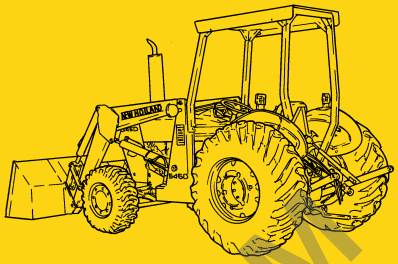
NEW HOLLAND CONSTRUCTION

250C

260C

SERVICE MANUAL



NEW HOLLAND

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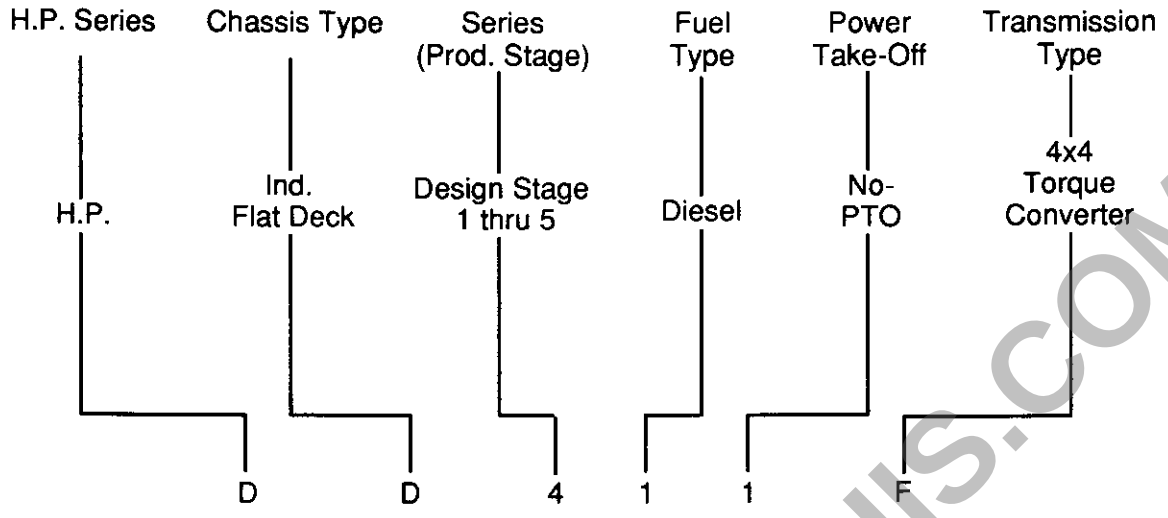
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MODEL NUMBER - CODE



KEY TO PRODUCTION DATE CODES

First Number Year	First Letter Month	Second Number DAY OF MONTH	Second Letter PRODUCTION SHIFT
8 - 1988 9 - 1989 0 - 1990 1 - 1991 2 - 1992 3 - 1993 4 - 1994	A - Jan B - Feb C - March D - April E - May F - June G - July H - Aug J - Sept K - Oct L - Nov M - Dec	01-32	A - Midnight B - Day C - Afternoon

Example of Production Unit Date Code 9 L 0 3 B

- 9 — Year of Final Assembly (1989)
- L — Month of Year (November)
- 03 — Day of Month (Third)
- B — Shift Period (Day)

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PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements ("CAUTION", "WARNING", and "DANGER") followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.



CAUTION: THE WORD "CAUTION" IS USED WHERE A SAFE BEHAVIORAL PRACTICE ACCORDING TO OPERATING AND MAINTENANCE INSTRUCTIONS AND COMMON SAFETY PRACTICES WILL PROTECT THE OPERATOR AND OTHERS FROM ACCIDENT INVOLVEMENT.



WARNING: THE WORD "WARNING" DENOTES A POTENTIAL OR HIDDEN HAZARD WHICH HAS A POTENTIAL FOR SERIOUS INJURY. IT IS USED TO WARN OPERATORS AND OTHERS TO EXERCISE EVERY APPROPRIATE MEANS TO AVOID A SURPRISE INVOLVEMENT WITH MACHINERY.



DANGER: THE WORD "DANGER" DENOTES A FORBIDDEN PRACTICE IN CONNECTION WITH A SERIOUS HAZARD.

FAILURE TO FOLLOW THE "CAUTION", "WARNING", AND "DANGER" INSTRUCTIONS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH.

MACHINE SAFETY

Additional precautionary statements ("ATTENTION" and "IMPORTANT") are followed by specific instructions. These statements are intended for machine safety.

ATTENTION: The word "ATTENTION" is used to warn the operator of potential machine damage if a certain procedure is not followed.

IMPORTANT: The word "IMPORTANT" is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.

