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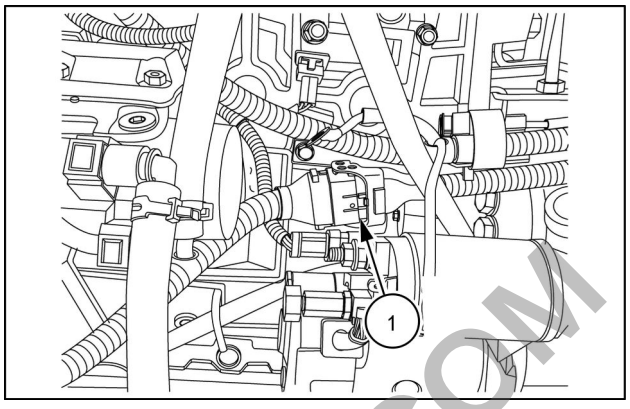
Front axle system 25

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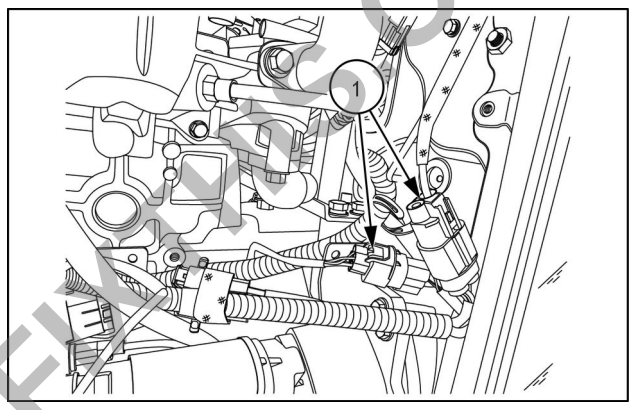
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22. Disconnect the Engine Control Unit (ECU) electrical connector **(1)** near the middle of the engine crankcase.



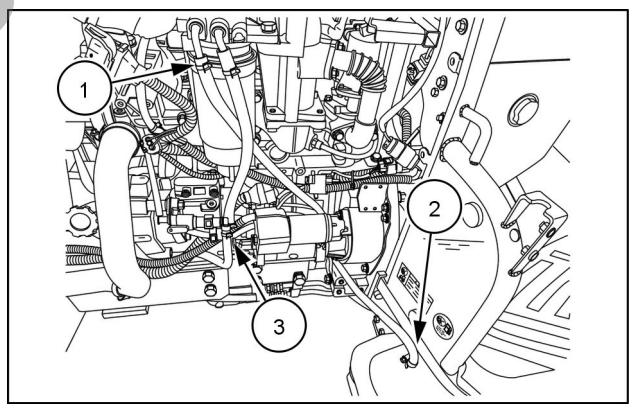
NHIL16CT01386AA 15

23. Disconnect the power and ground electrical connectors **(1)** above the starter motor.



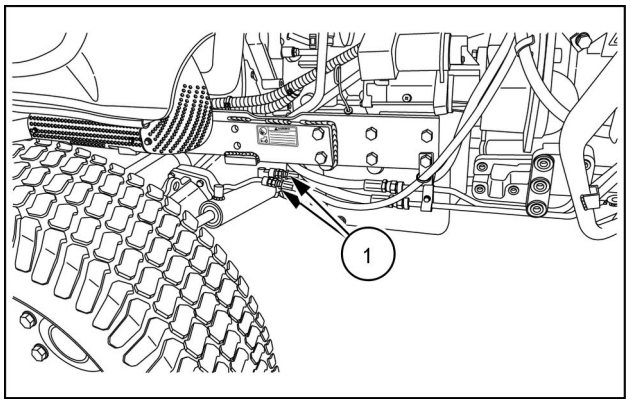
NHIL16CT01387AA 16

24. Disconnect the fuel supply hose **(1)** from the fuel water separator filter to the fuel tank.
25. Disconnect the fuel return hose **(2)** from the high-pressure fuel pump to the right-hand fitting on the fuel cooler.
26. Disconnect the fuel return hose **(3)** from the fuel tank.



NHIL16CT01379AA 17

27. Disconnect the right-hand and left-hand steering hoses **(1)** at the power steering cylinders.
28. Tie hoses back out of the way toward rear of the tractor.



NHIL17CT00004AA 18

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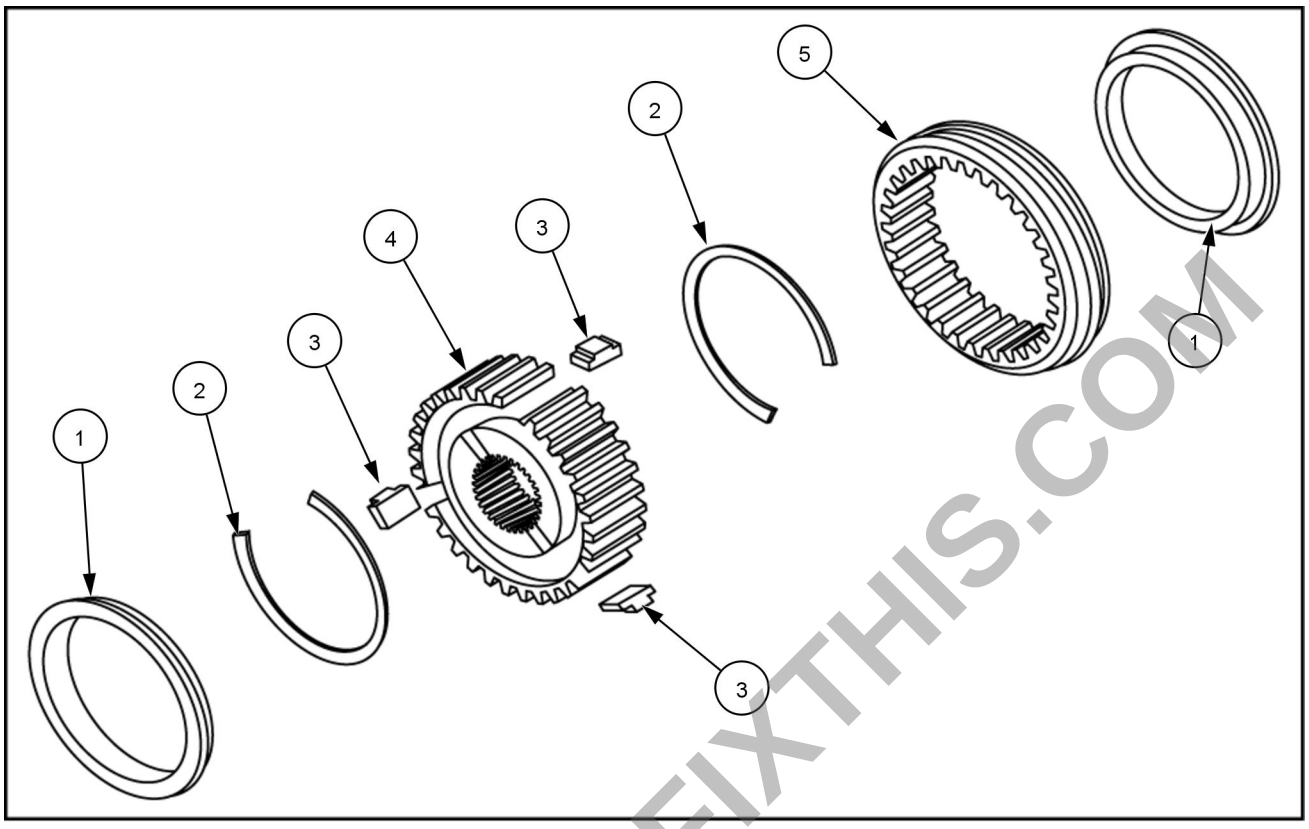
SERVICE MANUAL

