# SERVICE MANUAL

## Boomer™ 46D CVT
## Boomer™ 54D CVT
## Tier 4B (final)
Compact Tractor

**Part number 47851943**
1st edition English
February 2016

NEW HOLLAND AGRICULTURE

## CONTAINMENT OF AIR CONDITIONING REFRIGERANTS

The following procedure is a guide to servicing mobile air conditioning systems in a way that minimizes the potential for losing refrigerant to the atmosphere. Following the procedures in this section will help ensure compliance with SAE J2211 for **R134A** systems.

### ⚠ DANGER

**Avoid injury!**
**Observe ALL precautions listed below when servicing the air-conditioning system and handling refrigerant.**
**Failure to comply will result in death or serious injury.**

D0043A

Fire or explosion hazard exists with R-134a under certain conditions. R-134a has been shown to be nonflammable at ambient temperature and atmospheric pressure. However, tests under controlled conditions have indicated that, at pressures above atmospheric and with air concentrations greater than 60% by volume, R-134a can form combustible mixtures. While it is recognized that an ignition source is also required for combustion to occur, the presence of combustible mixtures is a potentially dangerous situation and should be avoided.

R-134a service equipment or vehicle air conditioning systems should not be pressure tested or leak tested with compressed air. Mixtures of air and R-134a have been known to be combustible at elevated pressures. These mixtures are potentially dangerous and could result in fire or explosion causing injury or property damage. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers. Failure to comply could result in death or serious injury.

### Recovery

1. Be sure that all service equipment hose lines have shutoff valves or check valves within **30 cm** (**12 in**) of their ends. This will ensure that only minimal quantities of refrigerant escape to the atmosphere when the equipment is disconnected from the air conditioning system, and only small amounts of moisture and other contaminants can enter the system.
2. Be sure that all equipment, including the connecting hose lines and manifold, are compatible with the refrigerant in the system with which you are going to work, and that your equipment has previously been used only with the refrigerant you are about to service.
3. Be sure that all shutoff valves are tight before connecting them to the air conditioning system.

   ***NOTE:*** *Keep shutoff valves closed at all times unless they are connected to a vehicle's air conditioning system, a refrigerant storage container or another piece of service equipment containing the same refrigerant. This prevents refrigerant from escaping into the atmosphere, damaging the environment, contaminating the equipment, and costing you money.*
4. Connect the extraction or recovery equipment to the air conditioning system in accordance with the instructions supplied by the equipment manufacturer.
5. Start the recovery process by turning on the extraction equipment and extracting the refrigerant from the air conditioning system in accordance with the equipment manufacturer's instructions.
6. Continue to extract refrigerant until the air conditioning system is under a vacuum and there is no refrigerant remaining in the vehicle system.
7. Verify that there is no refrigerant remaining in the system by:

   a) Shutting off the extraction unit and observing the system pressure level.

   b) Waiting five minutes and observing the system pressure again. If the system pressure has not risen above atmospheric pressure (0 gauge pressure), all refrigerant has been removed and you may proceed to step 8.

   If after five minutes, the system pressure reading has risen above atmospheric pressure (0 gauge pressure), the extraction / recovery process must be repeated until the pressure reading remains at or below atmospheric for at least two minutes with the extraction equipment shut off before proceeding to step 8.
8. Close the shutoff valve in the service lines.
9. Remove the service lines from the vehicle system. If the recovery equipment has automatic closing shutoff valves, verify that they are operating properly and do not leak.

# International symbols

As a guide to the operation of the machine, various universal symbols have been utilized on the instruments, controls, switches, and fuse box. The symbols are shown below with an indication of their meaning.


Thermostart starting aid


Alternator charge


Fuel level


Automatic Fuel shut-off


Engine speed (rev/min x 100)


Hours recorded


Engine oil pressure


Engine coolant temperature


Coolant level


Tractor lights


Headlamp main beam


Headlamp dipped beam


Work lamps


Stop lamps


Horn


Radio

KAM
Keep alive memory


Turn signals


Turn signals -one trailer


Turn signals -two trailers


Front wind-shield wash/wipe


Rear wind-shield wash/wipe


Heater temp-erature control


Heater fan


Air conditioner


Air filter blocked


Parking brake


Brake fluid level


Trailer brake


Roof beacon


Warning ! Corrosive substance


PTO

N
Transmission in neutral


Creeper gears


Slow or low setting


Fast or high setting


Ground speed


Differential lock


Rear axle oil tem-perature


Transmission oil pressure


FWD engaged


FWD dis-engaged


Warning!


Hazard warning lights


Variable control


Pressurized! Open carefully


Position Control


Draft Control


Accessory socket


Implement socket


%age slip


Hitch raise (rear)


Hitch lower (rear)


Hitch height limit (rear)


Hitch height limit (front)


Hitch dis-abled


Hydraulic and transmission filters

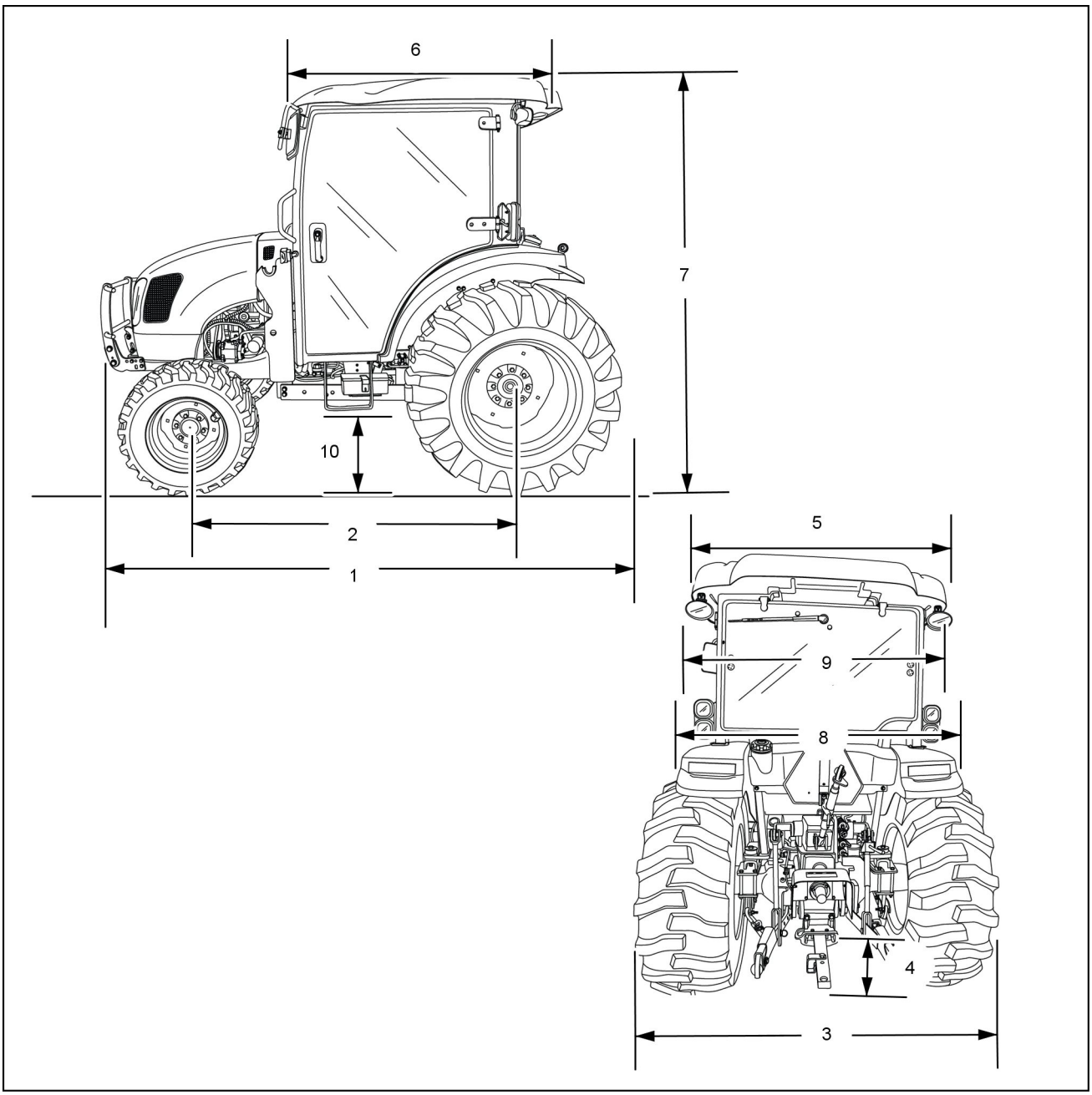

Remote valve extend


Remote valve retract


Remote valve float


Malfunction! See Operator's Manual


Malfunction! (alter-native symbol)

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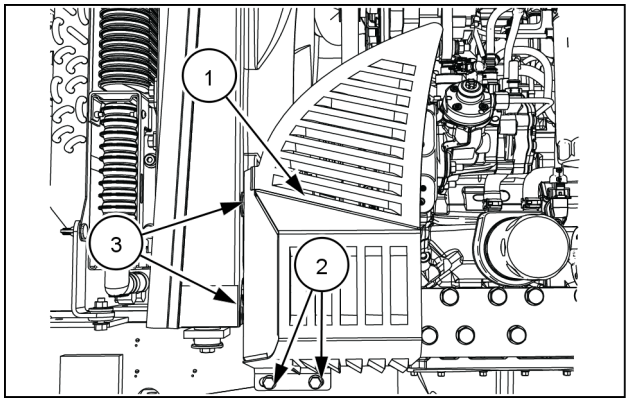
# Engine and crankcase - Remove remove the engine from the frame

**⚠ DANGER**

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

**D0076A**

1. Use jack stands under the frame rails to support the front frame/engine assembly.
2. Remove the A/C compressor guard, **(1)**, from the tractor.
3. Remove the two M16 flange bolts **(2)**, and loosen the two grommet bolts **(3)**.

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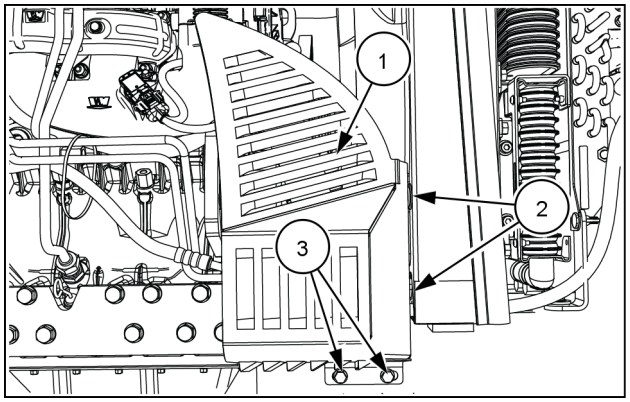
4. Remove the radiator hose guard **(1)** from the tractor.
5. Loosen the two grommet bolts **(2)**, and remove the two M16 bolts **(3)**.
6. Drain the coolant from the radiator into a suitable container.
7. Remove the top, **(3)**, and the bottom, **(4)**, radiator hoses.
8. Remove the radiator. See **Radiator - Remove (10.400)**.
9. Attach a chain sling to the two hoist eyes on the engine.
10. Attach a suitable hoist to the chain sling, and raise the hoist enough to support the engine.

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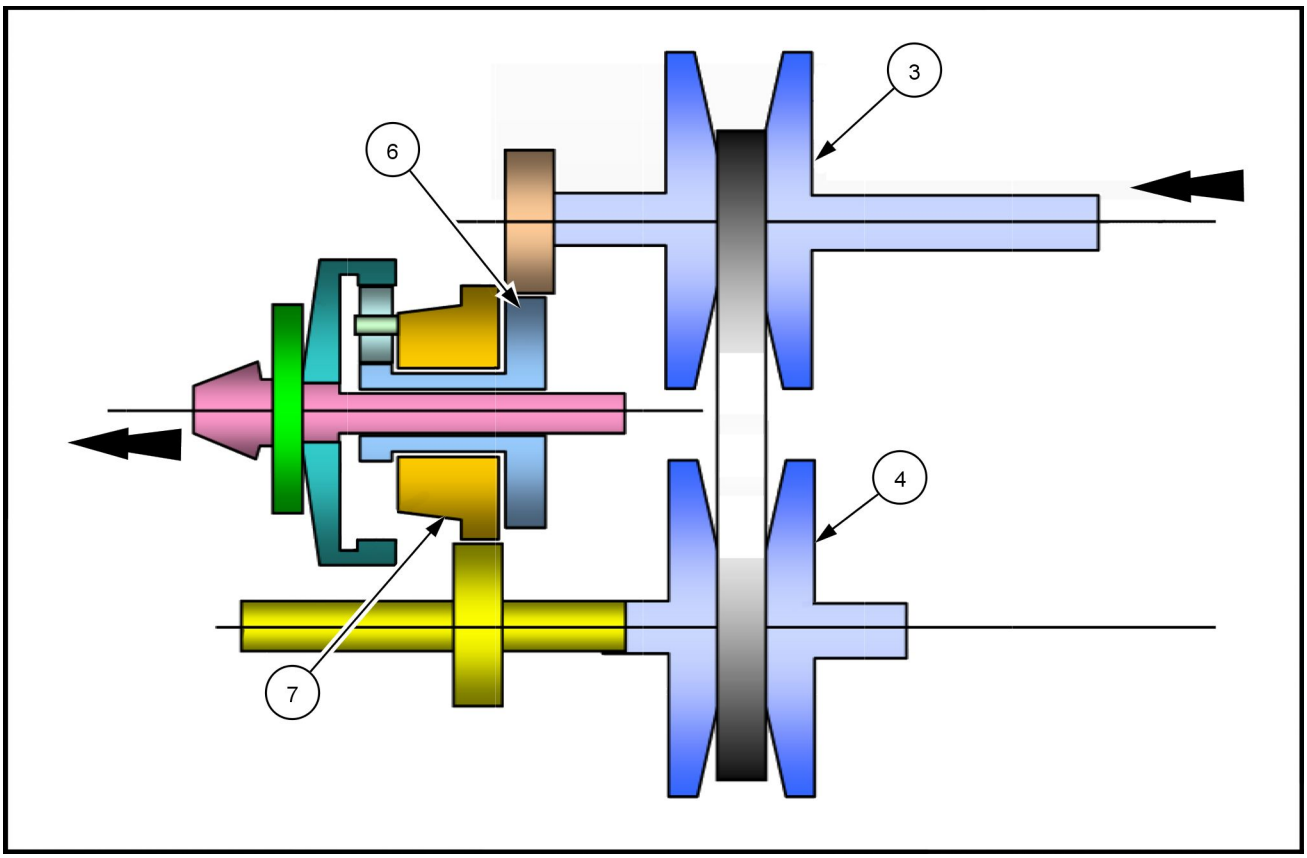
### Engine cooling system - 400

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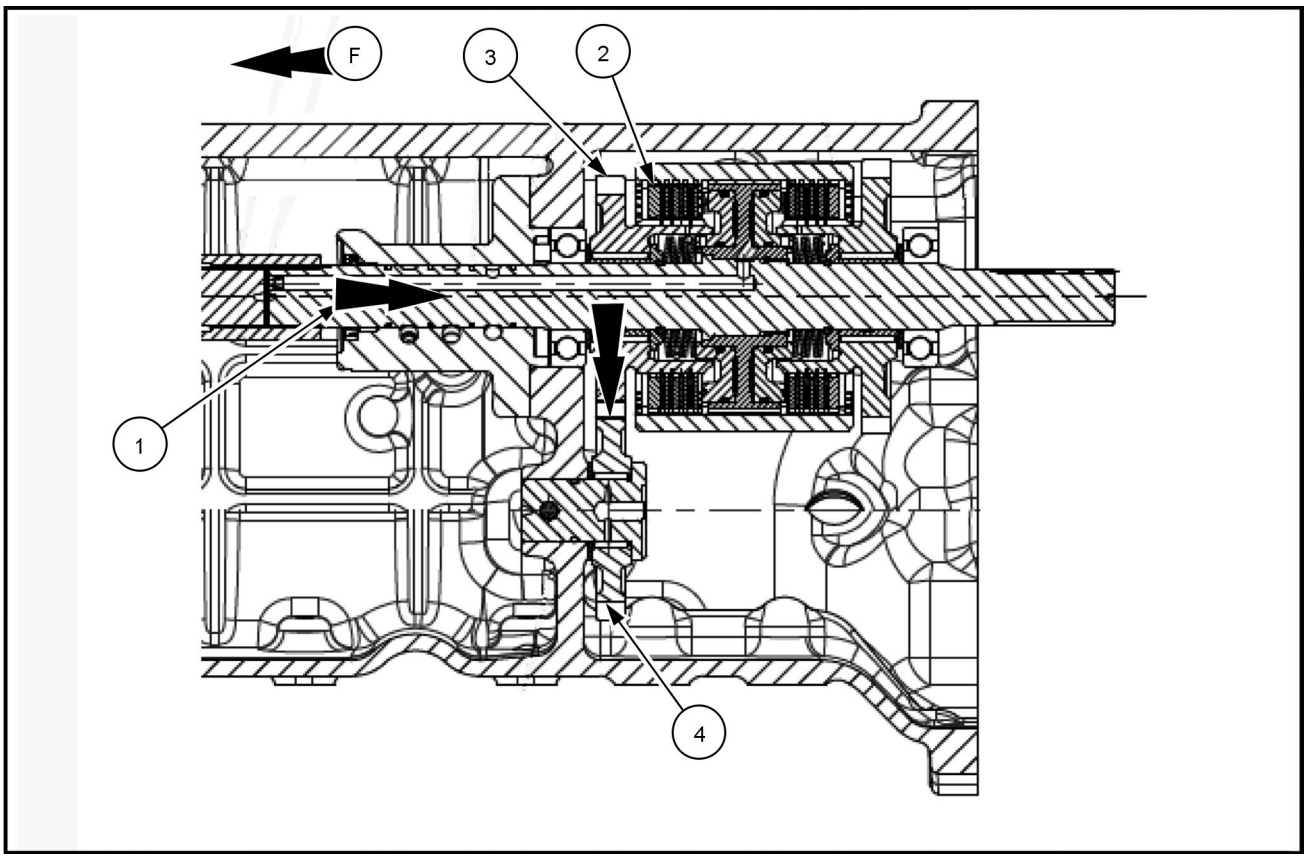
## Variator Assembly

The variator assembly **(2)** is an electro-hydraulically controlled variable speed transmission. The variator assembly consists of a gerotor style fixed displacement hydraulic pump, input drive pulley, output driven pulley, drive chain and mechanical torque sensor. The fixed displacement gerotor pump produces the oil flow for the complete transmission system except for the Forward/Reverse clutch which oil is supplied by the power steering hydraulic pump. The throat of the input and output pulleys are adjusted simultaneously by the use of both hydraulic and spring pressure to set the desired speed of the transmission. The driven output pulley also incorporates a mechanical torque sensor that acts similar to a mechanical governor. As the torque sensor senses torque rise it adjusts and increases the pressure to the input (P1) **(3)** and the output (P2) **(4)** pulleys to compensate and apply more force to the variator assembly. If the torque load increase to the point where the variator cannot hold the chain assembly safely, the transmission logic will dump the Forward/Reverse clutches and the unit will lose drive pressure, similar to blowing a pressure relief valve in a hydrostatic transmission.

## Planetary Reduction

The planetary reduction **(5)** uses the speed from the input pulley assemblies to control the sun gear **(6)** and carrier **(7)**. By controlling the speed at which the sun gear turns in comparison to the carrier, we can reduce the high speed revolutions of the variator assembly to a usable drive piniion ratio. The drive pinion is the direct out put of the planetary assembly.

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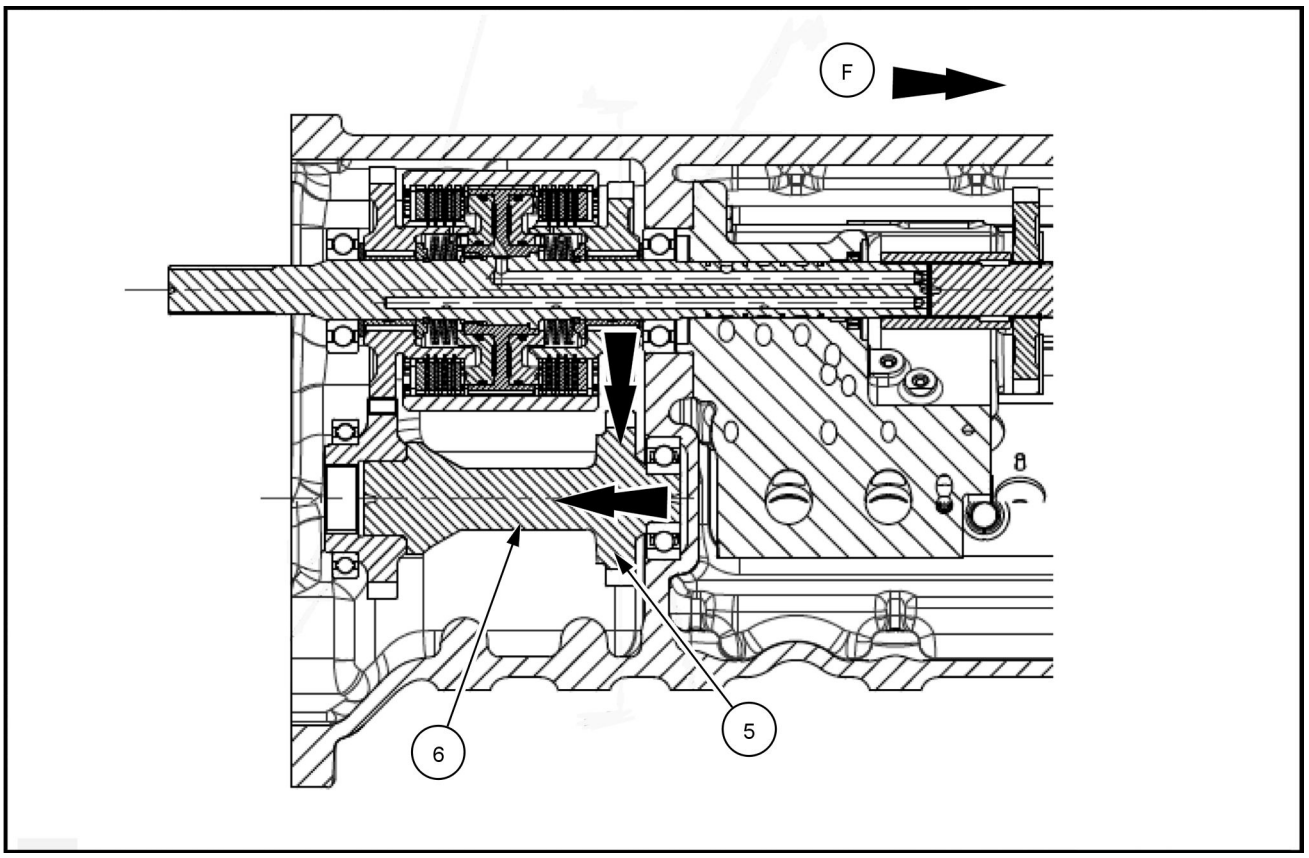
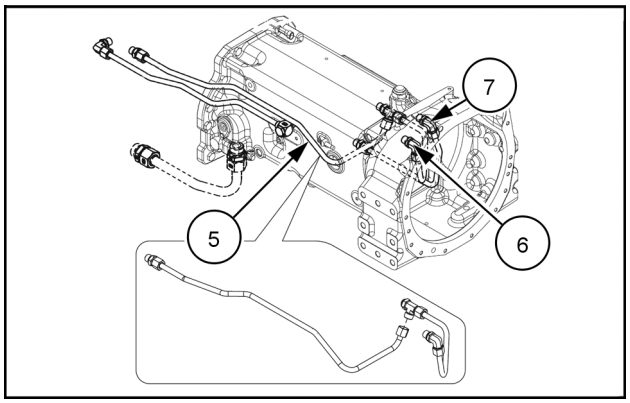
**Reverse Left Side View**




NHIL12CT00451FA 3

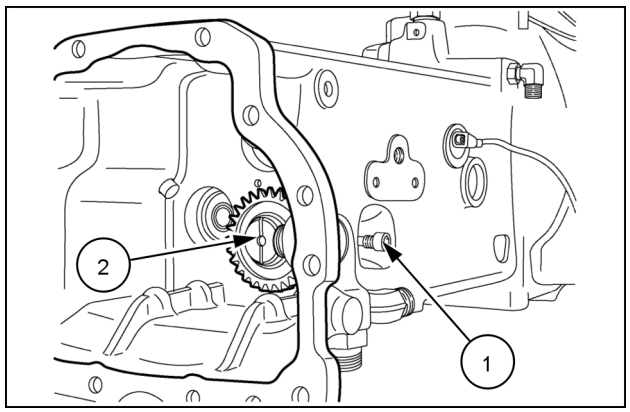
**Reverse Right Side View**

4. From inside the transmission box, disconnect and remove hydraulic tube, **(5)**, from line **(6)**. Disconnect and remove tubes **(6)**, and **(7)**.



