Capacities

Capacities

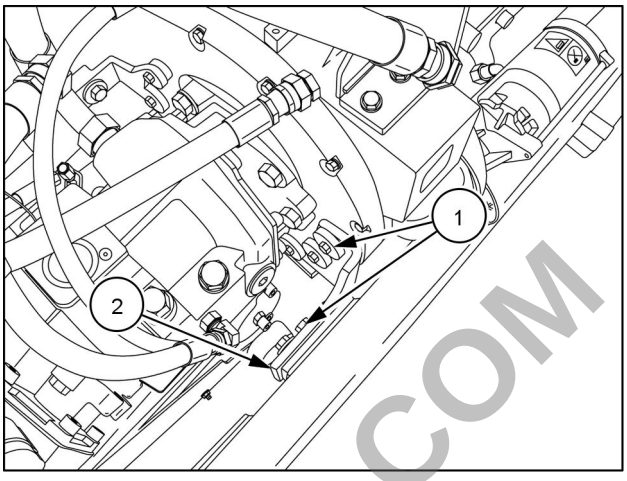
Engine crankcase	
Capacity with filter change	**16.4 L** (**17.3 US qt**)
Capacity without filter change	**15.6 L** (**16.5 US qt**)
Specifications	**CASE AKCELA UNITEK NO. 1™ SBL CJ-4 SAE 10W-40**
Fuel tank	
Capacity	**405 L** (**107 US gal**)
Selective Catalytic Reduction System — **DEF/ADBLUE®**	
Capacity	**52 L** (**14 US gal**)
Cooling system	
Capacity	**38.0 L** (**10.0 US gal**)
Specifications	**50%** Water and **50% CNH XHD HEAVY DUTY COOLANT / ANTI-FREEZE** or **CASE AKCELA ACTIFULL™ OT EXTENDED LIFE COOLANT**. Depending on the date of manufacture, the machine could have either coolant type. Machines with OAT coolant will have a decal near the fill location. Never mix conventional coolant with OAT coolant. See **Engine cooling system - Basic instructions (10.400)** for instructions on switching coolant types.
Hydraulic reservoir/Transmission refill	
Capacity	**227 L** (**60 US gal**)
Specifications	**TUTELA AUTO SUPREME™ ENGINE OIL SAE 10W-30**
Final drives	
Capacity - Each Side	**25.0 L** (**26.4 US qt**)
Specifications	**CASE AKCELA GEAR 135 H EP 85W-140**
Grease fittings	
Quantity	As Required
Specifications	**TUTELA MOLY GREASE GR-75**

NOTE: *If the ambient temperature is lower than* ***-37 °C (-34.6 °F)****, adjust the mixture according to the coolant manufacturer specifications.*

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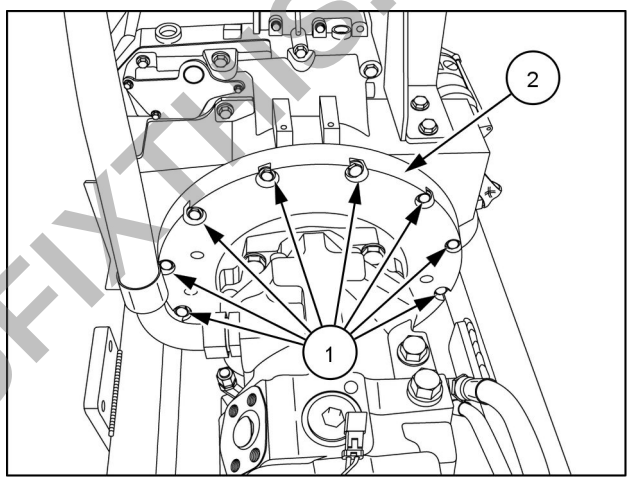
5. Remove the mounting bolts and washers **(1)** from the right side engine-to-frame cradle mounting bracket **(2)**. Remove the bracket.



RAIL14DOZ0202AA 3

6. Remove the mounting bolts and washers **(1)** from the engine-to-pump stack adapter plate **(2)**.
7. Slowly move the engine forward to separate it from the hydrostatic pump drive stack, and remove the engine from the frame cradle.

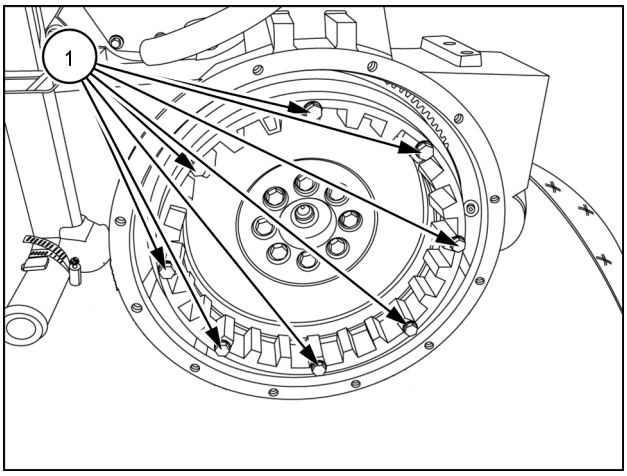
NOTE: *Pull the engine straight forward horizontally by hand only from the hydraulic pump stack until the rubber coupler teeth clear the mating ring attached to the flywheel.*



RAIL14DOZ0203AA 4

8. Remove the eight bolts **(1)** that secure the tandem pump flexible coupling mating ring to the engine flywheel and remove the mating ring.

NOTE: *Replace the flexible coupler when either the engine or hydrostatic pump stack are removed from the machine. The coupler is a flexible, rubber based component that could be damaged by excessive heat, excessive shock loading, unintended vibrations, or if soaked in oil. The coupler is in place to protect the integrity of the engine and pumps. Damage to coupler may not be visible.*

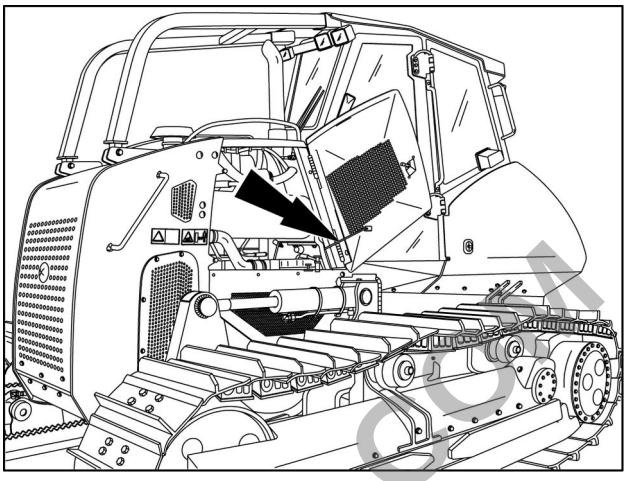


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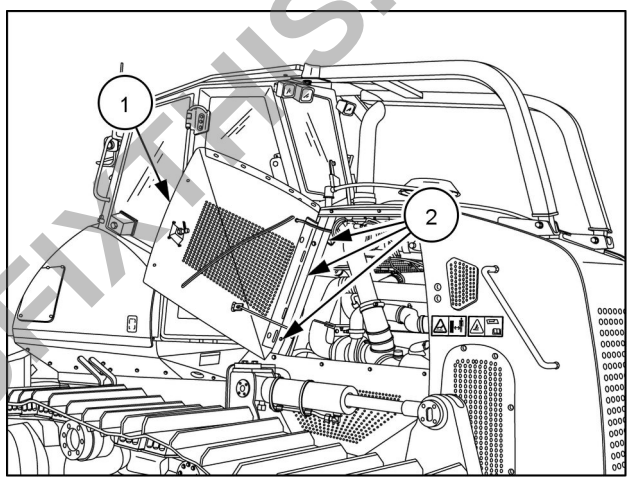
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13. Connect the left engine access door prop rod to the machine.



