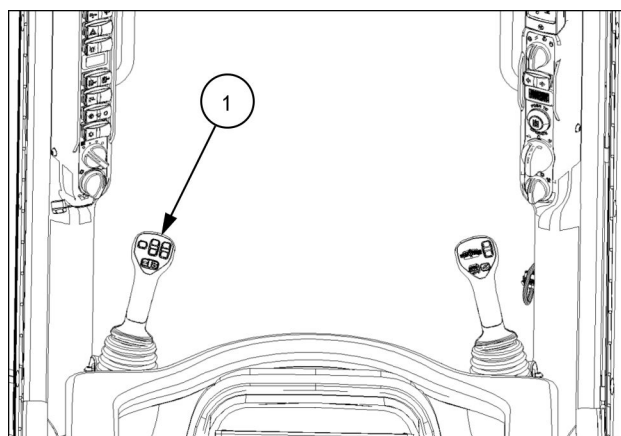
Collision hazard!

Always make sure the area behind the machine is clear of all persons, animals, and obstructions BEFORE backing up.

Failure to comply could result in death or serious injury.

W0232A

All steering and travel controls are directed with the left-hand control lever (1) only. Use the face of a clock for orientation. The machine will move in the direction the lever is moved from neutral, center. Release the lever and it will detent to neutral. Although the machine will turn and counter-turn sharply, it is best to travel through forward or reverse gradually when turning.



RAIL19SSL0057BA 1

NOTE: Adjust the seat lap bar for maximum stability of controls and to reduce operator fatigue.

Straight forward drive:

- Push the control lever straight forward (12:00 position) and the machine will move forward.

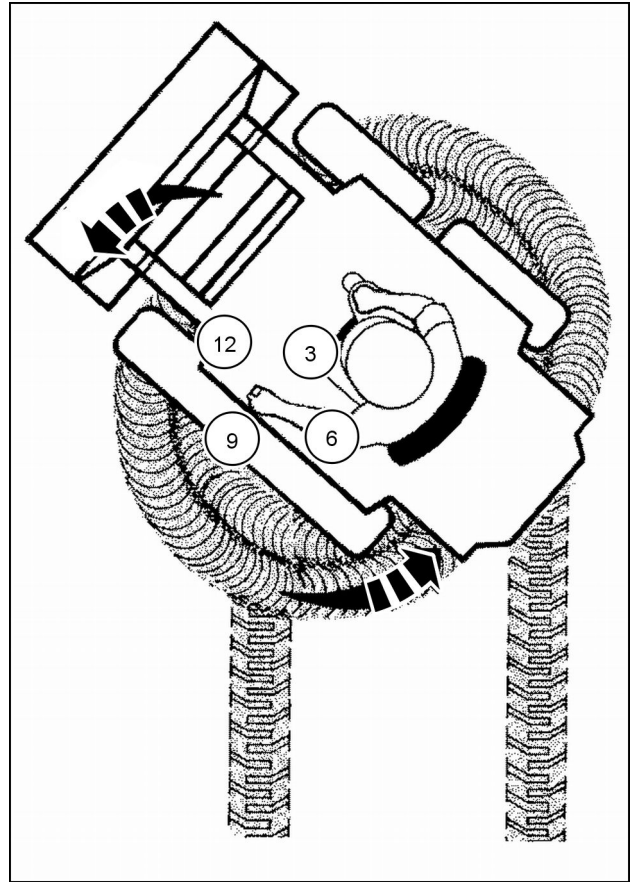
Straight rearward drive:

- Pull the control lever straight rearward (6:00 position) and the machine will move rearward.

Turning the machine

Pivot turn - power to only one side

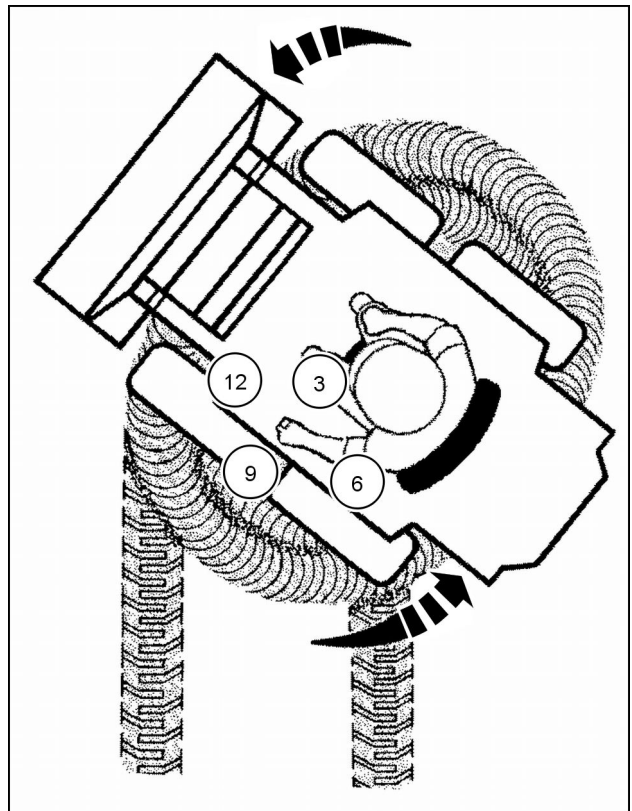
- To make a pivot turn left: from neutral, push the left-hand control lever slightly forward, and then left to the 10:00 position.
- To make a pivot turn right: from neutral, push the left-hand control lever slightly forward, and then right to the 2:00 position.
- To make a pivot turn reverse left: from neutral, pull the left-hand control lever slightly rearward, and then right to the 4:00 position.
- To make a pivot turn reverse right: from neutral, pull the left-hand control lever slightly rearward, and then left to the 8:00 position.



BS06G035 1

Counter rotation turn - power to both sides in opposing directions

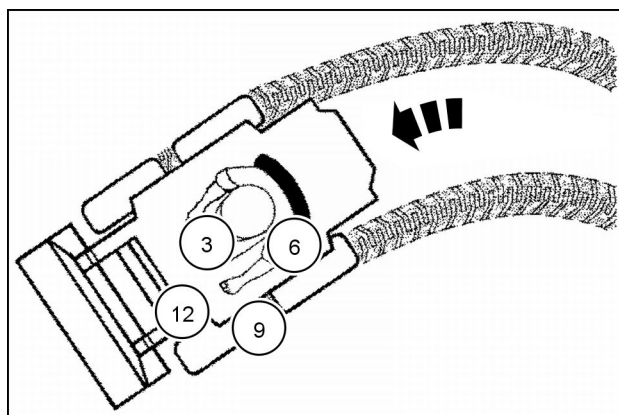
- To counter-rotate left: from neutral, push the left-hand control lever straight to the left (outward) toward the 9:00 position. The left-hand side drive will engage in reverse travel as the right-hand side drive will engage forward travel.
- To counter-rotate right: from neutral, push the left-hand control lever straight to the right (inward) toward the 3:00 position. The right-hand side drive will engage in reverse travel as the left-hand side drive will engage in forward travel.



BS06G036 2

Gradual turn - power to both sides in the same direction

- To make a gradual forward turn left: from neutral, push the left-hand control lever forward and slightly toward the 11:00 position.
- To make a gradual forward turn right: from neutral, push the left-hand control lever forward and slightly toward the 1:00 position.



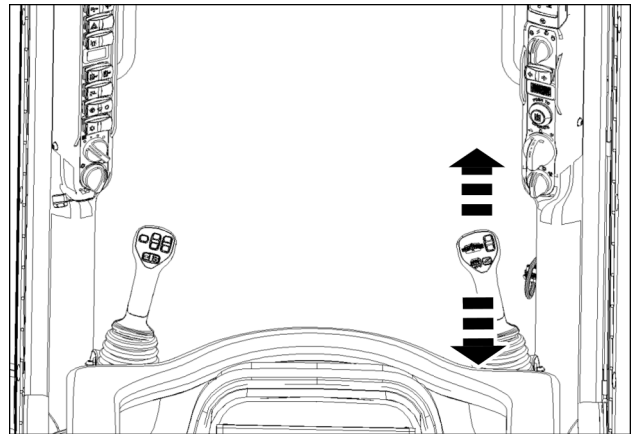
BS06G037 3

ISO control pattern lift arm and bucket controls

Lift arm and bucket controls

Lift arm raise and lower control.

- Pull back on the right-hand control lever to raise (up) the lift arm.
- Push the right-hand control lever forward to lower (down) the lift arm.
- The lift arm spool is equipped with a detent FLOAT circuit. In this detent position the lift arm will float over changing ground contour and the lever will remain in this position until pulled back toward the up stroke slightly.



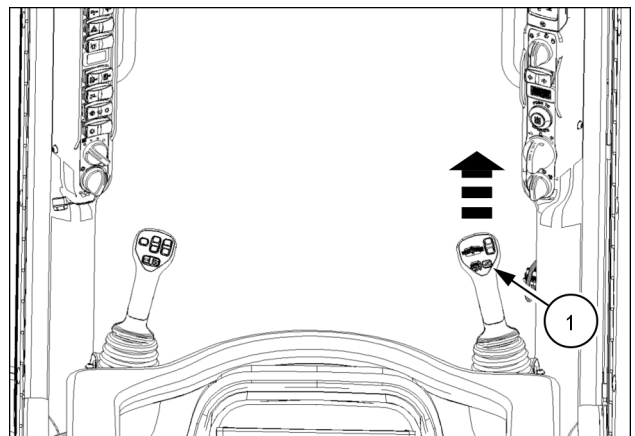
RAIL19SSL0057BA 1

Engage the float feature:

Press the float button on the right-hand control lever and push the lever partially forward. If the operator has the right-hand control lever already partially in the down stroke position and then presses the float button, the float feature will engage.

Disengage the float feature:

Pull back on the right-hand control lever out of the detent position.

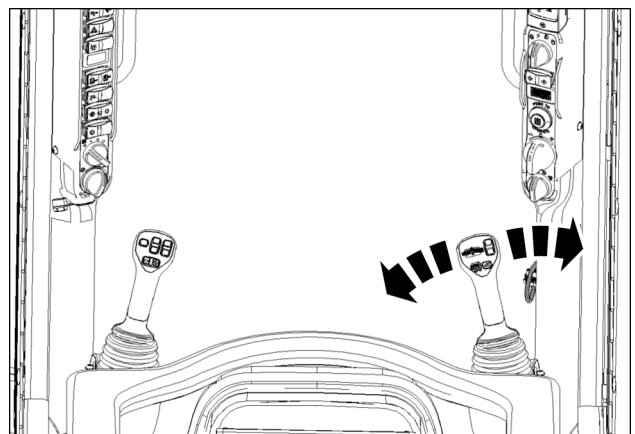


RAIL19SSL0057BA 2

Bucket dump and curl control.

- Pivot the right-hand control lever inward (down) and the bucket will roll back (curl).
- Pivot the right-hand control lever outward (up) and the bucket will dump.

NOTE: There is no detent or float position on the bucket dump and curl circuit.



RAIL19SSL0057BA 3

Bucket shake activation

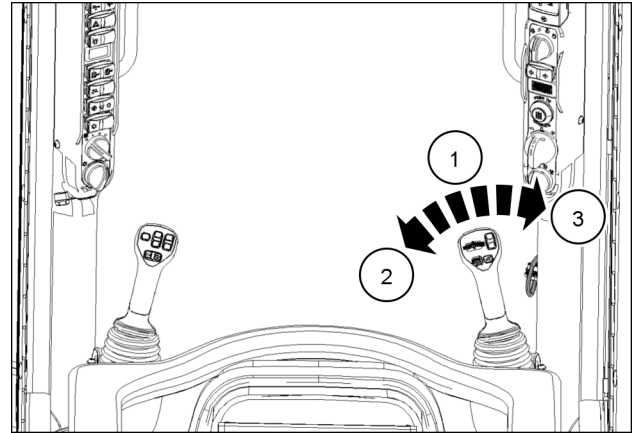
The bucket shake feature is only available on machines with Electro-Hydraulic (EH) controls. The operator can activate the Universal Control Module (UCM) to rapidly shake the bucket to help the operator either clear the bucket or to fill the bucket. The operator's action must be deliberate to activate the bucket shake feature.

Bucket dump shake activation (quickly empty the bucket)

- The operator must quickly move the right-hand control lever from the "Roll" position **(2)** to the "Dump" position **(3)** three full cycles. The control lever must travel more than **10°** from the "Neutral" position **(1)** in both directions.

Bucket roll (curl) shake activation (quickly flip the bucket to fill)

- The operator must quickly move the right-hand control lever from the "Dump" position **(3)** to the "Roll" position **(2)** three full cycles. The control lever must travel more than **10°** from the "Neutral" position **(1)** in both directions.



RAIL19SSL0057BA 1

CONTROL LEVERS

Switch configurations

The following functions can be activated from the control handles depending on your machine's configuration.

- Horn — Squeeze the trigger to sound the horn.
- Park — Press the park button to activate or deactivate the parking brake. The park symbol on the instrument panel will illuminate red when the parking brake is on.

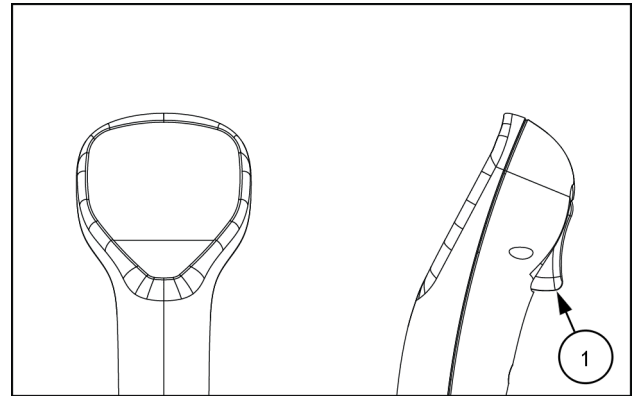
NOTE: The park brake button on the right-hand control lever will not turn off the park brake until the operator presses the "PUSH TO OPERATE" button.

NOTE: The other hydraulic functions remain active when the parking brake is ON.

- Proportional auxiliary — Activate the hydraulic component attached to the standard or high flow auxiliary hydraulic ports.
- 2nd auxiliary hydraulic — Activate the hydraulic component attached to the secondary auxiliary hydraulic ports.
- Multi-function hydraulics ON/OFF — Activate the hydraulic component attached to the enhanced high flow or high flow auxiliary hydraulic ports.
- 2-Speed and Creep speed setting — Press  to downshift from 2nd gear to 1st gear. Press  to shift back to 2nd gear. For more details refer to **3-29**. This rocker switch is also used to increase and decrease machine speed in creep mode. For more details on creep mode see the LCD multi-function display "Equipment Manual".
- **Ride Control™** — Press and hold the control lever trigger to activate **Ride Control™** and release to deactivate. **Ride Control™** reduces machine rocking motion during transport and material hauling operations. When engaged, loader down pressure is limited to the weight of the loader plus the attachment, and also reduces shock loads to the machine. The weight of the attachment is hydraulically cushioned during transport.
- Float — Press to activate or deactivate the lift arm float function. When float is activated, the lift arm will float over the ground contour the machine is traveling over. For more details refer to page **3-17** for the H control pattern, and page **3-22** for the ISO control pattern. Mechanical units do not have a float button.
- Multi-functional #1, #2, #3, and #4 — Press to control additional components attached to the machine. Refer to the owner's manual of the attachment for operating functions.

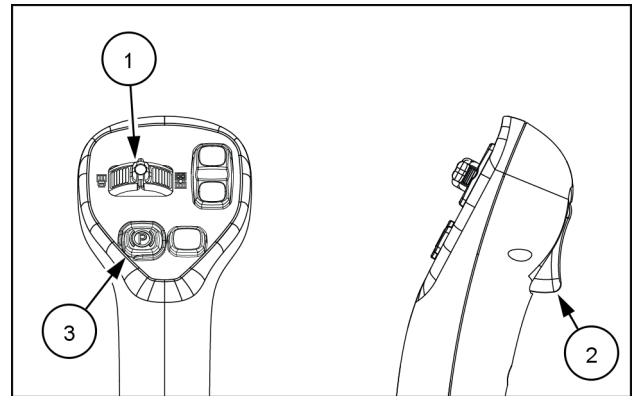
Level 100 control levers

Left-hand side control lever
(1) Horn



RAIL19SSL0008AA 1

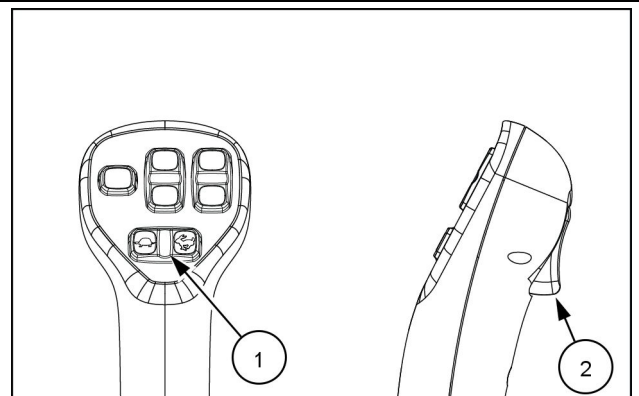
Right-hand side control lever
(1) Proportional auxiliary
(2) Not active
(3) Park brake



RAIL19SSL0009AA 2

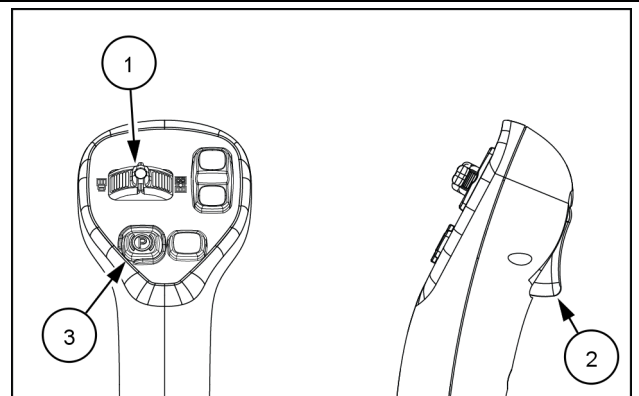
Level 200 control levers

Left-hand side control lever
(1) 2-Speed
(2) Horn



RAIL19SSL0010AA 3

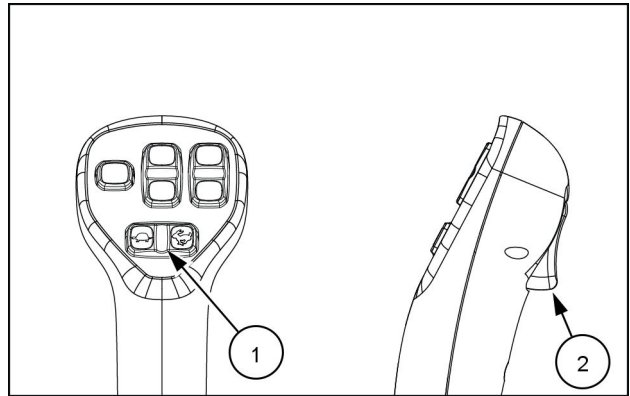
Right-hand side control lever
(1) Proportional auxiliary
(2) Ride Control™
(3) Park brake



RAIL19SSL0009AA 4

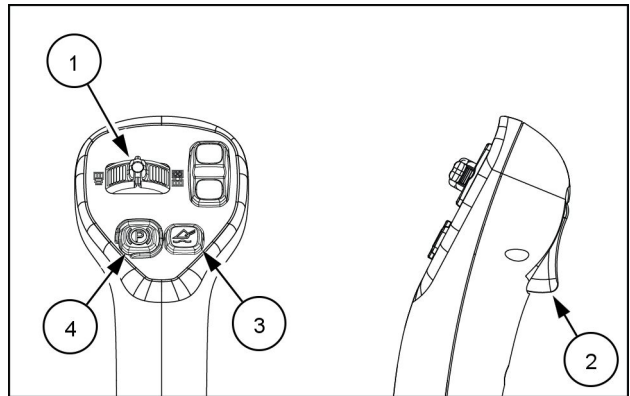
Level 250 control levers

Left-hand side control lever
(1) Horn
(2) 2-Speed / Creep



RAIL19SSL0010AA 5

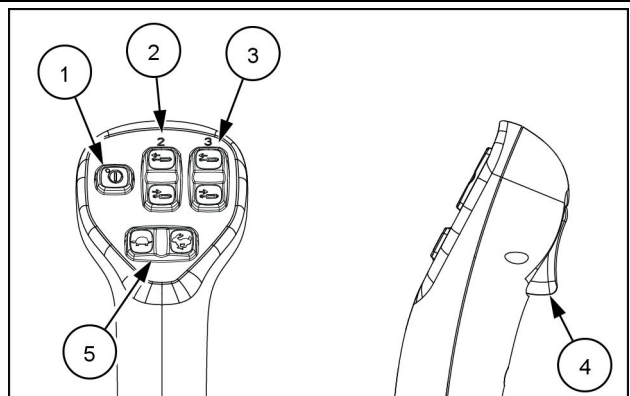
Right-hand side control lever
(1) Proportional auxiliary
(2) Ride Control™
(3) Float
(4) Park brake



RAIL19SSL0011AA 6

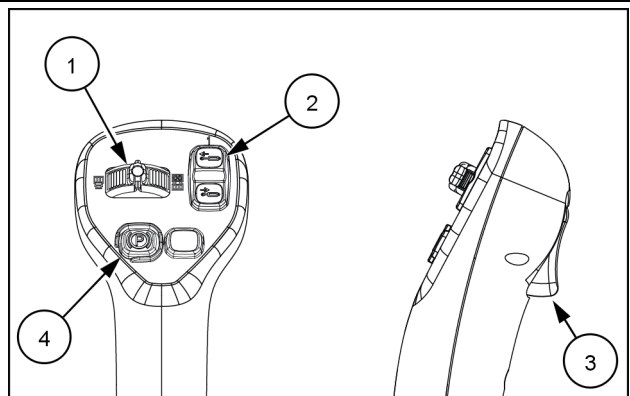
Level 300 control levers

Left-hand side control lever
(1) Multi-function hydraulics ON/OFF
(2) Multi-functional #2
(3) Multi-functional #3
(4) Horn
(5) 2-Speed



RAIL19SSL0014AA 7

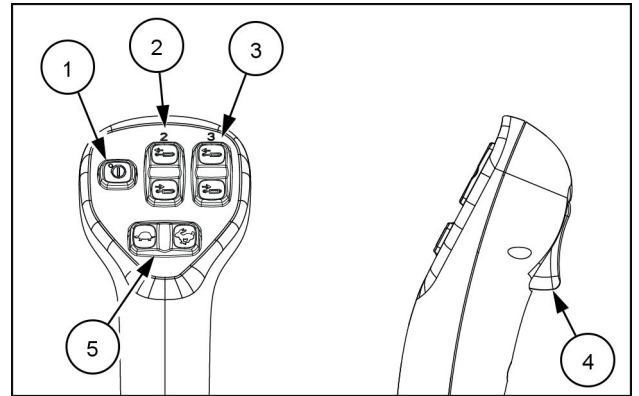
Right-hand side control lever
(1) Proportional auxiliary
(2) Multi-functional #1
(3) Ride Control™
(4) Park brake



RAIL19SSL0013AA 8

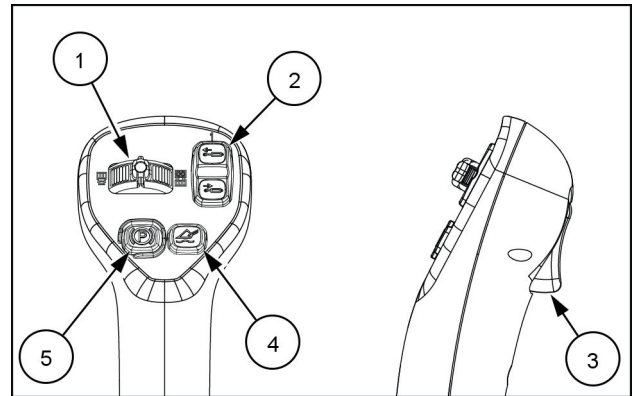
Level 350 control levers

- Left-hand side control lever
(1) Multi-function hydraulics ON/OFF
(2) Multi-functional #2
(3) Multi-functional #3
(4) Horn
(5) 2-Speed / Creep



RAIL19SSL0014AA 9

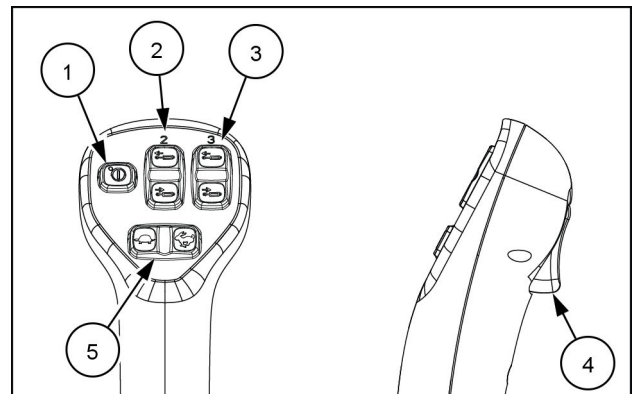
- Right-hand side control lever
(1) Proportional auxiliary
(2) Multi-functional #1
(3) Ride Control™
(4) Float
(5) Park brake



RAIL19SSL0012AA 10

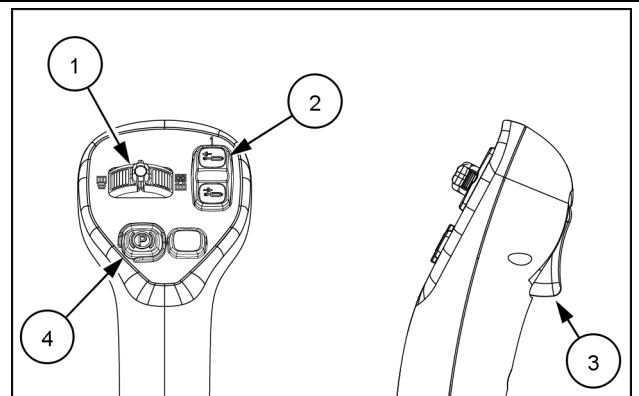
Level 400 control levers

- Left-hand side control lever
(1) Multi-function hydraulics ON/OFF
(2) 2nd auxiliary hydraulics
(3) Multi-functional #3
(4) Horn
(5) 2-Speed



RAIL19SSL0014AA 11

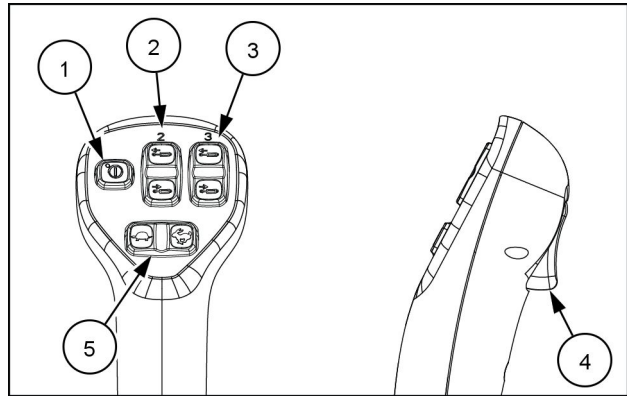
- Right-hand side control lever
(1) Proportional auxiliary
(2) Multi-functional #1
(3) Ride Control™
(4) Park brake



RAIL19SSL0013AA 12

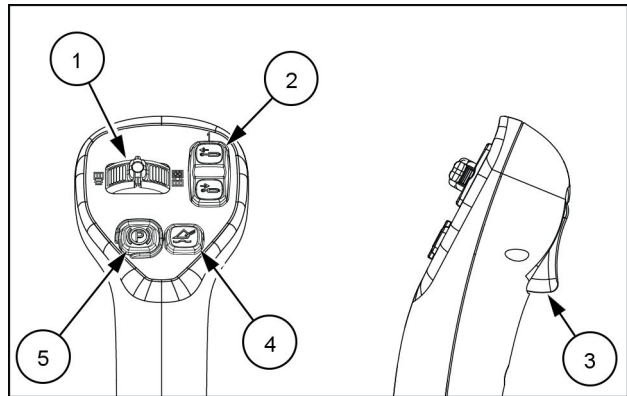
Level 450 control levers

- Left-hand side control lever
- (1) Multi-function hydraulics ON/OFF
 - (2) 2nd auxiliary hydraulics
 - (3) Multi-functional #3
 - (4) Horn
 - (5) 2-Speed / Creep



RAIL19SSL0014AA 13

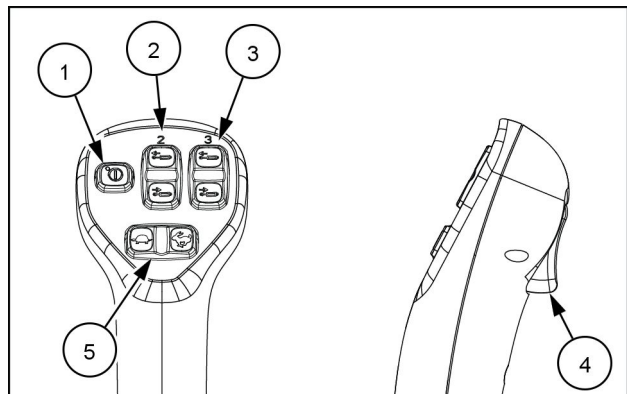
- Right-hand side control lever
- (1) Proportional auxiliary
 - (2) Multi-functional #1
 - (3) Ride Control™
 - (4) Float
 - (5) Park brake



RAIL19SSL0012AA 14

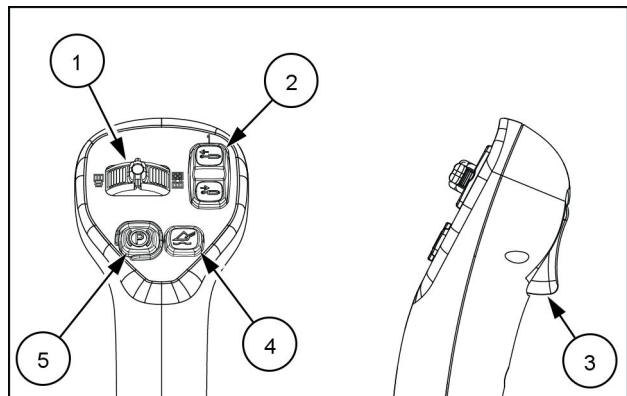
Level 550 control levers

- Left-hand side control lever
- (1) Multi-function hydraulics ON/OFF
 - (2) Enhanced High Flow (EHF)
 - (3) Multi-functional #3
 - (4) Horn
 - (5) 2-Speed / Creep



RAIL19SSL0014AA 15

- Right-hand side control lever
- (1) Proportional auxiliary
 - (2) Multi-functional #1
 - (3) Ride Control™
 - (4) Float
 - (5) Park brake



RAIL19SSL0012AA 16

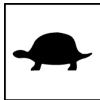
Two-speed function

Function-enable conditions

The two-speed function can be activated **ONLY IF ALL** of the following conditions are met.

- Operator is seated properly.
- The restraint bar is in the down position while the operator is in the seat.
- The hydraulic system is activated.
- Park brake is not set.
- The key or knob switch is in the ON position.

Two-Speed Function



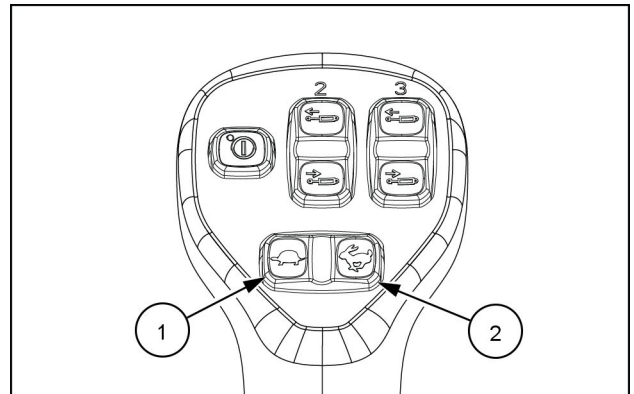
Press the turtle symbol to downshift from 2nd gear to 1st gear.



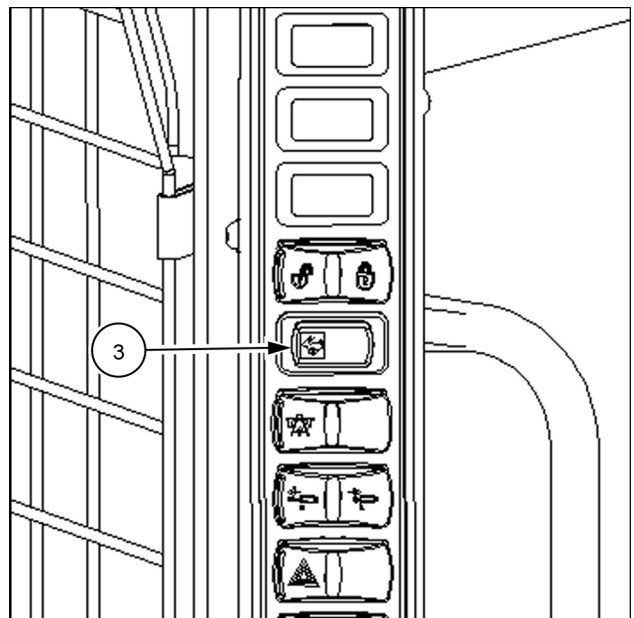
Press the rabbit symbol to shift from 1st gear to 2nd gear.

NOTE: The rabbit symbol (3) on the left-hand column illuminates when the two-speed function is active.

NOTE: If equipped with creep mode the 2-speed function buttons are also used to increase or decrease the machine speed in creep mode. See the LCD multi-function display "Equipment Manual" for more details.



RAIL19SSL0015AA 1



RAIL19SSL0068BA 2

AUXILIARY HYDRAULICS

Standard auxiliary hydraulics

Follow the attachment's operator's manual on specific installation procedures, operation, and removal procedures.

Auxiliary hydraulic couplers are located on the left-hand loader arm.

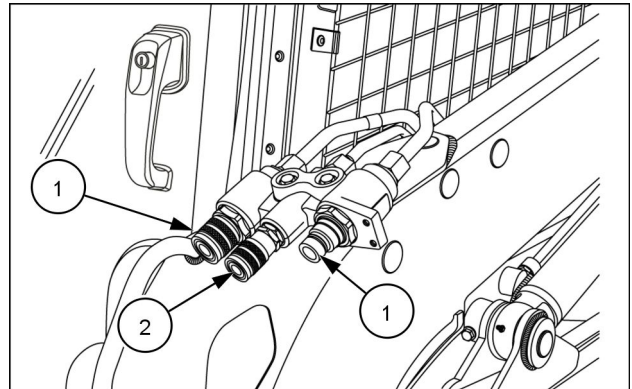
1. Work ports — 1/2 inch coupler size
2. Case drain — 3/8 inch coupler size

Use the Proportional Auxiliary “rotary” switch on the right-hand control lever to operate the attachment connected to the standard auxiliary hydraulics ports. See your control lever “Switch configurations” **3-24** for more details.

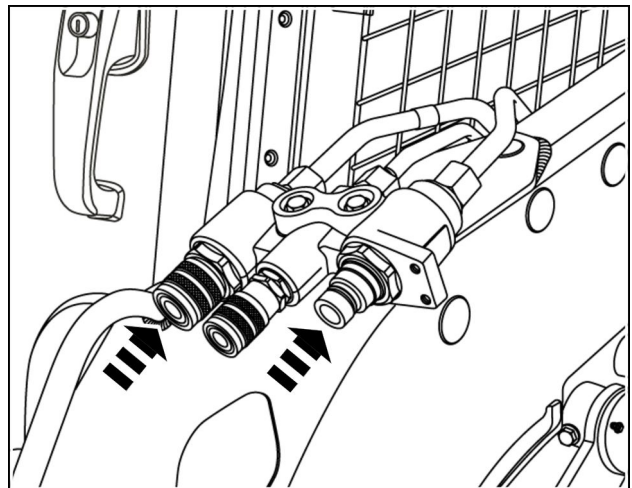
Relieve pressure before connecting attachment hoses

Machines with auxiliary hydraulic ports are built with a Connect-Under-Pressure (CUP) valve for the auxiliary hydraulic quick disconnects. Follow this procedure to relieve the pressure prior to connecting the hydraulic hoses from the attachment:

1. Using the palm of your hand push the 1/2 inch female quick disconnect coupling toward CUP valve. When done properly, the coupling will move about **10.0 mm (0.4 in)**, relieving the stored pressure.
2. Perform the same action for the 1/2 inch male quick disconnect coupling, relieving the stored pressure.



63106839 1

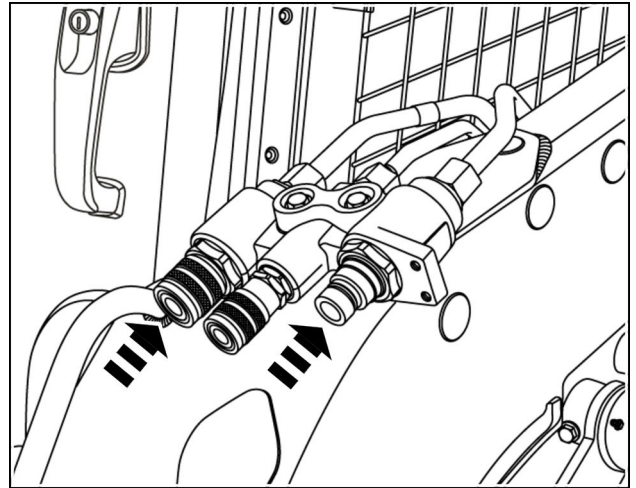


631068399 2

Relieve pressure before disconnecting attachment hoses

NOTICE: Before removing attachments, make sure that you relieve pressure from the hydraulic system **BEFORE** disconnecting the auxiliary hoses. If the pressure is not relieved, you **WILL NOT** be able to reattach hoses.

1. Lower the loader arm all the way down and ensure that the loader arm or attachment is not supporting the weight of the machine with the front wheels off the ground.
2. Place all controls in the neutral position.
3. Press the Operate button to deactivate the hydraulic system and ground drive system.
4. Stop the engine.
5. Move the controls to ensure that the hydraulic interlock is engaged and the loader arm and bucket cylinders do not move.
6. Raise the restraint bar, unfasten the seat belt, and safely exit the machine.
7. Prior to disconnecting the attachment hoses, grab the inside hose and push it toward the Connect-Under-Pressure (CUP) valve. When done properly, the coupling will move about **6.00 mm (0.24 in)**, relieving any stored pressure in that circuit. Repeat on the outside hose/coupling.
8. Disconnect the attachment hydraulic hoses from the Connect-Under-Pressure (CUP) valve quick disconnects.
9. Install the coupler port covers, if available.



631068399 3

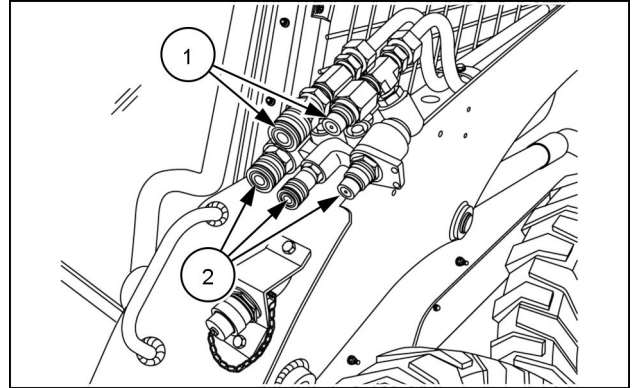
High flow auxiliary hydraulics

Follow the attachment's operator's manual on specific installation procedures, operation, and removal procedures. The high flow auxiliary hydraulic feature provides hydraulic oil pressure and flow to the auxiliary circuit.

Models	System Relief Pressure	Rated Flow
SR270B / TR340B	210 bar (3045 psi)	142.5 L/min (37.6 US gpm)
SV340B / TV450B	238 bar (3450 psi)	149 L/min (39.4 US gpm)

If the machine is equipped with a high flow auxiliary hydraulics there will be two 5/8 inch **(1)** couplers attached to the top of the standard auxiliary hydraulic coupler block **(2)** on the left-hand loader arm.

NOTICE: Always use the 5/8 inch couplers during high flow operation to prevent high back pressure and over heating of the hydraulic system.



93106839B 1

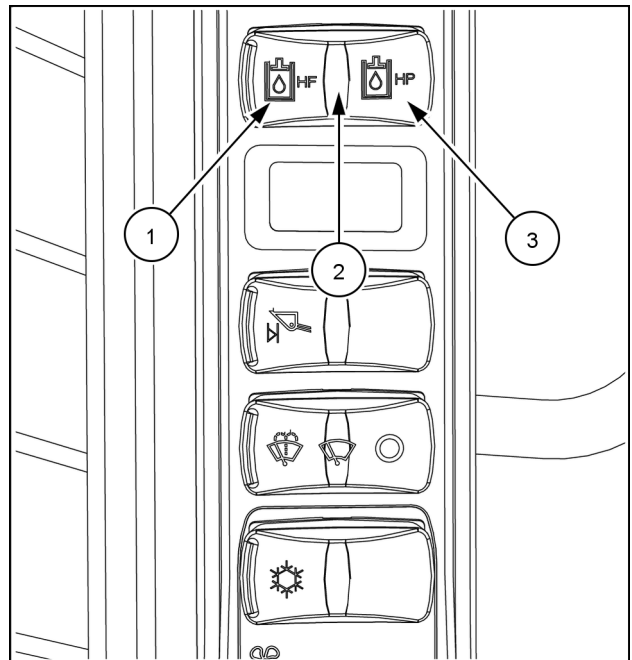
Use the three position switch on the left-hand ROPS post to activate the high flow option

- Position **(1)** — HF High Flow is activated
- Position **(2)** — Neutral or standard flow
- Position **(3)** — HP High Pressure is activated if equipped with Enhanced High Flow auxiliary hydraulics

NOTE: Only machines equipped with Enhanced high flow auxiliary hydraulics will be able to activate the HP function.

NOTICE: The high flow switch must be turned to the neutral position when not in use or required. Otherwise, overheating of the hydraulic oil or poor attachment operation may occur.

Use the Proportional Auxiliary “rotary” switch on the right-hand control lever to operate the attachment connected to the high flow auxiliary ports. See your control lever switch configurations **3-24** for more details.

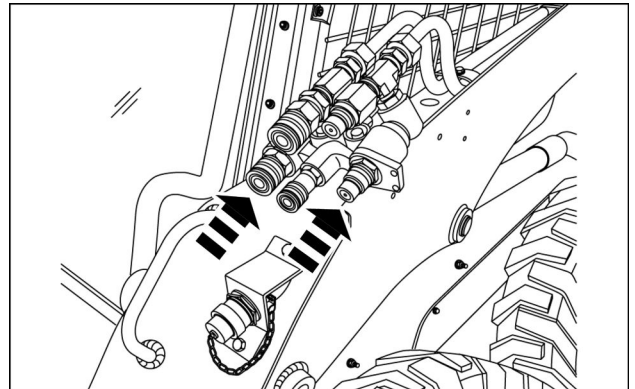


RAIL23SSL0234BA 2

NOTICE: Before removing attachments, make sure that you relieve pressure from the hydraulic system **BEFORE** disconnecting the auxiliary hoses. If the pressure is not relieved, you **WILL NOT** be able to reattach hoses. The high flow 5/8 inch quick disconnects on the machine do not have the ability to relieve pressure when connecting or disconnecting, but the following procedure shows how to release the pressure.

Relieve pressure before disconnecting attachment hoses

1. Lower the loader arm all the way down and ensure that the loader arm or attachment is not supporting the weight of the machine with the front wheels off the ground.
2. Place all controls in the neutral position.
3. Press the Operate button to deactivate the hydraulic system and ground drive system.
4. Stop the engine.
5. Move the controls to ensure that the hydraulic interlock is engaged and the loader arm and bucket cylinders do not move.
6. Raise the restraint bar, unfasten the seat belt, and safely exit the machine.
7. Prior to disconnecting the 5/8 inch high flow attachment hoses, with the palm of your hand push one of the lower, 1/2 inch quick disconnect couplings towards the Connect-Under-Pressure (CUP) valve. When done properly, the coupling will move about **6 mm (0.25 in)**, relieving any stored pressure in that circuit.
8. Repeat Step 7 on the other 1/2 inch coupling.
9. Disconnect the 5/8 inch high flow attachment hydraulic hoses from the quick disconnects.
10. Install the coupler covers, if equipped.



93106839B 3

Enhanced High Flow (EHF) auxiliary hydraulics

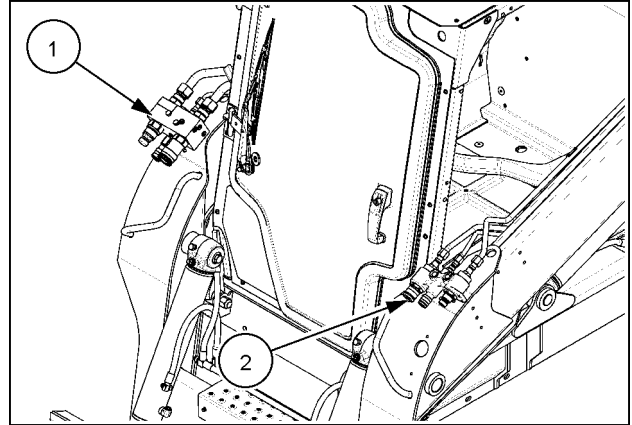
The Enhanced High Flow (EHF) auxiliary hydraulic feature provides **276 bar (4000 psi)** or **132 l/min (35 US gpm)** to the auxiliary circuit. Follow the attachment's operator's manual on specific installation procedures, operation, and removal procedures.

NOTE: The enhanced high flow setting can only be used with approved attachments and is controlled by a circuit interlock installed at the multifunction plug with the attachment.

If the machine is equipped with the enhanced high flow auxiliary hydraulics, two 5/8 inch couplers and a 3/8 inch case drain coupler block (1) will be attached to the right-hand loader arm.

The standard auxiliary hydraulic Connect-Under-Pressure (CUP) valve (2) with two 1/2 inch ports and one 3/8 inch case drain will remain on the left-hand loader arm.

NOTICE: Always use the 5/8 inch couplers during high flow operation to prevent high back pressure and overheating of the hydraulic system.



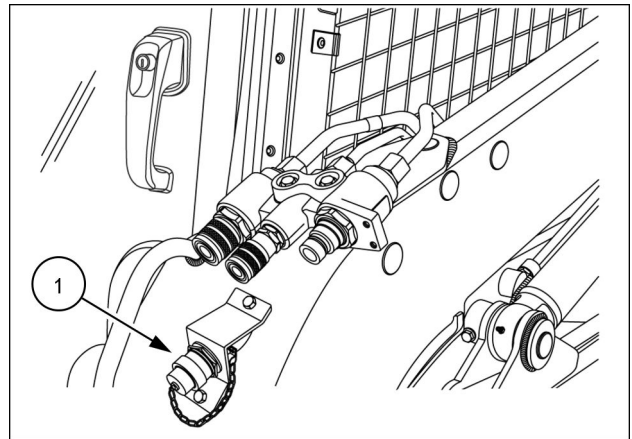
RCPH11SSL015BAD 1

Before operating the approved attachment, confirm the electrical connection (1) is secured in place.

NOTE: All approved Enhanced High Flow (EHF) attachments will have an electrical connection. This prevents operating attachments that are not approved to handle **276 bar (4000 psi)** in High Pressure (HP) mode.

NOTICE: If the circuit interlock connection is not made with the attachment and the High Pressure (HP) mode switch is engaged you will have extremely low hydraulic pressure and flow. The attachment will not be operable.

NOTICE: If the circuit interlock connection is not made with the attachment and the High Flow (HF) mode switch is engaged only standard HF will be available on the EHF couplers.



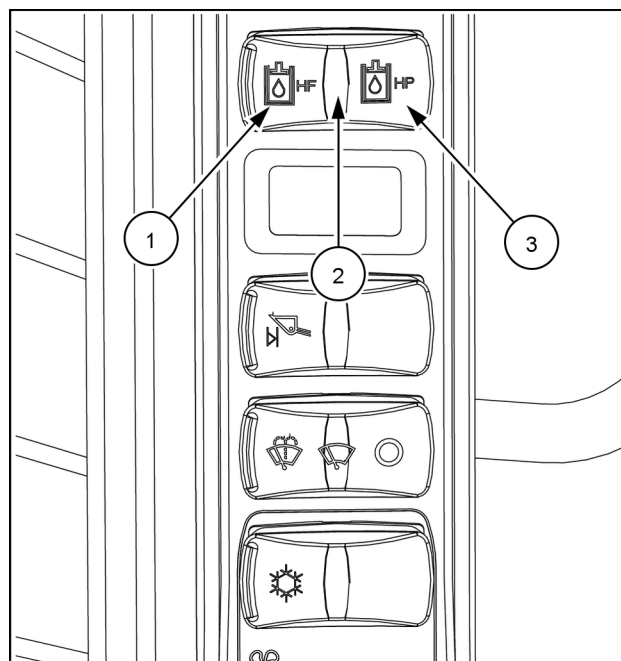
RCPH11SSL016BAD 2

Use the three position switch on the left hand ROPS post to activate the high flow option.

- Position **(1)** — HF High Flow is activated
- Position **(2)** — Neutral or standard flow
- Position **(3)** — HP High Pressure is activated

NOTICE: The high flow switch must be turned to the neutral position when not in use or required. Overheating of the hydraulic oil or poor attachment operation may occur.

Use the number 2 cylinder button on the left-hand control lever to operate the enhanced high flow attachments. See your control lever switch configurations **3-24** for more details.



RAIL23SSL0234BA 3

Disconnect the attachment

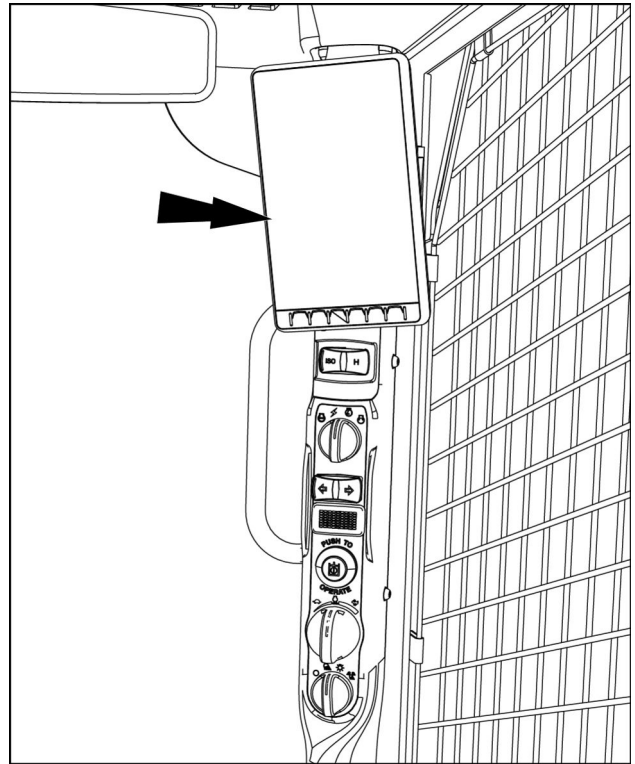
NOTE: Unlike the standard auxiliary hydraulics or the high flow auxiliary hydraulics you do not have to release hydraulic pressure from the system before disconnecting the attachments auxiliary hoses.

1. Lower the loader arm all the way down and ensure that the loader arm or attachment is not supporting the weight of the machine with the front wheels off the ground.
2. Place all controls in the neutral position.
3. Press the Operate button to deactivate the hydraulic system and ground drive system.
4. Stop the engine.
5. Move the controls to ensure that the hydraulic interlock is engaged and the loader arm and bucket cylinders do not move.
6. Raise the restraint bar, unfasten the seat belt, and safely exit the machine.
7. Disconnect the electrical connector and install the cap.
8. Disconnect the 5/8 inch enhanced high flow attachment hydraulic hoses from the quick disconnects.
9. Install the coupler covers, if equipped.

RIGHT-HAND COLUMN SWITCH IDENTIFICATION

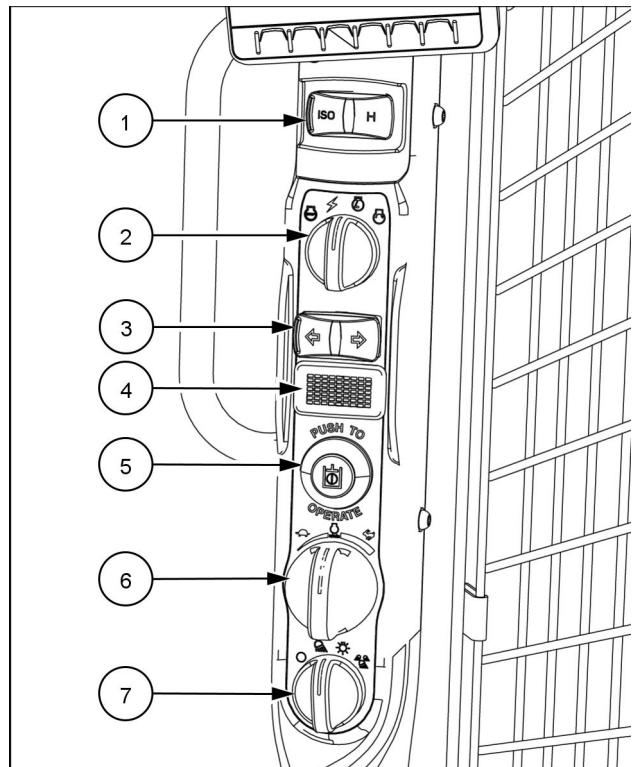
LCD multi-function display (if equipped)

See the LCD multi-function display “Equipment manual” that ships with the machine for details on display features, controls, and operation. The following pages in this section; pages **3-39** – **3-61** are only applicable to machines with the Instrument Cluster (IC).



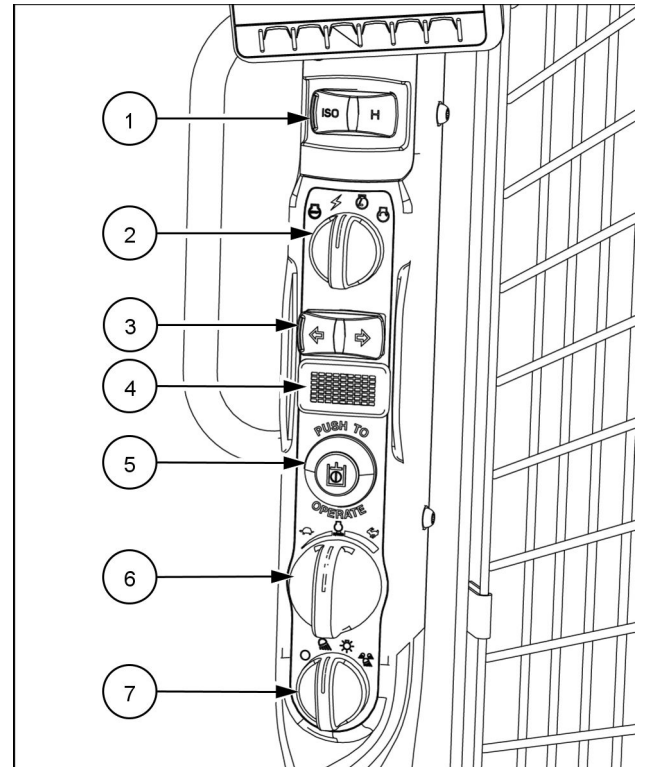
RAIL19SSL0071BA 1

(1)	ISO or H pattern control switch
ISO/H	On machines with ISO or H drive, the switch (1) determines which drive system the machine is operating. ISO drive (single lever controls drive) or H drive (traditional two lever drive control). See “ISO or H pattern control switch” 3-72 for more details.



RAIL21SSL0061BA 2

(2)	KEY SWITCH (four position) NOTE: Follow the starting procedure 4-3 described in this manual.
	Stop position Turn the key to the Stop position. The engine will stop and the electrical system will be inactive to the operator. NOTE: Some electrical components continue to receive power from the battery.
	Accessory position Turn the key to the left, the machine's electrical system is now active. NOTICE: Do not leave the key in this position otherwise you may drain the battery power.
	Run position Turn the key to the RUN position. The machine's electrical system becomes active, the system checks all starting criteria is met, and prepares the engine for starting.
	Start position (temporary position) Turn and hold the key to the Start position, release the key to the Run position once the engine starts. NOTICE: Do not operate the starter motor continuously for more than 30 seconds.
(3)	Turn signal indicator, if equipped When operating on the public roads use the turn signal switch to indicate the direction of travel. The direction selected will flash until you turn it off.



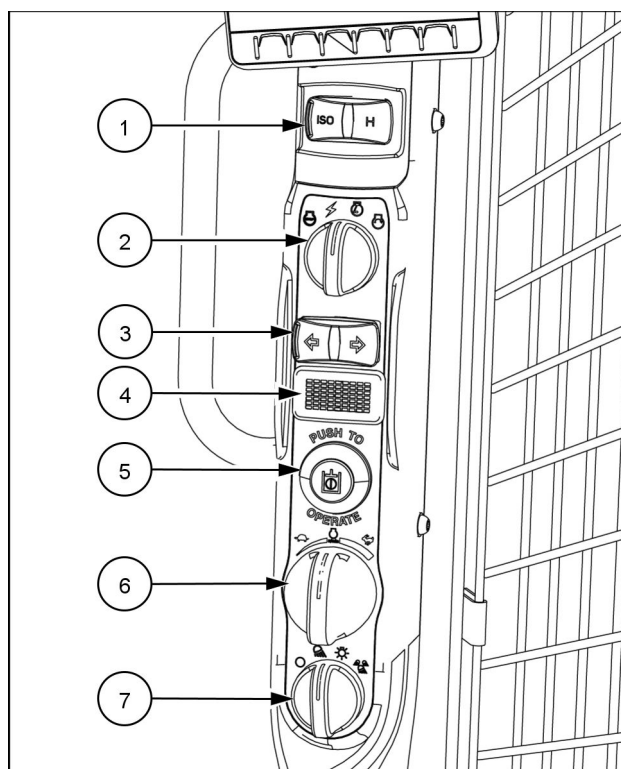
RAIL21SSL0061BA 3

(4)	MICROPHONE (if equipped)
	Microphone for hands free calling. Refer to the radio user guide for pairing your smart-phone with the Bluetooth® radio (if equipped).

(5)	PUSH TO OPERATE
	This button activates and deactivates the hydraulic system when the engine is running.

(6)	ENGINE THROTTLE
	This dial increases or decreases the engine RPM.

(7)	WORK LIGHTS			
Position	Front work lights	Side work lights	Rear work lights	Rear red lights
	OFF	OFF	OFF	OFF
	ON	OFF	ON	OFF
	ON	OFF	OFF	ON
	ON	ON	ON	OFF



RAIL21SSL0061BA 4

Instrument Cluster (IC)

Instrument Cluster (IC)

The Instrument Cluster (IC) is on the right-hand cab post.

Once in the seat, the alarm sounds and selected lamps illuminate briefly. Monitor these lamps on a daily basis to confirm that they will function in the event of a system alarm. The fuel gauge and hour meter will remain illuminated for operator monitoring.

When started, the machine will be in park with the park brake lamp (1) illuminated.

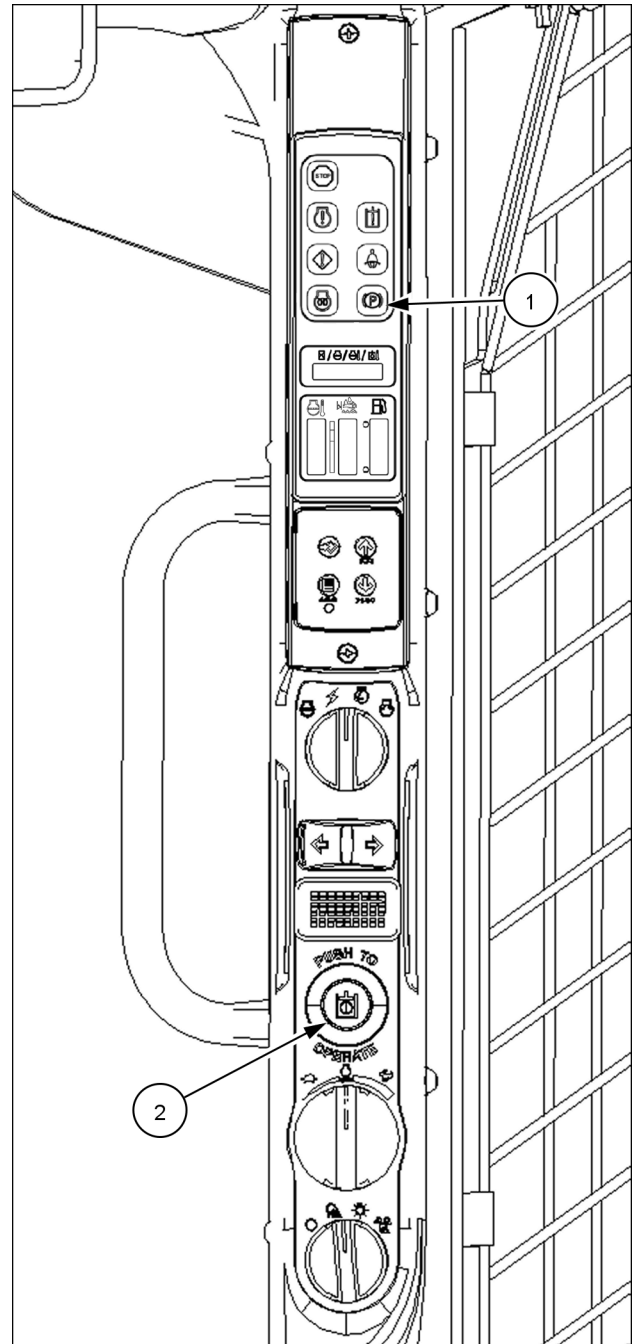
NOTE: The park brake button on the right-hand control lever will not turn off the park brake until the operator presses the "PUSH TO OPERATE" button (2).

The operator must be in the seat with the seat belt fastened and the restraint bar lowered. After the operator starts the machine, the operator must push the OPERATE button (2) to activate the loader arms and ground drive.

A "Setup" menu allows the user to view, select, change, and customize a number of machine settings. A security code may be entered into the Instrument Cluster. Once the security code has been entered, each user will have to enter the code before the machine will start. Contact your dealer for detailed information on the "Setup" menu and security feature activation.

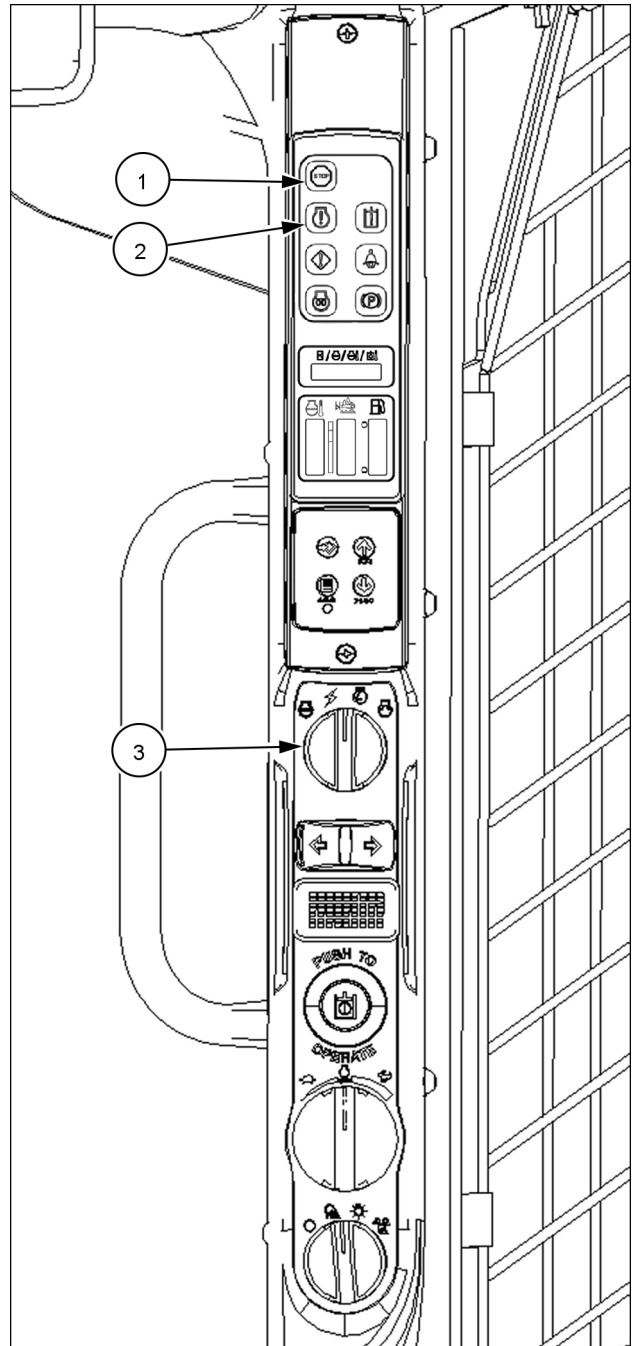
NOTE: The active fault code is visible to the operator on the display on the right-hand column. Locate the fault code definitions in the troubleshooting section.

NOTICE: Low hydraulic charge pressure will cause engagement of the park brake. With an Electro-Hydraulic (EH) control unit, the park brake lamp will flash and an audible alarm will sound, if this condition exists.



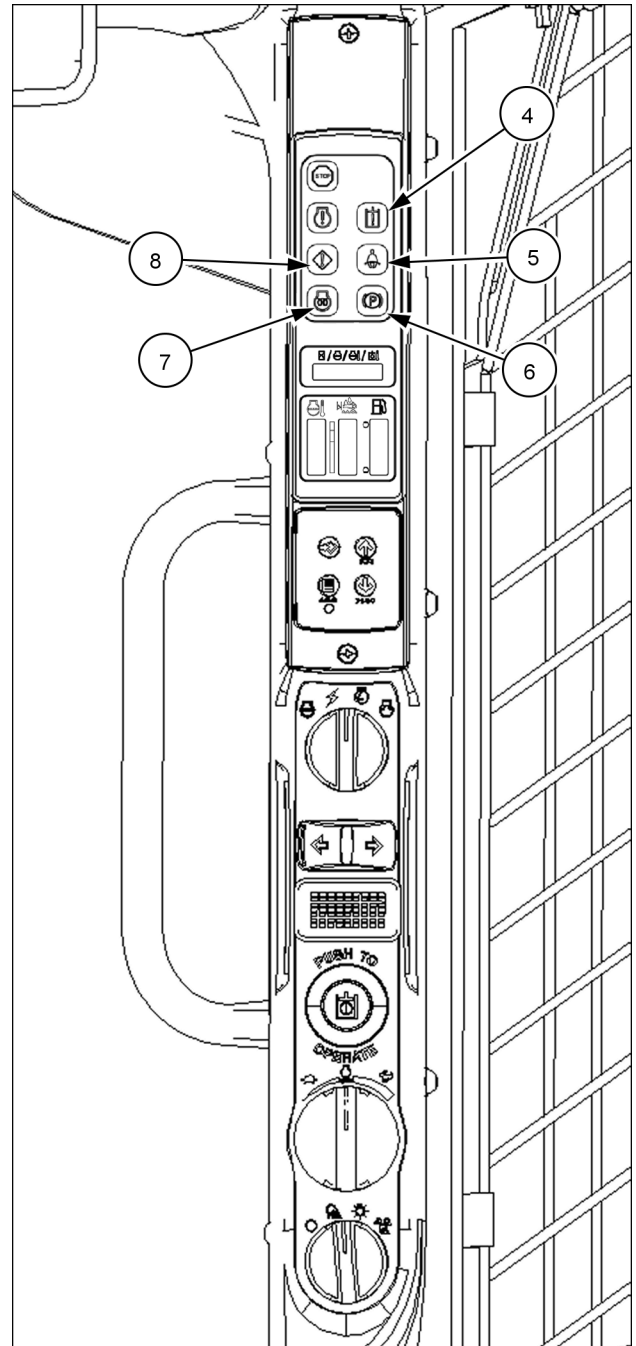
RAIL19SSL0208DA 1

(1)	STOP
	Severe warning requiring immediate shut down, RED lamp will flash and audible alarm will sound. Use the fault code that appeared in the text display and reference it in the trouble shooting section of this manual.
(2)	ENGINE MALFUNCTION
	Yellow lamp will flash when an engine fault is detected. Use the fault code that appeared in the text display and reference it in the trouble shooting section of this manual.
(3)	KEY SWITCH (four position)
	NOTE: Follow the starting procedure 4-3 described in this manual.
	Stop position Turn the key to the Stop position. The engine will stop and the electrical system will be inactive to the operator. NOTE: Some electrical components continue to receive power from the battery.
	Accessory position Turn the key to the left, the machine's electrical system is now active. NOTICE: Do not leave the key in this position otherwise you may drain the battery power.
	Run position Turn the key to the RUN position. The machine's electrical system becomes active, the system checks all starting criteria is met, and prepares the engine for starting.
	Start position (temporary position) Turn and hold the key to the Start position, release the key to the Run position once the engine starts. NOTICE: Do not operate the starter motor continuously for more than 30 seconds.



RAIL19SSL0208DA 2

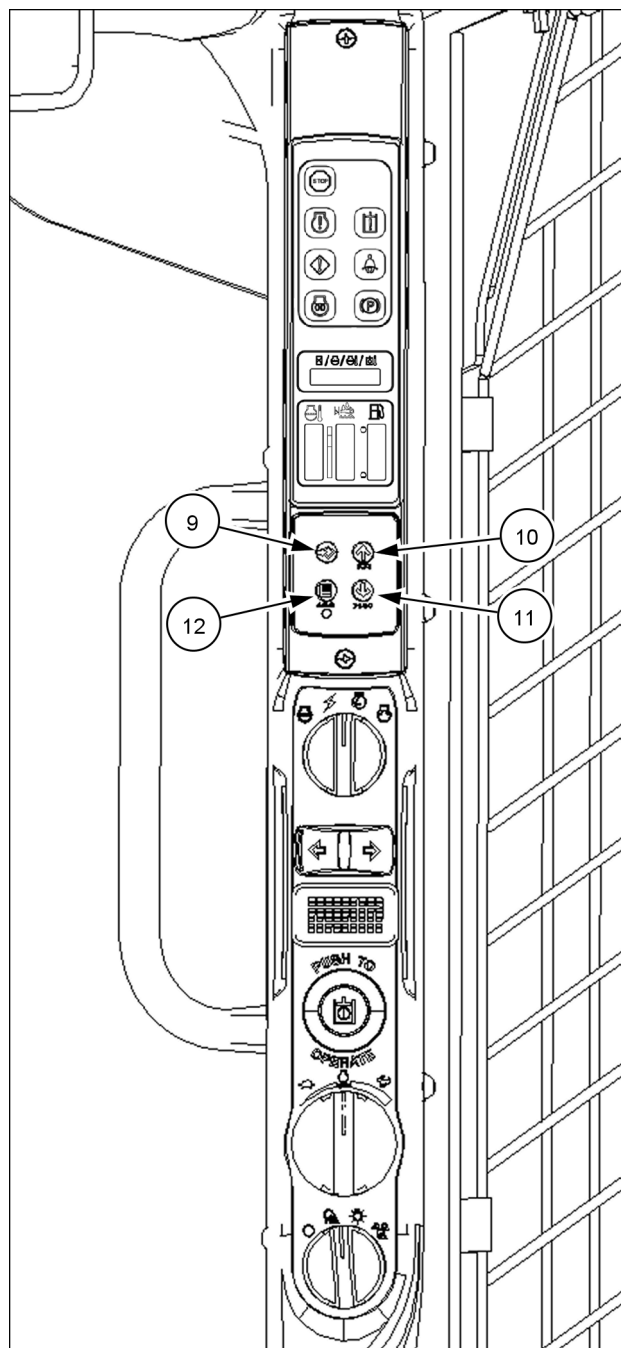
(4) 	HYDRAULIC SYSTEM MALFUNCTION Yellow Lamp will flash when a hydraulic fault is detected. Use the fault code that appeared in the text display and reference it in the trouble shooting section of this manual.
(5) 	SEAT BELT RED lamp will illuminate when the restraint bar is raised. RED lamp will also illuminate when the operator leaves the operator's seat.
(6) 	PARK BRAKE LAMP: This Red lamp illuminates to indicate the park brake is engaged. Under normal conditions the park brake will be set when: • The park brake button is activated (located on the right-hand control lever) • The OPERATE button is pressed to deactivate the hydraulics • The engine is shut off • The engine is running and the restraint bar is raised • The operator leaves the seat
(7) 	ENGINE PREHEATING LAMP: In cold climate starting conditions, after turning the key switch to run position, this yellow engine pre-heating lamp will illuminate, instructing the operator that incoming air is being preconditioned for smoother starting. The operator must wait until the lamp goes out before attempting to start the engine.
(8) 	ELECTRONIC SYSTEM MALFUNCTION This yellow lamp will flash and the alarm will sound. Use the fault code that appeared in the text display and reference it in the troubleshooting section of this manual.



RAIL19SSL0208DA 3

(9) 	ENTER BUTTON Use this, when in the "Setup" menu, as the "enter" data key NOTE: This button is used for user code lock and unlock.
(10) 	UP BUTTON Use to scroll Up within the "Setup menu" or cycle through the display options during normal operation. NOTE: This button is used for user code lock and unlock.
(11) 	DOWN BUTTON Use to scroll Down within the "Setup menu" or cycle through the display options during normal operation. NOTE: This button is used for user code lock and unlock.
(12) 	DISPLAY BUTTON Use to enter the "Set up" menu and to return to upper level menus. NOTE: This button is used for user code lock and unlock.

NOTE: For a fault code associated with a yellow amber light, record the code number and press the ENTER button twice to silence the code and return to normal operation. If the code appears again, contact your dealer for support.



RAIL19SSL0208DA 4

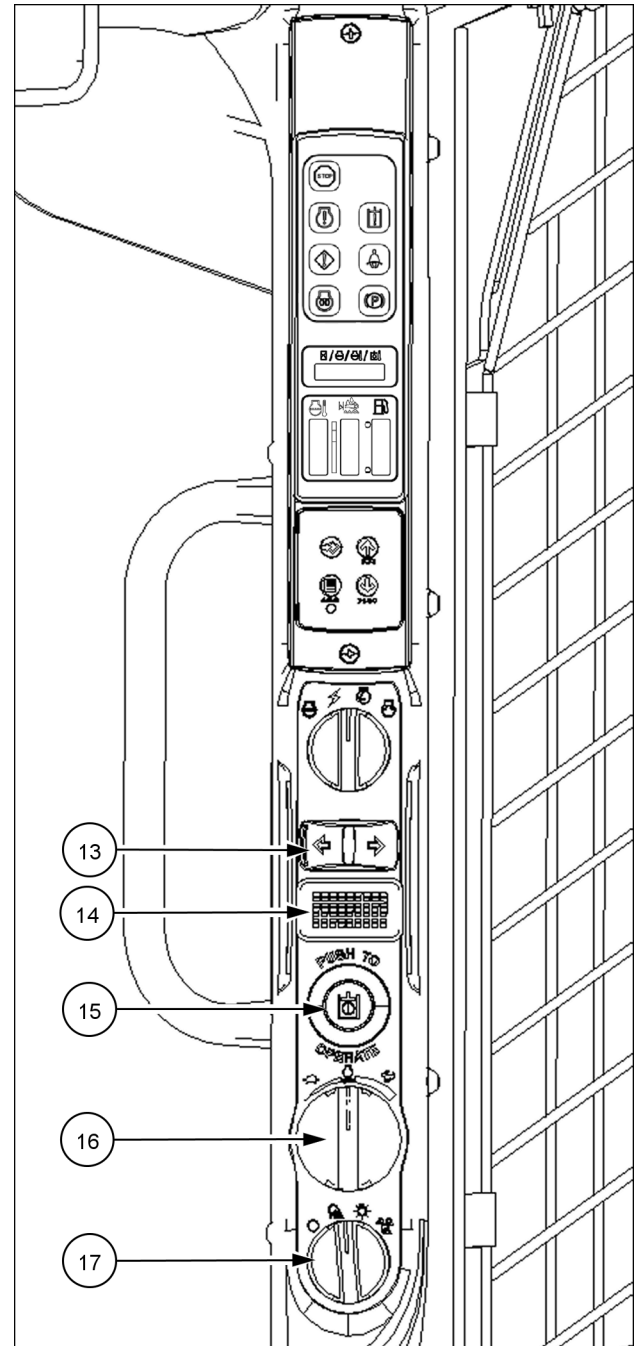
(13)	Turn signal indicator, if equipped
	When operating on the public roads use the turn signal switch to indicate the direction of travel. The direction selected will flash until you turn it off.

(14)	MICROPHONE (if equipped):
	Microphone for hands free calling. Refer to the radio user guide for pairing your smart-phone with the Bluetooth® radio (if equipped).

(15)	PUSH TO OPERATE:
	This button activates and deactivates the hydraulic system when the engine is running.

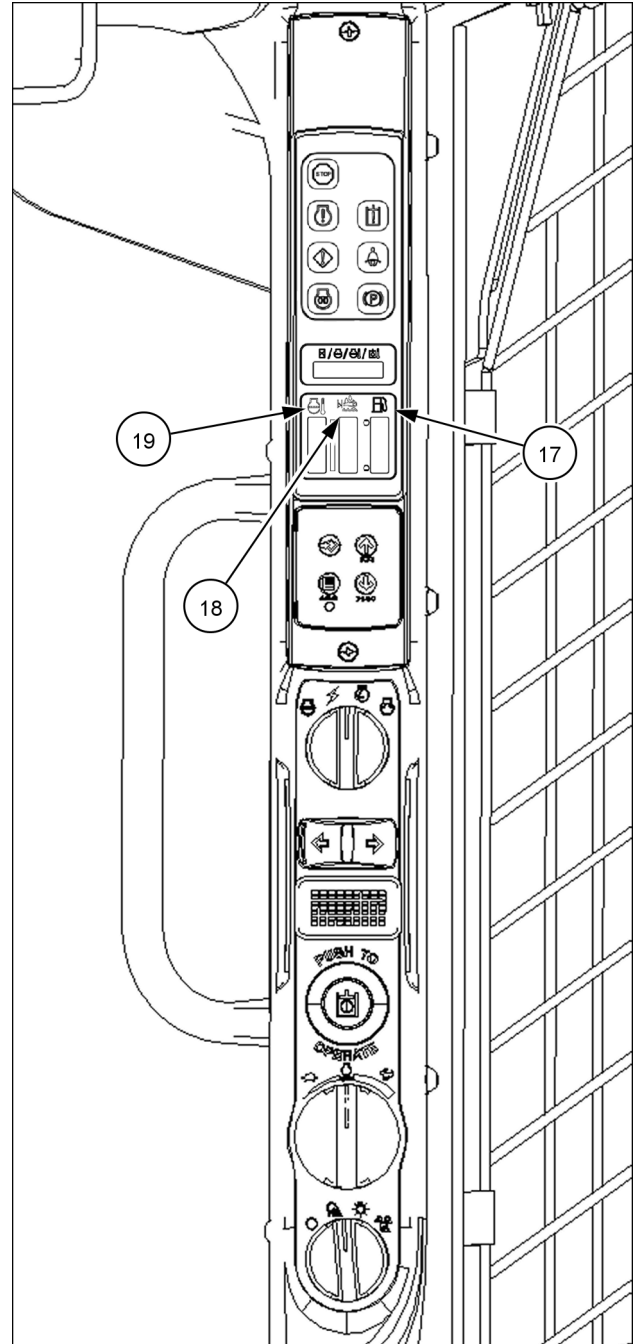
(16)	ENGINE THROTTLE:
	This dial increases or decreases the engine RPM.

(17)	WORK LIGHTS			
Position	Front work lights	Side work lights	Rear work lights	Rear red lights
	OFF	OFF	OFF	OFF
	ON	OFF	ON	OFF
	ON	OFF	OFF	ON
	ON	ON	ON	OFF



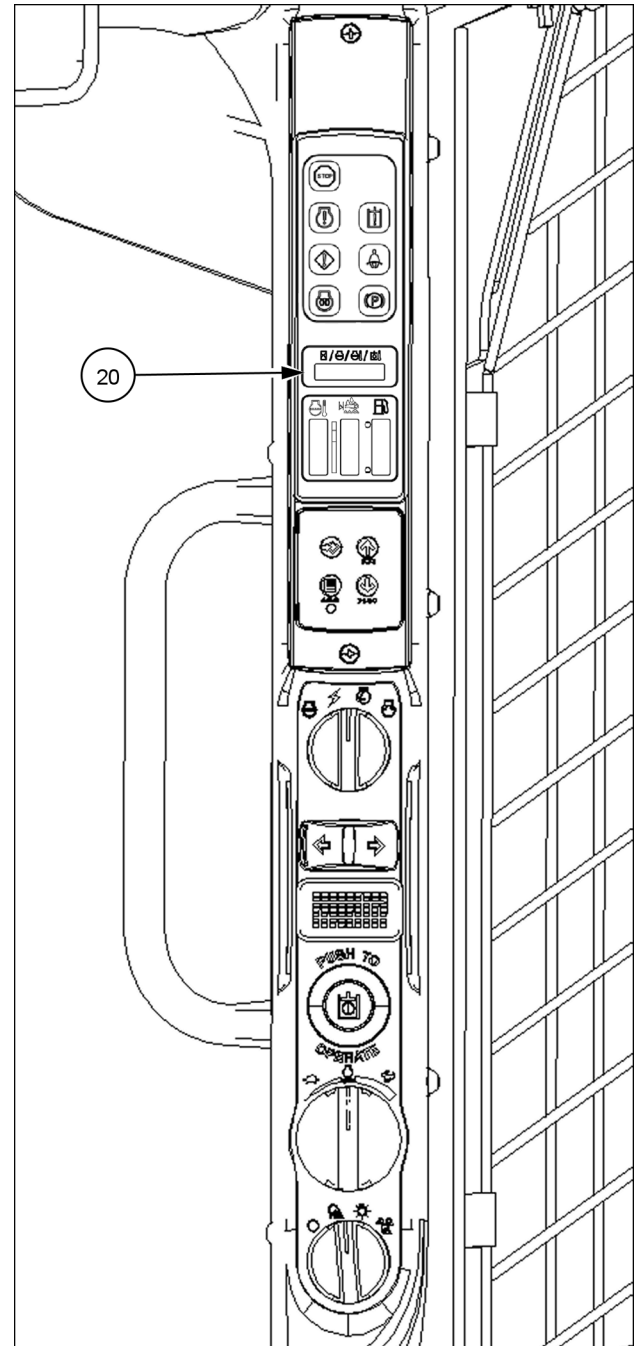
RAIL19SSL0208DA 5

(18) 	FUEL GAUGE: The fuel gauge consists of a series of bars that indicate the level of fuel in the fuel tank. When all bars are visible the fuel tank is full. Bottom bar flashing indicates approximately 3.8 L (1.0 US gal) of fuel remaining.
(19) 	DIESEL EXHAUST FLUID (DEF) GAUGE: This bar graph indicates the level of Diesel Exhaust Fluid (DEF) in the DEF tank. When all 8 bars are visible the DEF tank is full. See 3-62 for more information on the Selective Catalytic Reduction (SCR) system.
(20) 	ENGINE COOLANT TEMPERATURE GAUGE: This gauge indicates the relative temperature of the engine coolant from 0 – 110 °C (32 – 230 °F). If the coolant temperature rises above 110 °C (230 °F), all bars will display, the backlighting will flash, and an audible alarm will sound.



RAIL19SSL0208DA 6

(21) 	TEXT DISPLAY: This display will show the following during normal operation, as selected by the operator. • Engine hours: Engine hours will always be displayed momentarily when the operator initially sits in the seat. The operator may choose to leave engine hours on display continuously or select one of the following. • Engine RPM • Engine coolant temperature (degrees F or C) • Hydraulic oil temperature (degrees F or C) • Cycle: If this display option is chosen, the display will continuously cycle through all four of the above items The text display will also help the operator or technician with information as the "Setup" menu is utilized.
--	--



RAIL19SSL0208DA 7

Instrument cluster navigation buttons

Menu navigation controls

Use the four switch buttons to navigate through the instrument cluster Menu by following the setup menu functions. Many of the setup menu functions are intended for service technicians and owners. Contact your dealer for the service manual or security code information.

(1) TEXT DISPLAY

Displays the menu text.

(2) UP Arrow

Navigates upward through selections on the menu level.

Certain menus will prompt the user to enter an access code or allow the user to change a numerical value.

NOTE: Pushing the UP button will increment the flashing digit 1,2,3 for number entry.

(3) DOWN Arrow

Navigates downward through selections on the menu level.

NOTE: Pushing the DOWN button will increment the flashing digit 7, 8, 9, 0 for number entry.

(4) DISPLAY

Exits the sub-menu and moves top level to the next option.

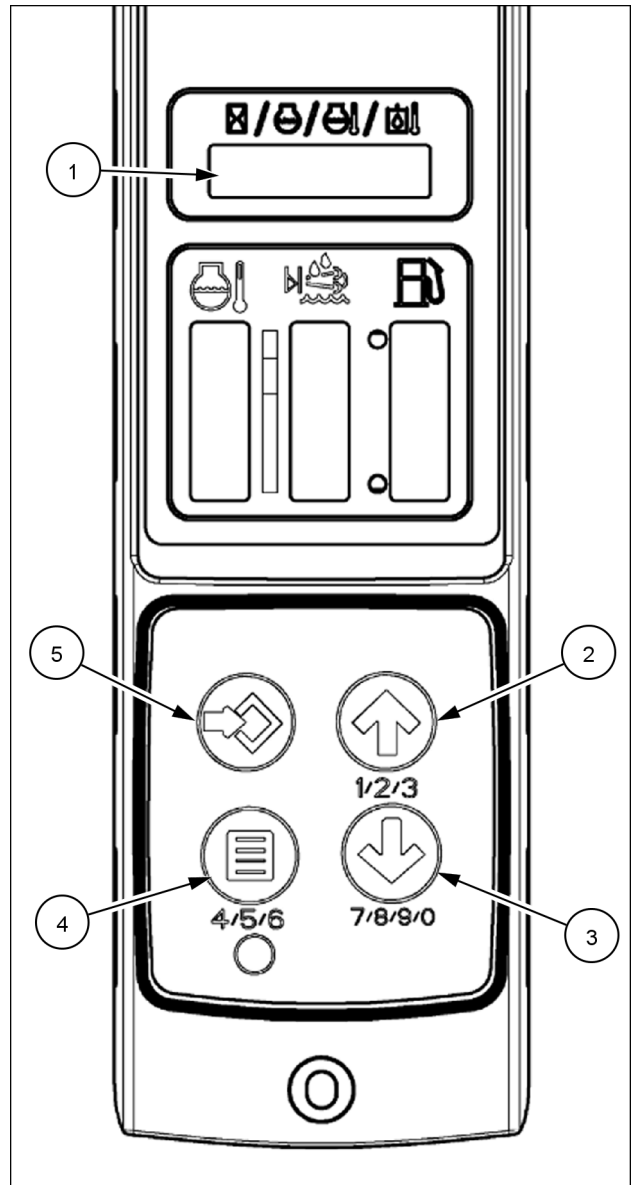
Increments the flashing digit 4,5,6 for number entry.

(5) ENTER

For number entry, moves flashing digit to the next place.

Saves entry.

Enters the sub-menu.



RAIL19SSL0103CA 1

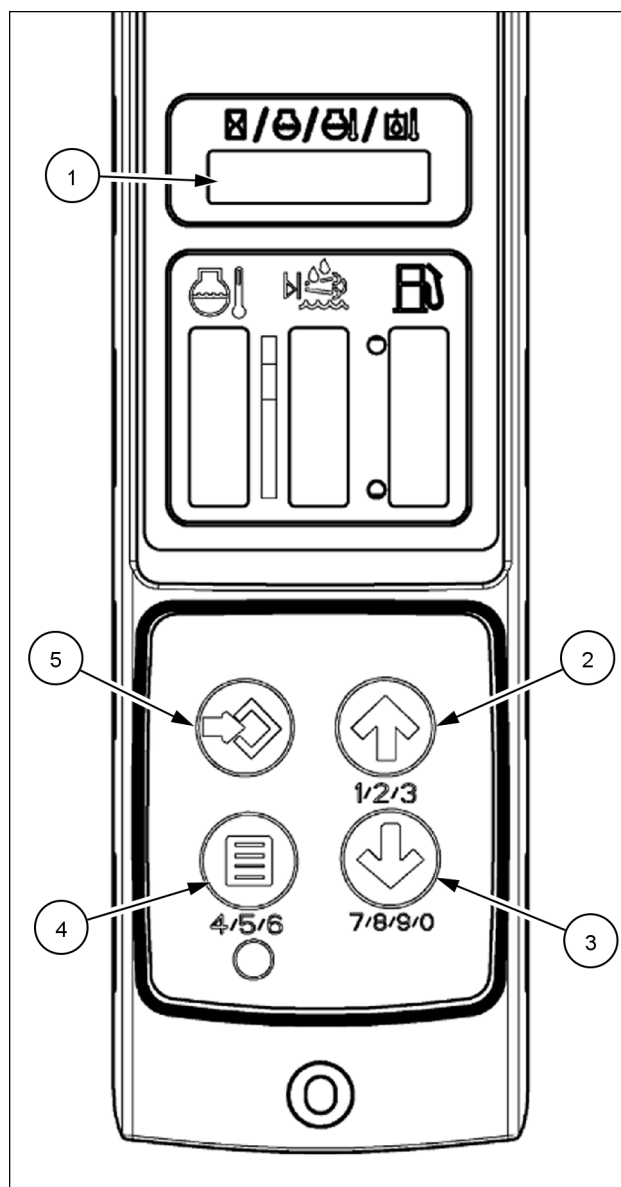
Top level menu options

- EXIT — Exit the setup menu.
- dSPly — Choose between the selected display parameters.
- AUX OVVRD — Auxiliary Hydraulic Interlock Override
- UNITS — Allows the operator to select between Fahrenheit (Imperial units) and Celsius (Metric units).
- JTIME — Job timer. Timer that displays engine operating hours since last reset. Ideal for rentals or job tracking.
- LOCK — Used to create/change owner and user codes
- SUSP TMOUT — Suspend Lock Time-out. Used to change the Suspend Lock delay.
- CRANK — Used to enable or disable the Crank capability when the machine is locked.
- IC SHTdN — Instrument Cluster (IC) Shutdown. Used to change whether the IC automatically powers OFF after delay set with below menu selection.
- IC TMOUT — Instrument Cluster (IC) Time-out. Used to change the IC power OFF delay.

Instrument cluster main menu

Entering the main menu:

1. Place the machine on firm, level ground with the loader arm and bucket down.
2. Push the DISPLAY  button to enter the main menu.
3. You may now sit down and navigate through the menu using the ARROW  /  buttons . Familiarize yourself with the use of the switch buttons in order to help prevent erroneous settings.



RAIL19SSL0103CA 1

Instrument cluster display setting

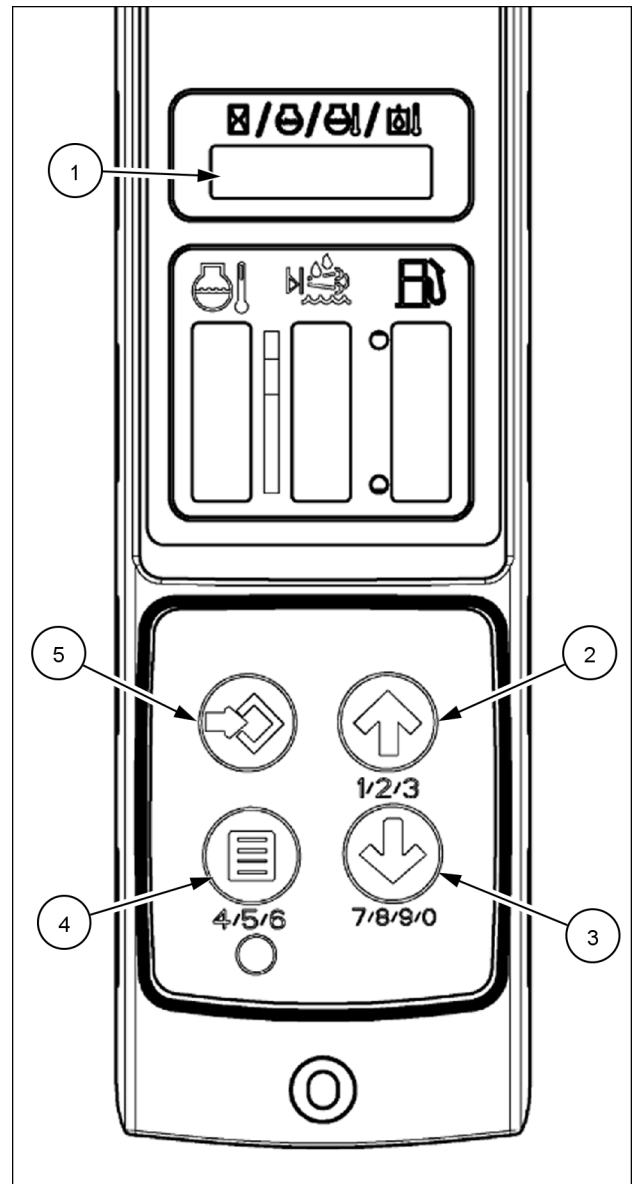
The operator may choose a continuous display of one of the four following parameters or select cycle from the dSPly top level menu and momentarily display all four of the parameters in a cycle for a few seconds each.

- HOUR - Engine hours.
- RPM - Engine RPM.
- COOLT - Engine coolant temperature.
- HOILT - Hydraulic fluid temperature.
- CYCLE - Cycle though all four parameters.

NOTE: The instrument cluster is programmed to display the last setting selected when you sit in the seat.

To change or select from the dSPly top level menu

1. Push the DISPLAY  button to enter the main menu.
2. Push the  button to display the current selection.
3. Push the  or  button to toggle through the selections.
4. Once the desired selection appears on the text display, push the  button (5) to save the selection.



