Safety rules - Ecology and the environment

SR210	
SR240	
SV280	
TR270	
TR310	

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.

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.
- The air-conditioning system contains gases that should not be released into the atmosphere. Consult an air-conditioning specialist or use a special extractor to 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.
- Protect hoses during welding. Penetrating weld splatter may burn a hole or weaken hoses, allowing the loss of oils, coolant, etc.

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.



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 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:

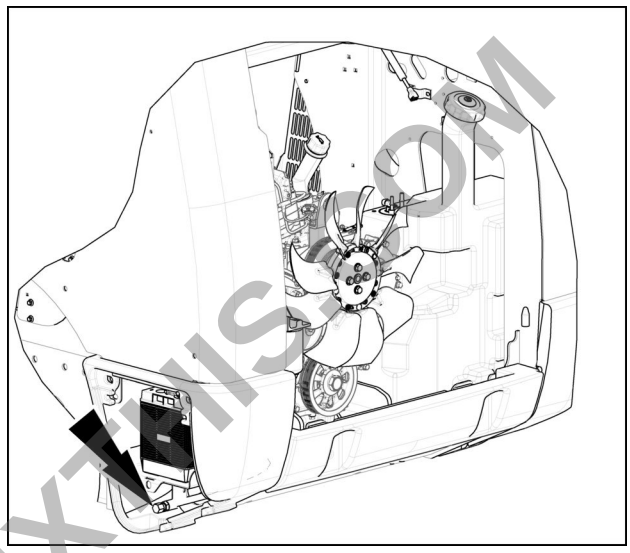
- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling

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Engine - Drain fluid

SR210 TIER 4B Final [NDM478026 -]	
SR240	
SV280	
TR270 TIER 4B Final [NDM462224 -]	
TR310	

1. Remove the access cover at the rear, lower left of the machine, exposing the engine oil drain hose and remote oil filter.
2. Remove the drain plug to drain the oil.
3. When the oil has completely drained, reinstall the drain plug and torque to **68 - 82 N·m** (**50 - 61 lb ft**).



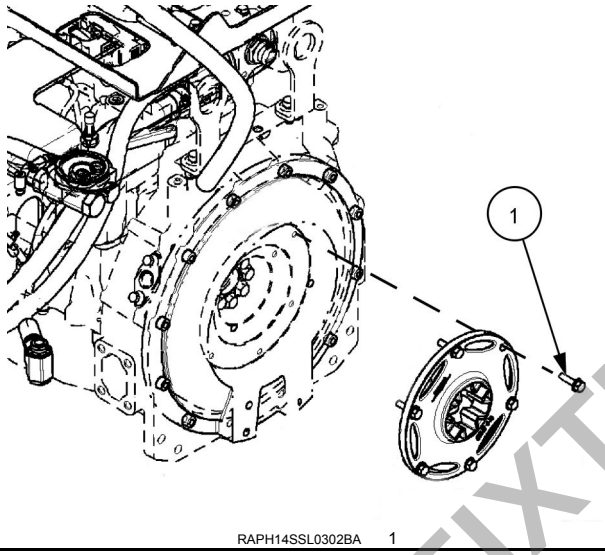
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Pump-drive coupling - Torque

SR210	
SR240	
SV280	
TR270	
TR310	

Component	identification	Toque	Consumable
Flange bolt **(1)**	 RAPH14SSL0302BA 1	**30 - 33 N·m** (**266 - 292 lb in**)	**LOCTITE® 243™**

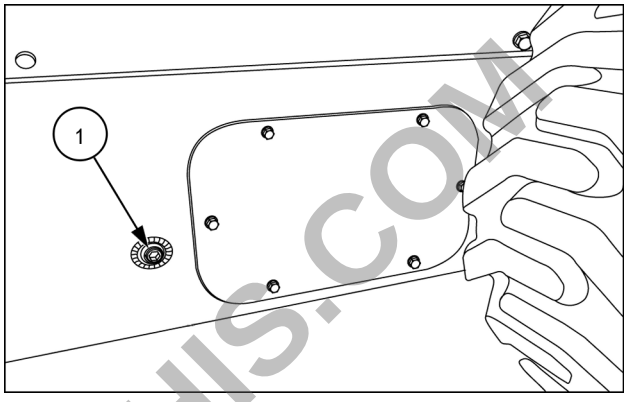
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Chain drive system - Change fluid

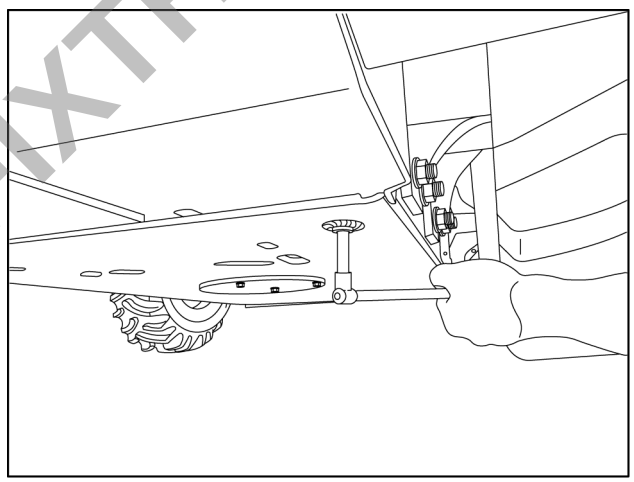
SR210	
SR240	
SV280	

1. Park the machine on a level surface.
2. Remove the fill plug **(1)**,



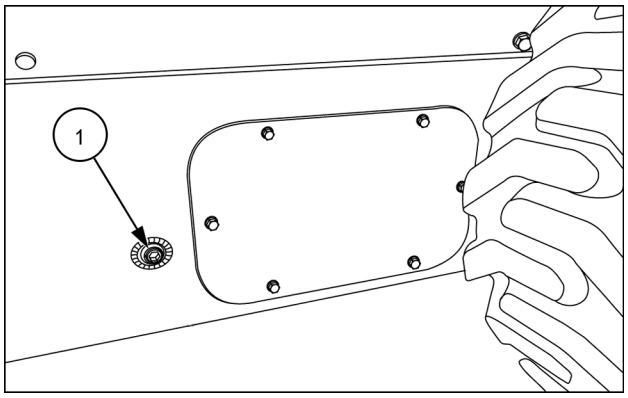
RAIL13SSL0560AA 1

3. Remove the drain plug, and drain the fluid into a suitable container.
4. When the tank is empty, apply **LOCTITE® 545™** to the threads of the drain plug, then install the drain plug.



