ELECTRICAL SYSTEMS - 55

[55.DTC] FAULT CODES - 55.16

5501 - 5803

8005 - 8037

9129 - 9166

19003 - 19999

DOZER BLADE AND ARM - 86

TOOLS - 89

PLATFORM, CAB, BODYWORK, AND DECALS - 90

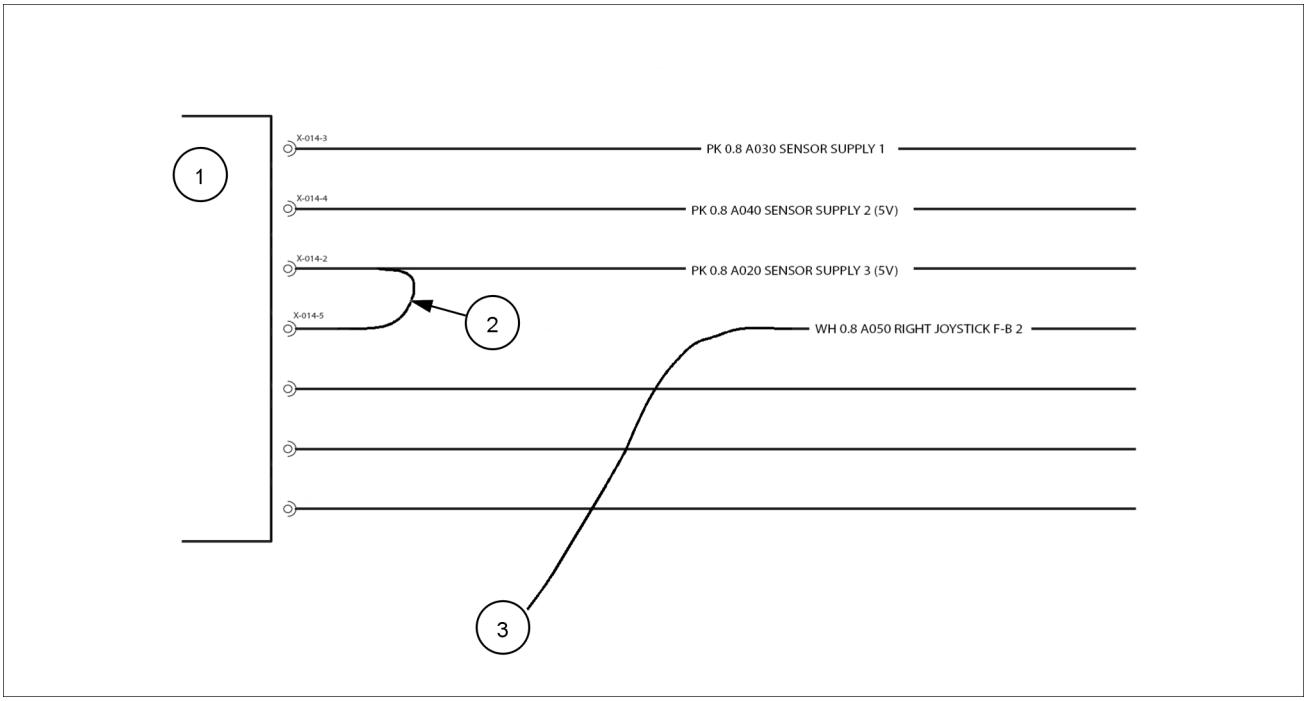
2050M
Tier 4A (interim)
Crawler Dozer

PIN NCDC25000 and above; PIN NDDC25000 and above
PIN NEDC20000 and above; PIN NFDC20000 and above

SERVICE MANUAL

Part number 47936435
2nd edition English
October 2015
Replaces part numbers 47738711, 47738712 and 47738713

CASE



RAIL12DOZ0440FA 2

Schematic legend			
(1)	UCM connector X-014	**(3)**	Wire WH A050 removed from connector X-014 Pin 5
(2)	Jumper wire installed between X-014 pin 5 and X-014 pin 2		

Reconnect UCM connector X-014.

Turn the ignition switch ON. Access the EST fault code screen.

Fault code 5511 should no longer be active. Fault code 5513 is now active.

A. Fault code 5511 is no longer active. Fault code 5513 is now active. Temporarily replace the joystick and retest. Return to step **1** to confirm elimination of the fault.

B. Fault code 5511 is still present and active. 5513 did not become active. Temporarily replace the UCM and retest. Return to step **1** to confirm elimination of the fault.

Harnesses and connectors - Electrical schematic sheet 09 - UCM (55.100-C.20.E.09)
Harnesses and connectors - Electrical schematic sheet 24 - Blade control (55.100-C.20.E.24)

5525-Implement Joystick Right-Left Axis: In Range Fault

2050M	NA

Context:
The UCM has sensed that the blade control L-R signal is not within the acceptable limits. Diagnostic Trouble Code 5525 has an error priority of red. Blade tilt functions are disabled while Diagnostic Trouble Code 5525 is active.

Cause:
The UCM has sensed that the blade control L-R signal is not within the acceptable limits. The fault is active while the combined voltage on X-014 pin 10 and X-014 pin 16 is less than **4 V** or greater than **6 V**.
Nominal operating voltage of the sensor output is **0.5 V** to **4.5 V**. Output of the sensor in the neutral position is approximately **2.5 V**.

Possible failure modes:

1. Open circuit in signal wire.
2. Short circuit in signal wire.
3. Failure of the blade control handle.
4. The UCM has an internal failure.

Solution:

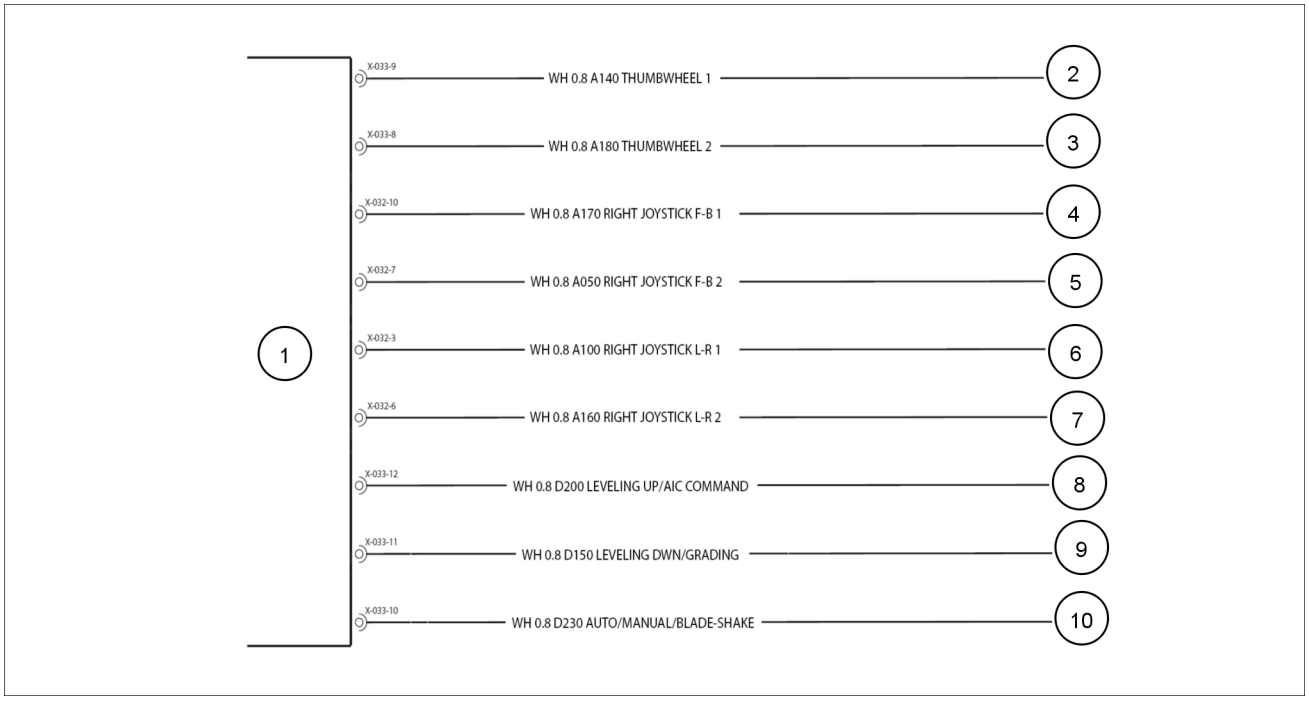
1. Verify that the fault code is active.

   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 5525 is recorded again. Go to step **2**.
2. Verify that the wiring and connectors are free of damage.



RAIL12DOZ0436FA 1

5541-Angle Thumbwheel Axis-1 Shorted to Ground or Open Circuit

2050M	NA

Context:
The UCM detects a short to ground or an open circuit in the joystick angle thumbwheel 1 signal, X-014 pin 11.

Cause:
The UCM detects a short to ground or an open circuit in the joystick angle thumbwheel 1 signal, X-014 pin 11.

Possible failure modes:

1. A short circuit in the joystick angle thumbwheel 1 signal.
2. An open circuit in the joystick angle thumbwheel 1 signal.
3. Faulty joystick.
4. Faulty UCM.

Solution:

1. Verify that the fault code is active.

   Connect the Electronic Service Tool to the service tool connector.

