
BOOMER 4055, BOOMER 4060 SERVICE MANUAL COMPLETE CONTENTS

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The following pages are the collation of the contents pages from each section and chapter of the Boomer 4055, Boomer 4060 Service manual. Complete Service part # 84242310.

The sections used through out all New Holland product Service manuals may not be used for each product. Each Service manual will be made up of one or several books. Each book will be labeled as to which sections are in the overall Service manual and which sections are in each book.

The sections listed above are the sections utilized for the Boomer 4055, Boomer 4060 Tractors.

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SECTION 21 - TRANSMISSION

BOOK 2 - 84270066

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SECTION 00 - GENERAL INFORMATION - CHAPTER 1

Lubricant	Type and Description	Part Number	Container Size
Engine Oil	AMBRA SUPER GOLD SSL ENGINE OIL SAE 10W-40	86994335	9.46 L/2.5 US gal
	AMBRA SUPER GOLD HSP ENGINE OIL SAE 10W	86641050	18.93 L/5 US gal
	AMBRA SUPER GOLD HSP ENGINE OIL SAE 10W-30	9613313	0.946 L/1 US qt
		86641052	3.785 L/1 US gal
		9613314	9.46 L/2.5 US gal
		9673508DS	18.93 L/5 US gal
	AMBRA SUPER GOLD HSP ENGINE OIL SAE 30	9613286	0.946 L/1 US qt
		86641043	3.785 L/1 US gal
		9613289	9.46 L/2.5 US gal
		86641044	18.93 L/5 US gal
	AMBRA SUPER GOLD HSP ENGINE OIL SAE 40	9624812DS	208.2 L/55 US gal
	AMBRA SUPER GOLD HSP ENGINE OIL SAE 15W-40	86641081	0.946 L/1 US qt
		86641082	3.785 L/1 US gal
		86641084	9.46 L/2.5 US gal
		86641083	18.93 L/5 US gal
	AMBRA SUPER GOLD HSP ENGINE OIL SAE 20W-50	86994337	18.93 L/5 US gal
	AMBRA AUTO SUPREME SAE 5W-30	9673589DS	0.946 L/1 US qt
AMBRA AUTO SUPREME SAE 10W-30	86641101	0.946 L/1 US qt	
Transmission Oil	AMBRA MULTI TRAN	86639558	3.785 L/1 US gal
		86639559	9.46 L/2.5 US gal
		86639560	18.93 L/5 US gal
	AMBRA MULTI TRAN SSL	86994339	9.46 L/2.5 US gal
	AMBRA MULTI BIO S	86994341	9.46 L/2.5 US gal
Hydraulic Oil	AMBRA MULTI G 134	9624655DS	0.946 L/1 US qt
		9624656DS	3.785 L/1 US gal
		9624450	9.46 L/2.5 US gal
		9624451	18.93 L/5 US gal
	AMBRA HYDROSYSTEM 46 HYD FLUID	86109085	18.93 L/5 US gal
	AMBRA HYDROSYSTEM 68 HYD FLUID	86994331	18.93 L/5 US gal
	AMBRA HYDROSYSTEM 100 HYD FLUID	86994343	18.93 L/5 US gal
ATF Oil	AMBRA HYDRODEX 3 ATF	9613304	0.946 L/1 US qt
		9613312	9.46 L/2.5 US gal
Gear Oil	AMBRA HYPOIDE 90 GEAR LUBE	9613295	0.946 L/1 US qt
		9613294	9.46 L/2.5 US gal
		86994348	60.6 L/16 US gal
	AMBRA HYPOIDE 140 GEAR LUBE	87027134*	0.946 L/1 US qt
		87027135	9.46 L/2.5 US gal
		86994351	60.6 L/16 US gal
	AMBRA TRANSAXLE FLUID	86994352	18.93 L/5 US gal
	AMBRA HYPOIDE SSL GEAR LUBE	86994354	0.946 L/1 US qt
Grease	AMBRA GR-9 MULTI-PURPOSE GREASE	9613310	TUBE - 14 OZ.
	AMBRA HI-TEMP GREASE	9861804DS	TUBE - 14 OZ.
	AMBRA CORN HEAD GREASE	94107DS	TUBE - 14 OZ.
	AMBRA GR 75 MD GREASE	87400001	TUBE - 14 OZ.
	AMBRA GR 1000 SYNTHETIC GREASE	86994355	TUBE - 14 OZ.
	LIMITED SLIP ADDITIVE	B96606	
Brake Fluid	BRAKE LHM FLUID (Mineral Based Oil)	86541699DS	0.946 L/1 US qt
Coolant	ESE-M97B18-D, Ethylene Glycol Coolant Concentrate	FGCC2701DS	3.785 L/1 US gal
	Propylene Glycol Concentrate	FGCC2711DS	3.785 L/1 US gal

*See specifications pages for current fluids for your tractor.

SECTION 00 - GENERAL INFORMATION - CHAPTER 1

Boomer 4055/Boomer 4060

(7)—GROUND CLEARANCE (Under FWD Axle):
sm AG TIRES

D.) - Minimum Centerline Clearance

329 mm (13 in)

lg AG TIRES

(D.) - Minimum Centerline Clearance

381 mm (15 in)

R4 TIRES

(D.) - Minimum Centerline Clearance

369 mm (14.5 in)

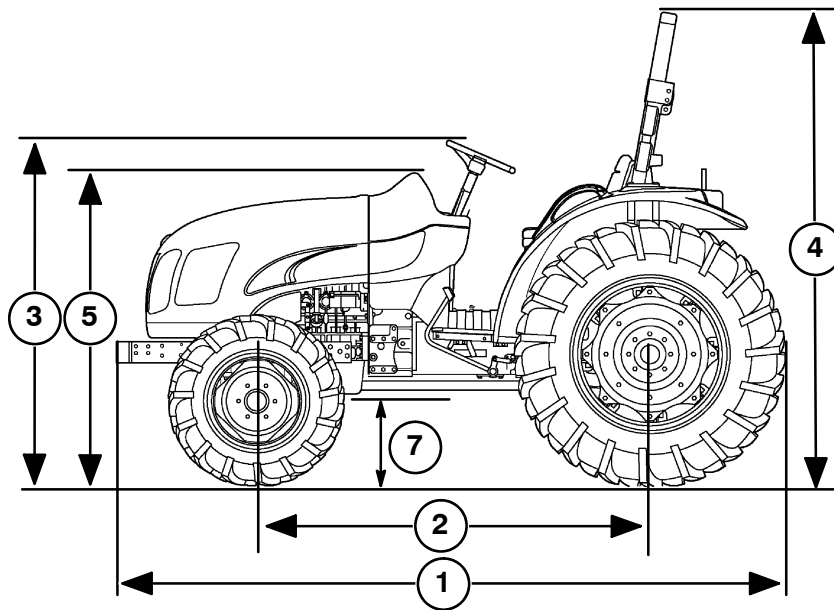
TURF TIRES

(D.) - Minimum Centerline Clearance

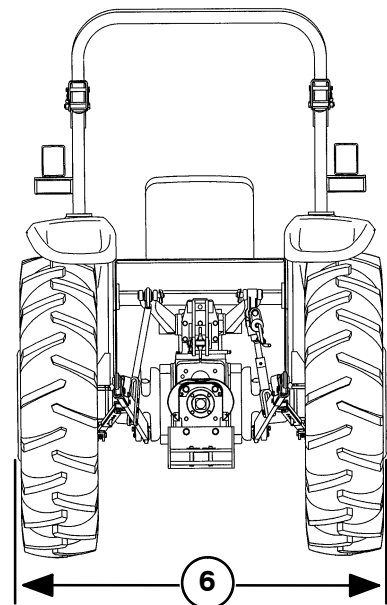
244 mm (9.6 in)

*Galaxy Turf Tire

*199 mm (7.83 in)



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20035686

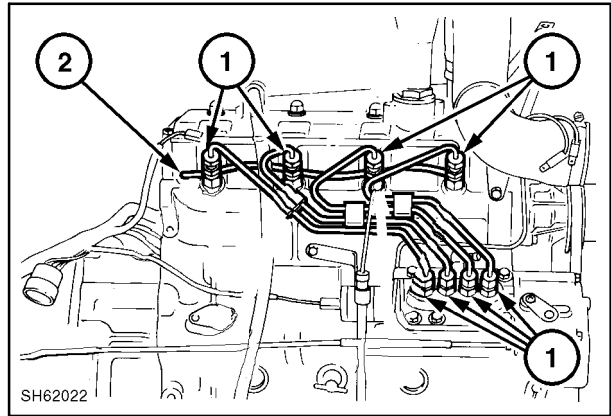
SECTION 10 - ENGINE - CHAPTER 1

CRANKSHAFT BEARING CLEARANCE		
Standard	0.035-0.083 mm (0.0014-0.0033 in)	0.035-0.083 mm (0.0014-0.0033 in)
Maximum	0.2 mm (0.008 in)	0.2 mm (0.008 in)
CRANKSHAFT	N844L-T	N844L-T
JOURNAL DIAMETER		
Standard	67.957-67.97 mm (2.675-2.676 in)	67.957-67.97 mm (2.675-2.676 in)
Maximum	67.9 mm (2.673 in)	67.9 mm (2.673 in)
CRANKPIN DIAMETER	N844L-T	N844L-T
Standard	51.964-51.975 mm (2.0458-2.0462 in)	51.964-51.975 mm (2.0458-2.0462 in)
Maximum	51.9 mm (2.043 in)	51.9 mm (2.043 in)
RUNOUT		
Standard	0.03 mm (0.0012 in)	0.03 mm (0.0012 in)
Maximum	0.06 mm (0.0024 in)	0.06 mm (0.0024 in)
ENDPLAY		
Standard	0.1-0.4 mm (0.0039-0.0157 in)	0.1-0.4 mm (0.0039-0.0157 in)
Maximum	0.5 mm (0.0197 in)	0.5 mm (0.0197 in)
THRUST WASHER THICKNESS		
Standard	2.95-3.0 mm (0.116-0.118 in)	2.95-3.0 mm (0.116-0.118 in)
Minimum	2.8 mm (0.110 in)	2.8 mm (0.110 in)
CYLINDER BLOCK BEARING DIAMETER		
Standard	68x72 mm (2.677x2.835 in)	68x72 mm (2.677x2.835 in)
JOURNAL TO CYLINDER BLOCK BEARING CLEARANCE		
Standard	0.044-0.116 mm (0.0017-0.0046 in)	0.044-0.116 mm (0.0017-0.0046 in)
Maximum	0.2 mm (0.008 in)	0.2 mm (0.008 in)
CENTER BEARING TO CRANKSHAFT CLEARANCE		
Standard	0.044-0.102 mm (0.0017-0.0040 in)	0.044-0.102 mm (0.0017-0.0040 in)
Maximum	0.2 mm (0.008 in)	0.2 mm (0.008 in)
DYNAMIC BALANCER		
Counterweight gear backlash	0.2-0.4 mm (0.008-0.016 in)	0.2-0.4 mm (0.008-0.016 in)
Maximum	0.4 mm (0.016 in)	0.4 mm (0.016 in)
CAMSHAFT	N844L-T	N844L-T
CAM HEIGHT-VALVE		
Standard	34.433-34.508 mm (1.3556-1.3586 in)	34.433-34.508 mm (1.3556-1.3586 in)
Minimum	34.1 mm (1.3425 in)	34.1 mm (1.3425 in)
BEND		
Standard	0.03 mm (0.001 in)	0.03 mm (0.001 in)
Maximum	0.1 mm (0.004 in)	0.1 mm (0.004 in)
CAM HEIGHT FUEL		
Standard	42.94-43.06 mm (1.6905-1.6953 in)	42.94-43.06 mm (1.6905-1.6953 in)
Minimum	42.8 mm (1.6850 in)	42.8 mm (1.6850 in)

FUEL INJECTION TUBING

Removal

1. Loosen the fuel tube nuts from the fuel injection pump and injectors, 1. Remove the tubing as an assembly.
2. Remove the spring clamp and fuel return hose, 2.

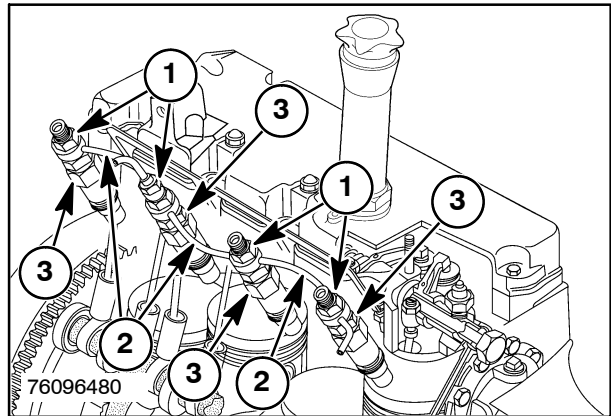


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FUEL INJECTOR

Removal

1. Loosen and remove the securing nuts, 1. Remove the fuel return tubing, 2. Remove the aluminum washers and discard. Remove the fuel injectors, 3.

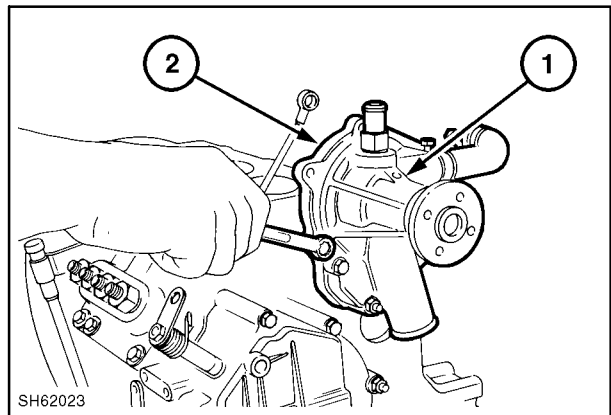


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WATER PUMP

Removal

1. Remove the five M6 nuts and remove the water pump assembly, 1, and set plate, 2.



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VALVES

Inspection

1. Check the valve stem for excessive wear or damage. If found to be excessively damaged, replace.
2. Check the valve stem diameters at positions, 1, 2 and 3, with a micrometer. If the diameter is less than the allowable limit, replace.

Intake Valve

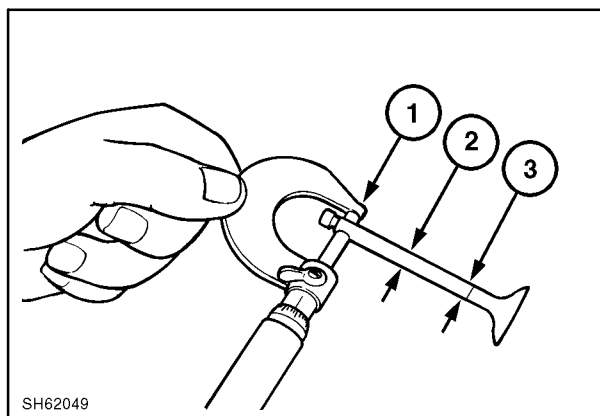
Standard Diameter	Allowable Limit
-------------------	-----------------

6.955 - 6.97 mm (0.2738 - 0.2744 in)	6.89 mm (0.271 in)
---	-----------------------

Exhaust Valve

Standard Diameter	Allowable Limit
-------------------	-----------------

6.94 - 6.95 mm (0.2732 - 0.2736 in)	6.84 mm (0.269 in)
--	-----------------------



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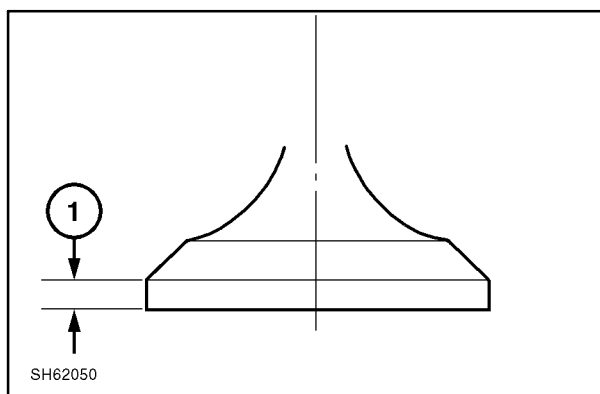
Thickness of Valve Head

If valve head thickness, 1, is less than the allowable limit, replace the valve.

All Engines

Standard Thickness	Allowable Limit
--------------------	-----------------

0.925 - 1.075 mm (0.036 - 0.042 in)	0.5 mm (0.020 in)
--	----------------------



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VALVE GUIDES

Inspection

1. Check the valve guides for damage such as cracks. If cracks or other damage is found, replace the valve guides as needed.
2. Check the clearance at, 1, between the valve and valve guide. If the clearance exceeds the allowable limit, replace.

Intake Valve - All Engines

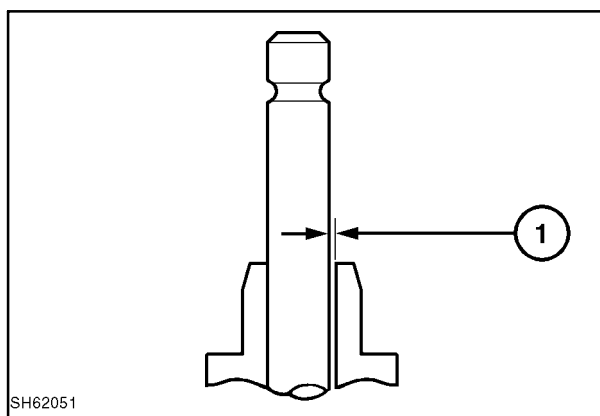
Standard Clearance	Allowable Limit
--------------------	-----------------

0.03 - 0.06 mm (0.0012 - 0.0024 in)	0.2 mm (Max. 0.008 in)
--	---------------------------

Exhaust Valve - All Engines

Standard Clearance	Allowable Limit
--------------------	-----------------

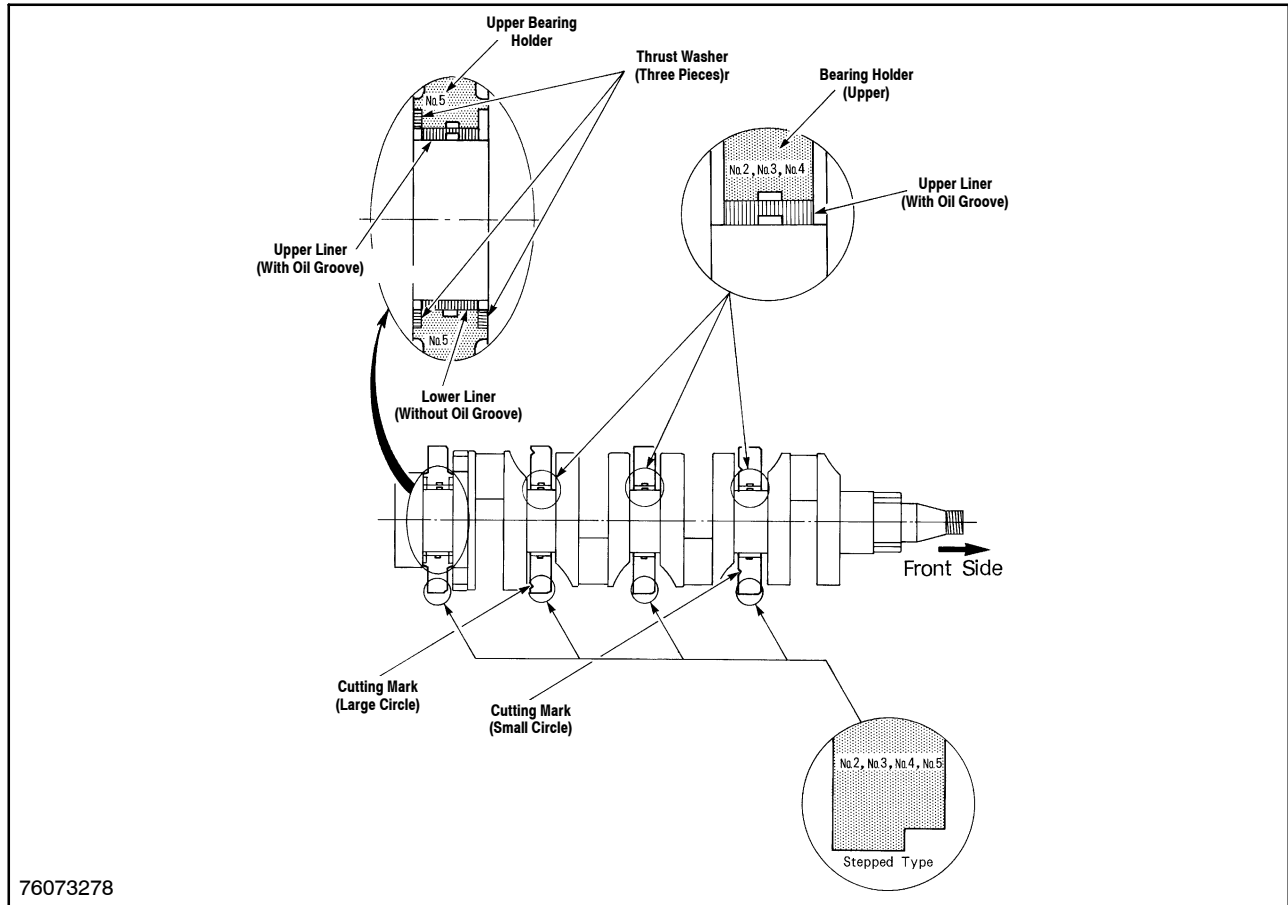
0.05 - 0.075 mm (0.002 - 0.003 in)	0.25 mm (Max. 0.010 in)
---------------------------------------	----------------------------



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CRANKSHAFT MAIN BEARING**Installation**

1. Install the bearing holders along with their liners. The rear bearing is also assembled along with the thrust bearing halves, one located on the upper rear and one on each side of lower portion of holder side of the bearing. Be sure the bearing holders are correctly positioned on the shaft with the chamfered edge facing forward.
2. Torque the bearing holder cap screws to 49.0 - 53.9 N·m (36.2 - 39.8 lb ft).

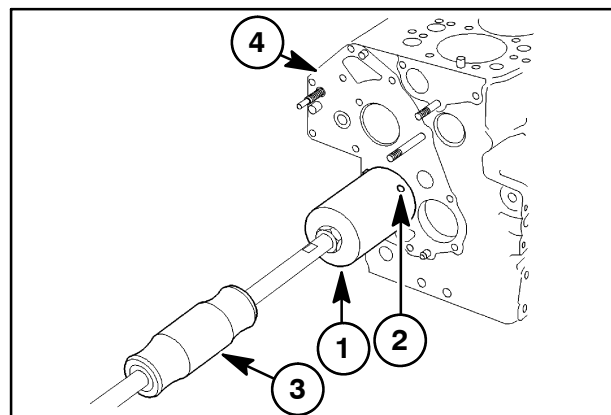


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PORT BLOCK**Removal**

NOTICE: The oil pump shaft and port block assembly is a press fit in the block.

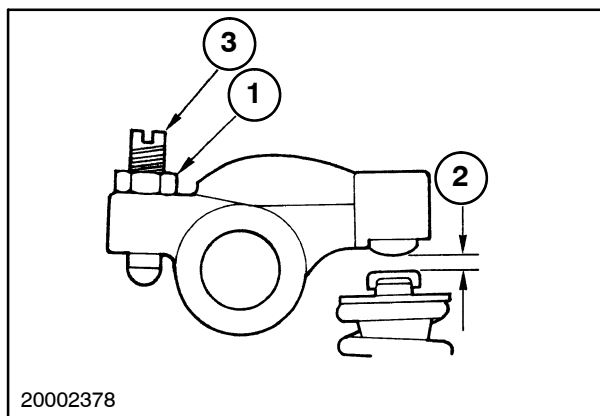
1. Using special Tool No. 380002888, 1, place the collars in the grooves of the port block assembly.
2. Align the set screws, 2, of the puller, 1, with the counterbores in the collars and tighten.
3. Using a sliding hammer, 3, remove the port block.
4. Remove plate, 4, from the block.



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- Loosen the lock nut, 1, and adjust both the intake and exhaust valve clearances of the No. 2 cylinder to 0.2 mm (0.008 in), 2, by turning the adjustment screw, 3.
- After adjustment has been set, tighten the locknut, 1.

NOTICE: Reconfirm the valve clearances of each of the cylinders when corresponding marks are aligned with the "TOP" mark on the timing gear case, on the compression stroke.

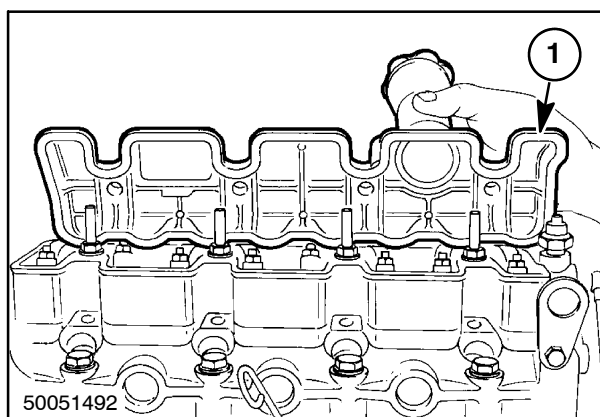


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HEAD COVER

Installation

1. Install a new gasket and position the valve cover, 1, over the rocker arms.
2. Secure the valve cover using the four M10 cap nuts and washers. Torque to 12 - 16 N·m (9 - 12 lb ft).

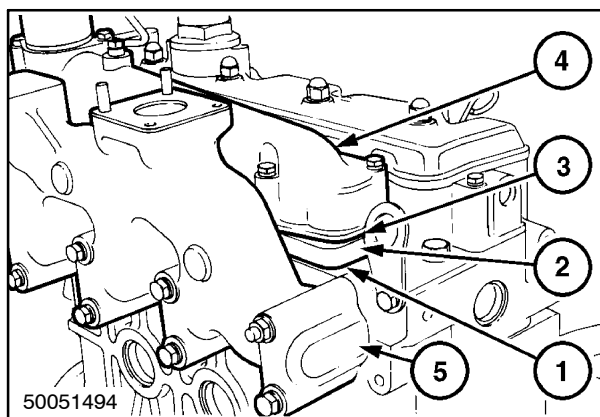


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INTAKE/EXHAUST MANIFOLDS

Installation

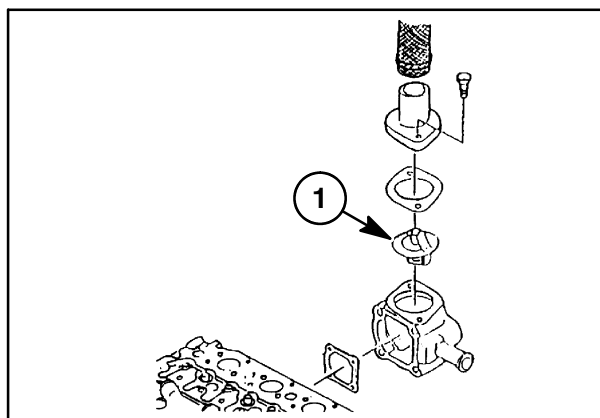
1. Install in sequence of gasket, 1; spacer, 2; gasket, 3; and intake manifold, 4. Secure using the eight M6 cap screws. Torque to 8.3 - 11.3 N·m (6.1 - 8.3 lb ft).
2. Install exhaust manifold, 5, and secure using the two M8 nuts and six M8x75 cap screws. Torque to 22.6 - 28.4 N·m (16.7 - 21.0 lb ft).



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THERMOSTAT

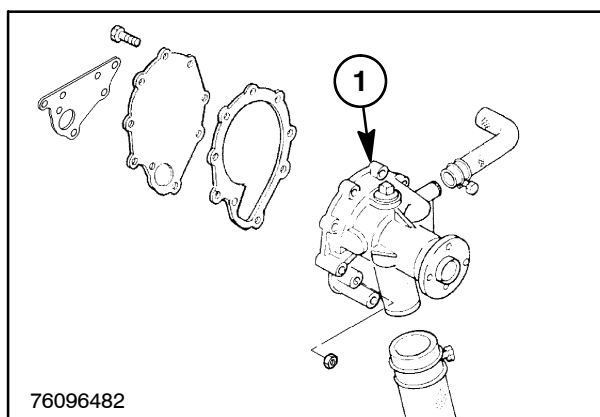
The thermostat, 1, is located between the coolant outlet on the engine and the radiator. In this position the thermostat is able to sense the coolant temperature in the engine and regulate the flow of coolant to the radiator. When the engine is cold, only a small amount of coolant flows to the radiator through the thermostat bypass. As the engine warms up, the thermostat opens to allow sufficient coolant flow to the radiator to maintain a constant engine temperature.



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WATER PUMP

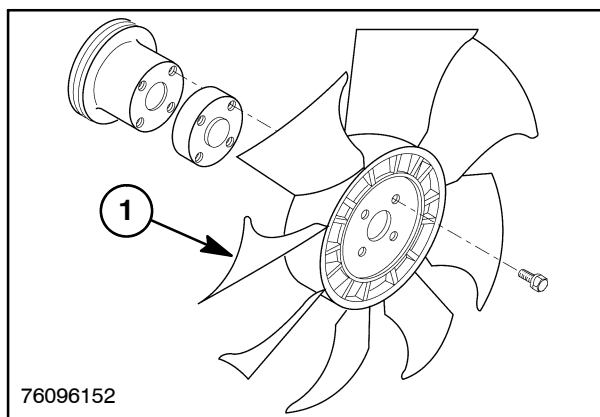
The water pump, 1, is an impeller attached to a shaft which is belt driven by the engine crankshaft. The impeller circulates water by centrifugal force. Coolant entering the pump housing from the radiator through the lower hose is thrown outward against the housing with sufficient force to cause a circulating action.



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COOLING FAN

A eight-blade cooling fan, 1, is belt driven by the engine crankshaft and is mounted on the water pump shaft. The cooling fan is positioned behind the radiator to draw air over the radiator cooling fins. To increase and concentrate the volume of air flowing through the radiator, a shroud is positioned around the fan.