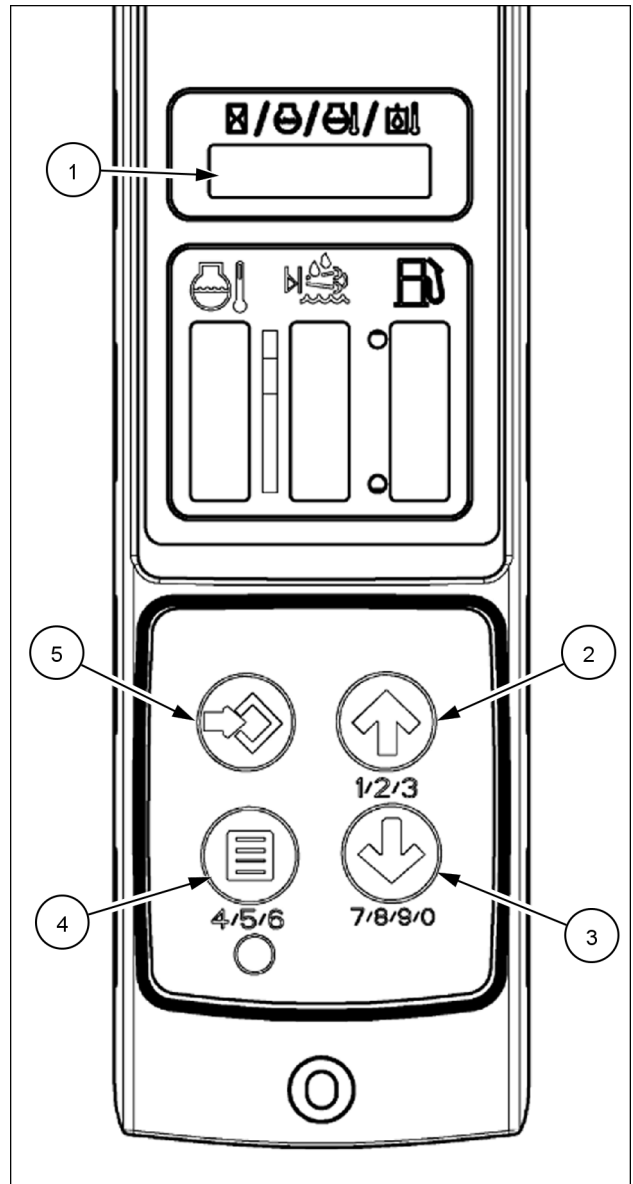
RAIL19SSL0103CA 1

Auxiliary hydraulic interlock override (AUX OVVRD)

NOTE: Some attachments have their own controls and this feature allows the auxiliary hydraulic oil flow to continue when the operator is out of the seat. The machine's control levers will be inactive.

When the operator leaves the seat, hydraulic oil flow and control levers are disabled.

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until AUX OVVRD appears on the display (1).
3. Push the ENTER  button to access the AUX OVVRD menu.
4. Push the ARROW   to toggle between the ON and OFF selection.
5. Push the Enter  button on the OFF selection will only allow auxiliary hydraulic operations from the operator seat. The small red indicator lamp below the DISPLAY  button will not illuminate when the override feature is OFF.
6. Push the Enter  button on the ON selection to allow auxiliary hydraulic operations to be operated without an operator in the seat. The operator must leave the seat within 30 seconds to override the auxiliary hydraulic interlock. The small red indicator lamp below the DISPLAY  button will illuminate when the override feature is ON.
7. Push the DISPLAY  button to return to normal operation.



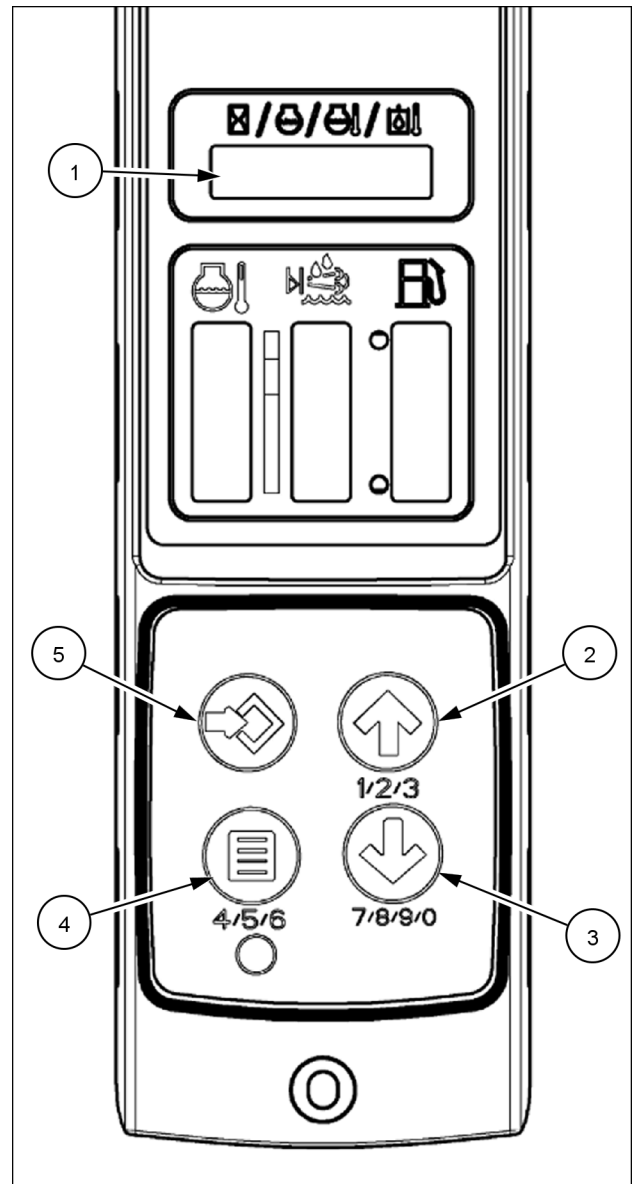
RAIL19SSL0103CA 1

Temperature display selection

The operator may choose to display either Celsius (°C) or Fahrenheit (°F) temperature scales.

To change the temperature scales:.

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until UNITS appears on the display **(1)**.
3. Push the ENTER  button to drop down into the sub-menu. Fahrenheit or Celsius will appear in the display.
4. Push the ARROW   buttons to toggle between the temperature scales.
5. Once the selected scale appears on the display **(1)**, push the ENTER  button. The display **(1)** will blink OFF then ON and show the selected temperature scale.
6. To exit, push the DISPLAY  button until the display **(1)** shows the word EXIT.
7. With EXIT in the display **(1)** push the ENTER  button to return to normal operation.



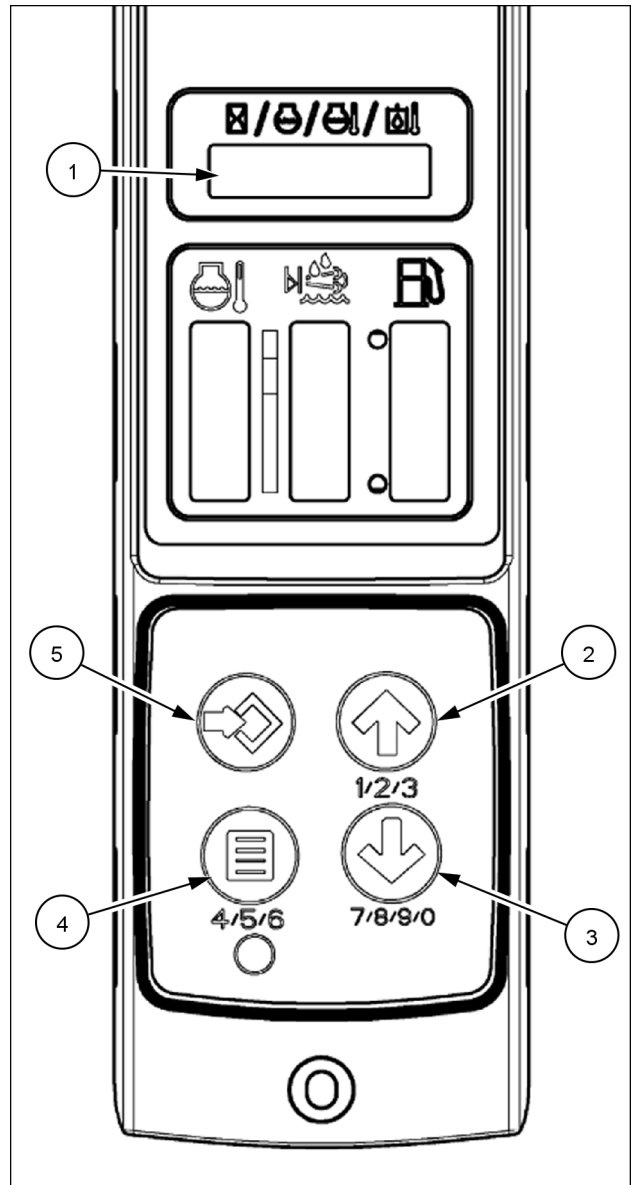
RAIL19SSL0103CA 1

View or reset Job Timer (JTIME)

The operator may choose to set a timer that will run independent from the machine hours.

To view or reset the timer:

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until JTIME appears on the display (1).
3. Push the ENTER  button to drop down into the sub-menu. RESET or view the timer in the display.
4. Push the ARROW   buttons to toggle between reset and hours.
5. Once the RESET appears on the display (1), push the ENTER  button. The display (1) will blink OFF then ON and the JTIME counter will start over..
6. To exit, push the DISPLAY  button until the display (1) shows the word EXIT.
7. With EXIT in the display (1) push the ENTER  button to return to normal operation.



RAIL19SSL0103CA 1

Anti-theft protection

Locking the instrument panel – Manual Lock, Suspend Lock, Off:

Manual Lock feature:

If a lock code has been entered; immediately after shutting off the engine the display will show PRESS ENTER TO LOCK. Anti-theft is set by pressing the Enter



button. The panel is now locked and LOCKd is displayed. Restarting requires entering the code. If the

ENTER  button is not pressed, the machine can be started without a code.

Suspend Lock feature:

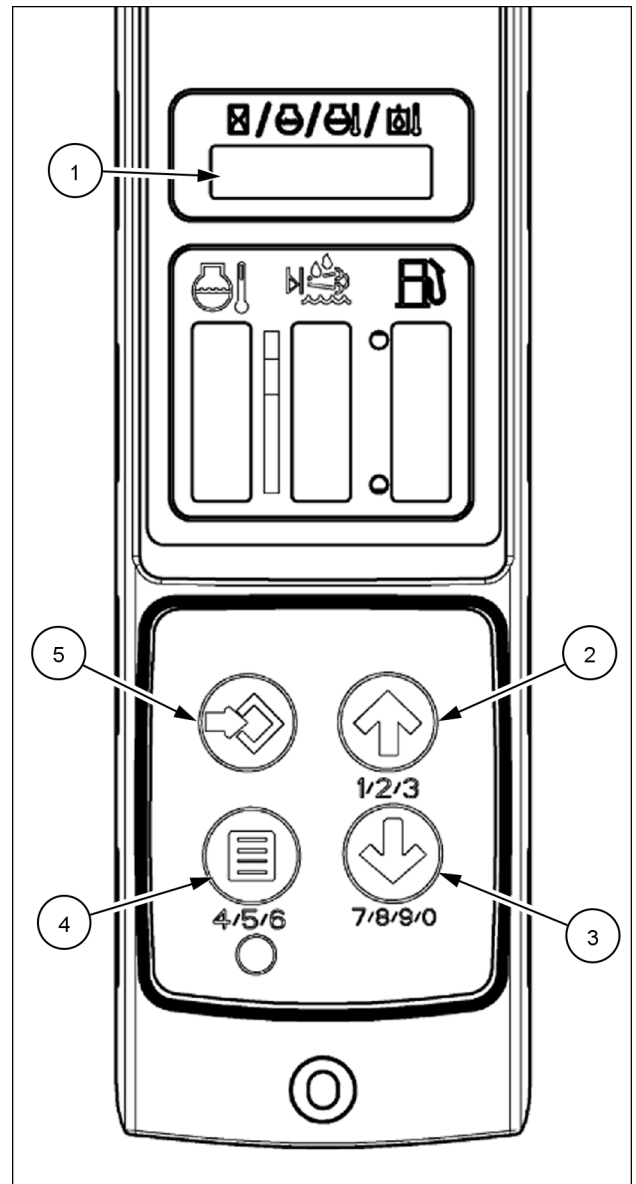
If a lock code has been entered; after shutting off the engine the display will show PRESS ENTER TO SUSPD

WITHOT LOCK. Pressing the ENTER  button delays the machine from locking for the time period cho-

sen in the SUSP LOCK menu. If the ENTER  button is not pressed, the machine may only be started after reentering the code.

Off feature:

If a LOCK code has not been entered; when the engine is shut off the display will not show lock? and the machine can be started without a code until a lock code is entered.



RAIL19SSL0103CA 1

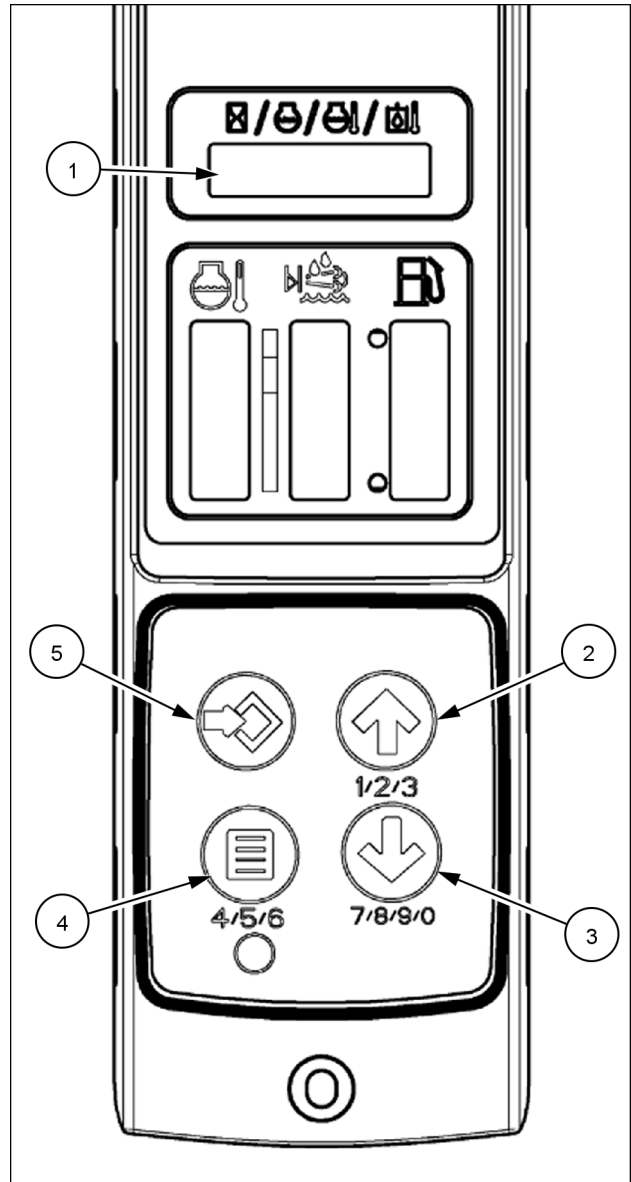
Unlocking the instrument panel:

1. Sit in the seat to power the instrument panel. The warning lamps will illuminate and there will be an audible beep.
2. Press the flashing ENTER  button. The display (1) will show unloc.
3. Enter the code by using multiple presses of the , , and . Press the ENTER  button to save each digit and move to the next.

NOTE: For numbers 1, 2, 3 use the  button. For numbers 4, 5, 6 use the  button. For numbers 7, 8, 9, 0 use the  button.

4. Press the ENTER  button after the fifth digit to enter the code. The engine preheat lamp will illuminate and the display (1) will begin the thirty second count-down.

NOTE: If the incorrect code is entered, *ERROR* is displayed, followed by 00000 prompting the operator to enter the correct code.



RAIL19SSL0103CA 2

Creating codes

The panel cannot be locked until a code is created. The instrument panel has one owner code and up to ten user codes. The owner code will always unlock the panel. The owner code will be required to create or change user codes and to modify the owner code.

Owner code:

Access the main menu, press the DISPLAY  button and use the ARROW ,  to move to the LOCK menu. Press the ENTER  button to enter the LOCK menu.

To create an owner code:

If no owner code exists, the display will show the word OWNCR (Owner Create), followed by 00000. Write down the planned 5 digit code or use a code you already know.

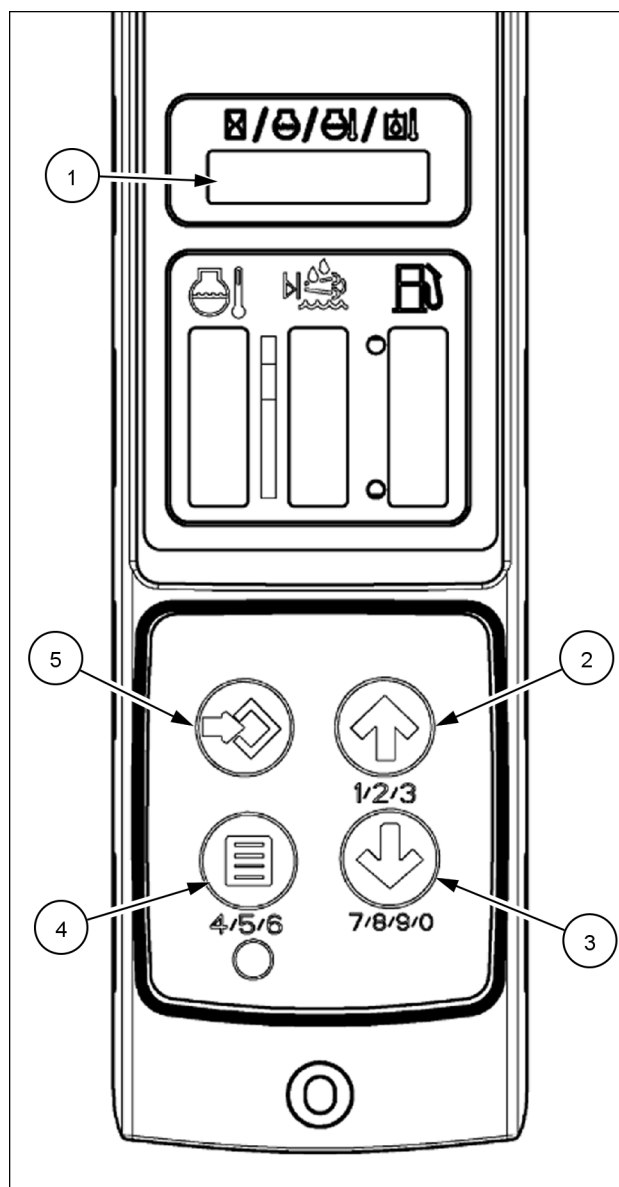
NOTICE: Once the code is created, the panel cannot be unlocked without the code. If the panel cannot be unlocked, contact your Dealer.

1. Enter code by using multiple presses of the , , and  buttons. Press the ENTER  button to save each digit and move to the next.

NOTE: For numbers 1, 2, 3 use the  button. For numbers 4, 5, 6 use the  button. For numbers 7, 8, 9, 0 use the  button.

NOTE: If you decide you do not want to create a code, enter all 0s, you will return to OWNCR.

2. Press the ENTER  button after the fifth digit to enter the code. The engine preheat lamp will illuminate and the display will begin the thirty second countdown.
3. Press the DISPLAY  button to exit the menu. The panel is not locked at this point.



RAIL19SSL0103CA 3

If an owner code has been created and LOCK function is disabled

NOTE: You can set the lock function to one of three settings OFF, MANUAL LOCK, or SUSPEND LOCK by pressing the ENTER  button when the display (1) shows ON.

1. If you cannot remember or enter an incorrect code you will return to OWNCR.

To modify the owner code:

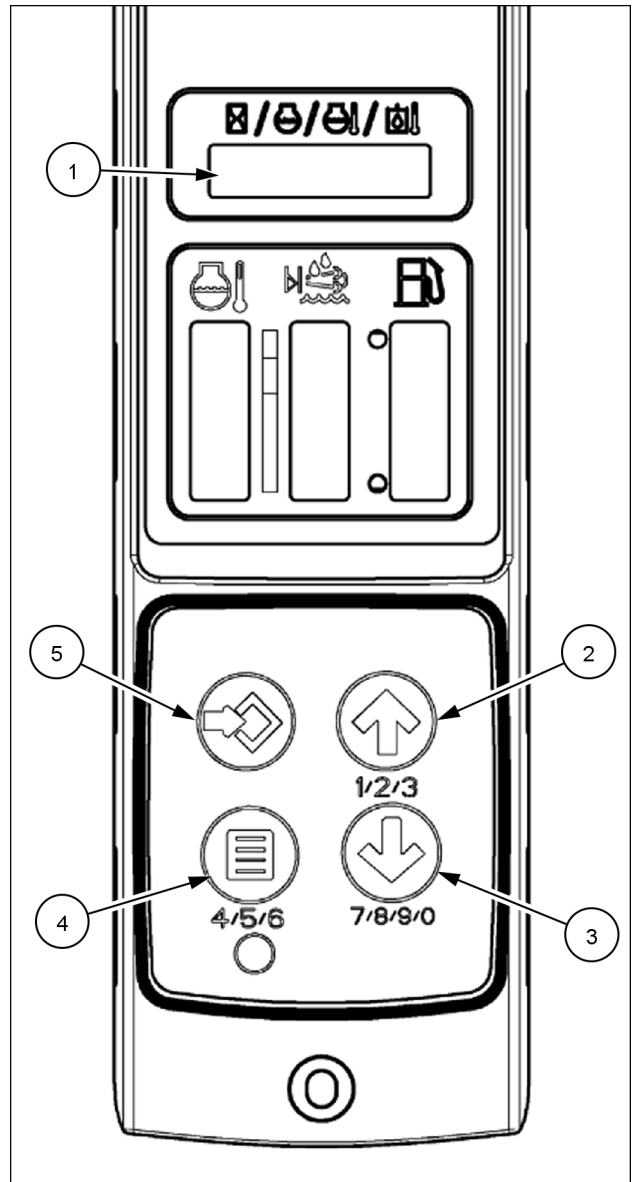
Once in the LOCK menu, the display will show OWNER.

Press the ENTER  button to enter the OWNER menu. The display will show open followed by 00000.

1. Enter code by using multiple presses of the , , and  buttons. Press the ENTER  button to save each digit and move to the next.

NOTE: For numbers 1, 2, 3 use the  button. For numbers 4, 5, 6 use the  button. For numbers 7, 8, 9, 0 use the  button.

2. Press the ENTER  button after the fifth digit to enter the code. The display (1) will show the word OWNCR followed by the saved owner code.
3. Enter a new owner code to overwrite the existing code. The panel will return to the main menu.



RAIL19SSL0103CA 4

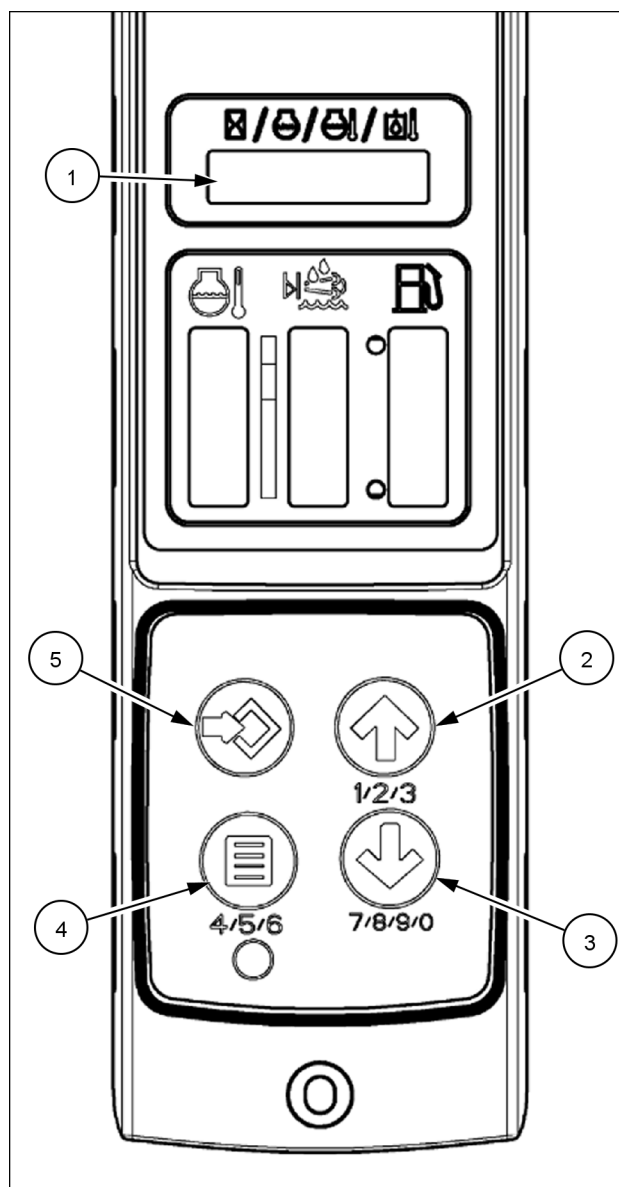
User codes

Once in the main menu, press the ARROW  ,  button to move to the LOCK menu. Press the ENTER  button to enter the LOCK menu.

To create or modify a user code:

NOTE: An owner code must be saved before a user code.

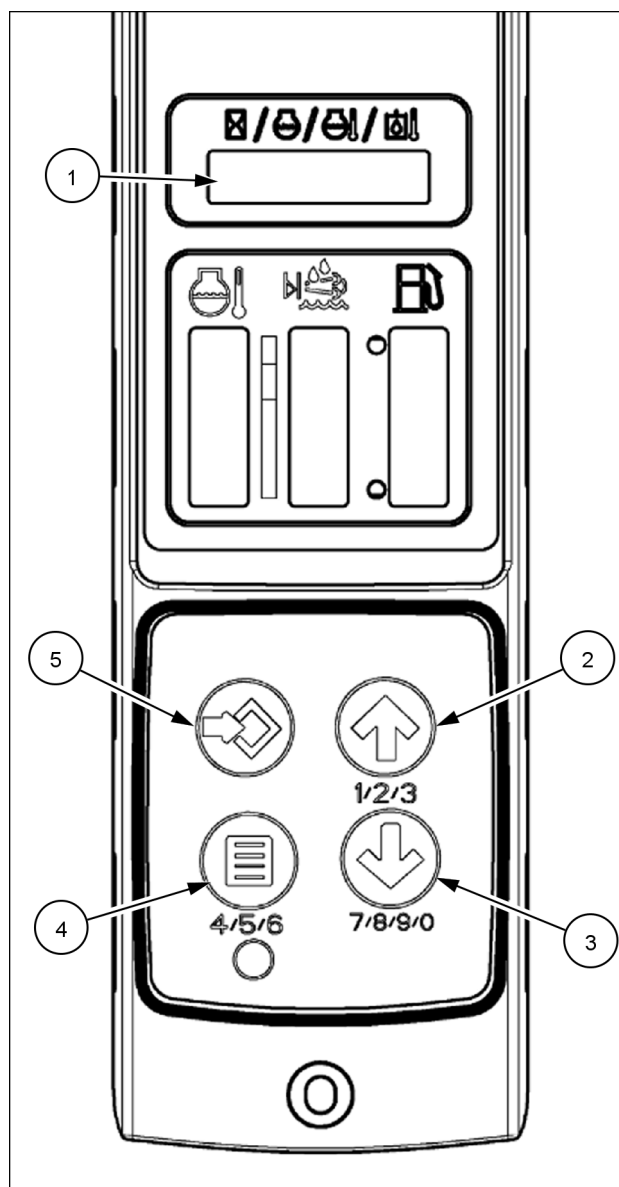
1. Once in the LOCK menu, the display will show the word OWNER. Press the ARROW  ,  button to move to the USER menu. Press the ENTER  button.
2. Use the ARROW  ,  buttons to move to user0 through user9. Press the ENTER  button to create or change that user code. The display (1) will show the word USRCR (user create) followed by 00000 .
3. Enter the owner code. 00000 or the existing user code will be displayed.
4. Enter a new user code to enter or overwrite the existing code. The panel will return to the “main menu.
5. Press the DISPLAY  button until the EXIT menu, appears. Press the ENTER  button to exit the main menu. The panel is not locked at this point.



Instrument cluster suspend time-out feature (SUSP TMOUT)

Machines may be setup to allow an operator to restart the machine without re-entering an unlock code within a set amount of time. To set the Suspend Time-out feature:

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until SUSP TMOUT appears on the display **(1)**.
3. Push the ENTER  button to access the SUSP TMOUT menu.
4. Push the ARROW   buttons until the desired time-out setting appears on the display. Settings are available in **10 min** increments up to **60 min**.
5. Push the Enter  button save the selection.
6. Push the DISPLAY  button to return to normal operation.

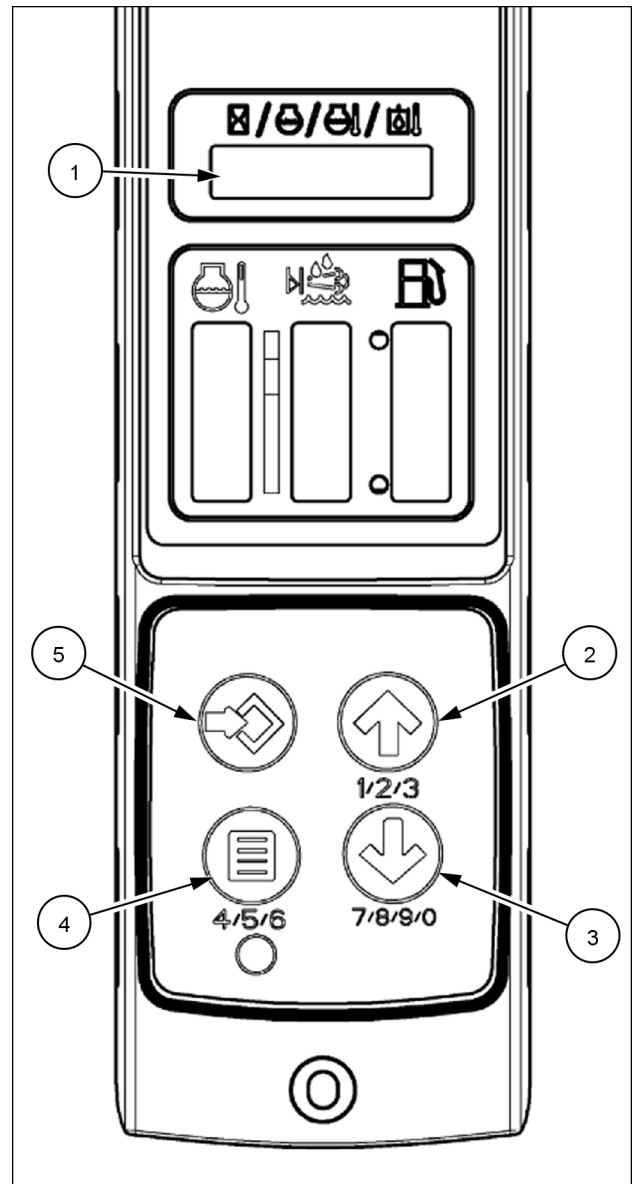


RAIL19SSL0103CA 1

Crank enable/disable feature

The machines may be setup to allow starting of the machine without entering an unlock code. The unlock code must then be entered before enabling hydraulic functions on the unit. To set the Crank enable or disable feature:

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until CRANK appears on the display (1).
3. Push the ENTER  button to access the CRANK menu.
4. Push the ARROW   buttons to select whether the crank function will be ON or OFF.
5. Push the Enter  button save the selection.
6. Push the DISPLAY  button to return to normal operation.

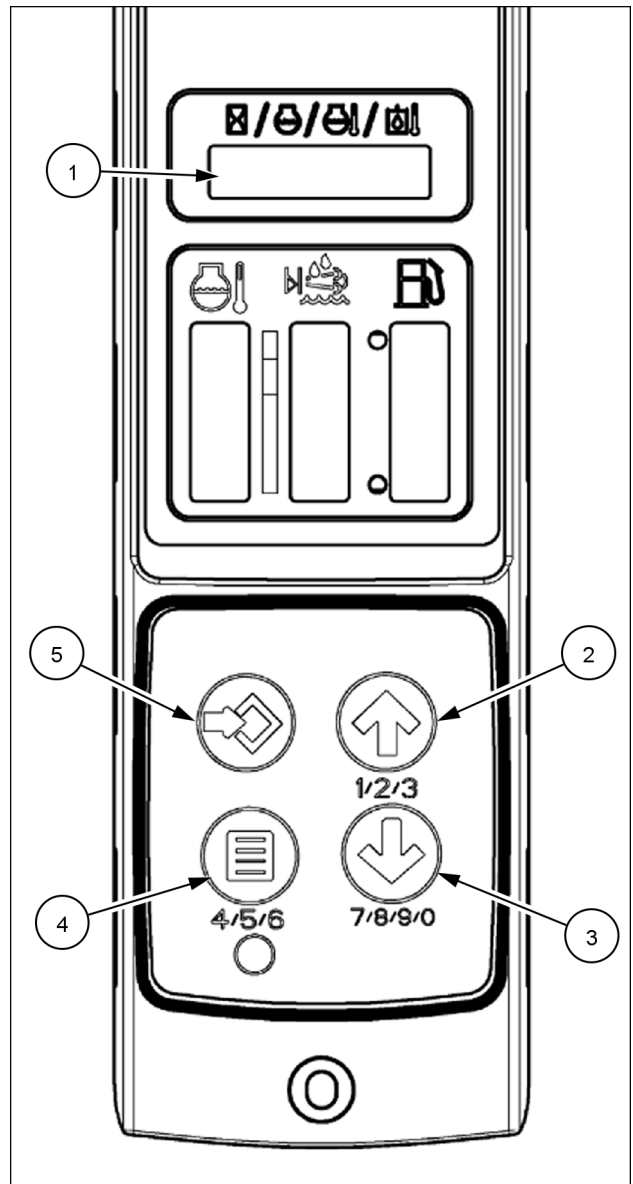


RAIL19SSL0103CA 1

Instrument cluster shutdown feature (IC SHTdN)

This enables the Instrument Cluster (IC) to shut down as described in the “Instrument cluster time-out feature (IC TMOUT)” 3-61. To set the Instrument cluster shutdown enable or disable feature:

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until IC SHTdN appears on the display (1).
3. Push the ENTER  button to access the CRANK menu.
4. Push the ARROW   buttons to select whether the Instrument cluster shutdown feature will be ON or OFF.
5. Push the Enter  button save the selection.
6. Push the DISPLAY  button to return to normal operation.



RAIL19SSL0103CA 1

Instrument cluster time-out feature (IC TMOUT)

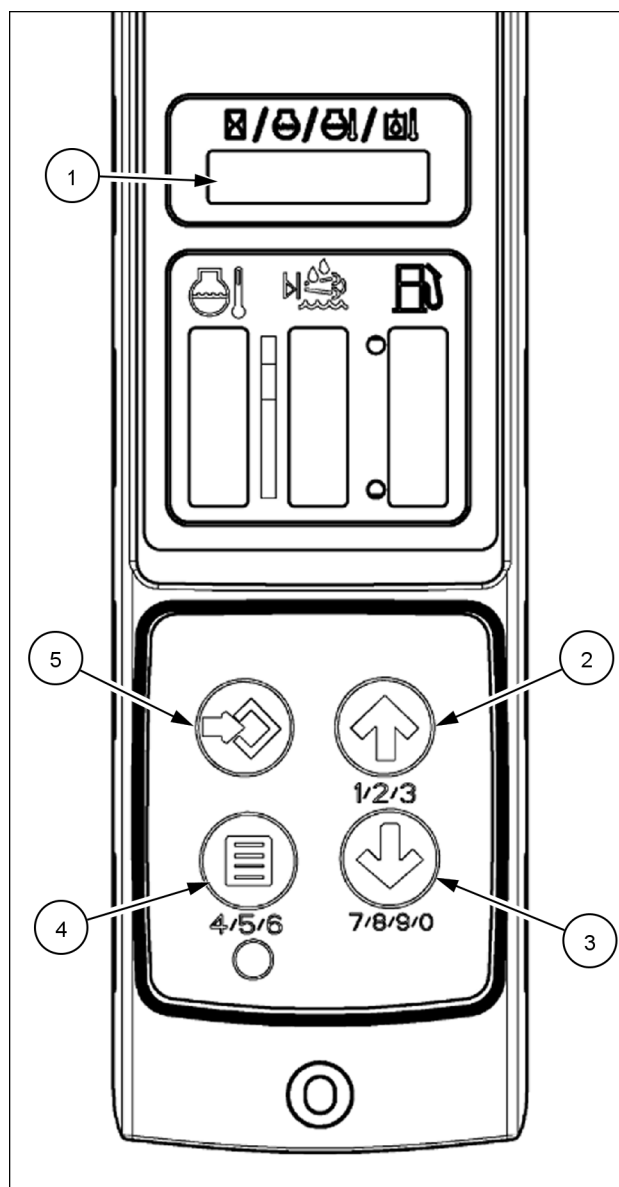
The Instrument Cluster (IC) will automatically go to a Power OFF state, if ALL of the following conditions are true for a continuous period of **10 – 60 min** (use the main menu to adjust):

- The operator is not in the operator seat
- The Instrument Cluster (IC) indicates Power ON
 - Key or Knob in the ON position
- Engine is not running

NOTE: If the Instrument Cluster (IC) enters Power OFF state due to the Time-out feature, the IC will resume normal behavior after turning the key or knob from the ON position to the OFF position

To set the Instrument cluster time-out feature:

1. Push the DISPLAY  button to enter the main menu.
2. Push the ARROW   buttons until IC TMOUT appears on the display **(1)**.
3. Push the ENTER  button to access the IC TMOUT menu.
4. Push the ARROW   buttons until the desired time-out setting appears on the display **(1)**. Settings are available in **10 min** increments up to **60 min**.
5. Push the Enter  button save the selection.
6. Push the DISPLAY  button to return to normal operation.



RAIL19SSL0103CA 1

Selective Catalytic Reduction (SCR) exhaust treatment - Overview

Diesel Exhaust Fluid (DEF)/AdBlue® instrumentation warning

ATTENTION: The fuel system, exhaust after-treatment system, and engine on your machine are designed and built to government emissions standards. Tampering by dealers, customers, operators, and users is strictly prohibited by law. Failure to comply could result in government fines, rework charges, invalid warranty, legal action, and possible confiscation of the machine until rework to original condition is completed. Engine service and/or repairs must be done by a certified technician only!

Your CASE CONSTRUCTION machine is equipped with a warning system to inform the operator of the DEF/AdBlue® level, system malfunctions, and engine power loss that may result from the SCR system for reducing exhaust emissions.

Warning symbols



Stop engine light



Warning/Fault light

DEF level inducement displays

Display	Description	Warning lamps and alarms	Corrective action
Instrument Cluster (IC): dDEF + LEVEL	DEF/AdBlue® level is less than 10% tank volume. No engine power loss at this level.	 One second audible alarm every 3 min	Fill DEF/AdBlue® tank.
LCD multi-function display: DEF/AdBlue level LOW			
Instrument Cluster (IC): dDEF + EMPTY	DEF/AdBlue® level is less than 5% of tank volume. Torque reduction and engine speed reduction will occur.	 Continuous alarm; DEF level bar flashes	Fill DEF/AdBlue® tank immediately. Cycle the key switch (or the POWER button) OFF then ON.
LCD multi-function display: DEF/AdBlue tank is EMPTY Power Limitation			
Instrument Cluster (IC): dDEF + EMPTY + POWER + LIMTd	DEF/AdBlue® level is empty. Torque reduction and engine speed reduction will occur.	 Continuous alarm; DEF level bar flashes	Fill DEF/AdBlue® tank immediately. Cycle the key switch (or the POWER button) OFF then ON.
LCD multi-function display: DEF/AdBlue tank is EMPTY Extreme Power Limitation			

DEF quality inducement displays

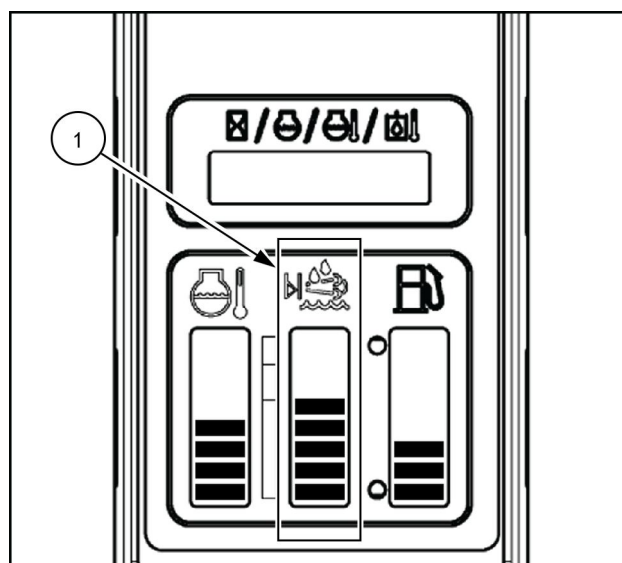
Display	Description	Warning lamps and alarms	Corrective action
Instrument Cluster (IC): dDEF + QLTY	DEF/AdBlue® quality / concentration is questionable.	 One second audible alarm every 3 min	Drain the DEF/AdBlue® tank. Fill the tank with approved DEF/AdBlue®. Contact your authorized dealer if the failure persists.
LCD multi-function display: Poor DEF/AdBlue quality detected			
Instrument Cluster (IC): dDEF + QLTY	DEF/AdBlue® quality / concentration is questionable 60 min after the initial warning. Torque reduction and engine speed reduction will occur.	 Continuous alarm	Drain the DEF/AdBlue® tank. Fill the tank with approved DEF/AdBlue®. Contact your authorized dealer if the failure persists.
LCD multi-function display: Poor DEF/AdBlue quality detected Power Limitation			
Instrument Cluster (IC): dDEF + QLTY + POWER + LIMTd	DEF/AdBlue® quality / concentration is questionable 4 h after the initial warning. Torque reduction and engine speed reduction will occur.	 Continuous alarm	Drain the DEF/AdBlue® tank. Fill the tank with approved DEF/AdBlue®. Contact your authorized dealer if the failure persists.
LCD multi-function display: Poor DEF/AdBlue quality detected Extreme Power Limitation			

DEF technical failure inducement

Display	Description	Warning lamps and alarms	Corrective action
Instrument Cluster (IC): SCR + FAIL	SCR fault/failure detected. Torque reduction and engine speed reduction will occur.	 One second audible alarm every 3 min	Contact your authorized dealer for repair.
LCD multi-function display: DEF/AdBlue injection failure Power Limitation			
Instrument Cluster (IC): SCR + FAIL	SCR fault/failure detected 60 min after the initial warning. Torque reduction and engine speed reduction will occur.	 Continuous alarm	Contact your authorized dealer for repair.
LCD multi-function display: DEF/AdBlue injection failure Power Limitation			
Instrument Cluster (IC): SCR + FAIL + POWER + LIMTd	SCR fault/failure detected 4 h after the initial warning. Torque reduction and engine speed reduction will occur.	 Continuous alarm	Contact your authorized dealer for repair.
LCD multi-function display: DEF/AdBlue injection failure Extreme Power Limitation			

Instrument cluster

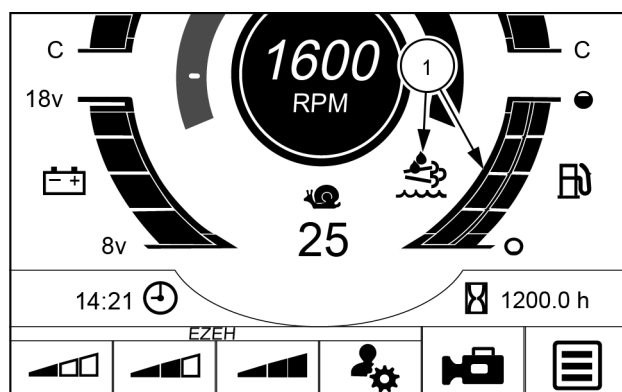
During normal operation of your CASE CONSTRUCTION machine, the instrument cluster displays the DEF/AdBlue® fluid level **(1)** at all times.



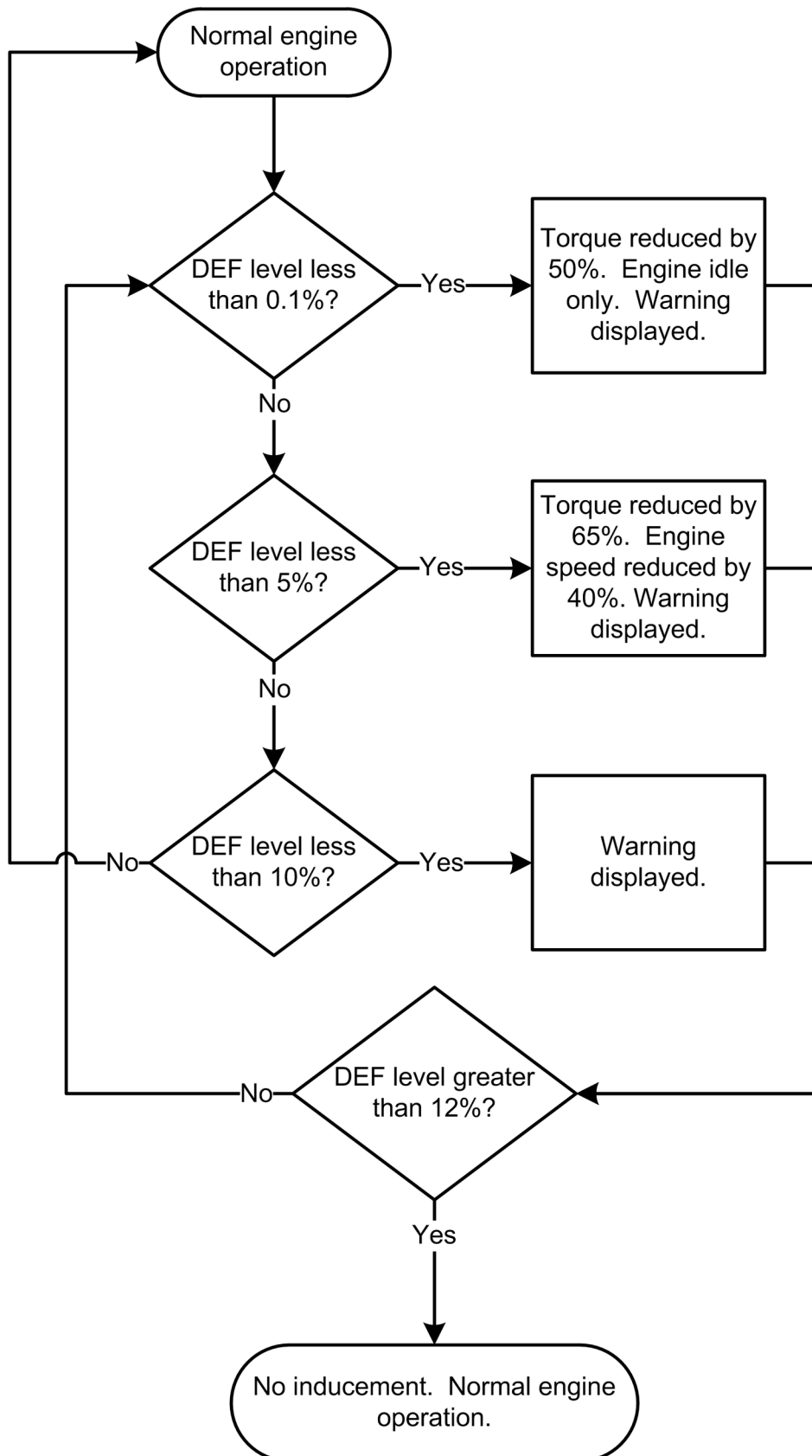
RAIL19SSL0075BA 1

LCD multi-function display

During normal operation of your CASE CONSTRUCTION machine, the instrument cluster displays the DEF/AdBlue® fluid level **(1)** at all times.

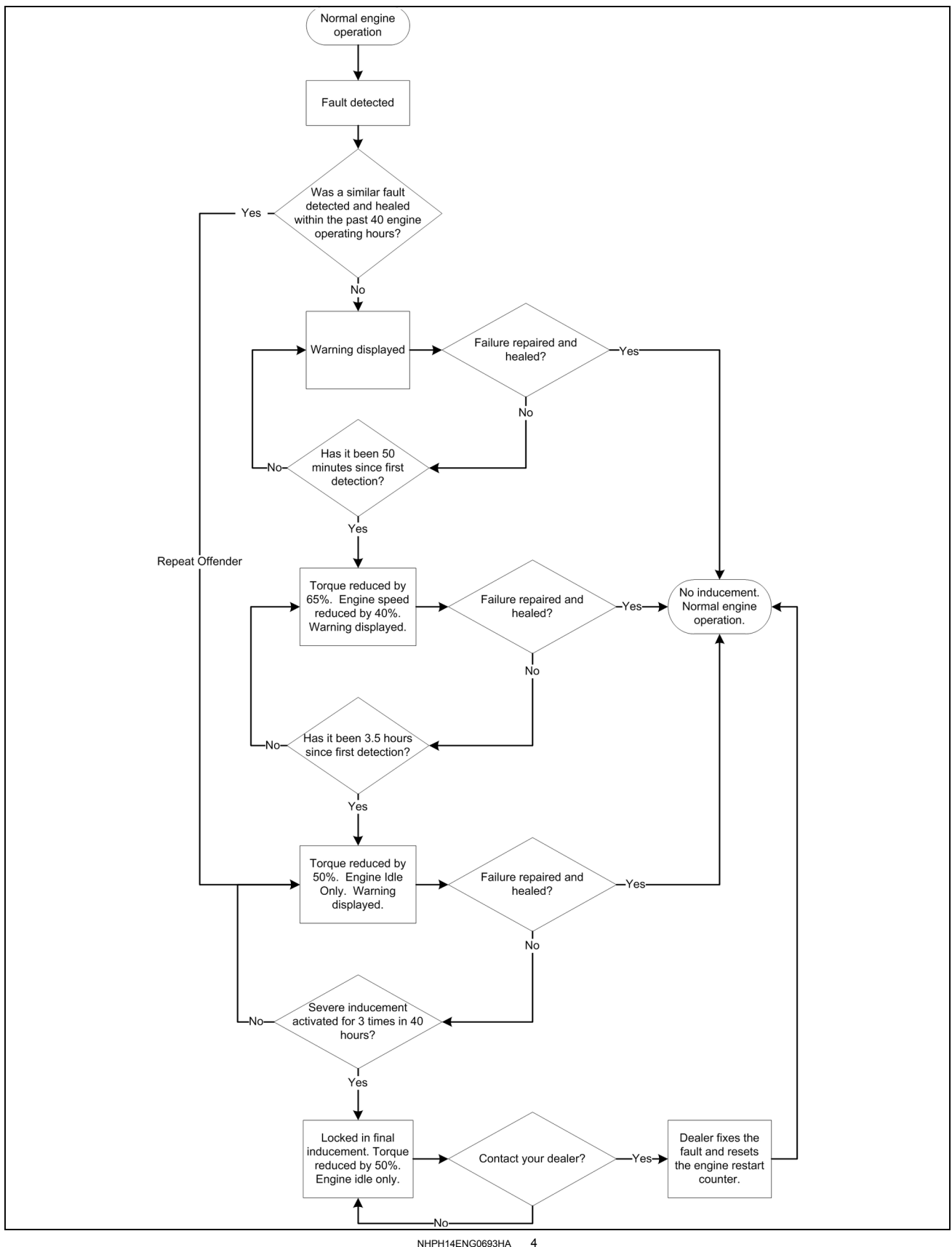


RAIL19SSL0455AA 2

DEF/AdBlue® level faults, failures, and engine power loss levels

NHPH14ENG0567HA 3

DEF/AdBlue® quality faults, failures, and engine power loss levels

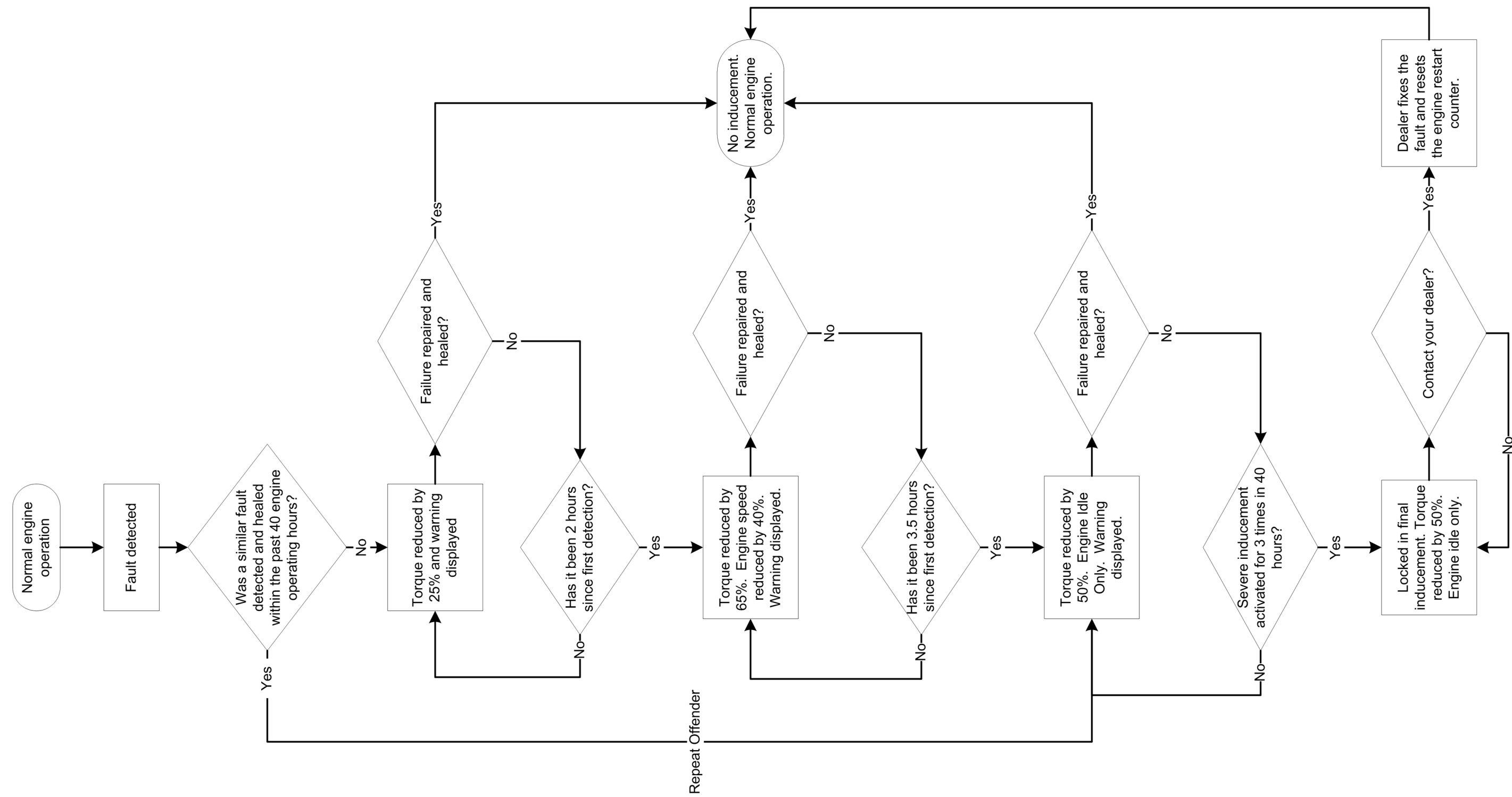


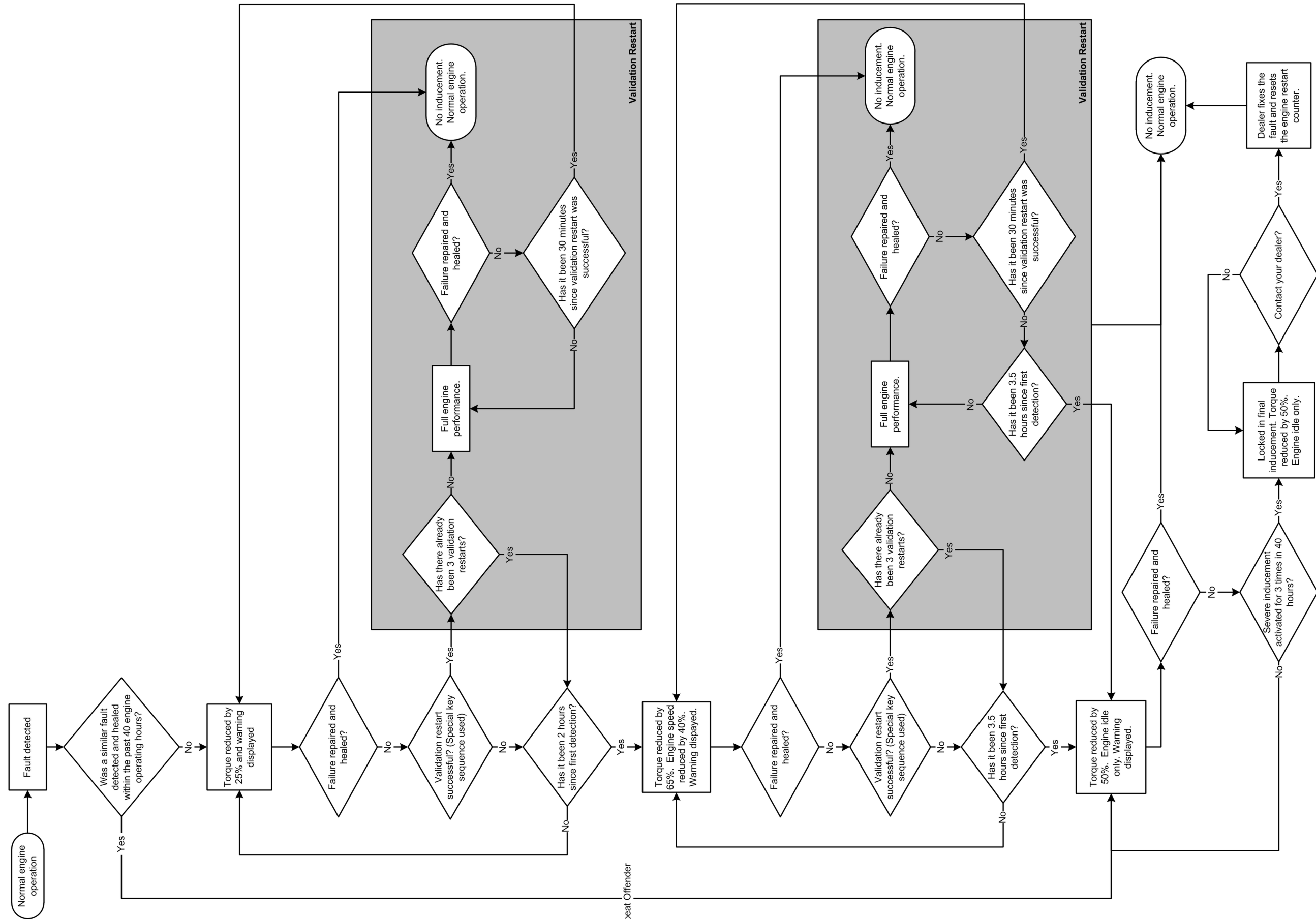
SCR system technical faults, failures, and engine power loss levels

There are two types of strategies that are applied to your machine based on the type of failure that occurs.

- For electrical failures, use figure 5.
- For failures that require the SCR system to be operational, use figure 6 and see the section on validation re-starts.

NOTE: *You can restart the engine and receive full engine power up to two times at any point after the machine detects a fault. However, if the machine detects the same fault within 40 operating hours, torque will be reduced to 50% and the engine will be reduced to idle immediately. If you attempt a third restart, the engine will be locked at 50% torque and engine idle. Contact your CASE CONSTRUCTION dealer to reset the engine restart counter and resolve the fault causing the loss of productivity.*





Validation re-starts

Validation re-starts allow operation of the machine for up to **30 min** without power loss after a poor DEF/AdBlue® quality or SCR system fault has been detected. Up to three re-starts are permitted. Re-starts are counted if either of the following conditions are met:

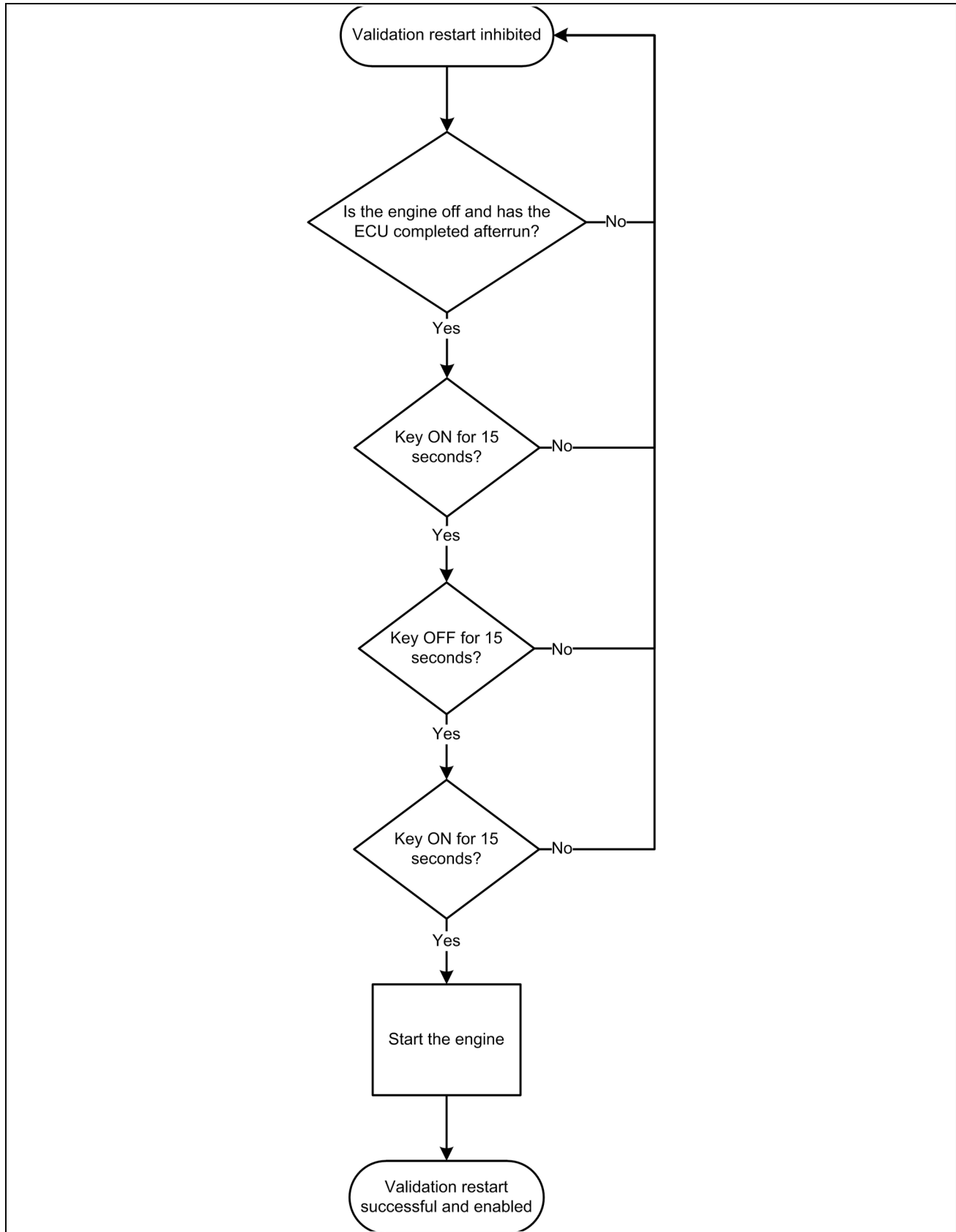
- Engine speed exceeds **1000 RPM**
- Engine running time exceeds **5 min**

Normal operation will resume if a reset is detected within the **30 min** window.

If a reset is not detected within **30 min**, power loss will occur as described in the flowcharts.

If all three validation re-starts have been used and the system has not been reset, the machine is limited to **50%** torque and engine idle only. See your local authorized CASE CONSTRUCTION dealer for repair.

Follow the sequence in figure 7 to activate validation re-starts.



NHPP14ENG0568HA 7

Resetting the Selective Catalytic Reduction (SCR) system

For DEF/AdBlue® storage tank fluid level faults, failures that can cause engine power loss:

- The DEF/AdBlue® tank level must be raised above **12%** total volume.
- The key switch must be cycled to the Off position or throttle returned to low idle position.

For DEF/AdBlue® quality and SCR system technical faults, failures that can cause engine power loss:

- To fully reset the system, the component/failure causing the fault must be repaired or replaced.
- Switching off the engine will reset the system and the engine will restart at full power.
- If the same failure is re-detected within **40 h** of engine operation, the maximum engine power loss level will be introduced.
- If the same failure is detected three consecutive times within **40 h** of engine operation, maximum engine power loss will remain active after engine restart until the system is repaired.
- Please contact your authorized CASE CONSTRUCTION dealer for service.

ISO or H pattern control switch

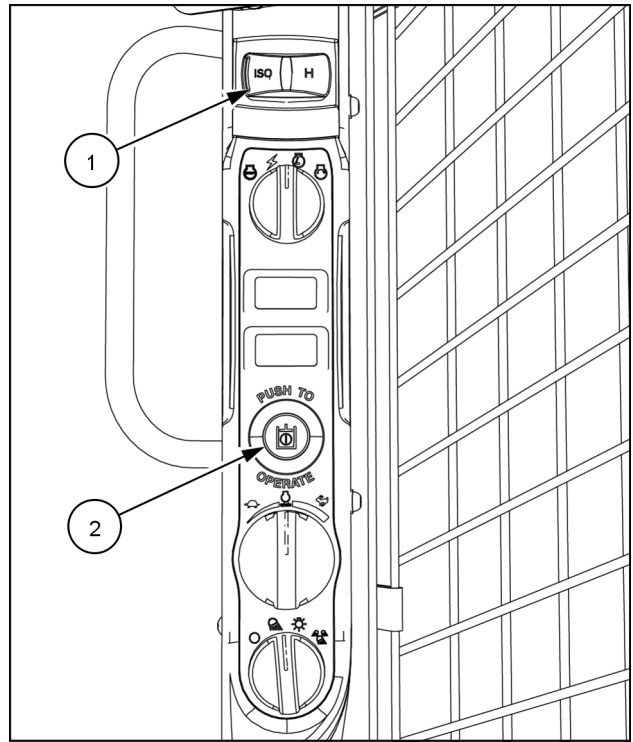
On machines with ISO or H drive, switch **(1)** determines which drive system the machine is operating. ISO drive (single lever controls drive) or H drive (traditional 2 lever drive control).

Switching from ISO to H pattern

1. Make sure that the machine is on level ground, lower the loader lift arms all the way down, and place the throttle control lever in the low idle position.
2. Press the OPERATE button **(2)**
 - The Park light will illuminate
 - The ground drive and loader hydraulics will not function
3. Confirm that the AUX roller switch on the right-hand control lever is in the neutral position.

NOTE: The AUX roller switch must be in neutral to change the pattern.

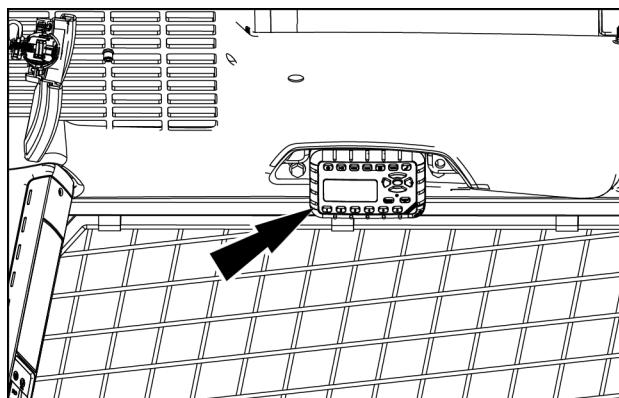
4. Push and hold the ISO - H pattern select switch **(1)** to the desired pattern for a few seconds. An audible alarm will sound to let you know that the pattern switch is successful.
5. Reference the text display to confirm the change of the control pattern. The switch will illuminate only on the selected side.
6. Activate the hydraulic system by pressing the OPERATE button **(2)**.



RAIL19SSL0069BA 1

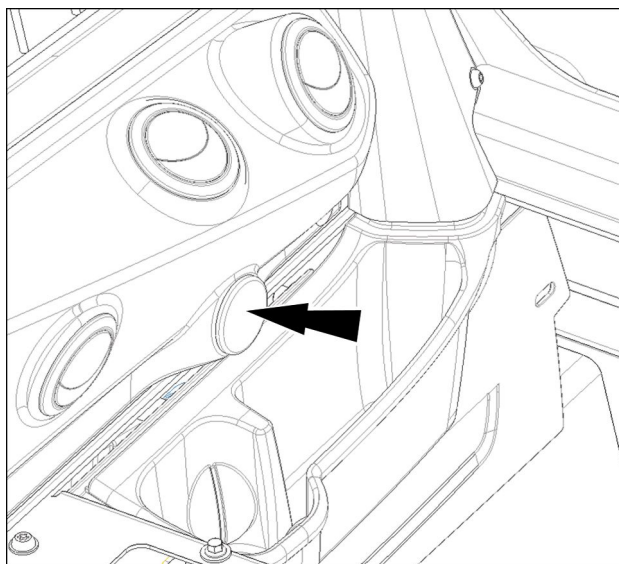
Bluetooth® radio (if equipped)

See the **Bluetooth®** radio user manual that ships with the machine for details on radio features, controls, and operation.



RAIL19SSL0005AA 1

The radio has a USB port located above the cup holder.

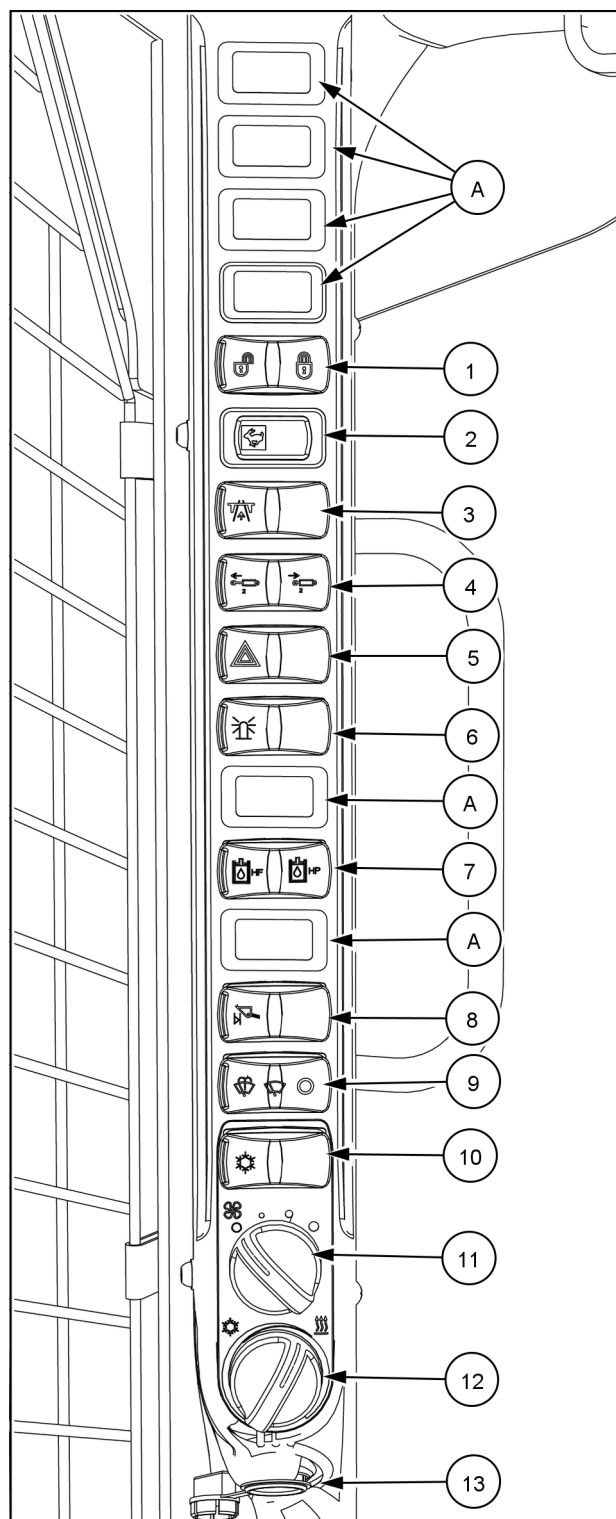


RAIL19SSL0052BA 2

LEFT-HAND COLUMN SWITCH IDENTIFICATION

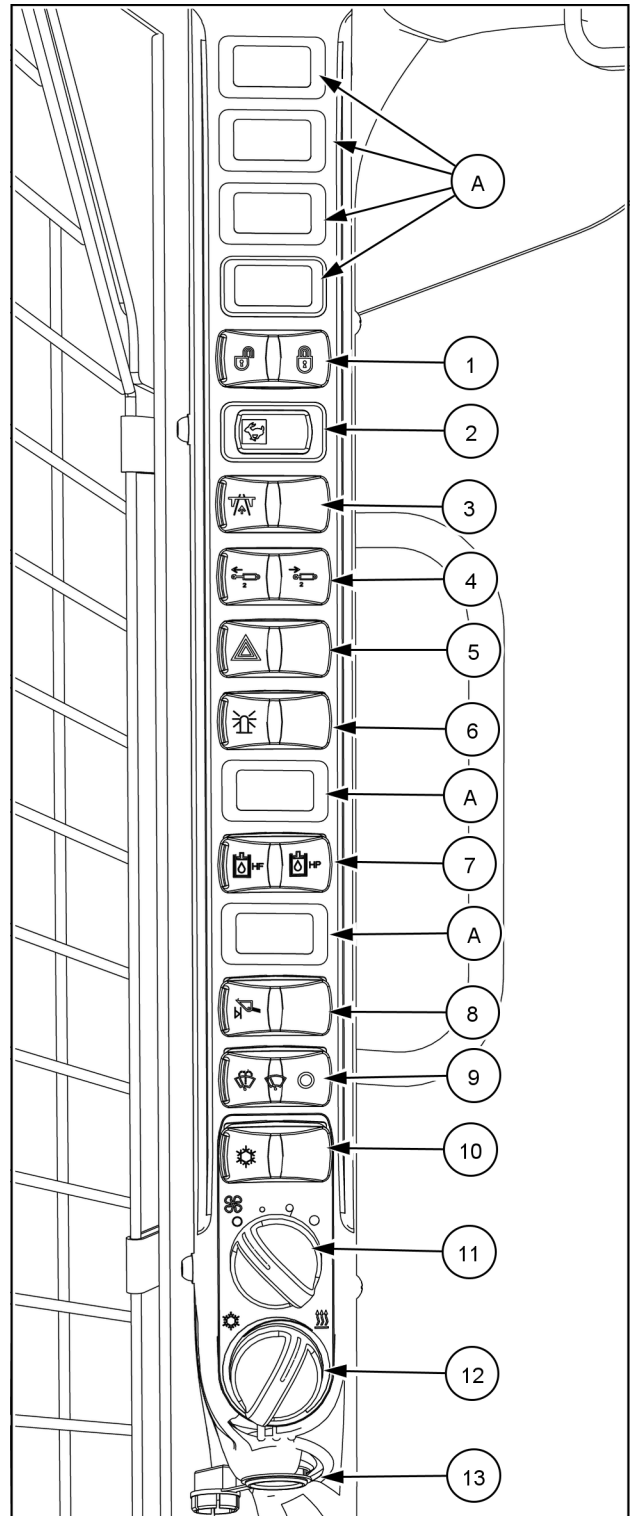
Left-hand column switch identification

(A)	Blanks
(1)	Hydraulic attachment coupler switch  Push the unlock side of this switch to unlock the coupler from the attachment. This switch must be used in conjunction with hydraulic pressure from the loader arm down, attachment curl in or auxiliary. To Lock: with the coupler properly inserted in the attachment, apply hydraulic pressure from the loader arm down, attachment curl in or auxiliary making sure that the hydraulic system goes over system relief to set lock pins.
(2)	Two-speed indicator  Indicates the two-speed system is in use.
(3)	Loader lockout switch  If equipped, push to disable loader control while roading the unit. The bucket and loader arm will be locked in the position they are in when the loader lockout switch is pressed to the ON position. This prevents the operator from inadvertently lowering or raising the loader arm or bucket while driving the machine on roads.
(4)	Auxiliary electric switch #2  If equipped, this switch is for the front electric connector.

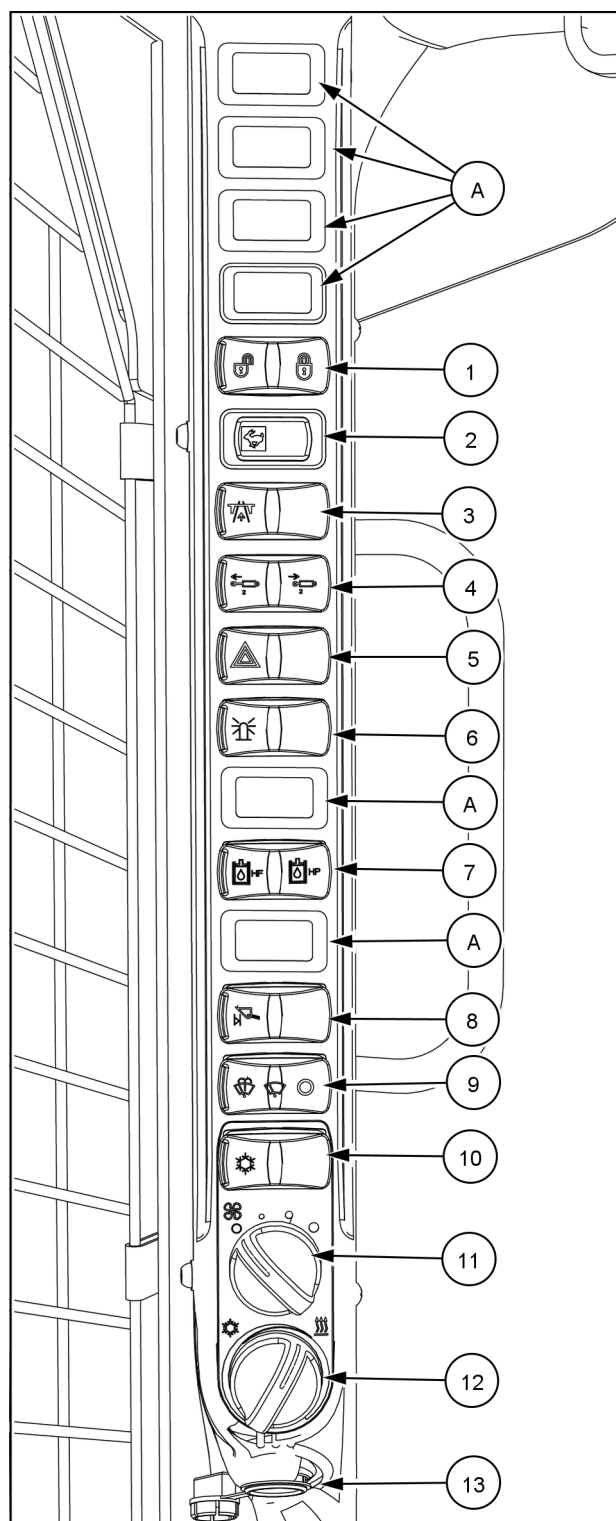


RAIL23SSL0541DA 1

(5)	Hazard flasher switch
	If equipped, push the switch to activate the 4-way flashers.
(6)	Rotating beacon switch
	If equipped, push the switch to activate the rotating beacon.
(7)	Auxiliary hydraulic switch
 HF  HP	If equipped, push the HF side of the switch to engage the high flow auxiliary hydraulic mode that produces 207 bar (3000 psi). NOTE: The TV450B will produce 238 bar (3450 psi) in high flow mode. Push the HP side of the switch to engage the enhanced high flow mode to produce 276 bar (4000 psi) if equipped with an approved attachment. The lamp will illuminate when activated. Keep the switch in the neutral position to disable high flow.
(8)	Self-leveling switch
	If equipped, use this switch to activate the self-leveling feature. As you raise the loader arm the bucket will rotate to maintain a level position.



(9) 	Windshield wiper switch If equipped, this three position switch turns the wiper ON/OFF and operates the washer fluid spray.
(10) 	Air-conditioning switch If equipped, this switch turns the air conditioning ON or OFF. The lamp will illuminate, to confirm the system is operational, once the fan switch has been activated.
(11) 	Fan dial Rotate this dial to activate the fan.
(12) 	Heating, Ventilation, Air-Conditioning (HVAC) dial Rotate this dial to adjust temperature.
(13)	12 V Power port Supplies 12 V of power for accessories.



4 - OPERATING INSTRUCTIONS

COMMISSIONING THE UNIT

Operating Instructions

Before each operating period, it is the responsibility of the operator to confirm that the machine is safe and serviced.

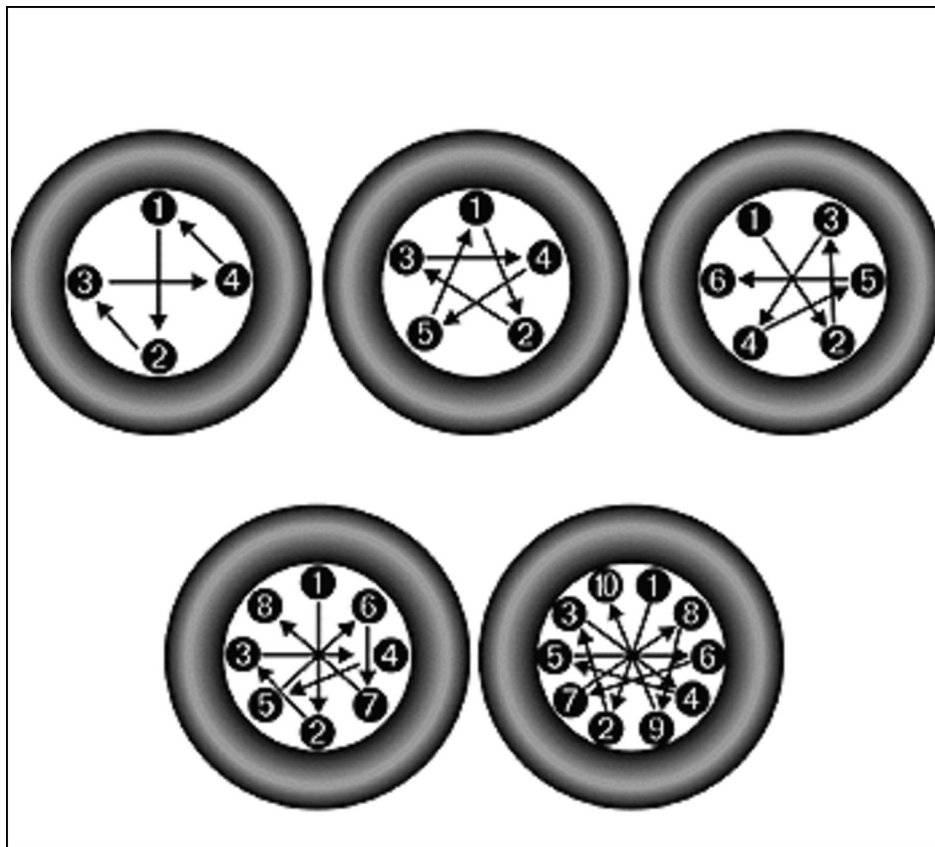
During the first 20 hours of operation, make sure to do the following:

1. If possible, operate the engine at intermittent heavy loads and engine speeds for this period to ensure proper engine break-in.
2. Keep the engine at normal operating temperature.
3. Do not run the engine at idle speeds for long periods of time.
4. During the first 20 hour break-in period, check the oil level at approximately one hour intervals. Oil consumption may be higher during the initial break-in period.
5. It is recommended that the operator run the engine at full throttle when operating conditions permit.

Wheel bolts

If the machine is new or if a wheel is removed for service, check and tighten the wheel bolts every 2 hours of operation until they remain tight. If the machine is equipped with stamped center wheels, the lug nuts will be tapered. Tighten each lug nut to a torque of **162.7 – 196.6 N·m (120 – 145 lb ft)**.

If the machine is equipped with solid center wheels, the lug nuts will be flanged. Tighten each lug nut to a torque of, **189.8 – 223.7 N·m (140 – 165 lb ft)**.



63109344 1

Pre-start checklist

Operating and environmental conditions must be considered and the following checked:

1. Fill the tank with No. 1 diesel or No. 2 diesel fuel. Use No. 1 diesel if the ambient temperature is expected to be less than **4 °C (40 °F)** or if the machine is to be used at an altitude exceeding **1524 m (5000 ft)**. The sediment and water content should not exceed **0.5%**. Use ultra-low sulfur fuel only (less than **15 ppm**).
2. Fill the Diesel Exhaust Fluid (DEF) tank with **DEF/AdBLUE®**.
3. Remove all dirt and debris from the floor board area to maintain full range of foot pedal travel and foot throttle if equipped.
4. Confirm that the radiator and coolers are clean of debris and obstruction.
5. **⚠ WARNING**
Hot liquid under pressure!
Service when cool.
Failure to comply could result in death or serious injury.

W1187A

Check fluid levels of the engine, hydraulic reservoir and coolant tank.
6. Lubricate any fittings in accordance with the lubrication and maintenance schedule.
7. Inspect the machine for loose parts, damaged components or missing items. Keep all shields in the proper position.

8. Confirm that all safety signs are legible and properly placed on the correct component. Replace any safety signs that are not legible. Contact your dealer for replacement safety signs.
9. Check the seat belt and seat switch for damage and proper operation. See the maintenance chapter of this manual under daily maintenance for the complete procedure.
10. Confirm that all controls operate freely and correctly.
11. Confirm that the drive control is correct and that the machine does not creep forward or rearward. Contact your dealer if the machine does not remain stationary with the drive controls in the neutral position.
12. Confirm that the parking brake holds the machine from movement when powered or on an incline.
13. **⚠ WARNING**

Falling object hazard!

Before operating the machine, always make sure the bucket or attachment is securely locked into the quick-attach plate. A loader bucket or attachment that is not securely locked into the quick-attach plate could come off during loader operation. Failure to comply could result in death or serious injury.

W0166A

Confirm that the attachment is properly secured to the attachment coupler.

STARTING THE UNIT

Engine operation

⚠ DANGER

Improper operation or service of this machine can result in an accident.
Do not operate this machine or perform any lubrication, maintenance, or repair on it until you have read and understood the operation, lubrication, maintenance, and repair information.
Failure to comply will result in death or serious injury.

D0010A

⚠ WARNING

Equipment failure could cause accident or injury!
Always fasten the seat belt securely before you operate the machine. Inspect seat belt parts for wear and damage. Replace any and all worn or damaged parts of the seat belt prior to operation.
Failure to comply could result in death or serious injury.

W0046C

⚠ WARNING

Explosion hazard!
DO NOT use ether starting fluid. Explosion, death, serious personal injury, or serious engine damage could occur.
Failure to comply could result in death or serious injury.

W0148B

Walk-around inspection

Each day before you start the engine:

- Check for leaks under the machine.
- Check tire condition and pressure or track condition.
- Check the machine, equipment and attachments for wear, damaged, or missing parts.
- Check the machine for debris, especially around the radiator and engine area. Make sure these areas are clean.
- Clean or replace any safety or instructional signs that you cannot read.
- Clean the steps, handrails, and operator compartment. Remove any loose items in the operator's compartment.
- See the maintenance chart in this manual and do all the items under **10 h**.

Engine speed

If the engine is run at low idle speed for a prolonged period of time, hydrocarbons can accumulate in the SCR catalyst. To manage this accumulation, your machine will monitor current conditions and request the operator to increase engine RPM or will automatically increase if an operator is not present.

NOTICE: Unless the Hydrocarbon (HC) level has reached the most critical level, running the unit under load is advantageous for quickly reducing the HC levels.

NOTICE: Prevent damage to the turbocharger. If the engine stalls during normal operation, immediately return the throttle to idle before restarting.

NOTE: This machine is not intended to be driven on public roads or highways. Contact your local and regional authorities before operating this machine on public roads or highways.

Starting the engine

When the operator sits in the seat the instrument cluster panel will light all functions for about **3 s**, during this time the instrument cluster is self-checking the electrical circuits. All lights will go off except the parking brake and the fasten seat belt light will flash until the seat belt is buckled and/or the restraint bar is lowered. The instrument cluster will sense this and the fasten seat belt light will go off allowing the operator to start the machine.

NOTICE: *If the machine is to be operated in consistently low temperatures, contact your dealer for the correct oil.*

NOTICE: *ALWAYS allow the engine and hydraulic system to warm up before applying a load.*

NOTICE: *If the engine does not start within **30 s**, allow the starter to cool for one minute and then begin the procedure again.*

Start the engine:

1. Adjust the seat, fasten the seat belt, and lower the restraint bar.
2. Place the control levers in the neutral position.
3. If applicable, put the High Flow (HF)/High Pressure (HP) switch in the standard flow (center) position.
4. Increase the throttle to approximately 1/8 throttle.
5. Sound the horn to alert others of your intentions. Follow the applicable system start procedure.
6. Turn the key/knob switch to the RUN position.
7. Monitor the instrument cluster lamps. If the engine preheat lamp illuminates, wait until the engine preheat lamp is off before you start the engine..
8. Turn and hold the key/knob in the START position until the engine starts. Do not hold the key/knob in the START position for longer than **30 s**.
9. After starting the engine, monitor the indicator lights and confirm that the machine functions are normal.

Operating in extreme temperatures

WARNING

Explosion hazard!

DO NOT use ether starting fluid. Explosion, death, serious personal injury, or serious engine damage could occur.

Failure to comply could result in death or serious injury.

W0148B

Operating in cold weather

This machine is designed to operate in the ambient temperature range of **-30 °C (-22 °F)** to **43 °C (110 °F)**.

Cold weather conditions require specific procedures. During these conditions your machine will require special attention to prevent serious damage. Cold weather maintenance will extend the service life of the machine.

Cold weather increases the viscosity of the oil in the hydraulic system. Cold oil can cause changes in the operational characteristics of the machine, particularly in machines equipped with the electro-hydraulic control system. It is recommended to warm the machine to sufficient operating temperature and take care when starting and stopping, and making steering adjustments until you are comfortable with the controls.

Allow extra time during cold weather to bring the machine and components up to operating temperature. Run the engine below **1500 RPM** until the engine temperature rises. Once the engine temperature rises, throttle the engine up to operating speed and operate the machine. Do not run the engine at idle speed for extended periods. This will help to extend the life of the engine.

NOTE: Contact your dealer for approved cold temperature starting aids.

NOTE: At cold ambient temperatures the engine speed will be automatically limited by the electronic engine control system until the engine has reached a warm operating temperature. This is to protect the engine system. During this time, the engine throttle controls will be unresponsive.

NOTE: Be aware that low load or low RPM operation in cold weather may increase hydrocarbon build up. See "Hydrocarbon management" in the "Selective Catalytic Reduction (SCR) exhaust treatment - Product overview" 1-15.

Battery and electrical system

Clean the battery and make sure it is at full charge. Inspect the battery cables and terminals. Clean and spray the terminals with battery terminal protector to prevent corrosion.

A fully charged battery at **-17 °C (0 °F)** has only **40%** of the normal starting power.

Lubricants

Use the correct viscosity oil in each component based on climate condition. Consideration for extreme temperatures and the correct viscosity are recommended.

Diesel fuel system

Verify with your fuel supplier for the correct cold weather fuel. Diesel engine power will be reduced if wax particles are in the fuel filter. Consult your dealer for the best fuel for these machines.

Cold temperature operation can cause moisture condensation in the fuel tank. Keep the fuel tank full and check for water frequently.

NOTICE: Failure to remove water from the fuel may result in an inoperative engine and damage to the fuel system.

Cooling system

Keep the coolant at the correct level in the reservoir and radiator. Use **EXTENDED LIFE OAT COOLANT/ANTIFREEZE** premix (**50%** concentrate and 50% distilled water). This mixture protects the engine cooling system to **-30.0 °C (-22.0 °F)**.

Keep dirt and debris from restricting air flow to the radiator and coolers. Take extra precaution to monitor build up while operating.

Improper fan belt tension may cause an overheating issue.

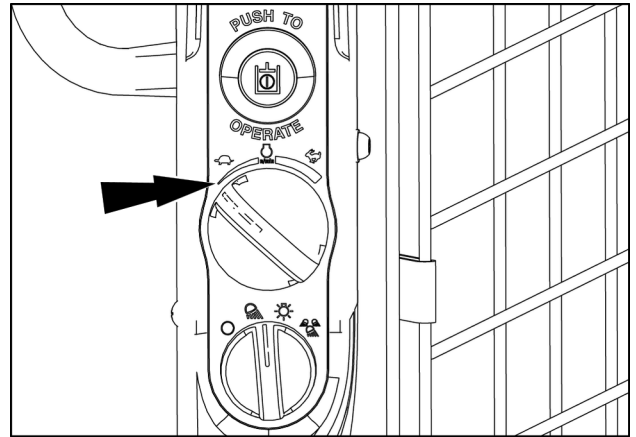
Throttle control

Hand throttle

NOTE: At cold ambient temperatures the engine speed will be automatically limited by the electronic engine control system until the engine has reached a warm operating temperature. This is to protect the engine system. During this time, the engine throttle controls will be unresponsive.

Hand throttle control dial to be in low to 1/8 throttle position for starting.