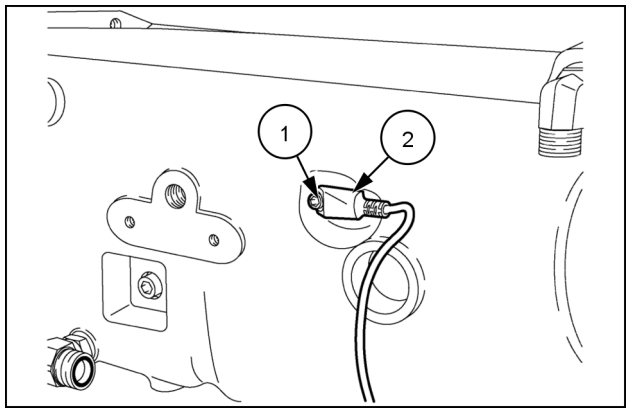

NHIL12CT00441AA 4

5. Remove the M10 x 1.25 x 88mm Allen head bolt, **(1)**, and the reverse idler gear assembly, **(2)**.



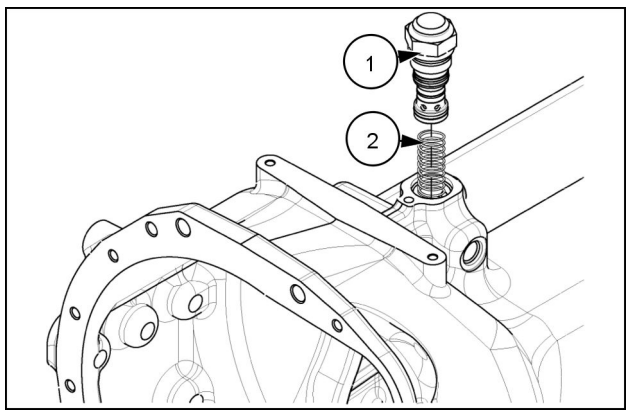

86084744N 5

6. Remove the M16 x 15mm Allen bolt, **(1)**, and engine speed sensor, **(2)**.



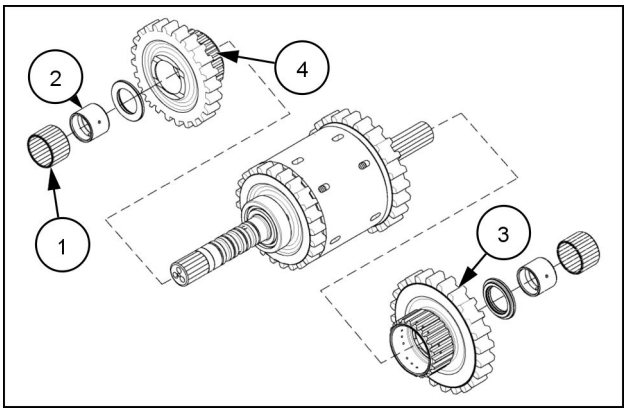

86084746N 6

7. Remove regulating valve, **(1)**, and spring, **(2)**.



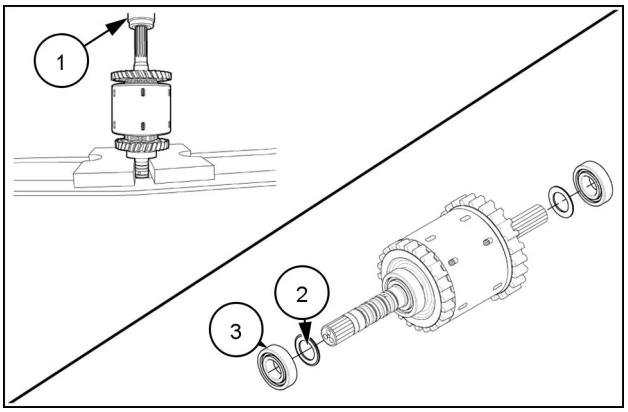

36084718N 7

12. Install needle bearing **(1)** over shaft bushing **(2)**. Install the forward (34 tooth) **(3)** and reverse (30 tooth) **(4)** shuttle clutch gears.




36084733N 15

13. Using a press **(1)** install thrust washer **(2)** and bearing **(3)**.

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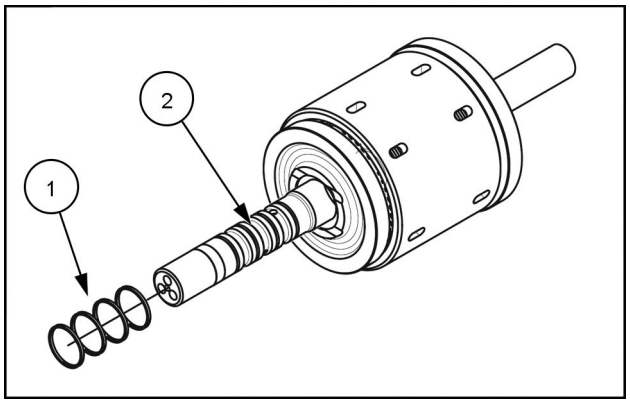
14. Install the four sealing rings **(1)** onto shaft **(2)**.




NHIL12CT00443AA 17

# Continuously Variable Transmission (CVT) - Test - (PIV) valve pressure transducer

**⚠ WARNING**

**Unexpected machine movement!**
**Support the front axle and rear axle off the ground with jack stands before you perform the transmission test. The front axle drive will engage automatically when you depress the brake pedals.**
**Failure to comply could result in death or serious injury.**

**W1444A**

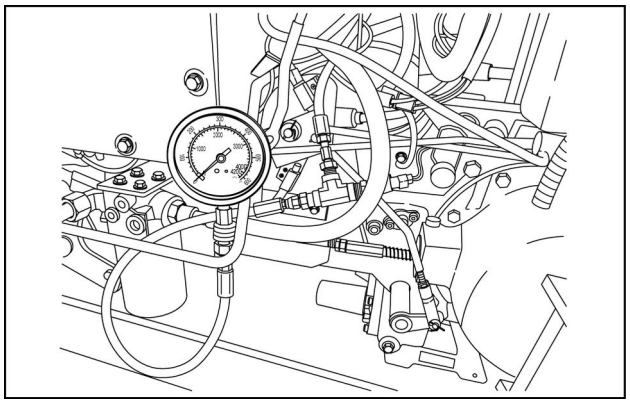
**⚠ CAUTION**

**Escaping fluid!**
**Hydraulic fluid or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury. To prevent personal injury: Relieve all pressure before disconnecting fluid lines or performing work on the hydraulic system. Before applying pressure, make sure all connections are tight and all components are in good condition. Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see your doctor immediately.**
**Failure to comply could result in minor or moderate injury.**

**C0104A**

## Pressure transducer hydraulic pressure to voltage comparison test

The following test procedure will provide the availability of the hydraulic pressures present at the (PIV) valve and the output voltages of the (PIV) pressure transducers simultaneously. Comparing hydraulic pressures to voltage outputs will provide information to assist in trouble shooting transmission operation concerns.



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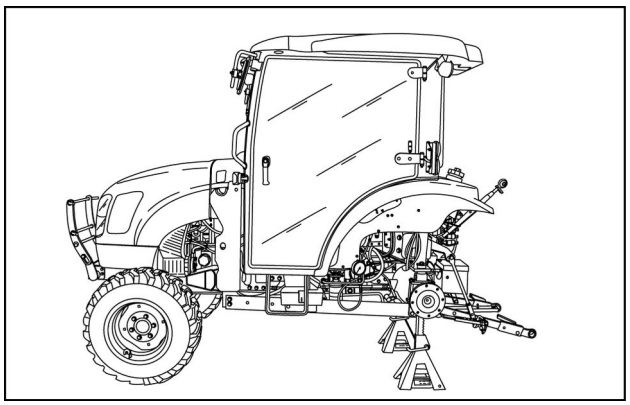
1. Support front and rear axles with jack stands.
2. Remove both rear tires from the tractor.

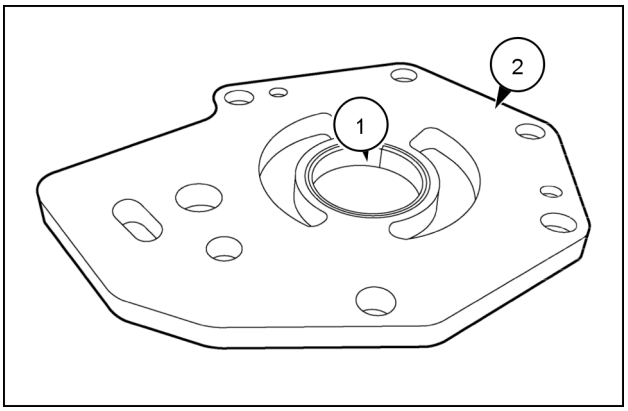


NHIL16CT00060AA 2

# Continuously Variable Transmission (CVT) - Visual inspection Gerotor pump

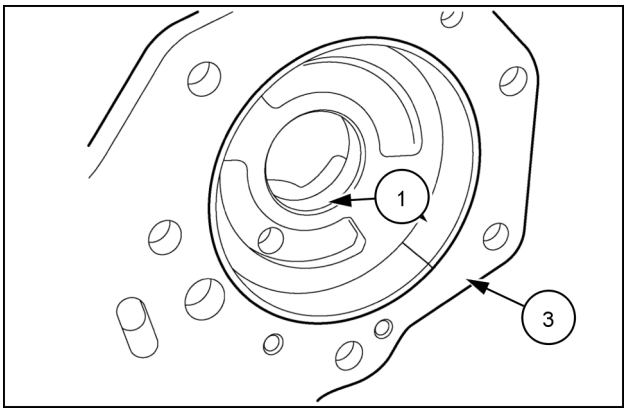
## Inspection

1. Thoroughly clean all parts in a suitable solvent and air dry.




86084051N 1

2. Inspect the bushings, **(1)**, in spacer plate, **(2)**, and pump body, **(3)**, for damage or excessive wear. If bushings are found to be damaged, replace pump.




86084052N 2

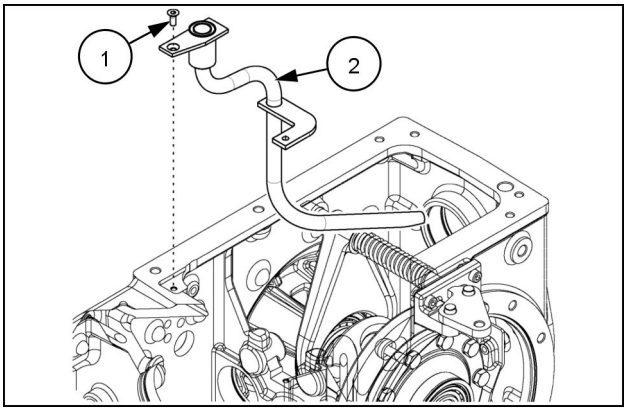
***NOTE:*** *Internal parts for this pump are not serviceable, if damage is visible on any of the components, replace the pump.*

# Continuously Variable Transmission (CVT) - Remove Secondary Pulley Output Shaft

**Prior operation:**
**Power Take-Off (PTO) clutch - Remove (31.114)**
**Prior operation:**
**Differential - Remove (27.106)**
**Prior operation:**
**Continuously Variable Transmission (CVT) - Disconnect (21.504)**

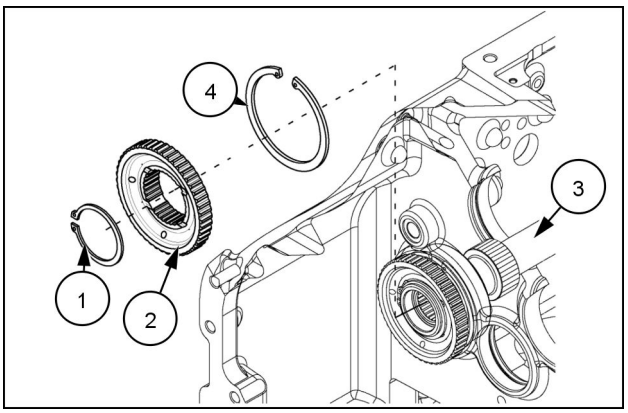
## Removal

1. Remove M6 x 12mm screw, **(1)** , and pull HPL drain tube, **(2)**, from differential housing.



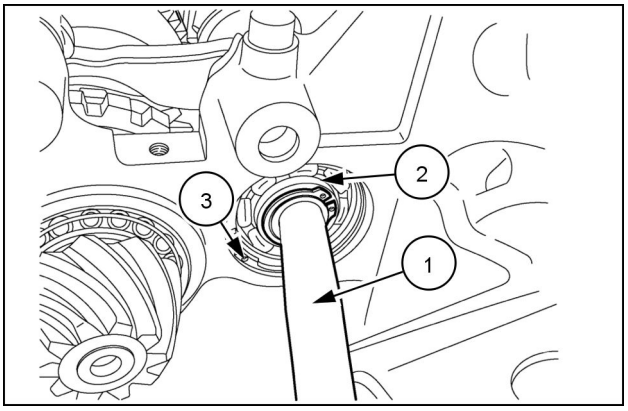

36084013N 1

2. Remove snap ring, **(1)**, and gear, **(2)**, from the front of the secondary pulley output shaft, **(3)**.
3. Remove large snap ring, **(4)**, that secures the secondary pulley output shaft in housing.




36084014N 2

4. Using an aluminum or brass drift, **(1)**, drive the secondary pulley output shaft, **(2)**, forward, from the differential housing, as an assembly.
5. Remove snap ring, **(3)**, from differential housing.




86084015N 3

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## Continuously Variable Transmission (CVT) - 504

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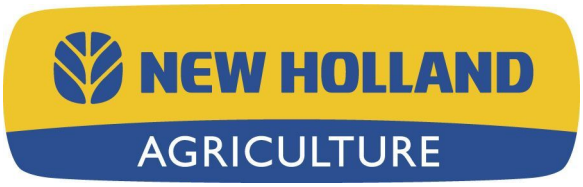


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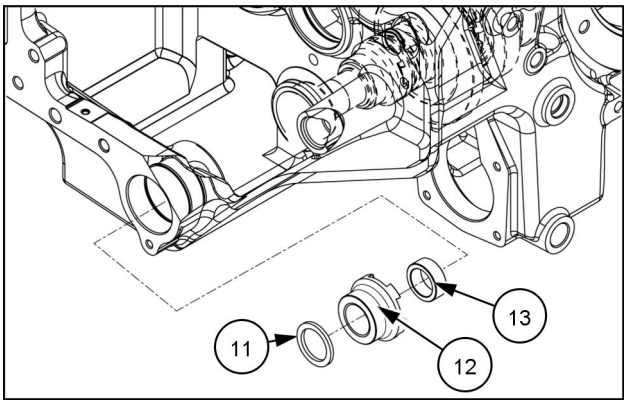
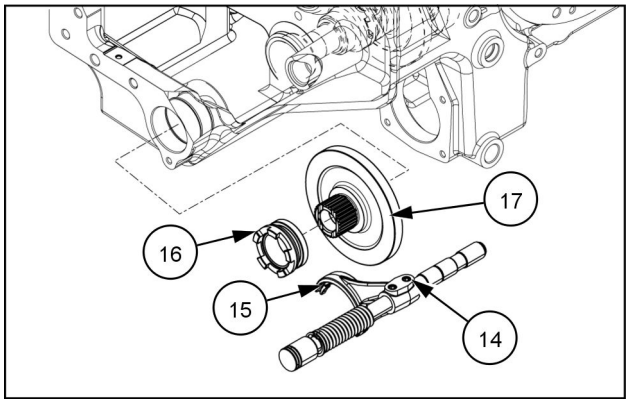
5. Keep washer, **(11)**, and remove sleeve, **(12)**, and spacer, **(13)**.




NHIL12CT00603AA 4

6. Loosen screws, **(14)**, and turn fork, **(15)**, so as to release sleeve, **(16)**.
7. Remove sleeve, **(16)**, and gear, **(17)**.

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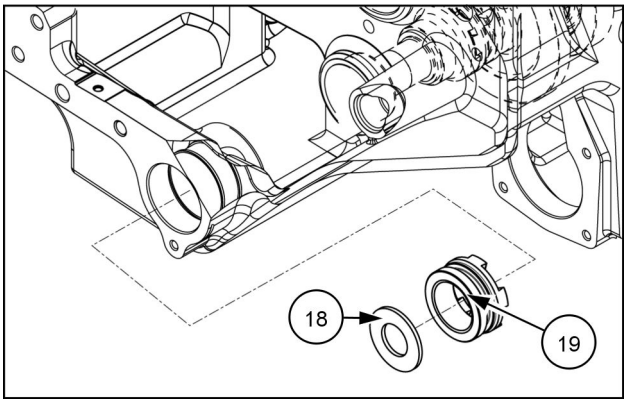
8. Keep washer, **(18)**, and remove sleeve, **(19)**.

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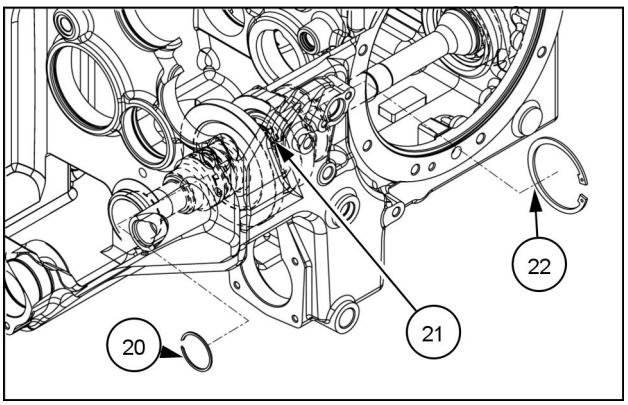
9. Remove retaining ring, **(20)**, on the front side of the PTO drive shaft, **(21)**, and retaining ring, **(22)**, on the rear of the housing.

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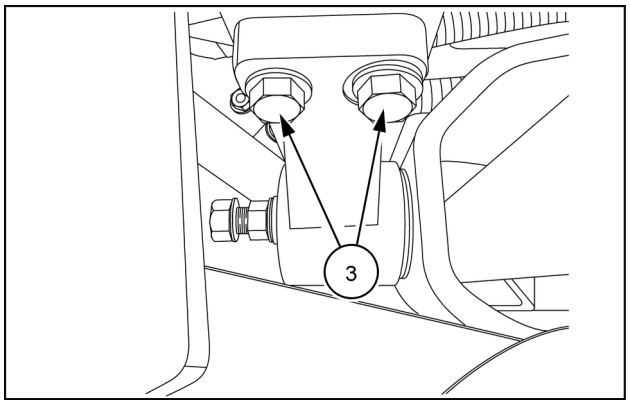
10. Remove the four forward pivot M14 x 50mm bolts and M14 nuts and lock washers **(3)**.(Left side shown.)

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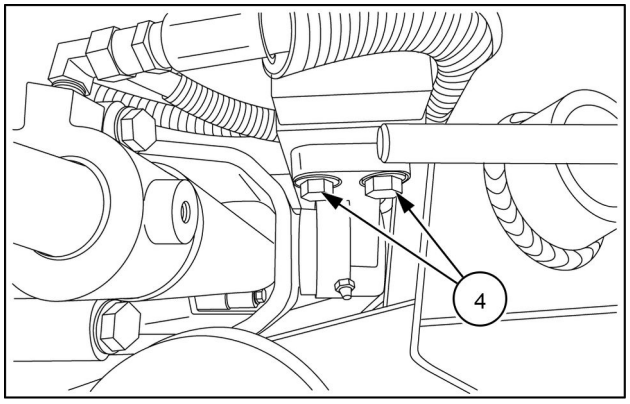
(Right side shown.) **(4)**



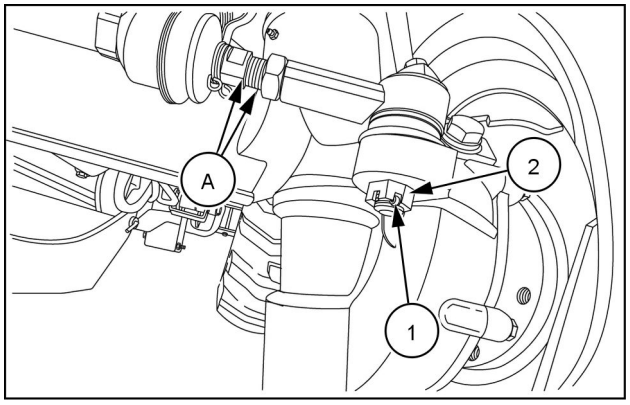

NHIL13CT00742AA 10

11. Roll the axle and wheel and tire assembly forward and clear of the tractor chassis.

***NOTICE:*** *Support the FWD shaft as it will fall away from the axle spline.*

12. Disconnect the tie rod ends / steering cylinder ends by removing the cotter pin **(1)** and castle nut **(2)**.

***NOTE:*** *Make note of tie rod toe in measurement **(A)**. (Left side shown.)*




NHIL13CT00739AA 11

# Powered front axle - Install front axle cover

**⚠ WARNING**

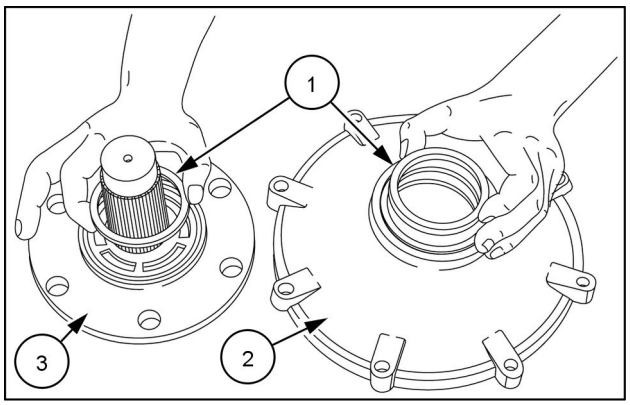
**Avoid injury!**
**Handle all parts carefully. Do not place your hands or fingers between parts. Use Personal Protective Equipment (PPE) as indicated in this manual, including protective goggles, gloves, and safety footwear.**
**Failure to comply could result in death or serious injury.**

**W0208A**

***NOTE:*** *Right side shown. Use this procedure for the left side also.*

## Installation

1. Install the floating seal **(1)** to the front axle cover **(2)** and the axle shaft **(3)**.




NHIL13CT00656AA 1

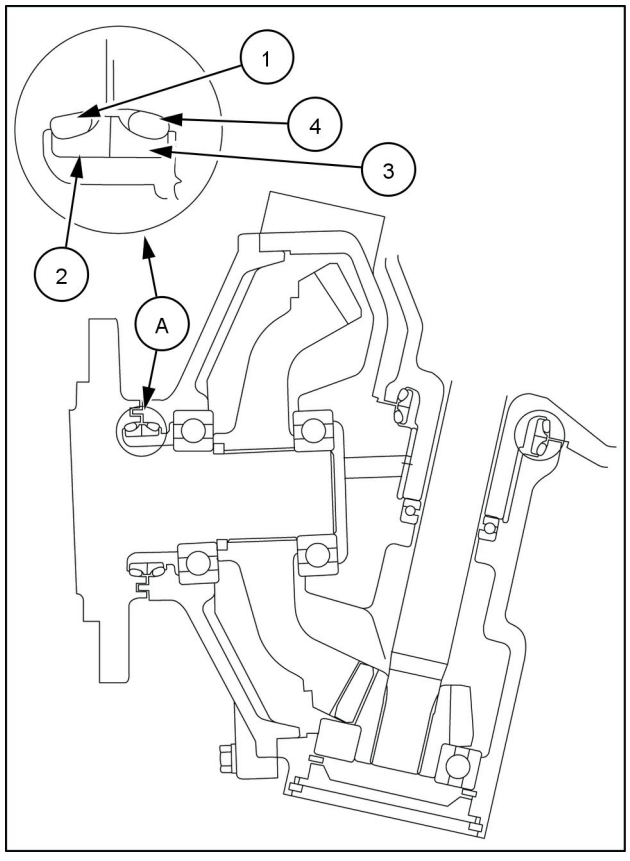
***NOTICE:*** *Make sure that the seal rings and O-rings are installed in the correct order.*

***NOTE: (A)*** *is an exploded view.*

Installation order :

- O-ring **(1)**.
- Seal ring **(2)**.
- Seal ring **(3)**.
- O-ring **(4)**.

***NOTICE:*** *Install the seal rings so that the machined surfaces of upper and lower seal rings face each other. Lubricate mating surfaces of seal rings with oil before installation.*

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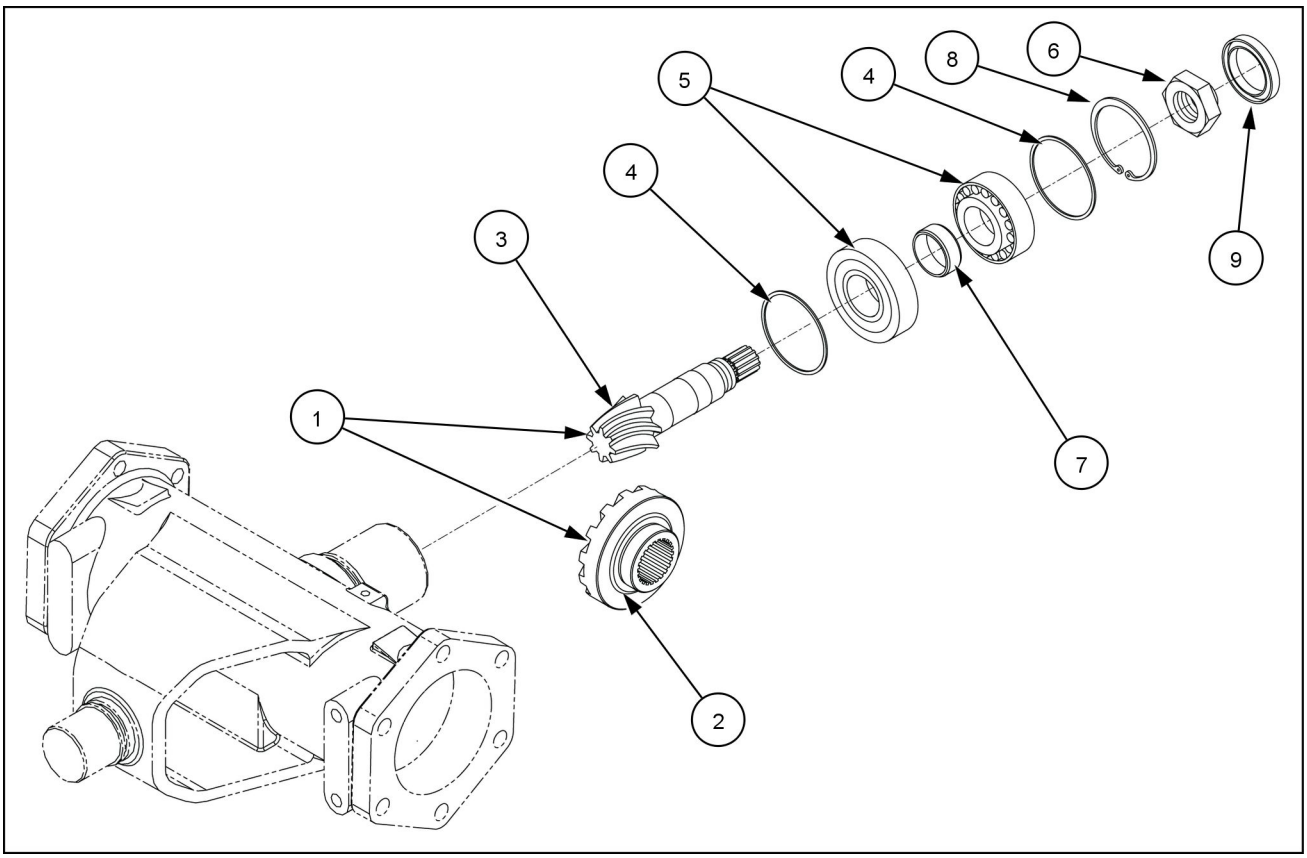


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**Bevel Pinion Shaft Components**

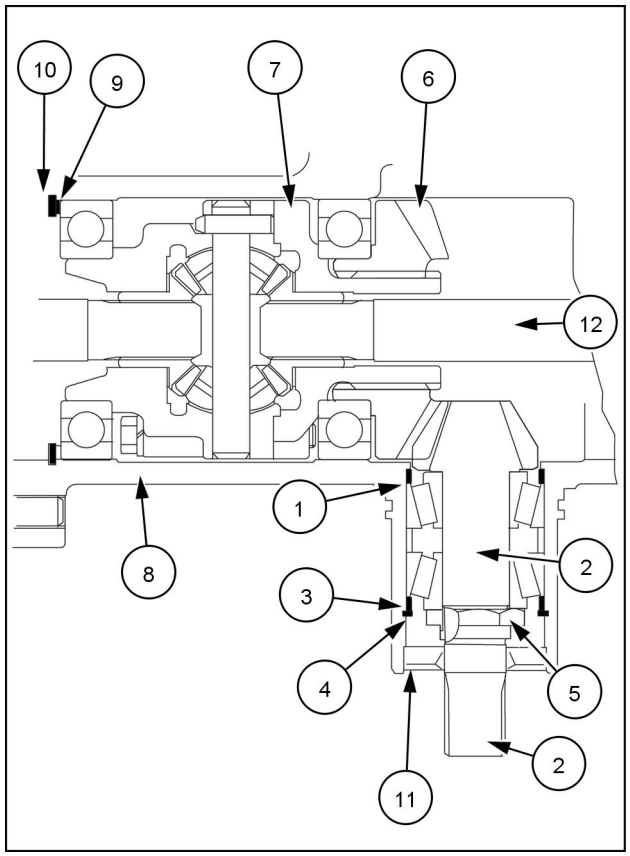
| | | |
|---|---|---|
| **(1)** Bevel gear assembly (Item **(2)** and **(3)**) | **(4)** Adjusting collar | **(7)** Spacer cylinder |
| **(2)** 22T bevel gear | **(5)** Taper roller bearing | **(8)** Snap ring |
| **(3)** Bevel pinion shaft 10T | **(6)** Nut M28 | **(9)** Oil seal |

## Pinion shaft installation

1. Insert the inner adjusting shim **(1)** into the housing.
2. Insert the pinion shaft **(2)** with the tapered bearings and the locking nut into the housing.
3. Install the outer adjusting shim **(3)** and snap ring **(4)**.
4. Tighten the locking nut **(5)** so that the proper amount of preload is applied to the tapered bearings.
5. Check the preload of the tapered bearings is correct by measuring the rolling torque of the pinion shaft.