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TROUBLESHOOTING

GENERAL

CONDITION	CAUSE	REMEDY
Fuel not reaching injection point	Fuel shutoff valve closed Restricted fuel filter Faulty fuel stop solenoid Air in fuel system Fuel leakage	Open the fuel shutoff valve Check and flush the fuel filter clean Check fuel stop solenoid. See "Fuel Stop Solenoid", Section 55 Check for air leaks on the suction side of system. Bleed the fuel system Check the condition of the fuel lines and connections for tightness or possible damage
Fuel reaching nozzles but engine will not start	Low cranking speed Incorrect throttle adjustment Fuel Leakage Faulty injectors Low compression	Check cranking Check throttle control or travel Check all fuel lines for leakage or possible damage See "Troubleshooting - Fuel Injectors" later in this section Check for air leaks on the suction side of system. Bleed the fuel system
Engine hard to start	Low cranking speed Incorrect throttle adjustment Restricted fuel filter Contaminated fuel Low compression Air in fuel	Check cranking Check throttle control or travel Check and flush fuel filter clean Check for water in fuel Check engine compression. See "Engine Compression Test", Section 10 Check for air leaks on the suction side of system. Bleed the fuel system

Repair

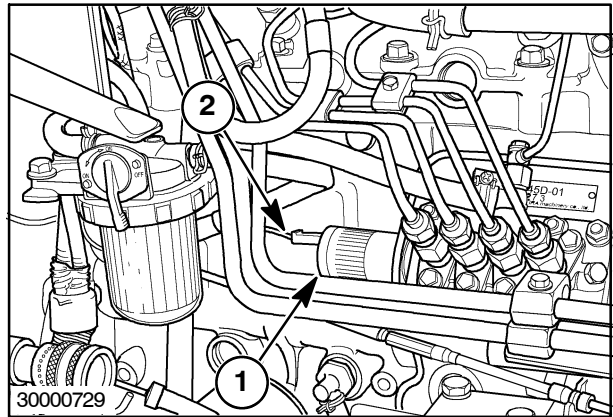
If the injection pump is suspected of being faulty, it should be repaired by an authorized Diesel Service Station only.

NOTICE: *If repair is within New Holland warranty period, replace injection pump with a new pump from the "New Holland Parts Department".*

Installation

Installation generally follows removal procedures in reverse. If the pump is being replaced or if the timing is unknown, proceed to "Timing and Governor Adjustment", later in this section.

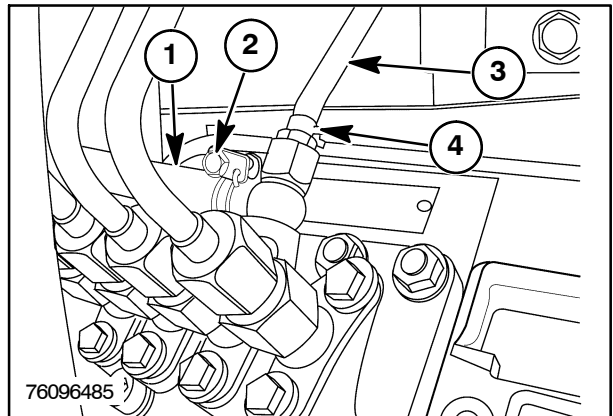
1. Attach the pump rack to the governor linkage.
2. Install injection pump assembly with shims into engine housing.
3. Install the pump, secure using the three M8 nuts, one M8x20 socket head cap screw with a M8 flat washer, and two M8x20 cap screws. Torque to 13 - 17 N·m (9.6 - 12.5 lb ft).
4. Install fuel solenoid, 1, into rear of injector housing and connect the electrical lead, 2.



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NOTICE: *The figure shown is for reference only.*

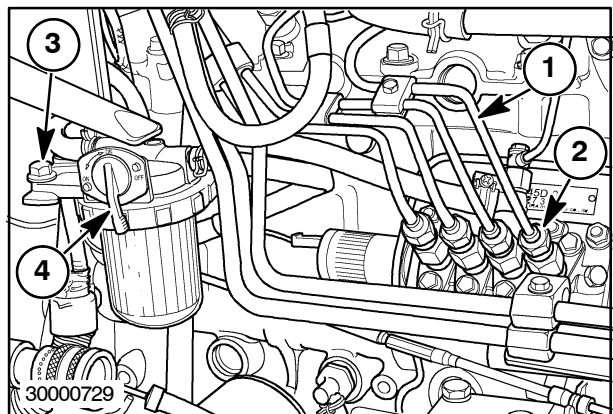
5. Connect the fuel inlet hose, 1, by tightening clamp screw, 2.
6. Install the fuel return hose, 3, secure using a hose clamp, 4.



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7. Install injector tubes, 1, by tightening nuts, 2, at the pump and nuts at the injectors.
 8. If removed, reinstall the fuel filter onto its bracket by tightening two M8x20 cap screws, 3.
 9. Turn the fuel select, 4, to the on position.
- After installation bleed air from the fuel system. See "Bleeding the Fuel System", later in this section.

NOTICE: *The figure shown is for reference only.*



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DIRTY EXHAUST SMOKE

POSSIBLE CAUSE	CORRECTION
Not enough intake air	A clogged element in the air cleaner, clean or replace element
	Closed air intake inlet, open inlet
	Air leakage from a connection, check and repair
The turbocharger is not running	Gum or sludge formation in the turbine-side seal, causing the turbine to resist turning, Check the oil quality and change Disassemble and clean
	Seized bearings, disassemble and clean Disassemble and repair
	Oil temperature too high, change engine oil
	Dynamic imbalance in the rotor, clean and/or replace rotor parts
	Turbine wheel or blower wheel rubbing or broken, disassemble and repair(remove foreign matter, if any, and check air cleaner and engine to locate the cause)
Not enough gas pressure	Gas leakage through a connection on upstream side of turbine, check and repair A large constriction in the exhaust line, due to distorted gas passages, check and repair

WHITE EXHAUST SMOKE

POSSIBLE CAUSE	CORRECTION
Oil return pipe is clogged or distorted, causing the lube oil to leak into turbine and blower	Repair or replace the pipe
Seal rings are abnormally worn or broken due to worn-down bearings	Disassemble and repair

ABNORMALLY HIGH OIL CONSUMPTION

POSSIBLE CAUSE	CORRECTION
Seal rings are abnormally worn or broken due to worn-down bearings	Disassemble and repair

SECTION 18 - CLUTCH

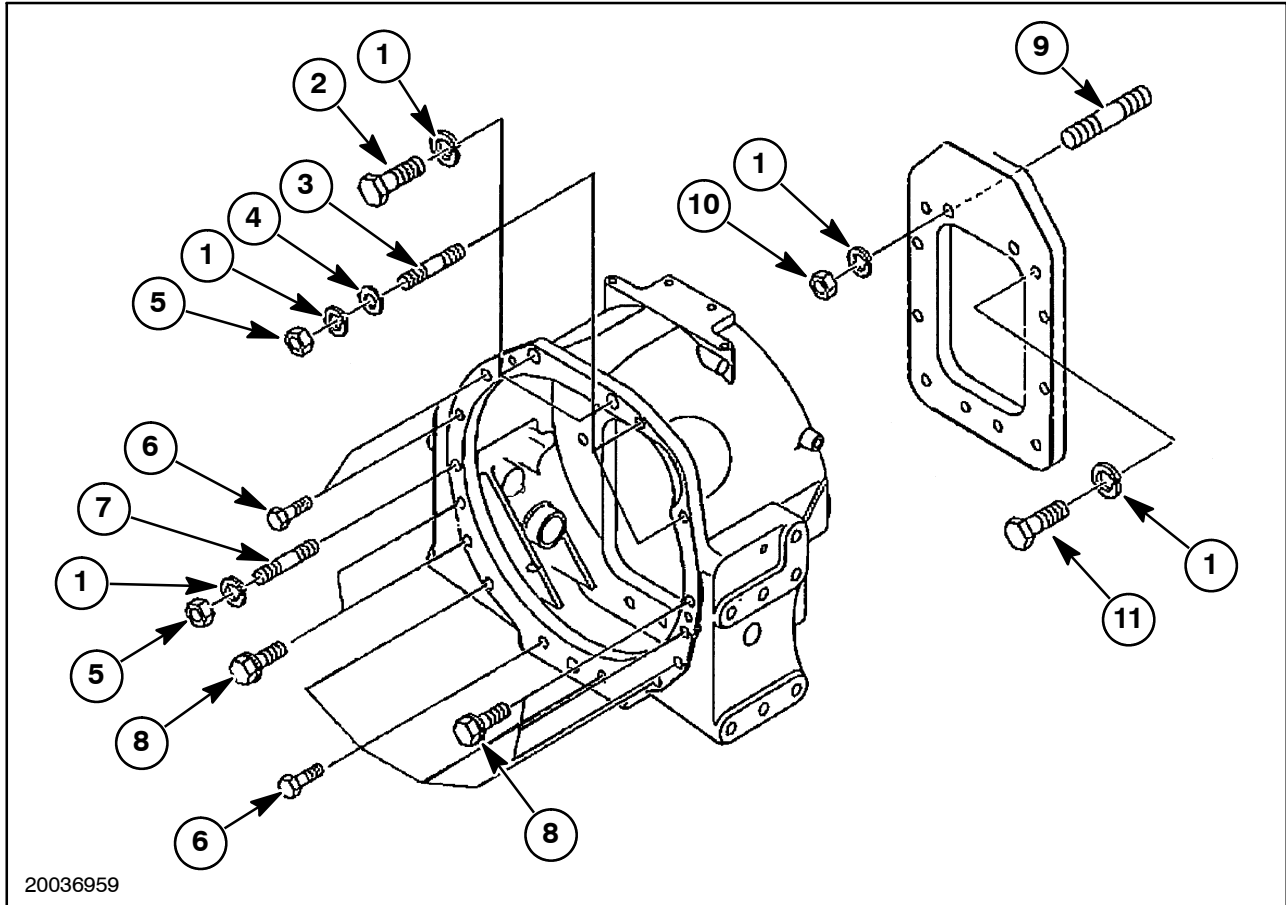
Chapter 1 - Clutch

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	Bolt Torques	3
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SECTION 18 - CLUTCH - CHAPTER 1

46. Loosen and remove all of the external buckle-up cap screws between the engine and clutch housing.
47. Gently separate the engine from the clutch housing while rolling the floor jack towards the rear of the tractor.
48. When separating operation is complete, place jack stands under each unit.

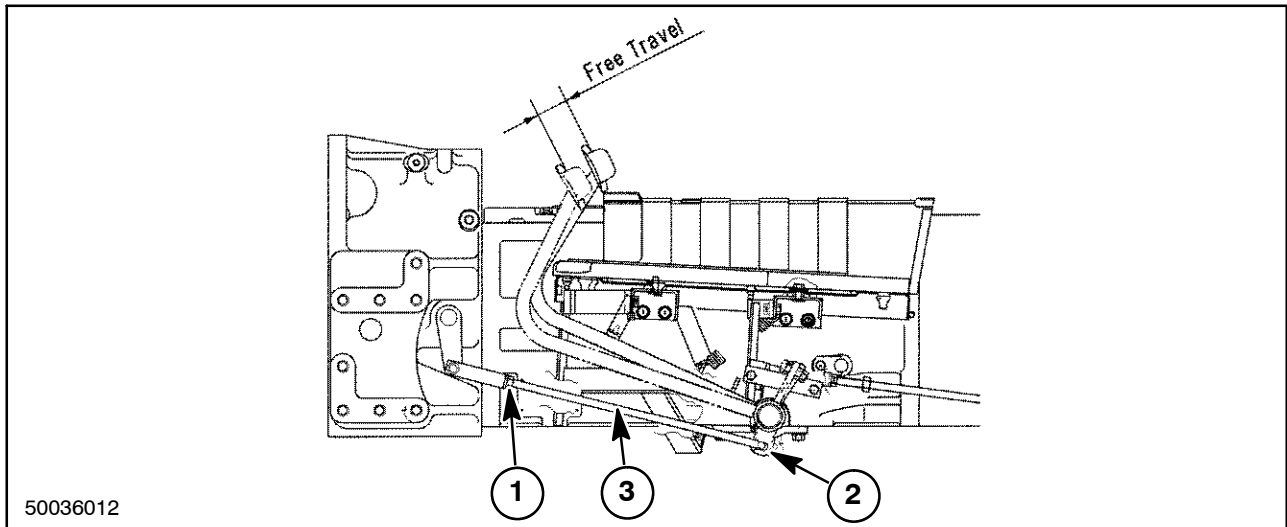


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Item	Description	Qty.
1	Lock Washer	5
2	M12 x 50 Cap Screw	2
3	M10 x 30 Stud	2
4	M10 Flat Washer	2
5	M10 Nut	3
6	M10 x 16 Cap Screw	6

Item	Description	Qty.
7	M10 x 40 Stud	1
8	M10 x 45 Cap Screw	5
9	M14 x 40 Stud	2
10	M14 Nut	2
11	M12 x 40 IIT Cap Screw	10



CLUTCH PEDAL ADJUSTMENT

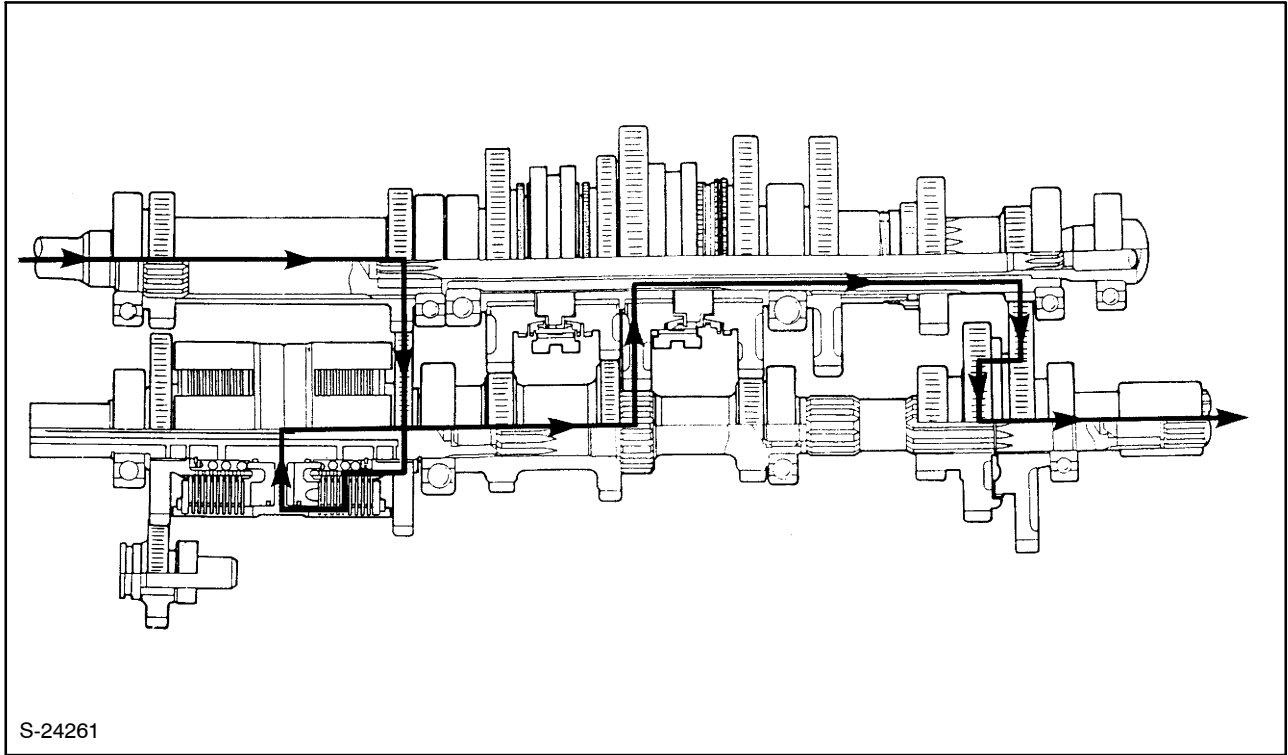
NOTICE: Check clutch pedal free travel after every 50 hours of operation.

Clutch pedal free travel should be maintained at 19 - 30 mm (0.75 - 1.18 in).

To adjust the clutch pedal:

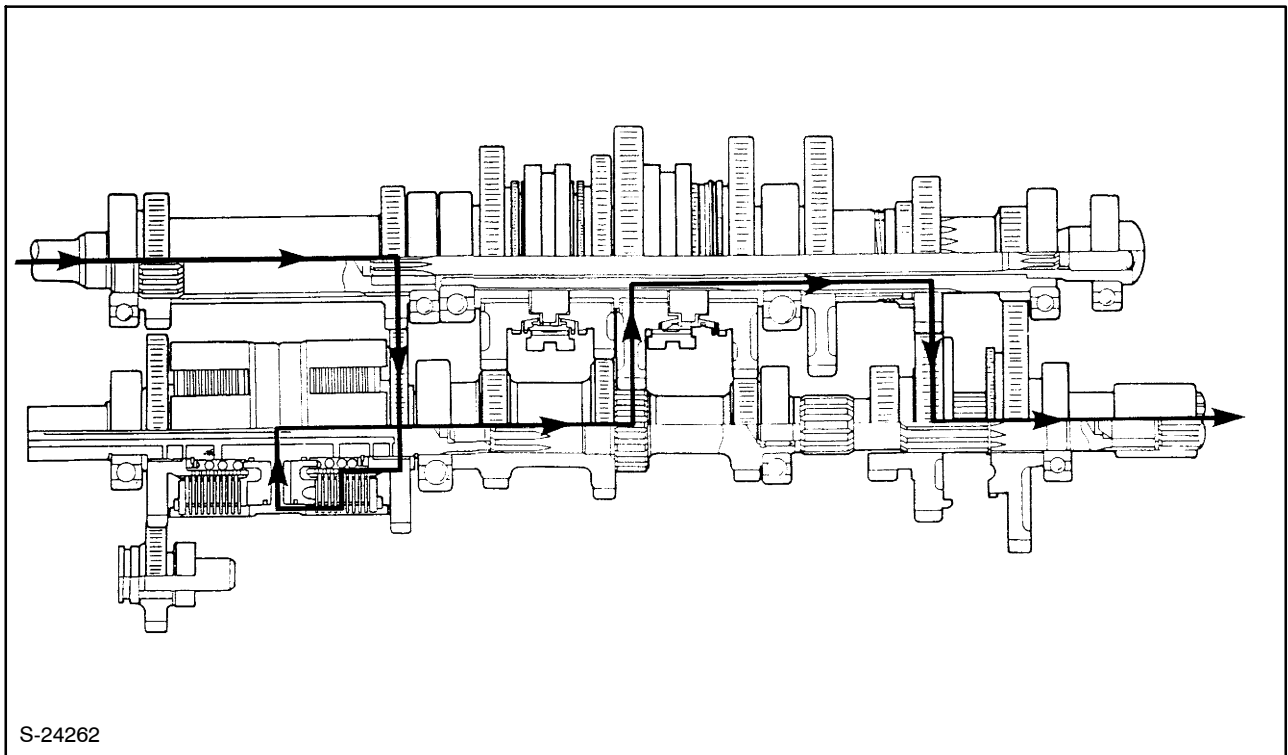
1. Loosen the M10 jam nut, 1.
2. Remove cotter pin, 2, and remove rod, 3, from pedal bracket.
3. Lengthen rod, 3, to decrease pedal free travel or shorten to increase.

POWERFLOW (ALL DIAGRAMS SHOWN WITH FORWARD CLUTCH PACK ENGAGED)



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Power Flow - Speed 1 (R1) - 1st Main - Low Range



11

Power Flow - Speed 5 (R5) - 1st Main - Middle Range

LUBE CUTOFF VALVE OPERATION

Inching Pedal Depressed

After system pressure is developed, the system relief valve, 1, diverts all remaining flow to the lubrication circuit via port C1. Oil flows from the EHSS manifold valve port C1 to the oil cooler, returns to the EHSS manifold valve port C2 and is routed internally to the transmission lubrication circuit port T1.

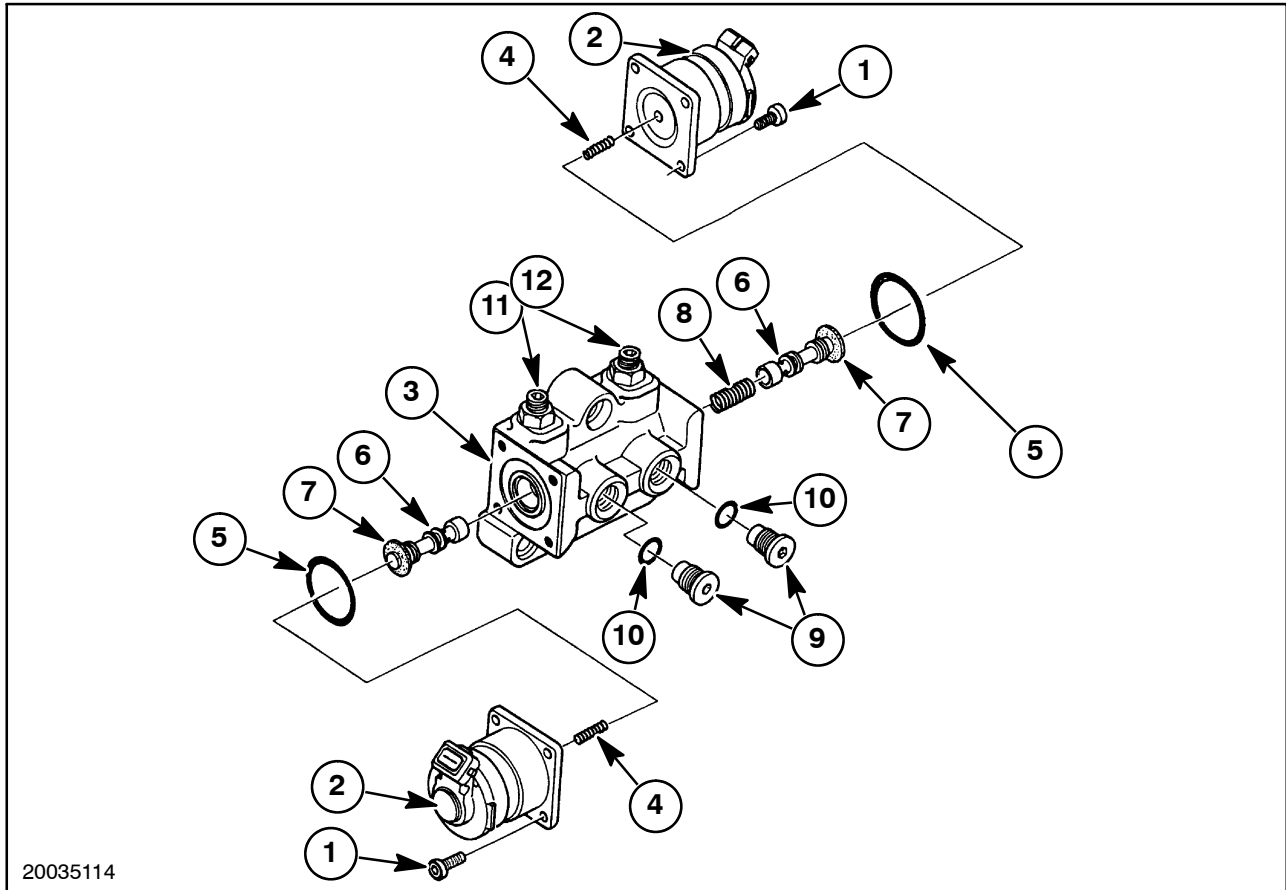
If the pressure in the oil cooler and lubrication circuit is greater than 500 kPa (72.5 psi), the oil cooler check valve poppet, 2, unseats and allows flow through the oil cooler check valve and through the clutch packs.

Oil Flow - Reverse, Inching Pedal Down diagram represents the EHSS hydraulic system response when the reverse solenoid is energized and the main clutch pedal is fully depressed.

Flow from the pump enters the EHSS manifold valve at port P. The system relief valve, 1, regulates the system pressure to 2300 kPa (330 psi).

The lube cutoff valve, 3, is closed and the pressurized oil is cut off from the solenoid valve. The reverse clutch is disengaged. Oil is directed through the system relief valve and into the oil cooler and lubrication circuit.

OVERHAUL



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EHSS CONTROL VALVE SOLENOID**Disassembly**

1. Loosen and remove the socket head cap screws, 1, securing the solenoid, 2, to the control valve, 3.

NOTICE: During solenoid removal, be sure not to lose the spring, 4, from the solenoid.

2. Remove the solenoid, 2, and O-ring, 5, from the control valve, 3.
3. Repeat steps 1 and 2 for the opposite side of the control valve.
4. Remove the spools, 6, with the diaphragms, 7, from both sides of the control valve, 3.
5. Remove the spring, 8, from the valve body.
6. Remove the plugs, 9, and O-rings, 10, from the valve body.

NOTICE: Never remove the two jam nuts, 11, and adjustment screws, 12, from the valve body. These are preset and removal may cause a change in flow.

Inspection

1. Clean all parts in a suitable solvent and allow to air dry.
2. Inspect both spools and valve body for wear and/or damage.

3. Replace all O-rings with new ones.

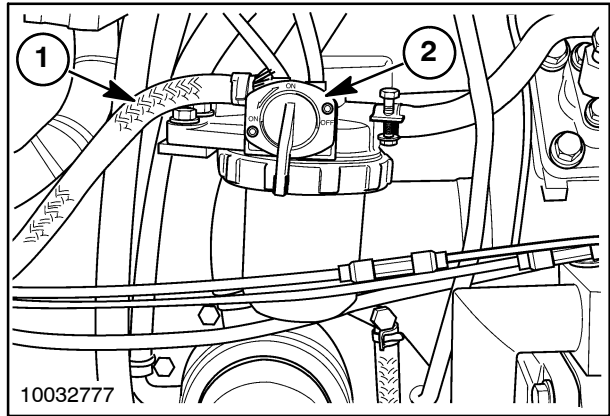
4. If any wear or damage is found, replace the solenoid control valve assembly.

Assembly

1. Lubricate and install new O-rings, 10, onto the plugs, 9.
2. Install and tighten the plugs, 9, in the control valve housing. Torque the plugs to 12.8 - 16.7 N·m (9.4 - 12.2 lb ft).
3. Lubricate and install the spool, 6, (without spring) and diaphragm, 7, into the valve body.
4. Lubricate and install a new O-ring, 5.
5. Install the solenoid, 2, and secure with the socket head cap screws, 1. Torque to 1.4 - 4.9 N·m (1 - 4 lb ft).
6. Install spring, 8, spool, 6, and diaphragm, 7, into valve body. Spool should have a sliding fit with finger pressure and no binding.
7. Lubricate and install a new O-ring, 5.
8. Install the solenoid, 2, and secure with the socket head cap screws, 1. Torque to 1.4 - 4.9 N·m (1 - 4 lb ft).

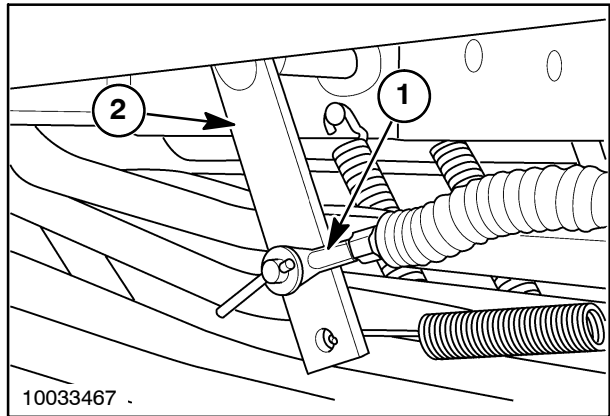
SECTION 21 - TRANSMISSION - CHAPTER 1

31. Remove the caps and plugs from fuel lines and fittings.
32. Connect the fuel supply line, 1, to the fuel shut-off valve, 2.



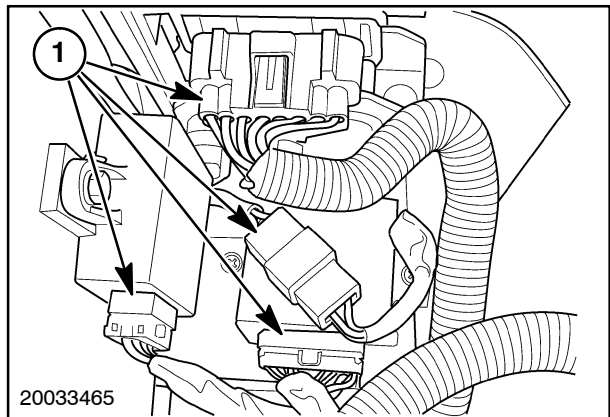
91

33. Connect the throttle cable, 1, to the foot throttle, 2.



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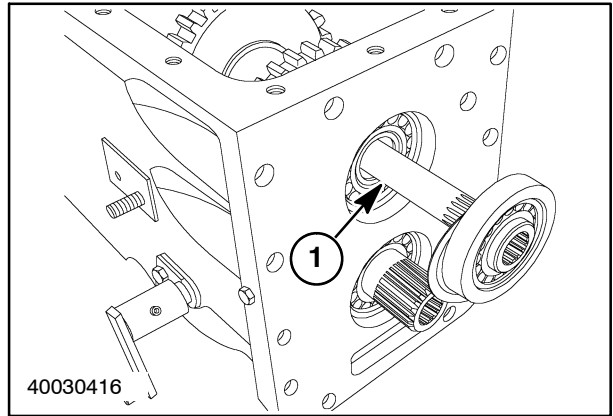
34. Connect the main wiring harness connectors, 1, to the left side of the steering column.



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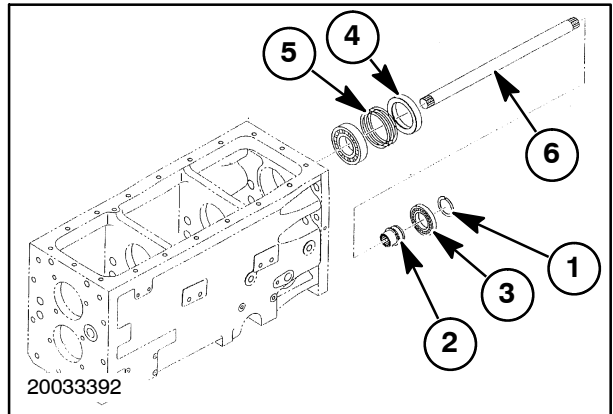
PTO Shaft

1. Pull the PTO shaft, 1, rearward, from the countershaft and housing.



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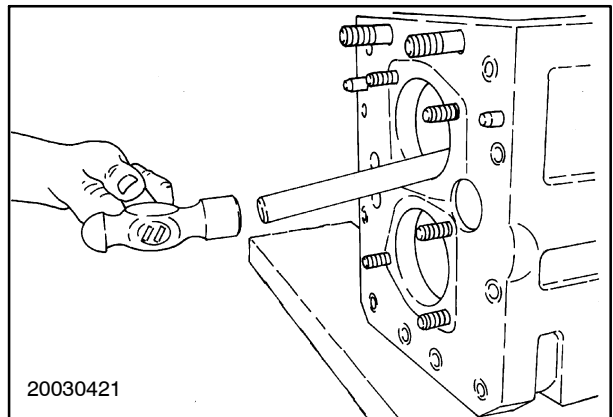
2. Remove the snap ring, 1, from the coupler, 2.
3. Remove the bearing, 3, bearing holder, 4, shims, 5, (if used) and coupler, 2, from the PTO shaft, 6.