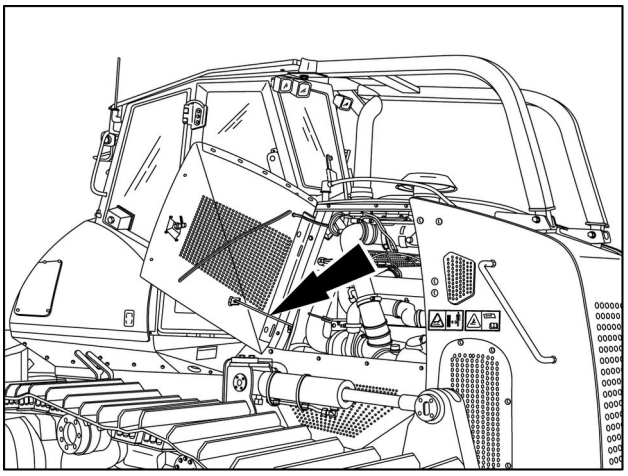
RAIL14DOZ0277AA 10

14. With the aid of a helper, install the right engine access door **(1)** to the machine using three inner door hinge mounting bolts and washers **(2)**. Tighten the bolts.



RAIL14DOZ0150AA 11

15. Connect the right engine access door prop rod to the machine.



RAIL14DOZ0150AA 12

16. Install the hood to the machine. See **Hood - Install (90.100)**.
17. Check the cooling system level and add as required.
18. Start and run the engine for 30 seconds. Stop the engine. Check for leaks.
19. Check the cooling system level and add as required.

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Belt - Replace

2050M	NA

⚠ WARNING

Entanglement hazard!
Always stop the engine and engage the parking brake, unless otherwise instructed in this manual, before checking and/or adjusting any drive belt or chain.
Failure to comply could result in death or serious injury.

W0097A

⚠ WARNING

Moving parts!
Install all covers, panels, and guards after servicing or cleaning the machine. Never operate the machine with covers, panels, or guards removed.
Failure to comply could result in death or serious injury.

W0135A

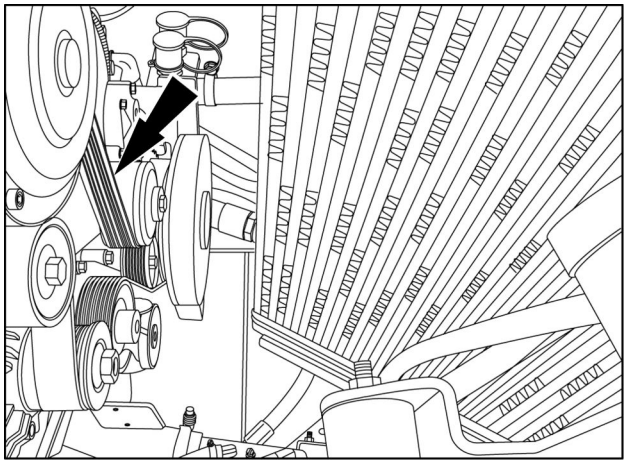
Prior operation:
Keep all unauthorized personnel clear of the area. Park the machine on level ground, in neutral with the parking brake applied, and the attachment lowered to the ground. Make sure that all residual pressure is relieved from circuits before beginning maintenance.

Maintenance Specifications	
Visual check	Every 10 hours or every day
Replace belts	Every 1500 hours

NOTICE: *If the engine runs with the drive belt loose, the drive belt can slip and cause the engine to overheat or the battery to receive insufficient charge.*

Replacing the drive belt

1. Turn the master disconnect OFF.
2. Locate the drive belt.



RAIL12DOZ034AA 1

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10. Make sure both parking brakes are in the OFF position.
11. Place the directional control in the F position.
12. Raise and maintain engine r/min (rpm) at 2000. When the pressure stops increasing, record the pressure readings.
13. Move the Hand throttle to the IDLE position.
14. Place the directional control in the R position.
15. Raise and maintain engine r/min (rpm) at 2000. When the pressure stops increasing, record the pressure readings.
16. Move the Hand throttle to the IDLE position, place the directional control in neutral and apply the parking brakes, stop the engine.

NOTE: *Reconnect the two* ***414 – 690 bar (6,000 – 10,000 psi)*** *gauges on the quick disconnect fitting marked Left Reverse Pump Port , Left Forward Pump Port , repeat procedures 2 through 16.*

17. Compare the pressure readings recorded to the specifications:

NOTE: *If charge pressure readings dropped more than 3.1 bar (45 psi) between N and F or R during procedures 12 or 15 it will be required to determine if the leakage is in the brake release system or the hydrostat system.*

NOTE: *Understanding results of the test. Charge pressure is used to shift the servo control pistons as well as release the brakes. Low charge pressure may be the result of a failure in either of these systems.*

Item	Specifications
Charge pump pressure – left track	**32 bar** (**464 psi**)
Charge pump pressure – right track	**39 bar** (**566 psi**)
Left forward pump port	**480 bar** (**6960 psi**)
Left reverse pump port	**480 bar** (**6960 psi**)
Right forward pump port	**480 bar** (**6960 psi**)
Right reverse pump port	**480 bar** (**6960 psi**)

NOTE: *The hydraulic and hydrostatic oil must be at an operating temperature of* ***49 – 63 °C*** *(* ***120 – 145 °F****) when checking pressure specifications.*

Next operation:
If pressure is not within specification refer to **Hydrostatic system feed pump - Pressure setting (29.218)**.

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Brake pedal control valve - Testing - Brake release solenoid.

2050M	NA

NOTE: *Hydrostatic charge pressure must be checked to make sure it is at proper pressure, refer to* ***Hydrostatic system feed pump - Pressure test (29.218)*** *. The pressure switch is normally open and closes at 11.4 to 12.8 Bar (165 to 185 psi).*

NOTE: *For wiring diagram refer to* ***Harnesses and connectors - Electrical schematic sheet 06 (55.100)****, and* ***Harnesses and connectors - Electrical schematic sheet 09 (55.100)*** *.*

Test N°1	
Test Point	**Condition** Put the master disconnect switch in the ON position. Disconnect the harness connector **X-107** for the brake solenoid. **Check** Check the brake solenoid coil resistance between pins 1 and 2.
Expected Result	**Result** 41.8 ohms at **25 °C (77 °F)**.
Other Result (Possible Cause)	**Action** Bad brake solenoid.

Test N°2	
Test Point	**Check** Terminal for wire G120, pin 2 on connector **X-107** to ground.
Expected Result	**Result** Continuity
Other Result (Possible Cause)	**Action** Bad ground circuit.