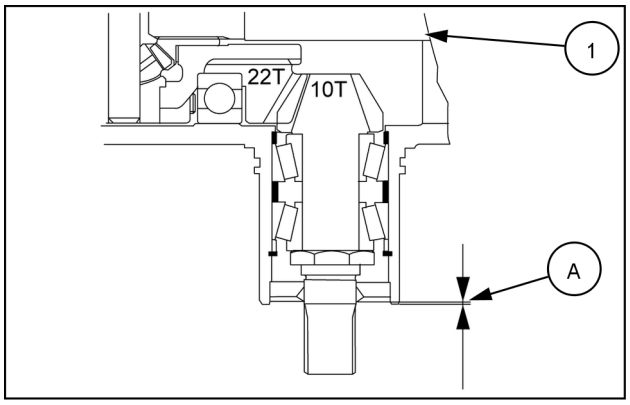
***NOTE:*** *See* ***Powered front axle - Preload of pinion shaft taper roller bearings (25.100)*** *for measuring and adjusting the rolling torque of pinion shaft.*

6. When the preload of the tapered roller bearing is obtained, peen the locking nut so that the nut will not loosen.
7. Insert the differential assembly **(6)** with the 22T bevel gear **(7)** and the bearing into the left side of the axle support housing **(8)** Make sure the 22T gear faces inner side.
8. Insert the shim **(9)** and install the snap ring **(10)**.
9. Measure the backlash and the contact area of the pinion gear and 22T bevel gear.




NHIL13CT00688BA 2

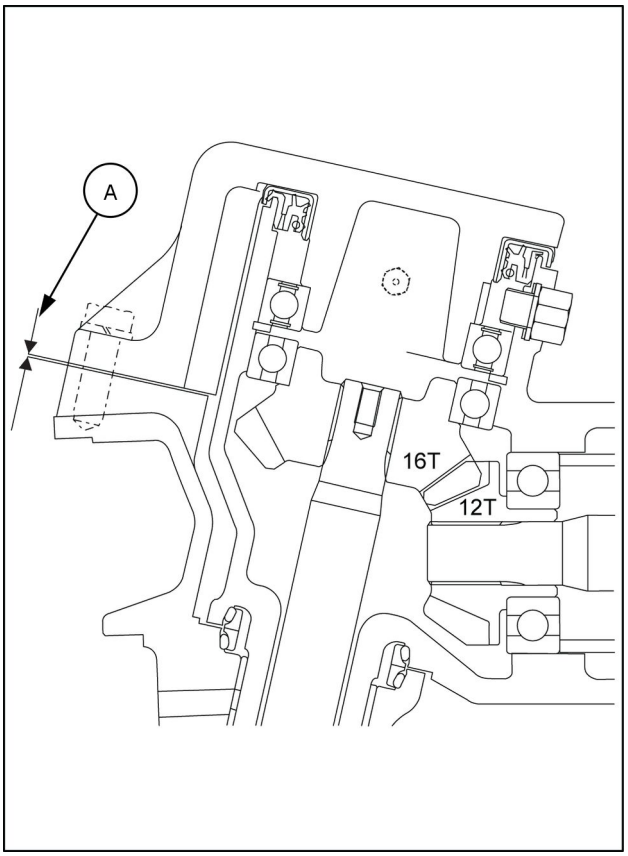
10. Insert the new oil seal **(11)** onto the pinion shaft.




NHIL13CT00689AA 3

***NOTE:*** *Make sure that the oil seal is inserted* ***1 mm*** *(****0.040 in****) deeper than the edge of the housing.* ***(A)***

4. Measure the clearance **(A)**.




NHIL13CT00635BA 4

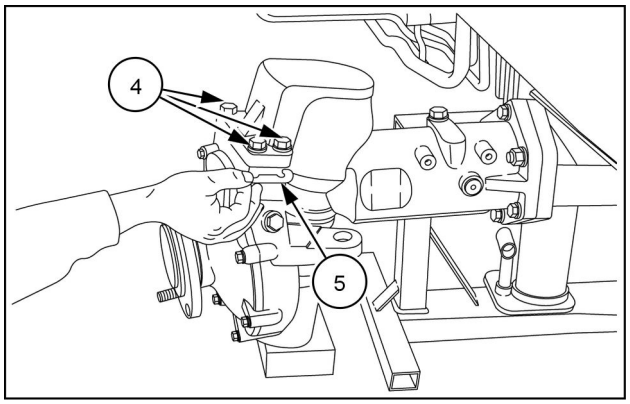
5. Install a shim **(5)** which is **0.2 - 0.5 mm** (**0.008 - 0.020 in**) thicker than the clearance **(A)**.

   Size of shims:

   - **0.5 mm** (**0.020 in**)
   - **0.8 mm** (**0.030 in**)
   - **1.0 mm** (**0.040 in**)
   - **1.2 mm** (**0.050 in**)

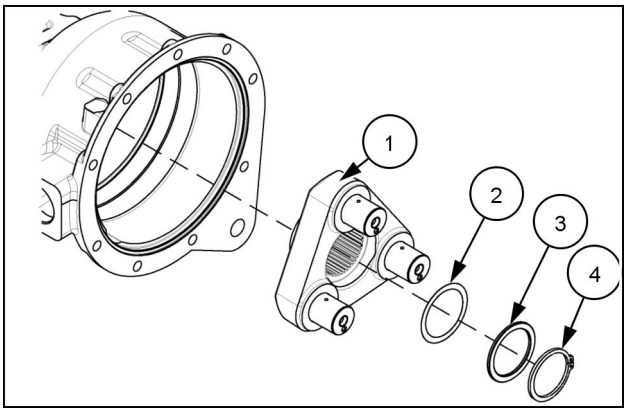
***NOTE:*** *Standard shim size:* ***1.0 mm*** *(****0.040 in****).*

6. Tighten the axle support M12 mounting bolts **(4)** to **78 - 90 N·m** (**57 - 67 lb ft**).




NHIL13CT00674AA 5

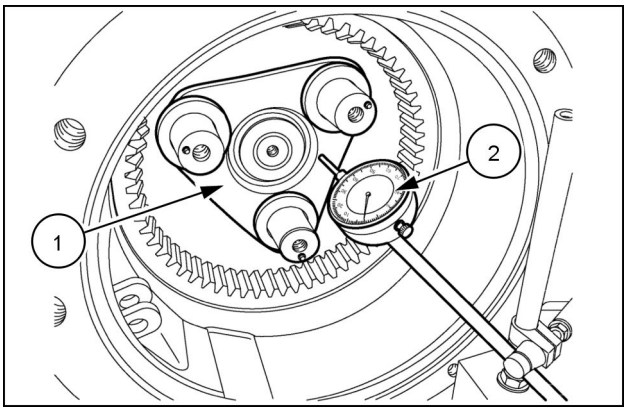
8. Install the planetary gear carrier, **(1)**, shims, **(2)**, and spacer, **(3)**, onto the axle shaft and secure with the snap ring, **(4)**.




36084223N 5

***NOTE:*** *Shim sizes are **0.15 mm** (**0.006 in**).*

9. Measure the end play of the planetary gear carrier, **(1)**, by placing a dial indicator, **(2)**, against the planetary gear carrier as shown.

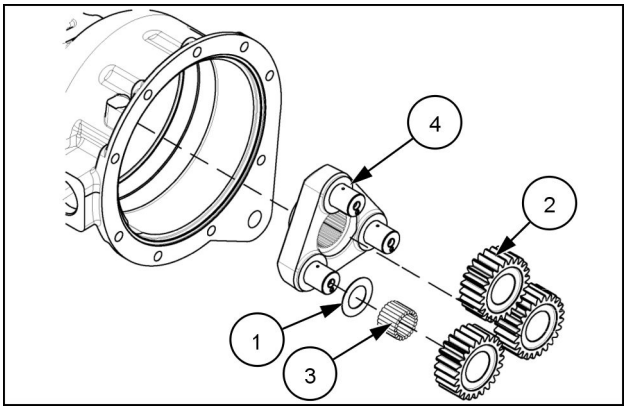



80085847N 6

10. Set the dial indicator, **(2)**, to zero, and then slide the planetary gear carrier, **(1)**, back and forth on the axle shaft. The planetary gear carrier should have an end play of **0.05 - 0.7 mm** (**0.002 - 0.028 in**).

***NOTICE:*** *If the end play measurement is not correct the shims will need to be readjusted.*

11. Install the washers, **(1)**, planetary gears, **(2)**, and needle bearings, **(3)**, onto the planetary gear carrier, **(4)**.




36084222N 7

***NOTE:*** *To aid in assembly, apply petroleum jelly to the needle bearings*

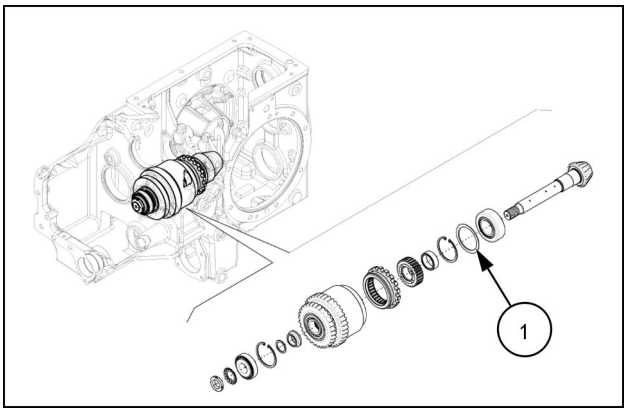
***NOTE:*** *When the value of the clearances is zero, the value is not stamped on the drive pinion.*

The following is the formula for the rear pinion gear shim, **(1)**, calculation:

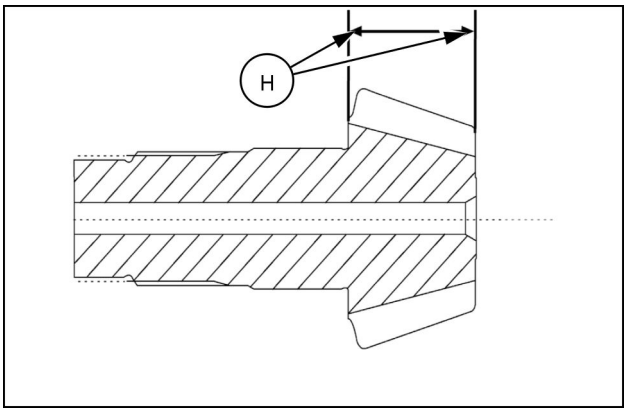
- S2 = S1 + (D1–D2) / 100 + (H1 — H2)
- D1 = Deviation value of original pinion
- D2 = Deviation value of replacement pinion
- H1 = Pinion head height of original pinion
- H2 = Pinion head height of replacement pinion
- S1 = Shim amount of original pinion
- S2 = Shim amount of replacement pinion

***NOTE:*** *D1 and D2 values engraved on pinion heads are expressed in hundredths of mm. All other dimensions are in mm.*

***NOTE:*** *H1 and H2 dimensions are found by measuring the height **(H)** of the pinion gear.*




36080701N 2




36084030N 3

## Replacement Shim Amount (S2) Calculation

## S2 = S1 + (D1 —D2) / 100 + (H1 —H2)

Example:

- D1 = 15
- D2 = 5
- H1 = 36.9
- H2 = 37.1
- S1 = 1.4

S2 = S1 + (D1 —D2) / 100 + (H1 —H2)

S2 = + 1.4 + (15 –5) / 100 + (36.9 + 37.1)

S2 = 1.4 + (10 / 100) + (-0.2)

S2 = 1.4 + 0.1 + (-0.2)

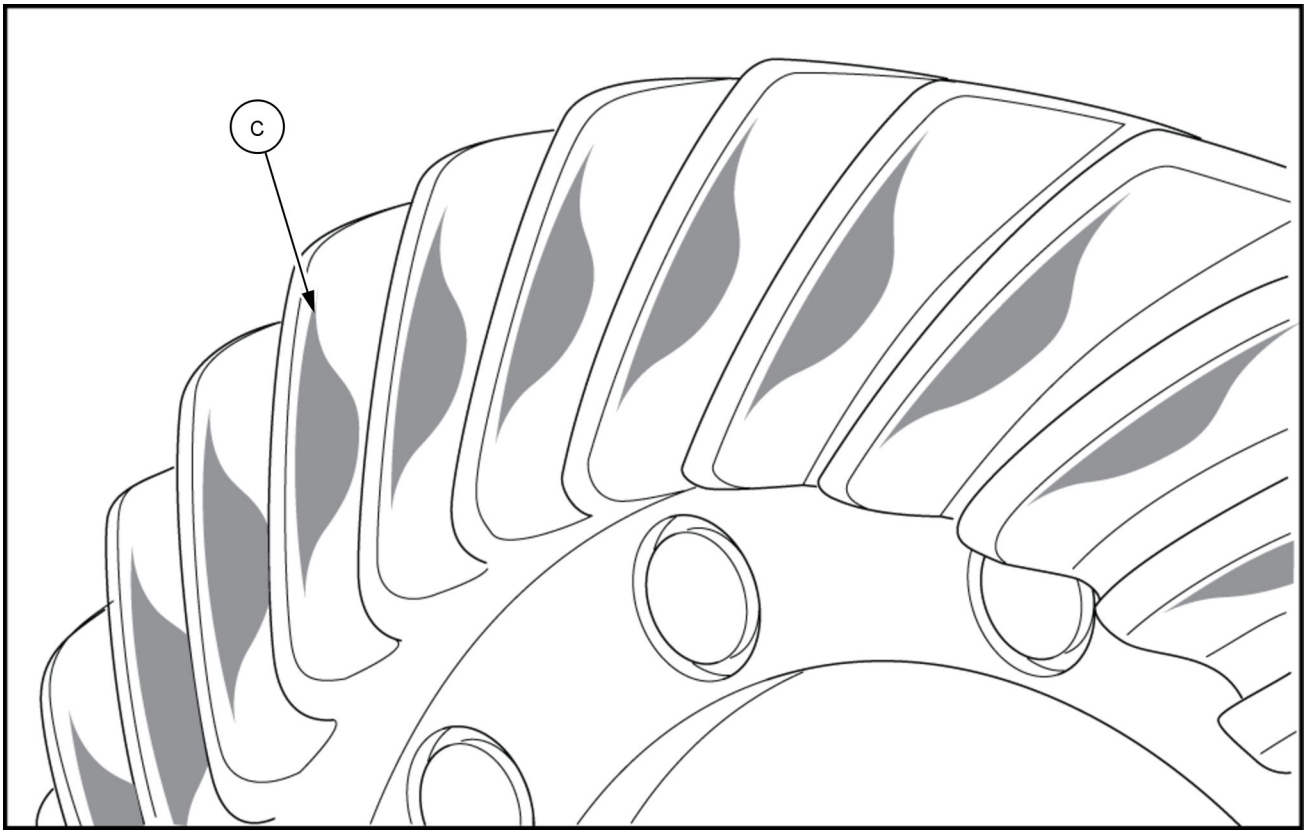
S2 = 1.5 + (-0.2)

S2 = 1.3

***NOTE:*** *Replacement shim amount is **1.3 mm** (**0.051 in**)*

## Incorrect tooth contact

***NOTE:*** *Distance of the pinion from the ring gear centerline must be reduced. (As shown in figures* ***5*** *and* ***6***




NHIL12CT00577AA 5

**(C)** Concave side (Ring Gear)

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows to splice- **(2)**, then through the **80 A** fuse to splice- **(5)**. Splice- **(5)** sends current in two directions:

- To splice- **(3)**, then to terminal **(B)** of the ignition switch.
- To ring terminal **(13)** on the un-switched power stud.

3. When the ignition switch is placed in the ACC/RUN position current is transferred across the following ignition switch terminals:

- **(B)** to **(C)** terminals.

4. Current flows from the **(C)** terminal of the ignition switch to terminal **(#86)** of the cab power relay.

## Un-switched Battery Power Stud

1. The un-switched battery power stud sends current in two directions:

- Current flows from the un-switched battery power stud to ring terminal **(14)**.
- Current flows from the un-switched battery power stud to ring terminal **(15)**.

2. Ring terminal **(14)** sends current in two directions:

- To fuse **(#18)**, **10 A** fuse. Current flows through fuse **(#18)** to terminal **(#14)** of the transmission control unit.
- To fuse **(#16)**, **10 A** fuse. Current flows through fuse **(#16)** to terminal **(#32)** on the ADIC instrument cluster.

3. Ring terminal **(15)** sends current to terminal **(#30)** of the cab power relay.

## Cab Power Relay

1. When current is provided to terminal **(#86)** of the cab power relay from terminal **(C)** of the ignition switch and a ground circuit is completed to the chassis ground from terminal **(#85)** of the power relay, the cab power relay is energized.
2. When the relay is energized, terminals **(#30)** and **(#87)** are latched, providing current to ring terminal **(10)** of the switched battery power stud.

## Switched Battery Power Stud

1. The switched battery power stud sends current in two directions:

- Current flows from the switched battery power stud to ring terminal **(11)**.
- Current flows from the switched battery power stud to ring terminal **(12)**.

2. Ring terminal **(11)** sends current to fuse **(#9)**, **15 A** fuse.
3. Current flows through fuse **(#9)** to terminal **(3)** of the transmission control unit.

4. Ring terminal **(12)** sends current in two directions:

- To fuse **(#3)**, **20 A** fuse. Current flows through fuse **(#3)** to terminal **(#31)** on the ADIC instrument cluster.
- To fuse **(#8)**, **7.5 A** fuse. Current flows through fuse **(#8)** to terminal **(A)** on the PTO activation switch.

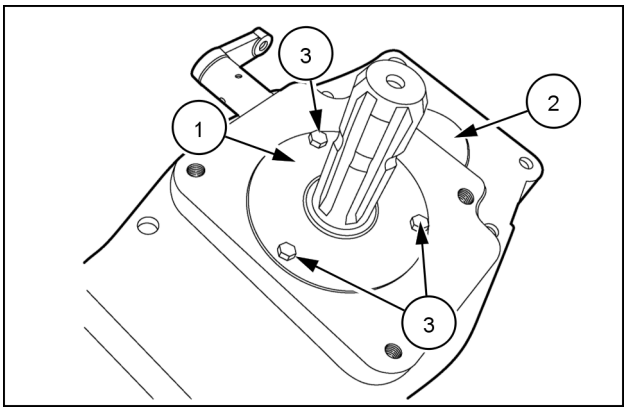
## PTO Activation Switch

1. When the PTO activation switch is activated (switch pulled up) it sends current from terminal **(C)** of the activation switch to terminal **(#20)** of the transmission control unit.

# Power Take-Off (PTO) case - Disassemble

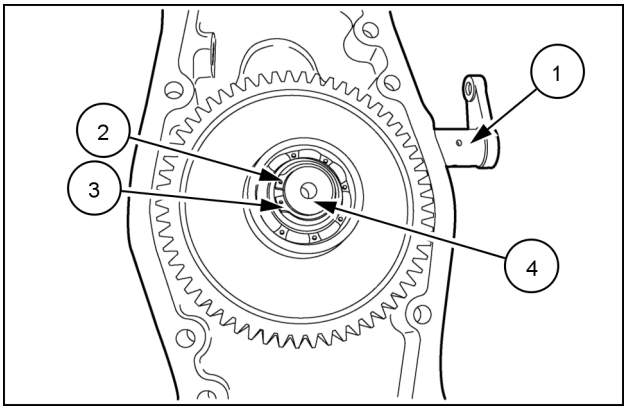
**Prior operation:**
**Power Take-Off (PTO) case Cover - Remove (31.114)**

1. Remove the seal cover plate, **(1)**, from the rear of the PTO cover, **(2)**, by removing the three M6 x 12mm bolts, **(3)**.




86084263N 1

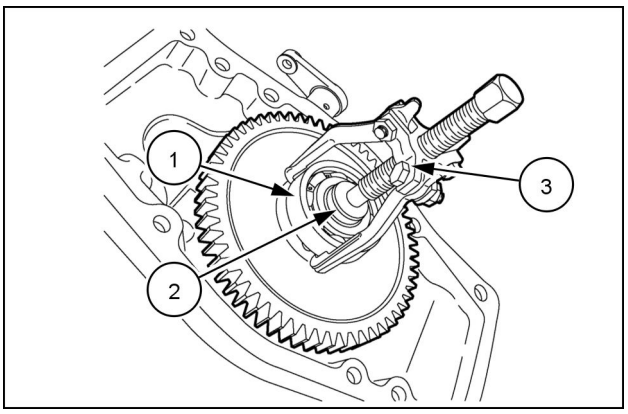
2. Disengage the PTO using the external PTO lever, **(1)**, and then remove the snap ring and thrust washer, **(2)** and **(3)**, from the rear PTO output shaft, **(4)**.




86084264N 2

***NOTE:*** *When the PTO is disengaged the rear PTO gear, **(5)**, will be able to spin without the PTO output shaft spinning.*

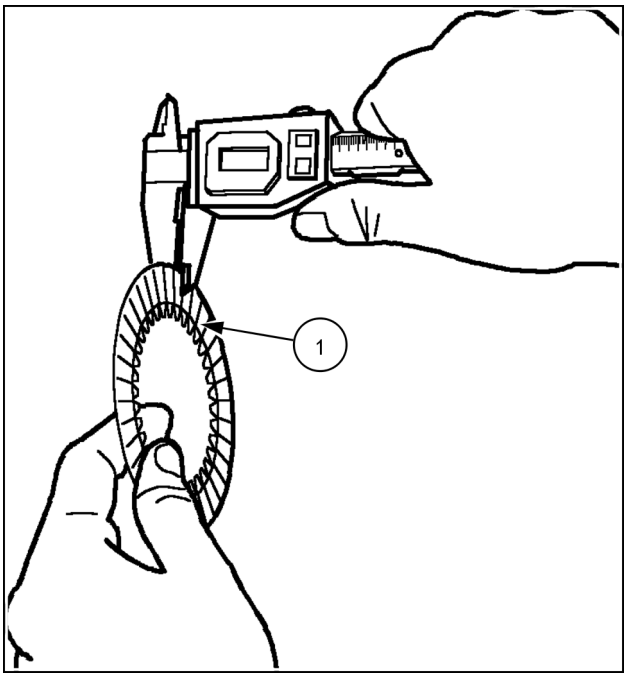
3. Remove the bearing, **(1)**, from the rear PTO output shaft, **(2)**, by using a suitable puller, **(3)**.




