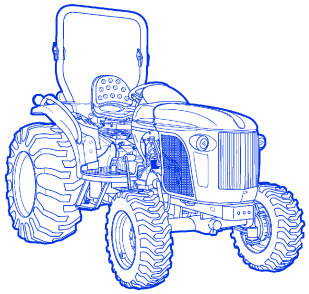

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8N

SERVICE MANUAL

NEW HOLLAND AGRICULTURE

SERVICE

84307374 6/10
Replaces 84218897

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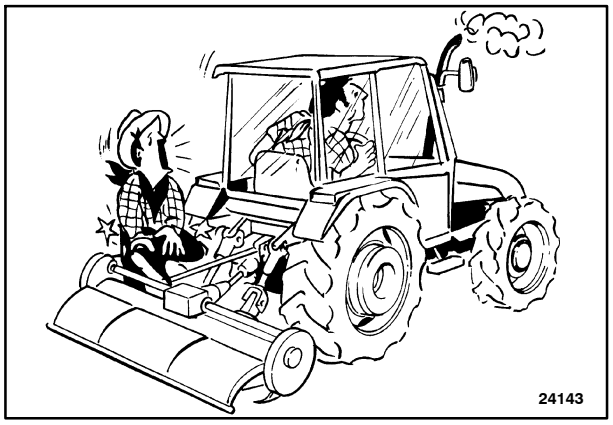
USING IMPLEMENTS AND AGRICULTURAL MACHINERY

1. Do not connect implements or machinery that require more power than can be generated by your tractor model.
2. Never negotiate sharp turns with the power take-off under a heavy load; this may damage the universal joints on the transmission shaft connected to the power take-off.
3. Never stand between the reversing tractor and the implement when hitching.
4. When using implements that require the tractor to be stationary with the engine running, keep the shuttle lever in the neutral position, apply the hand brake and use suitable wheel chocks.
5. Do not operate machines connected to the power take-off without first ensuring that the operating range of the machine is free of bystanders.

   Also check that all rotating parts connected to the power take-off shaft are correctly protected.
6. Add some type of rear ballast when using lifting equipment fitted to the front of the tractor. Rear ballast, such as, rear wheel weights, fluid in rear tires or 3pt weight box.

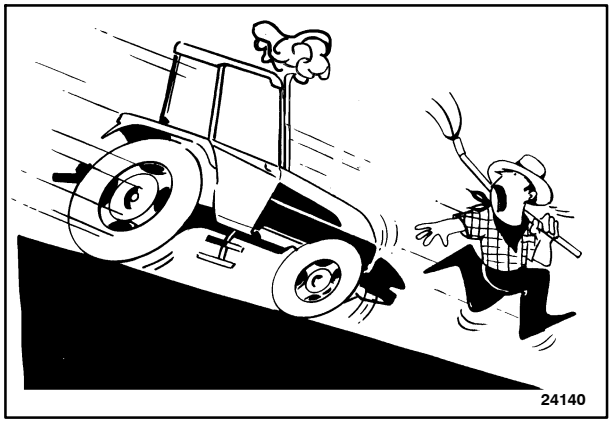


9

STOPPING THE TRACTOR

1. When the tractor is stationary, never leave connected implements in the raised position. All implements must be lowered before stopping the engine.
2. Before leaving the driving position, move the transmission shuttle shift lever to the neutral position, disengage the power take-off, apply the hand brake and stop the engine.

   Always remove the ignition key from the dashboard when leaving the tractor unattended.
3. Park on flat surfaces, where possible, put the tractor into gear and apply the hand brake. As an additional safety measure, use wheel chocks (available as an optional); this procedure is compulsory when parking with a trailer hitched.



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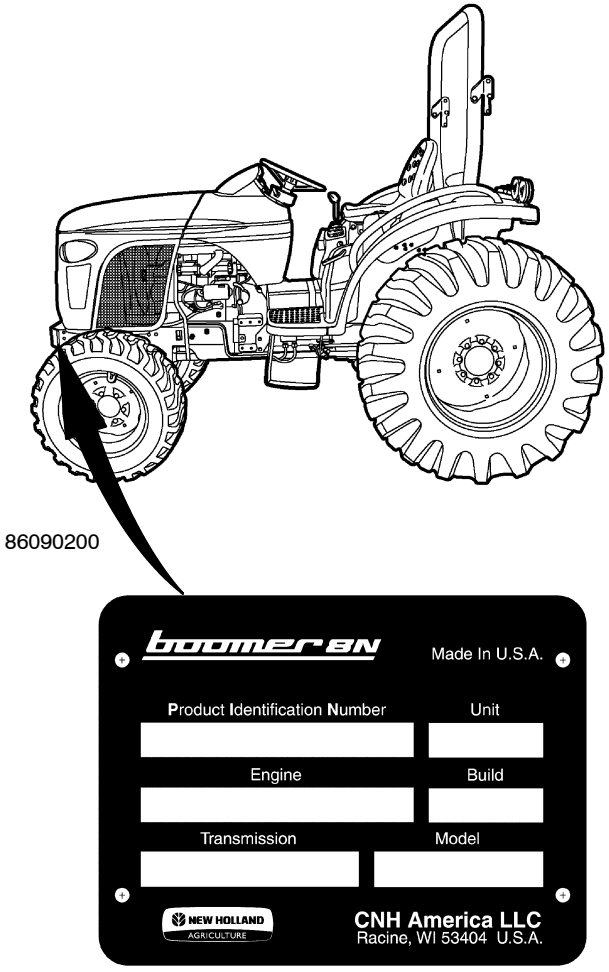
GENERAL INFORMATION

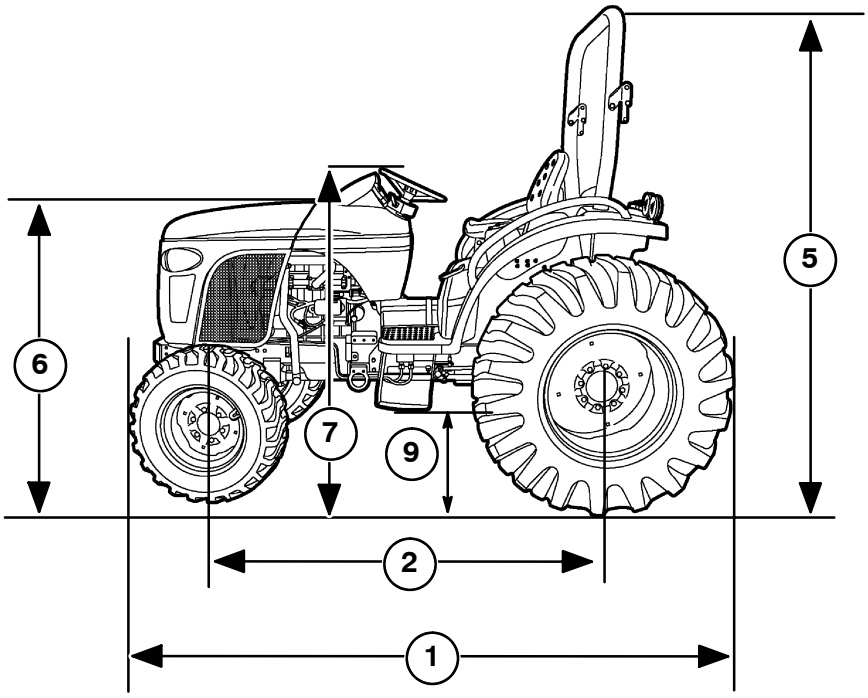
PLEASE READ CAREFULLY:

For a complete list of the pre-delivery service checks performed by your dealer, refer to the DELIVERY REPORT checklist found at the back of this manual. Keep one copy as your record of the service performed. The other copy should be removed from the manual and kept by your dealer. MAKE SURE THAT BOTH COPIES ARE COMPLETED AND THAT YOU AND THE DEALER SIGN BOTH COPIES.

A PRODUCT IDENTIFICATION PLATE is located on the left-hand side of the front frame.



All data given in this book is subject to production variations. Dimensions and weights are approximate only, and the illustrations do not necessarily depict tractors in standard condition. For exact information about any particular tractor, please consult your New Holland dealer.



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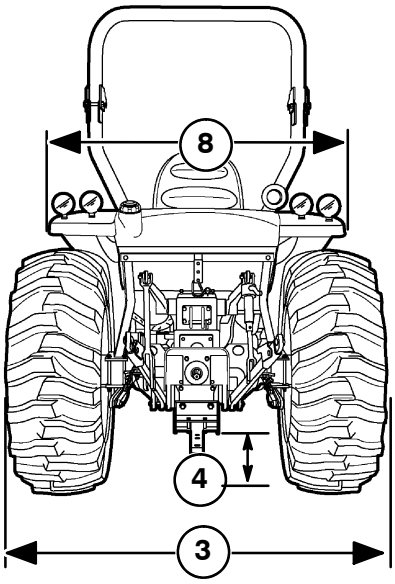

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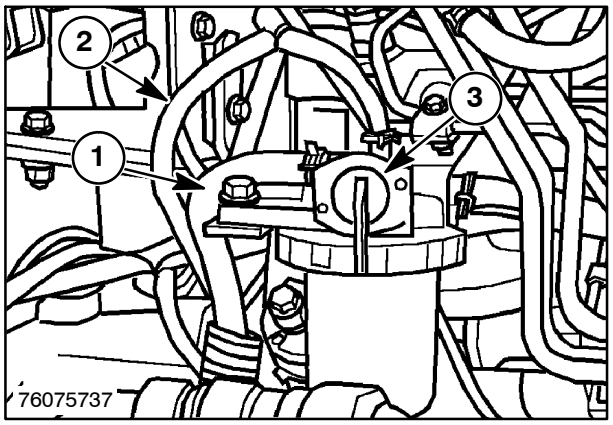
SPECIAL TOOLS

Tool No.	Description
FNH01721	Injector Tester
FNH00120	Adapter—Compression Tester
FNH01728	Injector Adapter Set
OEM1074	Compression Test Gauge Assembly
FNH01720	Injector Cleaning Kit
380002887	Port Block Installer
FNH11044	Port Block Installer Pins
380002888	Port Block Remover
FNH00011	Oil Pressure Test Fitting
Micrometer, Outside	0–25 mm (0–1 in)
Micrometer, Outside	25–51 mm (1–2 in)
Micrometer, Outside	76.2–101.6 mm (3–4 in)
Small Hole Gauge	19–25 mm (3/4–1 in)
Cylinder Bore Gauge	76.2–101.6 mm (3–4 in)
Cylinder Bore Gauge	25–51 mm (1–2 in)

7. Remove the fuel supply, 1, and return, 2, lines from the fuel filter, 3.
8. Drain the fuel tank into a suitable container.



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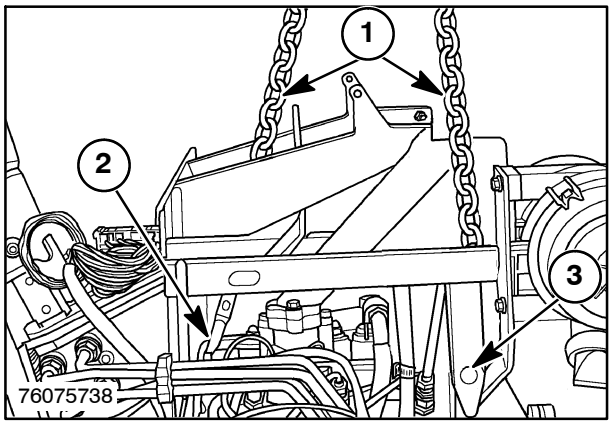
9. Attach a chain sling, 1, to the two hoist eyes, 2 and 3, on the engine.

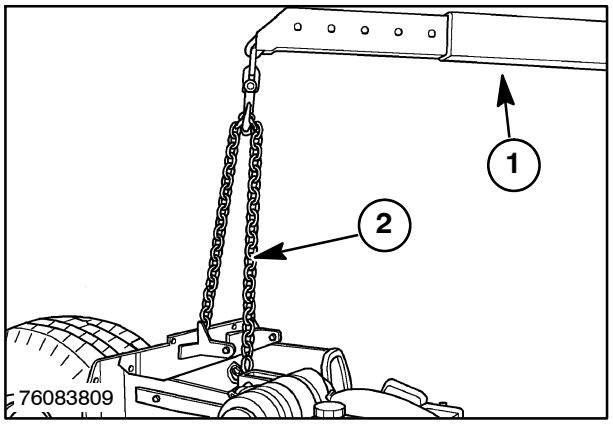


10

10. Attach a suitable hoist, 1, to the chain sling, 2.

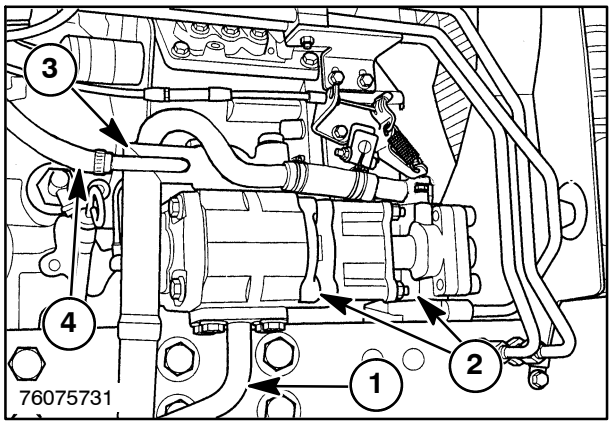
NOTICE: *The hoist is used for supporting the engine and axle assembly, not for lifting.*

11. Roll a floor jack under the tractor from the rear of the tractor, and place under the front transmission box. Raise the jack enough to support the drive train.



11

10. Install the hydraulic system pressure tube, 1, on the hydraulic pump, 2, and the diverter valve.
11. Install the hydraulic system inlet tube, 3, onto the hydraulic pump, 2, and connect the power steering return hose, 4, to the inlet tube, 3.



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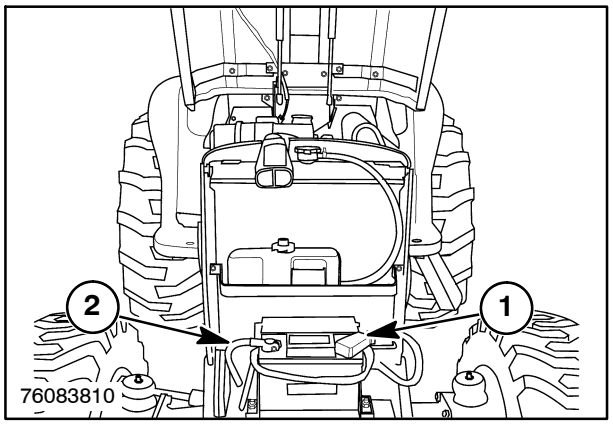
NOTICE: *Reattach the tractor cab and hood at this time. To accomplish this, see "Platform" Section 90, for installation procedure.*

12. If the engine oil was drained, and the oil filter was removed during disassembly, install a new oil filter on the engine, and fill the engine with the recommended oil to the proper level.
13. Connect the positive (+), 1, and the negative (-), 2, battery cables to the battery.
14. Check the fluid levels and start the tractor. Check for leaks and proper operation of all systems.
15. Make any adjustments necessary for proper operation of the tractor.



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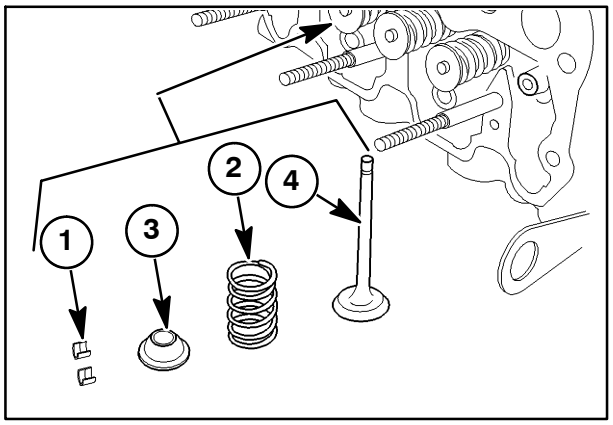
CYLINDER HEAD

Disassembly

1. Clean the cylinder head and remove any carbon deposits from around the valve heads.
2. Use a valve spring compressor and remove the valve spring retainer locks, 1, spring, 2, and spring retainer, 3, from each valve, 4.
3. Remove the valves and place the valve components together in separately marked containers for reassembly in their original position.



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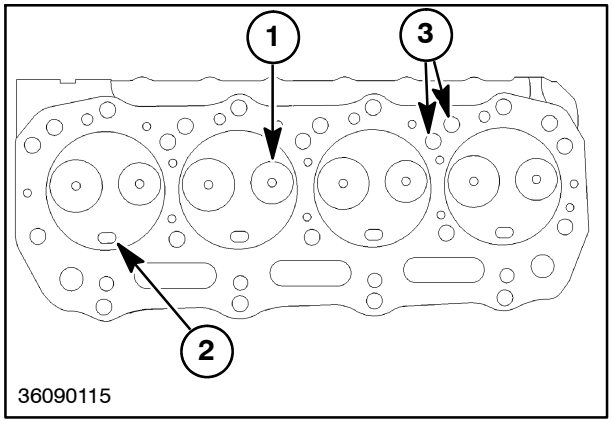
Inspection and Repair

1. Clean all carbon deposits from the combustion chamber and valve ports using a wire brush and scraper.
2. Clean all dirt and residue from the gasket surface using care not to scratch or nick the machined surface.
3. Clean the cylinder head in solvent and air dry.
4. Inspect the head for cracks or damage in the following areas:
   - Valve ports
   - Valve seats, 1
   - Prechamber, 2
   - External cracks in the water jackets, 3
5. Inspect the gasket surfaces for scratches or nicks, which could cause leakage.
6. Examine the core hole plugs for rust or signs of leakage. If a plug shows signs of damaging rust or leakage, replace all plugs in the head.
7. Inspect the prechamber for carbon deposits and looseness. Remove any carbon deposits found. If prechamber is found to be loose, cylinder head may be warped.



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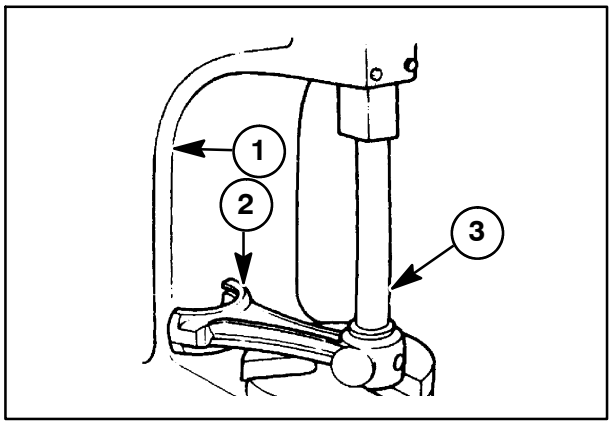
5. Remove and install the connecting rod wrist pin bushings using a suitable driver and press a new bushing into the rod bore.

6. Ream and hone the bushing to the following finish size.

Pin to Bushing Clearance

Std.	Max.
0.010 - 0.025 mm (0.00039- 0.00098 in)	0.08 mm (0.0031 in)



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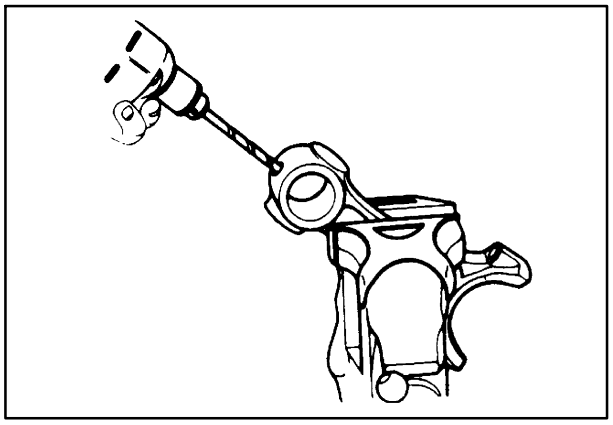
1. Press
2. Connecting Rod
3. Bushing Driver

7. When installing a new piston pin bushing, use the hole in the rod and drill a lube hole in the new bushing.



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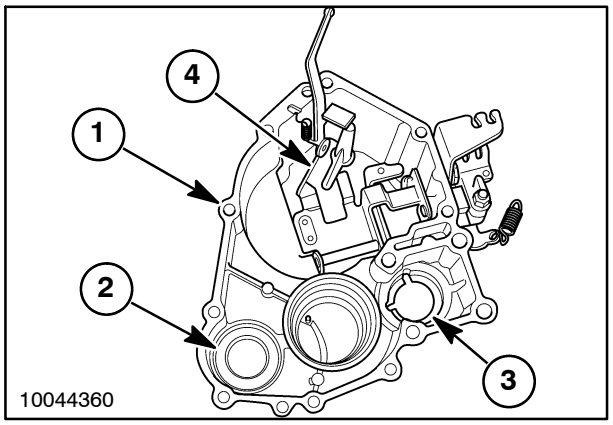
TIMING GEAR HOUSING

The timing gear housing, 1, contains the front oil seal, 2, power steering pump seal, 3, and the governor linkage assembly, 4. See “Governor Assembly”, for governor linkage repair and replacement procedures.



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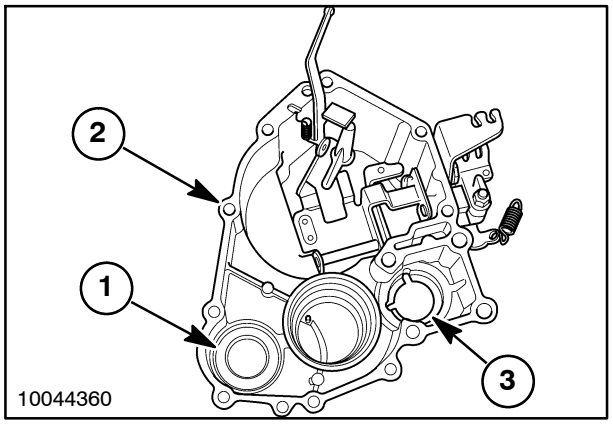
FRONT OIL SEAL AND STEERING PUMP SEAL

Replacement

1. Remove the front oil seal, 1, from the timing gear cover, 2, and insert a new oil seal in its place.
2. Remove the steering pump seal, 3, located on the front of the timing gear cover, and replace with a new seal.



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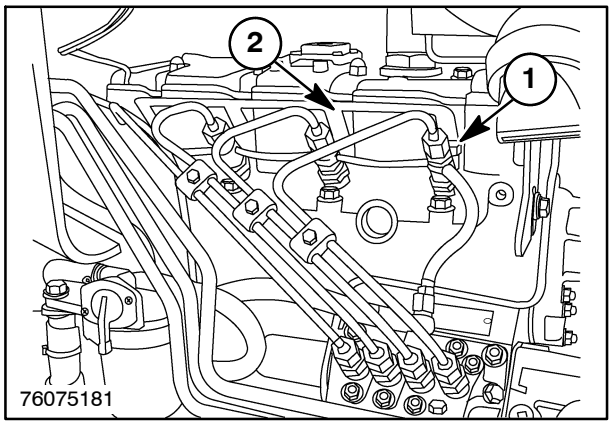
GLOW PLUG AND CONNECTOR

Installation

1. Install the glow plugs, 1, and torque to 15 – 20 N·m (11 – 14.5 lb ft).
2. Install the glow plug connector, 2.



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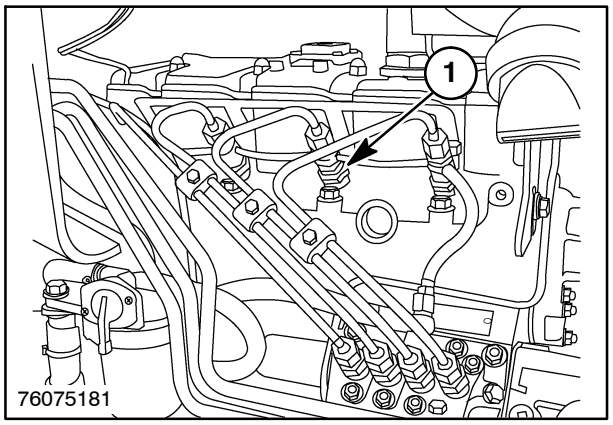
FUEL INJECTOR

Installation

Install the fuel injectors, 1, and torque to 60 – 69 N·m (43.4 – 50 lb ft).



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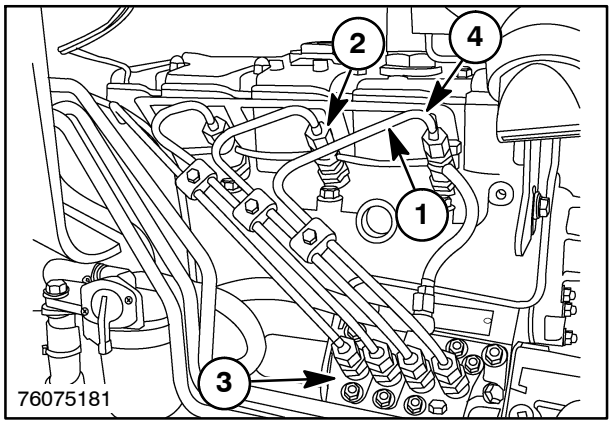
FUEL PIPING

Installation

1. Install the fuel return line, 1, on the injectors, 2, and injection pump, 3.
2. Install the injection piping, 4, and torque to 15 – 24 N·m (11 – 18 lb ft).



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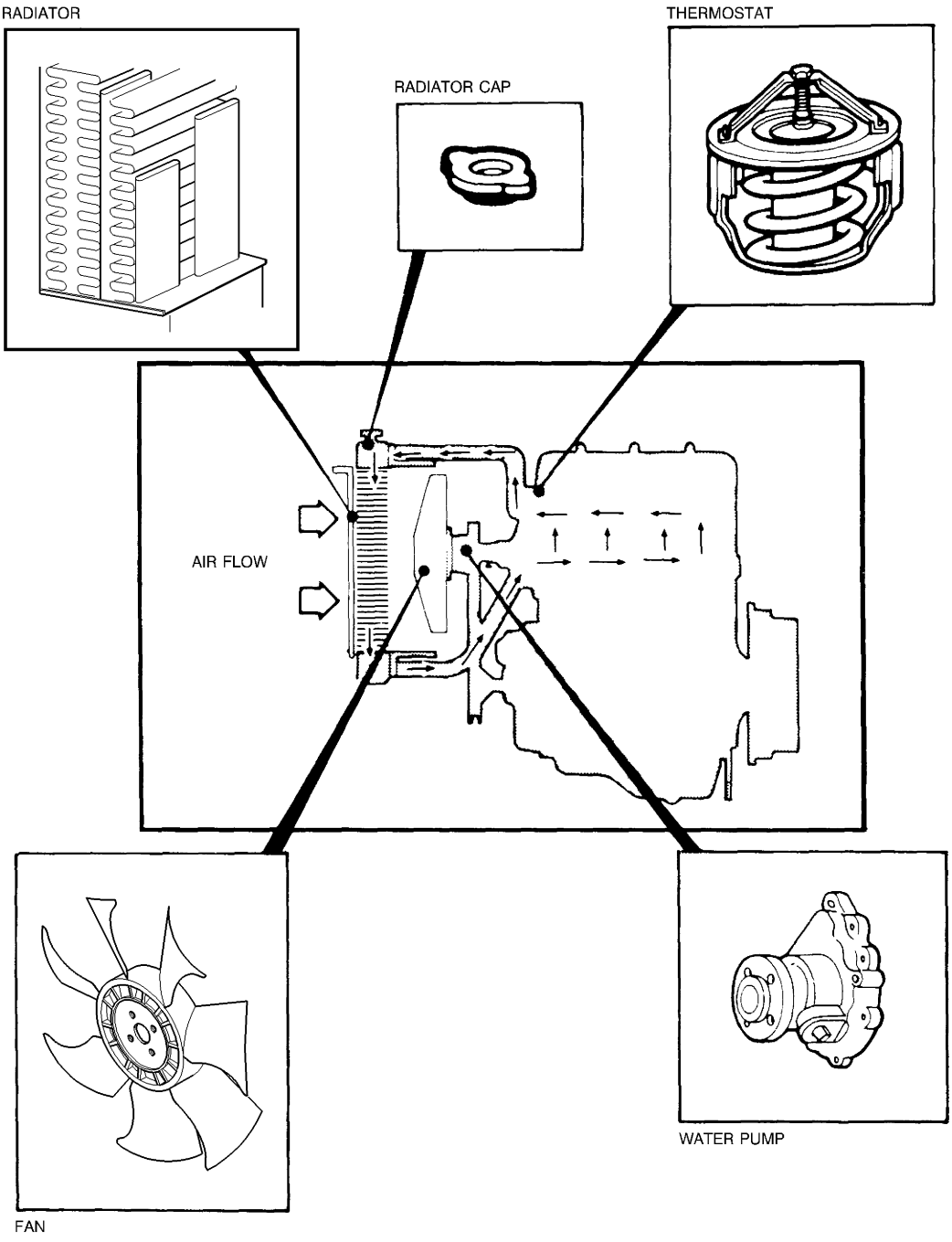

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FUEL INJECTORS

CONDITION	CAUSE	REMEDY
Nozzle does not “buzz” while injecting	Needle valve stuck	Check needle valve for carbon build-up and binding
	Excessive fuel leakage	Check valve and valve seat for scores or other indications of leakage
	Nozzle damage	Inspect faces and tighten nozzle retaining nut
Nozzle leakage	Needle valve worn	Replace nozzle assembly
	Blocked nozzle assembly	Check for carbon or foreign matter on faces of nozzle and nozzle holder. Flush, clean, or replace.
	Loose nozzle retaining nut	Inspect faces and tighten nozzle retaining nut
Nozzle opening pressure incorrect	Incorrectly adjusted nozzle retaining nut	Check retaining nut for looseness
	Damaged nozzle or seized needle valve	Replace nozzle assembly
	Blocked nozzle orifice	Check orifice for carbon or foreign matter. Flush clean or replace.
Nozzle seat leakage	Nozzle incorrectly seated	Check for carbon or foreign matter on faces of nozzle and nozzle holder. Flush, clean, or replace.
	Sticking or binding needle valve	Repair or replace nozzle assembly

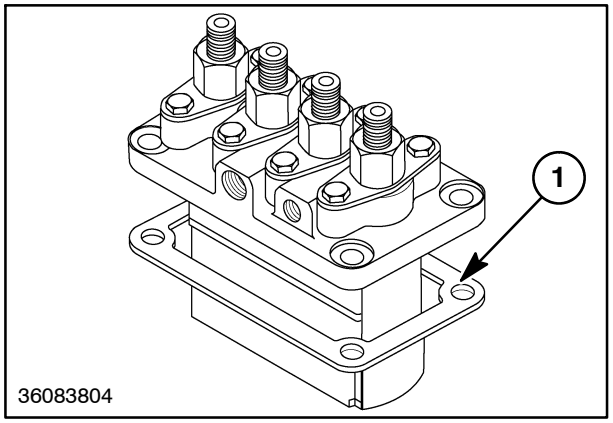
CALIBRATION/ADJUSTMENTS

FUEL PUMP

Installation (New Pump or Drive Component)

NOTICE: *Installation of a new pump is the same as installation of an original pump. When installing a new pump, however, checking the timing is required.*

1. Position the pump in the block using a new shim gasket, 1, of 0.3 mm (0.012 in) thickness, or original shim pack from removed pump.