Test N°3	
Test Point	**Condition** DO NOT start the engine. Place the ignition switch in the run position and release the parking brake levers. DO NOT press the brake pedal. Place the directional control in the F position and move hand throttle to ½ throttle position. **Check** Terminal for wire K271, pin 1 on connector **X-107** to ground.
Expected Result	**Result** 24 volts
Other Result (Possible Cause)	**Action** Bad wire between the brake solenoid and the UCM (universal control module), connector **X-019** pin 27, bad park brake switch or UCM. If the readings are good, replace the brake solenoid.

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Hydraulic systems - General specification

2050M	NA

Type of oil	Case Akcela auto supreme 10w-30
Transmission and Hydraulic oil refill capacity	**210 L** (**55.5 US gal**)

Temperature of hydraulic oil when testing	**52 – 79 °C (125 – 175 °F)**
Hydraulic pump output	87 cc pump = **170 L/min** (**44.9 US gpm**) at **2000 RPM**
Load sense relief valve pressure All models at **2000 RPM**	**246.5 – 253.5 bar** (**3574.2 – 3675.8 psi**)
Circuit relief valves Ripper/auxiliary section	**280 bar** (**4060 psi**)
Circuit relief valves Angle cylinders	**350 bar** (**5075 psi**)
Circuit relief valves Lift cylinders	**280 bar** (**4060 psi**)
Circuit relief valves Tilt cylinder	**280 bar** (**4060 psi**)
Dozer blade lift cylinder cycle time (measured from ground level to full height, dependent on engine speed)	**2 s** at **2200 RPM** – 2050M **2.4 s** at **2200 RPM** – 2050M Bull Dozer (BD) LT **2.2 s** at **2200 RPM** – 2050M Bull Dozer (BD) XLT
Pilot Pressure Reducing Valve	**34.5 bar** (**500 psi**)

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Frames and ballasting - 39

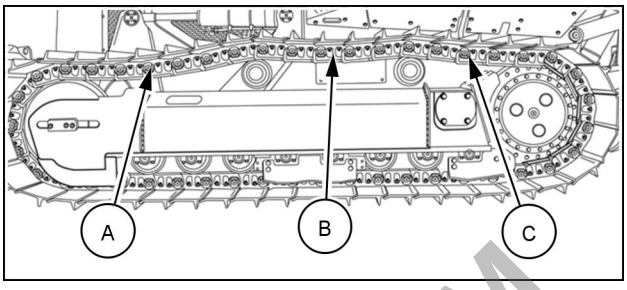
Frame - 100

2050M Extra Long Track (XLT), Bulldozer (BD) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -], 2050M Extra Long Track (XLT), Power Angle Tilt (PAT) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -], 2050M Long Track (LT), Bulldozer (BD) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -], 2050M Long Track (LT), Power Angle Tilt (PAT) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -], 2050M Wide Track (WT) / Low Ground Pressure (LGP), Bulldozer (BD) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -], 2050M Wide Track (WT) / Low Ground Pressure (LGP), Power Angle Tilt (PAT) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -]

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5. Total sag (front sag **(A)** + middle sag **(B)** + rear sag **(C)**) should be between **44.50 – 58.00 mm** (**1.75 – 2.25 in**).



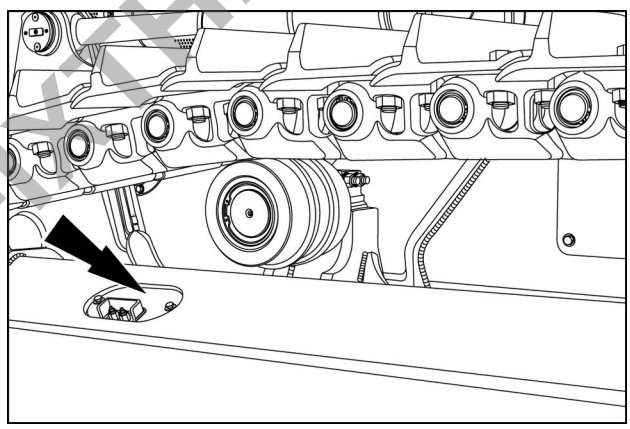
RAIL16DOZ0265AA 3

Increase the track tension

Use the track adjuster grease fitting to adjust track tension. Adding grease will increase and tighten the track deflection.

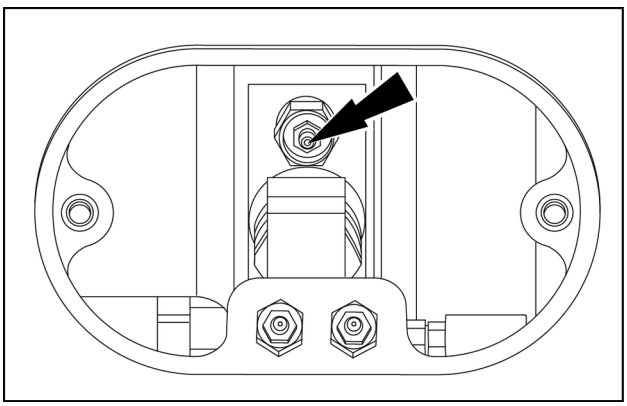
NOTE: *Make sure the tracks are clean prior to increasing the track tension. Material build up may cause improper adjustment of the track tension.*

1. Remove the cover.



RAIL16DOZ0358AA 4

2. Pump grease into the fitting until there is **44.50 – 58.00 mm** (**1.75 – 2.25 in**) of total sag.
3. Move the machine backward the length of the track, and then forward the length of the track. This will make the bottom of the track tight. Bring machine slowly to stop with the hydrostatic transmission F & R lever or with the decal pedal.
4. Check the deflection of the track again and adjust, if necessary.



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Track roller support - Remove

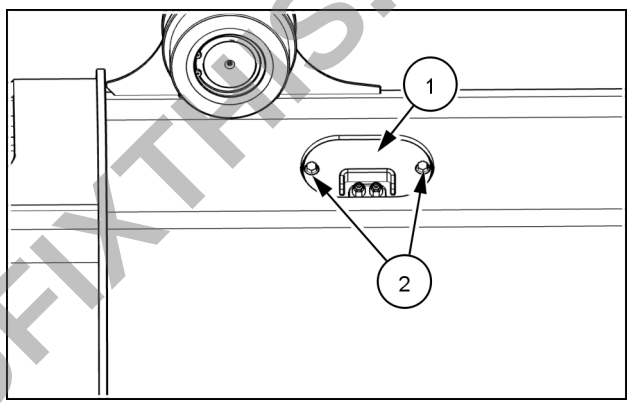
1. Park machine on a firm, level surface.
2. Lower all equipment to the ground.
3. Engage parking brake and shut engine off.
4. Relieve system of hydraulic pressure by actuating all hydraulic functions. Remove key when complete.