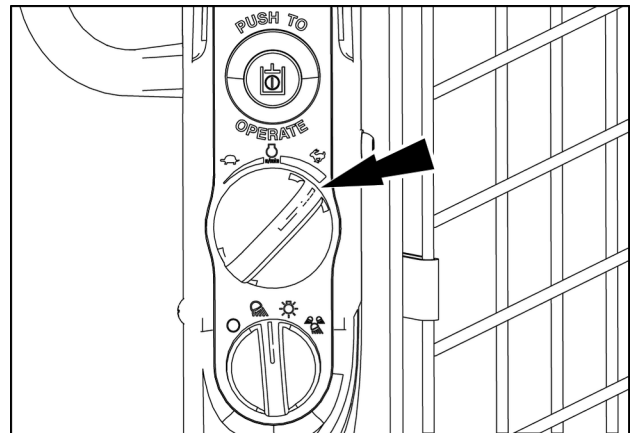
NOTE: If the throttle control dial is not in the low idle position when starting the engine, the engine speed will be limited to low idle until the throttle control lever is returned to the low idle position.



RAIL19SSL0061BA 1

Hand throttle control dial in the high throttle position.

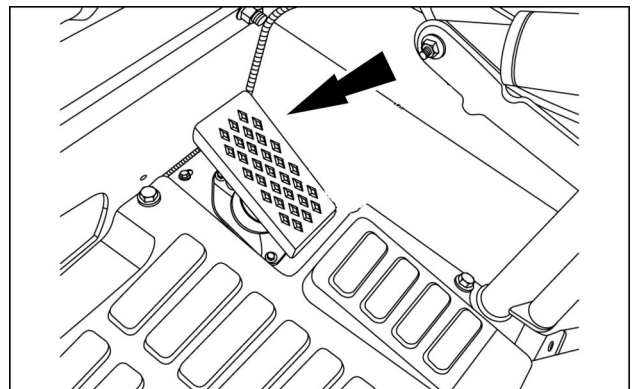
NOTE: Most operating conditions require full throttle (high throttle) position.



RAIL19SSL0062BA 2

Foot throttle

The foot throttle is on the right-hand side, if equipped. Push the foot throttle pedal down to increase engine speed. Release the foot throttle pedal to decrease engine speed. When you completely release the foot throttle pedal, it will default to the throttle position of the hand throttle control dial.



93109350 3

Booster battery procedure

⚠ WARNING

Hazardous chemicals!

Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.

Failure to comply could result in death or serious injury.

W0006A

Two persons are required for this procedure. Make sure the person making the connections is wearing face protection.

1. Sit in the operator's seat and have the other person make the connections. Make sure the booster battery is **12 V**.

NOTICE: Prevent the primary machine's electrical system from receiving excess voltage. Make sure that the secondary machine's engine is not operating or if applicable the charger is not in the boost position when you attempt to start the primary vehicle.

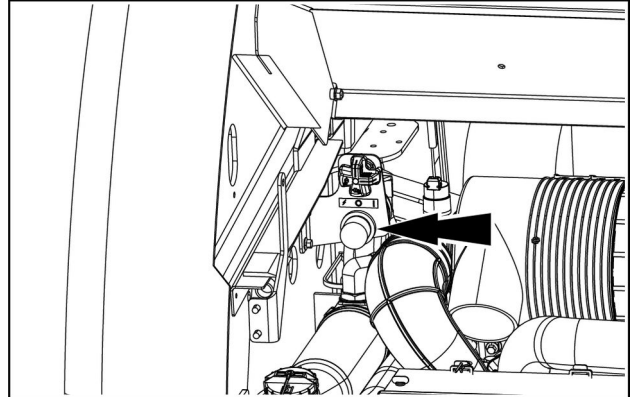
2. If using another machine for power, make sure the two machines do not touch.
3. Connect the positive jumper cable from the boost battery to the positive remote jump start terminal of the dead battery first.

NOTE: The positive remote jump start terminal is shown in the image.

4. Connect the negative jumper cable from the boost battery to a good frame ground, away from the dead battery.

NOTE: Follow the engine starting procedure in this manual.

5. Have the other person disconnect the negative jumper cable first and the positive jumper cable last.



RAIL23SSL0261BA 1

STOPPING THE UNIT

Parking the machine and stopping the engine

⚠ WARNING

Fall hazard!

Jumping on or off the machine could cause an injury. Always face the machine, use the handrails and steps, and get on or off slowly. Maintain a three-point contact to avoid falling: both hands on the handrails and one foot on the step, or one hand on the handrail and both feet on the steps.

Failure to comply could result in death or serious injury.

W0141A

⚠ WARNING

Equipment rolling hazard!

Always try to park the machine on firm level ground. Avoid parking on slopes. Block the wheels in both directions.

Failure to comply could result in death or serious injury.

W0265A

NOTICE: Damage to the turbocharger (if equipped) may occur if the engine is not properly shut down.

1. When the work day is complete, park the machine on level ground and lower the loader arms to the ground.
2. Before exiting the machine, make sure that the loader arm or attachment is not supporting the weight of the machine with the front tires off the ground.
3. Run the engine at idle speed and allow time for the engine and component parts to cool evenly.
4. Place all control levers in the neutral position.
5. Turn the key/knob switch to the Stop position to stop the engine. The parking brake will automatically engage.
6. Remove the key (if equipped), release the seat belt, and raise the restraint bar.
7. Use the grab handles and safely exit the machine.

NOTE: After the engine is shut off you will hear a clapping or clicking sound for up to **90 s**. This is a normal function of the Selective Catalyst Reduction (SCR) system. A pump is draining the Diesel Exhaust Fluid (DEF) that is still in the supply lines back into the DEF tank. During this time, **DO NOT** cycle the master disconnect switch OFF until after the pump has finished the drain cycle.

MOVING THE UNIT

Machine operation

WARNING

Impact hazard!

Refer to the cold weather operations section of this manual for start-up and operation in low temperatures 0 °C (32 °F). Follow these procedures to avoid sluggish operation or a change in operation characteristics.

Failure to comply could result in death or serious injury.

W1239A

WARNING

Misuse hazard!

Multiple sensors on your machine control safety functions. For example, a sensor in the operator's seat automatically disengages the drive to the attachment when the operator leaves the seat. To ensure a safe operating mode, DO NOT disconnect or bypass these sensors. Repair all inoperable sensors.

Failure to comply could result in death or serious injury.

W0014A

WARNING

Loss of control hazard!

Keep hands and feet on the appropriate controls at all times to maintain control of the machine.

Failure to comply could result in death or serious injury.

W0237A

WARNING

Roll-over hazard! A full bucket in the raised position alters the center of gravity of the machine.

When operating a loader with a full bucket on slopes, observe the following precautions:

1. Avoid turning the machine on slopes.
2. Always drive slowly straight up and down slopes.
3. Always carry the load as low as possible.

Failure to comply could result in death or serious injury.

W0018A

WARNING

Avoid injury!

Do not operate the machine while under the influence of alcohol or drugs.

Failure to comply could result in death or serious injury.

W0160A

WARNING

Fall hazard!

Jumping on or off the machine could cause an injury. Always face the machine, use the handrails and steps, and get on or off slowly. Maintain a three-point contact to avoid falling: both hands on the handrails and one foot on the step, or one hand on the handrail and both feet on the steps.

Failure to comply could result in death or serious injury.

W0141A

NOTICE: Before you operate the machine, check the control levers, instruments, warning lamps, engine throttle, and attachment hydraulic controls. Also check the seat belt/seat - restraint bar switch. If you know there is a malfunction, missing part, or part that needs adjustment, stop the machine, and correct the problem immediately.

NOTICE: For Electro-Hydraulic (EH) machines, when the operator presses the OPERATE button on the right-hand instrument cluster to enable the hydraulic system and a control lever is not in the neutral position; the hydraulics will not enable. JOYNU will appear on the display to inform the operator. Move the control levers to their neutral positions and press the OPERATE button. If JOYNU continues to appear contact your Dealer.

NOTICE: For all machines (mechanical or EH), if the operator is out of the seat, the restraint bar is unplugged or up, and the OPERATE button is pressed, error message OPRPR will appear on the display. Check the restraint bar plug connection, engage the restraint bar, sit in the operator's seat, engage the seat belt, press the OPERATE button. If OPRPR continues to appear contact your Dealer.

1. Set the engine speed at the desired throttle setting. Control the machine ground speed with the control levers. When the job site conditions permit, the throttle should be set at full throttle.

NOTE: The minimum throttle setting should be **1400 to 1500 RPM** for acceptable control.

2. If you are a new operator, always operate the machine in an open area at a reduced machine ground speed until you get a feel for the controls. Move the control levers slowly and smoothly to avoid machine bouncing. If the machine starts to bounce, bring the control handles back to the neutral position.
3. Keep all machine and loader arm movements smooth, and the work cycle as short as possible. Complete more work in a shorter time frame with a smooth, short work cycle.
4. Keep the work site as smooth and level as possible.

NOTE: Use the correct tires for the job site conditions.
Contact your dealer for tire options.

5 - TRANSPORT OPERATIONS

SHIPPING TRANSPORT

Transporting the machine

WARNING

Transport hazard!

Only use the identified tie-down points to secure the machine for transport on a trailer.

Failure to comply could result in death or serious injury.

W1431A

WARNING

Driving hazard!

Hillside operations can be dangerous. Rain, snow, ice, loose gravel, or soft ground, etc. can change the ground conditions. You must make a judgment if it is safe to operate your machine on any hillside or ramp.

Failure to comply could result in death or serious injury.

W0144A

WARNING

Transport hazard!

The machine can slip or fall from a ramp or trailer. Make sure the ramp and trailer are not slippery. Remove all oil, grease, ice, etc. Move the machine on or off the trailer with machine centered on the trailer or ramp.

Failure to comply could result in death or serious injury.

W0152A

You must know the rules or laws for safety that are used in each area that you will be in. Make sure that your truck and machine are equipped with the correct safety equipment.

Load the machine on to a trailer:

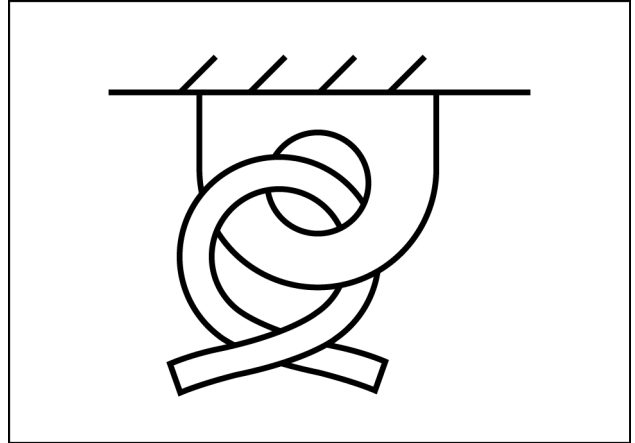
1. Put a chock block to the front and rear of all trailer wheels.
2. Use low idle speed, move the skid steer slowly onto the trailer. Keep the machine in the center of the ramp and trailer.
3. Lower the bucket or attachments onto the trailer. Make sure not to lift the front of the machine off the trailer.
4. Shut the engine off.
5. If applicable, remove the key.

NOTE: Route the strap through the hand holds or use the key hole available on the lift arm stops. Only secure straps or chains to the machine tie-down locations that have the tie-down decal.

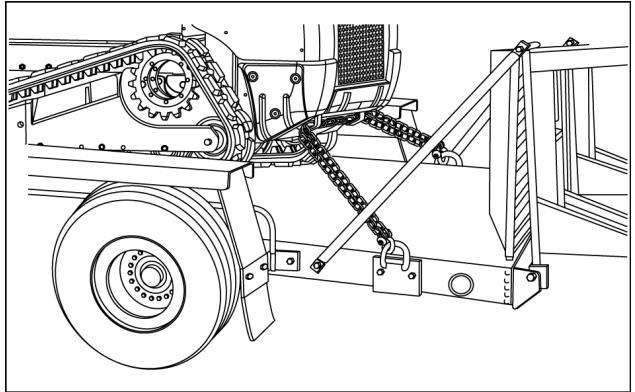
6. Use straps to fasten the machine to the trailer. Only use the tie-down locations, in the front and rear identified with the tie-down decal.
7. Put chock blocks at both ends of the wheels or tracks of the machine.
8. Remove the chock blocks from the trailer wheels.

Unload the machine from a trailer:

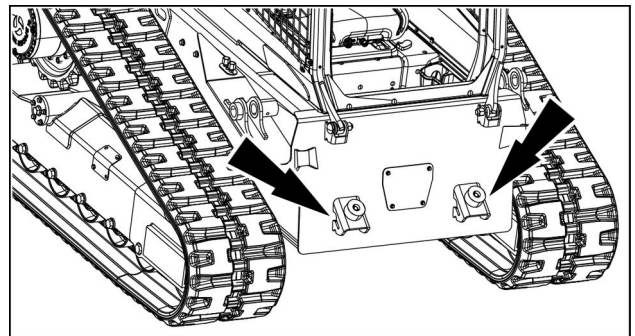
1. Put a chock block to the front and rear of all trailer wheels.
2. Remove the tie-down straps.
3. Remove the chock blocks at both ends of the wheels or tracks of the machine.
4. Start the machine and keep at a low idle speed.
5. Drive slowly down the center of the trailer or ramps.



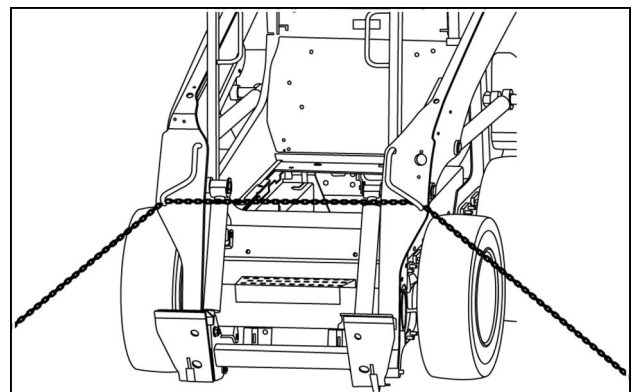
84315529A 1



93109385 2



RAIL21SSL0711AA 3



93109386B 4

Lifting the machine with a four-point lifting device (optional equipment)

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

W0398A

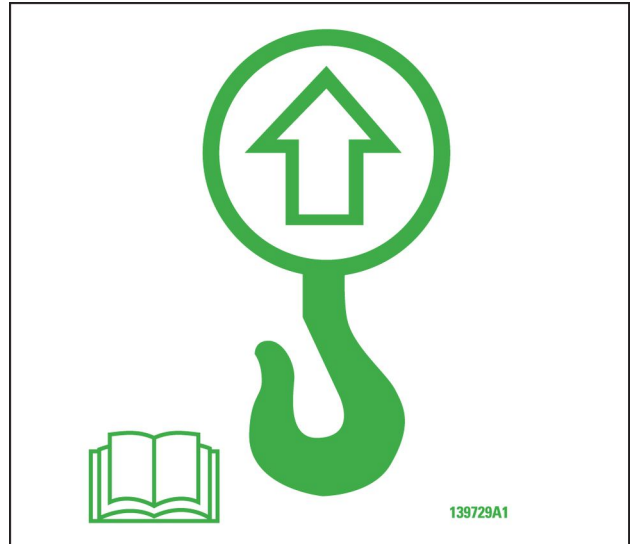
NOTICE: Only personnel with heavy machine lifting experience should attempt to lift the machine. Contact your dealer for assistance.

These machines are designed for a four-point lifting device. Use only lifting equipment with a rated capacity to handle the weight of the machine model being lifted. The lifting equipment weight must be added.

1. Remove any and all attachments before lifting the machine.
2. Use the two front lift points and the two rear lift points (one on each side).

NOTICE: To prevent damage to the cab, synthetic slings must be used for the front lift points.

Use the correct sling lengths to ensure the proper lift hook point above the cab is maintained for a level machine lift.



139729A1 5

The following precautions must be followed when craning (lifting or lowering) a machine.

- Only attach suitable lifting equipment to the machine at the designated lift points identified with the decal shown.
- Secure suitable lifting equipment to the designated lift points using hooks or shackles with the proper capacity rating.
- Never allow personnel on the machine while craning.
- Remove attachments before craning.
- Use only properly rated lifting devices.
- The weight of the lifting equipment must be added to the machine weight for the proper lift capacity requirement.
- Always inspect the lifting equipment to confirm safe condition. DO NOT use if worn or damaged.
- Do not attach lifting devices to the loader arms or attachments on the machine.
- Make sure that the loader arms are in the lowest position.
- Make sure that the engine is off and parking brake is engaged before craning.
- Keep bystanders a safe distance away from the machine while craning.

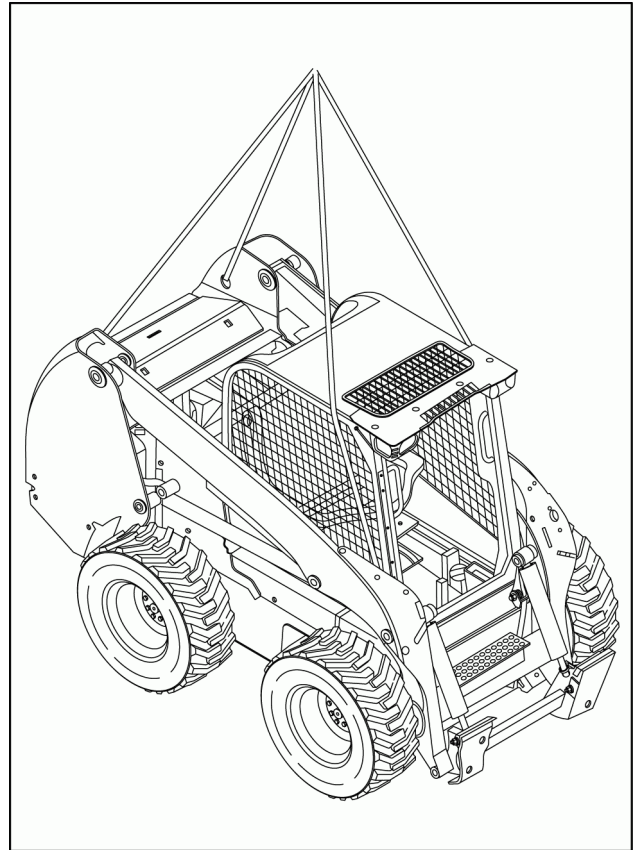
SR270B and TR340B only

Front sling requirements:

- Two synthetic slings **3.7 m (12.0 ft)** in length.
- Each sling must have a rated lifting capacity of equal to or greater than $0.748 \times$ Gross Vehicle Weight (GVW).

Rear sling requirements:

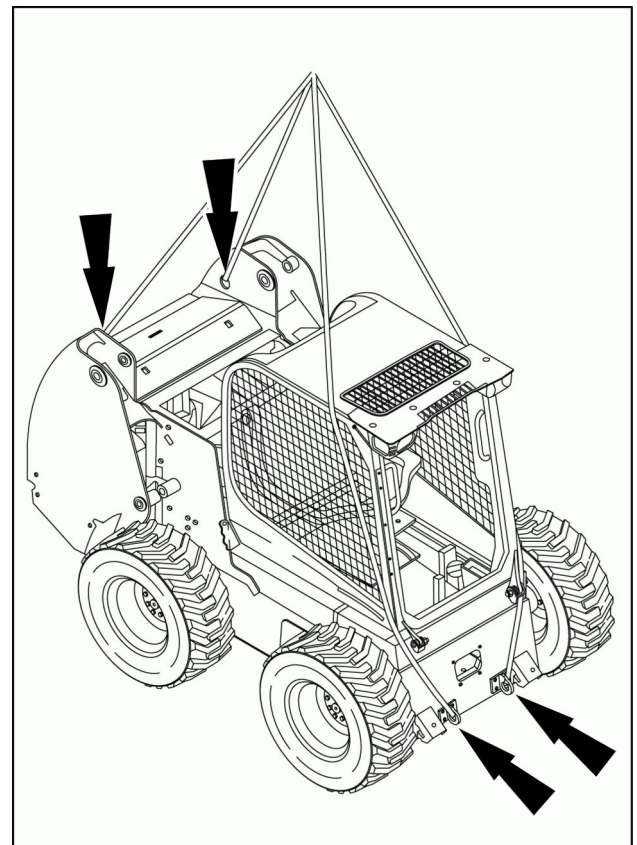
- Two chains approximately **2.4 m (8.0 ft)** in length. Some adjustment may be required for a level lift.
- Each chain must have a rated lifting capacity of equal to or greater than $0.555 \times$ Gross Vehicle Weight (GVW).



RAIL14SSL0393BA 6

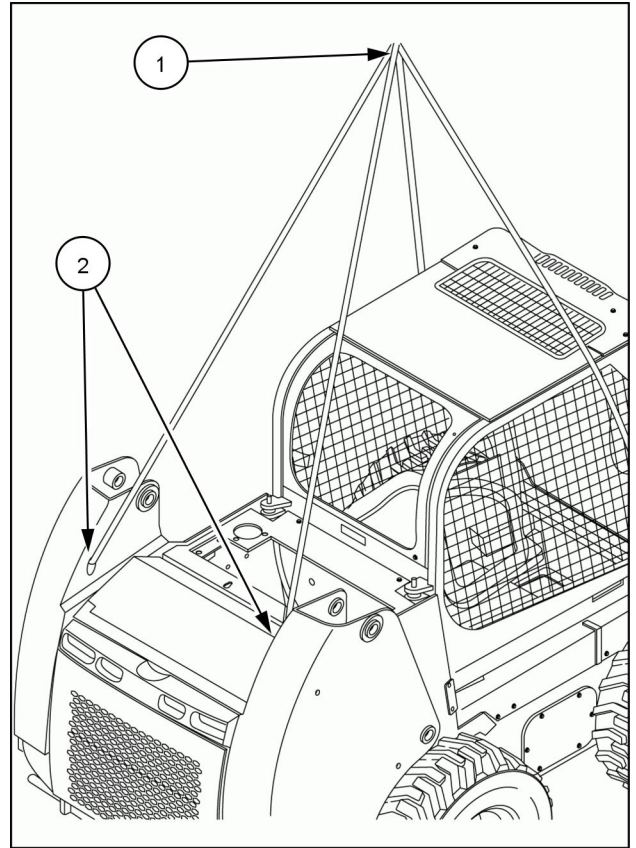
NOTE: For a clear view of the machine's lifting points and the sling routing, the loader arm is not shown. Do not remove the loader arms.

At each of the machine's lifting points will be a lifting point decal



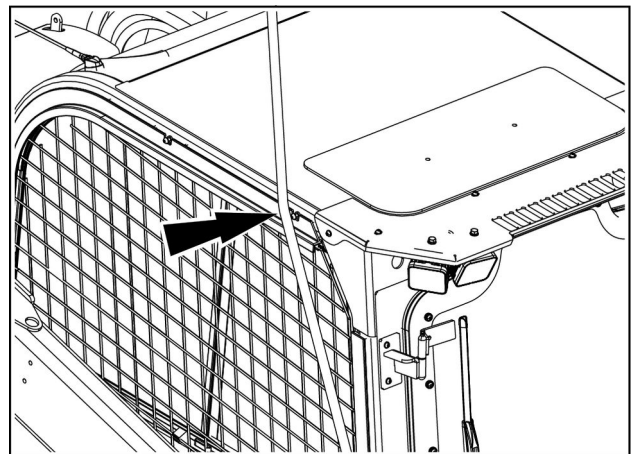
RAIL14SSL0394BA 7

1. Connect all slings to a single point **(1)** on the suitable craning equipment above the cab.
2. Attach chains to the machine's rear lifting points **(2)** on the machine.



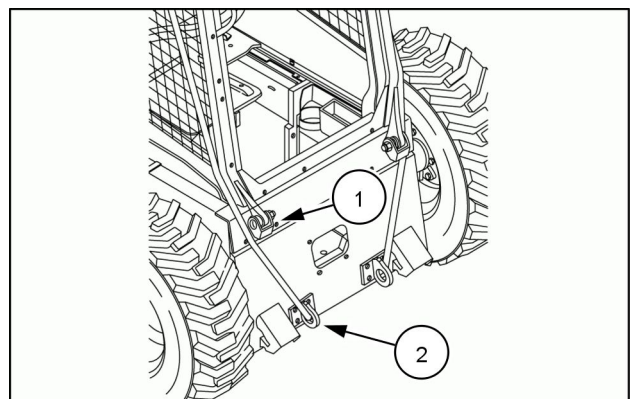
RAIL14SSL0397BA 8

3. Route the front sling down the right-hand side of the Roll Over Protective Structure (ROPS).



RAIL23SSL0233BA 9

4. Route the front sling down the outside of the ROPS front pivot point **(1)** and attach to the machine's right-hand side lifting point **(2)**.
5. Repeat on the left-hand side of the machine.
6. Clear the area.
7. Lift the machine just off the ground. The machine should stay level. If it is not level lower the machine to the ground and adjust the length of the rear chains. Repeat until you achieve a level lift.



RAIL14SSL0396BA 10

SV340B and TV450B only

Front sling requirements:

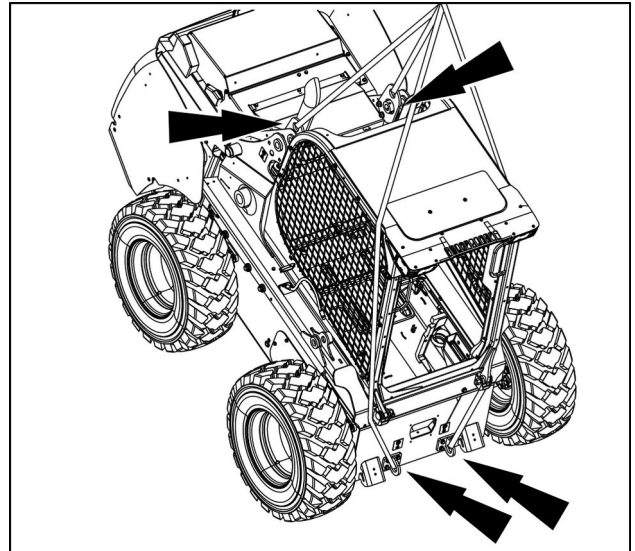
- Two synthetic slings **3.7 m (12.0 ft)** in length.
- Each sling must have a rated lifting capacity of equal to or greater than $0.368 \times$ Gross Vehicle Weight (GVW).

Rear sling requirements:

- Two chains approximately **2.0 m (6.5 ft)** in length. Some adjustment may be required for a level lift.
- Each chain must have a rated lifting capacity of equal to or greater than $0.851 \times$ Gross Vehicle Weight (GVW).

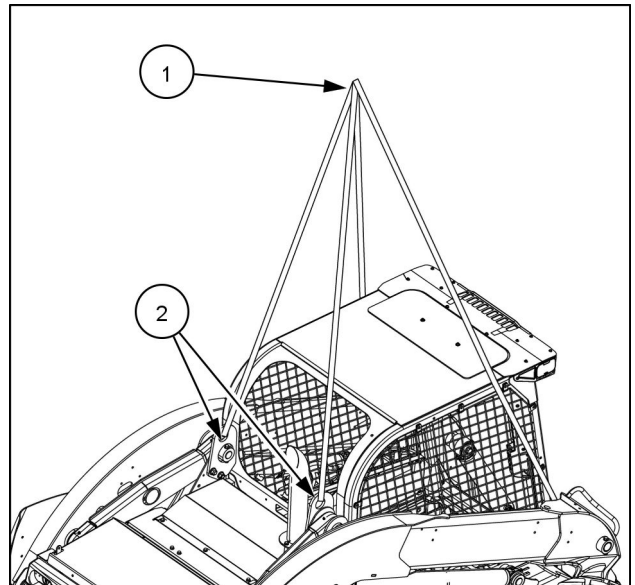
NOTE: For a clear view of the machine's lifting points and the sling routing, the loader arm is not shown. Do not remove the loader arms.

At each of the machine's lifting points will be a lifting point decal.



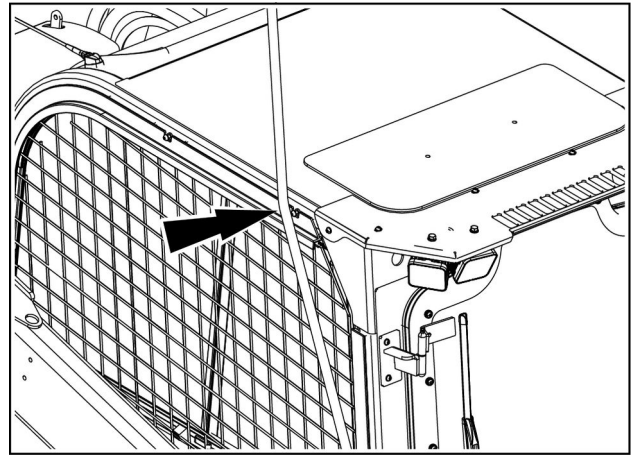
RAIL17SSL0050BA 11

1. Connect all slings to a single point **(1)** on the suitable craning equipment above the cab.
2. Attach chains to the machine's rear lifting points **(2)** on the machine.



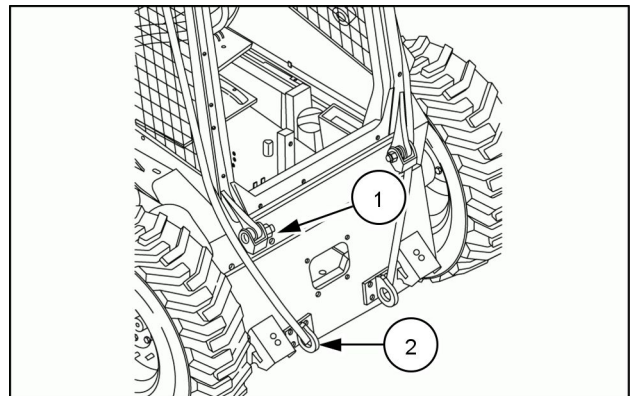
RAIL17SSL0051BA 12

3. Route the front sling down the right-hand side of the Roll Over Protective Structure (ROPS).



RAIL23SSL0233BA 13

4. Route the front sling down the outside of the ROPS front pivot point **(1)** and attach to the machine's right-hand side lifting point **(2)**.
5. Repeat on the left-hand side of the machine.
6. Clear the area.
7. Lift the machine just off the ground. The machine should stay level. If it is not level lower the machine to the ground and adjust the length of the rear chains. Repeat until you achieve a level lift.



RAIL14SSL0400BA 14

Lifting the machine with a single-point lifting device (optional equipment)

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

W0398A

NOTICE: The craning (lifting) device must be centered over the attachment point when lifting the unit equipped with a single point lifting device. If not centered properly (off to either side or fore and aft of attachment point), the single point lifting device mounting hardware could be damaged.

NOTICE: Never drag the unit by connecting to the single point lifting device attachment point. Never pull or tow anything by connecting to the single point lifting device attachment point. Either of these actions may result in damage to the single point lifting device mounting hardware.

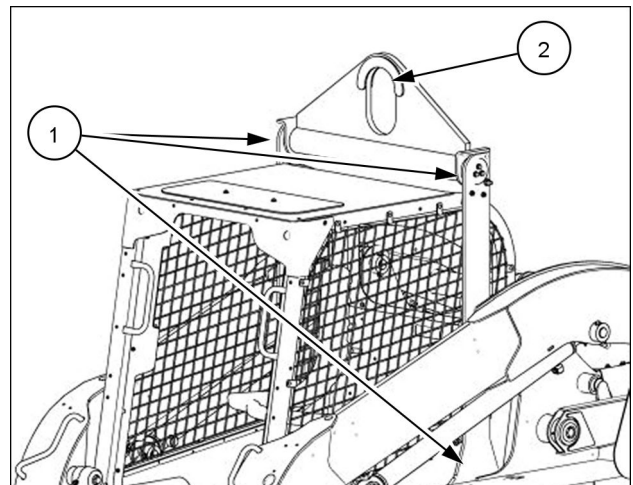
NOTICE: Only personnel with heavy machine lifting experience should attempt lifting the machine. Contact your dealer for assistance.

The following precautions must be followed when craning (lifting or lowering) a machine.

- Never allow personnel on the machine while craning.
- Remove attachments before craning.
- Use only properly rated lifting devices.
- The weight of the lifting equipment must be added to the machine weight for the proper lift capacity requirement.
- Always inspect the lifting equipment to confirm safe condition. DO NOT use if worn or damaged.
- Do not attach lifting devices to the loader arms or attachments on the machine.
- Make sure that the loader arms are in the completely lowered position.
- Make sure the engine is shut off and parking brake is engaged before craning.
- Keep bystanders a safe distance away from the machine while craning.

Use only lifting equipment with a rated capacity to handle the weight of the model skid steer being lifted. The lifting equipment weight must be added.

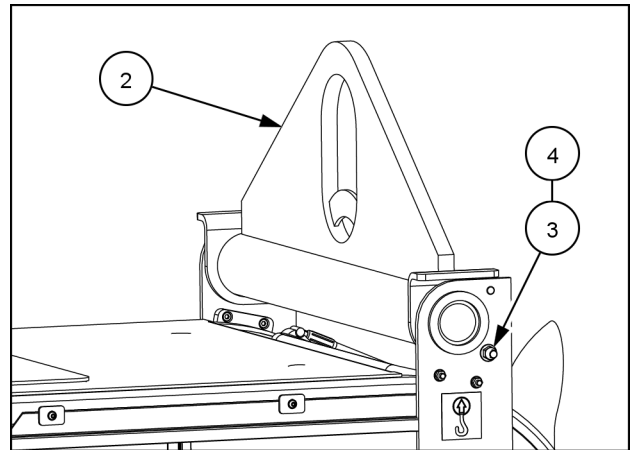
1. Remove any and all attachments before lifting the machine.
2. Only use a CASE CONSTRUCTION approved single-point lifting attachment specifically designed for your machine. Confirm all four hardware **(1)** locations are properly tightened (right-hand side lower hardware not shown).



RCPH11SSL016BAD 15

3. The carrier weldment **(2)** maybe locked in the upright position as shown or in a stowing position by inserting an M12 locking bolt **(3)** and nut **(4)** on each side, into the corresponding holes.
4. Only attach an suitable lifting device to the single point lifting attachment at point **(2)**.
5. If applicable remove M12 locking bolt **(3)** and nut **(4)** from each side before lifting the machine.

NOTE: The locking bolt mentioned above is not intended to carry a load. It is only intended to hold the carrier in position while attaching the lifting devise or stowing it for travel. It is recommended that the bolts be removed while the lift straps are being used.



RAIL19SSL0073BA 16

RECOVERY TRANSPORT

Moving a disabled machine

WARNING

Loss of control!

Only tow at safe speeds. Use caution when making corners or meeting traffic.

Failure to comply could result in death or serious injury.

W0126A

NOTICE: CASE CONSTRUCTION does not recommend towing the machine. Do not attempt to move the machine if you believe more damage to the machine will occur. You may damage the machine more severely if you attempt to tow or move a disabled machine. If possible, repair the machine at the job site. Contact your dealer if the machine is disabled.

6 - WORKING OPERATIONS

GENERAL INFORMATION

Mechanical attachment mounting systems

⚠ DANGER

Crushing hazard!

The loader arm is unsupported during support strut removal. Do not enter or exit the operator's compartment with an unsupported loader arm. Two persons are required during storage. One person should remove and store the support strut while the operator remains in the operator's compartment. Failure to comply will result in death or serious injury.

D0021B

⚠ WARNING

Crushing hazard!

On some attachments, it may appear there are two saddle positions for the coupler. Always use the lower position to ensure proper latching of the attachments. Failure to comply could result in death or serious injury.

W0182B

⚠ WARNING

Unexpected machine movement!

Always make sure the machine is at operating temperature before mounting or removing tools or attachments. Failure to comply could result in death or serious injury.

W0184A

⚠ WARNING

Crushing hazard!

Always use approved attachments. Make sure the attachment is compatible with the machine mounting system. Failure to comply could result in death or serious injury.

W0183A

⚠ WARNING

Falling object hazard!

Before operating the machine, always make sure the bucket or attachment is securely locked into the quick-attach plate. A loader bucket or attachment that is not securely locked into the quick-attach plate could come off during loader operation. Failure to comply could result in death or serious injury.

W0166A

⚠ WARNING

Crushing hazard!

Never extend any part of the body from the operator's compartment to latch or unlatch components while changing attachments. Always follow the correct procedure in this manual. Failure to comply could result in death or serious injury.

W0213A

⚠ WARNING

Falling parts!

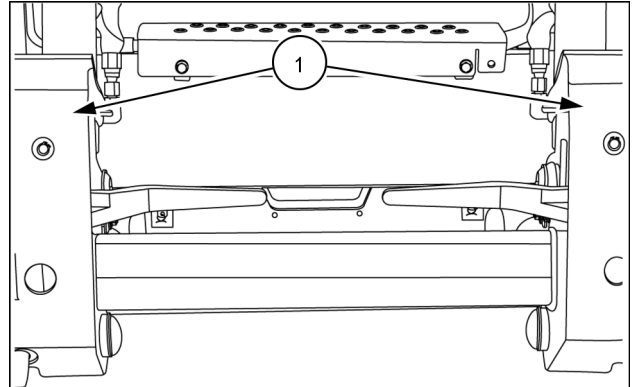
Debris build up may interfere with proper and complete mounting or removal of a tool or attachment. Always make sure all debris is cleared from the machine, attachment, or tool before attempting any mounting or removal procedures. Failure to comply could result in death or serious injury.

W0214A

Installing the attachment

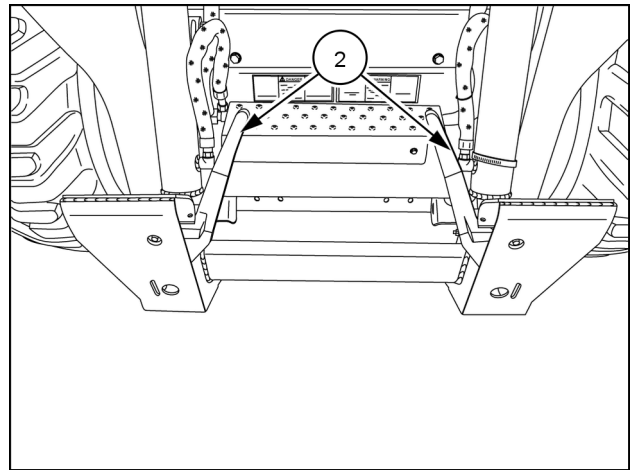
NOTICE: Read the manufacturer's instruction manual for attachments not included in this manual.

A pivoting coupler (1) is supplied with the machine as standard equipment and remains attached to the loader arm.



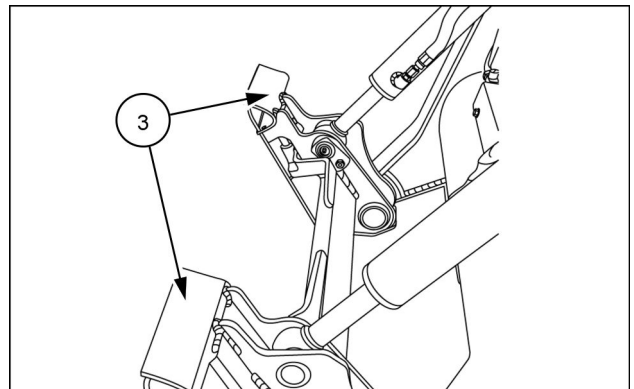
931007516A 1

1. Rotate the latch handles (2) up and outward to the unlatched position. Be sure the latch handles are all the way up so the lock pins are fully retracted.



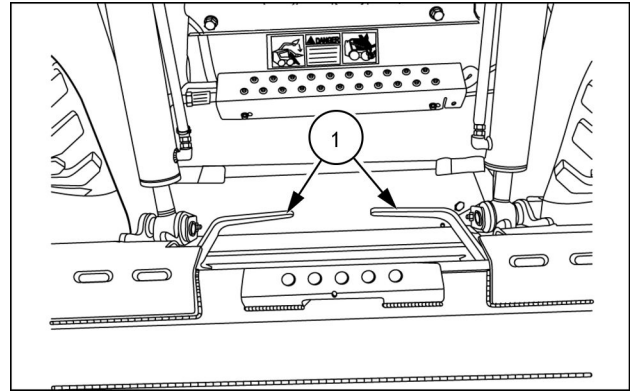
RAIL14SSL0843BA 2

2. Hydraulically tilt the couplers (3) forward while guiding the crest of the coupler under the attachment saddle.



931007517 3

3. Raise and curl the coupler until the back surface of the attachment comes to rest flat against the front surface of the coupler.
4. When the attachment is fully supported, lower the loader arm until the loader arm is completely down on the loader stops.
5. Roll the bucket or attachment out, stopping with the bucket edge just off the ground.
6. Turn off the engine, raise the restraint bar, unfasten the seat belt, and exit the operator's compartment.
7. Push the two latch handles (1) inward and down over center to engage the lock pins with the retaining tabs on the attachment.



93106897 4

⚠ WARNING

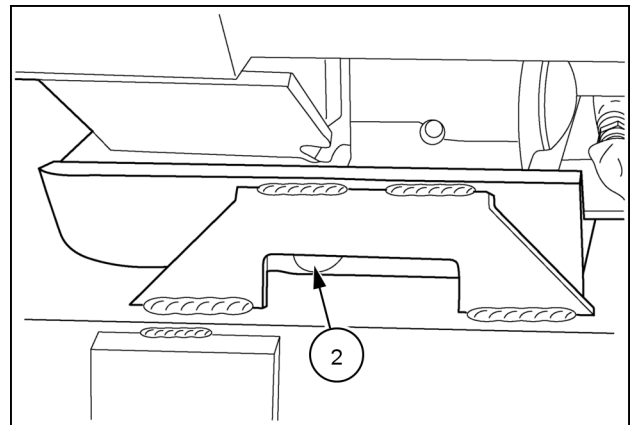
Falling object hazard!

Before operating the machine, always make sure the bucket or attachment is securely locked into the quick-attach plate. A loader bucket or attachment that is not securely locked into the quick-attach plate could come off during loader operation.

Failure to comply could result in death or serious injury.

W0166A

8. Raise the attachment and slowly roll the bucket or attachment out. Make a visual inspection of the lock pins (2) engagement in the attachment lower tab slots.
- If the attachment is not properly secured to the coupler, lower the loader arm and repeat the mounting procedure.
 - Before using the attachment, the operator must operate it through its full range of motion and confirm that the attachment is secure and safe.



86092926 5

Removing the attachment

1. Lower the attachment to the ground, stop the engine, confirm that the parking brake is set, and exit the skid steer.
2. Pull the latching handles up and outward to the unlatched position to release the pins from the lower attachment tabs.

NOTICE: Be sure the latch handles are fully raised.

3. Fasten your seat belt, lower the restraint bar, start the skid steer, and release the park brake.
4. Tilt the attachment forward so that the front edge is resting on the ground.
5. Continue tilting the coupler forward as you back the machine away from the attachment at the same time.

Hydraulic attachment mounting systems

The optional hydraulic coupler allows the operator to remain in the operator seat and quickly change the loader arm attachments.

The hydraulic coupler switch must be used in conjunction with the one of the three hydraulic functions (held to the end of its stroke):

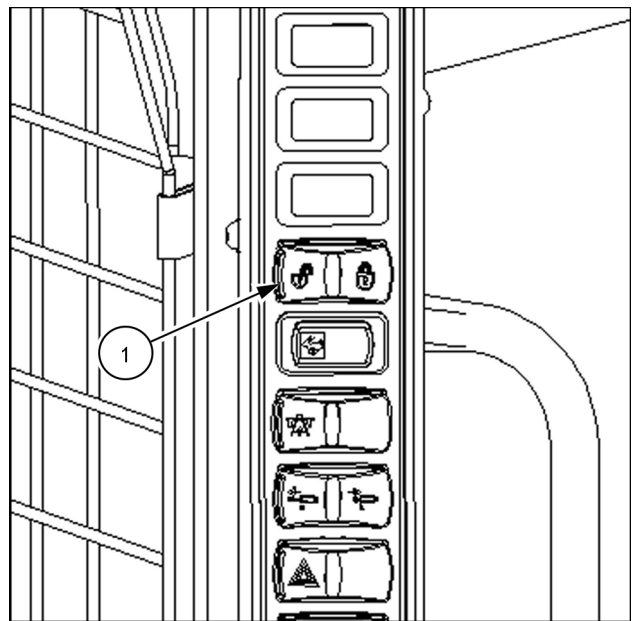
- The control lever's auxiliary switch
- The loader arm down operation
- The attachment curl-in operation

To simplify the instructions only one of the three hydraulic functions is mentioned.

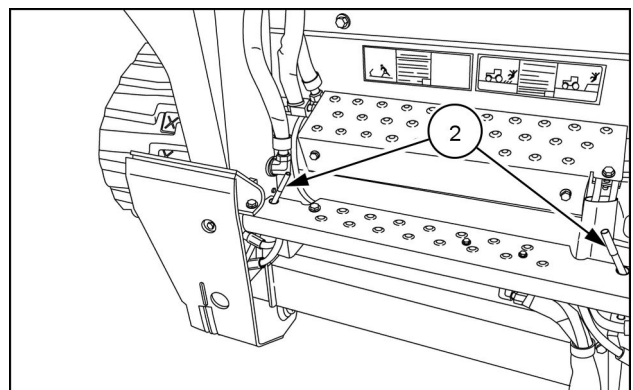
NOTE: If you have any questions about installing or removing attachments, contact your dealer.

Removing the attachment

1. Position the attachment above the dismount surface.
2. Press and hold the hydraulic coupler switch **(1)** in the unlock direction. With the other hand activate and hold the control lever's auxiliary switch.
3. Continue to hold the switches as you watch for the red markings on the indicator pins **(2)** to appear. Visible red markings indicate the coupler is in the unlock position.
4. Release the control lever's auxiliary switch and the hydraulic coupler switch.
5. Place the attachment on the dismount surface, roll the coupler out, and back the machine away from the attachment.



RAIL19SSL0068BA 1



RAIL14SSL0840AA 2

Installing the attachment

1. Confirm the red markings on the indicator pins (2) are visible (unlock position). If the red markings are not visible, press and hold the hydraulic coupler switch (1) in the unlock direction. With the other hand activate and hold the control lever's auxiliary switch.
2. Tilt the hydraulic coupler forward.
3. Slowly move the machine toward the attachment until both tabs on top of the coupler are underneath and in alignment with the attachment's mounting points.
4. Raise the loader arm enough to engage the attachment.
5. Curl the coupler back towards the machine until the attachment is completely resting on the coupler and off the ground.

NOTE: In the next step, if the indicator pins do not retract you may need to reposition the attachment on the coupler.

6. Activate the auxiliary switch on the control lever to the end of its control stroke. The indicator pins (2) on the coupler will retract into the lock position and the red markings will no longer be visible on the indicator pins.
7. Slowly raise and roll the attachment outward. Do not leave the operator seat but make a visual inspection from the cab that the hydraulic coupler's lower lock pins (1) extend fully into the attachment's lower tab slots.

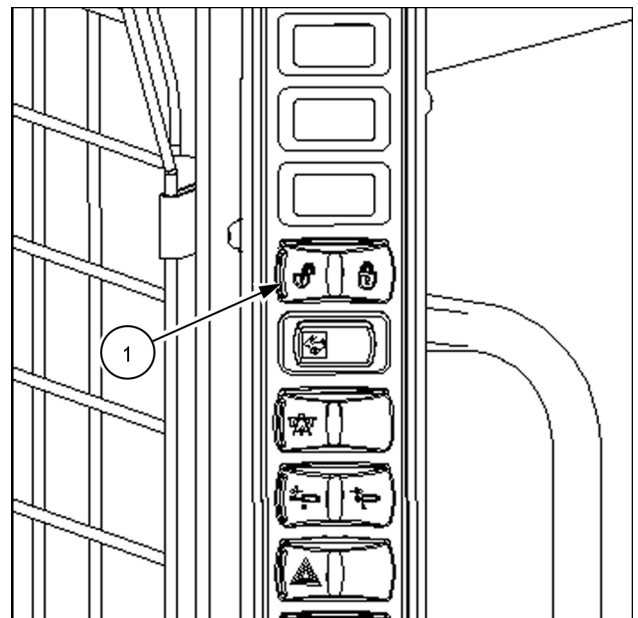
⚠ WARNING

Falling object hazard!

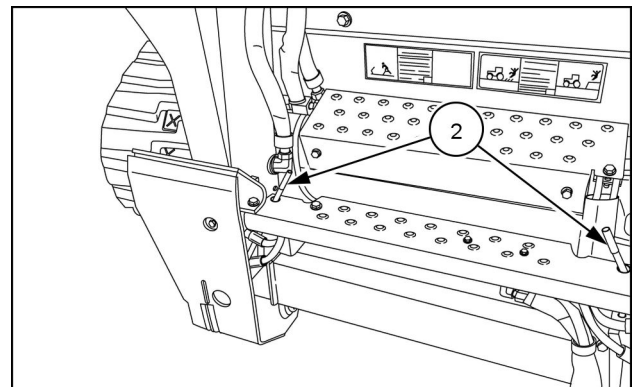
Before operating the machine, always make sure the bucket or attachment is securely locked into the coupler. A loader bucket or attachment that is not securely locked into the coupler could come off during loader operation.

Failure to comply could result in death or serious injury.

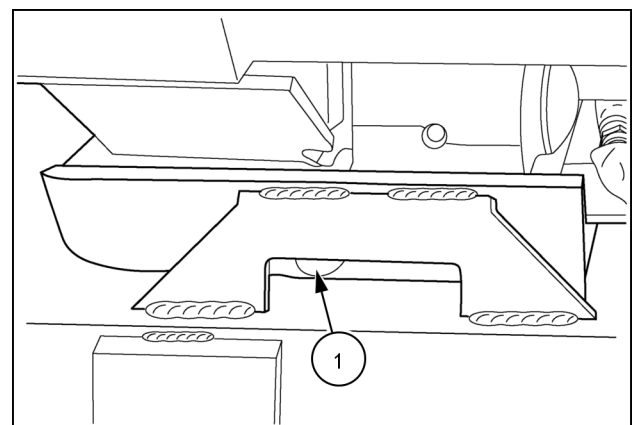
W0947A



RAIL19SSL0068BA 3



RAIL14SSL0840AA 4



86092926 5

8. Make sure that the attachment is secure and safe to use. Operate the attachment through the full range of motions before you begin normal work operations.

Field operation

WARNING

Roll-over hazard! A full bucket in the raised position alters the center of gravity of the machine. When operating a loader with a full bucket on slopes, observe the following precautions:

1. Avoid turning the machine on slopes.
2. Always drive slowly straight up and down slopes.
3. Always carry the load as low as possible.

Failure to comply could result in death or serious injury.

W0018A

WARNING

Electrical shock hazard!

Do not work under overhangs or electric wires. Do not work where there is a danger of sliding.

Failure to comply could result in death or serious injury.

W0215A

WARNING

Loss of control hazard!

Keep hands and feet on the appropriate controls at all times to maintain control of the machine.

Failure to comply could result in death or serious injury.

W0237A

WARNING

Overturning hazard!

Always try to park the machine on firm level ground. Avoid parking on slopes. Block the wheels in both directions.

Failure to comply could result in death or serious injury.

W0051A

WARNING

Equipment failure could cause accident or injury!

Always fasten the seat belt securely before you operate the machine. Inspect seat belt parts for wear and damage. Replace any and all worn or damaged parts of the seat belt prior to operation.

Failure to comply could result in death or serious injury.

W0046C

WARNING

Falling object hazard!

Wear an approved safety hat when operating the machine and while in any work area.

Failure to comply could result in death or serious injury.

W0219A

Job layout

For efficient operation, arrange the job to minimize the time required to perform the work cycle. In spotting the dump site, consider wind direction, and ground slope. Whenever possible, position the dump site so that the wind will carry dust away from the operator. Before the operator begins work, take a few minutes to level off the work area if it is not smooth. Minimize transport distances for a faster work cycle.

Operating load capacities

⚠ WARNING

Roll-over hazard!

Overloading the rated capacity of the machine could cause the machine to roll over. Always follow the recommended load limits. Never overload the rated capacity of the machine. Failure to comply could result in death or serious injury.

W0217A

⚠ WARNING

Overturning hazard!

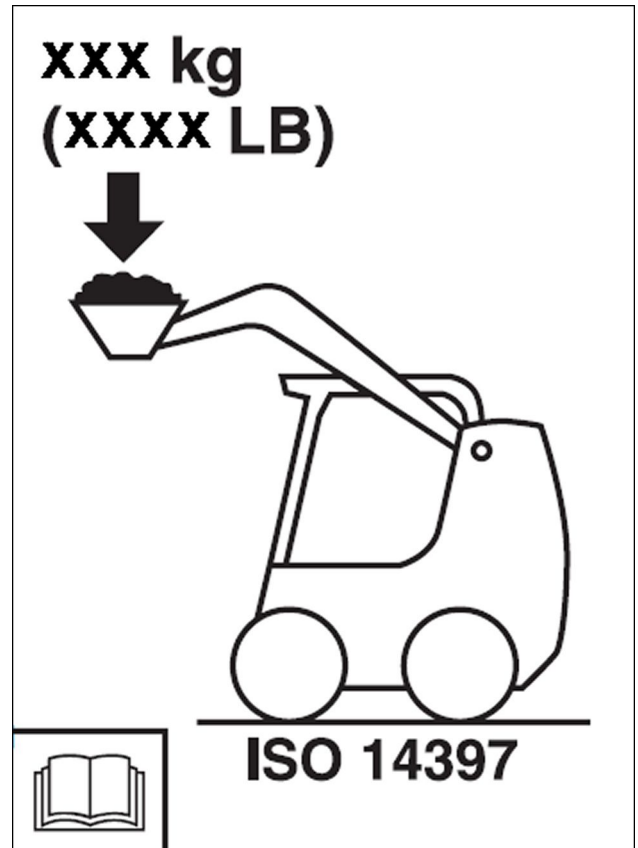
The operator must know the correct **OPERATING LOAD** capacity of the machine before attempting to operate the machine. Always follow the recommended load limits.

Failure to comply could result in death or serious injury.

W0216A

See page 9-2 for a list of models and specifications. For your specific machine, see the decal on your machine for the operating load capacity. The decal is located on the cab right-hand console post. If you have questions about the load capacity of your machine, contact your dealer.

- Before starting work, familiarize yourself with the work area. Locate holes, obstacles, and debris that can be cleared from the site. Be aware that the job site may change repeatedly during the course of the work day.
- Locate any unavoidable danger areas such as, power lines, bridges, and tight corners to make sure that you can operate safely in these areas.
- Confirm the possibility of other personnel in the machine vicinity and clear the area of unauthorized personnel.
- If possible, arrange the job site to minimize the time required to perform the work cycle. Consider wind direction and ground slope. Position the dump site so that the wind will carry dust and dirt away from the operator.
- Use low range for maximum machine efficiency.



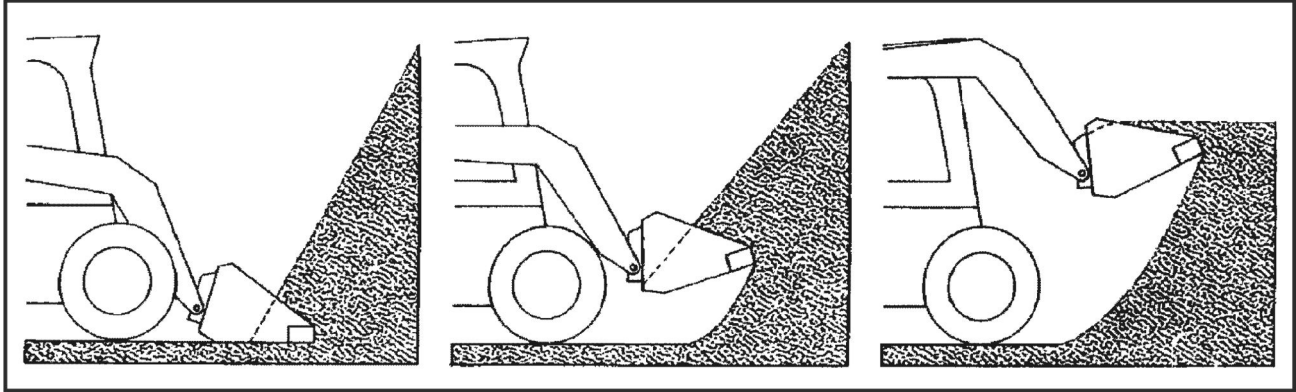
RAIL15SSL0380BA 1

Filling the bucket

There are two basic methods of filling a bucket from a pile: arc penetration and step penetration. Judge the type of penetration needed for loading and vary the methods to suit the materials.

Arc penetration

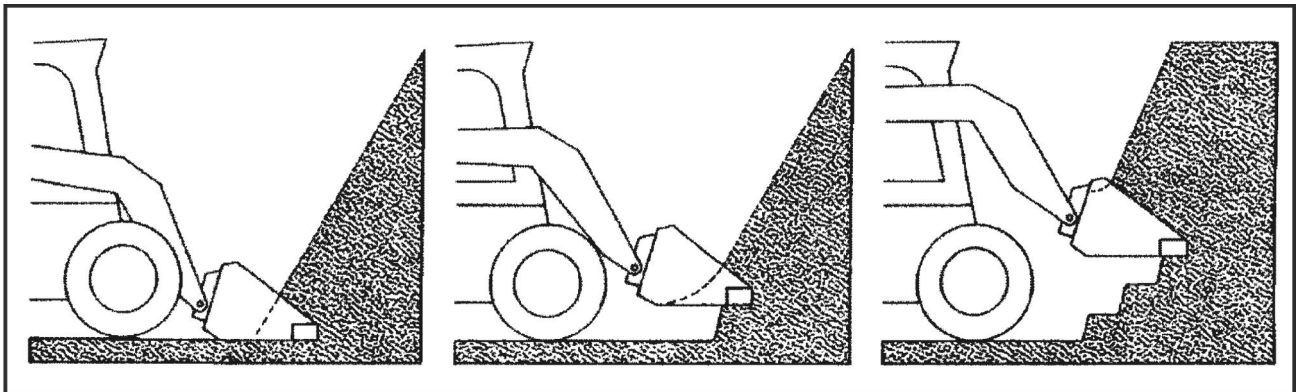
With the arc penetration method, the bucket is forced into the pile and rolled back while raised in a continuous upward arc until the bucket is filled. When using this method, remember that too much roll back may over load the lift system. When activating both the lift and bucket hydraulic systems at the same time, the lift system may occasionally stall. When this happens, disengage either the lift or roll back function to allow maximum hydraulic force to act upon one set of cylinders.



BT09A228 2

Step penetration

With the step penetration method, the bucket is forced into the pile at ground level with the bucket bottom horizontal. Force the bucket into the pile as far as possible during the initial thrust. Raise the bucket about **0.3 m (1 ft)** and then force it further into the pile. Repeat this cycle as many times as necessary to fill the bucket.



BT09A229 3

Digging

⚠ WARNING

Collision hazard!

Always make sure the area behind the machine is clear of all persons, animals, and obstructions **BEFORE** backing up.

Failure to comply could result in death or serious injury.

W0232A

⚠ WARNING

Loss of control hazard!

A full bucket in the raised position may cause the machine to slide when operating over rough ground. Keep the bucket as low as possible during operation for better stability and visibility. Always operate the machine at slow speeds over rough ground.

Failure to comply could result in death or serious injury.

W0271A

⚠ WARNING

Tip-over hazard!

Raising an overloaded bucket could cause an accident. If this situation should occur, and the machine should start to tip forward, **IMMEDIATELY** lower the lift arms.

Failure to comply could result in death or serious injury.

W0255A

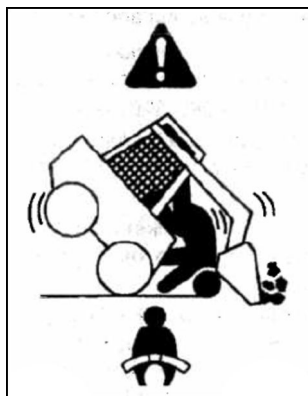
⚠ WARNING

Loss of control hazard!

Travel speed should be such that complete control and machine stability is maintained at all times. Where possible, avoid operating near ditches, embankments and holes. Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.

Failure to comply could result in death or serious injury.

W0233A



BC04F048X 4

When digging with the machine, remove a thin layer with each pass. This method is efficient and minimizes wheel slippage. When encountering firmly packed materials, flutter the bucket control valve to assist penetration.

NOTE: If the engine pulls down as the machine is engaging a load, the directional controls are being held too far in the direction of travel. Maximum torque is obtained at minimum ground speed in low range for all machines.

Transporting the load

When backing out and transporting a load, carry the bucket just high enough to clear obstacles in the loader's path. Raising the bucket higher than necessary reduces stability.

Dumping the bucket

Coordinate the forward ground speed and lift arm lift speed to attain the desired bucket height when arriving at the dump site.

Before the forward and lifting motions are stopped, begin dumping the bucket to gradually empty the load at minimum lift arm height. By emptying before stopping, machine stability can be maximized.

When loading into a truck, the bucket can be used to push materials to the far side of the truck if the bucket is in a tilted down position. For greatest efficiency this should be done as the load is being dumped, before the machine's forward motion is stopped. Try to spot the truck so that you dump over the low side and into the far side of the truck first.

When handling adhesive materials, the bucket can be fluttered to loosen the materials which tend to stick to the back of the bucket.

Returning the bucket load to the loading position

Immediately after the bucket has been fully dumped, begin the roll back cycle as the machine is backed away from the dump site. Repositioning the bucket for the filling cycle while lowering the lift arms is a good time saver. Fine adjustments in bucket height can be made as the machine begins forward on the filling cycle, thereby saving a period of dead time between the dumping and filling cycles.

Dozing with the bucket

The machine can be used for dozing by controlling the tilt of the bucket.

The machine can be used for leveling, by placing the bucket in the dump position and back dragging loose soil. The tilt of the bucket will control the amount of soil that is moved.

Place the lift arm control valve spool in the detent position to allow the bucket to follow the ground contour and deposit soil in the low areas.

NOTICE: Do not push against objects with the lift arms fully raised or damage to the lift arms or lift arm cylinders may occur.

NOTICE: Do not push forward with the bucket in the fully dumped position because the bucket cylinders may be damaged.

Dislodging mired machine

In most cases, when a machine becomes bogged down, the bucket can be used to push the loader to more solid ground. When this is done, the bucket is in the fully dumped position and the lift arms are lowered. The bucket is then curled back as the steering control levers are pulled back. When the bucket has stroked out of ground engagement, immediately return the steering control levers to neutral. DO NOT spin the wheels. Repeat this cycle as necessary to move the machine to solid ground.

Operating the machine in water

⚠ WARNING

Driving hazard!

Do not operate the machine in a fast flowing stream. Fast flowing water can cause you to lose control of the machine.

Failure to comply could result in death or serious injury.

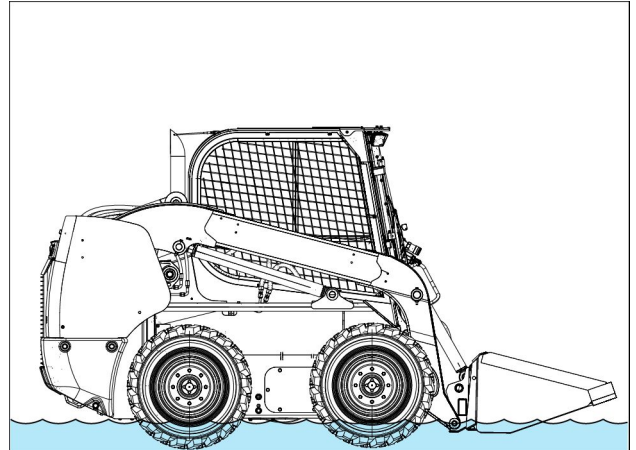
W0151A

Make sure that the bed of the stream or stretch of water can support the weight of the machine.

The level of the water must not exceed the bottom of the machine belly pan.

Before taking the machine into the water, pump plenty of new grease into the attachment linkages on the machine.

After operating the machine in the water, pump plenty of new grease into the attachment linkages on the machine.



RAIL23SSL0231BA 1

7 - MAINTENANCE

GENERAL INFORMATION

General safety before you service

WARNING

Overturning hazard!

Always try to park the machine on firm level ground. Avoid parking on slopes. Block the wheels in both directions.

Failure to comply could result in death or serious injury.

W0051A

WARNING

Crushing hazard!

Never use the machine lift arms or attachment to raise the machine for service. Use adequate blocking to ensure the machine is supported safely with all four wheels off the ground.

Failure to comply could result in death or serious injury.

W0345A

WARNING

Pressurized system!

Always remove all pressure before working on the hydraulic system. Follow the pressure BLEED program in the Configuration Mode to remove the pressure in the entire hydraulic system.

Failure to comply could result in death or serious injury.

W1410A

WARNING

Improper operation or service of this machine can result in an accident.

Raised equipment or machine movement without an operator can cause serious injury. Always do the following before performing any maintenance:

Park the machine on flat, level ground.

Lower the attachment to the ground.

Shut down the engine and remove the starter switch key.

Lock the tracks.

Failure to comply could result in death or serious injury.

W0269A

WARNING

Improper operation or service of this machine can result in an accident.

If you do not understand a maintenance procedure, or doubt your ability to perform a maintenance procedure correctly, see your authorized dealer.

Failure to comply could result in death or serious injury.

W0157A

WARNING

Pressurized hydraulic fluid can penetrate the skin and cause severe injuries.

Hydraulic fluid is under extreme pressure. Rest the bucket or attachment on the ground. Shut the engine off, turn the key on, and move the hydraulic control lever through all movements several times to relieve residual pressure in the system.

Failure to comply could result in death or serious injury.

W0161A

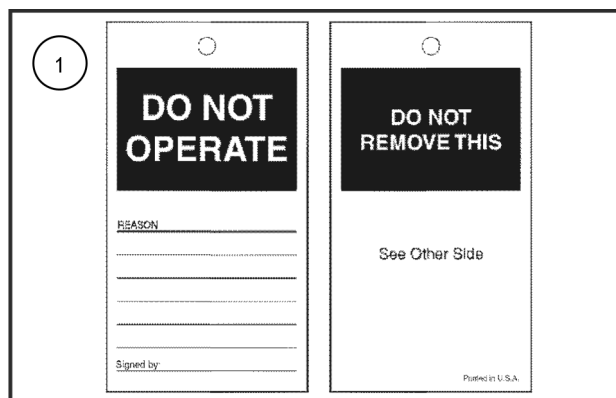
Read the safety signs and instructional signs on the machine. Read the operator's manual and safety manual. Understand the operation of the machine before you start servicing.

Use the correct safety clothing and safety equipment. Understand how to use a fire extinguisher and first aid kit.

Maintenance and lubrication schedules are defined for NORMAL working environments and conditions. Extreme working conditions and environments require more frequent service and care. Contact your dealer if you have any questions about your service intervals or requirements.

Before you service the machine, put a DO NOT OPERATE TAG (1) on the instrument panel or key switch.

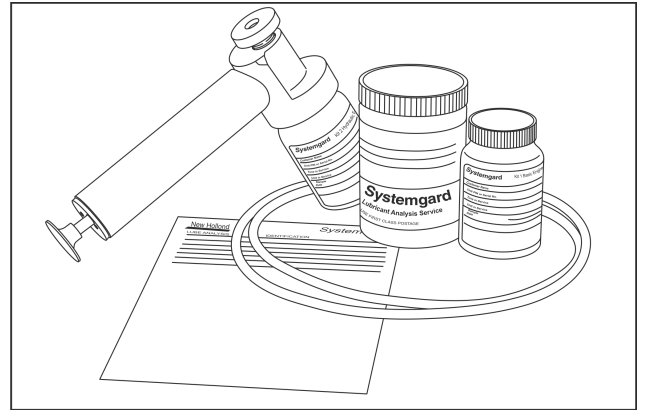
NOTICE: While any company can perform necessary maintenance or repairs on your equipment, CASE CONSTRUCTION strongly recommends that you use only authorized CASE CONSTRUCTION dealers and products that meet the given specifications. Improperly or incorrectly performed maintenance and repair voids the equipment warranty and may affect service intervals.



321_4614 1

Lubrication analysis program

Ask your dealer about a lubricant analysis program. Through this service, your lubricants are tested in an independent laboratory. You simply remove a sample of lubricant from your machine and send the sample to the independent laboratory. After the sample is processed, the laboratory will report back to you and guide you with maintenance requirements. A lubricant analysis program can help support your equipment up time and provide you with a service that can pay back dividends when you trade for another piece of equipment. The normal engine oil change interval is listed in the maintenance chart. Operating conditions, quality of the engine oil, and sulfur content of the fuel can change this interval. It is recommended that you use a lubricant analysis program. See your dealer.



BT09B001-01 1

Plastic and resin parts

Avoid using gasoline, kerosene, paint thinner, etc., when cleaning plastic windows, console, instrument cluster, monitor, gauges, etc. Use ONLY water, mild soap and a soft cloth when you clean these parts. Using gasoline, kerosene, thinners, etc., will cause discoloration, cracking or deformation of the part being cleaned.

Machine cleaning

WARNING

Fire hazard!

Failure to inspect and clean machine and engine compartment could result in reduced machine performance, machine damage, and increased risk of fire. Fire can result in total loss of vehicle and property, and may cause serious personal injury. Check machine and engine compartment daily for debris build up, especially in operating environments with high debris. Remove any debris immediately.

Failure to comply could result in death or serious injury.

W1181A

It is recommended that the complete machine be kept clean. Machine operation in water, mud, dust, landfill, land clearing, or forestry will require complete machine clean up. Cleaning includes periodic removal of inspection covers and guards to gain access for cleaning and removal of dirt and debris. Clean all dirt and foreign material from the engine area and from around all access doors and panels. Clean all cooling systems and radiators.

After cleaning is complete, install all covers and guards. DO NOT operate the machine with covers or guards removed.

NOTICE: When washing the machine, DO NOT direct the water jet onto electrical or electronic components, assemblies, or openings. Water ingress may cause malfunctions or the failure of the entire electronic system.

NOTICE: Avoid direct power washing of interior electrical components such as the instrument panel, switches, radio, and speakers.

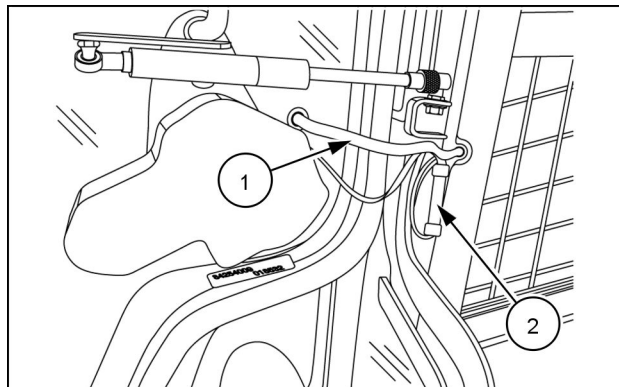
Cab door removal and installation

NOTICE: During the removal process retain all door hinge shims and keep in a secure location. The shims are required for a proper fit when installing the door at a later date.

Removal

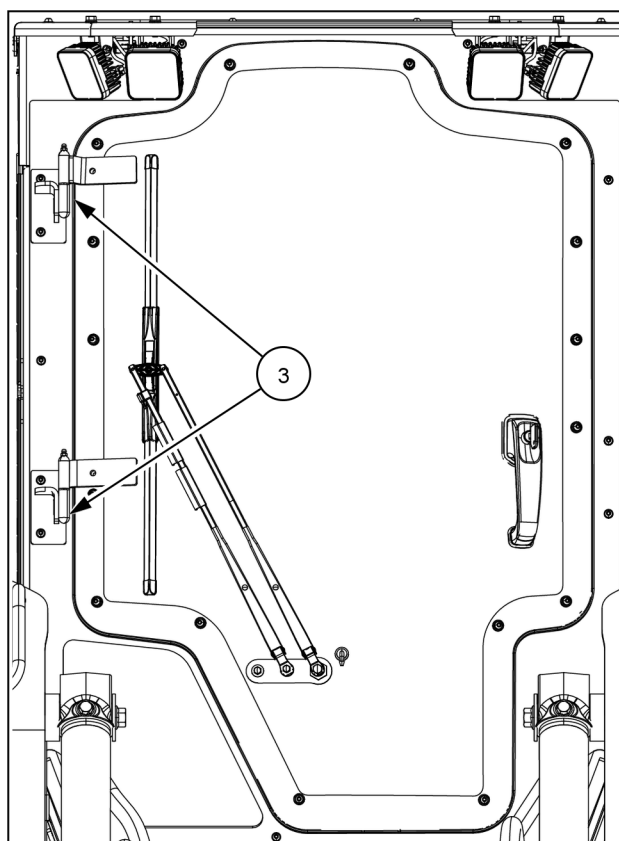
1. Open door.
2. Disconnect the washer hose (1).
3. Disconnect the wire harness (2).
4. Plug the jumper connector into the harness (2).

NOTE: Jumper connector is tied to the door harness.



93106895 1

5. Lift the door off the hinges (3).

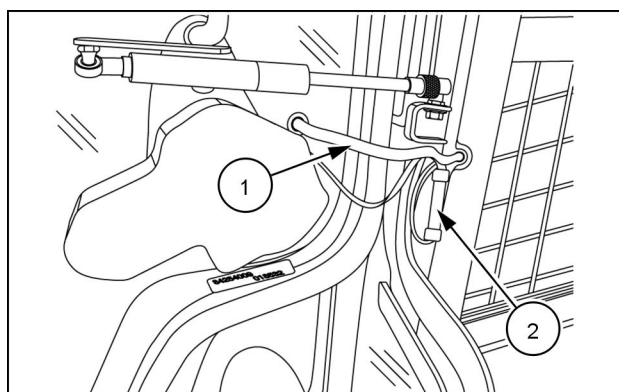


RAIL23SSL0226BA 2

Installation

NOTE: If door hinge shims were removed during the removal procedure, install the shims.

1. Install the door on the hinges.
2. Install the washer hose (1).
3. Unplug the jumper connector from the wire harness (2).
4. Connect the wire harness (2).
5. Tie the jumper connector to the door harness.



93106895 3

Battery safety - check and cleaning

WARNING

Hazardous chemicals!

Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.

Failure to comply could result in death or serious injury.

W0006A

WARNING

Explosive gas!

Batteries emit explosive hydrogen gas and other fumes while charging. Ventilate the charging area. Keep the battery away from sparks, open flames, and other ignition sources. Never charge a frozen battery.

Failure to comply could result in death or serious injury.

W0005A

WARNING

Battery acid causes burns. Batteries contain sulfuric acid.

Avoid contact with skin, eyes or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately.

Failure to comply could result in death or serious injury.

W0111A

WARNING

Battery gas can explode!

To prevent an explosion: 1. Always disconnect the negative (-) battery cable first. 2. Always connect the negative (-) battery cable last. 3. Do not short circuit the battery posts with metal objects. 4. Do not weld, grind, or smoke near a battery.

Failure to comply could result in death or serious injury.

W0011A

WARNING

Chemical hazard!

Always wear protective clothing and goggles when cleaning with solvents, acids, or alkaline chemical agents. Always follow the chemical manufacturer's instructions.

Failure to comply could result in death or serious injury.

W0180A

WARNING

Battery acid causes burns. Batteries contain sulfuric acid.

Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.

Failure to comply could result in death or serious injury.

W0120A

WARNING

Arc flash hazard!

Do not reverse battery terminals. Connect positive cable ends to positive terminals (+) and negative cable ends to negative terminals (-).

Failure to comply could result in death or serious injury.

W1366A

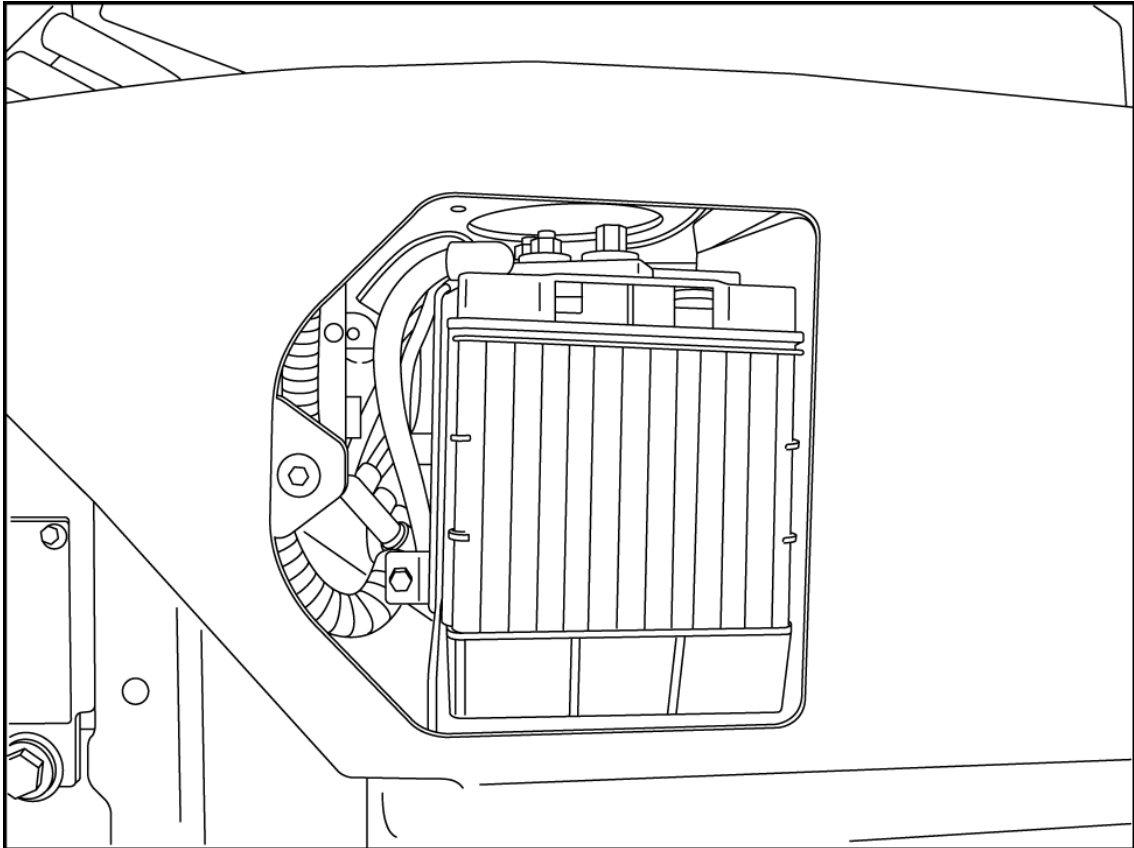
⚠ WARNING

Explosion hazard!

If battery electrolyte is frozen, attempting to charge the battery or jump-start the engine can cause the battery to explode. Always keep batteries at full charge to prevent frozen battery electrolyte. Never charge a frozen battery.

Failure to comply could result in death or serious injury.

W0203A



RAIL14SSL0710AA 1

Check the battery as required, for dirt corrosion and damage. Dirt mixed with electrolyte or moisture on the top of the battery can cause a discharged condition in the battery. Clean the battery by using baking soda or ammonia and flush the outside of the battery with water. Spray the battery terminals with battery terminal protector. DO NOT use grease.

Battery removal and installation

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

W0398A

⚠ WARNING

Chemical hazard!

When lifting a plastic-cased battery, excessive pressure on the end walls could cause acid to spill through the vent caps. Lift a plastic-cased battery with a battery carrier or with your hands positioned on opposite corners of the battery. Always wash your hands after handling.

Failure to comply could result in death or serious injury.

W0385A

⚠ WARNING

Hazardous chemicals!

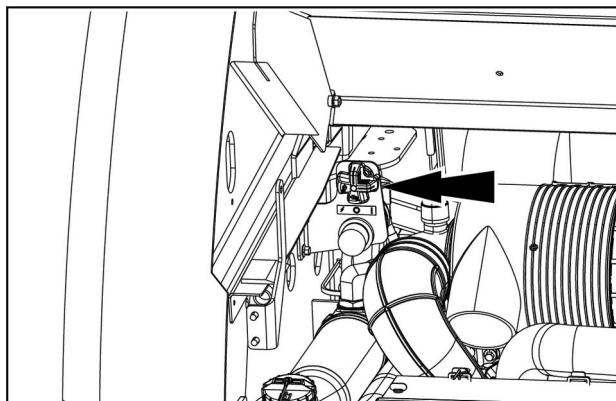
Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.

Failure to comply could result in death or serious injury.

W0006A

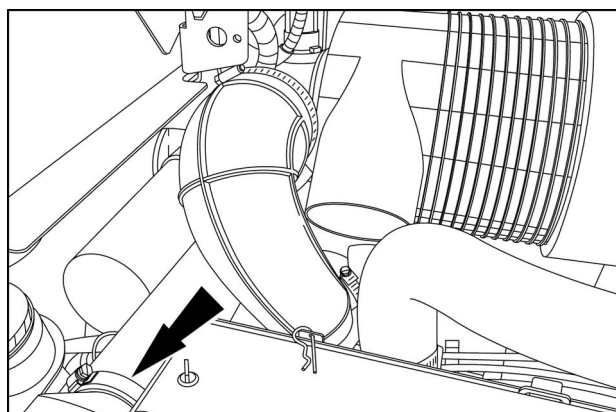
Battery – Remove

1. Open the engine hood and turn the battery quick disconnect switch to the OFF position.



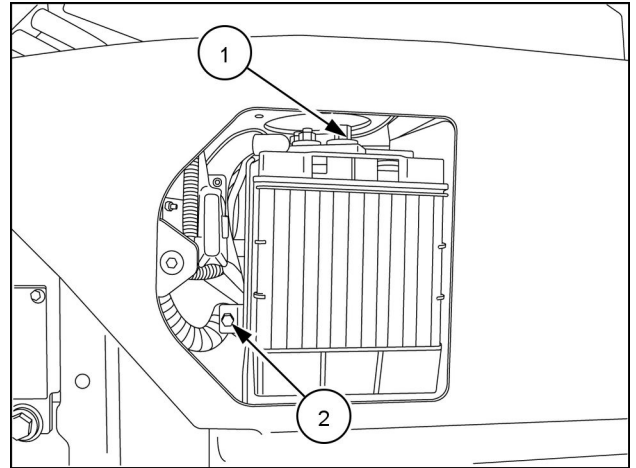
RAIL23SSL0261BA 1

2. Remove the clamp that fastens the hose to the air cooler. Lift up the hose to access the battery.



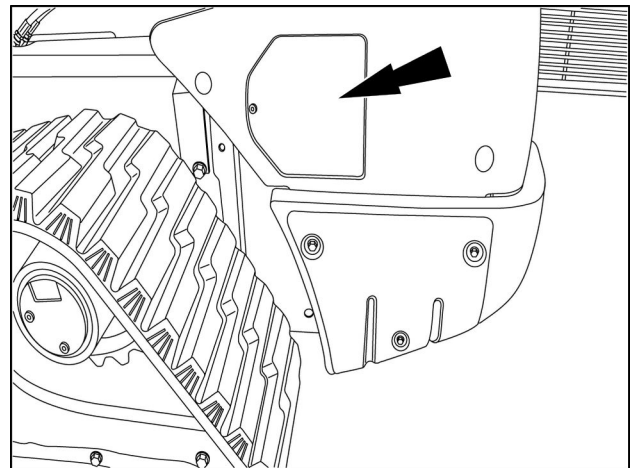
RAIL15SSL0029BA 2

3. Disconnect the negative (-) battery cable **(1)** from the battery
4. Remove the bolt **(2)** and remove the hold-down bar.



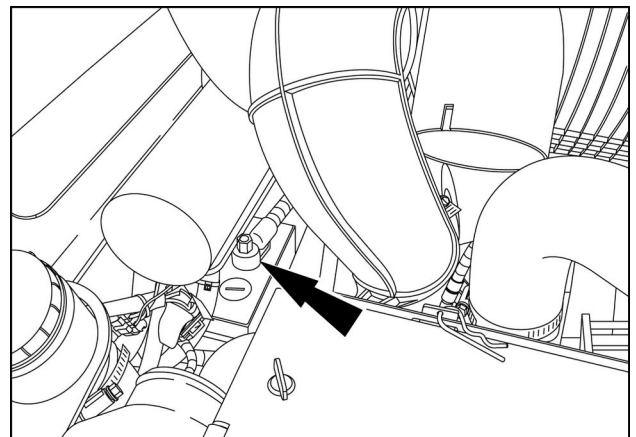
RAIL14SSL7010AA 3

5. Remove the battery cover to access the battery from the outside of the machine.



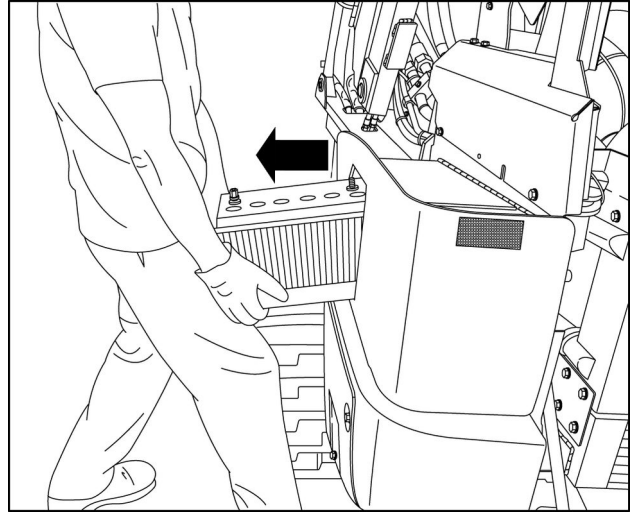
RAIL14SSL0707AA 4

6. Disconnect the positive (+) battery cable from the battery.



RAIL15SSL0030BA 5

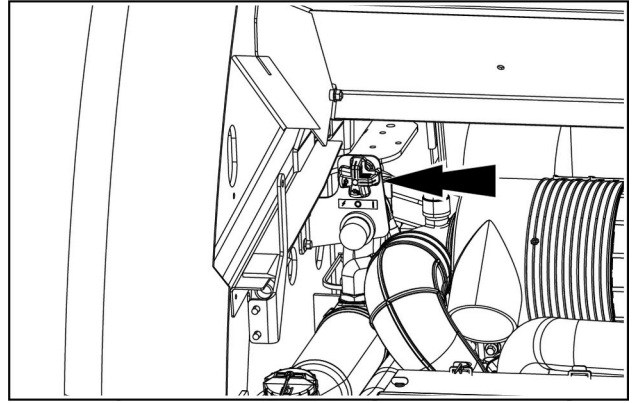
7. Remove the battery.



RAIL15SSL0031BA 6

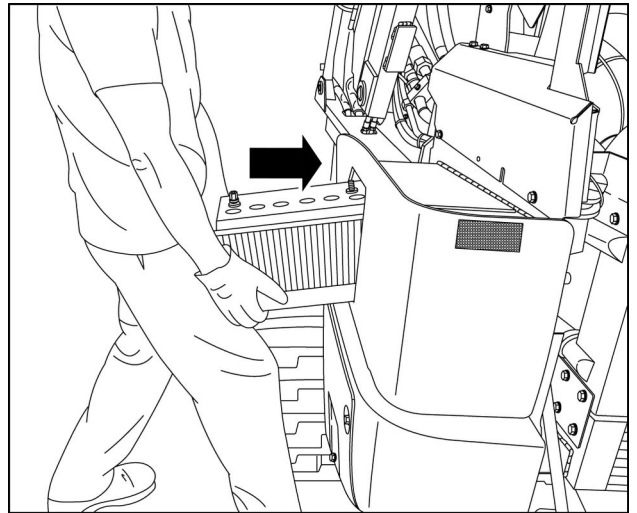
Battery – Install

1. Confirm that the battery quick disconnect switch is in the OFF position.



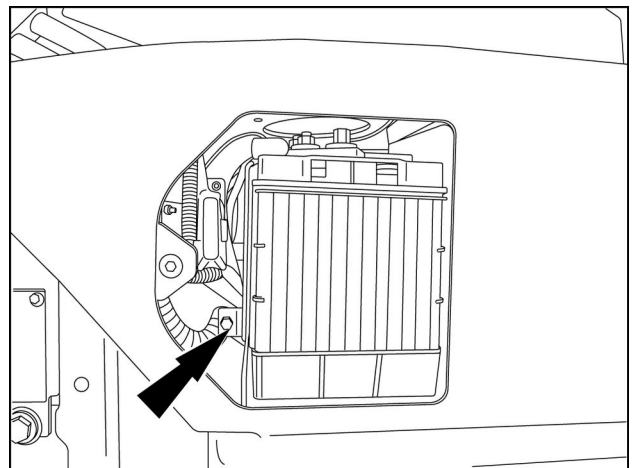
RAIL23SSL0261BA 7

2. Place the battery in the compartment.



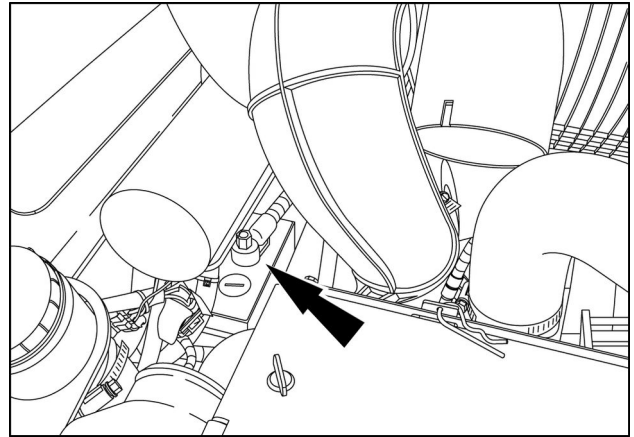
RAIL15SSL0031BA 8

3. Install the hold-down bar and secure the bolt.



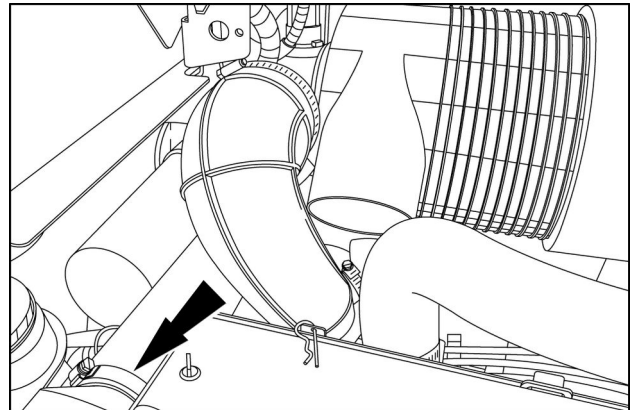
RAIL14SSL7010AA 9

4. Connect the positive (+) battery cable.



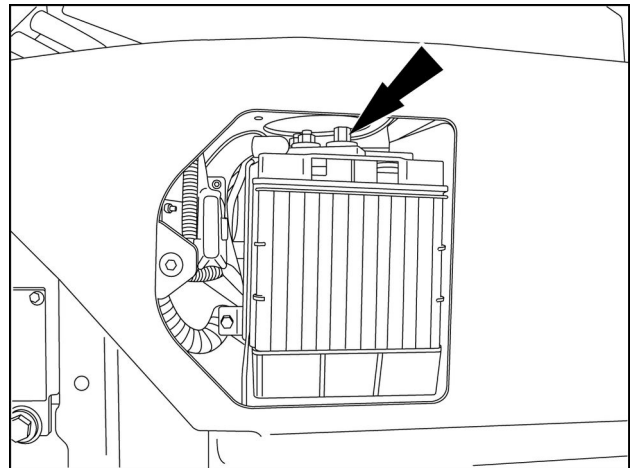
RAIL15SSL0030BA 10

5. Install the air cooler hose and secure with the clamp.



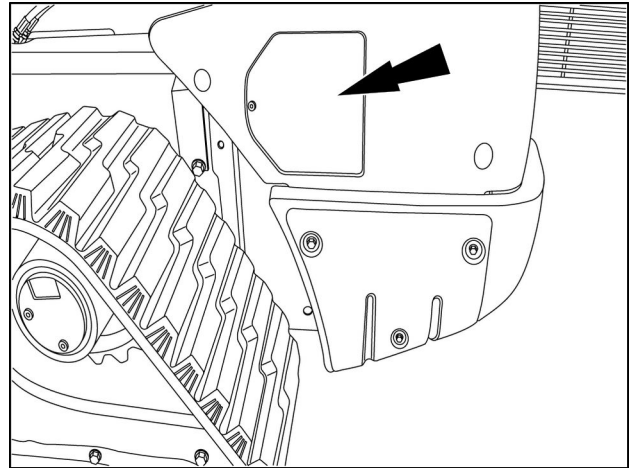
RAIL15SSL0029BA 11

6. Connect the negative (-) battery cable.



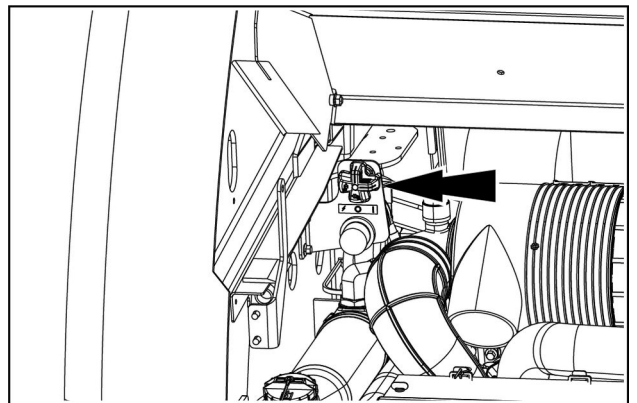
RAIL14SSL7010AA 12

7. Install the battery cover.



RAIL14SSL0707AA 13

8. Turn the battery quick disconnect switch to the ON position.



RAIL23SSL0261BA 14

9. Close the engine hood.

Fire extinguisher

It is recommended that you have a fire extinguisher on your machine. See your dealer for the type and mounting information.

NOTICE: Use the fire extinguisher mounting kit provided by your dealer. DO NOT make any modifications to the Roll Over Protective Structure (ROPS) or Falling Object Protective Structure (FOPS).

NOTICE: Make sure that the fire extinguisher(s) is maintained and serviced according to the manufacturer's instructions.

