Safety rules - 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.

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

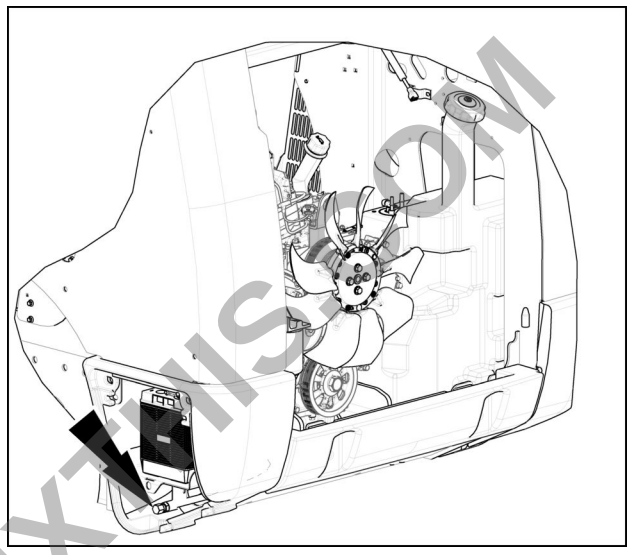
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Engine - Drain fluid - Remote oil drain

SR210 TIER 4B (FINAL) [NGM418237 -]	
SR240 TIER 4B (FINAL) [NGM418237 -]	
SV280 TIER 4B (FINAL) [NGM418237 -]	
TR270 TIER 4B (FINAL) [NGM418237 -]	
TR310 TIER 4B (FINAL) [NGM418237 -]	

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**).

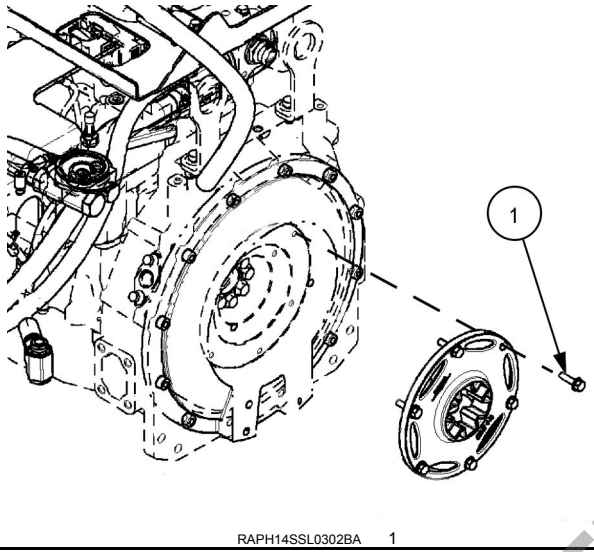


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Pump-drive coupling - Torque

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

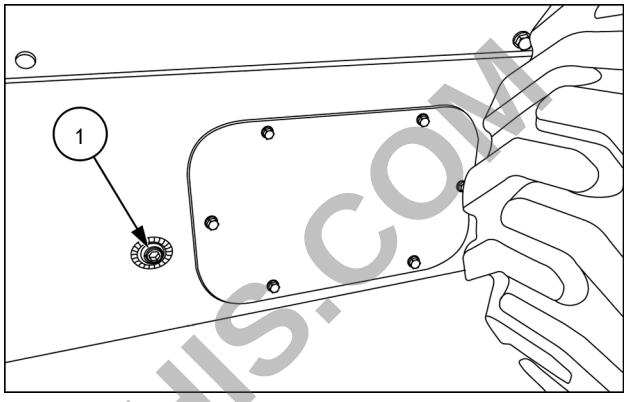
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Chain drive system - Change fluid

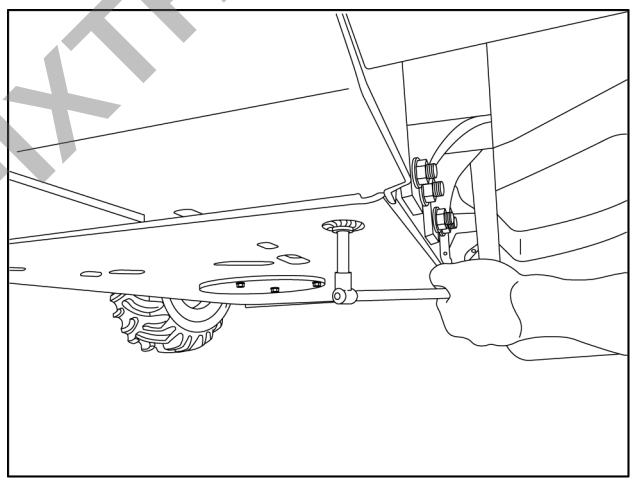
SR210	
SR240	
SV280	

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



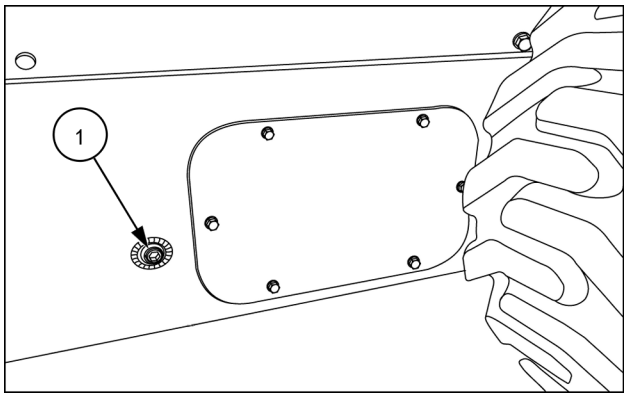
RAIL13SSL0560AA 1

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

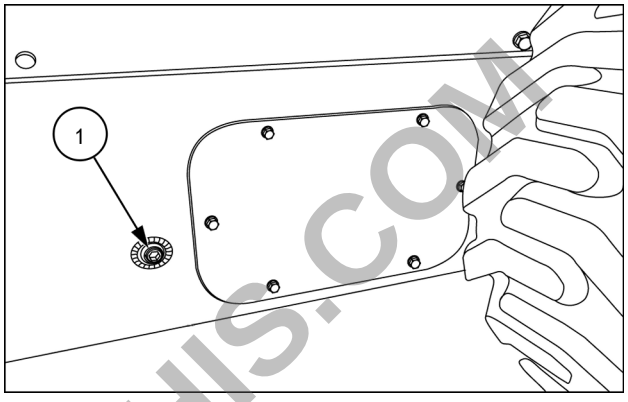
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Chain drive system - Change fluid

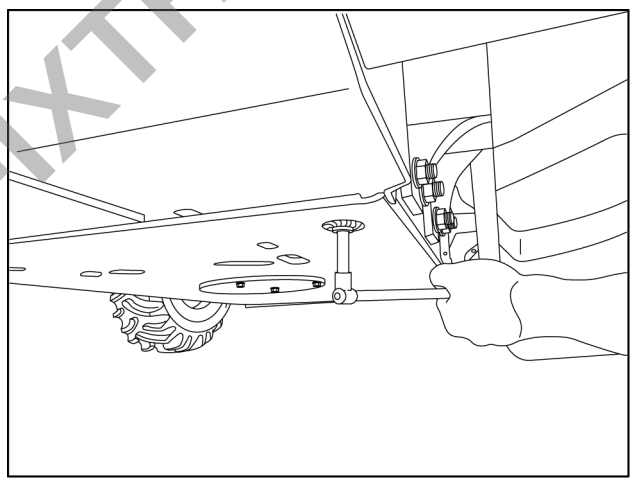
SR210	
SR240	
SV280	

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



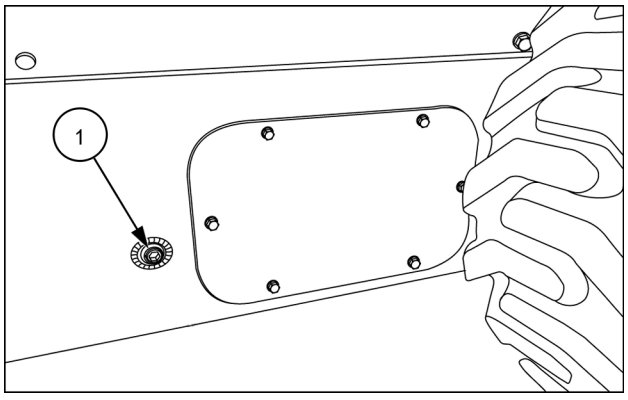
RAIL13SSL0560AA 1

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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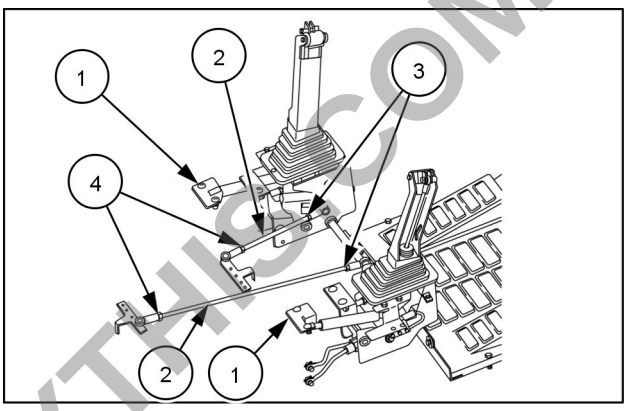
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Mechanical control - Adjust - Machines with only hand controls