RAIL13SSL0382BA 2

5. Fill the chain tank by pouring oil into the fill plug hole. Please see **Capacities ()** for specifications and capacities.
6. Apply **LOCTITE® 545™** to the threads of the fill plug (1), then install the fill plug **(1)**.



RAIL13SSL0560AA 3

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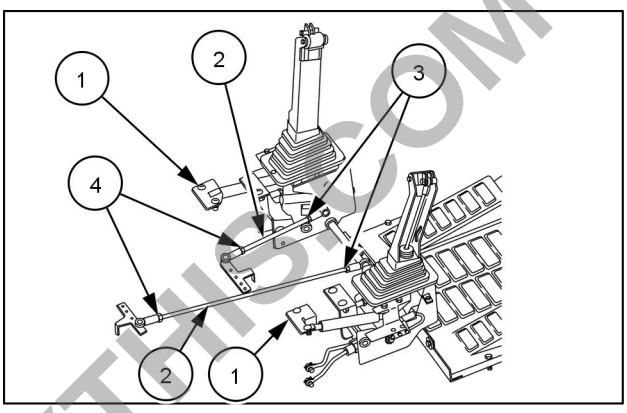
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Mechanical control - Adjust - Machines with only hand controls

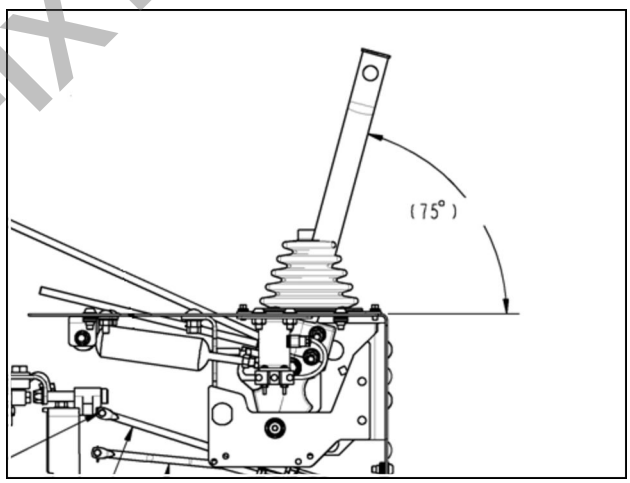
SR210	Mechanical hydraulic controls
SR240	Mechanical hydraulic controls
SV280	Mechanical hydraulic controls
TR270	Mechanical hydraulic controls
TR310	Mechanical hydraulic controls

NOTE: *Inspect the linkage and linkage components for wear and damage before performing the following steps. Replace all worn and/or damaged parts.*

1. Loosen the bolts **(1)** that attach the self centering dampeners.
2. Loosen the jam nuts **(3)**, **(4)**.
3. Rotate the rod **(2)** until the handles are in the correct position of **75 °** (see image **2**).
4. Tighten the jam nuts **(2)**, **(3)**.
5. Tighten the bolts **(1)** that attach the self centering dampeners.
6. Repeat steps **1** – **5** on the other pump.



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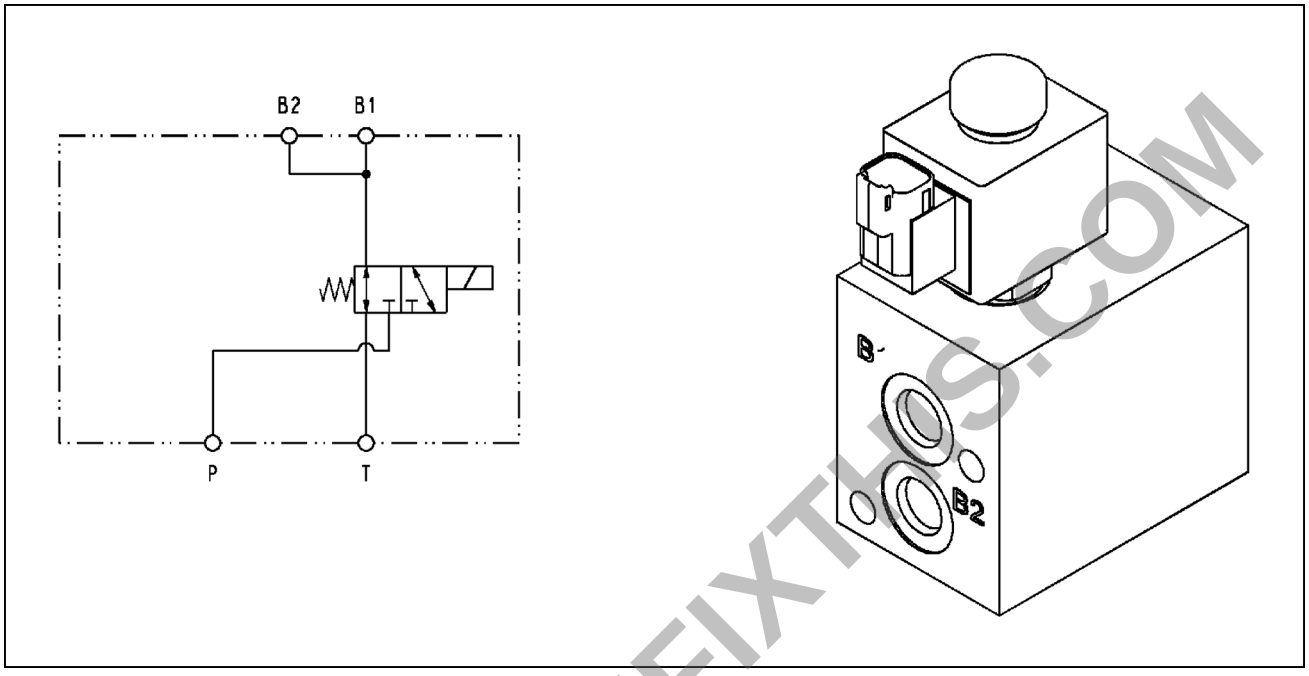
23112922 2

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Parking brake control valve - General specification

SR210	Mechanical hydraulic controls
SR240	Mechanical hydraulic controls
SV280	Mechanical hydraulic controls



RAPH13SSL0966EA 1

Brake valve

Hydraulic requirements:	Charge pressure = **24 - 25.5 bar** (**350 - 370 psi**)
	Brake release pressure = **15 bar** (**218 psi**)
Port identification	P - Supply inlet
	T - Tank return
	B1 - Brake motor 1
	B2 - Brake motor 2