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Countershaft

1. Use an aluminum drift and a hammer to lightly tap the countershaft rearward.

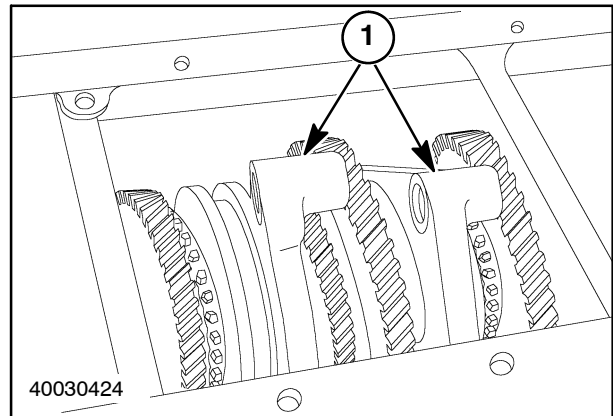


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SECTION 21 - TRANSMISSION - CHAPTER 1

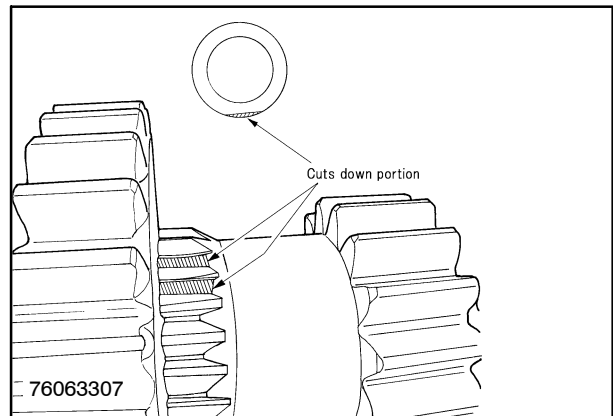
NOTICE: Be sure to install shift forks to corresponding synchronizers using paint marks made during disassembly. The longer part of the shift rail boss in the shift fork will face rearward when installed properly.

4. Install the shift forks, 1, onto the synchronizers.
5. Rotate the shift forks to the normal position for installation of the shift rails at a later time.



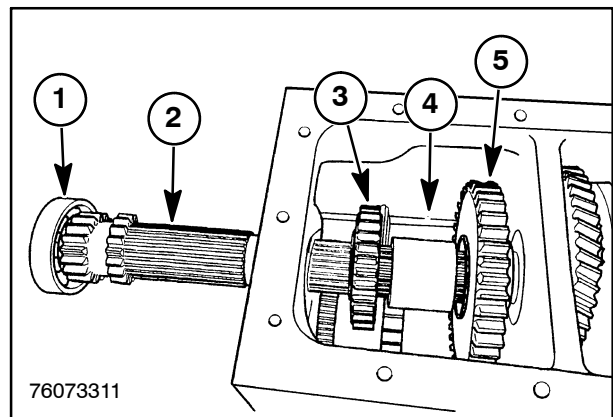
172

NOTICE: The cut portion of the countershaft needs to be turned downward to the six o'clock position to prevent interference with the low range fixed gear (51T) on the rear main shaft.



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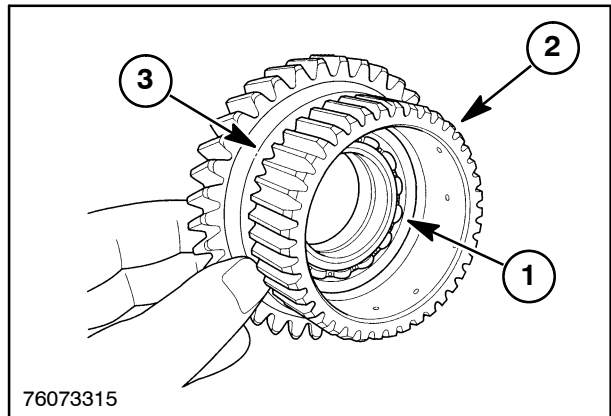
6. Install the bearing, 1, on the countershaft, 2.
7. Install the countershaft, 2, through the rear of the housing while installing 26T gear, 3, collar, 4, and 40T gear, 5. (Be sure flange side of gear, 5, is facing toward front of housing.)
8. Continue to insert countershaft through main gears/synchronizers until fully seated.



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SECTION 21 - TRANSMISSION - CHAPTER 1

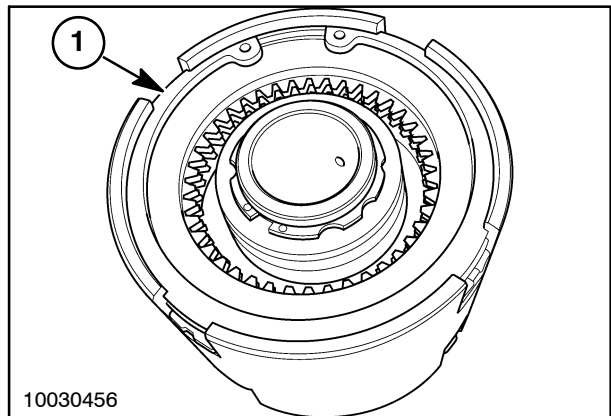
4. Remove the bearing, 1, from the reverse gear, 2.
If necessary, remove the seal ring, 3, from the reverse gear, 2.



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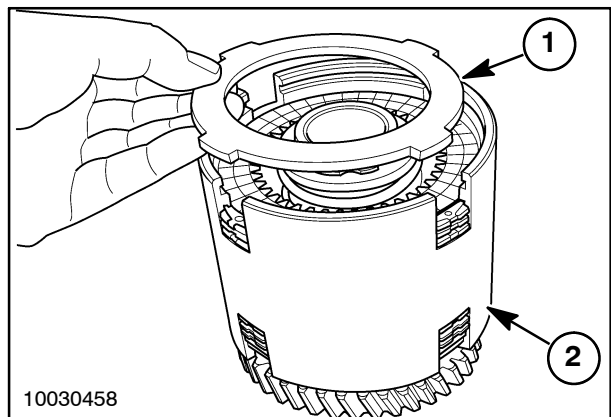
NOTICE: Note the orientation of the opening in the snap ring to the housing for proper assembly later. The opening of the snap ring should NOT be positioned at any of the clutch disc slots.

5. Remove the snap ring, 1, from the shuttle clutch assembly.



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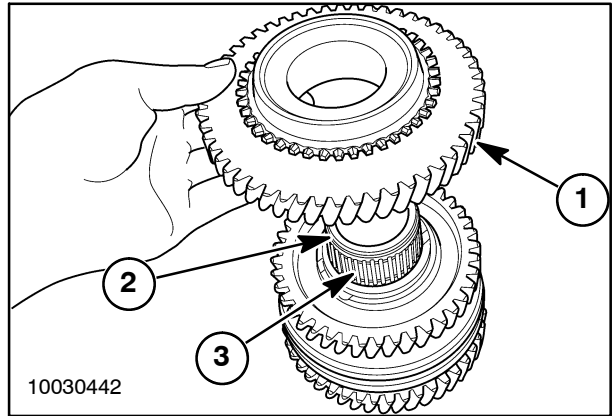
6. Remove the large thrust plate, 1, from the shuttle clutch housing, 2.



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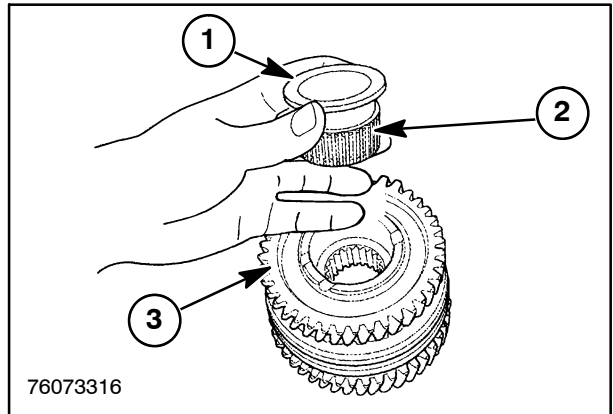
SECTION 21 - TRANSMISSION - CHAPTER 1

7. Remove the 52T counter gear (1st), 1, collar, 2, and needle bearing, 3.



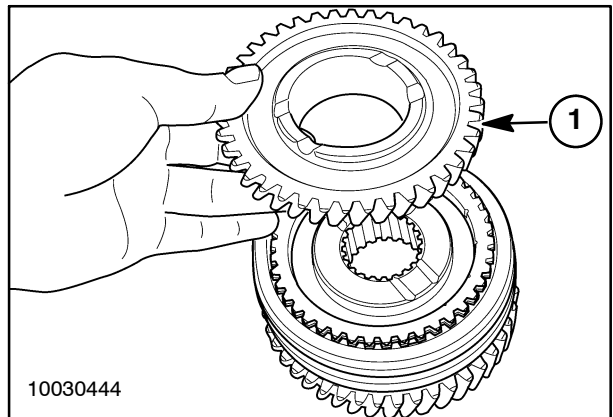
250

8. Remove the collar, 1, needle bearing, 2, and 40T counter gear, 3.



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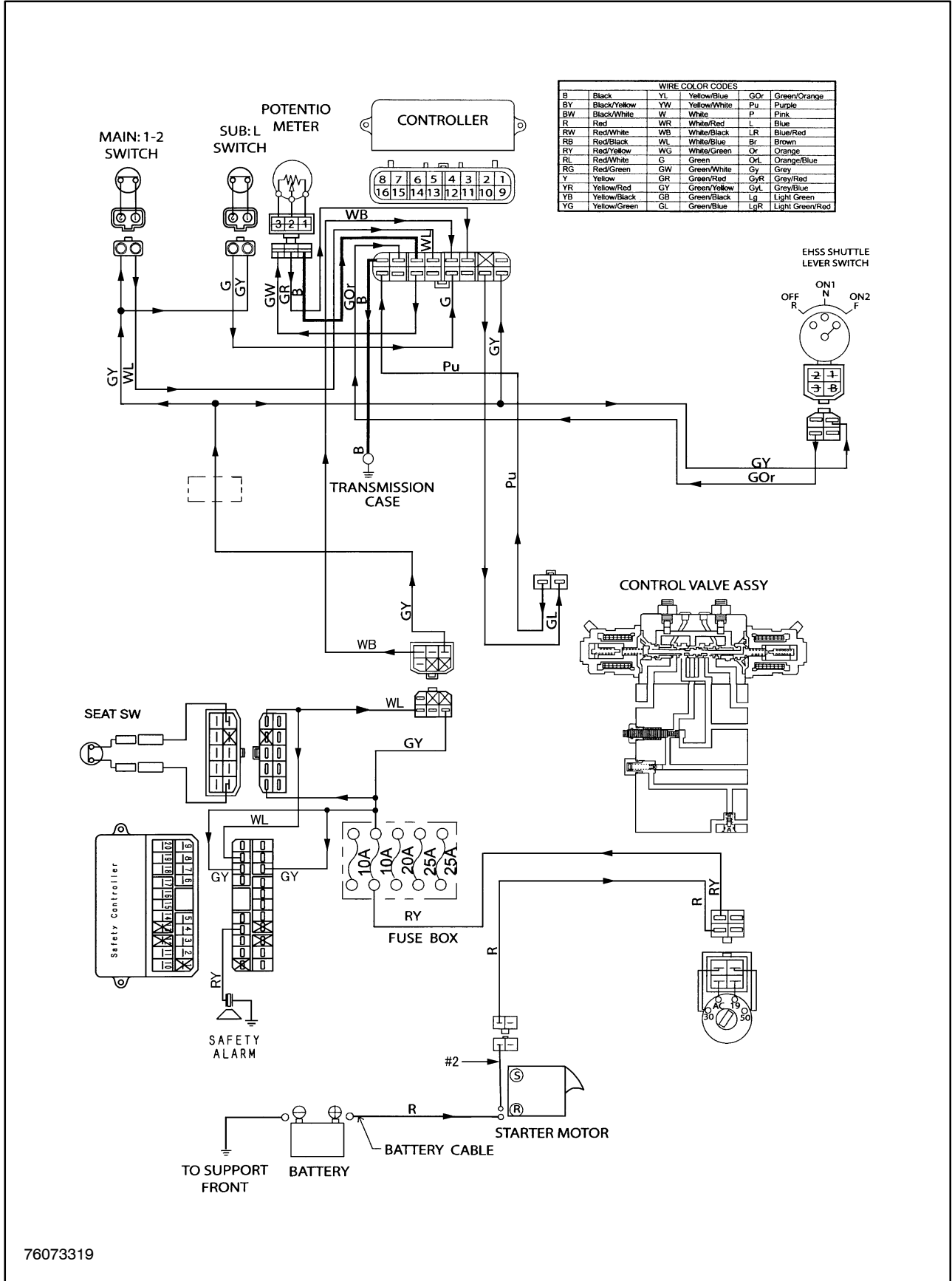
9. Remove the 40T counter gear (4th), 1.



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SECTION 21 - TRANSMISSION - CHAPTER 1

1ST OR 2ND GEAR, LOW AND FORWARD SCHEMATIC



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EHSS CONTROLLER ACTIVATION

Current Flow

- Battery
- #30 terminal of key switch
- Fusible link

Key Switch Placed in “RUN/ACC” Position

- ACC terminal of key switch
- #2 (10 amp) fuse
- #1 terminal of controller, “B” terminal of shuttle switch

When the key switch is placed in the “RUN/ACC” position, current flows from the seat switch to terminal #12 of the controller (when the operator is present in the seat) completing the transmission part of the safety circuit.

When the shuttle lever switch is in the “NEUTRAL” position current is transferred from terminal “B” to terminal #3. Terminal #3 provides current to terminal #5 of the controller.

CONTROLLER ACTIVATION

NOTICE: To activate the EHSS controller after the tractor is started:

- The engine must be running and the operator must be present in the seat
- The inching pedal is cycled

POTENTIOMETER

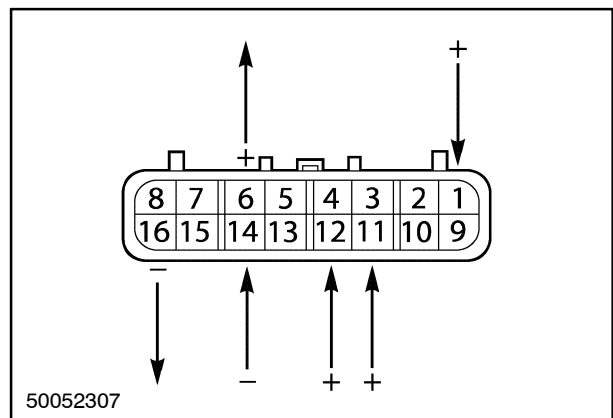
NOTICE: The inching pedal has to be cycled with the operator in the seat, after starting the tractor to activate the EHSS controller.

With the Inching Pedal (not depressed)

- Input current travels from #6 terminal of controller to #3 terminal of potentiometer
- Output current travels from #2 terminal of potentiometer to the #11 terminal of the controller.
- Ground source for potentiometer is provided by terminal #14 of controller, to terminal #1 of the potentiometer.

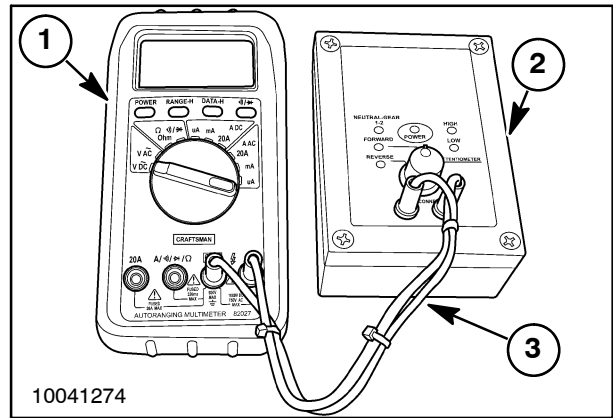
GROUND SOURCES

- Transmission case
- #14 terminal of controller
- #16 terminal of controller to transmission case



5. Connect a digital volt/ohmmeter, 1, to the breakout box, 2, using the supplied leads, 3.

NOTICE: Digital volt/ohmmeter is not included with the breakout box and must be procured locally. The breakout box may be used with an analog volt/ohmmeter, but use of a digital instrument is suggested.

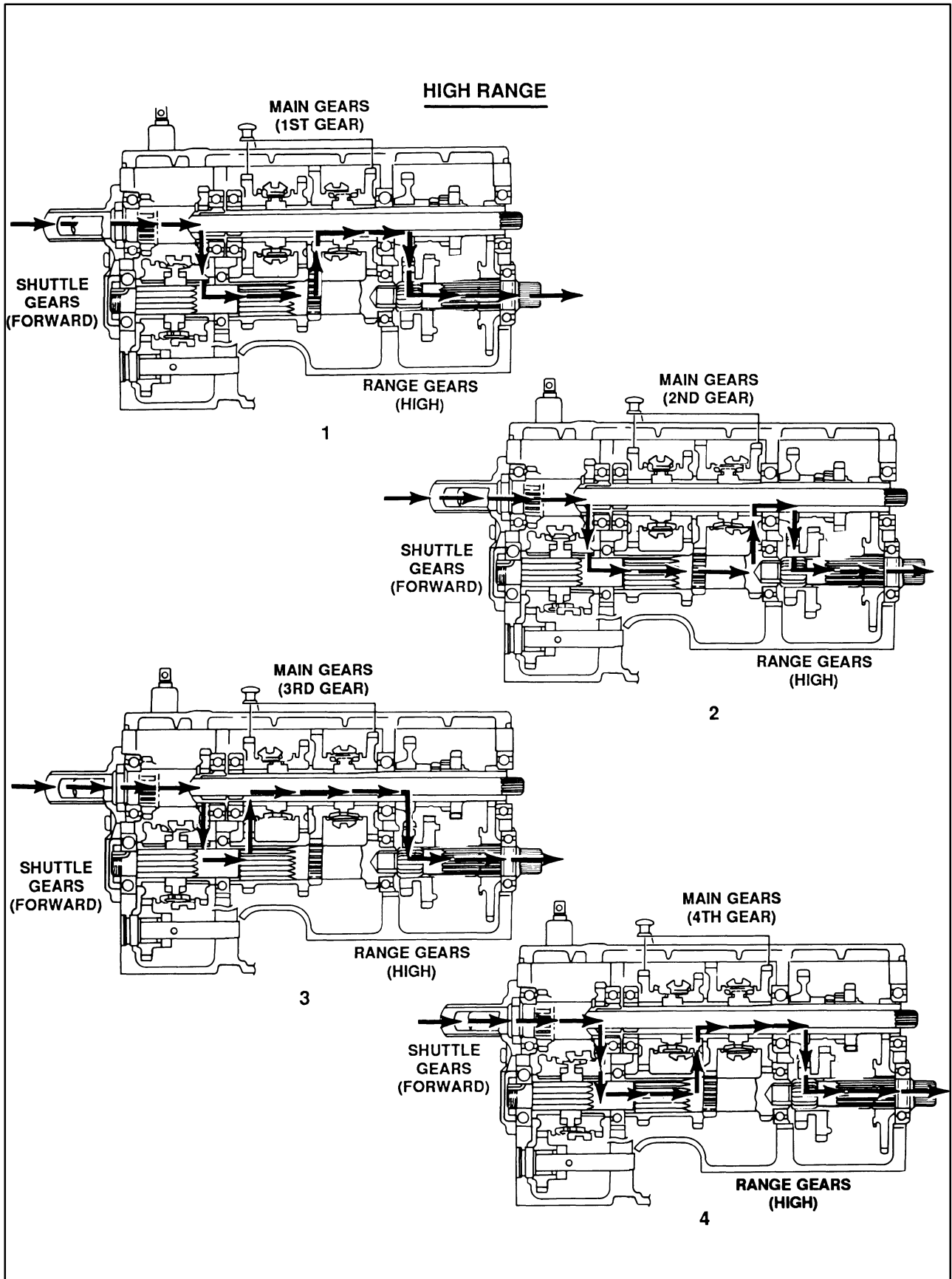


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TEST PROCEDURES - SWITCHES

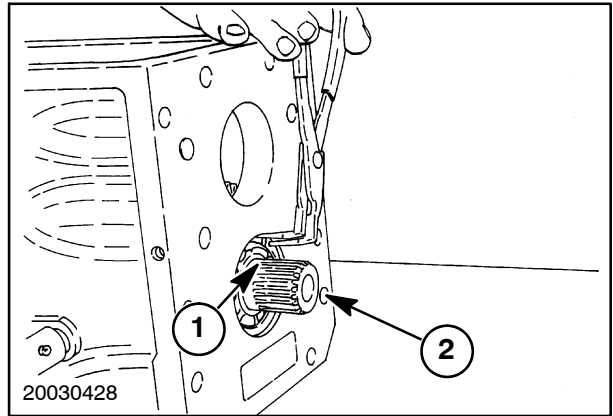
NOTICE: Volt/ohmmeter does not need to be connected to the breakout box for initial switch tests. Use volt/ohmmeter for continuity check, following initial test with breakout box.

NOTICE: In the event of a High or Low switch failure, the controller will default the transmission to the Mid range.



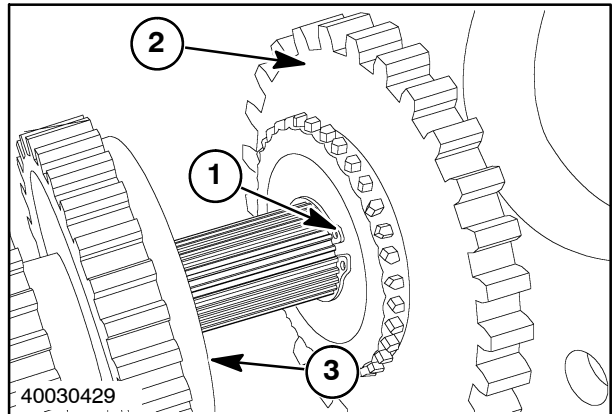
SECTION 21 - TRANSMISSION - CHAPTER 2

7. Remove the rear snap ring, 1, from the main shaft, 2.



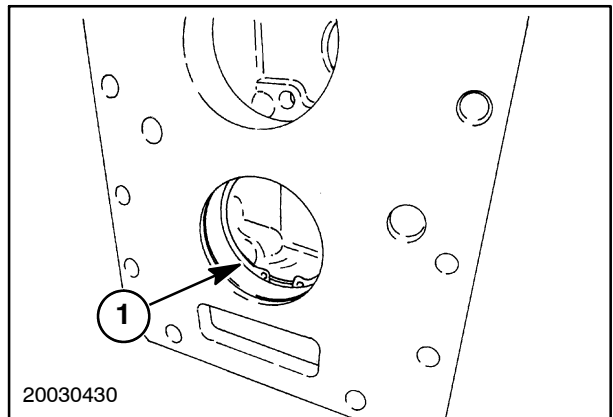
46

8. Remove the small snap ring, 1, in front of the rear gear, 2.
9. Slide the snap ring towards the front of the shaft.
10. Pull the shaft towards the rear of the housing.
11. Remove the gears, 2 and 3, and snap ring, 1.



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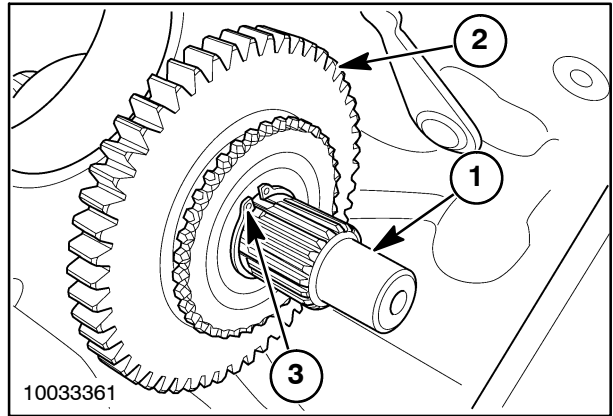
12. Remove the inner snap ring, 1, from the bearing web in rear of housing.



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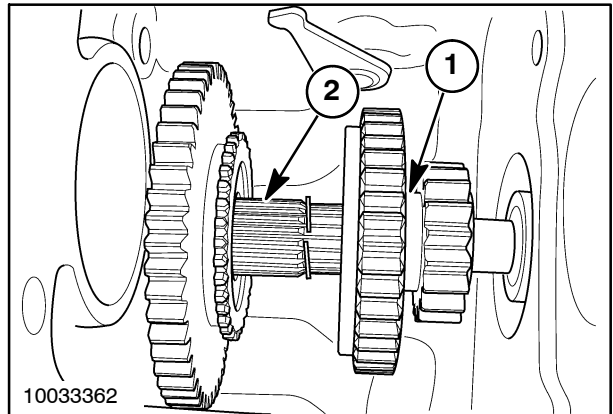
SECTION 21 - TRANSMISSION - CHAPTER 2

4. Insert the main shaft, 1, partially into the housing from the rear, through the large gear, 2.
5. Slide the small snap ring, 3, over the end of the main shaft, 1, and position towards the rear of the shaft.



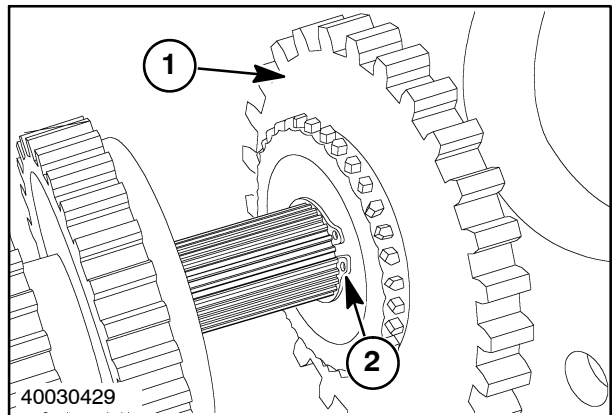
86

6. Install the sliding, smaller 18/32T double gear, 1, onto the main shaft, 2, while inserting the main shaft into the housing.



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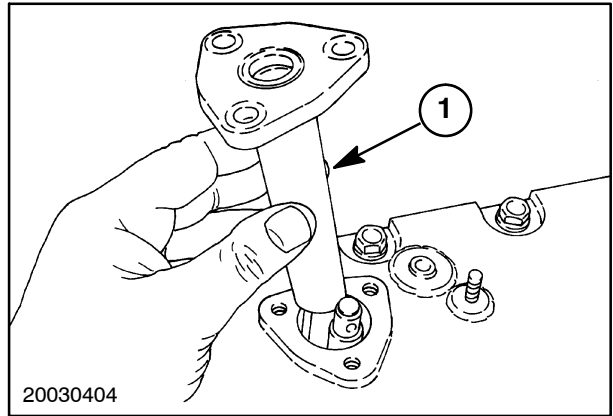
7. Fully insert the main shaft until the rear bearing bottoms against the snap ring.
8. Slide the large gear, 1, rearward and install small snap ring, 2, in groove on shaft to retain large gear.



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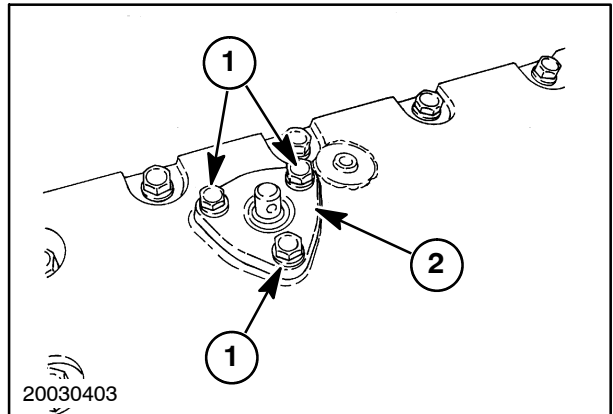
SECTION 21 - TRANSMISSION - CHAPTER 2

12. Install the shift arm cover, 1, over the shift arm and onto the transmission cover.



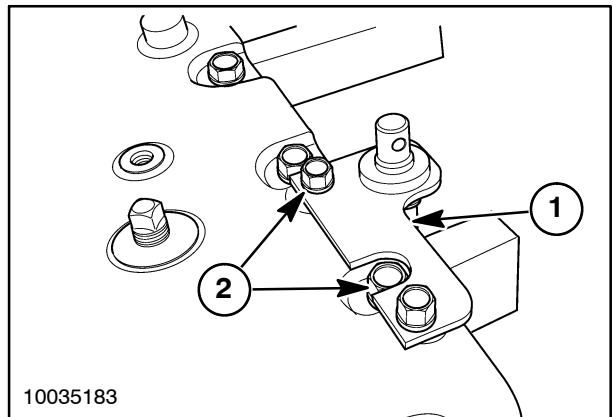
128

13. Install and tighten the three M8x16 cap screws, 1, to secure the shift arm cover, 2, to the transmission cover.



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14. Install the shuttle shift arm retainer, 1, over the shift arm and secure with two M8x16 cap screws, 2. Tighten cap screws securely.