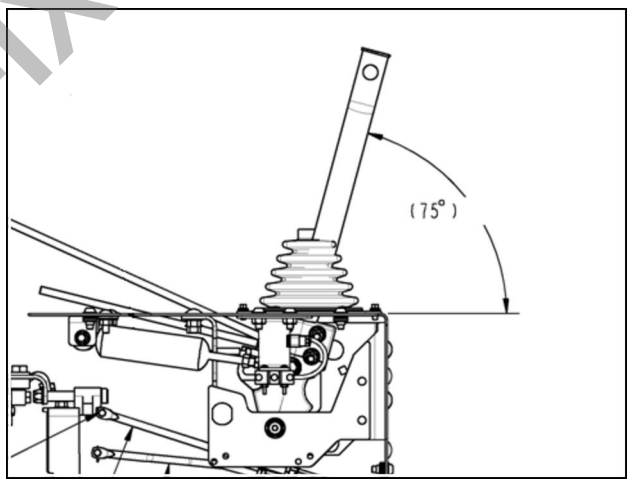
SR210	(Mechanical hydraulic controls)
SR240	(Mechanical hydraulic controls)
SV280	(Mechanical hydraulic controls)
TR270	(Mechanical hydraulic controls)
TR310	(Mechanical hydraulic controls)
TV370 TIER 4B (FINAL) [NHM435463 -]	(Mechanical hydraulic controls)

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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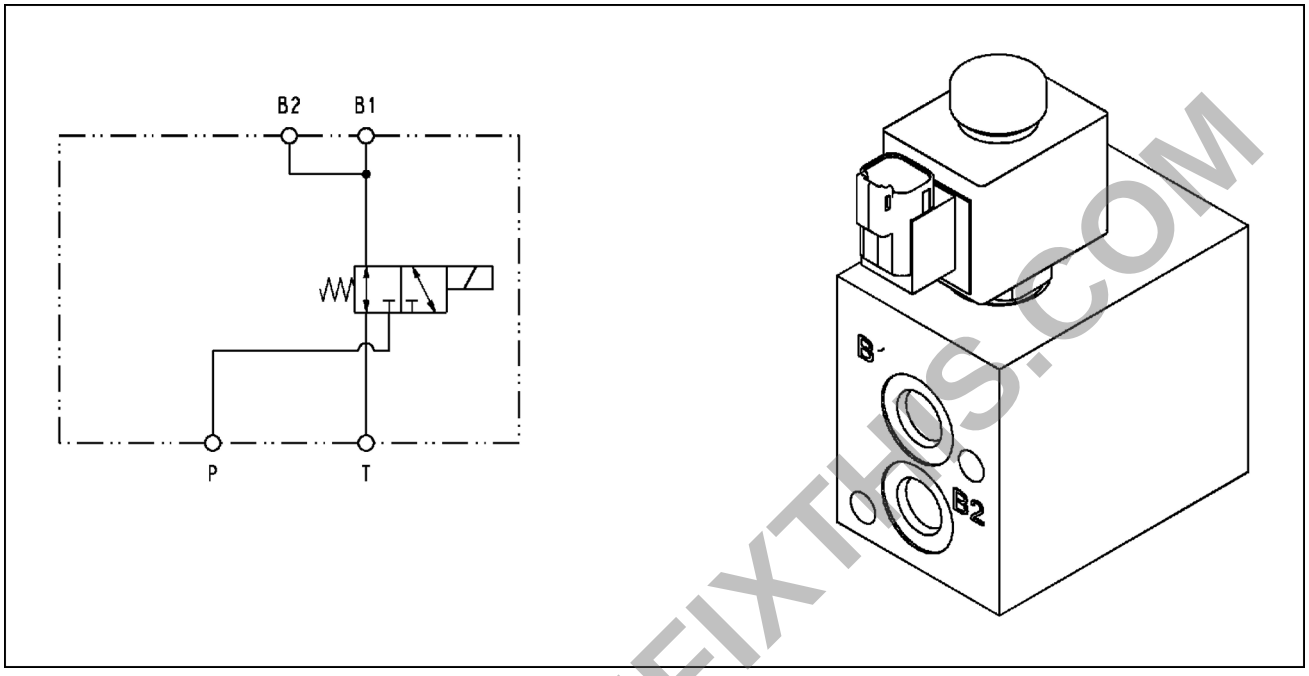
23112922 2

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Parking brake control valve or manifold - 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 or manifold - General specification

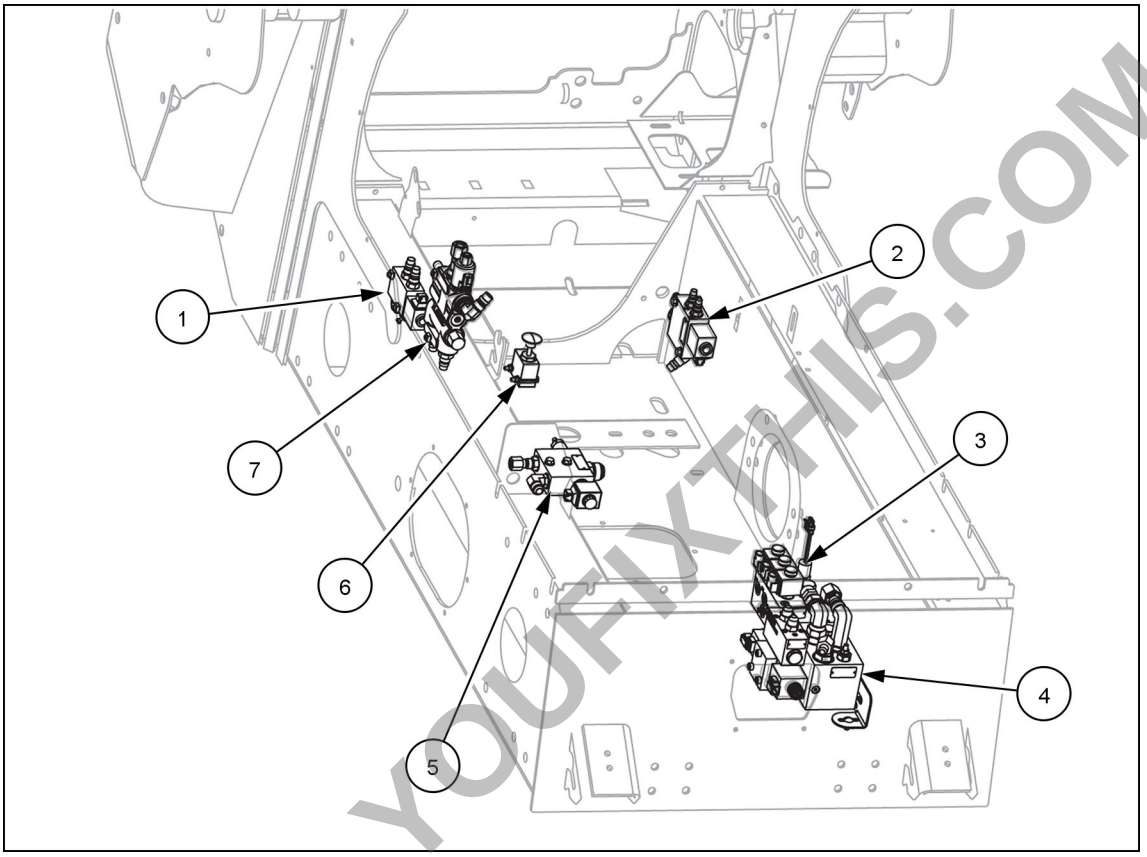
SR210	(Electro hydraulic controls)
SR240	(Electro hydraulic controls)
SV280	(Electro hydraulic controls)

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Hydraulic systems - Component localization

SR210 TIER 4B (FINAL) [NGM418237 -]	
SR210 TIER 4B (FINAL) [NHM435463 -]	
SR240 TIER 4B (FINAL) [NGM418237 -]	
SR240 TIER 4B (FINAL) [NHM435463 -]	
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

⚠ DANGER

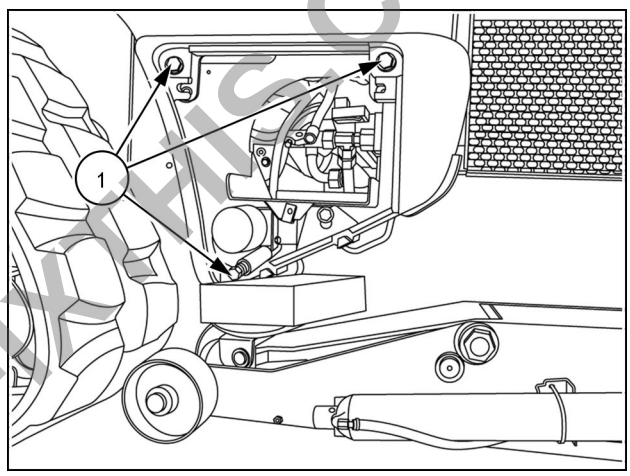
Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply will result in death or serious injury.