86084265N 3

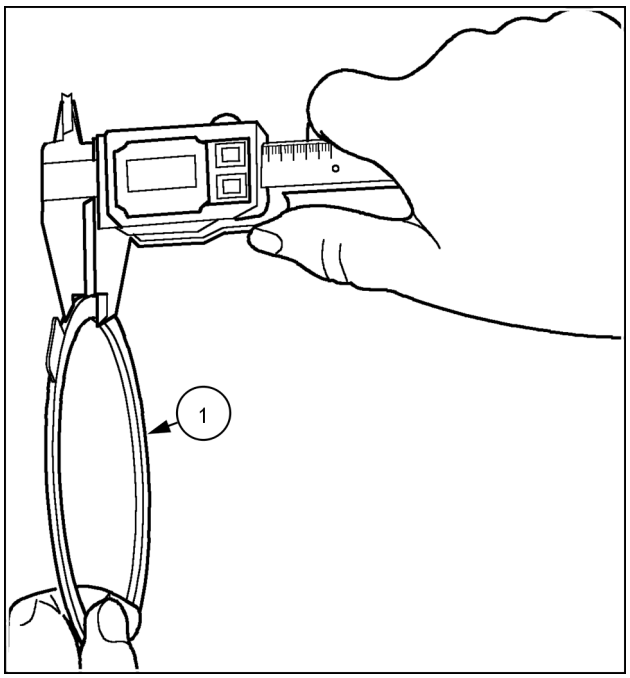
***NOTE:*** *To aid in disassembly use a suitable heat source to apply heat to the bearing before removing it.*

4. Inspect each friction disc, **(1)**, for thickness, damage, or excess wear. Replace if the thickness of the discs is less than **1.675 mm** (**0.065 in**).
5. Lay each clutch plate and the clutch backing plate on a plate of glass or other flat surface and inspect them for warpage, excess wear, or damage. Replace as needed.




30000382 4

6. Inspect the clutch brake disc, **(1)**, thickness and replace the brake disc if damaged or if the thickness is less than **5.25 mm** (**0.20 in**).
7. Inspect the brake pressure plates for warpage, excess wear, or damage. Replace as needed.
8. Clean and inspect the clutch housing, piston, spring, and distribution block for excess wear or damage. Replace the clutch assembly if any of these are found to be damaged or show excess wear.



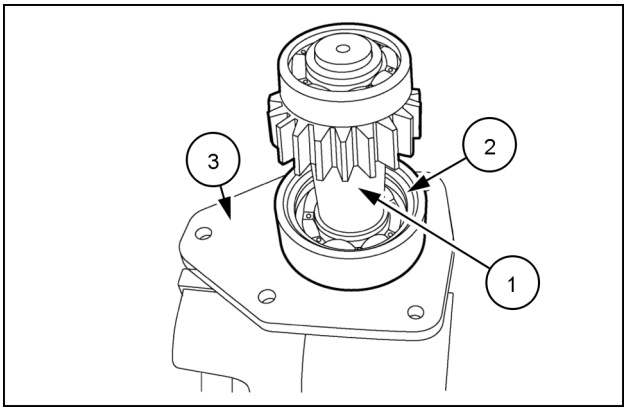

30000381 5

# Central Power Take-Off (PTO) - Disassemble

**Prior operation:**
**Central Power Take-Off (PTO) - Remove (31.120)**

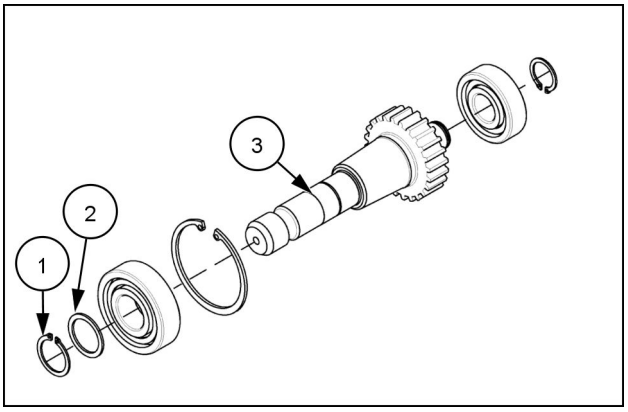
## Disassembly

1. Place the mid PTO shaft, **(1)**, into a vice.
2. Remove the snap ring, **(2)**, from the mid PTO cover, **(3)**.
3. Remove the mid PTO shaft, **(1)**, from the vise then use a dead blow hammer to remove the mid PTO shaft from the mid PTO cover, **(3)**.
4. Use a seal removal tool to remove the oil seal from the mid PTO cover, **(3)**.



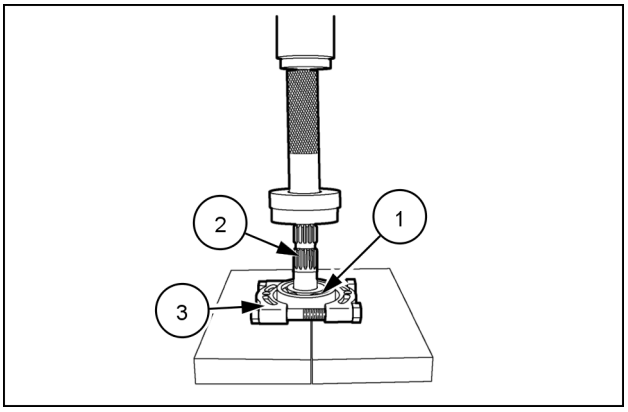

86084250N 1

5. Remove the snap ring, **(1)**, and thrust washer, **(2)**, from the mid PTO shaft, **(3)**.




36084251N 2

6. To remove the bearing, **(1)**, from the mid PTO shaft, **(2)**, place a bearing splitter, under the bearing, **(1)**, and place the mid PTO shaft, **(2)**, in a hydraulic press with the splined end of the shaft facing up.




86084252N 3

***NOTE:*** *The bearing splitter **(3)** will rest on the press plates on the hydraulic press.*

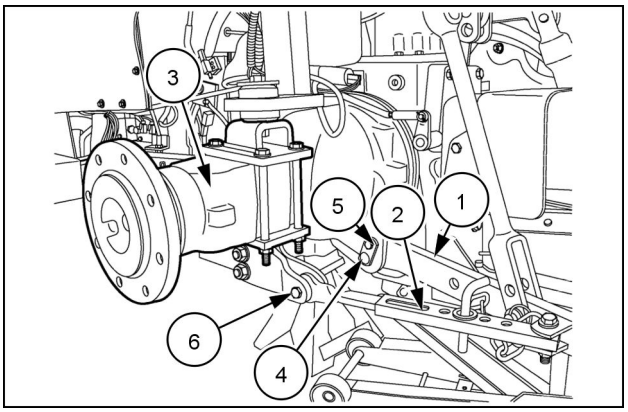
7. Carefully press the mid PTO shaft, **(2)**, down through the bearing, **(1)**.

# Contents

## Brakes and controls - 33

### Mechanical service brakes - 120

19. Install the lower lift links, **(1)** and **(2)**, to the rear axle, **(3)**.
20. Install the first lift link, **(1)**, to the rear axle by installing the pin, **(4)**, through the link then secure using the M8 x 16mm bolt and M8 Belleville washer, **(5)**. Torque to **23 N·m** (**17 lb ft**).
21. Install the second lift link, **(2)**, to the rear axle by installing the M12 x 70mm bolt, M12 flat washer and M12 lock nut, **(6)**. Torque to **66 N·m** (**49 lb ft**)
22. Fill the combined transmission, differential and rear axle with clean **NEW HOLLAND AMBRA MULTI G 134™ HYDRAULIC TRANSMISSION OIL**.
23. Reinstall the rear wheels onto the tractor.
24. Jack up the back of the tractor and remove the jack stands from the differential housing, then lower the tractor and remove the jack.



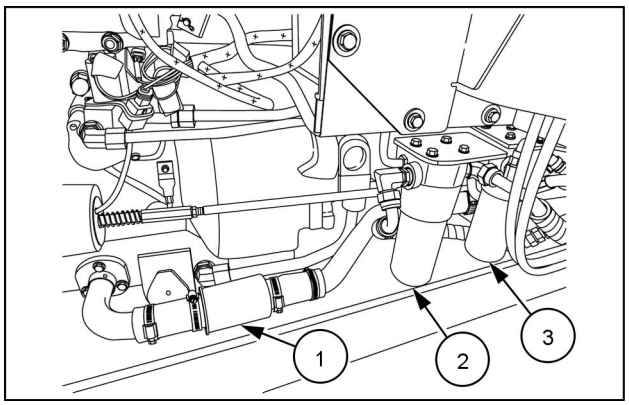
86084297N 17

***NOTE:*** *The installation procedure is the same for the left and right axle housings.*

## Filters

The tractor hydraulic filtration consists of five filters.

1. Suction strainer
2. Hydraulic system pressure filter
3. Steering system pressure filter
4. Transmission control valve filter
5. Gerotor pump filter

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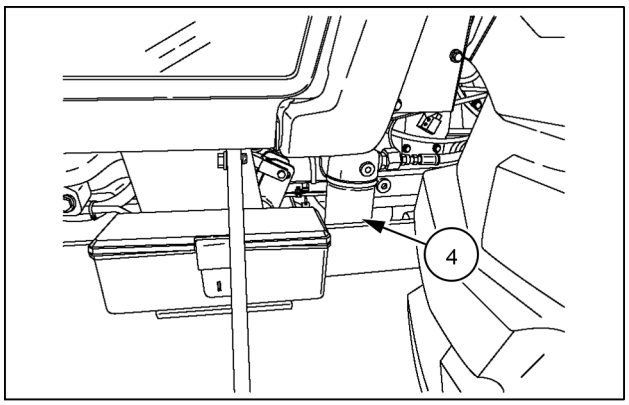


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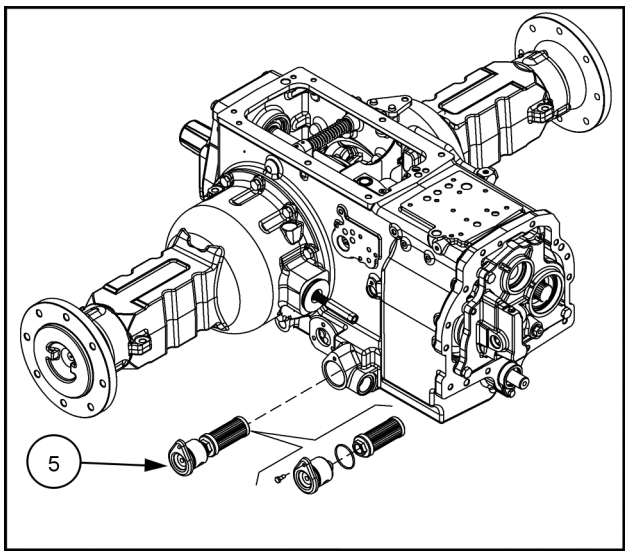


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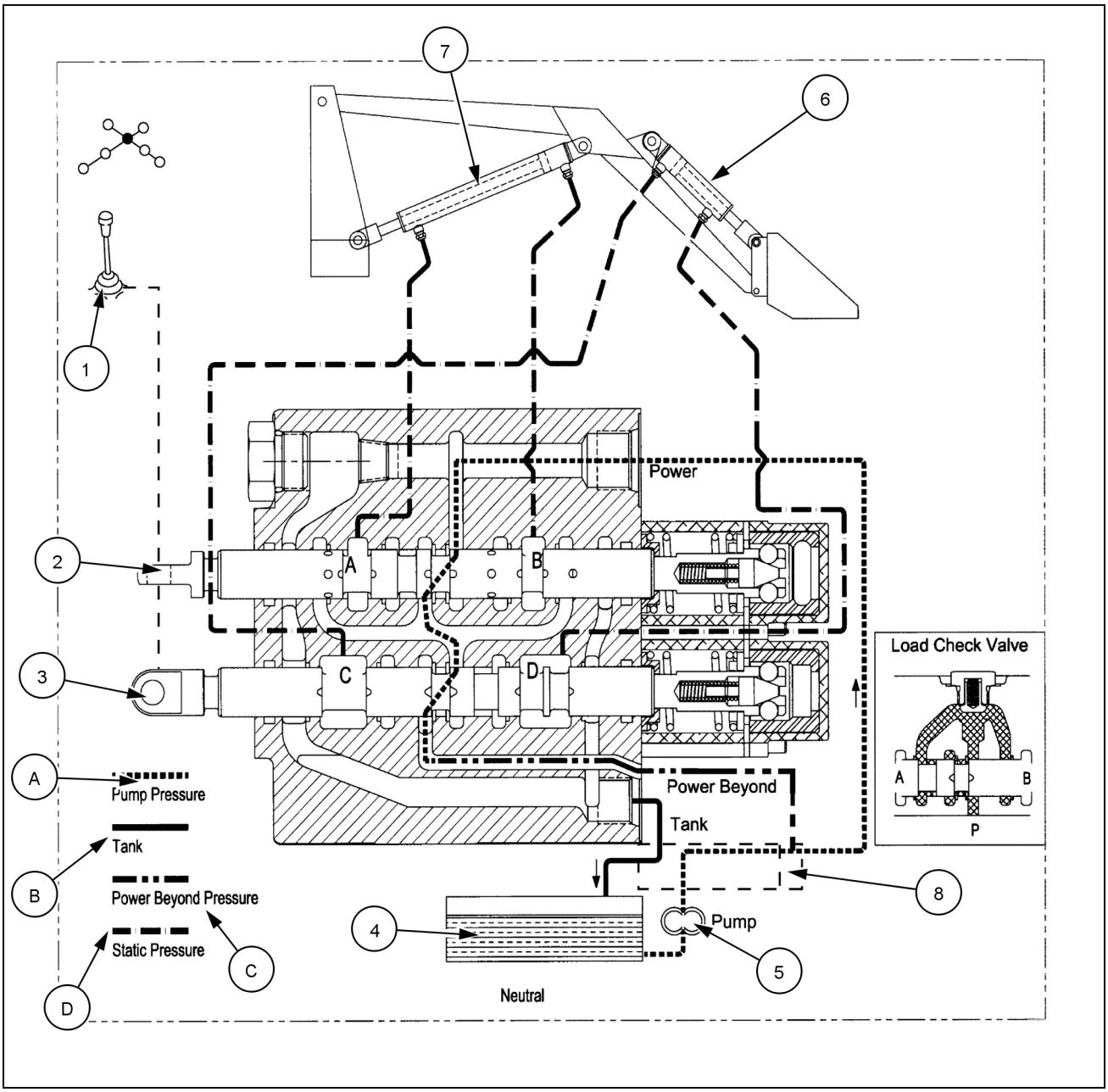
# Hydraulic systems - Overview Front Remote (Two Spool) Loader Control Valve - Fluid Flow Diagrams




50035589N 1

**Neutral**

| | | | |
|---|---|---|---|
| **(A)** Pump Pressure | **(B)** Tank | **(C)** Power Beyond Pressure | **(D)** Static Pressure |

# Hydraulic systems - Disassemble Rear Lift External Controls

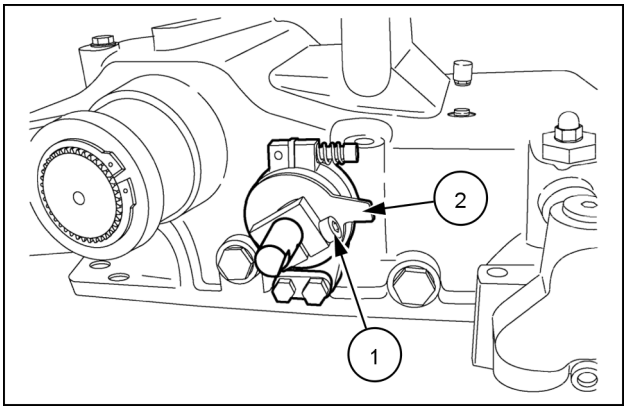
**⚠ WARNING**

**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**

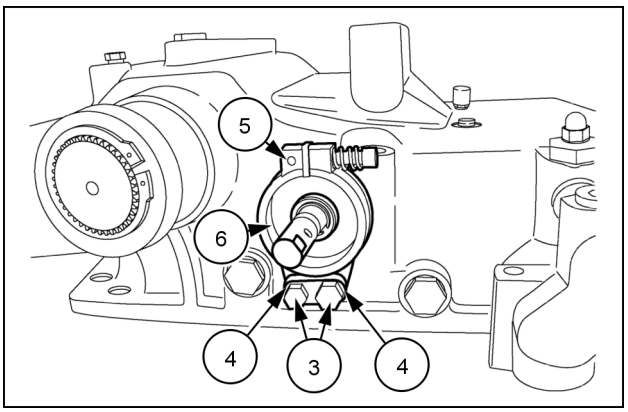
***NOTE:*** *Lift external control can be disassembled and reassembled only with the lift on a work bench or on a rotary stand.*

Proceed as follows:




86083826N 1

1. Remove the hydraulic lift from the transmission housing and place on a work bench or fix on a rotary stand.
2. Remove the position control lever.
3. Remove the M9 Allen screw, **(1)** , and remove the position control lever stop plate, **(2)**.
4. Remove two M8 bolts, **(3)** , and lock washers, **(4)** , and remove position control lever hub, **(5)** , along with nylon washer, **(6)**.




86083827N 2

# Hydraulic systems - Remove Control Valve

**⚠ 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**

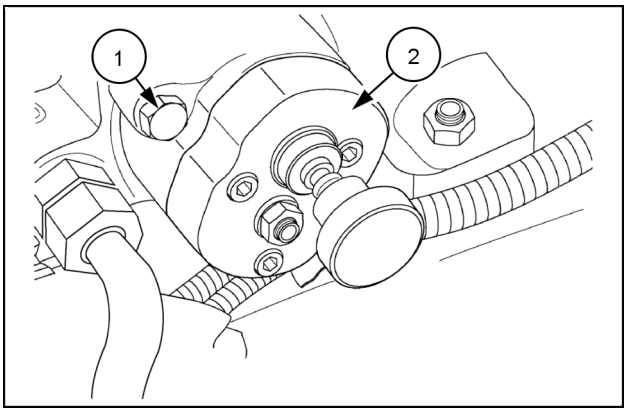
**Pressurized system!**
**Before disconnecting the couplers, you must:**
**-lower the connected attachments,**
**-stop the engine,**
**-move the control levers forward and backward to discharge pressure from the hydraulic system.**
**Failure to comply could result in death or serious injury.**

**W0389A**

## Removal

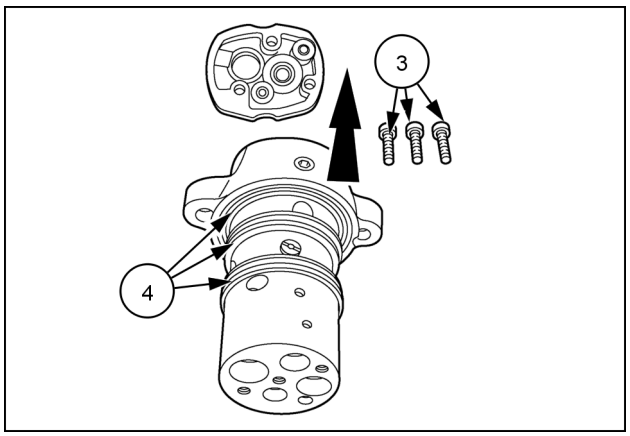
Lower the 3-point hitch to the ground to relieve any hydraulic pressure in the valve.

1. Remove the two mounting bolts, **(1)** securing the valve assembly, **(2)** to the front of the hydraulic lift cover.
2. Remove the valve assembly from the lift cover.




36090162N 1

3. Remove three Allen bolts **(3)** , separate valve body.
4. Inspect the three O-rings, **(4)** on the valve body, replace if damaged.




86071997 2

***NOTE:*** *The control valve spool components are not serviced separately but the valve could be disassemble and cleaned if in case of oil contamination.*

# Index

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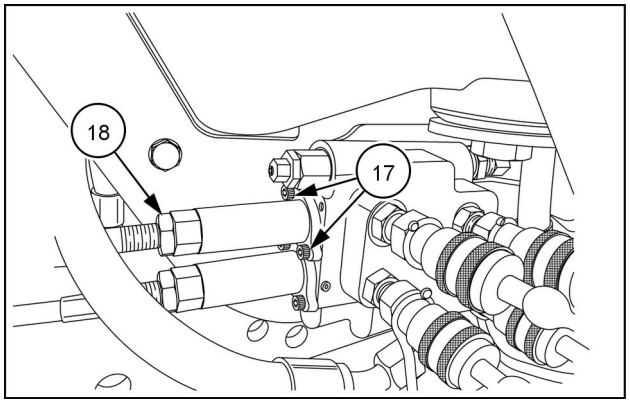
## Hydraulic systems - 000

13. See **Remote control valve - Adjust - mid mount valve control cables (35.204)** for adjustment of control cables.
14. When cable adjustment is completed, tighten socket head retaining bolts **(17)** and jam nut **(18)**.




NHIL15CT01152AA 9

**Next operation:**
**Remote control valve - Adjust - mid mount valve control cables (35.204)**

29. Lubricate and install a new seal ring **(10)** and new O-ring **(11)** on the check valve guide **(12)**. Install the check valve guide **(12)** into the valve body.

***NOTE:*** *O-ring, **(13)** was installed earlier during valve body and spool assembly.*

30. Lubricate and install the wiper ring **(14)** in the valve body.
31. Install the lever control support **(15)** on the valve body. Install the two bolts **(16)** and lock washers to secure the lever control support to the valve body. Tighten securely.

***NOTICE:*** *On the four valve face ports **(A)** each port has an O-ring and retaining ring. Only the lower middle port has a third anti-extrusion ring. Make sure all O-rings and retaining rings are in place before installing the valve assembly to the tractor.*

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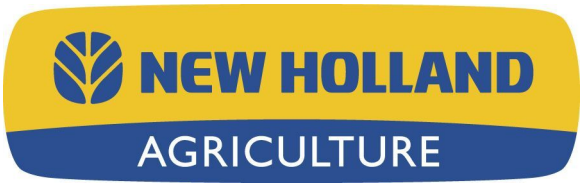


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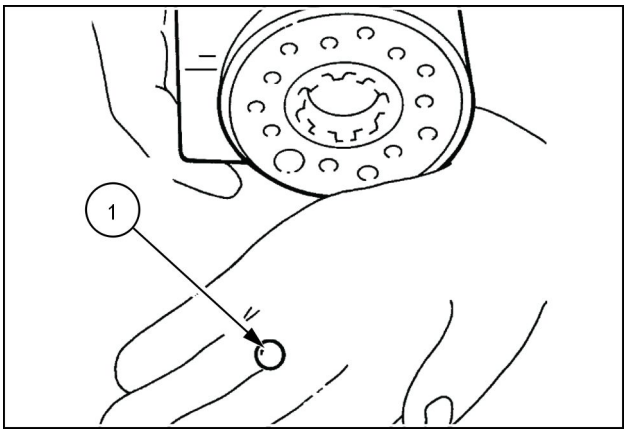
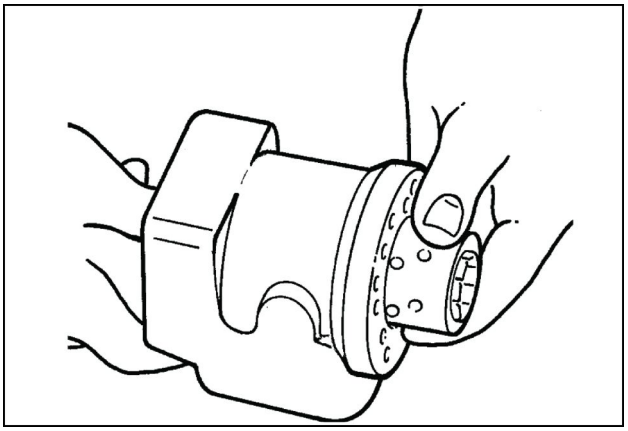
9. Rotate the control valve body and remove the check valve ball **(1)**.

***NOTICE:*** *The check ball **(1)**, is located in the deepest bolt hole. Mark the hole after removing the ball.*



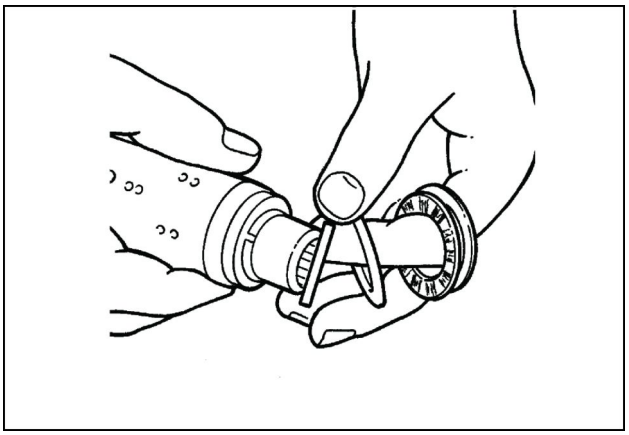

27856 8

10. Position the control valve body so that the sleeve control shaft trim pin is in a horizontal position.
11. Push the rotating valve inwards, so that the valve, the valve seat sleeve and the thrust bearing can be removed from the control valve body.



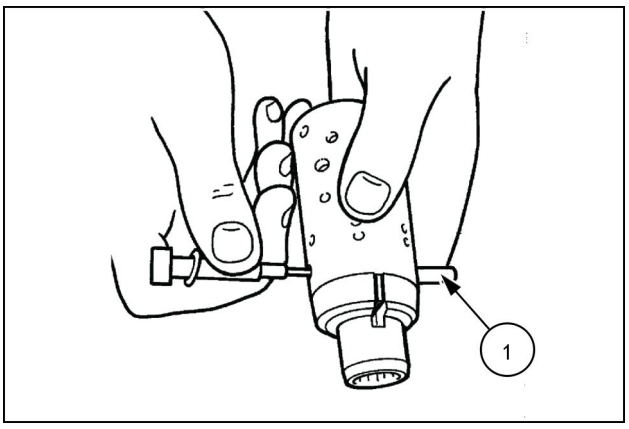
24709 9

12. Remove the two thrust washers, the thrust bearing, and the spring retaining ring from the valve seat sleeve.



24710 10

13. Remove the valve sleeve trim pin **(1)**, from the rotating valve assembly.

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# Contents

## Steering - 41

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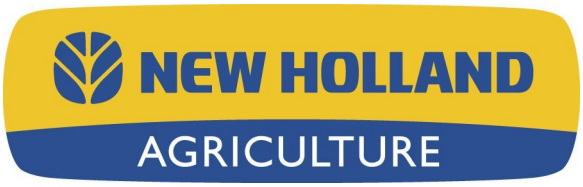


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# Contents

# Cab climate control - 50

## Air conditioning - 200

Equipment that removes refrigerant from a mobile air conditioning system (recovery equipment) may allow you to put the used refrigerant back in the system without first cleaning it to minimize performance. You may also use such conditioning systems. Non-mobile air conditioning systems use refrigerants and contain contaminants that are different from those in mobile air conditioning systems. Recovery equipment may therefore allow the mixing of different types of refrigerants or introduce contaminants that may not be removable by recycling equipment available in the service shop.