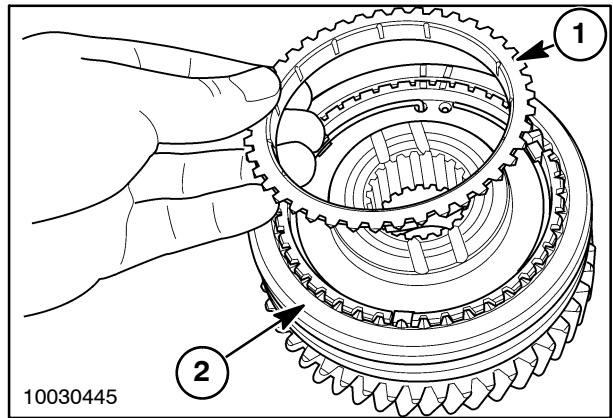


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SECTION 21 - TRANSMISSION - CHAPTER 2

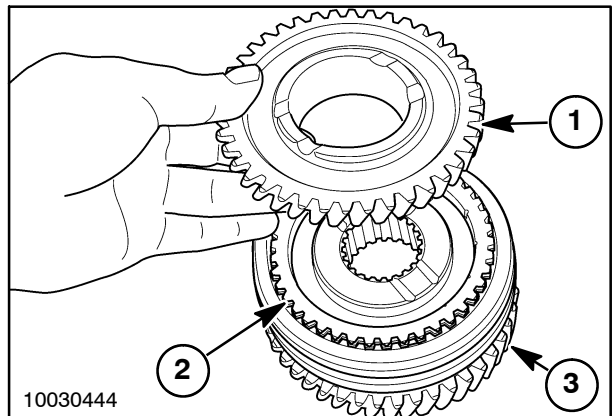
9. Install the synchronizer ring, 1, on the synchronizer gear/coupling assembly, 2.

NOTICE: Be sure to align notches in synchronizer ring with keys in synchronizer gear assembly.



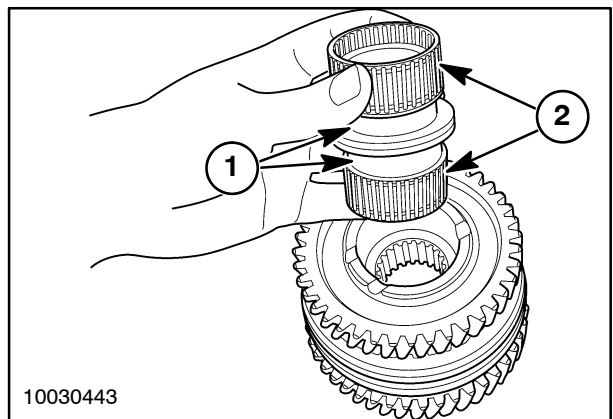
162

10. Install the 40T counter gear (4th), 1, on the synchronizer ring, 2, and the synchronizer gear/coupling assembly, 3.



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11. Install the collars, 1, and two needle bearings, 2.



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SECTION 23 - FWD DRIVELINE

Chapter 1 - FWD Driveline

CONTENTS

Section	Description	Page
	Description of Operation - Front Wheel Drive Gearbox	2
	Lubrication	3
	Troubleshooting	3
	Overhaul	4
	Front Wheel Gearbox	4
	Removal	4
	Front Wheel Gearbox	5
	Counter Gear Removal	5
	Disassembly	5
	Inspection	5
	Assembly	6
	Counter Gear	6
	Installation	6

TROUBLESHOOTING

Most malfunctions in the steering system can usually be traced to dirt or foreign matter in the system. Dirt can cause such things as stickiness, erratic operation, or hard steering.

Before considering the procedures below, follow these suggested steps:

1. Check the pump for proper relief valve action. See "Pressure Testing," discussed later in this section.
2. Jack the front end of the tractor off the ground and cycle the steering from stop to stop to check for front axle binding.
3. Be sure the hydraulic hoses from the pump-to-motor and from the motor-to-cylinder are hooked up correctly.

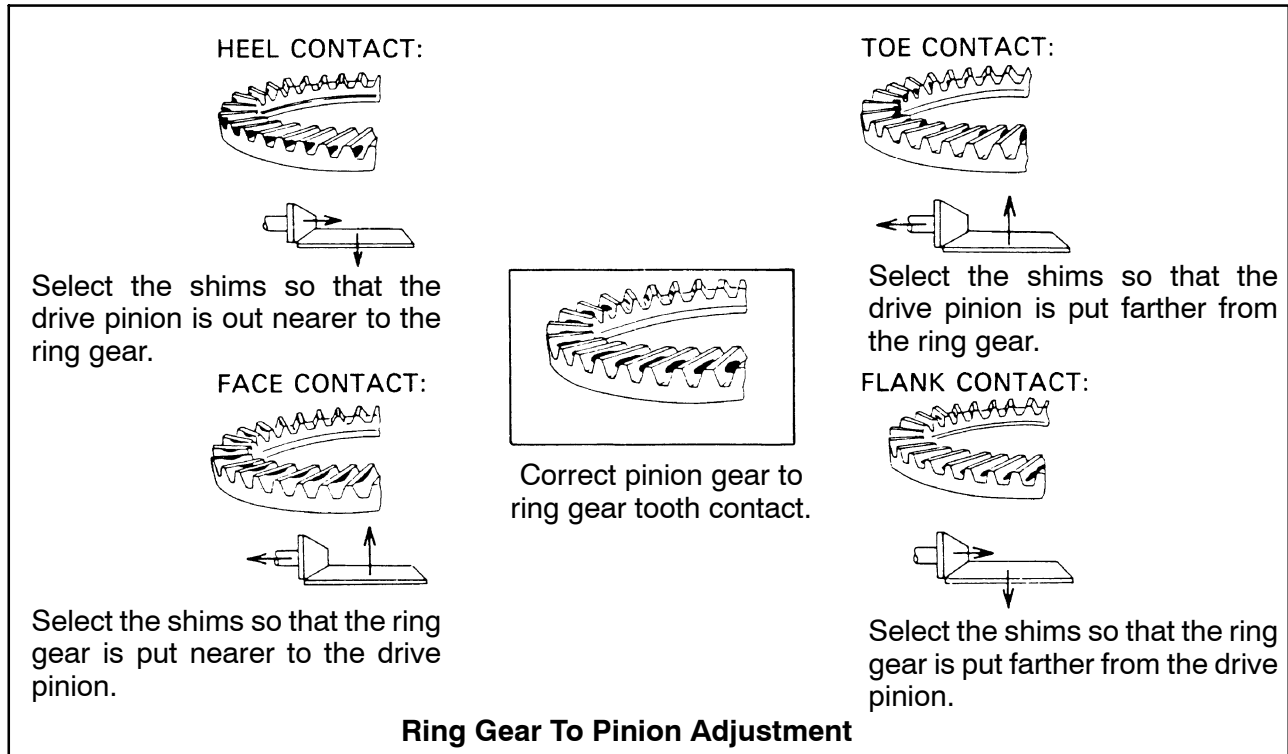
CONDITION	POSSIBLE CAUSE	REMEDY
Hard Steering.	<ol style="list-style-type: none"> 1. Control valve unit. <p>Control valve unit not aligned to steering column.</p> <p>Spool-and-sleeve combination is seized because of foreign matter.</p> <p>Over tightening of the end cap bolts.</p> 2. Oil pump. <p>The pump is stuck and will not work.</p> <p>The pump is worn down.</p> <p>Pumping performance inadequate.</p> 3. Relief valve. <p>The valve is damaged because of internal deterioration.</p> <p>Pressure setting is too low.</p> 	<p>Reposition Control valve unit. (If loosening its mounting bolts lightens the handwheel, it means that Control valve unit was in misalignment).</p> <p>Replace.</p> <p>Re-tighten to the specified torque limit.</p> <p>Replace oil pump.</p> <p>Replace oil pump.</p> <p>Test pump performance and, if necessary, remove the pump. Disassemble the pump and inspect the internal seals. Refer to the pump seal kit repair section.</p> <p>Replace control valve assembly.</p> <p>Adjust relief pressure.</p>
Steering wheel will not return to neutral or will turn by itself.	<ol style="list-style-type: none"> 1. Control valve unit. <p>Spool and sleeve combination is stuck and will not rotate.</p> <p>Control valve unit not aligned to steering column.</p> 	<p>Replace control valve assembly.</p> <p>Re-align.</p>

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

6. Remove the differential assembly from the housing and apply Prussian blue to the pinion shaft gear teeth.
7. Position the differential assembly in the right axle housing. Make sure the differential assembly is fully seated in the housing.
8. Assemble the differential axle housing complete with axle shafts, bearings, shims, and install the left axle housing onto the right axle housing. Refer to "Axle and Differential, Assembly" procedure found later in this section.

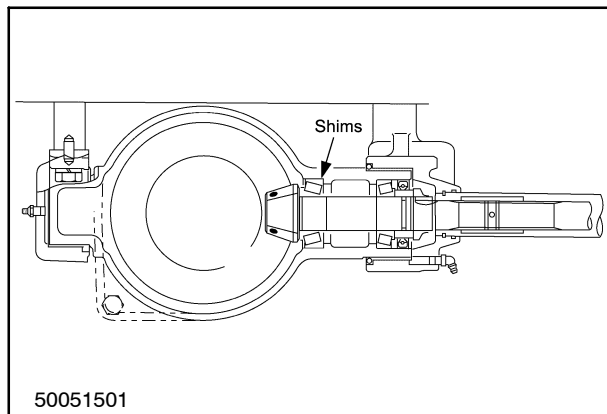
NOTICE: Only use four M14x45 cap screws to secure the axle housings, do not torque.

9. Rotate the pinion until the ring gear has rotated one complete revolution.
10. Disassemble the front axle and differential, refer to "Front Axle and Differential, Disassembly" procedure found earlier in this section.
11. Inspect the gear tooth markings. If the markings are incorrect, adjust the pinion gear assembly as required to obtain the correct pattern as shown.

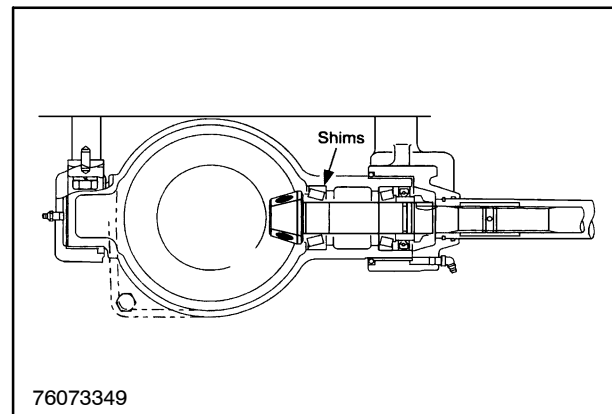


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NOTICE: Ring and pinion markings may show substantial toe contact, under non-load conditions, (fig. 26). However, under-load conditions will show normal markings as in fig. 27.

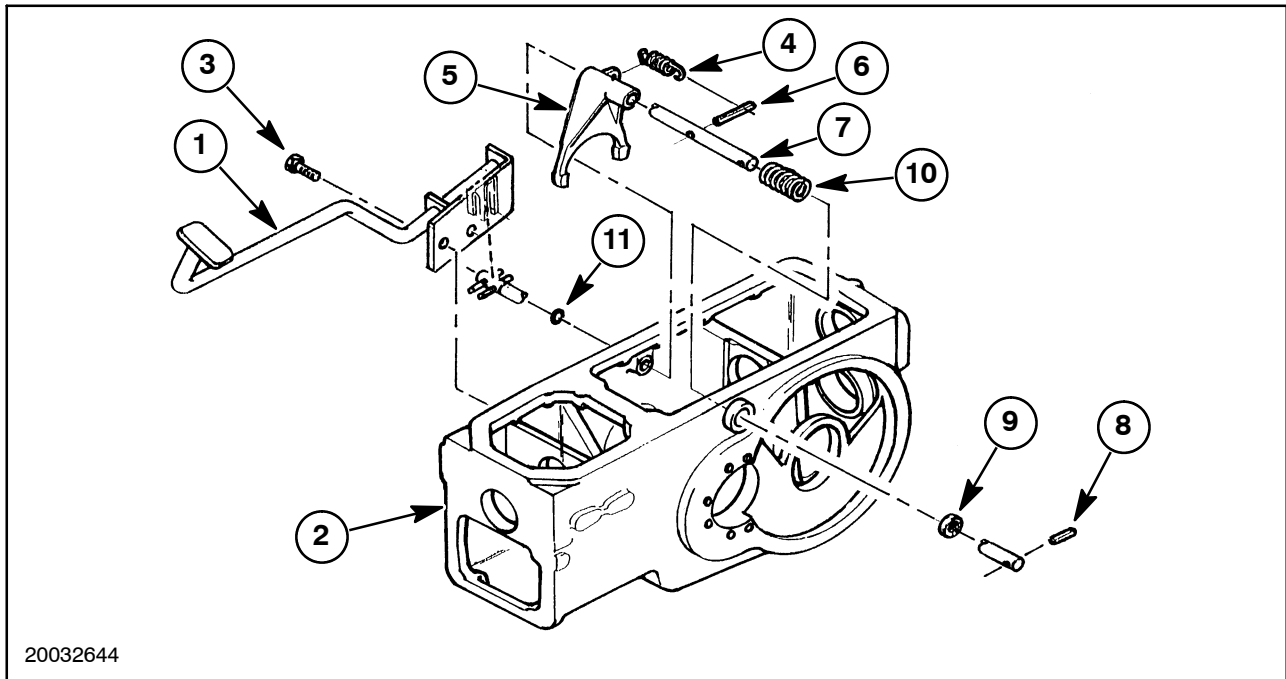


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SECTION 27 - DIFFERENTIAL, REAR AXLE - CHAPTER 1



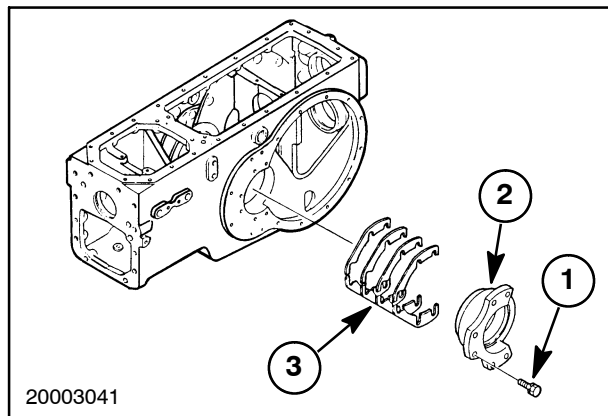
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6

7. Remove the differential lock pedal, 1, from the differential housing, 2, by removing the two M10 x 20 cap screws, 3.
8. Remove the tension spring, 4, from the differential lock fork, 5, and the long roll pin, 6.
9. Remove the long roll pin, 6, from the differential lock shaft, 7.
10. Remove the retaining roll pin, 8, from the differential lock shaft, 7.
11. Using a hammer and a brass or aluminum drift, carefully drive the differential lock shaft, 7, free of the oil seal, 9, in the left-hand side of the differential housing, 2.

12. Slide the lock shaft, 7, free of the return spring, 10, and remove the return spring.
13. Slide the lock shaft, 7, free of the lock fork, 5, and out the right-hand side of the differential housing, 2, and remove the lock fork.
14. Remove and discard the lock shaft oil seal, 9, and O-ring, 11, from the left-hand side of the differential housing, 2.
15. Remove the PTO clutch and shafts from the differential housing to gain access to the differential assembly. See "PTO", Section 31, for removal procedure.

16. Loosen and remove the six M8 x 25 cap screws, 1, securing the left-hand differential bearing carrier, 2, to the differential housing. Remove the shims, 3, found between the bearing carrier, 2, and the differential housing, noting the number and thickness of the shims, 3, for ease of assembly. Remove the bearing carrier, 2, from the differential housing. Repeat for the right side.
17. Using pry bars, carefully remove the side bearings from the differential assembly, and set the bearings aside with their respective bearing carriers.



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NOTICE: The side bearings are NOT identical. The right-hand side bearing has an integral retaining ring, used to locate the bearing axially, while the outer case of the left-hand bearing is plain.

SECTION 31 - POWER TAKE-OFF (PTO) - CHAPTER 1

METRIC BOLT TORQUE SPECIFICATIONS

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pound Foot	Newton Meters	Pitch (mm)	Pound Foot	Newton Meters
M6	4T, 4.8	1.0	3.6 - 5.1	4.9 - 6.9			
	7T, 8T, 8.8		6.1 - 8.3	8.3 - 11.3			
	10T, 11T		8.6 - 11.6	11.7 - 15.7			
M8	4T, 4.8	1.25	9.4 - 12.3	12.7 - 16.7	1.0	11.2 - 14.9	15.2 - 20.2
	7T, 8T, 8.8		16.7 - 21.0	22.6 - 28.4		19.6 - 25.3	26.5 - 34.3
	10T, 11T		21.0 - 26.8	28.5 - 36.3		22.4 - 29.7	30.4 - 40.2
M10	4T, 4.8	1.5	18.8 - 24.6	25.5 - 33.3	1.25	21.0 - 26.8	28.5 - 36.3
	7T, 8T, 8.8		32.5 - 41.3	44.1 - 55.9		36.2 - 46.3	49.0 - 62.8
	10T, 11T		39.8 - 51.3	54.0 - 69.6		42.7 - 54.2	57.9 - 73.5
M12	4T, 4.8	1.75	27.5 - 34.8	37.3 - 47.1	1.25	31.8 - 40.5	43.1 - 54.9
	7T, 8T, 8.8		48.5 - 61.5	65.7 - 83.3		54.9 - 69.4	74.5 - 94.1
	10T, 11T		68 - 85.6	92 - 116		73.1 - 93.7	99 - 127
M14	4T, 4.8	2.0	46.3 - 59.3	62.8 - 80.4	1.5	51.4 - 64.4	69.7 - 87.3
	7T, 8T, 8.8		76.8 - 97.4	104 - 132		85.6 - 109	116 - 148
	10T, 11T		102.6 - 129	139 - 175		110 - 136	149 - 185
M16	4T, 4.8	2.0	63.5 - 81.2	86 - 110	1.5	67.2 - 84.9	91 - 115
	7T, 8T, 8.8		110 - 136.5	149 - 185		116 - 142	157 - 193
	10T, 11T		151.3 - 188	205 - 255		162 - 199	220 - 270
M18	4T, 4.8	2.0	83.4 - 104	113 - 141	1.5	96.7 - 120	131 - 163
	7T, 8T, 8.8		145 - 174	196 - 236		169 - 206	230 - 280
	10T, 11T		203 - 246	275 - 333		220 - 270	299 - 367
M20	4T, 4.8	2.5	106 - 133	144 - 180	1.5	126 - 155	171 - 211
	7T, 8T, 8.8		177 - 214	240 - 290		203 - 245	275 - 333
	10T, 11T		268 - 326	363 - 441		293 - 358	397 - 485

Assembly

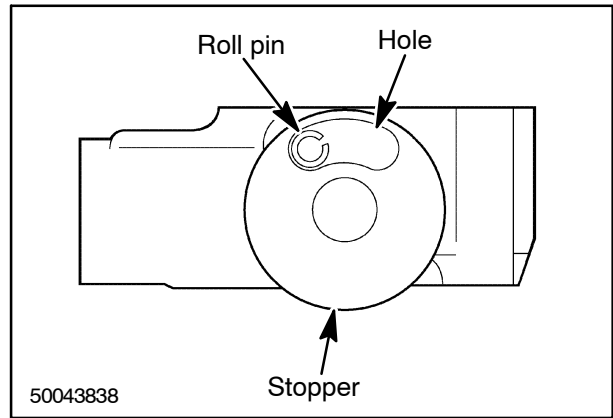
1. Sparingly lubricate new O-rings, 9, (Figure 20) with petroleum jelly and install them onto the valve spool, 3 (Figure 20).

NOTICE: Align the roll pin with the stopper's hole of the spool.

2. Lubricate the spool bore with clean hydraulic fluid.

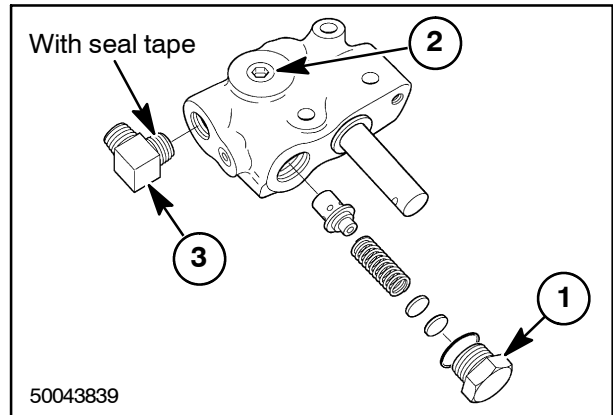
NOTICE: Due to minimal diameter tolerances between the valve spool bore and the valve spool, it is necessary to chill the valve spool in a freezer or other cooling device prior to inserting the valve spool into spool bore. Failure to do so may result in damage to the valve spool, valve body, or O-rings.

3. Install the valve spool, 3, into the valve body, 4. (Figure 20).
4. Install the spacers, 2, snap ring, 1, (Figure 20) onto the valve spool.
5. Check that the spool moves freely in the spool bore. If it does not, replace the clutch control valve assembly.
6. Install the poppet, 8, spring, 7, shims, 6, and plug, 5, (Figure 20).



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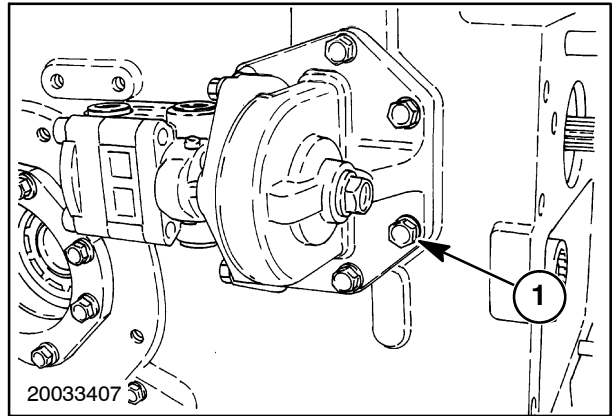
Tightening Torque		N·m (lb ft)
1	Plug	29 (21)
2	Plug	15 (11)
3	Adapter	15 (11)



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SECTION 31 - POWER TAKE-OFF (PTO) - CHAPTER 1

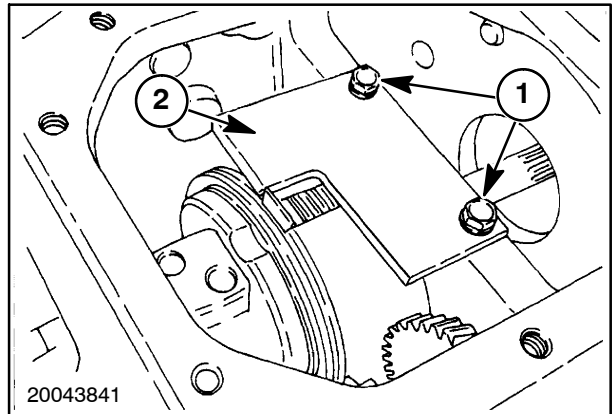
17. Remove the six M10x30 cap screws, 1, securing the hydraulic gear pump to the differential housing.
18. Remove the gear pump to gain access to the right side clutch retaining cap screw.



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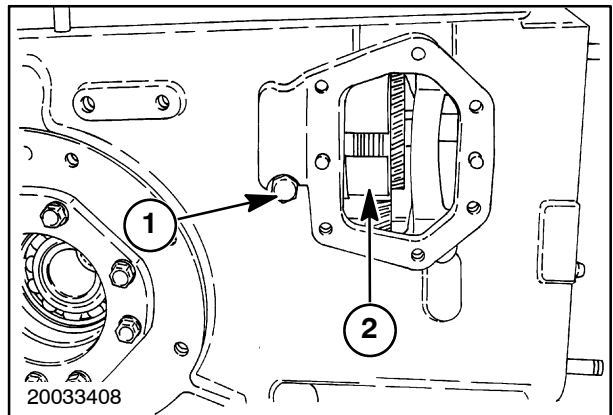
19. Remove the two M8x20 cap screw, 1, securing the PTO clutch brake stopping plate, 2, to the differential housing.

NOTICE: The PTO clutch stopping plate cap screws are secured with a thread-locking compound. Do not attempt to remove the cap screws without heating them prior to removal. Use a propane torch to heat the cap screws and soften the thread-locking compound.

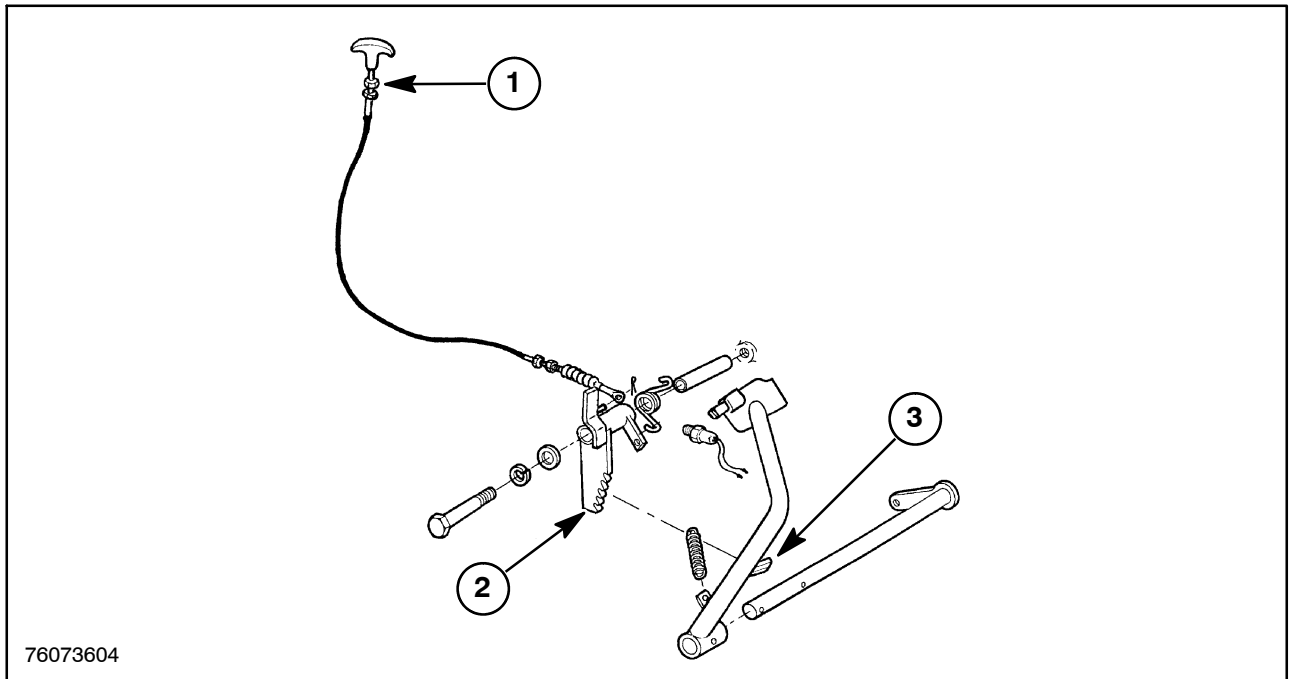


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20. Remove the two M6x30 cap screws, 1, (one each side) retaining the clutch assembly, 2, to the inside of the differential housing.



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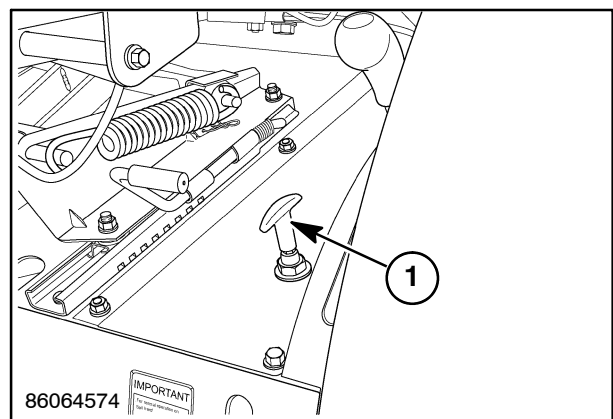


4

PARK BRAKE

A park brake is provided to hold the brakes in a locked position when the park brake handle, 1, is locked. The park brake cable, 1, holds the teeth, 2, in a locked position with the engagement pawl, 3, on the inner (left-hand) brake pedal.

The park brake handle, 1, is located on the left side of the seat deck.