D0076A

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

Left hand side

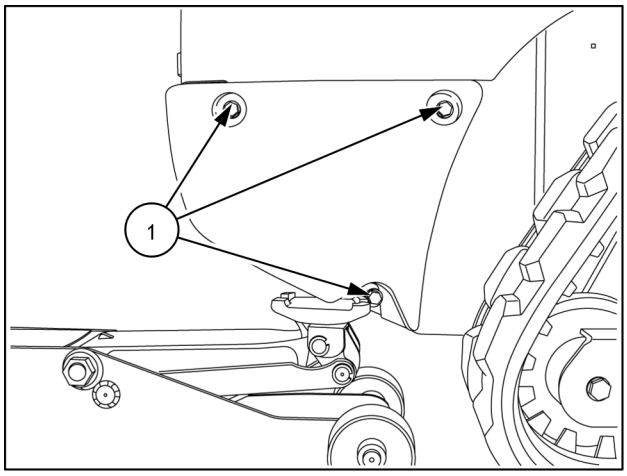
1. Support the counterweight with a suitable lifting device. Remove corner mounting hardware **(1)**.
2. Remove the counterweight.



RAPH12SSL0289AA 1

Right hand side

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



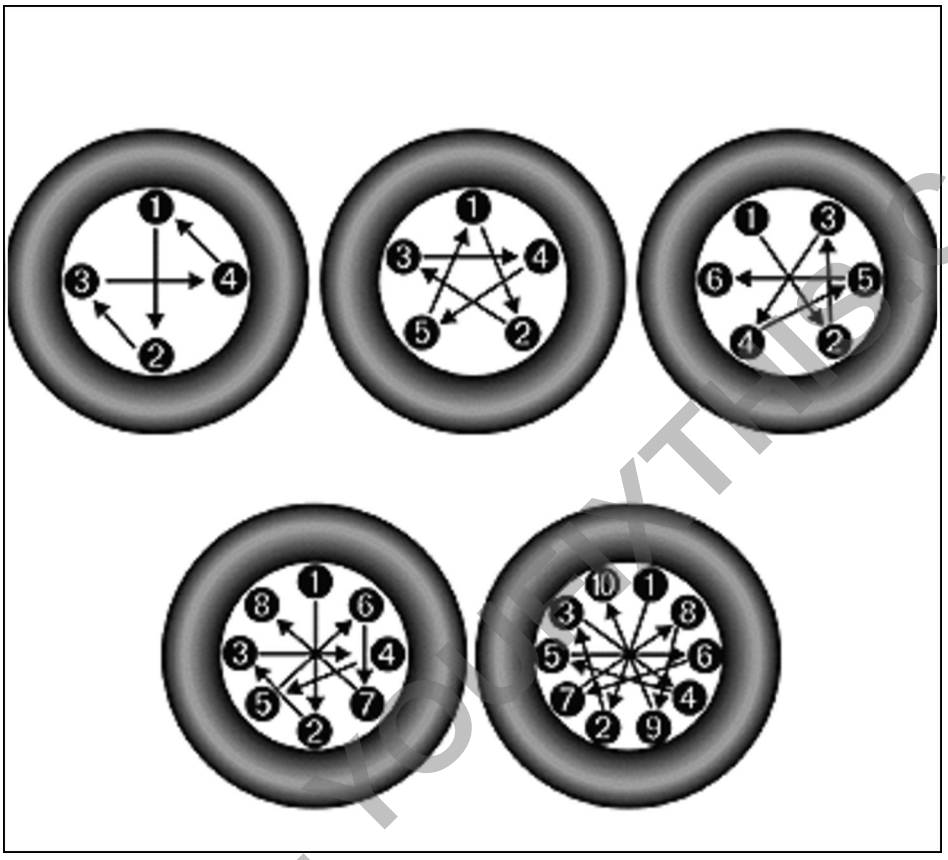
RAPH12SSL0041AA 2

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Front wheels - Torque

SR210 TIER 4B (FINAL) [NGM418237 -]	
SR210 TIER 4B (FINAL) [NHM435463 -]	
SR240 TIER 4B (FINAL) [NGM418237 -]	
SR240 TIER 4B (FINAL) [NHM435463 -]	
SV280 TIER 4B (FINAL) [NGM418237 -]	
SV280 TIER 4B (FINAL) [NHM435463 -]	



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Torque pattern

Torque table

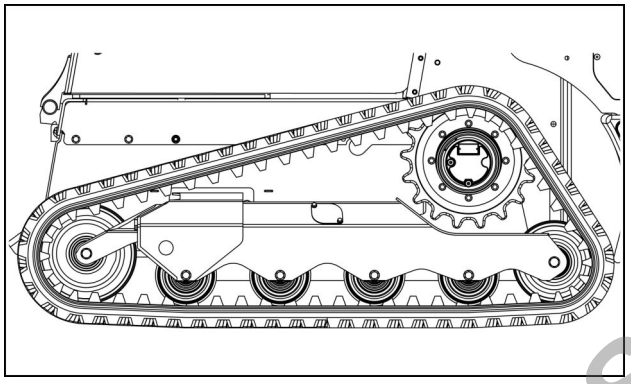
Taper nut torque	**169.5 N·m** (**125 lb ft**)
Flange nut torque	**203.5 N·m** (**150 lb ft**)

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Track frame and driving wheels - Overview

TR310 TIER 4B (FINAL) [NGM418237 -]	
TR310 TIER 4B (FINAL) [NHM435463 -]	
TV370 TIER 4B (FINAL) [NHM435463 -]	



RAIL17CTL0001AA 1

Low-Profile Undercarriage

The Compact Track Loaders (CTL) now feature a redesigned undercarriage beginning February 2016, starting serial number (NGM414518 – and beyond). The new low-profile design promotes the same quality and long lasting **Berco®** undercarriage components. The primary change from the older style undercarriage is in the frame design of the undercarriage.

The newer design changes immediately increase the ease of cleanout by eliminating the large angled carrier design used in the older style undercarriage. The updated carrier design features an improved yoke-to-frame engagement which increases track alignment, maximizes the track life, and produces less operating noise. The new design does not affect or increase performance specifications that were met with the older style undercarriage design. The new design allows for an ease of serviceability to the undercarriage which lowers the cost of operation and in time provides undercarriage longevity.

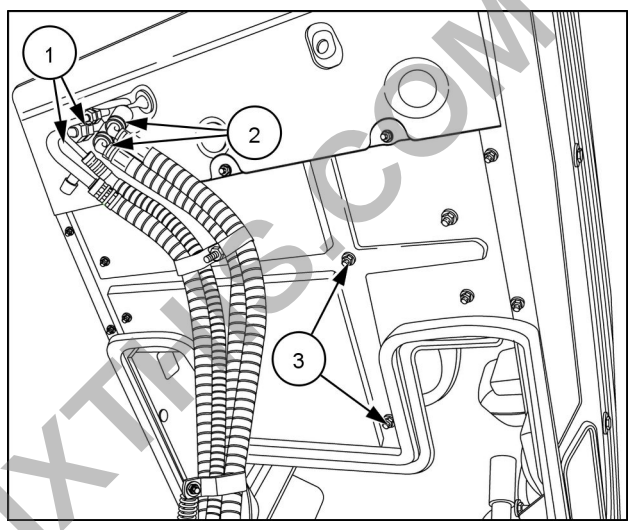
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Heater core - Remove

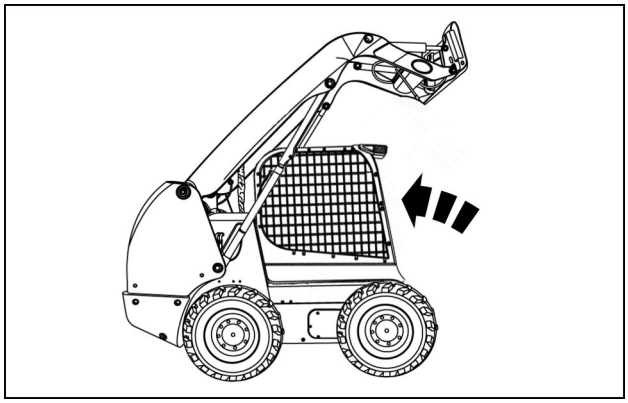
Prior operation:
Tilt the cab. Please see **Cab tilting system - Tilt (90.150)**
Prior operation:
Discharge the A/C (if applicable). Please see **Air conditioning - Discharging (50.200)**.

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.