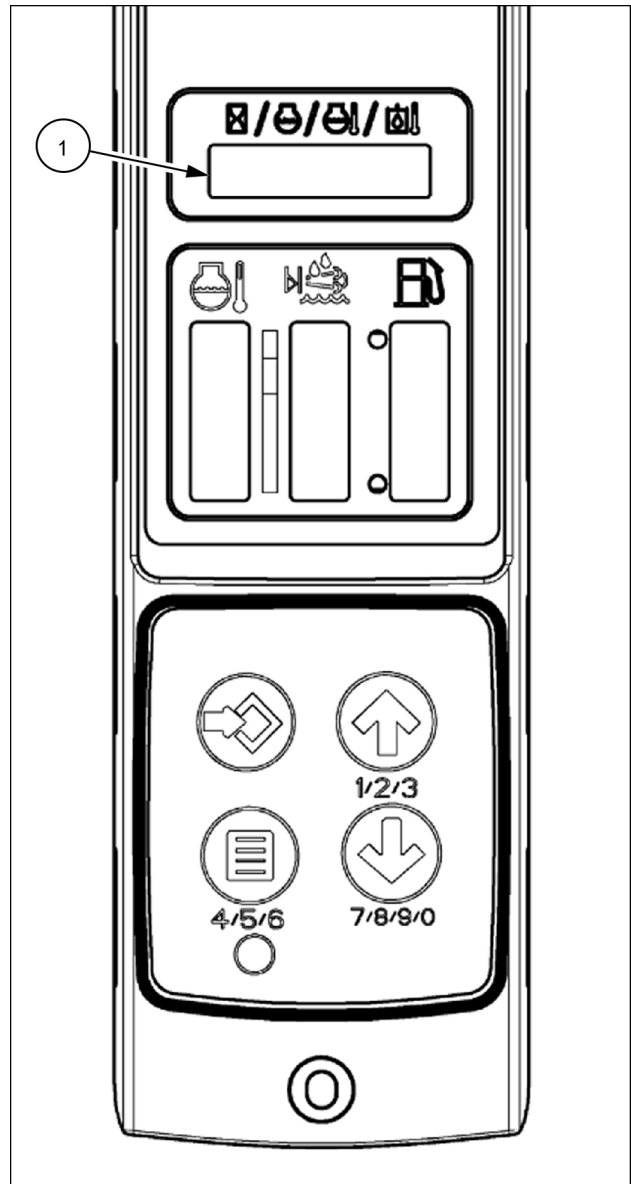
Engine hourmeter

Service your machine at the intervals and locations given in the maintenance and lubrication chart. When you service your machine, use only high quality lubricants.

The engine hourmeter (1) shows the amount of actual hours the engine has run. The first number to the right displays tenths of an hour and the remaining digits to the left display hours. Use the engine hourmeter along with the lubrication and maintenance chart to service your machine at the correct intervals.

Engine hours are displayed with the key switch off or with the engine running, if the operator chooses.

NOTE: After the machine hourmeter reaches 9999.9 hours the tenths position will no longer be shown. The display will only show whole hours.



RAIL19SSL0103CA 1

Fluids and lubricants

Fuel tank

Capacity	96.5 L (25.5 US gal)
Specifications	#2 Diesel ultra-low sulfur

Cooling system

Capacity	19.0 L (5.0 US gal)
Specifications	EXTENDED LIFE OAT COOLANT/ANTIFREEZE

Hydraulic system

Reservoir capacity	22.7 L (6.0 US gal)
System capacity:	45.4 L (12.0 US gal)
Specifications	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

Chain compartments

Capacity - each side	
SR270B, SV340B	22.2 L (23.5 US qt)
Specifications	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

Grease fittings

Quantity	As required
Specifications	MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2 (Molydisulfide)

Engine crank case oil

Capacity - with filter change	8.5 L (9.0 US qt)
Specifications	NO.1 ENGINE™ OIL SBL CJ-4

Final track drive

Capacity - each side	
TR340B, TV450B	1.0 L (1.06 US qt) +/- 0.1 L (0.1 US qt)
Specifications	HYPOID GEAR OIL EP SAE 80W-90

Emissions fluid

Reservoir capacity	10.7 L (2.8 US gal)
DEF/AdBLUE® low volume indicator	2.4 L (0.6 US gal)
Specifications	DEF/AdBLUE®

Engine oils

CASE CONSTRUCTION prefers the use of engine oils that meet CNH Industrial standard **MAT3571** in your engine.

You may also use engine oils that meet CNH Industrial standard **MAT3572** in your engine.

You may use other engine oils if the engine oils meet **API CJ-4** or **API CK-4** or **ACEA E6** or **ACEA E9** performance requirements.

CASE CONSTRUCTION engine oils exceed API and ACEA performance requirements.

NOTE: Do not put performance additives or other oil additive products in the engine crankcase. See your CASE CONSTRUCTION dealer for approved engine oil additives, engine oil analysis test package information.

RECOMMENDED VISCOSITY GRADES AT VARYING AMBIENT TEMPERATURE LIMITS												
			(H)	SAE 0W-40								
			(H)	SAE 10W-40								
			(H)	SAE 10W-30								
			(H)	SAE 15W-40								
-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C	30 °C	40 °C	50 °C			
-40 °F	-22 °F	-4 °F	14 °F	32 °F	50 °F	68 °F	86 °F	104 °F	122 °F			
(H) = Engine oil pan or coolant block heater recommended in this range												

This information reflects the coldest ambient temperature condition for starting a cold machine and for operating a cold machine.

Engine oil and filter service intervals

CASE CONSTRUCTION develops the oil/filter change intervals given in this manual from tests with CASE CONSTRUCTION lubricants/filters.

Engine oil and filter service interval recommendations are based on type of engine oil, oil filter used, sulfur, bio-diesel content of diesel fuel. See diesel fuel recommendations for the approved Diesel fuel sulfur content, Bio-Diesel blends, and fuel specification information.

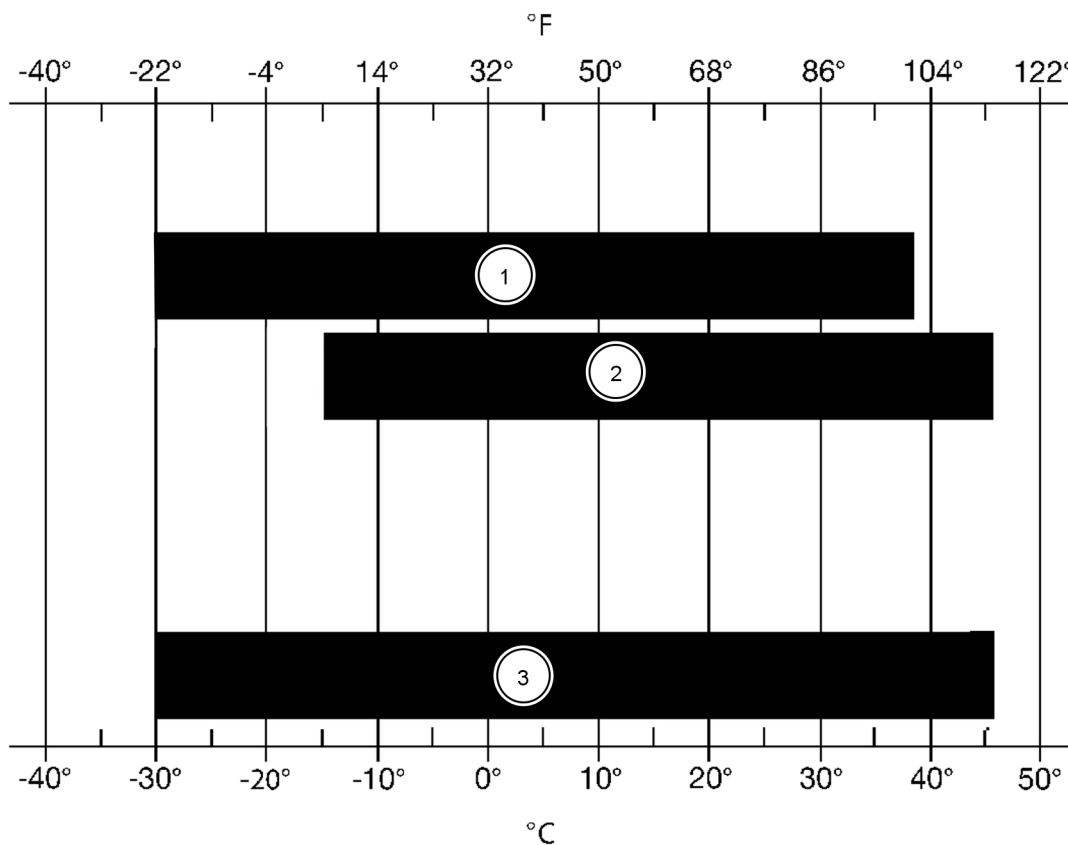
Always change engine oil and oil filter at the service intervals described in your maintenance chart. See **7-32**.

NOTICE: Service intervals must be reduced by **50%** (Maximum **300 h**) when using engine oils that do not meet CNH Industrial standards **MAT3571** or **MAT3572**. Service intervals must be reduced by **20%** (Maximum of **500 h**) when using engine oils that meet CNH Industrial standard **MAT3572**.

Hydraulic oil viscosity

Hydraulic oil for all models

This information reflects the coldest ambient temperature condition for starting a cold machine and for operating a cold machine.



RAPH12SSL0110FA 1

Block	Viscosity	Temperature range
(1)	PREMIUM HYDRAULIC OIL HV46 MULTI-GRADE ANTI-WEAR	-30 – 38 °C (-22 – 100 °F)
(2)	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW	-15 – 46 °C (5 – 115 °F)
(3)	No.1 ENGINE™ OIL FULL SYNTHETIC SAE 0W-40	-30 – 46 °C (-22 – 115 °F)

NOTE: CASE CONSTRUCTION recommends **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** for applications where continuous operations above 38 °C (100 °F) ambient temperature or frequent roading applications (above 20 – 30 min) are common.

NOTE: CASE CONSTRUCTION recommends **PREMIUM HYDRAULIC OIL HV46 MULTI-GRADE ANTI-WEAR** for improved cold weather operation. Standard factory fill oil **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** is acceptable for cold weather operation when sufficient warm up time is provided.

Organic Acid Technology (OAT) coolant

CASE CONSTRUCTION requires the use of a fully formulated Organic Acid Technology (OAT) based coolant. The coolant must meet the specifications outlined in the CNH Industrial material specification MAT3724. Use of coolant not meeting this specification is not allowed. Mixing of different coolant brands is not recommended.

NOTICE: OAT coolant is mandatory for all FPT engines compliant to Tier 4B (final) or Stage V emissions using Selective Catalytic Reduction (SCR). NEVER mix OAT coolant with IAT coolant. Under no circumstances should you top off a cooling system with only water.

Use distilled or demineralized water for diluting when using OAT coolant concentrate. The optimum OAT coolant to water concentration is 50/50. This concentration will protect the cooling system to **-37 °C (-35 °F)**. Do not exceed **60%** by volume ethylene glycol-based coolant. The heat dissipation and antifreeze properties may otherwise be negatively affected. You can use a refractometer to check the concentration level. If distilled or demineralized water is not available, use water for dilution with the following properties:

Property	Limit Maximum
Total Solids	340 ppm
Total Hardness	170 ppm
Chloride (Cl)	40 ppm
Sulfate (SO ₄)	100 ppm
Acidity pH	5.5 to 9.0

You should not use Supplemental Coolant Additives (SCA). Do not add rust inhibitors or other additives to your vehicle's cooling system. Contact your CASE CONSTRUCTION dealer for approved additives and coolant analysis test package information.

Service intervals

See **7-32** for the proper service intervals. Drain and flush the cooling system at the recommended drain interval, then fill with fresh coolant.

Definitions

Inorganic Acid Technology (IAT) coolant:

A coolant that relies on inorganic inhibitors such as silicates, nitrites, and phosphates for corrosion and cavitation protection.

Organic Acid Technology (OAT) coolant:

A coolant that relies on inhibitors such as organic acid salts for corrosion and cavitation protection.

General specification - Diesel fuel

Only use diesel fuel that conforms to North American standard **ASTM D975** Grade No. 2-D S15 or equivalent in your engine. Do not use any other low grade diesel fuel.

NOTICE: Use of other low grade diesel fuels will result in loss of engine power, high fuel consumption, and damage to the exhaust aftertreatment system (if equipped).

NOTE: When operating the machine in very cold climates, the use of winter blended fuel is permitted for a short period of time. See your fuel supplier for winter fuel requirements in your area.

Fuel conditioner

Diesel fuel conditioner is available from your CASE CONSTRUCTION dealer. Instructions for the use of the fuel conditioner is on the container.

The use of diesel fuel conditioner will:

- Clean fuel injectors, valves, and manifolds for increased service life
- Disperse insoluble gummy deposits that form in the fuel system

- Separate moisture from the fuel
- Stabilize fuel in storage

NOTICE: Use only CASE CONSTRUCTION approved biocide additives to prevent damage to the exhaust aftertreatment system (if equipped).

General specification - Biodiesel fuels

Biodiesel usage in CASE CONSTRUCTION products

Introduction to Fatty Acid Methyl Ester (FAME) biodiesel

FAME biodiesel, called biodiesel fuel in the following section, consists of a family of fuels derived from vegetable oils treated with methyl esters.

There are two main biodiesel fuel types: Rapeseed Methyl Ester (RME) and Soybean Methyl Ester (SME). RME is a blend of rapeseed and sunflower methyl ester, and is the preferred crop in Europe. SME is the preferred crop in the United States.

Biodiesel fuel is a renewable alternative fuel source. Its use and development is promoted worldwide, especially in Europe and in the United States.

NOTICE: *Your emissions control system is compatible with up to 5% biodiesel fuel (B5). Be aware that the use of biodiesel fuel that does not comply with the standards mentioned in this section could lead to severe damage to the engine, fuel system or aftertreatment system of your machine. The use of non-approved fuels may void CASE CONSTRUCTION Warranty coverage.*

Biodiesel can be used to run Tier 4B (final) and Stage IV diesel engines only when blended with standard diesel fuel:

- B5: indicates the blend of **5%** biodiesel and **95%** diesel fuels.
- B20: indicates the blend of **20%** biodiesel and **80%** diesel fuels. Do not use.

Biodiesel fuel has several positive features in comparison with diesel fuel:

- Biodiesel fuel adds lubricity to the fuel, which is beneficial in many circumstances, particularly as sulfur and aromatics are removed from the fuel.
- Biodiesel has a greater cetane number and burns cleaner.
- Biodiesel produces less particulate matter and reduces smoke emissions.
- Biodiesel is fully biodegradable and non-toxic.

Diesel and biodiesel fuel specifications

Tier 4B (final) and Stage IV diesel fuel specifications are covered by the following:

- **ASTM D975**, Standard Specification for Diesel Fuel Oils. (15 ppm sulfur maximum.)

Biodiesel blends are covered by:

- United States Diesel Fuel Specification **ASTM D975** allows up to **5%** biodiesel since 2009. United States fuel

suppliers are allowed to use up to **5%** biodiesel fuel (B5) to supply the network.

- United States Biodiesel Fuel Specification **ASTM D7467** provides specifications for diesel and biodiesel blends from B5 to B20.

Pure biodiesel blend stock (B100) specification is covered by the following requirements:

- **ASTM D6751** - Standard specification for biodiesel fuel blend stock (B100) for middle distillate fuels.

NOTE: *ASTM D6751 specification has been updated to improve the quality of biodiesel in the market place.*

Before raw oil can be converted into usable biodiesel fuel, it must undergo transesterification to remove glycerides. During the transesterification process, the oil reacts with an alcohol to separate the glycerine from the fat or vegetable oil. This process leaves behind two products: methyl ester (the chemical name for biodiesel) and glycerine (a byproduct usually sold for use in soaps or other products).

NOTICE: *Biodiesel fuels approved for use in the CASE CONSTRUCTION equipment must be transesterified and comply with the latest North America Standard **ASTM D6751**.*

NOTICE: *Cold Pressed Biodiesel, Cold Pressed Oil, Straight Vegetable Oil (SVO), or more generally unrefined vegetable oils used as motor fuel, are fuels that are normally made from Rapeseed oil or similar high oil content crops. These kinds of fuel are not transesterified, so they do not fulfil the **ASTM D6751** requirements. There is no recognized quality standard available for these types of fuel. Therefore the use of Cold Pressed Biodiesel, Cold Pressed Oil, Straight Vegetable Oil (SVO), or more generally unrefined vegetable oils used as motor fuel are NOT APPROVED at any blend in any CASE CONSTRUCTION product.*

NOTICE: *Any engine and fuel injection equipment fitted to a CASE CONSTRUCTION vehicle found to have run with any blend of NON-APPROVED fuel (fuel not fulfilling the specification described in the requirement **ASTM D6751**) will no longer be covered for Warranty by CASE CONSTRUCTION.*

Biodiesel fuel usage conditions

You must stringently follow the biodiesel fuel usage conditions. Incorrect application of the biodiesel fuel usage conditions could lead to severe damage to the engine, fuel injection equipment and aftertreatment system.

The main concerns related to operation with biodiesel fuels are:

- Filters and injector blockage caused by poor fuel quality.

- Wear and corrosion of internal components due to water content, which affects lubricity.
- Deterioration of some rubber sealing compounds in the fuel system.
- Biodiesel oxidation, which can lead to the formation of deposits that can harm the fuel injection system.

NOTICE: Any problem in the engine fuel injection equipment associated with non-compliance to the following conditions for biodiesel fuel handling and maintenance will not be covered for Warranty by CASE CONSTRUCTION.

Purchase biodiesel fuel from a trusted supplier who understands the product and maintains acceptable fuel quality. The National Biodiesel Board awards **BQ-9000®** accreditation to biodiesel marketers and producers that meet strict quality and consistency standards. Biodiesel users in North America are strongly encouraged to purchase biodiesel blends from the **BQ-9000®** Certified Marketers and sourced from the **BQ-9000®** Accredited Producers found on the **BQ-9000®** website.

The use of biodiesel blends up to B5 will not void the CASE CONSTRUCTION warranty as long as the following conditions for biodiesel fuel handling and maintenance are stringently followed:

Biodiesel fuel must be pre-blended by the supplier. Mixing biodiesel fuels on-site can result in an incorrect mixture that could damage the engine and/or fuel system.

NOTICE: CASE CONSTRUCTION may void your warranty if the problem is associated with poor fuel quality due to improper blending. It is the responsibility of the fuel supplier and/or yourself to ensure the right type of fuel and blend is delivered and used.

Storage

The machine should not be stored for more than 6 months with biodiesel in the fuel system. For longer storage time, it is strongly suggested that only regular #2 diesel fuel is used.

NOTE: If storage for longer than 6 months is necessary, the engine must be run on regular #2 diesel for a minimum of 20 hours to flush the biodiesel fuel out of the fuel system prior to storage.

Biodiesel is highly hygroscopic and tends to collect water more than diesel fuel. This increases the risk of algae and bacteria growth which can cause severe damage to the fuel injection system. Keep the machine fuel tanks and on-site storage tanks as full as possible to limit the amount of air and water vapors inside the tank. Drain water from the tanks at least once a week.

NOTICE: Use only CASE CONSTRUCTION approved biocide additives on Tier 4B (final) and Stage IV engines with an exhaust aftertreatment system.

Limited B10 biodiesel approval

CASE CONSTRUCTION approves the use of up to B10 on Tier 4B (final) and Stage IV engines only in Minnesota (or other States & Provinces) where the state legislation mandates its usage during the months of April to September only and the state legislation mandates strict compliance of the B10 to specification **ASTM D7467**. The B10 must consist of a blend of S15 #2D Diesel Fuel per **ASTM D975** and B100 blend stock per **ASTM D6751** only.

Lubrication and maintenance access

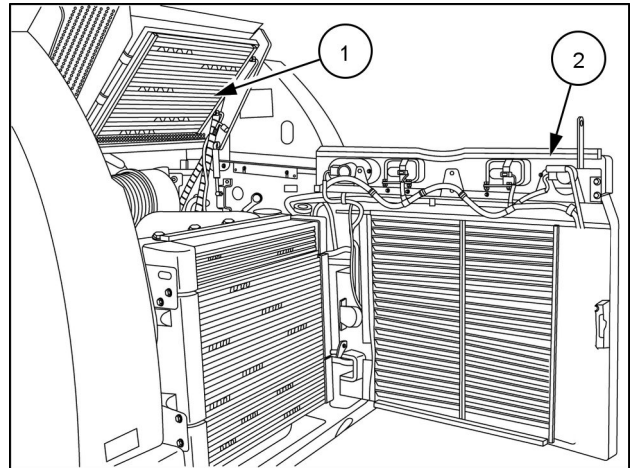
1. Lift open the engine hood. Make sure that the hood pivots to a fully open position.
2. Pull rearward on the hood lock tab to open the rear service door. Otherwise, lift up on the rear service door latch to open the rear service door, if equipped.

NOTE: This style hood and door may be locked with a padlock.

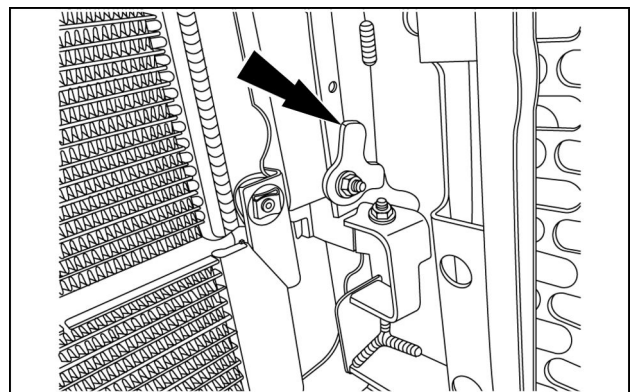
The open engine hood (1) and rear service door (2) will allow the operator or technician to:

- Check the engine oil.
- Access engine oil fill.
- Add fuel.
- Check radiator and hydraulic oil coolers (fill, drain and clean debris).
- Check and clean the coolant reservoir.
- Service both fuel filters (in-line and spin on element water separator) drain water from spin on filter element canister
- Service the hydraulic filter.
- Service the air filters.
- Access hydraulic oil fill.
- The drive belts.
- The alternator.

Always lock the rear service door open when you service or monitor the components. Pivot the latch down to lock.



RAIL14SSL0723AA 1



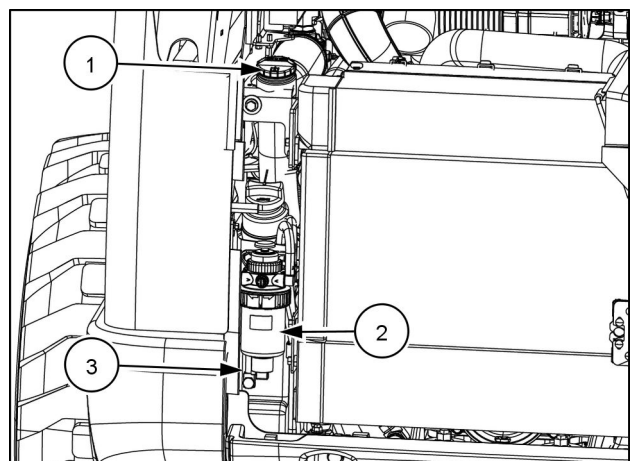
93106878 2

Open the rear service door. Access the following:

- Hydraulic oil fill (1).

NOTE: If the hydraulic oil fill cap is to be removed, wipe clean before removal to prevent hydraulic system contamination.

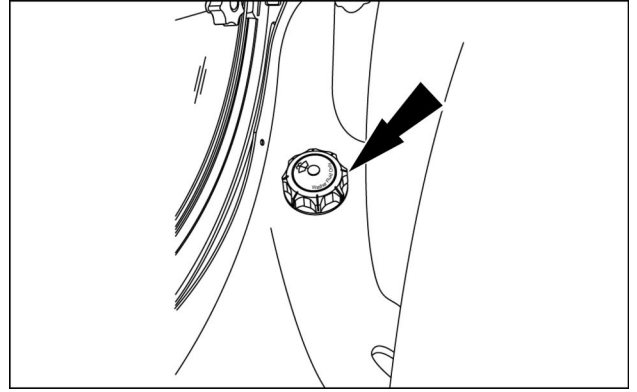
Hydraulic oil level indicator sight glass (3) (behind the fuel filter water separator (2)).



RAIL17SSL0347BA 3

The rear inside cab.

- The windshield washer reservoir is inside the cab between side window of the cab and the right side of the seat.



93109373A 4

Selective Catalytic Reduction (SCR) exhaust treatment - Basic instructions

Requirements

The operator must maintain appropriate Diesel Exhaust Fluid (DEF)/AdBlue® levels at all times. No additional maintenance is required.

NOTICE: Prolonged idling of the machine with no load for more than **6 h** will cause damage to the SCR catalyst.

NOTE: See your CASE CONSTRUCTION dealer for replacement components and cleaning agents.

CASE CONSTRUCTION recommends using **No.1 ENGINE OIL™ SAE 10W-40 CK-4 SEMI-SYNTHETIC**. See **7-16** for other recommended engine oils, their operating temperature ranges and their required oil change interval.

See “General specification - Biodiesel fuels” for details on biodiesel fuel usage in your CASE CONSTRUCTION machine.

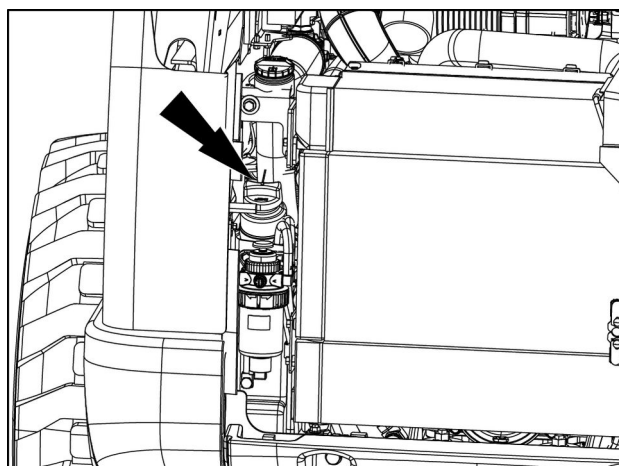
NOTICE: While any company can perform necessary maintenance or repairs on your equipment, CASE CONSTRUCTION strongly recommends that you use only authorized CASE CONSTRUCTION dealers and products that meet the given specifications. Improperly or incorrectly performed maintenance and repair voids the equipment warranty and may affect service intervals.

Diesel Exhaust Fluid (DEF)/AdBlue® refilling

The DEF/AdBlue® tank is located on the left-hand side of the machine, next to the hydraulic filling port.

The DEF/AdBlue® tank cap can be identified by the “blue” color of the cap. A fitting under the cap prevents the insertion of a diesel fill nozzle.

NOTICE: If any DEF/AdBlue® spills or contacts any surface other than the storage tanks, immediately clean the affected surface with clear water. DEF/AdBlue® will cause corrosion on painted and unpainted metallic surfaces, and may distort some plastic and rubber components.



RAIL17SSL0347BA 1

It is recommended that DEF/AdBlue® filling equipment should be used having a fill nozzle/pump with the correct length and diameter, triggered by the magnet in the tank filler neck, and with overfill flow cut out.

This will ensure that:

- The screen in the filler neck will not be damaged.
- Impurities are not entering the DEF/AdBlue® tank. The standardized DEF/AdBlue® nozzle matches the filler neck diameter.
- The DEF/AdBlue® tank is not overfilled, as the DEF/AdBlue® pump will stop when the DEF/AdBlue® tank is full.
- DEF/AdBlue® is not pumped in the fuel tank, as the DEF/AdBlue® nozzle cannot pump when the magnet is not sensed.

NOTICE: If a warning light has been triggered for low or empty DEF/AdBlue®, the system must be reset by cycling the key switch OFF then ON after refilling the DEF/AdBlue® tank.

NOTICE: Refilling with a funnel is not recommended, as this may lead to damage of the screen in the filler neck.

NOTE: The information above has been provided by the International Organization for Standardization (ISO), Document number **ISO 22241-4** Diesel engines - NOx reduction agent AUS 32 - Part 4: Refilling interface.

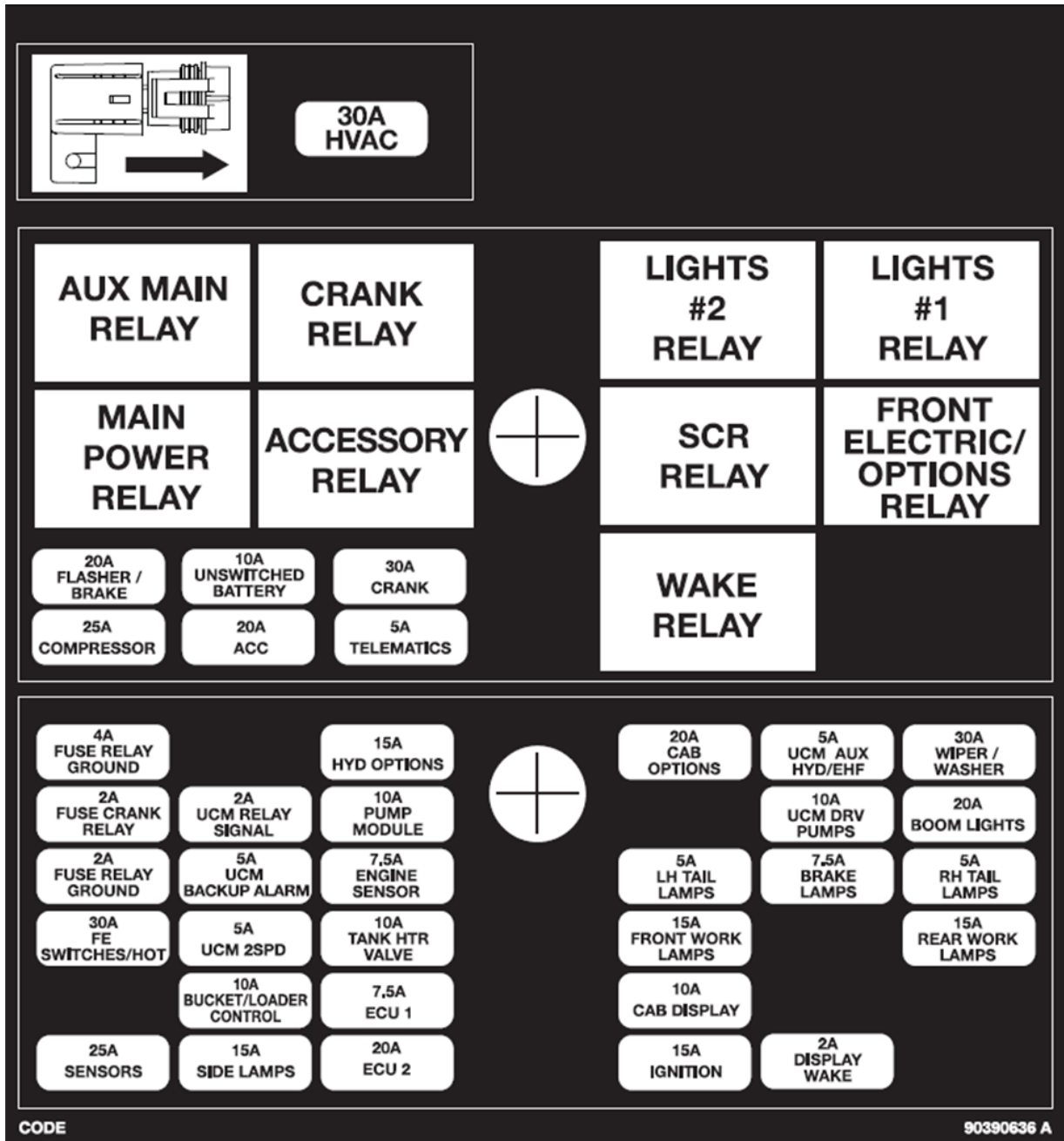
Diesel Exhaust Fluid (DEF)/AdBlue® consumption

DEF/AdBLUE® consumption is figured against the amount of fuel consumed. Typical **DEF/AdBLUE®** consumption is approximately **6%** of fuel consumption when you operate the machine at rated engine speed. **DEF/AdBLUE®** consumption can be as high as **15%** when NOx output increases. The consumption rate of **DEF/AdBLUE®** and fuel also depends on:

- Engine load
- Ambient humidity
- **DEF/AdBLUE®** fluid concentration
- Gear selection
- Ground drive slip
- Engine RPM during operation

Fuses and relays

Electro-Hydraulic (EH) controls main fuse and relay identification decal

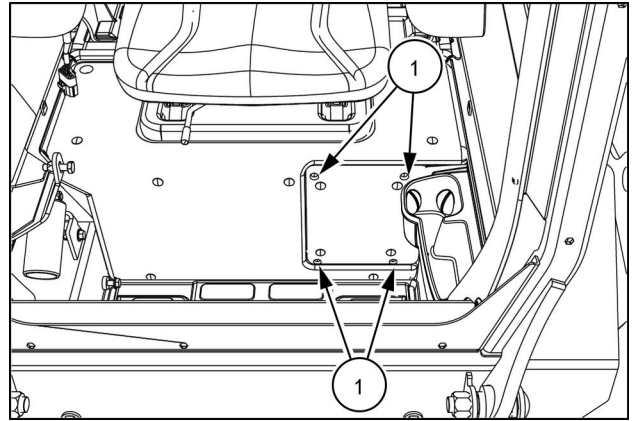


90390636A 1

Electro-Hydraulic (EH) controls - fuse and relay panel in the cab area

1. Remove the screws (1) from the cover panel to expose the fuse and relay blocks.

NOTE: The fuse and relay identification decal is on the back side of the cover panel.



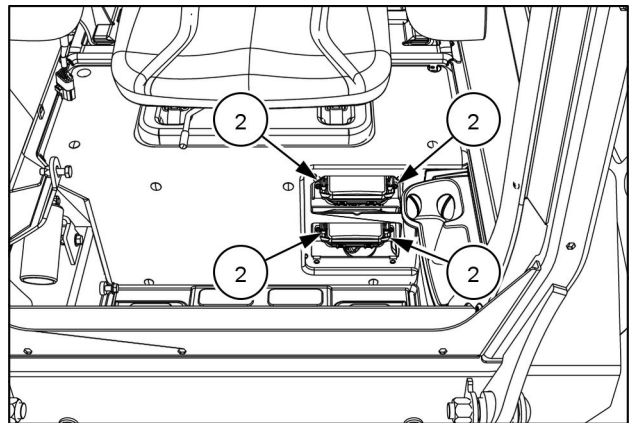
RAIL19SSL0063BA 2

2. Press both of the locking tabs on each side of the cover and lift off of the fuse and relay block.

NOTICE: Only replace fuse and relays with the same type and amperage rating. Failure to do so may result in an electrical system failure.

3. Locate and check the problem fuse or relay. If necessary, replace the fuse or relay.

NOTICE: To prevent water and moisture from entering the fuse and relay block, make sure that the cover is properly positioned and fully latched. Failure to do so may allow water or moisture to enter the power center and possibly result in an electrical system failure.

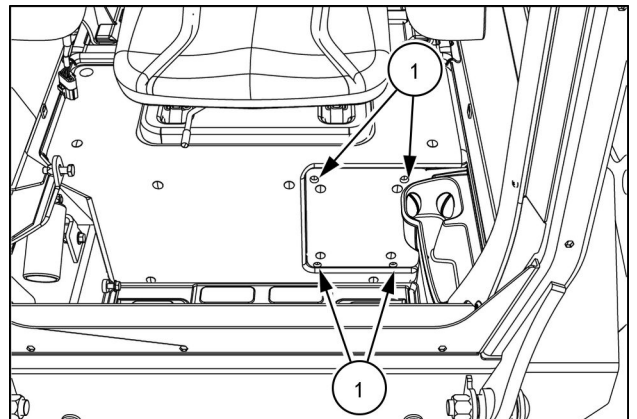


RAIL19SSL0064BA 3

4. Align the locking tabs (2) on the fuse block cover and push down to secure in place. Make sure that the cover is in proper position and secure.

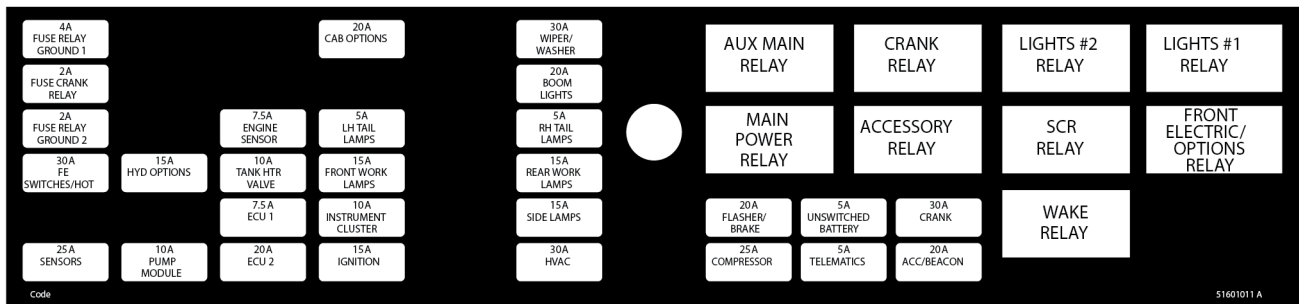
NOTICE: To prevent water and moisture entering the power center, make sure that the fuse panel cover is in the proper position and secure. Failure to do so may allow water to enter the power center and possibly result in an electrical system failure.

5. Position the fuse and relay cover so that all sides are flush or even with the heel kick plate.
6. Hold the fuse and relay panel cover in position.
7. Tighten the screws (1) to secure the cover in position.

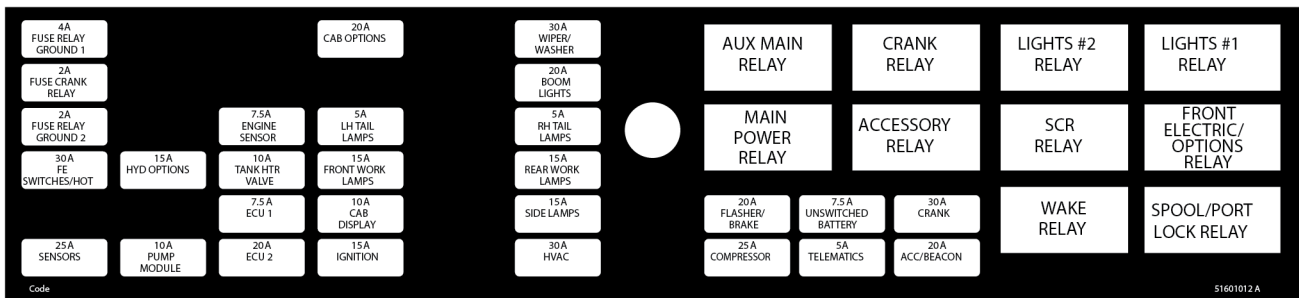


RAIL19SSL0063BA 4

Mechanical controls main fuse and relay identification decal



Mechanical machines with Instrument Cluster (IC)



Mechanical machines with LCD multi-function display

Mechanical controls - fuse and relay panel in the cab area

1. Remove the screws (1) from the cover panel (2) to expose the fuse and relay blocks.

NOTE: The fuse and relay identification decal is on the back side of the cover panel.

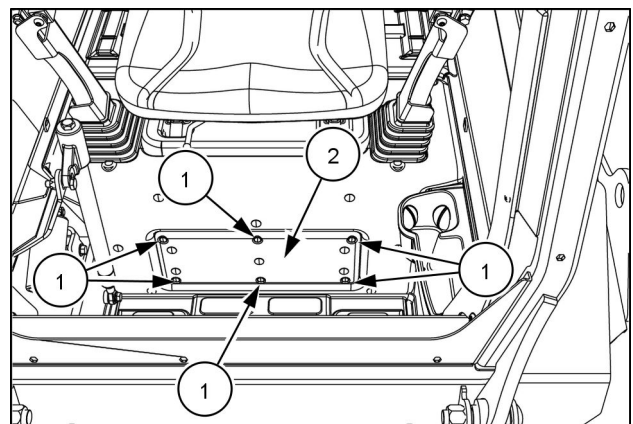
2. Press both of the locking tabs (3) on each side of the cover and lift off of the fuse and relay block.

NOTICE: Only replace fuse and relays with the same type and amperage rating. Failure to do so may result in an electrical system failure.

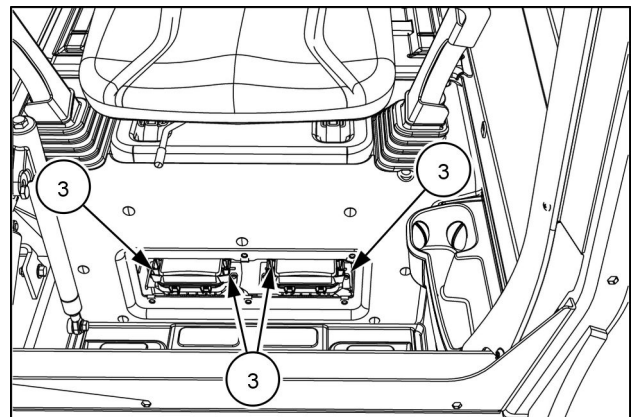
3. Locate and check the problem fuse or relay. If necessary, replace the fuse or relay.

NOTICE: To prevent water and moisture from entering the fuse and relay block, make sure that the cover is properly positioned and fully latched. Failure to do so may allow water or moisture to enter the power center and possibly result in an electrical system failure.

4. Align the locking tabs on the fuse block cover and push down to secure in place. Make sure that the cover is in proper position and secure.



RAIL19SSL0065BA 7



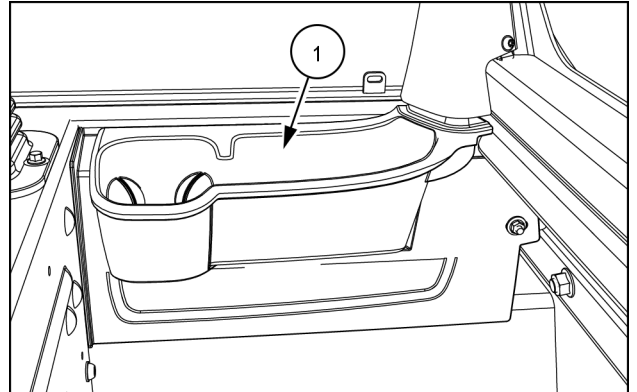
RAIL19SSL0066BA 8

NOTICE: To prevent water from entering the power center, make sure that the fuse panel cover is in the proper position and secure. Failure to do so may allow water to enter the power center and possibly result in an electrical system failure.

5. Position the fuse and relay cover so that all sides are flush or even with the heel kick plate.
6. Hold the fuse and relay panel cover in position.
7. Tighten the screws to secure the cover in position.

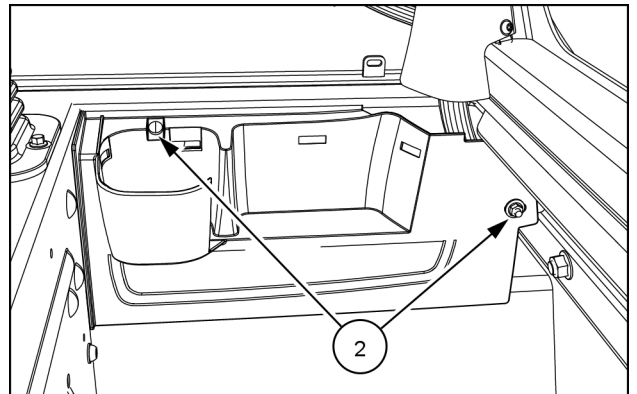
Fuse and relay locations applicable to all machines

1. Remove the cup holders rubber insert (1). The rubber insert has four tabs that secure it to the panel.



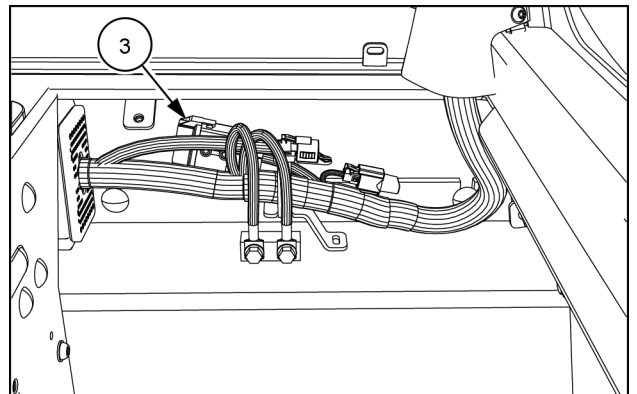
RAIL19SSL0067BA 9

2. Remove the cup holder screws (2).



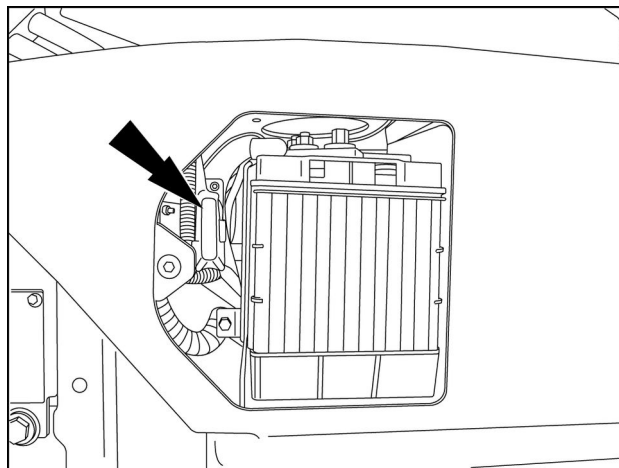
RAIL19SSL0006AA 10

3. Locate the **40 A** Heater Control Unit (HCU) fuse (3) .



RAIL19SSL0007AA 11

4. Remove the battery access cover on the left-hand rear side of the machine to access the **60 A** Glow-plug Control Unit (GCU) fuse.



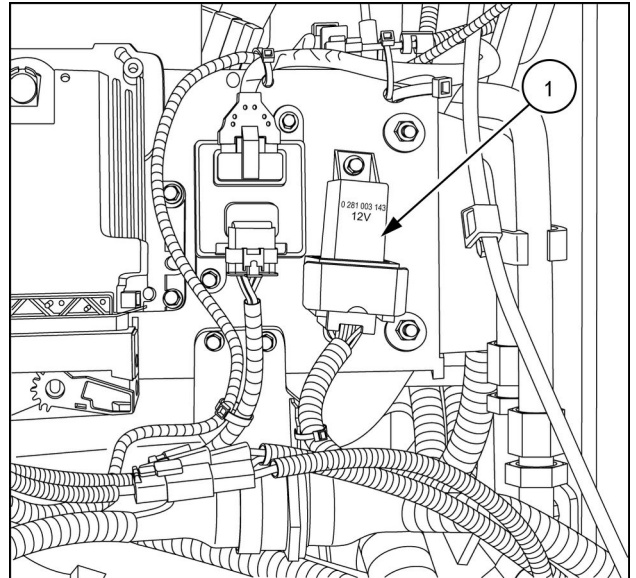
RAIL14SSL7010AA 12

NOTE: See “Loader arm lock and cab tilt procedure - radial lift machines” page **2-16** or “Loader arm lock and cab tilt procedure - vertical lift machines” page **2-20** in this manual.

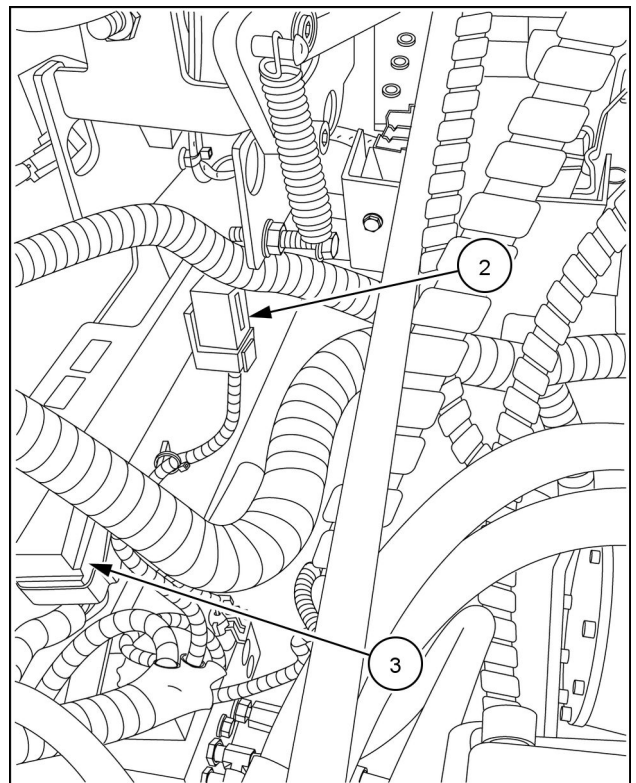
5. Tilt the cab and on the left-hand side of the chassis will be the following components:

- (1) - Heater Control Unit (HCU) relay
- (2) - Flasher relay (if equipped with a flasher system)
- (3) - Engine Control Unit (ECU) relay

NOTE: Heater Control Unit (HCU) relay is on the left-hand side of the cross panel above the engine. The flasher and Engine Control Unit (ECU) relays are on the inside chassis below the left-hand control lever.



RAIL16SSL0172BA 13



RAIL16SSL0173BA 14

MAINTENANCE CHART

Maintenance chart

Maintenance action	Grease			Change fluid			Page no.
	Cleaning Check	Drain fluid					
		Replace					
Initial 10 hours							
Track tension check and adjustment	x						7-34
Tire pressure and wheel hardware torque	x						7-36
Every 10 hours or daily							
Clean tracks and components		x					7-38
Engine and hydraulic coolers	x						7-39
Engine coolant level	x						7-40
Engine oil level	x						7-41
Loader arm pivot points, coupler pins, and cylinder pins - Vertical lift			x				7-42
Loader arm pivot points, coupler pins, and cylinder pins - Radial lift			x				7-42
Hydraulic oil level	x						7-43
Loader arm and bucket hydraulic interlock	x						7-45
Initial 50 hours							
Roll Over Protective Structure (ROPS) mechanism and hardware check	x						7-46
Every 50 hours							
Track tension check and adjustment	x						7-47
Tire pressure and wheel hardware torque	x						7-36
Cab intake filter	x						7-51
Seat restraints - Check	x						7-52
Initial 100 hours							
Final drive oil (track models)				x			7-53
Every 250 hours							
Drive chain tension check	x						7-54
Fuel-water separator filter - drain fluid					x		7-55
Every 500 hours							
Engine oil and oil filter - Change						x	7-56
Fuel-water separator filter element						x	7-61
Fuel filter						x	7-62
Diesel Exhaust Fluid (DEF)/AdBlue® tank filter		x					7-63
Hydraulic oil filter						x	7-66
Final drive chain tank oil	x						7-67
Air cleaner elements						x	7-68
Final drive oil (track models)				x			7-71
Cab door - Grease			x				7-72
Roll Over Protective Structure (ROPS) mechanism and hardware check	x						7-73
Every 1000 hours							
Hydraulic oil and filter				x			7-74
Final drive chain tank oil				x			7-78
Diesel Exhaust Fluid (DEF)/AdBlue® tank suction filter - Replace						x	7-79
Belt - Replace						x	7-84
Every 1500 hours							
Blow-by recirculation system						x	7-87
Every 3600 hours or two years							
Selective Catalytic Reduction (SCR) system - Replace supply module filter - Radial lift machines only						x	7-90

7 - MAINTENANCE

Maintenance action	Grease			Change fluid				Page no.
	Cleaning	Check		Drain fluid				
				Replace				
Selective Catalytic Reduction (SCR) system - Replace supply module filter - Vertical lift machines only					x		7-93	
Every 4000 hours								
Engine cooling system - Change fluid				x			7-96	
As required								
Hydrocarbon management		x					7-101	
Window removal and cleaning		x					7-103	
Hardware - loose or damaged	x						7-108	

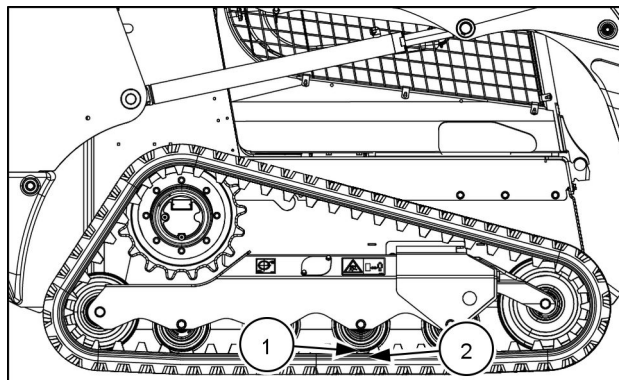
Initial 10 hours

Track tension check and adjustment

Check the track tension after the first **10 h** on a new machine or if new tracks have been installed. After the initial **10 h** check, the track tension should be checked every **50 h** thereafter. For this procedure, the tracks, rollers, idler wheels, debris guard, and final drive sprockets must be clean of dirt and debris.

Track tension check (non-suspension undercarriage)

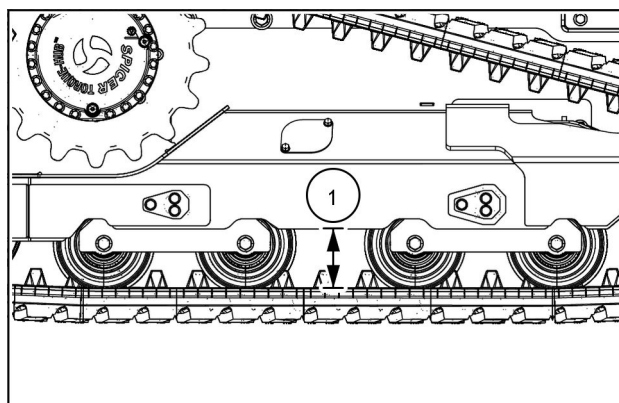
1. Park the machine on firm level surface.
2. Raise, block, and support machine properly until the tracks are about **50 mm (2.0 in)** off the surface.
3. Measure from the bottom of the center roller wheel **(1)** to the lower track top surface **(2)**. The allowable track sag is **12 – 19 mm (0.5 – 0.75 in)**.



RAIL15SSL0356AA 1

Track tension check (suspension undercarriage)

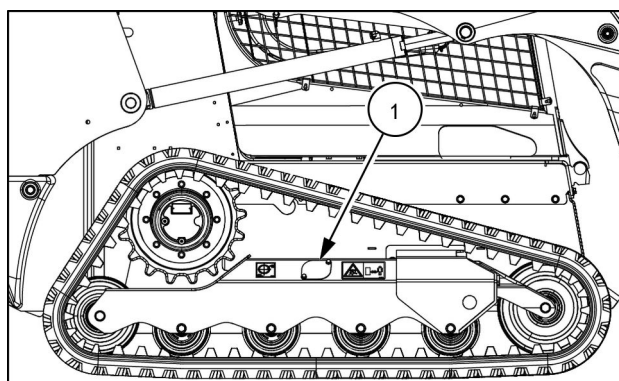
4. Park the machine on firm level surface.
5. Raise, block, and support machine properly until the tracks are about **50 mm (2.0 in)** off the surface.
6. Measure from the bottom of the undercarriage **(1)** between the two center rollers to the lower track top surface. The allowable track sag is **143 – 151 mm (5.6 – 5.9 in)**.



RAIL23SSL0382QA 2

Track tension adjustment

1. Use a **13 mm** tool and remove the track adjustment access cover **(1)** to expose the track adjustment fitting.



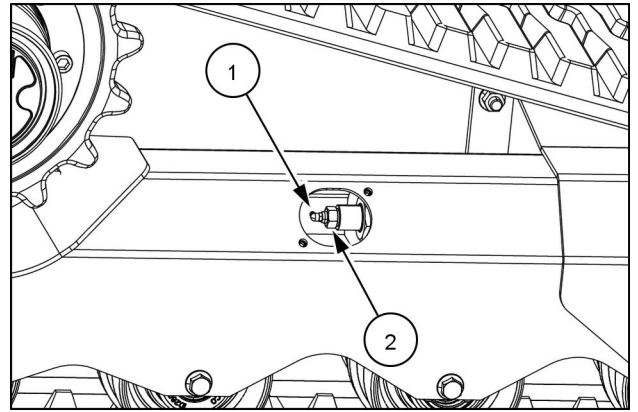
RAIL15SSL0356AA 3

Increase track tension:

Add **MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2** grease to increase track tension adjustment fitting **(1)**.

Decrease track tension:

Use a **19 mm** tool and slowly turn the fitting **(2)** counterclockwise. Grease will escape from the bottom of the fitting and decrease tension.



RAIL15SSL0382BA 4

Tire pressure and wheel hardware torque

⚠ WARNING

Explosion hazard!

Tires must be replaced by skilled personnel with the proper tools and technical knowledge. Unskilled personnel replacing wheels or tires could result in serious physical injuries, tire damage, and/or wheel distortion. Always have a qualified tire mechanic service wheels and tires.

Failure to comply could result in death or serious injury.

W0171A

⚠ WARNING

Explosion hazard!

Always maintain correct tire pressure as indicated in this manual. **DO NOT** inflate tires above the recommended pressure. Excessive pressure could result in tire failure.

Failure to comply could result in death or serious injury.

W0109A

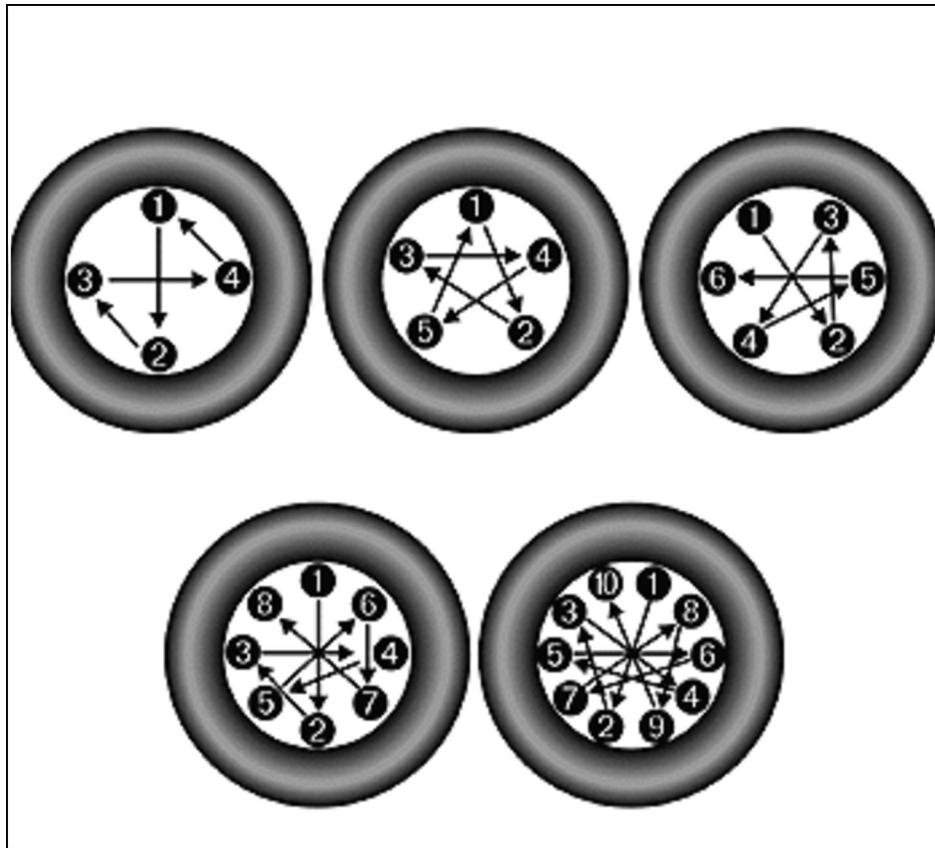
The skid steer will be hard to turn and the tires will wear faster if the correct pressure is not maintained. When a worn or damaged tire is replaced, the replacement must be the same size and tread design as the other tires on the machine. Two different sized tires on one side of the machine will cause accelerated tire wear, loss of power, and excessive strain on the drivetrain. Replace worn tires in pairs with the two new tires used on the same side of the loader. If this tilts the loader too much, replace all four tires.

Adding air to the tire

NOTICE: Check tire pressure gauges at regular intervals for calibration and accuracy.

1. Check the tire pressure.
2. Before you add air, have the wheel correctly installed on the machine or put the wheel in a restraining device (tire inflation cage).
3. Use an air hose with a remote shutoff valve, self-locking air chuck and wear eye protection.
4. Stand **BEHIND** the tread of the tire and make sure **ALL** persons are away from the side of the tire before you start to add air.
5. Inflate the tire to the recommended air pressure. **DO NOT** inflate the tire more than the recommended maximum pressure given on the tire.

TIRE	SIZE	PRESSURE
Heavy Duty	12 x 16.5	290 – 345 kPa (42 – 50 psi)
	14 x 17.5	359 – 414 kPa (52 – 60 psi)
Premium	12 x 16.5	290 – 345 kPa (42 – 50 psi)
	14 x 17.5	359 – 414 kPa (52 – 60 psi)
Premium with liner	12 x 16.5	290 – 345 kPa (42 – 50 psi)
Severe Duty	12 x 16.5	290 – 345 kPa (42 – 50 psi)
	14 x 17.5	531 – 586 kPa (77 – 85 psi)
Flotation	33 x 15.5 x 16.5	290 – 345 kPa (42 – 50 psi)
Mining	12 x 16.5	290 – 345 kPa (42 – 50 psi)
Non-Pneumatic	12 x 16.5	not required
	14 x 17.5	

Wheel torque

63109344 1

1. Check that the wheel nuts have the proper torque setting.

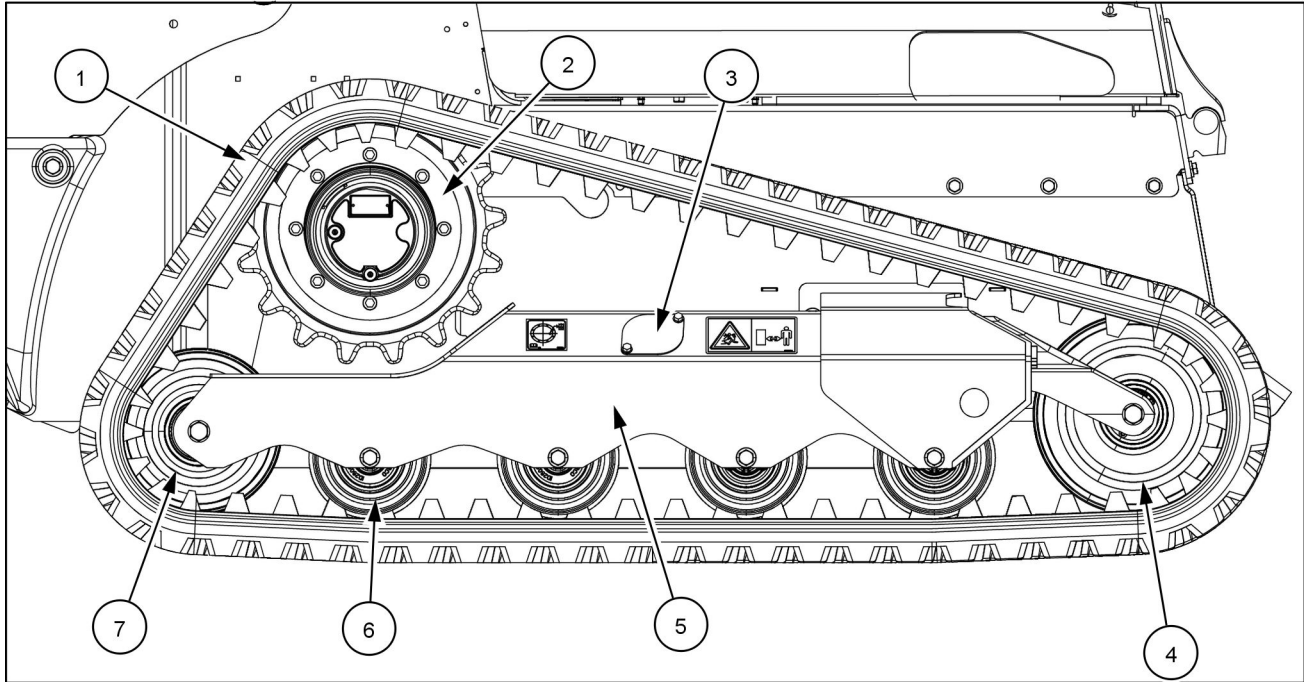
Wheel taper nut torque	169.5 N·m (125 lb ft)
Flange nut	203.5 N·m (150 lb ft)

2. If necessary, tighten the nuts in a cross-pattern sequence as shown.

Every 10 hours or daily

Clean tracks and components

Clean the components in the illustration every **10 h** or daily, and when the machine has worked in muddy conditions.

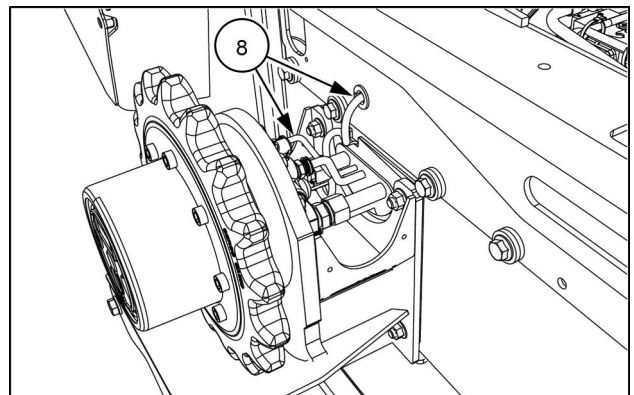


RAIL15SSL0395FA 1

1	Rubber track	5	Track debris guard
2	Final drive sprocket (1 each side)	6	Track roller wheels (4 each side)
3	Track adjustment access cover (1 each side)	7	Rear idler wheel (1 each side)
4	Front idler wheel (1 each side)	8	Speed sensor harness (if equipped)

NOTICE: Avoid using sharp objects when cleaning debris out of the track tube covers. Failure to comply may damage the motor speed sensor harness (if equipped).

(8) Speed sensor harness (if equipped)



RAIL19SSL0074BA 2

Engine and hydraulic coolers

Radiator and oil cooler

NOTICE: DO NOT USE A PRESSURE WASHER! The machine should be cool.

1. Raise the engine hood and ensure it stays in the open position.
2. Open the rear service door. Use the service lock in the lower right to secure the door in the open position.
3. Remove thumb screws (1) and cover (2) to access the radiator/cooler assembly for inspection and cleaning.

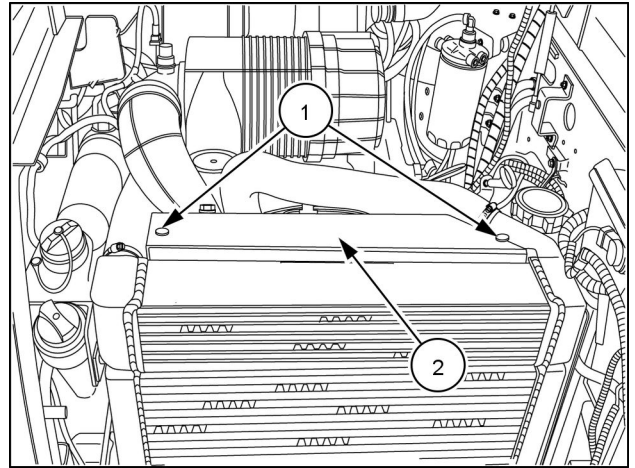
4. **CAUTION**

Flying debris!

Compressed air can propel dirt, rust, etc. into the air. Wear eye and face protection when using compressed air.

Failure to comply could result in minor or moderate injury.

C0049A



RAIL14SSL0712AA 1

Use compressed air to clean the radiator/cooler assembly. If compressed air is used, keep the attachment enough distance away from the cooler fins to prevent damage or bending over and restricting air flow. The bent fins may restrict flow enough to cause overheating. If compressed air is not available, use water regulated to a low pressure.

Engine coolant level

⚠ WARNING

Hot liquid under pressure!
Service when cool.
Failure to comply could result in death or serious injury.

W1187A

NOTICE: NEVER mix OAT coolant with conventional coolant. Under no circumstances should you top off a cooling system with only water. You can use a refractometer to check the concentration level. Supplemental Coolant Additives (SCA) should not be used when using **EXTENDED LIFE OAT COOLANT/ANTIFREEZE**.

The most accurate coolant level check is when the engine is OFF and you allow the coolant to return to ambient temperatures. Check before operating the machine.

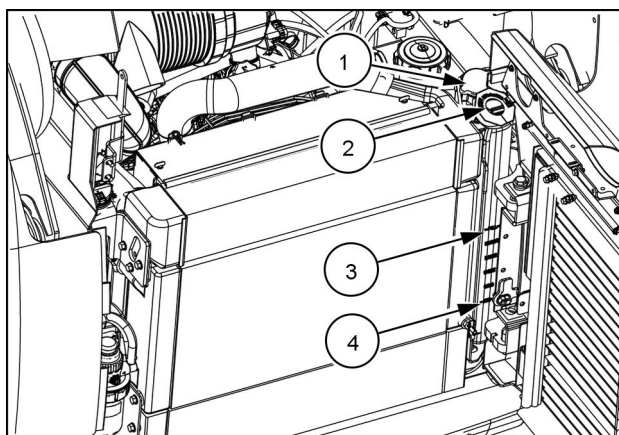
Coolant specifications – **EXTENDED LIFE OAT COOLANT/ANTIFREEZE**

1. Open the engine hood and rear service door.
2. Engage the door lock located near the lower hinge.
3. Check the coolant level on the reservoir bottle:
 - A. Level with the FULL mark (3) if the engine coolant is hot.
 - B. Level with the ADD mark (4) if the engine coolant is cold.

4. ⚠ WARNING

Hot liquid under pressure!
Service when cool.
Failure to comply could result in death or serious injury.

W1187A



RAIL15SSL0383BA 1

If the coolant is cool and the level is below the ADD mark (4), add **EXTENDED LIFE OAT COOLANT/ANTIFREEZE** to the reservoir bottle (2) until it reaches the ADD mark (4) on the bottle.

NOTE: If the coolant system has been opened and/or had maintenance performed recently, open the radiator fill cap (1) and check the coolant level in the radiator fill neck. Add coolant until the level reaches the top of the radiator fill neck, if necessary.

Engine oil level

NOTICE: DO NOT put performance additives or other oil additive products in the engine crankcase.

During the first **20 h** of operation, check the oil level at one hour intervals. After the initial **20 h** check, check the engine oil level daily or every **10 h** of operation. Always check the oil with the engine stopped and when the machine is on level ground.

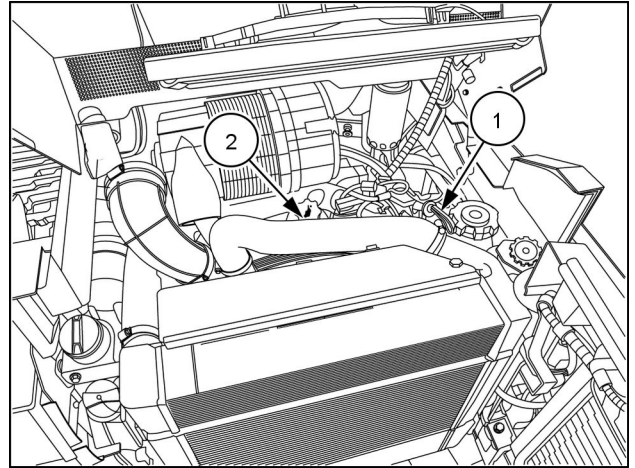
Engine oil specification – **No.1 ENGINE OIL™ SAE 10W-40 CK-4 SEMI-SYNTHETIC** is recommended.

See the “Engine oils” on page **7-16** for the recommended viscosity at ambient temperature ranges.

Engine oil level

The engine oil dipstick (**1**) is above the radiator toward the right-hand side of the machine.

1. Fully insert the engine oil level dipstick into the tube and then pull out to check the oil level.
2. If the oil level is below the ADD mark, add oil at the engine oil fill tube (**2**). DO NOT raise the oil level above the FULL mark.



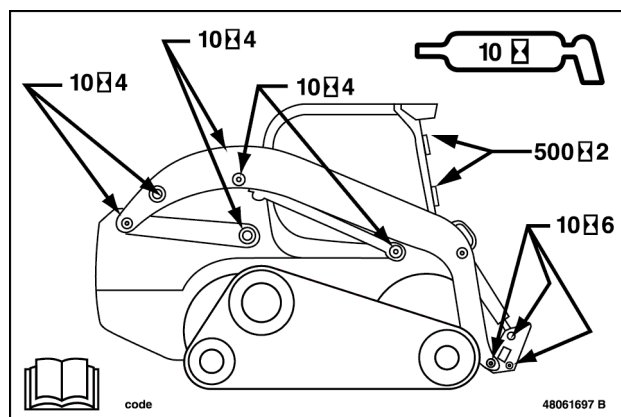
RAIL14SSL0708AA 1

Loader arm pivot points, coupler pins, and cylinder pins - Vertical lift

Use **MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2** every 10 hours of operation. Lower pins may require more frequent service intervals if submerged in water.

NOTE: All of the loader arm lubrication points are easily accessible with the loader arm down.

1. Lower the loader arms and tilt the coupler forward. The attachment does not need to be removed.
2. Clean the grease fittings before greasing.
3. Grease the loader arm pivot points, coupler pins, and cylinder pins.
4. Repeat on the other side of the machine.



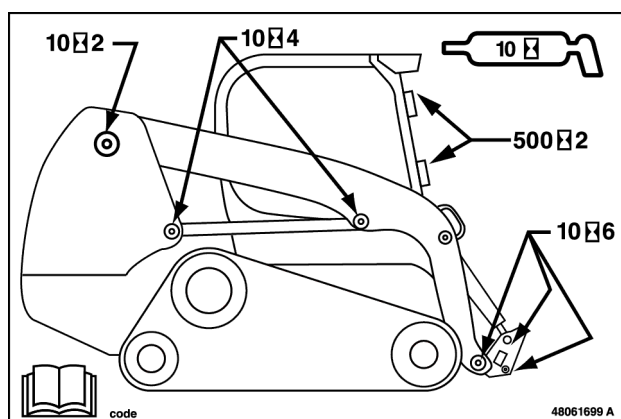
48061697B 1

Loader arm pivot points, coupler pins, and cylinder pins - Radial lift

Use **MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2** every 10 hours of operation. Lower pins may require more frequent service intervals if submerged in water.

NOTE: All of the loader arm lubrication points are easily accessible with the loader arm down.

1. Lower the loader arms and tilt the coupler forward. The attachment does not need to be removed.
2. Clean the grease fittings before greasing.
3. Grease the loader arm pivot points, coupler pins, and cylinder pins.
4. Repeat on the other side of the machine.



48061699A 1

Hydraulic oil level

⚠ WARNING

Avoid injury!

Pressurized hot oil can cause burns. Depress the stem or remove the cap slowly with the engine off to relieve the hydraulic tank pressure.

Failure to comply could result in death or serious injury.

W1238A

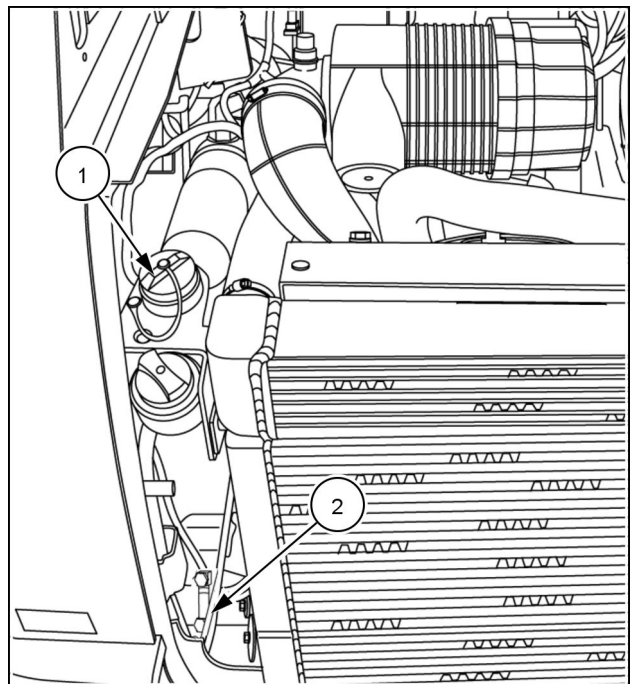
Check the hydraulic reservoir oil level daily, before beginning operation or every **10 h** of operation. Check the level with the lift arms down on the ground, bucket flat on the ground, engine off, and the hydraulic oil cold.

Hydraulic oil specification – **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW**

Hydraulic reservoir oil check

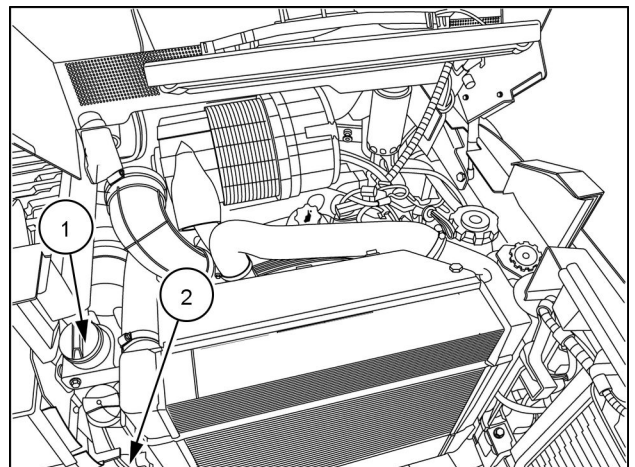
NOTICE: When servicing the reservoir it is important to prevent contamination. Clean the components and all areas around the components to help reduce the risk of contamination.

1. Park the machine on a firm, level surface with safe access all around.
2. Lower the lift arms down on the ground and bucket flat on the ground.
3. Lift engine compartment hood and open the rear access door, and engage lock. Locate the hydraulic oil fill cap (1) and the hydraulic oil level (2). See Figure 1 for radial machines and Figure 2 for vertical machines.
4. Check the fluid level. The oil level should be within the middle one third of the sight glass (2).
5. If oil needs to be added:
 - A. Clean the filler cap and the area around the cap to reduce the risk of contamination.
 - B. Slowly turn the filler cap counterclockwise but DO NOT remove the cap until pressure is relieved.
 - C. Remove the filler cap and add oil as required.
 - D. Watch the sight glass for proper level.
 - E. Replace the cap.



RAIL14SSL7111AA 1

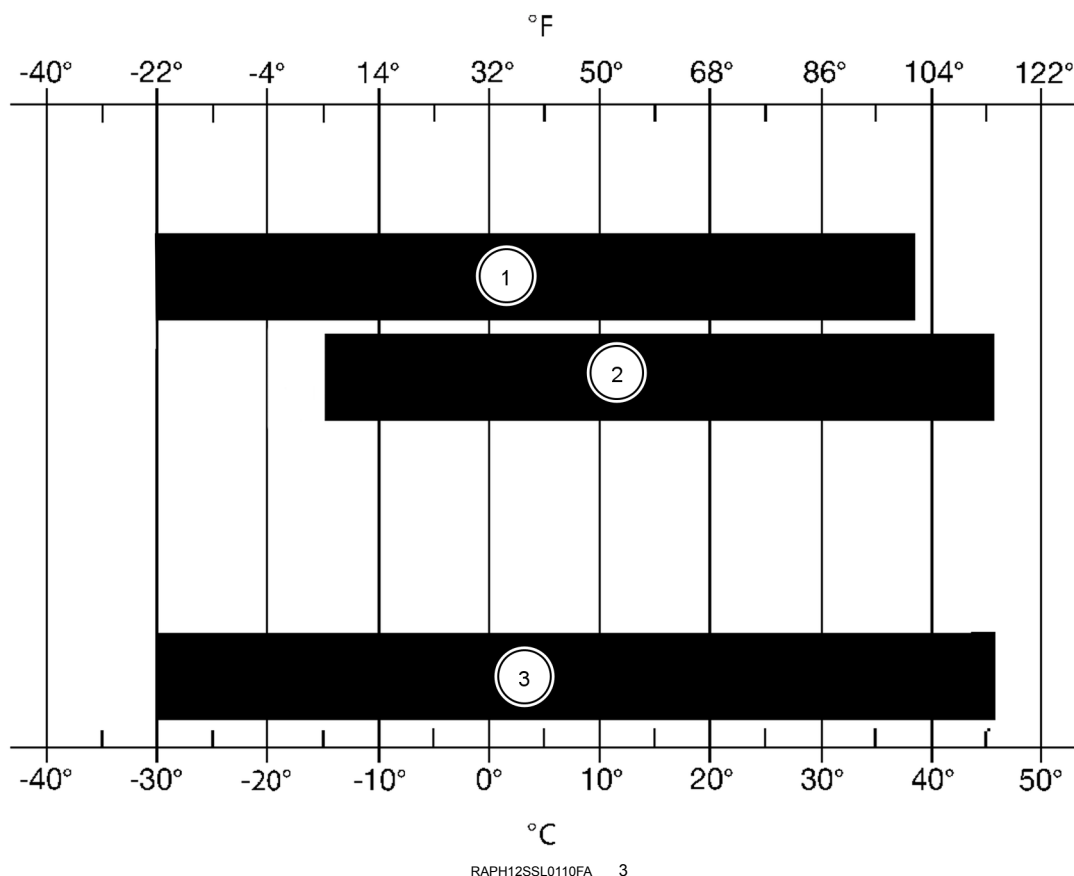
NOTICE: Use the correct hydraulic oil when topping off or changing oil. See the hydraulic oil chart 3 for oil recommendations.



RAIL14SSL0708AA 2

Hydraulic oil

NOTICE: This information reflects the coldest ambient temperature condition for starting a cold machine and for operating a cold machine.



Block	Viscosity	Temperature range
(1)	PREMIUM HYDRAULIC OIL HV46 MULTI-GRADE ANTI-WEAR	-30 – 38 °C (-22 – 100 °F)
(2)	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW	-15 – 46 °C (5 – 115 °F)
(3)	NO.1 ENGINE™ OIL FULL SYNTHETIC SAE 0W-40	-30 – 46 °C (-22 – 115 °F)

NOTE: CASE CONSTRUCTION recommends **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** for applications where continuous operations above **38 °C (100 °F)** ambient temperature or frequent roading applications (above **20 – 30 min**) are common.

NOTE: CASE CONSTRUCTION recommends **PREMIUM HYDRAULIC OIL HV46 MULTI-GRADE ANTI-WEAR** for improved cold weather operation. Standard factory fill oil **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** is acceptable for cold weather operation when sufficient warm up time is provided.

Loader arm and bucket hydraulic interlock

WARNING

Machine damage can cause accidents!

If you discover any problem or defect on the machine, repair it immediately or see your authorized dealer. Do not operate the machine until all problems are corrected.

Failure to comply could result in death or serious injury.

W0159A

The seat switch, restraint bar, loader arm, and bucket interlock prevents the operation of loader arm and bucket function from movement if the operator raises the restraint bar or leaves the seat with the ignition switch on.

Check the interlock operation:

1. Enter the machine, sit in the seat, connect the seat belt, and lower the restraint bar.
2. Start the engine and run at idle speed.
3. Make sure that the loader arm is completely lowered to the ground and the attachment is empty.
4. Push the operate button to activate the hydraulic and ground drive systems.
5. Engage the park brake, push the Park Brake button on the right-hand control lever.
6. Operate the loader arm and bucket controls to ensure they function properly.
7. Raise the restraint bar and attempt to move the loader arm and bucket controls. The operation should be locked.
8. Lower the restraint bar, and push the Operate Button to reactivate the hydraulic functions.
9. Operate the loader arm and bucket controls to ensure they function properly.
10. Lift yourself for **5 s** with no more than **25 mm (1 in)** off the seat and attempt to move the loader arm and bucket controls. The operation should be locked.
11. If the controls are not locked properly, contact your dealer for assistance. Do not operate the machine until the fault is resolved.

Initial 50 hours

Roll Over Protective Structure (ROPS) mechanism and hardware check

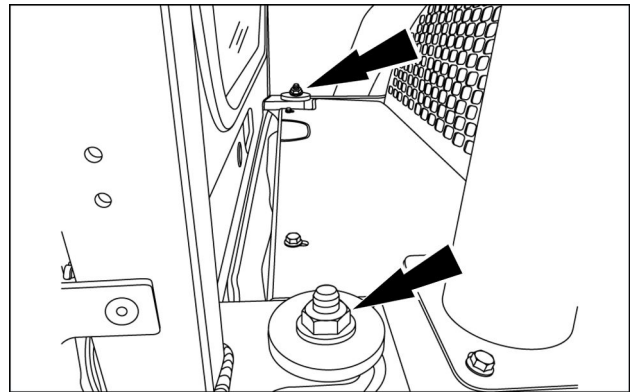
⚠ WARNING**Roll-over hazard!**

Securely fasten the seat belt. Your machine is equipped with a Roll-Over Protective Structure (ROPS) cab, ROPS canopy, or ROPS frame for your protection. The seat belt can help ensure your safety if it is properly used and maintained. Never wear a seat belt loosely or with slack in the belt system. Failure to comply could result in death or serious injury.

W0143A

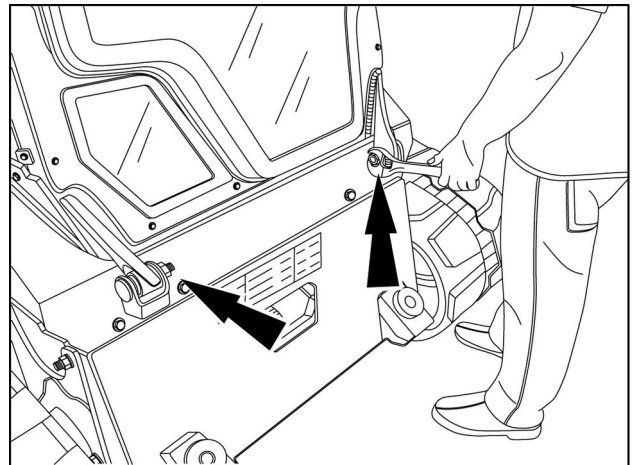
Check the Roll Over Protective Structure (ROPS) cab to lower mainframe hardware for proper torque.

1. Check the ROPS hardware at the back of the machine that are used to secure the cab. Torque the hardware to **170 N·m (125.4 lb ft)**.



931001633 1

2. Check the ROPS front pivot bolts. Torque these bolts to **42 N·m (31.0 lb ft)**.



RAIL14SSL0469BA 2

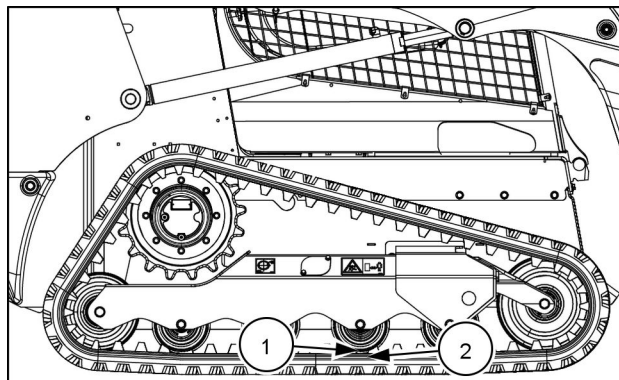
Every 50 hours

Track tension check and adjustment

Check the track tension after the first **10 h** on a new machine or if new tracks have been installed. After the initial **10 h** check, the track tension should be checked every **50 h** thereafter. For this procedure, the tracks, rollers, idler wheels, debris guard, and final drive sprockets must be clean of dirt and debris.

Track tension check (non-suspension undercarriage)

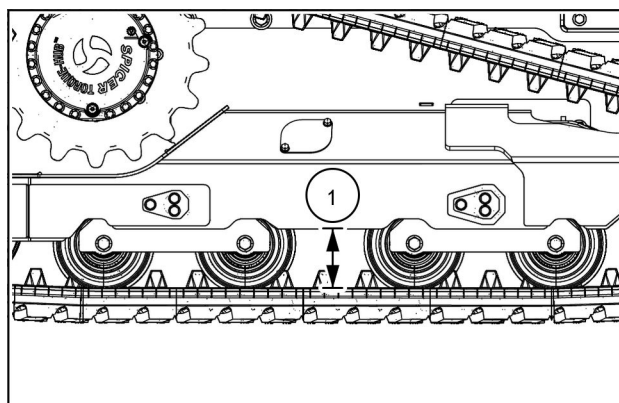
1. Park the machine on firm level surface.
2. Raise, block, and support machine properly until the tracks are about **50 mm (2.0 in)** off the surface.
3. Measure from the bottom of the center roller wheel **(1)** to the lower track top surface **(2)**. The allowable track sag is **12 – 19 mm (0.5 – 0.75 in)**.



RAIL15SSL0356AA 1

Track tension check (suspension undercarriage)

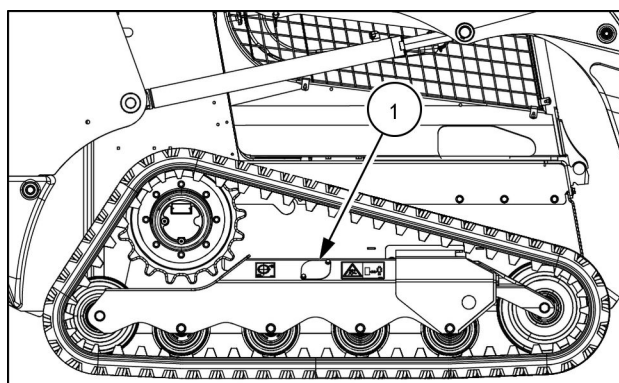
4. Park the machine on firm level surface.
5. Raise, block, and support machine properly until the tracks are about **50 mm (2.0 in)** off the surface.
6. Measure from the bottom of the undercarriage **(1)** between the two center rollers to the lower track top surface. The allowable track sag is **143 – 151 mm (5.6 – 5.9 in)**.



RAIL23SSL0382QA 2

Track tension adjustment

1. Use a **13 mm** tool and remove the track adjustment access cover **(1)** to expose the track adjustment fitting.



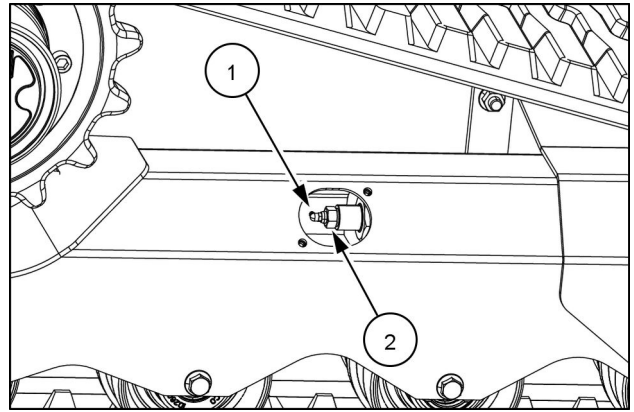
RAIL15SSL0356AA 3

2. Increase track tension:

Add **MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2** grease to increase track tension adjustment fitting **(1)**.

3. Decrease track tension:

Use a **19 mm** tool and slowly turn the fitting **(2)** counterclockwise. Grease will escape from the bottom of the fitting and decrease tension.



RAIL15SSL0382BA 4

Tire pressure and wheel hardware torque

⚠ WARNING

Explosion hazard!

Tires must be replaced by skilled personnel with the proper tools and technical knowledge. Unskilled personnel replacing wheels or tires could result in serious physical injuries, tire damage, and/or wheel distortion. Always have a qualified tire mechanic service wheels and tires.

Failure to comply could result in death or serious injury.

W0171A

⚠ WARNING

Explosion hazard!

Always maintain correct tire pressure as indicated in this manual. **DO NOT** inflate tires above the recommended pressure. Excessive pressure could result in tire failure.

Failure to comply could result in death or serious injury.

W0109A

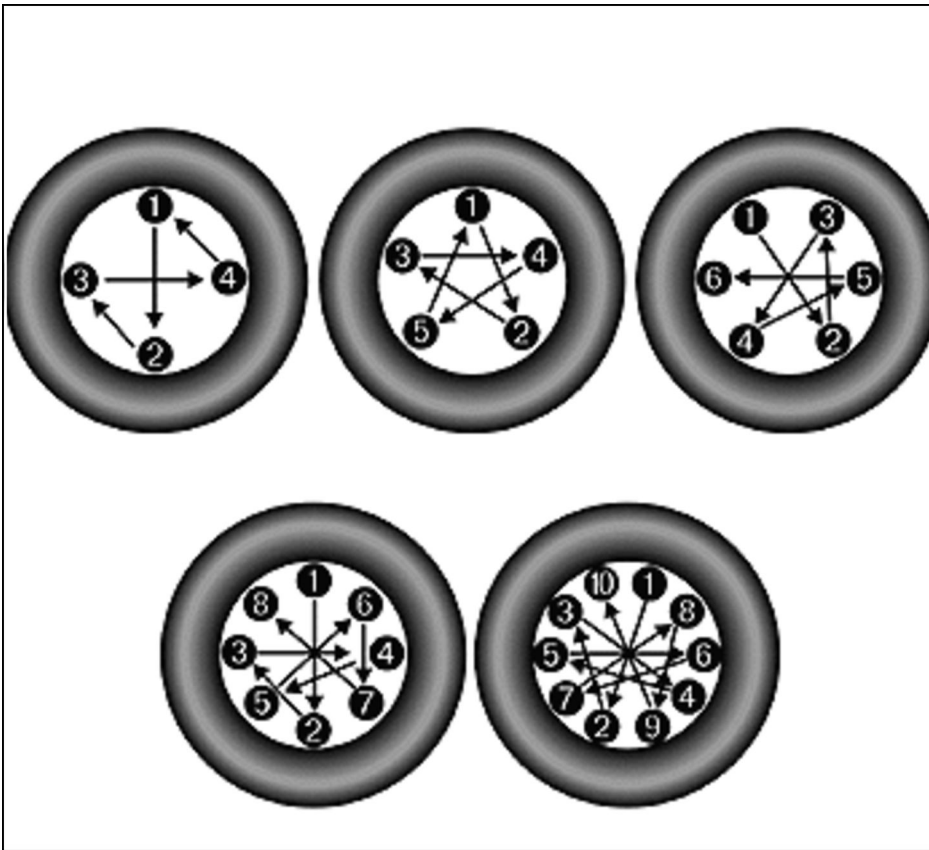
The skid steer will be hard to turn and the tires will wear faster if the correct pressure is not maintained. When a worn or damaged tire is replaced, the replacement must be the same size and tread design as the other tires on the machine. Two different sized tires on one side of the machine will cause accelerated tire wear, loss of power, and excessive strain on the drivetrain. Replace worn tires in pairs with the two new tires used on the same side of the loader. If this tilts the loader too much, replace all four tires.