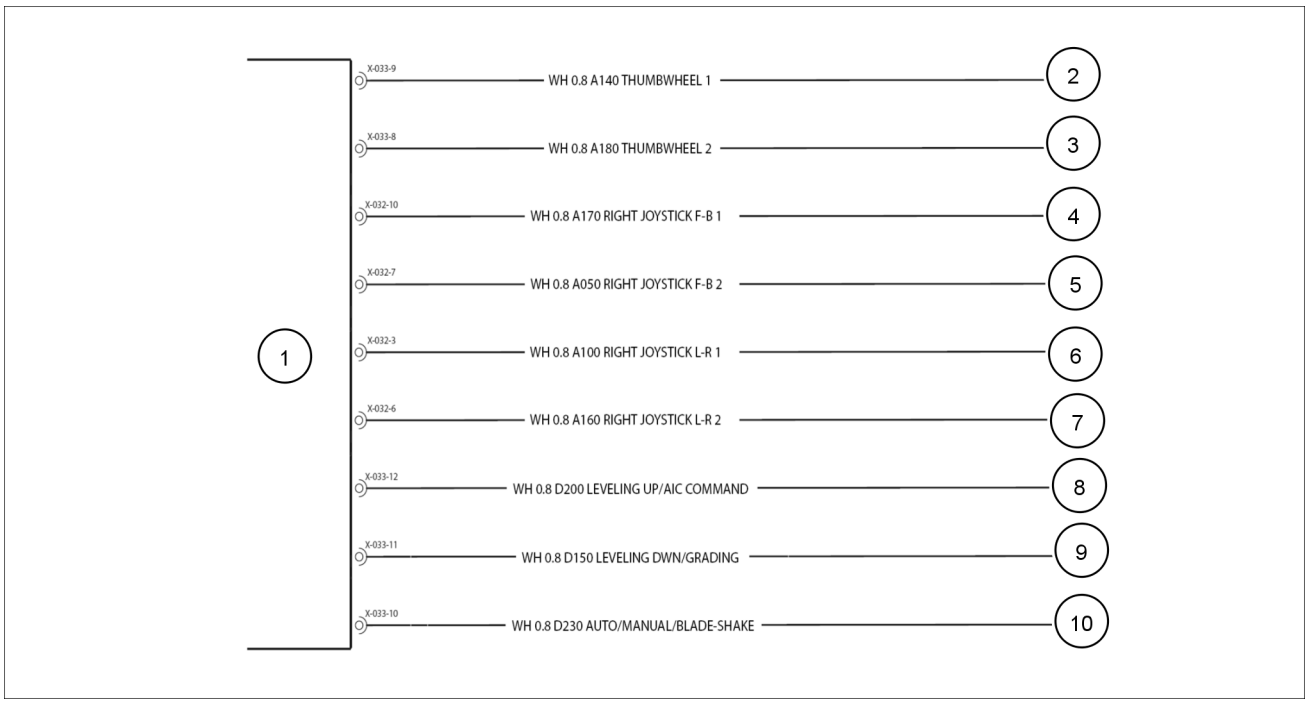
   To check for fault codes: Start and operate the machine.

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

   B. Fault code 5541 is recorded again. Go to step **2**.
2. Verify that the wiring and connectors are free of damage.

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

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



RAIL12DOZ0436FA 1

5551-Angle Thumbwheel Axis-2 Shorted to Ground or Open Circuit

2050M	NA

Context:
The UCM detects a short to ground or an open circuit in the joystick angle thumbwheel 2 signal, X-014 pin 18.

Cause:
The UCM detects a short to ground or an open circuit in the joystick angle thumbwheel 2 signal, X-014 pin 18.

Possible failure modes:

1. A short circuit in the joystick angle thumbwheel 2 signal.
2. An open circuit in the joystick angle thumbwheel 2 signal.
3. Faulty joystick.
4. Faulty UCM.

Solution:

1. Verify that the fault code is active.

   Connect the Electronic Service Tool to the service tool connector.

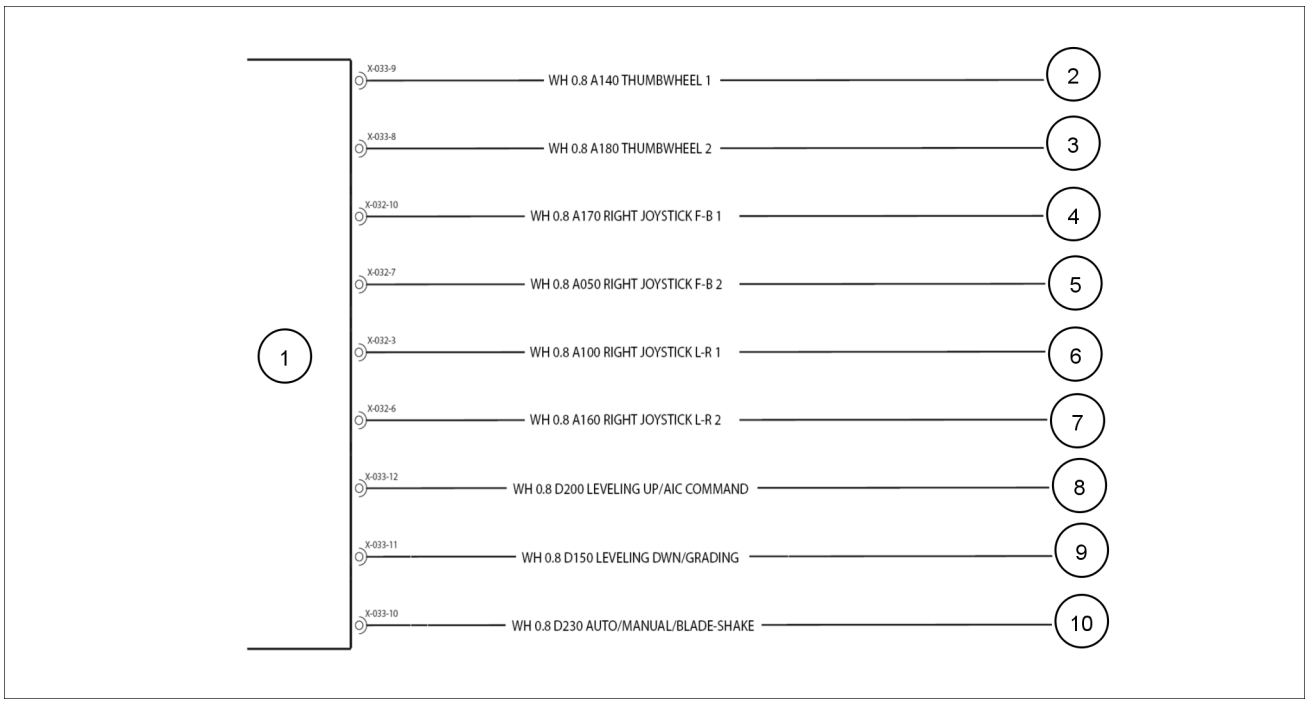
   To check for fault codes: Start and operate the machine.

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

   B. Fault code 5551 is recorded again. Go to step **2**.
2. Verify that the wiring and connectors are free of damage.

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

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



RAIL12DOZ0436FA 1

Schematic legend			
(1)	UCM connector X-014 Pin 2, Ripper blade sensor supply 3	**(5)**	Ripper control Connector X-142
(2)	UCM connector X-014 Pin 4, Ripper blade sensor supply 2	**(6)**	UCM connector X-014 Pin 15, Ripper 2 signal
(3)	UCM connector X-014 Pin 6, Sensor ground	**(7)**	UCM connector X-014 Pin 8, Ripper 1 signal
(4)	UCM connector X-015 Pin 9, Sensor ground		

A. The connectors are secure and the harness is free of damage. Go to step **3**.

B. The connectors or the harness has damage. Repair or replace the harness or connectors as required. Return to step **1** to confirm elimination of fault.

3. Measure the voltage on the signal wire.

   Turn the ignition switch OFF.

   Disconnect UCM connector X-014.

   Disconnect ripper joystick connector X-142.

   Turn the ignition switch ON.

   Measure the voltage between UCM connector X-014 pin 8 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. 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 **4**.

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

4. Test the UCM.

   Turn the ignition switch OFF.

   Reconnect ripper joystick connector X-142.

   Leave UCM connector X-014 disconnected.

   Remove the wire A080 WH from X-014 pin 8.

Schematic legend			
(1)	UCM connector X-014 Pin 2, Ripper Blade Sensor Supply 3	**(5)**	Ripper control Connector X-142
(2)	UCM connector X-014 Pin 4, Ripper blade sensor supply 2	**(6)**	UCM connector X-014 Pin 15, Ripper 2 signal
(3)	UCM connector X-014 Pin 6, Sensor ground	**(7)**	UCM connector X-014 Pin 8, Ripper 1 signal
(4)	UCM connector X-015 Pin 9, Sensor ground		

A. The connectors are secure and the harness is free of damage. Go to step **3**.

B. The connectors or the harness has damage. Repair or replace the harness or connectors as required. Return to step **1** to confirm elimination of fault.

3. Measure the voltage on the signal wire.

   Turn the ignition switch OFF.

   Disconnect UCM connector X-014.

   Disconnect ripper joystick connector X-142.