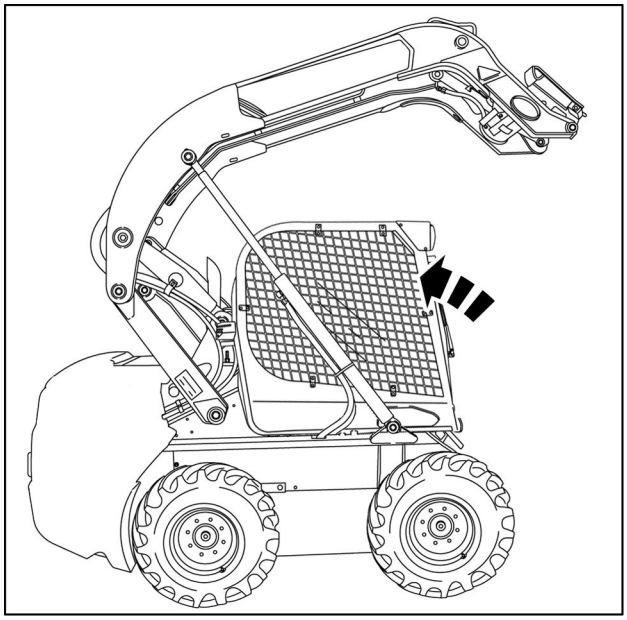


RAIL15SSL0042BA 1

4. Carefully lower the cab. Please see **Cab tilting system - Lower (90.150)** for assistance.



RAIL14SSL0418AA 2



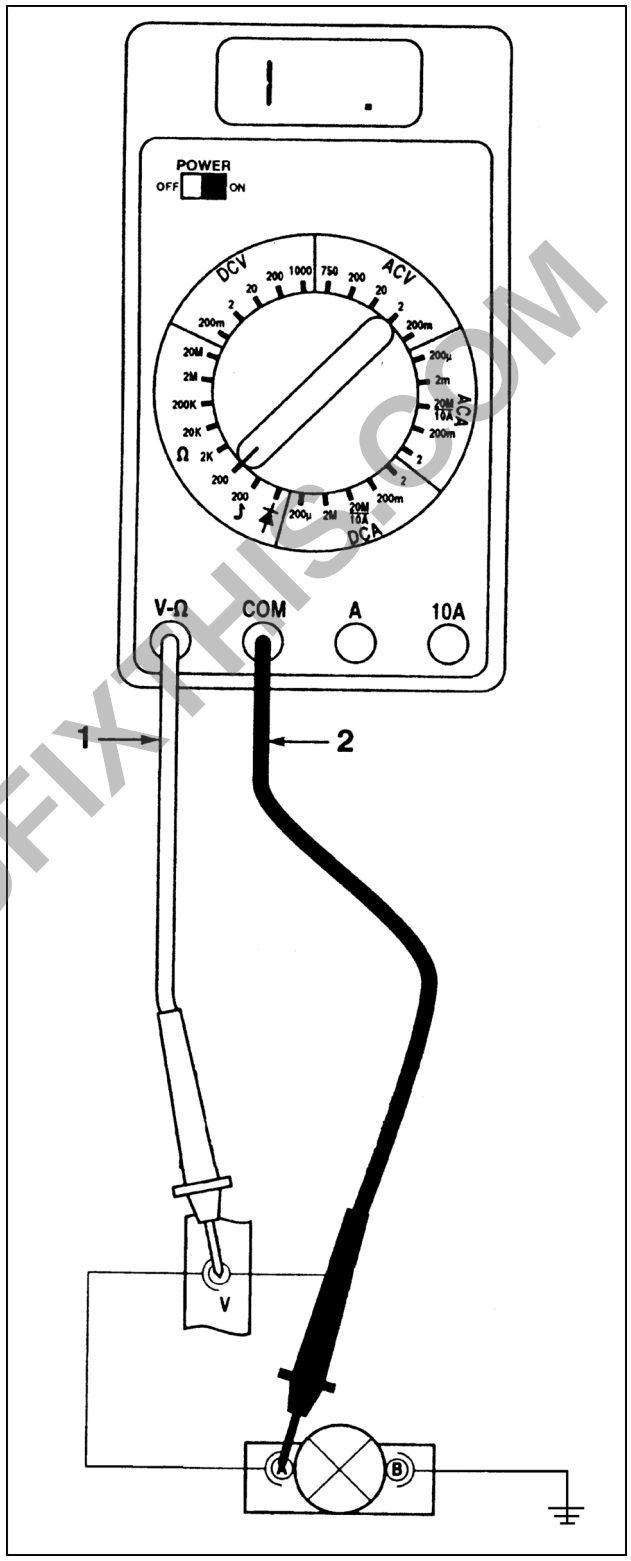
RAPH14SSL0351BA 3

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3. Set meter to measure resistance or ohms, and measure circuit resistance as illustrated. Use the red meter lead **(1)** to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors. Use the black lead **(2)** to make contact with the connector pin at the other end of the circuit. Avoid contact with other pins in the connector and the connector case, if it is metal.

NOTE: *Testing continuity from one connector to another is often not possible given the distance between the connectors. The alternate method used in this service manual requires the use of a jumper wire. Attach the jumper wire between the specified pin in one of the connectors and chassis (frame) ground. Use the red lead of the multi-meter to touch the specified pin of the other connector and touch the black lead to chassis (frame) ground. Using chassis (frame) ground as an integral part of the continuity test requires good electrical contact with the metal frame (chassis). Paint and contaminants serve as insulators and reduce the effectiveness of the electrical connection. If possible use frame (chassis) ground points already established for the black lead and one end of the jumper wire.*



26093637 1

4. Determine if measured resistance falls within guidelines specified in the procedure. If the resistance is no more than **3 – 4 ohms**, the circuit is continuous. More resistance usually indicates dirty or corroded terminals in connectors, and **100k ohms** or greater indicates an open circuit.

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Disconnect the instrument cluster connector X-C23.

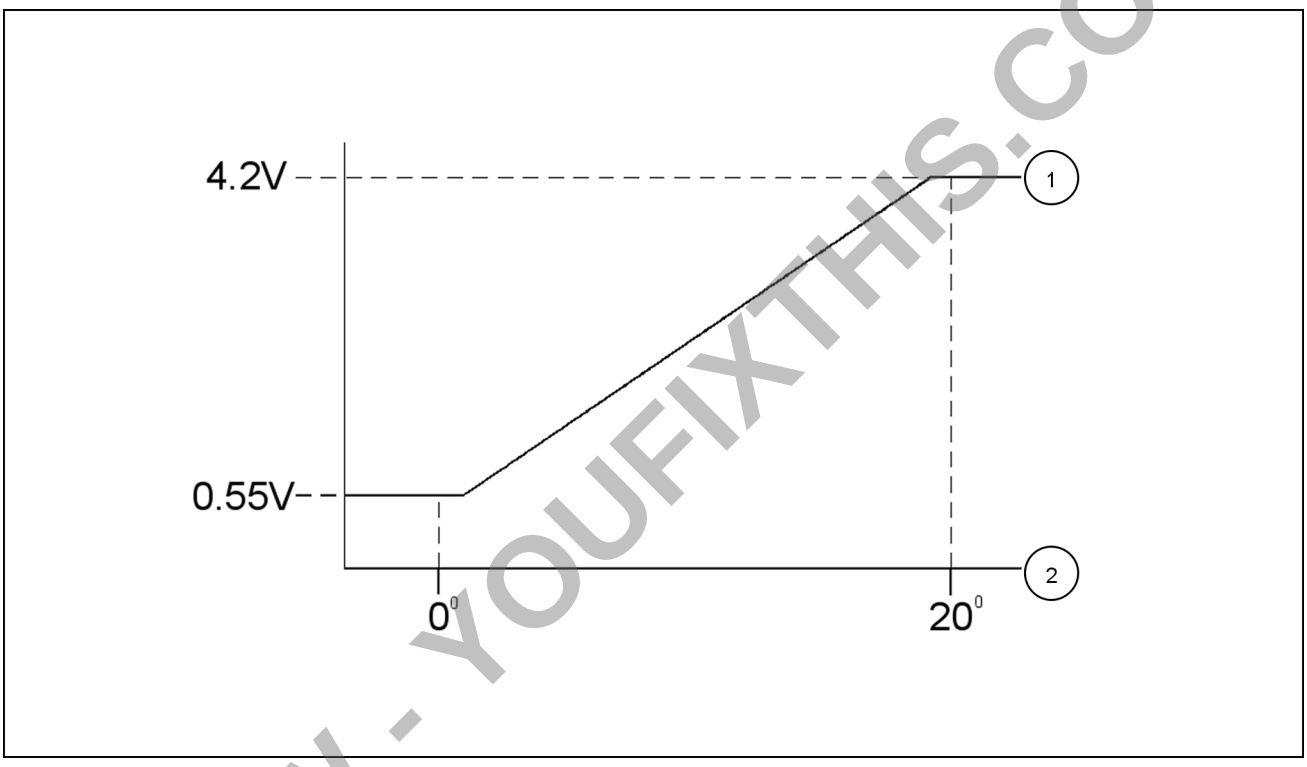
Turn the ignition switch ON.

Measure the voltage between X-20 pin A and chassis ground. The voltage should be less than **0.5 V**. Wiggle the harness during measurement to reveal an intermittent condition.

A. The voltage is less than **0.5 V**. Go to step **5**.

B. The voltage is greater than **0.5 V**. There is a short circuit to another voltage source. Repair or replace the wire as required. Return to step **1** to confirm elimination of the fault.

5. Check the signal voltage from the sensor.



RCPH10TLB053FAM 1

Throttle Signal Legend	
(1)	Throttle Signal Voltage
(2)	Throttle movement in degrees of travel. **0°** equals low idle. **20°** equals WOT (Wide Open Throttle).

This step is used to monitor the throttle signal. The sensor must be connected and active in order to continue. The dealer must build a breakout harness as shown below.

Connect the breakout harness between the foot throttle sensor and the instrument cluster.

Measure the voltage between pin A and pin B (or slide back probes into pin A and pin B).

Turn the ignition switch ON, engine OFF.

Measure the voltage between pin A and pin B. Move the throttle from low idle to WOT (wide open throttle). The voltage should change from approximately **0.55 V** at low idle to **4.2 V** at WOT.