Transmission

Workmaster™ 35 Tier 4B (final), ROPS [LSM0W35Rxx0010001 - LSM0W35RHH0010200]
Workmaster™ 40 Tier 4B (final), ROPS [LSM0W40Rxx0010001 - LSM0W40RKH0010198]

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93102313 2

Synchronizer

Item	Description	Item	Description
(1)	Synchronizer ring	**(4)**	Hub
(2)	Spring	**(5)**	Shift sleeve
(3)	Key		

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Four-Wheel Drive (4WD) axle - Remove

⚠ 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

Avoid injury!
Handle all parts carefully. Do not place your hands or fingers between parts. Use Personal Protective Equipment (PPE) as indicated in this manual, including protective goggles, gloves, and safety footwear.
Failure to comply could result in death or serious injury.

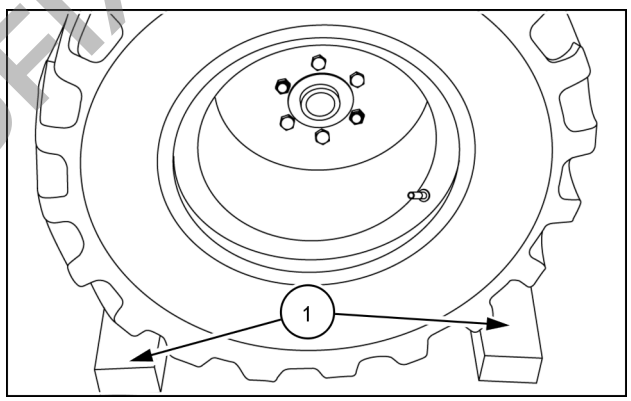
W0208A

⚠ WARNING

Crushing hazard!
When jacking under the front axle, make sure the machine is on level ground. Engage the parking brake. Securely block rear wheels.
Failure to comply could result in death or serious injury.

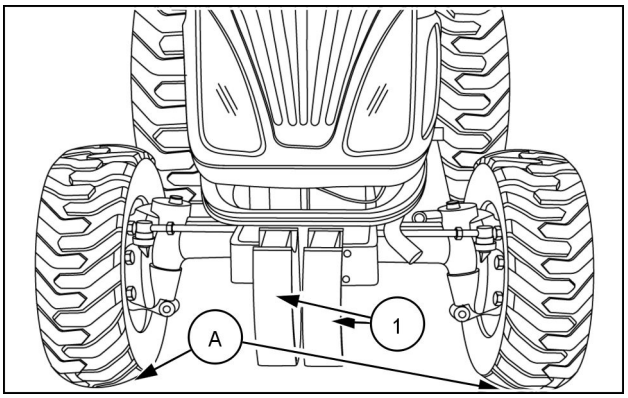
W0085A

1. Block both sides of rear wheels **(1)** to prevent the tractor from moving frontward or rearward.



93104522 1

2. Remove all balance weights **(1)**.
3. Lift the front of tractor until the front tires are no more than one inch **(A)** off the ground.

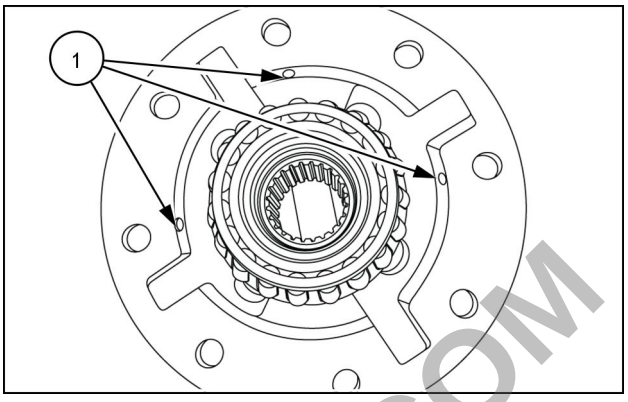


93104521 2

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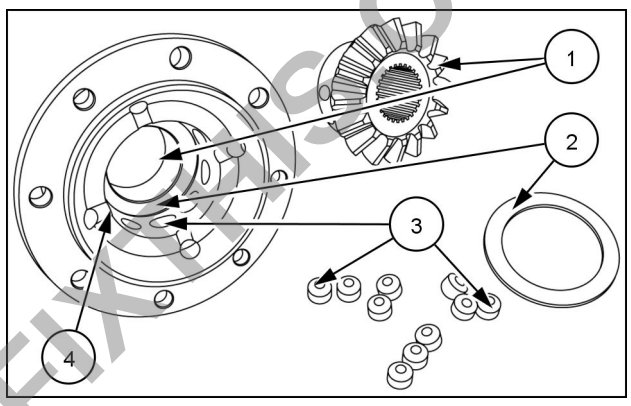
4. Drive the three spring pins **(1)** completely in flush with the surface **(2)**.