Adding air to the tire

NOTICE: Check tire pressure gauges at regular intervals for calibration and accuracy.

1. Check the tire pressure.
2. Before you add air, have the wheel correctly installed on the machine or put the wheel in a restraining device (tire inflation cage).
3. Use an air hose with a remote shutoff valve, self-locking air chuck and wear eye protection.
4. Stand **BEHIND** the tread of the tire and make sure **ALL** persons are away from the side of the tire before you start to add air.
5. Inflate the tire to the recommended air pressure. **DO NOT** inflate the tire more than the recommended maximum pressure given on the tire.

TIRE	SIZE	PRESSURE
Heavy Duty	12 x 16.5	290 – 345 kPa (42 – 50 psi)
	14 x 17.5	359 – 414 kPa (52 – 60 psi)
Premium	12 x 16.5	290 – 345 kPa (42 – 50 psi)
	14 x 17.5	359 – 414 kPa (52 – 60 psi)
Premium with liner	12 x 16.5	290 – 345 kPa (42 – 50 psi)
Severe Duty	12 x 16.5	290 – 345 kPa (42 – 50 psi)
	14 x 17.5	531 – 586 kPa (77 – 85 psi)
Flotation	33 x 15.5 x 16.5	290 – 345 kPa (42 – 50 psi)
Mining	12 x 16.5	290 – 345 kPa (42 – 50 psi)
Non-Pneumatic	12 x 16.5	not required
	14 x 17.5	

Wheel torque

63109344 1

1. Check that the wheel nuts have the proper torque setting.

Wheel taper nut torque	169.5 N·m (125 lb ft)
Flange nut	203.5 N·m (150 lb ft)

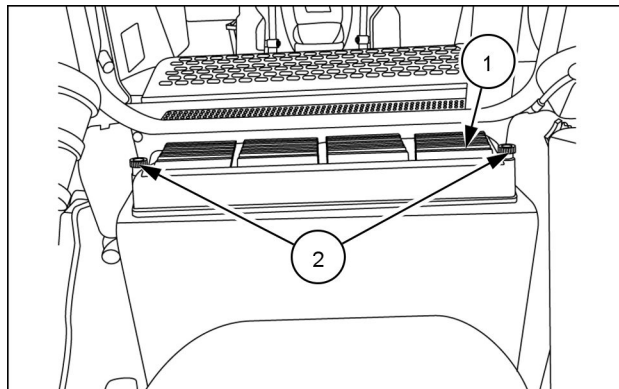
2. If necessary, tighten the nuts in a cross-pattern sequence as shown.

Cab intake filter

If the machine is equipped with a cab heater or air conditioning, the cab intake filter should be inspected. The cab intake filter (1) is located inside the cab behind the seat below the rear window.

NOTE: The service interval for the cab intake filter is dependent on the amount of use and the operating conditions. It is recommended to check more often if working in extreme environmental conditions.

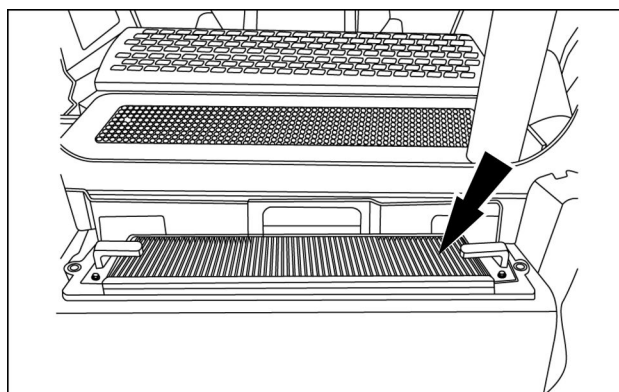
1. Open the access cover using knobs (2). Replace the cab intake filter (1) if it is damaged, torn, or if it is clogged with debris and dirt.



93106883 1

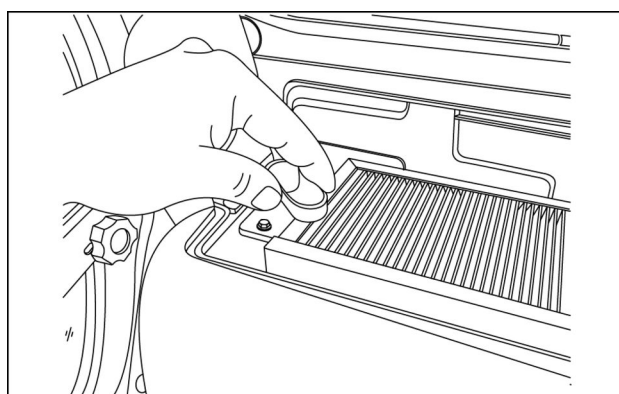
2. Remove the cab intake filter.

NOTICE: Maintain the filter in a horizontal orientation when removing from the air box. This will prevent dust and debris from being accidentally dumped in the cab.



93106884 2

3. Clean the cab intake filter compartment of dirt and debris. The rubber gasket on the filter must seal properly with the compartment filter flange.
4. Replace the new or cleaned components in the reverse order.



93107489A 3

NOTICE: Make sure to get a good seal between the filter and the housing.

Seat restraints - Check

NOTE: State or Local regulations may require a **7.6 cm (3.0 in)** webbing seat belt available through Dealer Service Parts. This belt may be necessary in some industrial applications. Check your local codes.

Seat belt inspection and maintenance:

- Keep seat belts in good condition.
- Keep sharp edges and items than can cause damage away from the belts.
- Periodically check belts, buckles, retractors, tethers, slack take-up system, and mounting bolts for damage and wear.
- Replace all parts that have damage or wear.
- Replace belts that have cuts that can make the belt weak.
- Check that bolts are tight on the seat bracket or mounting.
- If belt is attached to seat, make sure seat or seat brackets are mounted securely.
- Keep seat belts clean and dry.
- Clean belts only with soap solution and warm water.
- Do not use bleach or dye on the belts because this can make the belts weak.

Initial 100 hours

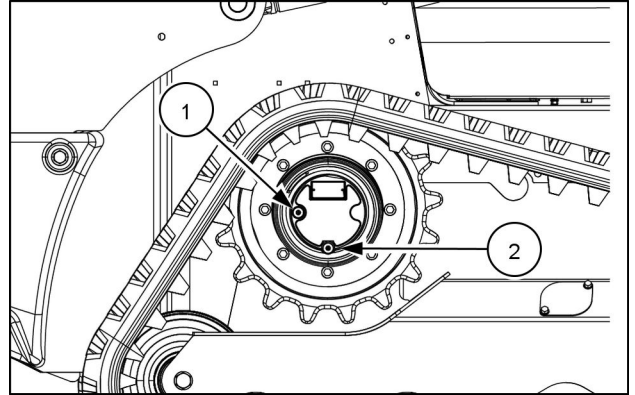
Final drive oil (track models)

The final track drive gear oil should be changed the first **100 h** of operation.

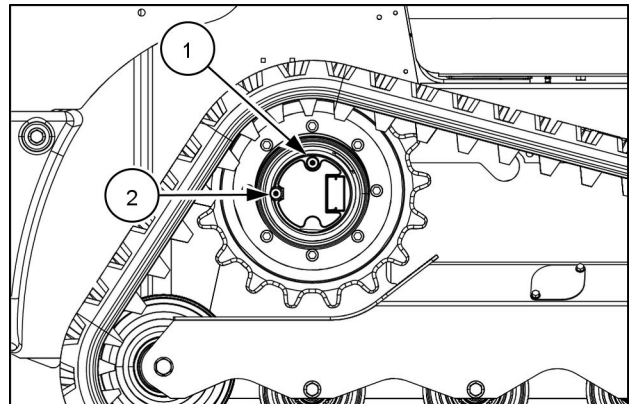
Final track drive gear oil specification – **HYPOID GEAR OIL EP SAE 85W-140**

To change oil

1. Position the final drive hub so that one of the drain plugs **(2)** is in the 6:00 position as shown.
2. Remove drain plug **(2)** and let oil drain completely before replacing the drain plug.



3. Rotate the hub so one drain plug **(1)** is at the 12:00 position and the other plug **(2)** is at 3:00 or 9:00 position as shown.
4. Using a funnel, fill the track drive hub until oil starts to flow from **(2)** that is at 3:00 or 9:00 position.
5. Insert both plugs **(1)** and **(2)** and wipe any excess or spilled oil and repeat this procedure on the other side of the machine.



Capacity - each side

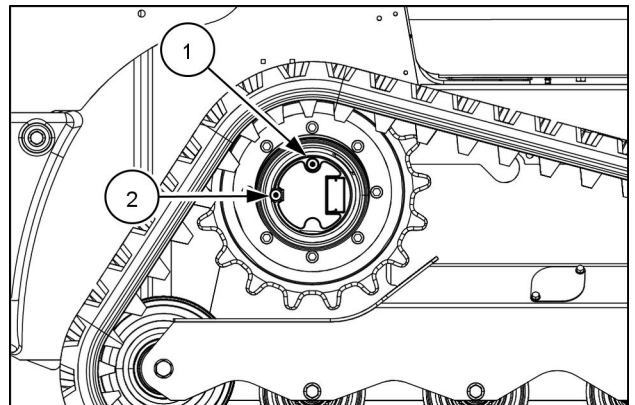
1.0 L (1.06 US qt) +/- 0.1 L (0.1 US qt)

Specifications

HYPOID GEAR OIL EP SAE 85W-140

To check oil level

1. To check the final drive oil level, rotate the hub so one drain plug **(1)** is at the 12:00 position and the other plug **(2)** is at 3:00 or 9:00 position as shown.
2. Remove the drain plug **(2)**. If the oil level is at the proper level, the oil should be even with the bottom of the drain plug.
3. If the oil is low, remove the top plug **(1)** and add oil until it starts to flow out of **(2)**.

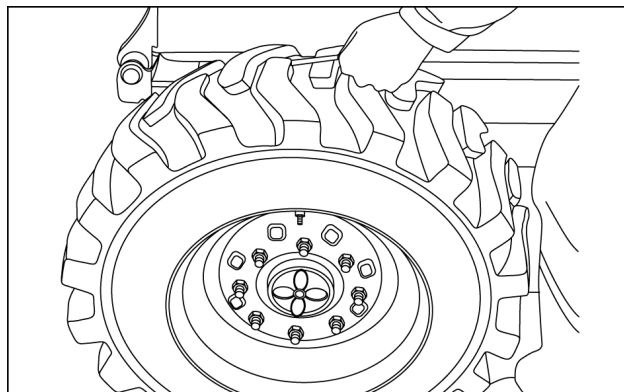


Every 250 hours

Drive chain tension check

Check the tension of the four drive chains after the first 250 hours of operation on a new machine or if new chains have been installed and every 500 hours of operation.

With the machine blocked up, rotate each tire and check for allowable movement. **6 – 12 mm (0.2 – 0.5 in)** is the acceptable range.



63107489 1

Drive chain adjustment

⚠ WARNING

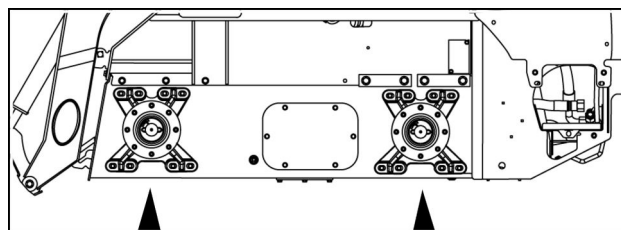
Jack stands can slip or fall over. Dropping, tipping, or slipping of machine or its components is possible.

DO NOT work under a vehicle supported by jack stands only. Park machine on a level surface. Block wheels. Support machine with safety stands.

Failure to comply could result in death or serious injury.

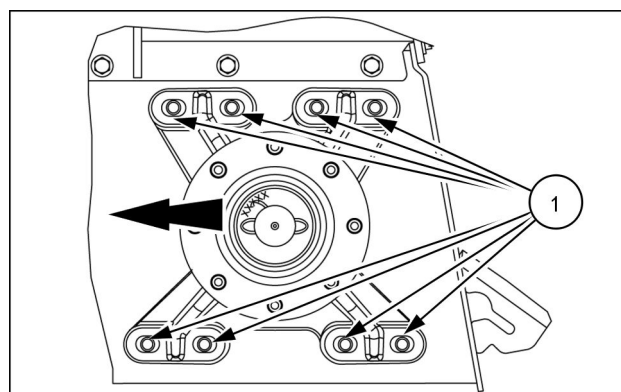
W0069A

1. To adjust the final drive chains jack up and properly support the machine securely off the ground.



931002280 2

2. Adjust each axle drive chain by loosening the retaining nuts **(1)** (left front shown) and sliding the axle-hub assembly to remove the excessive slack.
3. To tighten the chains, slide the front axle-hubs forward and rear axle-hubs rearward.
4. Torque the axle retaining hardware to **244 N·m (180 lb ft)**.

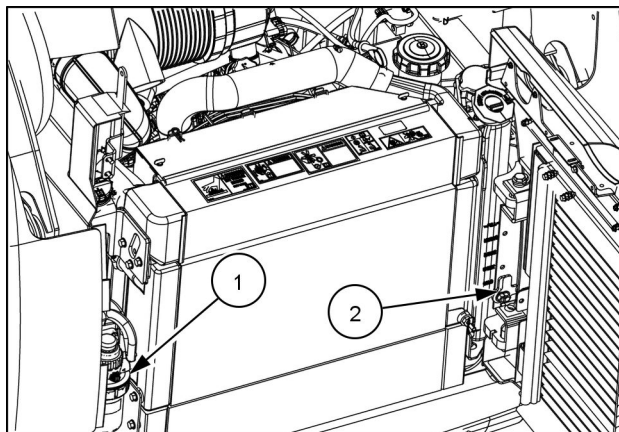


93109317 3

Fuel-water separator filter - drain fluid

Check for water in the fuel-water separator filter every **250 h** of operation. The quality of fuel may determine if the water separator needs to be checked more frequently than **250 h**

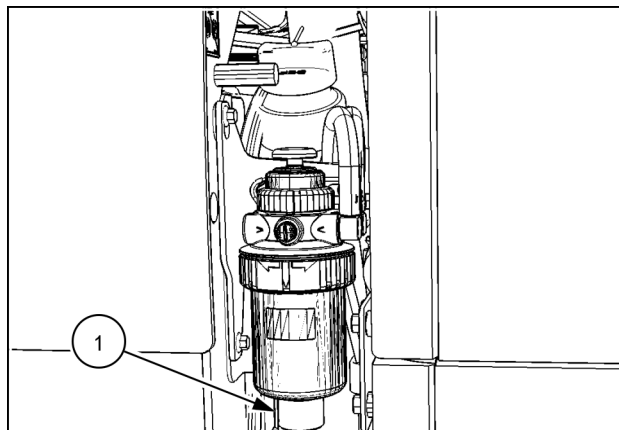
1. Place the machine on a firm, level surface.
2. Turn off the engine.
3. Open engine hood and rear service door. Engage the rear service door latch **(2)** located near the lower hinge. The fuel-water separator filter **(1)** is on the inside to the left-hand side of the cooling package.



RAIL15SSL0383BA 1

4. Place a clean suitable container underneath the fuel-water separator filter.
5. Turn the drain valve on the bottom of the fuel-water separator filter **(1)** counter-clockwise and drain the water until only fuel is present.
6. Close the drain valve.

NOTICE: If excess water is found in the filter, the fuel tank should also be checked.



RAPH16SSL0223BA 2

Every 500 hours

Engine oil and oil filter - Change

⚠ DANGER

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply will result in death or serious injury.

D0076A

⚠ CAUTION

Chemical hazard!

Avoid getting engine oil on your skin. In case of skin contact, wash with running water. Failure to comply could result in minor or moderate injury.

C0202B

⚠ CAUTION

Burn hazard!

Do not handle any service fluid (engine coolant, engine oil, hydraulic oil, etc.) at temperatures that exceed 49 °C (120 °F). Allow fluids to cool before proceeding. Failure to comply could result in minor or moderate injury.

C0107B

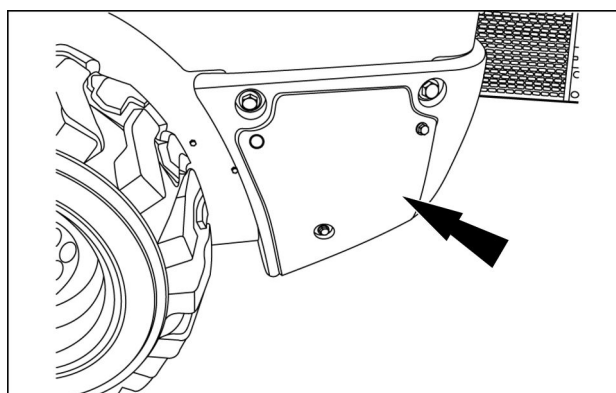
Change engine oil and filter at **500 h** intervals.

Oil specification – **No.1 ENGINE OIL™ SAE 10W-40 CK-4 SEMI-SYNTHETIC** or go to “Engine oils” **7-16** for recommendations.

The quick-disconnect hose is secured to the cab tilt cylinder from the factory. After the first oil change choose a suitable storage location for the quick-disconnect drain.

NOTE: The images may differ slightly based on the machine configuration. The procedure is the same.

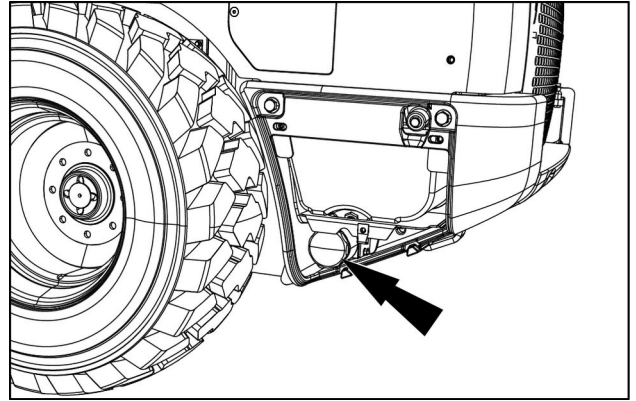
1. Perform a Manual Catalyst Management (MCM) procedure **Manual Catalyst Management (MCM)** prior to the engine oil and filter change.
2. Place the machine on firm, level ground.
3. Remove the access cover from the rear lower left-hand side of the machine.



931001637 1

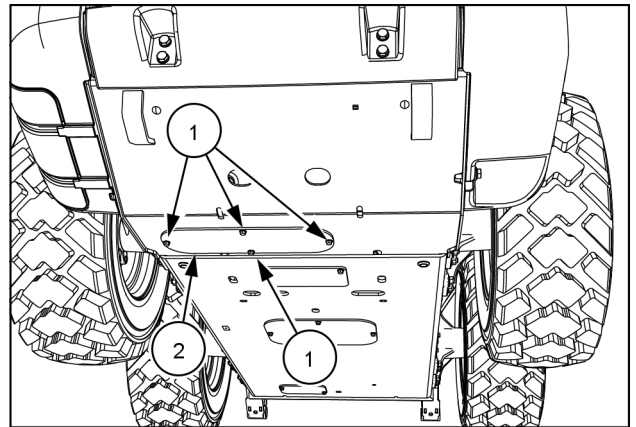
4. Locate the engine oil remote filter.
5. If applicable, use compressed air to clean the engine oil filter assembly.

NOTICE: If compressed air is not available, use a clean rag or cloth to wipe the area clean. This reduces the potential of dirt contamination into the engine.



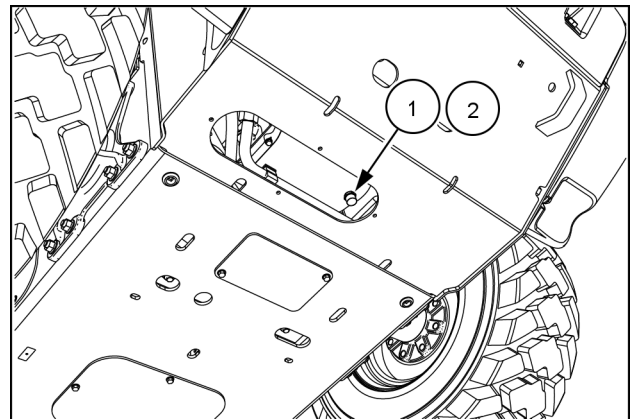
RAIL21SSL0113AA 2

6. Remove the mounting hardware (1) and cover (2) from underneath the machine.



RAIL18SSL0076BA 3

7. Remove the cap (1) (47786509) from the quick disconnect drain fitting (2) (48103849).

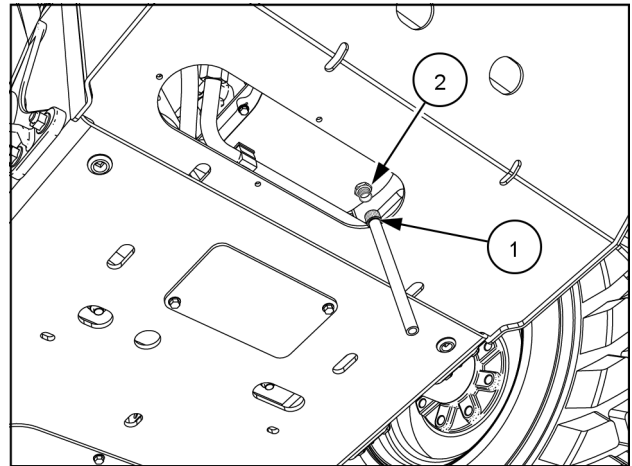


RAIL18SSL0077BA 4

8. Place a drain receptacle under the machine.

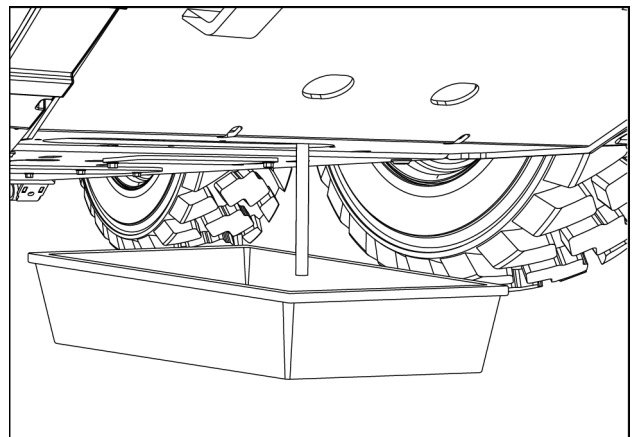
NOTE: After the quick-disconnect hose installation, oil will automatically begin to flow out of the hose.

9. Thread the quick-disconnect hose assembly (1) (48109944) onto the quick-disconnect drain fitting (2) (48103849).
10. Allow the oil to drain completely from the crankcase.



RAIL18SSL0078BA 5

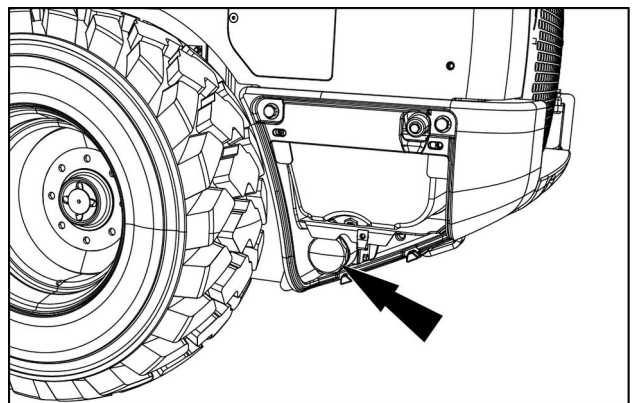
11. Remove the receptacle, with the used oil, from under the machine.
12. Dispose of the oil in accordance with the local regulations.



RAIL18SSL0079BA 6

13. Turn the old engine oil filter counter-clockwise to remove.
14. Dispose of the filter in accordance with the local regulations.
15. Use a clean cloth and wipe sealing surface of the old filter base to remove all dirt.
16. Apply a thin layer of clean grease or oil to the gasket of the new filter.

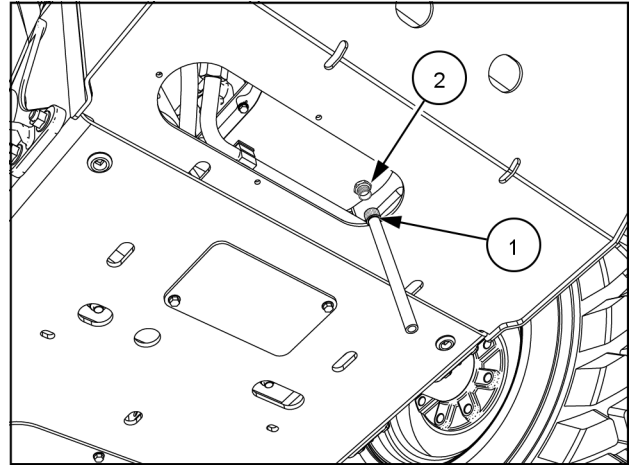
NOTICE: DO NOT use a filter strap wrench to install the oil filter. An oil filter strap wrench can cause a leak if the filter is dented or overstressed.



RAIL21SSL0113AA 7

17. Turn the new oil filter clockwise onto the base until the gasket makes contact with the base. Continue to tighten the filter with your hand for 3/4 to one full turn as directed on the filter label.

18. Remove the quick-disconnect hose assembly (1) (48109944) from the quick-disconnect drain fitting (2) (48103849).

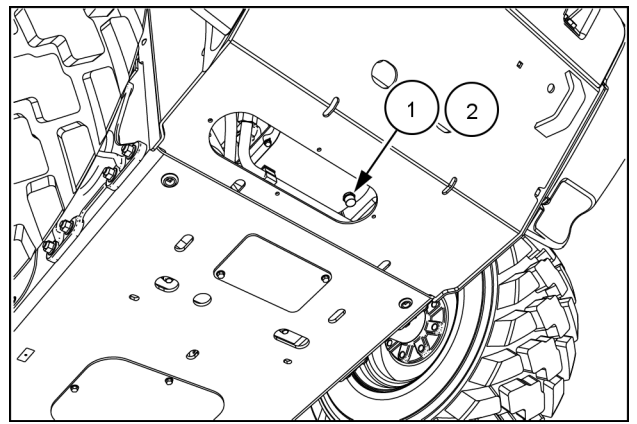


RAIL18SSL0078BA 8

19. Install the cap (1) (47786509) onto the quick-disconnect drain fitting (2) (48103849).

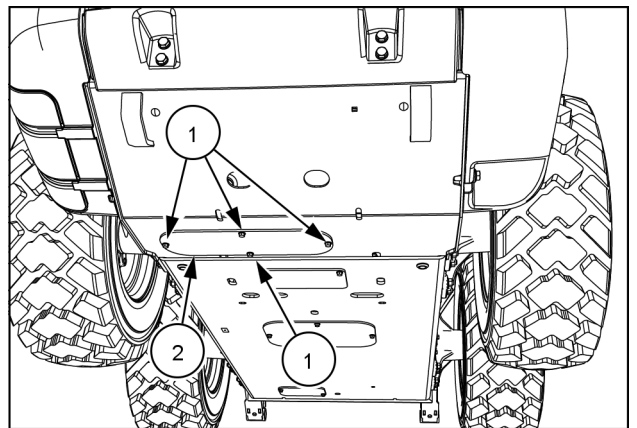
NOTE: Make sure the o-ring is installed on the drain fitting (2), if it is damaged, then replace with new.

NOTE: The cap (1) is only hand tight on the drain fitting (2).



RAIL18SSL0077BA 9

20. Install the cover (2) underneath the machine and secure with the hardware (1).



RAIL18SSL0076BA 10

21. Remove the engine oil dipstick (2) to provide crankcase ventilation.

NOTICE: Slowly fill to avoid flooding valve cover with oil.

NOTE: Use an oil spout that is smaller than the engine oil fill neck (1). This will allow air to pass around the oil fill neck as you pour.

22. Slowly add the correct type and quantity of oil, see the oil table below.

NOTE: Keep the oil fill spout in the upper half of the oil fill neck.

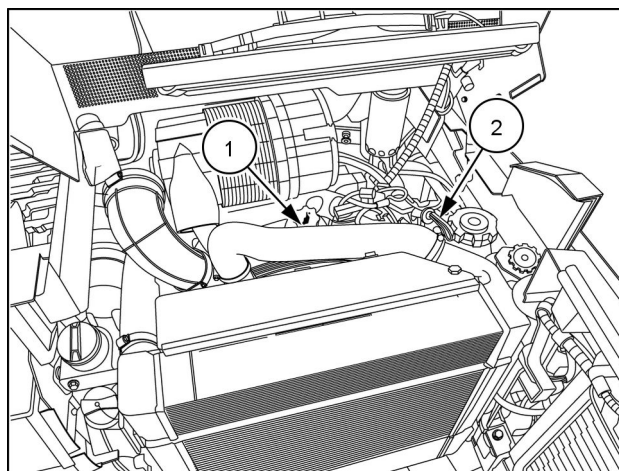
23. Install the engine oil fill cap.

24. Install the engine oil dipstick.

25. Start the engine and run at idle speed. Check the engine oil filter and drain plug for leaks. After **2 min**, stop the engine, wait for **2 – 3 min**, and check the engine oil level.

26. Install access cover and secure with bolts.

27. Close rear access door and engine hood.



RAIL14SSL0708AA 11

Engine crank case oil

Capacity - with filter change

8.5 L (9.0 US qt)

Specifications

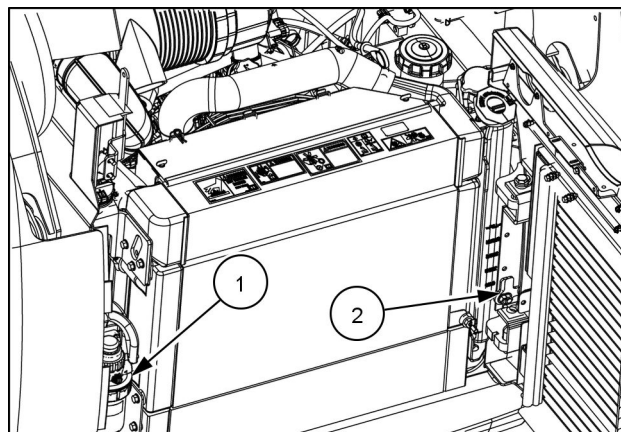
NO.1 ENGINE OIL™ SAE 10W-40 CK-4 SEMI-SYNTHETIC

NOTE: See the “Engine oils” on page 7-16 for the recommended viscosity at ambient temperature ranges.

Fuel-water separator filter element

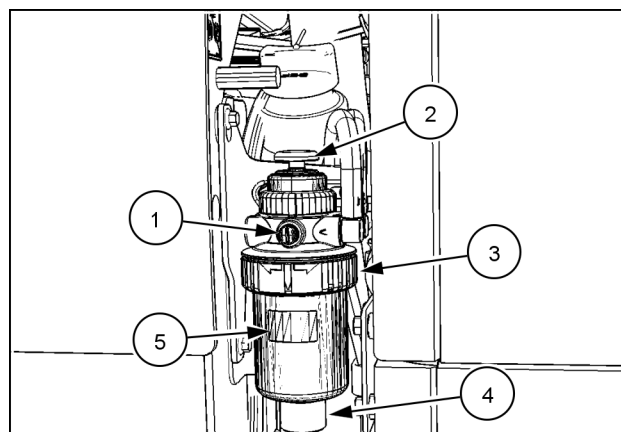
Replace the fuel-water separator filter every **500 h** of operation.

1. Place the machine on a firm, level surface.
2. Turn off the engine.
3. Open engine hood and rear service door. Engage the rear service door latch (2) located near the lower hinge. The fuel prefilter (1) is on the inside to the left-hand side of the cooling package.



RAIL15SSL0383BA 1

4. Clean the area around the fuel-water separator filter (3) collar with water before proceeding.
5. Disconnect the water in fuel sensor connector (4).
6. Unscrew the black retaining ring (3).
7. Pull the filter (5) straight down. Do not twist or turn the filter, as it is not threaded.
8. Wipe filter head with a clean cloth.
9. Apply a thin film of clean motor oil to the gasket.
10. Push the new filter up to the filter head.
11. Hand tighten the retaining ring until it clicks.



RAPH16SSL0223BA 2

NOTICE: DO NOT use a strap wrench to tighten the filter.

12. Replace water-in-fuel sensor and attach the electrical connector (4) on the bottom of the fuel-water separator filter.

NOTICE: Do not start the engine until you purge the air from the fuel system.

13. Turn the bleed screw (1) out approximately one turn and pump the hand pump (2) on top of the pre-filter until fuel is coming out of the bleed screw (1); then immediately close the bleed screw (1) while fuel is coming out.
14. Start the engine and check for leaks around the fuel filter.
15. Unlatch and close the rear service door.
16. Close engine hood.

Fuel filter

Replace the fuel filter every **500 h** of operation.

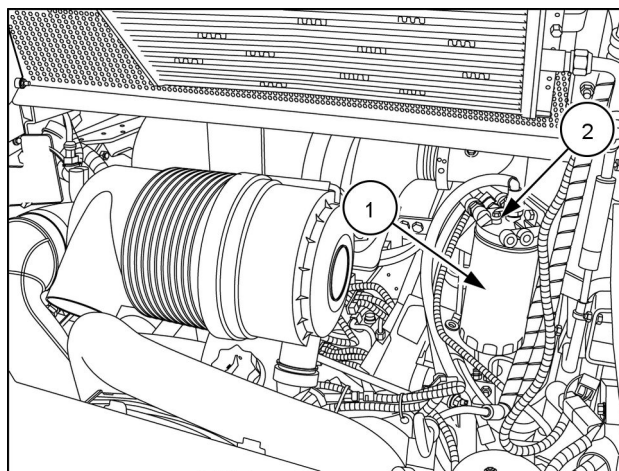
1. Place the machine on a firm, level surface.
2. Turn off the engine.
3. Open the engine hood. Locate the fuel filter **(1)** on the right-hand side of the engine compartment.
4. Clean the area around the fuel filter **(1)** before you proceed.
5. Use a strap wrench and remove the fuel filter **(1)**.
6. Remove the rubber seal from the stud on the filter head.
7. Use a cloth and clean the gasket surfaces of the filter body.
8. Apply clean engine oil to the new rubber seal.
9. Install the rubber seal on the filter head stud.
10. Apply clean engine oil to the gasket of the new filter. **DO NOT** fill the new filter with fuel before installation.

NOTICE: *DO NOT use a strap wrench to tighten the filter.*

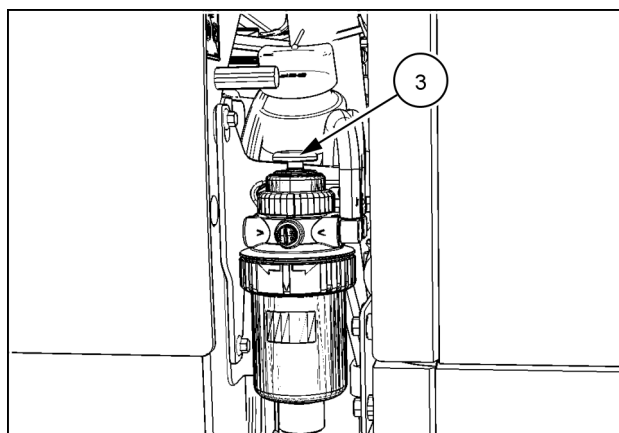
11. Turn the filter onto the filter body until the filter gasket makes contact with the filter body. Continue to tighten the filter with your hand for 1/2 to 3/4 turn.

NOTICE: *Do not start the engine until you purge the air from the fuel system.*

12. Turn the bleed screw **(2)** out approximately five turns and pump the hand pump **(3)** on top of the fuel-water separator filter (located left of the cooling package) until fuel is coming out of the bleed screw **(2)**; then immediately close the bleed screw **(2)** while fuel is coming out.
13. Start the engine and check for fuel leaks around the fuel filter.



RAIL14SSL0718AA 1

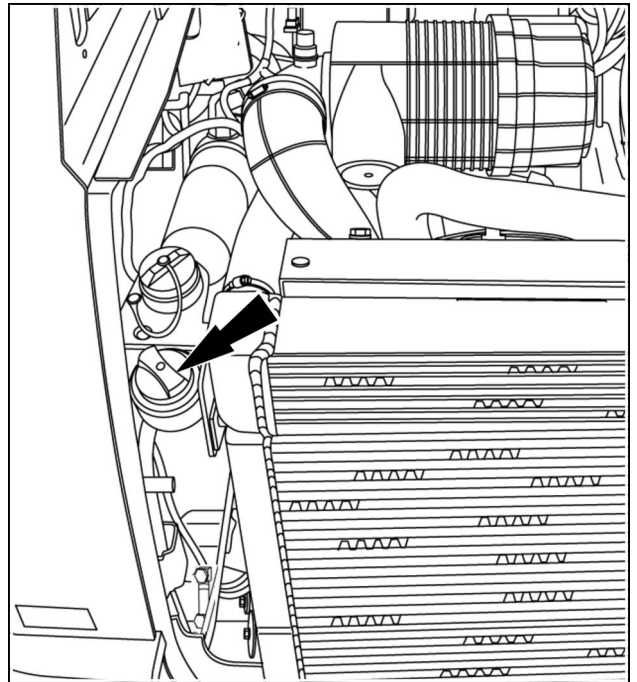


RAPH16SSL0223BA 2

14. Close the engine hood.

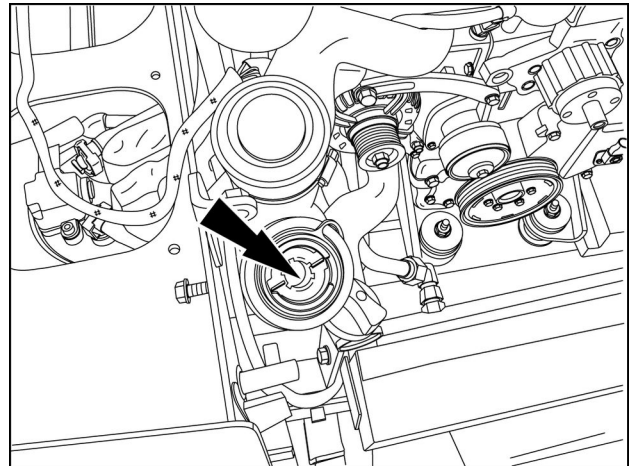
Diesel Exhaust Fluid (DEF)/AdBlue® tank filter

1. Remove the Diesel Exhaust Fluid (DEF) tank filler cap.



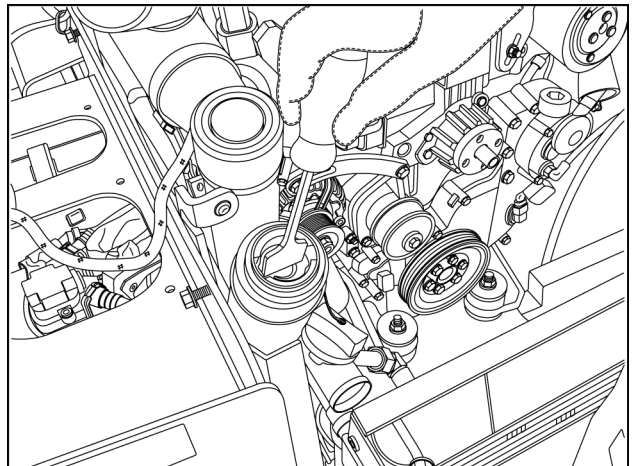
RAIL14SSL7111AA 1

2. Locate the filter in the DEF tank filler neck.



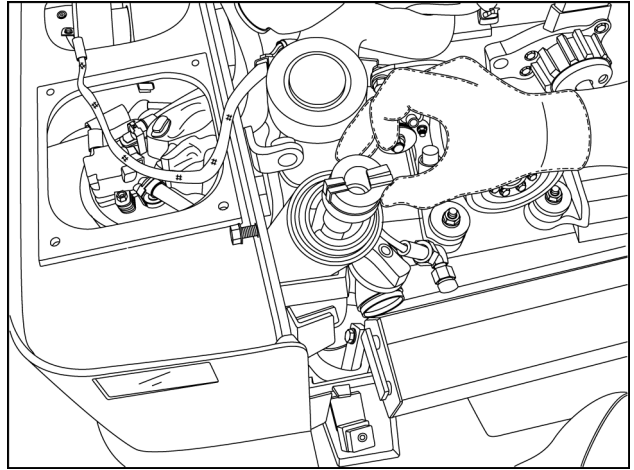
RAIL14SSL0749BA 2

3. Turn the filter counterclockwise to remove.



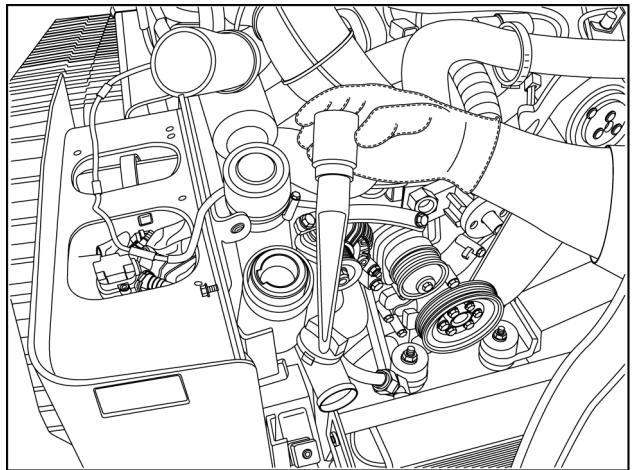
RAIL14SSL0748BA 3

4. Remove the filter from the DEF tank filler neck.



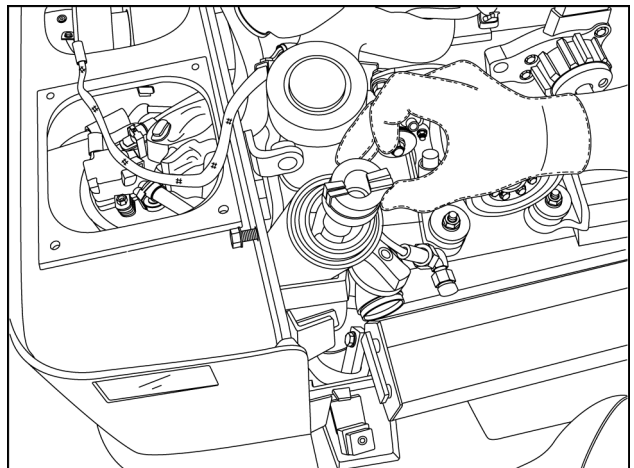
RAIL14SSL0750BA 4

5. Clean the filter with distilled water.



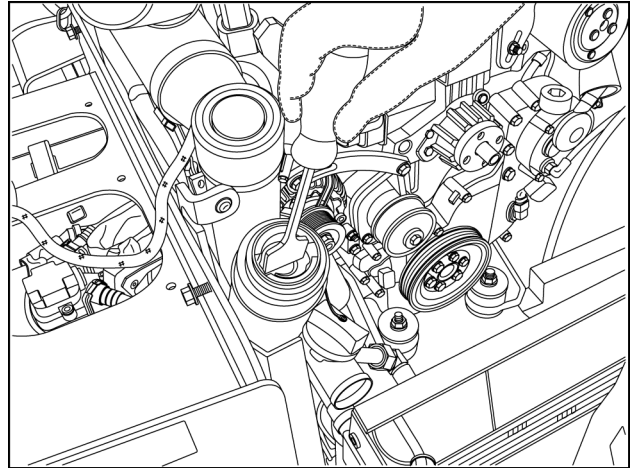
RAIL14SSL0751BA 5

6. Insert the filter into the Diesel Exhaust Fluid (DEF) filler neck.

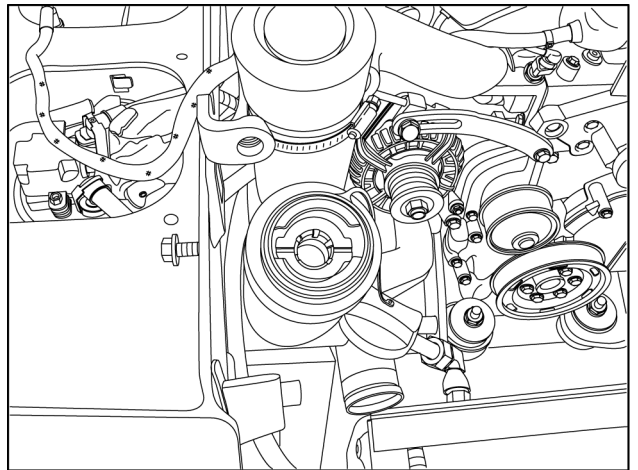


RAIL14SSL0750BA 6

7. Turn the filter clockwise to lock the filter in place.

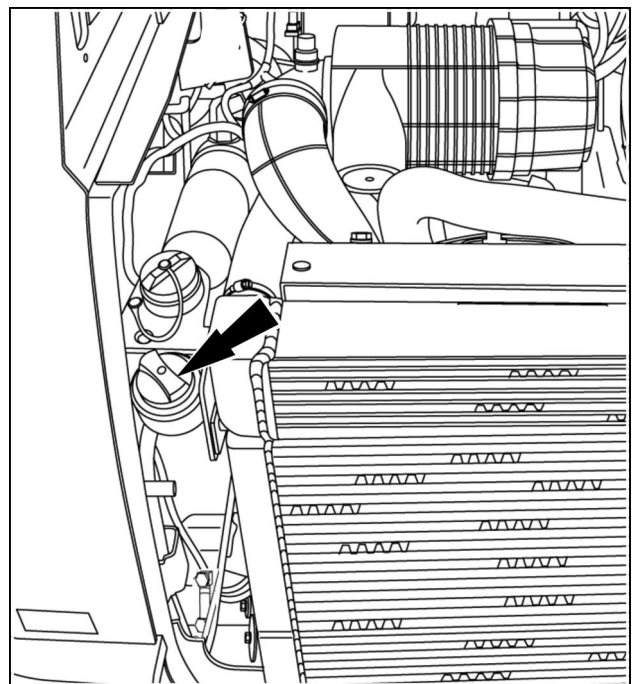


RAIL14SSL0748BA 7



RAIL14SSL0747BA 8

8. Install the Diesel Exhaust Fluid (DEF) tank filler cap.



RAIL14SSL7111AA 9

Hydraulic oil filter

⚠ WARNING

Burn hazard!

Do not handle engine coolant, engine oil, or hydraulic oil at temperatures that exceed 49 °C (120 °F). Allow fluids to cool before proceeding. Failure to comply could result in death or serious injury.

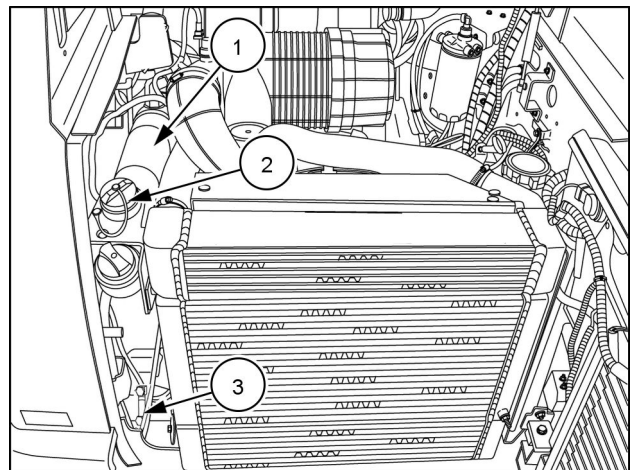
W0330A

The hydraulic oil filter should be replaced every **500 h** of operation or if the warning lamp illuminates.

Hydraulic oil specifications – **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** or see the “Hydraulic oil viscosity” chart **7-17**.

NOTICE: Replace the hydraulic oil filter after **20 h** of operation if a major hydraulic component has been replaced.

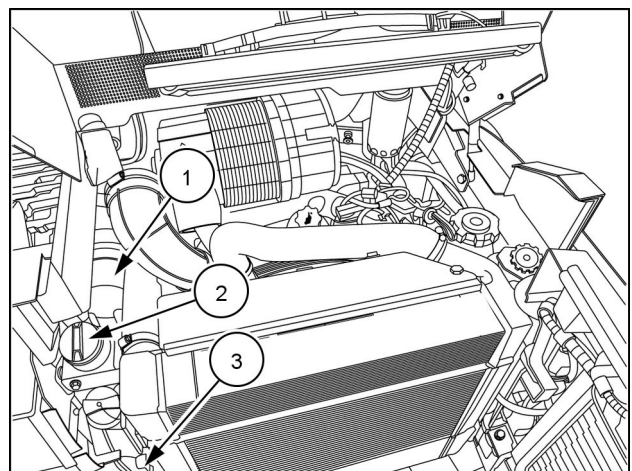
1. Remove any attachments and place the machine on firm level ground.
2. Open the engine hood and rear service door. Engage the rear service door latch located near the lower hinge.
3. Locate the Hydraulic oil filter **(1)** to the left of the radiator, see Figure 1 for radial machines and Figure 2 for vertical machines. Check funnel and drain hose are secure and reposition the drain hose.
4. Slowly loosen the hydraulic fill cap **(2)** to relieve pressure in the system. Leave the cap on, but loose.
5. Clean the area around the hydraulic filter.
6. Turn hydraulic filter counter-clockwise and remove. Dispose of the filter and oil properly.
7. Apply a thin layer of clean oil on the O-ring of the new filter.
8. Install the filter. Hand tighten the filter 1/2 to 3/4 turn after the filter O-ring touches the filter head.



RAIL14SSL7011AA 1

NOTICE: DO NOT use a filter strap wrench to tighten the filter. Hand tighten only.

9. Start the engine and check for oil leaks around the hydraulic filter.
10. Check the fluid level. The oil level should be within the middle one third of the sight glass **(3)**. Add oil as required.
11. Unlatch/close rear service door and close engine hood.



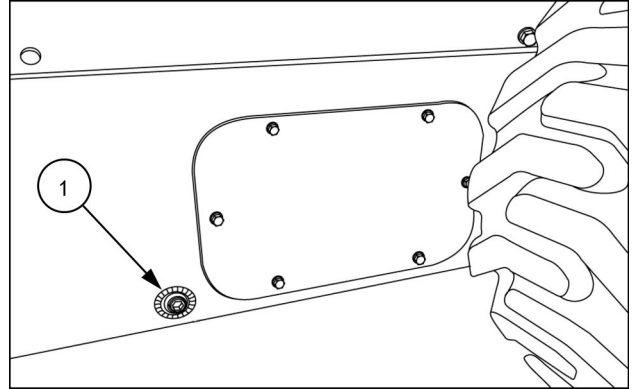
RAIL14SSL0708AA 2

Final drive chain tank oil

The final drive chain tank oil should be checked every **500 h** of operation.

Final drive chain tank oil specification – **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW**

1. Park the machine on firm level surface.
2. Clean the area around the chain tank fill/level plug **(1)**.
3. Remove the chain tank fill/level plug **(1)**. The oil should be up to the bottom of the inspection orifice.



RCPH11SSL006AAD 1

4. Add **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW**.
5. Replace the chain tank fill/level plug **(1)**.

NOTE: Use **LOCTITE® 545™** or an equivalent product on the threads of the plug.

6. Repeat this procedure for the other side.

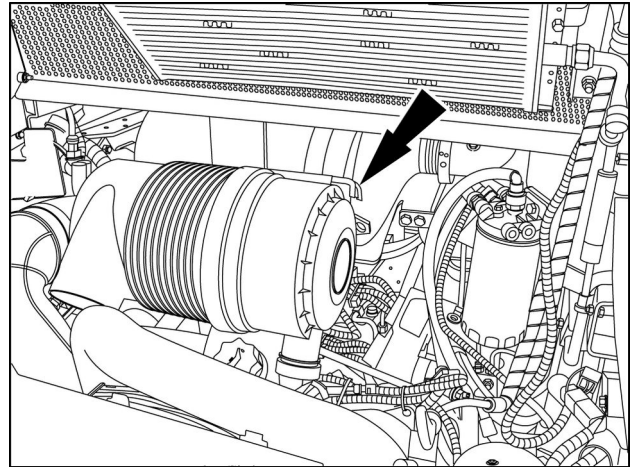
Capacity - each side	
SR270B, SV340B	22.2 L (23.5 US qt)
Specifications	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

Air cleaner elements

Both air cleaner elements should be changed at **500 h** of operation or if the air restriction indicator is illuminated.

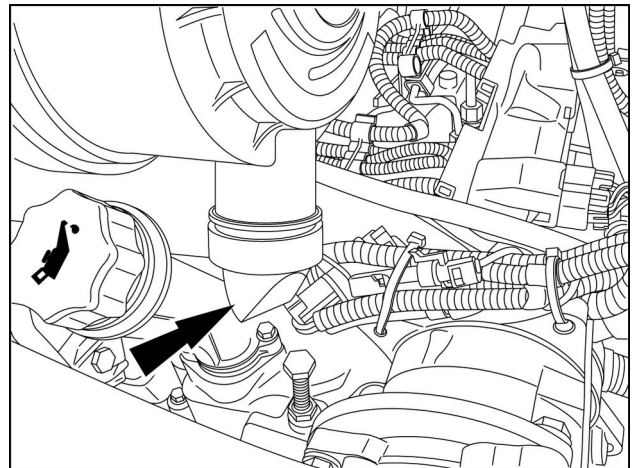
Air cleaner filter removal

1. Open the engine hood and rear service door. Engage the rear service door latch located near the lower hinge.
2. Pull the yellow tab out, rotate the cover counterclockwise until the cap turns to open. See instructions symbols and decal on the cover. Pull the cap off and clean the inside.



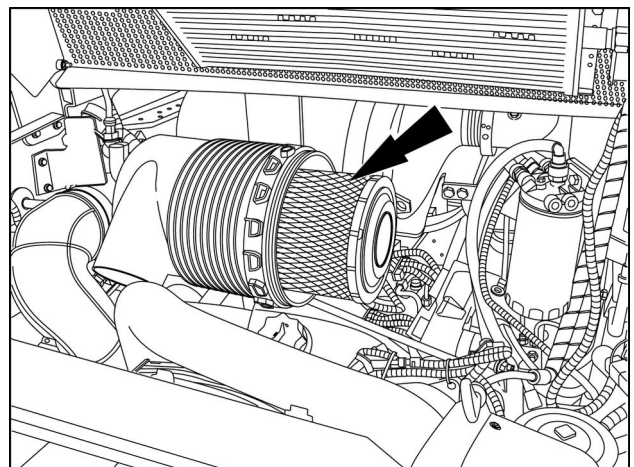
RAIL14SSL0719AA 1

3. Clean the debris from the dust cap valve.



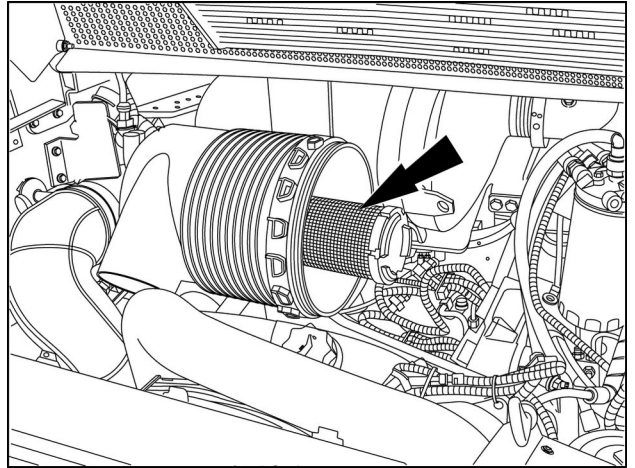
RAIL14SSL0722AA 2

4. Remove the primary filter.



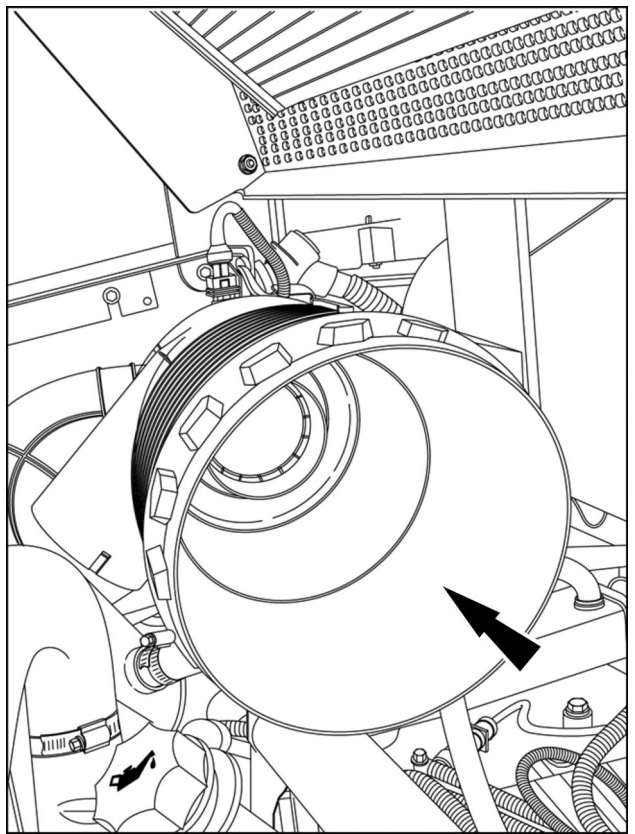
RAIL14SSL0720AA 3

5. Remove the secondary filter.



RAIL14SSL0721AA 4

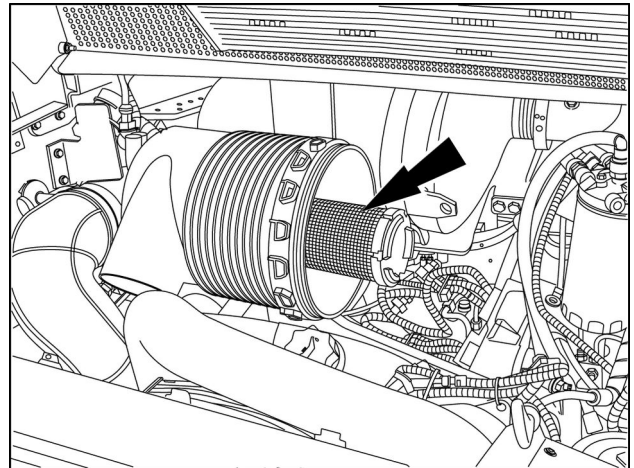
6. When both of the air cleaner filters have been removed, be sure to clean out the box, without allowing any debris to fall into the intake track.



RAIL14SSL0730BA 5

Air cleaner filter installation

1. Install the secondary filter.

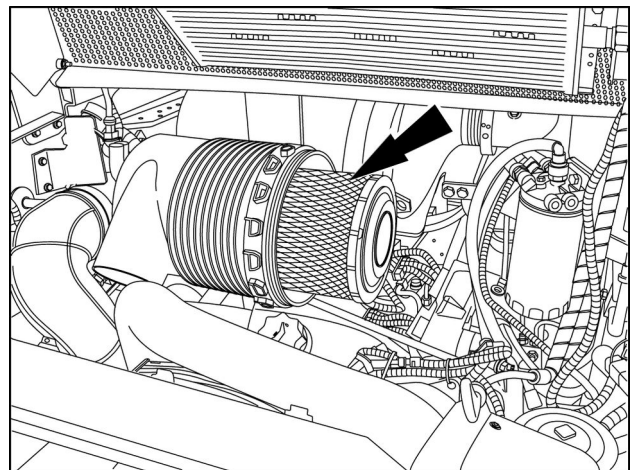


RAIL14SSL0721AA 6

2. Install the primary filter.

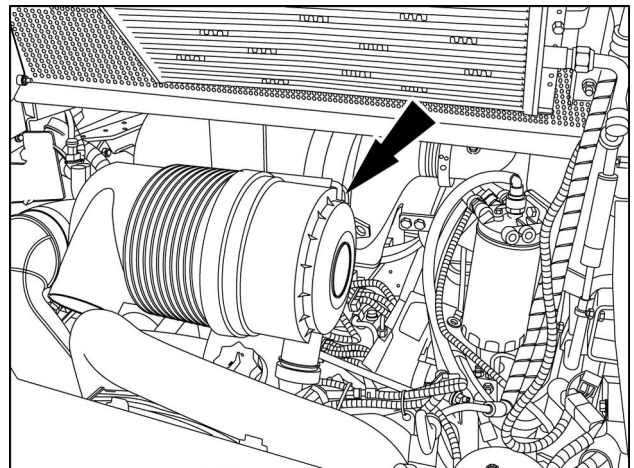
NOTE: Make sure the filters are seated properly into the filter housing.

NOTICE: The inner end of the canister must be free of dirt and debris to insure the filters will seal properly. Failure of a good seal between the filter and canister may cause major engine damage.



RAIL14SSL0720AA 7

3. Install the cover by rotating clockwise until tight and push the yellow tab in to lock the cover in place.



RAIL14SSL0718AA 8

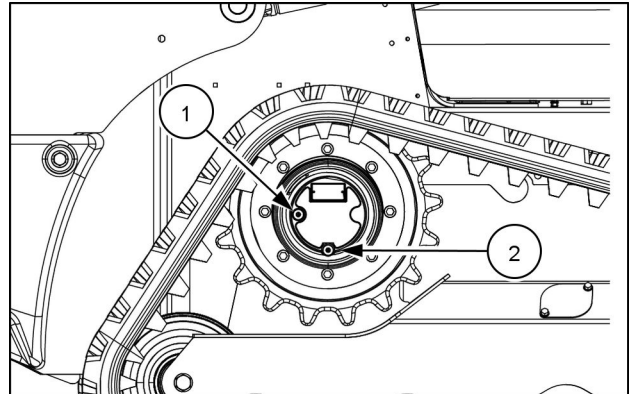
Final drive oil (track models)

The final track drive gear oil should be changed every **500 h** of operation.

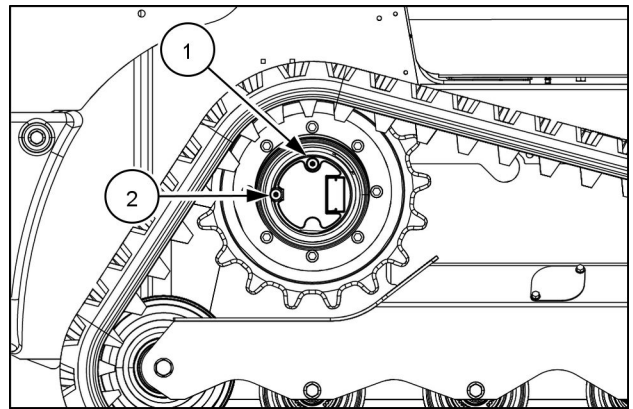
Final track drive gear oil specification – **HYPOID GEAR OIL EP SAE 85W-140**

To change oil

1. Position the final drive hub so that one of the drain plugs **(2)** is in the 6:00 position as shown.
2. Remove drain plug **(2)** and let oil drain completely before replacing the drain plug.



3. Rotate the hub so one drain plug **(1)** is at the 12:00 position and the other plug **(2)** is at 3:00 or 9:00 position as shown.
4. Using a funnel, fill the track drive hub until oil starts to flow from **(2)** that is at 3:00 or 9:00 position.
5. Insert both plugs **(1)** and **(2)** and wipe any excess or spilled oil and repeat this procedure on the other side of the machine.



Capacity - each side

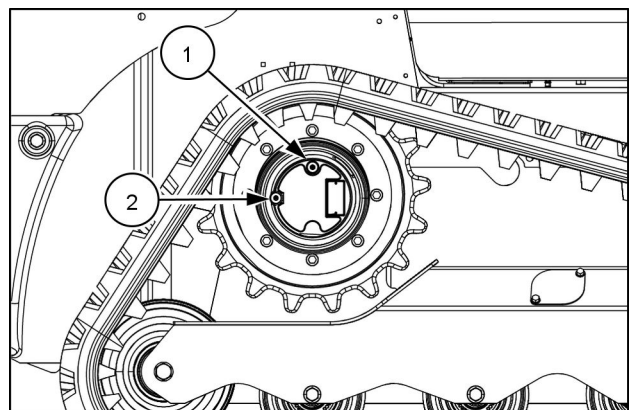
1.0 L (1.06 US qt) +/- 0.1 L (0.1 US qt)

Specifications

HYPOID GEAR OIL EP SAE 85W-140

To check oil level

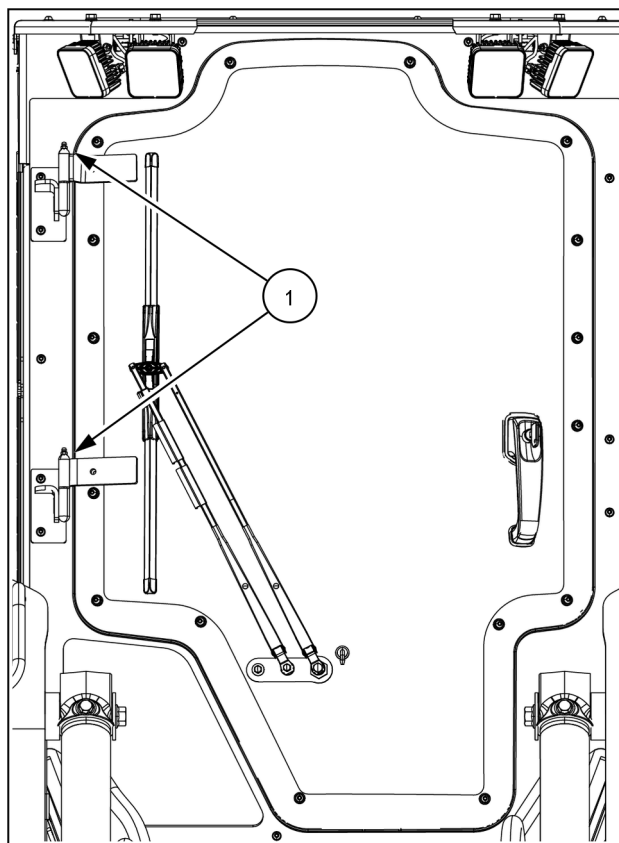
1. To check the final drive oil level, rotate the hub so one drain plug **(1)** is at the 12:00 position and the other plug **(2)** is at 3:00 or 9:00 position as shown.
2. Remove the drain plug **(2)**. If the oil level is at the proper level, the oil should be even with the bottom of the drain plug.
3. If the oil is low, remove the top plug **(1)** and add oil until it starts to flow out of **(2)**.



Cab door - Grease

Grease both door hinges every **500 h** with **MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2**.

1. Clean the grease fittings **(1)** before greasing.
2. Open and close the door to work in the grease.



RAIL23SSL0226BA 1

Roll Over Protective Structure (ROPS) mechanism and hardware check

⚠ WARNING

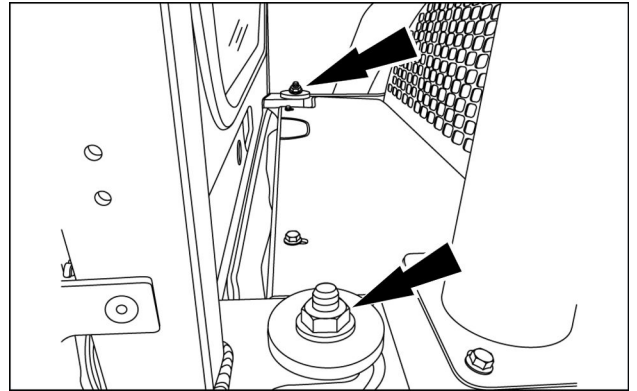
Roll-over hazard!

Securely fasten the seat belt. Your machine is equipped with a Roll-Over Protective Structure (ROPS) cab, ROPS canopy, or ROPS frame for your protection. The seat belt can help ensure your safety if it is properly used and maintained. Never wear a seat belt loosely or with slack in the belt system. Failure to comply could result in death or serious injury.

W0143A

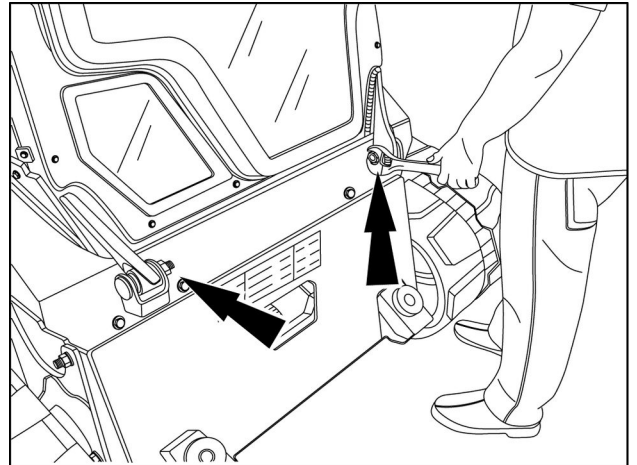
Check the Roll Over Protective Structure (ROPS) cab to lower mainframe hardware for proper torque.

1. Check the ROPS hardware at the back of the machine that are used to secure the cab. Torque the hardware to **170 N·m (125.4 lb ft)**.



931001633 1

2. Check the ROPS front pivot bolts. Torque these bolts to **42 N·m (31.0 lb ft)**.



RAIL14SSL0469BA 2

Every 1000 hours

Hydraulic oil and filter

WARNING

Chemical hazard!

When handling fuel, lubricants, and other service chemicals, follow the manufacturer's instructions. Wear Personal Protective Equipment (PPE) as instructed. Do not smoke or use open flame. Collect fluids in proper containers. Obey all local and environmental regulations when disposing of chemicals.

Failure to comply could result in death or serious injury.

W0371A

WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.

Failure to comply could result in death or serious injury.

W0398A

WARNING

Chemical hazard!

When lifting a plastic-cased battery, excessive pressure on the end walls could cause acid to spill through the vent caps. Lift a plastic-cased battery with a battery carrier or with your hands positioned on opposite corners of the battery. Always wash your hands after handling.

Failure to comply could result in death or serious injury.

W0385A

WARNING

Hazardous chemicals!

Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.

Failure to comply could result in death or serious injury.

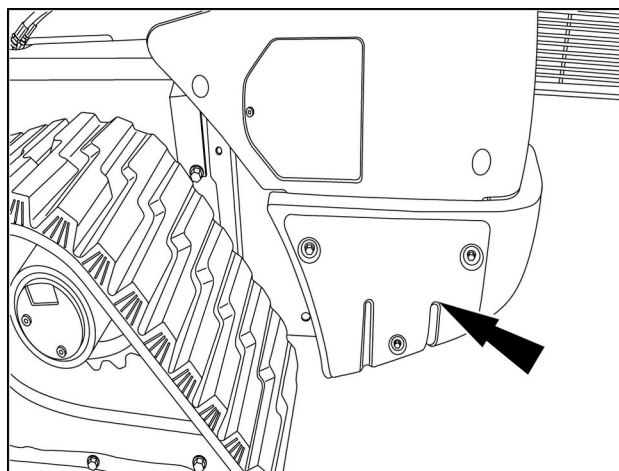
W0006A

Every **1000 h** of operation or if a major hydraulic component has been replaced, rebuilt, or damaged, the hydraulic oil and filter should be changed.

Hydraulic oil specification – **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW**

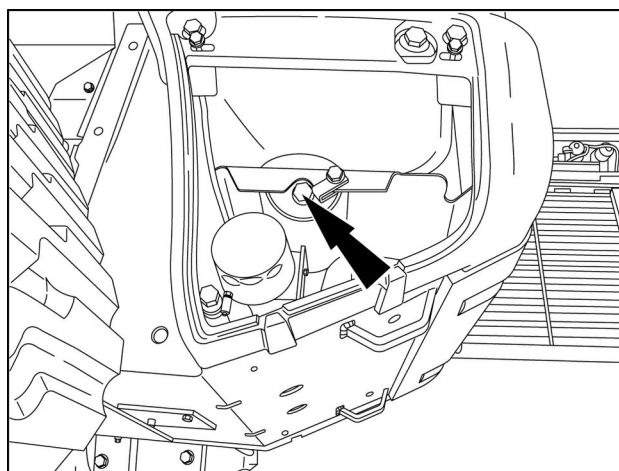
1. Park the machine on firm level surface.
2. Lower the loader arms to the ground and shut off the engine.
3. Replace the hydraulic oil filter. See **7-66** for more details.

4. Remove the lower access panel.



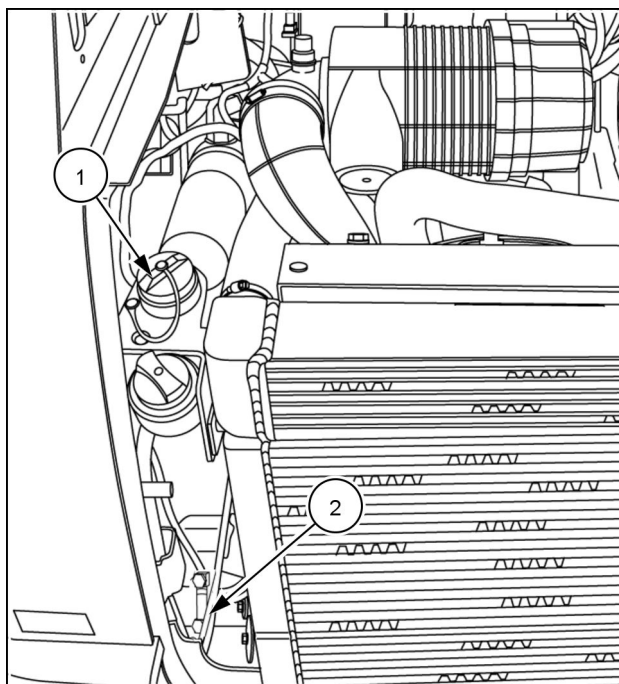
RAIL14SSL0707AA 1

5. Place a container under the drain plug.



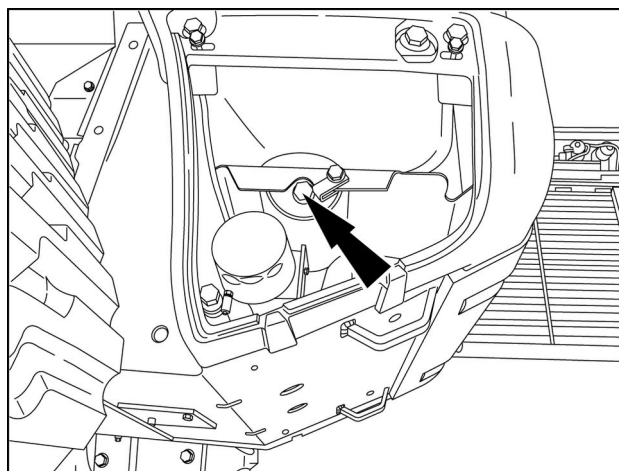
RAIL14SSL0709AA 2

6. Clean the reservoir filler cap (1) and the area around the filler cap with cleaning solvent.
7. Turn the reservoir filler cap 1/2 turn to relieve air pressure from the reservoir. Do not remove the filler cap from the reservoir until the pressure is relieved.



RAIL14SSL7111AA 3

8. Slowly remove the drain plug. Drain the hydraulic oil.
9. After the hydraulic oil has completely drained, close the drain plug.



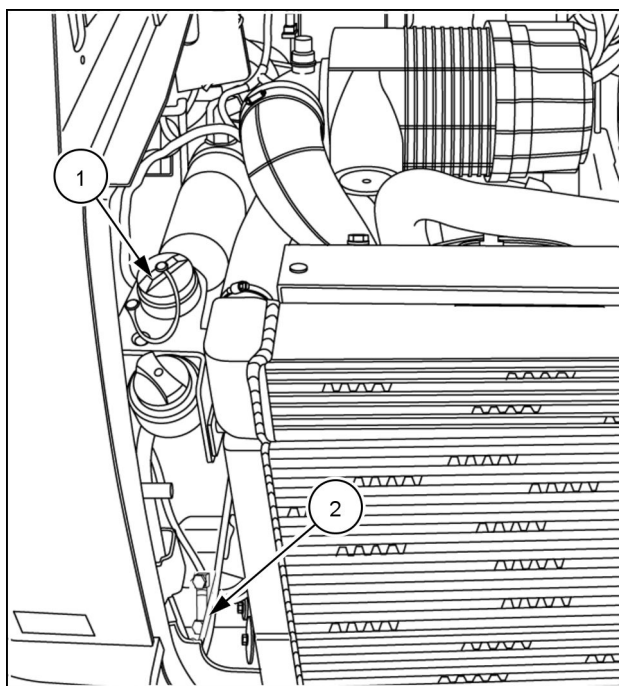
RAIL14SSL0709AA 4

NOTE: The loader arms should be all the way down before filling the hydraulic tank.

10. Remove the reservoir filler cap (1) from the reservoir.
11. Add the correct oil to the reservoir until the proper oil level is established. Fill the reservoir until the oil level is at the midpoint of the sight gauge (2).

NOTE: See the hydraulic oil chart on the following page.

12. Install the reservoir filler cap (1) .
13. Start and run the engine and operate the hydraulics. Lower the loader lift arms to the ground.
14. Stop the engine and check the oil level in the reservoir. Add oil as required.

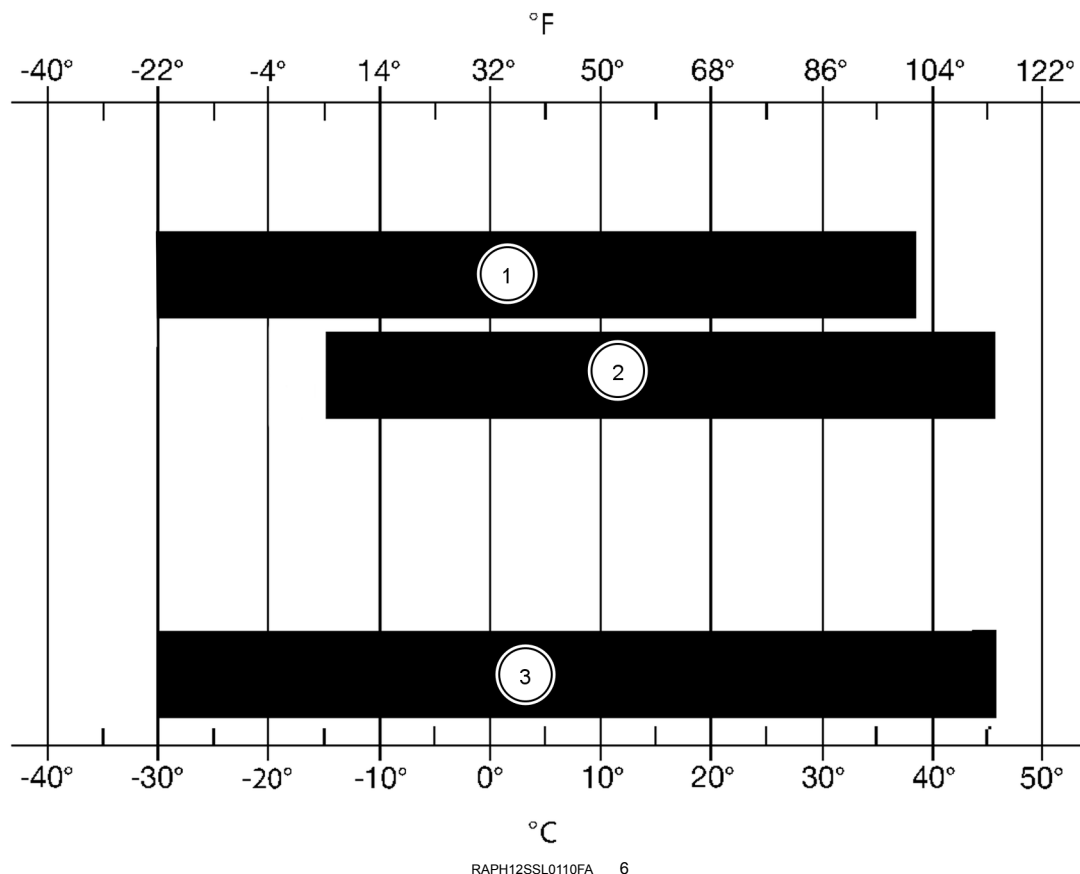


RAIL14SSL7111AA 5

Reservoir capacity	22.7 L (6.0 US gal)
System capacity:	45.4 L (12.0 US gal)
Specifications	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

Hydraulic oil

NOTICE: This information reflects the coldest ambient temperature condition for starting a cold machine and for operating a cold machine.



Block	Viscosity	Temperature range
(1)	PREMIUM HYDRAULIC OIL HV46 MULTI-GRADE ANTI-WEAR	-30 – 38 °C (-22 – 100 °F)
(2)	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW	-15 – 46 °C (5 – 115 °F)
(3)	NO.1 ENGINE™ OIL FULL SYNTHETIC SAE 0W-40	-30 – 46 °C (-22 – 115 °F)

NOTE: CASE CONSTRUCTION recommends **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** for applications where continuous operations above **38 °C (100 °F)** ambient temperature or frequent roading applications (above **20 – 30 min**) are common.

NOTE: CASE CONSTRUCTION recommends **PREMIUM HYDRAULIC OIL HV46 MULTI-GRADE ANTI-WEAR** for improved cold weather operation. Standard factory fill oil **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW** is acceptable for cold weather operation when sufficient warm up time is provided.

Final drive chain tank oil

Change the oil in the chain tanks every **1000 h** of operation.

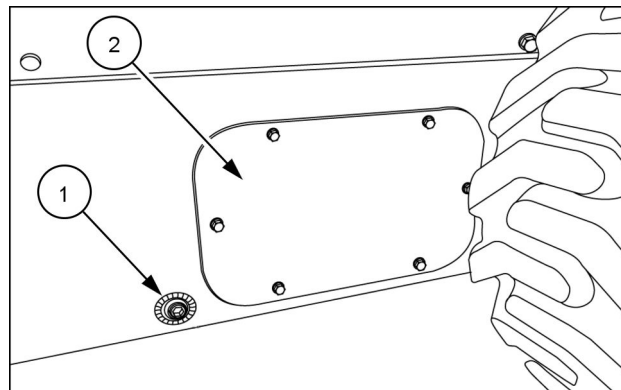
Final drive chain oil specification – **PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW**

1. Park the machine on firm level surface.
2. Clean the area around the chain tank drain plugs (not shown), located on the bottom of the drive chain tank, one on each side.
3. Clean the area around the chain tank fill/level plug **(1)**.
4. Place a suitable container under the chain tank and slowly remove the tank drain plug.

NOTE: Use a jack and raise the front of the machine slightly for better draining.

5. Remove the chain tank fill/level plug **(1)**.
6. After the oil has been completely drained, replace the chain tank drain plug.
7. Fill the tank with new oil and replace the chain tank fill/level plug **(1)**.

NOTE: Use **LOCTITE® 545™** or an equivalent product on the threads of the plugs.



RCPH11SSL006AAD 1

Capacity - each side

SR270B, SV340B

22.2 L (23.5 US qt)

Specifications

PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

8. Repeat this procedure for the other side.

NOTE: The chain tank may be cleaned with a solvent based cleaner by removing the inspection cover **(2)** on each side, after the oil has been removed. Allow the tank to dry thoroughly before filling with oil.

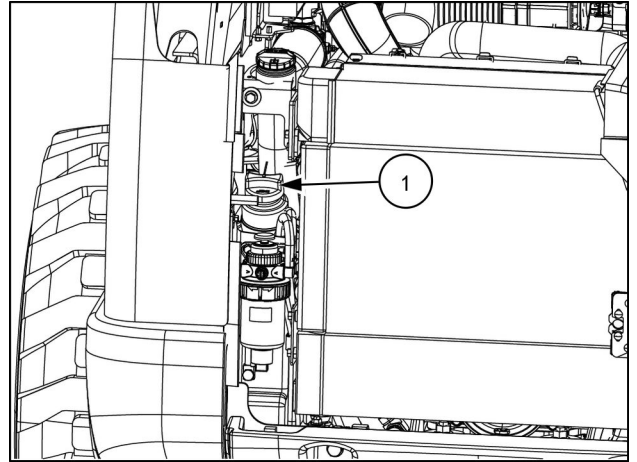
Diesel Exhaust Fluid (DEF)/AdBlue® tank suction filter - Replace

NOTE: Procedure is shown with a vertical lift machine. For radial lift machines access to the DEF tank level sender and temperature sensor assembly is from the rear door access.

Replace the 40 µm suction filter every 1000 h.

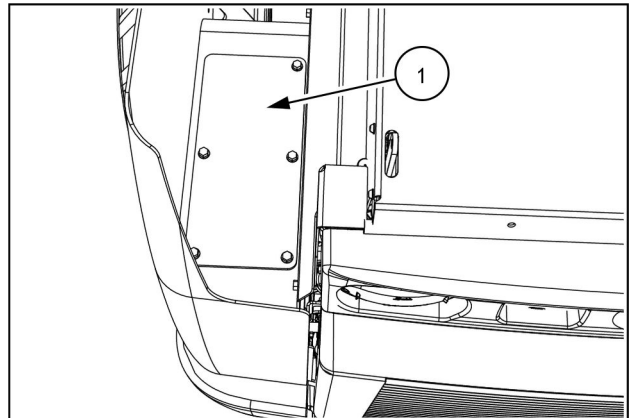
Removing the 40 µm suction filter

1. Remove the attachment, park the machine, raise the loader arm, engage the loader arm safety support pin, and turn off the engine.
2. Loosen the DEF tank fill cap (1).



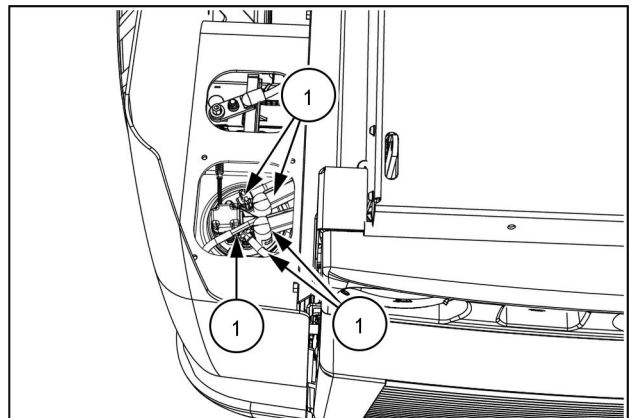
RAIL17SSL0347BA 1

3. Remove the cover plate (1) to access the DEF tank level sender and temperature sensor assembly.



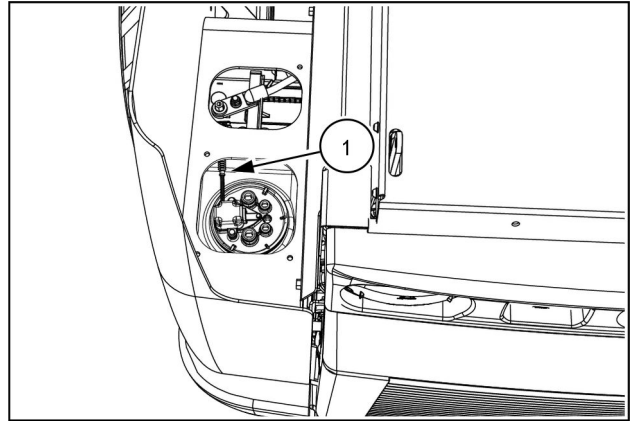
RAIL22SSL0802AA 2

4. Disconnect the DEF lines and hoses (1) from the DEF tank level sender and temperature sensor assembly.



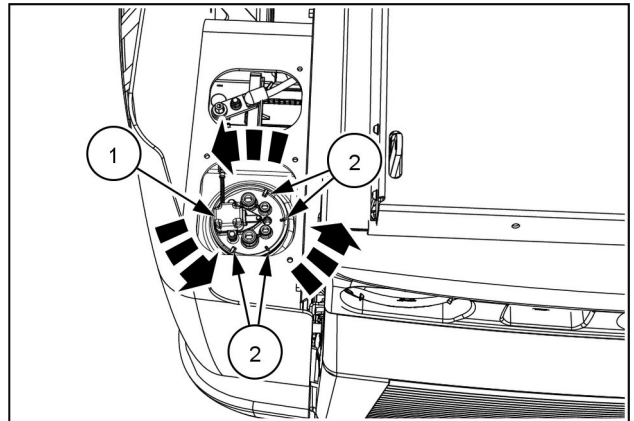
RAIL22SSL0803AA 3

5. Disconnect the electrical connector **(1)** from the DEF tank level sender and temperature sensor assembly.



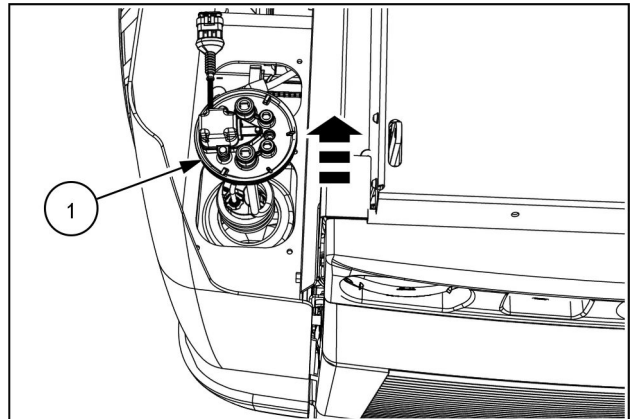
RAIL22SSL0801AA 4

6. Use a round punch and hammer to gently tap counter-clockwise on the inner tabs **(2)** of the DEF tank level sender and temperature sensor assembly **(1)** until it is loose on the tank.



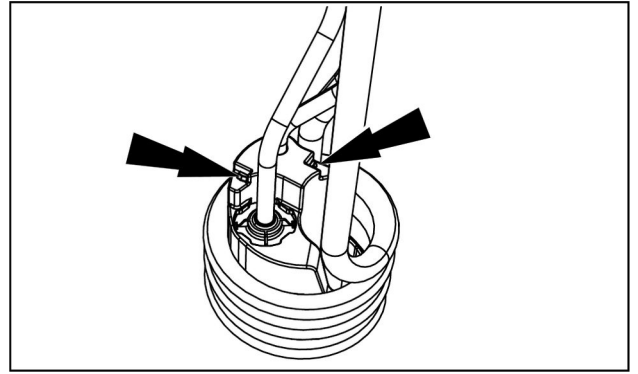
RAIL22SSL0801AA 5

7. Carefully remove the DEF tank level sender and temperature sensor assembly **(1)** from the DEF tank.

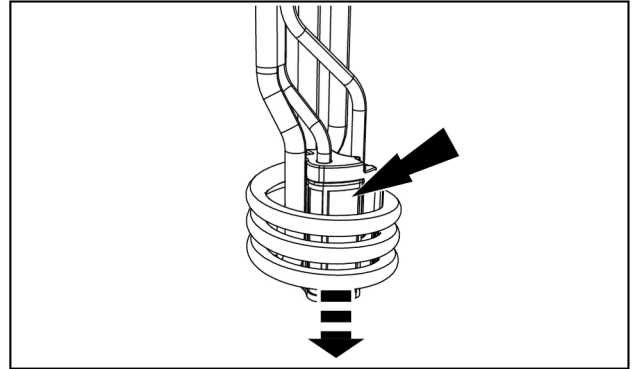


RAIL22SSL0804AA 6

8. Press the two tabs and pull the filter off.



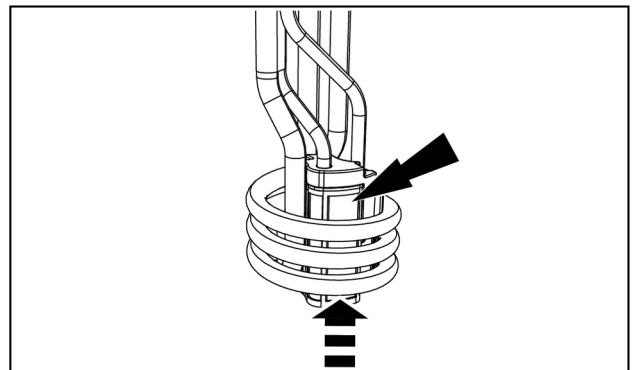
RAIL22SSL0761AA 7



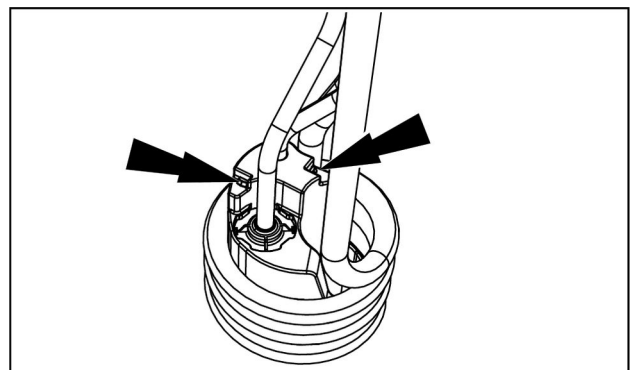
RAIL22SSL0759AA 8

Installing the 40 µm filter

1. Push the filter on to the suction tube until the two filter tabs click into position.

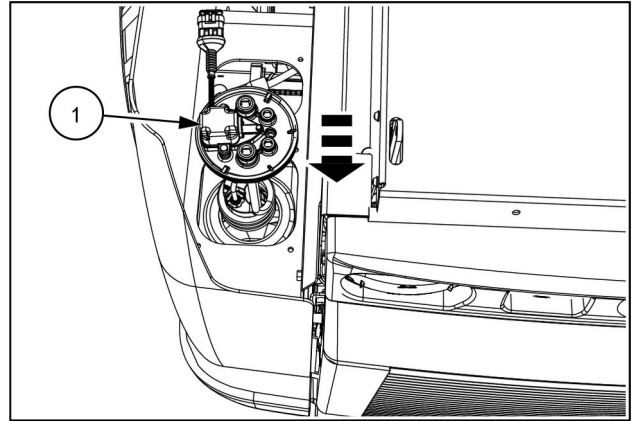


RAIL22SSL0759AA 9



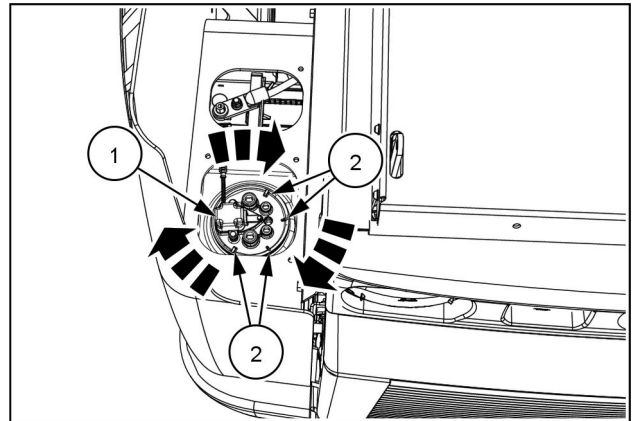
RAIL22SSL0761AA 10

2. Carefully install the DEF tank level sender and temperature sensor assembly **(1)** into the DEF tank.



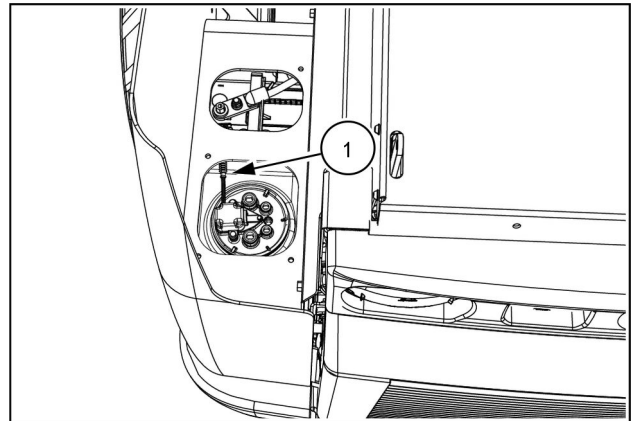
RAIL22SSL0804AA 11

3. Use a round punch and hammer to gently tap clockwise on the inner tabs **(2)** of the DEF tank level sender and temperature sensor assembly **(1)** until it is tight on the tank.