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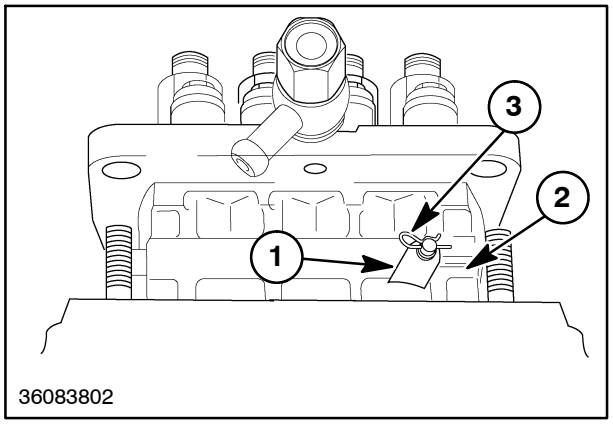
2. Connect the governor link, 1, to the pump control rack, 2, and secure with snap pin, 3.



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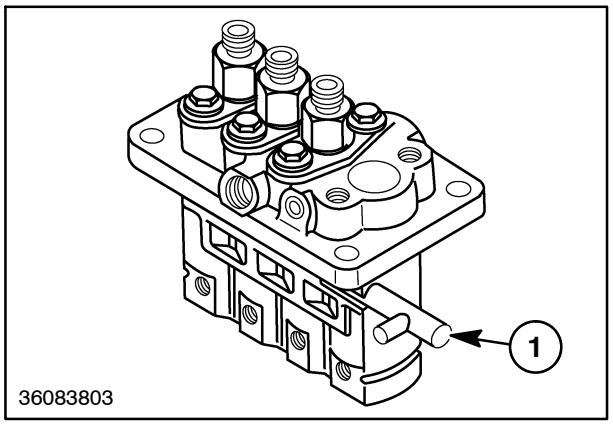
NOTICE: *Check the control rack, 1, for any binding conditions by moving the control lever back and forth. Lubricate control rack with clean engine oil before installation.*

3. Install the mounting bolts and tighten to 13 – 17 N·m (9.4 – 12.3 lb ft).
4. Connect the fuel inlet line.
5. Connect the fuel injection lines.
6. Connect the fuel return line to the number three injector (three cylinder engines) or number four injector (four-cylinder engines).
7. Spill-time the pump.



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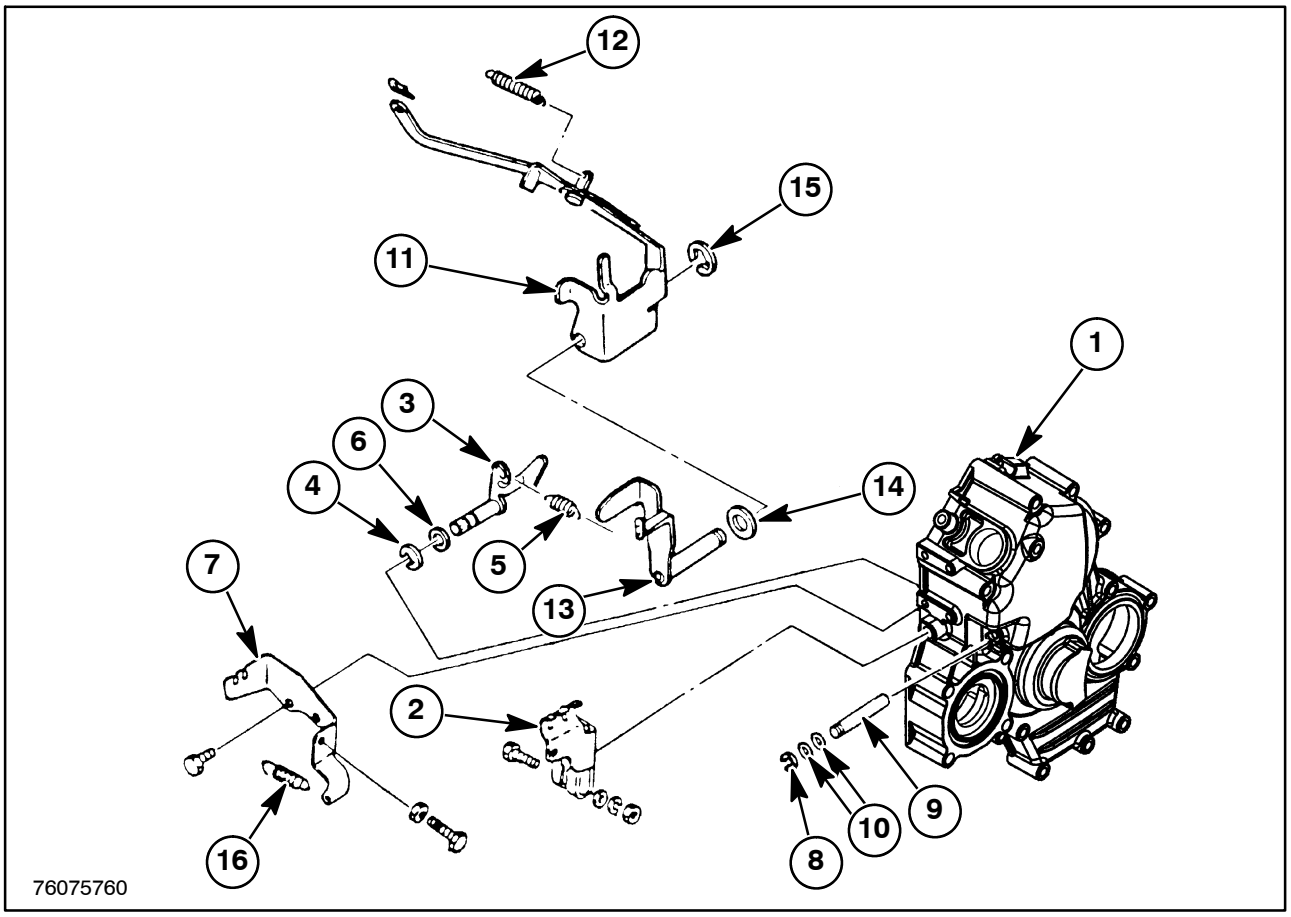

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1. Timing Gear Cover
2. Throttle Lever
3. Throttle Arm
4. E Ring
5. Governor Spring
6. O Ring
7. Throttle Cable Stay
8. E Ring
9. Pivot Shaft
10. O Rings
11. Linkage Arm Assembly
12. Dampener Spring
13. Spring Holder Arm
14. Washer
15. E Ring
16. Spring

Disassembly

1. Remove the injection pump and timing gear case from the engine as discussed earlier in this section.

2. Remove the timing case, 1, from the front of the engine. Remove the throttle lever, 2, from the outside end of throttle arm, 3.

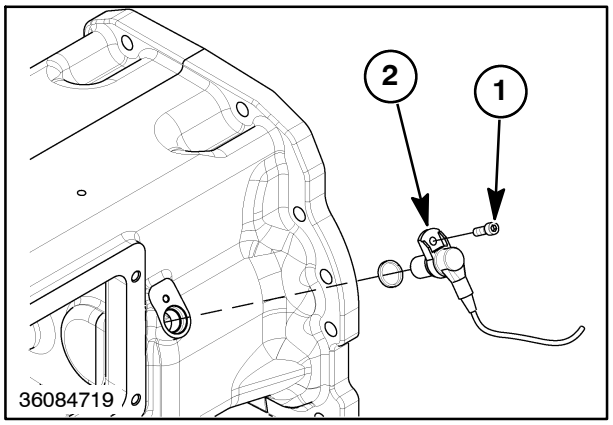
3. Remove the E ring, 4, from throttle arm, 3. Push throttle arm into the timing case until there is enough space to remove governor spring, 5. Remove governor spring, 5, from throttle arm, 3. Remove throttle arm from timing case. Inspect O ring, 6, and replace if damaged.

4. Remove throttle cable stay, 7, from timing gear cover, 1.

5. Remove E ring, 8, from the outside end of linkage pivot shaft, 9. Pull pivot shaft, 9, out of the timing case. Inspect O rings, 10, on shaft. Replace if damaged.

6. Remove linkage arm assembly, 11, from the timing case, 1. Remove governor spring, 5, and dampener spring, 12, from the linkage. Check all pivot points, slot, and pin locations for wear. Replace the linkage assembly, 11, if wear is present. Check spring holder arm, 13, making sure it pivots freely. Confirm that spacer, 14, is installed between arm and arm base. Also make sure the E ring, 15, is installed in the groove of the spring holder arm.

8. Remove the M6 x 15 mm Allen bolt, 1, and variator input speed sensor, 2.



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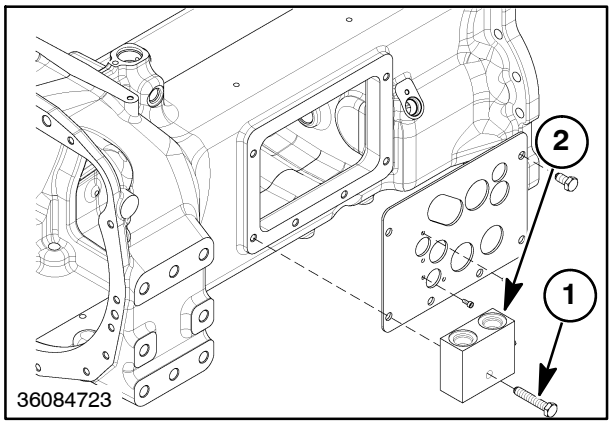
9. Remove the M10 x 55 mm bolt, 1, and oil cooler bypass valve, 2.



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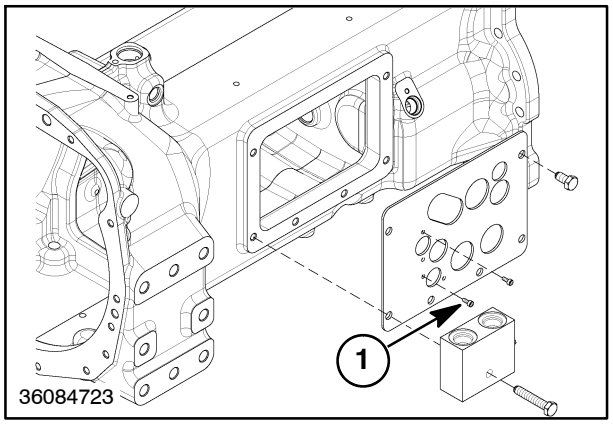
10. Remove the four M4 x 10 mm Allen bolts, 1, that secure the forward and reverse test port hydraulic tubes.



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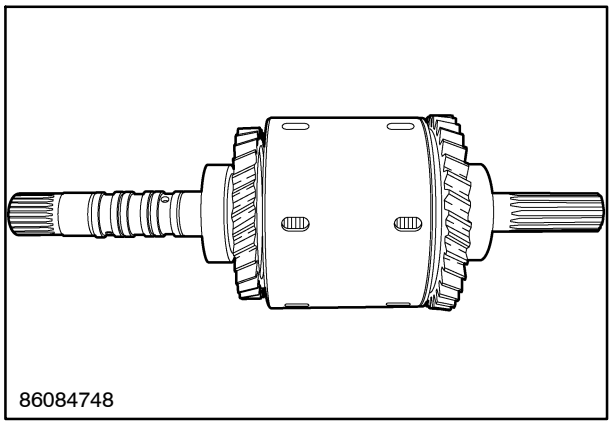
FORWARD/REVERSE SHUTTLE CLUTCH



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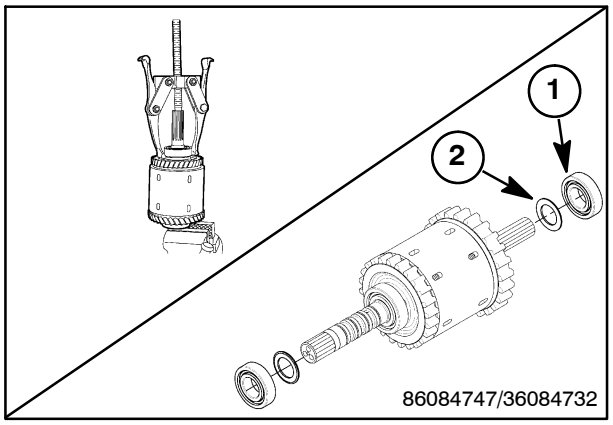
Disassembly

1. Using a puller, remove bearing, 1, and thrust washer, 2, from both ends of shuttle clutch.



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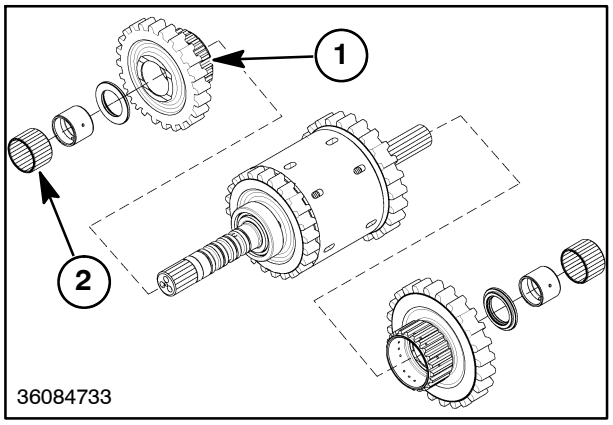
2. Remove the forward/reverse shuttle clutch gears, 1, and needle bearings, 2.



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A. Park on a flat surface and engage the hand brake. The tractor can move during this procedure, so be sure that the area around the tractor is clear. Transmission output rpm is constantly monitored. Calibration cannot proceed unless the tractor is stopped.

B. Enter this mode using the service switch while starting the engine. Set engine rpm between 1700 and 2000. Navigate the H-tree by using the switches on the instrument cluster, selecting the product code SF and the H1 menu, “transmission”. “F” will be displayed on the lower center LCD on the instrument cluster. Then “F” (forward clutch) will be displayed. Press the “res/+” switch until “R” is displayed on the lower center LCD.

C. Engine speed must be stable, with no noticeable hunting or surging. If necessary, change the throttle setting slightly to achieve a stable engine rpm.

D. Check to ensure that the hand brake is engaged. Place the shuttle lever in gear.

E. Press and hold the “set / –” switch. The calibration procedure will start (throughout the procedure, the switch 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 “set / –” switch. The reverse clutch will be automatically selected (or it is possible to select another clutch by pressing the “res / + switch) and it will be possible to calibrate it by pressing and holding the “set / –”switch. When the engine is shut off, the calibration value will be stored inside the non-volatile memory of the electronic module.

NOTICE: *Transmission output rpm, shuttle lever position, res/+ switch, and hand brake are constantly monitored. Calibration cannot proceed unless the tractor is stopped, the shuttle lever is in forward or reverse, the hand brake is engaged and set/- switch is pressed. If during the calibration process a wrong condition is detected, then a “U” code is displayed on the LCD. Refer to the following list for an explanation of “U” codes:*

19 = Transmission oil temperature low (Below 10°C).

20 = Hand brake is not engaged.

21 = 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 hand brake 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.

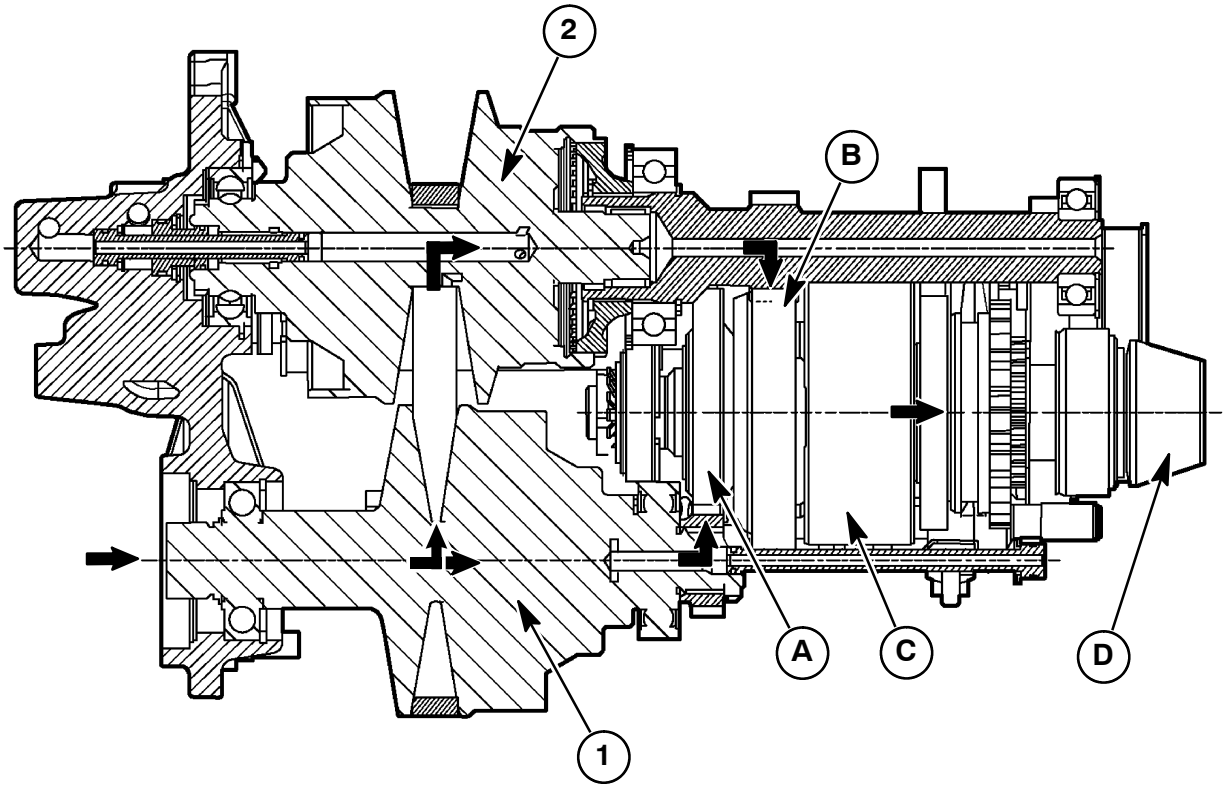
34 = REVERSE clutch cal too low – rpm dropped too soon, clutch pressure is not being controlled properly or something else caused rpm to drop.

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.**



2

The torque sensor specifically functions as follows:

- Transmission Forward / Reverse shuttle clutch supplies drive to the input pulley, 1.
- Input pulley, 1, is coupled to sun gear “A” of the planetary reduction gear train.
- Output pulley, 2, drives the planetary carrier “B” of the planetary reduction gear train.
- Crown gear “C” is connected to transmission pinion gear “D”.
- Result of the gear train is, the speed of the crown gear “C” is the algebraic sum of the sun gear “A” and the planetary carrier speeds.

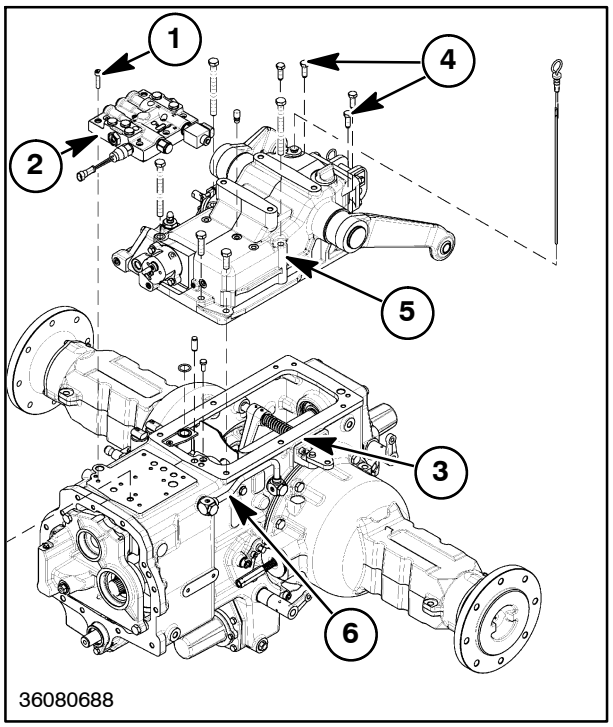
OVERHAUL

VARIATOR

Removal

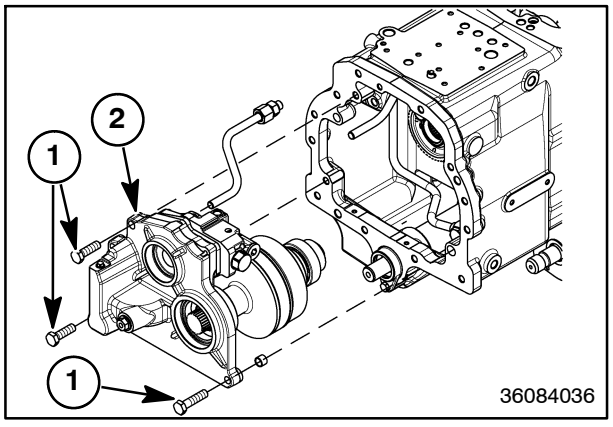
To remove the variator from the rear differential housing, the differential housing must be separated from the front transmission box, see “TRANSMISSION” Section 21, Chapter 1, for this procedure.

1. Remove ten M8 Allen head bolts, 1, and pull PIV hydraulic valve block, 2, from atop the transmission/ differential housing, 3.
2. Remove nine M10 bolts, 4, securing the hydraulic lift cover, 5, to the transmission/differential housing, 3.
3. Remove hydraulic oil delivery tube, 6.



12

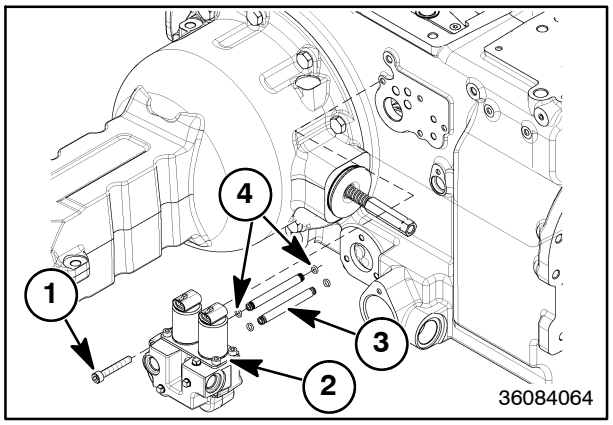
4. Remove three M12 bolts, 1, securing the variator, 2, and the transmission/differential housing together.



13

2. Remove four M8 bolts, 1, from rear PTO/FWD hydraulic valves, 2, and two oil distribution pipes, 3, with O-rings, 4.
3. Discard O-rings, 4, on the two oil distribution pipes, 3, at this time.

NOTICE: *For complete disassembly, inspection, and assembly procedures of the rear PTO/FWD hydraulic valves, see "HYDRAULICS" Section 35.*



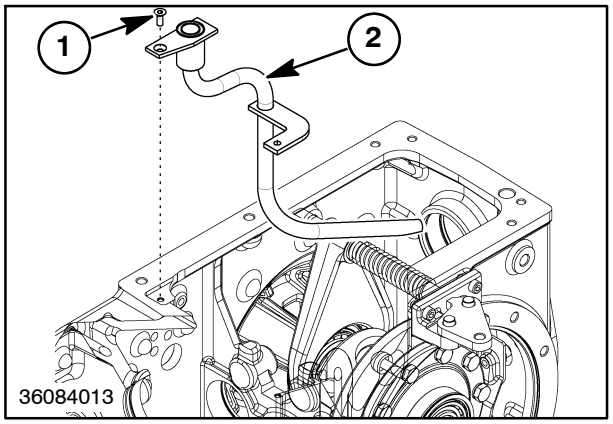
35

SECONDARY PULLEY OUTPUT SHAFT

Removal

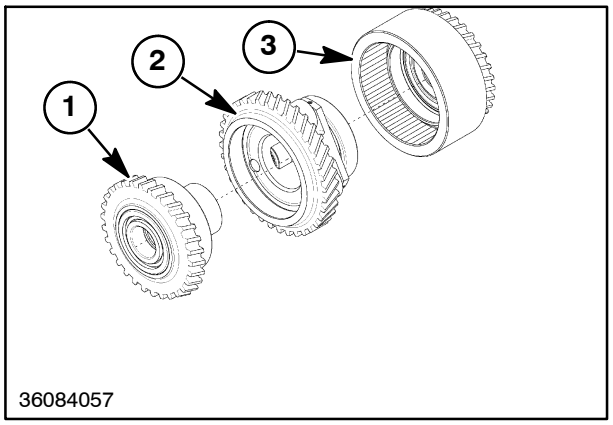
To remove the secondary pulley output shaft, park lock control, transmission release control, and the planetary reduction gear assembly from the housing, the PTO clutch and shafts, and the differential must be removed. To accomplish this, the differential housing must be separated from the front transmission box, see Section 21 for this procedure. For removal of the PTO clutch and shafts, see "PTO", Section 31, and see "Differential Overhaul – Removal" Section 27 for the procedure to remove the differential, to allow access to the drive pinion shaft.

1. Remove M6x12 mm screw, 1, and pull HPL drain tube, 2, from differential housing.



36

8. Press the sun gear (49T), 1, into the planetary gear carrier (54T), 2.
9. Place crown gear (26T), 3, onto planetary gear carrier (54T), 2.



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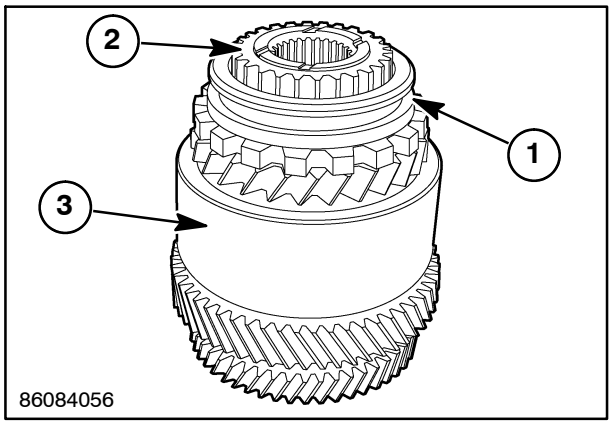
10. Place the park lock sliding gear (17T), 1, and the transmission disengagement hub (26T), 2, on top of the planetary reduction gear assembly, 3.



61

VARIATOR CALIBRATION

Control Module : TCU

NOTICE: *To be performed only by a qualified service technician: Access to the ADIC's "H_Menus", mentioned below are part of the onboard diagnostic providing configuration and diagnostic support through the resources (display, switches, controllers) available on the system. In general, those routines are not intended to be activated during normal functionality and should not be available to the end user. For this reason, to execute those routines a special tool 380000843 is required.*

⚠ WARNING ⚠

The machine could move during the calibration process. Park on a flat surface, engage the hand brake, and be sure that the area around the machine is clear. Failure to comply could result in death or serious injury.

M1540

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

Context:

- Harsh transmission engagement.
- Error code 2602 displayed on start-up.
- Ground speed surging or oscillating. (Including ground speed surging/oscillation at operating oil temperatures greater than 30°C (86°F).
- Slow reaction when pedal is released.
- Pushing or pulling performance issues.

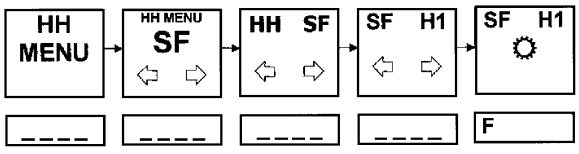
Cause:

Possible failure modes:

1. The variator offset has never been calibrated (TCU replacement)
2. The offset value is wrong (Error in the EEPROM read/write procedure).

Solution:

1. Calibrate the variator offset:



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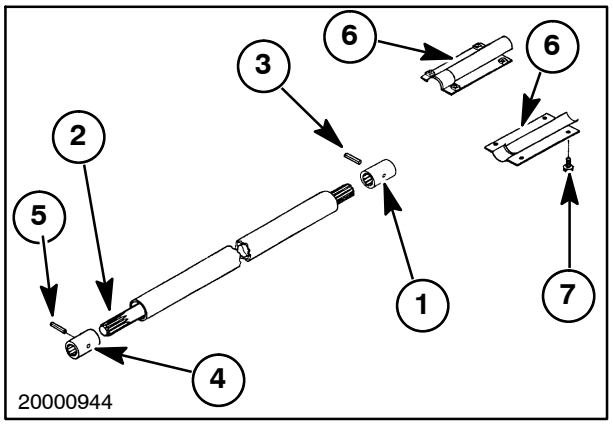
87

HH Menu	Product Code = SF			H1 Menu (transmission) Forward Clutch (F)

4. Install the coupler, 1, onto the drive shaft, 2, using the roll pin, 3.
5. Install the coupler, 4, onto the drive shaft, 2. Do not install the roll pin, 5, at this time.
6. Install the drive shaft assembly onto the tractor.
7. Install the roll pin, 5, into the coupler, 4, at this time.
8. Install the covers, 6, onto the drive shaft, 3, and secure with the retaining bolts, 7.