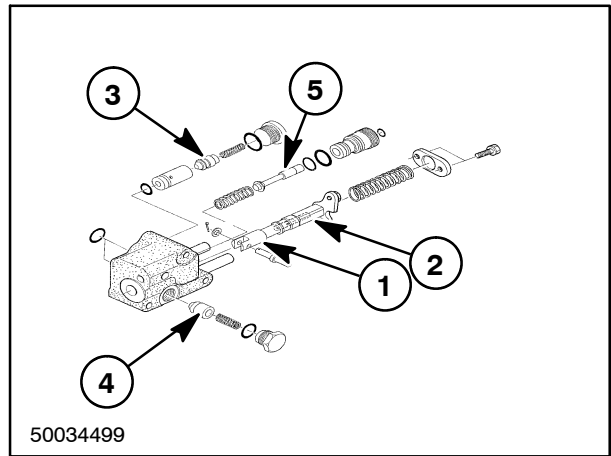
5

SECTION 35 - HYDRAULIC SYSTEM - CHAPTER 1

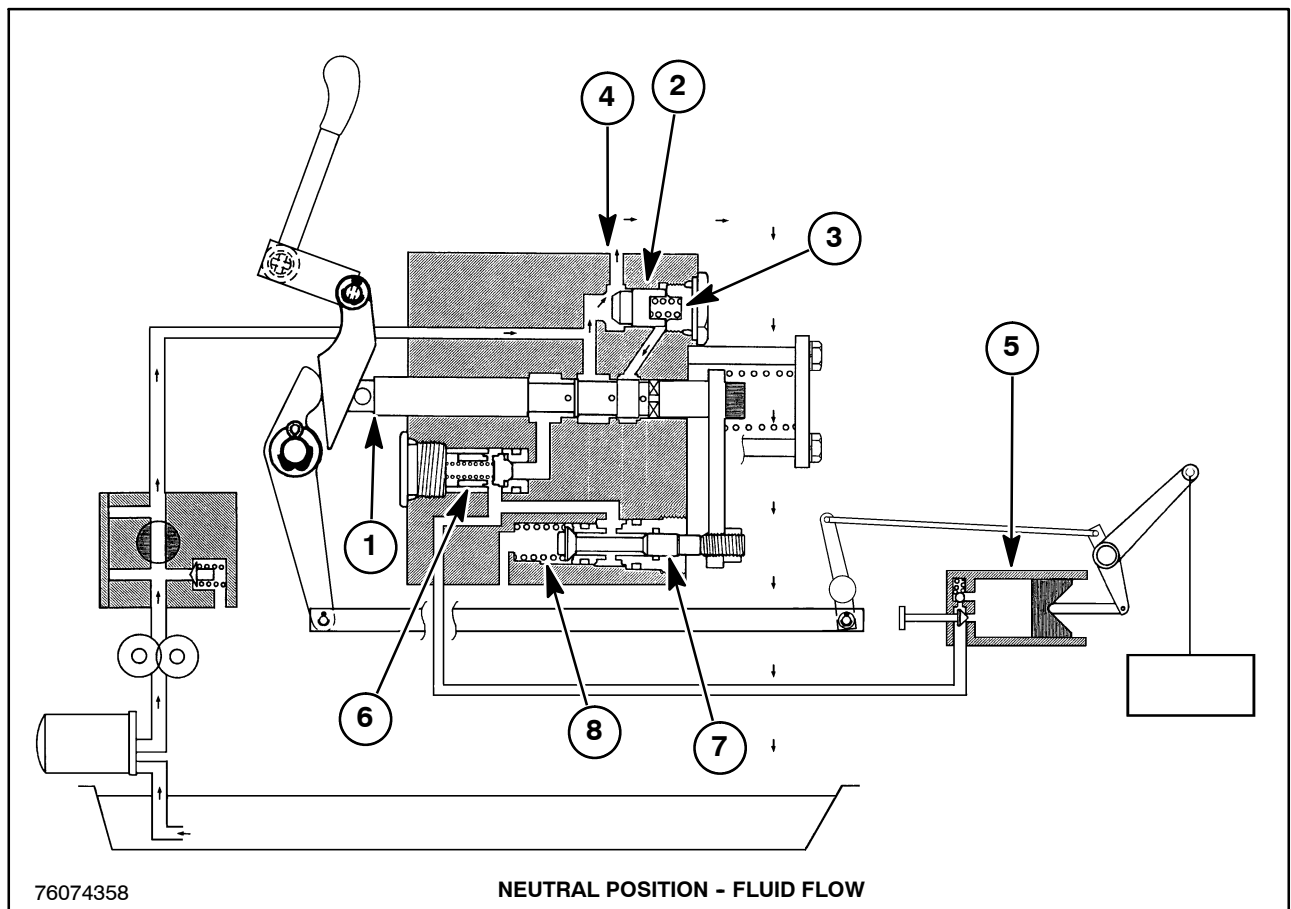
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CONTROL VALVE ASSEMBLY (HPL)

The control valve assembly is located inside the hydraulic lift cover and contains the control valve spool, 1, bypass spool, 2, check valve, 3, unload valve, 4, and lowering valve, 5.



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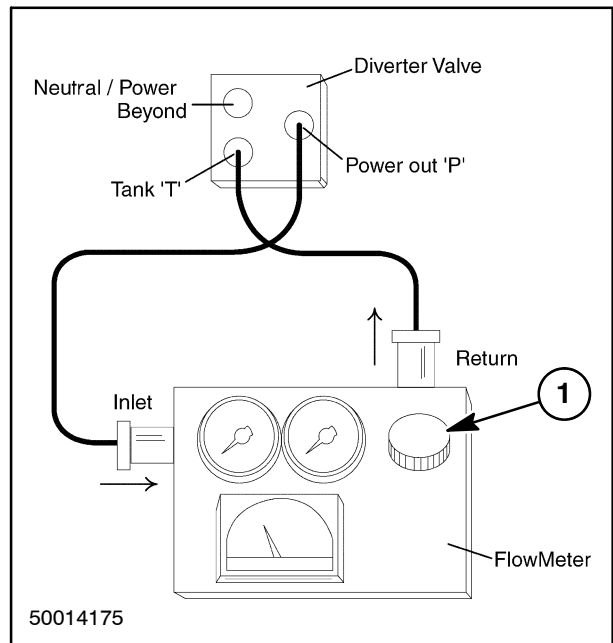
NEUTRAL POSITION - FLUID FLOW

In the neutral position, the control valve spool, 1, is centered in the valve body. As fluid from the hydraulic pump is directed to the valve body, the fluid pressure moves the unload valve, 2, and compresses the spring, 3. This opens the passages, 4, to the sump. Fluid then flows from the pump to these passages and returns to the sump.

Fluid trapped in the lift cylinder, 5, under weight caused by the implement on the lift arms, exerts pressure on the cylinder side of the check valve, 6. This holds it in a closed position. The lowering valve spool, 7, positioned by the spring, 8, retains the fluid in the lift cylinder and maintains the implement in a fixed position.

SECTION 35 - HYDRAULIC SYSTEM - CHAPTER 1

6. Start the engine and operate the hydraulic system to warm the hydraulic fluid to normal operating temperature.
Normal operating temperature: 38°C (100°F) + ambient temperature.
7. Operate the tractor engine at full rpm. Observe the flow meter reading. See chart below for the no load pressure readings.
8. Tighten the flow restrictor valve, 1, on the flow meter until the system pressure is 13100 - 13789 kPa (1900 - 2000 psi).
9. Observe the flow meter reading, the results should be approximately 80% of the no-load flow. Minimum flow ratings are shown below. If testing shows the hydraulic pump output is low, the pump requires replacement.



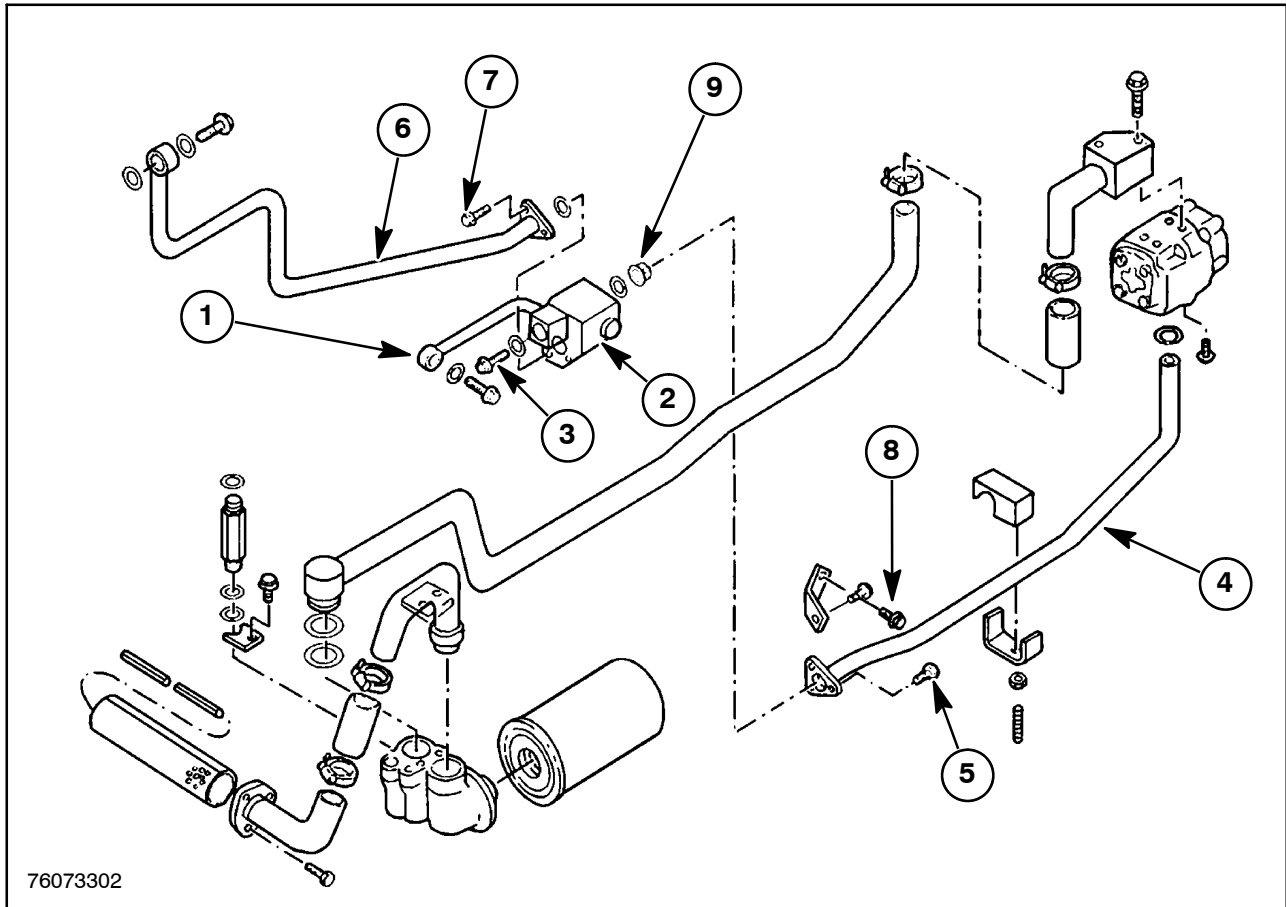
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EHSS Model	Boomer 4055	Boomer 4060
Pump Capacity @ Rated Engine Speed	43.9 L/min (11.6 US gal/min)	45.5 L/min (12.0 US gal/min)
rpm @ Half Throttle	1350	1400
Pump Flow @ Half Throttle	21.9 L/min (5.8 US gal/min)	22.7 L/min (6.0 US gal/min)
Rated Engine rpm	2700	2800
Pump Flow @ Rated Speed	43.9 L/min (11.6 US gal/min)	45.5 L/min (12.03 US gal/min)
Minimum Flow Rating (80% of the No-load Flow)	35.1 L/min (9.28 US gal/min)	36.4 L/min (9.62 US gal/min)

SSS Model	Boomer 4055	Boomer 4060
Pump Capacity @ Rated Engine Speed	40.9 L/min (10.8 US gal/min)	42.5 L/min (11.2 US gal/min)
rpm @ Half Throttle	1350	1400
Pump Flow @ Half Throttle	20.5 L/min (5.4 US gal/min)	21.3 L/min (5.6 US gal/min)
Rated Engine rpm	2700	2800
Pump Flow @ Rated Speed	40.9 L/min (10.8 US gal/min)	42.5 L/min (11.2 US gal/min)
Minimum Flow Rating (80% of the No-load Flow)	32.7 L/min (8.6 US gal/min)	34.0 L/min (9.0 US gal/min)

NOTICE: The SSS transmission tractors have a lower hydraulic output because the PTO priority flow valve located in the manifold block diverts 3.0 L/min (0.8 US gal/min) to the PTO control valve.

**COMBINATION SYSTEM RELIEF VALVE
AND DIVERTER VALVE ASSEMBLIES**



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Removal

NOTICE: Removal and installation procedures shown are for tractors equipped with EHSS transmissions. Tractors with SSS transmissions will have an additional pressure tube, from the diverter valve to the PTO clutch control valve.

1. Disconnect the relief valve to sump return tube, 1, at the valve body, 2, by removing the banjo bolt, 3.
2. Disconnect the pump pressure tube, 4, at the valve body, 2, by removing the three M8x25 cap screws, 5.

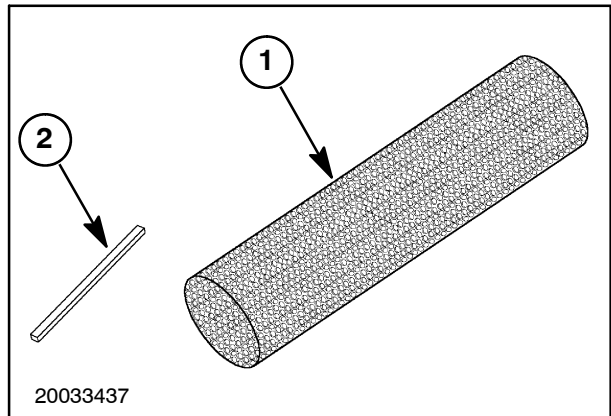
NOTICE: The pump pressure tube on tractors equipped with a SSS transmission is secured to the diverter valve with two M8x25 cap screws, 5.

3. Disconnect the HPL pressure tube, 6, at the valve body, 2, by removing the three M8x20 cap screws, 7.
4. Remove the M8x20 cap screw, 8, securing the valve assembly to the tractor. Cap and plug all openings.
5. Remove the filtering screen, 9, from the pump pressure tube, 4.

NOTICE: If a hydraulic pump flow problem has been noticed, first check filterings screen, 9, for debris. The screen should be cleaned or changed every 300 hours.

Inspection

1. Visually inspect the strainer, 1, and the six magnet bars, 2, for damage and/or excessive debris. Replace or clean with appropriate solvent as necessary.
2. If the screen filter and magnets are being reused, be sure that the filter and magnets are clean and dry before assembly.

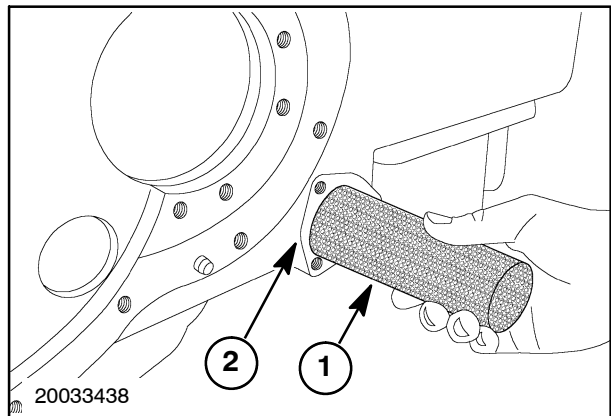


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Assembly

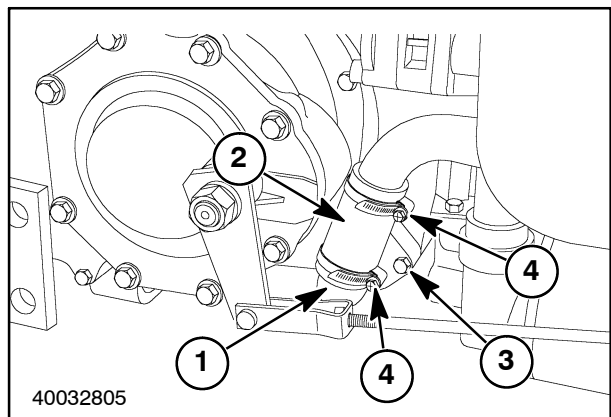
1. Install the magnet bars inside the metal screen filter.
2. Install the strainer, 1, in the housing.
3. Install a new gasket, 2, on the housing.

NOTICE: Axle housing is removed for clarity. It is not necessary to remove the axle housing to service the screen filter.



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4. Install the lower sump hydraulic tube, 1, into the connector hose, 2.
5. Position the lower sump hydraulic tube, 1, against the housing aligning the cap screw holes.
6. Install the three M8x20 cap screws, 3, securing the lower sump tube to the housing.
7. Tighten hose clamps, 4, on the connector hose, 2.

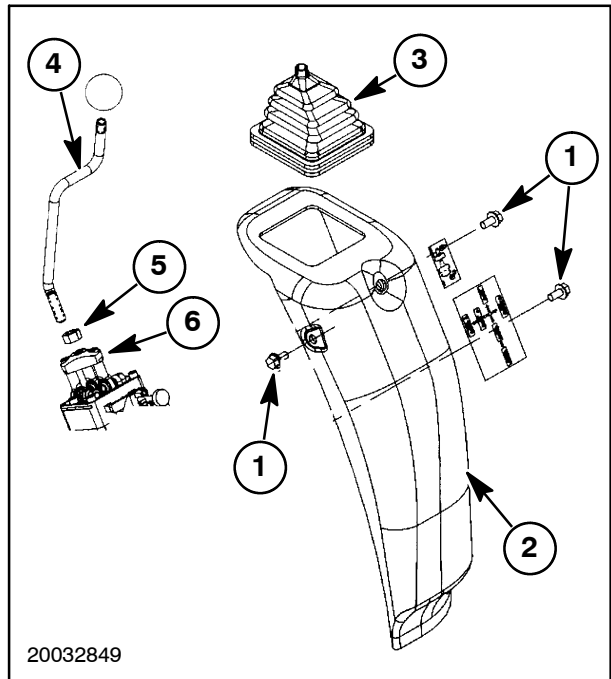


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TWO SPOOL REMOTE VALVE

Removal

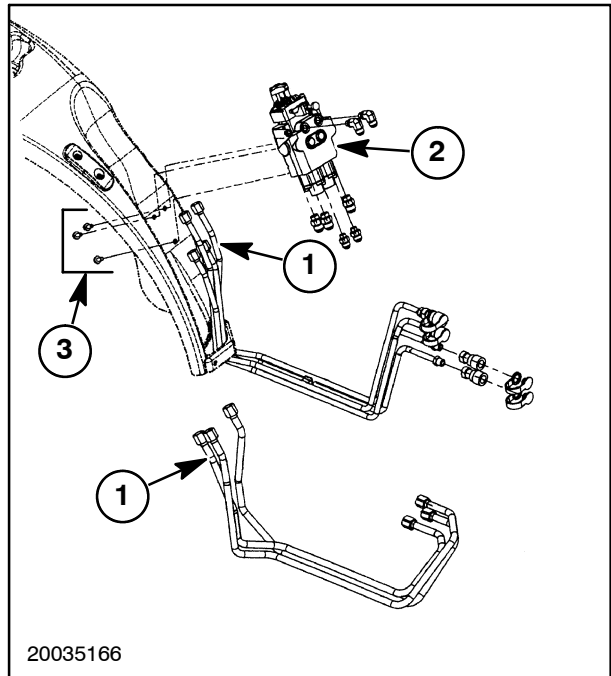
1. Remove the three M8x16 cap screws, 1, securing the control valve cover, 2, to the valve.
2. Slide the joystick boot, 3, towards the top of the joystick, 4.
3. Loosen the lock nut, 5, on the joystick, 4, and unscrew the joystick from the valve linkage, 6.
4. Remove the cover, 2.



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NOTICE: Before disconnecting or removing hydraulic lines from the control valve, label or mark each tube for proper re-assembly.

5. Disconnect the hydraulic tubes, 1, from the control valve, 2. Cap and plug all openings. Remove the three M8x16 cap screws, 3, securing the valve, 2, to the fender. Remove the control valve.



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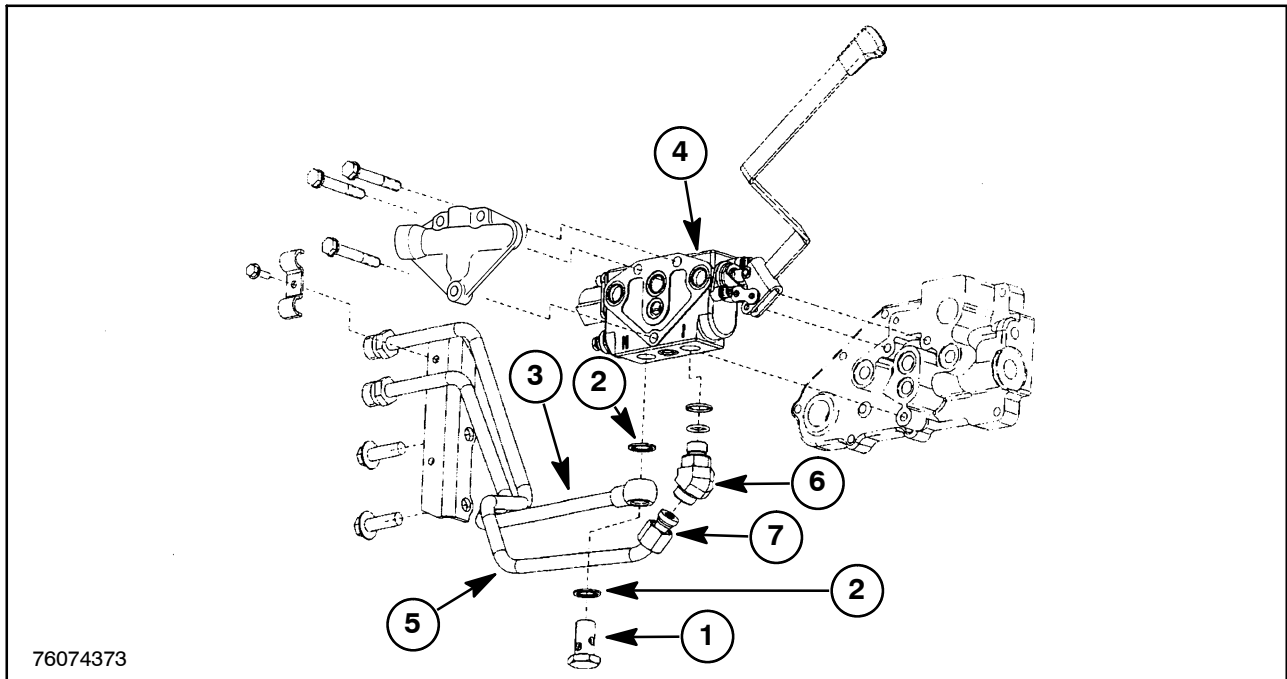
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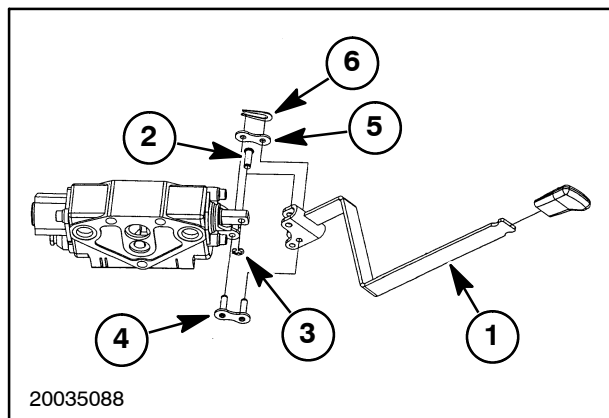


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NOTICE: Control lever shown for clarity only. Lever installation is done later.

NOTICE: It may be necessary to loosen the tube retaining clamps to ease connection of tubes to valve.

5. Place banjo bolt, 1, through washers, 2, rear remote tube, 3, and install into control valve, 4. Tighten banjo bolt.
6. Connect tube, 5, to 45° fitting, 6.
7. Tighten tube fitting, 7.
8. If loosened previously, tighten tube clamps.
9. Connect the lever assembly, 1, to the valve spool using pin, 2, and E-clip, 3.
10. Connect the remaining end of the lever assembly, 1, to the valve body using the double pin, 4, link, 5, and spring stop lock, 6.



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Inspection

1. Clean all parts in a clean, suitable solvent. Allow to air dry.
2. Discard all O-rings and seals. Lubricate new O-rings and seals with clean hydraulic oil, prior to installation.
3. Inspect the spool bore in the valve body, for pitting, scratches or excessive wear. Inspect the valve spool for the same. If inspection reveals defects, replace the entire valve assembly.
4. Check that the spool moves freely in the spool bore. If spool sticks or is rough, replace the entire valve assembly.
5. Inspect all valve parts for wear or damage to seating surfaces. Replace as necessary.
6. Check springs for weakness or cracks. Replace as necessary.

SECTION 41 - STEERING

Chapter 1 - Steering

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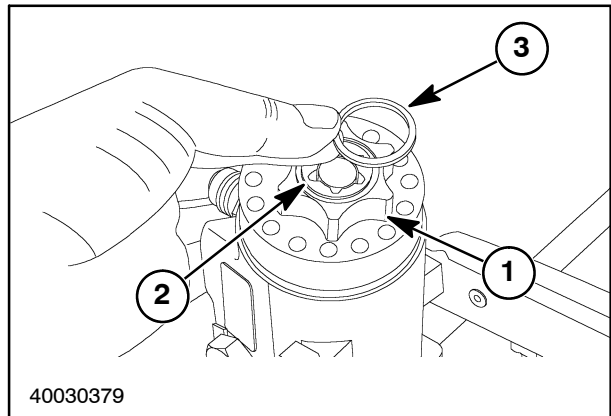
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SECTION 41 - STEERING - CHAPTER 1

CONDITION	POSSIBLE CAUSE	REMEDY
Front wheel shimmy	<ol style="list-style-type: none">1. Worn pivot shaft and/or bushings.2. Loose tie-rod.3. Loose spindle arm.4. Worn king pin and/or bearing.	<ol style="list-style-type: none">1. Replace pivot shaft and/or bushings.2. Tighten tie-rod.3. Tighten spindle arm.4. Replace king pin and/or bushing.
Loose spindle	<ol style="list-style-type: none">1. Worn bushing.2. Worn spindle shaft.3. Worn or damaged thrust bearing.	<ol style="list-style-type: none">1. Replace bushing.2. Replace spindle shaft.3. Replace thrust bearing.

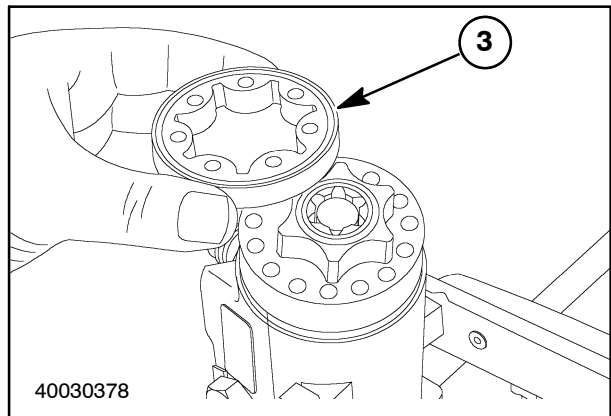
SECTION 41 - STEERING - CHAPTER 1

20. Install the rotor, 1, on the drive shaft.
21. Lubricate a new O-ring, 2, with petroleum jelly and install in the groove on the rotor.
22. Install the spacer, 3.



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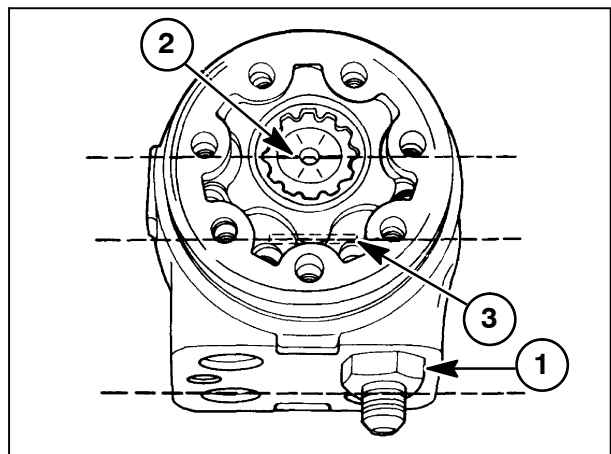
23. Install the fixed ring, 3, aligning the paint marks made during disassembly.
24. Lubricate a new O-ring with petroleum jelly and install in the groove on the fixed ring.



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25. When the steering control motor is assembled properly, the components are in the correct timing position to allow the motor to function properly. The following areas should be aligned:
 - The port face, 1, of the housing.
 - The pin through the spool and sleeve.
 - The line, 2, drawn on the drive shaft.
 - The middle of the two valleys, 3, in the rotor.

If any of these areas are not aligned, the steering control motor will not operate properly.



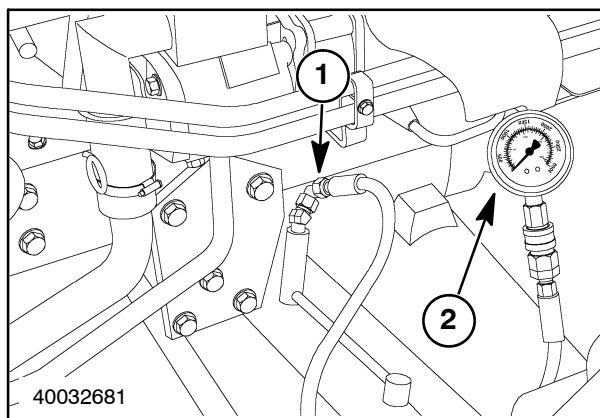
Break-in Procedure

NOTICE: Check the pump body and oil temperature during the break-in period. If the temperature is too high or pump is noisy, stop immediately and inspect pump for possible causes.

Normal operating temperature: 37.7 °C (100 °F) + ambient temperature.

After the oil pump has been overhauled, it needs a trial run as follows:

1. Connect a tee fitting, 1, Tool No. NH01412, and 0-20684 kPa (0-3000 psi) pressure gauge, 2, between the base end of the steering cylinder tube fitting and steering hose.
2. Start the engine and operate at low idle (1000 rpm) while the steering control valve is in the neutral position, for approximately ten minutes.
3. Increase the engine speed to 2000 rpm and maintain these conditions for another ten minutes.
4. Read the oil pressure gauge and gradually increase the pressure to 14996 kPa (2175 psi) by placing steering linkage at full turn position (against steering stops). Allow engine to operate approximately five minutes between increases, as indicated on the chart below.



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Step	Pressure	Engine Speed (rpm)	Minutes
1	999.7 kPa (145 psi) or less	1000	10
2	999.7 kPa (145 psi) or less	2000	10
3	14996 kPa (2175 psi)	1000	5
4	14996 kPa (2175 psi)	1500	5
5	14996 kPa (2175 psi)	2000	5

SPECIAL TOOLS

Listed below are the tools required to service the A/C system. These tools listed are standard equipment. See your authorized service dealer for more information.

Part Number	Description
FNH02343B	Sanden Compressor Tool Kit
FNH00855	Refrigerant Gas Leak Detector
FNH00890	Air Conditioning Spring Lock Coupling Tool
OEM1419	Service Gauge Set (R134A)
OEM1598	R-134A Recovery/Recycle and Recharging Station
OEM1662	Thermometer

Preventing Mixing of Service Equipment

To help avoid the mistake of charging a system with an incorrect, incompatible refrigerant, the compressor fittings are different for refrigerants R12 and R134a. Systems using R134a have quick couple service connections, while R12 systems use screw threads. This prevents the use of the same tools for different refrigerants, thereby helping to avoid the mixing of refrigerants in service equipment.

If refrigerants become mixed, the thermodynamic and chemical characteristics will change. This change results in excessive pressure and poor lubrication and leads to failure of the compressor, desiccant (drier) and other system components.

Ultimately, system failure and an expensive repair bill will result if refrigerants become mixed in a single set of service equipment.