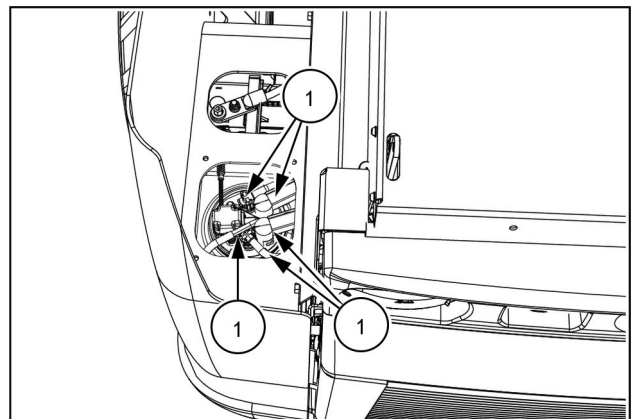
RAIL22SSL0801AA 12

4. Connect the electrical connector **(1)** to the DEF tank level sender and temperature sensor assembly



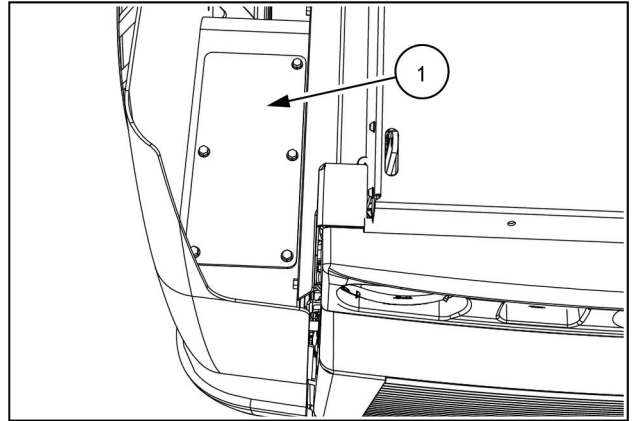
RAIL22SSL0801AA 13

5. Connect the DEF lines and hoses **(1)** to the DEF tank level sender and temperature sensor assembly.



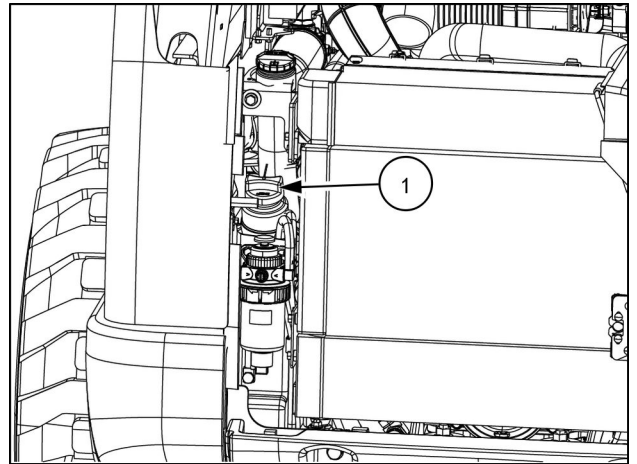
RAIL22SSL0803AA 14

6. Install the cover plate **(1)** over the DEF tank level sender and temperature sensor assembly.



RAIL22SSL0802AA 15

7. Tighten the DEF tank fill cap **(1)**.



RAIL17SSL0347BA 16

Belt - Replace

⚠ WARNING

Hot surface possible!

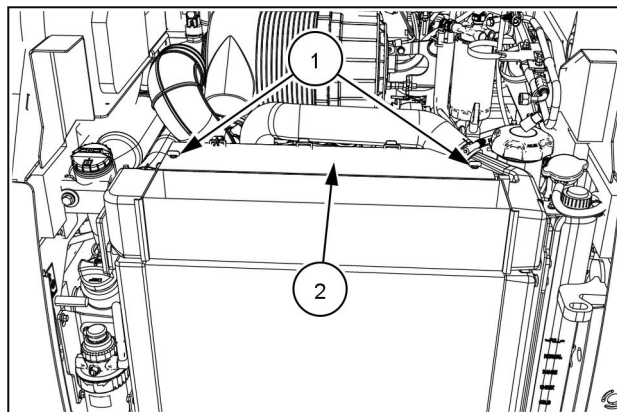
Wait for all components to cool before performing any operation.

Failure to comply could result in death or serious injury.

W0251A

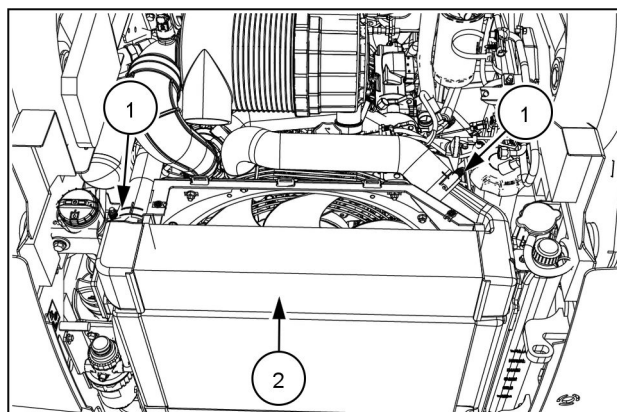
Replace the engine fan belt every **1000 h**.

1. Raise the engine hood and ensure it stays in the open position.
2. Open the rear service door. Use the service lock in the lower right to secure the door in the open position.
3. Remove thumb screws **(1)**.
4. Remove the access cover **(2)** from the machine.



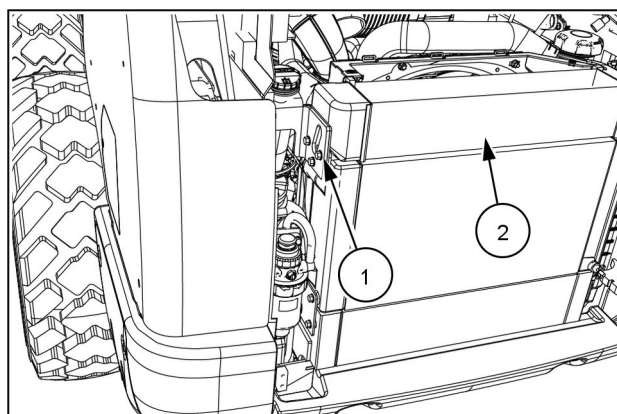
RAIL23SSL0245BA 1

5. Loosen the charge air cooler tube clamps **(1)** and slide them away from the charge air cooler **(2)**.



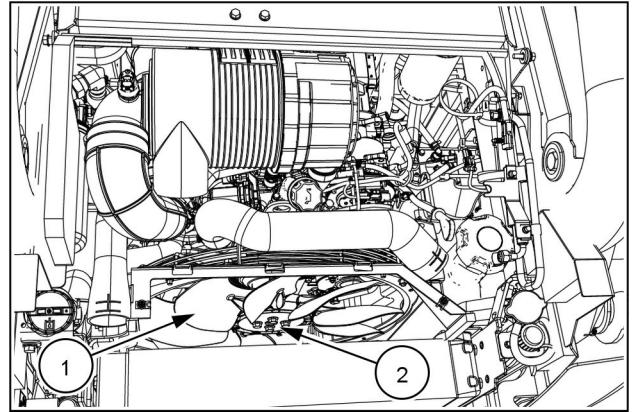
RAIL23SSL0246BA 2

6. Remove the charge air cooler bolt hardware **(1)** from both sides.
7. Remove the charge air cooler **(2)**. Plug the tube holes and the charge air cooler openings with clean shop rags.



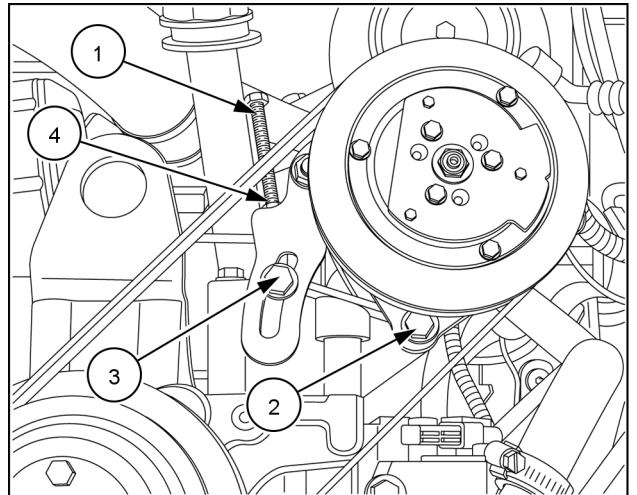
RAIL23SSL0248BA 3

8. Remove the fan mounting bolts **(2)**.
9. Remove the fan **(1)** and spacer from the machine.



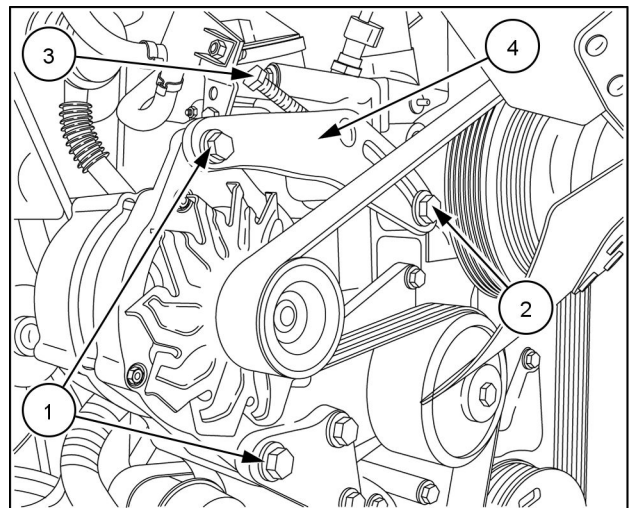
RAIL23SSL0249BA 4

10. Loosen the air conditioning compressor adjusting bracket bolt **(3)** (if equipped).
11. Loosen the mounting bolt **(2)**.
12. Loosen the adjusting bolt jam nut **(4)**.
13. Loosen the adjusting bolt **(1)**.
14. Remove the belt.



RAPH12SSL0064BA 5

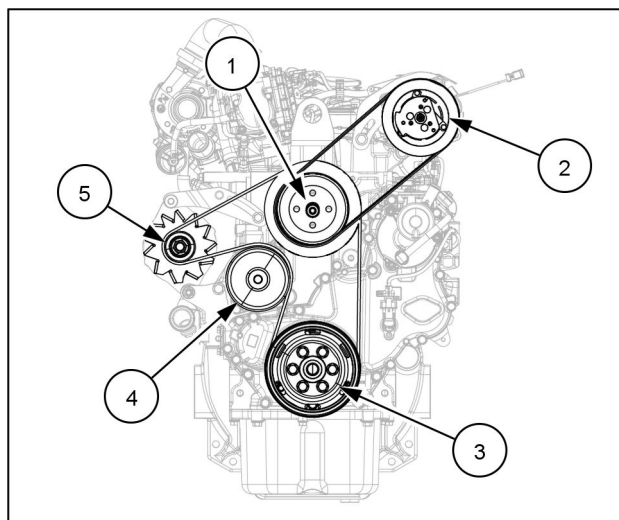
15. Loosen the upper and lower mounting bolts **(1)** on the alternator bracket.
16. Loosen the adjusting bracket bolt **(2)**.
17. Loosen the jam nut on the adjusting bolt **(3)**, and turn the adjusting bolt **(3)** until the belt is loose.
18. Remove the belt **(1)**.



RCPH11SSL038AAP 6

19. Install the new belt according to the diagram shown.

- Fan pulley (1)
- Air Conditioning compressor pulley (if equipped) (2)
- Crankshaft pulley (3)
- Water pump (4)
- Alternator pulley (5)



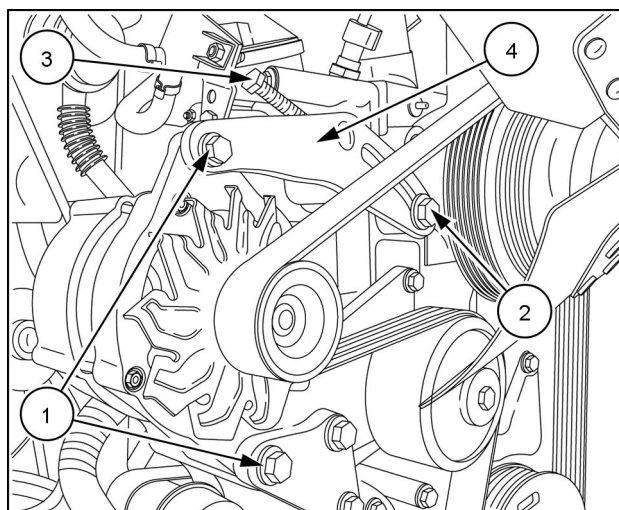
RAIL23SSL0377QA 7

20. Turn the adjusting bolt (3) until the bracket (4) is adjusted to the stop. Tighten the jam nut to secure the position. Torque the jam nut to **30 N·m (22 lb ft)**.

NOTE: The serpentine belt does not have a tensioning procedure. Adjust the adjusting bolt to the stop on the bracket.

21. Tighten the adjusting bracket bolt (2). Torque to **50 N·m (37 lb ft)**.

22. Tighten the alternator mounting bolts (1). Torque to **50 N·m (37 lb ft)**.



RCPH11SSL038AAP 8

23. Install the air conditioning compressor belt (if equipped).

24. Turn the adjusting bolt (1) until the bracket is adjusted to the stop.

25. Tighten the adjusting bolt jam nut (4).

26. Tighten the adjusting bracket bolt (3) and mounting bolt (2).

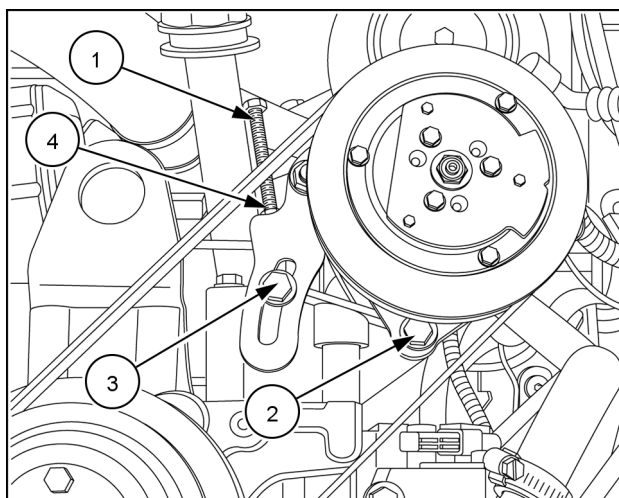
NOTE: The AC compressor belt does not have a tensioning procedure. Adjust the adjusting bolt to the stop on the bracket.

27. Install the fan with spacer and secure the fan with bolts. Tighten to a torque of **72.6 – 98.2 N·m (53.5 – 72.4 lb ft)**.

28. Install the air charge cooler. Torque bolt hardware to **27.0 – 36.5 N·m (19.9 – 26.9 lb ft)**.

29. Install air charge cooler tubes and secure with worm clamps. Torque clamps to **3.4 N·m (30 lb in)**.

30. Install access cover.



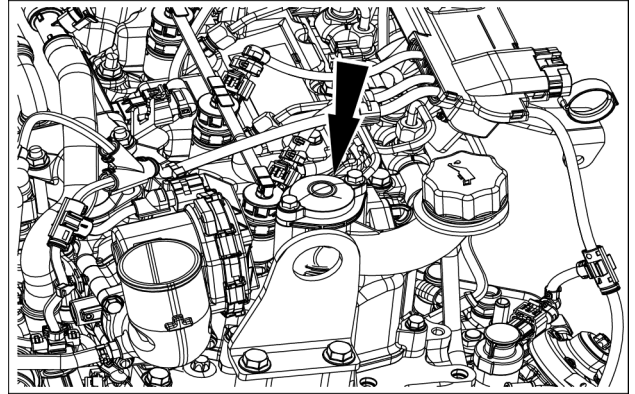
RAPH12SSL0064BA 9

Every 1500 hours

Blow-by recirculation system

These models are equipped with a blow-by recirculation system relief valve. This relief valve is intended to prevent engine failure in case of blow-by recirculation system blockage in extreme cold applications.

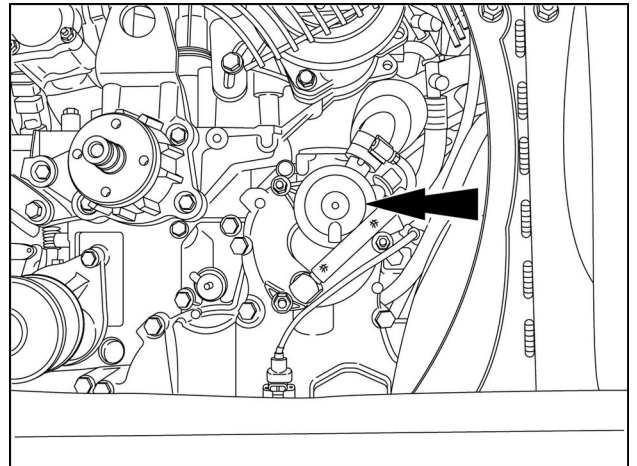
NOTE: The relief valve may seep oil during routine operation. This is normal and does not constitute a failure or an oil leak.



RAIL23SSL0124AA 1

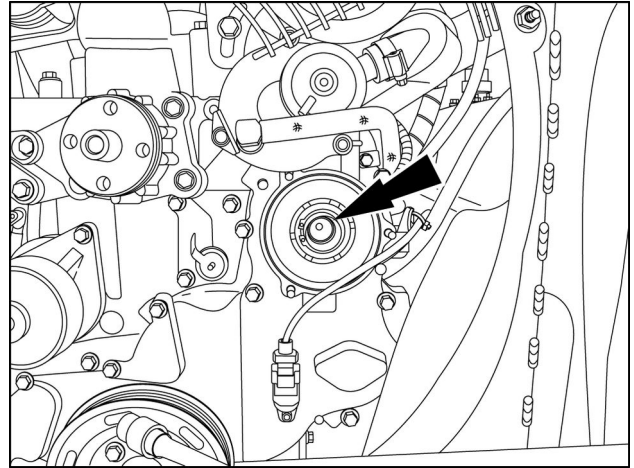
NOTE: The radiator must be removed to access the blow-by recirculation filter.

1. Remove the cover.

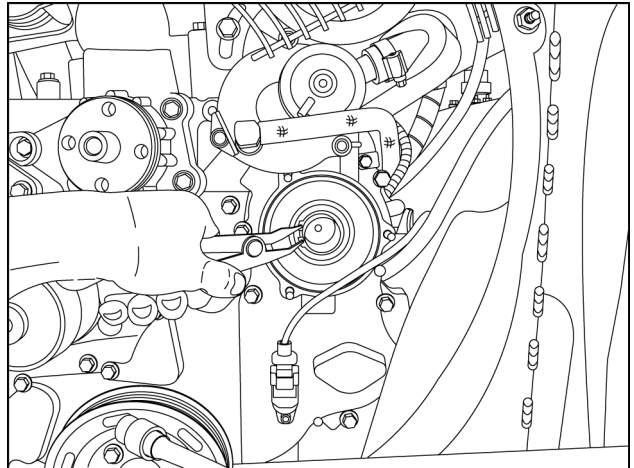


RAIL14SSL0726AA 2

2. Remove the snap ring.

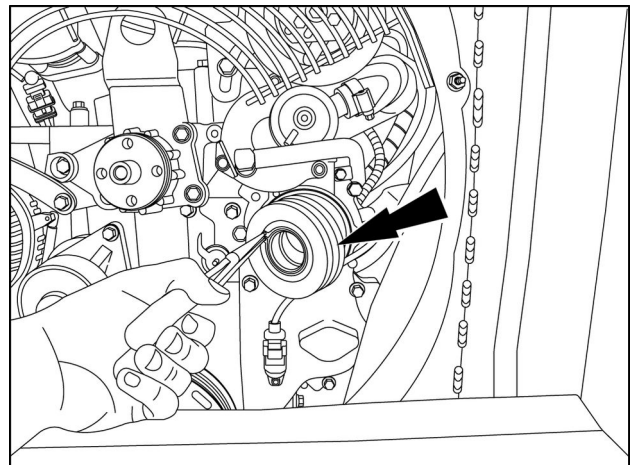


RAIL14SSL0727AA 3



RAIL14SSL0728AA 4

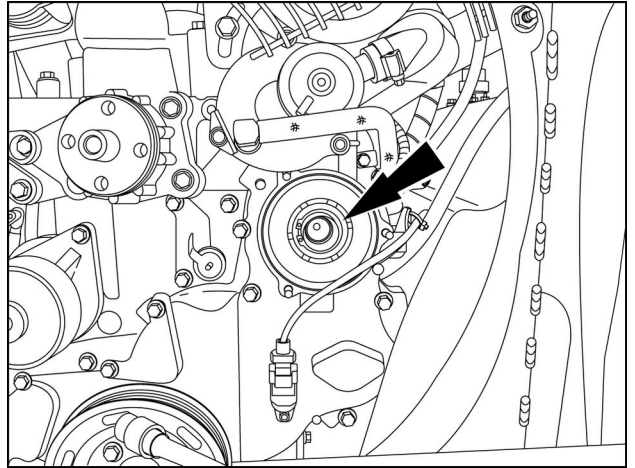
3. Slide the filter off the drive hub.



RAIL14SSL0729AA 5

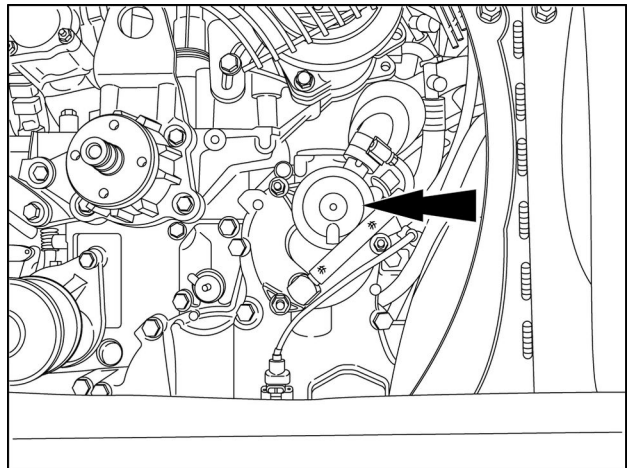
4. Slide the new filter on the drive hub.

5. Install the snap ring.



RAIL14SSL0727AA 6

6. Install the cover.

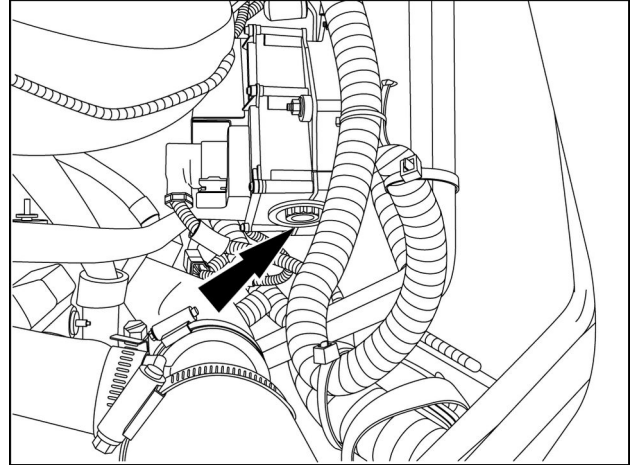


RAIL14SSL0726AA 7

Every 3600 hours or two years

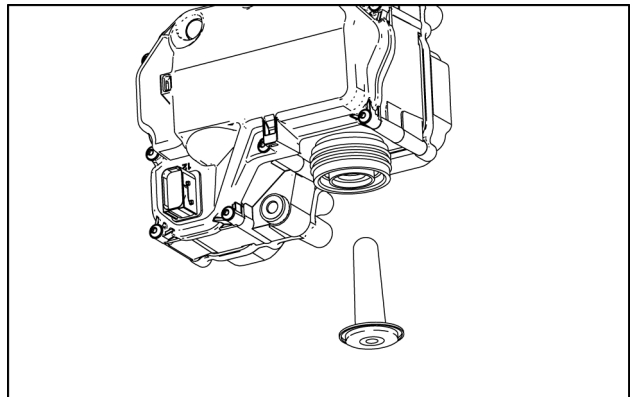
Selective Catalytic Reduction (SCR) system - Replace supply module filter - Radial lift machines only

1. Raise the cab. Follow the “Loader arm lock and cab tilt procedure – radial lift machines.” **2-16** to access the supply module.
2. Remove the filter cover from the supply module.



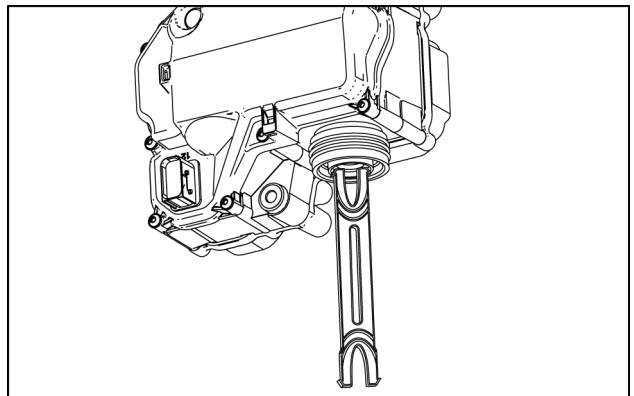
RAIL14SSL0742BA 1

3. Remove the equalizing element.



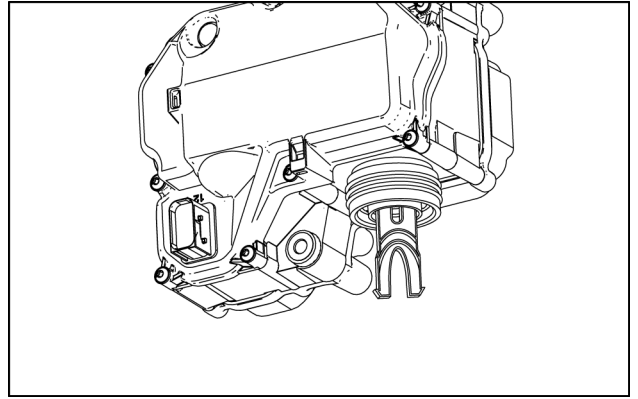
RAIL13GEN0027AA 2

4. Remove the filter tool from the new filter element. Check the color of the filter (Grey or Black). Based on the color of your filter element, insert the correct end of the filter tool into the filter element.



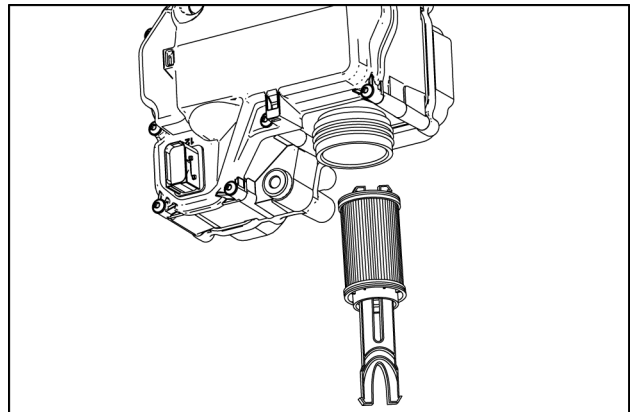
RAIL13GEN0028AA 3

5. Insert the tool completely until a click is felt or heard. This indicates that the tool is completely inserted.



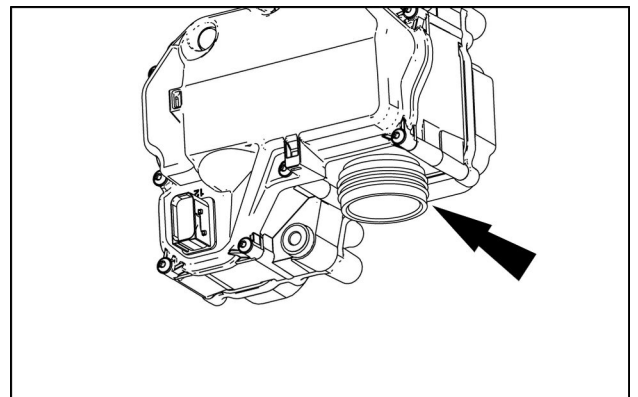
RAIL13GEN0029AA 4

6. Pull the tool with the filter element out of the supply module.



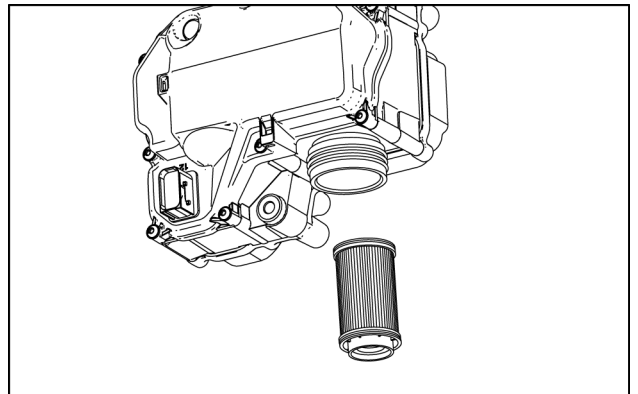
RAIL13GEN0030AA 5

7. Clean the supply module filter housing and threads with distilled water.



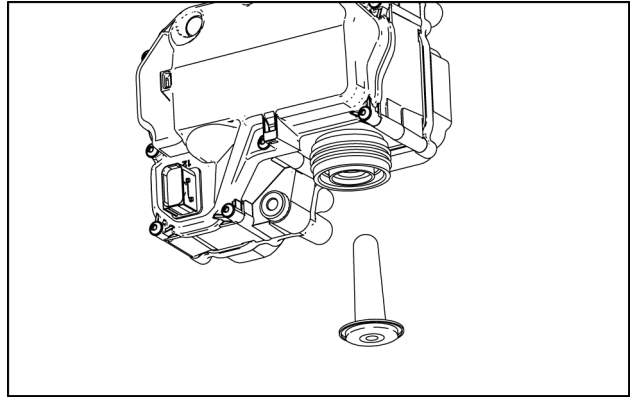
RAIL13GEN0031AA 6

8. Oil the O-rings on the new filter element. Insert the filter element fully into the supply module.



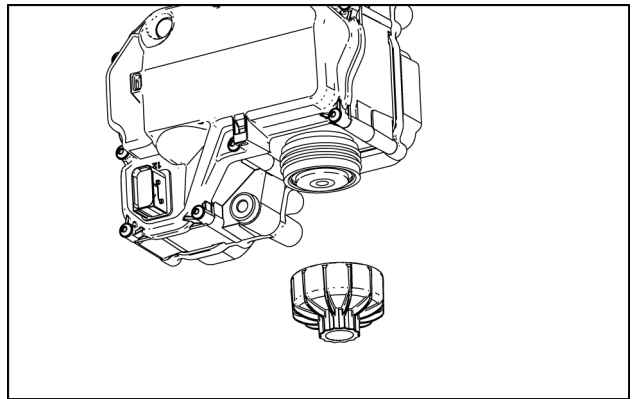
RAIL13GEN0032AA 7

9. Install the new equalizing element.



RAIL13GEN0027AA 8

10. Install the filter cover. Torque to **15 – 25 N·m (11 – 18 lb ft)**

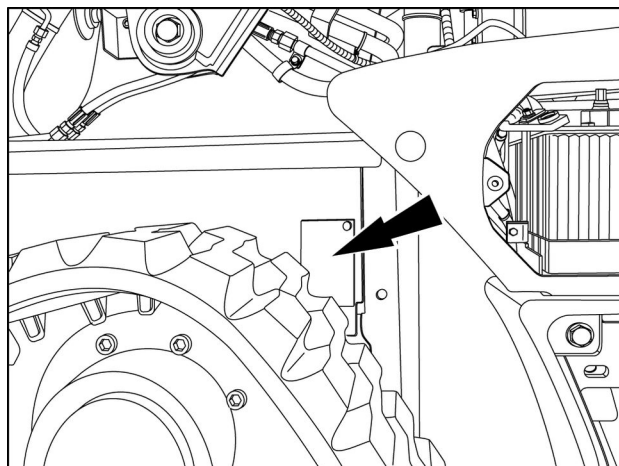


RAIL13GEN0026AA 9

11. Lower the cab. Follow the “Loader arm lock and cab tilt procedure – radial lift machines.” **2-16**.

Selective Catalytic Reduction (SCR) system - Replace supply module filter – Vertical lift machines only

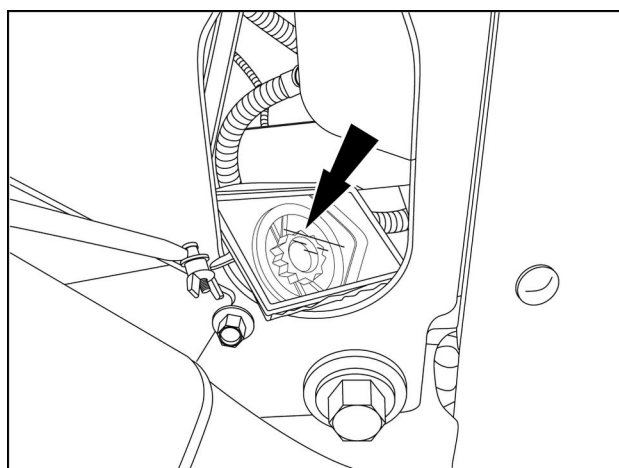
1. Remove the panel on the left-hand side of the machine to access the supply module.



RAIL14SSL0752BA 1

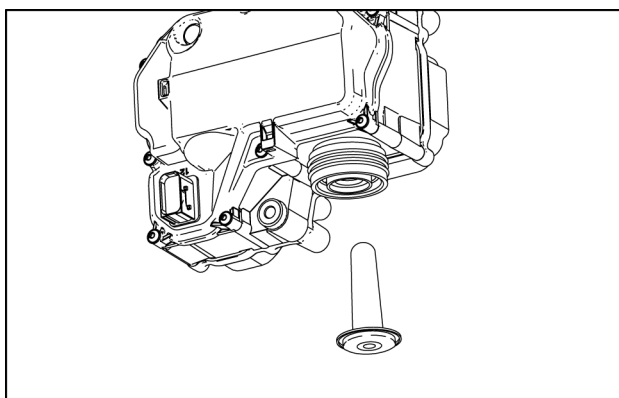
2. Remove the filter cover.

NOTE: Use a mirror to locate the filter cover of the supply module.



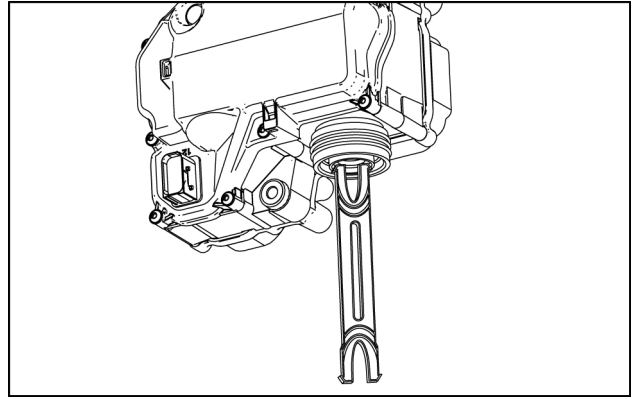
RAIL14SSL0746BA 2

3. Remove the equalizing element.



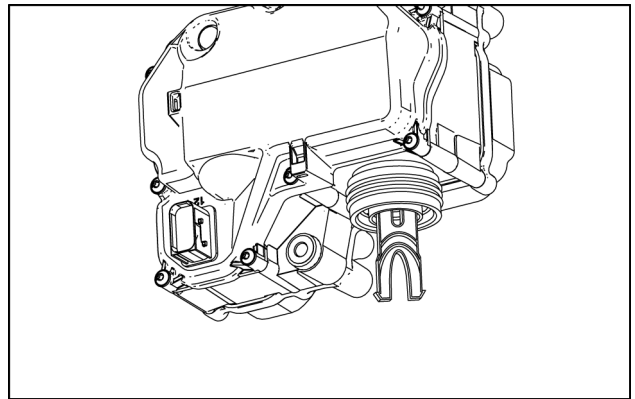
RAIL13GEN0027AA 3

4. Remove the filter tool from the new filter element. Check the color of the filter (Grey or Black). Based on the color of your filter element, insert the correct end of the filter tool into the filter element.



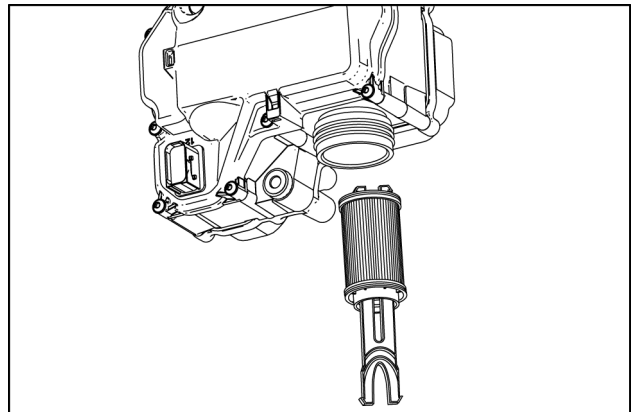
RAIL13GEN0028AA 4

5. Insert the tool completely until a click is felt or heard. This indicates that the tool is completely inserted.



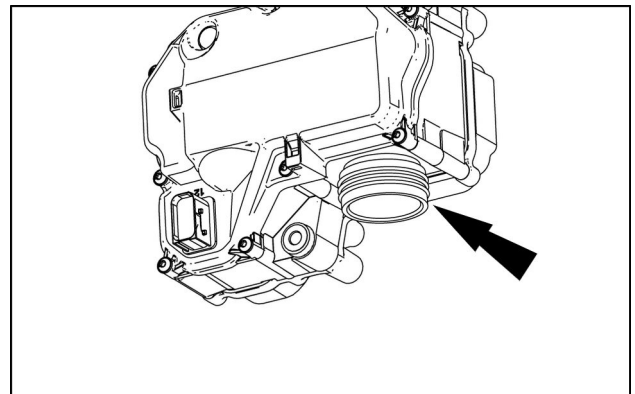
RAIL13GEN0029AA 5

6. Pull the tool with the filter element out of the supply module.



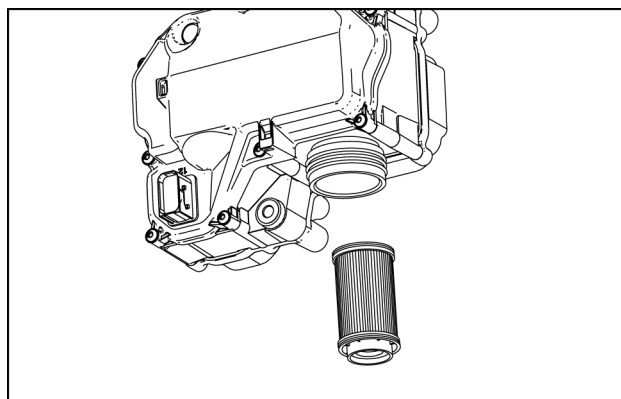
RAIL13GEN0030AA 6

7. Clean the supply module filter housing and threads with distilled water.



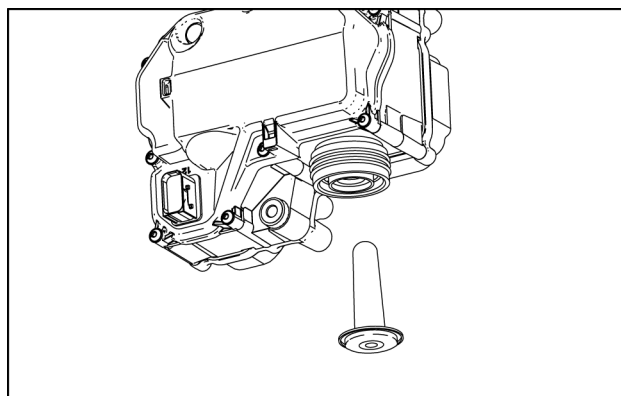
RAIL13GEN0031AA 7

8. Oil the O-rings on the new filter element. Insert the filter element fully into the supply module.



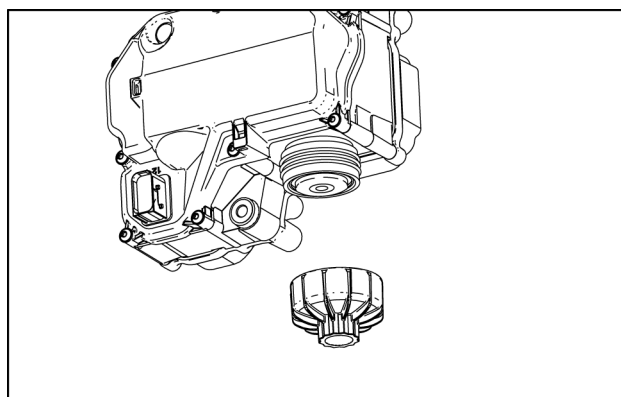
RAIL13GEN0032AA 8

9. Install the new equalizing element.



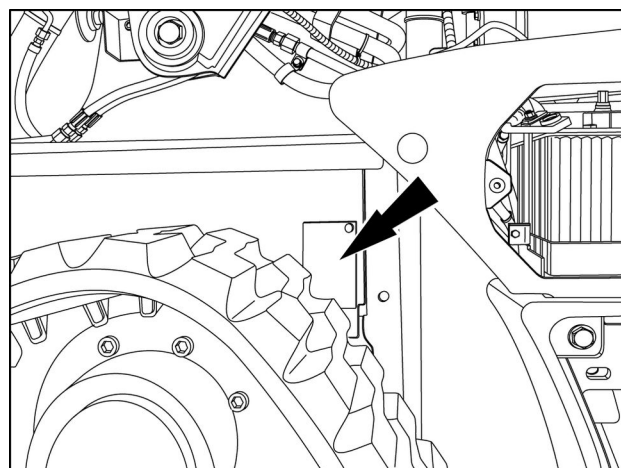
RAIL13GEN0027AA 9

10. Install the filter cover. Torque to **15 – 25 N·m (11 – 18 lb ft)**



RAIL13GEN0026AA 10

11. Install the access panel to the supply module.



RAIL14SSL0752BA 11

Every 4000 hours

Engine cooling system - Change fluid

⚠ WARNING

Hot surface possible!
Wait for all components to cool before performing any operation.
Failure to comply could result in death or serious injury.

W0251A

⚠ WARNING

Burn hazard!
Do not handle engine coolant, engine oil, or hydraulic oil at temperatures that exceed 49 °C (120 °F).
Allow fluids to cool before proceeding.
Failure to comply could result in death or serious injury.

W0330A

⚠ WARNING

Burn hazard!
Hot coolant can spray and scald if you remove the radiator or deaeration tank cap while the system is hot. To remove the cap: allow the system to cool, turn the cap to the first notch, and wait for all pressure to release. Remove the cap only after all pressure has released.
Failure to comply could result in death or serious injury.

W0367A

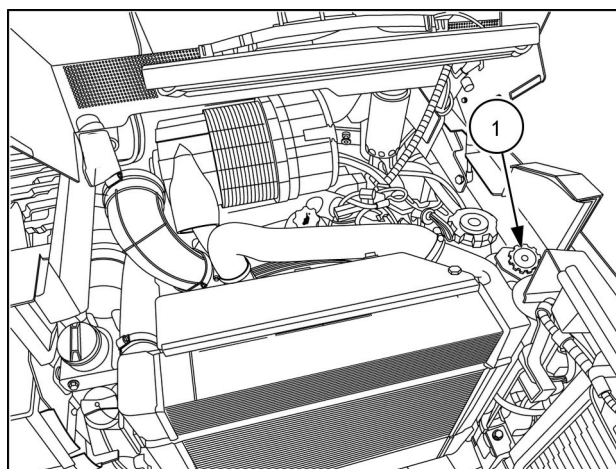
NOTE: Some components are removed for clarity purposes.

Drain and flush the cooling system every **4000 h** of operation or every two years. Clean the system and replace the coolant if the coolant becomes dirty or has the color of rust.

Coolant specifications – **17.0 L (18.0 US qt)** of **EXTENDED LIFE OAT COOLANT/ANTIFREEZE**

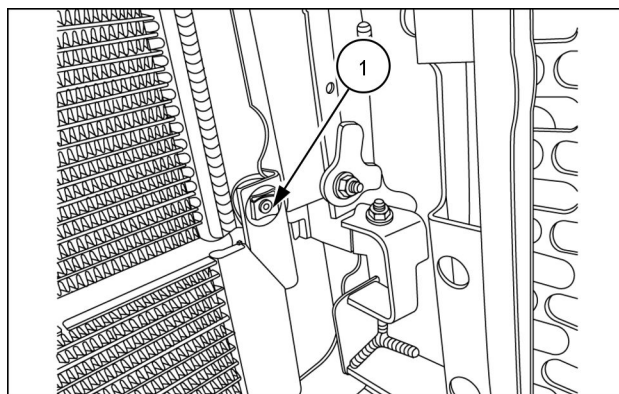
Coolant system flush procedure

1. Lift open the engine hood.
2. Open the rear engine door and engage the lock.
3. Remove the radiator fill cap (1).



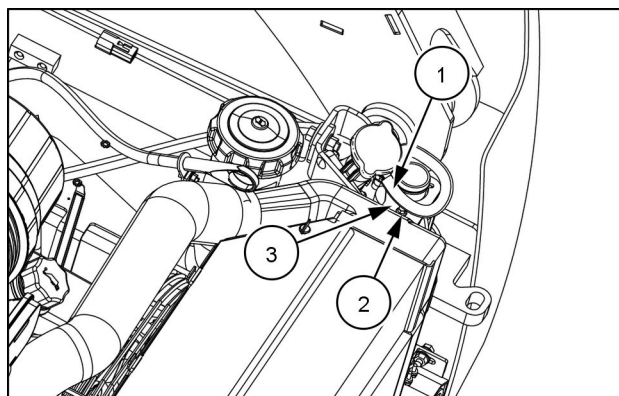
RAIL14SSL0708AA 1

4. Attach a hose to the radiator drain valve **(1)**. Place the other end of the hose into a suitable container that will hold at least **19.0 L (5.0 US gal)**.
5. Open the radiator drain valve **(1)**.
6. Close the radiator drain valve after coolant stops draining from the tube.

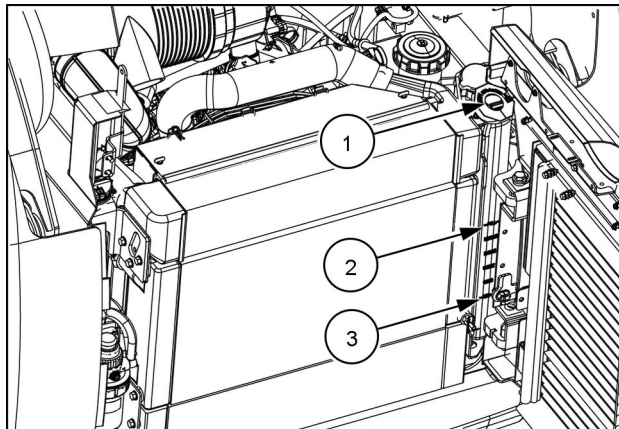


93106878 2

7. Disconnect the tube **(1)** that connects the radiator fill neck to the reservoir bottle.
8. Remove the bolt **(2)** and bracket **(3)** from the top of the reservoir bottle.
9. Remove the reservoir bottle from the machine.
10. Flush the reservoir bottle a few times with clean distilled or demineralized water.
11. Position the reservoir bottle in the mounting location with the bottle markings facing outward.
12. Secure the reservoir bottle with the bolt and bracket.
13. Attach the tube from the reservoir bottle to the radiator fill neck. If necessary, secure with tie wraps.
14. Fill the reservoir bottle **(1)** with clean distilled or demineralized water to the FULL mark **(2)**.
15. Secure the cap on the reservoir bottle.

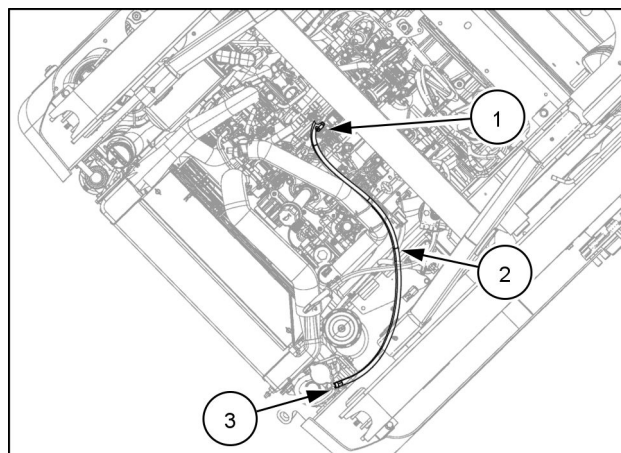


RAIL16SSL0021AA 3

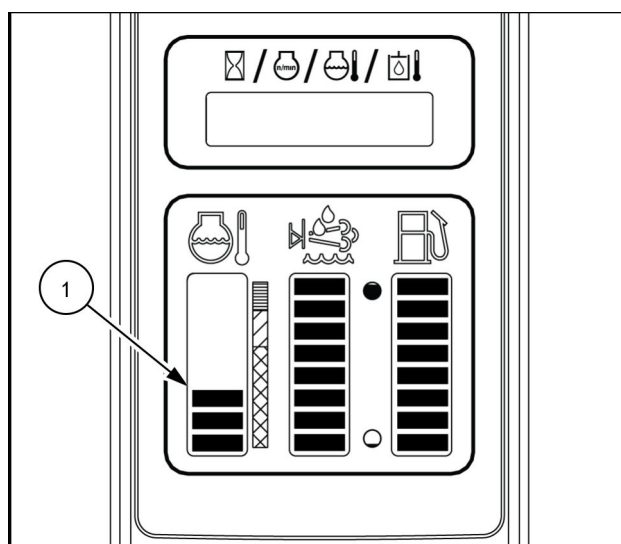


RAIL15SSL0383BA 4

16. Follow the EGR purge line **(2)** from the radiator fill neck **(3)** to underneath the engine air filter in order to locate the EGR purge line cap **(1)**.
17. Remove the EGR purge line cap **(1)**.
18. Fill the radiator with clean distilled or demineralized water until the water starts to bleed out from the EGR purge line cap.
19. Secure the cap on the EGR purge line.
20. Secure the cap on the radiator.
21. Start the engine.
22. If equipped, set the cab HVAC temperature control knob to full heat and the fan control knob on setting 1, 2, or 3.
23. Machines with the Instrument Cluster (IC) follow STEP A. Machines with the LCD multi-function display follow STEP B.
 - A. Run the engine until the coolant temperature level **(1)** on the instrument cluster shows three bars for **5 min**. Increase engine speed and/or load if necessary.



RAIL16SSL0037BA 5

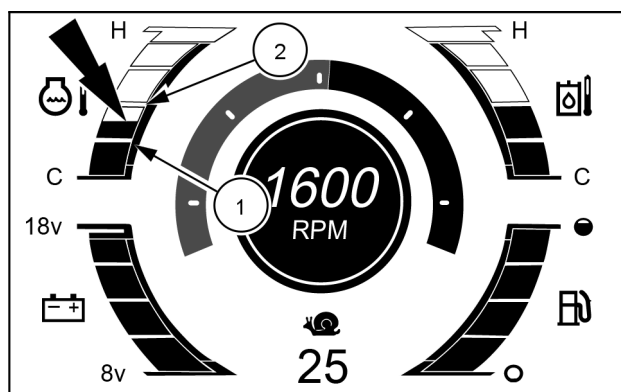


RAIL16SSL0036BA 6

- B. Run the engine until the coolant temperature level is halfway between the coolant temperature gauge increment **(1)** and increment **(2)** for **5 min**. Increase engine speed and/or load if necessary.

NOTE: Alternatively, check the Sensor Status sub-menu and run the engine for **5 min** after the coolant temperature reaches **71 °C (160 °F)**. See the LCD multi-function display equipment manual for more details.

24. Stop the engine and allow to cool.
25. Open the radiator drain valve and drain the system.
26. Close the radiator drain valve.
27. Repeat steps **16** through **26** and flush the system two more times. Use fresh clean distilled or demineralized water each time.

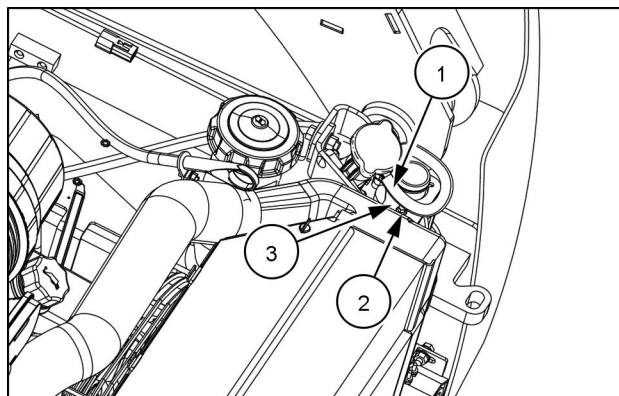


RAIL19SSL0457AA 7

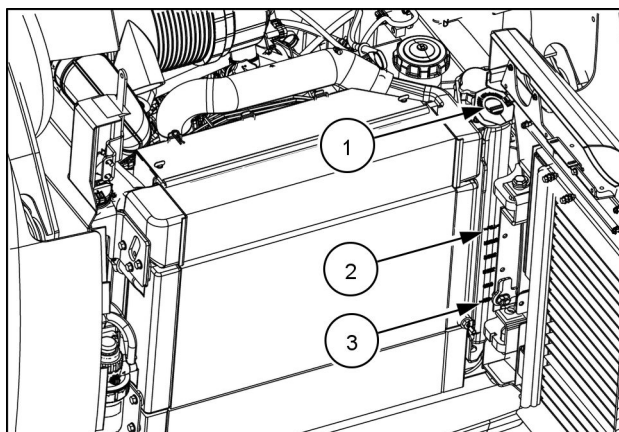
Coolant system fill procedure

NOTICE: NEVER mix OAT coolant with conventional coolant. Under no circumstances should you top off a cooling system with only water. You can use a refractometer to check the concentration level. Supplemental Coolant Additives (SCA) should not be used when using **EXTENDED LIFE OAT COOLANT/ANTIFREEZE**.

1. Disconnect the tube (1) that connects the radiator fill neck to the reservoir bottle.
2. Remove the bolt (2) and bracket (3) from the top of the reservoir bottle.
3. Remove the reservoir bottle from the machine.
4. Flush the reservoir bottle with clean distilled or demineralized water.
5. Position the reservoir bottle in the mounting location with the bottle markings facing outward.
6. Secure the reservoir bottle with the bolt (2) and bracket (3).
7. Attach the tube from the reservoir bottle to the radiator fill neck. If necessary, secure with tie wraps.
8. Fill the reservoir bottle (1) with **EXTENDED LIFE OAT COOLANT/ANTIFREEZE** to the FULL mark (2).
9. Secure the cap on the reservoir bottle.

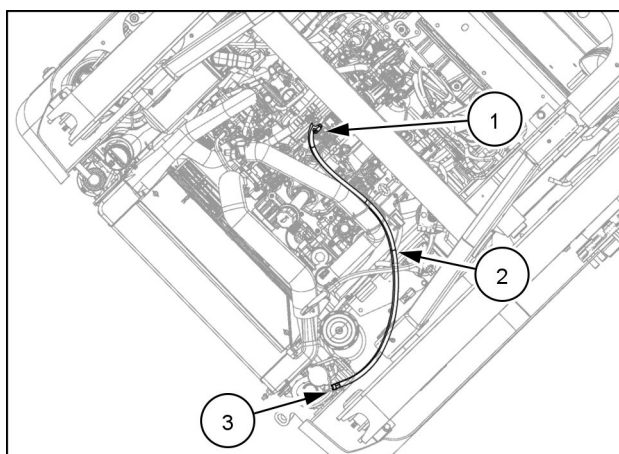


RAIL16SSL0021AA 8



RAIL15SSL0383BA 9

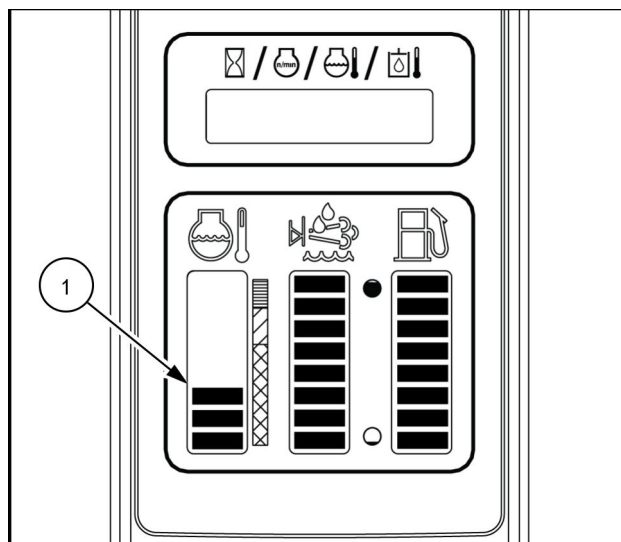
10. Follow the EGR purge line (2) from the radiator fill neck (3) to underneath the engine air filter in order to locate the EGR purge line cap (1).
11. Remove the EGR purge line cap (1).
12. Fill the radiator with **EXTENDED LIFE OAT COOLANT/ANTIFREEZE** until the coolant starts to bleed out from the EGR purge line cap.
13. Secure the cap on the EGR purge line.



RAIL16SSL0037BA 10

14. Continue to fill the radiator until the coolant level is at the top of the fill neck.
15. Secure the cap on the radiator.
16. Start the engine.

17. If equipped, set the cab HVAC temperature control knob to full heat and the fan control knob on setting 1, 2, or 3.
18. Machines with the Instrument Cluster (IC) follow STEP A. Machines with the LCD multi-function display follow STEP B.
 - A. Run the engine until the coolant temperature level (1) on the instrument cluster shows three bars for **5 min**. Increase engine speed and/or load if necessary.

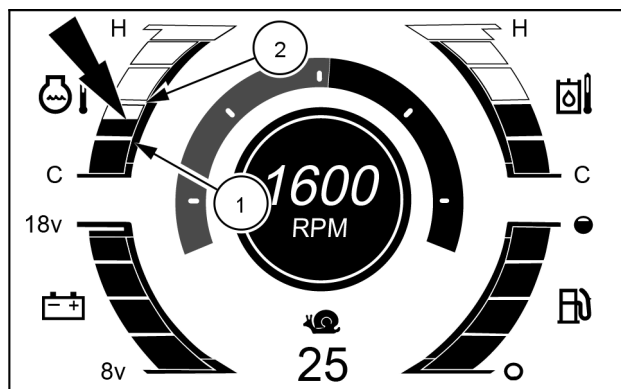


RAIL16SSL0036BA 11

- B. Run the engine until the coolant temperature level is halfway between the coolant temperature gauge increment (1) and increment (2) for **5 min**. Increase engine speed and/or load if necessary.

NOTE: Alternatively, check the Sensor Status sub-menu and run the engine for **5 min** after the coolant temperature reaches **71 °C (160 °F)**. See the LCD multi-function display equipment manual for more details.

19. Stop the engine and allow to cool.
20. Remove the radiator fill cap and check the coolant level in the radiator fill neck. Add coolant until the level reaches the top of the radiator fill neck, if necessary.
21. Check the coolant level in the reservoir bottle. Add coolant to reach the ADD mark, if necessary.
22. Check the hoses, elbows and system for leaks. Repair or replace as necessary.



RAIL19SSL0457AA 12

As required

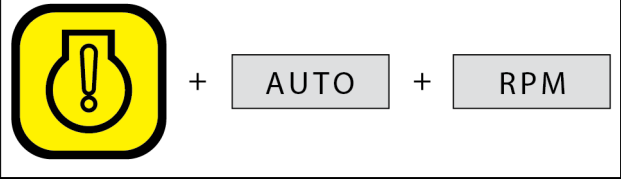
Hydrocarbon management

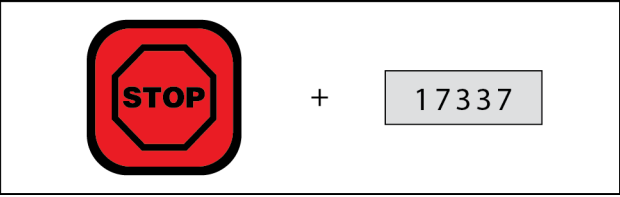
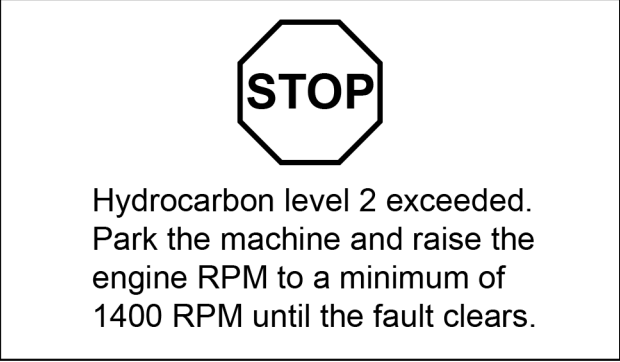
NOTICE: Unless the Hydrocarbon (HC) level has reached the most critical level, running the unit under load is advantageous for quickly reducing the HC levels.

NOTE: There are two indicators that can be displayed to inform you that hydrocarbon management is active. One will be an indicator lamp on the instrument cluster and the other one will alternate on the display screen.

If the engine is run at low idle speed for a prolonged period of time, hydrocarbons can accumulate in the SCR catalyst. To manage this accumulation, your machine will monitor current conditions and increase idle speed and/or activate the throttle to increase the temperature inside the SCR catalyst and eliminate the hydrocarbons.

Hydrocarbon Management active indicators

Display	Description	Action
Instrument Cluster (IC)  RAIL16SSL0018AA 1	Low idle Increase Recommended	Low Idle Increase Recommended - The instrument cluster or LCD multi-function display may request the engine speed be increased when operating at lower temperatures or with lighter engine loads in order to elevate SCR temperatures. Increase engine RPM to 1900 RPM and continue to operate the machine.
LCD Multifunction display  RAIL19SSL0451AA 2		
Instrument Cluster (IC)  RAIL16SSL0024AA 3	Automatic Low Idle Increase Active	The engine RPM may automatically increase to 1400 RPM if an operator is not present.
LCD Multifunction display  RAIL19SSL0450AA 4		

Display	Description	Action
Instrument Cluster (IC)  RAIL16SSL0025AA 5	SCR Catalyst Full	The SCR catalyst has become clogged with hydrocarbon accumulation. Hydrocarbon level 2 exceeded. Park the machine and raise the engine RPM to a minimum of 1400 RPM until the fault clears. NOTE: This procedure may take approximately 1 – 2 h to complete depending on the ambient air temperature. NOTICE: Do not turn off the engine, drive the machine, or increase the load on the machine to avoid damage to the catalyst. Failure to comply could cause component damage.
LCD Multifunction display  RAIL19SSL0454AA 6		

Window removal and cleaning

⚠ WARNING

Avoid injury and/or machine damage!

Debris on the window can severely obstruct the operator's vision. To ensure that the operator has clear visibility through the windows, always keep the windows clean.

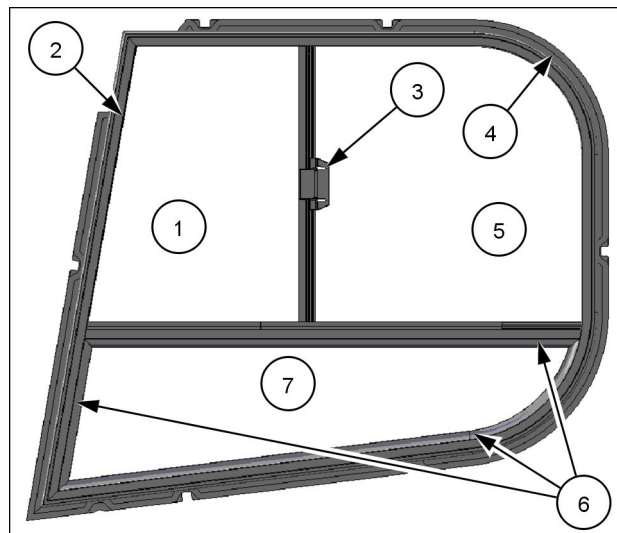
Failure to comply could result in death or serious injury.

W1517A

NOTICE: DO NOT change the window position without properly locking the window latch! Improper use WILL result in premature wear.

NOTICE: It is suggested that for normal cleaning, a water hose or power washer on low pressure be used to clear the glass from outside of the machine. Do not direct the stream from a power washer into the seals or joints of the window. If removal of the glass is necessary for maintenance, replacement, or more thorough cleaning, each pane can be removed from inside the cab.

Removal



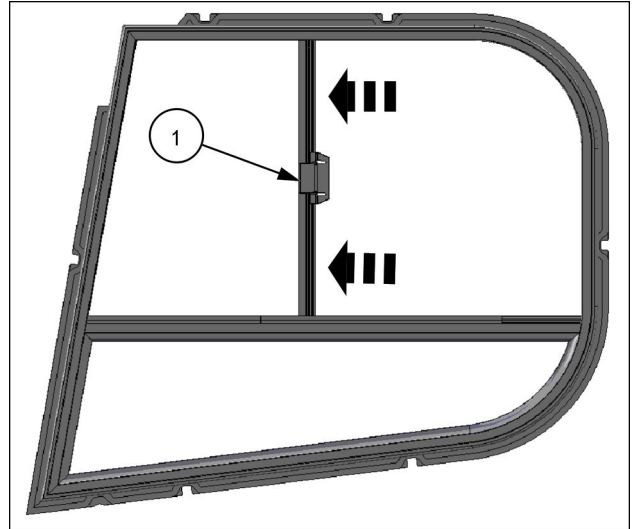
RAIL17SSL0039BA 1

1	Slider glass	5	Fixed upper glass
2	Frame	6	Lower seals
3	Latch	7	Lower glass
4	Frame		

Tools required: Small screwdriver, flat drive, about **178**
– **203 mm (7 – 8 in)**.

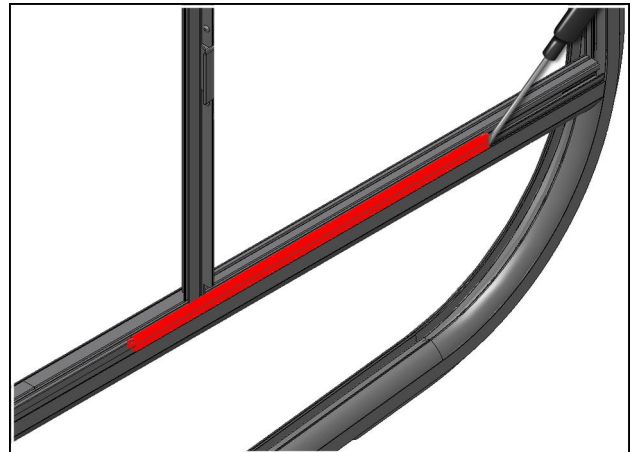
Slider glass

1. Verify that the slider glass is shut and latched.



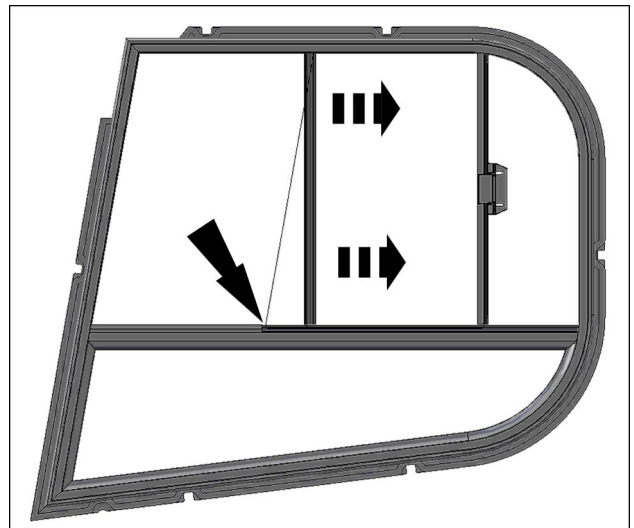
RAIL17SSL0039BA 2

2. Slip the screwdriver down into the aluminum track from the back, and slide forward underneath the rear inner rigid PVC slider channel.



RAIL17SSL00348BA 3

3. Pry upward until you are able to grab hold of the end of the PVC channel.
4. Lift the PVC channel up and out of the track. Pull rearward until it slides free from underneath the slider glass.
5. Unlatch and move the slider glass rearward until it clears the front PVC channel.

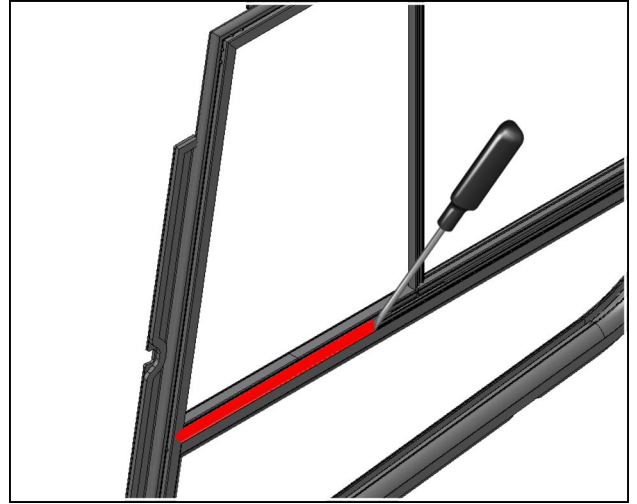


RAIL17SSL0038BA 4

6. Tip the lower edge of the glass into the cab and drop down and out of the frame.

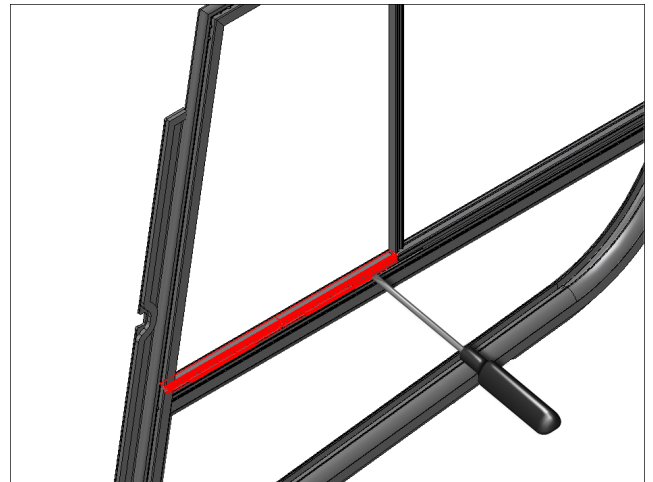
Fixed upper glass

7. Slip the screwdriver down into the aluminum track from the back, and slide forward underneath the front inner rigid PVC slider channel.



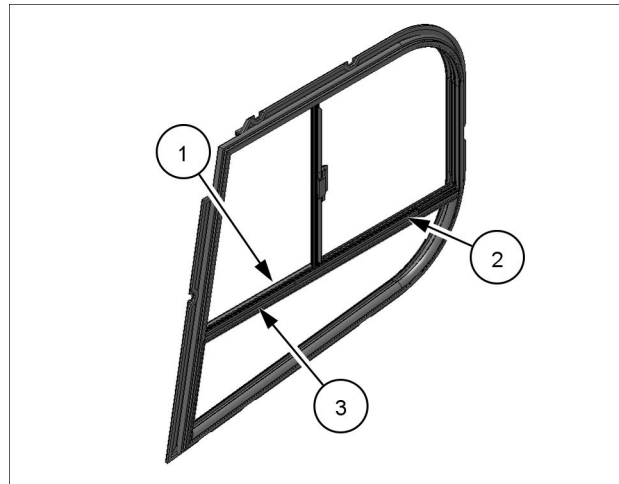
RAIL17SSL0349BA 5

8. Pry upward until you are able to grab hold of the end of the PVC channel.
9. Using the flat drive end of the screwdriver, place it under the edge of the outer PVC channel as shown and pry the PVC channel up and out of the aluminum frame.



RAIL17SSL0322BA 6

10. Slide the fixed glass forward until it clears the remaining PVC channel.
11. Tip the lower edge into the cab and drop down and out of the frame.

Lower glass

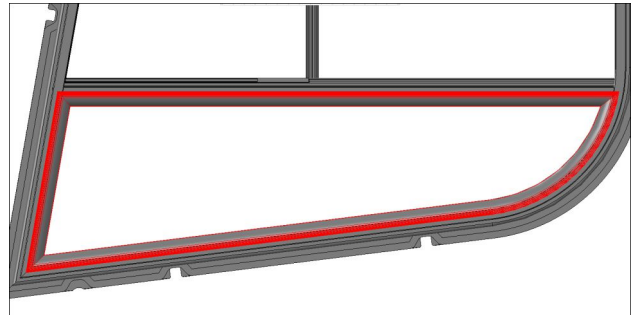
RAIL17SSL0325BA 7

1	Outer PVC channel	3	Front inner PVC channel
2	Rear inner PVC channel		

NOTICE: While the lower glass seal is removable, it was designed to be removed only when replacement of the glass is necessary. It is not intended as a means for cleaning. If removed periodically, the ability to seal out water and dust from the cab may be diminished. When a lower glass pane is ordered for replacement, new inner seals will be included for replacement as well.

NOTICE: Do not remove the outer seal. Damage can occur that may lead to leaks.

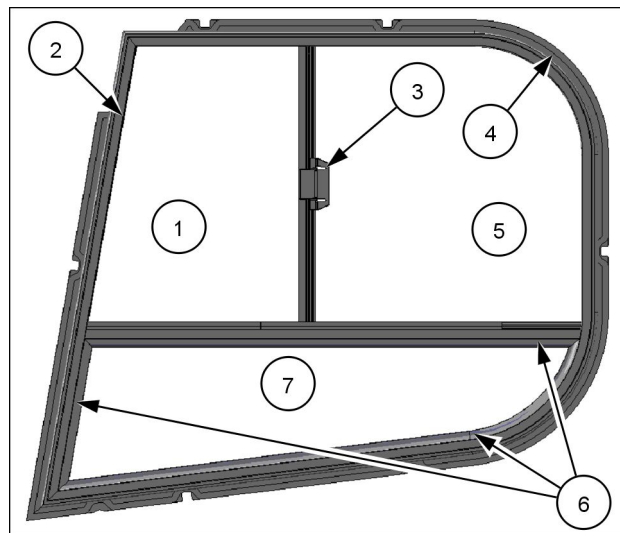
12. Push the flat end of the screwdriver between the ends of the top and front vertical seals where they meet.



RAIL17SSL0324AA 8

13. Pry the end of the front vertical seal out.
14. Pull the seal out of the aluminum frame.
15. Repeat for the remaining pieces.
16. The glass can then be tipped in and removed.

Installation



RAIL17SSL0039BA 9

1	Slider glass	5	Fixed upper glass
2	Frame	6	Lower seals
3	Latch	7	Lower glass
4	Frame		

Lower glass

1. Place the glass into the outer seal.
2. Starting at the front, bottom corner, press the lower seal down into the frame all the way to the back.
3. Starting at the front, top corner, press the upper seal up into the frame all the way to the back.
4. Starting at the top, press the front seal into the frame all the way down to the bottom corner.

Fixed upper glass

5. Place glass back into the frame and slide into rearward position just as it was removed.
6. Press the outer PVC channel down into the frame until it snaps in place.

Slider glass

7. Press the front, inner PVC channel down into the frame, sliding it forward as far as possible.
8. Place the slider glass into the track and push forward until latched.
9. Press the front edge of the last PVC channel down into the frame just behind the slider glass until and push forward until it meets the front PVC channel underneath the glass.
10. Press the channel down into the frame working from front to back until it snaps into place.

Hardware - loose or damaged

Check the entire machine for hardware that is loose or damaged. Replace damaged hardware and use the proper torque values.

STORAGE

Storing the machine

Geographic, environmental, and actual storage conditions make it difficult to follow a set storage procedure for all areas and conditions. The following procedure is for a storage period of six months or longer. This procedure is a good starting point but may not be all inclusive. If you have questions about storing your machine, contact your dealer.

1. Prior to storing, inspect the machine for visible signs of wear, breakage, or damage. Order any parts required and make the necessary repairs to avoid delays when starting the next operating period.
2. Prior to storing, wash the machine.
3. Lubricate the entire machine.
4. Paint any areas where the paint has been damaged.
5. Move all hydraulic controls through their complete ranges several times to relieve any pressure in the circuits.
6. Drain the fuel tank.
7. Put approximately **8 l (2.1 US gal)** of diesel flushing oil in the fuel tank. Run the engine until the exhaust smoke is blue-white.
8. Drain the flushing oil from tank.
9. Fill the fuel tank and add diesel fuel conditioner by following the directions on the container.
10. Drain the **DEF/AdBlue®** tank.
11. Change the engine oil and replace the filter.
12. Drain the cooling system. Leave the drains open and do not tighten the radiator cap.
13. Put a DO NOT OPERATE or OUT OF SERVICE tag or marker in the cab.
14. Replace the air filter elements if the hours of operation or time interval will lapse during storage.
15. Cover the exposed cylinder rods, and valve spools and any other bare metal parts with a rust and corrosion preventive.
16. Cover exhaust outlet.
17. Park the machine inside a building. If a building is not available, park the machine in a dry area on planks and cover with a waterproof cover.
18. Remove and clean the battery. Fully charge the battery. Store the battery in a cool dry place where it will not freeze.
19. Block the machine up so that the tires are just off the ground, if possible.

NOTE: *EXTREME precautions must be taken when blocking up a machine for long periods. Block the machine with the tires just off the surface. No more than **25 mm (1.0 in)** above the surface.*

20. Do periodic checks for protection. Look for corrosion.

Storage removal

1. If machine is blocked, lower it to the ground.
2. Change the fuel filters and fill the fuel tank if needed.
3. Tighten the cooling system drain valves.
4. Fill engine coolant system.
5. Check engine oil level.
6. Check the condition of the engine fan belt. Replace it if required.
7. Check the hydraulic fluid level.
8. Lubricate the machine grease fittings.
9. Use a petroleum base solvent and remove the rust and corrosion preventive from the hydraulic cylinder rods and spools, etc.
10. Install a fully charged battery.
11. Fill the DEF/AdBlue® tank to a minimum **20%** level.
12. If stored longer than four months, change the DEF supply module filter as shown on **7-90** (radial lift machines) or **7-93**.
13. Remove air from the engine fuel lines.
14. Prime the turbocharger oil lines with oil using the following procedure:
 - Disconnect the electrical connector to the injection pump solenoid. This will prevent the engine from starting.
 - Make sure all persons are clear of the machine. Turn key to START and actuate the starter for about 10 to 15 seconds.
 - Reconnect the wires to the injection pump solenoid.

NOTE: Before starting the engine, make sure there are no leaks, missing or broken parts.

15. Start the engine and run at idle speed for 2 minutes. Check for leaks around the filters and drain plugs.
16. Stop the engine and check the fluid levels of the engine cooling system and final drive chain compartments.
17. Start the machine and place the engine at a **40 – 50%** load to start the DEF/AdBlue® injection into the exhaust. If an error message occurs, shut off the machine and let DEF/AdBlue® system drain.
18. Start the machine and place the engine at a **40 – 50%** load. If another DEF/AdBlue® error occurs, contact your dealer.

8 - TROUBLESHOOTING

FAULT CODE RESOLUTION

Display warnings – Instrument Cluster (IC) only

NOTE: See the LCD Multi-function display “Equipment manual” for more details on the display warnings.

The table provides a list of messages that may appear on the instrument cluster display, the possible cause, and the corrective action the operator may take.

Message on the display	Possible cause	Action
CRKON	The OPERATE button is being pressed while attempting to start the machine.	Do not push the OPERATE button while attempting to start the machine.
EOLT	The instrument cluster does not have the latest software.	Contact your dealer.
JOYNU	One or both of the control levers are not in the neutral position.	Move the control levers to the neutral position.
	One or both of the control levers are not calibrated correctly.	Contact your dealer.
LOCK?	The instrument cluster is asking the operator if he/she wants to lock the machine to prevent unwanted machine operation.	No action needed. The machine is working as designed. Do not press the ENTER button. This will lock the machine controls. You will not be able to start the machine without an owner's code if the ENTER button has been pressed.
WIF	Water is detected in the fuel. The fuel-water separator filter is full.	Follow the “Fuel-water separator filter - Drain fluid” 7-55 maintenance procedure in this manual.
OPRPR	The restraint bar is not engaged.	Release and re-engage. Contact your dealer if the problem continues.
	The seat switch does not detect an operator in the machine.	Contact your dealer.
30 s count down	The instrument cluster detected a critical machine error which will result in an engine shutdown.	Contact your dealer.

Fault code index

NOTE: If you have a fault code (DTC) associated with a red light flashing and an audible alarm, shut the unit down and call your dealer for support. For a fault code (DTC) associated with a yellow amber light, record the code number and press the ENTER button twice to silence code and return to normal operations. If the code appears again, contact your dealer for support.

NOTE: For machines equipped with the LCD multi-function display refer to the "Equipment manual" that ships with the machine.

The following are the error codes and associated functions.