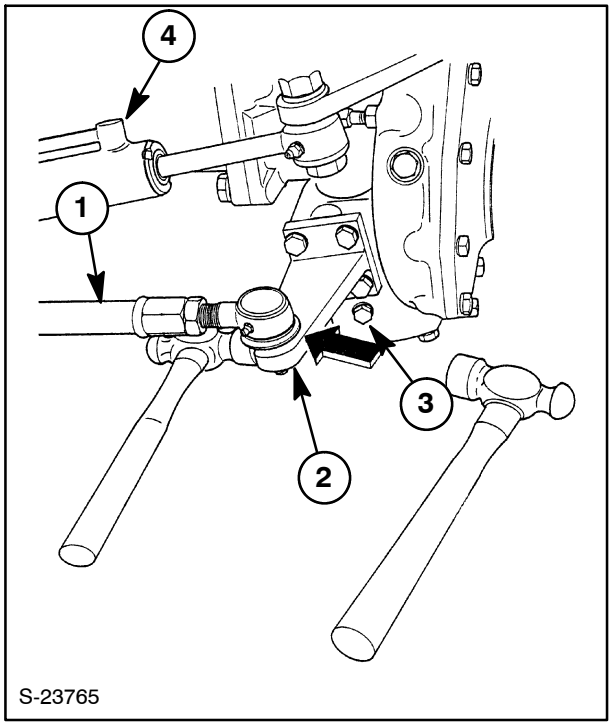
8

GEAR REDUCTION DROP BOX

Disassembly

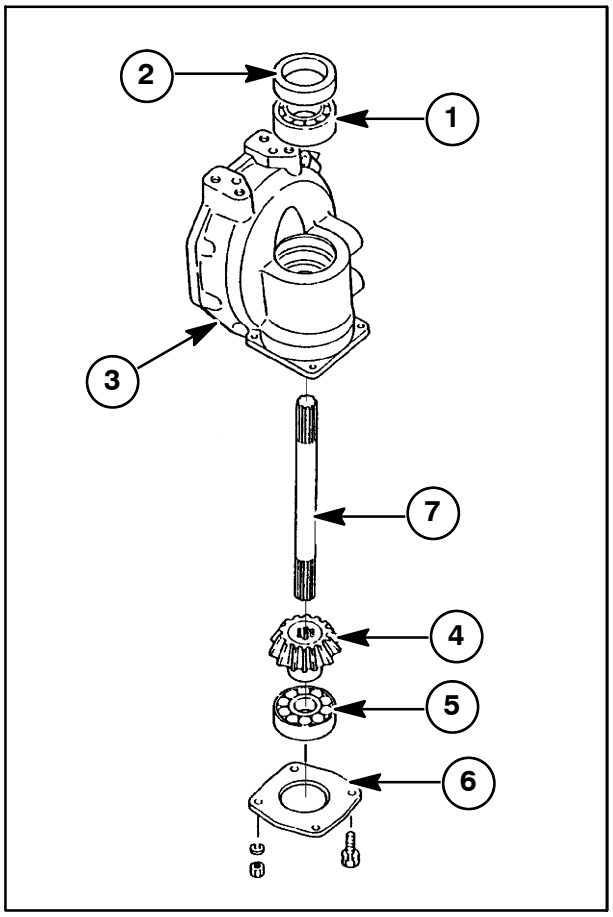
NOTICE: *These procedures apply to both the right and left front axle component assemblies. Repeat the procedure for the opposite side component to be disassembled or repaired.*

1. Remove the front-wheel hub bolts and remove the front wheels.
2. Remove the tie rod, 1, from the steering arm, 2. Tap the ball joint with a hammer to loosen the ball joint.
3. Remove the drain plug, 3, from the drop box case, and drain the oil into a clean suitable container.
4. Remove the steering cylinder, 4, from the steering arm, and the front axle.



9

7. Install the idler gear bearing, 1, and seal, 2, in the drop box case, 3.
8. Install the final drive pinion gear, 4, bearing, 5, and cover, 6, in the bottom of the drop box case, 3.
9. Install the idler shaft, 7, from the top.



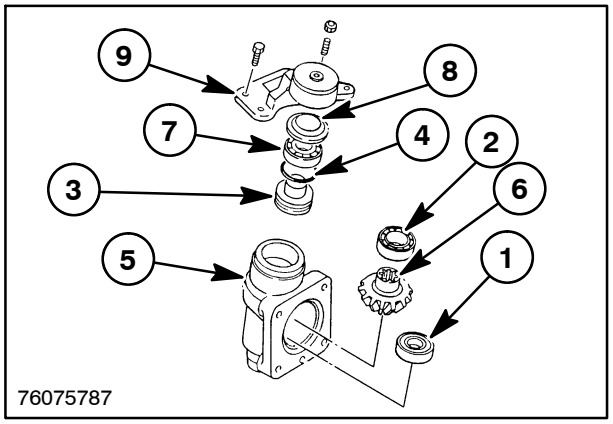
24

10. Install the bearings, 1 and 2, kingpin, 3, and O-ring, 4, into the idler case, 5.
11. Position the idler gear, 6, inside the idler case, 5.

NOTICE: *The sealed side of the bearing, 7, is installed facing the bottom.*

Be sure to lube the assembly and related parts with grease.

12. Install the spacer, 8, and bearing, 7, into the steering arm, 9.



25

13. Position the drop box case assembly in a vertical position, supported by the housing and not the shaft.

NOTICE: *For personal safety, be sure the assembly is properly supported to prevent falling.*

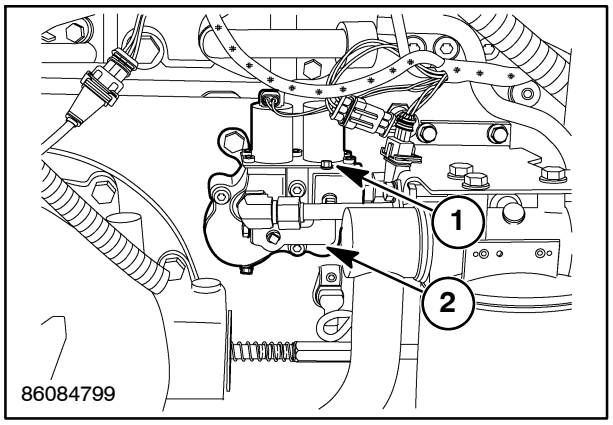
4WD PRESSURE TEST

⚠ WARNING ⚠

Before you begin installation; Make sure machine is on a firm level surface and apply the parking brake. Failure to comply could result in death or serious injury.

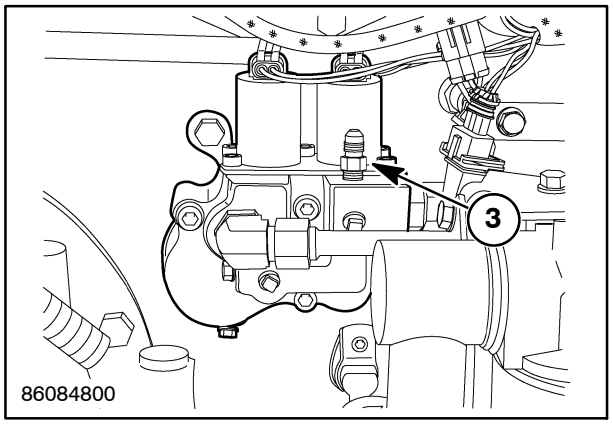
M1451

1. Using an adequate jack and jack stand, remove the right rear wheel and tire.
2. Remove plug, 1, located on the top of the 4WD solenoid, 2.



9

3. Install pressure gauge fitting, 3.

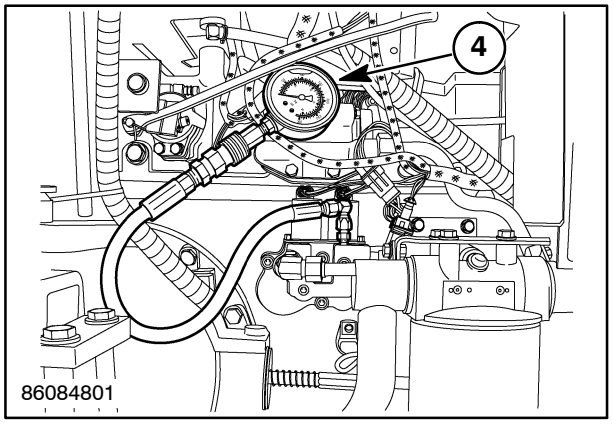


10

4. Attach pressure gauge, 4. Start engine and check pressure reading. Pressure should be 1620 – 1965 kPa (235 to 285 psi). If pressure reading does not fall in the proper range, check steering pump or regulating valve for proper function.

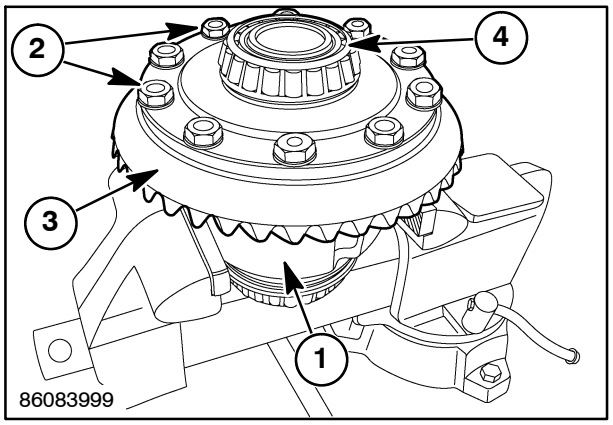
NOTICE: *This test port only indicates oil supply and pressure being available to the solenoid block. The test port will not indicate opening and closing of the solenoid valve.*

5. Mount right rear wheel and tire back on tractor. Torque wheel bolts to 129 N·m (95 lb ft).



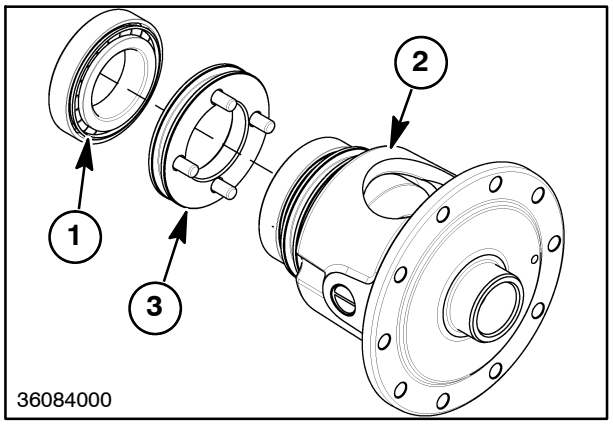
11

16. Place differential assembly, 1, securely in a vise.
17. Remove ten M10x25 mm bolts and flat washers, 2, and separate ring gear (39T), 3, from differential assembly, 4.



12

18. Press bearing roller cages, 1, and 4 (Figure 12), from differential assembly, 2,
19. Remove differential locking clutch, 3, from differential assembly, 2,



13

Inspection

1. Clean all parts in a suitable solvent and allow to air dry.
2. Inspect the ring gear for excessive wear or damage.
3. Inspect the differential side gear teeth for excessive wear or damage.
4. Inspect the differential pinion gears and shaft for excessive wear or damage.
5. Inspect the differential gear case for excessive wear or damage.
6. Inspect the bearings for excessive wear or binding when rotated by hand, replace if necessary.

NOTICE: *The differential assembly, 2, is not serviceable, replace as necessary if excessive wear or damage is noticeable.*

Inspection

1. Clean all parts in a suitable solvent and allow to air dry.
2. Turn the tapered roller bearings by hand to check for roughness. Replace as necessary.
3. Inspect the drive pinion shaft for excessive wear, nicks, chips, or other damage. Replace as necessary

Installation

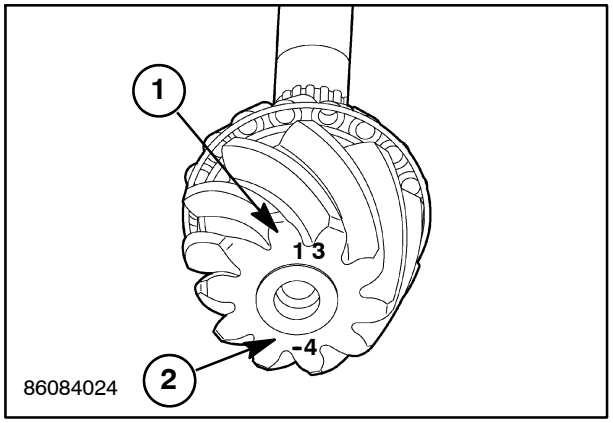
NOTICE: *When the drive pinion, ring gear, bearing or other components are reused, reassemble using the same shims. When new parts are being installed, adjust the gears as described below. The ring and pinion gears are serviced as a set, and must be replaced together.*

A progressive serial number, 1, is engraved on both the pinion shaft and ring gear and is different for each bevel set.

Also, bevel set deviations, 2, are engraved on the end of the pinion shaft. Increase or decrease the thickness of the shim in front of the rear bearing to cover the difference between the allowances of the old pinion and that of the new pinion (allowances of the old pinion minus that of the new pinion).

1. Progressive Serial Number (example: 13)
2. Bevel Set Clearances (example: –4)

NOTICE: *When the value of the clearances is zero (0), the value is not stamped on the drive pinion.*



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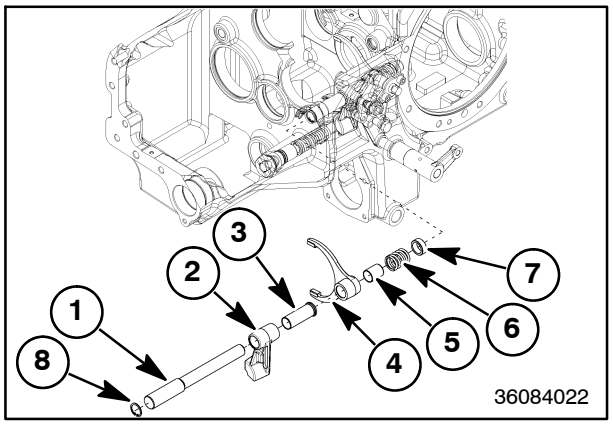
Transmission Release Control – Installation

1. Insert transmission release control shaft, 1, into differential housing through the control fork, 2, bushing, 3, transmission release fork, 4, bushing, 5, spring, 6, and spacer, 7.
2. Using a suitable punch, apply pressure to the end of the shaft, 1, compressing the spring, 6, and secure assembly with snap ring, 8.



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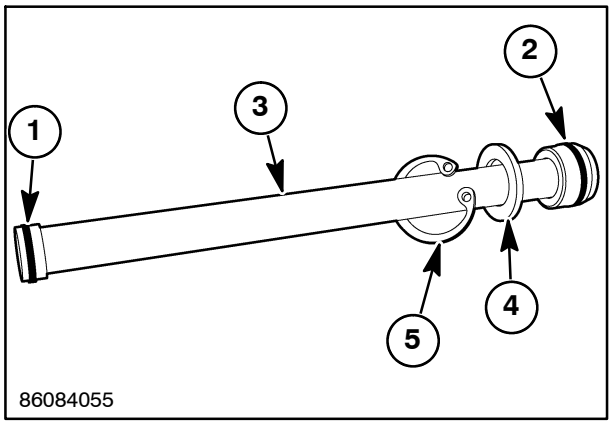
PRIMARY PULLEY OIL DISTRIBUTION PIPE

Installation

1. Lubricate and install new seal, 1, and O-ring, 2, onto the primary pulley oil distribution pipe, 3.
2. Place washer, 4, and snap ring, 5, onto oil distribution pipe, 3.



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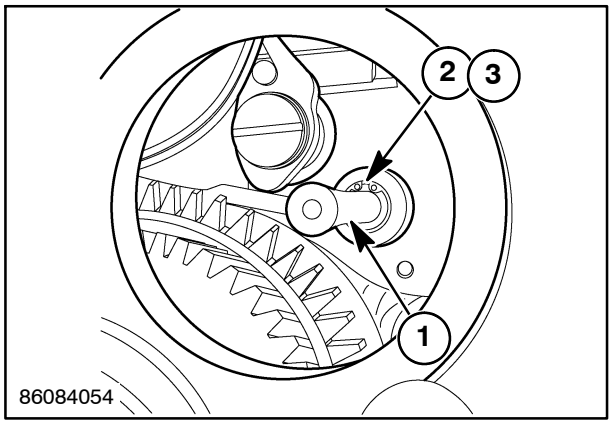
3. Insert oil distribution pipe, 1, into the differential housing and secure with washer, 2, and snap ring, 3.



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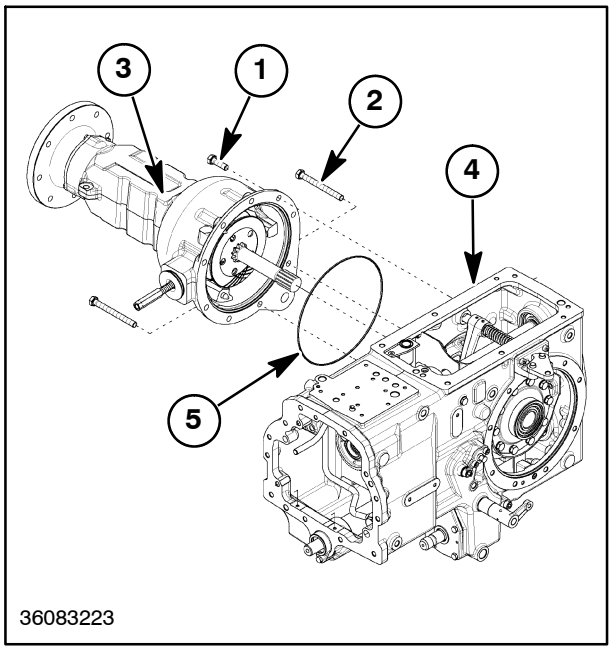
17. Remove the M12 x 40 mm and M12 x 120 mm axle housing retaining cap screws, 1 and 2. Then separate the axle housing, 3, from the differential housing, 4, using the lifting device to move the axle assembly out and away from the differential housing.
18. Remove the seal, 5, from the differential housing, 4.
19. Place the axle housing on a clean work bench.

NOTICE: *The differential housing is shown removed from the transmission and tractor.*

NOTICE: *The removal procedure is the same for the left and right axle housings.*



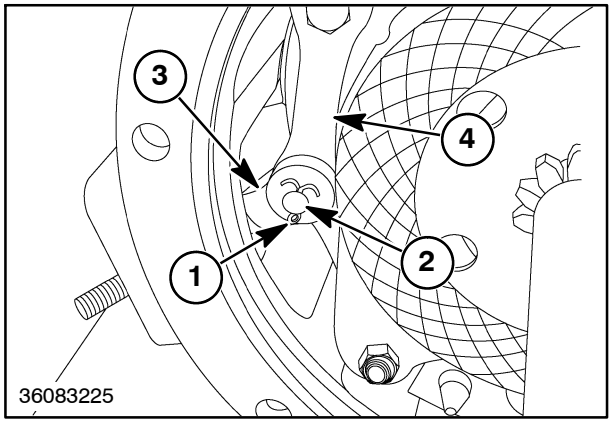
7

Disassembly

1. Remove the cotter pin, 1, and brake rod linkage pin, 2, from the rear brake rod, 3, and brake actuator, 4.

NOTICE: *In order to remove the brake rod linkage pin, slide the differential shaft, brake discs, stator, and brake actuator out until the pin can be removed.*

NOTICE: *Push the rear brake rod towards the front of the axle housing to make clearance to remove the brake actuator, stator, and brake discs.*



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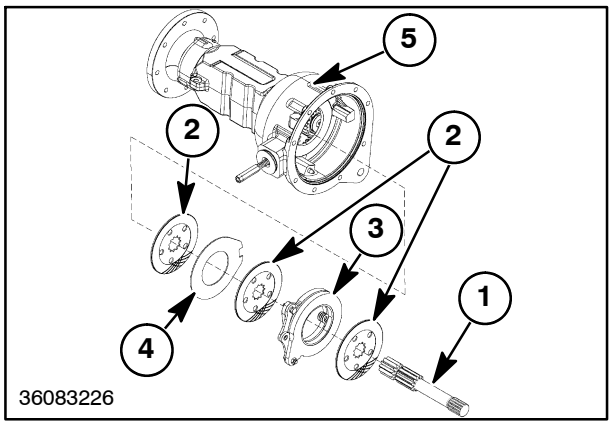
2. Pull out the differential shaft, 1, and, at the same time remove the brake discs, 2, and brake actuator, 3, and stator, 4, from the axle housing, 5.



9

10. Reconnect the linkage, 1, to the mid PTO control lever, 2, and secure using the pin, 3, and cotter pin, 4.
11. Prior to connecting the front brake rods, 5, to the adjustment tie-rod, 6, back the tie-rod out a few turns from the rear brake rod, 7.

NOTICE: *The tie-rod should have a minimum of three threads of engagement left on the rear brake rod. Do not loosen the tie-rod past that point.*

12. Connect the front brake rod, 5, to the tie-rod, 6.

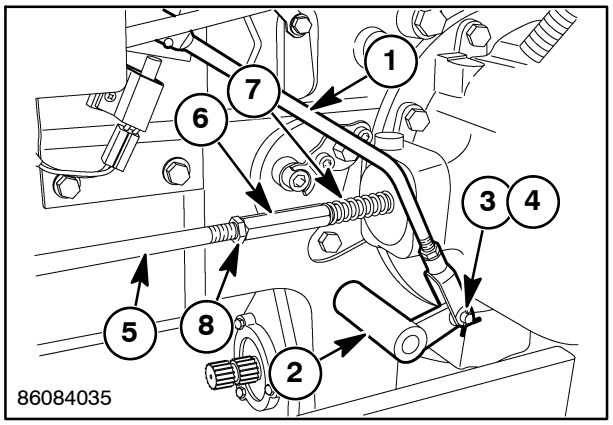
NOTICE: *The brake rods have left handed threads.*

13. While turning the axle, tighten the tie-rod, 6, until resistance can be felt in the axle, then loosen the tie-rod one flat at a time until resistance is eliminated.
14. Tighten the jam nut, 8, against the tie-rod, 6.

NOTICE: *Check the brake pedal free play. The free play should be between 30–40 mm (1.18–1.57 in).*

15. Install the lower lift links, 1 and 2, to the rear axle, 3.
16. Install the first lift link, 1, to the rear axle by installing the pin, 4, through the link then secure using the M8 x 16 mm cap screw and M8 Belleville washer, 5. Torque to 23 N·m (16.9 lb ft).
17. Install the second lift link, 2, to the rear axle by installing the M12 x 70 mm cap screw, M12 flat washer and M12 lock nut, 6. Torque to 66 N·m (48.6 lb ft).
18. Fill the combined transmission, differential and rear axle with clean AMBRA MULTI G134 hydraulic oil.
19. Reinstall the rear wheels onto the tractor.
20. Jack up the back of the tractor and remove the jack stands from the differential housing, then lower the tractor and remove the jack.

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



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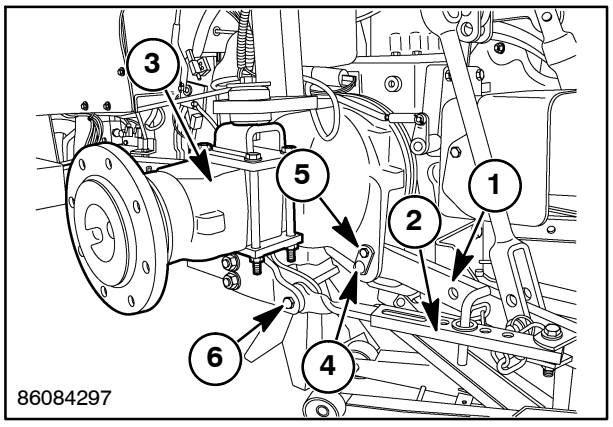

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PTO Clutch Solenoid

1. The PTO clutch solenoid receives current from terminal # 30 of the transmission control unit. The PTO clutch solenoid is now active, sending hydraulic pressure to PTO clutch. When the PTO clutch solenoid is active, the solenoid sends sensing current to terminal # 6 of the transmission control unit.

ADIC Instrument Cluster

1. The ADIC instrument cluster is provided with current to terminal # 1 from the # 3, 20-amp fuse, the ground source for the instrument cluster is provided through terminal # 19 to a clean ground.
2. Current is then sent from the rear PTO speed indicator, terminal # 10 to terminal # 1 on the rear PTO speed sensor.

Rear PTO Speed Sensor

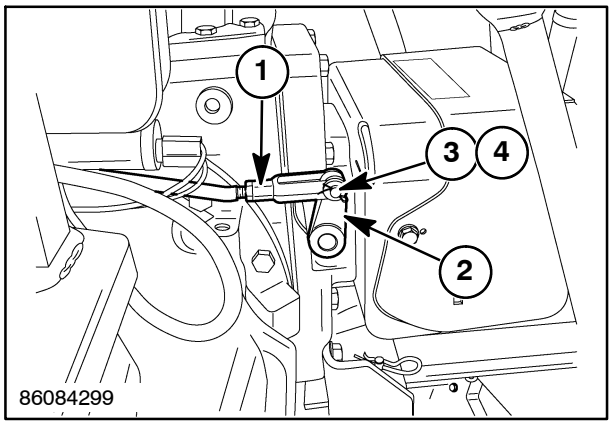
1. When current is sent from terminal # 10 on the instrument cluster to terminal # 1 of the rear PTO speed sensor and a chassis ground source is provided to terminal # 3 of the sensor. The sensor becomes energized sending a ground circuit from terminal # 2 of the sensor to splice-21 then to a clean ground.
2. Terminal # 20 of the instrument cluster sends a ground circuit to splice-21. When this happens it completes the ground circuit for the rear PTO speed indicator, which sends current internally in the ADIC to the PTO indicator light. The indicator light will now illuminate warning the operator that PTO is in operation.

NOTICE: *When the PTO shaft is turning, the sensor generates pulsating current as the gear teeth of the PTO shaft pass by the sensor. As the PTO speed increases the frequency of the pulsating current increases. The ADIC interrupts the frequency rate as PTO speed on the ADIC display.*

NOTICE: *The rear PTO speed sensor input is internally calculated within the ADIC instrument cluster.*

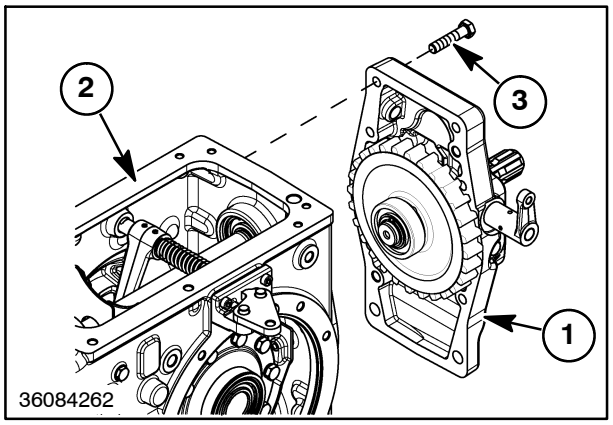
NOTICE: *The speed display for the rear and mid PTO will be displayed on the ADIC instrument cluster regardless of which PTO is engaged or disengaged.*

4. Remove the linkage, 1, from the rear PTO control lever, 2, by removing the cotter pin, 3, and pin, 4.



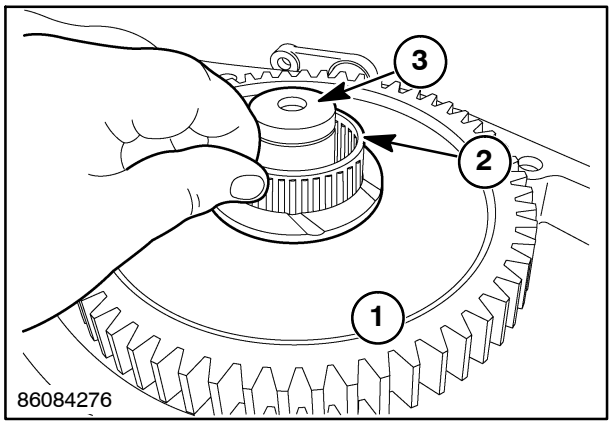
21

5. Remove the PTO cover, 1, from the differential housing, 2, by removing the six M12 x 55 mm cap screws, 3, from the PTO cover.



22

16. Install the rear PTO gear, 1, and needle bearing cage, 2, onto the rear PTO output shaft, 3.



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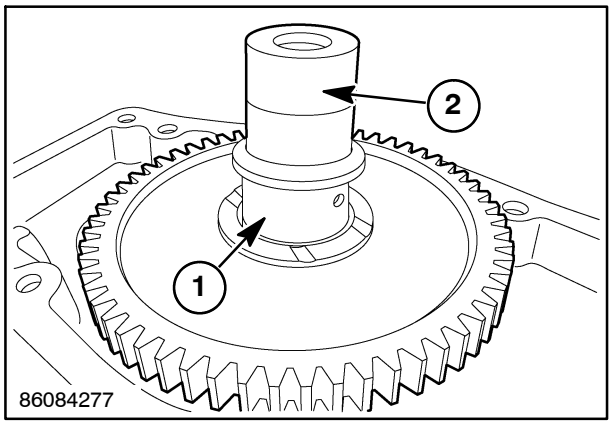
17. Place the PTO gear bushing, 1, onto the rear PTO output shaft.
18. Place a socket, 2, or similar device on top of the bushing.
19. Using a hammer hit the socket to drive the bushing down onto the rear PTO output shaft.

NOTICE: *Make sure the PTO gear bushing is aligned with the needle bearing cage when installing the bushing.*

NOTICE: *Engage the PTO using the external PTO lever. Ensure the PTO is working properly before proceeding. When engaged the rear PTO gear should rotate with PTO output shaft.*



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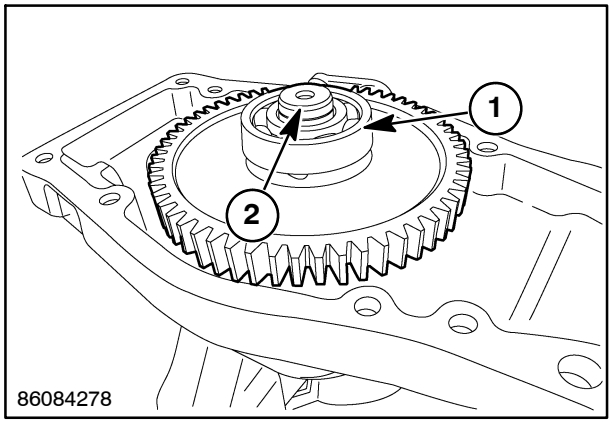
20. Place the bearing, 1, onto the rear PTO output shaft, 2.