REFRIGERANT EXTRACTION AND RECYCLING EQUIPMENT

Both extraction and recycling equipment are in use and available to service technicians. Both types of equipment will remove the refrigerant from an air conditioning system. However, extraction equipment only pulls the refrigerant from the air conditioning system and stores it in an appropriate container. Extraction equipment does not clean the refrigerant. Its only purpose is to recover the refrigerant from an air conditioning system prior to disassembling and servicing it.

Always recycle or reclaim recovered refrigerant before putting it back into an air conditioning system. During service operations involving a partial recharge, or while the air conditioning system is in use, refrigerant can pick up moisture, lubricants, microscopic metal chips, and other potential contaminants. In many cases the contaminants contribute to or are the primary cause of the system failure. Putting used, unclean refrigerant back into an air conditioning system may result in poor system performance.

NOTICE: *Reuse of unrecycled, unreclaimed refrigerant will void the warranty.*

Equipment that removes refrigerant from a mobile air conditioning system (recovery equipment) may allow you to put the used refrigerant back in the system without first cleaning it to minimize performance. You may also use such conditioning systems. Non-mobile air conditioning systems use refrigerants and

contain contaminants that are different from those in mobile air conditioning systems. Recovery equipment may therefore allow the mixing of different types of refrigerants or introduce contaminants that may not be removable by recycling equipment available in the service shop.

If you want to remove, clean and reuse R134a refrigerant, you must use a machine that both extracts and recycles refrigerant from mobile air conditioning systems. Dedicate that machine to R134a only.

Recycling equipment meeting SAE standards J1990 and J2210 is designed to extract and recycle refrigerants that have been in mobile air conditioning systems only. R134a refrigerant that also is used in non-mobile systems may introduce contaminants to the refrigerant that equipment meeting SAE J1990 and J2210 cannot remove. This equipment is not intended for use on non-mobile systems.

Using Extraction Equipment

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

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

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

If you use extraction equipment and send your recovered refrigerant to a reclamation facility, reclaimed refrigerant you purchase must meet the Air Conditioning and Refrigeration Institute standards of purity (ARI Standard 700-88). This will ensure that the refrigerant you are using not only meets the purity requirements of SAE J1991 (for R12) OR J2099 (for R134a), but also that it does not contain incompatible lubricants or other contaminants from non-automotive air conditioning systems.

EXAMPLE 10

SYMPTOMS

1. Evaporator is only slightly cool.
2. Liquid line and receiver/drier are cool to touch and show frost or considerable moisture.
3. Low side pressure is too low. The gauge should read 20.6 - 206.8 kPa (3 - 30 psi).
4. High side pressure is too low. See the pressure-temperature chart for the correct gauge readings.

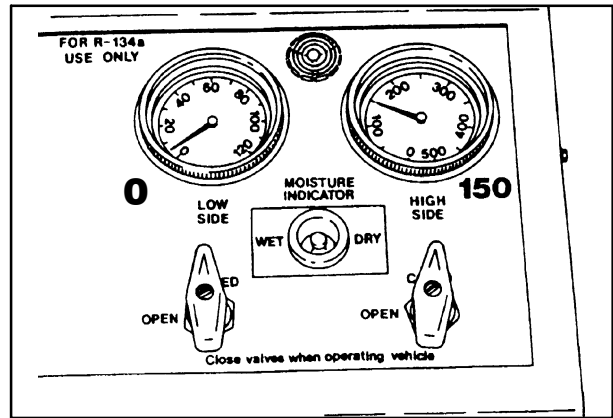
NOTICE: A normal or high reading of the high side pressure gauge under these conditions indicates that the system is overcharged or that the condenser or receiver/drier is too small.

DIAGNOSIS: Restriction in the liquid line and/or receiver/drier resulting in a “starved” evaporator (compressor moving refrigerant from the evaporator faster than it can enter).

CORRECTIVE PROCEDURES

1. Extract the refrigerant from the system.
2. Replace the liquid lines, receiver/drier, or other obstructed components.
3. Evacuate the system.
4. Charge the system.
5. Performance test the system.

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

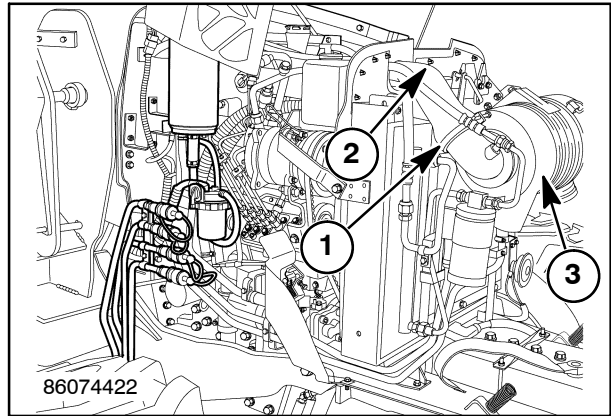


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Ambient Temperature*		High Pressure Gauge Reading	High-Pressure Gauge Reading
°C	°F	kPa	psi
21	70	786 - 923.8	114 - 134
24	75	868.7 - 1006.6	126 - 146
26	80	972.1 - 1110	141 - 161
29.5	85	1096.2 - 1234.1	159 - 179
32	90	1158.3 - 1296.2	168 - 188
35	95	1247.9 - 1385.8	181 - 201
38	100	1385.8 - 1523.7	201 - 221
40.5	105	1503 - 1640.9	218 - 238
43	110	1696.1 - 1834	246 - 266
46	115	1909.8 - 2047.7	277 - 297
49	120	2116.6 - 2254.5	307 - 327

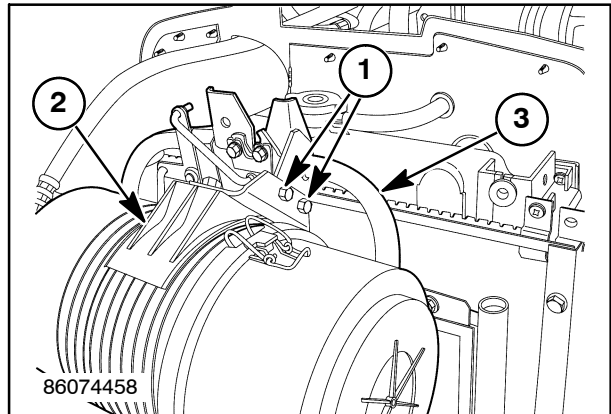
SECTION 50 - CLIMATE CONTROL - CHAPTER 1

6. Loosen hose clamp, 1, and remove the air inlet tube, 2, from the air cleaner assembly, 3.



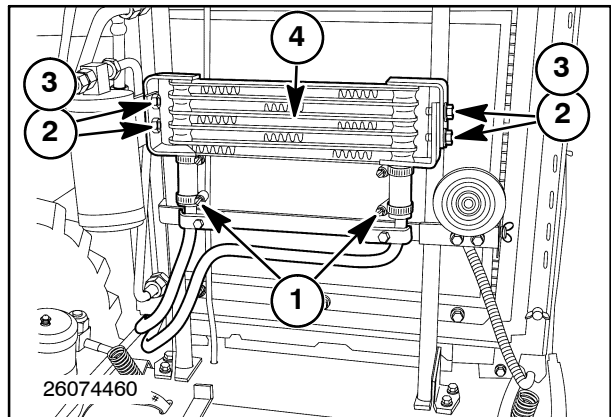
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7. Loosen and remove the two M8x16 cap screws, 1, securing the air cleaner assembly, 2, to the A/C condenser support, 3. Remove air cleaner assembly, 2, from tractor.



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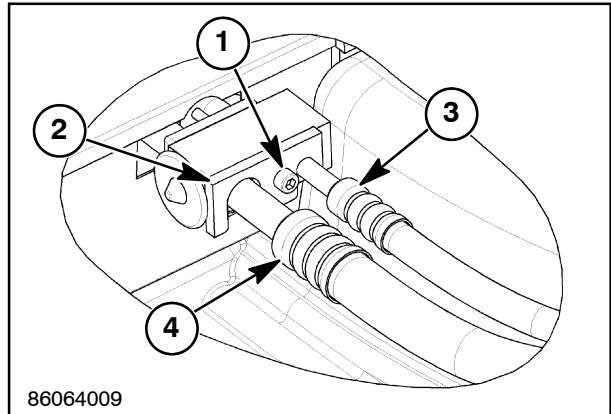
8. **On EHSS Models:** Loosen hose clamps, 1, remove four M8x16 cap screws, 2, four M8 belleville washers, 3, and remove transmission oil cooler, 4, from the tractor.



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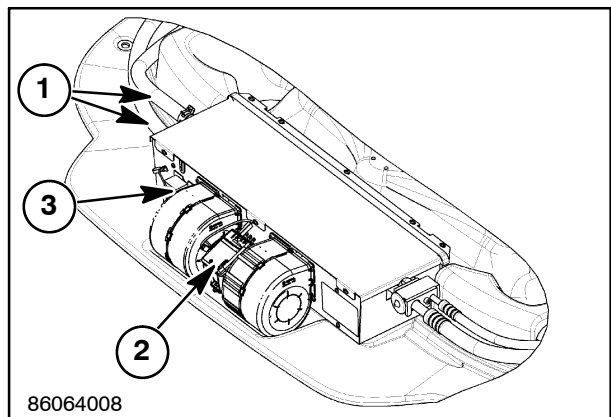
SECTION 50 - CLIMATE CONTROL - CHAPTER 1

4. Install a new O-ring at both connections. Lubricate the O-rings with PAG 20 A/C oil before attaching the high and low pressure hoses.
5. Install the internal socket head cap screw, 1, that secures the plate, 2, holding the high pressure hose, 3, and low pressure hose, 4, into the expansion valve. Torque the socket head cap screw to 4.5 N·m (40 lb in).
6. Install the insulation tape (not shown) around the lines going into the thermal expansion valve.



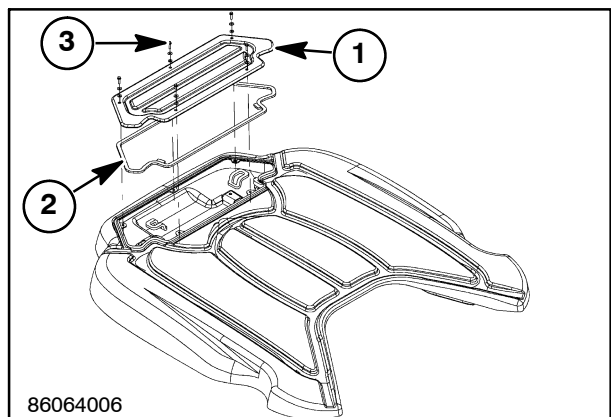
103

7. Install and secure the heater hoses, 1.
8. Connect the electrical harness to the blower resistor, 2, and the temperature sensor, 3.



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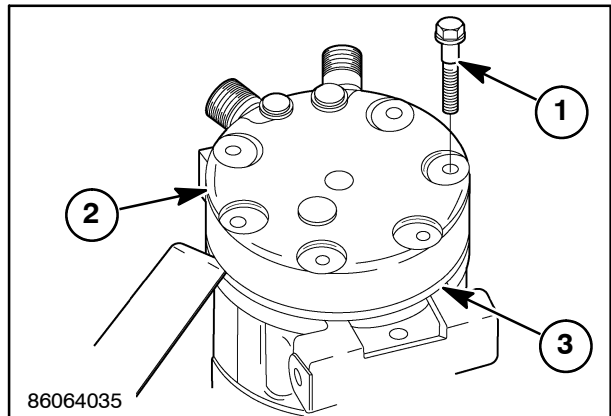
9. Install the cab roof access panel, 1. When installing the cover make sure the seal, 2, is intact.
10. Install the six M6x25 cap screws, 3. Each cap screw will have a M6 flat washer and a rubber washer. Torque the hardware to 3.4 N·m (30 lb in).
11. Perform a vacuum test and after all checks are complete, fill the system. Refer to the "Vacuum Test" and "Charging" in this section.



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Cylinder Head Removal

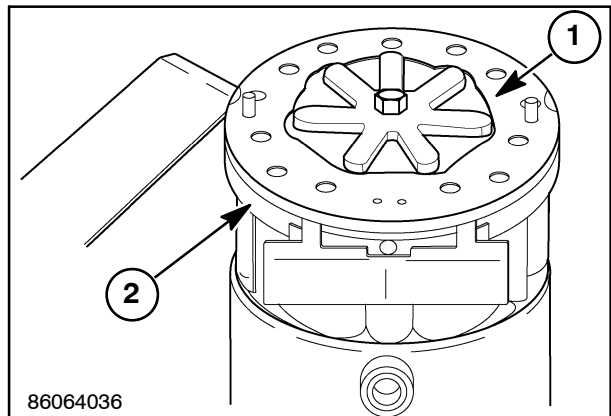
1. Be sure all internal compressor pressure has been relieved.
2. Inspect cylinder head for fitting or thread damage. Replace if damaged.
3. Remove cylinder head cap screws, 1.
4. Use a small hammer and gasket scraper to separate the cylinder head, 2, from the valve plate, 3. Be careful not to scratch the gasket surface of the cylinder head.
5. Carefully lift the cylinder head, 2, from the valve plate, 3.



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NOTICE: It is recommended that both the head gasket (between the cylinder head and the valve plate) and the block gasket (between the valve plate and the cylinder block) be replaced any time the cylinder head is removed. However, if no service is required to the valve plate, it may be left in place. If the valve plate comes loose from the cylinder block, the block gasket must be replaced.

6. Carefully remove old head gasket, 1, from top of valve plate, 2, with gasket scraper. Be careful not to disturb valve plate to cylinder block joint if valve plate has been left in place. If valve plate comes loose from cylinder block, proceed to Valve Plate Removal, and replace block gasket.

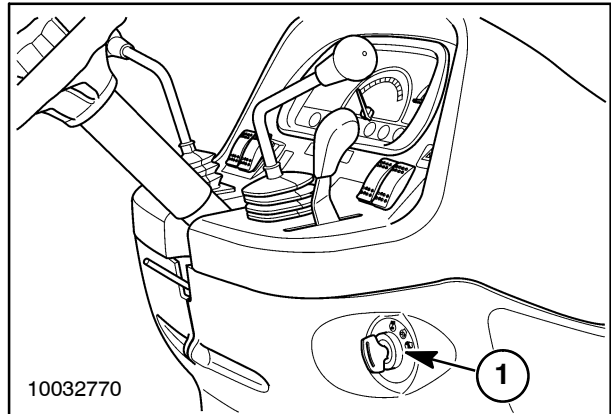


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IGNITION SWITCH

Description

The ignition start switch, 1, is located on the right side panel. The ignition switch has four key-operated positions; STOP, AC/RUN, HEAT, and START. Turning the key from the STOP position will align the electrical contacts within the ignition switch. With the contacts aligned, the circuit is closed and battery current will flow through the circuit.



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1. STOP POSITION

In the STOP position, 1, there is no battery power supplied to electrical circuits and the key may be removed from the ignition switch to prevent unauthorized use of the tractor. The STOP position also stops the tractor engine, when running.

2. AC/RUN POSITION

When the ignition switch is rotated clockwise to the AC/RUN position, 2, battery power is supplied to operate the electrical accessories without the engine running. The switch will also be in this position while the tractor is running.

3. HEAT POSITION

To pre-heat the engine, turn the ignition switch to the "HEAT" position, 3. The cold start indicator light goes out after approximately four seconds. The glow plugs heat the precombustion chambers during this time, and the engine will start.

NOTICE: The preheat is auto-timed, when the indicator light goes off, the power to the glow plugs is also removed.



WARNING

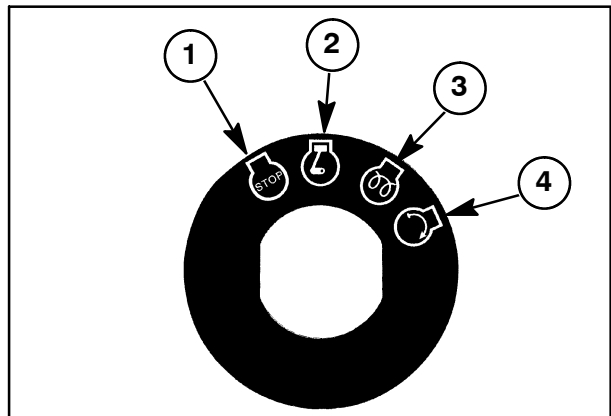
DO NOT use ether starting fluid. Serious engine damage or explosion could occur. Failure to comply could result in death or serious injury.

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4. START POSITION

NOTICE: The ignition switch is spring-loaded to return to the AC/RUN position, 2, when released from the START position, 4.

When the ignition switch is turned clockwise to the START position, 4, power is supplied to the starter motor to crank and start the engine. This position also provides current to the engine glow plugs to aid in starting the tractor engine.



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HEAD LAMP

Removal

1. Open the tractor hood.
2. Bulb Removal:

Road lights, 1, (Blue Cap/dual element): Release retaining tabs and pull bulb assembly from holder.

Work lights, 2, (Single element): Turn bulb assembly 1/4 turn and remove bulb from holder.

3. Bulb Replacement:

Road lights: Insert bulb assembly and secure with retaining clips.

Work lights: Insert bulb assembly into slots and turn 1/4 turn clockwise to secure.

4. Rotate the socket counter-clockwise a quarter turn and remove the socket from the housing.
5. Remove the bulb assembly from the harness.
6. Place a new bulb in the socket, then reinstall the socket in the housing.

NOTICE: Be careful not to touch the bulb with bare fingers. Oil from the fingers can shorten the life of bulb. Use protective cloth or glove when installing bulb.

NOTICE: Replacement bulbs are:

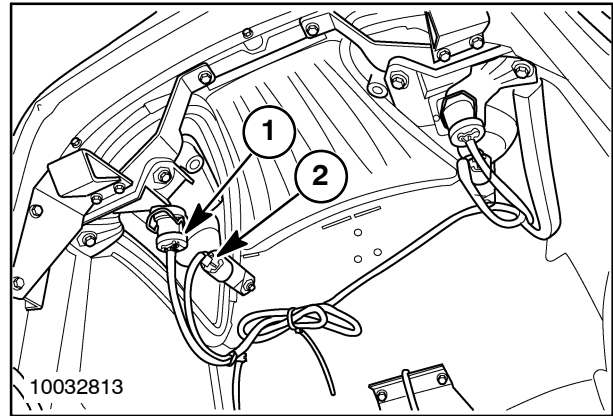
Road lights: HB1/9004, dual element 50/65 Watt, Halogen

Work lights: GE886, single element 50 Watt, Halogen.

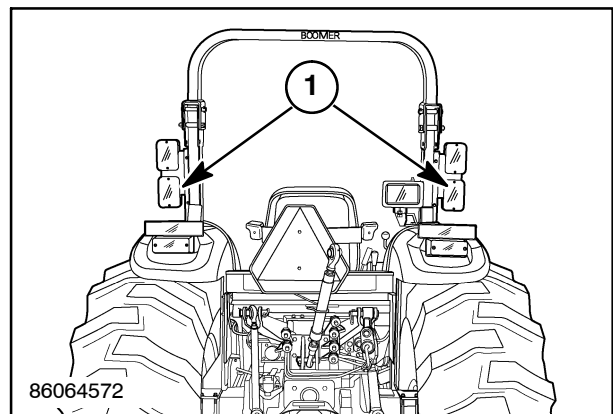
TAILLIGHTS

Description

The taillights, 1, are located on the left and right ROPS uprights. The two taillights illuminate the rear of the tractor to provide warning to approaching vehicles.



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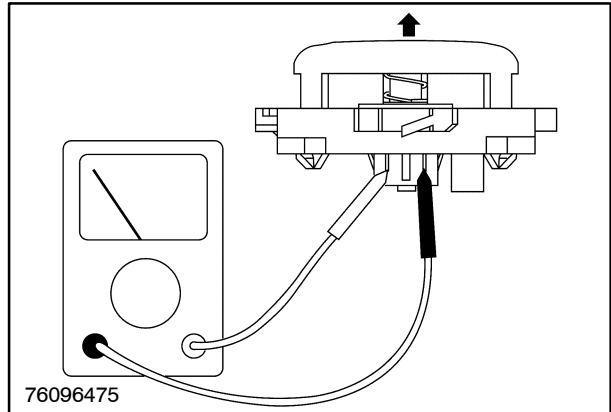
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Testing

Use an ohmmeter to test both of the positions of the seat switch for electrical continuity.

Extended Position

With the switch in the “extended” (OUT) position check continuity between the two terminals. Continuity should not exist between the two terminals. If continuity exists between the switch terminals while the switch is in the “extended” position, the switch is defective and needs to be replaced.



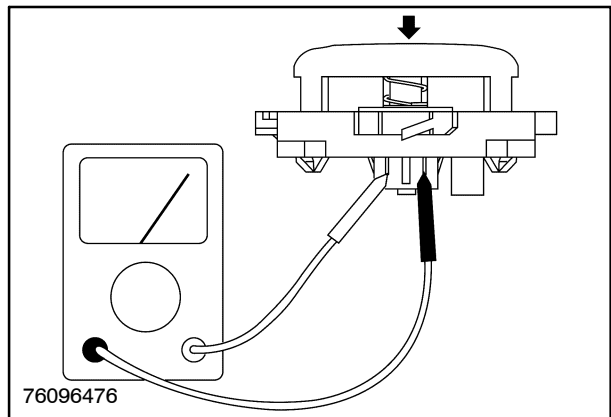
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Retracted Position

Press the switch down and check continuity between the two terminals. There should be little or no resistance, indicating that continuity exists between the two terminals. If the resistance is high, there is no continuity, the switch is defective and needs to be replaced.

Installation

1. Tilt the seat forward to reveal the bottom of the seat.
2. Rotate the switch clockwise to retain the locking tabs.
3. Connect the seat switch harness to the switch.



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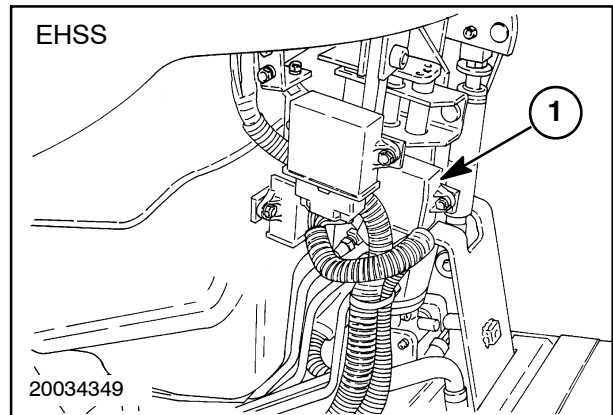
SAFETY AND FLASHER CONTROLLERS

SAFETY CONTROLLER

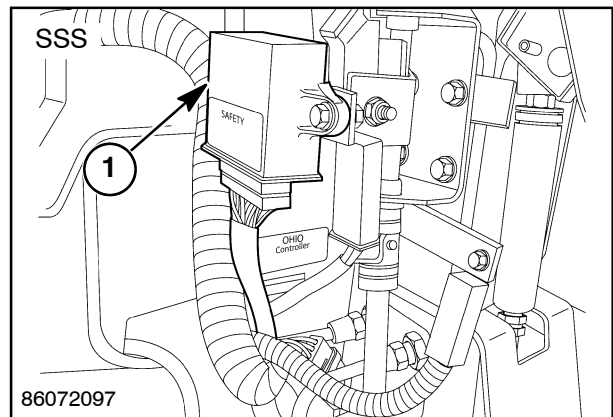
The safety controller, 1, located on the left side of the steering column, coordinates the safety start, safe operation and shutdown functions of the tractor electrical system.

Removal

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal.



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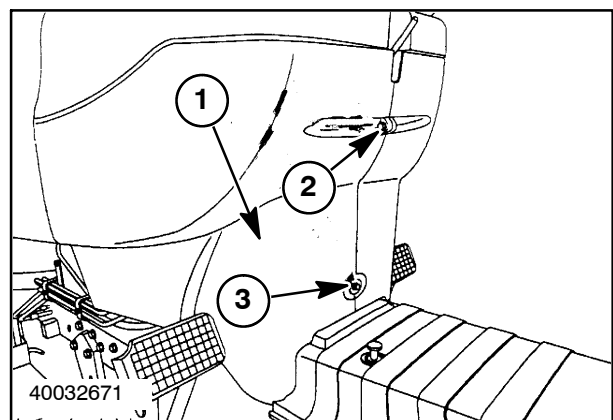


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2. Remove the left side steering column panel, 1, by removing the two M6x20 cap screws, 2 and 3, and two M6x20 cap screws securing the front of the panel to the firewall.

NOTICE: The M6x20 cap screw, 2, is secured using a M6 nut.

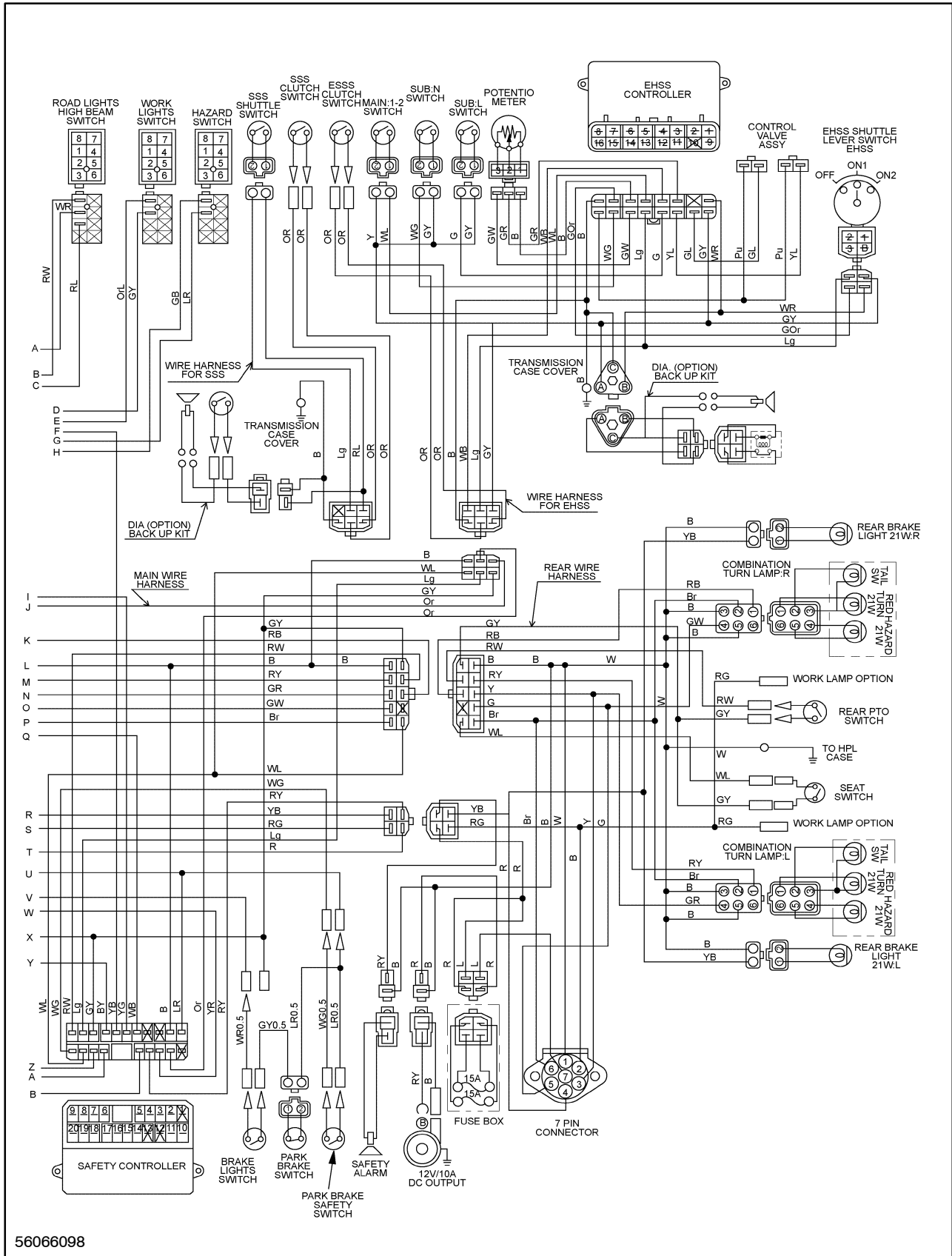
3. Disconnect the safety controller from the tractor wire harness.
4. Remove the two mounting screws and remove controller from the tractor.



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SECTION 55 - ELECTRICAL SYSTEM - CHAPTER 2

COMPLETE SCHEMATICS (CONT.)
Boomer 4055 - Boomer 4060



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ENGINE GLOW PLUG CIRCUIT

When the key switch is in the “HEAT” position, electrical current is being supplied to the safety controller, which transfers current to the glow plug relay for approximately four seconds. The relay sends current to the glow plugs to preheat the engine to aid in starting.

NOTICE: When the safety controller shuts off the current to the relay, the current is also cutoff to the glow plugs.

Operation

1. Current starts at the battery and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the fusible link wire. From the fusible link, the current spits into two different directions due to a wire connector.

#1 terminal of connector – Sends current to:

- Terminal “30” of the key switch.
 - Switch side of the glow plug relay.
 - #3 fuse (20 amp).
3. When the key switch is place in the “HEAT” or “START” position, current transfers from terminal “30” to “ 19” and “AC” terminals.
 4. Terminal “19” of the key switch sends current to terminal #6 of the safety controller.
 5. Terminal “AC” of the key switch provides current to the #2, (10 amp) fuse.
 6. The #2, (10 amp) fuse supplies current to:
 - #3 terminal of the instrument panel.
 - Terminals #7 and #18 of the safety controller.

Ground Circuits

The ground source for the glow plug circuit is located on the front of the engine cylinder head. Ground source is provided to the following components.

- Safety controller, terminal #11.
- Glow plug relay, coil side.

Safety Controller Functions:

Inputs:

- Terminal #6, from key switch terminal “19”.
- Terminals #7, from the #2 (10 amp) fuse.
- Terminal #10, from the #3 (20 amp) fuse.
- Terminals #18, from the #2 (10 amp) fuse.

TROUBLESHOOTING HAZARD FLASHER CIRCUIT		
PROBLEM	POSSIBLE CAUSE	CORRECTION
Inoperative flasher signals.	Blown 20 amp fuse.	Inspect and replace fuse as necessary.
	Defective hazard switch.	Test switch, replace as necessary.
	Malfunctioning flasher controller.	Test controller, replace as necessary.
	Loose tractor lights connectors.	Check connectors for proper connections.
	Improper ground circuit.	Check ground circuit connector for corrosion.