NOTE: *Wait 90 seconds after engine shutdown before turning master battery disconnect switch OFF. After engine shutdown, the Selective Catalytic Reduction (SCR) system module continues to run and conducts a purge cycle.*

5. Turn master battery disconnect switch to the OFF position.

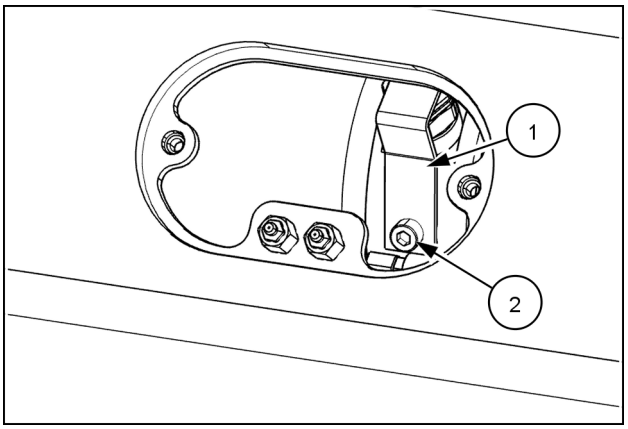
NOTICE: *The grease in the track tensioning mechanism is under high pressure. Keep face and body away from grease fitting.*

6. Remove the grease cover plate **(1)** from the center frame cover by removing the two bolts **(2)**.



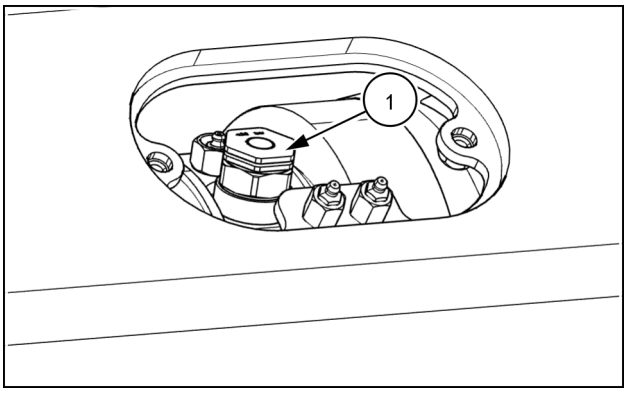
RAPH16DOZ0751AA 1

7. Remove the grease pressure relief valve cover **(1)** by removing the screw **(2)**.



RAPH16DOZ0752BA 2

8. Loosen the valve in the track adjuster **(1)** to release the track tension.
9. Use an appropriate lifting device to lift top of track to compress track adjuster piston as far as needed to hold the track off the track carrier roller.



RAPH16DOZ0753AA 3

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Air-conditioning compressor - General specification

2050M	NA

Lubricant	SP-15 PAG oil
Compressor belt tension (new belt)	**578 – 667 N** (**130 – 150 lb**)
Compressor belt tension (used belt)	**356 – 534 N** (**80 – 120 lb**)
Front plate air gap	**0.41 – 0.79 mm** (**0.016 – 0.031 in**)

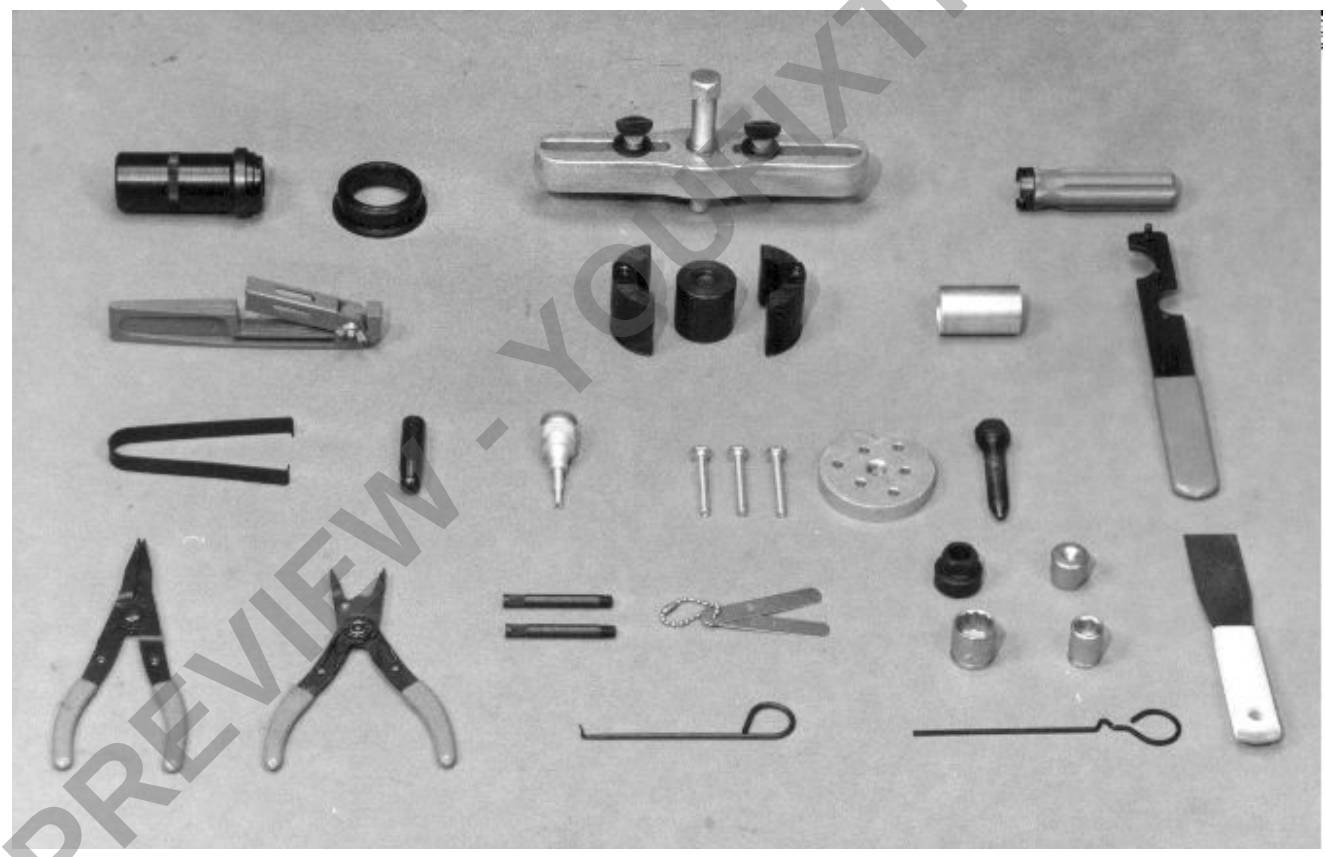
Air-conditioning compressor - Torque

2050M	NA

Compressor rotor shaft nut	**15 – 20 Nm** (**11 – 15 lb ft**)
Oil filler plug	**15 – 24 Nm** (**11 – 18 lb ft**)
Dust cover screws	**7 – 11 Nm** (**5 – 8 lb ft**)

Air-conditioning compressor - Special tools

2050M	NA



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CAS10747A COMPRESSOR TOOL KIT

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Fuel level sensor - Testing

2050M	NA

NOTE: *For wiring diagram refer to* ***Harnesses and connectors - Electrical schematic sheet 15 (55.100)*** *.*

Test N°1	
Test Point	**Condition** Disconnect the wiring harness from the fuel level sender connector **X-037** . Put the master disconnect switch in the ON position. **Check** Terminal 1 on connector **X-037** to ground.
Expected Result	**Result** Continuity
Other Result (Possible Cause)	**Action** Bad ground connection.

Test N°2	
Test Point	**Condition** Put the master disconnect switch in the ON position and the ignition switch in the RUN position. **Check** Read sensor output using a multimeter set to read DC voltage.
Expected Result	**Result** Full tank should read about **1.5 – 3.5 V**, empty tank should read about **7.0 – 9.0 V**.
Other Result (Possible Cause)	**Action** Bad fuel level sending unit.