   Turn the ignition switch ON.

   Measure the voltage between UCM connector X-014 pin 15 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. 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 **4**.

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

4. Test the UCM.

   Turn the ignition switch OFF.

   Reconnect ripper joystick connector X-142.

   Leave UCM connector X-014 disconnected.

   Remove the wire A150 WH from X-014 pin 15.

Schematic legend			
(1)	UCM connector X-020 Pin 9 Leveling system ON	**(5)**	Battery supply to switch from fuse F-008, **7.5 A**
(2)	Connector X-045/X-002 Pin 41, 42, and 46	**(6)**	Leveling enable/disable switch S-005 Connector X-057
(3)	Leveling system ON LED	**(7)**	UCM connector X-017 Pin 16 Leveling OFF, Normally Closed
(4)	Ground connection GND-DASH	**(8)**	UCM connector X-016 Pin 16 Leveling ON, Normally Open

A. The connectors are secure and the harness is free of damage. Go to step **3**.

B. The connectors or the harness has damage. Repair or replace the harness or connectors as required. Return to step **1** to confirm elimination of fault.

3. Measure the voltage at the switch.

   Turn the ignition switch ON.

   Measure the voltage between the leveling enable switch pin 2 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. The voltage should be approximately **12 V**. Wiggle the harness during measurement to reveal an intermittent condition.

   A. The voltage is between **10 V** and **14.5 V**. Go to step **4**.

   B. The voltage is less than **10 V**, there is a problem in the battery supply to the switch. Check splice SP-044. Check fuse F-008. Repair as required. Return to step **1** to confirm elimination of fault.

4. Measure the resistance through the signal wires.

   Turn the ignition switch OFF.

   Disconnect the leveling enable switch.

   Fabricate a jumper wire that will connect between the leveling enable switch connector X-057 pin 3 and pin 1.

   Connect the jumper wire between the leveling enable switch connector X-057 pin 3 and pin 1.

   Measure the resistance between X-016 pin 16 and X-017 pin 16. 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**. Go to step **5**.

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

5. Measure the voltage on the signal wires.

   Disconnect the jumper wire between X-057 pin 3 and pin 1.

   Disconnect UCM connectors X-016 and X-017.

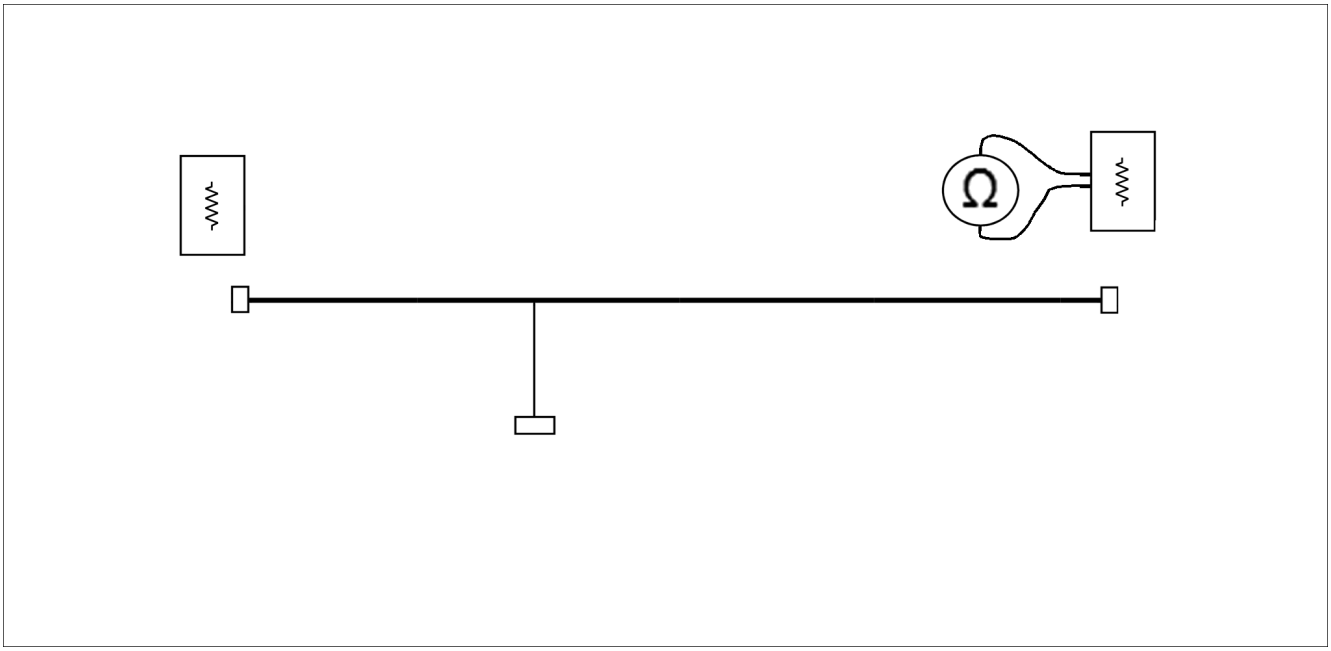
   Turn the ignition switch ON.

   Measure the voltage between X-016 pin 16 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. The voltage should be less than **0.5 V**. Wiggle the harness during measurement to reveal an intermittent condition.

   Measure the voltage between X-017 pin 16 and chassis ground. The chassis ground connection must be clean and free of paint, oil, and dirt. 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 **6**.

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



RAIL12DOZ0244FA 3

Measure the resistance directly on the lazer guide system module CAN bus pins. Measure the resistance between X-154 pin 1 and pin 2. The resistance should be between **108 Ω** and **132 Ω**.

A. Both resistance measurements are approximately **120 Ω**. Return to step **6**.

B. One or more resistance measurements are greater than **140 Ω**. There is an open circuit in the CAN bus within the control. Replace the control module. Return to step **1** to confirm elimination of the fault.

Harnesses and connectors - Electrical schematic sheet 28 - CAN bus system (55.100-C.20.E.28)

19003-Battery voltage sensing (electrical) - Above upper limit

2050M	NA

Context:
The Dosing control unit (DCU) has detected a high voltage condition in the voltage supply circuit. The fault becomes active when the supply voltage is greater than **36.7 V** for at least **0.3 s**. The code will heal if the supply voltage returns to less than **36.7 V** for **0.8 s**.

Cause:
The supply voltage to the DCU is greater than **36.7 V**.

Possible failure modes:

1. Faulty electrical wiring or connections.
2. Faulty Power converter
3. Faulty DCU.

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 no longer present or inactive, continue with step **3**.
2. Verify the voltage supply to the DCU.

   Disconnect the wiring harness from the DCU.

   Turn the ignition switch ON.

   Use a multi-meter to check for voltage between the DCU connector pins 3 and 4,and ground.

   There should be **24 V** on both pins.

   A. If there is greater than **36.7 V**, use the product schematics to diagnose the wiring and ensure the Power converter is operating correctly.

   B. If there is **24 V**, there is an internal failure of the DCU. Replace the DCU
3. 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 monitoring the Display.

   A. If damage is found or other than normal display readings are indicated, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the fault has been resolved.

   B. If no damage or other than normal display readings are indicated, erase the fault code and continue operation.

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

19037-Reagent - pressure sensor - Short circuit high (high supply voltage)

2050M	NA

Context:
The Dosing Control Unit (DCU) has detected a high supply voltage for the DEF/AdBlue® pressure sensors. These pressure sensors are located inside the DCU.

Cause:
The internal sensors for the DCU are sensing implausible values.

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 operator observes and detects the faults with the after treatment system. Be advised, if you update software to a newer level you cannot reverse back to the older software.*

operator observes and detects the faults with the after treatment system. Be advised, if you update software to a newer level you cannot reverse back to the older software.

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

19083-Vent valve (Reductant Purge Control Valve) - Short circuit low

2050M	NA

Context:
The Dosing Control Unit (DCU) has sensed a fault with the voltage supply for the reverting valve. The reverting valve is located in the DCU.

Cause:
The DCU is sensing implausible values.

Possible failure modes:

1. The wiring is the faulty.
2. The software is the faulty.
3. The DCU is the 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 operator observes and detects the faults with the after treatment system. Be advised, if you update software to a newer level you cannot reverse back to the older software.*

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

19146-Reductant Injector Circuit Low - Dosing Valve

2050M	NA

Possible failure modes:

1. Dosing valve harness short to ground.
2. Denox module/supply module is faulty

Solution:

1. Disconnect the dosing valve connector DEFDM. Use multimeter to check for short to ground at both harness end pins 1 and 2.
   A. Check indicates a short to ground (less than **10 Ω**) at connector DEFDM. Locate and repair short to ground in dosing circuit harness.
   B. Check indicates no short to ground at connector DEFDM. See step **2**.
2. Check the dosing valve resistance. Disconnect dosing valve connector DEFDM. Use a multi-meter to measure the resistance directly at dosing valve connector pins 1 and 2. The resistance should be less than **5 Ω** .
   A. If resistance is correct continue with step **3**.
   B. If the resistance is not correct, replace the dosing valve.
3. Verify error is still present and in an active state.
   A. If error is still present and active, replace the denox module/supply module..
   B. If the error is no longer present or inactive, return unit to field operation..