NOTICE: *Heat the bearing with a suitable heat source, this will allow the bearing to drop down onto the rear PTO output shaft.*



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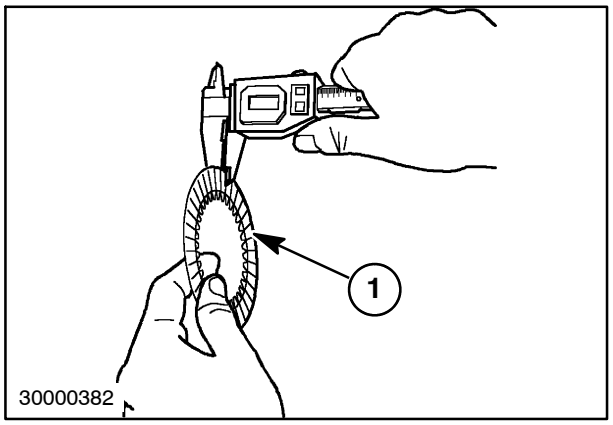
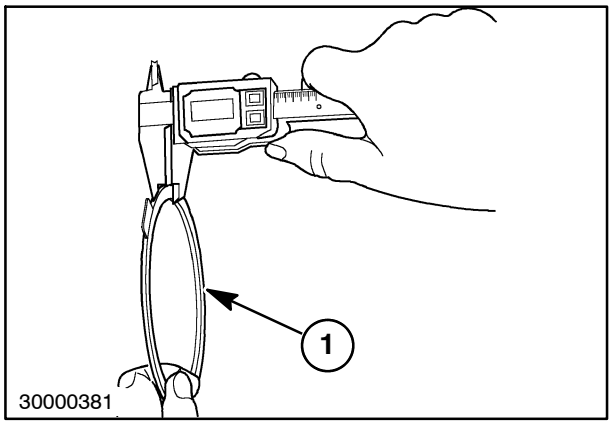
4. Inspect each friction disc, 1, for thickness, damage, or excess wear. Replace if the thickness of the discs is less than 1.675 mm (0.065 in).
5. Lay each clutch plate and the clutch backing plate on a plate of glass or other flat surface and inspect them for warpage, excess wear, or damage. Replace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



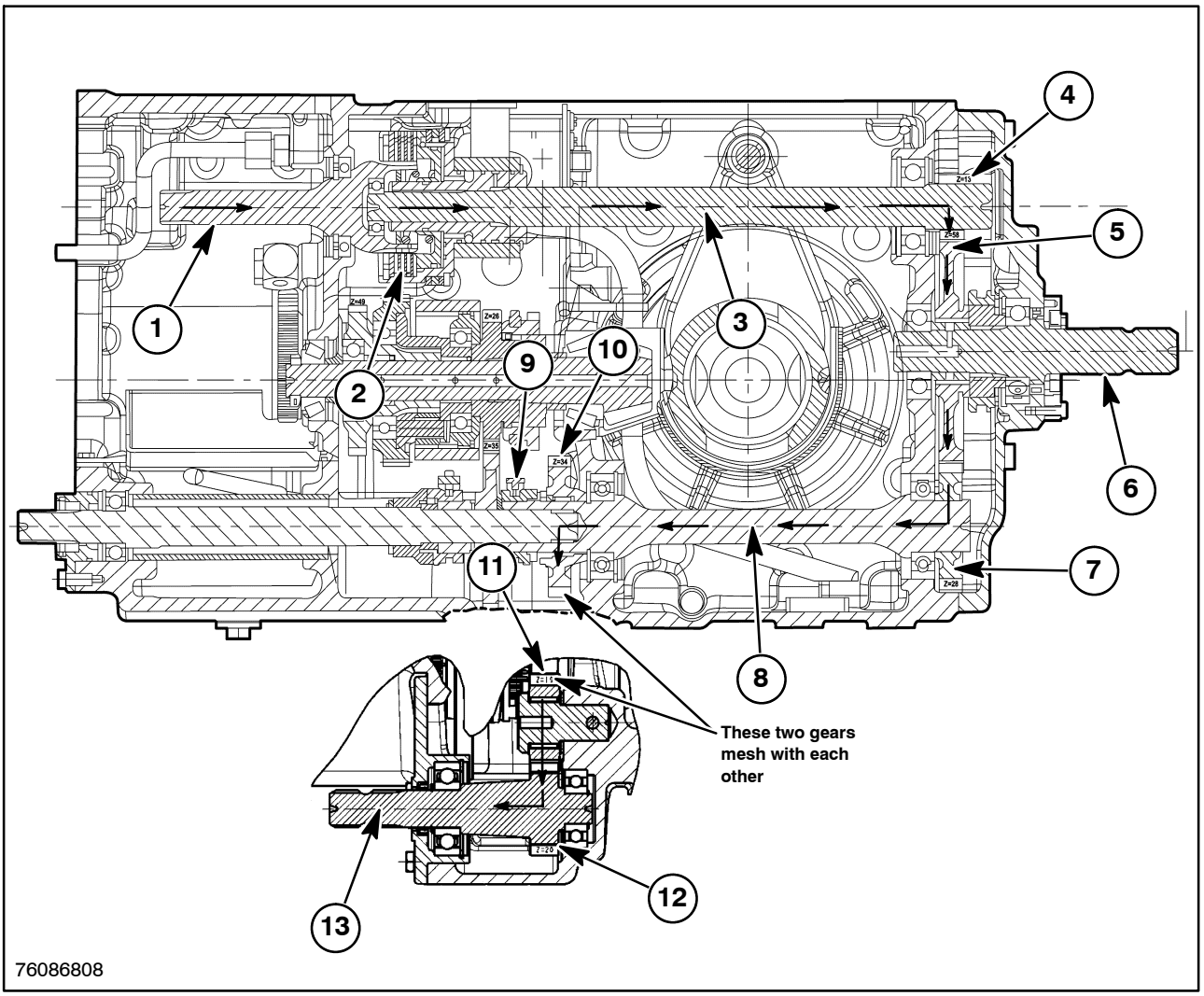
68

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.



69

POWER FLOW



1

Power Flow Diagram for the CVT Transmission with Mid PTO

The mid PTO system utilizes several components common to the rear PTO system. Power flows from the engine to the engine input shaft, through the shuttle clutch hydraulic block, to the shuttle clutch input shaft. Power is then routed through the hydraulic pump on the variator assembly to the rear PTO input shaft, 1. The rear PTO input shaft, 1, located in the rear differential housing is connected to the PTO clutch, 2. When the PTO activation switch is activated it sends current through the transmission controller to the PTO clutch solenoid valve. When the PTO clutch solenoid valve is energized it sends hydraulic pressure to the PTO clutch pack. Power then flows through the PTO clutch, 2, to the rear PTO countershaft, 3. Power is then transferred from the 13-tooth fixed gear, 4, on the end of the PTO countershaft, 3, to a fixed 58-tooth gear, 5, which rotates independently on the rear PTO output shaft, 6. The 58-tooth gear transfers power to a 28-tooth gear, 7, located on the mid PTO driving shaft, 8. When the mid PTO is engaged, a shifter fork engages a sliding gear coupler, 9, with the 34-tooth idler gear, 10, on the mid PTO driving shaft, 8. The 34-tooth idler gear transfers power to a 19-tooth idler gear, 11. This gear transfer power to a 20-tooth gear, 12, which is fixed to the mid PTO output shaft, 13, causing the mid PTO shaft to turn.

SPECIFICATIONS

Brake Discs

No. of Brake Discs	3
Width of Brake Surface	27 mm (1.06 in)
Disc OD	163.9 mm (6.45 in)
Total Brake Surface Area per Side	10,837.53 sq mm (16.9 sq in)
Total Brake Disc Thickness	4.75 mm (0.18 in)
Friction Material Thickness per Side	0.950 mm (0.037 in)
Standard Lining Groove Depth	0.45 mm (0.017 in)
Allowable Limit (Minimal Groove Depth)	0.112 mm (0.004 in)

Stators

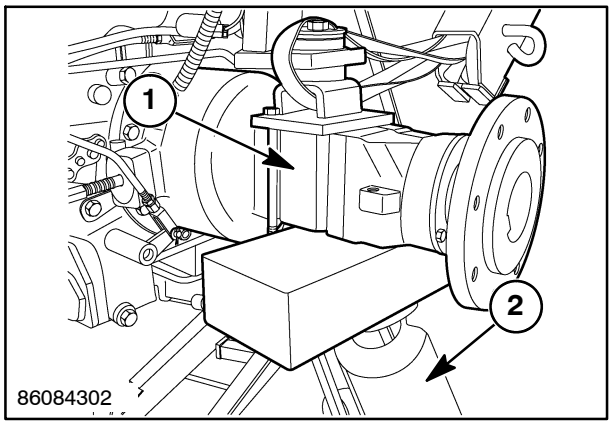
No. of Stators	1
Stator Thickness	2.65 mm (0.10 in)
Brake Pedal Free-Play	30–40 mm (1.18–1.57 in)

16. Support the axle housing, 1, using a jack, 2, or other suitable lifting device.

⚠ WARNING ⚠

The rear axle housings are very heavy and difficult to balance. Use a suitable lifting device or a second person to assist balancing the axle housing. Failure to comply could result in axle housing damage, death or serious injury.

M1601



16

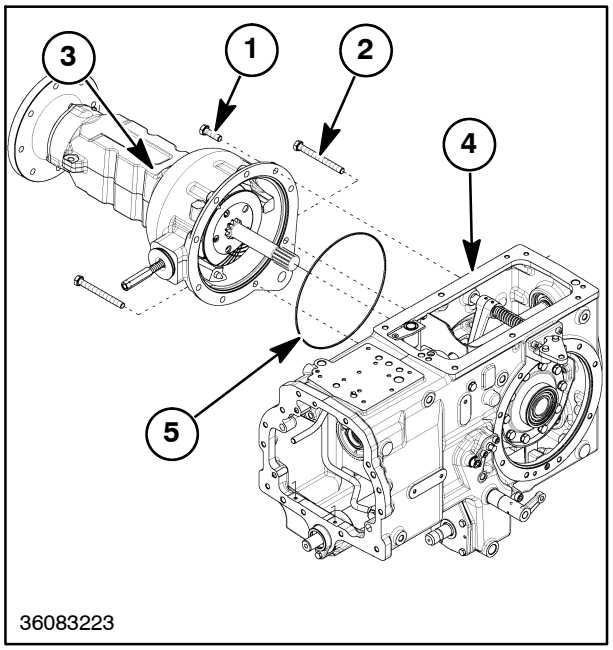
17. Remove the M12 x 40 and M12 x 120 axle housing retaining cap screws, 1 and 2. Then separate the axle housing, 3, from the differential housing, 4, using the lifting device to move the axle assembly out and away from the differential housing.

18. Remove the seal, 5, from the differential housing, 4.

19. Place the axle housing on a clean work bench.

NOTICE: *The differential housing is shown removed from the transmission and tractor.*

NOTICE: *The removal procedure is the same for the left and right axle housings.*



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INTRODUCTION AND CIRCUIT IDENTIFICATION

The hydraulic system on Boomer 8N model tractors are a mechanical lift assembly able to raise and lower the lift arms, in turn, three point linkages.

The high pressure hydraulic circuit is of open center type.

In this system, the hydraulic lift is connected to the hydraulic pump, and pump flow is continuously circulating through the hydraulic system even when the circuit are not being operated.

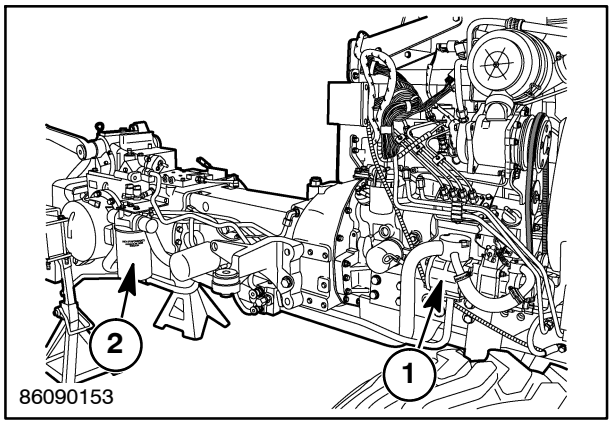
The open center high pressure hydraulic circuit with mechanical lift is shown in Figure 4 and includes the components shown on the following pages.

Pump

The open center hydraulic pump assembly, 1, is a high pressure gear pump.

Filter

Full-flow spin on type filter, 2, mounted on right side of the transmission housing.



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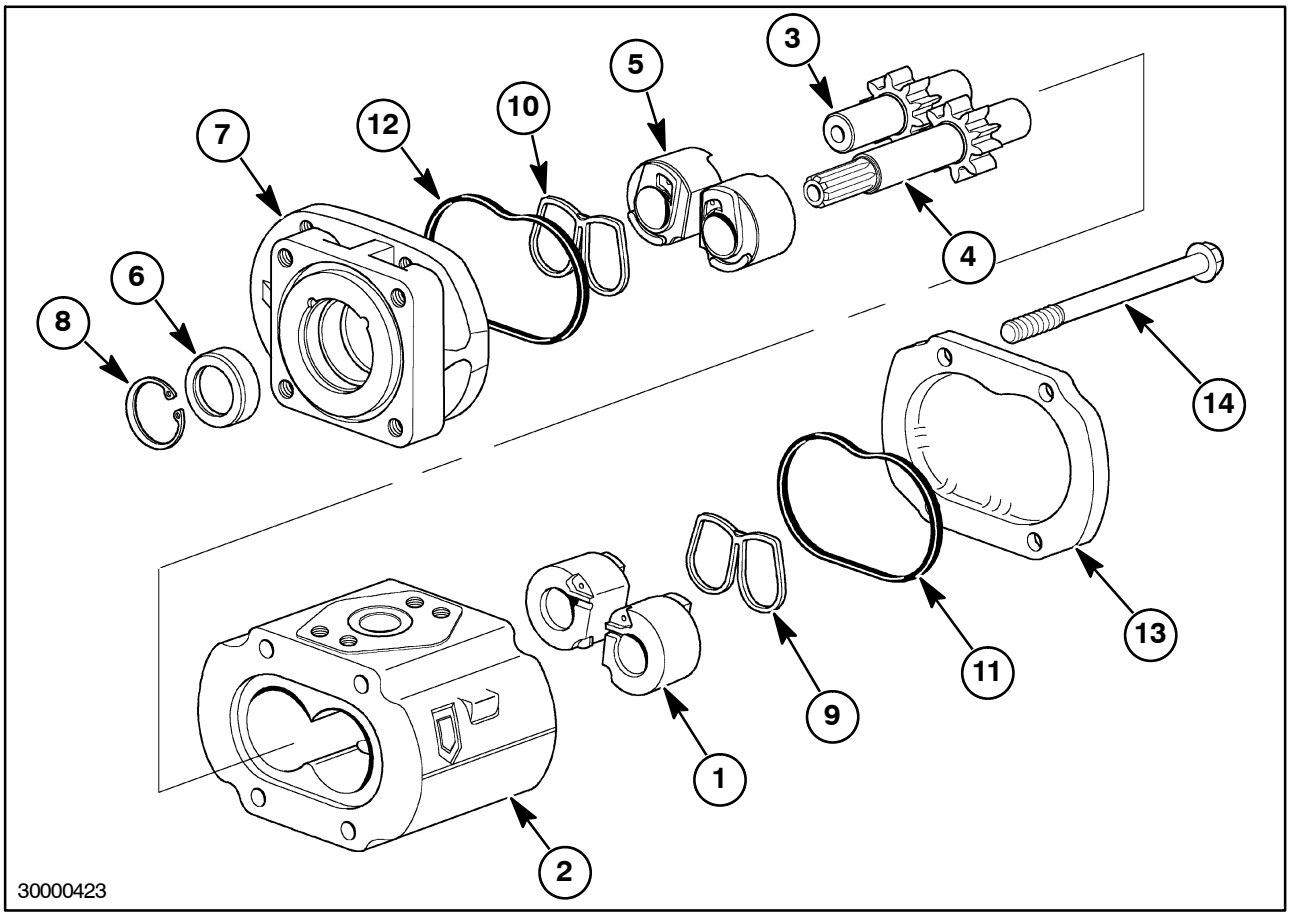

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Assembly

1. Lubricate all parts during assembly with clean hydraulic fluid.
2. Place the rear wear blocks, 1, into the pump body, 2. Be sure that the blocks are oriented correctly.
3. Install the pump gear, 3, into the pump body, 2.
4. Install the driveshaft, 4, in to the pump body, 2.
5. Place the front wear blocks, 5, into the pump body, 2. Again, be sure that the blocks are oriented correctly.
6. Using a seal driver, install a new shaft seal, 6, into the front cover, 7.
7. Install the snap ring, 8, into the end of the front cover, 7.
8. Install new back up rings, 9, 10, and seal rings, 11, 12.
9. Carefully place the front cover, 7, and the rear cover, 13, onto the pump body, 2, aligning the scribe marks made previously during disassembly.
10. Secure the covers, 13, 7, to the pump body, 2, with the four bolts, 14. Torque the bolts to 22 – 28 N·m (16 – 20 lb ft).

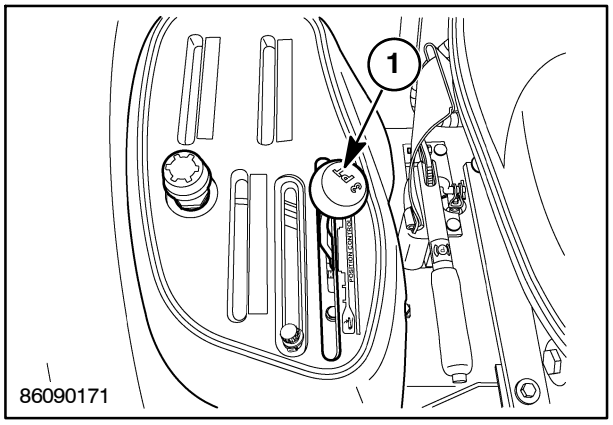
DESCRIPTION AND OPERATION - HYDRAULIC SYSTEM

This is a live hydraulic system, where gear type hydraulic pump is mounted directly to timing case. Transmission lubrication oil is used also as hydraulic oil. This system described here mechanically three point linkage. The system allows the operator to select Position control and Float control.

⚠ CAUTION ⚠

Hydraulic and transmission parts may get damaged if filter is choked. Hydraulic filter is to be changed at regular intervals, as recommended. Always use authorized approved Filters. Failure to comply could cause damage machine.

M1428



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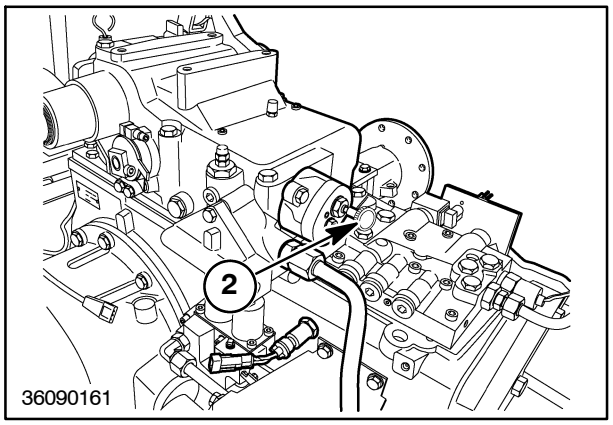
The system is operated by Position control lever, 1, and Response control, 2.

NOTICE: *Some mounted or semi-mounted equipment may interfere with and cause damage to tractor sheet metal. To avoid damage check for clearance between tractor and implements.*



4

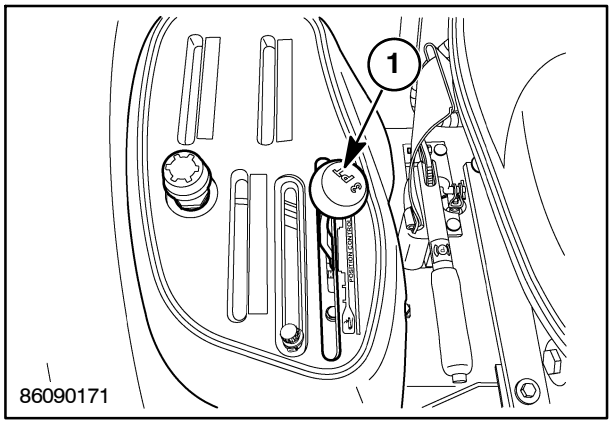
POSITION CONTROL OPERATION

Position control provides accurate control of implements such as sprayers, rakes, rotary tillers etc. that operate above the ground. Once set, Position control will maintain the selected implement height.

Always set the system to Position control at any time operating in , such as when attaching or transporting equipment or when no equipment is attached.

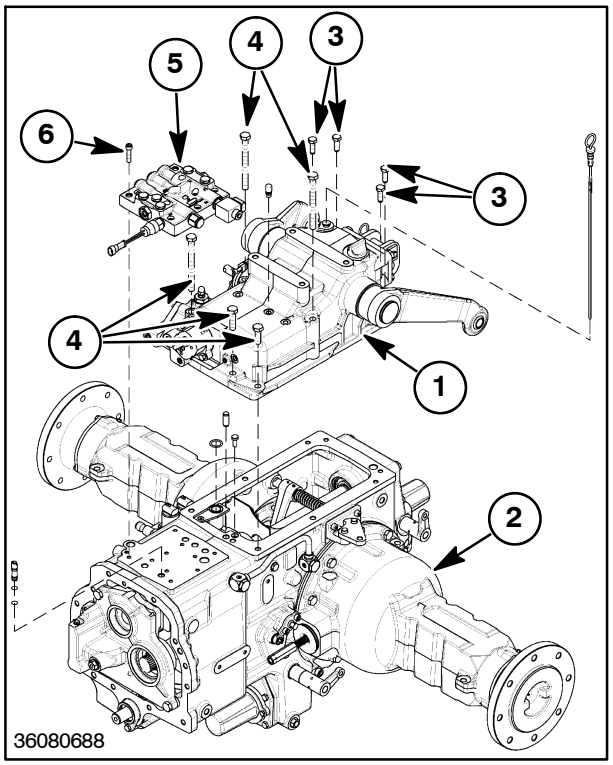
Set the required implement height/depth using the Position control lever, 1. Pull the lever back to raise the implement, push forward to lower. Implement height/depth is relative to the position of the lever in quadrant.

An adjustable stop is provided to enable the lever to be returned to the required working position.



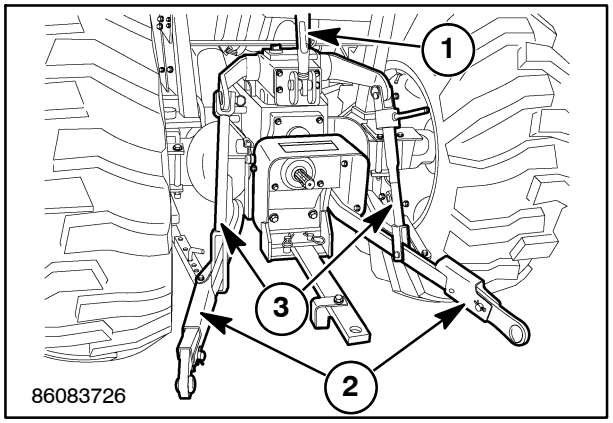
5

2. Install the hydraulic lift assembly, 1, using a suitable hoist.
3. Secure the hydraulic lift assembly to the transmission housing, 2, using four M10 bolts, 3, and five M12 bolts, 4. Torque M10 bolts to 55 N·m (40 lb ft) and M12 bolts to 84 N·m (62 lb ft).



18

4. Install the three-point linkages top link, 1, lower link, 2, and lift rod, 3, onto the tractor.



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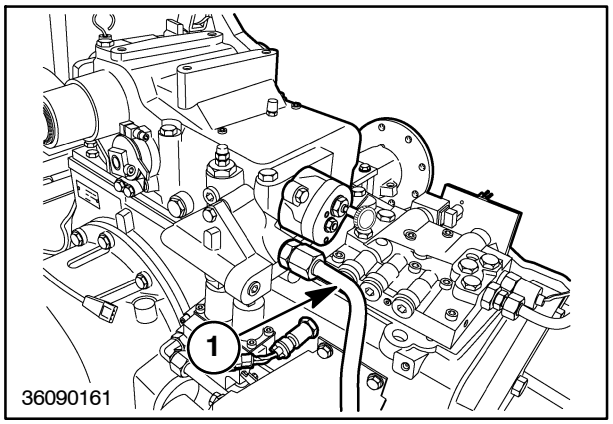
5. Attach the delivery pipe, 1, to the distributor.



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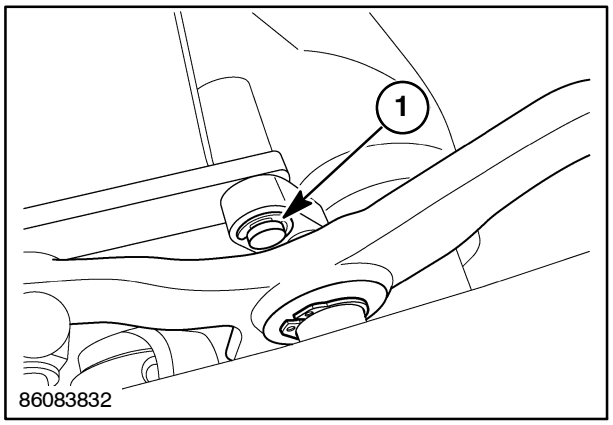
14. Secure the rear linkage assembly by installing e-clip, 1.



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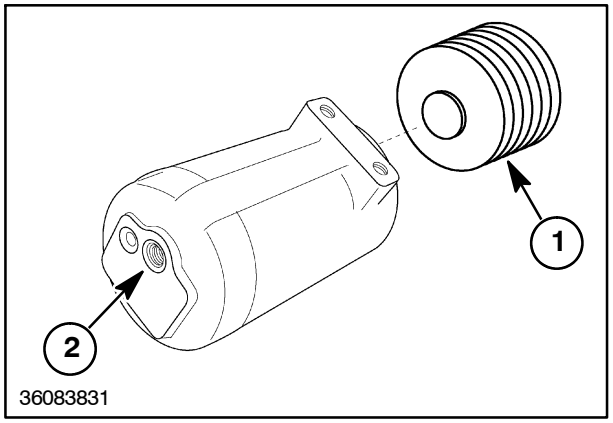
15. Put a light coat of the hydraulic fluid on the seal and install the piston, 1, into the cylinder housing, 2.



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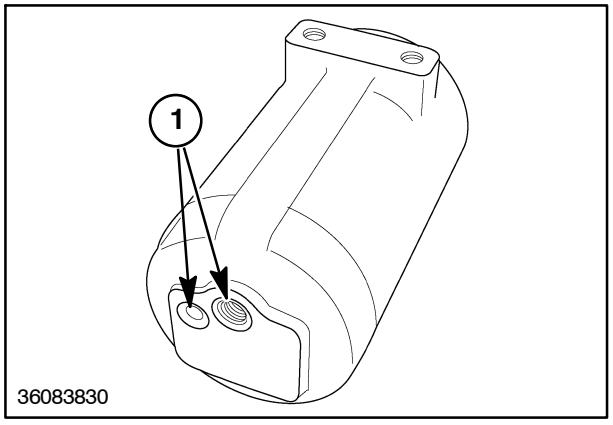
16. Install two new seals, 1, onto the head of the cylinder housing.



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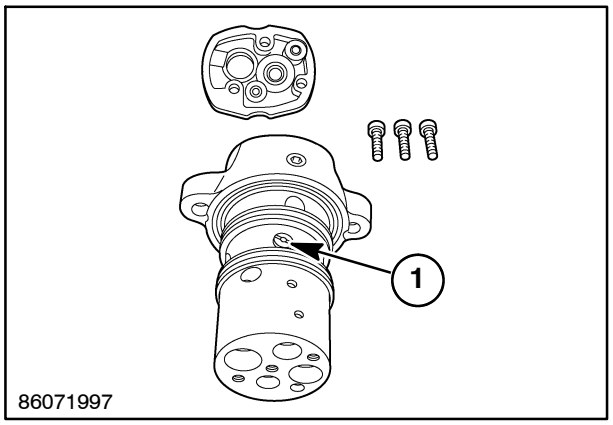
NOTICE: *Check orifice, 1, for contamination*



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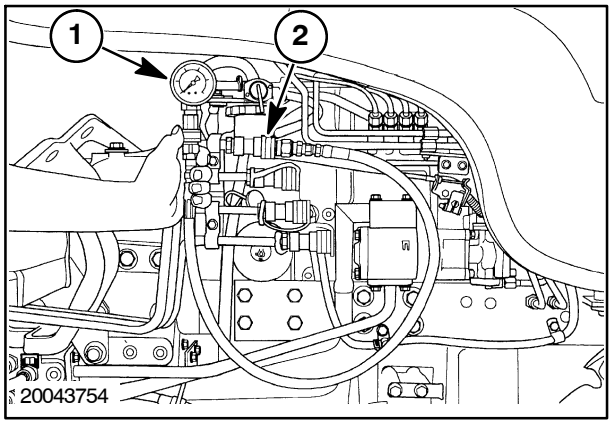
PRESSURE TESTING

MAIN SYSTEM RELIEF VALVE

NOTICE: *The hydraulic system is equipped with one system relief valve, located in the combination relief/ diverter valve assembly. This setup gives several options for checking the system relief pressure. If equipped, the hydraulic system relief pressure may be checked using the rear (single spool) remote valve kit, or a front (double spool) remote valve kit. If the tractor is not equipped with either of these, the system relief pressure must be tested using the combination relief/diverter valve.*

1. If equipped with a front (double spool) valve kit, connect a 0 - 20700 kPa (0 - 3000 psi) pressure gauge, 1, to the top high pressure hydraulic line, 2, located on the right side of the tractor. Proceed to step 4.



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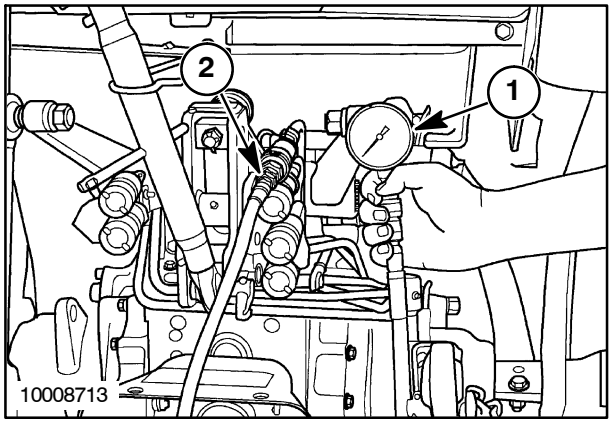
2. If equipped with a rear (single spool) valve kit, connect a 0 - 20700 kPa (0 - 3000 psi) pressure gauge, 1, to one of the remote lines, 2, on the rear of the tractor. Proceed to step 4.