Test N°3	
Test Point	**Condition** If the fuel tank is full, remove the sensor from its mounting grommet. It may be necessary to insert a temporary jumper harness to allow the fuel level sensor to be completely removed. **Check** Read sensor output using a multimeter set to read DC voltage while lifting it from the tank.
Expected Result	**Result** As the sensor is lifted the voltage level should increase to **7.0 – 9.0 V**.
Other Result (Possible Cause)	**Action** Bad fuel level sending unit.

Test N°4	
Test Point	**Condition** If the fuel level sending unit is removed from the machine, connect a **12 V** power supply through a **100 Ω** resistor in series to the sender. **Check** Read the voltage across the sender while moving the float from full to the empty position.
Expected Result	**Result** Full tank should read about **1.5 – 3.5 V**, empty tank should read about **7.0 – 9.0 V**.
Other Result (Possible Cause)	**Action** Bad fuel level sending unit.

Test N°5	
Test Point	**Condition** With the fuel level sending unit disconnected. **Check** Take an Ohm reading between the sender output and ground.

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Harnesses and connectors - Electrical schematic sheet 10 - Universal control module (UCM)

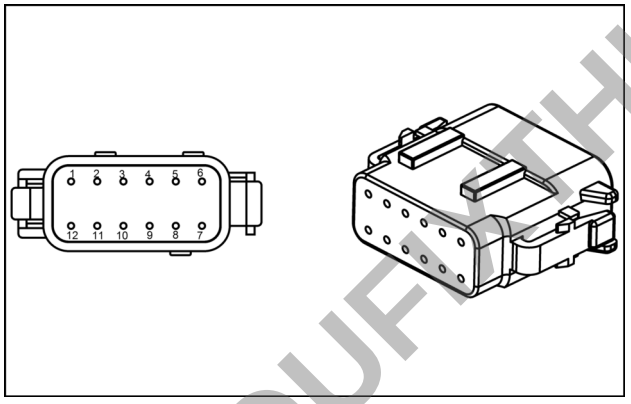
Item	Description
1	Universal control module (UCM)
2	Seat switch
3	Park brake switch normally closed (NC)
4	Park brake switch normally open (NO)
5	Leveling on (NO)
6	Leveling off (NC)
7	Implement enable (NO)
8	Implement enable (NC)
9	Left joystick F-B 1
10	Left joystick F-B 2
11	Left joystick L-R 1
12	Left joystick L-R 2
13	Bump up
14	Bump down
15	Thumb wheel 1
16	Thumb wheel 2
17	Right joystick F-B 1
18	Right joystick F-B 2
19	Right joystick L-R 1
20	Right joystick L-R 2
21	Leveling up / AIC command
22	Leveling down / grading
23	Auto / manual / blade-shake
24	Ripper 1
25	Ripper 2
26	Ripper return (RTN)
27	Left motor
28	Brake solenoid
29	Right speed sensor
30	Right speed sensor direction
31	Leveling system on
32	Implement interlock
33	Implement enable
34	Sensor supply 2
35	Sensor supply 3
36	Sensor supply 1
37	Throttle position
38	Starter interlock
39	Ripper up
40	Ripper down
41	Brake pressure switch
42	Left speed sensor
43	Left speed sensor direction
44	Left pump forward (front A)
45	Forward pump return (both A)
46	Right pump forward (rear A)
47	Left pump reverse (front B)
48	Reverse pump return (both B)
49	Right pump reverse (rear B)
50	Right motor
51	Motor return

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CONNECTOR X-033 - BLADE JOYSTICK

CONNECTOR X-033 - BLADE JOYSTICK			
PIN NUMBER	**WIRE NUMBER**	**CIRCUIT REFERENCE**	**ELECTRICAL SCHEMATIC FRAME**
1	A02C (PK)	BLADE SENSOR SUPPLY 2 (5V)	24
2	A02B (PK)	BLADE SENSOR SUPPLY 2 (5V)	24
3	A02A (PK)	BLADE SENSOR SUPPLY 2 (5V)	24
4	A029 (PK)	BLADE SENSOR SUPPLY 3 (5V)	24
5	G083 (BL)	BLADE SENSOR GROUND 2	24
8	A180 (WH)	THUMBWHEEL 2	24
9	A140 (WH)	THUMBWHEEL 1	24
10	D230 (WH)	AUTO/MANUAL/BLADE-SHAKE	24
11	D150 (WH)	LEVELING DWN/GRADING	24
12	D200 (WH)	LEVELING UP/AIC COMMAND	24



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Alternator - Testing

2050M	NA

Test N°1	
Test Point	**Condition** Turn the ignition switch OFF. **Check** Verify the battery connections are tight and secure. Verify connection to the alternator are tight and secure. Check the wiring and connections for corrosion, abrasion and damage. Verify that the chassis ground frame connections for the battery and alternator are secure and tight and free of oil, paint, dirt, damage and debris.
Expected Result	**Result** The connections are secure. The connections are free of corrosion, abrasion and damage.
Other Result (Possible Cause)	**Action** The connections are not secure or the connections show signs of corrosion, abrasion and damage. Repair as required.

Test N°2	
Test Point	**Condition** Turn the ignition switch OFF. **Check** Measure the resistance between the alternator case connection and chassis ground.
Expected Result	**Result** The resistance should be less than **10 Ω**.
Other Result (Possible Cause)	**Action** The resistance is greater than **10 Ω**, there is a problem with the chassis ground connection to the alternator. Repair as required.

Test N°3	
Test Point	**Condition** Turn the ignition switch OFF. **Check** Measure the resistance between the alternator and the starter on wire P004.
Expected Result	**Result** The resistance should be less than **10 Ω**.
Other Result (Possible Cause)	**Action** The resistance is greater than **10 Ω**, there is a problem with the connection between the alternator and the starter. Verify that the cable connections are secure and tight. Verify that the connections are free of corrosion, abrasion, damage and incorrect attachment. Repair as required.

Test N°4	
Test Point	**Condition** Turn the ignition switch OFF. **Check** Measure the resistance between the alternator connector X-110 pin 3 and the ignition switch connector X-083 pin A.
Expected Result	**Result** The resistance should be between **65 Ω** and **85 Ω**.
Other Result (Possible Cause)	**Action** The resistance is greater than **85 Ω** or less than **65 Ω**, there is a problem with the connection between the alternator and the ignition switch. Verify that resistor R-001 is not damaged. Verify that the cable connections are secure and tight. Verify that the connections are free of corrosion, abrasion, damage and incorrect attachment. Repair as required.

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Leave UCM connectors X-014 and X-018 disconnected.

Disconnect the jumper connected between X-023 pin 5 and X-023 pin 6.

Measure the resistance between X-023 pin 5 and X-023 pin 1. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 5 and X-023 pin 2. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 6 and X-023 pin 1. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 6 and X-023 pin 2. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 5 and X-023 pin 3. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 5 and X-023 pin 4. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 6 and X-023 pin 3. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-023 pin 6 and X-023 pin 4. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

A. All resistance measurements are greater than **20,000 Ω**. Go to step **5**.

B. One or more resistance measurements are less than **20,000 Ω**. There is an short circuit in the wiring. Repair or replace the harness as required. Return to step **1** to confirm elimination of the fault.

5. Measure the resistance to positive battery and chassis ground.

Turn the ignition switch OFF.

Disconnect UCM connector X-014 and X-018.