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

19156-Reagent-pump - Over speed

2050M	NA

Context:
The dosing control unit (DCU) has detected this failure because the averaged pump flow is greater than **4500 l/min** (**1188.8 US gpm**) for over **7 s** (**7 s**). Check hose from DEF/AdBlue® tank to pump module. If hose is detached, re-connect hose and secure to pump. If hose is defective, replace the hose. Ensure all connectors are secured properly on the DCU and all lines are in operable condition. Replace pump module, if fault reoccurs.

19263-Tank Heating Valve - Short Circuit Low

2050M	NA

Context:
A valve remote from the storage tank is used to control coolant to prevent Diesel Exhaust Fluid (DEF)/AdBlue® from freezing in cold temperatures. The valve will respond to a signal from the Dosing Control Unit (DCU) based on temperature signals from the temperature sensor.

Cause:
A short circuit has been detected in the coolant control valve circuit.

Possible failure modes:

1. Faulty coolant control valve
2. Faulty electrical wiring or connection.
3. Faulty DCU.

Solution:

1. Verify this error is still present and in an active state.
   A. If error is still present and active, continue with step **2**.
   B. If the error is no longer present or inactive, continue with step **4**.
2. Disconnect the wiring harness from the coolant control valve and DCU. Check all connections and product wiring harness.
   A. If error still exists, continue with **3**.
   B. If error goes away, refer to product manual for wiring testing.
3. Check to see if error **19262 - Diesel Exhaust Fluid (DEF)/AdBlue tank coolant control valve (electrical) - Shorted to high source** is present.
   A. If error has occurred, replace/repair coolant control valve.
   B. If error does not occur, refer to Electronic module - Service instruction Dosing Control Unit (DCU) verification test to verify the condition of the DCU.
4. 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 monitoring the Display.
   A. If damage is found or other than normal display readings are indicated, 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 no damage or other than normal display readings are indicated, erase the fault code and continue operation.

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

B. If no damage or other than normal display readings are indicated, erase the fault code and continue operation.

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

19415-Empty Urea Tank - Fluid Level In Tank Too Low

2050M	NA

Context:
The Diesel Exhaust Fluid (DEF)/Adblue® tank contains the DEF/Adblue®.

Cause:
The Dosing Control Unit (DCU) has detected the DEF/Adblue® level is constantly less than **0.1 %** for more than **25 s**.

Possible failure modes:

1. Tank is empty.
2. Faulty level sensor.

Solution:

1. Verify this error code is still present, and in an active state.
   A. If the error is still present and active, continue with step **2**.
   B. If the error is no longer present or is in an inactive state, continue with step **6**.
2. Check to see if there are DEF/Adblue® level sensor fault codes present.
   A. If no other faults are present, continue with step **3**.
   B. If other faults are present, correct these errors first. Verify original error has been corrected.
3. Check the DEF/Adblue® tank. Verify that the tank level is filled to the proper capacity.
   A. If the tank level is full, continue with step **4**.
   B. If the level is empty or below capacity, fill the tank to the proper level.
4. Check DEF/Adblue® tank float. Verify the DEF/Adblue® float is not stuck or is obstructed by any foreign object.
   A. If float moves freely, continue with step **5**.
   B. If float is stuck, clean any foreign object from around float.

   NOTE: *Verify the DEF/AdBlue® float moves freely through the entire empty to full range. If the float binds, replace the DEF/AdBlue® tank level sensor.*
5. Disconnect the DEF/AdBlue® tank level/temperature sensor connector. Measure the resistance of the DEF/AdBlue® tank level/temperature sensor connector between pin 1 and pin 2. Measure the resistance at the full and the empty positions.

   The resistance should read approximately **16,000 Ω** at the full position of the sensor.

   The resistance should read approximately **100 Ω** at the empty position of the sensor.
   A. The DEF/AdBlue® tank level/temperature sensor failed the resistance test. Replace the DEF/AdBlue® tank level/temperature sensor.
   B. The DEF/AdBlue® tank level/temperature sensor passed the resistance test. Continue to step **6**.
6. 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 monitoring the Display.
   A. If damage is found or other than normal display readings are indicated, 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 no damage or other than normal display readings are indicated, erase the fault code and continue operation.

19579-CAN Receive Frame E2SCR Timeout

2050M	NA

Possible failure modes:

1. Controller communication error.

Solution:

1. Check for other error codes being displayed. Are there other codes displayed referring to time out of communication link. Are there other can bus communication error issues.

   A. If any other error code is being displayed, continue to these tests.

   B. If no other error code is displayed, continue to step **2**.

2. Ensure all connectors are secured properly on the denox module/supply module connector, the denox terminator connector (located on top right front fender) and engine control module connector. Check for damage, loose connections or broken can bus wires.

   A. A connector/wiring issue was located and corrected. Erase fault code and return unit to field operation.

   B. No connector/wiring issues were located. Continue with step **3**.

3. Check the can bus terminators. Disconnect denox terminator connector. Check the terminators resistance from pin 1 to pin 2. The expected reading is **120 Ω**.

   A. Expected reading is not found. Replace denox terminator. Erase fault code and return unit to field operation.

   B. Reading is as expected. Continue with step **4**.

4. Next, check the harness end resistance on the denox terminator connector from pin 1 to pin 2. This will be checking the engine control modules internal terminator. The expected reading is **120 Ω**.

   A. Expected reading not found. There may be a short to ground, or open wire between denox terminator and engine control module connector , or the engine control module terminator is faulty. Trouble shoot the wiring harness make repairs, or replace engine control module.

   B. Reading is as expected. Erase fault code. If the fault code reoccurs contact ASIST.

Harnesses and connectors - Electrical schematic sheet 28 - CAN bus system (55.100-C.20.E.28)

19606-CAN Receive Frame ET1 - Too Many Messages

2050M	NA

Possible failure modes:

1. Controller communication error.

Solution:

1. Check for other error codes being displayed. Are there other engine temperature related error codes displayed. Are there other can bus communication error issues.

   A. If any other error code is being displayed, continue to these tests.

   B. If no other error code is displayed, continue to step **2**.
2. Ensure all connectors are secured properly on the denox module/supply module connector, the denox terminator connector and engine control module connector. Check for damage, loose connections or broken can bus wires.

   A. A connector/wiring issue was located and corrected. Erase fault code and return unit to field operation.

   B. No connector/wiring issues were located. Continue with step **3**.
3. Check the can bus terminators. Disconnect denox terminator connector. Check the terminators resistance from pin 1 to pin 2. The expected reading is **120 Ω**.

   A. Expected reading is not found. Replace denox terminator. Erase fault code and return unit to field operation.

   B. Reading is as expected. Continue with step **4**.
4. Next, check the harness end resistance on the denox terminator from pin 1 to pin 2. This will be checking the engine control modules internal terminator. The expected reading is **120 Ω**.

   A. Expected reading not found. There may be a short to ground, or open wire between denox terminator and engine control module connector, or the engine control module terminator is faulty. Troubleshoot the wiring harness make repairs, or replace engine control module.

   B. Reading is as expected. Erase fault code. If the fault code reoccurs contact ASIST.

Harnesses and connectors - Electrical schematic sheet 28 - CAN bus system (55.100-C.20.E.28)

19678-Ambient Air Temperature Sensor Range/ Performance - Too Many CAN Messages

2050M	NA

Context:
The denox module/supply module has detected this failure because the ambient air temperature has a faulty can bus signal.

Cause:
Ambient air temperature has a faulty sensor range.

Solution:

1. If the unit has been exposed to extreme ambient temperatures, either high or low, take steps to get it back into normal operating temperature range.

   Check that all connectors are connected and undamaged on the denox module/supply module and that all lines are operable.

   A. Connector or line problem found. Repair or replace connector or line, and return unit to field operation.

   B. Connector or line problem not found. Replace the denox module/supply module.

Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)
Harnesses and connectors - Electrical schematic sheet 28 - CAN bus system (55.100-C.20.E.28)

19741-ECM/PCM Power Relay Control Circuit Open - Main Relay Open Circuit

2050M	NA

Context:
When the machine is shutdown, the afterrun cycle will supply power until the DEF/Adblue® purge cycle is finish.

Cause:
Monitoring of the internal voltage is out of range, open circuit has been detected.

Possible failure modes:

1. Faulty wiring.
2. Faulty DCU.

Solution:

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

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

   B. If the fault is inactive or not present, the fault may have been intermittent. Check for an intermittent fault.
2. Inspect the wiring harness and connectors.

   Verify the wiring harness from the power distribution system to the DCU is not damaged and connections are properly connected.

   Verify the connector locks are not broken and securely hold the connectors in a connected and locked position.

   A. If there is no damage and the connectors are properly connected, continue to Step **3**.

   B. If damaged wiring is found, repair the damaged wiring. Retest the circuit(s).
3. Verify the supply voltage to the DCU.

   Disconnect the wiring harness from the DCU.

   Place the key switch ON.

   Use a multimeter to check for voltage on the wiring harness side of the DCU connector pin 3 to pin 14.

   Use a multimeter to check for voltage on the wiring harness side of the DCU connector pin 4 to pin 15.

   Use a multimeter to check for voltage on the wiring harness side of the DCU connector pin 24 to chassis ground.

   There should be between **20 - 28 V**.