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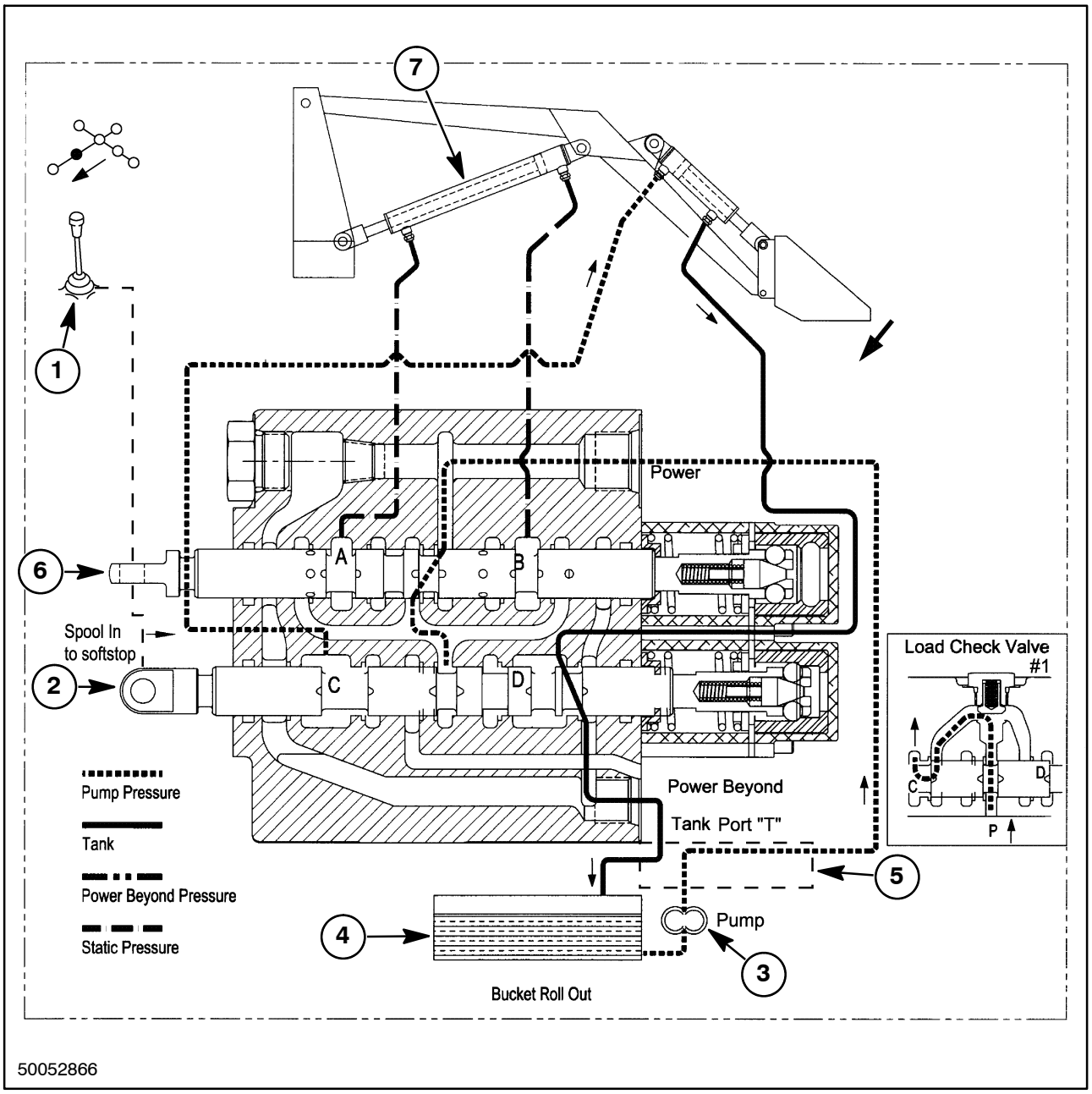

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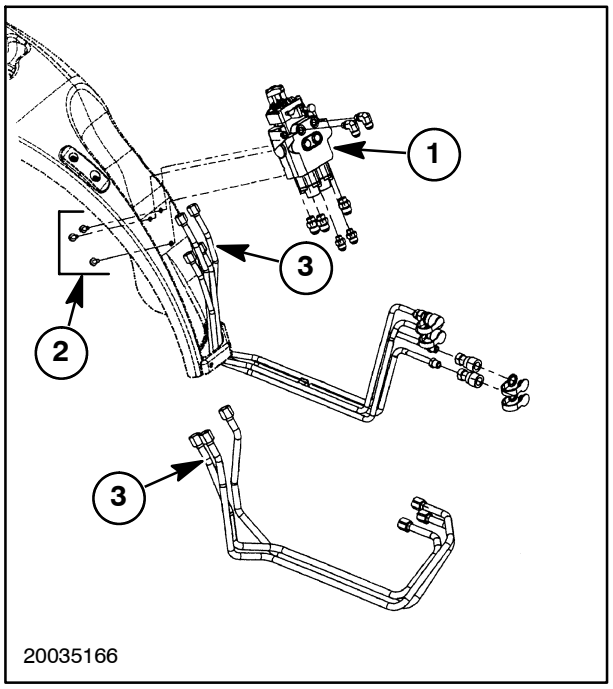
Bucket Control - Dumping/Lift Control - Neutral

When the control lever, 1, is moved to the dumping position, the bucket control spool, 2, is moved inward. Fluid flow from the hydraulic pump, 3, is directed into the valve body, opening check valve #1, to passage “C”. From passage “C”, fluid is directed to the piston side of the bucket cylinder, this pressurized oil will extend the bucket cylinder and allow the bucket to dump. Hydraulic fluid contained on the rod side of the bucket cylinder flows out of the cylinder, through passage “D”, and exits the valve body through the tank port, “T”. Hydraulic fluid is then returned to the hydraulic fluid reservoir, 4, through the relief/diverter valve manifold, 5.

Since the lift control spool, 6, remains in neutral, the lift control cylinders, 7, remain in a fixed position.

Installation

1. Install the control valve, 1, onto the right fender using three M8 x 16 mm bolts, 2. Do not tighten bolts at this time.
2. Connect the hydraulic lines, 3, to the control valve, 1, using reference marks made earlier for proper assembly.
3. Tighten the hydraulic line fittings securely. Do not over tighten the tube fittings.
4. Tighten the three M8 bolts, 2, securing the control valve to the fender.



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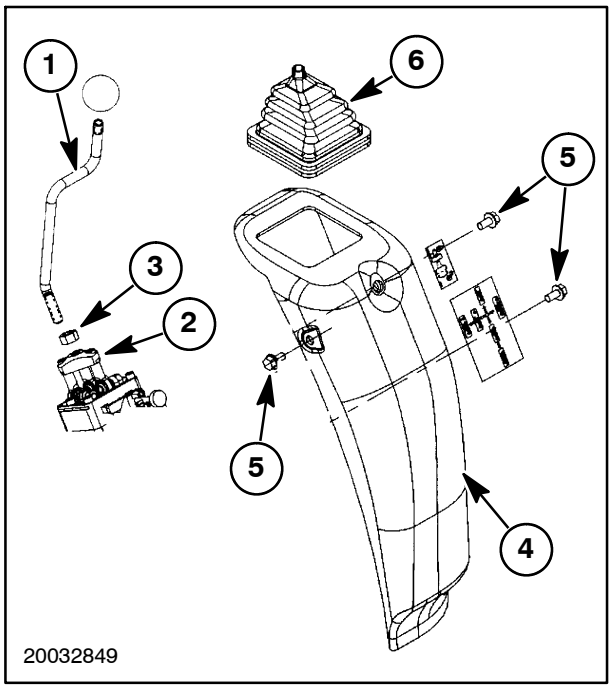
5. Install the joystick, 1, onto the control valve linkage, 2.
6. With joystick positioned properly, tighten the lock nut, 3, against the linkage, 2.
7. Install the control valve cover, 4, over the control valve and secure with the three bolts, 5. Tighten bolts securely.
8. Install the joystick boot, 6, into position if removed during disassembly.



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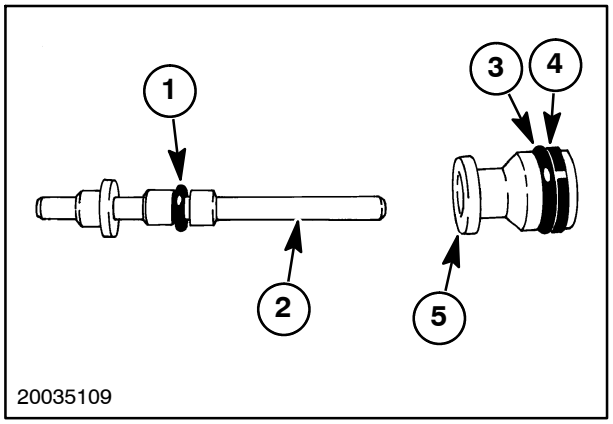
Assembly

1. Lubricate and install a new O-ring, 1, onto the pin, 2.
2. Lubricate and install a new O-ring, 3, and seal ring, 4, on the bushing, 5.
3. Install the bushing, 5, onto the pin, 2.



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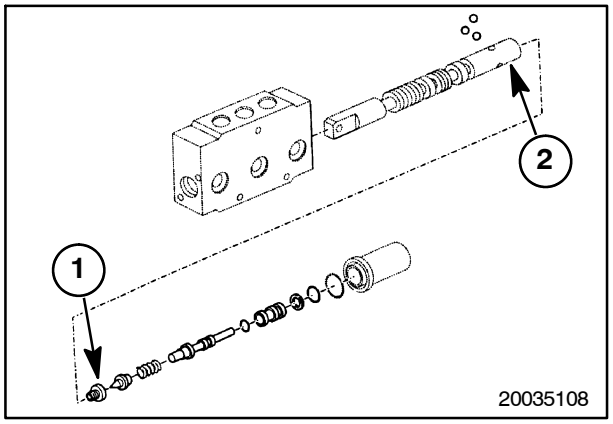
4. Install the poppet seat, 1, into the valve spool, 2. Tighten the seat securely.



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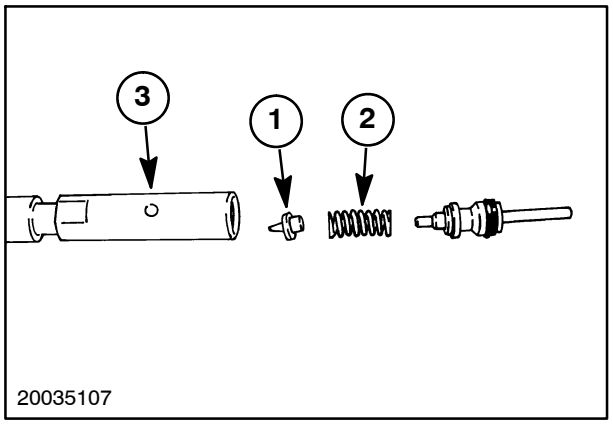
5. Install the poppet, 1, and spring, 2, into the spool, 3.



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INLET RESTRICTION

Perform the inlet restriction test to check for the hydraulic lines and filter for damage, obstructions, or air leaks. A hydraulic flow meter is required to perform the inlet restriction test.

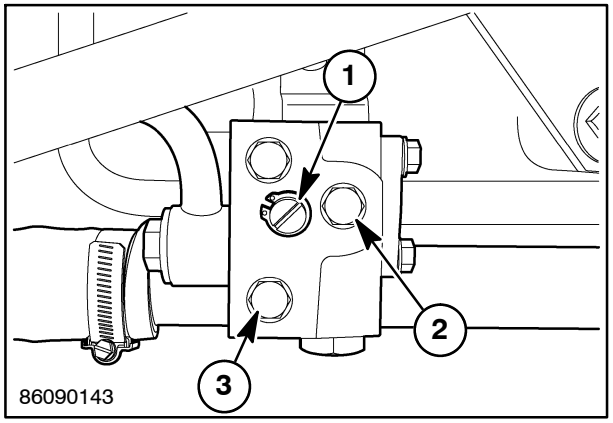
⚠ WARNING ⚠

Pressurized hydraulic fluid can penetrate the skin and cause severe injuries. Tighten all of the connections before starting the engine. If hydraulic fluid has penetrated the skin, seek medical assistance immediately. Failure to comply could result in death or serious injury.

M950A

NOTICE: *If equipped with a rear (single-spool) kit, connect the flow meter to the female quick couplers in the same manner as described below.*

1. Make sure the diverter valve adjuster screw, 1, is in the 10 o'clock position.
2. Remove the manifold plug, 2, from the diverter valve.
3. Connect a hydraulic line from the "Power Out" ('P') port of the diverter valve to the "Inlet" port of the flow meter.
4. Remove the manifold plug, 3, from the diverter valve.
5. Connect a hydraulic line from the "Tank" port ('T') to the "Return" port of the flow meter.



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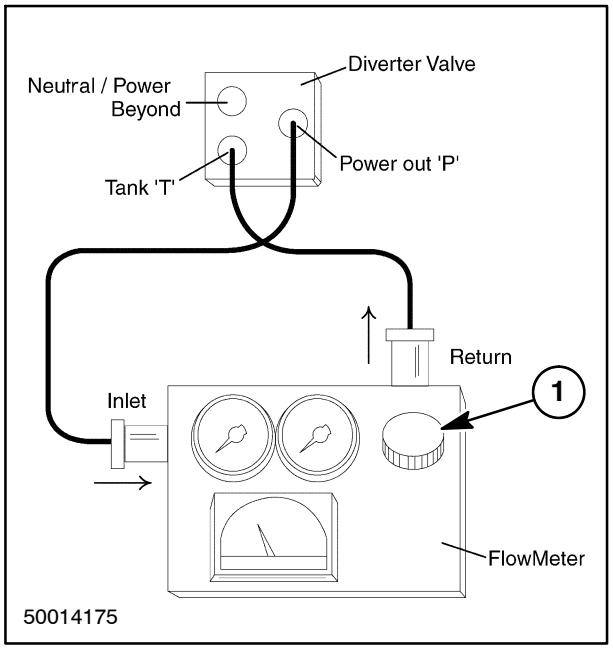
6. Start the engine and operate the hydraulic system to warm the hydraulic fluid to normal operating temperature.
7. Open the restrictor valve, 1, to allow full flow through the flow meter.
8. Run the engine at 1400 rpm and record the flow meter reading.
9. Run the engine at full throttle (Boomer 8N at 3050 rpm) and read the flow meter. The reading should indicate that the flow has doubled. If the meter reading is low, check the hydraulic lines, and filter for damage, clogs, or air leaks. If there are no problems with the hydraulic lines or the hydraulic filter, the hydraulic pump may require replacement. Use the Pump Efficiency Test described below to further inspect the hydraulic pump.



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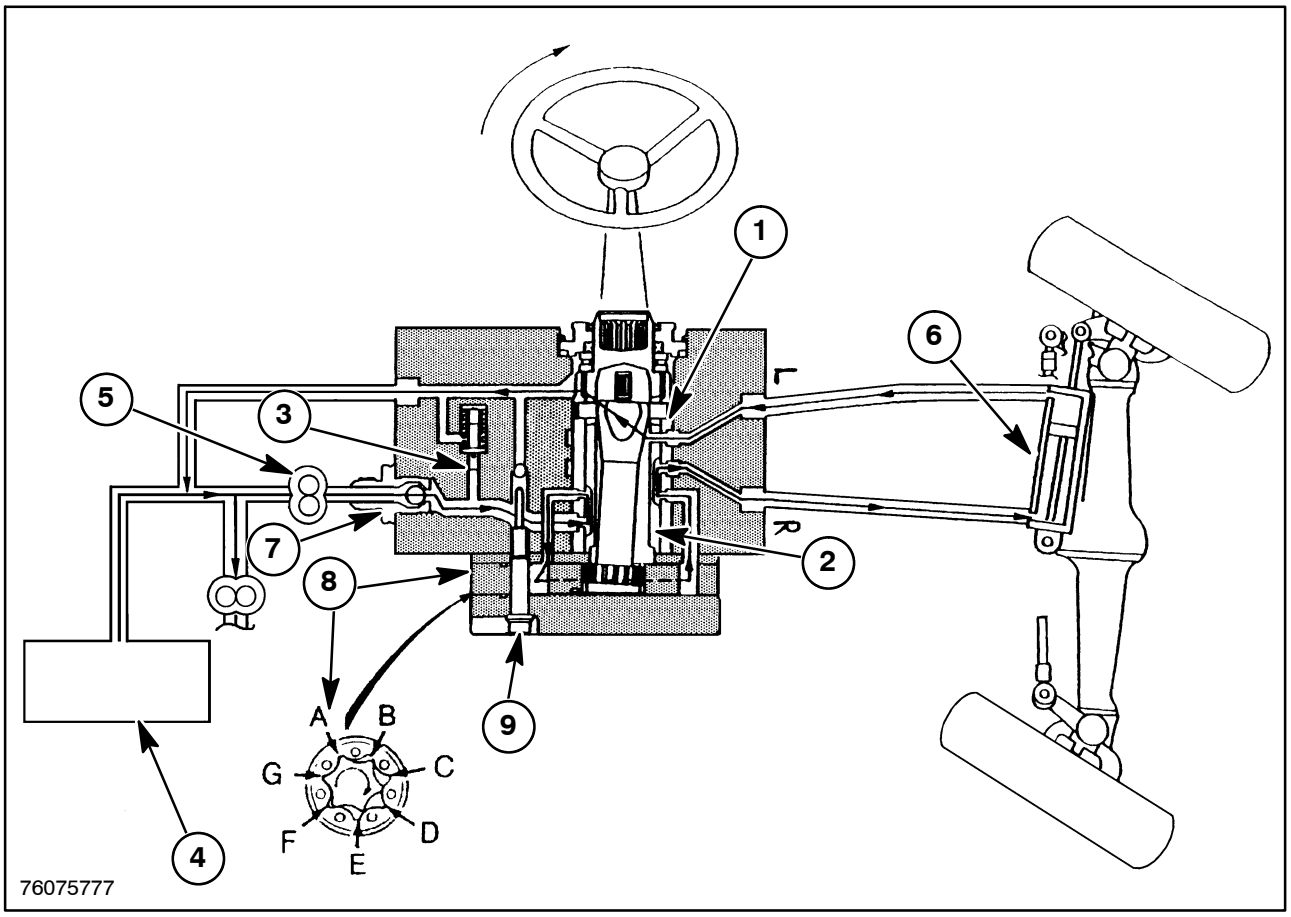


5

1. Sleeve
2. Spool
3. Relief Valve Assembly
4. Transmission Sump
5. P/S Pump
6. Cylinder
7. Check Valve Assembly
8. Gerotor Gear Pump
9. Kick Back Check Valve

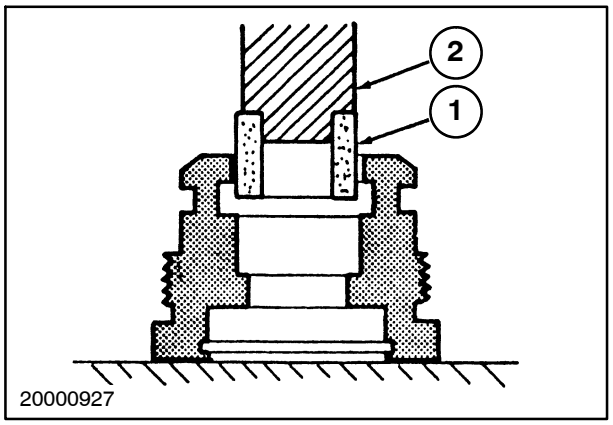
Fluid Flow - Right Turn

Turning the steering wheel to the right (clockwise) rotates the spool clockwise and indexes the grooves in the spool with holes in the sleeve for right turn.

Fluid flow from the pump enters the gear pump passages “A,” “B,” and “C” and flows out passages “D,” “E,” and “F” to the valve port “R” to the rod side of the cylinder. Fluid in the piston side of the cylinder returns to the control valve through port “L” and is directed back to the reservoir through port “T”.

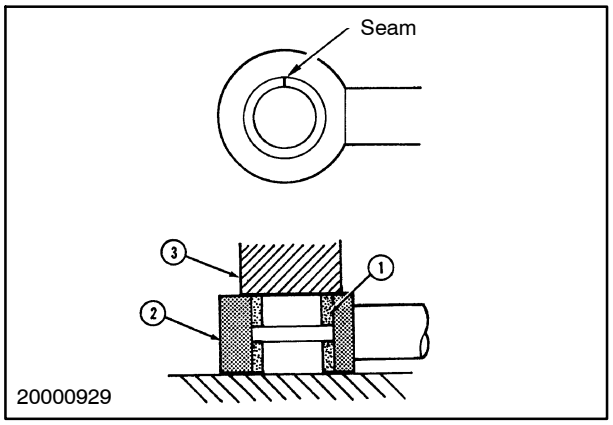
Assembly

1. If the gland head bushing, 1, needs to be replaced, use a suitable driver tool, 2, to install the new bushing.



18

2. If the pin bushings need to be replaced, lubricate the bushing bore, 2, and the bushing, 1, with hydraulic oil. With the seam positioned as shown, install the bushing using a suitable driver, 3.



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CONTROL MOTOR

POWER STEERING CONTROL MOTOR

Spool and Sleeve

1. The spool, 3, and sleeve, 4, Figure 1, constitute a rotary valve for selectively changing the fluid passage as well as the direction of the pressurized fluid flow. There are three forms of fluid passage. The first is for the NEUTRAL state, the second is for RIGHT turning, and the third is for LEFT turning.
2. The spool, 3, is fitted to rotate within the sleeve, 4, which is fitted into the bore of the valve body, 2. The leaf springs, 13, extend through the spool, 3, and sleeve, 4, and urge the spool to take the indicated position relative to the sleeve. This position corresponds to the NEUTRAL state, and persists as long as the steering wheel is at its center position, for straight-ahead driving.
3. A diametrically extended pin, 11, is loosely fitted to the drive shaft, 12, at the center, and to the sleeve, 4, with some clearance between the pin and the radial holes in the spool. When the drive shaft, spool, and sleeve are in the indicated positions, the sleeve and shaft are capable of as much as 10º movement in either direction (CW or CCW) relative to the spool. By this angular displacement, the fluid passage for RIGHT turning or LEFT turning is introduced.

Rotor and Fixed Ring

1. The rotor and fixed ring assembly, 16, in the pump, provides the steering system with a back-up device for steering, if the power steering pump is not providing oil flow to the steering motor.

Check Valve

1. The check valve, 5, normally remains closed, preventing pressurized fluid flow from its “IN” side to its “OUT” side. If fluid pressure is not available, the check valve unseats, permitting fluid to be drawn from the reservoir to the “IN” side.

Drive Shaft

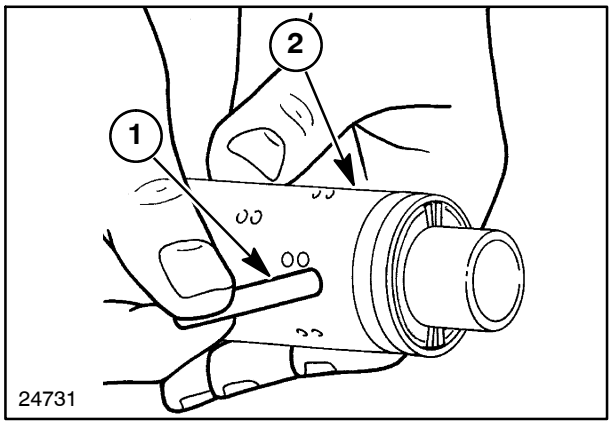
1. The pump drive shaft, 12, is slightly tilted off the spool axis, and is splined into the pump gear of the rotor and fixed ring pump assembly, 16, by its bottom end. As mentioned earlier, this shaft is connected to the pin, 11, by its top end.
2. In the event of a hydraulic fluid pressure loss, turning the steering wheel turns the drive shaft, 12, due to the spool and pin connection, to rotate the pump gear, 16. This enables the rotor and fixed ring, 16, to operate as a manually driven pump to produce hydraulic fluid pressure.

Pressure Relief Valve

1. The pressure relief valve, 21, prevents excess fluid pressure buildup within the steering pump and the circuit. This excess pressure may be due to the steering wheel being turned to its full travel and against its stops, or the front wheels being prevented from turning.

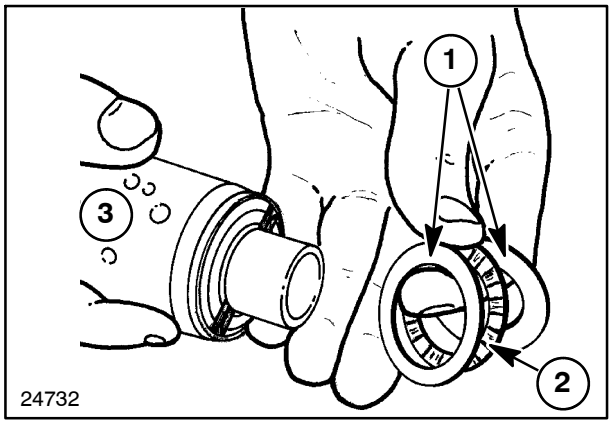
NOTICE: *The pressure relief valve is adjustable. Turning the calibration adjustment screw, 23, clockwise increases pressure, and turning counter-clockwise decreases pressure.*

5. Insert the rotating valve trim pin, 1, through the spool and sleeve, 2.



28

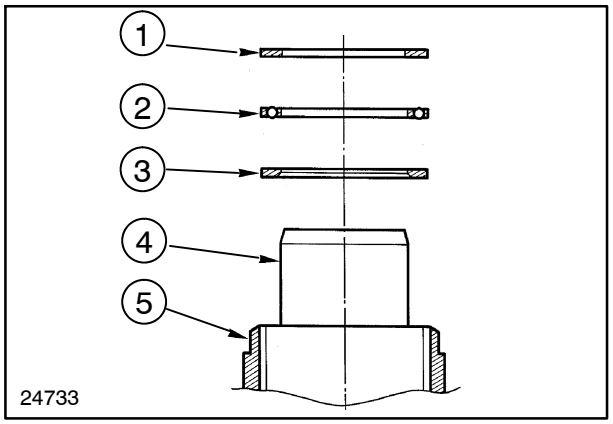
6. Install the two thrust washers, 1, and the thrust bearing, 2, onto the rotating valve, 3.



29

7. Install the thrust washers and the thrust bearing in the orientation shown.
   1. External thrust washer
   2. Thrust bearing
   3. Internal thrust washer
   4. Rotating valve
   5. Rotating valve seat sleeve

8. Position the control valve body so that the housing seat on the rotating valve sleeve is positioned horizontally.



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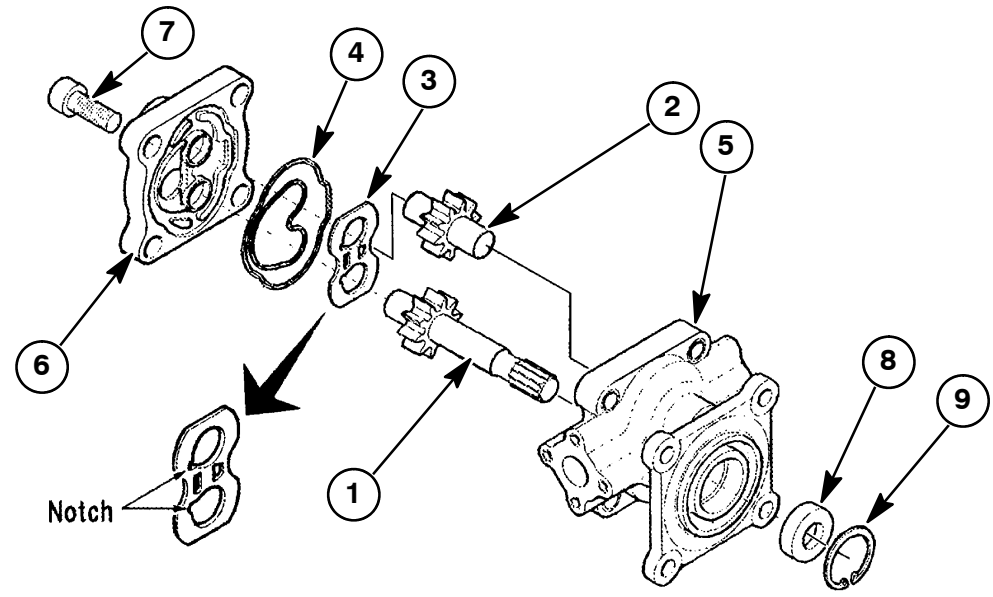

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Assembly

1. Lubricate all parts during assembly with clean hydraulic fluid.
2. Place the pump body in a soft-jawed vise.
3. Install the drive shaft, 1, and driven gear, 2, in the housing while aligned with the scribe mark on the shaft end.
4. Install the plate seal, 3, and seals, 4.

NOTICE: *Take notice of the notch direction on the plate seal.*

5. Install the pump body, 5, in the groove of the pump cover, 6.
6. Install the pump cover, 6, to the body, 5. Align the scribe line made during disassembly, and secure with the four retaining bolts, 7. Torque the bolts to 44-49 N·m (33-36 lb ft).
7. Remove the pump from the vice. Install the shaft seal, 8, and snap ring, 9.

1. **Battery** - Located under the hood, in front of the radiator; electrical power source. Group 47
2. **Main Fuse (60 Amp)** - Located on the left side of the engine directly above the starter; protects the entire electrical system from damage due to excessive current.
3. **Fuse Block** – Located under the left control pod cover; contains fuses that protect individual circuits from damage due to excessive current.
4. **Relay/Diode Panels** – Located on the left side of the steering wheel column and under the left control pod; houses relays utilized by individual circuits and diodes which direct current within a circuit to allow the use of one wire within multiple circuits to control a relay.
5. **Key Switch** – Located on the right side of the operator's console; used to switch battery power on or off to the tractors electrical circuits, supply power to the engine glow plugs, or to start the tractor.
6. **Safety Start Switches** – Shuttle Lever FNR (A), Rear PTO (B), Mid PTO (if equipped) (C), and the operator's seat switch (D); will not allow the tractor to start with the shuttle lever not in neutral or the PTO engaged, or without an operator in the seat.