93104580 4

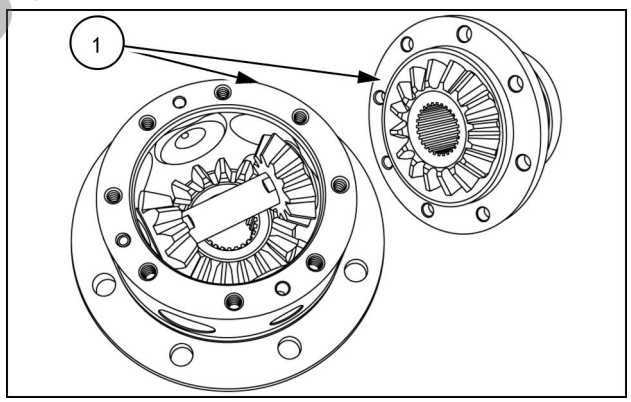
5. Install the spider gear **(1)** into the housing **(4)**.
6. Install the shims **(2)** and the tapered balls **(3)**.

NOTICE: *Install all ten tapered balls, account for all ten. Pay attention to the position of the balls on disassembly.*



93104578 5

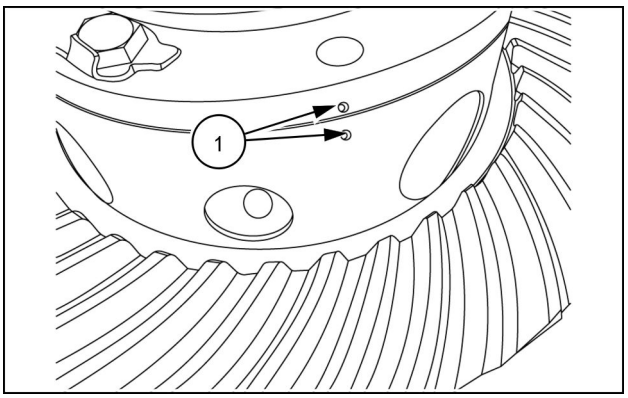
7. Join the differential housing **(1)**.



93104577 6

8. Align the differential housing punch marks as shown **(1)** for reassembly accuracy.

NOTE: *Housing bolts and locking devices must be installed last to facilitate putting the ring gear on with no interference.*



93104576 7

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Transmission and steering hand control - Adjust Hydrostatic Transmission (HST) pedal return spring

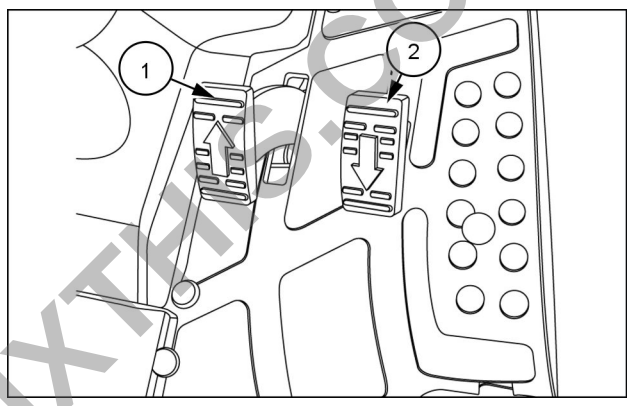
⚠ WARNING

Spring under tension!
Stretched springs have potentially dangerous stored energy. Always assemble and disassemble properly.
Failure to comply could result in death or serious injury.

W0383A

Function

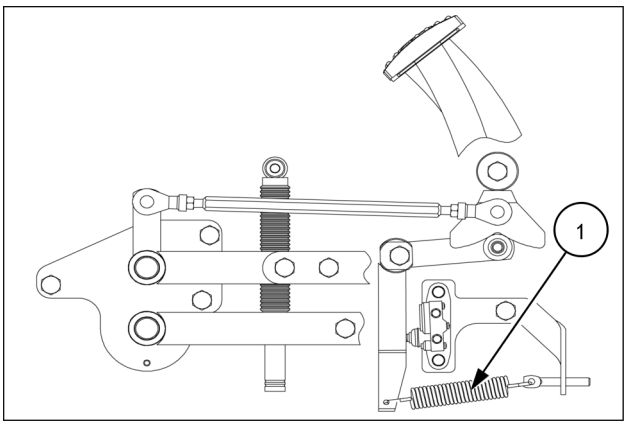
1. The HST pedal return spring is responsible for returning the Forward **(1)** and Reverse **(2)** HST pedals to the neutral position.