If you want to remove, clean and reuse **R134A** refrigerant, you must use a machine that both extracts and recycles refrigerant from mobile air conditioning systems. Dedicate that machine to **R134A** only.

Recycling equipment meeting SAE standards J1990 and J2210 is designed to extract and recycle refrigerants that have been in mobile air conditioning systems only. **R134A** refrigerant that also is used in non-mobile systems may introduce contaminants to the refrigerant that equipment meeting SAE J1990 and J2210 cannot remove. This equipment is not intended for use on non-mobile systems.

## Using Extraction Equipment

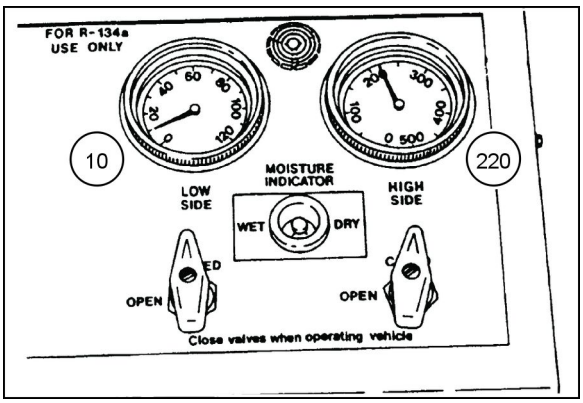
Extraction equipment is relatively small and easily portable. It is best used if a shop must service vehicles, such as agricultural or off-highway equipment, that cannot easily be brought into the shop. It is also convenient for shops that must deal with a variety of different refrigerant types and exchange recovered refrigerant at some central location.

Always use extraction equipment on those refrigerants for which it was designed. The lubricants, hoses, and seals in this equipment have been designed to work with only one refrigerant.

To help avoid a mix-up of service equipment and refrigerants, equipment hoses designed for use which each refrigerant are easily identifiable. New service hoses used with **R134A** must have a black stripe along the hose length and carry the designation “SAE J2196/R134a” (hoses labeled SAE J 2196” and lacking the black stripe were used for R12.)

If you use extraction equipment and send your recovered refrigerant to a reclamation facility, reclaimed refrigerant you purchase must meet the Air Conditioning and Refrigeration Institute standards of purity (ARI Standard 700-88). This will ensure that the refrigerant you are using not only meets the purity requirements of SAE J1991 (for R12) OR J2099 (for **R134A**), but also that it does not contain incompatible lubricants or other contaminants from non-automotive air conditioning systems.

# Air conditioning - Pressure test - Example 6




200900740 1

## Symptoms

1. Cooling is insufficient during the hottest part of hot days.
2. The low side pressure reading is normal **20.7 - 207 kPa** (**3 - 30 psi**).
3. The high side pressure reading is normal but drops when the low side reading shows a vacuum. Reference pressure-temperature chart: for correct gauge readings.
4. Evaporator air is sufficiently cold until the low side pressure gauge shows a vacuum; then it becomes warm.

**DIAGNOSIS: Excessive moisture is in system. Drying agent in receiver/drier is saturated and releases moisture during high outside air temperatures. This moisture collects and freezes in the expansion valve, preventing a flow of refrigerant through the evaporator.**

## Corrective Procedures

1. Extract the refrigerant from the system.
2. Replace the receiver/dryer.
3. Evacuate the system.
4. Charge the system.
5. Performance test the system.

***NOTE:*** *Test procedure based upon ambient temperature of* ***35 °C (95 °F)****. For proper high side gauge reading for other ambient temperatures, refer to the pressure-temperature chart.*

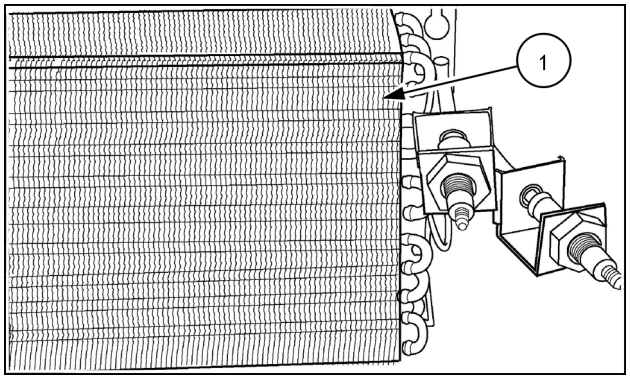
| Ambient Temperature* °C (°F) | High Pressure Gauge Reading kPa (psi) |
|---|---|
| **21 °C** (**70 °F**) | **786 - 924 kPa** (**114 - 134 psi**) |
| **24 °C** (**75 °F**) | **869 - 1007 kPa** (**126 - 146 psi**) |
| **26 °C** (**80 °F**) | **972 - 1110 kPa** (**141 - 161 psi**) |
| **29.5 °C** (**85 °F**) | **1096 - 1234 kPa** (**159 - 179 psi**) |
| **32 °C** (**90 °F**) | **1158 - 1296 kPa** (**168 - 188 psi**) |
| **35 °C** (**95 °F**) | **1248 - 1386 kPa** (**181 - 201 psi**) |
| **38 °C** (**100 °F**) | **1386 - 1524 kPa** (**201 - 221 psi**) |
| **40.5 °C** (**105 °F**) | **1503 - 1641 kPa** (**218 - 238 psi**) |
| **43 °C** (**110 °F**) | **1696 - 1834 kPa** (**246 - 266 psi**) |

# Air conditioning - Decontaminating - Component flushing

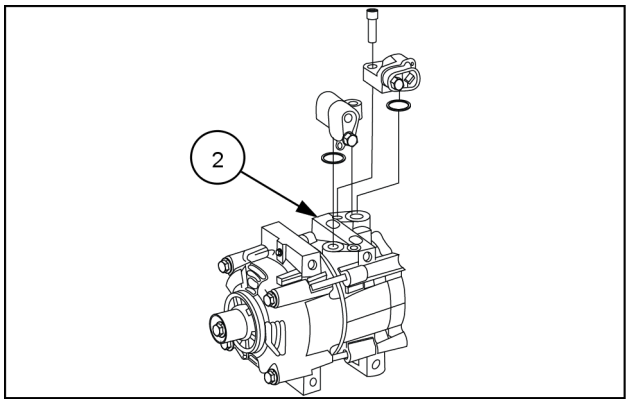
**Prior operation:**
**Air conditioning - Service instruction - Evacuating the Refrigerant (50.200)**

***NOTE:*** *The power flush unit uses shop air to atomize the flushing solvent and a pulsing action to scrub residue and contaminants out of components.*

1. Attach flushing adapters to the component to be flushed. The condenser **(1)** or the compressor **(2)**.These adapters can be shop built or a universal A/C flushing fitting set is available.

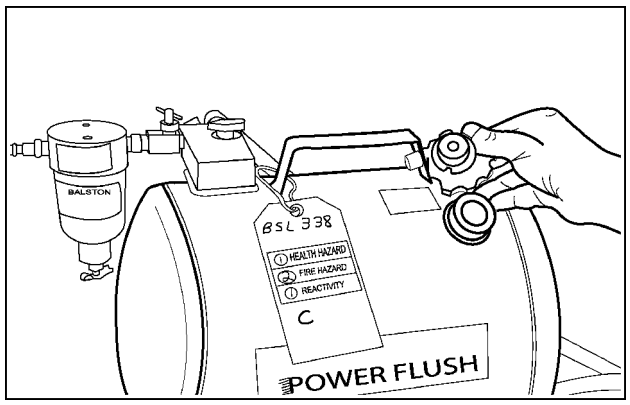



RCPH07CCH027AAC 1




NHIL15CT01136AA 2

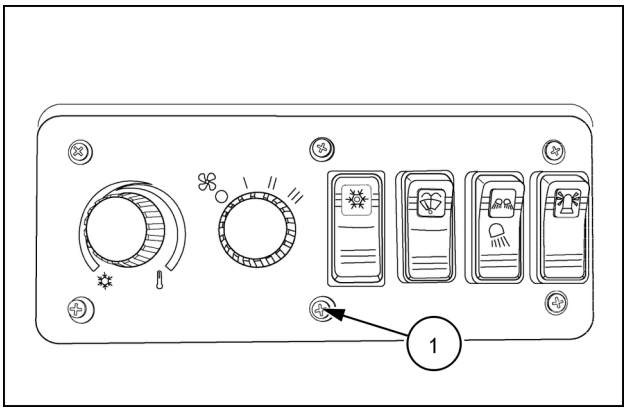
2. Fill the flushing reservoir three-quarter full with approved flushing solvent. Do not overfill the reservoir or you will restrict the pulsing action of the unit.




RCPH07CCH265ABC 3

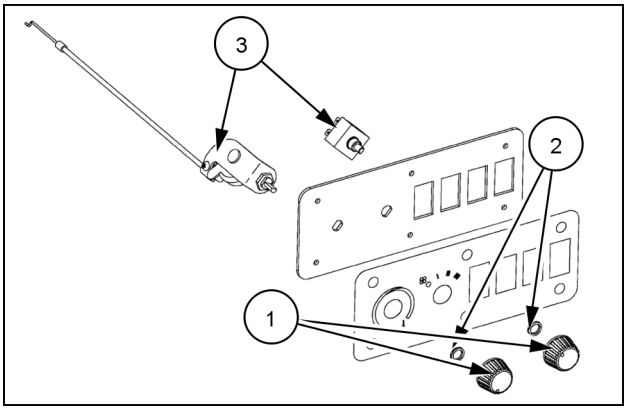
# Air conditioning - Remove - HVAC Controls

1. Remove the six screws, **(1)**, securing the HVAC panel to the roof.



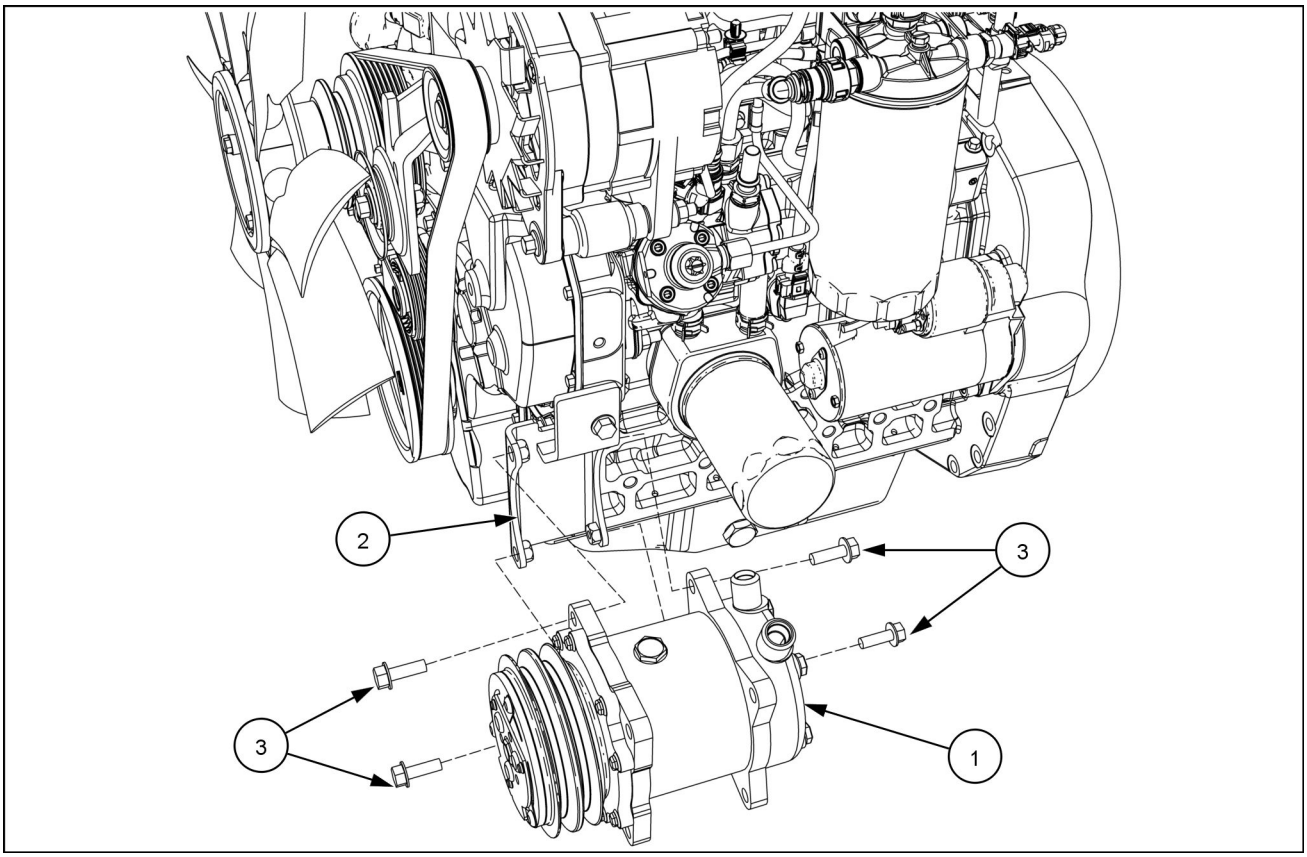

86064000N 1

2. Remove the knob, **(1)**, to switch being replaced by prying/pulling it outward.
3. Remove the nut, **(2)**, securing the switch, **(3)**, to the cover.



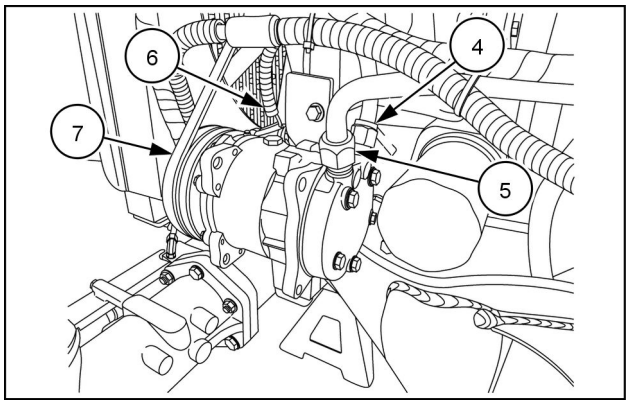

66064012N 2

# Air-conditioning compressor - Install



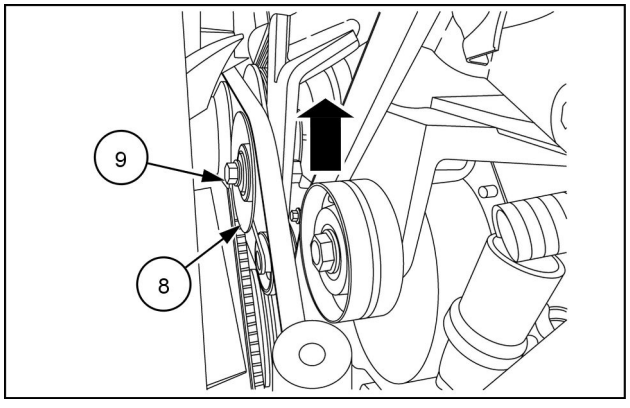

NHIL16CT00067FA 1

1. Install the compressor **(1)** onto the compressor mount plate **(2)** using four M8 x 25 flange head bolts **(3)**.
2. Install the high pressure line **(4)** and low pressure line **(5)** onto the compressor.
3. Connect the clutch wiring connector **(6)**.
4. Install belt **(7)**.




NHIL16CT00063AA 2

5. Adjust belt tension by moving adjuster pulley **(8)** upwards. Tighten pulley bolt **(9)** when proper belt tension is obtained.
   - Belt Deflection Force - **25 N** (**6 lb**)
   - Belt Deflection - **7 mm** (**0.28 in**)

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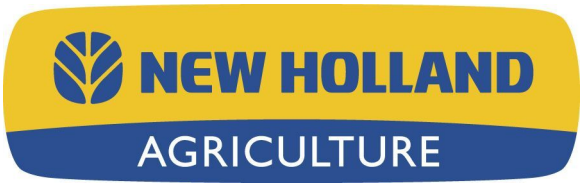


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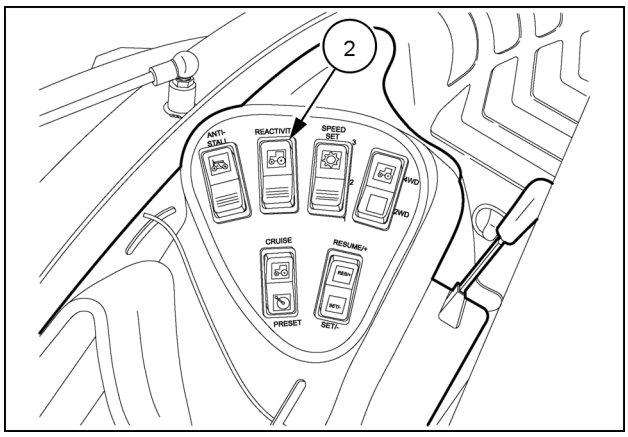
# Electrical system - Static description Reactivity / Response switch

The reactivity / response switch **(2)** is a two-position rocker switch located on the left control pod. This switch allows the selection between the high or low range of response settings.



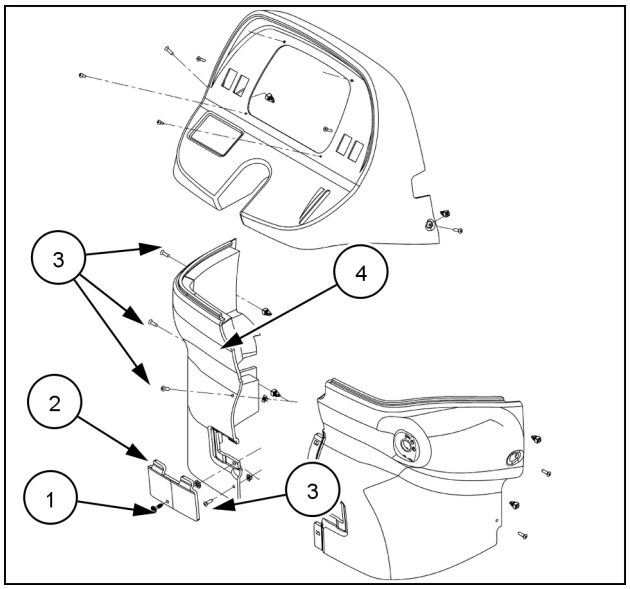

86083737 1

The two positions of the reactivity switch are:

- HIGH POSITION - The high response range, which corresponds to faster acceleration and deceleration of the tractor, is activated by pressing the double arrow portion of the switch forward which will illuminate the light inside the switch.
- LOW POSITION - The low response range, which corresponds to slower acceleration and deceleration of the tractor, is activated by pressing the single arrow portion of the switch rearward which will illuminate the light inside the switch.

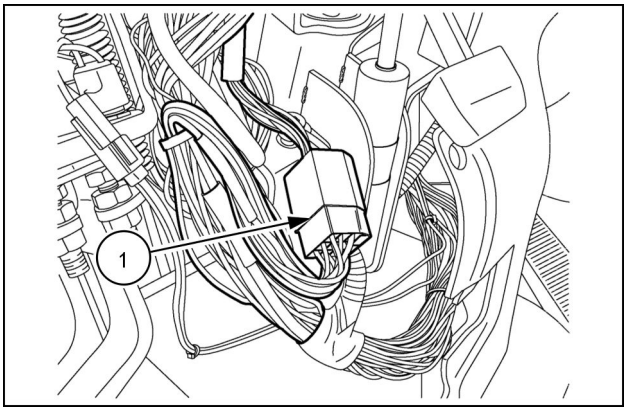
# Electrical system - Test Stalk Switch

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal.
2. Tilt the steering column forward
3. Remove the fastener, **(1)**, and then remove the fuse panel, **(2)**
4. Remove the four retaining screws, **(3)**, from the left side panel, **(4)**, and then remove the panel.




76085891N 1

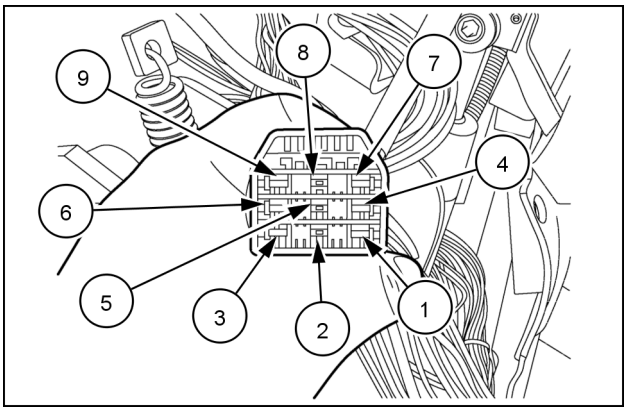
5. Unplug the connector, **(1)**, that goes to the stalk switch from the wire harness connector.




86085897N 2

6. Use an ohmmeter to test each position of the stalk switch for electrical continuity.

***NOTE:*** *To get accurate test readings use an analog ohmmeter.*



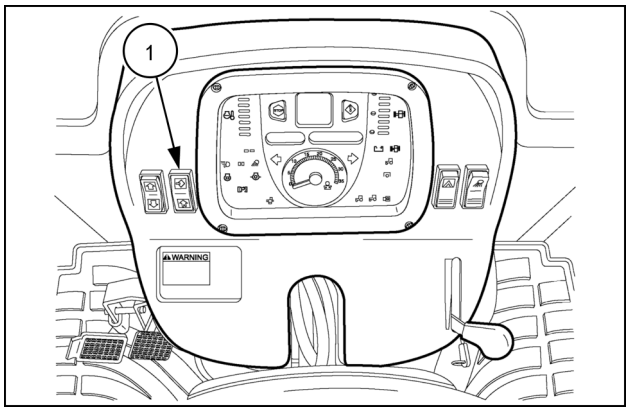

86085899N 3

| Switch Function | Continuity of Terminal No. |
|---|---|
| Horn | **(1)** and **(8)** |
| High Beam | **(2)** and **(4)** |
| Low Beam | **(4)** and **(7)**, **(4)** and **(9)** |
| Position Lights | **(4)** and **(9)** |
| Left Turn | **(3)** and **(5)** |
| Right Turn | **(5)** and **(6)** |

# Electrical system - Remove Enter / Home Switch

**Prior operation:**
**Electrical system - Static description - Scroll Up/Down switch (55.000)**

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal.
2. To remove the program select switch, **(1)**, from the dash panel. Use a flat tip screwdriver to pry the switch out of the dash panel.
3. Once the switch is removed from the dash panel, unplug the wire harness connector from the program select switch.



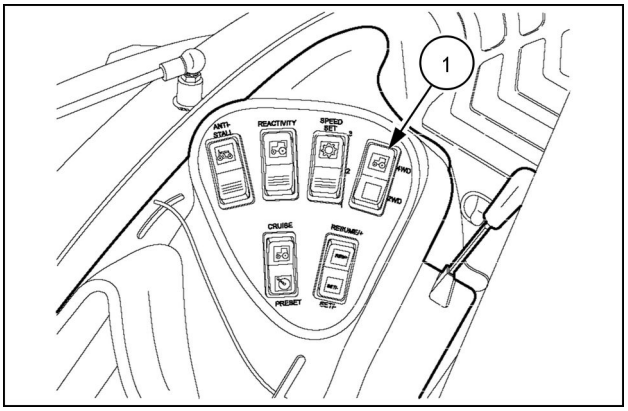

86084088NN 1

**Next operation:**
**Electrical system - Test Enter / Home Switch (55.000)**

# Electrical system - Install 2WD/4WD Select Switch

**Prior operation:**
**Electrical system - Test 2WD/4WD Select Switch (55.000)**

1. Plug the wire harness connector back into the 2WD/ 4WD select switch.
2. Push the switch **(1)** back into the control pod opening.
3. Reconnect the negative (-) battery cable to the negative (-) battery terminal.



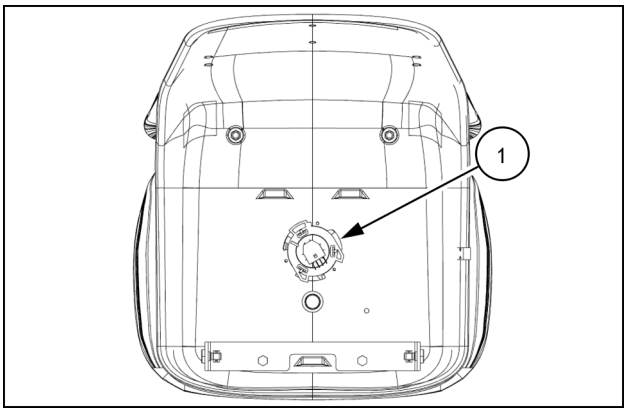

86083737N 1

# Electrical system - Remove Seat Safety Switch

**Prior operation:**
**Electrical system - Static description Seat safety switch (55.000)**

***NOTE:*** *The seat safety switch may be tested by removing the switch harness from the switch and placing ohmmeter test leads on the switch terminals. Push down on the middle of the seat to check for switch continuity However, it is recommended to remove the seat switch from the seat for testing.*

1. Tilt the seat forward to reveal the seat safety switch **(1)**.
2. Disconnect the seat switch harness from the switch.
3. Rotate the switch counterclockwise to release the locking tabs and remove the switch from the seat.




20054397N 1

**Next operation:**
**Electrical system - Test Seat Safety Switch (55.000)**

Test 3 – Test 2 is used to verify that the control module is functioning properly when the right turn signal is activated. This test simulates the turn signal switch being turned to the “Right” position.

1. Connect a jumper wire to terminal **(10)** of the control module and to the positive (+) terminal of a test light. This test light will simulate the left taillight (red). Connect a jumper wire to the (-) negative terminal of the test light and to the negative (-) terminal of the power source.
2. Connect a jumper wire to terminal **(11)** of the control module and to the positive (+) terminal of a test light. This test light will simulate the right taillight (red). Connect a jumper wire to the (-) negative terminal of the test light and to the negative (-) terminal of the power source.
3. Connect a jumper wire to terminal **(4)** of the control module and to the positive (+) terminal of a test light. This test light will simulate the right flasher (amber). Connect a jumper wire to the (-) negative terminal of the test light and to the negative (-) terminal of the power source.
4. Connect a jumper wire to terminal **(3)** of the control module and to the positive (+) terminal of a test light. This test light will simulate the left flasher (amber). Connect a jumper wire to the (-) negative terminal of the test light and to the negative (-) terminal of the power source.
5. Connect a jumper wire to the positive (+) terminal of the power source and the switch.
6. Connect a jumper wire to the switch and terminal **(7)** on the control module.
7. Connect a jumper wire to the positive (+) terminal of the power source and to terminal **(1)** of the control module.
8. Connect a jumper wire to the negative (-) terminal of the power source and to terminal **(6)** of the control module.
9. Switch the switch to the “On” position, observe the two test lights. The right flasher and the right taillight should both flash on and off while the left flasher and left taillight remain lit (solid).