DTC	SPN	FMI	Fault description	Detected by
1002	110	0	Engine Coolant Temperature Is Above Normal - Level 2 Warning	UCM
1003	110	16	Engine Coolant Temperature Is Above Normal - Level 1 Warning	UCM
1004	518116	4	Hydraulic Oil Filter Restricted	UCM
1009	177	0	Hydraulic Oil Temperature Is Above Normal - Level 2 Warning	UCM
1025	91	3	Foot Throttle Sensor Is Above Range - Shorted To Power	UCM
1026	29	3	Hand Throttle Sensor Is Above Range - Shorted To Power	UCM
1030	91	4	Foot Throttle Sensor Is Below Range - Open Or Shorted To Ground	UCM
1031	29	4	Hand Throttle Sensor Is Below Range - Open Or Shorted To Ground	UCM
1040	190	16	RPM Monitoring Over Speed	UCM
1041	190	0	RPM Monitoring Over Speed Max	UCM
1044	96	4	Fuel level sensor under voltage	UCM
1045	96	3	Fuel Level Sensor over voltage	UCM
1051	5111	2	No CAN Communication With Engine Controller	UCM
1058	182	9	Timeout of CAN message: EDC2BC	ECU
1061	195	9	Timeout of CAN Message AT1T1I	ECU
1062	196	9	Timeout of CAN Message ENG06	ECU
1063	197	9	Timeout of CAN Message ENG07	ECU
1064	5536	16	Hydraulic Oil Temperature Is Above Normal - Level 1 Warning	UCM
1065	198	31	RPM below 1800 during Hydrocarbon Management	UCM
1066	199	31	RPM below 1800 during DeSOx Management	UCM
1082	518484	4	Short to Ground at Ride Control Solenoid High Side Drive	UCM
1083	518484	3	Short to Power at Ride Control Solenoid High Side Drive	UCM
1100	2900	3	Engine crank signal Actuation - STP	UCM
1101	2900	4	Engine crank signal Actuation - STG	UCM
1102	2900	5	Engine crank signal Actuation - OC	UCM
1201	518116	5	Hydraulic Filter Restriction Switch Open Circuit	UCM
1205	1845	3	Hydraulic Enable Output Shorted To Power (Electro-Hydraulic Machines)	IC/HIC
1211	2660	13	Joystick Calibration not Complete	UCM
1212	519303	13	Ground Drive Calibration not Complete	UCM
1213	519039	13	Loader Valve Calibration not Complete	UCM
1215	519332	13	Saturation Function not complete - Forward Pumps	UCM
1216	519333	13	Saturation Function not complete - Reverse Pumps	UCM
1222	518389	0	UCM Sustained Over Temperature Limit	UCM
1223	518389	6	Health Monitor Functions - UCM Sustained Over Current Limit	UCM
1224	5531	12	UCM Internal Memory or Core Monitoring Fault	UCM
1225	522809	12	UCM EEPROM Memory Corruption	UCM
1400	519541	3	Awake Power Relay - STP	UCM
1401	519541	4	Awake Power Relay - STG	UCM
1402	519541	5	Awake Power Relay - OC	UCM
1403	2634	3	Main Power Relay - STP	UCM
1404	2634	4	Main Power Relay - STG	UCM
1405	2634	5	Main Power Relay - OC	UCM
1406	519542	3	ACC Power Relay - STP	UCM
1407	519542	4	ACC Power Relay - STG	UCM
1408	519542	5	ACC Power Relay - OC	UCM
1511	1045	5	Right Brake Light Open Circuit	UCM
1512	1045	4	Right Brake Light Shorted To Ground	UCM
1513	1045	3	Right Brake Light Shorted To Power	UCM
1521	1046	5	Left Brake Light Open Circuit	UCM
1522	1046	4	Left Brake Light Shorted To Ground	UCM
1523	1046	3	Left Brake Light Shorted To Power	UCM
1532	520591	4	Backup Alarm Shorted To Ground	UCM
1533	520591	3	Backup Alarm Shorted To Power	UCM
1600	519001	13	Vehicle configuration error	UCM
1601	519275	13	Loader Arm Configuration Error	UCM
1900	158	5	UCM Ground Fault	UCM

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
1901	158	3	UCM - UCM Supply Voltage (12VP) High	UCM
1902	158	4	UCM - UCM Supply Voltage (12VP) Low	UCM
1903	158	18	UCM - UCM Supply Voltage (12VP) Below Operational Limit	UCM
1904	518841	4	UCM - Rail 12VB - 5V Regulators Supply Input Power Off	UCM
1905	3509	2	UCM - 5Vref1 Sensor Supply Voltage Out Of Range	UCM
1906	3510	2	UCM - 5Vref3 Sensor Supply Voltage Out Of Range	UCM
1907	518847	4	UCM - Rail 12VF1 - EHF Input and bucket, Aux and EHF return Power Off	UCM
1908	518848	4	UCM - Rail 12VF2 - Proportional Aux extend and Retract Input Power Off	UCM
1909	518849	4	UCM - Rail 12VF3 - Boom and pumps return, Control pattern Indicator, 2speed and Ride control Input Power Off	UCM
1910	518851	4	UCM - Rail 12VH - Bucket extend and Retract Input Power Off	UCM
1911	518852	4	UCM - Rail 12VH 1- Loader Pilot Interlock And Port Lock Input Power Off	UCM
1912	518853	4	UCM - Rail 12VM - Left And Right Brake Lights Input Power Off	UCM
1913	518855	4	UCM - Rail 12VS1 - Right pumps Input Power Off	UCM
1914	518856	4	UCM - Rail 12VD - Backup Alarm Input Power Off	UCM
1915	518857	4	UCM - Rail 12VT1 - Display Switched Power Input Off	UCM
1916	518858	4	UCM - Rail 12VU1 - Boom Raise and Lower Input Power Off	UCM
1917	518859	4	UCM - Rail 12VU2 - Left pumps Input Power Off	UCM
1918	518854	4	UCM - Rail 12VR - Combinational Relay, Power and Creep Led Inputs Power Off	UCM
1919	518860	4	UCM - Rail 12VS2 - Park Brake Solenoid Input Power Off	UCM
1920	3511	2	UCM - 8Vref2 Sensor Supply Voltage Out Of Range	UCM
3001	15025	31	Diagnostic fault check of synchronization between the accelerator pedal potentiometer and Low idle switch (LIS)	ECU
3002	5809	31	Signal Range Check High for Acceleration Pedal Position Device Driver Sensor 1	ECU
3003	10417	31	Signal Range Check Low for Acceleration Pedal Position Device Driver Sensor 1	ECU
3005	19332	31	Air filter clog or circuit failure	ECU
3006	14355	31	Stuck in range high, plausibility test failure	ECU
3007	4371	31	Engine coolant temperature sensor voltage is higher than expected	ECU
3008	8723	31	Engine coolant temperature sensor voltage is lower than expected	ECU
3009	18195	31	CAN signal error for Engine coolant temperature (down stream)	ECU
3011	9332	31	Intake manifold temperature sensor voltage is lower than expected	ECU
3013	37307	31	CAN-Receive-Frame Torque / Speed control from AE to ECU through TSC1_AE Message passive	ECU
3014	19588	31	Air filter clog or circuit failure present for a long time	ECU
3015	7189	31	Fuel temperature sensor voltage is higher than expected	ECU
3016	11541	31	Fuel temperature sensor voltage is lower than expected	ECU
3017	19844	31	Air Filter Clogging sensor switch implausible	ECU
3019	7524	31	Intake manifold pressure sensor voltage is higher than expected	ECU
3024	5060	31	ECU internal failure - Ambient pressure sensor voltage is higher than expected	ECU
3025	9412	31	ECU internal failure - Ambient pressure sensor voltage is lower than expected	ECU
3027	13523	31	Defect fault check for plausibility from digital sensor	ECU
3028	9939	31	Oil pressure is too low	ECU
3029	6355	31	Oil pressure sensor voltage is higher than expected	ECU
3030	10707	31	Oil pressure sensor voltage is lower than expected	ECU
3031	18387	31	Signal error on CAN for oil pressure sensor	ECU
3032	5587	31	Oil pressure is too high	ECU
3033	13283	31	Diagnostic fault check for oil temperature sensor	ECU
3034	4579	31	Oil temperature sensor voltage is higher than expected	ECU
3035	8931	31	Oil temperature sensor voltage is lower than expected	ECU
3036	19923	31	Signal error on CAN for Oil Temperature	ECU
3037	11876	31	Intake manifold pressure sensor voltage is lower than expected	ECU
3043	20449	31	Signal error for vehicle speed over Tachometer	ECU
3044	7649	31	Max error for vehicle speed signal over Tachometer sensor	ECU
3045	12001	31	Min error for vehicle speed signal over Tachometer sensor	ECU
3051	4449	31	Battery voltage is higher than expected	ECU
3052	8801	31	Battery voltage is lower than expected	ECU
3057	38961	31	Timeout of CAN-Receive-Frame High Resolution Wheel Speed information (HRWS)	ECU
3058	39307	31	CAN-Receive-Frame Vehicle Dynamic Stability Control 1 (VDC1)	ECU
3059	18017	31	Main relay stuck error	ECU
3087	14360	31	Switching to replacement value in case of sensor fault (boost or atmospheric)	ECU
3088	17682	31	Crankshaft speed sensor values are not plausible	ECU
3089	17426	31	Crankshaft speed sensor pattern is not plausible	ECU
3090	16914	31	Camshaft speed sensor values are not plausible	ECU
3091	16658	31	Camshaft speed sensor pattern is not plausible	ECU
3093	13074	31	Compared camshaft and crankshaft speed sensor values are not plausible	ECU
3094	4632	31	Physical Range high for Charged Air cooler down stream sensor	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
3096	38171	31	CAN A Bus off failure	ECU
3097	38427	31	CAN B Bus off failure	ECU
3098	40123	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_TE Message active	ECU
3100	40875	31	CAN-Receive-Frame Torque / Speed control from AE to ECU through TSC1_AE Message active	ECU
3102	9509	31	Fuel rail pressure sensor voltage is lower than expected	ECU
3103	8984	31	Physical Range low for Charged Air cooler down stream sensor	ECU
3104	62533	31	Fuel pressure relief valve is open	ECU
3105	62021	31	Fuel pressure relief valve is forced to open, perform pressure increase	ECU
3106	4421	31	Fuel pressure relief valve reached maximum allowed opening count	ECU
3107	26197	31	Fuel metering unit is shorted to battery voltage at the low side	ECU
3108	30549	31	Fuel metering unit is shorted to ground at the low side	ECU
3109	17432	31	Boost Pressure Sensor (downstream) CAN signal is invalid	ECU
3110	4645	31	Rail pressure sensor value is above maximum offset	ECU
3111	8997	31	Rail pressure sensor value is below minimum offset	ECU
3112	5157	31	Fuel rail pressure sensor voltage is higher than expected	ECU
3115	5400	31	Boost Pressure Sensor (downstream) voltage is higher than expected	ECU
3116	9752	31	Boost Pressure Sensor (downstream) voltage is lower than expected	ECU
3132	10008	31	Boost pressure sensor: over boost detection	ECU
3133	20818	31	No load error for Glow lamp power stage	ECU
3134	25426	31	Short circuit to battery error for Glow lamp power stage	ECU
3135	29778	31	Short circuit to ground error for Glow lamp power stage	ECU
3136	33362	31	Over temperature error for Glow lamp power stage	ECU
3137	21077	31	Fuel metering unit has an open load error	ECU
3139	6229	31	signal range check high error of metering unit AD-channel	ECU
3140	10581	31	signal range check low error of metering unit AD-channel	ECU
3141	17509	31	Fuel pump pressure has exceeded desired pressure limits	ECU
3146	17429	31	Water in fuel detected or water in fuel circuit failure	ECU
3147	15059	31	Oil temperature too high plausibility error	ECU
3148	13587	31	Dynamic plausibility test failed	ECU
3150	31346	31	SVS lamp power stage: hardware reports a Short circuit to ground error	ECU
3151	22386	31	SVS lamp power stage: hardware reports a "no load" error	ECU
3152	34930	31	SVS lamp power stage: hardware reports a over temperature	ECU
3153	26994	31	SVS lamp power stage: hardware reports a Short circuit to battery error	ECU
3154	27156	31	Intake air heater actuator is shorted to battery voltage	ECU
3155	31764	31	Intake air heater actuator is shorted to ground	ECU
3156	22036	31	Intake air heater actuator has an open load error	ECU
3157	5657	9	ECM Not Detected On CAN Bus - The Engine Dataset Registration Information Was Not Available From The Engine Within The Time Required.	UCM
3158	5657	2	The Engine Dataset Installed Does Not Match The Dataset Registered For This Machine. Register The New Dataset If the Dataset Has Just Been Updated	UCM
3160	26419	31	Fan clutch solenoid short circuit to battery failure	ECU
3161	30771	31	Fan clutch solenoid short circuit to ground failure	ECU
3162	21811	31	Fan clutch solenoid open load failure	ECU
3163	34355	31	Fan clutch solenoid ECU driver over temperature failure	ECU
3164	6707	31	Fan speed above maximum threshold	ECU
3165	11059	31	Fan speed below minimum threshold	ECU
3166	25525	31	Fuel filter heater actuator is shorted to battery voltage	ECU
3167	29877	31	Fuel filter heater actuator is shorted to ground	ECU
3168	20917	31	Fuel filter heater actuator has an open load error	ECU
3169	33461	31	Fuel filter heater ECU driver has an over temperature error	ECU
3170	14539	31	NH3 sensor signal is not changing	ECU
3171	38699	31	CAN transmit error - EEC2 message (Electronic Engine Control 2 message)	ECU
3172	62755	31	Engine coolant temperature has exceeded the pre-warning threshold	ECU
3173	63011	31	Engine coolant temperature has exceeded the warning threshold	ECU
3174	29747	31	Fan0, PWM, Short circuit to ground	ECU
3175	18739	31	Fan speed signal could not be measured for a period	ECU
3176	15205	31	High pressure pump fuel delivery quantity in over run exceeds a maximum threshold	ECU
3177	61858	31	Engine over speed condition detected	ECU
3179	38251	31	CAN communication failure between vehicle controller and ECU - BC2ECU2 message	ECU
3180	39803	31	CAN communication error between vehicle controller to ECU	ECU
3182	38721	31	CAN timeout error from cruise control vehicle speed (CCVS)	ECU
3183	37835	31	CAN communication failure between vehicle controller and ECU controller - TSC1_VR message (Engine brake)	ECU
3184	38091	31	CAN communication failure between vehicle controller and ECU controller - TSC1_VR message (Engine brake)	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
3185	38795	31	CAN timeout error from transmission - Transmission fluids (TF) message	ECU
3210	28950	31	Injection bank 1 short circuit failure (all injectors of the same bank can be affected)	ECU
3218	29206	31	Injection bank 2 short circuit failure (all injectors of the same bank can be affected)	ECU
3235	63798	31	Exceeded the number of injections for a given engine speed	ECU
3236	63542	31	Number of injections is limited by system	ECU
3237	5686	31	Number of desired injections exceeds threshold	ECU
3245	58653	31	ECU internal failure - Query/response communication errors	ECU
3252	58909	31	ECU internal failure - SPI communication error	ECU
3253	58397	31	ECU internal failure - Voltage ratio in ADC monitoring	ECU
3255	58141	31	ECU internal failure - ADC test	ECU
3256	57885	31	ECU internal failure - NTP error in ADC monitoring	ECU
3258	26402	31	Starter relay high side driver circuit short to battery failure	ECU
3259	30754	31	Starter relay high side driver circuit short to ground failure	ECU
3260	22818	31	Starter relay low side driver circuit open failure	ECU
3261	27426	31	Starter relay low side driver circuit short to battery failure	ECU
3262	31778	31	Starter relay low side driver circuit short to ground failure	ECU
3263	38683	31	CAN C Bus off failure	ECU
3265	58589	31	Fuel injection requested during overrun	ECU
3269	42260	31	Grid Heater always switched on	ECU
3271	18629	31	If Sensor is connected via CAN: Signal error	ECU
3272	6597	31	Prefilter fuel pressure sensor voltage is higher than expected	ECU
3273	10949	31	Prefilter fuel pressure sensor voltage is lower than expected	ECU
3274	5829	31	Plausibility check: Measured fuel pressure downstream main filter is higher than the possible physical maximum in this operating point	ECU
3275	10181	31	Plausibility check: Measured fuel pressure downstream main filter is less than the possible physical minimum in this operating point	ECU
3276	12658	31	Via CAN Bus: MIL LAMP Error	ECU
3277	37803	31	Timeout Error of CAN-Receive-Frame DD	ECU
3282	39243	31	Timeout of CAN-Transmit-Frame ECU2FLP, Electric exhaust flap actuator	ECU
3283	58157	31	ECU internal failure - Sensor 5 volt supply 2	ECU
3285	58413	31	ECU internal failure - Sensor 5 volt supply 3	ECU
3293	8805	31	Fuel rail pressure has exceeded maximum positive deviation limits	ECU
3297	4965	31	Maximum positive deviation of rail pressure exceeded concerning set flow of fuel. Fuel Pump Pressure has exceeded maximum positive deviation limits	ECU
3301	5477	31	Fuel rail pressure has exceeded maximum negative deviation limits	ECU
3305	10085	31	Fuel rail pressure has dropped below the minimum limit	ECU
3309	6245	31	Fuel rail pressure has exceeded maximum limit	ECU
3323	40900	31	Timeout Error of CAN-Receive-Frame RxAMCON	ECU
3324	38107	31	Timeout Error of CAN-Receive-Frame Electronic Brake Controller (EBC1)	ECU
3325	37259	31	CAN-Receive-Frame Transmission Control message 1 (ETC1)	ECU
3327	38449	31	Timeout of CAN-Receive-Frame Tachograph (TCO1) receive message	ECU
3329	37563	31	CAN-Receive-Frame Torque / Speed control from AR to ECU through TSC1_AR Message active	ECU
3330	38075	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_AR Message active	ECU
3333	38587	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_DR Message active	ECU
3334	39099	31	CAN communication failure between vehicle controller and ECU controller - TSC1_PE message	ECU
3334	39355	31	CAN communication failure between vehicle controller and ECU controller - TSC1_PE message	ECU
3337	40635	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_TR Message active	ECU
3338	37323	31	CAN communication failure between vehicle controller and ECU controller - TSC1_VE message	ECU
3338	37579	31	CAN communication failure between vehicle controller and ECU controller - TSC1_VE message	ECU
3343	9236	31	Signal range check: low error when heater is On	ECU
3344	4884	31	Signal range check: high error when heater is On	ECU
3346	17569	31	Diagnostic fault check for signal error of COM message	ECU
3347	4513	31	Diagnostic fault check for max error of COM message	ECU
3348	8865	31	Diagnostic fault check for min error of COM message	ECU
3351	21747	31	Engine compression brake low side driver circuit open failure	ECU
3352	26355	31	Engine compression brake low side driver circuit short to battery failure	ECU
3353	30707	31	Engine compression brake low side driver circuit short to ground failure	ECU
3357	18246	31	Too many recognized misfires in more than one cylinder	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
3358	38443	31	CAN transmit error - EEC1 message (Electronic Engine Control 1 message - Torque, accelerator pedal, engine speed, and other signals)	ECU
3361	57709	31	ECU internal failure - EEPROM write/read error	ECU
3362	57853	31	ECU internal failure - Fuel calibration	ECU
3363	17860	31	ECU internal failure - Ambient pressure failure	ECU
3364	6065	31	Signal Range Check High for Acceleration Pedal Position Device Driver Sensor 2	ECU
3365	10673	31	Signal Range Check Low for Acceleration Pedal Position Device Driver Sensor 2	ECU
3367	13843	31	Absolute plausibility test failed	ECU
3368	63215	31	Torque limitation caused by performance limiter	ECU
3369	63727	31	Torque limitation caused by smoke limitation	ECU
3370	62191	31	Strong torque limitation from engine protection active	ECU
3371	62447	31	Strong torque limitation from injection system active	ECU
3390	519156	4	Air Filter Restriction Switch Short To Ground	UCM
3403	35362	31	Starter relay low side ECU driver circuit over temperature failure	ECU
3404	5220	31	SRC High for Charge air cooler downstream Temperature	ECU
3409	9171	31	Defect fault check for minimum oil pressure from digital sensor	ECU
3425	5176	31	Under boost failure	ECU
3436	64447	31	Inducement system is locked due to 3 detections in 40 hours. The system must be reset using the dealer service tool screen "Engine Restart Counter Reset".	ECU
3443	62370	31	Torque limitation due to excessive coolant temperature	ECU
3444	62626	31	Torque limitation due to excessive exhaust gas temperature	ECU
3445	62882	31	Torque limitation due to excessive fuel temperature	ECU
3446	63138	31	Torque limitation due to excessive intake air temperature	ECU
3447	63394	31	Torque limitation due to excessive oil temperature	ECU
3448	63650	31	Torque limitation due to turbocharger protection after start	ECU
3449	59410	31	ECU internal failure - Calculated engine speed	ECU
3451	6837	31	The fuel main filter cartridge is worn and should be replaced, but is not yet in a critical state	ECU
3452	6581	31	The fuel main filter cartridge is severely clogged and must be replaced immediately, risk of bursting, torque limitation active	ECU
3453	19381	31	Fuel filter clog or circuit failure	ECU
3454	19637	31	Fuel filter switch is failed	ECU
3455	12773	31	Fuel pre-filter clog or circuit failure	ECU
3456	42852	31	Charge air cooler efficiency is too low	ECU
3457	4980	31	Intake manifold temperature sensor voltage is higher than expected	ECU
3458	5603	31	Crankcase pressure too high	ECU
3459	7123	31	Oil temperature too high	ECU
3460	11475	31	Oil temperature too low	ECU
3461	59037	31	ECU internal failure - Timeout in the shut off path test error	ECU
3462	59293	31	ECU internal failure - Overvoltage monitoring error	ECU
3497	14305	31	NPL error for vehicle speed signal over Tachometer or hardware sensor	ECU
3498	11489	31	signal level low error for vehicle speed signal over Tachometer or hardware sensor	ECU
3499	6369	31	Vehicle speed is too high	ECU
3500	7137	31	signal level high error for vehicle speed signal over Tachometer or hardware sensor	ECU
3501	60701	31	ECU internal failure - Software resets in DSM 0	ECU
3502	60957	31	ECU internal failure - Software resets in DSM 1	ECU
3503	61213	31	ECU internal failure - Software resets in DSM	ECU
3504	39627	31	CAN timeout error - TSC1PE Message (Torque/Speed control from ABS/ASR to ECU - Limp home status)	ECU
3505	40139	31	CAN timeout error - TSC1VE message (Limp home status)	ECU
3506	15281	31	Diagnostic fault check of synchronism for double potentiometer and Low idle switch(LIS)	ECU
3507	18273	31	Engine cranked for too long or key switch failure	ECU
3508	64239	31	Torque limitation active	ECU
3509	17121	31	Fuel tank level too low	ECU
3512	19162	31	State monitoring of the SCR systems	ECU
3515	18906	31	SCR Catalyst missing	ECU
3517	6596	31	Ambient temperature sensor voltage is higher than expected	ECU
3518	10948	31	Ambient temperature sensor voltage is lower than expected	ECU
3519	19396	31	Ambient temperature sensor failure	ECU
3521	15322	31	NOx estimation model in ECU software is inaccurate due to other failures	ECU
3525	57742	31	Downstream NOx sensor internal failure (Open Circuit Error)	ECU
3526	57998	31	Downstream NOx sensor internal failure (Short Circuit Error)	ECU
3528	12702	31	Downstream NOx sensor values are not plausible	ECU
3529	57710	31	Downstream NOx sensor internal failure (Heater Open Circuit Error)	ECU
3530	57966	31	Downstream NOx sensor internal failure (Heater Short Circuit Error)	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
3531	41838	31	Downstream NOx sensor internal failure (Heater Performance Plausibility Error)	ECU
3532	13198	31	Downstream NOx Sensor Value is not within the expected range	ECU
3533	40302	31	CAN timeout error from downstream NOx sensor	ECU
3545	62090	31	DEF/AdBlue Dosing Valve Protection 2 Request signal values and debouncing	ECU
3546	61834	31	DEF/AdBlue Dosing Valve Protection 1 Request signal values and debouncing expired	ECU
3549	7252	31	Intake air humidity sensor voltage is higher than expected for too long	ECU
3557	64340	31	Intake air humidity sensor voltage is higher than expected	ECU
3559	19028	31	Intake air humidity sensor failure	ECU
3564	14298	31	Plausibility error of NOx sensor values	ECU
3581	64911	31	Torque limitation is active	ECU
3586	14554	31	Dynamic plausibility error (exhaust temp sensors)	ECU
3594	63471	31	Torque limitation caused by SCR catalyst protection	ECU
3597	62351	31	Warning for level of reducing agent stage 3	ECU
3605	6204	31	Not reaching the setpoint of the outer loop with maximal control variable	ECU
3606	10556	31	Not reaching the setpoint of the outer loop with minimal control variable	ECU
3611	9690	31	Catalyst efficiency lower than first NOx production threshold level	ECU
3612	9946	31	Catalyst efficiency lower than second NOx production threshold level	ECU
3613	4826	31	Too high efficiency of the catalyst system	ECU
3616	61935	31	Torque limitation caused by turbo charger protection	ECU
3618	64175	31	Engine shutdown after an emergency restart was detected	ECU
3623	15534	31	Downstream NOx sensor lambda signal deviation - NOx sensor possible removal detected	ECU
3624	5027	31	Crankcase pressure sensor voltage is higher than expected	ECU
3625	9379	31	Crankcase pressure sensor voltage is lower than expected	ECU
3626	14259	31	Crankcase pressure has exceeded tolerance limit	ECU
3627	4515	31	Crankcase pressure too high	ECU
3628	8867	31	Crankcase pressure too low	ECU
3629	15523	31	Crankcase Pressure Sensor Value not plausible	ECU
3630	17859	31	After opening the valve the pressure decreased and then increased again - The engine is probably filled up with oil	ECU
3631	15779	31	Crankcase pressure sensor value is not plausible	ECU
3632	16035	31	Status of Fuel in oil relief valve is not plausible	ECU
3633	17347	31	Crankcase pressure too high: After error (FOCasePressHigh_C) and the countermeasure was successful (FOReacExpected_C) the maximal supplementary delay during which the engine can still run has expired	ECU
3634	18115	31	After opening the valve the pressure decreased and then increased again - A long time elapsed	ECU
3635	4547	31	Crankcase pressure too high: Blow-by pressure exceeded admissible threshold	ECU
3636	4803	31	Crankcase pressure too high: Info - After Blow-by pressure exceeded than admissible threshold (error: FOCasePressHigh_C) the countermeasure has been successful: the blow-by pressure decreased	ECU
3637	17603	31	Crankcase pressure too high: After Blow-by pressure has been higher than admissible threshold (error: FOCasePressHigh_C) the countermeasure has not been successful: the pressure kept on increasing	ECU
3638	62703	31	Torque limitation caused by engine brake	ECU
3639	13530	31	Drift error of NOx sensor values	ECU
3641	19000	31	Turbo charger speed signal period has exceeded a limit	ECU
3642	15160	31	Turbo acceleration higher than expected	ECU
3644	7240	31	Over pressure too high in Exhaust pressure controller - monitoring	ECU
3645	15688	31	Over pressure deviation too high in Exhaust pressure controller - monitoring	ECU
3646	18232	31	Multisignal defect in Pressure charger regulator	ECU
3647	4920	31	Over boost failure	ECU
3652	37147	31	CAN A Bus off passive failure	ECU
3656	62959	31	Torque limitation caused by particulate filter	ECU
3678	13842	31	Error in engine downstream temperature	ECU
3679	14098	31	Error in engine upstream temperature	ECU
3680	58678	31	Engine speed limitation via fuel injection cut off is active	ECU
3682	4380	31	Fault Check for enhanced SRC-Max of First exhaust gas temperature	ECU
3683	10012	31	Fault Check for enhanced SRC-Min of First exhaust gas temperature	ECU
3684	4636	31	Fault Check for enhanced SRC-Max of Second exhaust gas temperature	ECU
3685	10268	31	Fault Check for enhanced SRC-Min of Second exhaust gas temperature	ECU
3686	15644	31	DOC upstream temperature sensor signal drift at cold start	ECU
3687	15900	31	SCR upstream temperature sensor signal drift at cold start	ECU
3688	20245	31	Water in fuel sensor or sensor circuit failure	ECU
3699	58733	31	ECU EEPROM memory failure - EEPROMData1 block	ECU
3700	14164	31	Intake air humidity sensor value is not plausible	ECU
3702	18998	31	Detection of Failed Engine Start	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
3703	11062	31	The minimum rail pressure value necessary to allow fuel injection has not been reached	ECU
3726	5347	31	Fuel in oil has exceeded the maximum limit	ECU
3729	5859	31	Too frequent regenerations	ECU
3730	6115	31	Calculated soot in oil value has exceeded the allowable limit	ECU
3734	13217	31	Diagnostic fault check non plausibility of COM message	ECU
3735	33621	31	Fuel metering unit has an over-temperature error	ECU
3738	59165	31	ECU internal failure - ROM error	ECU
3739	57661	31	ECU internal failure - Loss of synchronization to MM from CPU	ECU
3740	57917	31	ECU internal failure - ECU shutdown test failure	ECU
3741	58173	31	ECU internal failure - Wrong set response time	ECU
3742	58429	31	ECU internal failure - SPI errors during MoCSOP execution	ECU
3743	58685	31	ECU internal failure - Undervoltage monitoring error	ECU
3745	58941	31	ECU internal failure - WDA is not working correctly	ECU
3746	59197	31	ECU internal failure - Alarm task period error	ECU
3747	59453	31	ECU internal failure - Positive test failed	ECU
3749	58801	31	ECU internal failure - Accelerator pedal position sensor	ECU
3750	60470	31	ECU internal failure - Fuel injection energizing time is not plausible	ECU
3751	60726	31	ECU internal failure - Fuel injection energizing phase is not plausible	ECU
3752	60982	31	Fuel injection correction has exceeded a minimum limit	ECU
3753	58845	31	ECU internal failure - Injection quantity correction	ECU
3754	59101	31	ECU internal failure - Rail pressure plausibility	ECU
3755	59357	31	ECU internal failure - Torque request comparison	ECU
3756	57821	31	ECU internal failure - Post injection quantity	ECU
3757	58077	31	ECU internal failure - Post injection shut-off failure	ECU
3758	58333	31	Post injection efficiency failure	ECU
3759	59613	31	ECU internal failure - Torque request due to fuel pressure exceeds maximum torque limit	ECU
3760	59869	31	ECU internal failure - Torque request due to air control exceeds maximum torque limit	ECU
3761	60125	31	ECU internal failure - Torque request exceeds maximum torque limit	ECU
3762	60381	31	ECU 5 volt supply voltage is higher than expected	ECU
3763	60637	31	ECU 5 volt supply voltage is lower than expected	ECU
3764	62817	31	ECU after run power interruption	ECU
3767	59421	31	ECU internal failure - 'WDA active' reported due to errors in query/response communication	ECU
3768	59677	31	ECU internal failure - 'ABE active' reported due to undervoltage detection	ECU
3769	59933	31	ECU internal failure - 'ABE active' reported due to overvoltage detection	ECU
3770	60189	31	ECU internal failure - 'WDA/ABE active' reported	ECU
3771	15001	31	Up and down stream temperature sensors in Oxidation catalysts exchanged	ECU
3773	10296	31	Turbocharger boost pressure is lower than expected	ECU
3794	15204	31	Plausibility Check for air pressure at the upstream of intake valve sensor	ECU
3795	15460	31	Plausibility Check for air pressure at the upstream of intake valve sensor	ECU
3799	62277	31	Fuel pressure relief valve is forced to open, perform pressure shock	ECU
3805	7557	31	Maximum rail pressure exceeded	ECU
3808	15461	31	High pressure pump fuel delivery quantity at low idle is too high	ECU
3810	16677	31	Rail pressure sensor value is intermittent	ECU
3811	57901	31	ECU internal failure - Sensor 5 volt supply 1	ECU
3814	58717	31	ECU temperature sensor error detected	ECU
3836	9369	31	Downstream oxidation catalyst temperature sensor voltage is lower than expected	ECU
3837	13721	31	Upstream oxidation catalyst temperature plausibility failure	ECU
3838	10649	31	Upstream oxidation catalyst temperature sensor voltage is lower than expected	ECU
3856	4408	31	Turbine reversible over speed in Pressure charger regulator	ECU
3857	4664	31	Turbine over speed failure	ECU
3870	37739	31	CAN communication failure between vehicle controller and ECU - BC2ECU1 message	ECU
3873	40379	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_TE Message passive	ECU
3874	37819	31	CAN-Receive-Frame Torque / Speed control from AR to ECU through TSC1_AR Message passive	ECU
3875	38843	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_DR Message passive	ECU
3876	40891	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_TR Message passive	ECU
3884	4883	31	Physical Range Check high for Engine coolant temperature (down stream)	ECU
3897	34291	31	Engine compression brake low side ECU driver circuit over temperature failure	ECU
3898	13687	31	EGR cooler temperature defective	ECU
3903	6677	31	Fuel temperature is too high	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
3904	15893	31	Fuel temperature plausibility check failed	ECU
3905	34836	31	Intake air heater ECU driver has an over-temperature error	ECU
3906	18230	31	Number of injections is limited by quantity balance of high pressure pump	ECU
3910	16725	31	Fuel metering unit intermittent electrical connection failure	ECU
3913	8633	31	The calculated conversion rate is smaller as the limiting value	ECU
3915	13893	31	Averaged rail pressure is outside the expected tolerance range	ECU
3916	5957	31	Fuel pressure relief valve has reached maximum allowed open time	ECU
3951	4420	31	Physical Range check high	ECU
3952	8772	31	Physical Range check low	ECU
3953	14148	31	Plausibility check failure against second temperature	ECU
3959	6052	31	Intake Throttle Valve Position is higher than expected	ECU
3960	10404	31	Intake Throttle Valve Position is lower than expected	ECU
3961	60717	31	CAN communication failure - External torque/speed checksum and counter	ECU
3977	5605	31	Prefilter fuel pressure sensor voltage is higher than expected	ECU
3978	5861	31	Prefilter fuel pressure sensor voltage is lower than expected	ECU
3979	13029	31	Plausibility check: Measured fuel pressure upstream gear pump is higher than the possible physical maximum in this operating point	ECU
3980	13285	31	Plausibility check: Measured fuel pressure upstream gear pump is less than the possible physical minimum in this operating point	ECU
3985	5976	31	Exhaust gas pressure sensor voltage is higher than expected	ECU
3986	10328	31	Exhaust gas pressure sensor voltage is lower than expected	ECU
3987	6488	31	Turbine downstream pressure sensor voltage is higher than expected	ECU
3988	10840	31	Turbine downstream pressure sensor voltage is lower than expected	ECU
4043	177	4	Hydraulic Oil Temperature Sensor Shorted To Ground	UCM
4044	177	5	Hydraulic Oil Temperature Sensor Open Circuit	UCM
4055	517776	5	Park Brake Valve (On / Off) Solenoid Supply Open Circuit	UCM
4056	517776	4	Park Brake Valve (On / Off) Solenoid Supply Shorted To Ground	UCM
4057	517776	3	Park Brake Valve (On / Off) Solenoid Supply Shorted To Power	UCM
4061	519334	5	Open Circuit / Short to Power at Right Pump Control Forward Valve High Side Driver	UCM
4062	519334	4	Short to Ground at Right Pump Control Forward Valve High Side Driver	UCM
4063	519334	3	Short to Power at Right Pump Control Forward or Reverse Valve High Side Driver	UCM
4071	519335	5	Open Circuit / Short to Power at Left Pump Control Forward Valve High Side Driver	UCM
4072	519335	4	Short to Ground at Left Pump Control Forward Valve High Side Driver	UCM
4073	519335	3	Short to Power at Left Pump Control Forward or Reverse Valve High Side Driver	UCM
4081	519332	3	Short to Power at Right Pump Valve Low Side Driver	UCM
4082	519332	4	Short to Ground at Right Pump Valve Low Side Driver	UCM
4100	518277	2	Creep Engagement return fault	UCM
4101	518277	3	Creep engagement indicator short to Power	UCM
4102	518277	4	Creep engagement indicator short to ground	UCM
4309	521309	9	Parkbrake Button timeout	UCM
4361	519336	5	Open Circuit / Short to Power at Right Pump Control Reverse Valve High Side Driver	UCM
4362	519336	4	Short to Ground at Right Pump Control Reverse Valve High Side Driver	UCM
4363	519336	3	Short to Power at Right Pump Control Reverse or Forward Valve High Side Driver	UCM
4371	519337	5	Open Circuit/Short to Power at Left Pump Control Reverse Valve High Side Driver	UCM
4372	519337	4	Short to Ground at Left Pump Control Reverse Valve High Side Driver	UCM
4373	519337	3	Short to Power at Left Pump Control Reverse or Forward Valve High Side Driver	UCM
4381	519333	3	Short to Power at Left Pump Valve Low Side Driver	UCM
4382	519333	4	Short to Ground at Left Pump Valve Low Side Driver	UCM
4431	619	2	Park Brake Pressure Switch (Plausibility Check With Solenoid Valve)	UCM
4781	848	5	Two speed Solenoid Valve Supply Open Circuit	UCM
4782	848	4	Two speed Solenoid Valve Supply Shorted To Ground	UCM
4783	848	3	Two speed Solenoid Valve Supply Shorted To Power	UCM
4951	1745	3	Hydraulic Interlock Solenoid Shorted To Power	IC/HIC
4952	1745	5	Hydraulic Interlock Solenoid Open Circuit	IC/HIC
5051	518177	5	Loader Pilot Interlock Valve (On/Off) Solenoid Supply Open Circuit	UCM
5052	518177	4	Loader Pilot Interlock Valve (On/Off) Solenoid Supply Shorted To Ground	UCM
5053	518177	3	Loader Pilot Interlock Valve (On/Off) Solenoid Supply Shorted To Power	UCM
5061	519310	5	Port Lock Valve (On/Off) Solenoid Supply Open Circuit	UCM
5062	519310	4	Port Lock Valve (On/Off) Solenoid Supply Shorted To Ground	UCM
5063	519310	3	Port Lock Valve (On/Off) Solenoid Supply Shorted To Power	UCM
5121	2661	3	Right Joystick Forward-Back Axis Pin A Open Or Shorted To Ground Or Power	UCM
5122	2663	3	Right Joystick Forward-Back Axis Pin B Open Or Shorted To Ground Or Power	UCM
5124	2661	12	Right Joystick Forward-Back Axis In-Range Fault	UCM

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
5131	2660	4	Right Joystick Right-Left Axis (ISO/H Pattern) Pin A Open Or Shorted To Ground	UCM
5132	2660	3	Right Joystick Right-Left Axis (ISO/H Pattern) Pin A Shorted To Power	UCM
5134	2662	4	Right Joystick Right-Left Axis (ISO/H Pattern) Pin B Open Or Shorted To Ground	UCM
5135	2662	3	Right Joystick Right-Left Axis (ISO/H Pattern) Pin B Shorted To Power	UCM
5137	2660	12	Right Joystick Right-Left Axis (ISO/H Pattern) In-Range Fault	UCM
5141	2664	4	Aux Thumbwheel Axis Pin A Open Or Shorted To Ground	UCM
5142	2664	3	Aux Thumbwheel Axis Pin A Shorted To Power	UCM
5144	4746	4	Aux Thumbwheel Axis Pin B Open Or Shorted To Ground	UCM
5145	4746	3	Aux Thumbwheel Axis Pin B Shorted To Power	UCM
5147	2664	12	Aux Thumbwheel Axis In-Range Fault	UCM
5201	2697	3	Left Joystick Right-Left Axis Pin A Open Or Shorted To Ground Or Power	UCM
5202	2699	3	Left Joystick Right-Left Axis Pin B Open Or Shorted To Ground Or Power	UCM
5204	2697	12	Left Joystick Right-Left Axis In-Range Fault	UCM
5211	2698	4	Left Joystick Forward-Back Axis Pin A Open Or Shorted To Ground	UCM
5212	2698	3	Left Joystick Forward-Back Axis Pin A Shorted To Power	UCM
5214	2700	4	Left Joystick Forward-Back Axis Pin B Open Or Shorted To Ground	UCM
5215	2700	3	Left Joystick Forward-Back Axis Pin B Shorted To Power	UCM
5217	2698	12	Left Joystick Forward-Back Axis In-Range Fault	UCM
5221	519311	5	Open Circuit / Short to Power at Boom Raise Valve High Side Driver	UCM
5222	519311	4	Short to Ground at Boom Raise Valve High Side Driver	UCM
5223	519311	3	Short to Power at Boom Raise or Lower Valve High Side Driver	UCM
5231	518130	5	Open Circuit / Short to Power at Boom Lower Valve High Side Driver	UCM
5232	518130	4	Short to Ground at Boom Lower Valve High Side Driver	UCM
5233	518130	3	Short to Power at Boom Lower or Raise Valve High Side Driver	UCM
5241	518129	3	Short to Power at Boom Valve Low Side Driver	UCM
5242	518129	4	Short to Ground at Boom Valve Low Side Driver	UCM
5251	518132	5	Open Circuit / Short to Power at Bucket Roll Valve High Side Driver	UCM
5252	518132	4	Short to Ground at Bucket Roll Valve High Side Driver	UCM
5253	518132	3	Short to Power at Bucket Roll or Dump Valve High Side Driver	UCM
5261	518133	5	Open Circuit / Short to Power at Bucket Dump Valve High Side Driver	UCM
5262	518133	4	Short to Ground at Bucket Dump Valve High Side Driver	UCM
5263	518133	3	Short to Power at Bucket Dump or Roll Valve High Side Driver	UCM
5271	519312	3	Short to Power at Bucket Valve Low Side Driver	UCM
5272	519312	4	Short to Ground at Bucket Valve Low Side Driver	UCM
5281	519313	5	Open Circuit / Short to Power at Aux Extend High Side Driver	UCM
5282	519313	4	Short to Ground at Aux Extend High Side Driver	UCM
5283	519313	3	Short to Power at Aux Extend or Retract High Side Driver	UCM
5291	519314	5	Open Circuit / Short to Power at Aux Retract High Side Driver	UCM
5292	519314	4	Short to Ground at Aux Retract High Side Driver	UCM
5293	519314	3	Short to Power at Aux Retract or Extend High Side Driver	UCM
5309	518058	9	Float Button Timeout (30 Seconds)	UCM
5313	519315	3	Short to Power at EHF Enable Switch	UCM
5323	519316	3	Short to Power at EHF Fwd Rev Switch	UCM
5371	519317	5	Open Circuit / Short to Power at EHF Forward Solenoid High Side Driver	UCM
5372	519317	4	Short to Ground at EHF Forward Solenoid High Side Driver	UCM
5373	519317	3	Short to Power at EHF Forward or Reverse Solenoid High Side Driver	UCM
5381	519318	5	Open Circuit / Short to Power at EHF Reverse Solenoid High Side Driver	UCM
5382	519318	4	Short to Ground at EHF Reverse Solenoid High Side Driver	UCM
5383	519318	3	Short to Power at EHF Reverse or Forward Solenoid High Side Driver	UCM
5392	519319	4	Short to Ground at EHF Forward Solenoid Low Side Driver	UCM
5393	519319	3	Short to Power at EHF Low Side Driver	UCM
5501	519320	4	Loader Arm Spool Sensor Open or Shorted To Ground	UCM
5502	519320	3	Loader Arm Spool Sensor Shorted To Power	UCM
5503	1746	3	Electro-Hydraulic Aux Output Shorted To Power	IC/HIC
5504	519341	4	Bucket Valve Spool Sensor Open Or Shorted To Ground	UCM
5505	519341	3	Bucket Valve Spool Sensor Shorted To Power	UCM
5507	519342	4	Auxiliary Valve Spool Sensor Open Or Shorted To Ground	UCM
5508	519342	3	Auxiliary Valve Spool Sensor Shorted To Power	UCM
5511	519320	2	Implausible Loader Arm Sensor State Vs Loader Arm Command - Stuck Spool Or PRV	UCM
5512	519341	2	Implausible Bucket Sensor State Vs Loader Bucket Command - Stuck Spool Or PRV	UCM
5513	519342	2	Implausible Auxiliary Sensor State Vs Auxiliary Command - Stuck Spool Or PRV	UCM
5599	519544	2	2 speed and Creep Turtle button - implausible state	UCM
5600	519543	2	2 speed and Creep Hare button - implausible state	UCM
5601	924	3	Short to Power at Aux Low Side Driver	UCM
5602	924	4	Short to Ground at Aux Low Side Driver	UCM
5604	519405	3	Left Motor Sensor - Shorted to Power	UCM
5605	519405	5	Left Motor Sensor - OC	UCM

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
5606	519405	4	Left Motor Sensor - STG	UCM
5607	519406	3	Right Motor Sensor - Shorted to Power	UCM
5608	519406	5	Right Motor Sensor - OC	UCM
5609	519406	4	Right Motor Sensor - STG	UCM
5610	516	2	Ground Drive Speed sensor RPM plausibility fault	UCM
5611	1861	2	Ground Drive Speed sensor Direction plausibility fault	UCM
5612	519405	2	Left Motor Speed Sensor in-range fault - Intermittent Speed Drop	UCM
5613	519406	2	Right Motor Speed Sensor in-range fault - Intermittent Speed Drop	UCM
5614	519405	12	Left Motor Speed Sensor in-range fault - No Speed	UCM
5615	519406	12	Right Motor Speed Sensor in-range fault - No Speed	UCM
5701	519280	5	Pattern Switch Open Or Shorted To Ground	UCM
5703	519280	3	Pattern Switch Shorted To Power	UCM
5811	518357	2	Loader Lockout Switch Is In An Implausible State	UCM
8018	518089	2	Auto Ride Control switch plausibility fault	UCM
9152	520329	31	Bus-Warn at CAN-Bus No.1	UCM
9158	519343	4	H Pattern Indicator Shorted To Ground	UCM
9159	519344	4	ISO Pattern Indicator Shorted To Ground	UCM
9160	519343	3	H Pattern Indicator Shorted To Power	UCM
9161	519344	3	ISO Pattern Indicator Shorted To Power	UCM
9403	519301	12	Machine Configuration Settings Required using Service Tool	IC/HIC
9404	519302	2	Memory Error - Triple - Hour Meter Failure	UCM
9406	5123	2	No CAN Communication From GHMI Controller	UCM
17106	40795	31	Timeout Error of CAN-Transmit-Frame A1DEFI	ECU
17107	46187	31	DLC Error of CAN-Receive-Frame BC2ECU1	ECU
17108	46699	31	DLC Error of CAN-Receive-Frame BC2ECU2	ECU
17109	16305	31	CAN-Receive-Frame 2 from the Body Controller Module to ECU (BC2ECU2), Status of Clutch Message Counter is false	ECU
17110	48945	31	DLC Error of CAN-Receive-Frame CCSSBC, Transmitted by Body Computer	ECU
17111	45675	31	Data length code Error of CAN-Receive-Frame CM1BC	ECU
17112	48763	31	DLC Error of CAN-Receive-Frame CTLPTO	ECU
17113	47355	31	DLC Error of CAN-Receive-Frame DD	ECU
17114	17788	31	SAE J1939 error for HCI dosing quantity	ECU
17115	47211	31	DLC Error of CAN-Receive-Frame DLCD1	ECU
17116	15218	31	CAN-Receive-Frame: Message Implausible DLCD1 (Direct Lamp Control) MIL	ECU
17117	46043	31	DLC Error of CAN-Receive-Frame Electronic Brake Controller (EBC1BC)	ECU
17118	46811	31	DLC Error of CAN-Receive-Frame Electronic Brake Controller (EBC1)	ECU
17119	47067	31	DLC Error of CAN-Receive-Frame EBC1VS	ECU
17120	47921	31	DLC Error of CAN-Receive-Frame Wheel Speed Information Frame (WSI)	ECU
17121	38987	31	Timeout of CAN-Transmit-Frame ECU2EGR, Exhaust gas recirculation valve	ECU
17122	46062	31	Data length code error of CAN-Transmit-Frame ECU to NH3 (ammonia) Sensor	ECU
17123	40644	31	Timeout Error of CAN-Receive-Frame ECU2VM Ambient Conditions CAN frame	ECU
17124	48891	31	DLC Error of CAN-Receive-Frame EEC2V	ECU
17125	38059	31	CAN-Receive-Frame Electronic Engine Control #2 from Vehicle Controller (EEC2V)	ECU
17126	38955	31	CAN-Transmit-Frame EEC3, Electronic Engine Control #3 message	ECU
17127	38859	31	Timeout Error of CAN-Receive-Frame EEC3V for Estimated Parasitic Losses	ECU
17128	39211	31	CAN-Transmit-Frame EEC4, Electronic Engine Control #4 message	ECU
17129	45803	31	DLC Error of CAN-Receive Frame Engine Gas Flow Rate Frame (EngGsFlowRt)	ECU
17130	6711	31	Receive Can Frame: Max Error for Exhaust Gas Mass Flow Rate Signal	ECU
17131	11063	31	Receive Can Frame: Min Error for Exhaust Gas Mass Flow Rate Signal	ECU
17132	15415	31	Receive Can Frame: Exhaust Gas Mass Flow Rate Signal plausibility	ECU
17133	19767	31	Receive Can Frame: Exhaust Gas Mass Flow Rate Signal error	ECU
17134	12615	31	Can Receive Frame: Fault check for EGR, control failure	ECU
17135	48455	31	Data length Error of CAN-Receive-Frame EGR2ECU	ECU
17136	12871	31	Can Receive Frame: EGR electrical or mechanical fault	ECU
17137	17223	31	Can Receive Frame: EGR other errors	ECU
17138	5191	31	Can Receive Frame: EGR high motor effort fault	ECU
17139	13639	31	CAN transmit error - EGR initialization fault	ECU
17140	5399	31	EGR smart actuator: Feedback position positive deviation	ECU
17141	9751	31	EGR smart actuator: Feedback position negative deviation	ECU
17142	17991	31	Can Receive Frame: EGR system faults	ECU
17143	34631	31	Can Receive Frame: EGR temperature fault	ECU
17144	40827	31	Timeout Error of CAN-Transmit-Frame EI	ECU
17145	64495	31	No Failure: Engine shut off request through CAN	ECU
17146	64751	31	No Failure: Auxiliary Engine Shutdown Switch Message	ECU
17147	46827	31	Auxiliary Engine Shutdown Switch Message	ECU
17148	45531	31	CAN-Receive-Frame ERC1BC (Retarder Enable - Brake Assist Switch signal)	ECU
17149	45707	31	Data length Error of CAN-Receive-Frame ETC1	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
17150	46219	31	CAN-Receive-Frame Electronic Transmission Controller 2 message sent from the gearbox control unit	ECU
17151	46731	31	CAN -Receive-Frame Transmission Control 7 (ETC7)	ECU
17152	48707	31	DLC Error of CAN-Receive-Frame FDBC	ECU
17153	19523	31	Error in the Frame FDBC containing the Fan speed	ECU
17154	13995	31	Gear information from AMT contain implausible value for (gear/gear ratio)	ECU
17155	47050	31	Message length error of CAN receive frame HCUDData	ECU
17156	49098	31	Message length error of CAN receive frame HCUDData	ECU
17157	46395	31	Data length code CAN-Transmit-Frame HRLFC, High Resolution Fuel Consumption	ECU
17158	49147	31	DLC Error of CAN-Receive-Frame HRVD	ECU
17159	47595	31	Data length Error of CAN-Receive-Frame HRWS	ECU
17160	12604	31	SAE J1939 error for Signal not in range or Erroneous signal HCI dosing request status	ECU
17161	46203	31	DLC Error of CAN-Receive-Frame ISCSBC	ECU
17162	47739	31	DLC Error of CAN-Receive-Frame MuxInfo	ECU
17163	47675	31	Data Length Error of CAN-Transmit-Frame MVS, Maximum Vehicle Speed Limits	ECU
17164	46574	31	DLC Error of CAN-Receive-Frame NH3Fact	ECU
17165	6894	31	Monitoring of the NH3 sensor trim value is higher than the high limitation variation range	ECU
17166	11246	31	Monitoring of the NH3 sensor trim value is lower than the low limitation variation range.	ECU
17167	7406	31	Monitoring of the NH3 sensor trim value is higher than the high limitation	ECU
17168	11758	31	Monitoring of the NH3 sensor trim value is lower than the low limitation	ECU
17169	45550	31	CAN-Receive-Frame NH3Sens	ECU
17170	46958	31	CAN-Receive-Frame NOx-Data from NOx Sensor	ECU
17171	5905	31	SRC Max error of the analogue A/C coolant pressure sensor	ECU
17172	10257	31	SRC Min error of the analogue A/C coolant pressure sensor	ECU
17173	6417	31	SRC Max duty cycle error in the PWM A/C coolant pressure sensor	ECU
17174	9745	31	SRC Min duty cycle error in the PWM A/C coolant pressure sensor	ECU
17175	5393	31	SRC Max period error in the PWM A/C coolant pressure sensor	ECU
17176	10769	31	SRC Min period error in the PWM A/C coolant pressure sensor	ECU
17177	20769	31	Open Circuit on power stage for the A/C compressor	ECU
17178	33313	31	Over temperature on powerstage for the A/C compressor	ECU
17179	21521	31	A/C: Open Circuit on power stage for the reduce torque instruction	ECU
17180	33553	31	A/C: Over temperature on powerstage for the reduce torque instruction	ECU
17181	24849	31	A/C: Short circuit to battery on power stage for the reduce torque instruction	ECU
17182	29201	31	A/C: Short circuit to ground on power stage for the reduce torque instruction	ECU
17183	25377	31	A/C: Short circuit to battery on power stage for the compressor	ECU
17184	29729	31	A/C: Short circuit to ground on power stage for the A/C compressor	ECU
17185	15121	31	Plausibility error in A/C main switch	ECU
17186	19473	31	Signal error for CAN Signal of A/C main switch	ECU
17187	62899	31	Blow By 3-way valve over speed and SCG of power stage are simultaneously detected	ECU
17188	12721	31	Main and redundant brake switch state different	ECU
17189	12737	31	Brake state 01	ECU
17190	12993	31	Brake with no CAN Plaus state 01	ECU
17191	13249	31	Brake state 10	ECU
17192	13505	31	Brake with no CAN Plaus state 10	ECU
17193	19889	31	Signal Error for Main Brake	ECU
17194	19633	31	Signal Error for Redundant Brake	ECU
17195	37403	31	CAN B Bus off passive failure	ECU
17196	37915	31	CAN D Bus off passive failure	ECU
17197	38939	31	CAN D Bus off failure	ECU
17199	22228	31	Open load of powerstage of Charge Air Cooling Bypass Valve due to pump blockage	ECU
17202	16049	31	Low idle switch plausibility against relative accelerator pedal value coming via CAN	ECU
17203	22307	31	Open load failure	ECU
17204	34851	31	Over Temperature of powerstage	ECU
17205	26915	31	Short Circuit to Battery	ECU
17206	31267	31	Short Circuit to Ground	ECU
17207	13233	31	Clutch actuation not plausible	ECU
17208	17585	31	Sig Error for Clutch actuation	ECU
17209	47214	31	CAN-Receive-Frame NOx-Data	ECU
17210	47726	31	CAN-Receive-Frame ComNOxDataUsBAM (NOx Sensor)	ECU
17211	47982	31	CAN-Receive-Frame ComNOxDataUsPac (Upstream NOx Sensor)	ECU
17212	47038	31	DLC Error of CAN-Receive-Frame NOxSens	ECU
17213	47294	31	DLC Error of CAN-Receive-Frame NOxSensUs	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
17214	47851	31	Data length Error of CAN-Receive-Frame PRODPM1	ECU
17215	46753	31	CAN-Receive-Frame Engine power take off enable switch status message PTOBC was not received	ECU
17216	47265	31	CAN-Receive-Frame PTODE ("At least one PTO engaged" signal value)	ECU
17217	47777	31	CAN-Receive-Frame PTOTx (Ambient Conditions CAN frame)	ECU
17218	45691	31	DLC Error of CAN-Receive-Frame RESET	ECU
17219	46843	31	DLC Error of CAN-Receive-Frame RxAmb	ECU
17220	47169	31	Data length Error of CAN-Receive-Frame RxCCVS	ECU
17221	47019	31	CAN frame error - RxEngTemp2 (Engine Temperature) message	ECU
17222	4375	31	CAN receive frame: Open Circuit Error for Exhaust Gas temperature Signal	ECU
17223	8727	31	CAN receive frame: Short Circuit Error for Exhaust Gas temperature signal	ECU
17224	13079	31	CAN receive frame: NPL Error Circuit Error for Exhaust Gas Mass Temperature Signal	ECU
17225	17431	31	CAN receive frame: Sig Error for Exhaust Gas temperature Signal	ECU
17226	47227	31	DLC Error of CAN-Receive-Frame RxSERV	ECU
17227	47409	31	DLC Error of CAN-Receive-Frame Vehicle Distance (VD) message	ECU
17228	47723	31	DLC Error of CAN-Receive-Frame TCFG2	ECU
17229	45819	31	Data length Error of CAN-Receive-Frame TCO1	ECU
17230	47243	31	DLC Error of CAN-Receive-Frame TF	ECU
17231	46289	31	DLC error of CAN-Receive-Frame TimeDate	ECU
17232	39851	31	CAN-Receive-Frame Torque / Speed control from ADE to ECU through TSC1_ADE Message Active	ECU
17233	40107	31	CAN-Receive-Frame Torque / Speed control from ADE to ECU through TSC1_ADE Message passive	ECU
17234	40363	31	CAN-Receive-Frame Torque / Speed control from ADR to ECU through TSC1_SDR Message active	ECU
17235	40619	31	CAN-Receive-Frame Torque / Speed control from ADR to ECU through TSC1_SDR Message passive	ECU
17236	38331	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_AR Message passive	ECU
17237	39611	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_PR Message active	ECU
17238	39867	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_PR Message passive	ECU
17239	47425	31	CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCE Message	ECU
17240	37713	31	CAN transmit error - TSC1ACCE message	ECU
17241	47937	31	CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCR Message	ECU
17242	48267	31	CAN-Receive-Frame Torque / Speed control from ADE to ECU through TSC1_ADE Message	ECU
17243	37969	31	CAN transmit error - TSC1ADE message	ECU
17244	48779	31	CAN-Receive-Frame Torque / Speed control from ADR to ECU through TSC1_SDR Message	ECU
17245	48066	31	DLC Error of CAN-Receive-Frame TSC1AE	ECU
17246	48322	31	DLC Error of CAN-Receive-Frame TSC1AR	ECU
17247	48578	31	DLC Error of CAN-Receive-Frame TSC1DE	ECU
17248	48834	31	DLC Error of CAN-Receive-Frame TSC1DR	ECU
17249	49090	31	DLC Error of CAN-Receive-Frame TSC1PE	ECU
17250	46795	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_PR Message	ECU
17251	45522	31	DLC Error of CAN-Receive-Frame TSC1TE	ECU
17252	45778	31	DLC Error of CAN-Receive-Frame TSC1TR	ECU
17253	46034	31	DLC Error of CAN-Receive-Frame TSC1VE	ECU
17254	46290	31	DLC Error of CAN-Receive-Frame TSC1VR	ECU
17255	48042	31	CAN frame error - Urea tank level sensor	ECU
17256	9521	31	Vehicle speed Controller: Vehicle speed limiter error	ECU
17257	47755	31	CAN-Receive-Frame Vehicle Dynamic Stability Control 1 (VDC1)	ECU
17258	48251	31	CAN-Receive-Frame from the Vehicle Control Module to ECU (VM2ECU)	ECU
17259	21825	31	Open Circuit on ECU powerstage	ECU
17260	34369	31	Powerstage Over temperature	ECU
17261	25409	31	Short circuit to battery for powerstage	ECU
17262	29761	31	Short circuit to ground for powerstage	ECU
17263	12609	31	Irreversible error: invalid combination of cruise control keys pressed	ECU
17264	12865	31	Reversible error: invalid combination of cruise control keys pressed	ECU
17265	20771	31	OL error on the output powerstage	ECU
17266	33827	31	Over temperature error on powerstage	ECU
17267	25123	31	Short circuit to battery on the output powerstage	ECU
17268	29475	31	Short circuit to ground on the output powerstage	ECU
17269	16674	31	Engine Compartment start and Stop Button signal check	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
17270	16930	31	Engine Compartment start and Stop Button signal check, pressed too long	ECU
17271	23671	31	Detection of short circuit to battery on the PWM output power stage for the EGR cooling bypass	ECU
17272	36215	31	Over temperature error on powerstage for EGR cooler bypass valve	ECU
17273	5175	31	Physical Range Check high for EGR Cooling Bypass Valve Actuator position sensor	ECU
17274	9527	31	Physical Range Check low for EGR Cooling Bypass Valve Actuator position sensor	ECU
17275	26167	31	EGR Cooling Bypass Valve Actuator position sensor	ECU
17276	30519	31	EGR Cooling Bypass Valve Actuator position sensor	ECU
17277	6199	31	SRC Max on EGR Cooling Bypass Valve Actuator position sensor	ECU
17278	10551	31	SRC Min on EGR Cooling Bypass Valve Actuator position sensor	ECU
17279	12663	31	Identification not possible with in reasonable time	ECU
17280	12919	31	A malfunctioning EGR cooler is detected	ECU
17281	13175	31	Fault code to indicate a defect of EGR cooler bypass valve	ECU
17282	13431	31	Fault code to indicate EGR cooler defect	ECU
17283	22823	31	EGR inducement lamp - No load error reported from Powerstage	ECU
17284	35367	31	EGR inducement lamp - Over temperature reported from Powerstage	ECU
17285	27431	31	EGR inducement lamp - short circuit to battery reported from Powerstage	ECU
17286	31783	31	EGR inducement lamp - short circuit to ground reported from Powerstage	ECU
17287	18759	31	Indication for EGR shutoff	ECU
17288	19015	31	EGR governor deviation negation error	ECU
17289	19271	31	EGR governor deviation positive error	ECU
17290	12631	31	DFC 1 for EGR plausibility	ECU
17291	12887	31	DFC 2 for EGR plausibility	ECU
17292	13143	31	DFC 3 for EGR plausibility	ECU
17293	13399	31	DFC 4 for EGR plausibility	ECU
17294	13655	31	DFC 5 for EGR plausibility	ECU
17295	13911	31	DFC 6 for EGR plausibility	ECU
17296	7991	31	EGR valve : Current limitation active	ECU
17297	12647	31	DFC for valve drift at closed position	ECU
17298	12903	31	DFC for valve drift at open position	ECU
17299	13159	31	DFC for Range drift	ECU
17300	13415	31	DFC for Cold Start	ECU
17301	5479	31	Permanent governor deviation for valve	ECU
17302	9831	31	Permanent governor deviation for valve	ECU
17303	22375	31	Open load error for powerstage	ECU
17304	6247	31	Over current error for H-bridge	ECU
17305	35175	31	Over temperature error for H-bridge	ECU
17306	27239	31	Short circuit to battery on Out1 error for H-bridge	ECU
17307	27495	31	Short circuit to battery on Out2 error for H-bridge	ECU
17308	31847	31	Short circuit to ground on Out1 error for H-bridge	ECU
17309	32103	31	Short circuit to ground on Out2 error for H-bridge	ECU
17310	7783	31	Short circuit over load error for H-bridge	ECU
17311	8039	31	Temperature dependent over current error for H-bridge	ECU
17312	8599	31	Under voltage error for H-bridge	ECU
17313	12951	31	Jammed valve of valve	ECU
17314	13207	31	Jammed valve of valve	ECU
17315	13463	31	DFC for long time valve drift at closed position	ECU
17316	13719	31	DFC for long time valve drift at open position	ECU
17317	5783	31	DFC for valve position sensor physical SRC high	ECU
17318	10135	31	DFC for valve position sensor physical SRC low	ECU
17319	14487	31	DFC for short time valve drift at closed position	ECU
17320	14743	31	DFC for short time valve drift at open position	ECU
17321	60055	31	DFC for spring break detection	ECU
17322	7063	31	DFC for valve position sensor voltage SRC high	ECU
17323	11415	31	DFC for valve position sensor voltage SRC low	ECU
17324	60823	31	DFC for temporary errors	ECU
17325	5478	31	DFC reporting error state on comparing energizing time to Max value	ECU
17326	5734	31	DFC reporting error state on comparing energizing time to Max value	ECU
17327	5990	31	DFC reporting error state on comparing energizing time to Max value	ECU
17328	6246	31	DFC reporting error state on comparing energizing time to Max value	ECU
17329	10598	31	DFC reporting error state on comparing energizing time to Min value	ECU
17330	10854	31	DFC reporting error state on comparing energizing time to Min value	ECU
17331	11110	31	DFC reporting error state on comparing energizing time to Min value	ECU
17332	11366	31	DFC reporting error state on comparing energizing time to Min value	ECU
17333	5436	31	Not reaching the setpoint of the inner loop with maximal control variable	ECU
17334	9788	31	Not reaching the setpoint of the inner loop with minimal control variable	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
17335	14140	31	Response time of inner loop	ECU
17336	14908	31	Response time of outer loop	ECU
17337	40588	31	Hydrocarbon level 2 exceeded	ECU
17338	20787	31	Fan1, Open Circuit	ECU
17339	33331	31	Fan1, Over temperature error	ECU
17340	25395	31	Fan1, Short circuit to battery	ECU
17341	19365	31	FBC is not in closed loop operation mode	ECU
17342	12929	31	Plausibility check of rear gear detection switch	ECU
17343	12673	31	Error on Neutral Position signal received via CAN message	ECU
17344	17746	31	DFC for coding error when selected coding is not working	ECU
17345	18002	31	DFC for faulty diagnostic data transmission or protocol error	ECU
17346	18258	31	DFC for coding error when different coding words were received in a coding cycle	ECU
17347	22610	31	No load error for Low Voltage System	ECU
17348	35154	31	Over temperature error on ECU powerstage for Glow plug Low Voltage System	ECU
17349	27218	31	Short circuit to battery error for Low Voltage System	ECU
17350	31570	31	Short circuit to ground error for Low Voltage System	ECU
17351	23634	31	No load error for Standard Voltage System	ECU
17352	36178	31	Over temperature error on ECU powerstage for Glow plug Standard Voltage System	ECU
17353	20050	31	Array of DFCs for failure in i+1th Glow Plug	ECU
17354	20306	31	Array of DFCs for failure in i+1th Glow Plug	ECU
17355	16738	31	Array of DFCs for failure in i+1th Glow Plug	ECU
17356	16994	31	Array of DFCs for failure in i+1th Glow Plug	ECU
17357	17250	31	Array of DFCs for failure in i+1th Glow Plug	ECU
17358	17506	31	Array of DFCs for failure in i+1th Glow Plug	ECU
17359	30050	31	Array of DFCs for short circuit in i+1th Glow Plug	ECU
17360	30306	31	Array of DFCs for short circuit in i+1th Glow Plug	ECU
17361	30562	31	Array of DFCs for short circuit in i+1th Glow Plug	ECU
17362	30818	31	Array of DFCs for short circuit in i+1th Glow Plug	ECU
17363	31074	31	Array of DFCs for short circuit in i+1th Glow Plug	ECU
17364	31330	31	Array of DFCs for short circuit in i+1th Glow Plug	ECU
17365	27490	31	Short circuit to battery error for Standard Voltage System	ECU
17366	31842	31	Short circuit to ground error for Standard Voltage System	ECU
17367	19810	31	DFC for SVS GCU faulty diagnostic glow plug or relay error	ECU
17368	61026	31	DFC for SVS GCU faulty diagnostic sticking relay error	ECU
17369	61282	31	DFC for T30 missing error in GCU-T	ECU
17370	16818	31	DFC for glow module error in GCU-T	ECU
17371	4498	31	Low-idle Speed above Limit	ECU
17372	8850	31	Low-idle Speed below Limit	ECU
17373	20802	31	Bypass Valve for cold start assistance - open load error	ECU
17374	33346	31	Bypass Valve for cold start assistance - over Temperature	ECU
17375	25410	31	Bypass Valve for cold start assistance - Short circuit to battery	ECU
17376	29762	31	Bypass Valve for cold start assistance - Short circuit to ground	ECU
17377	8614	31	MI1 injection quantity is low	ECU
17378	8870	31	MI1 energizing time is low	ECU
17379	17318	31	measured injection closing time exceeds a limit	ECU
17380	17574	31	measured injection closing time exceeds a limit	ECU
17381	17830	31	measured injection closing time exceeds a limit	ECU
17382	18086	31	measured injection closing time exceeds a limit	ECU
17383	63862	31	IMA type mismatch	ECU
17384	64118	31	IMA type mismatch	ECU
17385	64374	31	IMA type mismatch	ECU
17386	64630	31	IMA type mismatch	ECU
17387	57750	31	ECU internal failure - Injector CY33x component	ECU
17388	33650	31	Over Temperature error on the output powerstage for MIL lamp	ECU
17389	25714	31	Short circuit to battery error on the output powerstage for MIL lamp	ECU
17390	5278	31	SRC Max error for the binary lambda signal	ECU
17391	9630	31	SRC Min error for the binary lambda signal	ECU
17392	5790	31	SRC Max error for the Linear lambda signal	ECU
17393	10142	31	SRC Min error for the Linear lambda signal	ECU
17394	6302	31	Error detection and healing of MAX error of lambda plausibility test	ECU
17395	10654	31	Error detection and healing of MIN error of lambda plausibility test	ECU
17396	15928	31	Defect of Boost pressure instability Monitoring in PCR	ECU
17397	13351	31	Npl value check for EGR differential pressure	ECU
17398	5415	31	Physical Range Check high for EGR differential pressure	ECU
17399	9767	31	Physical Range Check low for EGR differential pressure	ECU
17400	5927	31	SRC High for EGR differential pressure	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
17401	10279	31	SRC low for EGR differential pressure	ECU
17402	13541	31	No valid Fuel pre-filter pressure received via CAN (Pressure == 0)	ECU
17403	12726	31	Reporting Error if Relay is stuck at closed position	ECU
17404	12982	31	Reporting Error if Relay is stuck at open position	ECU
17405	7754	31	DFC used to evaluate filter clog	ECU
17406	15978	31	Plausibility of the absolute difference between the battery voltage and power stage voltage of backflow and suction line heater	ECU
17407	16234	31	Plausibility of the absolute difference of battery voltage and the powerstage of the pressure line	ECU
17408	16026	31	Plausibility of the absolute difference between the battery voltage and power stage voltage of supply module heater	ECU
17409	21430	31	Reporting the leakage in the system during no dosing	ECU
17410	16282	31	Error in dosing valve plausibility at low voltage	ECU
17411	65210	31	Defective pressure reduction	ECU
17412	5302	31	high threshold for pressure sensor plausibility	ECU
17413	9654	31	Low threshold for pressure sensor plausibility	ECU
17414	22198	31	No load error	ECU
17415	34742	31	Over temperature error	ECU
17416	26806	31	Short circuit to battery error	ECU
17417	31158	31	Short circuit to ground error	ECU
17418	65393	31	Fuel injection is not possible - Unauthorized use	ECU
17419	19126	31	Signal error for CAN message	ECU
17420	7094	31	SRC high for Urea Pump Module Pressure Sensor	ECU
17421	11446	31	SRC low for Urea Pump Module Pressure Sensor	ECU
17422	59949	31	ECU internal: Timer error of ECU off time counter	ECU
17423	61855	31	SCR Inducement: Level 1 (Torque reduction), triggered by EGR valve blocked fault	ECU
17424	62111	31	SCR Inducement: Level 3 (creep mode), triggered by EGR valve blocked fault	ECU
17425	62367	31	SCR Inducement: Warning, triggered by EGR valve blocked fault	ECU
17426	65199	31	Inducement healing by override is locked	ECU
17427	5684	31	SRC high for air temperature sensor	ECU
17428	10036	31	SRC low for air temperature sensor	ECU
17429	62786	31	DFC is set if the cold start is detected	ECU
17430	6237	31	Physical Range Check high for ECU temperature sensor	ECU
17431	10589	31	Physical Range Check low for ECU temperature sensor	ECU
17432	5751	31	Physical Range Check high for EGR cooler downstream temperature	ECU
17433	10103	31	Physical Range Check low for EGR cooler downstream temperature	ECU
17434	6263	31	SRC high for EGR cooler downstream temperature sensor	ECU
17435	10615	31	SRC low for EGR cooler downstream temperature sensor	ECU
17436	14967	31	Diagnostic fault check for EGR cooler downstream temperature sensor	ECU
17437	6564	31	Current limited	ECU
17438	15012	31	DFC for valve drift at closed position	ECU
17439	15268	31	DFC for valve drift at open position	ECU
17440	15524	31	DFC for Range drift	ECU
17441	15780	31	Cold Start	ECU
17442	7844	31	Permanent governor deviation for valve	ECU
17443	12196	31	Permanent governor deviation for valve	ECU
17444	15796	31	Open load error for powerstage	ECU
17445	7860	31	Over current error for H-bridge	ECU
17446	36788	31	Over temperature error for H-bridge	ECU
17447	25060	31	Short circuit to battery on Out1 error for H-bridge	ECU
17448	25316	31	Short circuit to battery on Out2 error for H-bridge	ECU
17449	29668	31	Short circuit to ground on Out1 error for H-bridge	ECU
17450	29924	31	Short circuit to ground on Out2 error for H-bridge	ECU
17451	5604	31	Short circuit over load error for H-bridge	ECU
17452	5860	31	Temperature dependent over current error for H-bridge	ECU
17453	10212	31	Under voltage error for H-bridge	ECU
17454	14564	31	Jammed valve of valve	ECU
17455	14820	31	Jammed valve of valve	ECU
17456	15076	31	DFC for long time valve drift at closed position	ECU
17457	15332	31	DFC for long time valve drift at open position	ECU
17458	7396	31	DFC for valve position sensor physical SRC high	ECU
17459	11748	31	DFC for valve position sensor physical SRC low	ECU
17460	16100	31	DFC for short time valve drift at closed position	ECU
17461	16356	31	DFC for short time valve drift at open position	ECU
17462	62196	31	DFC for spring break detection	ECU
17463	61940	31	DFC for temporary errors	ECU
17464	65455	31	Status of tank level to report warning	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
17465	23990	31	Open Load error in powerstage of Urea dosing valve actuator	ECU
17466	28342	31	Short circuit to battery error in powerstage of Urea dosing valve actuator	ECU
17467	28598	31	Short circuit to battery error in highside powerstage of Urea dosing valve actuator	ECU
17468	29126	31	Short circuit to ground error in lowside powerstage of Urea dosing valve actuator	ECU
17469	29382	31	Short circuit to ground error in highside powerstage of Urea dosing valve actuator	ECU
17470	58310	31	FET error	ECU
17471	5318	31	Physical Range Check high for Urea Pressure line Heater Diagnostics	ECU
17472	5574	31	Physical Range Check high for Urea Pressure line Heater Diagnostics	ECU
17473	9926	31	Physical Range Check low for Urea Pressure line Heater Diagnostics	ECU
17474	10182	31	Physical Range Check low for Urea Pressure line Heater Diagnostics	ECU
17475	59590	31	FET error	ECU
17476	18886	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17477	6854	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17478	11206	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17479	7366	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17480	11718	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17481	7878	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17482	12230	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17483	4566	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17484	8918	31	Diagnostic Fault Check for Supply Module temperature Duty cycle in failure range	ECU
17485	21462	31	No load error on low powerstage for Urea back flow pump	ECU
17486	34006	31	Over temperature error on low powerstage for Urea back flow pump	ECU
17487	26070	31	Short circuit to battery error on low powerstage for Urea back flow pump	ECU
17488	30422	31	Short circuit to ground error on low powerstage for Urea back flow pump	ECU
17489	22486	31	No load error	ECU
17490	35030	31	Over temperature error	ECU
17491	27094	31	Short circuit to battery error	ECU
17492	31446	31	Short circuit to ground error	ECU
17493	20814	31	Open Load (reported via CAN Frame ComRx_CRI1)	ECU
17494	25166	31	Short circuit to Battery (reported via CAN frame ComRx_CRI1)	ECU
17495	29518	31	Short circuit to Ground (reported via CAN Frame ComRx_CRI1)	ECU
17496	5198	31	Concentration signal range check max (reported via CAN Frame ComRx_CRI1)	ECU
17497	9550	31	Concentration signal range check min (reported via CAN Frame ComRx_CRI1)	ECU
17498	17998	31	Sensor internal fault (via CAN Frame ComRx_CRI1)	ECU
17499	22350	31	Open circuit of the temperature sensor located in the Urea Quality sensor (reported via CAN Frame ComRx_CRI1)	ECU
17500	26702	31	Short to Battery of the temperature sensor located in the Urea Quality sensor (reported via CAN Frame ComRx_CRI1)	ECU
17501	31054	31	Short to Ground of the temperature sensor located in the Urea Quality sensor (reported via CAN Frame ComRx_CRI1)	ECU
17502	6734	31	Signal range max of the temperature sensor located in the Urea Quality sensor (reported via CAN Frame ComRx_CRI1)	ECU
17503	6990	31	Signal range min of the temperature sensor located in the Urea Quality sensor (reported via CAN Frame ComRx_CRI1)	ECU
17504	19534	31	Signal fault of the temperature sensor located in the Urea Quality sensor (reported via CAN Frame ComRx_CRI1)	ECU
17505	23786	31	No load error	ECU
17506	36330	31	Over temperature error	ECU
17507	28394	31	Short circuit to battery error	ECU
17508	32746	31	Short circuit to ground error	ECU
17509	20785	31	Vehicle Speed limitation lamp, open Circuit	ECU
17510	33329	31	Vehicle Speed limitation lamp, Over temperature of ECU Powerstage	ECU
17511	25393	31	Vehicle Speed limitation lamp, Short circuit to ground of ECU Powerstage	ECU
17512	29745	31	Vehicle Speed limitation lamp, Short circuit to battery of ECU Powerstage	ECU
17522	15830	31	Urea Tank level sensor - System Error	ECU
17524	12777	31	Hydrocarbon level 1 exceeded	ECU
17525	15911	31	EGR OBD Monitoring error	ECU
17526	62079	31	Repeated offenders is active	ECU
17527	5961	31	Regeneration ends due to time exceeded	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19001	4961	31	Battery voltage is higher than expected	ECU
19002	9313	31	Battery voltage is lower than expected	ECU
19005	38126	31	Timeout error of CAN-Transmit-Frame ECU to NH3 (ammonia) Sensor	ECU
19006	38638	31	CAN timeout error from NH3 sensor - NH3Fac message	ECU
19007	59102	31	NH3 sensor open or short in measuring cell circuit	ECU
19008	59358	31	NH3 sensor open or short in ground circuit	ECU
19009	6366	31	NH3 sensor short in heater circuit causing overheating	ECU
19010	5658	31	Downstream SCR catalyst temperature sensor voltage is higher than expected	ECU
19011	10010	31	Downstream SCR catalyst temperature sensor voltage is lower than expected	ECU
19012	59870	31	NH3 sensor open in heater circuit causing underheating	ECU
19013	60126	31	NH3 sensor open or short in temperature cell circuit	ECU
19014	60382	31	NH3 sensor open or short in trim resistor circuit	ECU
19015	19678	31	NH3 sensor heater control failure	ECU
19016	14318	31	NH3 sensor heater performance failure	ECU
19017	14574	31	NH3 sensor signal out of range failure	ECU
19018	19934	31	NH3 sensor power supply failure	ECU
19019	6682	31	Upstream SCR catalyst temperature sensor voltage is higher than expected	ECU
19020	11034	31	Upstream SCR catalyst temperature sensor voltage is lower than expected	ECU
19023	20190	31	NH3 sensor controller failure	ECU
19024	37614	31	CAN timeout error from NH3 sensor - NH3Sens message	ECU
19025	5598	31	NH3 slip detected	ECU
19036	16156	31	SCR downstream temperature sensor signal drift at cold start	ECU
19039	13356	31	Exhaust gas temperature sensors signal drift at cold start	ECU
19040	13612	31	Upstream oxidation catalyst temperature sensor comparison to a calculated temperature value failure	ECU
19041	13868	31	Upstream SCR temperature sensor comparison to a calculated temperature value failure	ECU
19042	14124	31	Downstream SCR temperature sensor comparison to a calculated temperature value failure	ECU
19043	11604	31	Intake air humidity sensor voltage is lower than expected	ECU
19045	38078	31	Timeout Error of Message from ECU to NOx downstream Sensor	ECU
19049	16014	31	Up and downstream NOx sensors swapped	ECU
19050	18318	31	Downstream NOx sensor supply voltage is out of range	ECU
19051	58478	31	Upstream NOx sensor internal failure (Heater Open Circuit Error)	ECU
19052	9582	31	Upstream NOx sensor internal failure (Heater Short Circuit Error)	ECU
19053	42606	31	Upstream NOx sensor internal failure (Heater Performance Plausibility Error)	ECU
19054	58510	31	Upstream NOx sensor internal failure (Open Circuit Error)	ECU
19059	9614	31	Upstream NOx sensor internal failure (Short Circuit Error)	ECU
19060	40558	31	CAN timeout error from upstream NOx sensor	ECU
19061	12990	31	Upstream NOx sensor lambda signal deviation - NOx sensor possible removal detected	ECU
19062	59790	31	Upstream NOx sensor values are not plausible	ECU
19063	19086	31	Upstream NOx sensor supply voltage is out of range	ECU
19064	22074	31	Open Load error of DEF/AdBlue Supply Module Heater Actuator powerstage	ECU
19066	6297	31	Upstream oxidation catalyst temperature sensor voltage is higher than expected	ECU
19067	5146	31	Downstream SCR catalyst temperature is too high	ECU
19068	9498	31	Downstream SCR catalyst temperature is too low	ECU
19069	6170	31	Upstream SCR catalyst temperature too high	ECU
19070	10522	31	Upstream SCR catalyst temperature too low	ECU
19071	11738	31	SCR catalyst efficiency lower than first NOx production threshold level	ECU
19072	7898	31	SCR catalyst efficiency lower than second NOx production threshold level	ECU
19073	25018	31	Short Circuit to Battery of DEF/AdBlue Suction Line Heater Actuator powerstage	ECU
19074	29370	31	Short Circuit to Ground of DEF/AdBlue Suction Line Heater Actuator powerstage	ECU
19075	21434	31	Open Load of DEF/AdBlue Suction Line Heater Actuator powerstage	ECU
19076	5082	31	NH3 Slip behind SCR detected	ECU
19077	13130	31	DEF/AdBlue pressure stabilization failure	ECU
19079	6730	31	DEF/AdBlue over pressure failure	ECU
19080	10570	31	DEF/AdBlue under pressure failure	ECU
19081	29050	31	DEF/AdBlue dosing valve actuator short circuit to ground in high side failure	ECU
19085	34170	31	DEF/AdBlue dosing valve ECU driver overtemperature failure	ECU
19086	15802	31	DEF/AdBlue pressure line heater failure and DEF/AdBlue tank temperature is too low	ECU
19087	36266	31	DEF/AdBlue tank temperature is not within acceptable limits	ECU
19088	14906	31	Error supply module heater plausibility	ECU
19089	15162	31	Error DEF/AdBlue supply module heater temperature sensor dynamic plausibility	ECU
19090	15418	31	Error DEF/AdBlue supply module heater temperature sensor cold start plausibility	ECU
19095	12090	31	DEF/AdBlue tank temperature sensor plausibility failure	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19103	25658	31	Short Circuit to Battery of DEF/AdBlue Supply Module Heater Actuator powerstage	ECU
19104	30010	31	Short Circuit to Ground of DEF/AdBlue Supply Module Heater Actuator powerstage	ECU
19105	34714	31	DEF/AdBlue tank heater ECU driver over temperature failure	ECU
19106	30106	31	DEF/AdBlue tank heater actuator short circuit to ground failure	ECU
19107	20826	31	DEF/AdBlue supply module pump motor open load failure	ECU
19108	24890	31	DEF/AdBlue supply module pump motor short circuit to battery failure	ECU
19111	29242	31	DEF/AdBlue supply module pump motor short circuit to ground failure	ECU
19112	9818	31	DEF/AdBlue supply module pump motor pressure is too low	ECU
19114	10410	31	DEF/AdBlue tank temperature sensor plausibility min threshold	ECU
19116	4522	31	DEF/AdBlue tank level is too high	ECU
19117	8874	31	DEF/AdBlue tank level is too low	ECU
19126	65439	31	SCR Inducement: Warning, triggered by Tampering fault	ECU
19132	17386	31	Bad Quality of DEF/AdBlue detected	ECU
19136	30066	31	Short circuit to ground error on the output powerstage for MIL lamp	ECU
19138	21106	31	Open load error on the output powerstage for MIL lamp	ECU
19140	19402	31	DEF/AdBlue concentration is out of range	ECU
19141	19658	31	DEF/AdBlue quality sensor detects diesel fuel in DEF/AdBlue tank	ECU
19143	47594	31	DLC Error of CAN-Receive-Frame CRI1, Catalyst DEF/AdBlue Information Frame	ECU
19144	39658	31	CAN timeout error from DEF/AdBlue quality sensor	ECU
19151	48106	31	CAN-Receive-Frame Catalyst DEF/AdBlue information (CRI1)	ECU
19155	13402	31	DEF/AdBlue Supply Module Pump Motor Speed Deviation	ECU
19156	13146	31	DEF/AdBlue supply module pump motor severe speed deviation	ECU
19170	19146	31	DEF/AdBlue Quality Sensor - Physical Range Check error for Conductivity	ECU
19175	7850	31	DEF/AdBlue tank level sensor indicates too high fill level	ECU
19176	12202	31	DEF/AdBlue tank level sensor indicates too low fill level	ECU
19177	13022	31	NH3 sensor temperature invalid (to low or to high)	ECU
19178	15038	31	Downstream NOx sensor has too often aborted its self-diagnosis check during afterrun	ECU
19179	7358	31	Downstream NOx sensor self-diagnosis result is higher than the limit	ECU
19180	11710	31	Downstream NOx sensor self-diagnosis result is lower than the limit	ECU
19185	13966	31	Downstream NOx Sensor Value is not within the expected range	ECU
19186	61118	31	Upstream NOx sensor has too often aborted its self-diagnosis check during afterrun	ECU
19187	4558	31	Upstream NOx sensor self-diagnosis result is higher than the limit	ECU
19188	8910	31	Upstream NOx sensor self-diagnosis result is lower than the limit	ECU
19195	4372	31	Signal range check: high error when heater is Off	ECU
19196	8724	31	Signal range check: low error when heater is Off	ECU
19197	12628	31	Plausibility check error of the first fresh air temperature sensor at cold start	ECU
19198	12884	31	Plausibility check error of the second fresh air temperature sensor at cold start	ECU
19199	13140	31	Plausibility check error of the third fresh air temperature sensor at cold start	ECU
19200	13396	31	Plausibility check error of the forth fresh air temperature sensor at cold start	ECU
19201	13652	31	Plausibility check error of the fifth fresh air temperature sensor at cold start	ECU
19202	13908	31	Error in case of more than one not plausible fresh air temperature at cold start	ECU
19203	17857	31	Implausibility between brake and accelerator pedal detected	ECU
19210	22458	31	Open Load error of DEF/AdBlue Backflow Line Heater Actuator powerstage	ECU
19216	21427	31	Open load on Blow By 3-way valve power stage output	ECU
19220	33971	31	Over temperature on Blow By 3-way valve power stage output	ECU
19221	25011	31	Short circuit to battery on Blow By 3-way valve power stage output	ECU
19222	29363	31	Short circuit to ground on Blow By 3-way valve power stage output	ECU
19225	37659	31	CAN C Bus off passive failure	ECU
19229	21716	31	Open load of powerstage of Charge Air Cooling Bypass Valve	ECU
19230	33748	31	Over temperature of powerstage of Charge Air Cooling Bypass Valve	ECU
19231	25044	31	Short circuit to battery of powerstage of Charge Air Cooling Bypass Valve	ECU
19232	29396	31	Short circuit to ground of powerstage of Charge Air Cooling Bypass Valve	ECU
19233	14436	31	Difference between measured and calculated temperature	ECU
19253	27066	31	Short Circuit to Battery of DEF/AdBlue Pressure Line heater Actuator powerstage	ECU
19255	23482	31	Open Load error of DEF/AdBlue Pressure Line Heater Actuator powerstage	ECU
19258	9235	31	Physical Range Check low for Engine coolant temperature (down stream)	ECU
19259	4723	31	Plausibility check for Thermostat, deviation between Model and engine temperature too large	ECU
19260	10771	31	Coolant pressure low failure	ECU
19261	15123	31	Coolant pressure plausibility failure	ECU
19262	25754	31	DEF/AdBlue tank heater actuator short circuit to battery failure	ECU
19264	22170	31	DEF/AdBlue tank heater actuator open load failure	ECU
19266	16739	31	Coolant level: Low coolant level	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19267	62127	31	Engine idle shutdown commanded from SCR inducement	ECU
19268	65007	31	Engine shutdown commanded to protect the engine	ECU
19269	39833	31	Timeout CAN-Transmit-Frame A1DOC (Aftertreatment / Oxidation Catalyst Intake gas Temperature)	ECU
19270	39755	31	CAN timeout error - CRI1 message	ECU
19274	39467	31	CAN timeout error - A1SCREGT (SCR catalyst upstream and downstream catalyst temperatures) message	ECU
19275	39195	31	Timeout of CAN-Transmit-Frame Acknowledgment (ACK) occurred	ECU
19277	40489	31	Timeout of CAN Frame AT1G2 (Aftertreatment / Diesel Particulate Filter Intake Gas Temperature)	ECU
19278	37931	31	Timeout of CAN frame of Intermediate gas temperature and pressure message AT1MGTO	ECU
19286	40241	31	Timeout of CAN-Receive-Frame CCSSBC, Transmitted by Body Computer	ECU
19287	40497	31	Timeout of CAN- Receiving frame CCSS form Body Computer	ECU
19290	8857	31	Downstream oxidation catalyst temperature is too low	ECU
19292	37227	31	Timeout Error of CAN-Receive-Frame CM1BC	ECU
19293	37547	31	Timeout Error of CAN-Receive-Frame	ECU
19294	47915	31	Timeout Error of Frame CNH_FT - containing Diesel particulate Filter related status information	ECU
19295	40315	31	Timeout Error of CAN-Receive-Frame CTLPTO	ECU
19296	37211	31	Timeout Error of CAN-Transmit-Frame DLCC1	ECU
19297	38763	31	Timeout Error of CAN-Receive-Frame DLCD1	ECU
19300	38585	31	Timeout Error of CAN-Transmit-Frame DPF1S	ECU
19302	40187	31	Timeout Error of CAN-Transmit-Frame DSE	ECU
19304	38363	31	Timeout Error of CAN-Receive-Frame Electronic Brake Controller (EBC1BC)	ECU
19305	39131	31	Timeout Error of CAN-Receive-Frame EBC1VS	ECU
19306	39985	31	Timeout of CAN-Receive-Frame Wheel Speed Information Frame (WSI)	ECU
19308	37675	31	Timeout Error of Frame sent to Heater control unit (HCU)	ECU
19309	38334	31	Timeout Error of Message from ECU to NOx Upstream Sensor	ECU
19310	40491	31	Timeout Error of CAN-Transmit-Frame to Soot sensor	ECU
19311	39499	31	Timeout Error of CAN-Send-Frame	ECU
19313	37179	31	CAN timeout error - EFL_P1 message (Engine fluid level/pressure)	ECU
19314	38475	31		ECU
19315	40503	31	CAN-Receive Frame Engine Gas Flow Rate (EGF1)	ECU
19316	15674	31	DEF/AdBlue supply module temperature sensor dynamic plausibility failure	ECU
19317	40007	31	CAN-Receive-Frame EGR2 to ECU	ECU
19318	40519	31	Timeout Error of CAN-Transmit-Frame EGRIndc	ECU
19319	40523	31	Timeout of CAN-Transmit-Frame Eng06a (Vehicle warning for filter clogging)	ECU
19320	40747	31	Timeout Error of CAN-Transmit-Frame Eng07	ECU
19321	40155	31	Engine Retarder Configuration BAM message	ECU
19322	40411	31	Engine Retarder Configuration packet frame	ECU
19323	38139	31	External engine shutdown request received	ECU
19324	37691	31	CAN-Transmit-Frame Engine temperature	ECU
19325	6058	31	DEF/AdBlue tank temperature sensor plausibility max threshold	ECU
19326	38731	31	Can Transmit Frame: Engine Derate Request and Engine Operate State	ECU
19327	37595	31	CAN-Receive-Frame ERC1BC (Retarder Enable - Brake Assist Switch signal)	ECU
19328	39899	31	CAN-Receive-Frame ERC1DR (Electronic Retarder Controller #1)	ECU
19329	37771	31	CAN-Receive-Frame Transmission Control 2 (ETC2)	ECU
19330	38283	31	CAN-Receive-Frame Transmission Control 7 (ETC7)	ECU
19332	40259	31	Timeout Error of CAN-Receive-Frame FDBC	ECU
19333	37947	31	CAN timeout error - FIEco message (Fuel Economy send message according to SAE J1939-71)	ECU
19334	17290	31	DEF/AdBlue dosing valve protection, defreezing active	ECU
19335	8778	31	Pressure build-up error	ECU
19336	13642	31	DEF/AdBlue general pressure check failure	ECU
19337	13386	31	DEF/AdBlue dosing system backflow line pressure too high plausibility failure	ECU
19340	38346	31	Timeout error of CAN receive frame heater control unit (HCU) Data	ECU
19341	38602	31	Timeout error of CAN receive frame heater control unit (HCU) Data	ECU
19342	39114	31	Timeout error of CAN receive frame HCUData	ECU
19345	40650	31	Timeout error of CAN receive frame HCUData	ECU
19346	49082	31	Timeout error of CAN receive frame HCUData	ECU
19347	38459	31	Timeout CAN-Transmit-Frame HRLFC, High Resolution Fuel Consumption	ECU
19348	38705	31	Timeout of CAN-Receive-Frame High Resolution Vehicle Distance (HRVD)	ECU
19349	38715	31	Timeout Error of CAN-Transmit-Frame IC1, Inlet/Exhaust condition #1 frame	ECU
19350	37755	31	Timeout Error of CAN-Receive-Frame ISCSBC	ECU
19351	40267	31	Timeout Error of CAN-Transmit-Frame ISCS	ECU
19353	38971	31	Timeout of CAN-Transmit-Frame FLC, Fuel Consumption Transmit message	ECU
19354	39227	31	Timeout of CAN-Transmit-Frame MVS, Maximum Vehicle Speed Limits	ECU
19356	16350	31	Downstream NOx sensor signal and NH3 sensor signal plausibility check failure	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19357	39278	31	CAN-Receive-Frame from NOx Sensor (NOx-Data)	ECU
19358	40046	31	CAN-Receive-Frame NOxDataUs (Upstream NOx Sensor)	ECU
19359	15294	31	Downstream NOx Sensor could not perform self-diagnosis during afterrun	ECU
19360	61374	31	Upstream NOx Sensor could not perform self-diagnosis during after run	ECU
19361	4477	31	Powerstage diagnosis could be disabled due to high Battery voltage	ECU
19362	8829	31	Powerstage diagnosis could be disabled due to low Battery voltage	ECU
19365	40316	31	CAN-Receive-Frame PRODPM1 (HCI dosing quantity, dosing request status)	ECU
19366	38817	31	CAN-Receive-Frame Engine power take off enable switch status message PTOBC	ECU
19367	39329	31	CAN-Receive-Frame PTODE ("At least one PTO engaged" signal value)	ECU
19368	39841	31	CAN-Receive-Frame PTOTx (Ambient Conditions CAN frame)	ECU
19371	37243	31	Timeout Error of CAN-Receive-Frame RESET	ECU
19374	39083	31	CAN timeout error - RxEngTemp2 (EGR exhaust gas temperature) message	ECU
19375	38779	31	Timeout Error of CAN-Receive-Frame RxSERV	ECU
19376	39473	31	Timeout of CAN-Receive-Frame Vehicle Distance (VD) message	ECU
19377	40011	31	Timeout Error of CAN-Transmit-Frame SERV	ECU
19378	39739	31	Timeout of CAN-Transmit-Frame Shut down	ECU
19380	39275	31	Timeout Error of CAN-Receive-Frame TCFG2	ECU
19381	39066	31	CAN timeout error - T11 (DEF/AdBlue Tank Information) message	ECU
19382	40251	31	Timeout of CAN-Transmit-Frame ECU2BC, ECU to Body Computer	ECU
19383	39643	31	Timeout of CAN-Transmit-Frame ERC1, Electronic Retarder Controller 1	ECU
19384	39291	31	CAN-Receive-Frame MUXINFO (IVECO proprietary message from the body computer)	ECU
19385	37841	31	Timeout CAN-Receive-Frame TimeDate	ECU
19386	37201	31	Timeout of CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCE Message active	ECU
19387	37457	31	Timeout of CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCE Message passive	ECU
19388	40257	31	Timeout of CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCR Message active	ECU
19389	40513	31	Timeout of CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCR Message passive	ECU
19390	39489	31	Timeout of CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCE Message	ECU
19391	40001	31	CAN-Receive-Frame Torque / Speed control from ACC to ECU through TSC1_ACCR Message	ECU
19392	39819	31	CAN-Receive-Frame Torque / Speed control from ADE to ECU through TSC1_ADE Message	ECU
19393	40331	31	CAN-Receive-Frame Torque / Speed control from ADR to ECU through TSC1_SDR Message	ECU
19394	38315	31	CAN timeout error - TSC1AE message (Torque/Speed control from ABS/ASR to ECU - Limp home status)	ECU
19395	40914	31	CAN timeout error - TSC1DE message (Torque/Speed control from ABS/ASR to ECU - Limp home status)	ECU
19396	38347	31	CAN-Receive-Frame Torque / Speed control from ABS / ASR to ECU through TSC1_PR Message	ECU
19397	39883	31	CAN timeout error - TSC1TE message (Limp home status)	ECU
19398	37195	31	CAN timeout error - CCV message (Reception and evaluation of cruise control vehicle speed)	ECU
19399	39995	31	CAN timeout error - DD message	ECU
19400	39387	31	Timeout of CAN-Transmit-Frame TxEBC1, Electronic Brake Controller 1	ECU
19401	37963	31	Timeout of CAN-Transmit-Frame TxTC1, CAN frame Transmission Control 1	ECU
19402	39594	31	CAN timeout error - Urea tank level	ECU
19403	38219	31	Timeout of CAN-Transmit-Frame Vehicle Power Message, VEP1, comTx_VehPow	ECU
19404	40373	31	Timeout of CAN-Transmit-Frame WFL, Water in fuel indicator message	ECU
19411	5539	31	Crankcase pressure 2 (in blow by hose) is too high	ECU
19412	9891	31	Crankcase pressure 2 (in blow by hose) is too low	ECU
19413	6051	31	Crankcase pressure sensor 2 (in blow by hose) voltage is higher than expected	ECU
19414	10403	31	Crankcase pressure Sensor 2 (in blow by hose) voltage is lower than expected	ECU
19415	64191	31	Remaining DEF/AdBlue is below the empty threshold	ECU
19416	18851	31	Blow by connection hose between Blow by valve and air duct dropped	ECU
19419	64431	31	Vehicle speed limited to low speed (US = 8km/h, Europe = 20km/h or idle)	ECU
19420	14611	31	Measured coolant temperature different to modeled coolant temperature	ECU
19421	13246	31	Downstream NOx sensor failed negative drift test monitoring	ECU
19422	17358	31	Downstream NOx sensor signal is stuck at a constant value	ECU
19423	15578	31	Upstream NOx sensor comparison to a calculated NOx value failure	ECU
19425	15898	31	Plausibility temperature monitoring with ambient or catalyst temperatures	ECU
19426	16154	31	Plausibility temperature monitoring with downstream temperature	ECU
19427	12586	31	Plausibility temperature monitoring with upstream temperature	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19428	20442	31	Time to reach DEF/AdBlue closed loop control too long	ECU
19431	16883	31	Engine compression brake high side driver circuit short to battery and low side driver circuit short to ground failure	ECU
19432	25331	31	Engine compression brake high side driver circuit short to battery failure	ECU
19433	29683	31	Engine compression brake high side driver circuit short to ground failure	ECU
19434	57965	31	ECU internal failure - EEPROM erase error	ECU
19435	58221	31	ECU internal failure - EEPROM read error	ECU
19436	58477	31	ECU internal failure - EEPROM write error	ECU
19437	14407	31	NOx Difference between upstream and calculated value	ECU
19438	19123	31	Indicates if a TMFW resonance shutoff condition is active	ECU
19439	62114	31	Indicates a shutoff condition due to an active two mass fly wheel resonance	ECU
19440	20866	31	Open load error on the PWM output power stage for the Engine Speed	ECU
19441	33410	31	Over temperature on the PWM output power stage for the Engine Speed	ECU
19443	25474	31	Short circuit to battery error on the PWM output power stage for the speed output	ECU
19444	29826	31	Short circuit to ground error on the PWM output power stage for the speed output	ECU
19445	4892	31	Fault Check for enhanced SRC-Max of third exhaust gas temperature	ECU
19446	5148	31	Fault Check for enhanced SRC-Max of Fourth exhaust gas temperature	ECU
19447	5404	31	Fault Check for enhanced SRC-Max of fifth exhaust gas temperature	ECU
19448	5660	31	Fault Check for enhanced SRC-Max of sixth exhaust gas temperature	ECU
19449	10524	31	Fault Check for enhanced SRC-Min of third exhaust gas temperature	ECU
19450	10780	31	Fault Check for enhanced SRC-Min of Fourth exhaust gas temperature	ECU
19452	11036	31	Fault Check for enhanced SRC-Min of fifth exhaust gas temperature	ECU
19453	11292	31	Fault Check for enhanced SRC-Min of sixth exhaust gas temperature	ECU
19454	4548	31	ECU internal failure - Ambient pressure too high	ECU
19455	8900	31	ECU internal failure - Ambient pressure too low	ECU
19456	15556	31	Ambient temperature plausibility failure	ECU
19457	6084	31	Ambient temperature is too high	ECU
19458	10436	31	Ambient temperature is too low	ECU
19459	59976	31	Multisignal defect in Exhaust pressure controller - monitoring	ECU
19461	6984	31	Overboost failure in engine brake mode	ECU
19462	15944	31	Turbine over speed detected	ECU
19463	16200	31	Turbine irreversible over speed detected	ECU
19481	12588	31	Fault check for cold start condition of exhaust-gas temperature sensor 3	ECU
19482	12844	31	Fault check for cold start condition of exhaust-gas temperature sensor 5	ECU
19483	13100	31	Fault check for cold start condition of exhaust-gas temperature sensor 6	ECU
19484	14380	31	Fault check for Model based plausibility check of fourth exhaust-gas temperature	ECU
19485	14636	31	Fault check for Model based plausibility check of fifth exhaust-gas temperature	ECU
19486	14892	31	Fault check for Model based plausibility check of sixth exhaust-gas temperature	ECU
19493	4373	31	Water level sensor voltage is higher than expected	ECU
19494	8725	31	Water level sensor voltage is lower than expected	ECU
19495	17173	31	Fuel in oil detected	ECU
19496	6218	31	Monitoring of over pressure	ECU
19497	21941	31	Open load error for Water in Fuel Lamp powerstage	ECU
19498	34485	31	Over temperature error, Water in Fuel Lamp powerstage	ECU
19499	26549	31	Short circuit to battery error, Water in Fuel Lamp powerstage	ECU
19500	30901	31	Short circuit to ground error, Water in Fuel Lamp powerstage	ECU
19501	6053	31	Monitoring of the upper limit of the fuel mass observer correction quantity	ECU
19502	10405	31	Monitoring of the lower limit of the fuel mass observer correction quantity	ECU
19503	15790	31	Downstream NOx Sensor: Lambda signals is invalid	ECU
19504	16046	31	Downstream NOx Sensor: NOx signals invalid	ECU
19505	15930	31	DEF/AdBlue supply module temperature sensor cold start plausibility failure	ECU
19506	18574	31	Status byte error, Sensor Temperature Not okay	ECU
19507	16302	31	Upstream NOx Sensor: Lambda signals is invalid	ECU
19508	12734	31	Upstream NOx Sensor: NOx signals invalid	ECU
19509	19342	31	Status byte error, upstream Sensor Temperature Not okay	ECU
19510	11029	31	Fuel temperature is too low	ECU
19511	22292	31	No load error for powerstage 1	ECU
19512	35092	31	Over temperature error on Powerstage 1	ECU
19513	27412	31	Short circuit to battery error for powerstage 1	ECU
19515	32020	31	Short circuit to ground error for powerstage 1	ECU
19516	6228	31	Intake air humidity is too high	ECU
19517	10580	31	Intake air humidity is too low	ECU
19519	8806	31	Injection quantity at low idle below minimum value	ECU
19523	18858	31	DEF/AdBlue tank temperature failure	ECU
19524	5546	31	DEF/AdBlue temperature sensor voltage is higher than expected	ECU
19525	9898	31	DEF/AdBlue temperature sensor voltage is lower than expected	ECU
19536	31875	31	Power supply monitoring for the NOx sensor	ECU
19537	12958	31	NOx sensor plausibility check with other sensors	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19538	13214	31	NOx feed back fault detection	ECU
19539	15006	31	Offset Min/Max error detection for NOx extended Offset value	ECU
19540	7070	31	Offset Max error detection based on the NOx Offset value	ECU
19542	11422	31	Offset Min error detection based on the NOx Offset value	ECU
19543	7582	31	NOx offset max error detection	ECU
19544	11934	31	NOx offset min error detection	ECU
19545	16286	31	Plausibility error during Rich to Lean switch over	ECU
19546	12718	31	Monitoring of NOx signal readiness	ECU
19547	4782	31	SRC Max error for the NOx signal	ECU
19548	9134	31	SRC Min error for the NOx signal	ECU
19549	21678	31	Open circuit error for the NOx signal	ECU
19551	30126	31	Short circuit error for the NOx signal	ECU
19552	6323	31	Crankcase Pressure Sensor 2 (in blow by hose) Value exceeded Tolerance Limit	ECU
19553	15758	31	Power supply monitoring for the NOx sensor	ECU
19554	13998	31	NOx sensor plausibility check with other sensors	ECU
19555	14254	31	Dynamic Monitoring of the NOx sensor	ECU
19556	14510	31	Updating DIUMPR - OBD requirement	ECU
19557	14766	31	NOx feed back fault detection	ECU
19558	4478	31	SRC Max error for the binary lambda signal	ECU
19559	61839	31	DEF/AdBlue level too low warning is active - Stage 1	ECU
19560	8830	31	SRC Min error for the binary lambda signal	ECU
19561	4990	31	SRC Max error for the Linear lambda signal	ECU
19562	9342	31	SRC Min error for the Linear lambda signal	ECU
19563	5502	31	Error detection and healing of MAX error of lambda plausibility test	ECU
19564	9854	31	Error detection and healing of MIN error of lambda plausibility test	ECU
19565	6014	31	NOx Offset Max status based on the offset learned value	ECU
19566	10366	31	NOx Offset Min status based on the offset learned value	ECU
19567	6526	31	NOx offset signal plausibility check	ECU
19568	62095	31	DEF/AdBlue level too low warning is active - Stage 2	ECU
19569	10878	31	NOx offset signal plausibility check	ECU
19570	15022	31	Plausibility error during Rich to Lean switch over	ECU
19571	15278	31	Monitoring of NOx signal readiness	ECU
19572	7038	31	SRC Max error for the NOx signal	ECU
19573	11390	31	SRC Min error for the NOx signal	ECU
19574	23934	31	Open circuit error for the NOx signal	ECU
19575	32382	31	Short circuit error for the NOx signal	ECU
19583	61951	31	Long distance with oil change warning	ECU
19584	62207	31	Too long distance with oil change warning	ECU
19585	62463	31	Low oil viscosity	ECU
19588	62719	31	Too low oil viscosity	ECU
19589	18659	31	error for critical oil dilution time is detected	ECU
19590	6627	31	Maximum Signal Error	ECU
19591	10979	31	Minimum Signal Error	ECU
19592	12755	31	Plausibility Check failed	ECU
19593	17107	31	Oil level sensor fault	ECU
19594	19427	31	ECU power stage hardware reports a "no load" error	ECU
19600	36067	31	ECU power stage hardware reports a "over temperature" error	ECU
19601	28131	31	ECU power stage hardware reports a "short circuit to battery" error	ECU
19602	32483	31	ECU power stage hardware reports a "short circuit to ground" error	ECU
19618	8889	31	The calculated conversion rate is lower than the limiting value, passive monitoring	ECU
19619	9145	31	Monitoring of the oxidation catalyst in rapid heat-up, calculated conversion rate lower than the limiting value	ECU
19621	12568	31	Ambient and Boost pressure are different at start	ECU
19625	61816	31	Over Boost Detection	ECU
19626	5432	31	Over pressure too high at P3 in Pressure charger regulator	ECU
19627	17976	31	Over boost deviation at P3 too high in Pressure charger regulator	ECU
19646	20893	31	defect fault check for open load error	ECU
19647	33437	31	defect fault check for over temperature error	ECU
19648	25501	31	defect fault check for short circuit to battery error	ECU
19650	4506	31	DEF/AdBlue tank level sensor voltage too high	ECU
19651	8858	31	DEF/AdBlue tank level sensor voltage too low	ECU
19653	18842	31	Signal error for CAN message sensor (SCR dosing system)	ECU
19655	29853	31	defect fault check for short circuit to ground error	ECU
19656	4549	31	Plausibility check: Measured fuel pressure upstream main filter is higher than the possible physical maximum in this operating point	ECU
19657	8901	31	Plausibility check: Measured fuel pressure upstream main filter is less than the possible physical minimum in this operating point	ECU
19661	13253	31	No valid Fuel filter pressure received via CAN (Pressure == 0)	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19662	5317	31	Fuel pressure sensor voltage is higher than expected	ECU
19663	9669	31	Fuel pressure sensor voltage is lower than expected	ECU
19664	6500	31	Intake manifold pressure is too high	ECU
19665	10852	31	Intake manifold pressure is too low	ECU
19666	17733	31	Quantity balance check if a successful PRV opening is ensured	ECU
19667	20981	31	ECU Powerstage for pre-supply pump: open load of output	ECU
19668	33525	31	ECU Powerstage for pre-supply pump: Over temperature error	ECU
19669	25589	31	ECU Powerstage for pre-supply pump: short circuit to battery	ECU
19670	29941	31	ECU Powerstage for pre-supply pump: short circuit to ground	ECU
19671	12632	31	Plausibility defect between Turbine downstream pressure sensor and environmental pressure	ECU
19672	4696	31	Turbine downstream pressure is too high	ECU
19673	9048	31	Turbine downstream pressure is too low	ECU
19674	13400	31	Turbine downstream pressure sensor comparison to modeled pressure failure	ECU
19675	5464	31	Exhaust gas pressure is too high	ECU
19677	40388	31	CAN timeout error - Ambient conditions (ambient pressure and environmental air temp) message	ECU
19680	9816	31	Exhaust gas pressure is too low	ECU
19682	14933	31	Threshold of the battery undervoltage for switching to start with MeUn procedure	ECU
19683	63637	31	Rail pressure reduction by blank shots during after run aborted	ECU
19690	6213	31	Sum failure for Fuel system - negative rail pressure (pressure too high)	ECU
19691	10565	31	Sum failure for Fuel system - positive rail pressure (pressure too low)	ECU
19692	6725	31	Sum failure for Fuel system - MeUn negative rail pressure (pressure too high)	ECU
19693	11077	31	Sum failure for Fuel system - MeUn positive rail pressure (pressure too high)	ECU
19697	7237	31	Sum failure for Fuel system - PCV negative rail pressure (pressure too high)	ECU
19698	11589	31	Sum failure for Fuel system - PCV positive rail pressure (pressure too high)	ECU
19707	7749	31	Sum failure for Fuel system - positive correction value of the adaption of the metering unit	ECU
19709	5733	31	maximum negative rail pressure deviation with metering unit on lower limit is exceeded (second stage)	ECU
19710	6501	31	maximum rail pressure exceeded (second stage)	ECU
19711	6757	31	positive deviation of rail pressure under fast condition exceeded	ECU
19713	7525	31	maximum rail pressure exceeded - overrun detection	ECU
19714	7781	31	maximum positive deviation of rail pressure exceeded for tank lo detection	ECU
19715	8037	31	maximum positive deviation of rail pressure exceeded concerning set flow of fuel for tank lo detection	ECU
19716	4469	31	leakage is detected based on fuel quantity balance (tank low condition)	ECU
19717	4725	31	maximum negative rail pressure deviation with metering unit on lower limit is exceeded	ECU
19718	4981	31	maximum negative rail pressure deviation with metering unit on lower limit is exceeded (second stage)	ECU
19719	5237	31	minimum rail pressure exceeded for tank lo detection	ECU
19720	5493	31	Maximum rail pressure exceeded	ECU
19726	5749	31	maximum rail pressure exceeded (second stage)	ECU
19727	6005	31	positive deviation of rail pressure under fast condition exceeded for tank lo detection	ECU
19728	14453	31	setpoint of metering unit in overrun mode not plausible	ECU
19729	14709	31	setpoint of metering unit in idle mode not plausible (tank low condition)	ECU
19731	6773	31	maximum rail pressure exceeded - overrun detection	ECU
19748	33594	31	DEF/AdBlue supply module pump motor ECU driver over temperature failure	ECU
19752	7813	31	maximum rail pressure exceeded	ECU
19759	62607	31	Warning for level of reducing agent stage 4	ECU
19768	4378	31	SCR catalyst upstream temperature sensor plausibility max threshold	ECU
19769	8730	31	SCR catalyst upstream temperature sensor plausibility min threshold	ECU
19770	13082	31	SCR catalyst upstream temperature sensor static plausibility	ECU
19777	14830	31	NH3 and NO2 signal from Ammonia sensor are not valid	ECU
19778	7714	31	Maximum engine starts reached	ECU
19779	59469	31	Irregular switch off or reset of ECU without completely shutdown - not repairable	ECU
19780	61887	31	Customer Hard Inducement: Level 1 (Torque reduction), triggered by SCR system related fault	ECU
19781	62399	31	Customer Hard Inducement: Level 3 (Creep mode), triggered by SCR system related fault	ECU
19782	62655	31	SCR Inducement: Warning, triggered by Customer Hard fault	ECU
19783	62911	31	Customer Moderate Inducement: Level 1 (Torque reduction), triggered by fault	ECU
19785	63423	31	Customer Moderate Inducement: Level 3 (Creep mode), triggered by fault	ECU
19786	63679	31	SCR Inducement: Warning, triggered by Customer Moderate fault	ECU
19787	62623	31	SCR Inducement: Level 1 (Torque reduction), triggered by DEF/AdBlue dosing interruption fault	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19788	62879	31	SCR Inducement: Level 3 (creep mode), triggered by DEF/AdBlue dosing interruption fault	ECU
19789	63135	31	SCR Inducement: Warning, triggered by DEF/AdBlue dosing interruption fault	ECU
19790	64703	31	Level 1 warning is active due to Low DEF/AdBlue Level	ECU
19791	64959	31	Level 3 warning is active due to Low DEF/AdBlue Level	ECU
19792	64687	31	Inducement Level 3 is active due to Low DEF/AdBlue Level	ECU
19794	63391	31	SCR Inducement: Level 1 (Torque reduction), triggered by DEF/AdBlue Consumption fault	ECU
19795	63647	31	SCR Inducement: Level 3 (creep mode), triggered by DEF/AdBlue Consumption fault	ECU
19796	63903	31	SCR Inducement: Warning, triggered by DEF/AdBlue Consumption fault	ECU
19797	64159	31	SCR Inducement: Level 1 (Torque reduction), triggered by DEF/AdBlue quality fault	ECU
19798	64415	31	SCR Inducement: Level 3 (creep mode), triggered by DEF/AdBlue Quality fault	ECU
19799	64671	31	SCR Inducement: Warning, triggered by DEF/AdBlue Quality fault	ECU
19800	64927	31	SCR Inducement: Level 1 (Torque reduction), triggered by Tampering fault	ECU
19801	65183	31	SCR Inducement: Level 3 (creep mode), triggered by Tampering fault	ECU
19809	63935	31	Diagnosis validation is active	ECU
19810	4452	31	Physical Range Check high for Charged Air cooler down stream temperature	ECU
19811	8804	31	Physical Range Check low for Charged Air cooler down stream temperature	ECU
19812	17252	31	Signal error for Charge air cooler downstream Temperature	ECU
19814	9572	31	SRC low for Charge air cooler downstream Temperature	ECU
19815	13924	31	Diagnostic fault check for charged air cooler downstream temperature sensor	ECU
19816	64557	31	Indicates that Thermal Management is active	ECU
19817	14202	31	DEF/AdBlue dosing valve is blocked	ECU
19819	6957	31	Indicates that ECU temperature has exceeded the maximum limit	ECU
19820	37329	31	The external clock via CAN is failure (TimeDate)	ECU
19821	13009	31	The time received via CAN (TimeDate) is lower than ECU absolute time	ECU
19823	4468	31	Intake manifold temperature is too high	ECU
19824	8820	31	Intake manifold temperature is too low	ECU
19825	4505	31	Downstream oxidation catalyst temperature is too high	ECU
19826	5017	31	Downstream oxidation catalyst temperature sensor voltage is higher than expected	ECU
19827	5785	31	Upstream oxidation catalyst temperature is too high	ECU
19828	10137	31	Upstream oxidation catalyst temperature is too low	ECU
19829	4424	31	Upper SRC limit for the current through the turbo charger actuator	ECU
19830	8776	31	Lower SRC limit for the current through the turbo charger actuator	ECU
19831	6456	31	Turbo over speed failure under high ambient pressure conditions	ECU
19835	21608	31	Open load temperature error on the Turbocharger PWM output powerstage	ECU
19836	33640	31	Over temperature error on the Turbocharger PWM output powerstage	ECU
19837	24936	31	SCB error on the Turbocharger PWM output powerstage	ECU
19838	29288	31	SCG error on the Turbocharger PWM output powerstage	ECU
19841	37275	31	CAN timeout error for TSC1 for ABS/ASR torque and/or speed request to ECU	ECU
19842	37531	31	CAN timeout error for TSC1 of DriveLine Retarder torque and/or speed request to ECU	ECU
19843	37787	31	CAN timeout error for TSC1 of GearBox/Vehicle management torque and/or speed request to ECU	ECU
19844	38043	31	CAN timeout error for TSC1 Body computer/Vehicle management (Torque request to Retarder - ECU makes retarder function)	ECU
19845	38299	31	CAN timeout error for TSC1 AD management (Torque request to Retarder - ECU makes retarder function)	ECU
19846	38555	31	CAN timeout error for TSC1 for active cruise control management (Torque request to Retarder - ECU makes retarder function)	ECU
19847	38811	31	CAN timeout error for TSC1 PTO/Vehicle management torque and/or speed request to ECU	ECU
19848	39067	31	CAN timeout error for TSC1 of GearBox/Vehicle management torque and/or speed request to ECU	ECU
19849	39323	31	CAN timeout error for TSC1 Body computer/Vehicle management torque and/or speed request to ECU	ECU
19850	39579	31	CAN timeout error for TSC1 of AD management torque and/or speed request to ECU	ECU
19851	39835	31	CAN timeout error for TSC1 for active cruise control management torque and/or speed request to ECU	ECU
19852	40091	31	CAN timeout error for TSC1 for ABS/ASR (Torque request to Retarder - ECU makes retarder function)	ECU
19853	40347	31	CAN timeout error for TSC1 of DriveLine Retarder (Torque request to Retarder - ECU makes retarder function)	ECU
19854	40603	31	CAN timeout error for TSC1 of PTO/Vehicle management (Torque request to Retarder - ECU makes retarder function)	ECU
19855	14664	31	Plausibility failure for turbine upstream temperature sensor	ECU