93109705 1

Location

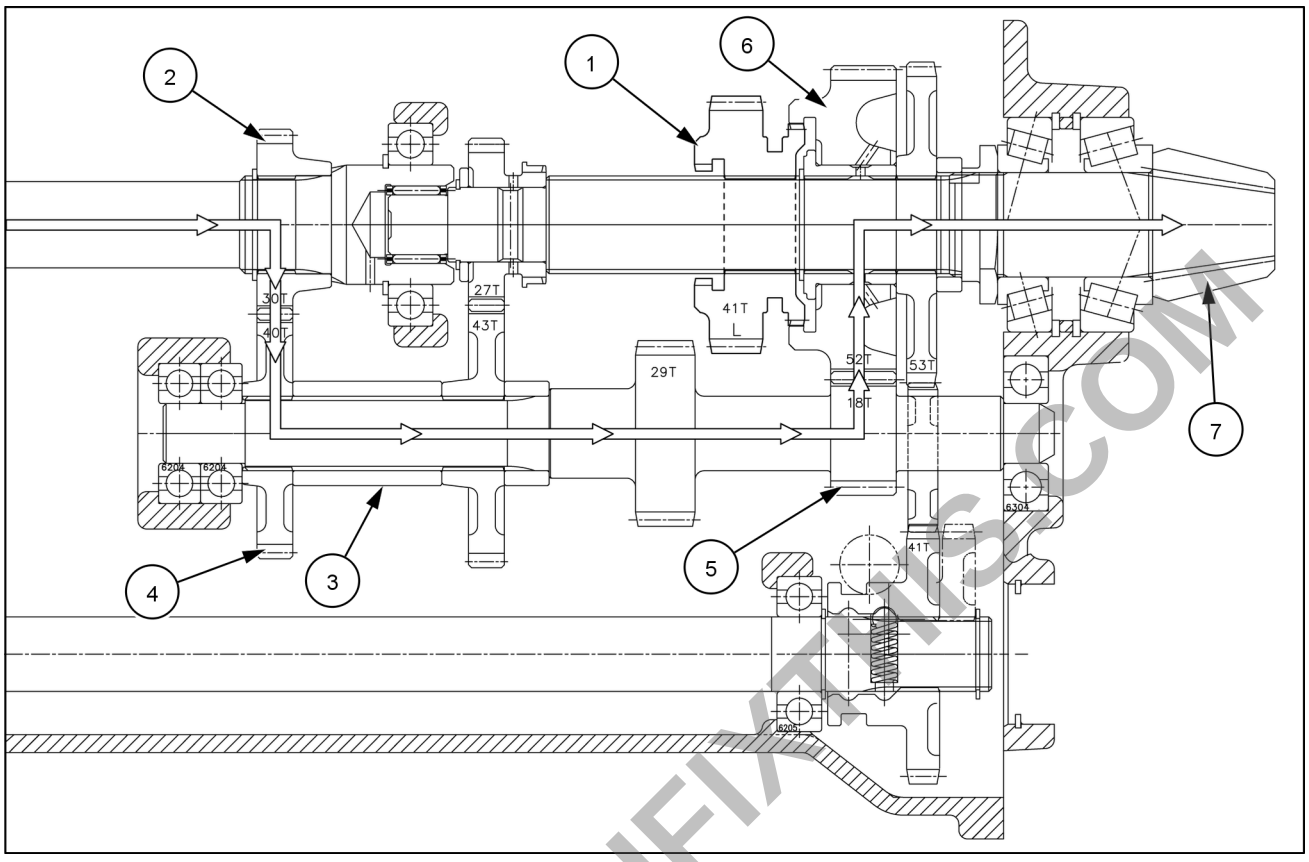
1. The return spring **(1)** is located under the right side of the tractor.



93102293A 2

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NHIL13CT00808FA 3

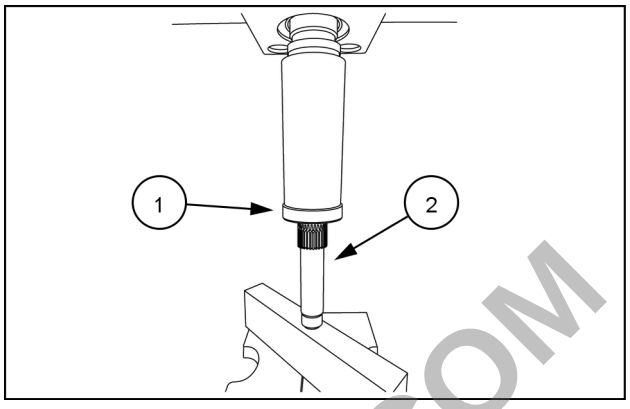
Low Range

When the range sliding gear (41T) **(1)** is in the Low range position, all the torque from the input shaft gear (30T) **(2)** is applied to the range drive counter shaft **(3)** through the range counter shaft intermediate gear (40T) **(4)**. Torque is transferred from the low range counter shaft drive gear (18T) **(5)** to the low range driven gear (52T) **(6)**. Torque is transferred from the low range driven gear to the pinion shaft **(7)**.

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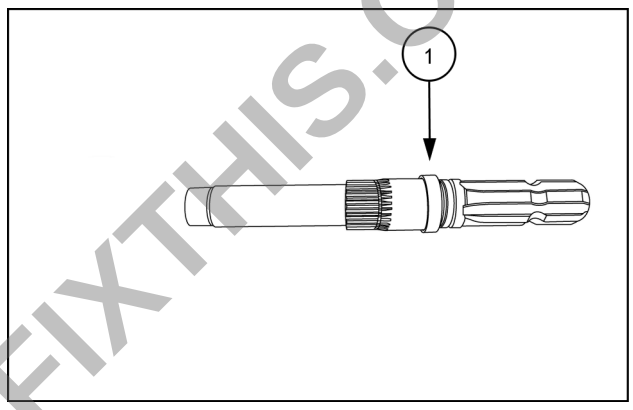
6. Use a shop press and remove the bearing **(1)** from the rear PTO stub shaft **(2)**.



NHIL16CT00533AA 7

7. Remove the seal wear sleeve **(1)**.

NOTE: *Strike the wear surface of the wear sleeve with a cold chisel to aid in the removal.*



NHIL16CT00534AA 8

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The oil cooler is protected from excessive hydraulic pressures by the oil cooler bypass valve, that is located in the HST filter base. The bypass valve starts to open when a pressure differential of the inlet and outlet of the oil cooler is **414 kPa** (**60 psi**) and fully opens at **538 kPa** (**78 psi**). When bypass valve is fully open, oil flow is not routed through the oil cooler. When the pressure differential is less than **414 kPa** (**60 psi**) the bypass valve closes and the oil flow is routed through the oil cooler.

The Hydrostatic Transmission (HST) filter base **(2)** also contains the HST filter bypass valve **(3)**. This bypass valve protects the HST filter from excessive pressures. The HST filter bypass valve starts to open when a pressure differential of the inlet and outlet of the HST filter is **207 kPa** (**30 psi**) and fully opens at **276 kPa** (**40 psi**) . When bypass valve is fully open, oil flow is not routed through the HST filter. When the pressure differential is less than **207 kPa** (**30 psi**) the bypass valve closes and the oil flow is routed through the HST filter.

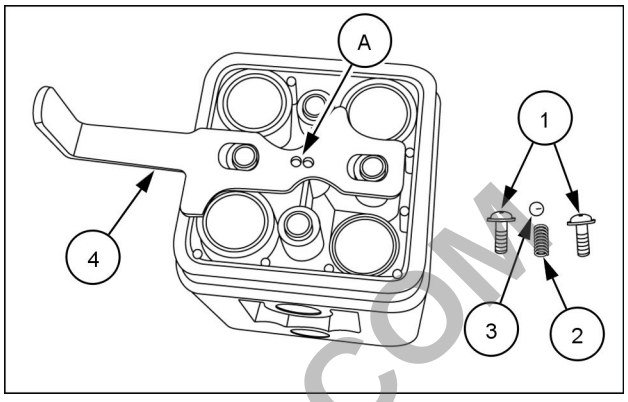
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Mid-mount remote control valve - Install Control cables.