A. The voltage changed from approximately **0.55 V** to **4.2 V**. Go to step **6**.

B. The voltage did not change from **0.55 V** to **4.2 V** as the throttle moved from low idle to WOT or the voltage was less than **0.55 V**. Temporarily replace the sensor and retest. Return to step **1** to confirm elimination of fault.

6. Measure the throttle signal from the sensor to the instrument cluster.

Turn the ignition switch OFF.

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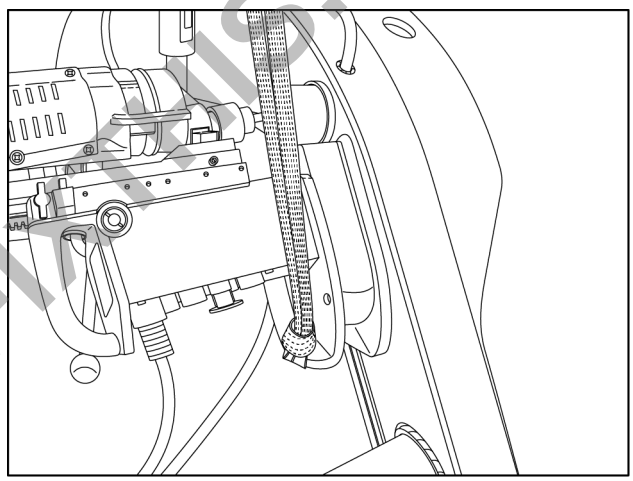
Arm - Repair

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.

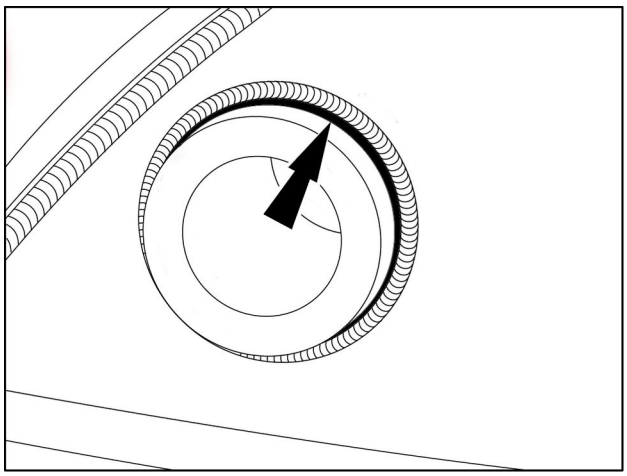
Upper boss repair

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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Cab and platform - Remove

⚠ DANGER

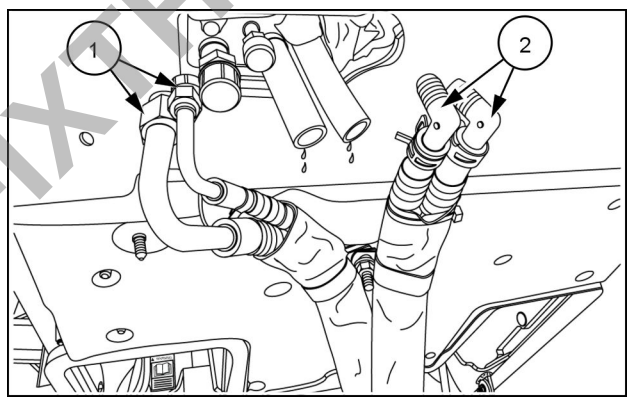
Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply will result in death or serious injury.

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The following procedure has been performed on a vertical lift machine with an inclosed, HVAC cab. Removing an opened cab is very similar. Removing the cab on a radial lift machine is very similar. Please use this procedure for all cab removals on all types of machines.

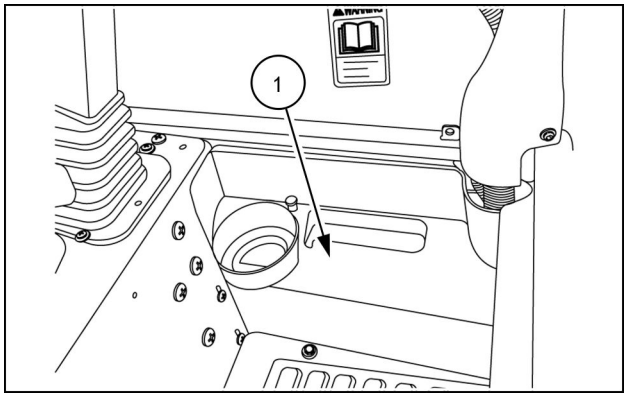
Prior operation:
If equipped with a cab heater, drain the coolant. Please see **Radiator - Drain fluid (10.400)**
Prior operation:
If equipped with a cab air conditioner, discharge the refrigerant. Please see **Air conditioning - Discharging (50.200)**
Prior operation:
Tilt the cab. Please see **Cab tilting system - Tilt (90.150)**

1. Disconnect the A/C lines **(1)**, if applicable.
2. Disconnect the heater hoses **(2)**, if applicable.



931001757 1

3. Remove the cup holder **(1)**.



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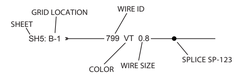
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TABLE OF CONTENTS / STANDARD SYMBOLS

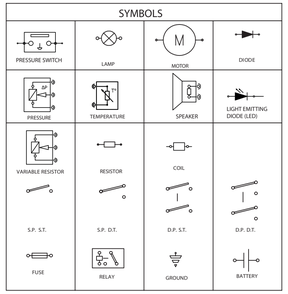
Diagram
SH01 - TITLE PAGE
SH02 - MAIN POWER DISTRIBUTION
SH03 - ACCESSORY POWER DISTRIBUTION
SH04 - IGNITION / CHARGING SYSTEM
SH05 - GROUNDING SYSTEM
SH06 - ENGINE F5C T4
SH07 - ENGINE F5C T4
SH08 - ENGINE F5C T4
SH09 - THROTTLE SENSORS
SH10 - ET PUMP / HYDRAULICS
SH11 - HYDRAULIC INTERLOCKS
SH12 - LOADER VALVE AND SENSORS
SH13 - BULKHEAD CONNECTION
SH14 - BULKHEAD CONNECTION
SH15 - BULKHEAD CONNECTION
SH16 - LEFT-HAND CAB CONSOLE
SH17 - LEFT NH CONTROL HANDLE
SH18 - RIGHT NH CONTROL HANDLE
SH19 - RIGHT NH CONTROL HANDLE
SH20 - UNIT CONTROL MODULE

Diagram
SH21 - UNIT CONTROL MODULE
SH22 - LAMPS
SH23 - INDICATORS
SH24 - EU LIGHT ADAPTER
SH25 - BOOM ROAD LIGHTS
SH26 - WIPERS / WASHERS
SH27 - INSTRUMENT CLUSTER
SH28 - HVAC
SH29 - RADIO
SH30 - UJM CONNECTORS
SH31 - MULTIFUNCTION CONNECTOR
SH32 - TELEMATICS
SH33 - MULTIFUNCTION JUMPER
SH34 - 2ND AUX
SH35 - DIAGNOSTIC CONNECTOR
SH36 - FUEL FILTER JUMPER
SH37 - CHASSIS INTERFACE X-900 / X-901
SH38 - CHASSIS INTERFACE
SH39 - CHASSIS INTERFACE X-900 / X-901 MD

CIRCUIT DIAGRAM LEGEND



SYMBOLS

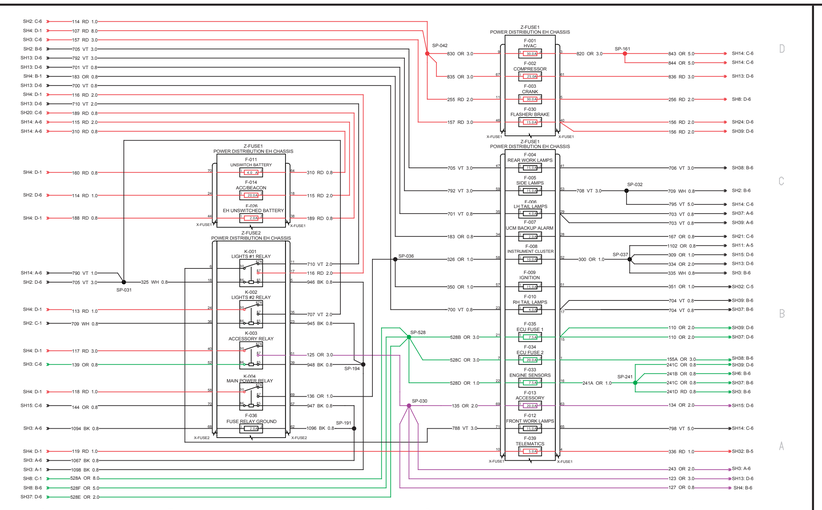


COLOR	ABBREVIATION
BLACK	BK
BLUE	BL
LIGHT BLUE	LB
BLACK/WHITE	BK/WH
GREEN	GN
LIGHT GREEN	LG
ORANGE	OR
PINK	PK
VIOLET	VT
RED	RD
GREY	GY
TAN	TN
WHITE	WH
YELLOW	YE