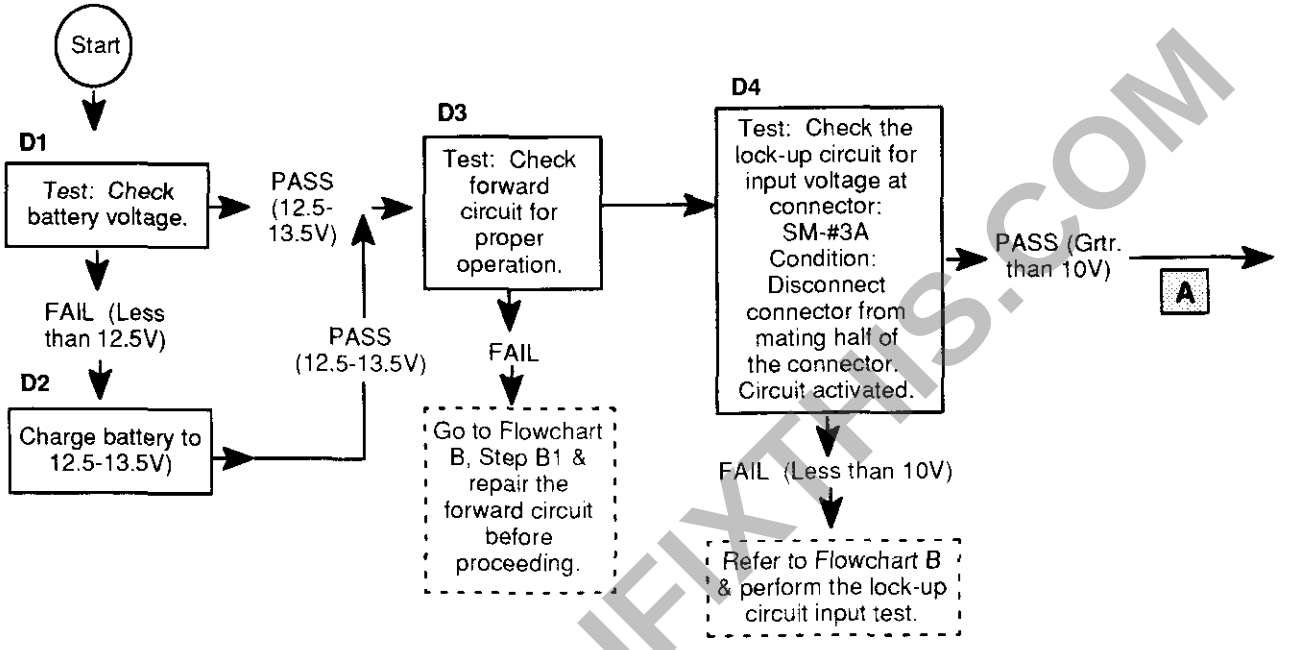
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FLOWCHART D
TORQUE CONVERTER LOCK-UP CIRCUIT TEST

Symptom: Torque Converter Lock-Up Circuit (8x8 Only) Won't Operate

See the Notes and Quick Test below before proceeding.



NOTES:

If test voltage is below specification, check battery voltage before proceeding.

The forward circuit must operate properly for the lock-up circuit to operate. test and repair the forward circuit (if required) before proceeding.

The lock-up circuit must be activated when performing voltage tests.

When checking lock-up circuit output voltage, there will be a 3- 5 second delay after the circuit is activated before a voltage reading will be obtained.

QUICK TEST:

Before proceeding to the flowchart, perform this quick test to determine if the electrical circuit is operating properly.

1. Place the ignition switch to the "on" position, but DO NOT START THE ENGINE.

2. Move the shuttle control lever to the "forward" position.

NOTE: The tractor must be in a quiet location when performing steps 3 and 4.

3. Depress, then release, the torque converter lock-up engagement button.

4. Three to five seconds after the lock-up button has been depressed, you should hear a faint "clicking" sound at the lock-up valve. The clicking sound is made when the lock-up solenoid is activated and depresses the control spool in the lock-up valve against the valve housing.

Repeat Step #4 several times.

If you hear the clicking sound: The electrical system, lock-up solenoid, and valve are working properly.

If you do not hear the clicking sound: Proceed to the flowchart.