Measure the resistance between X-014 pin 3 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-018 pin 12 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-014 pin 3 and X-014 pin 14. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-014 pin 3 and X-014 pin 26. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-014 pin 3 and X-018 pin 12. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-018 pin 12 and X-014 pin 14. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

Measure the resistance between X-018 pin 12 and X-014 pin 26. The resistance should be greater than **20,000 Ω**. Wiggle the harness during measurement to reveal an intermittent condition.

A. All resistance measurements are greater than **20,000 Ω**. Temporarily replace the UCM and retest. Return to step **1** to confirm elimination of the fault.

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Remove and perform continuity tests between connectors ODFT and 2 on engine wiring harness. Flex harness during test to check for any intermittent operation. Use the test lead labeled "Air Press/Temp Sensor" from the Tier II (NEF) Diagnostic Repair Kit 380040185 to be able to access the pins on the sensor connector ODFT. Also, use the **0.4 mm** (**0.017 in**) diameter test probes from the repair kit when connecting the digital multi-meter (DMM) to connector 2. Make sure the DMM's test lead resistance is taken into account when taking continuity measurements. See test table below.

Important Note: Check and verify that the Vehicle Status is correct. Potential ECU damage could result when removing main ECU connectors if this is not followed.

Test Type	From	To	Expected Results
1. Continuity	ODFT (Pin: 1)	2 (Pin: 24)	Approx. **0 – 0.10 ohms**
2. Continuity	ODFT (Pin: 2)	2 (Pin: 28)	Approx. **0 – 0.10 ohms**
3. Continuity	ODFT (Pin: 3)	2(Pin: 32)	Approx. **0 – 0.10 ohms**
4. Continuity	ODFT (Pin: 4)	2 (Pin: 27)	Approx. **0 – 0.10 ohms**
5. Short Circuit	2 (Pin: 28)	2 (Pin: 24, 27, 32)	Open Circuit
6. Short Circuit	2 (Pin: 24)	2 (Pin: 27, 32)	Open Circuit
7. Short Circuit	2 (Pin: 27)	2 (Pin: 32)	Open Circuit

A. If continuity/shorts test is successful, go to step **4**.

B. If continuity/shorts test is unsuccessful, find and repair the damaged section(s) of the wiring harness.

4. Operation: Check Engine Oil Pressure
Vehicle Status: Key Off Engine Off (test preparation)
Vehicle Status: Key On Engine On (during test)

Use the procedure established in the appropriate Engine Maintenance and Repair Manual to test the pressure of the engine oil lubrication system.

A. If the oil pressure test is successful, proceed to step **5**.

B. If the oil pressure test is not successful, refer to the appropriate Engine Maintenance and Repair Manual to diagnose, troubleshoot and repair the low oil pressure fault condition.

5. Operation: Check for ECU Voltages and Ground Continuity.
Vehicle Status (when removing connector 1): Key Off Engine Off.
Vehicle Status (when performing test): Key On Engine Off.
Vehicle Status (when replacing connector 1): Key Off Engine Off.

Use product schematic for a reference, remove connector 1 from the ECU and check for voltage and continuity at the appropriate pins defined in the test table below. Use the **0.4 mm** (**0.017 in**) diameter test probes from the Tier II (NEF) Diagnostic Repair Kit 380040185 when connecting the DMM to the connector 1. Make sure the DMM's test lead resistance is taken into account when making any continuity measurements.

Important Note:
Check and verify that the Vehicle Status is correct for each operation. Potential ECU damage could result when removing and replacing main ECU connectors if this is not followed.

Test Type	From	To	Expected Results
1. Voltage	1 (Pin 2, 3, 8, 9, 40)	Ground (engine block)	Approx. **12 volts**
2. Continuity	1 (Pin 5, 6, 10, 11)	Ground (engine block)	Approx. **0 – 0.10 ohms**

A. If the voltages and ground paths are correct and the Oil temp / press sensor was not replaced on a prior diagnostic of this type, replace the sensor.

B. If the voltages and ground paths are correct and the Oil temp / press sensor was replaced on a prior diagnostic of this type, re-initialize the ECU as if it was blank (new) and load the appropriate data-set.

C. If the voltages and ground paths are correct and the ECU was re-initialized on a prior diagnostic of this type, replace the ECU.

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3231 - Injection Processor Error - Internal Reset/Clock Loss/Voltage Too Low

2050M	NA

Context:
The engine control unit (ECU) has sensed a problem with the internal supply voltage for Fuel Injector Group “B”, the fault path for errors in the power stage component of the unit injection system. The power stage monitors itself and reports detected errors to the ECU. Monitoring is performed once per camshaft revolution. An internal reset or parity error present longer than 3 camshaft revolutions, will produce this error. As a result of this error an individual cylinder or bank is shut off. This shut off is currently applied to be permanent without a healing possibility by switching on the component to see if the defect is still present. With either an irreversible or reversible shut off of the engine being executed. The reason for this failure is a defective ECU. If the fault doesn't reset or reoccurs, replace the ECU.

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4112 - Left Pump Forward Solenoid High Side Shorted to Ground

2050M	NA

Context:
The UCM detects a short circuit in the left forward solenoid circuit, X-016 pin 5. Forward ground drive is disabled while fault code 4112 is active.

Cause:
There is a short circuit to chassis ground in the left forward solenoid circuit, X-016 pin 5.

Possible failure modes:

1. Short circuit in the left forward solenoid circuit.
2. Faulty left forward solenoid.
3. Faulty UCM.

Solution:

1. Verify that the fault code is active.

   Connect the Electronic Service Tool to the service tool connector.

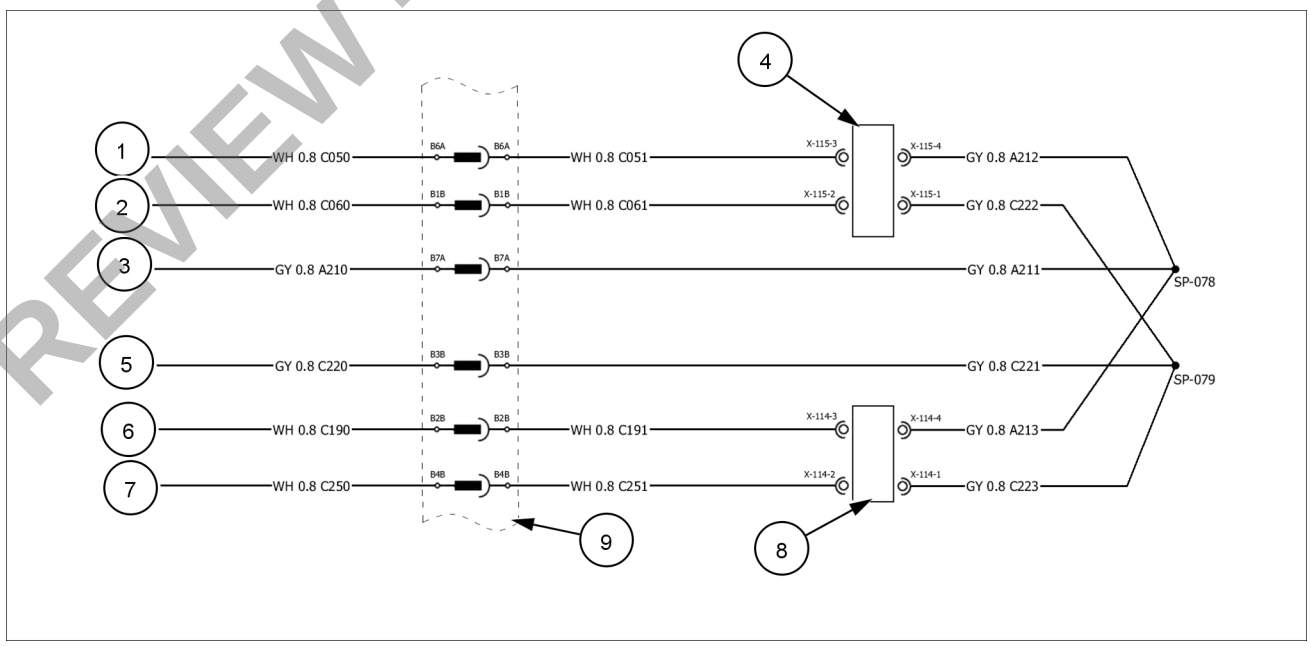
   To check for fault codes: Start and operate the machine.