8 - TROUBLESHOOTING

DTC	SPN	FMI	Fault description	Detected by
19856	5448	31	Physical Range Check high for turbine upstream temperature sensor	ECU
19857	9800	31	Physical Range Check low for turbine upstream temperature sensor	ECU
19858	5960	31	SRC High for turbine upstream temperature sensor	ECU
19859	10312	31	SRC low for turbine upstream temperature sensor	ECU
19860	19738	31	Signal error for CAN message downstream temperature sensor	ECU
19861	19482	31	Signal error for CAN message for upstream temperature sensor	ECU
19862	59498	31	Power stage error in HCU for DEF/AdBlue Back flow line Heater	ECU
19863	6762	31	PRC high for DEF/AdBlue Backflow Line Heater (via HCU)	ECU
19864	11114	31	PRC low for DEF/AdBlue Backflow Line Heater (via HCU)	ECU
19865	26042	31	Short Circuit to Battery of DEF/AdBlue Backflow Line Heater Actuator powerstage	ECU
19866	26298	31	Short Circuit to Ground of DEF/AdBlue Backflow Line Heater Actuator powerstage	ECU
19867	7274	31	PRC high for Voltage at DEF/AdBlue Backflow Line Heater (via HCU)	ECU
19868	11626	31	PRC low for Voltage at DEF/AdBlue Backflow Line Heater (via HCU)	ECU
19870	31418	31	Short Circuit to Ground of DEF/AdBlue Pressure Line Heater Actuator powerstage	ECU
19872	59754	31	Power stage error in HCU for DEF/AdBlue Supply Module Heater	ECU
19873	7034	31	PRC high for Current at DEF/AdBlue Supply module Heater (via HCU)	ECU
19874	11386	31	PRC low for Current at DEF/AdBlue Supply module Heater (via HCU)	ECU
19875	7546	31	PRC high for voltage at DEF/AdBlue Supply module Heater (via HCU)	ECU
19876	11898	31	PRC low for voltage at DEF/AdBlue Supply module Heater (via HCU)	ECU
19877	5466	31	DEF/AdBlue supply module pump motor pressure is too high	ECU
19879	20346	31	Heater control unit reports missing voltage at Terminal 30	ECU
19880	60554	31	Heater control unit detected error with Non Volatile Memory (NVM) - internal system failure	ECU
19881	60810	31	Heater control unit detected an over temperature error - internal system failure	ECU
19882	61066	31	Heater control unit detected an overvoltage error - internal system failure	ECU
19883	61322	31	Heater control unit detected an under voltage error - internal system failure	ECU
19885	5034	31	DEF/AdBlue tank temperature is too high	ECU
19886	9386	31	DEF/AdBlue tank temperature is too low	ECU
19887	17377	31	Signal error for cardan speed over CAN	ECU
19888	17633	31	CAN vehicle speed source and HRWS replacement defect	ECU
19889	17889	31	Vehicle speed CAN message not received	ECU
19890	18145	31	Maximum threshold error for vehicle speed	ECU
19891	10721	31	Vehicle speed is too low	ECU
19892	15073	31	Plausibility defect for vehicle speed	ECU

9 - SPECIFICATIONS

Fluids and lubricants

Fuel tank

Capacity	96.5 L (25.5 US gal)
Specifications	#2 Diesel ultra-low sulfur

Cooling system

Capacity	19.0 L (5.0 US gal)
Specifications	EXTENDED LIFE OAT COOLANT/ANTIFREEZE

Hydraulic system

Reservoir capacity	22.7 L (6.0 US gal)
System capacity:	45.4 L (12.0 US gal)
Specifications	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

Chain compartments

Capacity - each side	
SR270B, SV340B	22.2 L (23.5 US qt)
Specifications	PREMIUM HYDRAULIC OIL HV68 MULTI-GRADE AW

Grease fittings

Quantity	As required
Specifications	MULTI-PURPOSE MOLY GREASE EP / AW / NLGI 2 (Molydisulfide)

Engine crank case oil

Capacity - with filter change	8.5 L (9.0 US qt)
Specifications	NO.1 ENGINE™ OIL SBL CJ-4

Final track drive

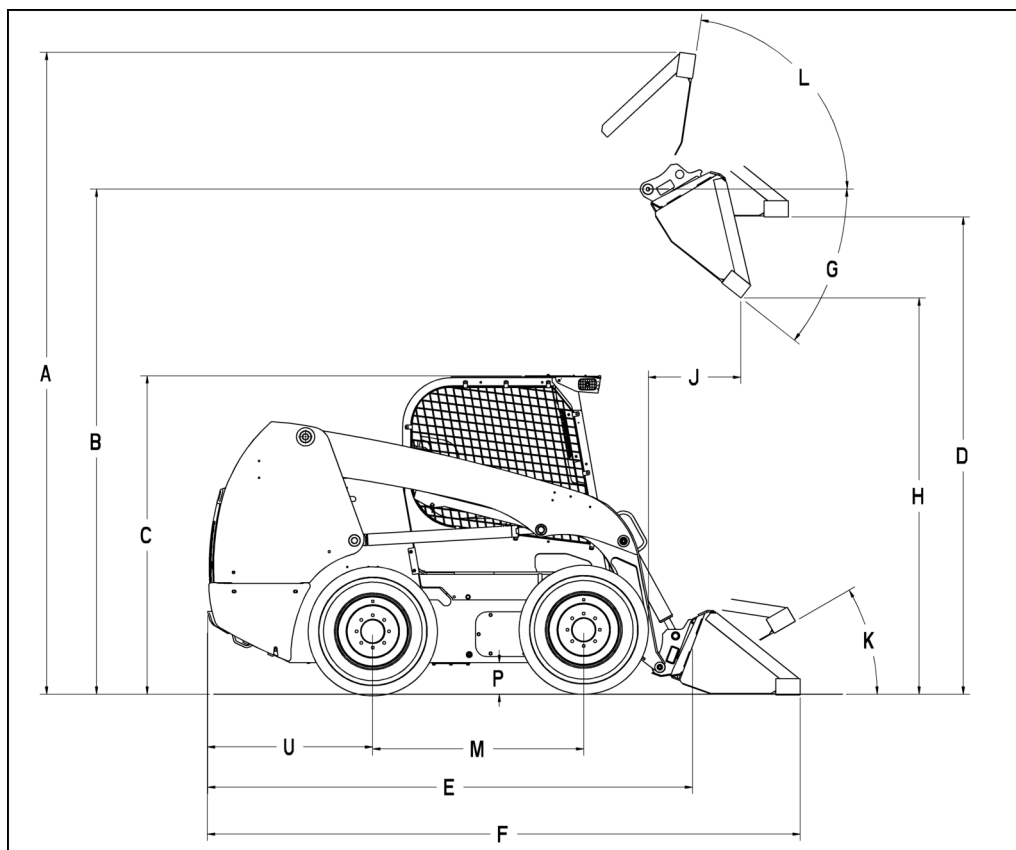
Capacity - each side	
TR340B, TV450B	1.0 L (1.06 US qt) +/- 0.1 L (0.1 US qt)
Specifications	HYPOID GEAR OIL EP SAE 80W-90

Emissions fluid

Reservoir capacity	10.7 L (2.8 US gal)
DEF/AdBLUE® low volume indicator	2.4 L (0.6 US gal)
Specifications	DEF/AdBLUE®

General specification

NOTE: All specifications are given according to SAE standards or recommended practices where the specification applies.

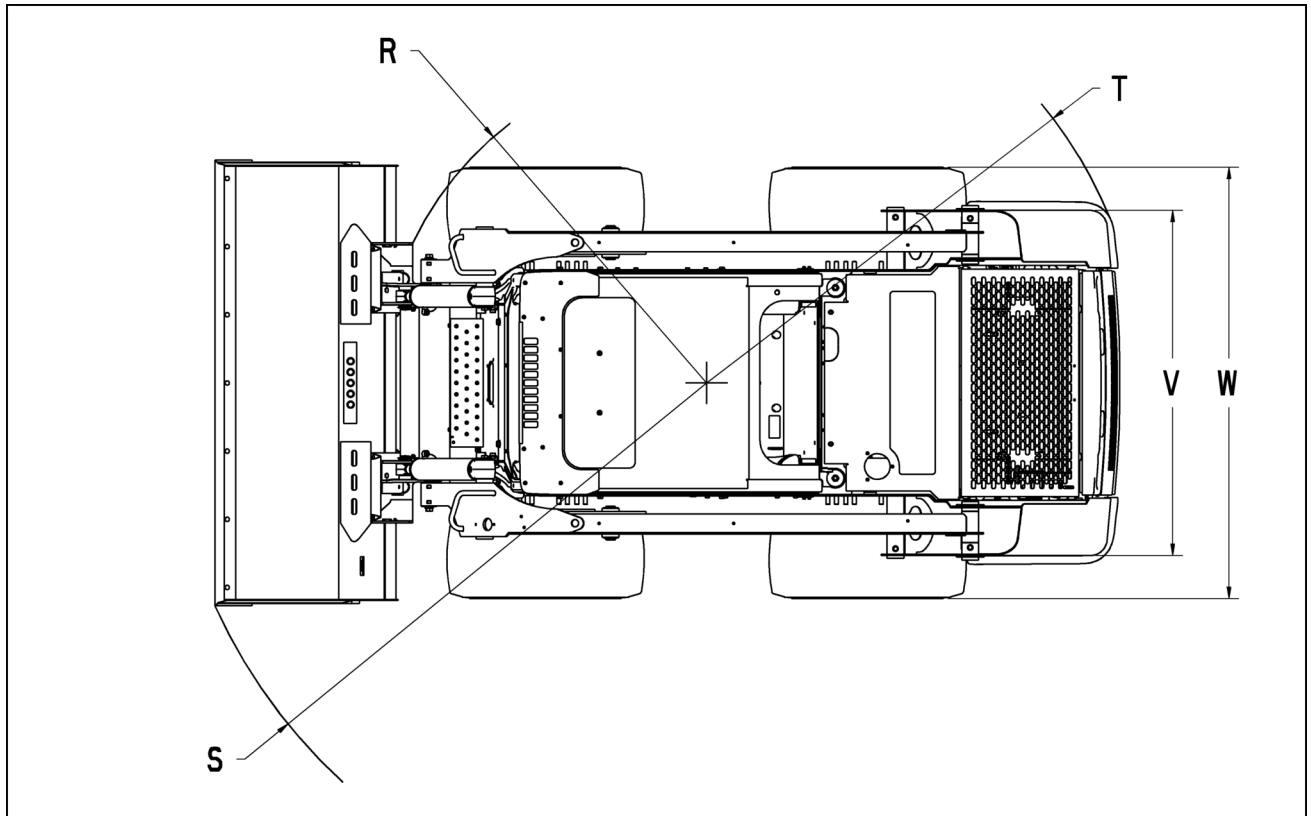


63109372 1

LARGE RADIAL FRAME WHEEL UNITS (SR270B)

ITEM	COMPONENT	MEASUREMENT
A	Overall Operating Height (Fully Raised)	4075 mm (160.4 in)
B	Height to Hinge Pin (Fully Raised)	3178 mm (125.1 in)
C	Cab Height	2004 mm (78.9 in)
D	Highest Level Bucket Height	3002 mm (118.2 in)
E	Overall Length (No Attachment)	3017 mm (118.8 in)
F	Overall Length (With standard Bucket)	3758 mm (148.0 in)
G	Dump Angle (Fully Raised)	38.1°
H	Dump Height (Maximum Reach)	2497 mm (98.3 in)
J	Dump Reach (Fully Raised)	564 mm (22.2 in)
K	Maximum Rollback @ Ground	30.8°
L	Maximum Rollback (Fully Raised)	99.8°
M	Wheel Base	1322 mm (52 in)
P	Ground Clearance (Belly Pan)	204 mm (8.0 in)
Q	Angle of Departure	23.5°
U	Rear Axle to Bumper	1078 mm (42.4 in)

NOTE: Measurements are based on machines with 12 x 16.5 tires and a 1829 mm (72 in) Low Profile (LP) bucket.



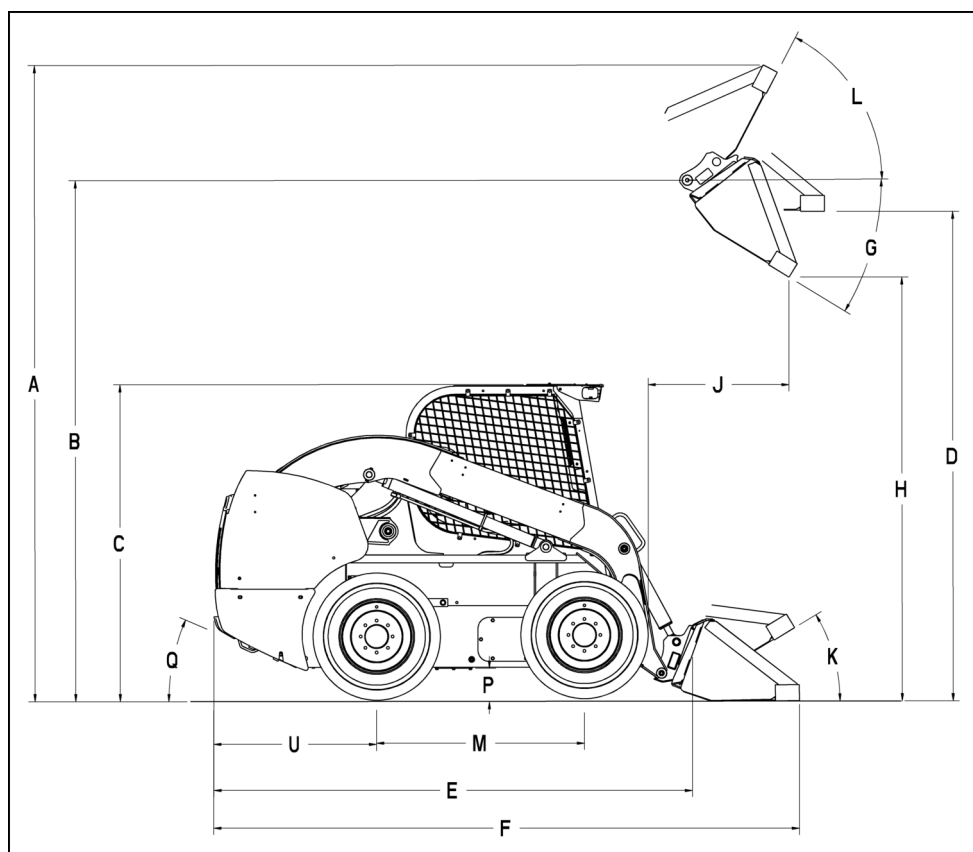
63109375 2

LARGE RADIAL FRAME WHEEL UNITS (SR270B)

ITEM	COMPONENT	MEASUREMENT
R	Loader arm clearance circle (no attachment)	1365 mm (53.7 in)
S	Clearance circle with standard bucket	2216 mm (87.2 in)
T	Clearance circle rear	1808 mm (71.2 in)
V	Over the tire width	1448 mm (57.0 in)
W	Overall width	1773 mm (69.8 in)
Operating weight		3682 kg (8117 lb)
SAE Rated Operating Capacity (ROC)		1225 kg (2399.0 lb)
Tipping load		2450 kg (5401 lb)
Counter weight (optional)		273 kg (602 lb)
Cab side glass (optional)		21.3 kg (47.0 lb)
Cab glass door (optional)		34 kg (75.0 lb)
Cab Lexan door (optional)		33.6 kg (74.1 lb)
Suspension seat (optional)		10.0 kg (22.0 lb)

NOTE: Measurements are based on machines with 12 x 16.5 tires and a 1829 mm (72 in) Low Profile (LP) bucket.

9 - SPECIFICATIONS

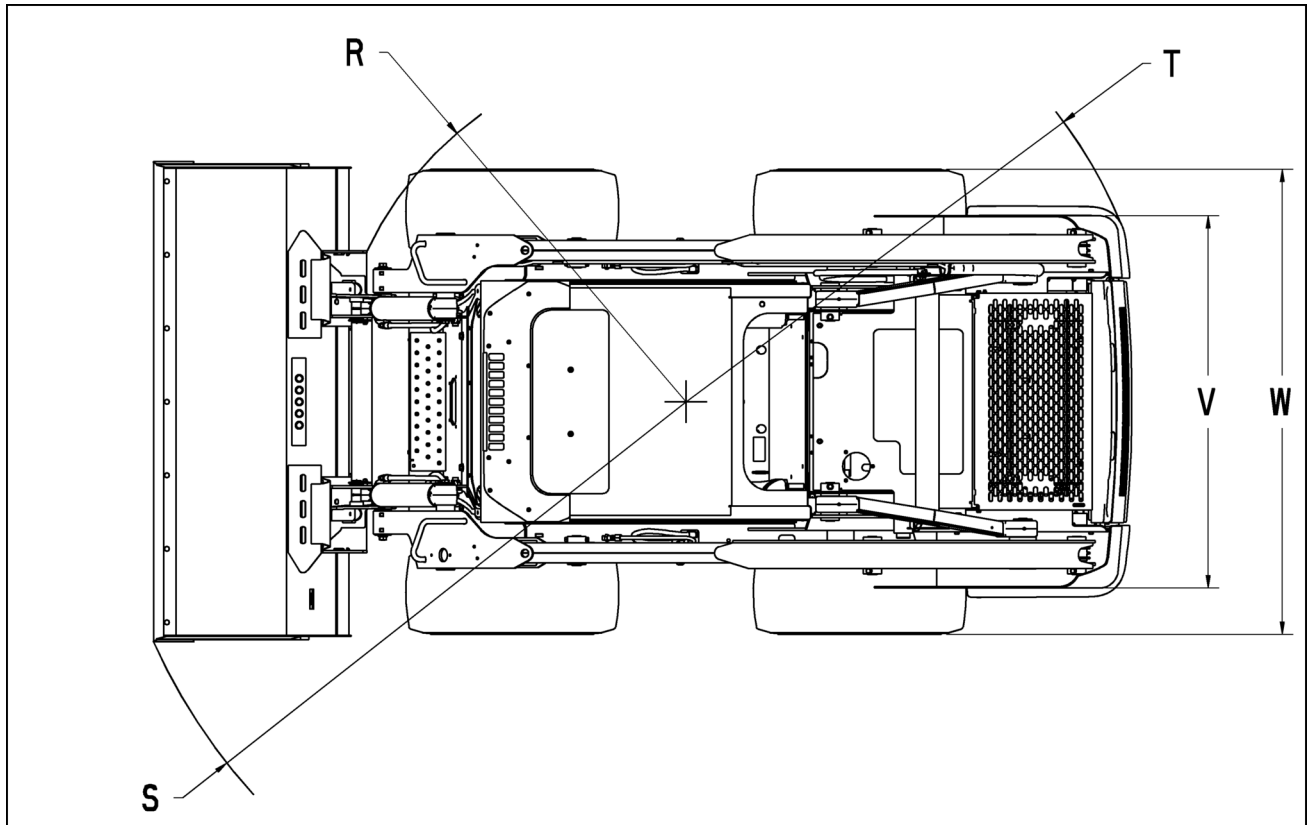


931002271 3

LARGE VERTICAL FRAME WHEEL UNIT (SV340B)

ITEM	COMPONENT	MEASUREMENT
A	Overall Operating Height (Fully Raised)	4221 mm (166.2 in)
B	Height to Hinge Pin (Fully Raised)	3343 mm (131.6 in)
C	Cab Height	2044 mm (80.5 in)
D	Highest Level Bucket Height	3168 mm (124.7 in)
E	Overall Length (No Attachment)	3025 mm (119.1 in)
F	Overall Length (With standard Bucket)	3773 mm (148.5 in)
G	Dump Angle (Fully Raised)	46.7°
H	Dump Height (Maximum Reach)	2594 mm (102.1 in)
J	Dump Reach (Fully Raised)	691 mm (27.2 in)
K	Maximum Rollback @ Ground	34.9°
L	Maximum Rollback (Fully Raised)	86.2°
M	Wheel Base	1322 mm (52 in)
P	Ground Clearance (Belly Pan)	244 mm (9.6 in)
Q	Angle of Departure	26.5°
U	Rear Axle to Bumper	1078 mm (42.4 in)

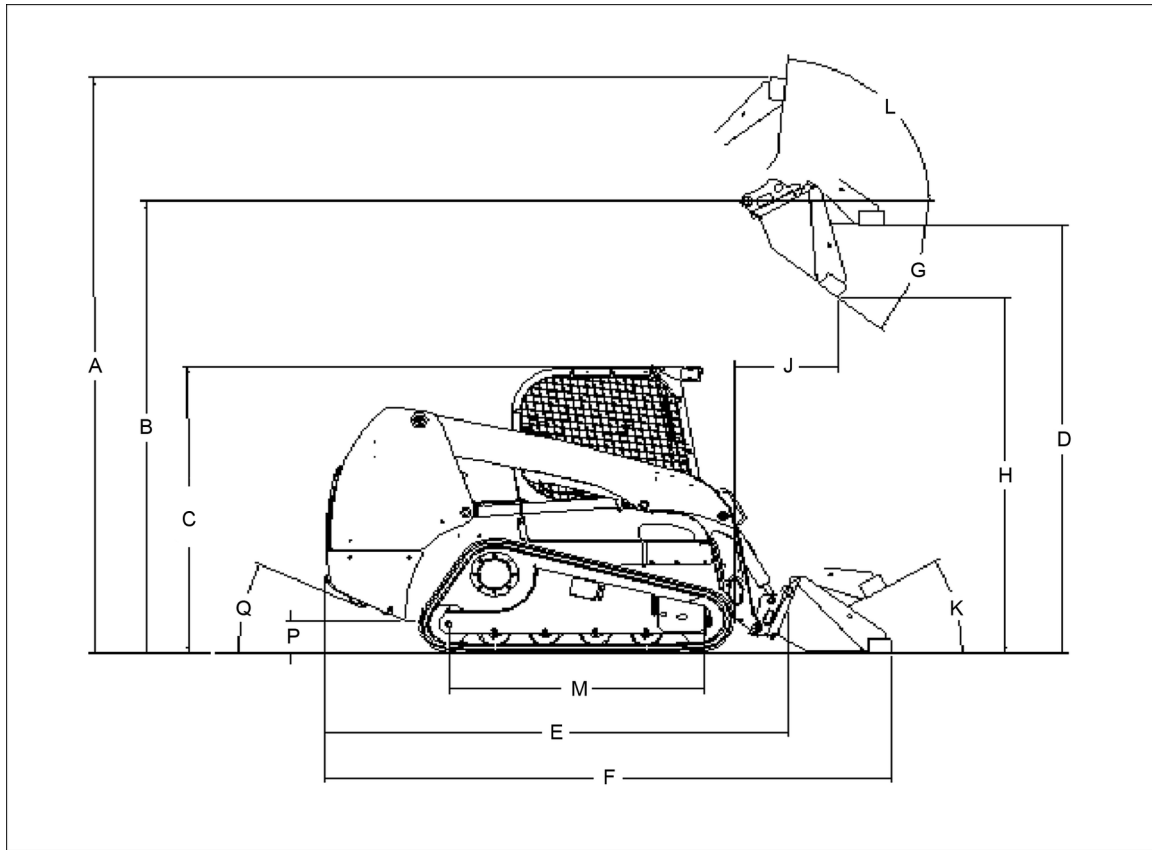
NOTE: Measurements are based on machines with 14 x 17.5 tires and a 1981 mm (78 in) Heavy Duty (HD) bucket.



931002272 4

LARGE VERTICAL FRAME WHEEL UNIT (SV340B)

ITEM	COMPONENT	MEASUREMENT
R	Loader arm clearance circle (no attachment)	1432 mm (56.4 in)
S	Clearance circle with standard bucket	2262 mm (89.1 in)
T	Clearance circle rear	1808 mm (71.2 in)
V	Tread width	1529 mm (60.2 in)
W	Overall width	1875 mm (73.8 in)
Operating weight		4128 kg (9100 lb)
SAE Rated Operating Capacity (ROC)		1545 kg (3406 lb)
Tipping load		3091 kg (6814 lb)
Counter weight (optional)		136.0 kg (299.8 lb)
Cab side glass (optional)		21.3 kg (47.0 lb)
Cab glass door (optional)		34 kg (75.0 lb)
Cab Lexan door (optional)		33.6 kg (74.1 lb)
Suspension seat (optional)		10.0 kg (22.0 lb)
NOTE: Measurements are based on machines with 14 x 17.5 tires and a 1981 mm (78 in) Heavy Duty (HD) bucket.		

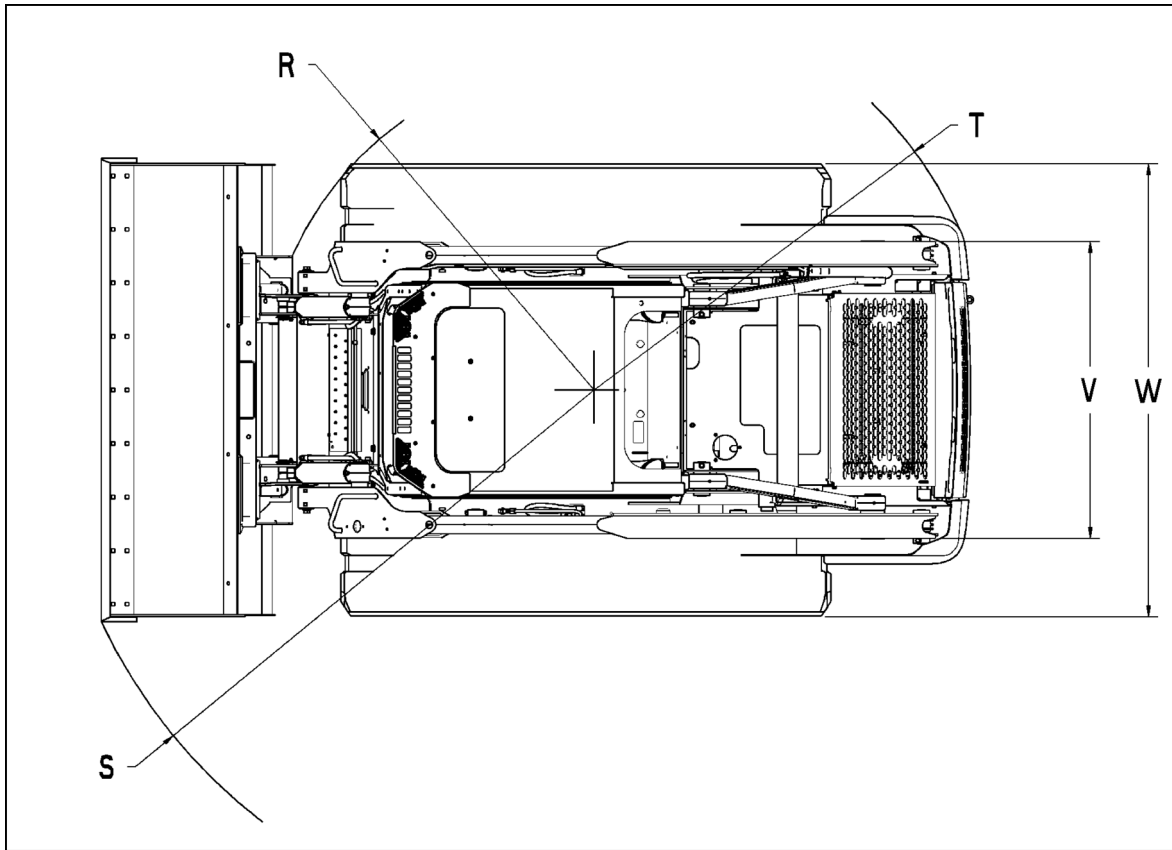


RAIL18SSL0056FA 5

LARGE RADIAL FRAME TRACK UNITS (TR340B)

LOCATION	COMPONENT	MEASUREMENT
A	Overall Operating Height (Fully Raised)	3993 mm (157.2 in)
B	Height to Hinge Pin (Fully Raised)	3218 mm (126.7 in)
C	Cab Height	2044 mm (80.5 in)
D	Highest Level Bucket Height	3016 mm (118.7 in)
E	Overall Length (No Attachment)	3003 mm (118.2 in)
F	Overall Length (With standard Bucket)	3622 mm (142.6 in)
G	Dump Angle (Fully Raised)	38.1°
H	Dump Height (Maximum Reach)	2596 mm (102.2 in)
J	Dump Reach (Fully Raised)	540 mm (21.3 in)
K	Maximum Rollback at Ground	30.6°
L	Maximum Rollback (Fully Raised)	100°
P	Ground Clearance (Belly Pan)	244 mm (9.6 in)
Q	Angle of Departure	32°

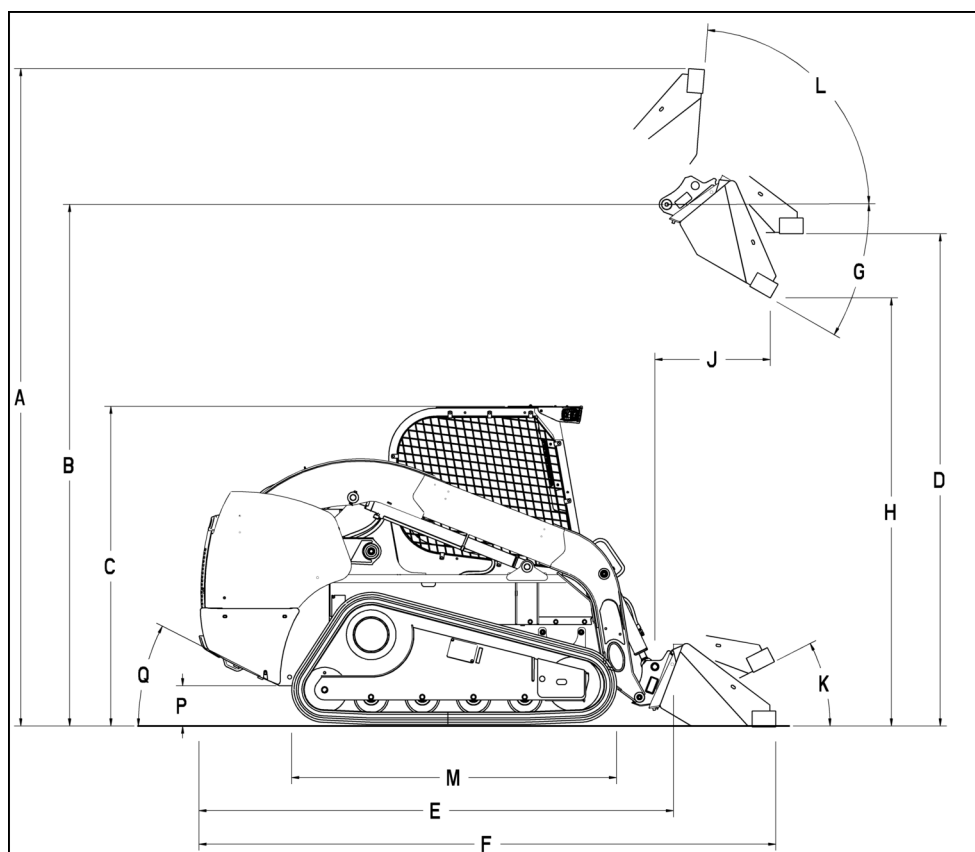
NOTE: All measurements are based on machines with a 1981.2 mm (78.0 in) Dirt & Foundry (DF) bucket.



RAIL14SSL0431FA 6

LARGE RADIAL FRAME TRACK UNITS (TR340B)

ITEM	COMPONENT	MEASUREMENT
R	Loader arm clearance circle (no attachment)	1418 mm (55.8 in)
S	Clearance circle with standard bucket	2189 mm (86.2 in)
T	Clearance circle rear	1742 mm (68.6 in)
V	Over the track width	1488 mm (58.6 in)
W	Overall width	1943 mm (76.5 in)
Operating weight		4536 kg (10000 lb)
SAE Rated Operating Capacity (ROC)		
	35% of tipping load	1079 kg (2379 lb)
	50% of tipping load	1542 kg (3400 lb)
Tipping load		3084 kg (6799 lb)
Counter weight (optional)		273.0 kg (601.9 lb)
Cab side glass (optional)		21.3 kg (47.0 lb)
Cab glass door (optional)		34 kg (75.0 lb)
Cab Lexan door (optional)		33.6 kg (74.1 lb)
Suspension seat (optional)		10.0 kg (22.0 lb)
NOTE: All measurements are based on machines with a 1981.2 mm (78.0 in) Dirt & Foundry (DF) bucket.		

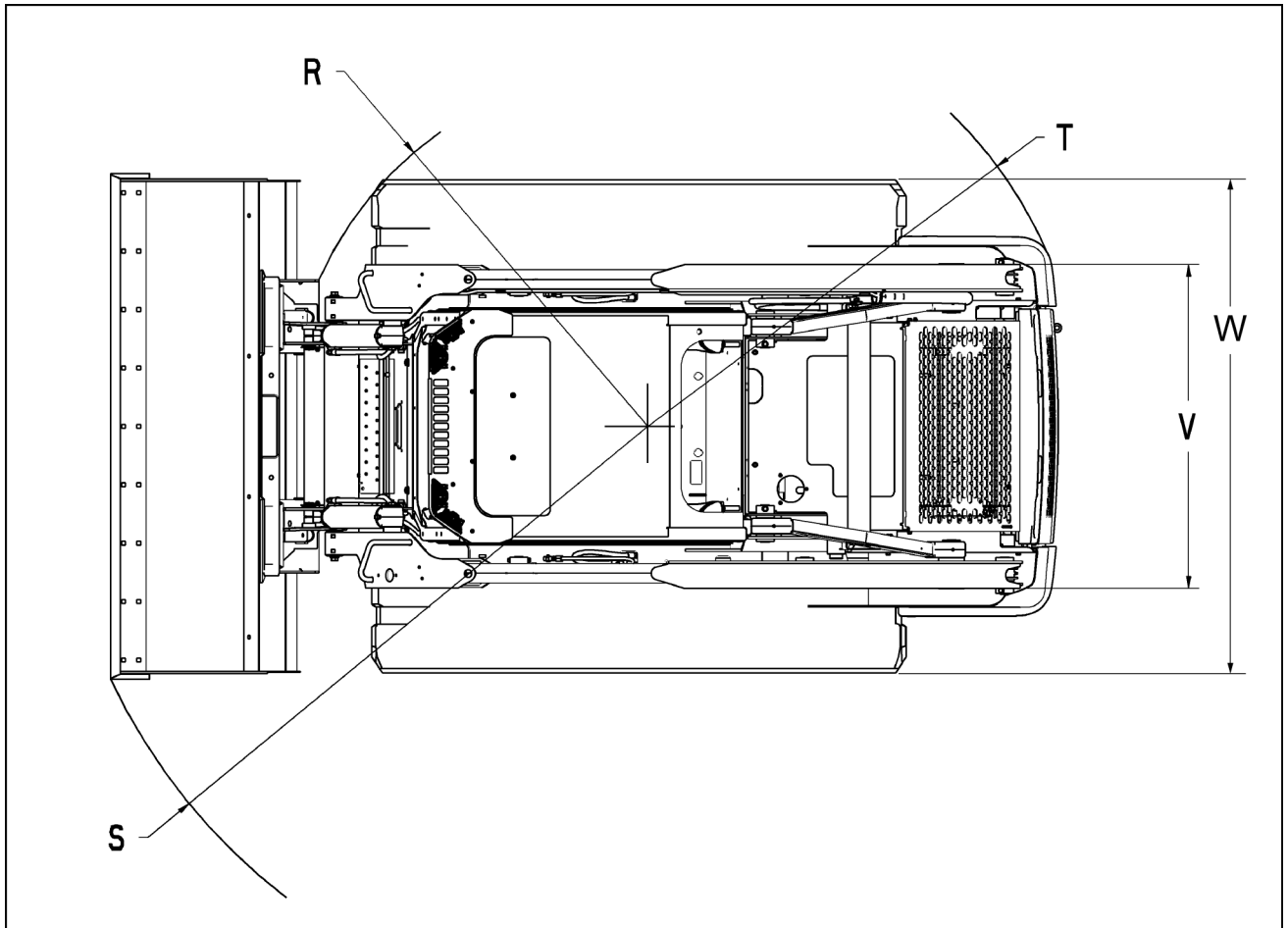


63109363 7

LARGE VERTICAL FRAME TRACK UNITS (TV450B)

LOCATION	COMPONENT	MEASUREMENT
A	Overall Operating Height (Fully Raised)	4207 mm (165.6 in)
B	Height to Hinge Pin (Fully Raised)	3344 mm (131.7 in)
C	Cab Height	2044 mm (80.5 in)
D	Highest Level Bucket Height	3129 mm (123.2 in)
E	Overall Length (No Attachment)	3050 mm (120.1 in)
F	Overall Length (With std Bucket)	3775 mm (148.6 in)
G	Dump Angle (Fully Raised)	45.3°
H	Dump Height (Maximum Reach)	2568 mm (101.1 in)
J	Dump Reach (Fully Raised)	802 mm (31.6 in)
K	Maximum Rollback at Ground	32.0°
L	Maximum Rollback (Fully Raised)	83.1°
P	Ground Clearance (Belly Pan)	244 mm (9.6 in)
Q	Angle of Departure	32°

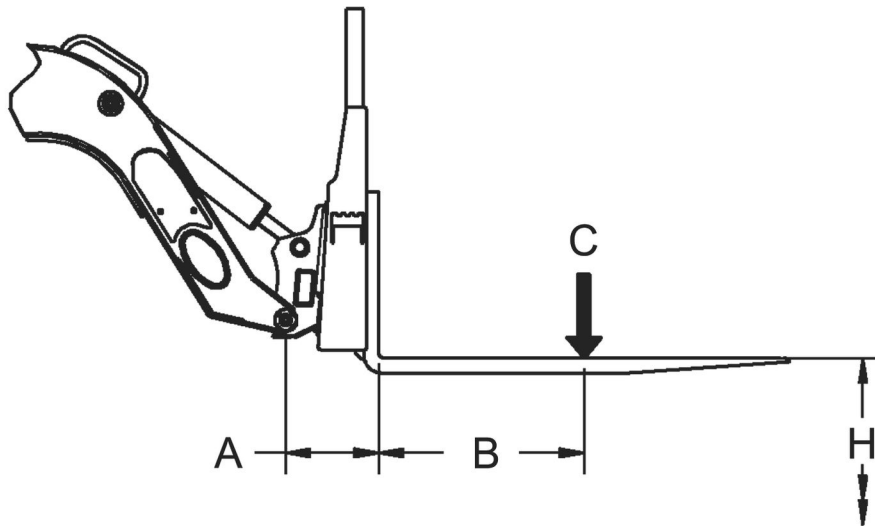
NOTE: All measurements are based on machines with a 1980 mm (78.0 in) Heavy Dirt (HD) bucket.



RAIL17SSL0078GA 8

LARGE VERTICAL FRAME TRACK UNITS (TV450B)

LOCATION	COMPONENT	MEASUREMENT
R	Lift Arm Turning Radius	1462 mm (57.6 in)
S	Bucket Turning Radius	2327 mm (91.6 in)
T	Chassis Turning Radius	1742 mm (68.6 in)
V	Over the Track Width	1488 mm (58.6 in)
W	Overall width	1943 mm (76.5 in)
Operating weight		4823 kg (10633 lb)
SAE Rated Operating Capacity (ROC)		
	35% of tipping load	1432 kg (3157.0 lb)
	50% of tipping load	2045 kg (4508 lb)
Tipping load		4091 kg (9019.1 lb)
Counter weight (optional)		273.0 kg (601.9 lb)
Cab side glass (optional)		21.3 kg (47.0 lb)
Cab glass door (optional)		34 kg (75.0 lb)
Cab Lexan door (optional)		33.6 kg (74.1 lb)
Suspension seat (optional)		10.0 kg (22.0 lb)
NOTE: All measurements are based on machines with a 1980 mm (78.0 in) Heavy Dirt (HD) bucket.		



RCPH11WHL007FAN 9

Pallet Fork 201 kg (443 lb) – Rated Operating Capacity (ROC)

Legend:		B= 610 mm (24.0 in)	C= Load Center of Gravity (CG)	
Model	A = Pivot Pin to Back of Fork	H = Height @ maximum reach	SAE Rated Operating Capacity (ROC)	ROC with Standard Weight Kit
SR270B	345 mm (13.6 in)	1505 mm (59.3 in)	820 kg (1808 lb)	890 kg (1962 lb)
SV340B	345 mm (13.6 in)	2443 mm (96.2 in)	987 kg (2176 lb)	1063 kg (2344 lb)
TR340B ¹	323 mm (12.7 in)	1514 mm (59.6 in)	611 kg (1347 lb)	720 kg (1587 lb)
TV450B ¹	348 mm (13.7 in)	2406 mm (94.7 in)	906 kg (1997 lb)	1024 kg (2258 lb)

¹Specified ROC for track models is **35%** tipping load.

Loader arm stop pucks

The loader arm stop pucks are stoppers located where the loader arm and frame meet. By design, the loader arm stop pucks allow the operator to lower the arms to the bottom position and level the bucket for precision grading. These pucks can also be used to change the grade of a bucket. A thinner puck will lower the grade and a thicker puck will raise the grade. The pucks installed at the factory are based on the tire size of the machine.

Frame size	Tire size width	Loader geometry	Loader stop height	Stop bolt hole location
Large	12x	Radial	50 mm (2.0 in)	Upper
Large	12x	Vertical	63 mm (2.5 in)	Upper
Large	14x	Radial	23 mm (0.9 in)	Upper
Large	14x	Vertical	40 mm (1.6 in)	Upper
Large	Track	Radial	40 mm (1.6 in)	Upper
Large	Track	Vertical	40 mm (1.6 in)	Upper

Product identification – attachments

NOTE: *Contact your CASE CONSTRUCTION dealer if you need any assistance.*

Table legend:

A = Applicable to this model

HF = Requires High Flow Hydraulics

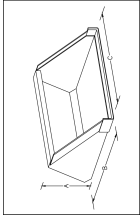
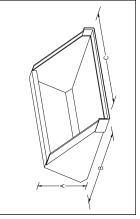
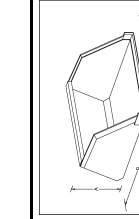
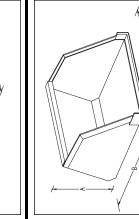
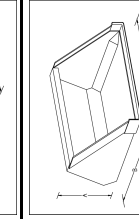
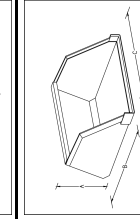
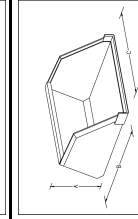
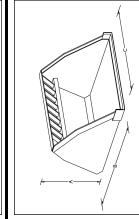
SF = Requires Standard Flow Hydraulics

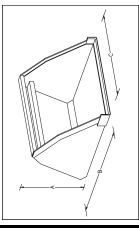
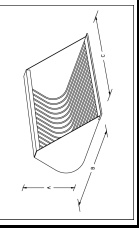
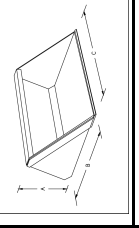
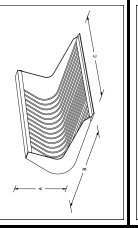
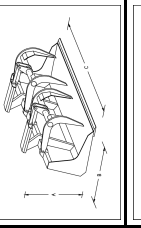
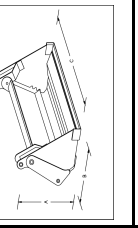
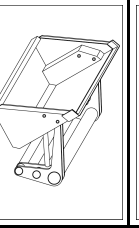
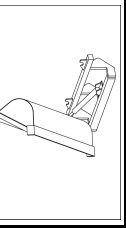
MM = Millimeters

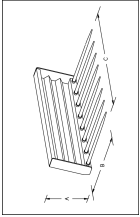
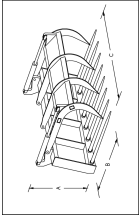
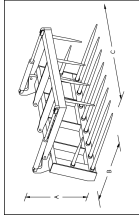
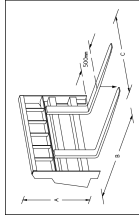
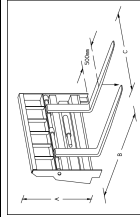
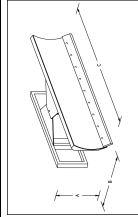
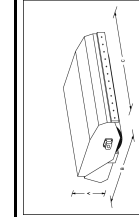
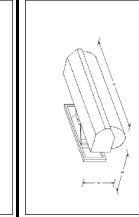
M3 = Meters cubed

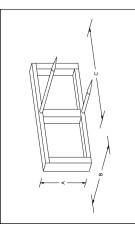
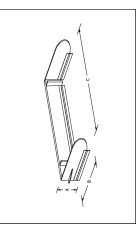
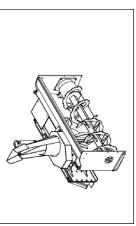
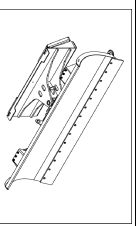
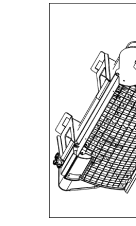
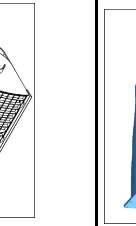
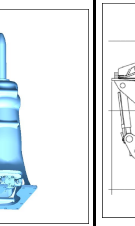
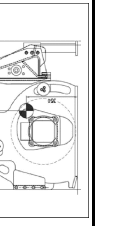
KG = Kilograms

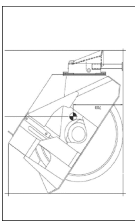
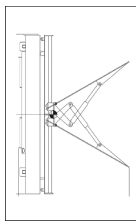
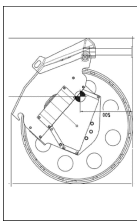
L/MIN = Liters per minute

ATTACHMENT FAMILY	IMAGE	WIDTH (MM)	LENGTH (MM)	HEIGHT (MM)	CAPACITY (M3)	MASS (KG)	OPERATING PRESSURE (BAR)	FLOW (L/MIN)	SR270B SV340B	TR340B TV450B
BUCKET HD		1,850	890	586	0.57	230			A	
		2,080	890	586	0.65	330			A	A
		1,850	1,010	586	0.57	257			A	
		2,080	1,010	586	0.65	290			A	A
BUCKET LOW PROFILE - HD		1,850	870	536	0.58	250			A	
		2,080	870	536	0.65	278			A	A
		1,850	960	536	0.60	259			A	
		2,080	960	536	0.66	288			A	A
		1,850	990	536	0.65	260			A	
		2,080	990	536	0.74	282			A	A
BUCKET UTILITY - HD		1,850	1,058	727	0.90	322			A	
		2,080	1,058	727	1.01	366			A	A
BUCKET SLURRY - HD		1,850	949	594	0.53	150			A	
		2,080	949	594	0.59	159			A	A
BUCKET DIRT - HD		1,850	890	586	0.56	272			A	
		2,080	890	586	0.63	320			A	A
BUCKET LIGHT MATERIAL - HD		1,850	1,083	830	1.10	342			A	
		2,080	1,083	830	1.20	373			A	A
BUCKET FERTILIZER - HD		1,850	1,391	833	1.24	322			A	
		2,080	1,391	833	1.40	342			A	A
BUCKET SHIP TRIMMING - HD		1,850	1,400	974	0.79	305			A	
		2,080	1,400	974	0.89	315			A	A

ATTACHMENT FAMILY	IMAGE	WIDTH (MM)	LENGTH (MM)	HEIGHT (MM)	CAPACITY (M3)	MASS (KG)	OPERATING PRESSURE (BAR)	FLOW (L/MIN)	SR270B SV340B	TR340B TV450B
BUCKET POULTRY - HD		1,850	1,004	802	1.00	350			A	
		2,080	1,004	802	1.13	410			A	A
BUCKET ROOT CROP - HD		1,850	1,008	685	0.72	290			A	
		2,080	1,008	685	0.79	327			A	A
BUCKET CALIBRATED		1,180	832	497	0.20	117			A	A
		1,406	1,064	618	0.40	148			A	A
		1,748	1,064	618	0.50	161			A	A
BUCKET DUTCH STONE - HD		1,850	835	695	0.33	238			A	
		1,850	835	695	0.33	242			A	
		2,080	835	695	0.38	242			A	A
BUCKET INDUSTRIAL - HD		2,080	835	695	0.38	245			A	A
		1,850	986	765	0.77	495	225	20-80	A, SF	
		2,080	986	765	0.87	522	225	20-80	A, SF	A, SF
BUCKET 4 IN 1		1,850	753	768	0.43	310	225	20-80	A, SF	
1,850		807	724	0.44	387	225	20-80	A, SF		
1,850		868	724	0.44	403	225	20-80	A, SF		
2,080		807	724	0.50	435	225	20-80	A, SF	A, SF	
BUCKET HIGH TIP - HD		2,080	868	724	0.50	453	225	20-80	A, SF	A, SF
		1,850	968	606	0.67	407	225	20-80	A, SF	
		2,080	968	606	0.76	426	225	20-80	A, SF	A, SF
BUCKET SIDE TIP - HD		1,850	1,048	748	0.55	250	225	20-80	A, SF	
		1,850	1,048	748	0.55	250	225	20-80	A, SF	
		2,080	1,048	748	0.60	295	225	20-80	A, SF	A, SF
		2,080	1,048	748	0.60	295	225	20-80	A, SF	A, SF

ATTACHMENT FAMILY	IMAGE	WIDTH (MM)	LENGTH (MM)	HEIGHT (MM)	CAPACITY (M3)	MASS (KG)	OPERATING PRESSURE (BAR)	FLOW (L/MIN)	SR270B SV340B	TR340B TV450B
FORK FARM - HD		1,850	893	593		221			A	
		2,080	893	593		211			A	A
FORK FARM with GRAPPLE - HD		1,850	1,010	796	1.01	341	225	20-80	A, SF	
		2,080	1,010	796	1.14	381	225	20-80	A, SF	A, SF
FORK SILAGE with GRAPPLE - HD		1,850	903	776	1.02	367	225	20-80	A, SF	
		2,080	903	776	1.14	407	225	20-80	A, SF	A, SF
FORK PALLET - HD		1,220	1,401	904		194			A	A
FORK PALLET with SIDE SHIFT - HD		1,220	1,760	900		320	225	20-80	A, SF	A, SF
SNOW PLOW / DOZER BLADE - HD		2,135	812	679		316			A	
		2,135	812	627		358	225	20-80	A, SF	
		2,365	812	679		328			A	A
		2,365	812	627		370	225	20-80	A, SF	A, SF
		2,640	1,068	716		650	225	20-80	A, SF	A, SF
		2,100	1,314	683	0.43	460	225	20-80	A, SF	
BROOM BUCKET		2,333	1,314	683	0.48	490	225	20-80	A, SF	A, SF
BROOM ANGLE - HD		2,610	1,342	772		465	<300	<95	A, SF	A, SF

ATTACHMENT FAMILY	IMAGE	WIDTH (MM)	LENGTH (MM)	HEIGHT (MM)	CAPACITY (M3)	MASS (KG)	OPERATING PRESSURE (BAR)	FLOW (L/MIN)	SR270B SV340B	TR340B TV450B
BALE SPIKE		1,220	980	610		55			A	A
SCRAPER - HD		2,080	1,092	600		198			A	A
SNOW BLOWER		1,790	990	780		506	170-210	65-90	A, SF	
SNOW BLADE		2,080	990	780		524	170-210	65-90	A, SF	A, SF
CEMENT MIXER		2,400	990	800		410	<180	<80	A, SF	A, SF
HAMMER		1,170	750	630	0.15	255	140-260	60-115	A, SF	A, SF
COLD PLANER		1,490	820	720	0.25	345	140-260	60-115	A, SF	A, SF
HAMMER		1,490	820	720	0.25	340	140-260	60-115	A, SF	A, SF
HAMMER		1,575	820	820	0.30	365	140-260	60-115	A, SF	A, SF
HAMMER		1,575	820	820	0.30	355	140-260	60-115	A, SF	A, SF
HAMMER		1,700	820	820	0.35	420	210-280	80-120		A, SF
HAMMER		1,760	980	980	0.45	590	210-280	80-120		A, SF
HAMMER		380	417	911		275	80-130	35-90	A, SF	A, SF
HAMMER		380	453	1,032		385	80-130	40-120	A, SF	A, SF
COLD PLANER		380	453	1,032		385	80-130	40-120	A, HF	A, HF
COLD PLANER		400	508	1,217		505	100-140	50-150	A, HF	A, HF
COLD PLANER		1,520	1,025	810		615	<250	<90	A, SF	A, SF
COLD PLANER		1,740	1,165	890		780	<215	<135	A, HF	A, HF
COLD PLANER		1,740	1,165	890		1,100	<215	<155	A, HF	A, HF

ATTACHMENT FAMILY	IMAGE	WIDTH (MM)	LENGTH (MM)	HEIGHT (MM)	CAPACITY (M3)	MASS (KG)	OPERATING PRESSURE (BAR)	FLOW (L/MIN)	SR270B SV340B	TR340B TV450B
ROCK WHEEL		1,740	1,900	1,650		1,255	<215	<155	A, HF	A, HF
		1,740	1,900	1,650		1,125	<215	<155	A, HF	A, HF
		1,740	1,900	1,650		1,180	<215	<155	A, HF	A, HF
		1,740	2,130	1,930		1,595	<215	<155	A, HF	A, HF
		1,740	2,130	1,930		1,340	<215	<155	A, HF	A, HF
		1,740	2,130	1,930		1,390	<215	<155	A, HF	A, HF
		1,740	2,130	1,930		1,390	<215	<155	A, HF	A, HF
		1,740	2,130	1,930		1,390	<215	<155	A, HF	A, HF
ASPHALT FLOAT		2,012	1,459	823		675	<250	<90	A, SF	A, SF
WHEEL COMPACTOR		1,341	1,334	1,154		615	<215	<90	A, SF	A, SF
		1,740	1,555	1,215		615	<250	<90	A, SF	A, SF
		1,740	1,555	1,215		615	<250	<90	A, SF	A, SF

Material weights

MATERIAL	kg/m ³	lbs/ft ³
Aluminum		
Lump	881	55
Pulverized	769	48
Ashes	561-833	35 - 52
Bauxite	1202 - 1922	75 - 120
Beans	769	48
Charcoal	368	23
Chips	288	18
Coal	1282	80
Coke - Lump - Loose	849 - 1009	53 - 63
Clay	368 - 513	23 - 32
Concrete	1378 - 1778	86 - 111
Copper Ore	1666	104
Corn - Shelled	673	42
Cottonseed	401	25
Earth		
Dry Loam	929 - 1089	58 - 68
Wet	1602 - 1666	100 - 104
Earth - Sand Gravel	1570	98
Ensilage	577	36
Granite	1490 - 1778	93 - 111
Gravel		
Dry	1522	95
Wet	1906	119
Ice - Crushed	593	37
Iron Ore	2323	145
Limestone - Loose - Crushed	1538 - 1602	96 - 100
Oats	416	26
Peanuts - Shelled	280	17
Peas	769	48
Peat - Solid	753	47
Phosphate - Granular	1442	90
Potash	1089	68
Potatoes	769	48
Quartz - Granular	1762	110
Rice	769	48
Rye	705	44
Salt - Rock - Solid	2163	135
Sand & Gravel		
Dry	1730	108
Wet	2003	125
Sand - Foundry	1522	95
Shale	1410	88
Slag - Crushed	1121	70
Slate	2243	130
Snow	240 - 801	15 - 50
Soybeans	743	46
Sugar Beet Pulp - Wet	561	35
Sugar - Raw	961	60
Sulfur - Lumpy	1330	83
Taconite	1714	107
Wheat	769	48

Units of measure and conversion

QUANTITY	TYPICAL APPLICATION	FROM U.S. UNIT	TO SI UNIT	MULTIPLY BY
Flow, volume	Liquid flow, pump capacity	US gpm	l/min	3.7854117834
Force, thrust, drag	Pedal, spring, belt, lever	lb	N	4.4482216153
Length or distance	Land distance, odometers	miles	km	1.6093440001
		yd	m	0.9144000003
		ft	m	0.3048000000
		in	mm	25.4000000001
Torque bending moment	General, engine torque, fasteners	lb in	N·m	0.1129848333
		lb ft	N·m	1.3558179999
		kgf cm	N·m	.0980665
Power	Air conditioning, heating	btu/min	W	17.58427
		btu/h	W	.2930711
	Motors	Hp	kW	0.7354990839
	Engine	Hp	kW	0.7354990839
Power quotient	Engine performance	lb/hp	kg/kW	.6080327
Temp scale	General use	°F	°C	°C = (°F-32)/1.8
Velocity, linear	Vehicle	mph	km/h	1.6093439998
Volume	Bucket capacity	yd ³	m ³	0.7645548582
		ft ³	m ³	0.0283168466
		Bu	m ³	.03523907
		Bu	l	35.2390700035
	Liquid, fuel, lubricants	US gal	l	3.7854117834
		US qt	l	0.9463529464
		US pt	l	0.4731764730
		US fl oz	ml	29.5735295641
Flow, mass		psi	bar	0.0689655172
		psi	kPa	6.8947572946
		lb	kg	0.4535923700

9 - SPECIFICATIONS

Ampere	A
Volt	V
kiloNewton	kN
Newton	N
pound	lb
ounce	oz
Newton meters	N·m
pound inches	lb in
revolutions per minute	RPM
kilometer	km
meter	m
centimeter	cm
millimeter	mm
miles	miles
yard	yd
foot	ft
inch	in
kilogram	kg
kiloWatts	kW
Watt	W
horsepower	Hp
Btu per hour	Btu/hr
kiloPascal	kPa
pound per square inch	psi
degrees Celsius	°C
degrees Fahrenheit	°F
pound feet	lb ft
kilometers per hour	km/h
miles per hour	mph
cubic meter	m ³
cubic yard	yd ³
liter	l
milliliters	ml
cubic inches	in ³
US gallons	US gal
US quarts	US qt
US fluid ounces	US fl oz

Torque charts - Minimum tightening torques for normal assembly

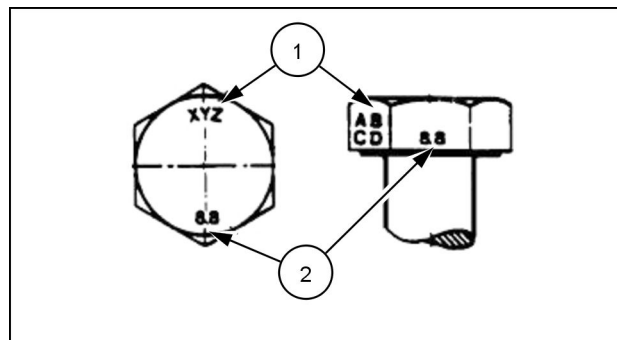
Metric non-flanged hardware

Nom- inal size	Class 8.8 bolt and class 8 nut		Class 10.9 bold and class 10 nut		Locknut class 8 with class 8.8 bolt	Locknut class 10 with class 10.9 bolt
	Unplated	Plated with ZnCr	Unplated	Plated with ZnCr		
M4	2.2 N·m (19 lb in)	2.9 N·m (26 lb in)	3.2 N·m (28 lb in)	4.2 N·m (37 lb in)	2 N·m (18 lb in)	2.9 N·m (26 lb in)
M5	4.5 N·m (40 lb in)	5.9 N·m (52 lb in)	6.4 N·m (57 lb in)	8.5 N·m (75 lb in)	4 N·m (36 lb in)	5.8 N·m (51 lb in)
M6	7.5 N·m (66 lb in)	10 N·m (89 lb in)	11 N·m (96 lb in)	15 N·m (128 lb in)	6.8 N·m (60 lb in)	10 N·m (89 lb in)
M8	18 N·m (163 lb in)	25 N·m (217 lb in)	26 N·m (234 lb in)	35 N·m (311 lb in)	17 N·m (151 lb in)	24 N·m (212 lb in)
M10	37 N·m (27 lb ft)	49 N·m (36 lb ft)	52 N·m (38 lb ft)	70 N·m (51 lb ft)	33 N·m (25 lb ft)	48 N·m (35 lb ft)
M12	64 N·m (47 lb ft)	85 N·m (63 lb ft)	91 N·m (67 lb ft)	121 N·m (90 lb ft)	58 N·m (43 lb ft)	83 N·m (61 lb ft)
M16	158 N·m (116 lb ft)	210 N·m (155 lb ft)	225 N·m (166 lb ft)	301 N·m (222 lb ft)	143 N·m (106 lb ft)	205 N·m (151 lb ft)
M20	319 N·m (235 lb ft)	425 N·m (313 lb ft)	440 N·m (325 lb ft)	587 N·m (433 lb ft)	290 N·m (214 lb ft)	400 N·m (295 lb ft)
M24	551 N·m (410 lb ft)	735 N·m (500 lb ft)	762 N·m (560 lb ft)	1016 N·m (750 lb ft)	501 N·m (370 lb ft)	693 N·m (510 lb ft)

NOTE: M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M24 hardware torque specifications are shown in pound-feet.

Metric flanged hardware

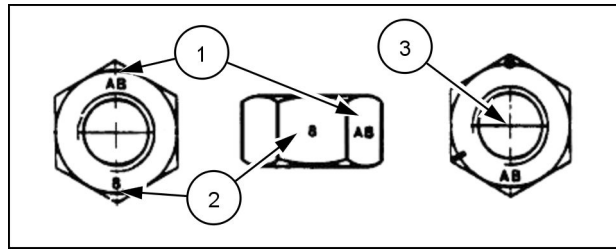
Nom- inal size	Class 8.8 bolt and class 8 nut		Class 10.9 bolt and class 10 nut		Locknut class 8 with class 8.8 bolt	Locknut class 10 with class 10.9 bolt
	Unplated	Plated with ZnCr	Unplated	Plated with ZnCr		
M4	2.4 N·m (21 lb in)	3.2 N·m (28 lb in)	3.5 N·m (31 lb in)	4.6 N·m (41 lb in)	2.2 N·m (19 lb in)	3.1 N·m (27 lb in)
M5	4.9 N·m (43 lb in)	6.5 N·m (58 lb in)	7.0 N·m (62 lb in)	9.4 N·m (83 lb in)	4.4 N·m (39 lb in)	6.4 N·m (57 lb in)
M6	8.3 N·m (73 lb in)	11 N·m (96 lb in)	12 N·m (105 lb in)	16 N·m (141 lb in)	7.5 N·m (66 lb in)	11 N·m (96 lb in)
M8	20 N·m (179 lb in)	27 N·m (240 lb in)	29 N·m (257 lb in)	39 N·m (343 lb in)	18 N·m (163 lb in)	27 N·m (240 lb in)
M10	40 N·m (30 lb ft)	54 N·m (40 lb ft)	57 N·m (42 lb ft)	77 N·m (56 lb ft)	37 N·m (27 lb ft)	53 N·m (39 lb ft)
M12	70 N·m (52 lb ft)	93 N·m (69 lb ft)	100 N·m (74 lb ft)	134 N·m (98 lb ft)	63 N·m (47 lb ft)	91 N·m (67 lb ft)
M16	174 N·m (128 lb ft)	231 N·m (171 lb ft)	248 N·m (183 lb ft)	331 N·m (244 lb ft)	158 N·m (116 lb ft)	226 N·m (167 lb ft)
M20	350 N·m (259 lb ft)	467 N·m (345 lb ft)	484 N·m (357 lb ft)	645 N·m (476 lb ft)	318 N·m (235 lb ft)	440 N·m (325 lb ft)
M24	607 N·m (447 lb ft)	809 N·m (597 lb ft)	838 N·m (618 lb ft)	1118 N·m (824 lb ft)	552 N·m (407 lb ft)	

Identification**Metric Hex head and carriage bolts, classes 5.6 and up**

20083680 1

1. Manufacturer's Identification
2. Property Class

Metric Hex nuts and locknuts, classes 05 and up



20083681 2

1. Manufacturer's Identification
2. Property Class
3. Clock Marking of Property Class and Manufacturer's Identification (Optional), i.e. marks **60°** apart indicate Class 10 properties, and marks **120°** apart indicate Class 8.

Inch non-flanged hardware

Nominal size	SAE grade 5 bolt and nut		SAE grade 8 bolt and nut		Locknut GrB with Gr5 bolt	Locknut GrC with Gr8 bolt
	Unplated or plated silver	Plated with ZnCr gold	Unplated or plated silver	Plated with ZnCr gold		
1/4	8 N·m (71 lb in)	11 N·m (97 lb in)	12 N·m (106 lb in)	16 N·m (142 lb in)	8.5 N·m (75 lb in)	12.2 N·m (109 lb in)
5/16	17 N·m (150 lb in)	23 N·m (204 lb in)	24 N·m (212 lb in)	32 N·m (283 lb in)	17.5 N·m (155 lb in)	25 N·m (220 lb in)
3/8	30 N·m (22 lb ft)	40 N·m (30 lb ft)	43 N·m (31 lb ft)	57 N·m (42 lb ft)	31 N·m (23 lb ft)	44 N·m (33 lb ft)
7/16	48 N·m (36 lb ft)	65 N·m (48 lb ft)	68 N·m (50 lb ft)	91 N·m (67 lb ft)	50 N·m (37 lb ft)	71 N·m (53 lb ft)
1/2	74 N·m (54 lb ft)	98 N·m (73 lb ft)	104 N·m (77 lb ft)	139 N·m (103 lb ft)	76 N·m (56 lb ft)	108 N·m (80 lb ft)
9/16	107 N·m (79 lb ft)	142 N·m (105 lb ft)	150 N·m (111 lb ft)	201 N·m (148 lb ft)	111 N·m (82 lb ft)	156 N·m (115 lb ft)
5/8	147 N·m (108 lb ft)	196 N·m (145 lb ft)	208 N·m (153 lb ft)	277 N·m (204 lb ft)	153 N·m (113 lb ft)	215 N·m (159 lb ft)
3/4	261 N·m (193 lb ft)	348 N·m (257 lb ft)	369 N·m (272 lb ft)	491 N·m (362 lb ft)	271 N·m (200 lb ft)	383 N·m (282 lb ft)
7/8	420 N·m (310 lb ft)	561 N·m (413 lb ft)	594 N·m (438 lb ft)	791 N·m (584 lb ft)	437 N·m (323 lb ft)	617 N·m (455 lb ft)
1	630 N·m (465 lb ft)	841 N·m (620 lb ft)	890 N·m (656 lb ft)	1187 N·m (875 lb ft)	654 N·m (483 lb ft)	924 N·m (681 lb ft)

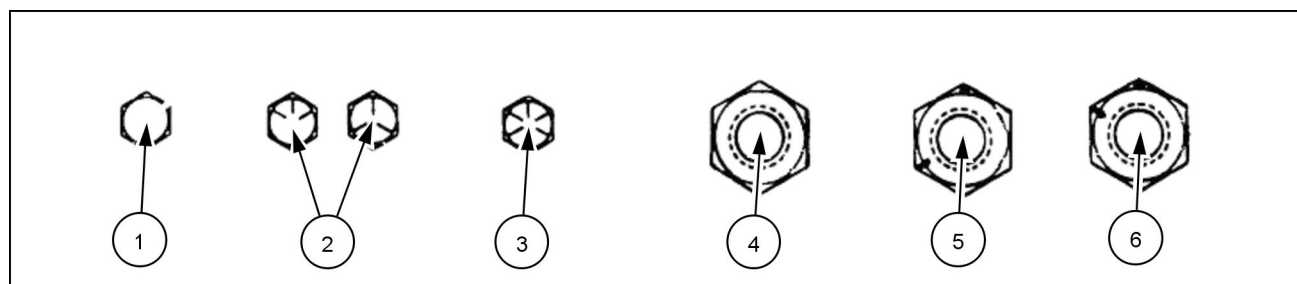
NOTE: For Imperial Units, **1/4 in** and **5/16 in** hardware torque specifications are shown in pound-inches. **3/8 in** through **1 in** hardware torque specifications are shown in pound-feet.

Inch flanged hardware

Nom- inal size	SAE grade 5 bolt and nut		SAE grade 8 bolt and nut		Locknut GrB with Gr5 bolt	Locknut GrC with Gr8 bolt
	Unplated or plated silver	Plated with ZnCr gold	Unplated or plated silver	Plated with ZnCr gold		
1/4	9 N·m (80 lb in)	12 N·m (106 lb in)	13 N·m (115 lb in)	17 N·m (150 lb in)	8 N·m (71 lb in)	12 N·m (106 lb in)
5/16	19 N·m (168 lb in)	25 N·m (221 lb in)	26 N·m (230 lb in)	35 N·m (310 lb in)	17 N·m (150 lb in)	24 N·m (212 lb in)
3/8	33 N·m (25 lb ft)	44 N·m (33 lb ft)	47 N·m (35 lb ft)	63 N·m (46 lb ft)	30 N·m (22 lb ft)	43 N·m (32 lb ft)
7/16	53 N·m (39 lb ft)	71 N·m (52 lb ft)	75 N·m (55 lb ft)	100 N·m (74 lb ft)	48 N·m (35 lb ft)	68 N·m (50 lb ft)
1/2	81 N·m (60 lb ft)	108 N·m (80 lb ft)	115 N·m (85 lb ft)	153 N·m (113 lb ft)	74 N·m (55 lb ft)	104 N·m (77 lb ft)
9/16	117 N·m (86 lb ft)	156 N·m (115 lb ft)	165 N·m (122 lb ft)	221 N·m (163 lb ft)	106 N·m (78 lb ft)	157 N·m (116 lb ft)
5/8	162 N·m (119 lb ft)	216 N·m (159 lb ft)	228 N·m (168 lb ft)	304 N·m (225 lb ft)	147 N·m (108 lb ft)	207 N·m (153 lb ft)
3/4	287 N·m (212 lb ft)	383 N·m (282 lb ft)	405 N·m (299 lb ft)	541 N·m (399 lb ft)	261 N·m (193 lb ft)	369 N·m (272 lb ft)
7/8	462 N·m (341 lb ft)	617 N·m (455 lb ft)	653 N·m (482 lb ft)	871 N·m (642 lb ft)	421 N·m (311 lb ft)	594 N·m (438 lb ft)
1	693 N·m (512 lb ft)	925 N·m (682 lb ft)	979 N·m (722 lb ft)	1305 N·m (963 lb ft)	631 N·m (465 lb ft)	890 N·m (656 lb ft)

Identification

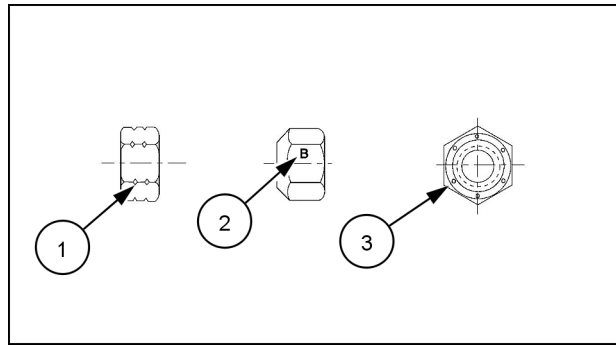
Inch bolts and free-spinning nuts



20083682 3

Grade marking examples

SAE Grade Identification			
1	Grade 2 - No Marks	4	Grade 2 Nut - No Marks
2	Grade 5 - Three Marks	5	Grade 5 Nut - Marks 120° Apart
3	Grade 8 - Five Marks	6	Grade 8 Nut - Marks 60° Apart

Inch locknuts, all metal (three optional methods)

20090268 4

Grade Identification

Grade	Corner Marking Method (1)	Flats Marking Method (2)	Clock Marking Method (3)
Grade A	No Notches	No Mark	No Marks
Grade B	One Circumferential Notch	Letter B	Three Marks
Grade C	Two Circumferential Notches	Letter C	Six Marks

10 - ACCESSORIES

Telematics - Overview with Case SiteWatch™

NOTE: The CASE CONSTRUCTIONSiteWatch™ website (www.casesitewatch.com) will not be accessible until the CASE CONSTRUCTIONSiteWatch™ subscription for this machine is registered by an authorized CASE CONSTRUCTION dealer. Contact an authorized CASE CONSTRUCTION dealer for details.

This machine may be equipped with a Telematics system. This is an asset-monitoring system that combines Internet, cellular, and GPS technologies. A transponder unit is mounted on the equipment that wirelessly communicates with the user interface CASE CONSTRUCTIONSiteWatch™ at www.casesitewatch.com. Using cellular technology, the transponder can send equipment data, including location, on/off status, usage and production metrics, diagnostic data, movement alarms, unauthorized usage and monitor machine maintenance to the user interface CASE CONSTRUCTIONSiteWatch™. The system will help cut costs and keep accurate records.

Index

A

Air cleaner elements	7-68
Air seat	3-5
Anti-theft protection	3-53
Auxiliary hydraulic interlock override (AUX OVRRD).	3-50

B

Battery removal and installation.	7-8
Battery safety - check and cleaning	7-6
Belt - Replace	7-84
Blow-by recirculation system	7-87
Bluetooth® radio (if equipped)	3-73
Booster battery procedure	4-8
Bucket curl/dump control	3-17
Bucket shake activation	3-18, 3-23

C

Cab air louvers	3-4
Cab door - Grease	7-72
Cab door removal and installation.	7-5
Cab intake filter.	7-51
Clean tracks and components	7-38
Control pattern overview	3-11
Crank enable/disable feature	3-59

D

Diesel Exhaust Fluid (DEF)/AdBlue® tank filter	7-63
Diesel Exhaust Fluid (DEF)/AdBlue® tank suction filter - Replace	7-79
Display warnings – Instrument Cluster (IC) only	8-1
Door latches, cab	3-1
Drive chain tension check	7-54

E

Ecology and the environment.	2-26
Electro-hydraulic control handle adjustment	3-13
Electro-Magnetic Compatibility (EMC)	1-3
Emergency exit.	2-25
Emissions overview	1-20
Engine and hydraulic coolers.	7-39
Engine coolant level.	7-40
Engine cooling system - Change fluid	7-96
Engine hourmeter.	7-14
Engine oil and oil filter - Change	7-56
Engine oil level	7-41
Engine oils.	7-16
Engine operation	4-3
Enhanced High Flow (EHF) auxiliary hydraulics.	3-34

F

Fault code index	8-2
Field operation	6-6
Final drive chain tank oil	7-67, 7-78
Final drive oil (track models)	7-53, 7-71
Fire extinguisher	2-13, 7-14
Fluids and lubricants	7-15, 9-1
Foot controls	3-10
Fuel filter	7-62

Fuel-water separator filter - drain fluid	7-55
Fuel-water separator filter element	7-61
Fuses and relays	7-26

G

General safety before you service.	7-1
General specification	9-2
General specification - Biodiesel fuels	7-20
General specification - Diesel fuel	7-19

H

Hand controls	3-10, 3-14
Hardware - loose or damaged	7-108
H control pattern lift arm and bucket controls	3-17
H control pattern steering and travel.	3-14
High flow auxiliary hydraulics.	3-32
Hydraulic attachment mounting systems	6-4
Hydraulic oil and filter	7-74
Hydraulic oil filter	7-66
Hydraulic oil level	7-43
Hydraulic oil viscosity	7-17
Hydrocarbon management.	7-101

I

Instrument Cluster (IC)	3-39
Instrument cluster display setting	3-49
Instrument cluster main menu	3-48
Instrument cluster navigation buttons	3-46
Instrument cluster shutdown feature (IC SHTdN)	3-60
Instrument cluster suspend time-out feature (SUSP TMOUT)	3-58
Instrument cluster time-out feature (IC TMOUT)	3-61
ISO control pattern lift arm and bucket controls	3-22
ISO control pattern steering and travel.	3-19
ISO or H pattern control switch	3-72

L

LCD multi-function display (if equipped)	3-36
Left-hand column switch identification	3-74
Lift arm and bucket controls	3-10, 3-22
Lift arm raise/lower control	3-17
Loader arm and bucket hydraulic interlock	7-45
Loader arm lock and cab tilt procedure - radial lift machines	2-16
Loader arm lock and cab tilt procedure - vertical lift machines.	2-20
Loader arm pivot points, coupler pins, and cylinder pins - Radial lift	7-42
Loader arm pivot points, coupler pins, and cylinder pins - Vertical lift	7-42
Lubrication analysis program	7-3
Lubrication and maintenance access	7-22

M

Machine cleaning	7-4
Machine components	1-8
Machine operation	4-10
Machine orientation	1-7
Maintenance chart	7-32
Material weights	9-18
Mechanical attachment mounting systems	6-1
Mechanical suspension seat	3-5
Moving a disabled machine	5-10
Moving the machine.	3-8, 3-15, 3-19

N

No engine power - loader arm up and down control	2-24
Note to the owner.	1-1

O

Operating in extreme temperatures	4-5
Operating Instructions	4-1
Operating the machine in water	6-11
Operator's manual storage on the machine	1-7
Organic Acid Technology (OAT) coolant	7-18

P

Parking the machine and stopping the engine	4-9
Plastic and resin parts	7-3
Product identification	1-4
Product identification – attachments	9-12
Proper entry and exit	2-8

R

Restraint bar	3-7
Roll Over Protective Structure (ROPS)	2-14
Roll Over Protective Structure (ROPS) mechanism and hardware check	7-46, 7-73

S

Safety rules	2-2
Safety rules and signal word definitions	2-1
Safety signs	2-27
Seat belt operation	3-6
Seat belt precautions	2-11
Seat restraints - Check	7-52
Selective Catalytic Reduction (SCR) exhaust treatment - Basic instructions	7-24
Selective Catalytic Reduction (SCR) exhaust treatment - Overview	3-62
Selective Catalytic Reduction (SCR) exhaust treatment - Product overview	1-15
Selective Catalytic Reduction (SCR) system - Replace supply module filter - Radial lift machines only	7-90
Selective Catalytic Reduction (SCR) system - Replace supply module filter – Vertical lift machines only	7-93
Shoulder belt	3-7
Specific precautions to this machine	2-13
Standard auxiliary hydraulics	3-30
Standard H control pattern	3-11
Standard ISO control pattern	3-12
Standard seat	3-5
Starting and stopping precautions	2-10
Steering and travel	3-8
Storing the machine	7-109
Switch configurations	3-24

T

Telematics - Overview with Case SiteWatch™	10-1
Temperature display selection	3-51
Throttle control	4-7
Tire pressure and wheel hardware torque	7-36, 7-49
Torque charts - Minimum tightening torques for normal assembly	9-21
Track tension check and adjustment	7-34, 7-47
Transporting the machine	5-1
Turning the machine	3-9, 3-16, 3-20
Two-speed function	3-29

U

Units of measure and conversion	9-19
Utility safety	2-7

V

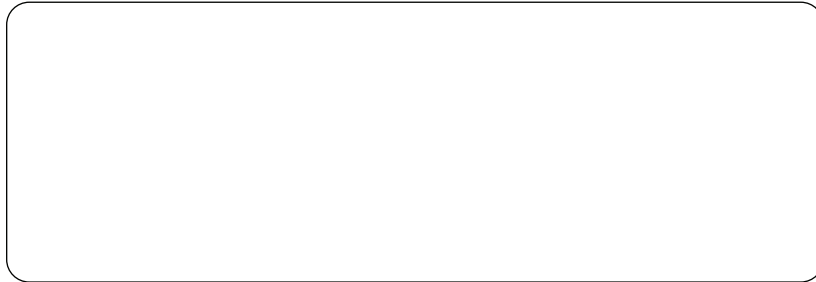
View or reset Job Timer (JTIME)	3-52
---	------

W

Welding on the machine	2-15
Window glass, cab	3-2
Window removal and cleaning	7-103

Windshield wiper and washer controls 3-3

Dealer's stamp



CNH Industrial America LLC reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold.

Specifications, descriptions, and illustrative material herein are as accurate as known at time of publication, but are subject to change without notice.

Availability of some models and equipment builds varies according to the country in which the equipment is being used. For exact information about any particular product, please consult your Case dealer.



© 2023 CNH Industrial America LLC. All Rights Reserved.

Case is a trademark registered in the United States and many other countries, owned or licensed to CNH Industrial N.V., its subsidiaries or affiliates.

Any trademarks referred to herein, in association with goods and/or services of companies, other than owned by or licensed to CNH Industrial N.V., its subsidiaries or affiliates, are the property of those respective companies.