NOTICE: *The park brake switch also lights the parking brake indicator light on the instrument cluster when the parking brake is engaged.*

NOTICE: *The tractor may be started with out the operator being seated when the parking brake lever is engaged.*

7. **Headlights** – Two lights, located on the left and right sides of the front grill of the tractor, used to illuminate the area in front of the tractor.
8. **Taillights/Directional Signals/ Flasher Warning (Hazard) Lights** – Located on both fenders; provide warning during transportation and emergency.
9. **Instrument Cluster** – Located in the center of the dash panel; houses gauges and indicator lights that monitor tractor functions.
10. **Multi Function Stalk Switch** – Located on the right side of the steering wheel; switched the headlight, taillight and instrument cluster lights on or off.
11. **Hazard (Flashing Warning Lights) Switch** – Located on the right side of the dash panel; switches the flashing warning (hazard) lights on and off.
12. **Work Light Switch (Optional)** – Located on the left side of the dash panel; switches the work lights (if equipped) on and off.
13. **Starter** – Located on the left side of the engine; rotates the engine for starting.
14. **Alternator (55 Amp)** – Located on the left side of the engine; generates power to charge the battery.
15. **Engine oil Pressure Switch** – Located in front of the cylinder head; provides warning of low engine oil pressure.
16. **Engine Coolant Temperature Sending Unit** – Located in the thermostat housing on the front left side of the engine; warns the operator of high operating temperatures.
17. **Fuel Level Sending Unit** – Located inside the fuel tank; sends a signal indicating fuel level to the instrument cluster.
18. **Fuel Shutoff Solenoid** – Located on the right side of the engine; shuts off the fuel flow to the injection pump to stop the engine.
19. **Engine Glow Plugs** – Located on the right side of the cylinder head, adjacent to the fuel injectors; aid in engine startup by warming the air in the combustion chamber.
20. **Park Brake Switch** – Located under the parking brake lever; actuates with the parking brake mechanism; indicates when the parking brake is engaged by illuminating a light on the instrument cluster.
21. **Program Set Switch** – Located on the left side of the dash panel; enters programs within the ADIC.
22. **Program Select Switch** – Located on the left side of the dash panel; selects programs within the ADIC.
23. **Anti-Stall Switch** – Located on the left control pod; used to avoid engine stall.
24. **Reactivity Switch** – Located on the left control pod; controls the acceleration/deceleration rate of the tractor.

Terminal Identification

A	Start
B	12 V Input
C	ACC Terminal
D	12 V Input

Testing

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

Stop Position (Not Shown)

1. With the key switch in the stop position, continuity should not exist between any of the terminals. If continuity exists between any of the terminals while the switch is in the “stop” position, the key switch is defective and needs replaced.

Heat/ Accessory/ Run Position

When the key switch in the “Heat/ ACC/ Run” position, continuity should exist between the “B” and “C” terminals.

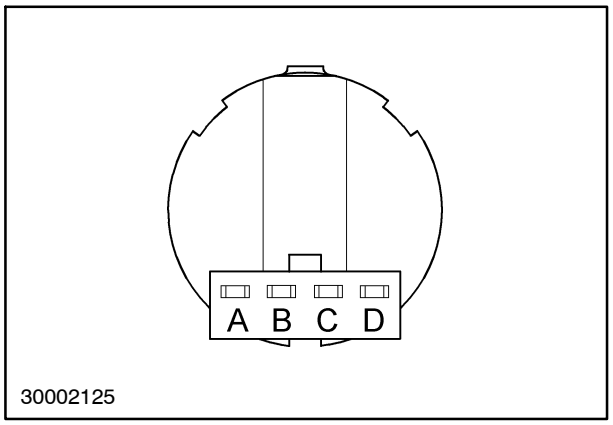
1. Make sure the switch is in the “Heat/ACC/Run” position.
2. Using an ohmmeter, touch one of the test probes to terminal “B”. Touch the other test probe to terminal “C”.
3. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal “B” and terminal “C”. If continuity does not exist between terminal B” and terminal “C”, the key switch is defective and needs replaced.

NOTICE: *Continuity should not exist between terminals A and D in the “Heat/ACC/Run” position.*

Start Position

Make sure the key switch is in the “Start” position.

1. Using an ohmmeter, touch one of the test probes to terminal “B”. Touch the other test probe to terminal “C”.
2. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal “B” and terminal “C”. If continuity does not exist between terminal “B” and terminal “C”, the key switch is defective and needs replaced.



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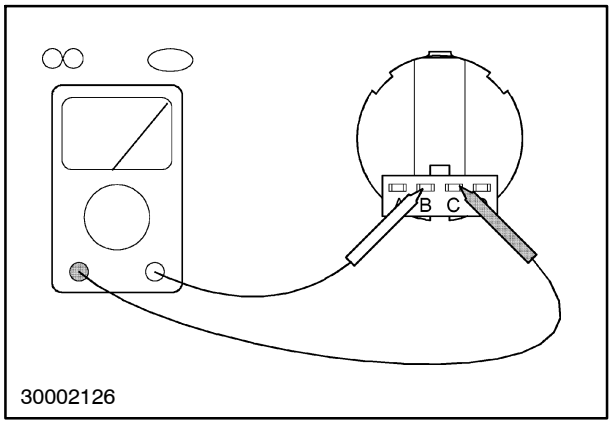

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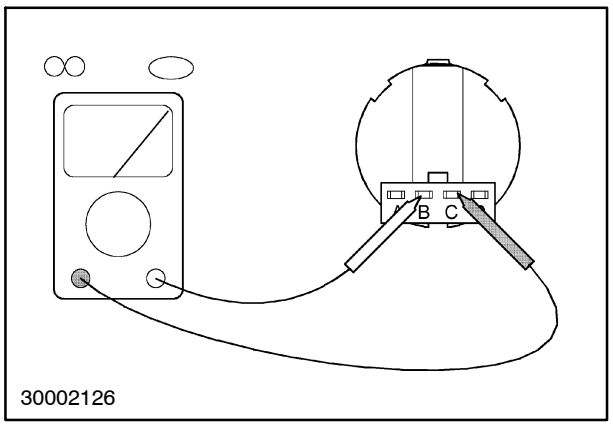

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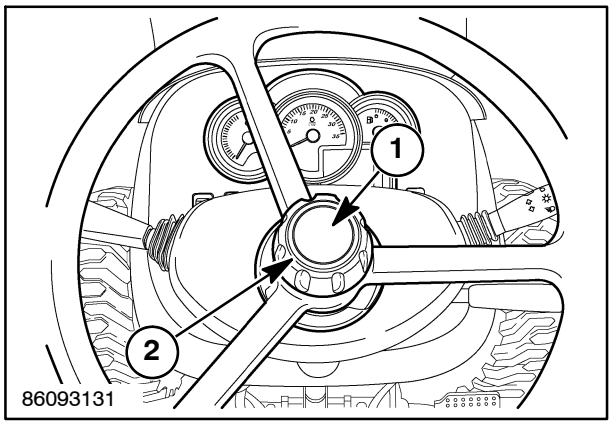
9. Reinstall the center cap, 1, onto the adjuster knob, 2.



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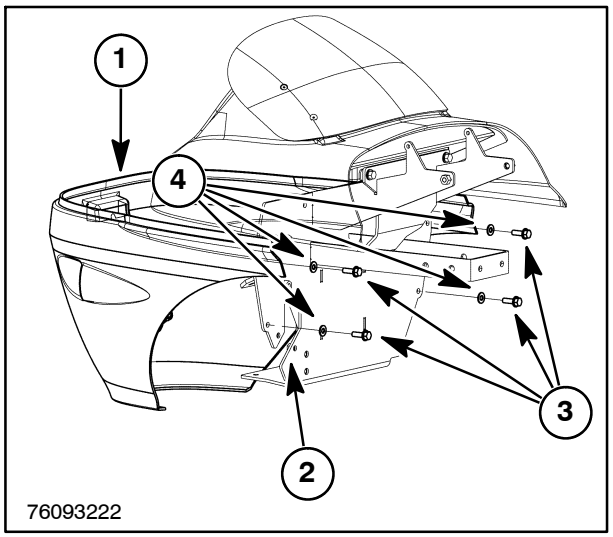
10. Reattach the lower rear hood panel, 1, to the tractor firewall, 2.
11. Secure using the four M8 x 25 cap screws, 3, and four M8 Belleville washers, 4.
12. Reattach the knob to the tilt wheel lever.
13. Reconnect the negative (-) battery cable to the negative (-) battery terminal.



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SHUTTLE LEVER (FNR)

The shuttle lever, 1, is located on the left side of the steering column.

The lever has the following functions:

1. Forward Position

Lift up on the lever then slide the lever forward.

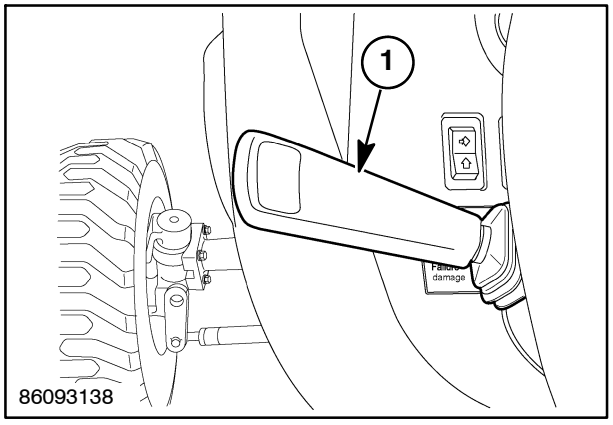
2. Neutral Position

When the lever in the middle position.

NOTICE: *The lever has two neutral positions. One when the lever is resting in the middle position and the other when the lever is lifted up but still in the middle position.*

3. Reverse Position

Lift up on the lever and slide the lever rearward.



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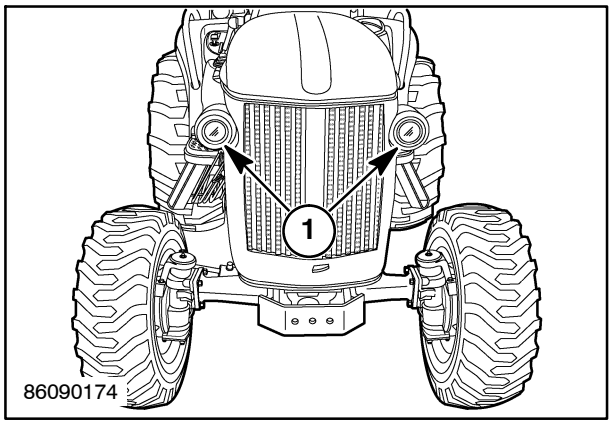
HEADLIGHT

There are two halogen front headlights, 1, on the Boomer 8N tractor.



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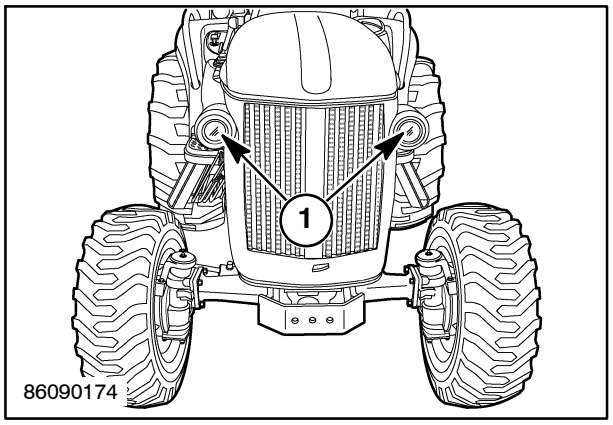
Bulb Replacement

If headlight, 1, fails to operate, the bulb must be replaced.

NOTICE: *The same procedure is used to replace the bulbs in the optional work lights.*



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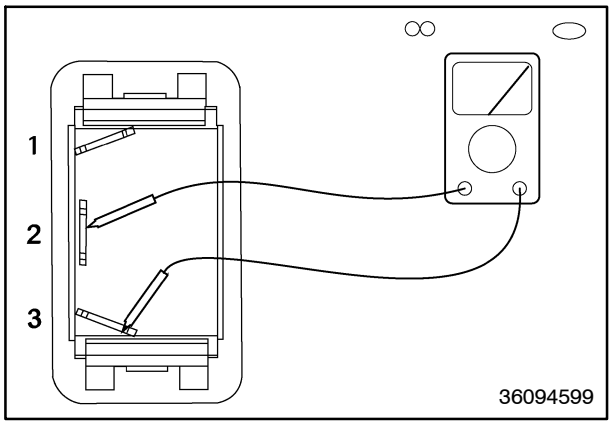
Home Position "ON"

1. Push and hold the program set switch in the home 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 program set switch is defective and needs to be replaced.



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Installation

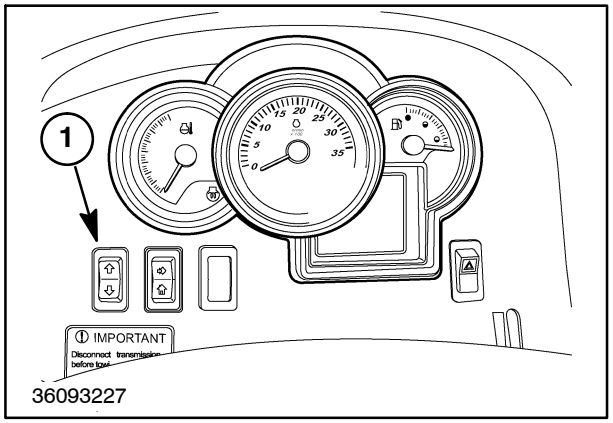
1. Plug the wire harness connector back into the program set switch.
2. Push the switch back into the dash panel switch opening.
3. Reconnect the negative (-) battery cable to the negative (-) battery terminal.

PROGRAM SELECT SWITCH

The program select switch, 1, is a three-position momentary switch located on the left-hand side of the tractor dash panel.

The three positions of the program set switch are:

- UP POSITION (Up Arrow is pushed into the switch).
- OFF POSITION (When the switch is released from the UP or Down positions the switch returns to the OFF position).
- DOWN POSITION (Down arrow is pushed into the switch).



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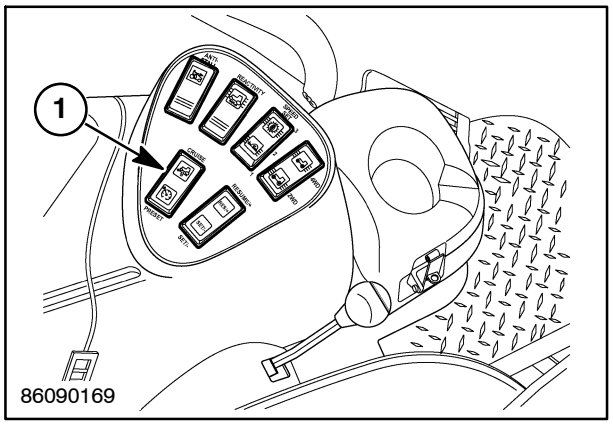
CRUISE/PRESET SWITCH

The cruise/preset switch, 1, is a three-position rocker switch located on the left control pod.

The three positions of the cruise/preset switch are:

- CRUISE POSITION (Tractor with arrow symbol is pushed into the switch).
- OFF POSITION (Middle position, both ends of switch protruding).
- PRESET POSITION (Speedometer symbol will be pushed into the switch).

An internal indicator bulb illuminates when the cruise/preset switch is in the cruise and preset positions.



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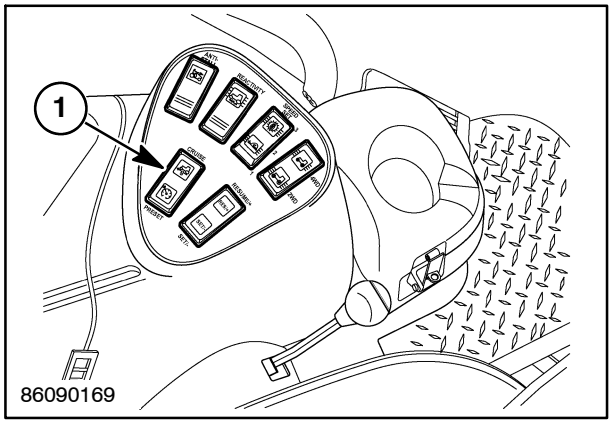
Removal

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal.
2. To remove the cruise/preset switch, 1, from the left control pod. Use a flat tip screwdriver to pry the switch out of the control pod.
3. Once the switch is removed from the control pod, unplug the wire harness connector from the cruise/preset switch.



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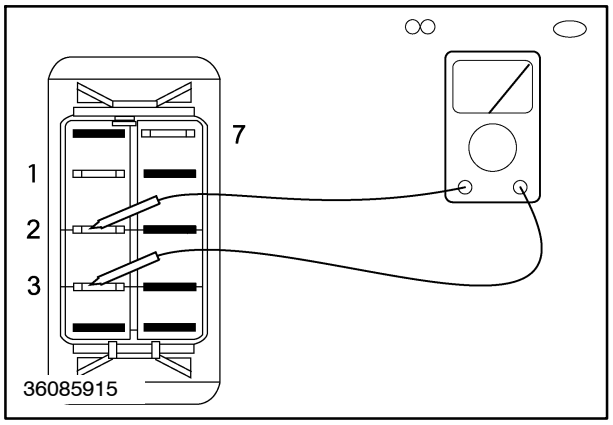
Testing

Use an ohmmeter to test the cruise and preset positions of the cruise/preset switch for electrical continuity.

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

CRUISE Position "ON"

1. Push the cruise/preset switch to he cruise position (Tractor with arrow symbol pushed into switch).
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 cruise/preset switch is defective and needs to be replaced.



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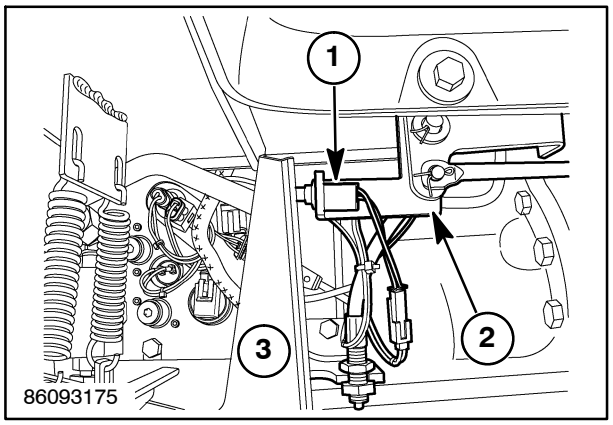
NOTICE: *If the tractor is equipped with the optional dual brake pedal kit #84180373, the brake switch, 1, is located on the platform bracket, 2, located by the cruise/brake switch lever, 3, on the left side of the tractor.*



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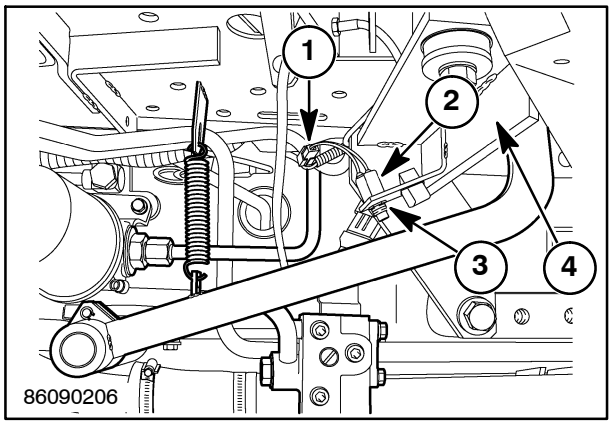
Removal

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal.
2. Disconnect the wire harness connector, 1, from the switch, 2.
3. Loosen the jam nut, 3, and remove the brake switch, 2, from the deck support bracket, 4.

NOTICE: *The brake switch removal procedure for a tractor equipped with the optional dual brake pedal kit is the same, except the switch is mounted on the platform bracket on the left side of the tractor.*



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Testing

Use an ohmmeter to test the mid and rear PTO switches for electrical continuity.

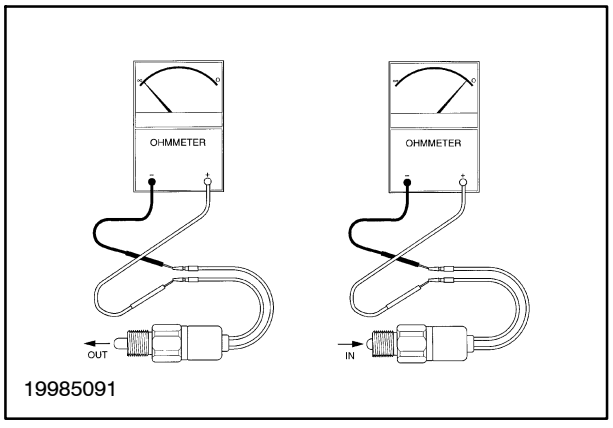
NOTICE: *To get accurate test readings use an analog ohmmeter.*

Extended Position

1. With the switch in the “extended” (brake on) position, continuity should not exist between the terminals. If continuity exists in the “extended” position, the switch is defective and needs replaced.

Retracted Position

1. With the switch in the “retracted” (brake off) position, continuity should exist between the terminals. If continuity does not exist in the “retracted” position, the switch is defective and needs replaced.



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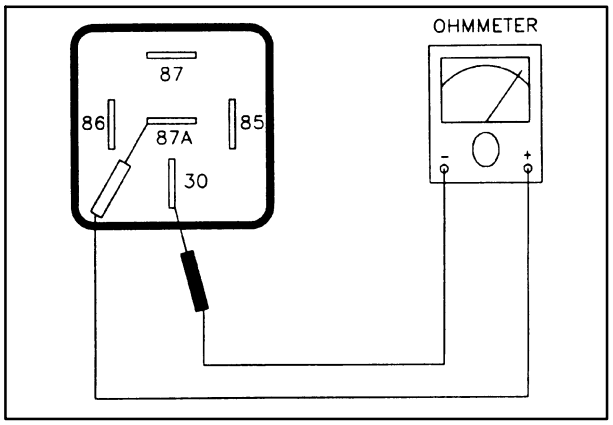
CRANK AND GLOW PLUG POWER RELAYS

Testing

1. Remove the relay from the tractor.
2. Using an ohmmeter, touch one test probe to terminal 87A and the other test probe to terminal 30.
3. Observe the ohmmeter. There should be little or no resistance, indicating continuity. If there is no continuity, the relay is defective and needs replaced.



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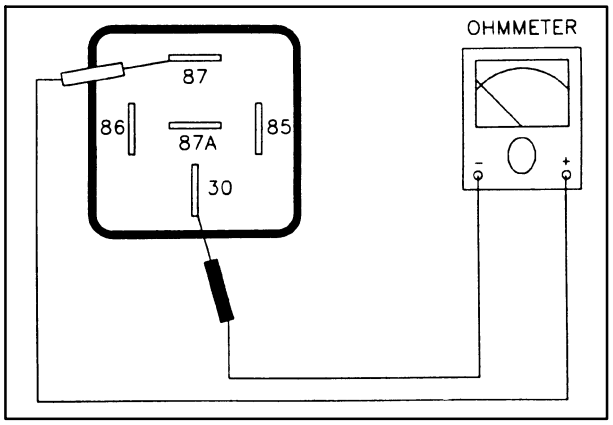
4. Repeat the previous test for terminal 30 and 87. There should be no continuity between these terminals. If tests indicate continuity, the relay is defective and needs replaced.



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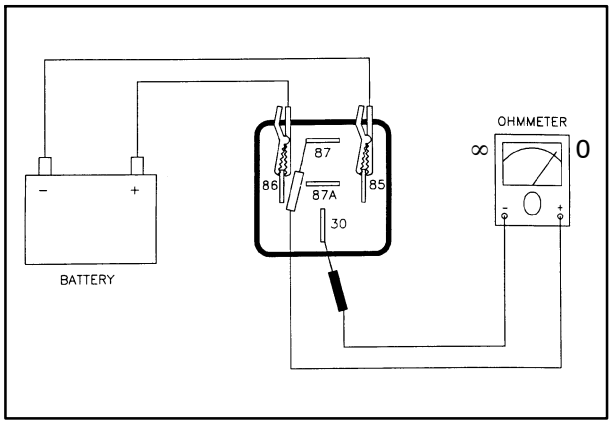
5. If the results from the previous test were good, use a jumper lead to connect the positive (+) terminal of a 12-volt power source to terminal 86 of the relay. Use a jumper lead to connect the negative (–) terminal of a 12-volt power source to terminal 85 of the relay. The relay should now energize.
6. Using an ohmmeter touch a test probe to terminal 30 of the relay. Touch the other ohmmeter test probe to terminal 87.
7. Observe the ohmmeter. There should be little or no resistance, indicating continuity. If there is no continuity, the relay is defective and needs replaced.



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Terminal Identification and Function

Terminal 1:

Wire Code HM79 K -0.8

5 volt input voltage

Terminal 2:

Wire Code HM6 P - 0.8

Variable output voltage from potentiometer

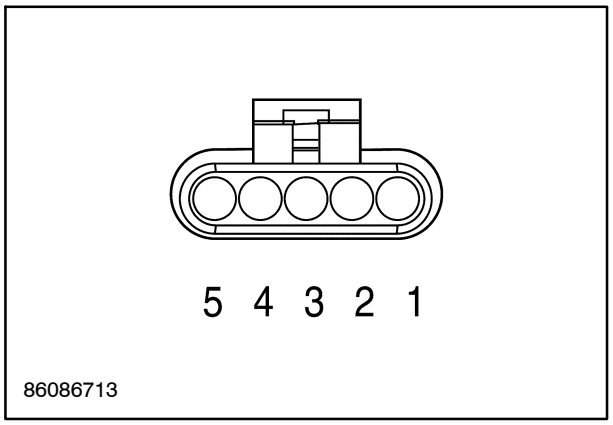
Terminal 3:

Wire Code HM8 B/W - 0.8

Ground for potentiometer

NOTICE: *Terminals 1, 2, 3 are on the potentiometer side of foot pedal control.*

NOTICE: *The terminals are shown looking at the harness side of the wiring harness plug.*



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Terminal 4:

Wire Code HM9 P- 0.8

Output voltage to transmission controller

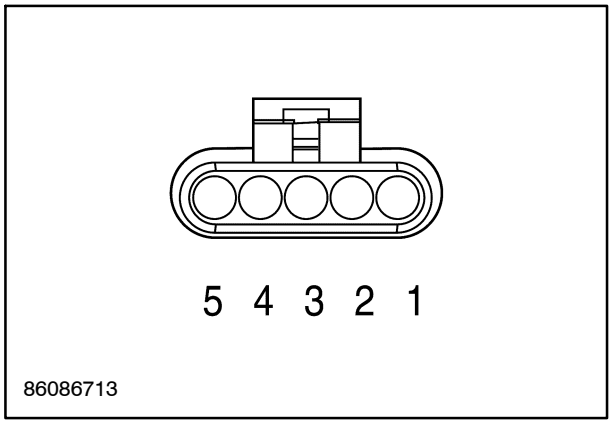
Terminal 5:

Wire Code HM69 O - 0.8

Switched Input voltage (12V)

NOTICE: *Terminals 4 and 5 are part of the Idle Validation Switch of the foot pedal control.*

NOTICE: *The terminals are shown looking at the harness side of the wiring harness plug.*



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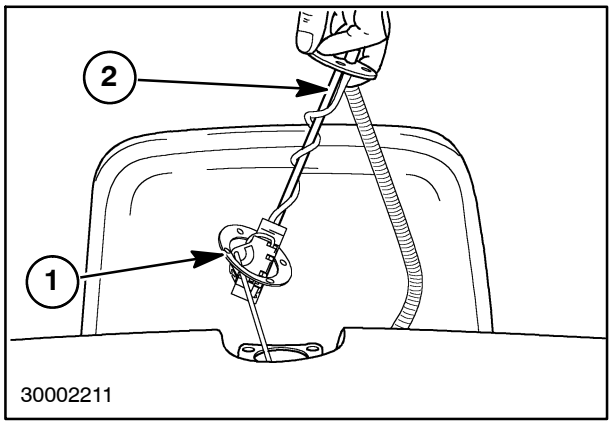
The idle validation switch function is: When the foot pedal is not depressed, the idle validation switch is closed sending 12 volt current to the transmission controller, this current tells the controller that the foot pedal is in the “OFF” position, the controller sensing this current prevents any movement of the tractor, when the foot pedal is not depressed.

When the foot pedal is depressed, the idle validation switch opens, cutting the current to the transmission controller and allowing the tractor to move.

Installation

1. Install a new sealing gasket, 1, between the sending unit, 2, and the fuel tank.
2. Carefully place the sending unit, 2, into the fuel tank.



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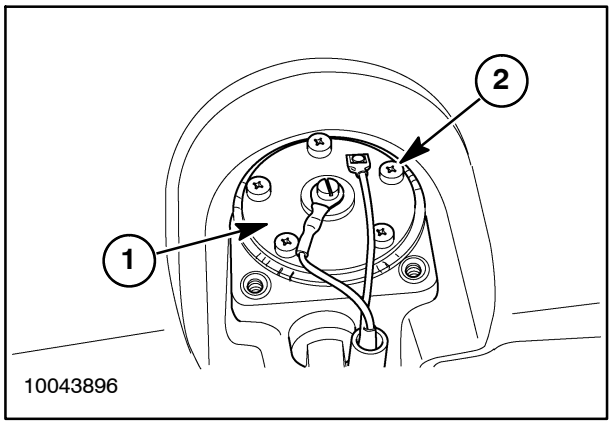
3. Secure the sending unit, 1, to the fuel tank using the five retaining screws, 2.



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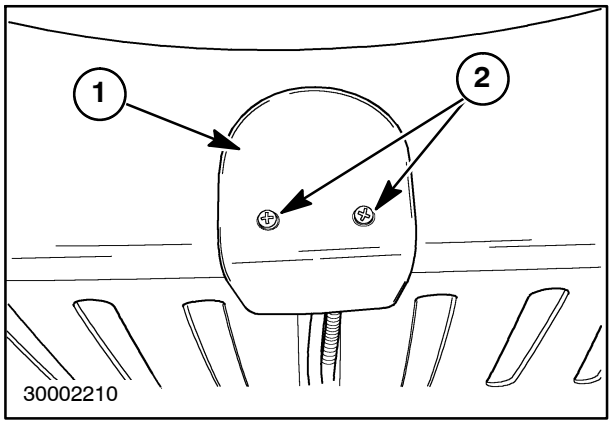
4. Install the fuel level sending unit cover, 1, using the two screws, 2.
5. Connect the fuel level sending unit to the wiring harness.
6. Reinstall fuel tank onto tractor.
7. Connect the negative (-) battery cable to the battery.