Parking brake control valve - General specification

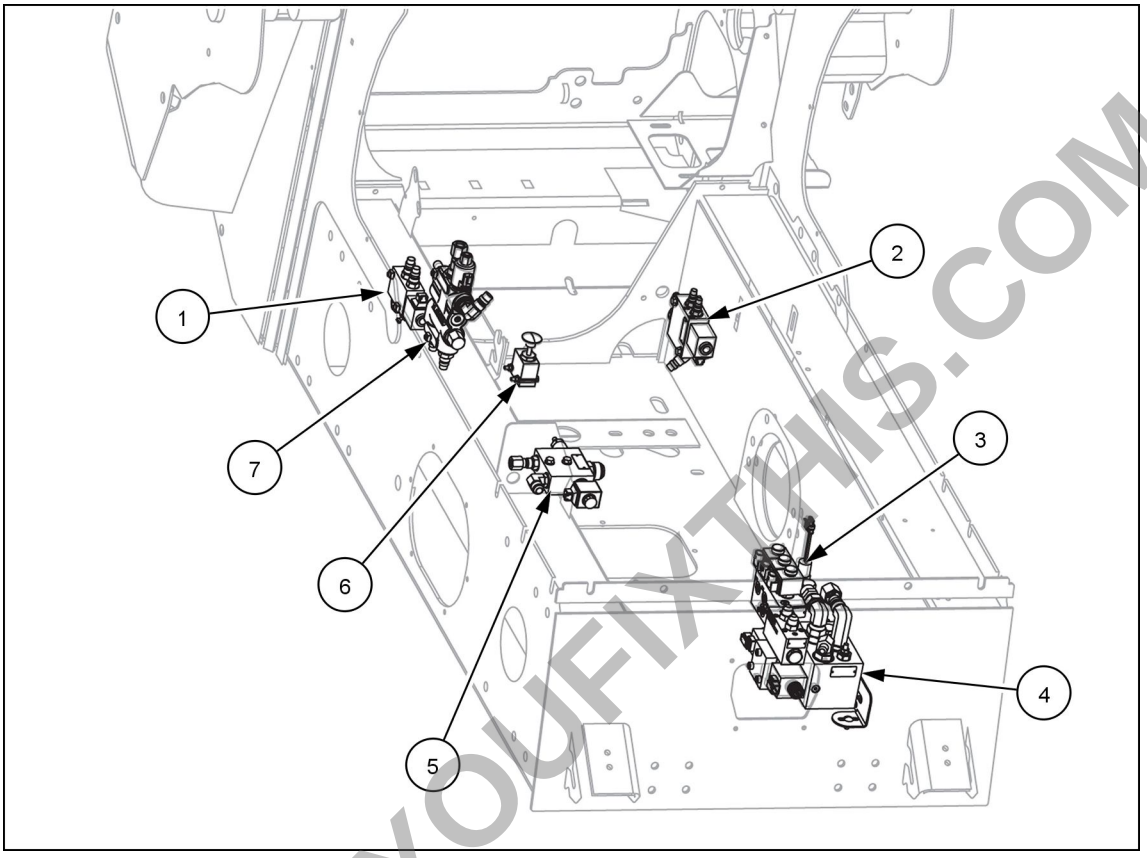
SR210	Electro hydraulic controls
SR240	Electro hydraulic controls
SV280	Electro hydraulic controls

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Hydraulic systems - Component localization

SR210 TIER 4B Final [NDM478026 -]	
SR240 TIER 4B (FINAL)	
TR270	



RAPH13SSL0863FA 1

Valve location

Valve identification

(1) Ride control valve	**(3)** Loader pilot interlock, brake, two speed valve	**(5)** High flow valve	**(7)** Self-leveling valve
(2) Hydraulic coupler valve	**(4)** Second auxiliary valve	**(6)** Override valve for the loader arm	

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Counterweight - Remove

SR210	
SR240	
SV280	
TR270	
TR310	

⚠ DANGER

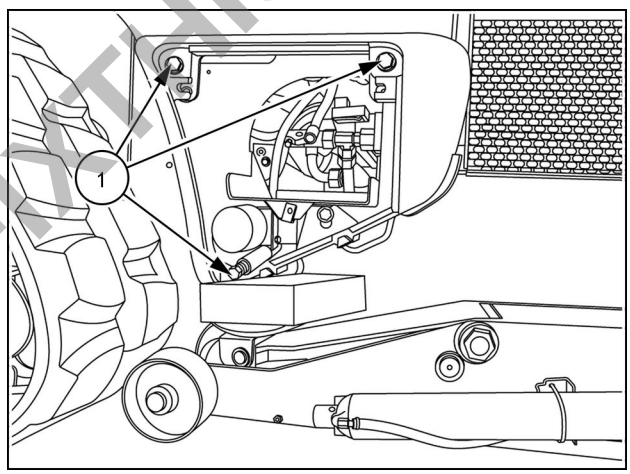
Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply will result in death or serious injury.

D0076A

Prior operation:
Remove the battery. See **Battery - Remove (55.302)**.

Left hand side

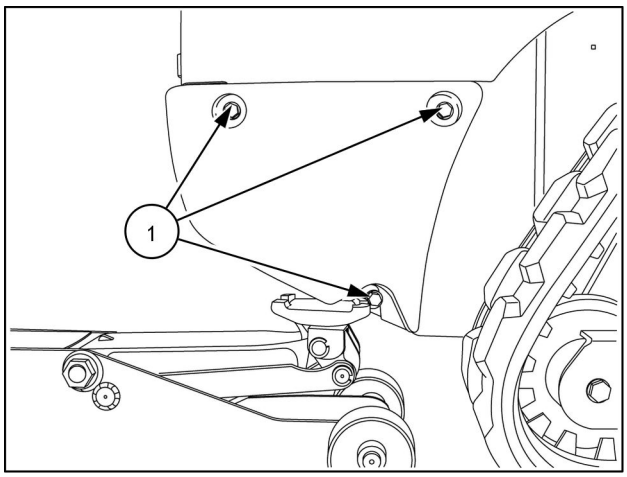
1. Support the counterweight with a suitable lifting device. Remove corner mounting hardware **(1)**.
2. Remove the counterweight.



RAPH12SSL0289AA 1

Right hand side

3. Support the counterweight with a suitable lifting device. Remove corner mounting hardware **(1)**.
4. Remove the counterweight.