# Electrical system - Troubleshooting - Front work lights circuit

| Problem | Possible Cause | Correction |
|---|---|---|
| **Front work lamps will not illuminate or are dim** | Insufficient battery charge | Test battery. Charge, add water, or replace as necessary |
| | Faulty power relay | Test relay and replace as necessary |
| | Work lamp bulb faulty | Check and replace bulb as necessary |
| | Blown **80 A** main fuse | Inspect main fuse and replace as necessary |
| | Blown No. 6, **25 A** fuse | Replace fuse as necessary. |
| | Faulty work light switch | Test light switch and replace as necessary. |
| | Faulty work light relay | Test relay and replace as necessary |
| | Improper connection at work lamp terminals or headlight socket | Check connections and lamp socket. Repair or replace as necessary. |
| | Improper ground connection | Check ground connections and repair as necessary. |

# Electrical system - Troubleshooting - Cab work lights circuit

| Problem | Possible Cause | Correction |
|---|---|---|
| **Cab work lights will not illuminate** | Ignition switch not in the "ON" position | Place ignition switch in the "ON" position |
| | Faulty power relay | Test relay, replace if necessary |
| | Blown No. 6, **25 A** fuse | Replace **25 A** fuse |
| | Faulty cab work light switch | Check switch, replace if necessary. |
| | Faulty ground connection | Check ground circuit, correct if necessary |
| | Faulty light bulb | Replace bulb |

# Electrical system - Troubleshooting - Interior cab lights circuit

| Problem | Possible Cause | Correction |
|---|---|---|
| **Dome light will not illuminate** | Blown No. 18, **10 A** fuse | Replace **10 A** fuse |
| | Blown No. 22, **2 A** fuse | Replace **2 A** fuse |
| | Faulty dome light switch | Check dome light switch, replace dome light assembly, if necessary. |
| | Faulty dome light bulb | Replace bulb |
| **Dome light will not go out when doors are closed** | Faulty door switch or misadjusted striker plate. | Test switches or adjust striker plates to actuate switch when doors are closed. |

# Electrical system - Troubleshooting - Hazard flasher circuit

| Problem | Possible Cause | Correction |
|---|---|---|
| **Hazard Signal Lights will not illuminate or flash** | Blown No. 20, **20 A** hazard signal fuse | Inspect fuse and replace as necessary |
| | Hazard signal bulb(s) burnt out | Inspect bulb(s) and replace as necessary |
| | Defective hazard switch | Test switch and replace as necessary |
| | Defective flasher cutoff relay | Test flasher relay by using a known functioning flasher relay and re- place as necessary |
| | Defective hazard/turn flasher module | Test module and replace as necessary |
| | Faulty wiring or ground connection | Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed |
| **Instrument panel hazard indicator(s) does not illuminate** | Blown No. 16 **10 A** fuse | Inspect fuse and replace as necessary |

# Contents

# Electrical systems - 55

## Harnesses and connectors - 100

FUNCTIONAL DATA

Wiring harnesses



(*) See content for specific models

# Wiring harnesses - Electrical schematic sheet 09 – Transmission sensors

| | |
|---|---|
| Boomer™ 46D CVT Boomer 46D, CVT, TIER 4B (FINAL), ROPS | NA --- NA |
| Boomer™ 54D CVT Boomer 54D, CVT, TIER 4B (FINAL), ROPS | NA --- NA |

| Type | Component | Connector / Link | Description |
|---|---|---|---|
| Sensor | **B-011** | **X-020 X-072** | OIL PRESSURE SWITCH |
| Sensor | **B-012** | **X-070** | INPUT SPEED SENSOR |
| Sensor | **B-013** | **X-071** | OUTPUT SPEED SENSOR |
| Sensor | **B-014** | **X-088** | OUTPUT PULLEY PRESSURE SENSOR |
| Sensor | **B-015** | **X-087** | INPUT PULLEY PRESSURE SENSOR |
| Sensor | **B-016** | **X-075** | TORQUE PRESSURE SENSOR |
| Sensor | **B-017** | **X-074** | OIL TEMPERATURE SENDER |
| Connector | X-020 | **X-020** | SW B+ |
| Connector | X-070 | **X-070** | INPUT SPEED SENSOR |
| Connector | X-071 | **X-071** | OUTPUT SPEED SENSOR |
| Connector | X-072 | **X-072** | OIL PRESSURE SWITCH |
| Connector | X-074 | **X-074** | OIL TEMPERATURE SENDER |
| Connector | X-075 | **X-075** | TORQUE PRESSURE SENSOR |
| Connector | X-087 | **X-087** | INPUT PULLEY PRESSURE SENSOR |
| Connector | X-088 | **X-088** | OUTPUT PULLEY PRESSURE SENSOR |

# Wiring harnesses - Electrical schematic sheet 04 – Starting and charging systems

| | |
|---|---|
| Boomer™ 46D CVT Boomer 46D, CVT, TIER 4B (FINAL), Cab | NA --- NA |
| Boomer™ 54D CVT Boomer 54D, CVT, TIER 4B (FINAL), Cab | NA --- NA |

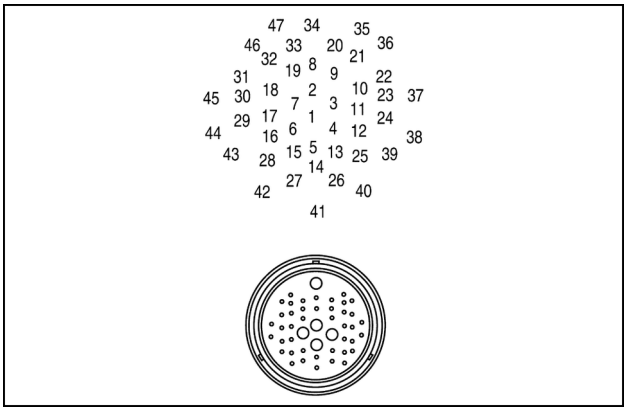
| Type | Component | Connector / Link | Description |
|---|---|---|---|
| ECU | **A-004** | **X-041** | GLOW PLUG CONTROL UNIT |
| ECU | **A-050A** | **X-050A** | RELAY BLOCK 1 |
| Voltage source | **G-001** | BT-001BBT-001A | BATTERY |
| Voltage source | **G-002** | RT-5RT-7 | ALTERNATOR |
| Ground | **GND-001** | GND-001 | GROUND |
| Relay | **K-001** | | NEUTRAL START RELAY |
| Relay | **K-013** | **X-010** | CRANK RELAY |
| Relay | **K-014** | **X-013** | FUEL HEATER CUTOFF RELAY |
| Relay | **K-020** | **X-150** | ENGINE CONTROL UNIT (ECU) START RELAY |
| Motor | **M-001** | RT-3RT-4 | STARTER MOTOR |
| Resistor | **R-001** | **X-176** | GLOW PLUG 1 |
| Resistor | **R-002** | **X-175** | GLOW PLUG 2 |
| Resistor | **R-003** | **X-174** | GLOW PLUG 3 |
| Switch | **S-001** | | IGNITION SWITCH |
| Connector | X-009 | **X-009** | IGNITION SWITCH |
| Connector | X-010 | **X-010** | CRANK RELAY |
| Connector | X-013 | **X-013** | FUEL HEATER CUTOFF |
| Connector | X-041 | **X-041** | GLOW PLUG CONTROL UNIT |
| Connector | X-050A | **X-050A** | RELAY BLOCK |
| Connector | X-150 | **X-150** | ENGINE CONTROL UNIT (ECU) START RELAY |
| Connector | X-158 | **X-158** | ENGINE CONTROL UNIT (ECU) - VEHICLE |
| Connector | X-172 | **X-172** | FUEL FILTER HEATER |
| Connector | X-174 | **X-174** | GLOW PLUG 1 |
| Connector | X-175 | **X-175** | GLOW PLUG 2 |
| Connector | X-176 | **X-176** | GLOW PLUG 3 |
| Connector | X-2P | X-2P | MAIN - CHASSIS POWER |
| Connector | X-2R | **X-2R** | CHASSIS - MAIN POWER |
| Connector | X-43P | X-43P | MAIN TO PANEL SIGNAL |
| Connector | X-43R | **X-43R** | PANEL - MAIN POWER |
| Connector | X-44P | X-44P | CHASSIS - PANEL SIGNAL |
| Connector | X-44R | **X-44R** | PANEL - CHASSIS SIGNAL |
| Connector | X-5P | X-5P | MAIN - JUMPER GLOW PLUG |
| Connector | X-5R | **X-5R** | JUMPER GLOW PLUG - MAIN |
| Sub-Assembly | **Z-003** | **X-172** | FUEL FILTER HEATER |

# Wiring harnesses - Electrical schematic sheet 13 – Lighting

| | |
|---|---|
| Boomer™ 46D CVT Boomer 46D, CVT, TIER 4B (FINAL), Cab | NA --- NA |
| Boomer™ 54D CVT Boomer 54D, CVT, TIER 4B (FINAL), Cab | NA --- NA |

| Type | Component | Connector / Link | Description |
|---|---|---|---|
| Lamp | **E-001** | **X-036 X-038** | RIGHT-HAND (RH) HEAD LIGHT |
| Lamp | **E-002** | **X-037 X-039** | LEFT-HAND (LH) HEAD LIGHT |
| Lamp | **E-005** | **X-082** | LEFT-HAND (LH) FRONT WORK LIGHT |
| Lamp | **E-006** | **X-083** | RIGHT-HAND (RH) FRONT WORK LIGHT |
| Lamp | **E-007** | **X-123** | LEFT-HAND (LH) REAR WORK LIGHT |
| Lamp | **E-008** | **X-124** | RIGHT-HAND (RH) REAR WORK LIGHT |
| Lamp | **E-009** | **X-100 X-101 X-102** | DOME LIGHT |
| Ground | **GND-002** | GND-002 | MAIN GROUND |
| Switch | **S-021** | **X-121** | WORK LIGHT SWITCH |
| Switch | **S-022** | **X-104 X-117** | LEFT-HAND (LH) DOOR SWITCH |
| Switch | **S-023** | **X-103 X-116** | RIGHT-HAND (RH) DOOR SWITCH |
| Connector | X-036 | **X-036** | RIGHT-HAND (RH) HEAD LIGHT |
| Connector | X-037 | **X-037** | LEFT-HAND (LH) HEAD LIGHT |
| Connector | X-038 | **X-038** | RIGHT-HAND (RH) FRONT WORK LIGHT |
| Connector | X-039 | **X-039** | LEFT-HAND (LH) FRONT WORK LIGHT |
| Connector | X-082 | **X-082** | LEFT-HAND (LH) FRONT WORK LIGHT |
| Connector | X-083 | **X-083** | RIGHT-HAND (RH) FRONT WORK LIGHT |
| Connector | X-100 | **X-100** | DOOR SWITCH UNSWITCHED BATTERY POSITIVE (B+) |
| Connector | X-101 | **X-101** | DOOR SWITCH |
| Connector | X-102 | **X-102** | DOME LIGHT/GROUND |
| Connector | X-103 | **X-103** | RIGHT-HAND (RH) DOOR SWITCH |
| Connector | X-104 | **X-104** | LEFT-HAND (LH) DOOR SWITCH |
| Connector | X-116 | **X-116** | GROUND |
| Connector | X-117 | **X-117** | GROUND |
| Connector | X-121 | **X-121** | WORK LIGHT SWITCH |
| Connector | X-123 | **X-123** | LEFT-HAND (LH) REAR WORK LIGHT |
| Connector | X-124 | **X-124** | RIGHT-HAND (RH) REAR WORK LIGHT |
| Connector | X-4P | X-4P | HOOD - MAIN |
| Connector | X-4R | **X-4R** | MAIN - HOOD |

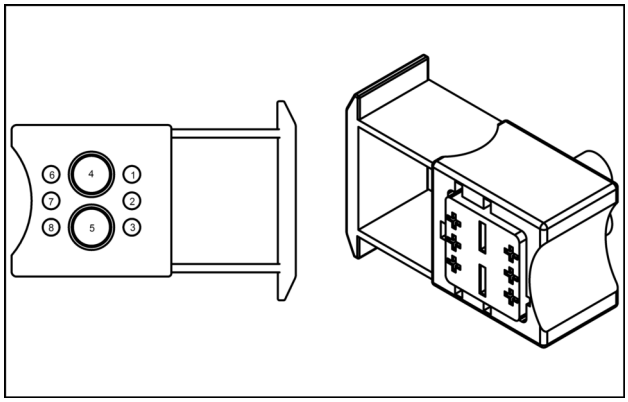
## Cab Signal Connector C44P Identification and Function (C44P-C44R)




76086721N 3

| Terminal No.(Wire Code) | Circuit | Terminal No.(Wire Code) | Circuit | Terminal No.(Wire Code) | Circuit |
|---|---|---|---|---|---|
| **(1)** (HM1 V) | Neutral Start Relay | **(17)** (HM112 BW) | Ground | **(33)** (HM33 BW) | Splice 11 to Ground |
| **(2)** (HM2 W) | Neutral Start Relay | **(18)** | N/A | **(34)** (HM34 DB) | Tail-License Lights |
| **(3)** (HM3 O) | Power Relay | **(19)** | N/A | **(35)** (HM35 DB) | Low Beam Relay |
| **(4)** (HM4 LG) | Front Wiper | **(20)** (HM20 DB) | Brake Switch | **(36)** (HM36 DB) | High Beam Relay |
| **(5)** | N/A | **(21)** (HM56 BW) | Engine Coolant Temperature | **(37)** (HM37 DB) | Hazard Flas-herModule |
| **(6)** (HM6 O) | Front Wiper | **(22)** (HM54 Y) | Alternator | **(38)** (HM38 DB) | Hazard Flas-herModule |
| **(7)** (HM7 LG) | Front Wiper | **(23)** (HM23 W) | Park Brake Switch | **(39)** (HM39 DB) | Work Light Relay |
| **(8)** (HM8 DB) | RH Warning Light | **(24)** (HM24 DB) | Splice 24 to RHWarning Lights | **(40)** (HM40 DB) | Splice 23-Haz-ardLights |
| **(9)** (HM9 T) | Transmis-sionController | **(25)** | N/A | **(41)** | N/A |
| **(10)** (HM10 DB) | LH Warning Light | **(26)** | N/A | **(42)** | N/A |
| **(11)** (HM11 V) | F / R Shuttle | **(27)** (HM27 V) | 2WD/4WD Switch | **(43)** (HM43 B) | Ground |
| **(12)** (HM12 V) | F / R Shuttle | **(28)** (HM28 DB) | Brake Pedal SignalTo Trans. Controller | **(44)** (HM42 G) | Diagnos-ticConnector |
| **(13)** (HM90 Y) | Engine OilPressure Switch | **(29)** (HM29 Y) | Can HI | **(45)** | N/A |
| **(14)** (HM93 Y) | Engine CoolantTemperature | **(30)** (HM30 DG) | Can LOW | **(46)** | N/A |
| **(15)** (HM22 Y) | Fuel Level Sender | **(31)** (HM31 W) | ADIC Opera-torPresence | **(47)** (HM12 O) | Horn |
| **(16)** (HM16 DB) | Head Lights | **(32)** (HM32 Y) | ADIC Rear PTOSpeed | | |

### *X-041 - GLOW PLUG CONTROL UNIT [ A-004] (84356962) (Female)*

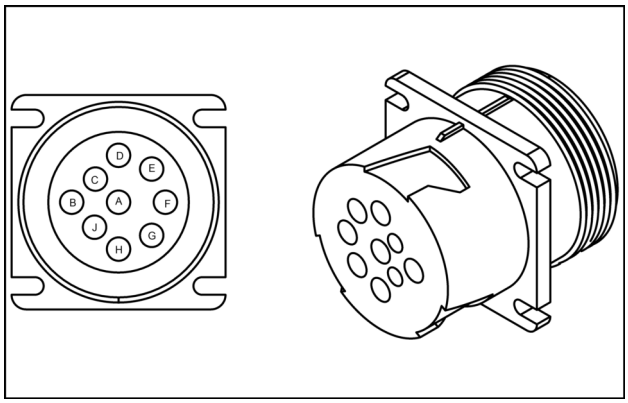



84356962 3

**84356962**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | X-5P-Female-P-C | HM065 | GLOW PLUG 3 BATTERY POSITIVE (B+) | OR - 1.0 | **SHEET 04** |
| 2 | X-5P-Female-P-A | HM062 | GLOW PLUG 1 BATTERY POSITIVE (B+) | OR - 1.0 | |
| 3 | **X-158 pin 22** ENGINE CONTROL UNIT (ECU) - VEHICLE CONNECTOR | HM053 | GLOW PLUG UNIT DIAGNOSTIC FEEDBACK | YE - 0.8 | |
| 4 | SP-003-P-X | HM101D | UNSWITCHED BATTERY POSITIVE (B+) | RD - 8.0 | |
| 5 | SP-044-P-X | HM073 | GLOW PLUG UNIT 31 | BL - 3.0 | |
| 7 | X-5P-Female-P-B | HM063 | GLOW PLUG 2 BATTERY POSITIVE (B+) | OR - 1.0 | |
| 8 | **X-158 pin 52** ENGINE CONTROL UNIT (ECU) - VEHICLE CONNECTOR | HM052 | GLOW PLUG UNIT CONTROL | YE - 0.8 | |

### *X-042 - DIAGNOSTIC CONNECTOR (Male)*

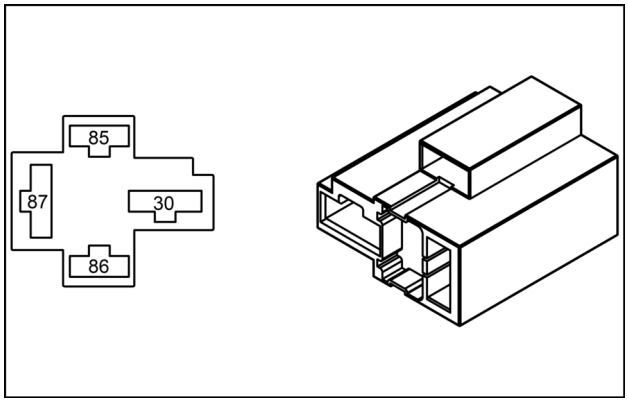



87516075 4

**87516075**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| A | GND-003C-P-1 GROUND | HC202 | GROUND | BK - 0.8 | **SHEET 11** |
| B | **X-076 (Female) pin D05** FUSE BLOCK | HC204 | UNSWITCHED BATTERY POSITIVE (B+) | RD - 0.8 | |
| C | SP-013-P-X | HC019B | CONTROLLER AREA NETWORK (CAN) HI | YE - 0.8 | |
| D | SP-014-P-X | HC020B | CONTROLLER AREA NETWORK (CAN) LO | GN - 0.8 | |
| G | **X-2R (Male) pin 21** CHASSIS - MAIN POWER | HC021 | SERVICE SWITCH | GY - 0.8 | |
| H | **X-2R pin 34** CHASSIS - MAIN POWER | HC034 | | GY - 0.8 | |

### *X-077 - POWER RELAY [ K-016] (87699186) (Female)*

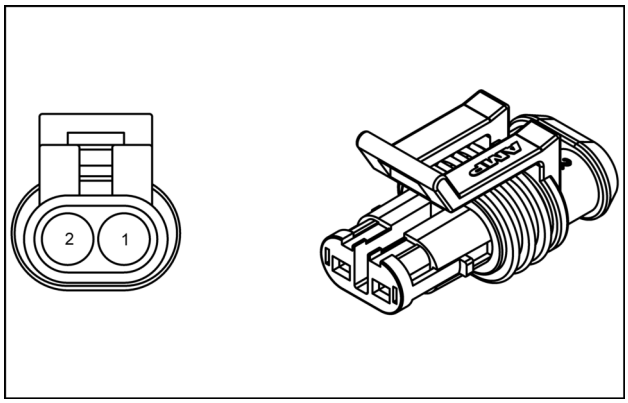



87699186 7

**87699186**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 30 | RT-15-P-1 UNSWITCHED BATTERY POSITIVE (B+) | HC139 | UNSWITCHED BATTERY POSITIVE (B+) | RD - 8.0 | **SHEET 03** |
| 85 | GND-003B-P-1 GROUND | HC138 | GROUND | BK - 0.8 | |
| 86 | **X-2R pin 2** CHASSIS - MAIN POWER | HC002 | SWITCHED BATTERY POSITIVE (B+) | OR - 0.8 | |
| 87 | RT-10-P-1 SWITCHED BATTERY POSITIVE (B+) | HC137 | SWITCHED BATTERY POSITIVE (B+) | OR - 8.0 | |

### *X-078 - FOUR-WHEEL DRIVE (4WD) SOLENOID [ Y-004] (82012083) (Female)*

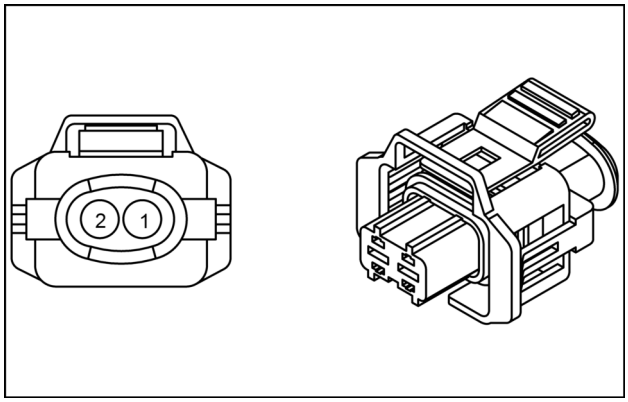



82012083 8

**82012083**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | **X-050A (Female) pin D3** RELAY BLOCK | HC209 | FOUR-WHEEL DRIVE (4WD)SOLENOID | WH - 0.8 | **SHEET 08** |
| 2 | GND-003C-P-1 GROUND | HC045 | GROUND | BK - 0.8 | |

### *X-167 - FUEL INJECTOR 1 [ Y-001] (87709793) (Female)*

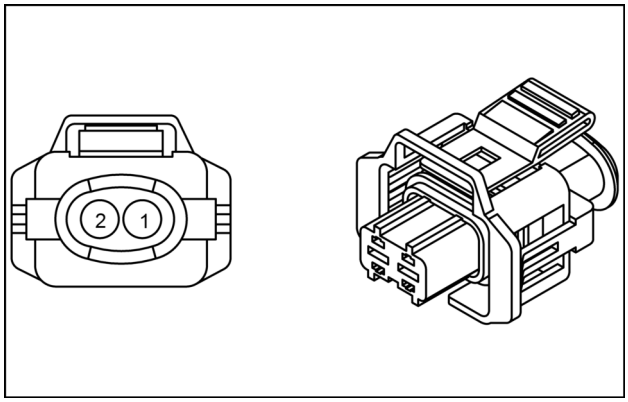



87709793 7

**87709793**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | **X-159 (Female) pin 16** ENGINE CONTROL UNIT (ECU) - ENGINE | HE019 | INJECTOR 1 SIGNAL | WH - 1.5 | **SHEET 06** |
| 2 | **X-159 (Female) pin 32** ENGINE CONTROL UNIT (ECU) - ENGINE | HE020 | INJECTOR 1 RETURN | BL - 1.5 | |

### *X-168 - FUEL INJECTOR 2 [ Y-002] (87709793) (Female)*




87709793 8

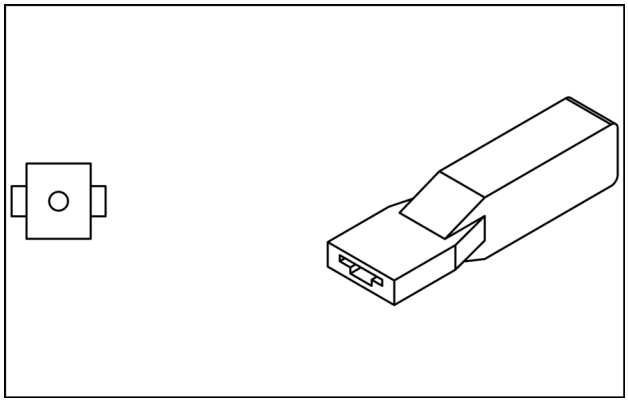
**87709793**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | **X-159 (Female) pin 17** ENGINE CONTROL UNIT (ECU) - ENGINE | HE021 | INJECTOR 2 SIGNAL | WH - 1.5 | **SHEET 06** |
| 2 | **X-159 (Female) pin 48** ENGINE CONTROL UNIT (ECU) - ENGINE | HE022 | INJECTOR 2 RETURN | BL - 1.5 | |

# Wire connectors - Component diagram 04 – Connectors X-040 to X-049

| | |
|---|---|
| Boomer™ 46D CVT Boomer 46D, CVT, TIER 4B (FINAL), Cab | NA --- NA |
| Boomer™ 54D CVT Boomer 54D, CVT, TIER 4B (FINAL), Cab | NA --- NA |

### *X-040A - HORN BATTERY POSITIVE (B+) [ H-001] (84120013) (Female)*

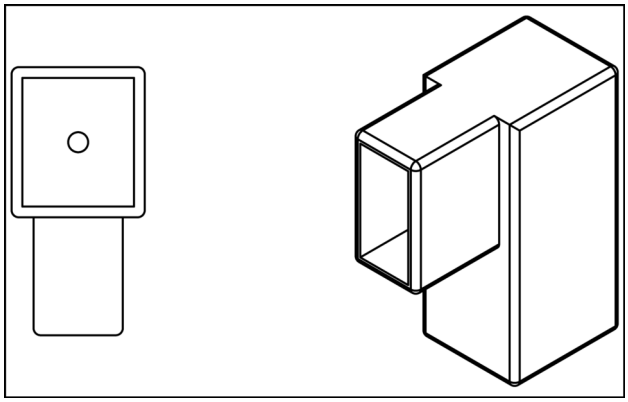


84120013 1

**84120013**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | X-43P-Female-P-9 | HM128 | HORN BATTERY POSITIVE (B+) | OR - 0.8 | **SHEET 12** |