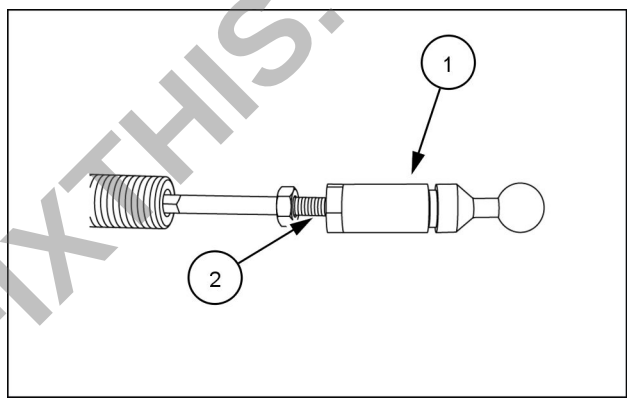
1. Use **FNH00081** and install the spring **(2)** and the detent ball **(3)** into the center hole of the joy stick block.
2. Install the lock plate **(4)** with the detent ball engaged into one of the holes **(A)**.
3. Secure the lock plate to the joystick block with two screws **(1)**.

NOTE: *Only tighten screws enough to allow a smooth sliding action of the lock plate. Over tightening will cause plate to bind.*



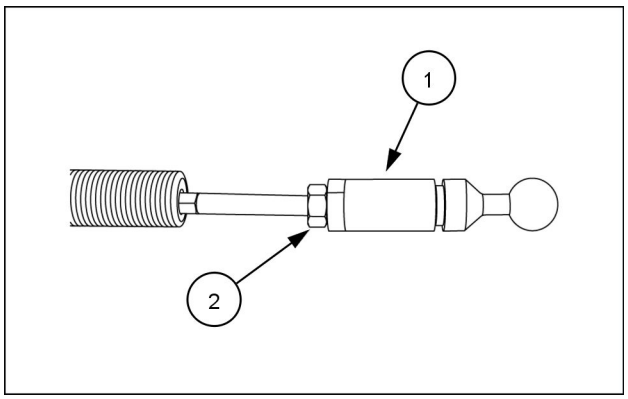
93109605 1

4. If installing a new cable ball end, thread the ball end **(1)** onto the cable until all the threads **(2)** of the cable are covered.



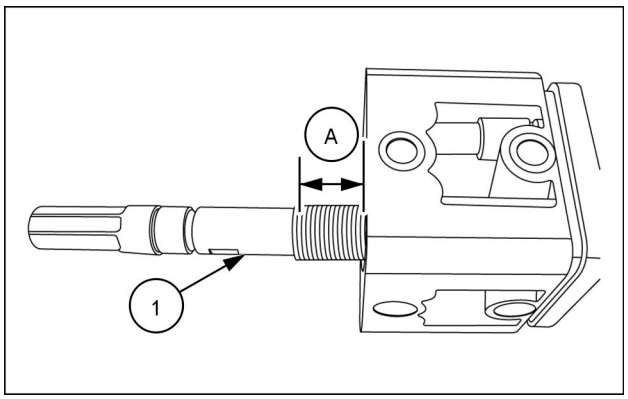
93109598 2

5. Secure the ball end **(1)** to the cable by tightening the jam nut **(2)**.



93109599 3

6. Thread the cable **(1)** into the joystick block unit approximately **20 mm** (**0.80 in**) of the threads **(A)** are exposed.



93109601 4

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Hitches, drawbars, and implement couplings - 37

Rear three-point hitch - 110

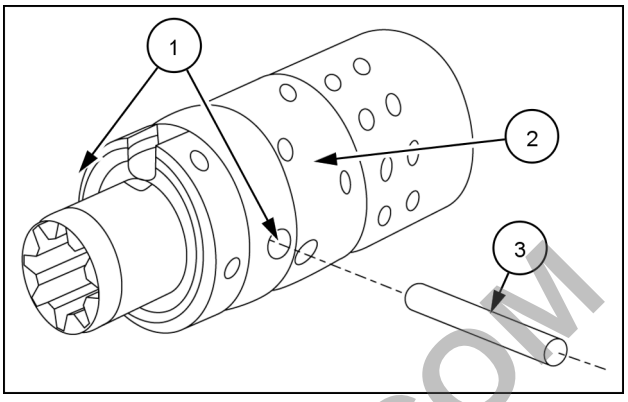
Workmaster™ 35 Tier 4B (final), ROPS [LSM0W35Rxx0010001 - LSM0W35RHH0010200]
Workmaster™ 40 Tier 4B (final), ROPS [LSM0W40Rxx0010001 - LSM0W40RKH0010198]

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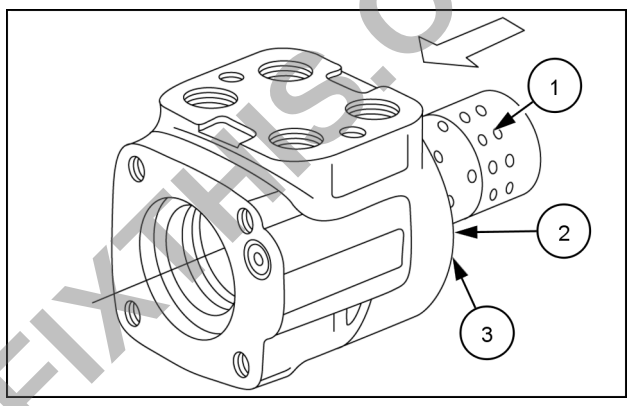
8. Align the holes **(1)** for the pin **(3)** in the spool and sleeve **(2)** and insert the pin until it is flush with the outside of the sleeve.