RAPH12SSL0041AA 2

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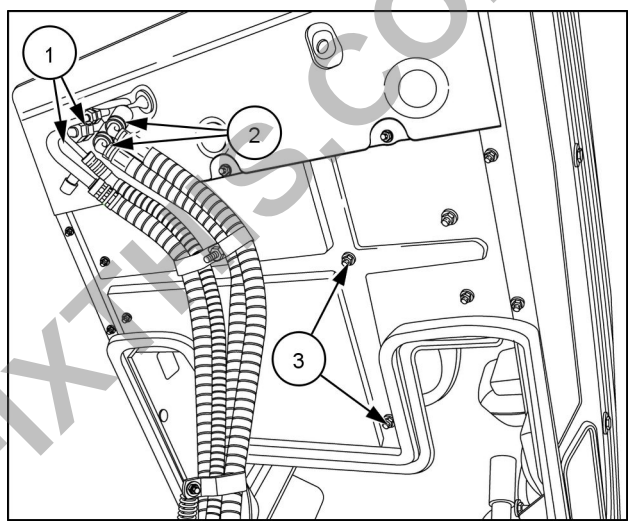
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Heater core - Remove

SR210	
SR240 TIER 4B (FINAL)	
SV280 TIER 4B (FINAL)	
TR270	
TR310 TIER 4B (FINAL)	

Prior operation:
Tilt the cab. Please see **Cab tilting system - Tilt (90.150)**
Prior operation:
Discharge the A/C (if applicable). Please see **Air conditioning - Discharging (50.200)**.

1. Detach the heater hoses **(2)** from the heater core.
2. Detach the A/C lines **(1)** from the evaporator (if applicable).
3. Remove the nuts **(3)**, and detach the seat from the cab.



RAIL15SSL0042BA 1

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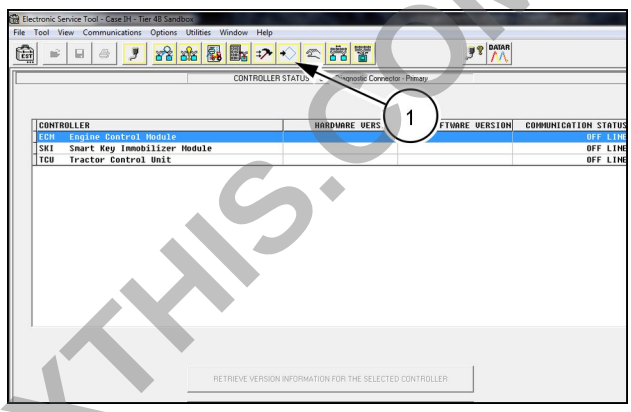
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Common rail pressure sensor - Configure - Reset ECU data (Rail pressure sensor)

SR210	
SR240	
SV280	
TR270	
TR310	

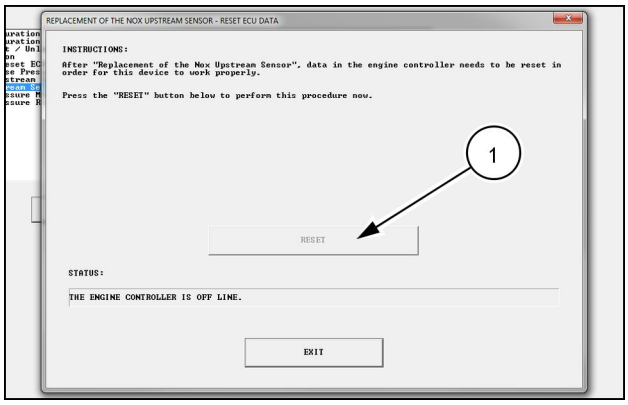
NOTE: *Active dosing faults require additional key cycles in order for the Engine Control Unit (ECU) to determine the fault has been repaired. Afterrun must be completed between each key cycle.*

1. Connect the Electronic Service Tool (EST) and turn the key switch ON without starting the engine.
2. Click the “Configuration” icon **(1)**.



NHPH14ENG0006AA 1

3. Select “Replacement of the Rail Pressure Sensor - Reset ECU Data.
4. Click the “CONFIGURE SELECTED ITEM” button.
5. Click the “RESET” button **(1)**.



NHPH14ENG0017AA 2

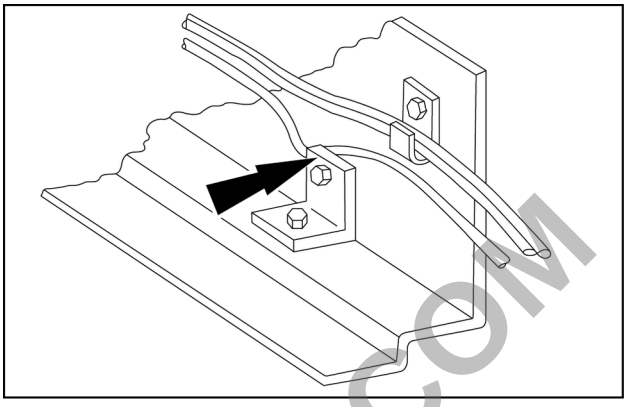
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Examples of common electrical problems

Short circuit

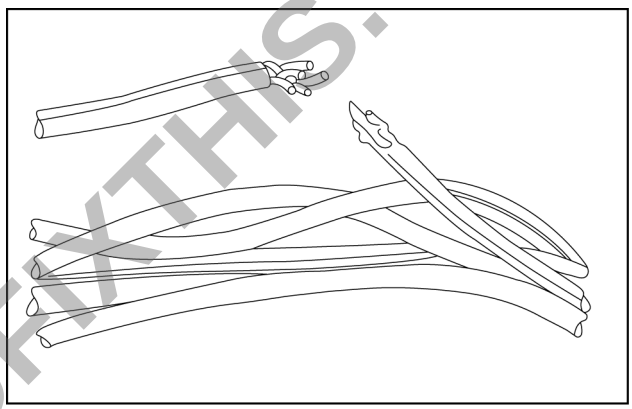
- The wires are pinched between two objects, e.g. a frame and bracket.



RAIL14SSL0590AA 1

Open circuit

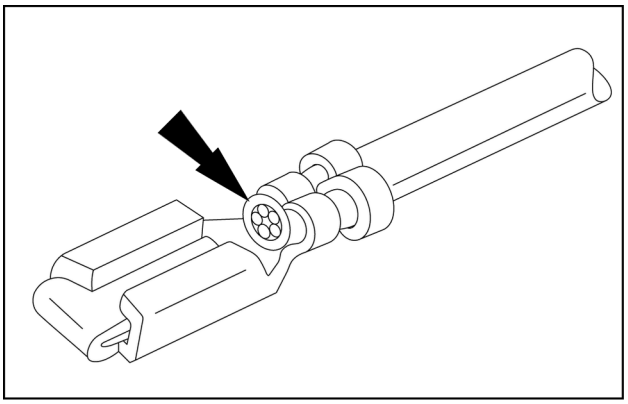
- A cut or broken wire.