   A. The voltage is incorrect, repair/replace the supply power wiring to the DCU. Test the system for proper operation.

   B. If the voltage is correct, try reloading the DCU software. If the fault is still present, replace the DCU.

Harnesses and connectors - Electrical schematic sheet 01 - Power distribution/charging system (55.100-C.20.E.01)
Harnesses and connectors - Electrical schematic sheet 02 - Starting system (55.100-C.20.E.02)
Harnesses and connectors - Electrical schematic sheet 05 - Exhaust control (55.100-C.20.E.05)

19818-Dynamic Urea Leakage Test - Leak Detected

2050M	NA

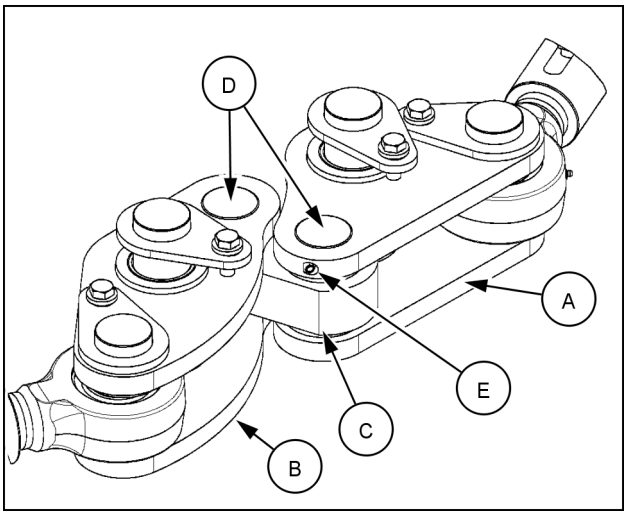
Context:
The dosing control unit (DCU) has sensed the dosing module is stuck open. Perform UDST and check **DEF/ADBLUE®** to verify stuck condition. If dosing module is confirmed stuck, replace the module.

(*) See content for specific models

Contents

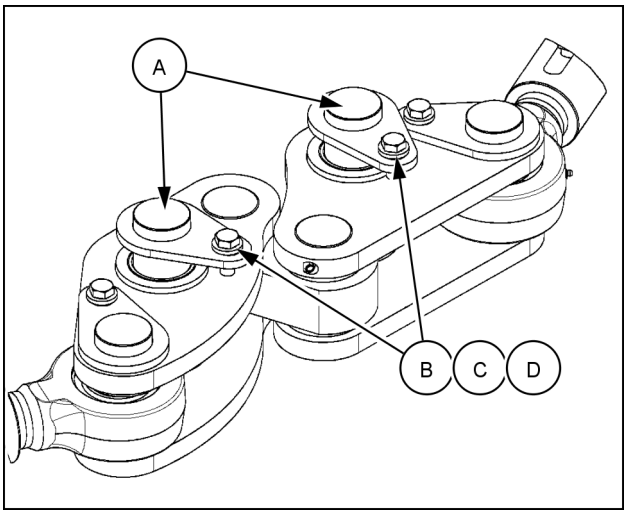
Dozer blade and arm - 86

4. Remove the spring pins **(E)** from the holes in links **(A)** and **(B)**.
5. Remove the pins **(D)** to the left-hand and right-hand equistatic links **(A)** and **(B)**.
6. Disassemble the left-hand equistatic link **(A)** and right-hand equistatic link **(B)** from the blade center link **(C)**.



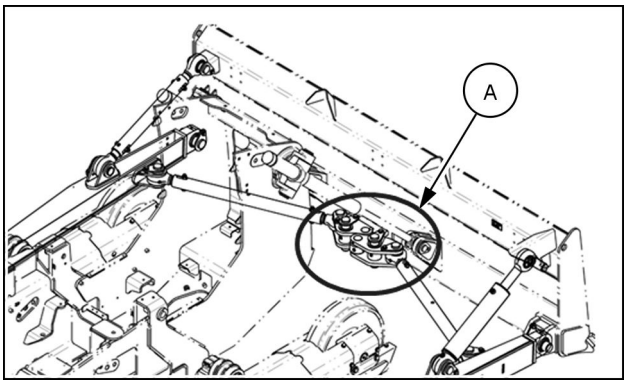
RAPH15DOZ0040BA 4

7. Remove the drive through pins **(A)** by removing the bolts **(B)**, spacers **(D)**, and washers **(C)**. Then drive the pins out of the assembly.



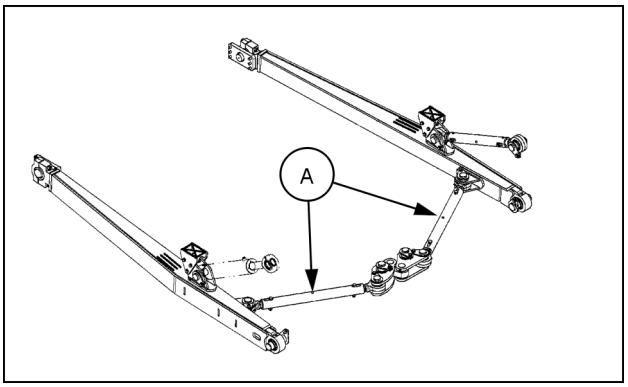
RAPH15DOZ0040BA 5

8. Remove the assembled lever from the bracket on the center of the blade.

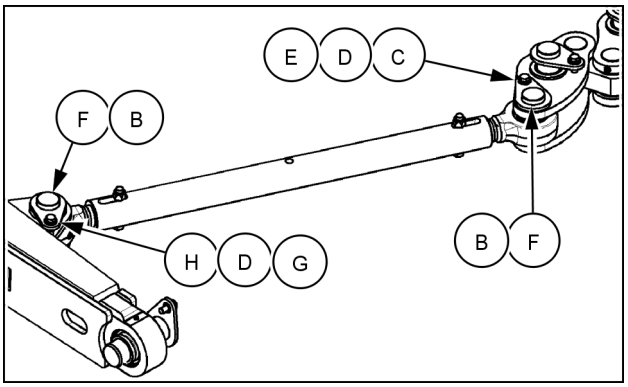


RAPH15DOZ0064AA 6

27. Install the push beam tie rods **(A)** with spacers **(F)** to the blade using pins **(B)**, bolts **(C)**, spacers **(E)**, and washers **(D)**.
28. Install the other ends of the push beam tie rods **(A)** to the push beams using pins **(B)**, bolts **(G)**, spacers **(H)**, and washers **(D)**. Apply **LOCTITE® 243™** on bolts **(C)** and **(G)**.

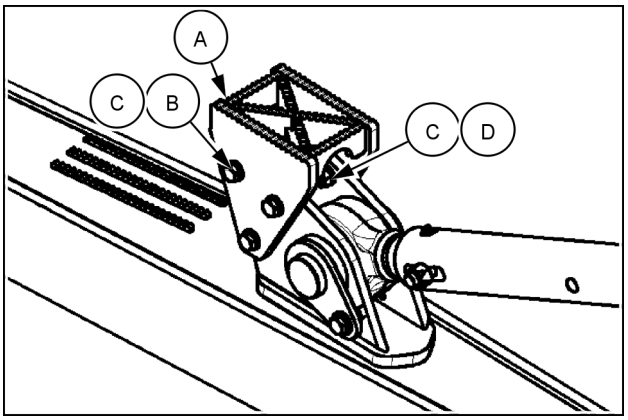


RAPH15DOZ0038AA 14



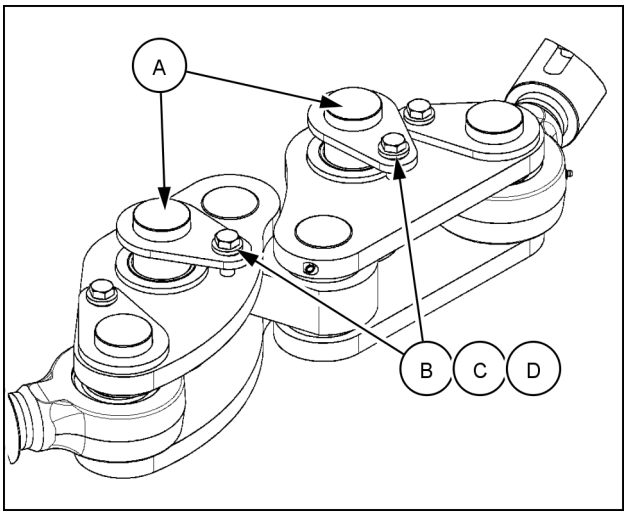
RAPH15DOZ0039BA 15

29. Install the push beam steps **(A)** to each side of the machine with six bolts **(B)** with washers **(D)** on the outside and nuts **(D)** with washers **(C)** on the inside of both sides of the step.



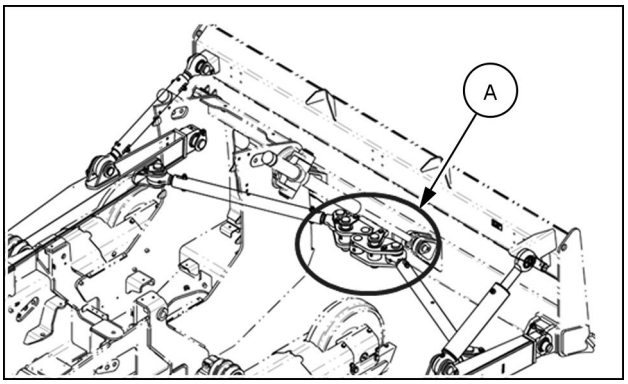
RAPH15DOZ0037BA 16

6. Remove the drive through pins **(A)** by removing the bolts **(B)**, spacers **(D)**, and washers **(C)**. Then drive the pins out of the assembly.