### *X-040B - HORN GROUND [ H-001] (84120017) (Female)*



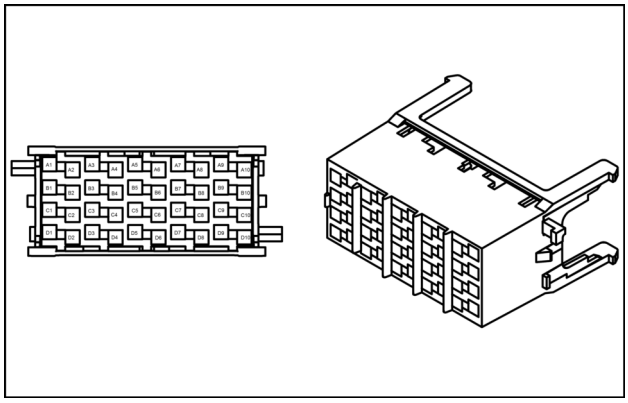
84120017 2

**84120017**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | GND-002-Male-P-1 MAIN GROUND | HM129 | HORN GROUND | BK - 0.8 | **SHEET 12** |

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | SP-017-P-X | HC014C | SENSOR GROUND | BL - 0.8 | **SHEET 09** |
| 2 | SP-016-P-X | HC105D | 5V REFERENCE | PK - 0.8 | |
| 3 | **X-061 pin 17** TRANSMISSION CONTROLLER | HC121 | TORQUE PRESSURE | YE - 0.8 | |

### *X-076 - FUSE BLOCK (87705026) (Female)*

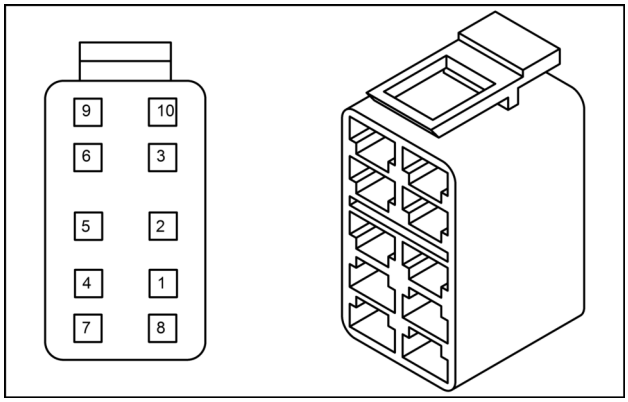


87705026 6

**87705026**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 2 | **X-121 (Female) pin 5** WORK LIGHT SWITCH | HR060 | SWITCHED BATTERY POSITIVE (B+) | OR - 2.0 | **SHEET 13** |
| 2 | **X-091 (Female) pin 6B** CAB ROOF FUSE BLOCK | HR012 | SWITCHED BATTERY POSITIVE (B+) | OR - 2.0 | |
| 3 | **X-083 (Female) pin B** RIGHT-HAND (RH) FRONT WORK LIGHT | HR057 | RIGHT-HAND (RH) FRONT WORK LIGHT | VT - 1.0 | |
| 3 | **X-082 (Female) pin B** LEFT-HAND (LH) FRONT WORK LIGHT | HR056 | LEFT-HAND (LH) FRONT WORK LIGHT | VT - 1.0 | |
| 5 | **X-121 (Female) pin 2** WORK LIGHT SWITCH | HR060 | SWITCHED BATTERY POSITIVE (B+) | OR - 2.0 | |
| 6 | **X-124 (Female) pin B** RIGHT-HAND (RH) REAR WORK LIGHT | HR059 | RIGHT-HAND (RH) REAR WORK LIGHT | VT - 1.0 | |
| 6 | **X-123 (Female) pin B** LEFT-HAND (LH) REAR WORK LIGHT | HR058 | LEFT-HAND (LH) REAR WORK LIGHT | VT - 1.0 | |
| 7 | SP-038-P-X | HR028E | GROUND | BK - 0.8 | |

### *X-122 - HEATING VENTILATION AND AIR CONDITIONING (HVAC) MODE [ S-025] (87716755) (Female)*

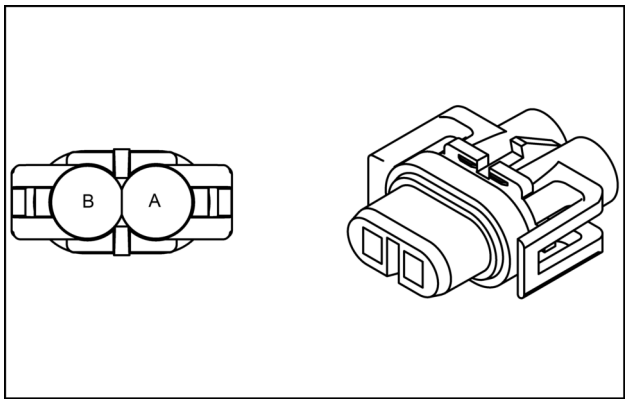



87716755 3

**87716755**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 2 | **X-115 (Male) pin C** FAN SWITCH | HR037 | SWITCHED BATTERY POSITIVE (B+) | OR - 2.0 | **SHEET 15** |
| 3 | **X-092 (Female) pin C** HEATING VENTILATION AND AIR CONDITIONING (HVAC) | HR038 | SWITCHED BATTERY POSITIVE (B+) | OR - 2.0 | |
| 7 | SP-037-P-X | HR025D | GROUND | BK - 0.8 | |

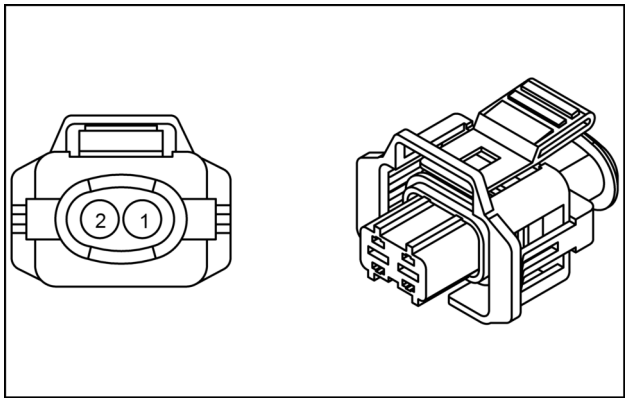
### *X-123 - LEFT-HAND (LH) REAR WORK LIGHT [ E-007] (82003123) (Female)*




82003123 4

**82003123**

### *X-169 - FUEL INJECTOR 3 [ Y-003] (87709793) (Female)*



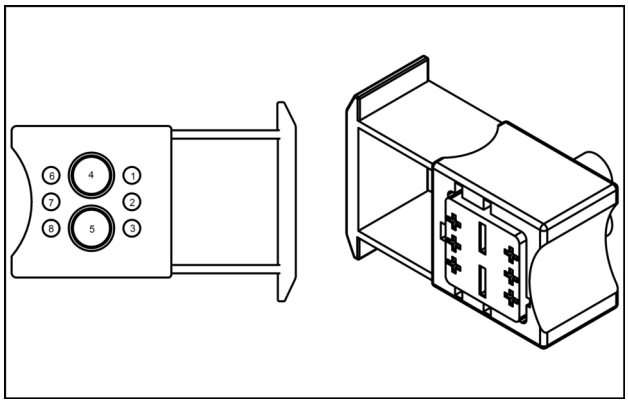

87709793 9

**87709793**

| Pin | From | Wire | Description | Color-Size | Frame |
|---|---|---|---|---|---|
| 1 | **X-159 (Female) pin 1** ENGINE CONTROL UNIT (ECU) - ENGINE CONNECTOR | HE023 | INJECTOR 3 SIGNAL | WH - 1.5 | **SHEET 06** |
| 2 | **X-159 (Female) pin 31** ENGINE CONTROL UNIT (ECU) - ENGINE CONNECTOR | HE024 | INJECTOR 3 RETURN | BL - 1.5 | |

# Wire connectors - Component diagram 11 - Connectors X-9110 to X-9119

***Connector X-9113 - Glow-plugs control unit***




84356962 1

**84356962**

| CONNECTOR X-9113 - Glow-plugs control unit | | | |
|---|---|---|---|
| **PIN NUMBER** | **WIRE NUMBER** | **CIRCUIT REFERENCE** | **ELECTRICAL SCHEMATIC FRAME** |
| 1 | VE-9060 | High Side Driver (HSD), Glow-plug 3 | **SHEET 01** |
| 2 | VE-9058 | High Side Driver (HSD), Glow-plug 1 | |
| 3 | VE-9073 | Feedback signal, Engine Control Unit (ECU) | |
| 4 | VE-9062 | **12 V** Supply, Battery positive | |
| 5 | VE-9074 | Reference ground, ECU | |
| 6 | - | - | |
| 7 | VE-9059 | High Side Driver (HSD), Glow-plug 2 | **SHEET 01** |
| 8 | VE-9072 | Control signal, ECU | |

***Connector X-9116 - Engine shut-off relay***

***NOTE:*** *Relays are in product relay panels. See product service manual for pinout image of this connector.*

| CONNECTOR X-9116 - Engine shut-off relay | | | |
|---|---|---|---|
| **PIN NUMBER** | **WIRE NUMBER** | **CIRCUIT REFERENCE** | **ELECTRICAL SCHEMATIC FRAME** |
| 85 | VE-9089 | Switched battery voltage, Power relay | **SHEET 02** |
| 86 | VE-#### | Low side control, Operator safety module | |
| 30 | VE-9053 | Key switch signal (T50), Engine Control Unit (ECU) | |
| 87A | - | - | |
| 87 | VE-9088, VE-9089 | Switched battery voltage, Power relay | **SHEET 02** |

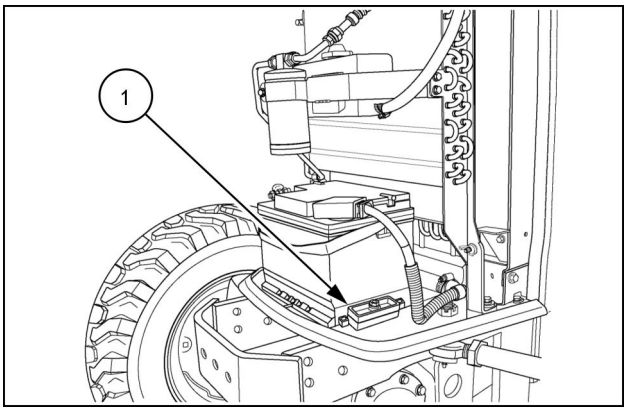
# Engine starter - Troubleshooting

| Problem | Possible Cause | Correction |
|---|---|---|
| **PINION SHAFT FAILS TO ADVANCE** | Wiring: Open circuit battery, and switch terminal connections. | Repair or replace |
| | Wiring: Open circuit, fuse | Replace fuse |
| | Key switch: No contact | Repair or replace |
| | Starter motor: Sleeve bearing burnt out | Repair or replace |
| | Starter motor: Lever broken | Replace |
| | Solenoid: Plunger movement defective or coil open or shorted | Repair or replace |
| **PINION MOTOR ROTATES BUT NO ROTATION TRANSMITTED TO ENGINE** | Starting motor: Clutch defective | Replace |
| | Starting motor: Orbital gear or planetary gears damaged | Replace |
| **MOTOR ROTATES BEFORE PINION MESHES WITH RING GEAR** | Starter motor: Shift lever damaged | Replace |
| | Starter motor: :Shift lever damaged | Replace |
| | Starter motor: Slip ring defective | Replace |
| | Starter motor: Pinion teeth worn | Replace |
| | Starter motor: Pinion push out position defective | Adjust |
| | Engine: Ring gear worn | Replace |
| | Solenoid defective | Replace |
| **PINION MESHES WITH RING GEAR BUT STARTING MOTOR FAILS TO TURN** | Wiring: Line connecting solenoid to battery broken or defective ground | Repair or replace |
| | Wiring: Lead wire connecting solenoid to motor tightened improperly | Repair or replace |
| | Starting motor: Ball bearing locked | Replace |
| | Starting motor: Brush worn | Replace |
| | Starting motor: Improper installation | Reinstall |
| | Starting motor: Brush spring defective | Replace |
| | Starting motor: Commutator dirty | Clean |
| | Starting motor: Armature of field coil defective | Repair or replace |
| | Starting motor: Field coil-to-brush connection defective | Replace |
| | Solenoid: Contact not touching properly | Replace |
| | Solenoid: Contact contacting surface roughened | Replace |
| | Battery: In discharge state | Recharge or replace |
| **MOTOR FAILS TO STOP AFTER ENGINE STARTS AND KEY SWITCH IS TURNED OFF** | Key switch: defective | Replace |
| | Defective solenoid | Replace |

# Battery - Remove

1. Release and lift the tractor engine cover.
2. Disconnect the negative (-) battery cable.
3. Disconnect the positive (+) battery cable.
4. Remove the hardware, **(1)**, securing the battery.
5. Carefully remove the battery from the tractor.

***NOTICE:*** *Crossing the battery terminals may cause damage to the electrical system*

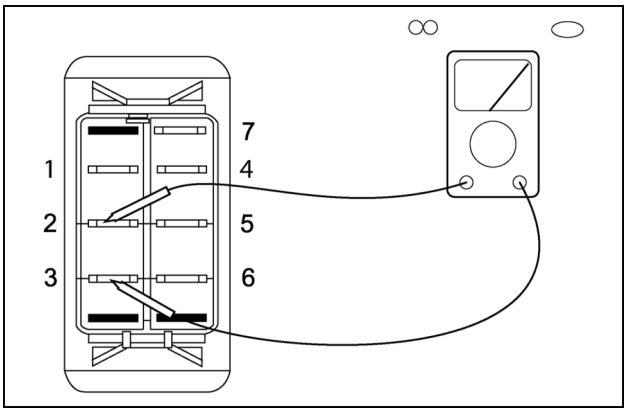



86064532N 1

**Next operation:**
**Battery - Install (55.302)**

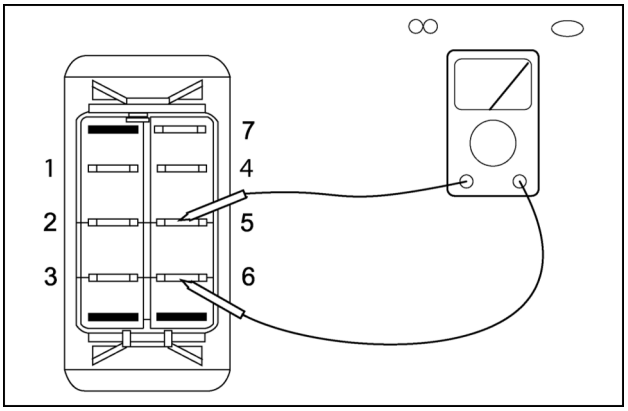
## "On" Position

1. Push the hazard light switch to the ON position.
2. Using an ohmmeter, touch one of the test probes to terminal **(2)** . Touch the other test probe to terminal **(3)** .
3. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal **(2)** and terminal **(3)**. If continuity does not exist between terminal **(2)** and terminal **(3)**, the switch is defective and needs replaced.



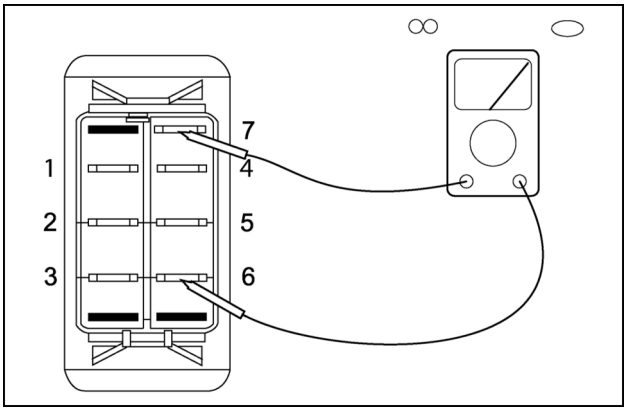

36085905N 4

4. Using an ohmmeter, touch one of the test probes to terminal **(5)**. Touch the other test probe to terminal **(6)** .
5. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal **(5)** and terminal **(6)**. If continuity does not exist between terminal **(5)** and terminal **(6)**, the switch is defective and needs replaced.




36085906N 5

6. Using an ohmmeter, touch one of the test probes to terminal **(6)**. Touch the other test probe to terminal **(7)** .
7. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal **(6)** and terminal **(7)**. If continuity does not exist between terminal **(6)** and terminal **(7)**, the internal indicator bulb is defective and needs replaced.

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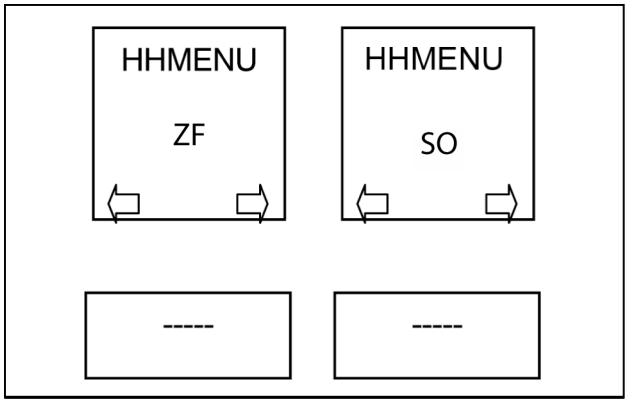
**Next operation:**
**Turn signal and/or hazard lights - Install - Hazard Lights Switch (55.404)**

## Tractor Configuration

The machine configuration will determine which HH menus are available for each module. Use "ZF" for the instrument cluster and "SO" to access the electronic transmission control unit.

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The table below shows which HH menus are enabled for each module. Select the module by pressing the UP / DOWN until the module is displayed on the LCD screen.

| Module | Menu | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HH | H1 | H2 | H3 | H4 | H5 | H7 | H8 | H9 | HB | HC | HE | HF |
| ZF | X | | | X | X | X | | X | X | X | X | X | X |
| SO | X | X | X | X | X | X | X | X | X | X | X | X | X |

## Electronic Transmission Control Module

The electronic transmission control module “SO” has subsystems on various HH menus. The subsystems available are the continuously variable transmission (CVT) and the Power Take-Off (PTO). These subsystems are only active on some of the HH menus. The table below shows the symbol that will be displayed when each subsystem is displayed and which HH menus are available for the subsystems.

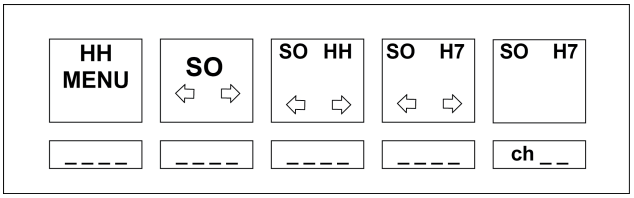
| Subsystems | | Menu | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subsystem name | Icon | H1 | H2 | H3 | H4 | H5 | H7 | H8 | H9 | HB | HC | HE | HF |
| CVT | | X | X | | X | X | X | X | X | X | X | X | X |
| PTO | | | | X | | | | | | X | X | | |

| Diagnostic Trouble Code (DTC) | Failure Description | Suspected Part Number (SPN) | Fault Mode Indicator (FMI) |
|---|---|---|---|
| 3137 | Fuel metering unit has an open load error | 159 | 2 |
| 3141 | Fuel pump pressure has exceeded desired pressure limits | 158 | 3 |
| 3146 | Water in fuel detected or water in fuel circuit failure | 11C | 3 |
| 3176 | High pressure pump fuel delivery quantity in over run exceeds a maximum threshold | 157 | 3 |
| 3177 | Engine over speed condition detected | 54C | 3 |
| 3179 | CAN communication failure between vehicle controller and ECU - BC2ECU2 message | 2B4 | 2 |
| 3180 | CAN communication error between vehicle controller to ECU | 1B5 | 2 |
| 3188 | Open load error of injector in cylinder 1 | 167 | 2 |
| 3196 | Open load error of injector in cylinder 3 | 169 | 2 |
| 3200 | Open load error of injector in cylinder 2 | 168 | 2 |
| 3210 | Injection bank 1 short circuit failure (all injectors of the same bank can be affected) | 171 | 3 |
| 3218 | Injection bank 2 short circuit failure (all injectors of the same bank can be affected) | 173 | 3 |
| 3230 | ECU internal failure - Injector CY33x component | 17C | 12 |
| 3235 | Exceeded the number of injections for a given engine speed | 17E | 3 |
| 3236 | Number of injections is limited by system | 17E | 4 |
| 3237 | Number of desired injections exceeds threshold | 17E | 2 |
| 3238 | ECU internal failure | 1D1 | 3 |
| 3239 | ECU internal failure - EEPROM read error | 1D2 | 4 |
| 3240 | ECU internal failure - EEPROM write error | 1D2 | 2 |
| 3241 | ECU internal failure - EEPROM write/read error | 1D2 | 12 |
| 3242 | ECU internal failure - Software resets in DSM 0 | 1D3 | 12 |
| 3243 | ECU internal failure - Software resets in DSM 1 | 2D3 | 12 |
| 3245 | ECU internal failure - Query/response communication errors | 1D4 | 12 |
| 3252 | ECU internal failure - SPI communication error | 1D8 | 12 |
| 3253 | ECU internal failure - Voltage ratio in ADC monitoring | 1D9 | 3 |
| 3255 | ECU internal failure - ADC test | 1D9 | 2 |
| 3256 | ECU internal failure - NTP error in ADC monitoring | 1D9 | 12 |
| 3258 | Starter relay high side driver circuit shorted to battery | 1E1 | 3 |
| 3259 | Starter relay high side driver circuit shorted to ground | 1E1 | 4 |
| 3260 | Starter relay low side driver circuit open | 2E1 | 2 |
| 3261 | Starter relay low side driver circuit shorted to battery | 2E1 | 3 |
| 3262 | Starter relay low side driver circuit shorted to ground | 2E1 | 4 |
| 3265 | Fuel injection requested during overrun | 1E3 | 3 |
| 3266 | ECU internal failure - Calculated engine speed | 1E4 | 3 |
| 3283 | ECU 5 volt sensor supply 2 out of range | 1E7 | 3 |
| 3285 | ECU 5 volt sensor supply 3 out of range | 1E8 | 3 |
| 3293 | Fuel rail pressure has exceeded maximum positive deviation limits | 151 | 3 |
| 3301 | Fuel rail pressure has exceeded maximum negative deviation limits | 153 | 3 |
| 3305 | Fuel rail pressure has dropped below the minimum limit | 154 | 3 |
| 3309 | Fuel rail pressure has exceeded maximum limit | 155 | 3 |
| 3334 | CAN communication failure between vehicle controller and ECU controller - TSC1_PE message | 1C6 | 3 |
| 3335 | CAN communication failure between vehicle controller and ECU controller - TSC1_PE message | 2C6 | 2 |

# Electronic modules - H7 - Vehicle test modes

***NOTE:*** *For HH menu navigation, refer to* ***Instrument cluster Analog-Digital Instrument Cluster (ADIC) - Detailed view HH Menus (55.408)*** *.*

1. The H7 menu is used to manually adjust the clutch calibration values for the Forward and Reverse clutches.

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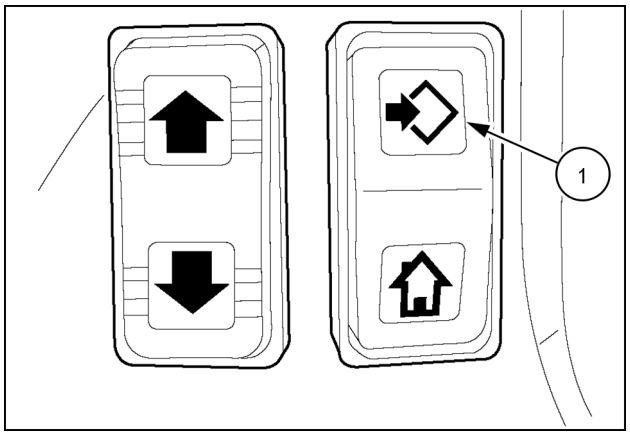
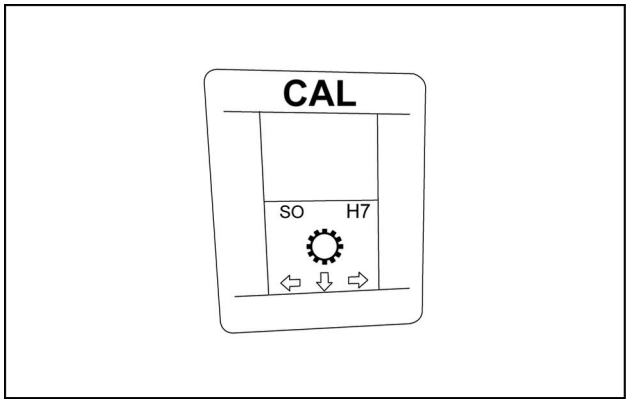
2. Start the engine with the operator in the seat and set the engine speed between **1700 - 2000 RPM**.
3. Press the ENTER switch **(1)** again, CAL will appear in the display.




83083755 2

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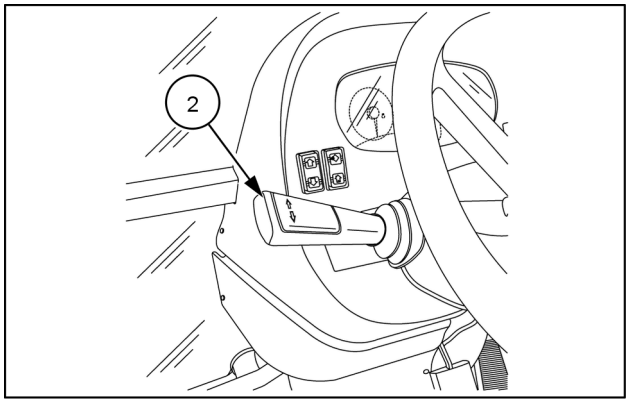
4. Use the shuttle lever **(2)** to select either the Forward or Reverse clutch. After the selection of the clutch, the display will show the specific calibration value currently stored for the selected channel (clutch).