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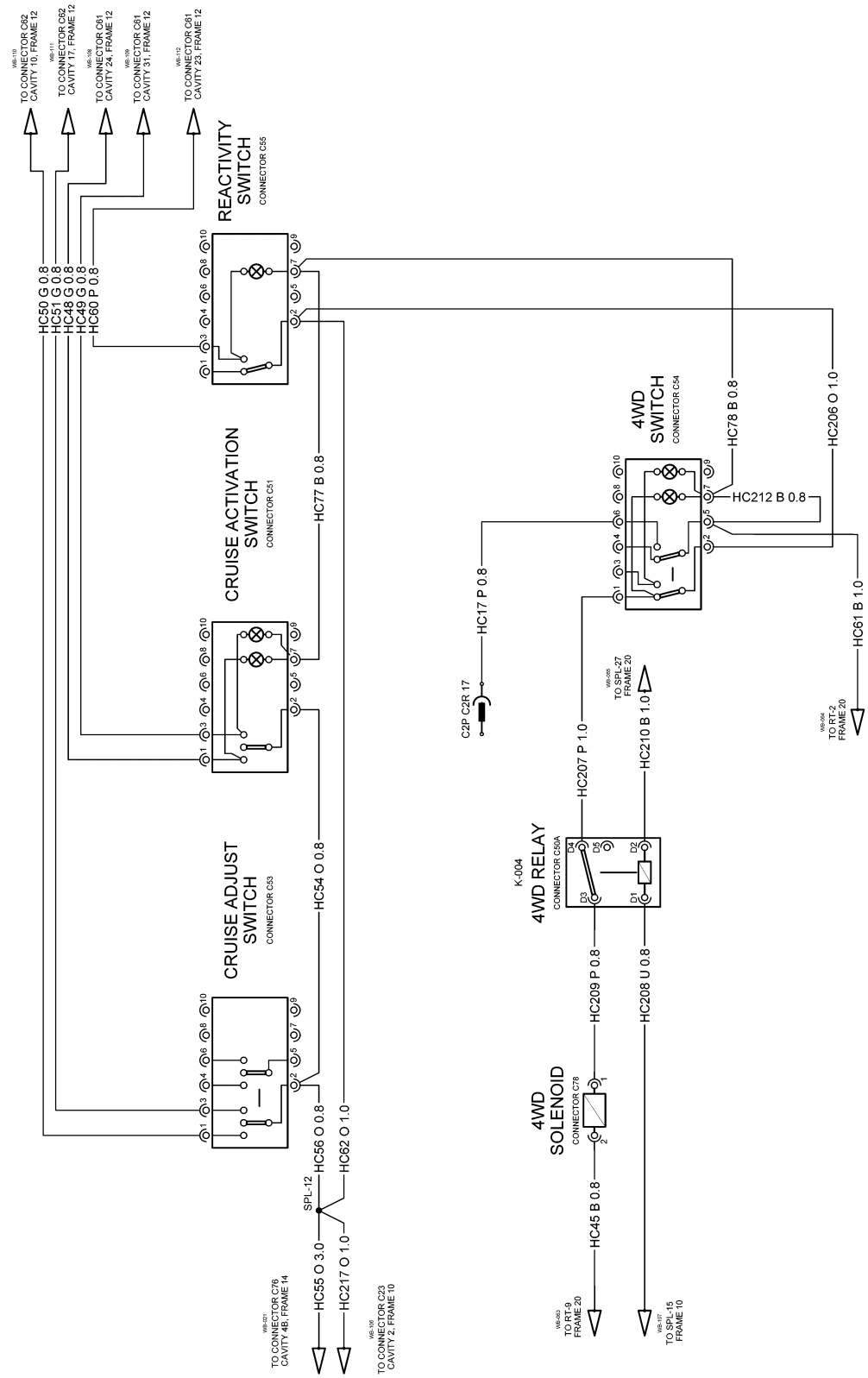
ELECTRICAL SCHEMATIC DIAGRAM
NEW HOLLAND BOOMER 8N COMPACT TRACTOR

NEW HOLLAND

FRAME 1

TRANSMISSION CONTROL SWITCHES

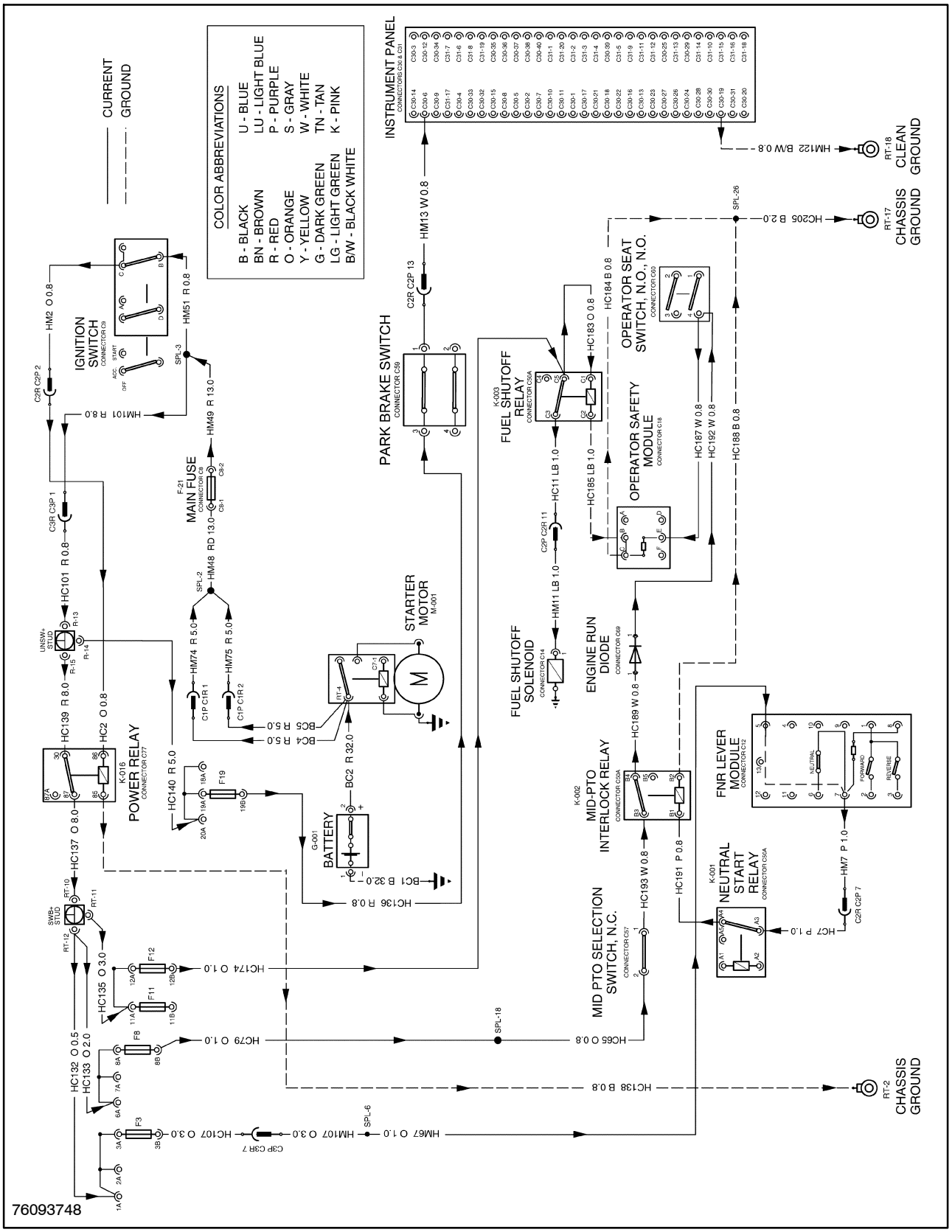


FRAME 11

INSTRUMENT CLUSTER MODULE - ICM PIN OUT TABLE					
PIN	DESCRIPTION - CN1 - C30	PIN	DESCRIPTION - CN2 - C30	PIN	DESCRIPTION - CN3 - C31
CN1-1	UNSWITCHED BATTERY 12V	CN2-1	SW BATTERY 12v	CN3-1	RESERVED
CN1-2	RIGHT TURN SIGNAL INDICATOR	CN2-2	SPARE	CN3-2	SPARE
CN1-3	POSITION LIGHTS	CN2-3	SPARE	CN3-3	SPARE
CN1-4	GLOW PLUG INDICATOR	CN2-4	SPARE	CN3-4	RESERVED
CN1-5	SPARE	CN2-5	SERVICE SWITCH	CN3-5	SPARE
CN1-6	PARKING BRAKE	CN2-6	TRACTOR BUS LO	CN3-6	PROGRAM UP / SELECT
CN1-7	RESERVED	CN2-7	TRACTOR BUS HI	CN3-7	PROGRAM DOWN / SELECT
CN1-8	ALTERNATOR CHARGING SENSE INDICATOR	CN2-8	SPARE	CN3-8	PROGRAM HOME / SET
CN1-9	FUEL LEVEL INDICATOR	CN2-9	OPERATOR SEAT PRESENCE SWITCH	CN3-9	SPARE
CN1-10	SPARE	CN2-10	SPARE	CN3-10	REAR PTO SPEED FREQUENCY
CN1-11	RESERVED	CN2-11	SPARE	CN3-11	SPARE
CN1-12	LEFT TURN SIGNAL INDICATOR	CN2-12	EXTERNAL CONNECTION OUT	CN3-12	SPARE
CN1-13	CRANKING LINE TO STARTER MOTOR	CN2-13	ALTERNATOR CHARGING RELAY ENABLE (D+)	CN3-13	SPARE
CN1-14	ENGINE OIL PRESSURE	CN2-14	SPARE	CN3-14	SPARE
CN1-15	EXTERNAL CONNECTION IN	CN2-15	SPARE	CN3-15	RESERVED
CN1-16	TRAILER INDICATOR	CN2-16	SPARE	CN3-16	SPARE
CN1-17	SPARE	CN2-17	SPARE	CN3-17	ENGINE COOLANT TEMPERATURE
CN1-18	SPARE	CN2-18	SPARE	CN3-18	SPARE
CN1-19	GROUND	CN2-19	BUZZER ALARM	CN3-19	PROGRAM ENTER / SET
CN1-20	GROUND	CN2-20	SPARE	CN3-20	BRAKE

FRAME 21

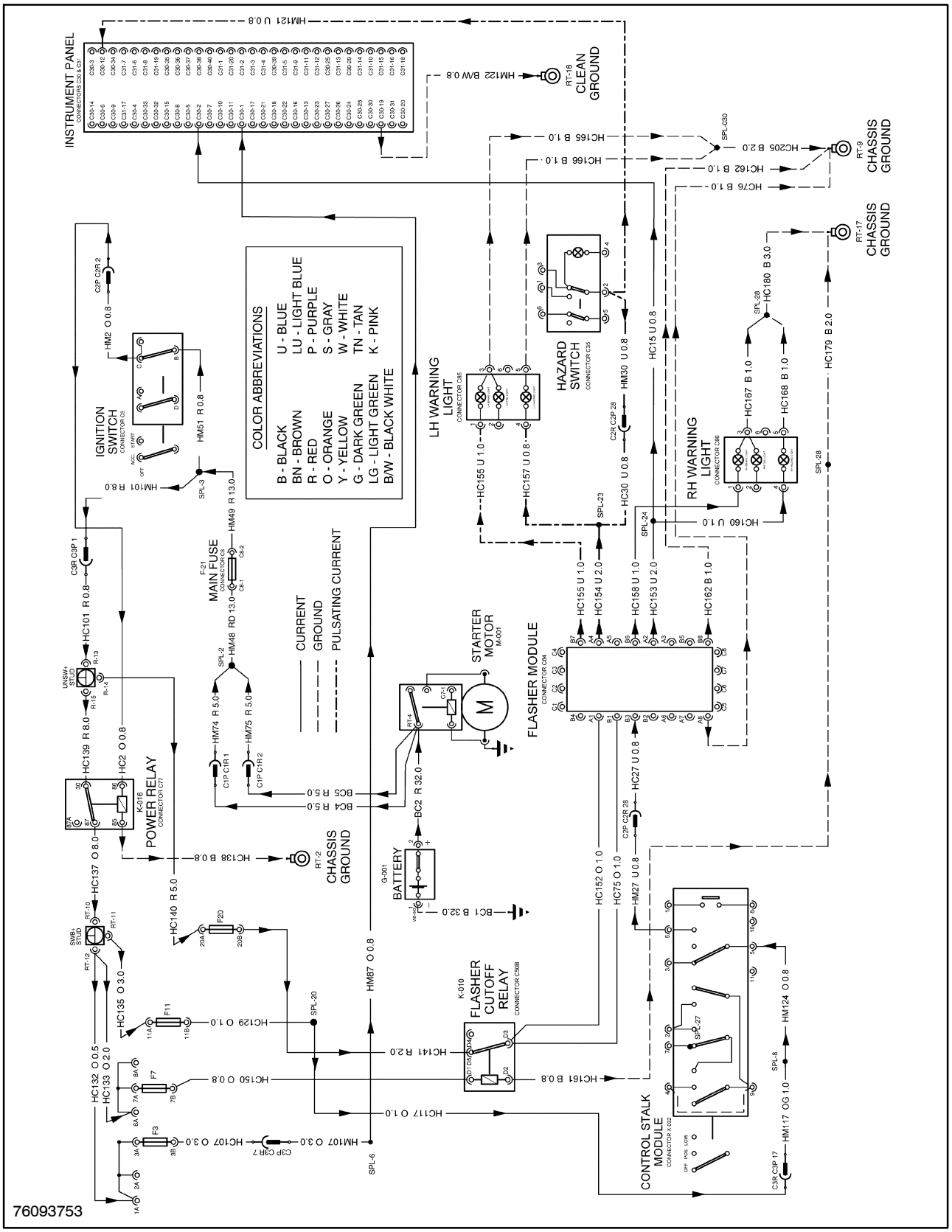
SAFE OPERATION CIRCUIT (OPERATOR NOT PRESENT)



Headlights Second Position

1. When the stalk switch is pushed downwards, with the switch in the headlight position, the headlights will remain illuminated. Current will be transferred from terminal #9 to #2.
2. When the high beam relay terminal “A1” is provided current from terminal #2 of the light stalk switch and terminal “A2” is provided a ground source the relay energizes. Terminal “A3” is provided current from fuse #11, (20 amp). When the relay energizes terminals”A3” and “A5” are latched.
3. Terminal “A5” sends current to the following:
   - Front headlights terminal “B”
4. The ground source for these lights is provided by the chassis ground.

LEFT TURN SIGNAL CIRCUIT



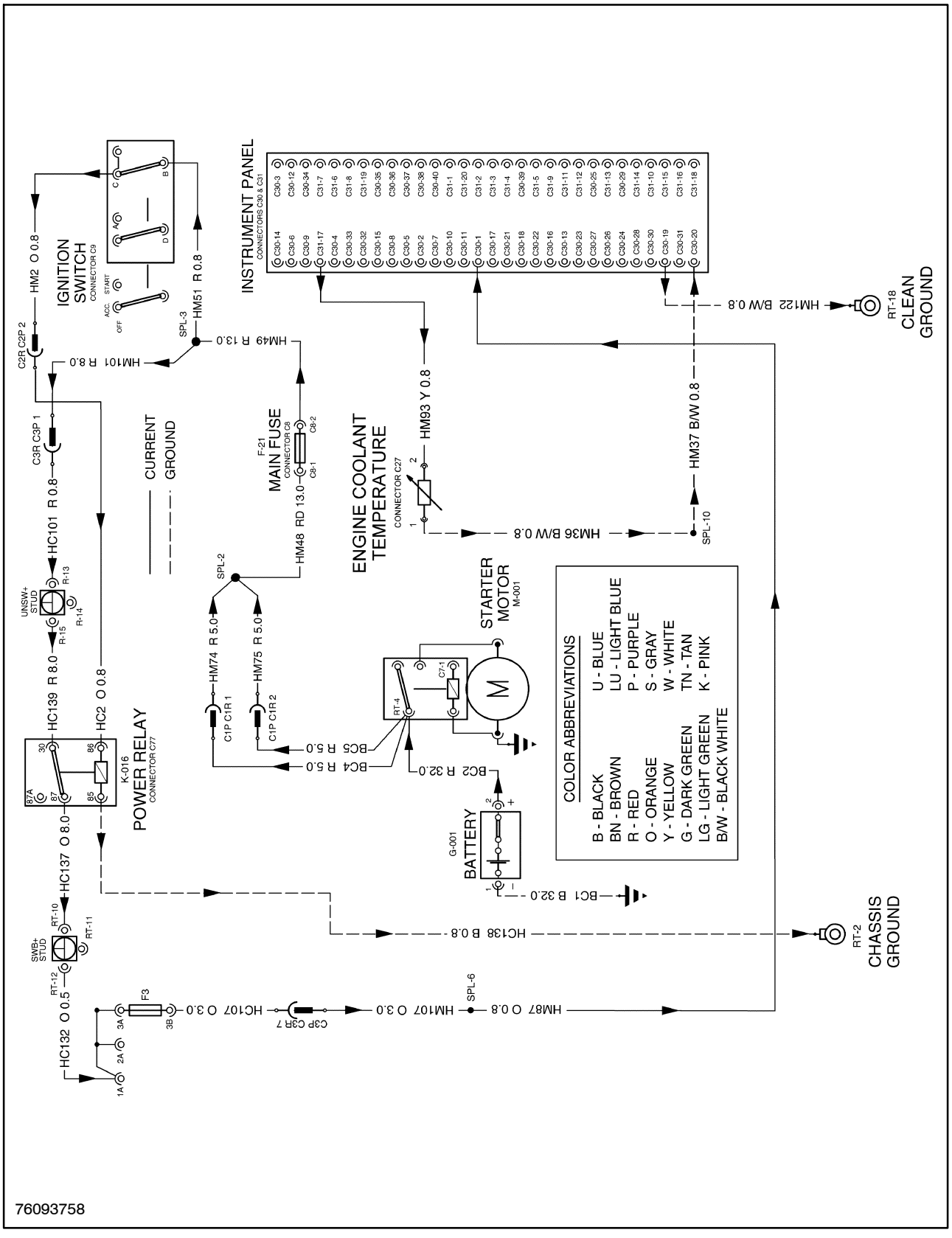
2. When the tractor engine is running with the alternator rotating and the ignition switch in the “ACC/RUN” position, the alternator produces an increased regulated voltage to the battery.
   - When the alternator is producing current, the ground circuit, through terminal #1, for the charge indicator light is disrupted, causing the indicator light not to illuminate, current is sent from terminal #1 of the alternator to terminal #33 of the ADIC.

NOTICE: *Terminal #1 of the alternator has two functions, when the alternator is not charging, terminal #1 is completing the ground circuit for the charge indicator light and when the alternator is charging, terminal #1 is sending current to the ADIC to indicate a charge is being generated.*

   - Terminal #2 controls the voltage output from the alternator. If current is not present at terminal #2 the alternator will not produce current.
   - Ring terminal “B” on the alternator is the output connection between the alternator and the battery.

3. Terminal #19 of the ADIC provides the ground source for the instrument cluster.

ENGINE COOLANT TEMPERATURE CIRCUIT



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FUEL LEVEL CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Inoperative fuel level gauge	Faulty power relay	Test relay, replace if necessary
	Blown #3, 20-amp fuse	Replace 20-amp fuse
	Malfunctioning fuel level sending unit	Test fuel level sending unit and replace if necessary
	Improper ground circuit	Check fuel level sending unit connections and circuit grounds and repair as necessary
	Malfunctioning fuel gauge	Test fuel gauge and replace ADIC instrument cluster as necessary

H1-Calibration Procedures (SF only)

The H1 menu allows the technician to calibrate the clutches and variator in the continuously variable transmission (CVT). These procedures allow the electronic transmission control module to determine the current required to activate the solenoids when the clutches begin to engage.

NOTICE: *Before beginning this procedure ensure the tractor is parked on a flat surface with the parking brake engaged and transmission fluid is at a minimum temperature of 60 °C (140.0 °F). Block the wheels and turn off any accessories.*

⚠ WARNING ⚠

The machine could move during the calibration process. Be sure that the area around the machine is clear. Failure to comply could result in death or serious injury.

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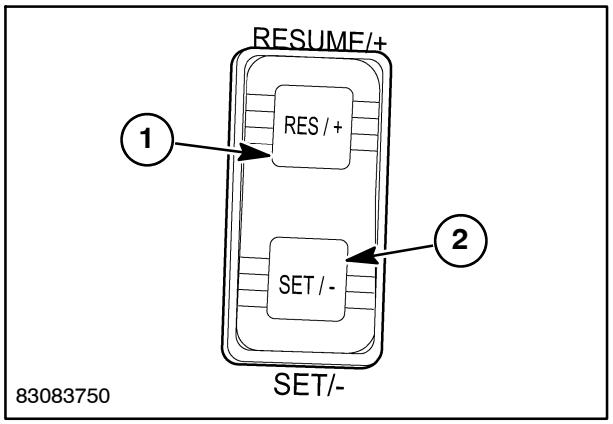
Forward and/or Reverse Clutch Calibration

1. With the SF controller menu selected, enter the H1 calibration menu.
2. You may select the calibration procedure (Forward (F) or Reverse Clutch (R) or the Variator (C)) by pressing the RESUME/+ switch **(1)**.
3. Ensure the handbrake is engaged and place the shuttle lever in gear. Apply heavy pressure to the brake pedal to aide in holding the tractor in place during this procedure.
4. Press and hold the SET / -switch, **(2)**. The calibration procedure will start (do not release the switch). The display will show a three digit current value in milliampere, mA, which will vary during the calibration process.
5. When the correct calibration current is reached, the display stops and will show the calibration current flashing.
6. Release the SET / -switch **(2)**. The next calibration procedure (in order of Forward, Reverse, then Variator) will automatically be selected for completion. To select a calibration procedure out of the preset order, press the RES / + switch **(1)** and select the desired calibration procedure.
7. Repeat steps 4 and 5 to calibrate the Reverse clutch.

NOTICE: *Transmission output RPM, shuttle lever position, the RESUME / + switch and the handbrake are constantly monitored during this calibration procedure. If an abnormal condition is detected at any point during the process, a "U" code is displayed in the lower left corner of the LCD. Refer to the table below for an explanation of these codes.*



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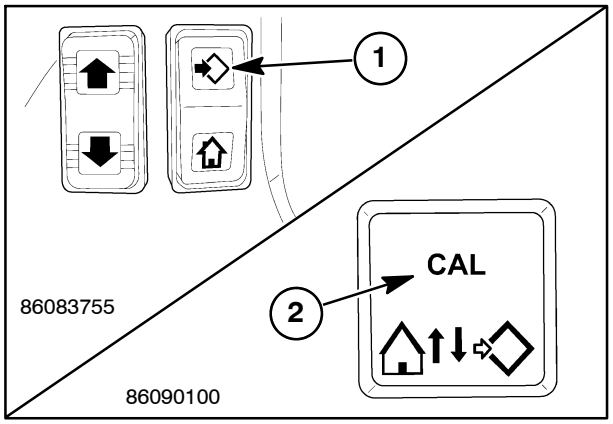
ADIC PROGRAMMING

WHEEL SPEED CALIBRATION

This feature allows the operator to calibrate the wheel speed when different tire sizes have been installed onto the tractor.

- Locate a smooth, level surface. Measure and clearly mark off a distance of 100 meters (328 ft).
- Start the tractor engine. Press and hold the ENTER switch, 1, to obtain ADIC “Set Up” programming mode, 2.



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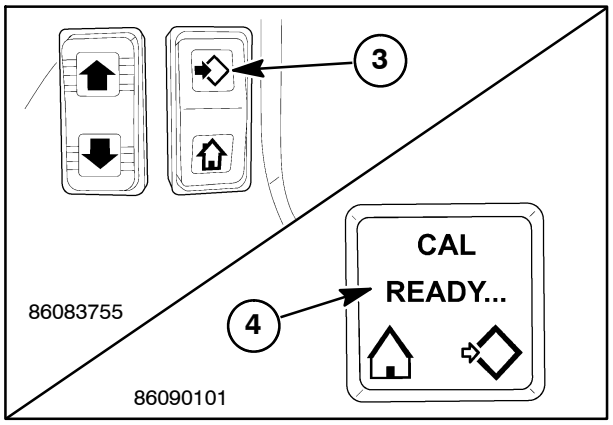
- Press the ENTER switch, 3, to navigate to WHEEL SPEED CALIBRATION mode, 4.
- Drive forward and maintain a constant speed greater than 2 km/h (1.24 mph), while approaching the pre-measured calibration area.

NOTICE: *The operator may use the cruise control while performing this calibration procedure.*



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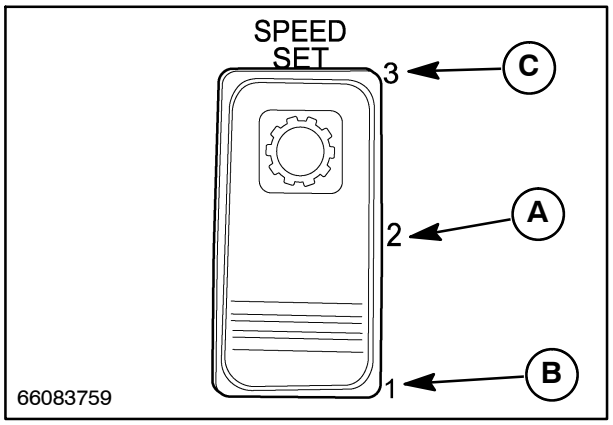
- To activate the MAX SPEED SET, place the Speed Range Switch in the middle position, A (#2).

NOTICE: *MAX SPEED SET will NOT work if Speed Range Switch is in the, B (#1) or C (#3), positions. If the switch is placed in positions, B, or, C, the tractor will not acknowledge the programmed MAX SPEED SET.*



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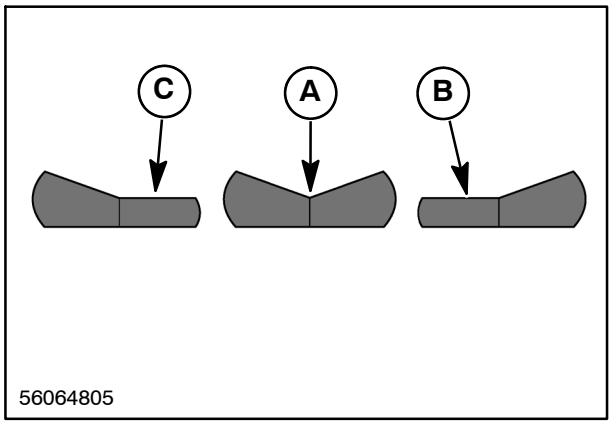
Speed Set Switch Position	Speed %	Default Top Speed @ Full Throttle	Max Speed Set @ Full Throttle
1	30%	0-9 km/h (0-5.6 mph)	NA
2	60%	0-18 km/h (0-11.2 mph)	0-30 km/h (0-18.6 mph)
3	100%	0-30 km/h (0-18.6 mph)	NA



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Tractor is set to go only as fast as the MAX SPEED SET. To increase the MAX SPEED raise the percentage, and to decrease the MAX SPEED lower the percentage in the MAX SPEED SET menu.

NOTICE: *If MAX SPEED SET is programmed while speed control pedal is pressed, control system WILL NOT activate the MAX SPEED mode until pedal is released.*

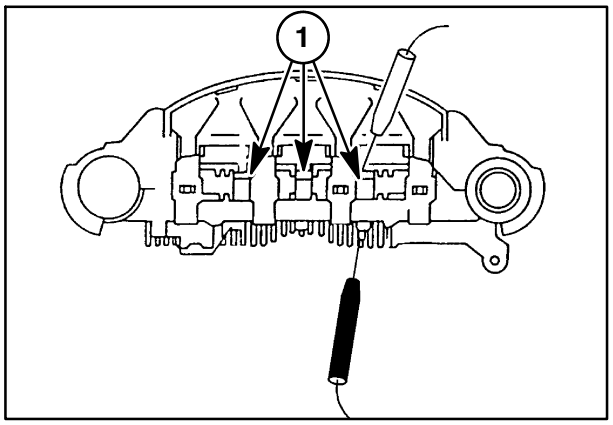
Once activated, the control system recalibrates the speed control pedal so full stroke gives operator the maximum speed set in the ADIC.

The basic operating principles are explained as follows, see Figure 2:

1. When the key switch, 6, is closed, current from the battery, 7, flows through the indicator lamp, 5, and resistor R6, which are in parallel to the field coil, 2. From here it continues to flow on through the field coil, 2, to the ground, completing the circuit back to the battery, 7.
2. When the alternator begins to rotate, AC voltages are generated by the stator coil, 3. The diodes in the rectifier assembly change the stator AC voltages to DC voltage which appears between ground and the “B” terminal.
3. The stator also supplies DC field current through the diode trio, 4, the field coil, 2, the power transistor, Tr2, and then through the diodes in the rectifier assembly back to the stator.
4. When the generated voltage is low, no current flows in the zener diode, DZ, since the voltage at point “A” is lower than the zener voltage.
5. As the speed and voltage increase, the voltage at point “A” also increases until it reaches the limiting value set at the factory. As the zener diode, DZ, breaks down, current flows through R1, DZ, and the base-emitter circuit of Tr1 to ground. This renders Tr1 conductive, so that much of the current flows through the collector-emitter circuit of Tr1. This reduces the base current of Tr2 thereby reducing the field current. This means that Tr1 turns on and Tr2 turns off.
6. When the generated voltage decreases, the zener diode, DZ, again turns off and Tr1 also turns off. This cycle repeats many times per second, and the alternator output voltage is, therefore, regulated within a narrow limit.

   In other words, the action is similar to the conventional vibrating-contact regulator, in that current to the field coil, 2, is varied to limit the output voltage, but in place of the voltage coil and spring system, there is a voltage divider network, R1 and R2, and a zener diode, DZ.

5. Test each of the three small diodes, 1, by touching the positive (+) ohmmeter test probe to one end of a diode and the negative (–) test probe to the opposite end of the diode.
6. Observe the ohmmeter for continuity.
7. Now switch the positions of the test probes and observe the ohmmeter for continuity. The ohmmeter should indicate continuity in one direction only. If there is continuity in both directions, or no continuity at all, the rectifier assembly is defective and needs replaced.