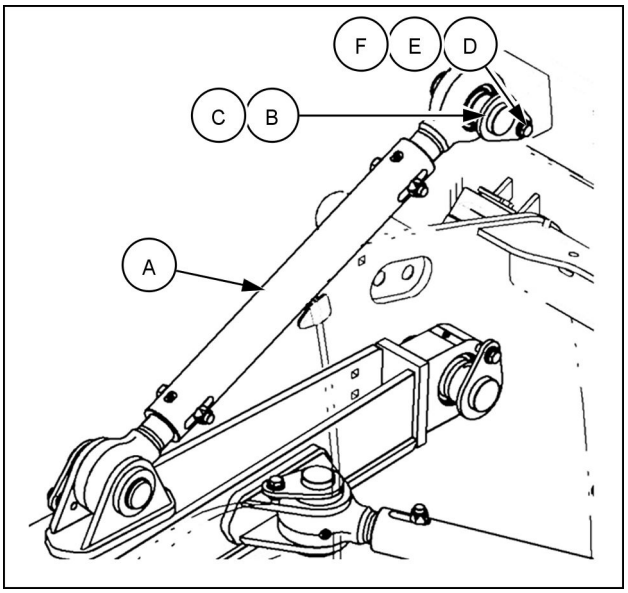
RAPH15DOZ0040BA 4

7. Remove the assembled lever from the bracket **(A)** on the center of the blade



RAPH15DOZ0064AA 5

8. Remove the push beam tie rod **(A)** from the blade by removing pin **(B)** with spacer **(C)**, bolt **(D)**, spacer **(F)**, and washer **(E)**.



RAPH15DOZ0041BA 6

C-frame or thrust arms - Install - PAT blade C-frame

2050M	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.

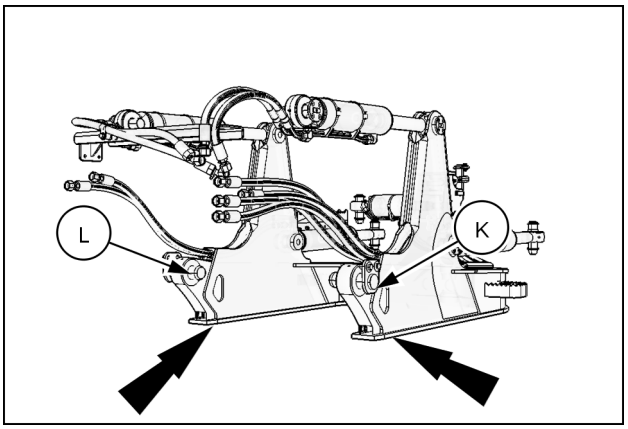
W0398A

⚠ 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.

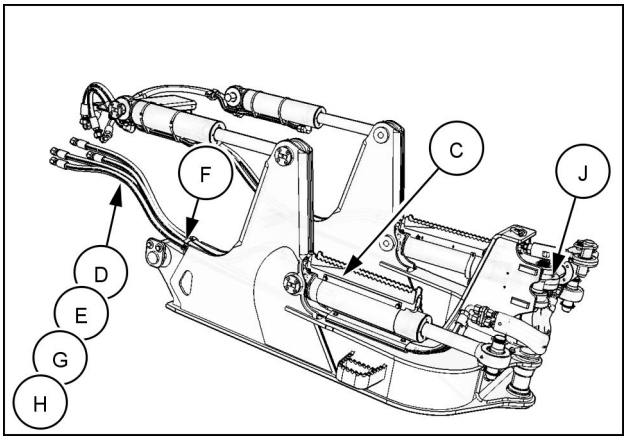
W0063C

1. Support the C-frame to correct height where indicated by arrows and drive the machine slowly forward to align.
2. Install the left-hand **(L)** and right-hand **(K)** machine pins to the C-frame and secure.



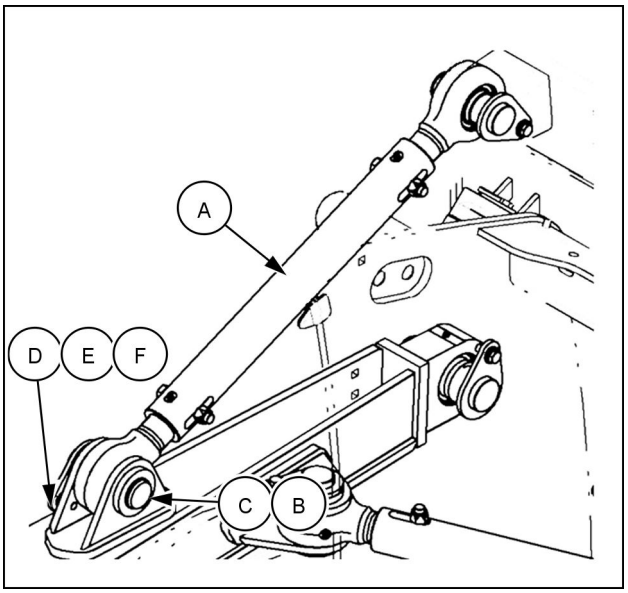
RAPH15DOZ0078BA 1

3. Connect the pipes on the right-hand side of the machine for the tilt cylinder **(J)**.
4. Install the right-hand hydraulic hoses **(D)**, **(E)**, **(G)**, and **(H)** through the frame and secure with clamps **(F)**.
5. Connect the right-hand grease line to the angle cylinder, if equipped.
6. Install the right-hand hydraulic lines **(D)** and **(E)** to the angle cylinder, and install the cylinder hose sleeve **(C)**.



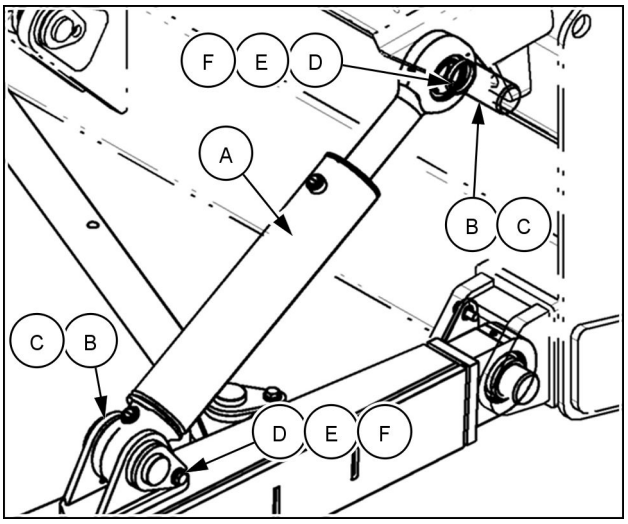
RAPH15DOZ0077BA 2

10. Remove the push beam tie rod **(A)** from the push beam by removing the pin **(B)** with spacer **(C)**, bolt **(D)**, spacer **(F)**, and washer **(E)**.



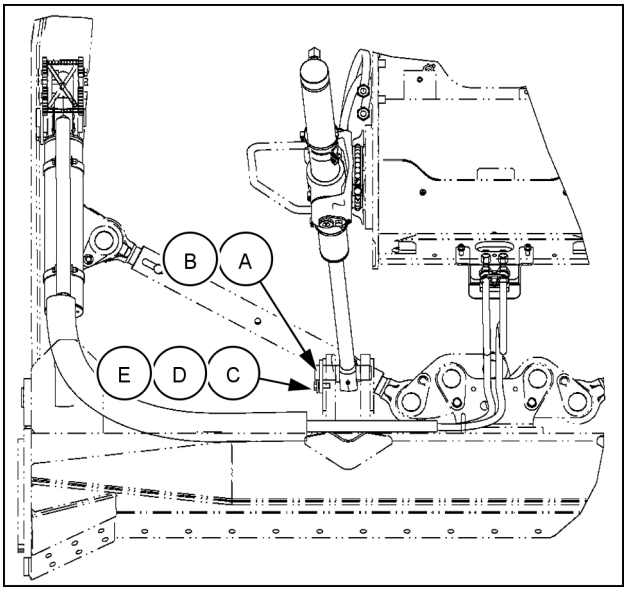
RAPH15DOZ0041BA 7

11. Disconnect the vertical cylinder from the blade and push beam by removing the pins **(B)** with spacers **(C)**, bolts **(D)**, spacers **(F)**, and washers **(E)**.



RAPH15DOZ0048BA 8

12. Disconnect the end of the lift cylinder from the blade by removing the pin **(A)** with bushing spacers **(B)**, bolt **(C)**, mounting spacer **(D)**, and washer **(E)**. Repeat for the opposite side.