RAIL14SSL0589AA 2

Open circuit

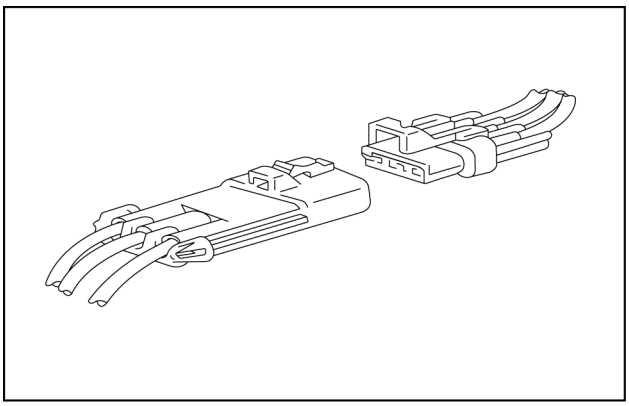
- There is no contact between the wire(s) and the terminal due to the insulation not being properly removed or positioned when the terminal was fastened to the wire(s) .



RAIL14SSL0595AA 3

Open circuit

- Completely disconnected connectors do not make contact with the terminals.



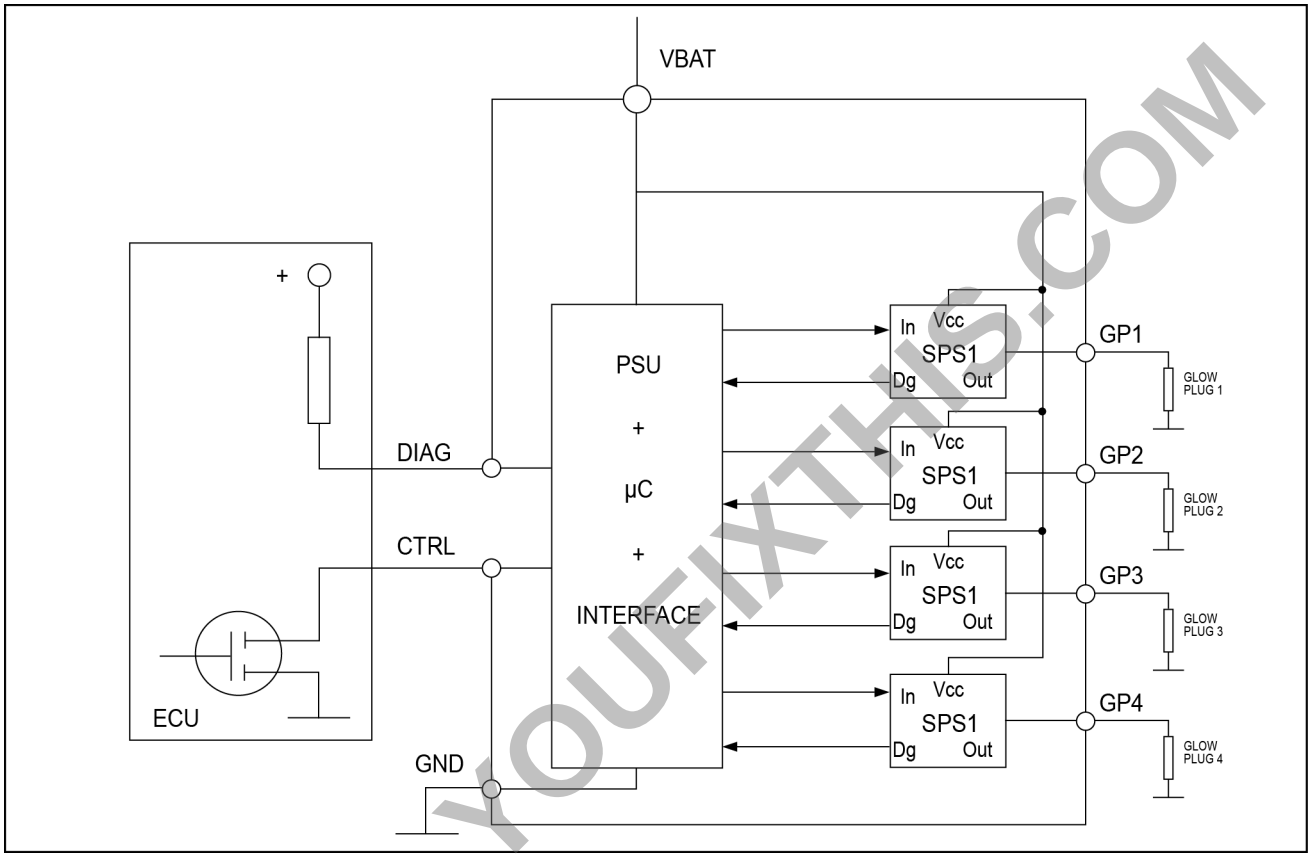
RAIL14SSL0600AA 4

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Glow plug system Glow plug control module - Overview

SR210	
SR240	
SV280	
TR270	
TR310	



NHIL14ENG0777FA 1

The Fast Glow Plug Control Unit (FGPCU) powers up to four fast glow plugs (low voltage glow plugs that cannot be permanently driven at battery voltage levels) as controlled by the input signal CTRL (active low). The duty cycle of the CTRL signal sets the power level of the plug outputs so the Engine Control Unit (ECU) can control the overall power of the heating elements.

The diagnostic functions are implemented for each glow plug putput independently. The diagnostic output signal transmits the current status of the glow plugs to the ECU. Each glow plug may either operate correctly or present a fault condition (open load, short circuit or thermal shutdown).

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1002-Engine Coolant Temperature Is Above Normal

SR240	
SV280	
TR310	

Context:
The instrument cluster has received a message from the ECU that the coolant temperature is above **111 °C** (**232 °F**) for a period greater than **5 s**.

Cause:
The coolant temperature is above normal. The instrument cluster has received a message from the ECU that the coolant temperature above **111 °C** (**232 °F**) for a period greater than **5 s**.

Possible failure modes:

1. The engine has a low coolant level.
2. Faulty wiring or connections.
3. A faulty coolant temperature sensor.
4. A faulty ECU.