NOTICE: *When installing the assembly, insure that the pin **(3)** does not fall out of the hole.*



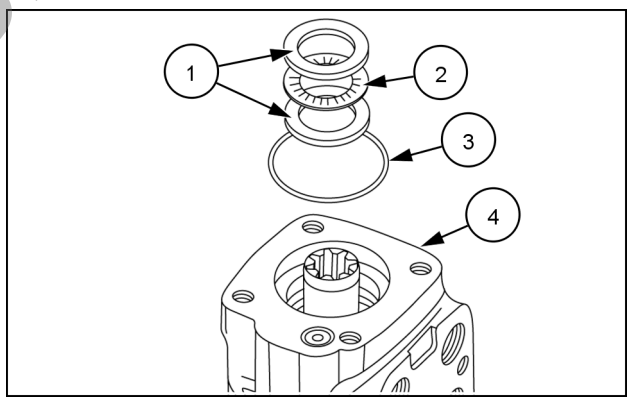
93102657 6

9. Insert the spool and sleeve assembly **(1)** to the rear of the valve housing **(2)** until flush with the surface of valve body **(3)**.
10. Rotate the spool and sleeve assembly in the valve body to insure smooth operation.



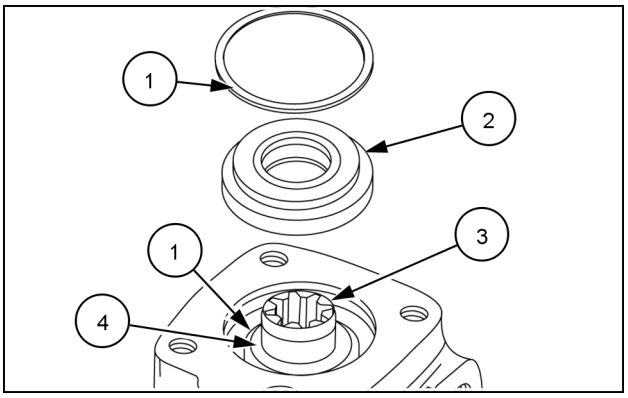
93102658 7

11. Place the housing **(4)** on a flat surface and install the O-ring **(3)**. Install two bearing races **(1)** and thrust bearing **(2)**.



93102659 8

12. Install the dust seal **(4)** in the seal retainer **(1)**.
13. Install oil seal **(2)** in seal retainer **(1)** by pushing with a finger.
14. Turn seal retainer **(1)** and press onto spool **(3)**. Tapping lightly with a rubber hammer, will make the seal retainer **(1)** flush with the valve body. Make sure contact is made between the seal and race.



93102660 9

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Connectors	**X-063 (Plug)**
Technical information	**Intake manifold pressure sensor - Technical Data (55.014)**
Functional information	**Engine control system - Component localization - Electrical sensors (55.015)**
Diagnostic information	**s106 F03 (P0106) - Intake Manifold Absolute Pressure sensor signal drift fault (55.640)** **s106 F04 (P0106) - Intake Manifold Absolute Pressure sensor signal drift fault (55.640)** **s106 F03 (P0108) - Intake Manifold Absolute Pressure sensor signal high fault (55.640)** **s106 F04 (P0107) - Intake Manifold Absolute Pressure sensor signal low fault (55.640)**

B-010 - EXHAUST TEMPERATURE SENSOR, AFTER DIESEL OXIDATION CATALYST (DOC) (T5) (Sensor)

Component Type	Sensor
Wiring frames	**SHEET 02**
Connectors	**X-064 (Plug)**
Technical information	**Exhaust Gas Recirculation (EGR) temperature sensors Diesel Particulate Filter (DPF) inlet temperature sensor - Technical Data (55.989)**
Functional information	**Engine control system - Component localization - Electrical sensors (55.015)**
Diagnostic information	**s173 F31 (P242A) - DPF In temp sensor fault (55.640)** **s173 F03 (P242D) - DPF In temp sensor high fault (55.640)** **s173 F04 (P242C) - DPF In temp sensor low fault (55.640)** **s173 F02 (P242E) - DPF In temp sensor noise fault (55.640)** **s173 F02 (P242B) - DPF In temp sensor plausibility fault (55.640)**

B-011 - DIFFERENTIAL PRESSURE SENSOR (DPS) (Sensor)

Component Type	Sensor
Wiring frames	**SHEET 02**
Connectors	**X-065 (Plug)**
Technical information	**Differential pressure sensor - Technical Data (55.989)**
Functional information	**Engine control system - Component localization - Electrical sensors (55.015)**
Diagnostic information	**s3253 F07 (P224A) - DP sensor leak detected (55.640)** **s3253 F07 (P244A) - DP sensor leak detected (55.640)** **s3253 F11 (P1453) - DP sensor tube Clamped (55.640)** **s3253 F11 (P1452) - DP sensor tube inverted (55.640)** **s3253 F02 (P2453) - DP sensor plausibility fault (55.640)** **s3253 F03 (P2455) - DP sensor high fault (55.640)** **s3253 F04 (P2454) - DP sensor low fault (55.640)** **s81 F00 (P2458) - DPF overload fault (55.640)** **s81 F07 (P2463) - DPF plugged fault (55.640)** **s81 F11 (P242F) - DPF regeneration error (55.640)**

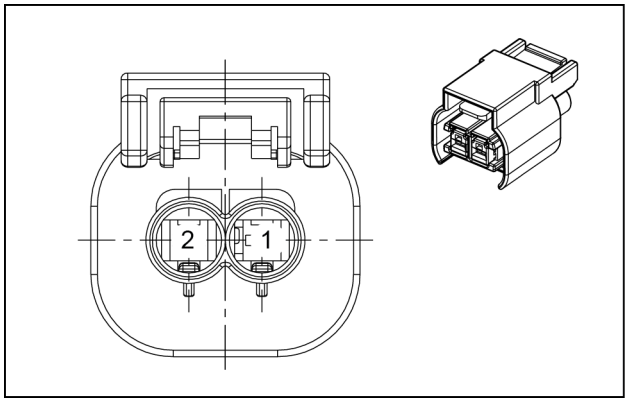
B-012 - COOLANT TEMPERATURE SENSOR (WTS) (Sensor)

Component Type	Sensor
Wiring frames	**SHEET 02**
Connectors	**X-066 (Plug)**
Technical information	**Engine coolant temperature sensor - Technical Data (55.012)**
Functional information	**Engine control system - Component localization - Electrical sensors (55.015)**
Diagnostic information	**s110 F02 (P0116) - Coolant sensor plausibility fault (55.640)** **s110 F02 (P0119) - Coolant sensor gradient fault (55.640)** **s110 F03 (P0118) - Coolant sensor high fault (55.640)** **s110 F04 (P0117) - Coolant sensor low fault (55.640)** **s110 F04 (P0115) - Coolant sensor fault (global) (55.640)**