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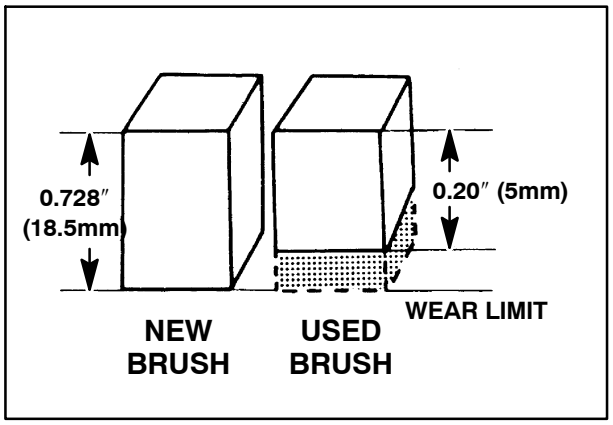
Alternator Brushes

1. Carefully clean the alternator brushes with a soft, dry cloth and electrical component cleaner, if available.
2. Inspect the brushes and brush springs for corrosion, damage, stretched springs, or a damaged brush holder. If damaged, replace the brush assembly.
3. Use a suitable measuring device to measure brush wear. The minimum brush length is 5 mm (.020 in). If either brush is worn beyond specifications, replace the brush assemblies.



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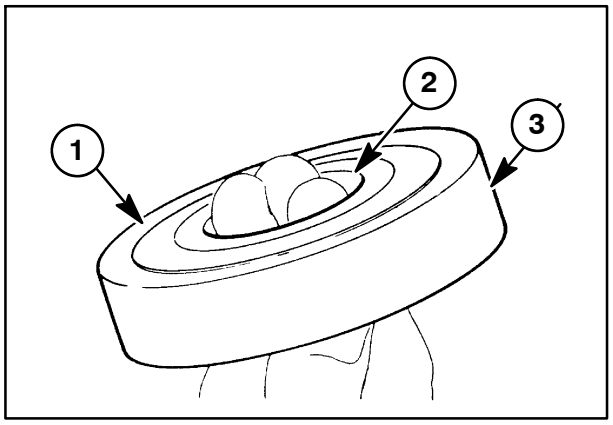
Alternator Bearings

1. Inspect the alternator bearings for smooth operation by spinning the bearing. Replace bearings that are rough and do not rotate smoothly.
2. Inspect the bearings for grease leakage between the bearing seal, 3, and races, 1, and 2.
3. Inspect the inner race, 1, and the outer race, 2, for signs of spinning in the alternator frame or on the rotor shaft.
4. Replace bearings that are damaged in any way.



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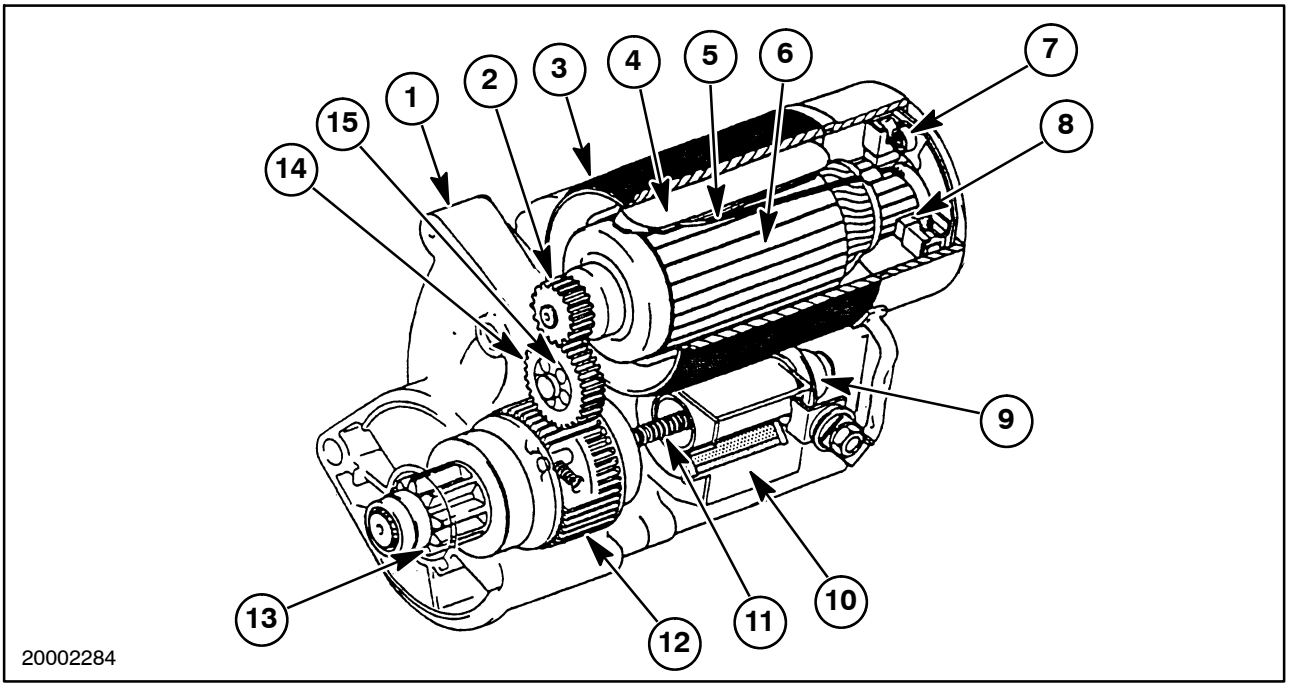
STARTING SYSTEM

DESCRIPTION OF OPERATION

The starting system consists of a starter motor equipped with an electromagnetic starter solenoid, a key switch, a start relay, several safety switches, and heavy-duty wiring.

STARTER COMPONENTS



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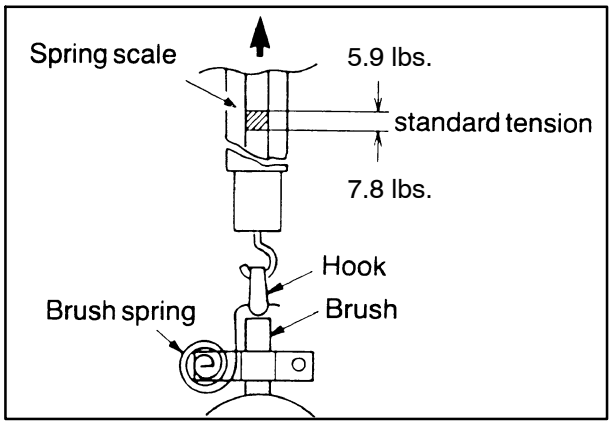
1. Reduction Uni Cover
2. Armature Drive Gear
3. Motor/Field Coil Housing (Yoke)
4. Permanent Magnet
5. Field Coil
6. Armature
7. Brush Spring
8. Brush
9. Plunger
10. Solenoid
11. Return Spring
12. Pinion Clutch
13. Pinion
14. Idler Gear
15. Idler Gear Roller Bearing

Starter Motor Assembly

The starter motor features a high-speed motor that utilizes a gear reduction unit, an overrunning pinion clutch, 12, and permanent magnets, 4, in a field coil, 5, for magnetic field induction. The reduction unit consists of a small drive gear, 2, on the motor armature, 6, which drives an idler gear, 14, in the reduction unit. The idler gear is splined to the gear on the pinion clutch housing, 12. When the starter solenoid, 10, is energized, the solenoid plunger, 9, pushes the pinion gear, 13, out, engaging with the engine flywheel. The starter motor then is turning the flywheel, which rotates the engine. The use of the gear reduction unit allows use of the compact, high-speed motor and provides more torque and power to turn the engine flywheel. The sliding pinion mechanism is enclosed, resulting in a more durable mechanism.

13. Test the brush spring tension by connecting a spring balance to the brush spring and pulling until the spring moves. Observe the reading indicated on the spring balance. If the reading is between 2.7 – 3.6 kg (5.9 – 7.8 lb.), the spring tension is within specifications. Otherwise, replace the brush springs.



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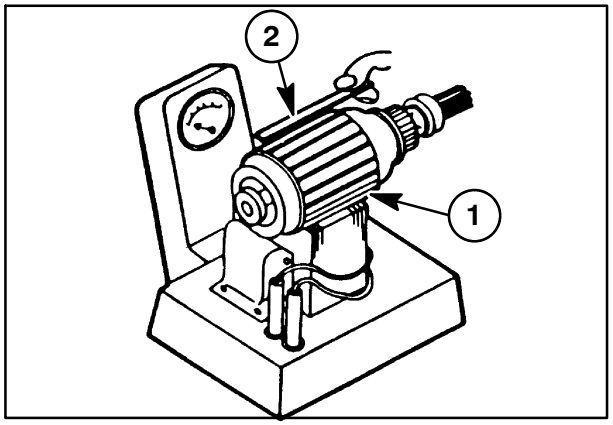
ELECTRICAL TESTING

Armature

1. Use a growler, 2, to inspect the armature coil, 1, for short circuits. Replace if the armature is shorted.



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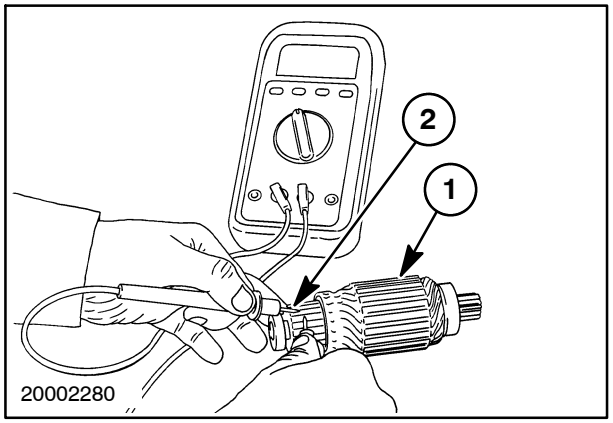
2. Use an ohmmeter to test for continuity in the armature coil, 1.
3. Touch one ohmmeter test probe to a commutator contact, 2. Touch the ohmmeter test probe to an adjacent commutator contact.
4. Observe the ohmmeter. Repeat the test on each adjacent commutator contact. Little or no resistance indicates that there is continuity and the armature coil is good. High resistance indicates that the armature is defective and needs replaced.



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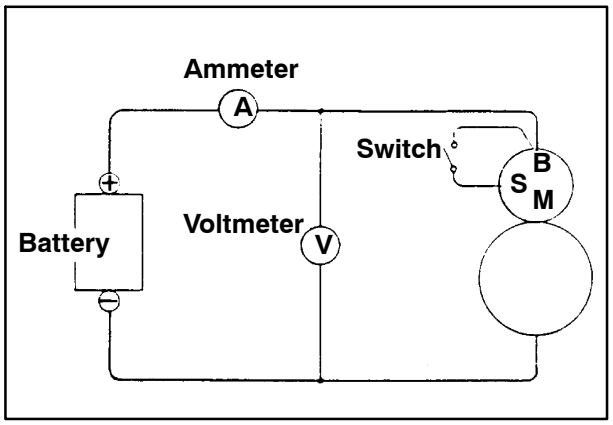
No Load Test

NOTICE: *Before installing the starter motor to the tractor engine, it is recommended that a no load test be performed on the starter motor.*

⚠ CAUTION ⚠

Do not operate the starter for than 30 seconds at a time.

1. Connect a battery and switch to the battery terminal of the starter and the "S" terminal of the solenoid.
2. Connect an ammeter between the positive (+) battery terminal of the battery and the battery terminal of the starter solenoid.
3. Connect a voltmeter, after the ammeter, between the positive (+) lead from the battery and the negative (-) lead from the battery.
4. Close the switch and record the readings indicated on the ammeter and voltmeter.
5. Test starter components if any abnormal operation is noted.
6. Service limits are 11.5 volts, 110 amps maximum at 4000 RPM.



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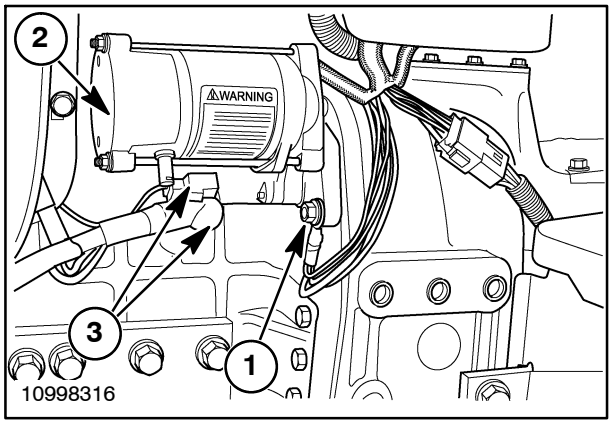
Installation

1. Install the starter motor, 2, to the engine and secure using the two (2) retaining bolts, 1. Be sure all ground terminals are connected to the bottom starter bolt.
2. Connect the tractor wiring harness connections, to the starter.
3. Connect the negative (-) battery cable to the battery.



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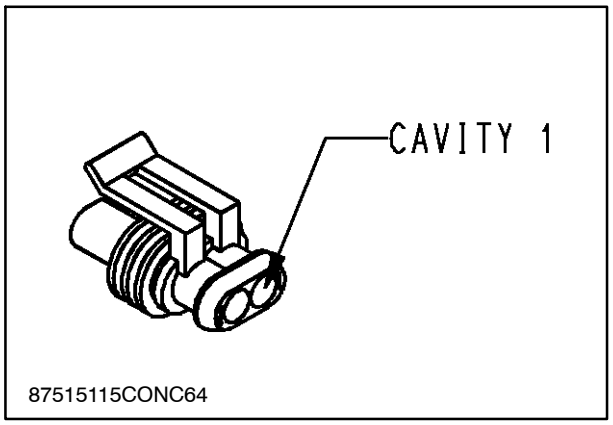
Connector C64 - Stand Still Solenoid

Cavity	Circuit ID	Description
1	HC87	Stand Still Solenoid
2	HC86	Stand Still Return



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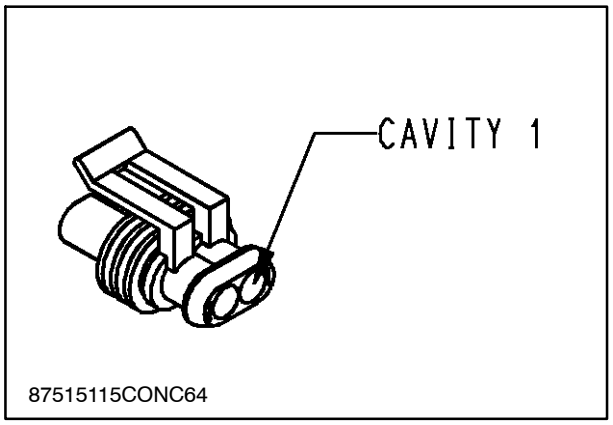
Connector C65 - Forward Solenoid

Cavity	Circuit ID	Description
1	HC88	Forward Solenoid
2	HC89	Forward Return



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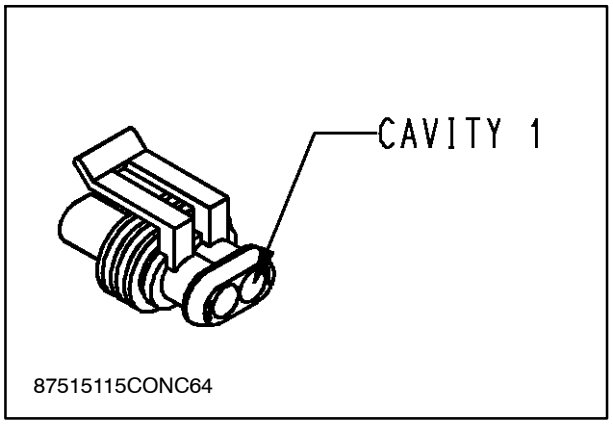
Connector C66 - Reverse Solenoid

Cavity	Circuit ID	Description
1	HC90	Reverse Solenoid
2	HC91	Reverse Return



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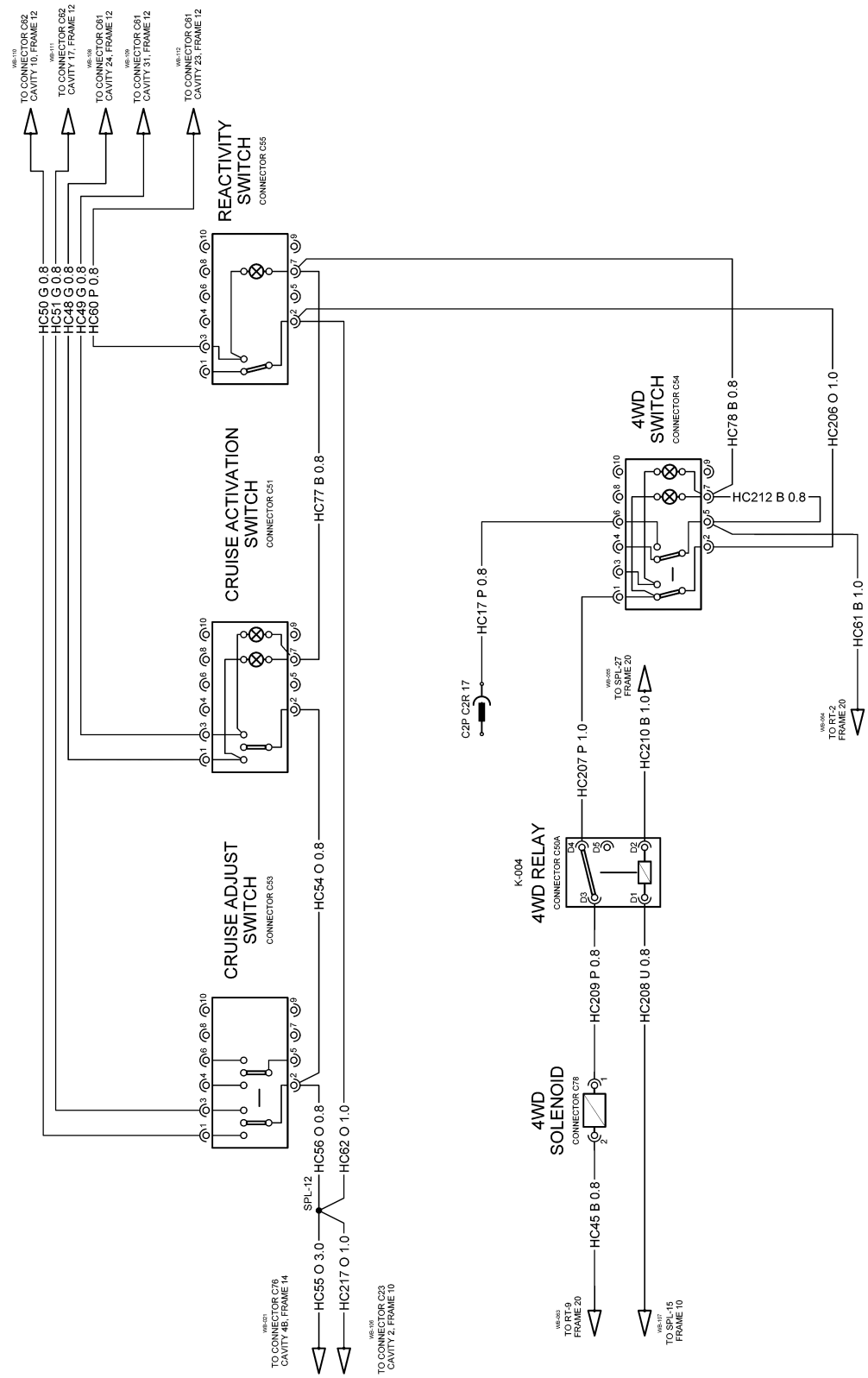
TRANSMISSION CONTROL SWITCHES



FRAME 11

2052 - OIL TEMPERATURE SENSOR SHORT TO GROUND OR HIGH VOLTAGE

Control Module: TCU

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

Context:

The temperature sensor is sourced by the TCU and varies the signal level being sensed by the TCU based upon the temperature of the oil. If the signal level falls below **0.1 V**, this error will occur.

Cause:

Short to ground on the transmission oil temperature sense line.

Possible failure modes:

1. Faulty connector
2. Faulty oil temperature sensor
3. Faulty harness
4. Faulty controller

Solution:

1. Check the temperature sensor connector **C74**, and the controller connector **C61**.
   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 temperature sensor for a short to ground.
   A. Disconnect connector **C74**. Check between the component side of connector **C74** pin A and pin B to chassis ground. If short to ground is indicated, remove and replace the temperature sensor.
   B. If the temperature sensor is okay, continue to step **3**
3. Check for short to ground.
   A. Disconnect connector **C61**. Check between connector: **C74** pin A (Y) and 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.

2. Check the shuttle lever forward switch.

   A. Disconnect the shuttle lever connector **C12**. Move the shuttle lever to forward and measure the resistance between the component side of connector **C12** pin 1 (K) and **C12** pin 2 (P), if the resistance indicated is not approximately **2.56K Ohms**, and then in neutral approximately **0.56K Ohms**, remove and replace the shuttle lever forward switch.

   B. If the shuttle lever forward switch is okay, continue to step **3.**

3. Check for an open circuit.

   A. Turn the keystart OFF. Disconnect the controller connector **C61**. Check between connector **C61** pin J1-15 (P) and **C12** pin 2 (P) . If an open circuit is indicated, repair or replace the harness as required. If an open circuit is not indicated, continue to step **4.**

4. Check for a short to ground.

   A. Check between connector **C61** pin J1-15 (P) and 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 re-occurs, remove and replace the controller.

2362 – FORWARD CLUTCH NOT CALIBRATED

Control Module : TCU

NOTE: *For Calibration Procedure refer to Section 21, Chapter 1.*

2605 - TRANSMISSION SPEED PEDAL POTENTIOMETER SHORTED TO GROUND OR OPEN CIRCUIT

Control Module : TCU

Cause:

Possible failure modes:

1. Faulty harness
2. Faulty connector
3. Faulty potentiometer internal to accelerator pedal
4. Faulty controller

Solution:

1. Check the accelerator pedal connector **C16**, the TCU connector **C61**, and inline connector **C2**.
   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 voltage from the 5V source line: With the ignition switch in the ON position, disconnect connector **C16** and, on the harness side, check for a voltage between pin 1 (K) and chassis ground.
   A. If **5 V** are indicated, go to step **3.**
   B. If **0 V** are indicated, there is a break and/or short to ground in the source line; repair or replace as required.
3. Check for an open circuit in clean ground. With the ignition switch in the OFF position, check for continuity from connector **C16**, pin 3 (BW), to chassis ground.
   A. If continuity is indicated, leave connector **C16** disconnected and go to step
   B. If continuity is not indicated, there is a break in the clean ground line; repair or replace as required.
4. Check for continuity and ground in the signal line between connector **C16** and connector **C2**: Disconnect connector **C2** and measure continuity from connector **C2**, pin 6 (P) to connector **C16**, pin 2 (K); also measure continuity from connector **C2**, pin 6 (P), to chassis ground.
   A. If continuity is indicated and there is no continuity to ground, leave connector **C2** disconnected and go to step **5.**
   B. If continuity is not indicated or there is continuity to ground, there is a break and/or grounded circuit condition in the signal line between the two connectors; repair or replace as required.
5. Check for continuity in the signal line between connector **C2** and connector **C61**: Disconnect connector **C61** and measure continuity from connector **C61**, pin 7 (P) to connector **C2**, pin 15 (P); also measure continuity from connector **C61**,pin 7 (P) to chassis ground.
   A. If continuity is indicated and there is no continuity to ground, replace the accelerator pedal. Should the error reoccur, reload the proper level of software, and then if the error reoccurs again, replace the TCU.
   B. If continuity is not indicated or there is continuity to ground, there is a break and/or grounded circuit condition in the signal line between the two connectors; repair or replace as required.

2640 - TRANSMISSION STANDSTILL SOLENOID OPEN CIRCUIT OR SHORTED TO GROUND

Control Module: TCU

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

Cause:

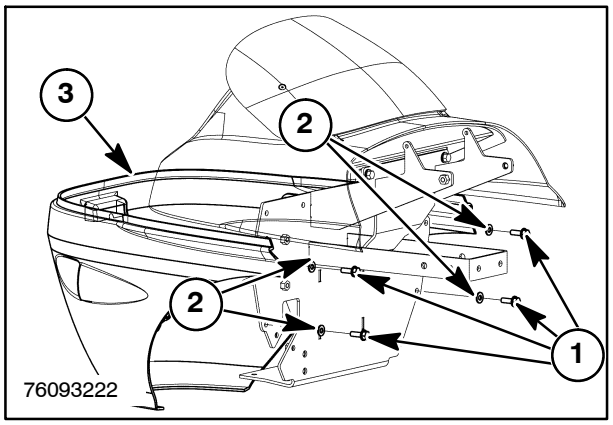
Possible failure modes:

1. Faulty connector
2. Faulty transmission standstill solenoid
3. Faulty harness
4. Faulty controller

Solution:

1. Check the transmission standstill solenoid connector **C64** and the controller connector **C62**.
   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 transmission standstill solenoid.
   A. Disconnect connector **C64**. Measure the resistance between the component side of connector, **C64** pin 1 and 2. If the resistance indicated is not approximately **9 Ohms** at **20 degrees centigrade**, remove or replace the transmission standstill solenoid.
   B. If the transmission standstill solenoid is okay, continue to step **3.**
3. Check for an open circuit.
   A. Disconnect connector **C62**, and **C64.** Check between connector:
   C64. pin 1 (P) and **C62** pin J2-7 (P)
   C64 pin 2 (B) and **C62** pin J2-2 (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: **C64** pin 1 (P) and ground. **C64** pin 2 (B) and 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.

4. Loosen and remove the four M8x25 mm retaining bolts, 1, and M8 Belleville washers, 2, which secure the rear hood panel.
5. Remove the rear hood panel, 3, and disconnect the key switch.
6. Disconnect wiring harness from switches, 7 (Fig. 8).



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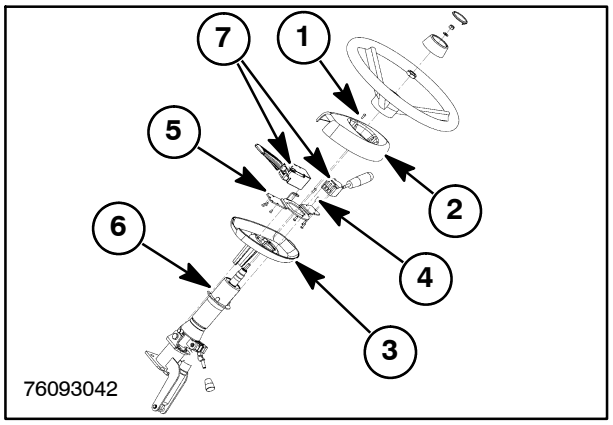
7. Loosen and remove screw, 1, separating the two control pod halves, 2 and 3. Lift top section of pod, 2, from steering column.
8. Loosen and remove three screws, 4, securing the switch mounting plate, 5, to the lower pod section, 3.
9. Lift lower pod section, 3, from the steering column, 6.



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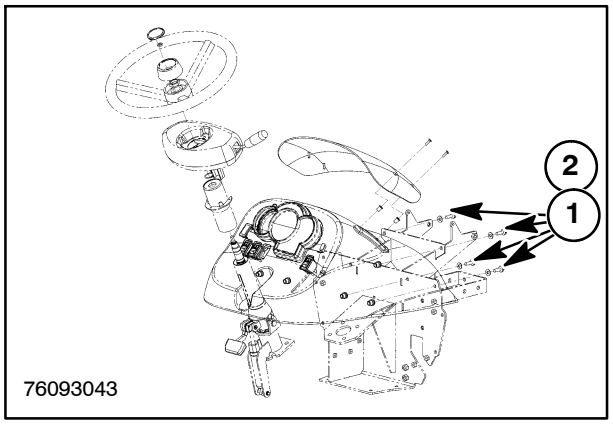
10. Loosen and remove the six M8x25 mm retaining bolts, 1, and M8 Belleville washers, 2, which secure the dash console to the firewall.



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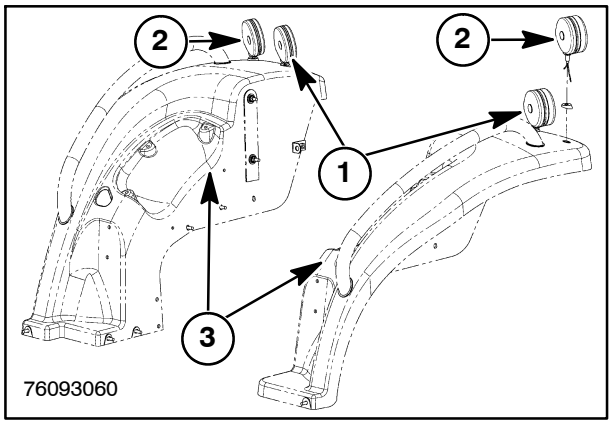
FENDERS

Removal

1. Remove taillights, 1, and turn signal lights, 2, from fenders, 3.



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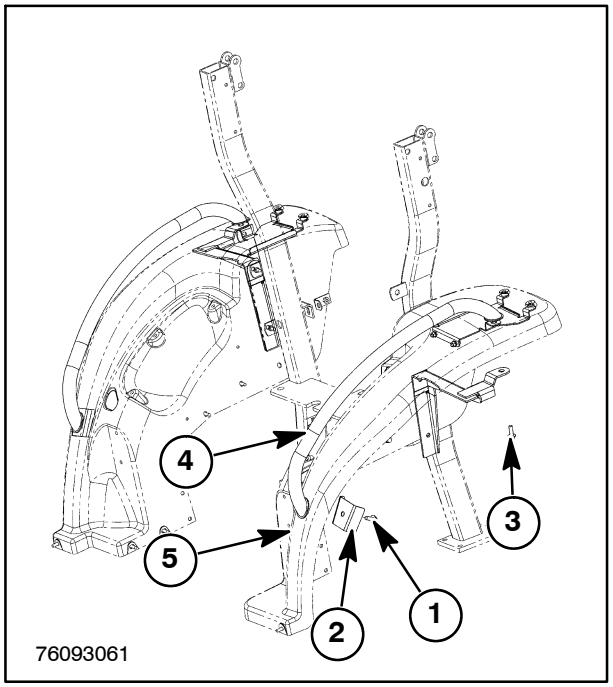
2. Loosen and remove M10x25 mm bolt, 1, handle support, 2, and M10x30 mm bolt, 3.
3. Remove handle, 4, from atop the left hand fender, 5.
4. Repeat steps 2 and 3 for the right hand fender.



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