Solution:

1. Verify that the fault code is active.

   Connect the Electronic Service Tool to the service tool connector.

   To check for fault codes: Start and operate the machine.

   A. The fault is not recorded again. OK to return the machine to service.

   B. Fault code **1002 - Engine Coolant Temperature Is Above Normal** is recorded again.
   Refer to procedure **3007-Engine coolant temperature sensor voltage is higher than expected (55.640)**.

Wiring harnesses - Electrical schematic sheet 07 Engine F5C T4 (Engine) (55.100.DP-C.20.E.07)
Wiring harnesses - Electrical schematic sheet 06 Engine F5C T4 (Engine) (55.100.DP-C.20.E.06)

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Arm - Repair

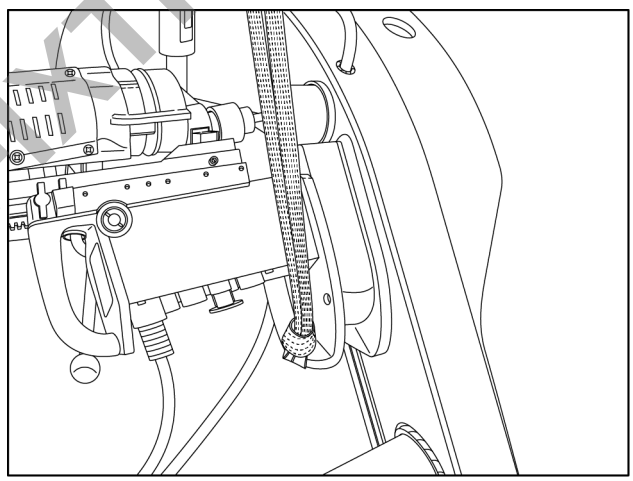
SR210 TIER 4B Final [NDM478026 -]	
SR240 TIER 4B (FINAL)	
SV280 TIER 4B (FINAL)	
TR270	
TR310 TIER 4B (FINAL)	

When the pivot pins fail or the retaining hardware for the bucket release device or the bucket cylinders is loose for an extended period of time, the tapered hole in the bosses become damaged and requires replacement. In this procedure, you will find directions for replacing the upper and lower bosses on the loader arm. Bosses are to be replaced only one at a time. Do not attempt to replace more than one boss at the same time. You will not be able to use the boss alignment tool, part number **380100288**, which is required for this procedure if you attempt to replace more than one boss at a time. All welding procedures are to be performed by a certified welder. Protect your work area from moisture, low temperatures, and excessive wind when repairing the bosses on the loader arm.

Prior operation:
Bucket release device - Remove (82.300)
Prior operation:
Remove the bucket cylinders.

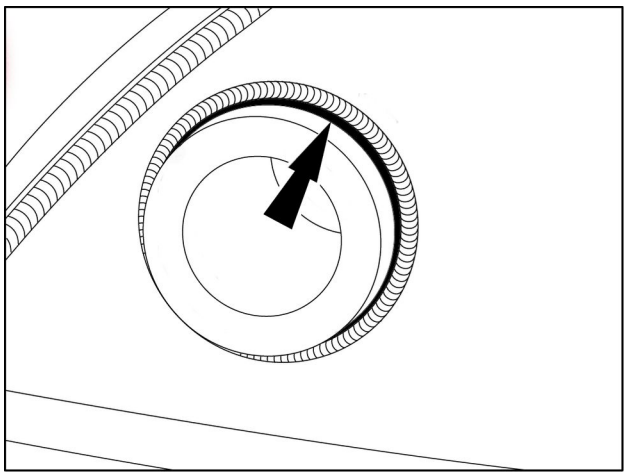
Upper boss repair

1. Attach a magnetic hole drill to the loader arm.



RAIL14SSL0303BA 1

2. Cut the welds that attach the boss to the loader arm.



RAIL14SSL0304BA 2

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Pump - Remove

SR210	Electro hydraulic controls
SR240	Electro hydraulic controls
SV280	Electro hydraulic controls
TR270	Electro hydraulic controls
TR310	Electro hydraulic controls

⚠ WARNING

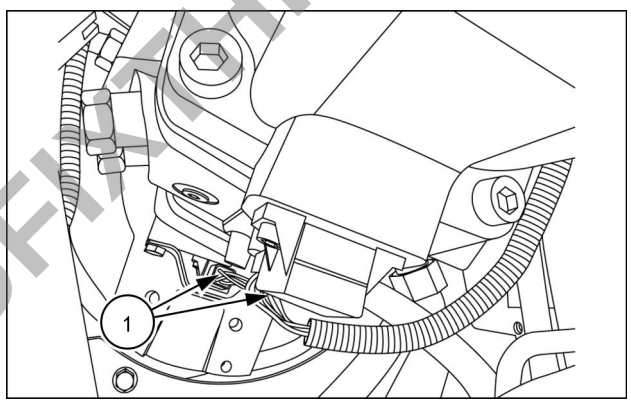
Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

W0398A

Prior operation:
Tilt the ROPS

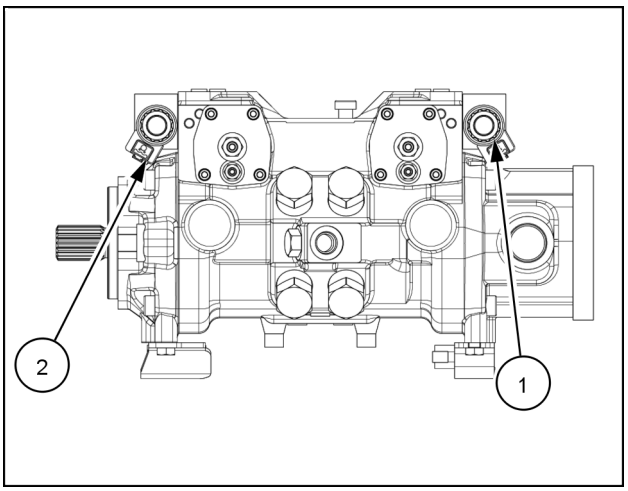
NOTE: *Some of the photos in the following procedure may appear slightly different than the model you are repairing. The procedure is the same.*

1. Label and disconnect control wires **(1)** on bottom of pumps



931001961 1

2. Label and disconnect the two front **(1)** and two rear **(2)** pump control connections.

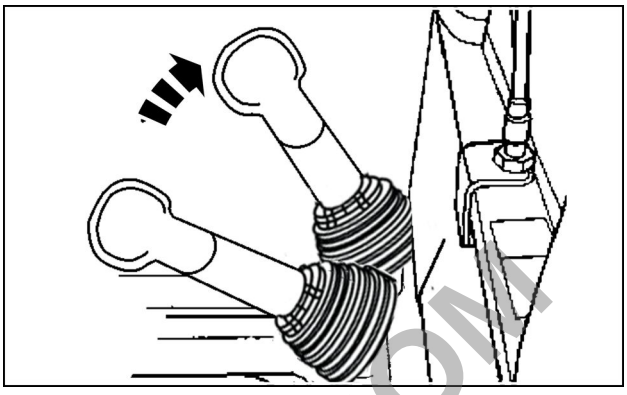


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6. Release the stroked bucket function.
7. Reset the flow meter.