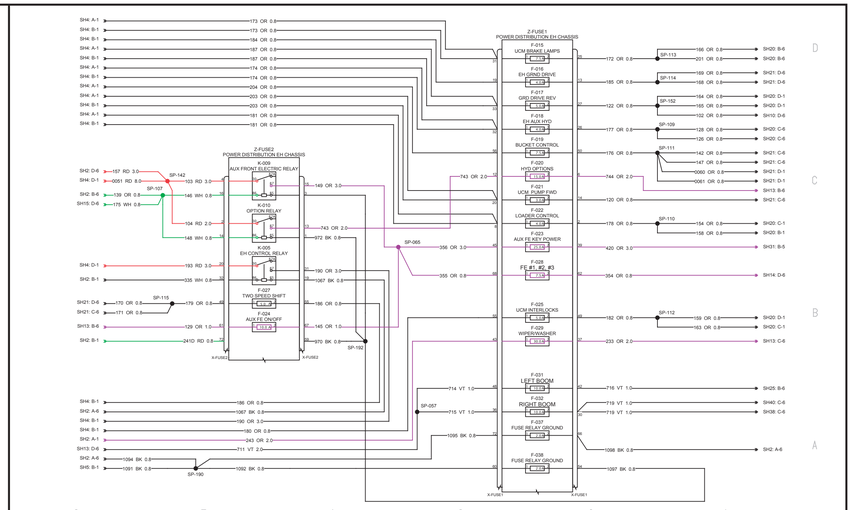
WIRE SIZE CHART	
Sq. mm	AWG
0.5	20
0,8	18
1.0	16
2.0	14
3.0	12
5.0	10
8.0	8

NOTE:
DIAGRAM SHOWN WITH VEHICLE PARKED & POWER OFF

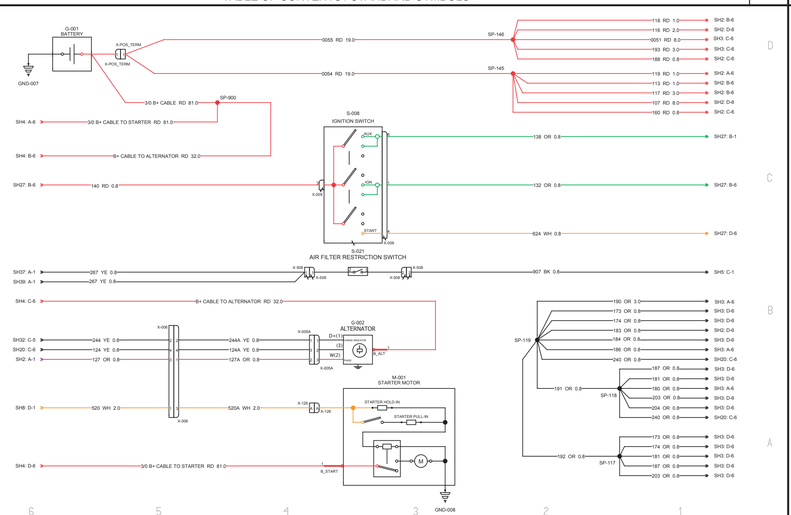
MAIN POWER DISTRIBUTION



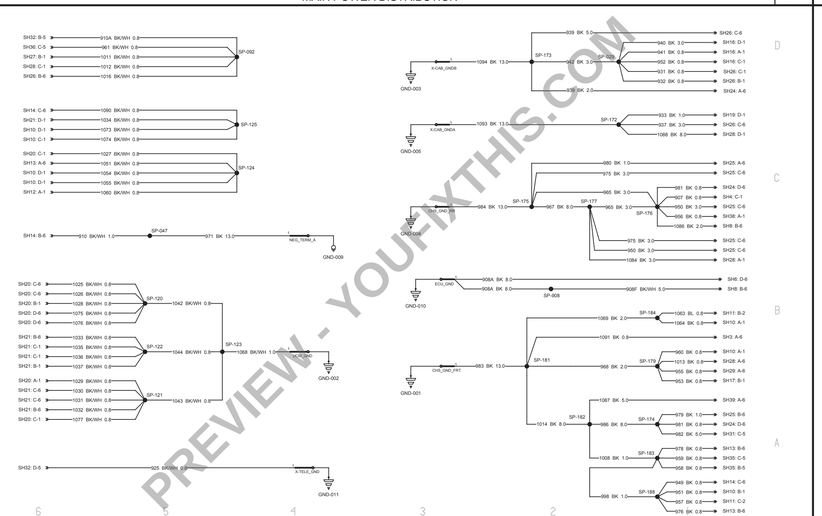
ACCESSORY POWER DISTRIBUTION



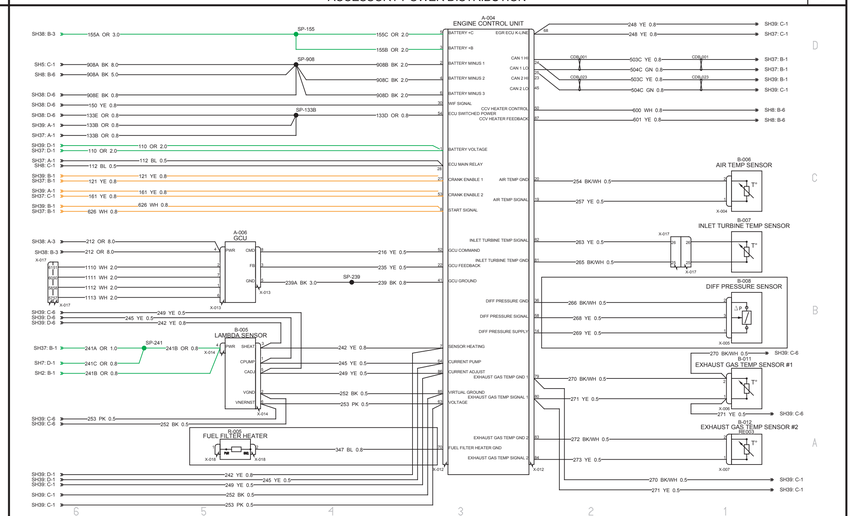
IGNITION / CHARGING SYSTEM



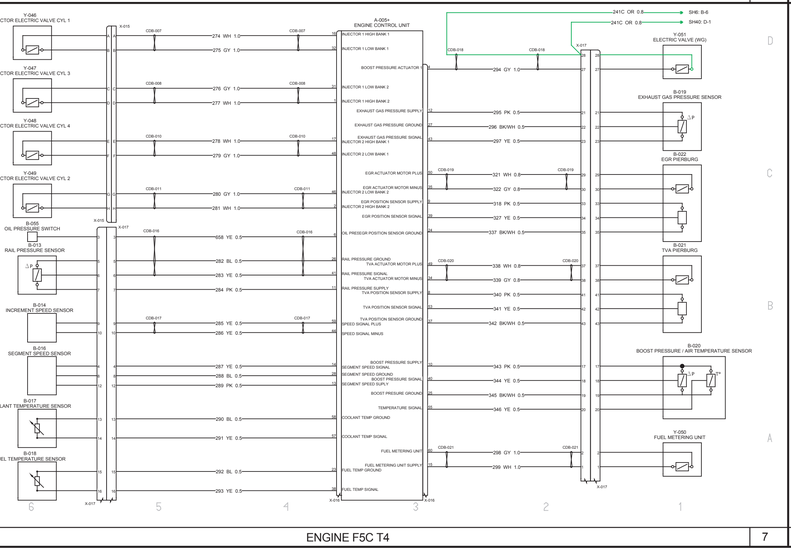
MAIN POWER DISTRIBUTION



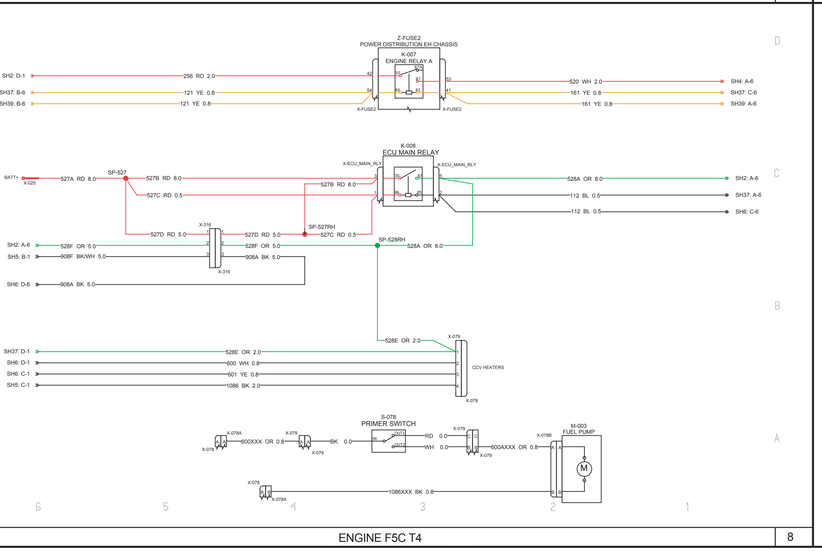
ACCESSORY POWER DISTRIBUTION



IGNITION / CHARGING SYSTEM



GROUNDING SYSTEM



ELECTRICAL SCHEMATIC

TIER 4B (FINAL)
ELECTRO-HYDRAULIC (EH) CONTROLS

Skid Steer Loaders:
SR210 - NGM418237 and above
SR210 - NHM435463 and above
SR240 - NGM418237 and above
SR240 - NHM435463 and above
SV280 - NGM418237 and above
SV280 - NHM435463 and above