RAPH15DOZ0049BA 9

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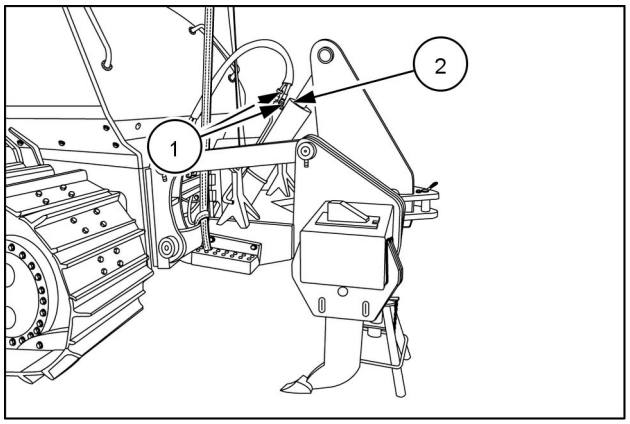
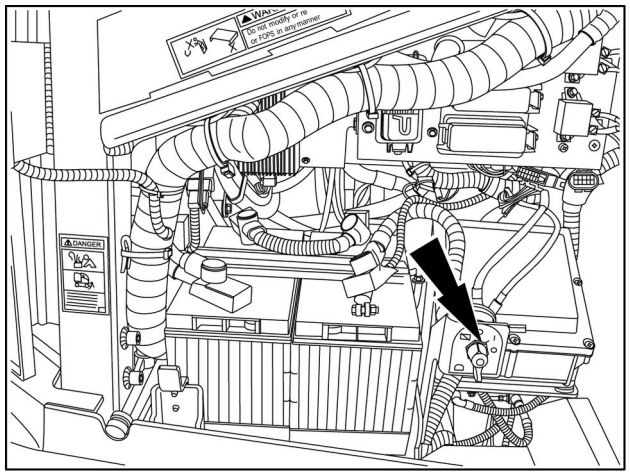
10. Connect two ripper cylinder hydraulic hoses **(1)** to the ripper cylinder **(2)**.

NOTE: *Torque the hydraulic hoses per general specification* ***Torque - Standard torque data for hydraulics ()****.*



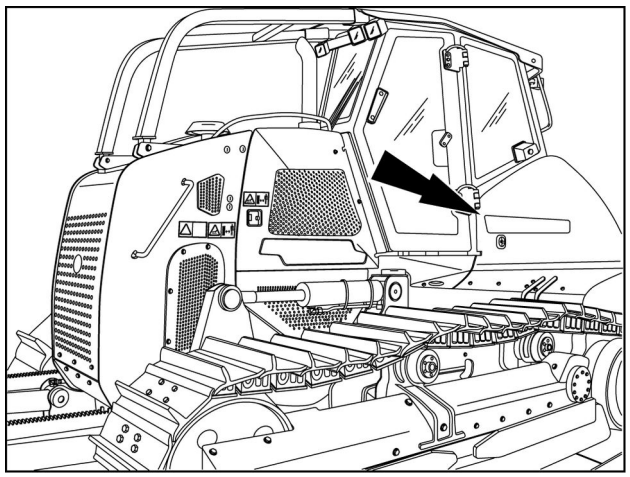
RAIL14DOZ0275AA 8

11. Remove the lifting and supporting device.
12. Grease the upper and lower ripper arm pins.
13. Turn the master battery disconnect switch to the ON position.



RAIL12DOZ0927BA 9

14. Close the battery access door.



RAIL14DOZ0175AA 10

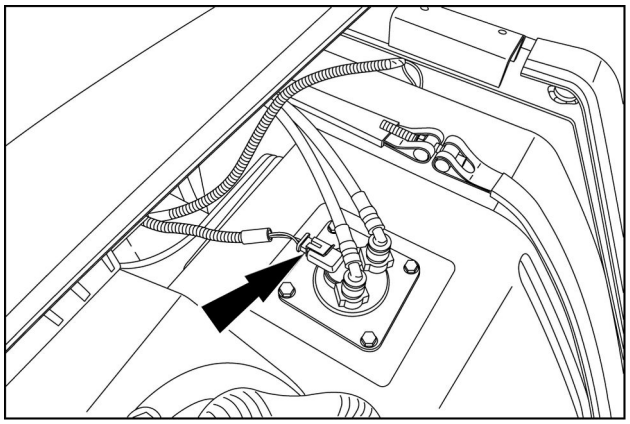
15. Check the hydraulic fluid level.

NOTICE: *Keep hands and body away from any pressurized leak. DO NOT use your hand to check for leaks. Use a piece of cardboard or paper. If fluid penetrates the skin, seek medical attention immediately.*

16. Start the engine and operate the ripper raise and lower functions. Check for leaks. Shut off engine.
17. Check the hydraulic fluid level.

Bulldozer (BD) Blade [NCDC25000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Bulldozer (BD) Blade [NDDC25000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Bulldozer (BD) Blade [NEDC20000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Bulldozer (BD) Blade [NFDC20000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Power Angle Tilt (PAT) Blade [NCDC25000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Power Angle Tilt (PAT) Blade [NDDC25000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Power Angle Tilt (PAT) Blade [NEDC20000 -] , 2050M Wide Track (WT) / Low Ground Pressure (LGP), Power Angle Tilt (PAT) Blade [NFDC20000 -]

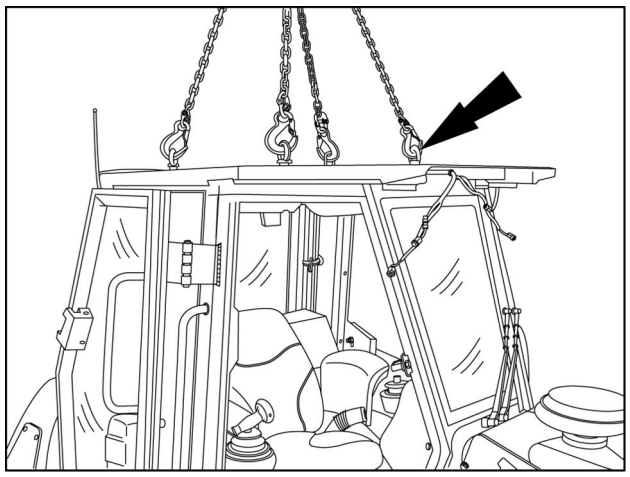
28. Disconnect the fuel level sensor electrical connector from the top of fuel tank.



RAIL14DOZ0271AA 24

NOTICE: *The cab weighs approximately* ***884.5 kg*** *(****1950 lb****). Use appropriate lifting device to prevent personal injury or property damage.*

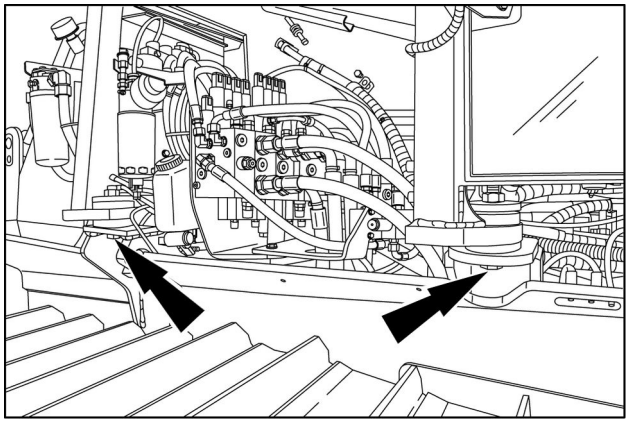
29. Attach an appropriate lifting device to the cab using the four lifting points as shown.



RAIL12DOZ0778BA 25

NOTE: *The right side cab mounting bolts, washers, and nuts are shown. The left side is similar.*

30. Remove four cab mounting bolts, washers, and nuts from the cab mounts.



RAIL14DOZ0270AA 26

NOTE: *Note the routing of the A/C lines during the cab removal to aid in installation.*

31. Remove the cab from the machine. While the cab is being removed, move the A/C lines out of the engine area and store the A/C lines inside the cab.
32. Remove the lifting device from the cab.
33. Repair or replace components as necessary.

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.

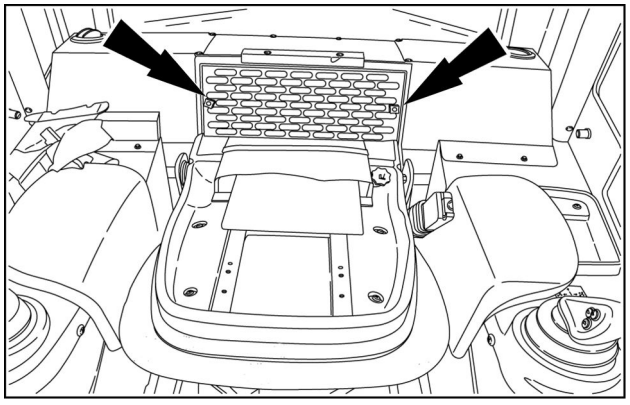
W0162A

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.