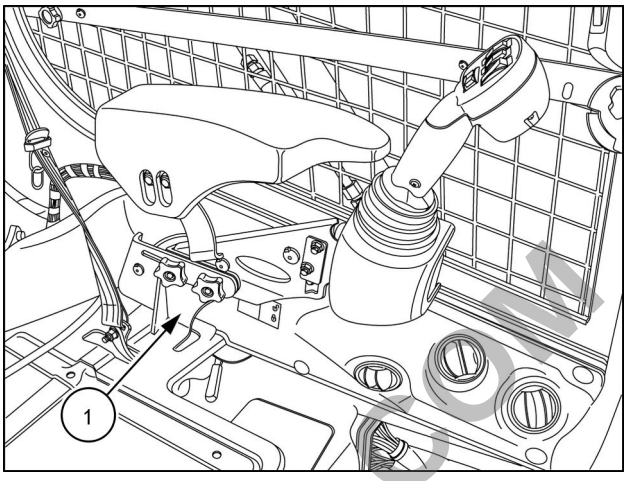


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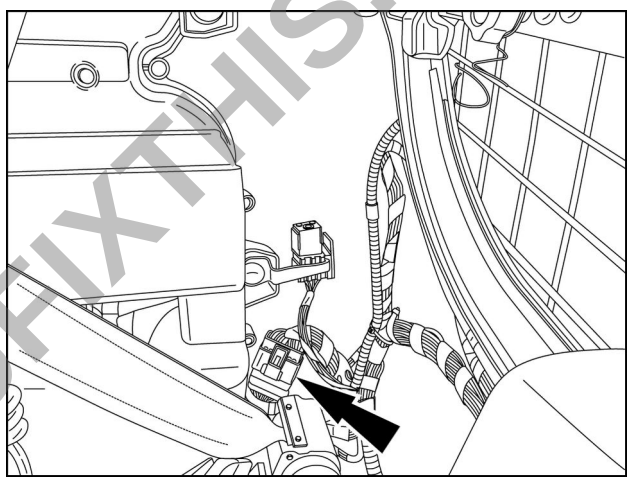
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17. Attach the joystick assembly to the cab.
18. Repeat steps **16** and **17** on the opposite side.



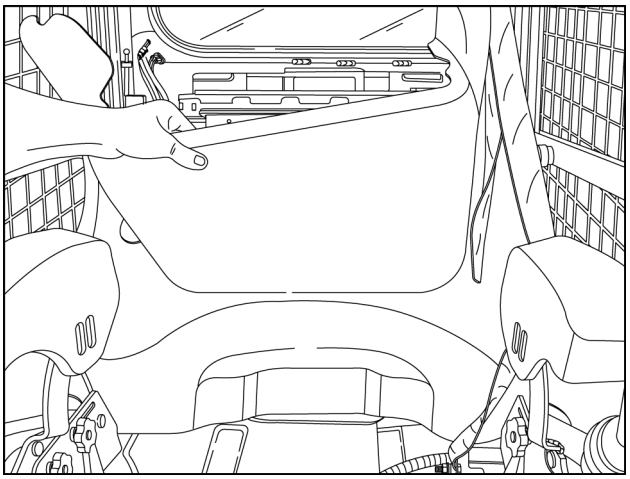
RAIL15SSL0039BA 10

19. Connect the HVAC assembly to the wiring harness.



RAIL15SSL0028BA 11

20. Install the panel into the cab.



RAIL15SSL0040BA 12

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Wiring harnesses - Electrical schematic sheet 26 Instrument Cluster

SR210 TIER 4B Final [NDM478026 -]	Electro hydraulic controls
SR240	Electro hydraulic controls
SV280	Electro hydraulic controls
TR270 TIER 4B Final [NDM462224 -]	Electro hydraulic controls
TR310	Electro hydraulic controls

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Wire connectors - Component diagram – Connectors A – Z

SR210 TIER 4B Final [NDM478026 -]	NA Electro hydraulic controls
SR240	Electro hydraulic controls
SV280	Electro hydraulic controls
TR270 TIER 4B Final [NDM462224 -]	NA Electro hydraulic controls
TR310	Electro hydraulic controls

CONNECTOR X-C23 - INSTRUMENT CLUSTER

CONNECTOR X-C23 - INSTRUMENT CLUSTER		
PIN NUMBER	WIRE NUMBER	CIRCUIT REFERENCE
2	261	HYDRAULIC OIL FILTER
3	624	KEY START OUTPUT
5	505	CAN LO
6	500	CAN HI
7	301	INSTRUMENT CLUSTER SWITCHED POWER
8	302	INSTRUMENT CLUSTER SWITCHED POWER
9	313	INSTRUMENT CLUSTER UNSWITCHED POWER
10	132	KEY IGNITION
11	267	AIR FILTER/ENGINE MALFUNCTION
12	328	SEAT SW CLUSTER INPUT
13	205C	TELEMATICS CRANK DISABLE
16	264	HYDRAULIC OIL TEMP SENDER
17	259	THROTTLE SENSOR SUPPLY
19	251	DOOR SW SIGNAL
22	543	THROTTLE SIGNAL
24	234	FUEL LEVEL SENDER
25	1070	THROTTLE SENSOR GROUND
29	137	ACCESSORY RELAY SIGNAL
30	303	HYDRAULIC LOADER INTERLOCK SIGNAL
32	622	START SIGNAL FROM CLUSTER
33	133	MAIN POWER RELAY SIGNAL
34	1011	INSTRUMENT CLUSTER GROUND

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1907-VCM - Rail 12VF1 - Aux Retract Input Power Off

SR240	Electro hydraulic controls
SV280	Electro hydraulic controls
TR310	Electro hydraulic controls

Context:
The UCM has sensed that the voltage on **CN1B pin 26** and **CN1B pin 27** is less than **9 V**. Diagnostic Trouble Code **1907 - VCM - Rail 12VF1 - Aux Retract Input Power Off** has an error priority of Amber.
The auxiliary functions are disabled while Diagnostic Trouble Code **1907 - VCM - Rail 12VF1 - Aux Retract Input Power Off** is active.