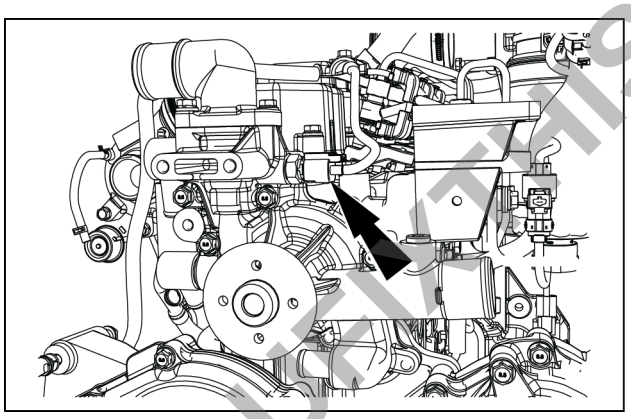
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X-066 - COOLANT TEMPERATURE SENSOR (WTS) [B-012] (Plug)



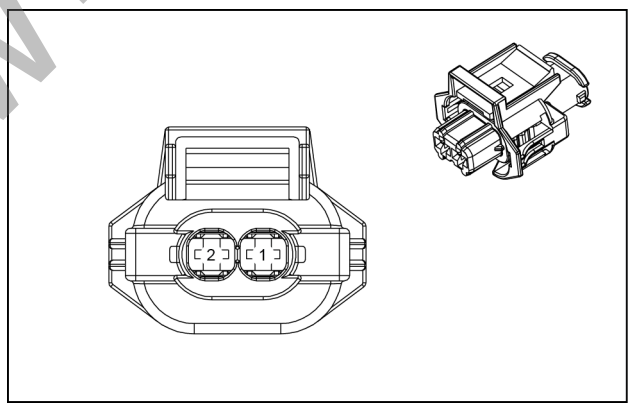
936248-2 13



NHIL16ENG0156AA 14

Pin	From	Wire	Description	Color-Size	Frame
1	**X-211A (Plug) pin 36**	EH-309A	Temperature signal	GY/BL - 0.5	**SHEET 02**
2	**X-211A (Plug) pin 37**	EH-345A	Reference ground	BK/OR - 0.5	

X-067 - EXHAUST (MANIFOLD) TEMPERATURE SENSOR, BEFORE TURBO [B-013] (Plug)



936059-2 15

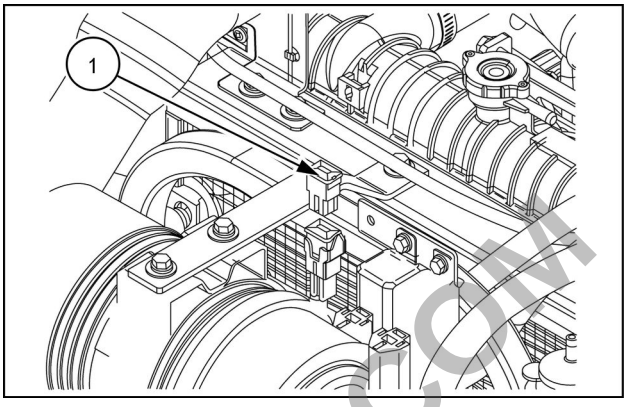
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Engine Control Unit (ECU) main fuse

The ECU fuse is a **40 A** fuse **(1)** located beside the battery positive (+) terminal. This fuse protects the tractor's Engine Control Unit (ECU) system.

NOTICE: *Always replace this fuse with a **40 A** fuse; DO NOT increase amperage rating.*

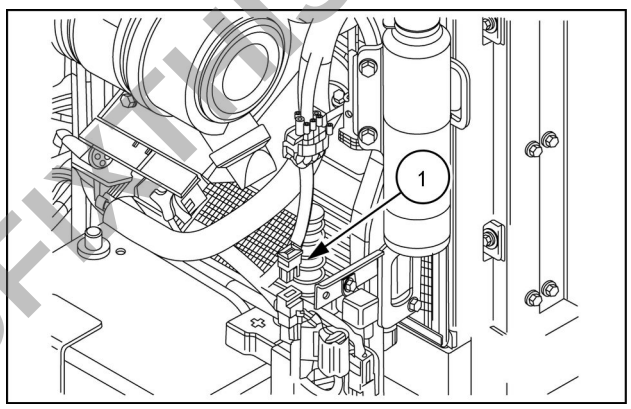


NHIL16CT00473AA 3

Cab main fuse

The main cab fuse is a **100 A** fuse **(1)** located on the left-hand side of the engine. This fuse protects the tractor's cab electrical system.

NOTICE: *Always replace this fuse with a **100 A** fuse; DO NOT increase amperage rating.*

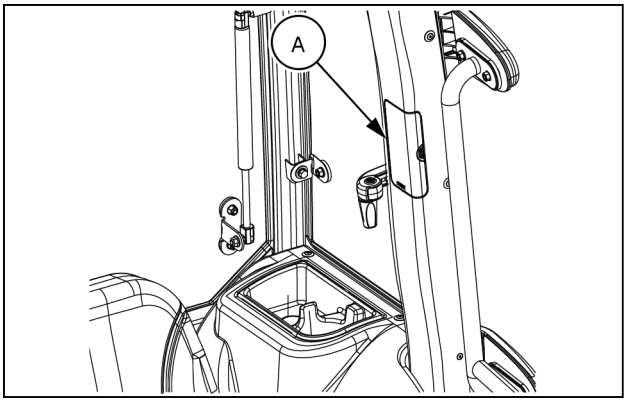


NHIL16CT00474AA 4

Cab fuse panel

The cab fuse block **(A)** is located on the left-hand side cab pillar.

NOTICE: *Always replace blown fuses with the size specified for that circuit.*



NHIL15CT00568AA 5

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s106 F03 (P0106) - Intake Manifold Absolute Pressure sensor signal drift fault

Control Module: ECU

Context:
If the Engine Control Unit (ECU) **A-009** senses a signal that is out of the acceptable range, this fault will occur. This fault can be the result of a sensor harness or circuit issue. Because of this fault, Diesel Particular Filter (DPF) regeneration will stop, Exhaust Gas Recirculation (EGR) valve control will stop, Air Control Valve (ACV) control will stop, and a reduction in engine torque may occur.