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With the FNR assembly **Z-001** shuttle lever in the forward position, measure the resistance between the component side of connector:
**X-012 (Female) pin 1** and **X-012 (Female) pin 2** should indicate approximately **0.560K Ω**

With the shuttle in reverse position, measure the resistance between the component side of connector:
**X-012 (Female) pin 1** and **X-012 (Female) pin 3** should indicate approximately **0.560K Ω**

If resistances are not okay, remove and replace the FNR assembly **Z-001**.

B. If the FNR assembly **Z-001**shuttle lever switch is okay, continue to step **4**

4. Check for a short circuit.

   A. Check on the harness side between connector **X-012 (Female) pin 2** and **X-012 (Female) pin 3**. If a short is indicated, repair or replace the harness as required.

   B. If a short circuit is not indicated, continue to step **5**

5. Check for a short to "key on" voltage.

   A. Turn the ignition swich **S-001** to the ON position. Measure the voltage between connectors:
   **X-012 (Female) pin 2** and **X-012 (Female) pin 3** and ground.
   If a voltage is indicated, repair or replace the harness as required.

   B. If the harness is okay, download the correct level of software. If the fault reoccurs, remove and replace the TCU **A-001** .

**Wiring harnesses - Electrical schematic sheet 10 (55.100.DP-C.20.E.10)**

E. Press and hold the program set switch **S-016**.The calibration procedure will start (throughout the procedure, the program set switch **S-016**. must be kept pressed). The display will show on the three LSB digits the current value in mA growing along the calibration process

R123

.

F. When the calibration current is reached the display stops and will show the calibration current flashing:

R123

.

G. Release the program set switch **S-016**. switch. The reverse clutch will be automatically selected (or it is possible to select another clutch by pressing the program select switch **S-017**) and it will be possible to calibrate it by pressing and holding the program set switch **S-016**. When the engine is shut off, the calibration value will be stored inside the non-volatile memory of the electronic module.

Note: Transmission output Revolutions Per Minute (RPM), shuttle lever position, program select switch **S-017**, and handbrake are constantly monitored. Calibration cannot proceed unless the tractor is stopped, the shuttle lever is in forward or reverse, the handbrake is engaged and program set switch **S-016** is pressed. If during the calibration process a wrong condition is detected, then a "U" code is displayed on the dot matrix display. Refer to the following list for an explanation of "U" codes:

19 = Transmission oil temperature low (Below **10 °C** (**50.0 °F**))
20 = Handbrake is not engaged
21 = Engine Revolutions Per Minute (ERPM) is below 1700; increase throttle
22 = ERPM is above 2000; decreased throttle
23 = Shuttle lever is in neutral; shift it to forward or reverse
31 = Wheel speed sensed; check handbrake and start again
32 = FORWARD clutch cal too low - RPM dropped too soon, clutch pressure is not being controlled properly or something else caused RPM to drop
33 = FORWARD clutch cal too high - RPM did not drop, no pressure to clutch or mechanical failure breaking the torque path
34 = REVERSE clutch cal too low - RPM dropped too soon, clutch pressure is not being controlled properly or something else caused RPM to drop
35 = REVERSE clutch cal too high - RPM did not drop, no pressure to clutch or mechanical failure breaking the torque path.
99 = Unable to calibrate transmission (transmission disabled)

If errors 20, 21, 22, 23, or 31 become active during the calibration procedure, the calibration procedure will restart from the same cycle in which the problem appeared. If the remaining errors become active, the tractor should be shutoff and the procedure started again.

H. If the error code is still displayed, continue to step **2**.

***NOTE:*** *In cold or hot transmission oil conditions, it will still be possible to calibrate the clutches, however one of the following messages will appear:*

*CL = Cold Oil Warning, displayed below **40 °C** (**104.0 °F**)*

*CH = Hot Oil Warning, displayed above **100 °C** (**212.0 °F**)*

*If the display shows the above messages, it is still possible to calibrate the clutches, just press the program select switch **S-017** for a while and the warning message will disappear.*

.

2. Check for other error codes being displayed.

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

B. If no other error code is displayed, continue to step **3**.

# 2615-Transmission Torque Pressure Sensor Open Circuit or Shorted to Ground

## Control Module : TCU

***NOTE:*** *When the cause of the error code has been rectified, clear the error code and test the system for normal operation.*

**Context:**
The Transmission Control Unit (TCU) **A-001** is sensing less than **0.44 V** at connector **X-061 (Female) pin 2** pin J1-7.

**Cause:**
There is a short to ground or open circuit in the torque pressure sensor **B-016** circuit.

**Possible failure modes:**

1. Faulty connector
2. Faulty torque pressure sensor **B-016**
3. Faulty harness
4. Faulty TCU **A-001**

**Solution:**

1. Check the torque pressure sensor connector **X-075** and the TCU connector **X-061**.
   A. Ensure the connectors are connected, not damaged, the pins are in the correct position and that the fit is tight. Repair or replace as required.
   B. If the connectors are okay, continue to step **2**.
2. Check for correct voltage at TCU connector: Use multi-meter, and a back-probe pin to measure voltage at connector **X-061** pin J1-17 (Y). With the ignition switch **S-001** in the ON position, measure the voltage on the harness side of connector **X-061**, pin J1-17 (Y).
   A. If the voltage indicated is not between **0.44 V** and **4.59 V**, continue to step **3**.
   B. If the voltage indicated is between **0.44 V** and **4.59 V**, reload correct level of software. If error reoccurs, remove and replace the TCU **A-001** .
3. Check for source voltage and clean ground: Disconnect connector **X-075**. With the ignition switch in the ON position, on the harness side of the connector measure the voltage between connector **X-075** pin 1 (BW) and **X-075** pin 2 (P)
   A. If **5 V** are indicated, continue to step **4**.
   B. If **0 V** are indicated, continue to step **5**.
4. Check for an open circuit or short to ground: Disconnect connectors **X-061** and **X-075**.
   Check to make sure the harness is continuous and not grounded between **X-075**, pin 3 and connector **X-061**, pin J1-17
   A. If the harness between connector **X-075**, pin 3 and connector **X-061**, pin J1-17 is broken or grounded, repair or replace.
   B. If the harness between **X-075**, pin 3 and connector **X-061**, pin J1-17 is not broken or grounded, replace torque pressure sensor **B-016**.
5. Check for 5V to chassis ground: Disconnect connector **X-075**, and test for voltage between pin 2 and chassis ground.
   A. If **5 V** are indicated between connector **X-075**, pin 2, and chassis ground, repair or replace ground wire.

# 5080-PTO Clutch Solenoid Excessive Voltage

## Control Module : TCU

***NOTE:*** *When the cause of the error code has been rectified, clear the error code and test the system for normal operation.*

**Context:**
This fault will occur when the current on the Power Take-Off (PTO) clutch solenoid **Y-010** signal is less than **0.2 A** when driven.

**Cause:**
There is a short to ground or open circuit in the PTO clutch solenoid or circuit.

**Possible failure modes:**

1. Faulty connector
2. Faulty PTO clutch solenoid
3. Faulty harness
4. Faulty controller

**Solution:**

1. Check the PTO clutch solenoid connector **X-068** and the controller connector **X-061**.
   A. Ensure the connectors are connected, not damaged, the pins are in the correct position and that the fit is tight. Repair or replace as required.
   B. If the connectors are okay, continue to step **2**.
2. Check the PTO clutch solenoid.
   A. Disconnect connector **X-068**. Measure the resistance between the component side of connector, **X-068** pin 1 and 2. If the resistance indicated is not approximately **9 Ohms** at **20 °C** (**68.0 °F**), remove or replace the PTO clutch solenoid.
   B. If the PTO clutch solenoid is okay, continue to step **3**.
3. Check for an open circuit.
   A. Disconnect connectors **X-061**, and **X-068**. Check between connector:
   **X-068** pin 1 (V) and **X-061** pin J1-30 (V)
   **X-068** pin 2 (B) and **X-061** pin J1-6(B)
   If an open circuit is indicated, repair or replace the harness as required.
   B. If an open circuit is not indicated, continue to step **4**.
4. Check for a short to ground
   A. Check between connector: **X-068** pin 1 (V) and pin 2 (B) to chassis ground. If a short to ground is indicated, repair or replace the harness as required.
   B. If the harness is okay, download the correct level of software. If the fault reoccurs, remove and replace the controller.

Then use the multimeter to perform the following tests, on the vehicle (VE) harness from :

| From | To | Value |
|---|---|---|
| **X-9125 pin 1** | **X-9125 pin 2** | There should be no continuity |
| **X-9125 pin 1** | **X-9125 pin 3** | There should be no continuity |
| **X-9125 pin 2** | **X-9125 pin 3** | There should be no continuity |

Then use the multimeter to perform the following tests, on the vehicle (VE) harness from :

| From | To | Value |
|---|---|---|
| **X-9125 pin 1** | Chassis ground | There should be no continuity |
| **X-9125 pin 3** | Chassis ground | There should be no continuity |

A. If the results are not as expected for any of the wiring tests listed above, there is an open, short or grounded circuit condition in the vehicle harness (VE) wiring. Use the appropriate vehicle service manual and schematics to diagnose and repair the wiring.

B. If the results are as expected in all of the wiring tests listed above, the wiring is ok. Leave connectors **X-9102** and **X-9125** disconnected and continue with Step **5**.

5. Check for key switch voltage supply to water in fuel switch S-9102.

   With the key switch in an ON position, use a multimeter to perform the following test, on the vehicle (VE) harness side from :

| From | To | Value |
|---|---|---|
| **X-9125 pin 3** | Chassis ground | There should be key switch voltage. |
| **X-9125 pin 1** | Chassis ground | There should be no key switch voltage. |

   A. If there is key switch voltage present in the first check and not present in the second check, continue with Step **6**.

   B. If key switch voltage is not present in the first check or present in the second check, use the appropriate vehicle service manual and schematics to diagnose and repair the wiring.

6. Replace the water in fuel switch S-9102, then check to see if this fault has been resolved.

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

   B. If the fault is not resolved, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

7. 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 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 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

4. Check the fuel temperature sensor B-9002 engine harness (EN) wiring for a short to ground condition.

   Disconnect the engine harness (EN) from the ECU A-9000 at connector **X-9001**.

   With the key in the OFF position use the a multimeter to perform the following continuity checks for a short to ground condition on the engine harness (EN) side :

| From | To | Value |
|---|---|---|
| **X-9005 pin 1** | All pins in connector **X-9001**. | There should be no continuity. |

   A. If the specified values are not measured, there is a fault in the fuel temperature sensor B-9002 engine harness (EN) wiring. Locate and repair the failed conductor.

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

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

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

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

**Wiring harnesses - Electrical schematic sheet 03 – Engine sensors and fuel injection (engine schematics) (55.100.DP-C.20.E.03)**

# DTC 151-03-Fuel rail pressure has exceeded maximum positive deviation limits

## Control Module : ECU

***NOTE:*** *If the Pressure Relief Valve (PRV) is replaced, it is necessary to perform the Replacement of the Rail Pressure Relief Valve (PRV) - Reset ECU Data with the Electronic Service Tool (EST) before you return the machine to service. See* ***Common rail Relief valve - Configure - Reset ECU data (10.218)****, if necessary.*

***NOTE:*** *If the rail pressure sensor B-9004 is replaced, it is necessary to perform the Replacement of the Rail Pressure sensor - Reset ECU Data with the Electronic Service Tool (EST) before you return the machine to service. See* ***Common rail pressure sensor - Configure - Reset ECU data (Rail pressure sensor) (55.010)****, if necessary.*

**Context:**
The Engine Control Unit (ECU) A-9000 monitors fuel rail pressure. If the measured rail pressure is lower than the desired pressure by **100 bar** (**1450 psi**) depending on engine speed, this fault will occur. For more information regarding fuel system troubleshooting, see **Fuel injection system - Troubleshooting (10.218)**.

**Cause:**
The ECU A-9000 has determined that the measured rail pressure is **100 bar** (**1450 psi**) lower than desired fuel pressure based on engine speed.

**Possible failure modes:**

1. Faulty fuel metering unit Y-9000, internal failure.
2. Faulty charge gear pump, low efficiency.
3. Faulty fuel filters, clogged.
4. Faulty low pressure fuel supply lines, clogged or damaged.
5. Faulty high pressure fuel supply lines, clogged or damaged.
6. Faulty Pressure Relief Valve (PRV), leakage.
7. Faulty high pressure fuel pump, low efficiency.
8. Faulty fuel injectors, worn, clogged or internal leakage.
9. Faulty rail pressure sensor B-9004, drifted or leaking.
10. Faulty ECU A-9000, software.

# DTC 161-03-Short circuit of low side to high source of injector in cylinder 1

## Control Module : ECU

**Context:**
The Engine Control Unit (ECU) A-9000 monitors the fuel injector power stages for a short circuit condition. If the ECU A-9000 detects a short circuit condition in the injector number 1 Y-9001 circuit, this fault will occur.

**Cause:**
The ECU A-9000 has detected a short circuit between the high side driver and low side driver of the fuel injector number 1 Y-9001.

**Possible failure modes:**

1. Faulty fuel injector number 1 Y-9001 wiring, short circuit.
2. Faulty fuel injector number 1 Y-9001, internal failure.
3. Faulty ECU A-9000, software.

**Solution:**

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

   Use the Easy Engine software provided on the Electronic Service Tool (EST) to check the fault status and to perform the cylinder cut-out test.

   A. If the fault is still 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 **6**.

2. Check the fuel injector number 1 Y-9001 internal resistance.

   Disconnect the engine harness (EN) from the fuel injector number 1 Y-9001 at connector **X-9030**.

   Use a multimeter to measure the resistance of fuel injector number 1 Y-9001 on the injector pins :

| From | To | Value |
|---|---|---|
| **X-9030 pin 1** | **X-9030 pin 2** | There should be between **.03 - .05 Ω** |

   A. If there is between **.03 - .05 Ω**, leave connector **X-9030** disconnected and continue to Step **3**.

   B. If the resistance is not between **.03 - .05 Ω**, fuel injector number 1 Y-9001 solenoid coil has failed. Replace fuel injector number 1 Y-9001.

3. Check the fuel injector number 1 Y-9001 injector harness (INJ) wiring for a short circuit condition.

   With the key in the OFF position, use a multimeter to perform the following continuity check on the engine harness (EN) side :

| From | To | Value |
|---|---|---|
| **X-9030 pin 1** | **X-9030 pin 2** | There should be no continuity. |

   A. If there is no continuity, leave connector **X-9030** disconnected and continue to Step **4**.

   B. If there is continuity, there is a short circuit in the fuel injector number 1 Y-9001 wiring in the engine harness (EN) wiring. Locate and repair the shorted conductor.

4. Check the fuel injector number 1 Y-9001 vehicle harness (VE) wiring for a short circuit condition.

   Disconnect the engine harness (EN) from the ECU A-9000 at connector **X-9001**.

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 sensors and fuel injection (engine schematics) (55.100.DP-C.20.E.03)**

4. Determine the condition of the ECU A-9000 CAN circuit.

   With the key switch in the OFF position, use a multimeter to measure the resistance of the CAN connection on the vehicle (VE) harness side:

| From | To | Value |
|---|---|---|
| **X-9102 pin K24** | **X-9102 pin K25** | There should be **120 Ω**. |
| **X-9102 pin K24** | chassis ground | There should be no continuity |
| **X-9102 pin K25** | chassis ground | There should be no continuity |

   Use a multimeter to measure the resistance of the CAN termination resistor, internal to the ECU A-9000:

| From | To | Value |
|---|---|---|
| **X-9102 pin K24** | **X-9102 pin K25** | There should be **120 Ω**. |

   A. If the measured resistances are correct and neither conductor is grounded, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

   B. If the measured resistances are not correct or one or both of the conductors is grounded, see the appropriate vehicle service manual and electrical schematics, if necessary, to locate and restore the termination resistance to the CAN circuit.

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

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

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

**Wiring harnesses - Electrical schematic sheet 02 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

# DTC 1D8-12-ECU internal failure - SPI communication error

## Control Module : ECU

**Context:**
The Engine Control Unit (ECU) A-9000 monitors the communication between the ECU A-9000 processor and the power stage controller over the SPI bus. If there is an error in the communication, this fault will occur.

**Solution:**

1. Check the ECU A-9000 for the appropriate software and re-flash, if necessary.
   A. If the fault has been resolved, return the machine to service.
   B. If the fault has not been resolved, escalate an ASIST concern.

4. Disconnect the engine harness (EN) from the ECU A-9000 at connector **X-9001**.

   Check the following pins listed below on the ECU A-9000 and in connectors **X-9001** and **X-9102**.

| Pin | Physical condition |
|---|---|
| **X-9102 pin K17** | The pin and connector should be free of corrosion or damage. |
| **X-9102 pin K18** | The pin and connector should be free of corrosion or damage. |
| **X-9001 pin A29** | The pin and connector should be free of corrosion or damage. |

   A. If a pin or connector shows signs of corrosion or damage, repair as necessary.

   B. If a pin or connector shows no signs of corrosion or damage, continue to Step **5**.

5. Check the ECU A-9000 for the appropriate software and re-flash, if necessary.

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

   B. If the fault has not been resolved, escalate an ASIST concern.

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 02 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**
**Wiring harnesses - Electrical schematic sheet 03 – Engine sensors and fuel injection (engine schematics) (55.100.DP-C.20.E.03)**

A. If there is less than approximately **12 V**, continue to Step **5**.

B. If there is approximately **12 V**, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

5. Check the ECU A-9000 voltage supply wiring for a short circuit to ground.

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

| From | To | Value |
|---|---|---|
| **X-9102 pin K01** | Chassis ground | There should be no continuity. |
| **X-9102 pin K03** | Chassis ground | There should be no continuity. |
| **X-9102 pin K05** | Chassis ground | There should be no continuity. |

   A. If there is continuity, there is a short circuit to ground condition in the ECU A-9000 voltage supply wiring. Use the appropriate service manual to locate and repair the shorted conductor.

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

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 02 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

# DTC 26F-04-The minimum rail pressure value necessary to allow fuel injection has not been reached

## Control Module : ECU

***NOTE:*** *If the Pressure Relief Valve (PRV) is replaced, it is necessary to perform the Replacement of the Rail Pressure Relief Valve (PRV) - Reset ECU Data with the Electronic Service Tool (EST) before you return the machine to service. See* ***Common rail Relief valve - Configure - Reset ECU data (10.218)****, if necessary.*

***NOTE:*** *If the rail pressure sensor B-9004 is replaced, it is necessary to perform the Replacement of the Rail Pressure sensor - Reset ECU Data with the Electronic Service Tool (EST) before you return the machine to service. See* ***Common rail pressure sensor - Configure - Reset ECU data (Rail pressure sensor) (55.010)****, if necessary.*

**Context:**
The Engine Control Unit (ECU) A-9000 monitors fuel rail pressure. If the ECU A-9000 determines that fuel rail pressure is less than **130.0 bar** (**1885.0 psi**) or below a limit value from an ECU A-9000 calculated curve, this fault will occur. Other active faults may have caused this fault to occur. For more information regarding fuel system troubleshooting, see **Fuel injection system - Troubleshooting (10.218)**.

**Cause:**
The ECU A-9000 has determined that fuel rail pressure is too low to continue engine operation.

**Possible failure modes:**

1. Faulty fuel metering unit Y-9000, stuck closed or internal failure.
2. Faulty high pressure pump, low efficiency.
3. Faulty charge gear pump, low efficiency.
4. Faulty fuel filters, clogged.
5. Faulty fuel lines, leakage or blockage.
6. Faulty electric fuel pump (if equipped).
7. Faulty fuel injectors, internal leakage or stuck open.
8. Faulty Pressure Relief Valve (PRV), leakage.
9. Faulty rail pressure sensor B-9004 drifted signal or leaking.
10. Faulty ECU A-9000, software.

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

4. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. 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 01 – Power distribution and glow plugs (engine schematics) (55.100.DP-C.20.E.01)**
**Wiring harnesses - Electrical schematic sheet 02 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

B. If the voltage is not present for one or more of the checks, see the appropriate vehicle service manual and electrical schematics, if necessary, to locate and restore supply power to the ECU A-9000.

4. Determine the condition of the ECU A-9000 CAN circuit.

   With the key switch in the OFF position, use a multimeter to measure the resistance of the CAN connection on the vehicle (VE) harness side:

| From | To | Value |
|---|---|---|
| **X-9102 pin K24** | **X-9102 pin K25** | There should be **120 Ω**. |
| **X-9102 pin K24** | chassis ground | There should be no continuity |
| **X-9102 pin K25** | chassis ground | There should be no continuity |

   Use a multimeter to measure the resistance of the CAN termination resistor, internal to the ECU A-9000:

| From | To | Value |
|---|---|---|
| **X-9102 pin K24** | **X-9102 pin K25** | There should be **120 Ω**. |

   A. If the measured resistances are correct and neither conductor is grounded, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

   B. If the measured resistances are not correct or one or both of the conductors is grounded, see the appropriate vehicle service manual and electrical schematics, if necessary, to locate and restore the termination resistance to the CAN circuit.

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

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

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

**Wiring harnesses - Electrical schematic sheet 02 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

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 sensors and fuel injection (engine schematics) (55.100.DP-C.20.E.03)**

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

B. If the fault has not been resolved, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

4. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. 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 01 – Power distribution and glow plugs (engine schematics) (55.100.DP-C.20.E.01)**
**Wiring harnesses - Electrical schematic sheet 02 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

# DTC 5E3-04-ECU internal failure - Torque request due to air control exceeds maximum torque limit

## Control Module : ECU

**Context:**
The Engine Control Unit (ECU) A-9000 monitors “lead torque”, which is the input torque request that is calculated for determining fuel pressure. If the ECU A-9000 determines that “lead torque” is less than the limited maximal torque, this fault will occur.

**Solution:**

1. Check the ECU A-9000 for the appropriate software and re-flash, if necessary.
   A. If the fault has been resolved, return the machine to service.
   B. If the fault has not been resolved, escalate an ASIST concern.

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

B. If this fault has not been resolved, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

4. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. 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 – Engine Control Unit (ECU) power and after treatment system (engine schematics) (55.100.DP-C.20.E.02)**

| From | To | Result |
|---|---|---|
| **X-9113 pin 7** | chassis ground | There should be no continuity. |

A. If there is continuity, the short to chassis ground condition is in glow plug circuit in the vehicle harness (VE). Use the appropriate service manual, if necessary, to locate and repair the grounded conductor.

B. If there is no continuity, continue with Step **6**.

5. Replace the glow plug control module Z-9101, then use EST to check to see that this fault has been resolved.

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

   B. If the fault has not been resolved, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

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 01 – Power distribution and glow plugs (engine schematics) (55.100.DP-C.20.E.01)**

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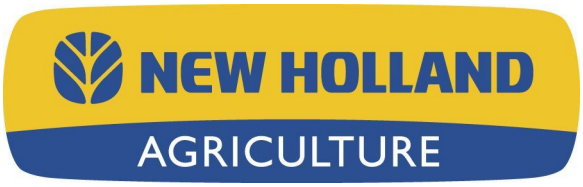


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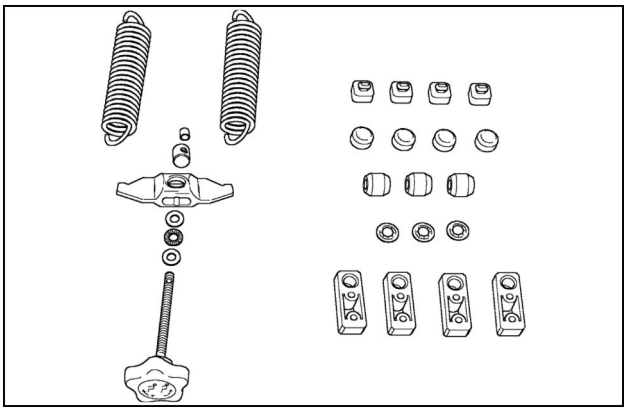
# Pneumatically-adjusted operator seat - Disassemble

**Prior operation:**
**Pneumatically-adjusted operator seat - Remove (90.124)**

***NOTE:*** *Use rebuild kit 86530936 to rebuild the seat on the Boomer 46D, and 54D .*

1. Remove the seat from the tractor.



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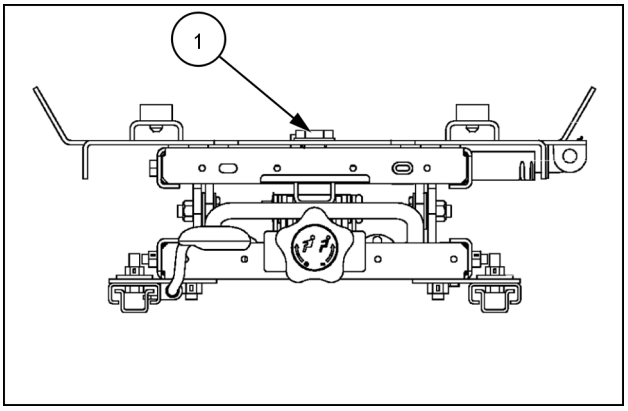
2. Place the seat assembly on a bench. Fold the seat front, and loosen the bolt, **(1)**, in the center
3. Remove the seat from the seat pedestal.

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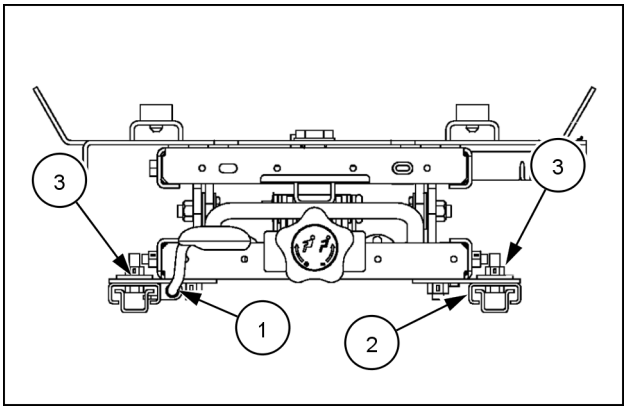
4. Remove the fore and aft slide lever, **(1)**, and slide, **(2)**, by removing the two nuts and washers, **(3)**, on each slide.

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