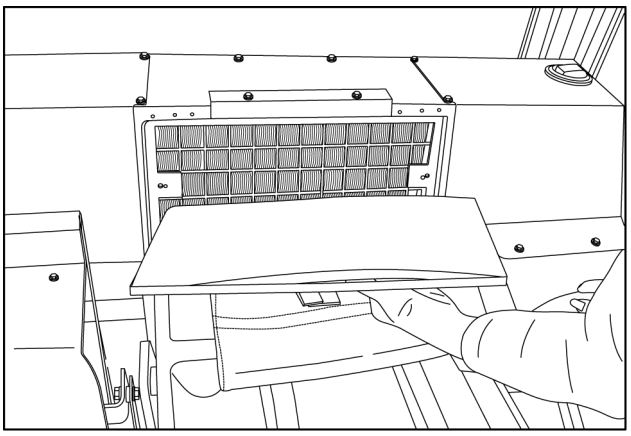
Recirculation filter

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



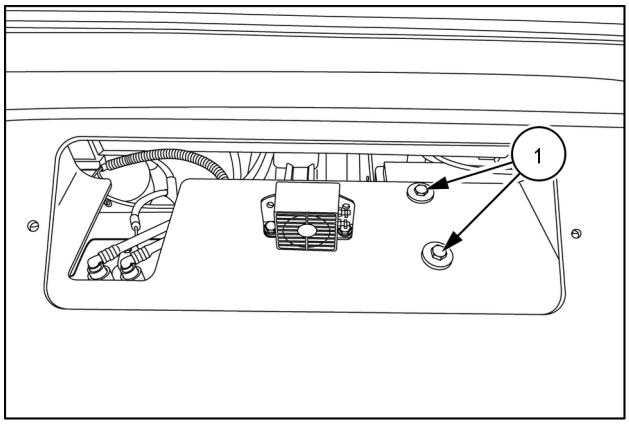
RAPH12DOZ0074AA 1

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



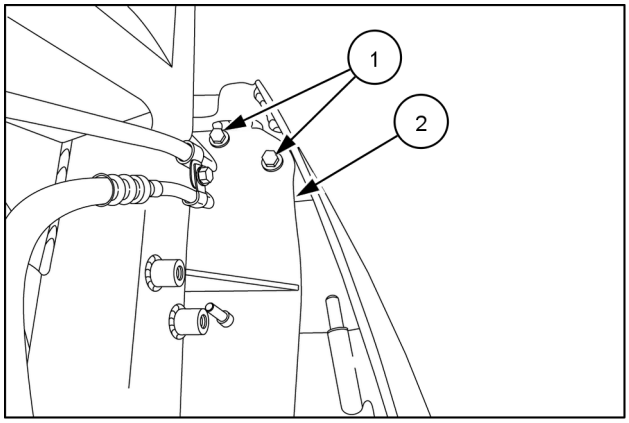
RAIL12DOZ0164AA 2

5. Install two upper center rear cover mounting bolts and washers **(1)** to the rear cover.



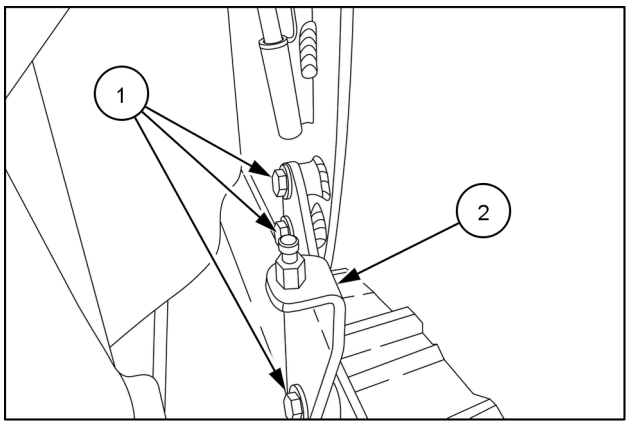
RAIL14DOZ0194AA 4

6. Install two upper left side rear cover mounting bolts and washers **(1)** to the rear cover **(2)**.



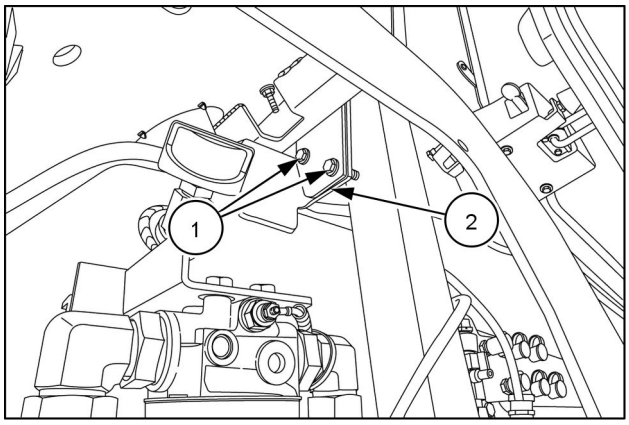
RAIL14DOZ0188AA 5

7. Install three lower left side mounting bolts and washers **(1)** to the rear cover and battery access door prop rod mounting bracket **(2)**.



RAIL14DOZ0189AA 6

8. Install two upper right side rear cover mounting bolts and washers **(1)** to the rear cover **(2)**.



RAIL14DOZ0187AA 7

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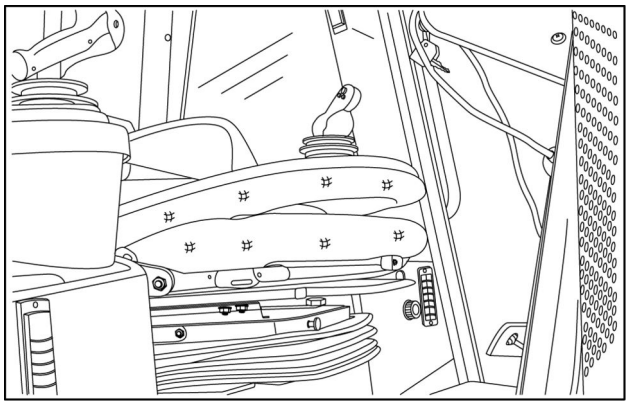
Platform, cab, bodywork, and decals - 90

Operator protections - 114

SERVICE

(*) See content for specific models

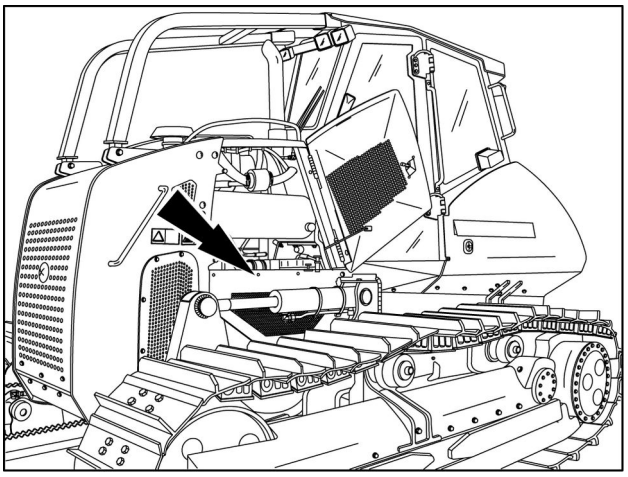
5. Remove the seat from the cab.



RAPH12DOZ0496AA 4

Next operation:
Pneumatically-adjusted operator seat - Install (90.124)

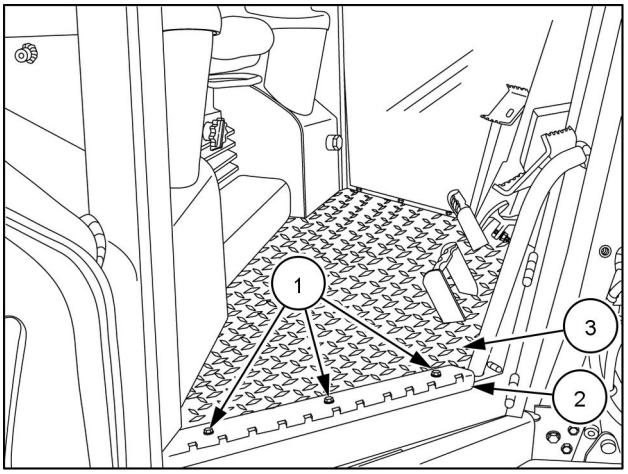
5. Remove the left lower engine access panel from the machine.



RAIL14DOZ0250AA 4

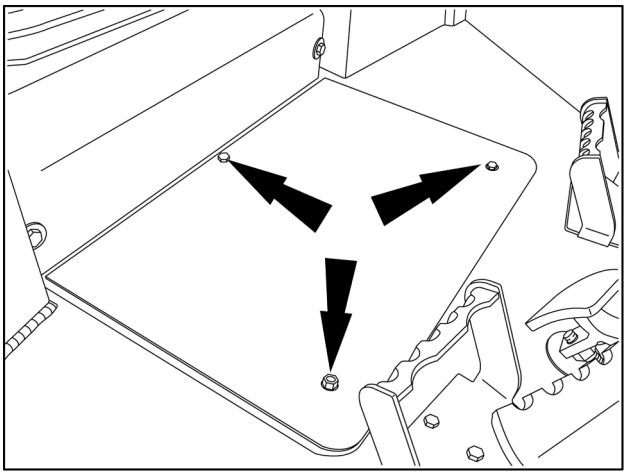
6. Open both cab doors.

7. Remove six cab floor mat mounting bracket screws **(1)** and brackets **(2)**. Remove the cab floor mat **(3)** from the machine.



RAIL14DOZ0239AA 5

8. Remove three floor access panel mounting bolts and washers from the floor access panel and remove the floor access panel from the machine.



RAIL13DOZ0331AA 6