Compact Track Loaders:
TR270 - NGM418237 and above
TR270 - NHM435463 and above
TR310 - NGM418237 and above
TR310 - NHM435463 and above
TV370 - NHM435453 and above

- BATTERY POWER
- STARTING SEQUENCE
- SWITCHED POWER
- POWER RELAY OUTPUT

RAC 48144044

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Contents

INTRODUCTION

Engine 10

[10.001] Engine and crankcase 10.1

[10.216] Fuel tanks 10.2

[10.400] Engine cooling system 10.3

[10.414] Fan and drive 10.4

[10.304] Engine lubrication system 10.5

Power coupling 19

[19.121] Pump-drive assembly 19.1

Front axle system 25

[25.450] Chain drive system 25.1

Rear axle system 27

[27.650] Chain drive system 27.1

Hydrostatic drive 29

[29.200] Mechanical control 29.1

[29.218] Pump and motor components 29.2

[29.202] Hydrostatic transmission 29.3

Brakes and controls 33

[33.110] Parking brake or parking lock 33.1

Hydraulic systems 35

[35.000] Hydraulic systems 35.1

[35.300] Reservoir, cooler, and filters 35.2

[35.104] Fixed displacement pump 35.3

[35.359] Main control valve 35.4

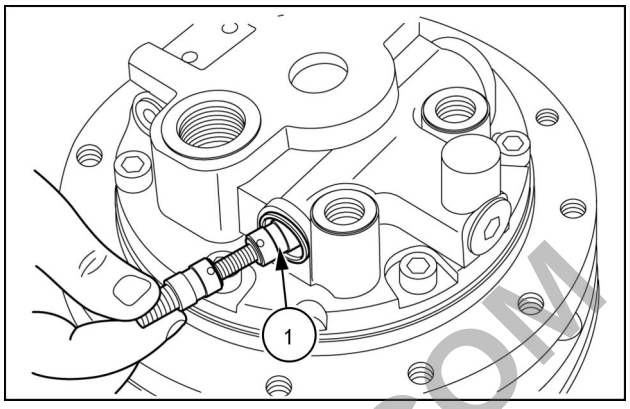
[35.525] Auxiliary hydraulic valves and lines 35.5

[35.600] High flow hydraulics 35.6

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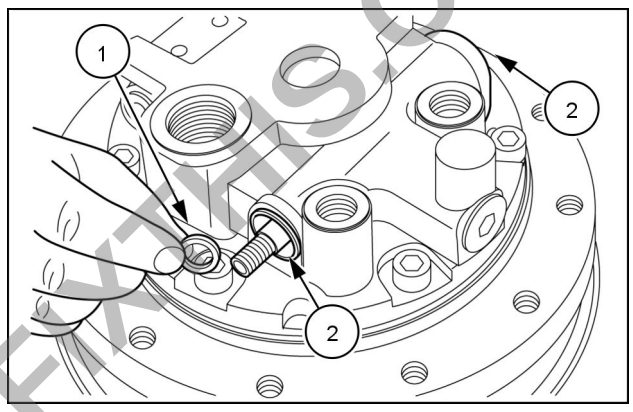
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42. Slide plunger **(1)** inside the base plate.



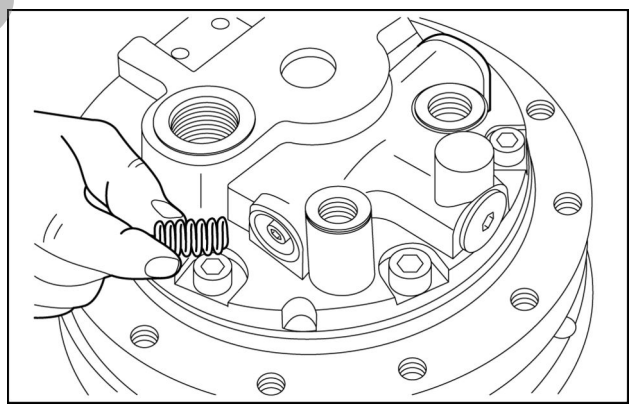
83115724 40

43. Install the spring seats **(1)** on each end of the plunger **(2)** .



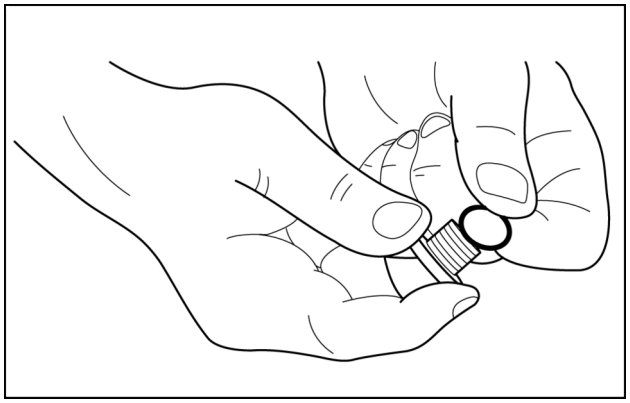
83115723_2 41

44. Install the springs on each end of the plunger.



83115722 42

45. Install the O-rings on the 2 plugs.



83115721 43

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Wiring harnesses - Electrical schematic sheet 20 SH20-UNIVERSAL CONTROL MODULE

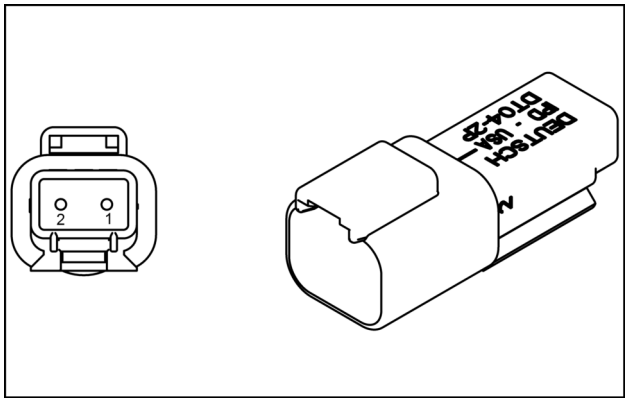
SR210 TIER 4B (FINAL) [NGM418237 -]	(Electro hydraulic controls)
SR210 TIER 4B (FINAL) [NHM435463 -]	(Electro hydraulic controls)
SR240 TIER 4B (FINAL) [NGM418237 -]	(Electro hydraulic controls)
SR240 TIER 4B (FINAL) [NHM435463 -]	(Electro hydraulic controls)
SV280 TIER 4B (FINAL) [NGM418237 -]	(Electro hydraulic controls)
SV280 TIER 4B (FINAL) [NHM435463 -]	(Electro hydraulic controls)
TR270 TIER 4B (FINAL) [NGM418237 -]	(Electro hydraulic controls)
TR270 TIER 4B (FINAL) [NHM435463 -]	(Electro hydraulic controls)
TR310 TIER 4B (FINAL) [NGM418237 -]	(Electro hydraulic controls)
TR310 TIER 4B (FINAL) [NHM435463 -]	(Electro hydraulic controls)
TV370 TIER 4B (FINAL) [NHM435463 -]	(Electro hydraulic controls)

Type	Component	Connector / Link	Description
ECU	**A-002A**	**X-CN1A X-CN2A X-CN1B X-CN2B**	UNIVERSAL CONTROL MODULE
Resistor	**R-002**		CAN TERMINATOR
Connector	X-CN1A	**X-CN1A**	UCM CN1A
Connector	X-CN1B	**X-CN1B**	UCM CN1B
Connector	X-CN2A	**X-CN2A**	UCM CN2A
Connector	X-CN2B	**X-CN2B**	UCM CN2B
Connector	X-FUSE1	**X-FUSE1**	

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X-432 - PROPORTIONAL AUX VALVE RETRACT (87695584) (Plug)

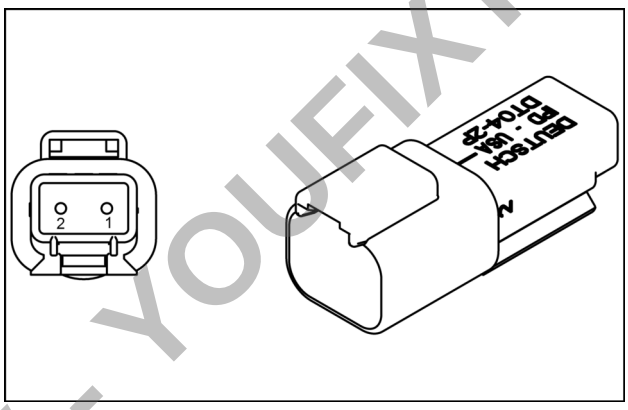


87695584 2

87695584

Pin	From	Wire	Description	Color-Size	Frame
1	Y-002-P-OUT	WIRE1575	WIRE1575		**SHEET 19**
2	Y-002-P-IN	WIRE1574	WIRE1574		

X-433 - PROPORTIONAL AUX VALVE EXTEND (87695584) (Plug)



87695584 3

87695584

Pin	From	Wire	Description	Color-Size	Frame
1	Y-003-P-OUT	WIRE1577	WIRE1577		**SHEET 19**
2	Y-003-P-IN	WIRE1576	WIRE1576		

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A. The voltage is less than **4.4 V**. Go to step **4**.