ENGINE COOLANT TEMPERATURE GAUGE CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the fusible link wire to terminal "30" of the key switch.
3. When the key switch is in the "RUN" position current crosses from terminal "30" to the "AC" terminal.
4. Current flows from the "AC" terminal of the key switch to the #2 fuse (10 amp) fuse of the fuse panel.
5. Current flows from the #2 fuse to the #3 terminal of the instrument panel.
6. The #3 terminal of the instrument panel provides current to the (+) terminal of the temperature gauge.
7. The #7 terminal of the instrument panel provides constant ground source for the (-) terminal of the temperature gauge.
8. The #8 terminal of the instrument panel provides the variable resistance to ground by the means of the temperature sensor located in the engine cylinder head. As the resistance decreases the temperature reading of the gauge increases.

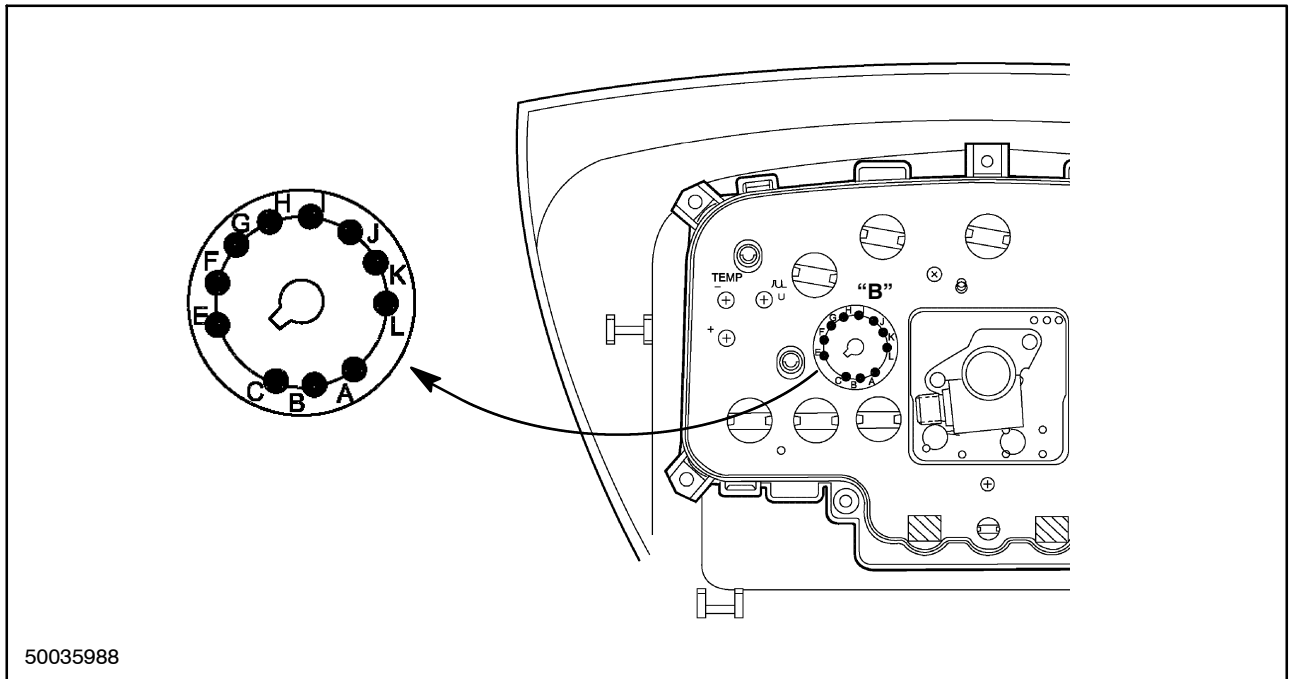
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BRAKE LIGHTS CIRCUIT

NOTICE: The brake lights are located on both rear fenders. The lights will illuminate with the key switch in any position, when both brake pedals are depressed, warning anyone following the tractor, the brakes are being applied and the tractor ground speed is being reduced.

1. Current starts at the battery and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the fusible link wire. From the fusible link, the current spits into two different directions due to a wire connector.
 - #1 terminal of connector** – Sends current to:
 - #3 (20 amp fuse).
 - #2 terminal of connector** – Sends current to:
 - #1 (10 amp fuse).
3. The #3 (20 amp) fuse supplies current to the park brake switch.
4. When the park brake is not applied, the park brake switch is closed, allowing current to flow to the brake lights switch.
5. When the brake pedals are depressed, the brake lights switch is closed and current flows to the coil side of brake lights relay.
6. The #1 (10 amp) fuse supplies current to the switch side of the brake lights relay.
7. When a ground source is supplied to the brake lights relay, the relay is energized, allowing the relay to latch and sends current to the rear brake lights and terminal #4 of the 7 pin connector. When a ground source is provided to the brake lights, the rear brake lights will illuminate.

NOTICE: The brake lights will not illuminate if the park brake is engaged.



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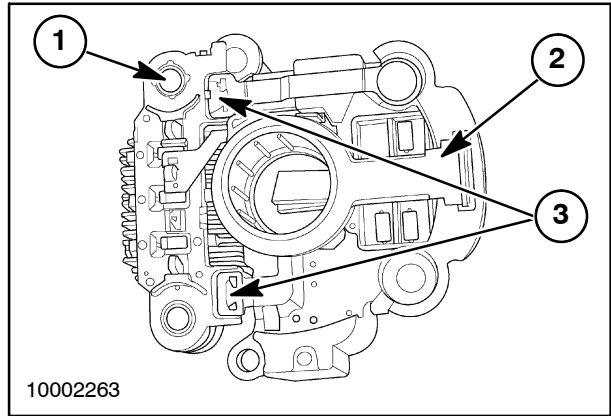
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CONNECTOR "B"

Terminal	Function
A	Trailer Hazard Indicator Light
B	NA
C	Rear PTO Indicator Light
E	NA
F	NA
G	NA
H	Parking Brake Indicator Light
I	Not used
J	Charge Indicator Light
K	Charge Indicator Light
L	NA

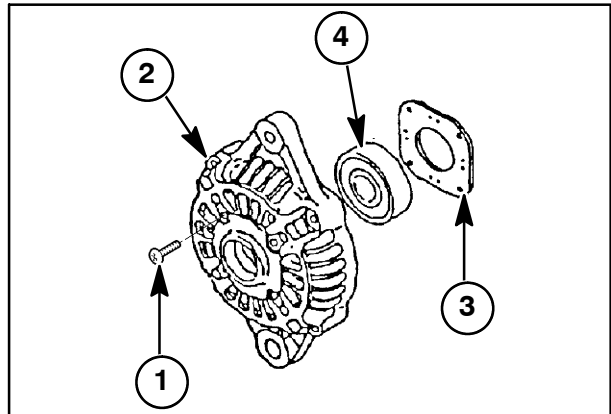
SECTION 55 - ELECTRICAL SYSTEM - CHAPTER 4

10. Unsolder the IC regulator assembly, 1, from the rectifier assembly, 2, at the solder joints, 3.



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11. Remove the four screws, 1, from the front alternator frame, 2. Remove the retaining plate, 3, and the front rotor bearing, 4.



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STARTER MOTOR SPECIFICATIONS

Manufacturer Denso Corporation

Model 228000-5122

Current Draw

 Under Load 500A @ 7.5V

 No Load less than 110 amps

No Load rpm 4000 rpm

No Load Voltage 11.5 volts

Clutch System Overrunning Pinion Clutch

Brush Length

 New 15 mm

 Wear Limit 12 mm

Brush Spring Tension 26.2 – 34.6 N (5.9 – 7.8 lb)

Commutator Diameter

 New 35 mm

 Wear Limit 34 mm

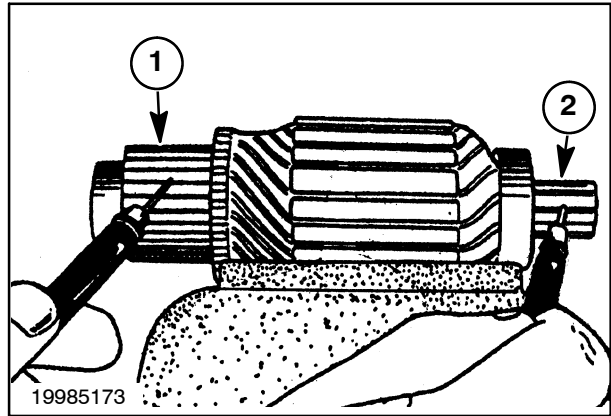
Commutator Insulation Depth 0.2 – 0.85 mm

Armature Runout

 Commutator 0.02 – 0.05 mm

 Armature Shaft02 mm

5. If the armature is tested OK, touch one ohmmeter test probe to a commutator contact, 1. Touch the other test probe to the armature shaft, 2.
6. Observe the ohmmeter. A high resistance reading indicates the armature is good. Little or no resistance indicates that the armature is defective and needs replaced.

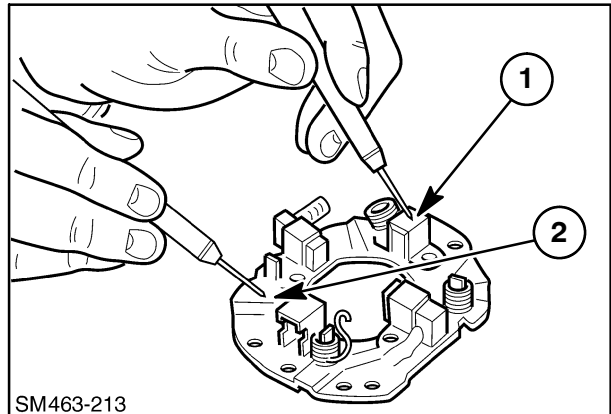


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Brush Holder

1. Using an ohmmeter, touch one test probe to the insulated brush holder, 1, and the other test probe to the brush holder plate, 2.
2. Observe the ohmmeter. Repeat the test for the opposite insulated brush holder.
3. A reading high resistance indicates no continuity and the brush holder is good. Little or no resistance indicates that there is continuity and the brush holder is defective and needs replaced.

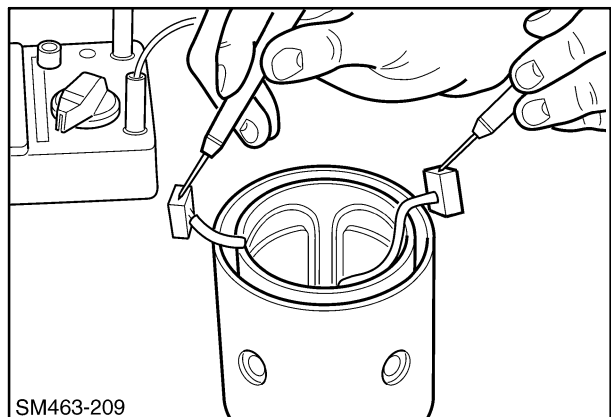


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Field Coil

1. Use an ohmmeter to test the field coil.
2. Touch one ohmmeter test probe to one of the field coil brushes. Touch the other test probe to the remaining field coil brush.
3. Observe the ohmmeter. Little or no resistance indicates continuity and that the field coil is functioning properly. High resistance indicates the field coil is defective and needs replaced.



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SECTION 55 - ELECTRICAL SYSTEM - CHAPTER 5

Section	Description	Page
	Fuel Level Sending Unit	75
	Removal	75
	Testing	76
	Installation	76
	Fuel Shutoff Solenoid	77
	Removal	77
	Testing	78
	Installation	78
	Engine Oil Pressure Switch	79
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	Engine Coolant Temperature Sending Unit	80
	Testing	81
	Coolant Temperature	81
	Sending Unit Temperature	81
	Cab to Tractor Harness Main Connectors	82
	Trailer Electrical Socket	85

Replacement

If head lamps, 1, fail to operate, the bulb must be replaced. To change the bulb:

1. Open the tractor hood.
2. Bulb Removal:

Road lights, 1, (Blue Cap/dual element): Release retaining tabs and pull bulb assembly from holder.

Work lights, 2, (Single element): Turn bulb assembly 1/4 turn and remove bulb from holder.

3. Bulb Replacement:

Road lights: Insert bulb assembly and secure with retaining clips.

Work lights: Insert bulb assembly into slots and turn 1/4 turn clockwise to secure.

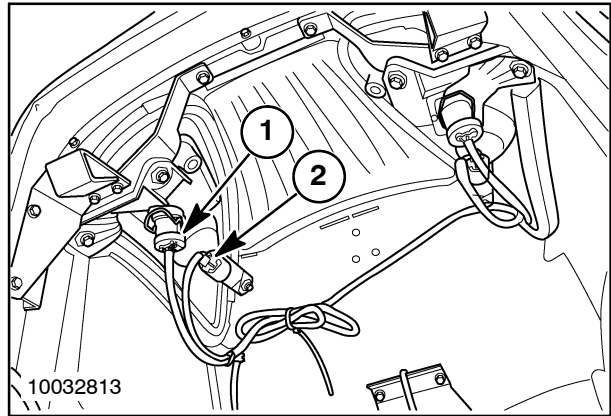
4. Rotate the socket counterclockwise a quarter turn and remove the socket from the housing.
5. Remove the bulb assembly from the harness.
6. Place a new bulb in the socket, then reinstall the socket in the housing.

NOTICE: Be careful not to touch the bulb with bare fingers. Oil from the fingers can shorten the life of bulb. Use protective cloth or glove when installing bulb.

NOTICE: Replacement bulbs are:

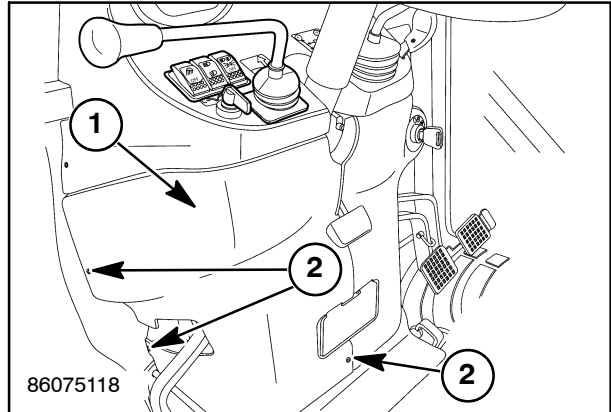
Road lights: HB1/9004, dual element 50/65 Watt, Halogen

Work lights: GE886, single element 50 Watt, Halogen.



Installation

1. Connect the switch to the tractor wire harness.
2. Install switch from underneath dash, align tab on switch with slot in dash. Install retaining nut and knob on switch.
3. Install the left side steering column panel, 1. Secure using the four retaining screws, 2. Secure the fuse door using the fastener.
4. Connect the negative (-) battery cable from the negative (-) battery terminal.

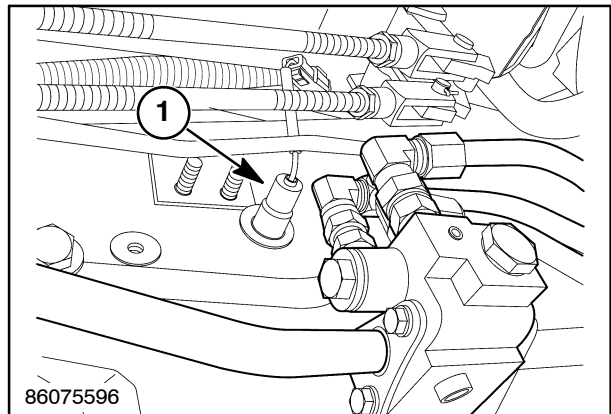


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TRANSMISSION MODULATION SWITCHES

There are three transmission modulations switches on the EHSS transmission. Single-pole push button type switch that is externally mounted on transmission case, but internally actuated.

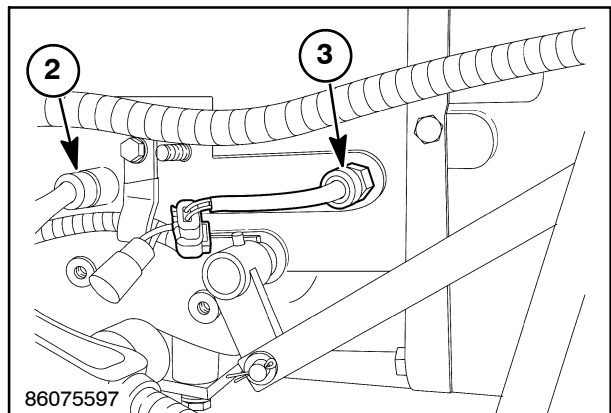
1. Main transmission 1-2 (right front of transmission)



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2. High Range (left rear of transmission)
3. Low Range (left rear of transmission)

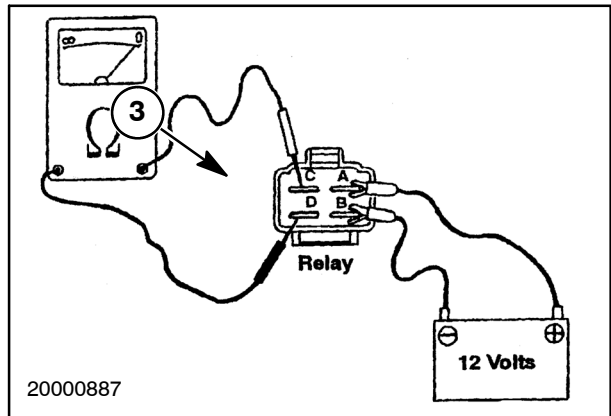
The purpose of these switches, is to supply current to the EHSS control module when the transmission is in 1st or 2nd gear and when either in "HIGH" or "LOW" range gears, so that the controller can supply different modulations during a shuttle shift.



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Energized

1. Connect a jumper wire from the positive (+) terminal of the 12-volt power source to the "A" terminal of the relay.
2. Connect the negative (-) terminal of the 12-volt power source to the "B" terminal of the relay.
3. Connect the ohmmeter test probes to terminals "C" and "D" on the relay. Observe the ohmmeter reading.
4. There should be little or no resistance between the "C" and "D" terminals of the relay when energized, indicating that continuity exists. If continuity does not exist between terminals "C" and "D" when the relay energized, the relay is defective and requires replacement.



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Installation

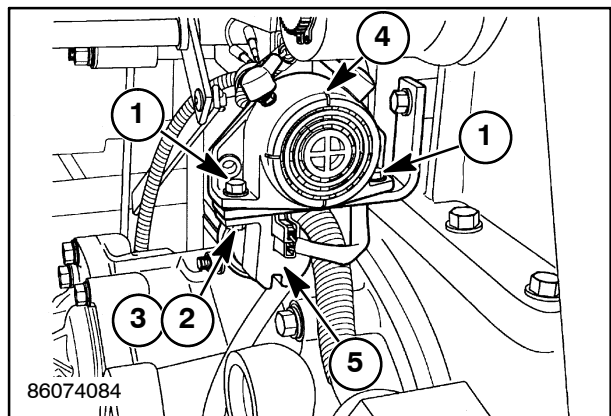
1. Plug wiring harness connector into relay.
2. Connect the negative (-) battery cable to the negative (-) battery terminal.

BACKUP ALARM

Removal

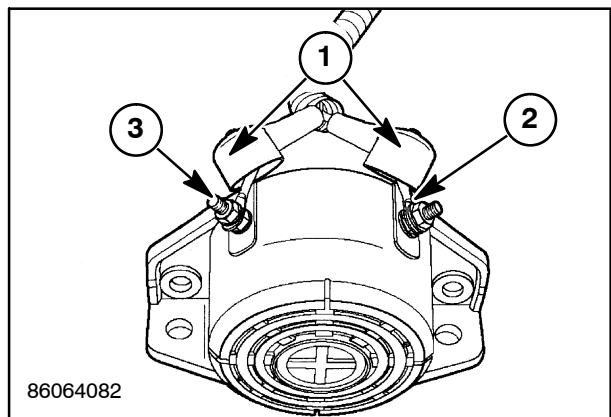
1. Remove two M6 bolts, 1, two M6 locknuts, 2, and two M6 washers, 3, securing the backup alarm, 4, and safety alarms, 5.

NOTICE: The backup and safety alarms are located on the left side of the HPL cover.



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2. Pull protective plastic covers, 1, exposing the positive and negative terminals.
3. Disconnect the black wire, 2, from the negative terminal.
4. On EHSS Models: Remove the green and yellow wire, 3, from the positive terminal.
5. On SSS Models: Remove the red and blue wire, 3, from the positive terminal.

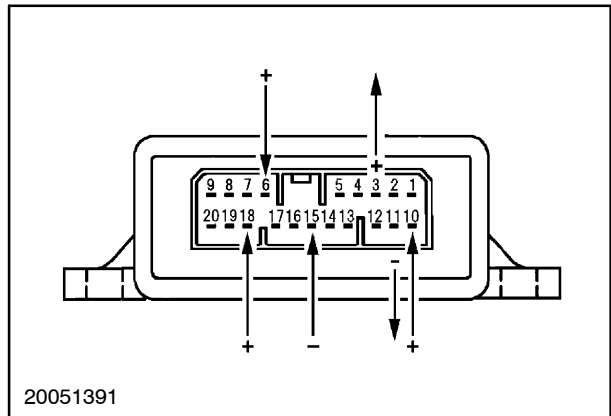


101

Testing Engine Preheat Circuit

Using a 12 volt supply and ohm meter test output current at indicated terminals

Input (+)	Terminal #s 6, 10, 18
Ground (-)	Terminal #11
Output (+)	Terminals #3
Input (-)	Terminal #15



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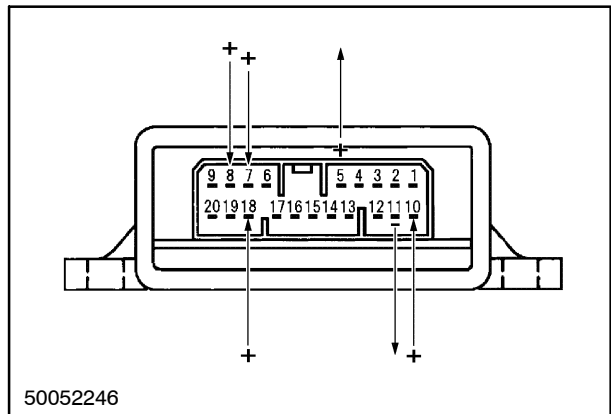
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Testing Safe Operation Circuit

(Operator Present)

Using a 12 volt supply and ohm meter test output current at indicated terminals

Input (+)	Terminal #s 7, 8, 10, 18
Ground (-)	Terminal # 11
Output (+)	Terminal # 5



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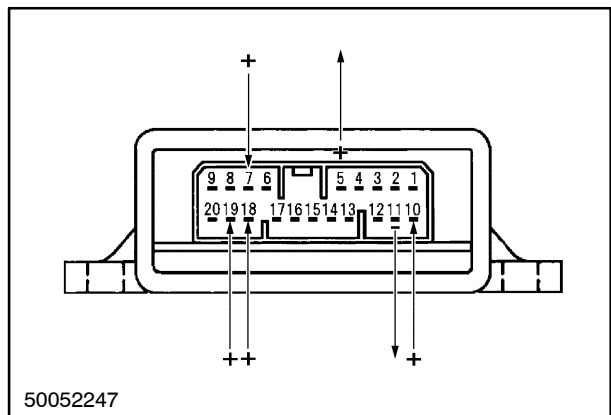
133

Testing Safe Operation Circuit

(Operator Not Present)

Using a 12 volt supply and ohm meter test output current at indicated terminals

Input (+)	Terminal #s 7, 10, 18, 19
Ground (-)	Terminal # 11
Output (+)	Terminal # 5

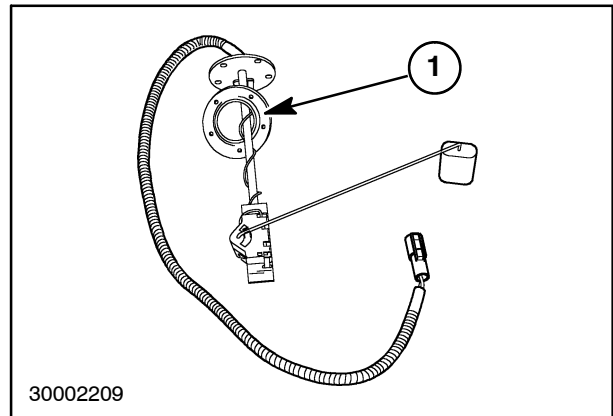


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FUEL LEVEL SENDING UNIT

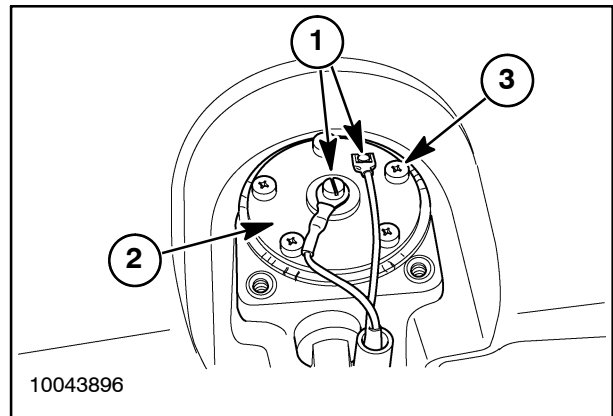
The fuel level sending unit, 1, is mounted on top of the fuel tank and extends into the tank. The sending unit utilizes a float that raises and lowers with the fuel level inside the tank. The float regulates a variable resistance to ground, which translates into movement of the fuel gauge on the instrument panel. As the float lowers (fuel being consumed) inside the tank, the ground resistance increases, indicating less fuel on the fuel gauge.



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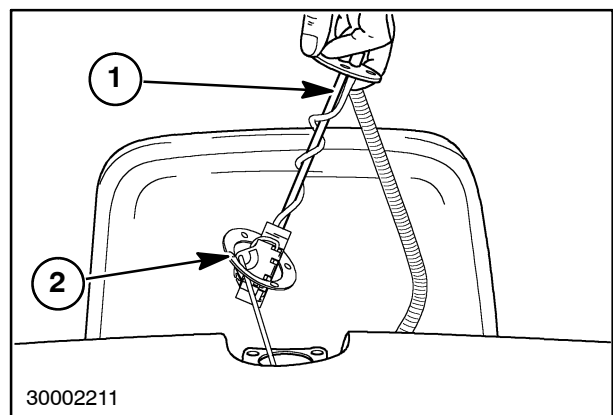
Removal

1. Disconnect the negative (-) battery cable from the battery.
2. Remove the fuel tank from rear of the tractor, as described in Section 90.
3. Disconnect the two wiring leads, 1, from the fuel level sending unit, 2.
4. Remove the five retaining screws, 3, that secure the sending unit, 2, to the fuel tank.



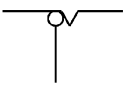
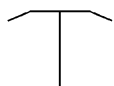








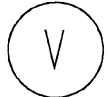







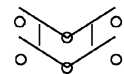


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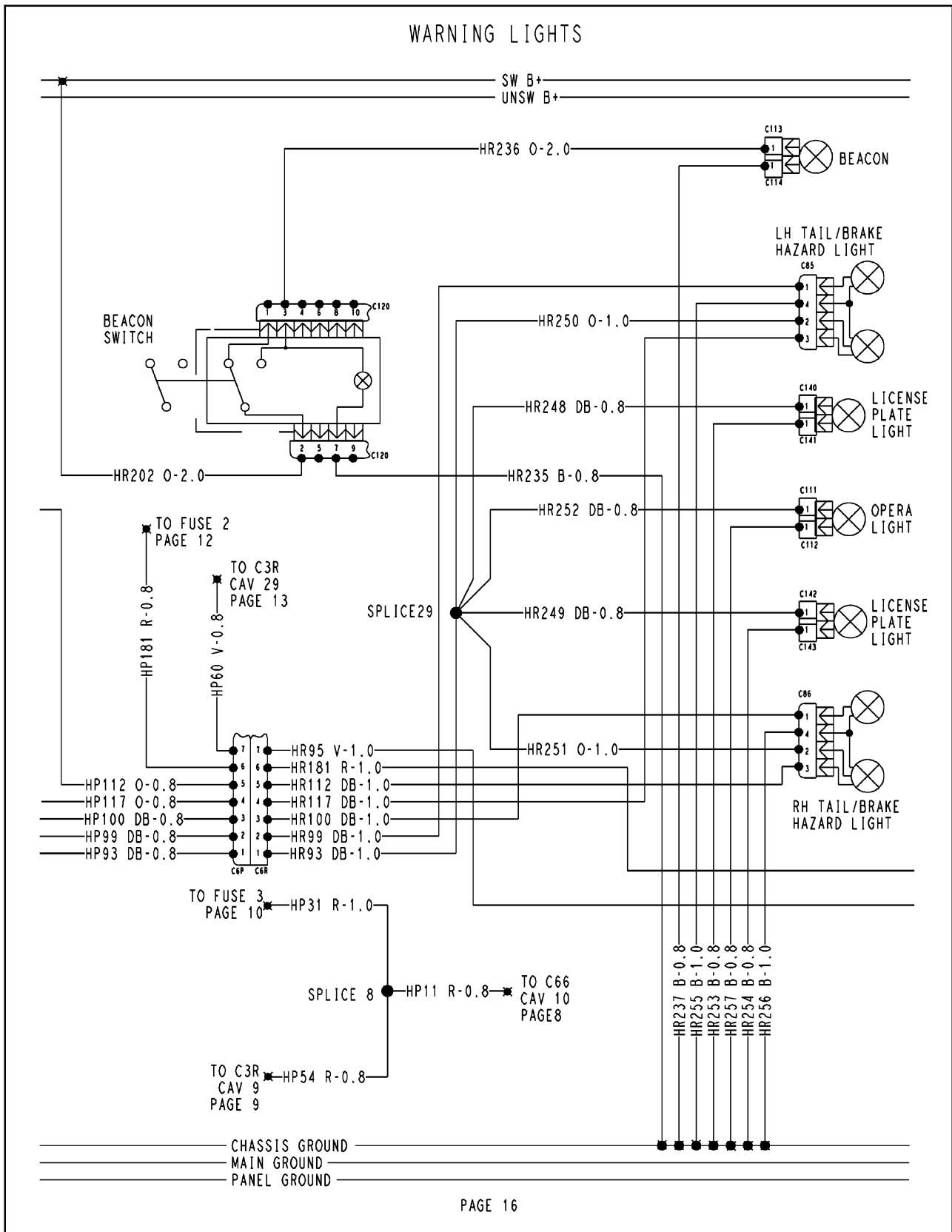
5. Carefully remove the sending unit, 1, from the fuel tank.
6. Remove and discard the sealing gasket, 2, from the sending unit, 1.