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

   B. Fault code 4112 is recorded again. Go to step **2**.
2. Verify that the wiring and connectors are free of damage.

   Inspect the UCM and the left forward solenoid connections. All connections should be secure, tight, free of corrosion, abrasion and damage.

   Inspect the harness from the UCM to the left forward solenoid. Verify that the harness is free of damage, corrosion, abrasion and incorrect attachment.



RAIL12DOZ0270FA 1

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5131 - Blade Tilt Right Solenoid High Side Open Circuit

2050M	NA

Context:
The UCM detects an open circuit in the Blade Tilt Right Solenoid Circuit, X-019 pin 25.

Cause:
There is an open circuit in the Blade Tilt Right Solenoid Circuit, X-019 pin 25.

Possible failure modes:

1. Open circuit in the blade tilt right solenoid circuit.
2. Faulty blade tilt right solenoid.
3. Faulty UCM.

Solution:

1. Verify that the fault code is active.

   Connect the Electronic Service Tool to the service tool connector.

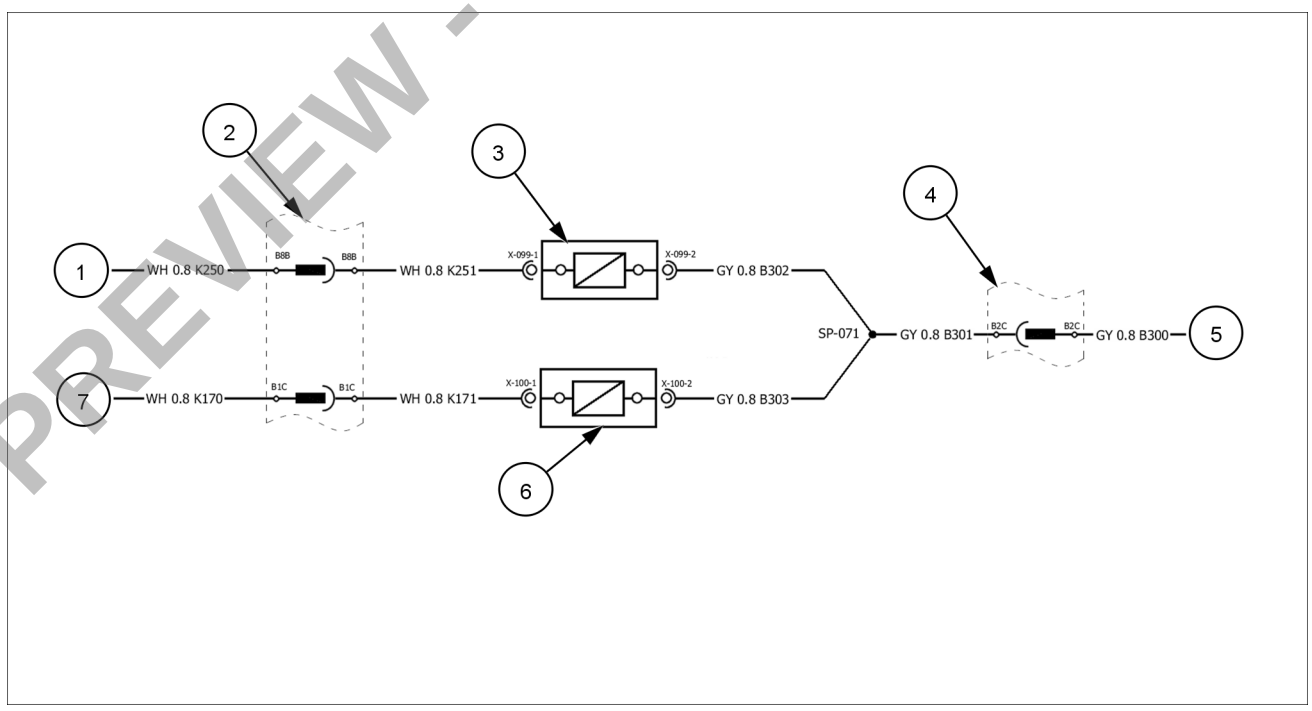
   To check for fault codes: Start and operate the machine.

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

   B. Fault code 5131 is recorded again. Go to step **2**.
2. Verify that the wiring and connectors are free of damage.

   Inspect the UCM and the blade tilt right solenoid connections. All connections should be secure, tight, free of corrosion, abrasion and damage.

   Inspect the harness from the UCM to the blade tilt right solenoid. Verify that the harness is free of damage, corrosion, abrasion and incorrect attachment.



RAIL12DOZ0237FA 1

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19055 - Reagent - temperature sensor of pump module - Short circuit high

2050M	NA

Context:
The Dosing Control Unit (DCU) has detected a failure of the DEF/AdBlue® temperature sensor. The DEF/Adblue temperature sensor is located inside the DCU.

Cause:
The sensor signal level is above **5.0 V** for over **700 ms**. This fault will reset if the signal level goes below **5.0 V** for over **1000 ms**. If the sensor is defective the DCU should be replaced.

Possible failure modes:

1. The wiring is faulty.
2. The software is faulty.
3. The DCU is faulty.

Solution:

1. Verify the fault is still present and in an active state.

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

   B. If the fault is not present, the fault may be intermittent. Check for an intermittent the fault. If no the faults are found, clear the fault code. Return machine to service.
2. Check the DCU connector for proper operation of the power supply and ground circuits.

   Disconnect the harness from the DCU at connector.

   Use a multi-meter to measure the voltage from the harness side of connector pin 3 to pin 14. The meter should read between **20–28 V**.

   Use a multi-meter to measure the voltage from the harness side of connector pin 4 to pin 15. The meter should read between **20–28 V**.

   Use a multi-meter to measure the voltage from the harness side of connector pin 24 to chassis ground. The meter should read between **20–28 V**.

   A. All of the expected voltage measurements are not present, repair/replace the circuit to the DCU connector.

   B. All of the expected voltage measurements are present, continue with step **3**.

   NOTE: *Inspect the DCU power relays to verify correct part is installed (verify a **24 V** relay is NOT installed in the **12 V** position).*
3. Clear the fault code.

   A. If the fault code did not clear, continue with step **4**.

   B. If the fault code has cleared, return the machine back to service.
4. Verify the proper software level is installed in the DCU.