B. The voltage is greater than **5.6 V**. Go to step **6**.

C. The voltage is greater than **4.4 V** but less than **5.6 V**. There does not seem to be a problem at this time. Reprogram the UCM with the latest software. If the fault code persists, temporarily replace the UCM and retest. Return to step **1** to confirm elimination of the fault.

4. Check for a short circuit to chassis ground.

   Turn the ignition switch OFF.

   Disconnect the UCM connector **X-CN1A (Receptacle)** .

   Disconnect the right hand control handle, and the universal joystick module.

   Use a digital voltmeter to measure the resistance between **X-CN1A (Receptacle) pin 9** and chassis ground. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

   A. The resistance is greater than **20,000 Ω**. Go to step **5**.

   B. The resistance is less than **20,000 Ω**. There is a short circuit to chassis ground. Repair or replace the harness as required. Return to step **1** to confirm elimination of the fault.

5. Reconnect the components to the harness while monitoring the resistance.

   Use a digital voltmeter to measure the resistance between **X-CN1A (Receptacle) pin 9** and chassis ground.

   Reconnect the components one at a time (the right hand control handle, and the universal joystick module), while monitoring the resistance reading. The resistance should be greater than **20,000 Ω** while the components are reconnected into the circuit.

   A. The resistance is greater than **20,000 Ω** but dropped below **20,000 Ω** when a component was reconnected into the circuit. Temporarily replace the component that dropped the resistance and retest. Return to step **1** to confirm elimination of the fault.

   B. The resistance is greater than **20,000 Ω** while each component was reconnected into the circuit. Temporarily replace the UCM and retest. Return to step **1** to confirm the elimination of the fault.

6. Check for an open circuit in the wiring.

   Turn the ignition switch OFF.

   Disconnect the UCM connector **X-CN1A (Receptacle)** .

   Fabricate a jumper wire that will connect **X-CN1A (Receptacle) pin 9** and chassis ground.

   Connect the jumper wire between **X-CN1A (Receptacle) pin 9** and chassis ground. The chassis ground connection must be clean and free of paint, dirt, and oil.

   Disconnect the right hand control handle, and the universal joystick module.

   Measure the resistance between the right control module connector **X-403 (Receptacle) pin 10** and chassis ground. The resistance should be less than **10 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

   Measure the resistance between the universal joystick module connector **X-UJML (Plug) pin 1** and chassis ground. The resistance should be less than **10 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

   Measure the resistance between the universal joystick module connector **X-UJMR (Plug) pin 1** and chassis ground. The resistance should be less than **10 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

   A. All resistance measurements are less than **10 Ω**. Go to step **7**.

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3716 (DTC 605-03) - Lambda sensor : O2 value above the max threshold

NOTE: *If the Lambda sensor is replaced, it is necessary to perform the Replacement of the Lambda Sensor - Reset ECU Data with the Electronic Service Tool (EST) before you return the machine to service. Refer to the engine service manual* ***Lambda sensor - Configure - Reset ECU data (Lambda sensor) (55.989)****, if necessary.*

Context:
The Engine Control Unit (ECU) has detected a fault associated with the oxygen sensor. This fault is a result of an open circuit in the factory installed trim resistor circuit. For information regarding the functional operation of the Lambda sensor, refer to the engine service manual **Lambda sensor - Overview (55.989)**. For more information regarding the technical specifications of the lambda sensor, see **Lambda sensor - Technical Data (55.989)**.

Cause:
The ECU is sensing an open circuit in the Lambda sensor trim resistor circuit.

Possible failure modes:

1. Faulty Lambda sensor circuit wiring, open circuit.
2. Faulty Lambda sensor, failed internally.
3. Faulty ECU, software.

Solution:

1. Verify that the fault present and active.

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

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

   B. If the fault is no longer present or in an inactive state, then the fault may be intermittent and not currently active. Continue with step **4**.
2. Check the Lambda sensor trim resistor circuit wiring for an open circuit.

   Disconnect the vehicle harness (VE) from the Lambda sensor at connector **X-014 LAMBDA SENSOR**.

   Disconnect the vehicle harness (VE) from the ECU at connector **X-012** and place a jumper wire between **X-012 (Receptacle) pin 86** and chassis ground.

   Use a multimeter to check for continuity on the vehicle harness (VE) side :

From	To	Result
X-014 LAMBDA SENSOR (Receptacle) pin 5	Chassis ground	There should be continuity.

   A. If there is no continuity, then there is an open circuit in the vehicle harness (VE) between connector **X-014 LAMBDA SENSOR (Receptacle) pin 5** and **X-012 (Receptacle) pin 86**. Locate and repair the broken conductor. Repair or replace the harness as required.

   B. If there is continuity, then continue with step **3**.
3. Replace the Lambda sensor.

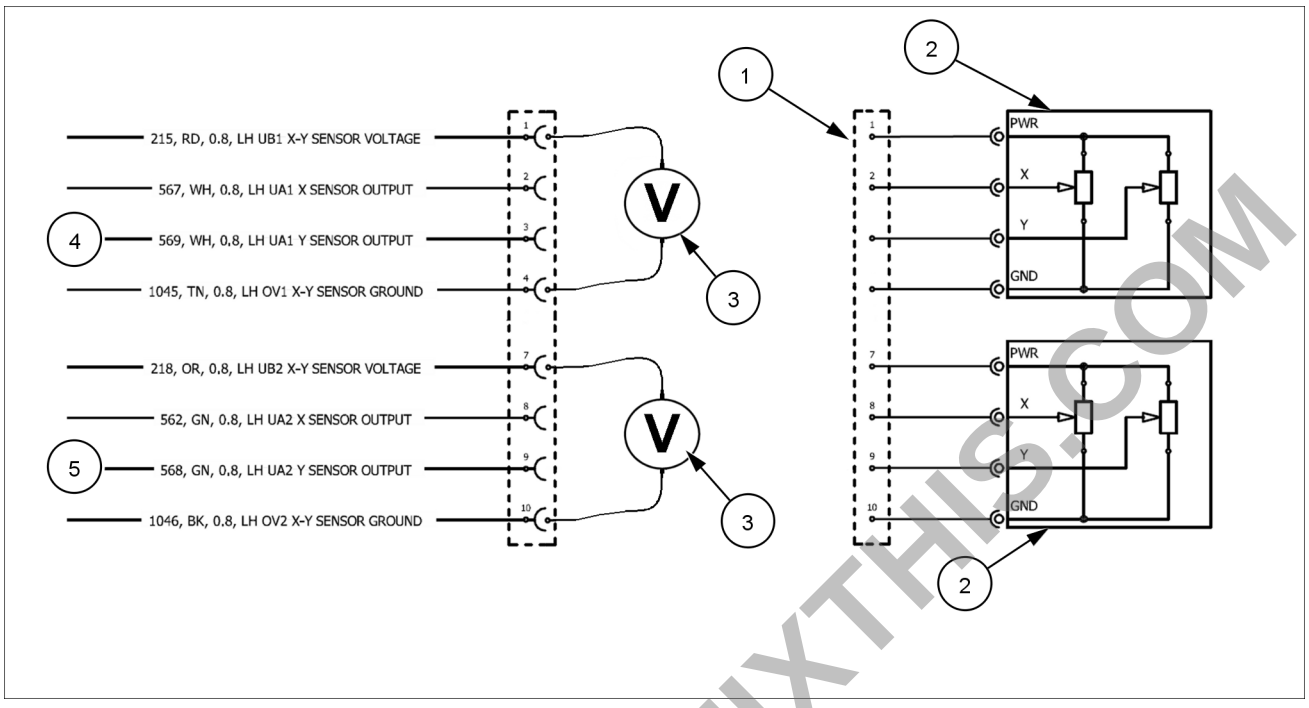
   Use EST to check to see that this fault has been resolved.

   A. If the fault has been resolved, then return the machine to service.

   B. If this fault has not been resolved, then check the ECU for the appropriate software and re-flash, if necessary.
4. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires.

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Measure the voltage between **X-UJML (Plug) pin 7** and **X-UJML (Plug) pin 10**. The voltage should be approximately **5 V**. Wiggle the harness during measurement to reveal an intermittent condition.



RAPH12SSL0348FA 1

Schematic legend			
(1)	Connector **X-UJML (Plug)**	**(4)**	Left Joystick F-B **X-CN4A (Receptacle) pin 18**
(2)	Joystick X-Y position sensor	**(5)**	Left Joystick F-B **X-CN2B (Receptacle) pin 31**
(3)	DVM set to measure voltage.		

A. The voltage is approximately **5 V**. Go to step **7**.

B. The voltage is not within range. There is a problem with the voltage supply to the sensor. Verify the voltage from the UCM. If the voltage from the UCM is correct, there is a problem in the voltage supply to the sensor. Repair as required. Return to step **1** to confirm elimination of fault.

7. Measure the voltage output of the sensor.

   Turn the ignition switch OFF.

   Disconnect the left joystick connector **X-UJML (Plug)** .

   Fabricate a breakout harness to measure the voltage output of the sensor.

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