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SECTION 55 - ELECTRICAL SYSTEM - CHAPTER 6

ACTUATORS				
 LEVER	 HAND	 FOOT	 TEMP.	
 LIQUID LEVEL FLOAT	 PRESSURE	 COIL	 DIODE	
 VARIABLE RESISTOR	 RESISTOR	CONTACTS ▲ MOMENTARY ○ MAINTAINED		
HOUSINGS				
 VACUUM SWITCH	 PRESSURE SWITCH	 TEMPERATURE SWITCH	 MOTOR	 LAMP
CONTACT CONFIGURATIONS				
 S.P.S.T.	 S.P.D.T.	 D.P.S.T.	 D.P.D.T.	
MISCELLANEOUS SYMBOLS				
 FUSE	 CIRCUIT BREAKER	RELAYS	FUSE BLOCK	



**STARTING CIRCUIT (OPERATOR PRESENT or NOT PRESENT)
TROUBLESHOOTING**

CONDITION	POSSIBLE CAUSE	REMEDY
Starter will not energize.	Insufficient battery charge	Recharge or replace battery
	Blown 40-amp fusible link	Replace 40-amp fusible link
	Faulty ignition switch	Check switch, replace if necessary
	Blown #4, 15-amp fuse	Replace 15-amp fuse
	Blown #3, 20-amp fuse	Replace 20-amp fuse
	Faulty shuttle safety switch	Check switch, replace if necessary
	Faulty operator safety controller	Check controller, replace if necessary
	Faulty EHSS controller	Check controller, replace if necessary
	Faulty Rear PTO safety switch	Check switch, replace if necessary
	Faulty clutch pedal safety switch	Check switch, replace if necessary
	Faulty PTO safety start relay	Check relay, replace if necessary
	Faulty starter relay	Check relay, replace if necessary
Faulty Starter motor	Check starter, replace if necessary	
Starter will energize but engine will not start	Blown #4, 15-amp fuse	Replace 15-amp fuse
	Blown #3, 20-amp fuse	Replace 20-amp fuse
	Faulty operator safety controller	Check controller, replace if necessary
	Faulty fuel shutoff solenoid	Check solenoid, replace if necessary

GLOW PLUGS

When the key switch is placed in the "HEAT" position, electrical current is being supplied to the safety controller, which transfers current to the glow plug relay for approximately four seconds. The relay sends current to the glow plugs to preheat the engine to aid in starting.

NOTICE: *When the safety controller shuts off the current to the relay, the current is also cutoff to the glow plugs.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the main 40 amp fusible link.
2. From the fusible link wire current flows to terminal "30" of the key switch.
3. When the key switch is in the "HEAT" position current crosses from terminal "30" to the "19" and "AC" terminals.

Key Switch Terminals

Terminal "19"

- Terminal "19" provides current to terminal # 6 of the safety controller.

Terminal "AC"

- Terminal "AC" provides current to Fuse # 4.

Fuse Functions

Fuse # 3 – Provides current to terminal# 10 of the safety controller

Fuse #4 – Provides current to terminal # 7 and # 18 of the safety controller

Ground Circuits

The ground source for the glow plug circuit is located on the front of the engine cylinder head. Ground source is provided to the following components.

- Terminal # 11 of the safety controller
- Glow plug relay , coil side

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LEFT TURN SIGNAL - TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Directional signal will not illuminate or flash	Blown #1, 25-amp hazard or directional signal fuse	Inspect fuse and replace as necessary
	Blown #4, 15-amp fuse	Inspect fuse and replace as necessary
	Directional signal bulb burnt out	Inspect bulb and replace as necessary
	Defective or directional signal switch	Test switch and replace as necessary
	Defective hazard/turn flasher module	Test module and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed
Instrument panel turn indicator does not illuminate	Indicator bulb burnt out	Inspect bulb and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed

RADIO

1. Current starts at the battery, and flows through the positive (+) battery cable to the main 40 amp fusible link.
2. From the fusible link wire current flows to terminal "30" of the key switch and fuse #2 (25 amp)
3. When the key switch is in the "ACC/RUN" position current crosses from terminal "30" to the "AC" terminal.

Key Switch Terminals

Terminal "AC"

1. Current flows from the "AC" terminal of the key switch to the # 4 fuse (15 amp) fuse of the fuse panel.

Fuse Functions

1. Fuse # 2 (25 amp) provides current to:

- Fuse #22 (2 amp)

The 2-amp fuse provides current to the radio for memory functions, when the key switch is in the "OFF" position.

2. Fuse # 4 (15 amp) provides current to:

- Cab power relay (coil side)

3. Fuse # 23 Cab fuse block (10 amp) provides current to:

- Terminal # 3 of the radio

Ground Circuits

A ground source is provide to the following components

- Cab power relay
- Radio
- Left and Right speakers

Cab Power Relay

1. When current from fuse #4 and a ground source is supplied to coil side of the relay, the relay energizes and latches.
2. When the relay latches, terminals # 30 and # 87 are connected, sending current to the cab fuse block, fuse #23 (10 amp)
3. Fuse # 23 Cab fuse block (10 amp) provides current to:
 - Terminal # 3 of the radio

Radio Functions

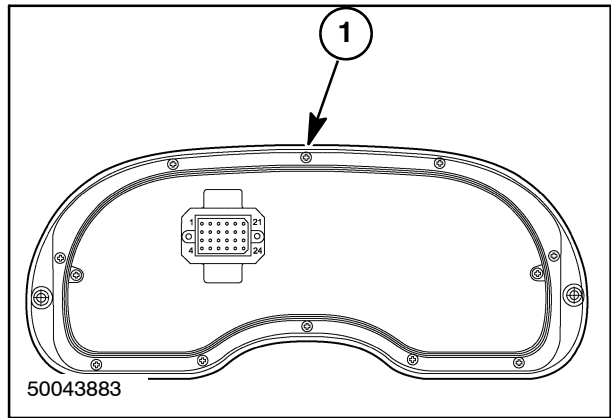
1. The radio terminals have the following functions:
 - Terminal #3, current input (functional)
 - Terminal #5, current output, left speaker
 - Terminal #7, current output, right speaker
 - Terminal #8, current input (memory)
 - Terminal #10, ground
 - Terminal #12, ground, left speaker
 - Terminal #14, ground, right speaker

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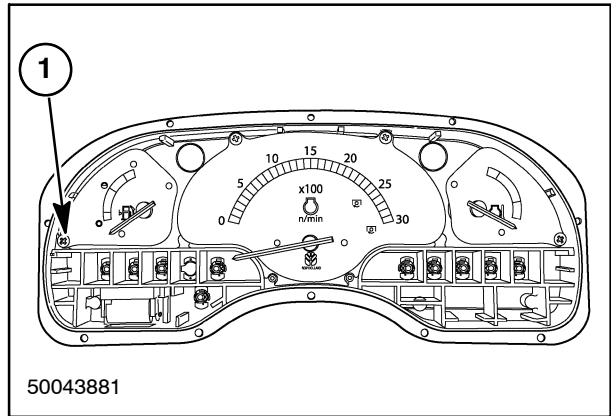
Replacement

1. Remove the ten retaining screws, 1, from the rear of the panel, then remove the lens and bezel from the panel body.



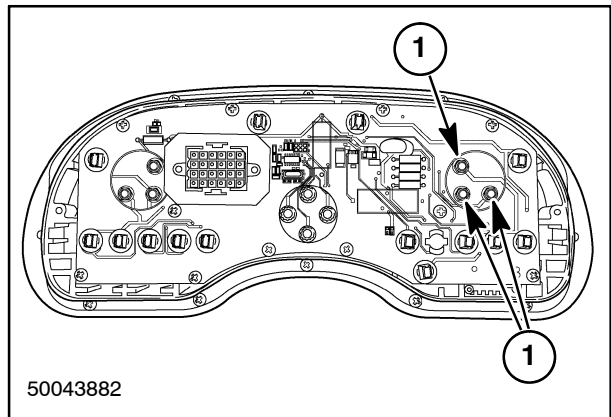
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2. Remove the gauge face plate retaining screw, 1, from the panel.

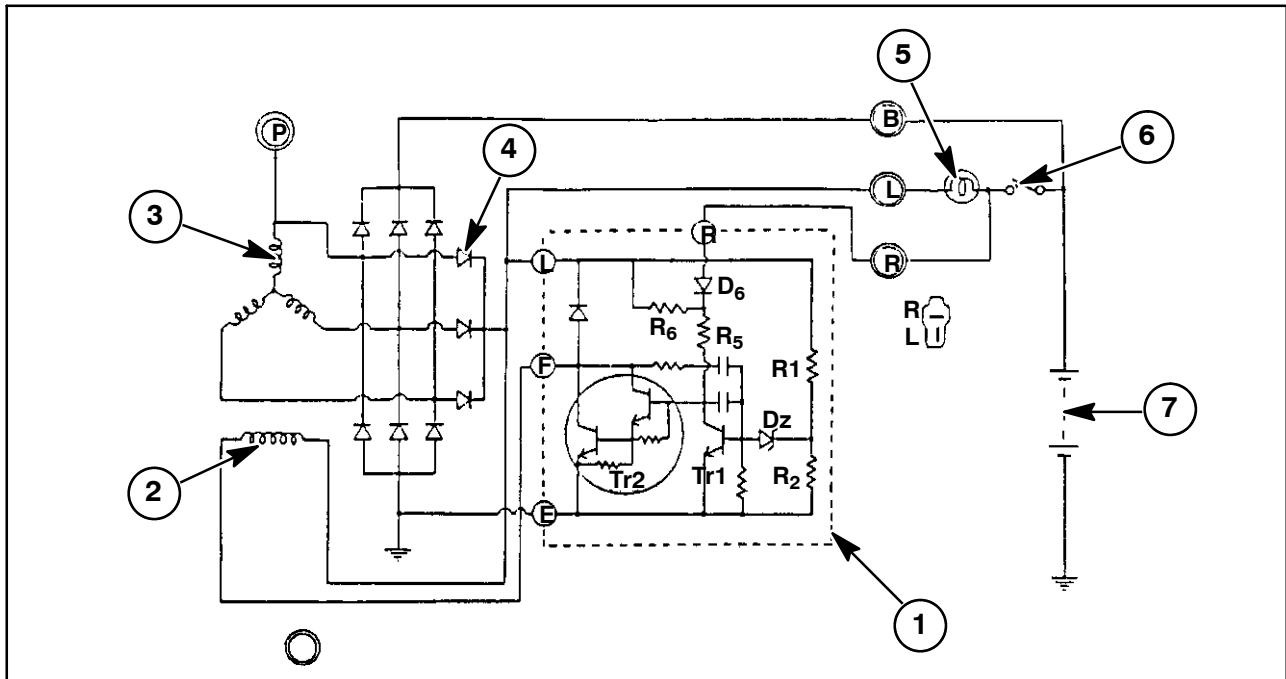


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3. Remove the three retaining nuts, 1, from the circuit board and remove the fuel gauge from the front on the instrument panel.
4. Insert new fuel gauge into panel, secure with face plate retaining screw and nuts. Reassembly lens and rear cover.



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2

Charging Circuit

The charging circuit and internal connections are shown. The charging system consists of an IC voltage regulator, 1, (enclosed with dotted lines), a battery, 7, and connecting wires. Because of the use of IC, the voltage regulator is very compact and is built into the alternator.

The IC voltage regulator, 1, permits the field current to flow directly from the diode trio, 4, to the field coil, 2, without passing through the external circuit. Consequently, there are no voltage drops caused by the key switch or the external wiring as with conventional vibrating-contact regulators mounted separately from the alternator. To aid in initial voltage buildup when the engine is started, the field current is supplied through the indicator lamp, 5, from the battery, 7.

Since the frequency pulse output of 1/10 the alternator speed develops on the "P" terminal, this terminal is used for speed detection.

Principle of IC Regulator

The basic function of the IC voltage regulator is to make the terminal voltage constant by detecting the generated voltage and increasing/decreasing the field current.

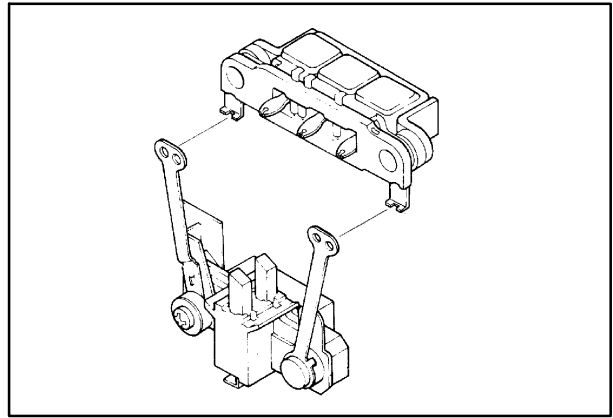
As indicated, the regulator consists of two basic sections: a voltage control device and an output device to handle the field current. The voltage control device includes the voltage divider network, R1 and R2, a zener diode, DZ, for voltage reference, and a single amplifying transistor, Tr1. The output device is a darlington-type amplifier which is called power transistor, Tr2. The power transistor, Tr2, is placed in series with the alternator field coil and ground.

The signal amplifying transistor, Tr1, senses the generated voltage and turns the power transistor, Tr2, on and off many times per second most of the time the engine is in operation.

SECTION 55 - ELECTRICAL SYSTEM - CHAPTER 8

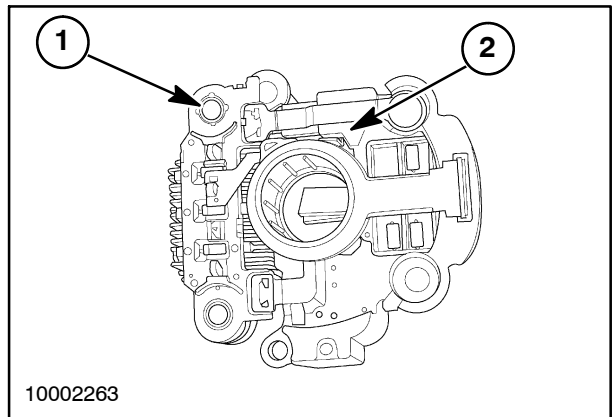
5. Use the following guidelines when soldering alternator components.

- Clean all terminals to be soldered and remove excess solder.
- Preheat the soldering iron and use rosin-core solder to solder terminals and/or wires. To avoid damage to the rectifier diodes, use a pair of needle nose pliers to remove excess heat from the area being soldered. Hold the pliers just below the solder joint on the rectifier to remove excess heat.
- Make good, solid, solder joints for best alternator performance.
- After soldering, quickly cool the solder joint with a damp cloth.



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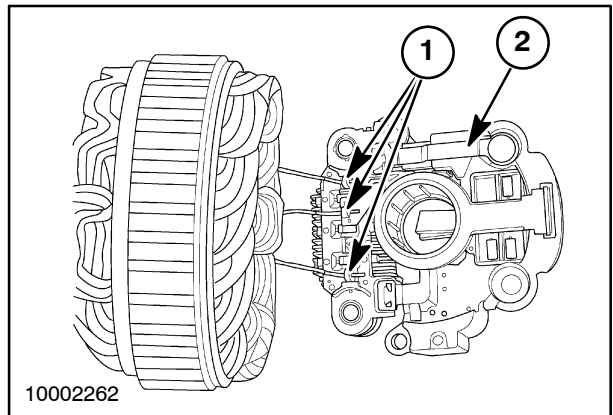
6. Solder the IC regulator, 1, and rectifier, 2, together.



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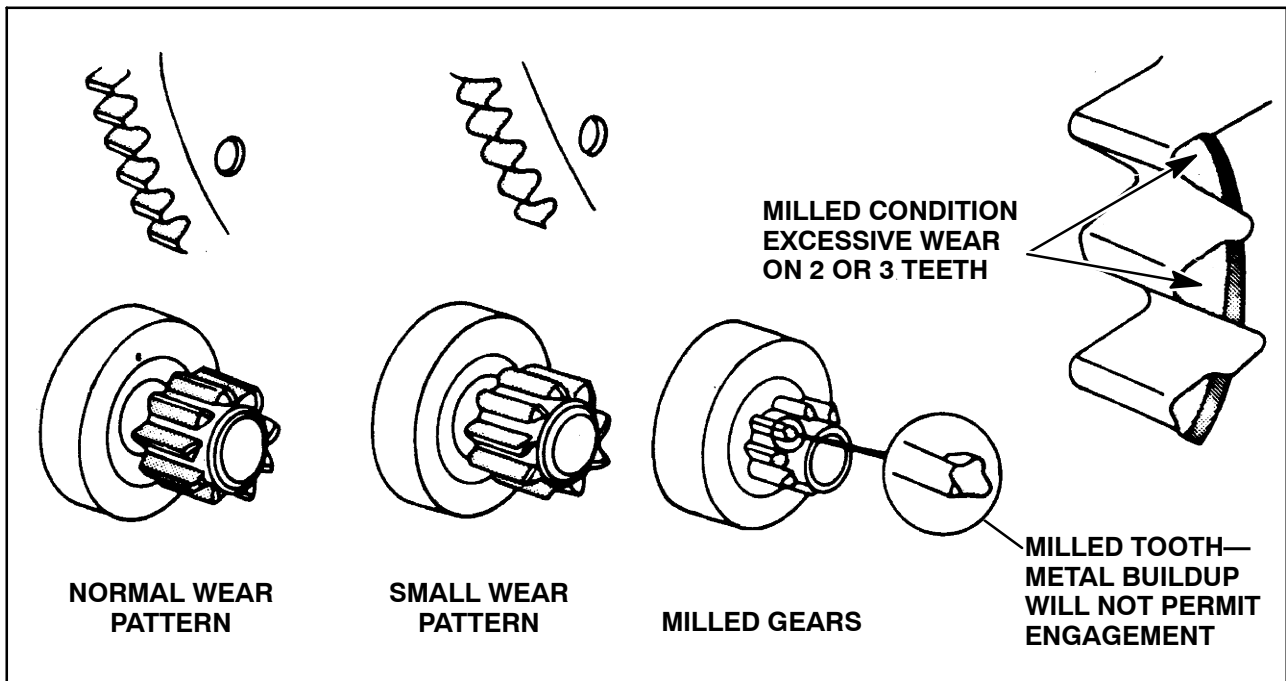
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7. Solder the stator leads, 1, to the terminals on the rectifier/regulator assembly, 2.



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Inspection

1. Inspect the gear splines on the pinion clutch, the pinion, the armature, and the intermediate gear for damaged or missing splines. Replace any damaged parts.
2. Hold the pinion clutch housing and rotate the pinion. The pinion should rotate smoothly, although not necessarily easily, in one direction only. If the pinion can spin in both directions, the clutch is defective and needs replaced.
3. Inspect the motor housing, brush cover, gear reduction unit, and solenoid housing for damage such as cracks, fatigue, wear, etc. Replace any damaged parts.
4. Inspect the brush terminals, battery terminals, and motor terminals for corrosion, loose connections or damage. Repair or replace any damaged parts.

SECTION 90 - PLATFORM

Chapter 1 - Platform

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	Removal	2
	Installation	2
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FUEL TANK

Removal

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal.
2. Remove steering column side panels (See Steering Column Side Panels Removal).
3. Remove the dash panel (See Dash Panel Removal).
4. Remove the hood (See Hood Removal).

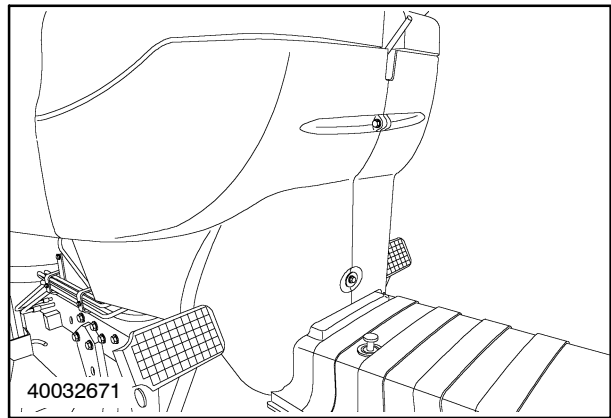


Fuel vapors are explosive and flammable. Do not smoke while handling fuel. Keep fuel away from flames or sparks. Shut off engine and remove key before servicing. Always work in a well ventilated area. Clean up spilled fuel immediately. Failure to comply could result in death or serious bodily injury.

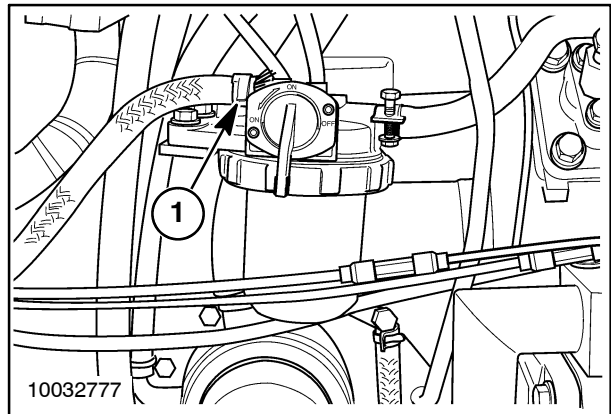
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NOTICE: The fuel tank can store up to 13.5 gallons (51 liters) of fuel.

5. Remove the fuel hose, 1, from the fuel shutoff valve and drain the fuel into a clean container.

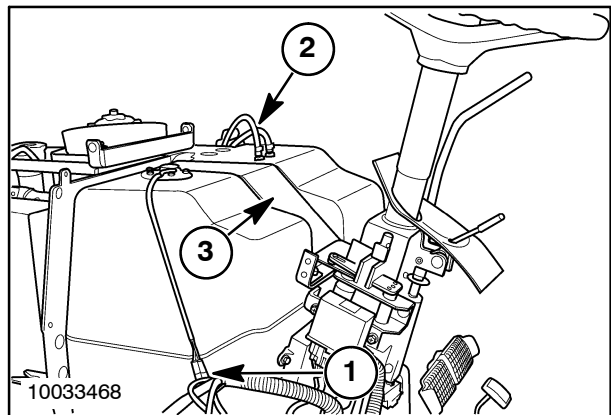


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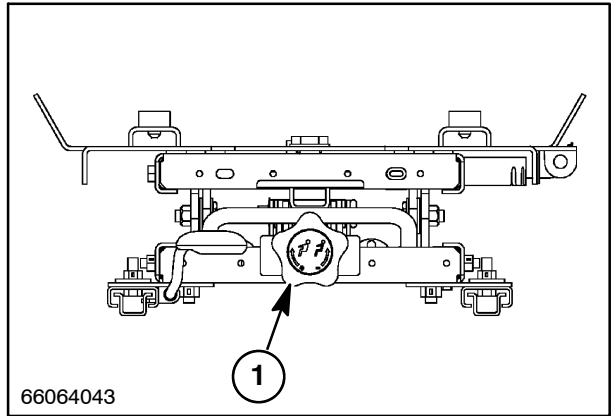
6. Disconnect the wire leads, 1, from the fuel level-sending unit.
7. Disconnect the fuel return lines, 2, from the top of the fuel tank.
8. Remove the fuel tank-retaining bracket, 3, by removing the two M8x16 cap screws.
9. Remove the fuel tank from the tractor.



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SECTION 90 - PLATFORM - CHAPTER 2

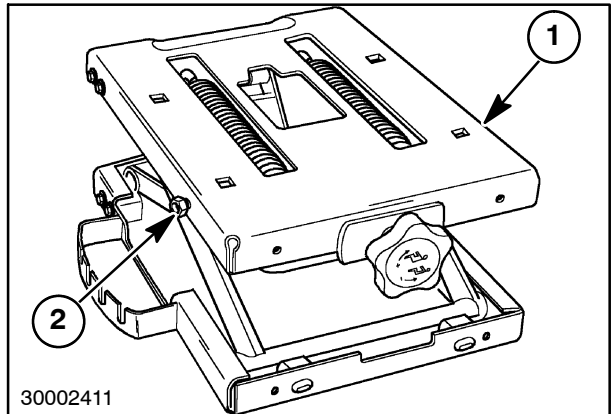
5. Turn the weight adjustment knob, 1, clockwise, until it is all the way in, to reduce the spring tension on the extension springs.



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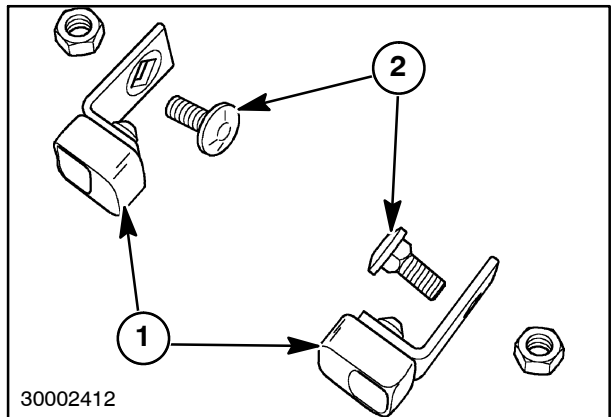
NOTICE: The seat pedestal is under spring tension. The pedestal must be compressed while removing the nuts and carriage bolts in step 6.

6. Place the seat pedestal, 1, on the bench with the bottom side facing up. Remove the nut, 2, from the carriage bolt, on both sides of the seat base.



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7. Remove the slider stop brackets, 1, and the carriage bolts, 2, from the seat pedestal assembly.



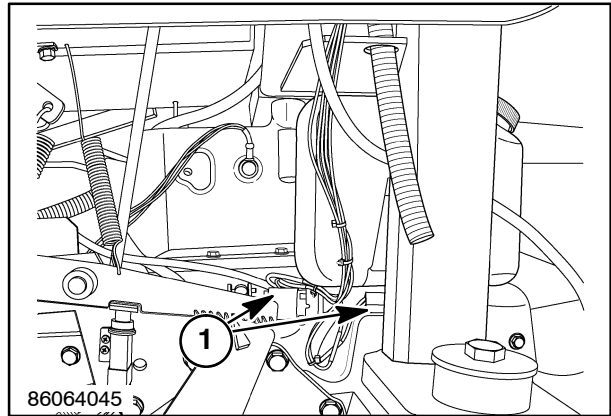
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WASHER TANK

Removal

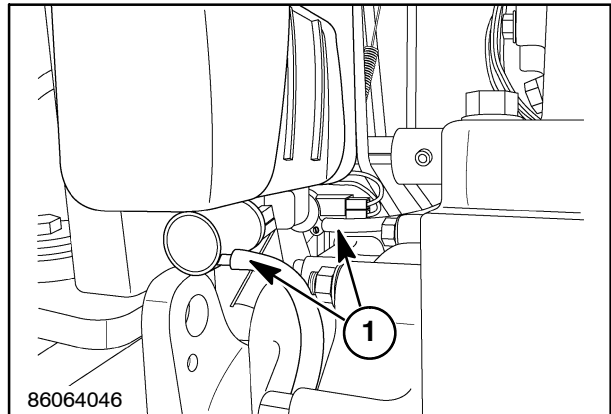
1. Disconnect the electrical connectors, 1, at each washer motor.

NOTICE: The left tire is removed for clarity.



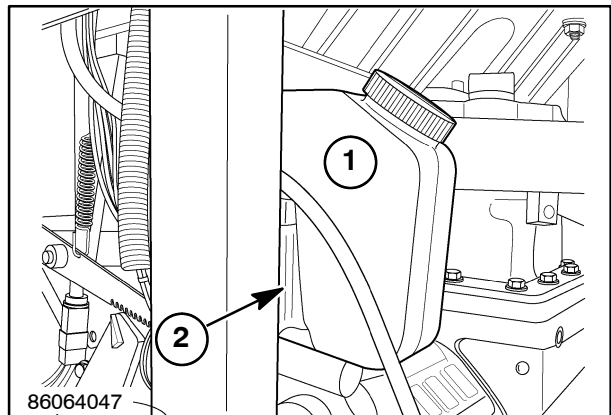
66

2. Disconnect each washer hose, 1, from each motor.



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3. Remove the washer bottle, 1, from the left pillar bracket, 2, by pushing upward.

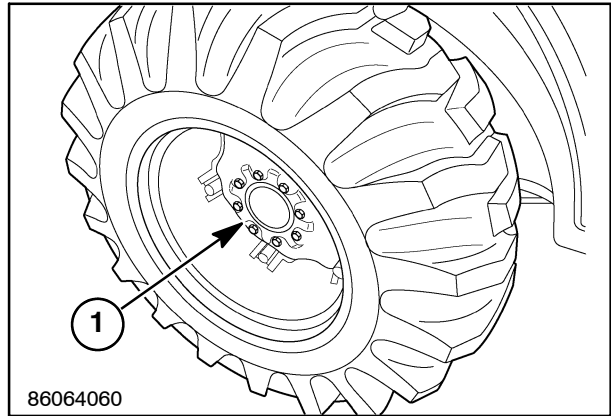


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FENDERS

Removal

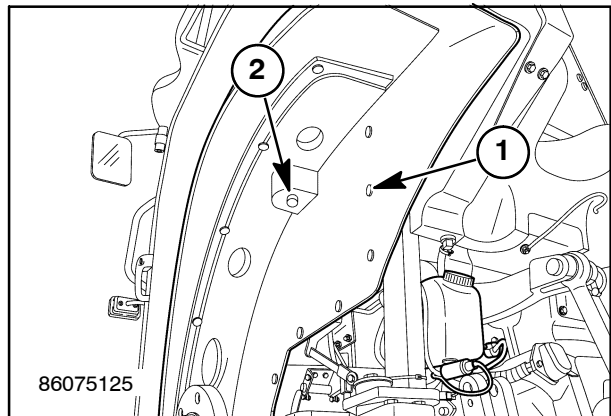
1. Use a floor jack to raise the rear of the tractor.
2. Place jack stands under the rear axle, not shown.
3. Remove the wheels, 1, from the tractor.



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4. Remove the fastener buttons and nylon washers, 1, and nut, 2, which secures the fender to the cab.

NOTICE: The left fender has 14 fastener buttons and nylon washers. The right fender has 13.



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