   A. The incorrect software level is installed. Install the correct software level. Test the system for proper operation.

   B. The correct software level is installed, replace the DCU. Install the current software level. Test the system to verify repairs.

   NOTE: *If the unit is equipped with 2010 or 2011 software, you can update the software to 2012. If you update the Engine Control Unit (ECU) software, the Display software also needs to be updated. This will change how the*

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Blade cylinder support - Remove - Clevis

2050M Extra Long Track (XLT), Bulldozer (BD) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -]	NA
2050M Long Track (LT), Bulldozer (BD) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -]	NA
2050M Wide Track (WT) / Low Ground Pressure (LGP), Bulldozer (BD) Blade - Tier 4B (final) and Stage IIIB [NGC109000 -]	NA

⚠ 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

Crushing hazard!
Always lower the machine hydraulic lift and all other hydraulic equipment to the ground before shutting off the engine and removing key.
Failure to comply could result in death or serious injury.

W0063C

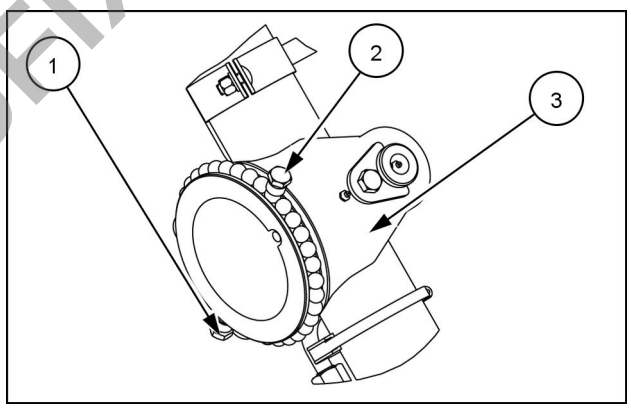
Prior operation:
Blade lifting cylinder - Remove - Bulldozer blade (35.741)

1. Remove the lower plug **(1)** and upper plug **(2)** from the lift cylinder trunnion clevis **(3)** on the front of the machine.

NOTE: *The Semi-U blade option is shown. Straight blade and Semi-U blade options are available. The procedures are the same for both blade types.*

NOTE: *The lift cylinder trunnion clevis weighs approximately* ***22.6 kg*** *(****49.8 lb****)*

2. Rotate the clevis **(3)** and remove all 70 ball bearings **(4)** through the bottom plug **(1)**.
3. When all of the ball bearings **(4)** have been removed, remove the clevis **(3)** from the trunnion.
4. Service or replace components and necessary.



RAIL16DOZ0153AA 1

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Pressurization system - Replace - Cab filters

2050M	NA

⚠ WARNING

Eye injury hazard!
Wear full coverage safety glasses with side panels when using compressed air. Limit air pressure to 200 kPa (29 psi).
Failure to comply could result in death or serious injury.

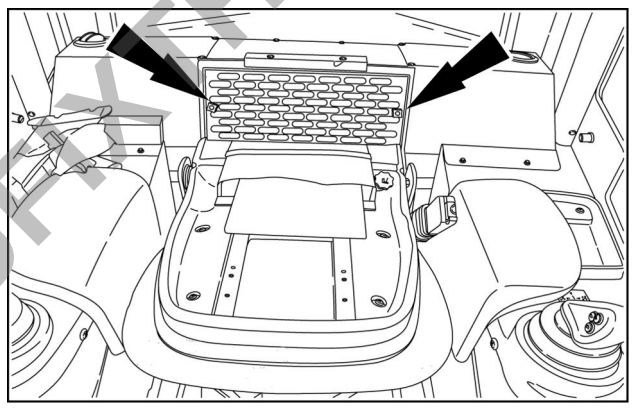
W0162A

The cab recirculation air filter is located behind the operator's seat. Replace the cab air filters when required. The cab air filter is located behind the operator compartment near the exhaust fan.

Prior operation:
Keep all unauthorized personnel clear of the area. Park the machine on level ground, in neutral with the parking brake applied, and the attachment lowered to the ground. Make sure that all residual pressure is relieved from circuits before beginning maintenance.

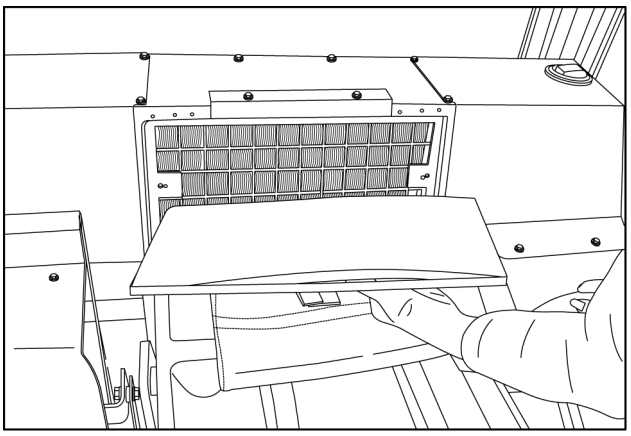
Recirculation filter

1. Remove the retaining screw that holds the recirculation filter cover in place, and remove the recirculation filter.
2. Wipe the housing clean.



RAPH12DOZ0074AA 1

3. Replace the recirculation filter with a new one.
4. Reinstall the new recirculation filter, and secure the access filter cover.



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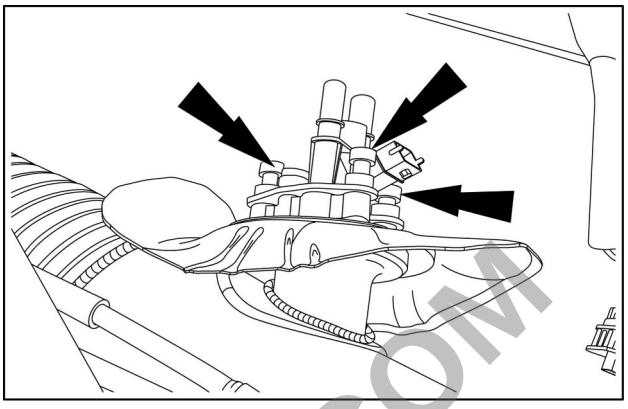
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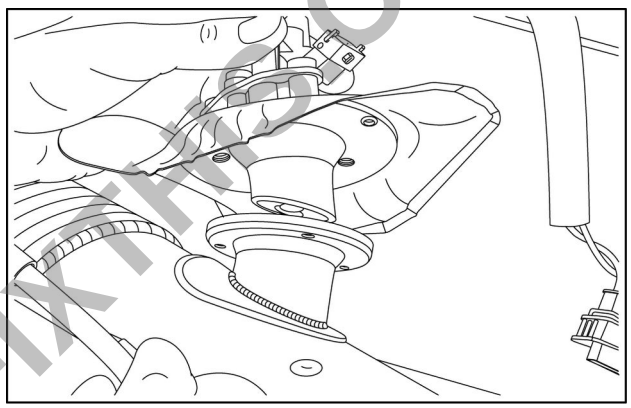
10. Remove the bolts securing the DENOx2 Urea Dosing Module to the machine.



RAIL13DOZ0798AA 7

11. Remove the DENOx2 Urea Dosing Module from the machine.

NOTE: *Cover the opening in the exhaust pipe to prevent debris from entering the system.*



RAIL13DOZ0799AA 8

Next operation:
Dosing control unit - Install (55.988)

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