Cause:
The intake manifold pressure sensor **B-009** signal is not within range.

Possible failure modes:

1. Faulty intake manifold pressure sensor **B-009**, internal failure.
2. Faulty intake manifold pressure sensor **B-009** circuit wiring, short or open wire condition.
3. Faulty ECU **A-009**, software or hardware.

Solution:

1. Verify fault is present and active.

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

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

   B. If the fault is no longer present or is in an inactive state, the fault may be intermittent and not currently active. Continue with Step **8**.

2. Check for the following related faults:

   s1079 F11 (P0641) – ECU Internal 5V Supply 1 fault, **s1080 F11 (P0651) – ECU Internal 5V Supply 2 fault** or **s1080 F11 (P0697) – ECU Internal 5V Supply 2 auxillary fault**

   A. If these faults are active, resolve these faults. Then determine that fault **s106 F03 (P0106) – Intake Manifold Absolute Pressure sensor signal drift fault** is also resolved.

   B. If those faults are not active, continue to Step **3**.

3. Check the intake manifold pressure sensor **B-009** signal circuit for a short to high source condition.

   Disconnect connector **X-063 (Plug)** from the intake manifold pressure sensor **B-009**.

   Disconnect connector **X-051 (Plug)** from the ECU.

   With the key switch **S-009** in the OFF position, use a multimeter to perform the following continuity check:

From	To	Value
X-051 (Plug) pin 12	**X-051 (Plug) pin 41**	There should be no continuity.
X-051 (Plug) pin 12	All other **X-051 (Plug)** pins	There should be no continuity.

   A. If there is continuity, there is a short to high source condition in the intake manifold pressure sensor **B-009** signal circuit, wire EH-312A or EN-312. Locate and repair the shorted conductor(s).

   B. If there is no continuity, leave the connectors disconnected and continue to Step **4**.

4. Check the ECU for an abnormally high reference voltage circuit to the intake manifold pressure sensor **B-009**.

   With the key switch **S-009** in the ON position, use a multimeter to perform the following voltage check:

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s1221 F11 (P1601) - ECU-Processor Data Fault

Control Module: ECU

NOTE: *If replacement of the Engine Control Unit (ECU)* ***A-009*** *occurs, use the Electronic Service Tool (EST) to apply the replacement issue to the ECU, ECU Replacement, before you return the machine to service.*

Context:
The ECU **A-009** employs programmed data verification processes to assure accurate internal operation and manipulation of the data it processes. If the ECU **A-009** senses an issue with the tested data, this fault will occur. Software re-flash or replacement of the ECU **A-009** may be necessary to resolve this fault.

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

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

Wiring harnesses - Electrical schematic sheet 03 - ENGINE SIDE 2 (55.100.DP-C.20.E.03)

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The key must be in the ON position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-060 (Plug) pin 5	battery power	There should be no continuity.

A. If there is no continuity, leave the connectors disconnected and continue to Step **5**.

B. If there is continuity, there is a short to battery condition in the EGR valve **Z-005** negative driver circuit, wire EH-393A or EN-393. Locate and repair the broken conductor(s).

5. Check the EGR valve **Z-005** positive driver circuit for an open circuit condition.

Disconnect connector **X-051** from the ECU **A-009**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-060 (Plug) pin 1	**X-051 (Plug) pin 92**	There should be continuity.

A. If there is continuity, leave the connectors disconnected and continue to Step **6**.

B. If there is no continuity, there is an open circuit condition in the EGR valve **Z-005** positive driver circuit, wire EH-392A or EN-392. Locate and repair the broken conductor(s).

6. Check the EGR valve **Z-005** negative driver circuit for an open circuit condition.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-060 (Plug) pin 5	**X-051 (Plug) pin 93**	There should be continuity.

A. If there is continuity, leave the connectors disconnected and continue to Step **7**.

B. If there is no continuity, there is an open circuit condition in the EGR valve **Z-005** negative driver circuit, wire EH-393A or EN-393. Locate and repair the broken conductor(s).

7. Check the EGR valve **Z-005** positive driver circuit for a short to ground circuit condition.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-060 (Plug) pin 1	chassis ground	There should be no continuity.

A. If there is no continuity, leave the connectors disconnected and continue to Step **8**.

B. If there is continuity, there is a short to ground condition in the EGR valve **Z-005** positive driver circuit, wire EH-392A or EN-392. Locate and repair the broken conductor(s).

8. Check the EGR valve **Z-005** negative driver circuit for a short to ground circuit condition.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-060 (Plug) pin 5	chassis ground	There should be no continuity.

A. If there is no continuity, leave the connectors disconnected and continue to Step **9**.

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From	To	Value
X-059 (Plug) pin 5	chassis ground	There should be no continuity.

A. If there is no continuity, leave the connectors disconnected and continue to Step **9**.

B. If there is continuity, there is a short to ground condition in the ACV **Z-003** negative driver circuit, wire EH-383A or EN-383. Locate and repair the broken conductor(s).

9. Use the EST to verify the status of **s51 F18 (P02FA) – ACV driver fault (etc)**.

   A. If the fault is resolved, return the machine to service.

   B. If the fault is not resolved, check the ECU **A-009** for the appropriate software and re-flash, if necessary.

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

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

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

Wiring harnesses - Electrical schematic sheet 02 (55.100)

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From	To	Value
X-051 (Plug) pin 1	**X-051 (Plug) pin 2**	There should be no continuity.

A. If there is continuity, there is a shorted condition in the engine (EN) harness. Locate and repair the shorted wire condition.

B. If there is no continuity, continue with Step **4**.

5. Check the ECU **A-009** software revision.

   Use the Electronic Service Tool (EST) to check the ECU **A-009** for the latest software revision.

   A. If the ECU **A-009** is not loaded with the latest software, use EST to flash the ECU **A-009**.

   B. If the ECU **A-009** already has the latest software, the ECU has failed internally. Replace the ECU **A-009**.

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 you monitor the display.

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

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

Wiring harnesses - Electrical schematic sheet 03 (55.100)

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