Cause:
The UCM has sensed that the voltage on **CN1B pin 26** and **CN1B pin 27** is less than **9 V**. The fault is active while the ignition is ON, the engine is not cranking, and Diagnostic Code **1903 - VCM - VCM Supply Voltage Below Operational Limit** is not active.

Possible failure modes:

1. Fuse F-018 is blown or missing.
2. An open circuit in the wiring.
3. A failure of the UCM.

Solution:

1. Verify that the fault code is active.

   Connect the Electronic Service Tool to the service tool connector.

   To check for fault codes: Start and operate the machine.

   A. The fault code is not recorded again. OK to return the machine to service.

   B. Fault code **1907 - VCM - Rail 12VF1 - Aux Retract Input Power Off** is recorded again. Go to step **2**.
2. Verify the harness is not damaged.

   Turn the ignition switch OFF.

   Inspect the UCM connections and the accessory power distribution fuse block #1 connections. All connections should be secure, tight, free of corrosion, abrasion, and damage.

   Inspect the harness from the UCM connector **CN1B** to the accessory power distribution fuse block #1. Verify that the harness is free of damage, corrosion, abrasion, and incorrect attachment.

   A. The wiring harness is not damaged and all connections are secure. Go to step **3**.

   B. The harness is damaged or the connectors are loose or damaged. Repair or replace the harness as required. Return to step **1** to confirm elimination of fault.
3. Measure the voltage at the fuse.

   Turn the ignition switch ON.

   Measure voltage between the accessory power distribution fuse block **FUSE2-EH pin B2** and chassis ground. The voltage should be approximately **12 V**.

   A. The voltage is between **9 V** and **14.8 V**. Go to step **4**.

   B. The voltage is less than **9 V**. Go to step **5**.
4. Test the UCM connection.

   Turn the ignition switch OFF.

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B. If there is no continuity, leave connector **X-9138** disconnected and continue to Step **4**.

4. Check the wastegate pressure modulator valve Y-9008 vehicle harness (VE) wiring.

   Disconnect the vehicle harness (VE) from the ECU A-9000 at connector **X-9121**.

   With the key in the OFF position, use a multimeter to perform the following continuity check on the vehicle harness (VE) side of the connectors from :

From	To	Value
X-9138 pin 27	Chassis ground	There should be no continuity.
X-9138 pin 27	All pins in connector **X-9139**	There should be no continuity.

   A. If there is continuity, there is an short circuit in the wastegate pressure modulator valve vehicle harness (VE) wiring. Use the appropriate service manual, if necessary to locate and repair the shorted conductor.

   B. If there is no continuity, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

5. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, then repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, then erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 05 – Engine Control Unit (ECU) engine connector (55.100.DP-C.20.E.05)
Wiring harnesses - Electrical schematic sheet 06 – Engine control and fuel injection (55.100.DP-C.20.E.06)

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3996-Cold start bypass valve is shorted to battery voltage

SR240	
SV280	
TR310	

Context:
The Engine Control Unit (ECU) A-9000 controls the cold start bypass valve relay K-9122 using a low side driver. If the ECU A-9000 detects a short circuit to battery in the low side driver circuit, this fault will occur.

Cause:
The ECU A-9000 has detected a short circuit to battery in the cold start bypass valve relay K-9122 low side driver circuit.

Possible failure modes:

1. Faulty cold start bypass valve relay K-9122, wiring or internal failure.
2. Faulty ECU A-9000, software.

Solution:

1. Verify fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step **6**.

2. Check the cold start bypass valve relay K-9122 coil.

   Remove the cold start bypass valve relay K-9122.

   Using a multimeter, perform the following resistance check on the cold start bypass valve relay K-9122 pins from :

From	To	Value
X-9116 pin 85	**X-9116 pin 86**	There should be approximately **70 - 130 Ω**.

   A. If there is approximately **70 - 130 Ω**, leave the relay disconnected and continue to Step **3**.

   B. If there is not approximately **70 - 130 Ω**, the relay has failed. Replace the relay.

3. Check the cold start bypass valve relay K-9122 low side driver vehicle harness (VE) wiring for a short circuit.

   With the key in the ON position, use a multimeter to perform the following voltage check from the vehicle harness (VE) side of the connector from :

From	To	Value
X-9116 pin 86	Chassis ground.	There should be no voltage.

   With the key in the OFF position, use a multimeter to perform the following continuity check from the vehicle harness (VE) side of the connector from :

From	To	Value
X-9120 pin 86	Chassis ground	There should be no voltage.
X-9120 pin 86	**X-9120 pin 85**	There should be no continuity.

   A. If the specified values are not measured, there is a short circuit in the cold start bypass valve relay K-9122 vehicle harness (VE) wiring. Use the appropriate service manual, if necessary, to locate and repair the shorted conductor.

   B. If the specified values are measured, leave the connector disconnected and continue to Step **4**.

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B. The resistance is greater than **100 Ω**. There is an open circuit. Go to step **4**.

4. Measure the solenoid resistance.

   Measure the resistance across the solenoid terminals pin 1 and pin 2. The resistance should be less than **100 Ω**.

   A. The resistance is less than **100 Ω**. Go to step **5**.

   B. The resistance is greater than **100 Ω**. There is an open circuit in the solenoid. Replace the solenoid and retest. Return to step **1** to confirm elimination of the fault.

5. Measure the resistance through the circuit.

   Leave UCM connectors **CN1A** and **CN1B** disconnected.

   Fabricate a jumper wire that will connect between X-24 pin 1 and pin 2.

   Connect the jumper wire between X-24 pin 1 and pin 2.

   Measure the resistance between **CN1B pin 33** and **CN1A pin 22**. The resistance should be less than **10 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

   A. The resistance is less than **10 Ω**. Temporarily replace the UCM and retest. Return to step **1** to confirm elimination of the fault.

   B. The resistance is greater than **10 Ω**. There is an open circuit in the wiring. Repair or replace the harness as required. Return to step **1** to confirm elimination of the fault.

Wiring harnesses - Electrical schematic sheet 19 Unit Control Module (55.100.DP-C.20.E.19)
Wiring harnesses - Electrical schematic sheet 11 Loader Valve and Sensors (55.100.DP-C.20.E.11)

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