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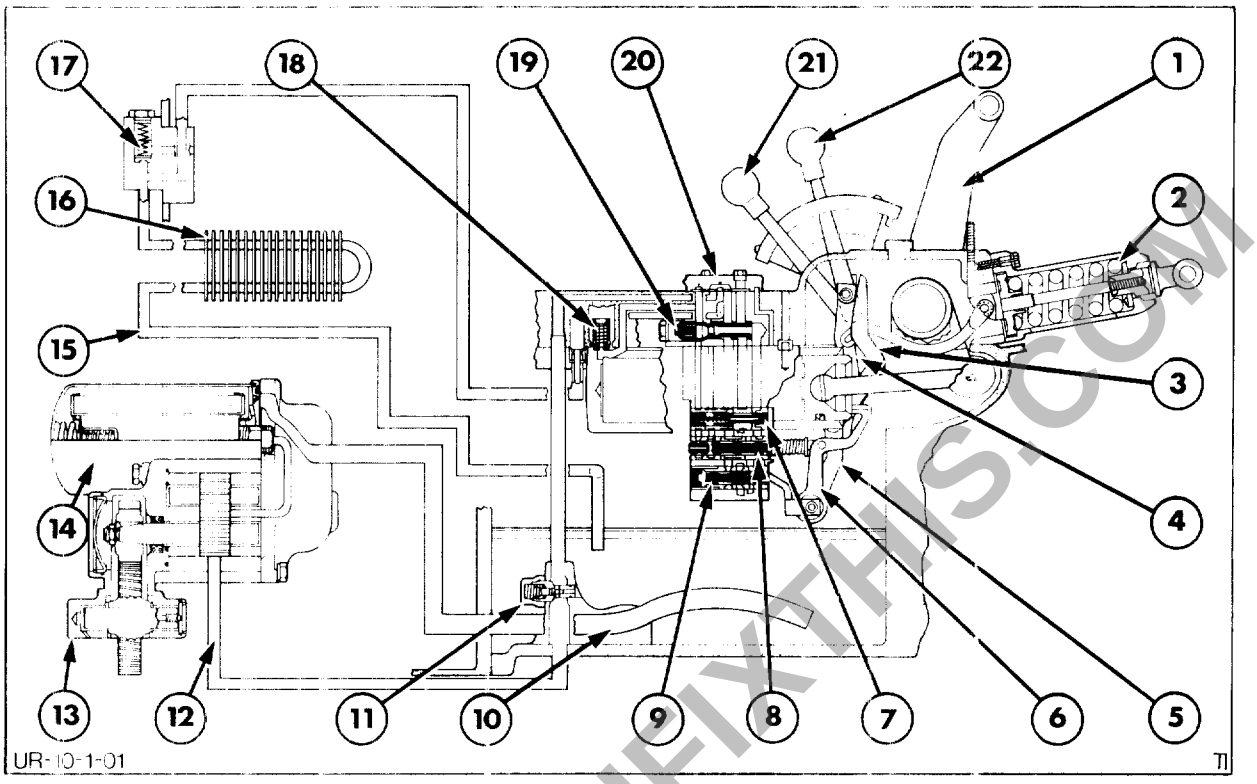


FIGURE 8-1

Hydraulic System - Schematic

1 Lift arm
2 Draft control spring
3 Draft lever
4 Position lever
5 Actuating lever
6 Control valve lever
7 Unload valve
8 Control valve
9 Feathering valve
10 Hydraulic pump inlet tube
11 Pressure relief valve
12 Pump pressure tube
13 Engine mounted gear type pump
14 Micronic inlet filter
15 Oil cooler return to sump
16 Oil cooler
17 Cooler valve
18 Lift cylinder safety valve
19 Check valve
20 Accessory cover
21 Draft control lever
22 Position control lever

ENGINE PUMP

A gear type pump located at the rear left hand side of the engine being driven from a gear on the rear of the camshaft.

Figure 8-1 illustrates the hydraulic system with an engine mounted gear type hydraulic pump.

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Cylinder Head Assembly

The cylinder head assembly incorporates the valves, valve springs, and rotators. The valve rocker arm shaft assembly is bolted to the cylinder block, through the head. The intake and exhaust manifolds are bolted to the head, the intake on the right hand side, and the exhaust on the left. The water outlet connection and thermostat are attached to the front of the cylinder head.

Valve guides are integral with the cylinder head, and valves with oversize stems are available for service. Special replaceable cast alloy valve seats are pressed into each valve port, and exhaust valves are fitted with positive valve rotators. Intake valves use umbrella-type seals, while the exhaust valves use a square section O ring.

Valve lash is maintained by self-locking adjusting screws. The camshaft runs in four replaceable bearings, an is driven by the camshaft drive gear in mesh with the camshaft and crankshaft gears. Camshaft thrust is controlled by a plate secured to the block and located between the camshaft gear and the front journal of the camshaft. A helical gear mounted on the rear of the camshaft drives the tractor hydraulic system pump, optional on some tractor models.

The cylinder head bolts are evenly spaced in a six-point pattern around each cylinder. Diesel engine injectors are mounted outside the rocker cover.

The engine cylinder head is designed with the entire face of the cylinder head flat. The combustion chambers are recessed into the piston crowns.

Crankshaft Assembly

The crankshaft is supported in the cylinder block by four main bearings and the crankshaft end thrust is suppressed by a thrust bearing located on the second main bearing.

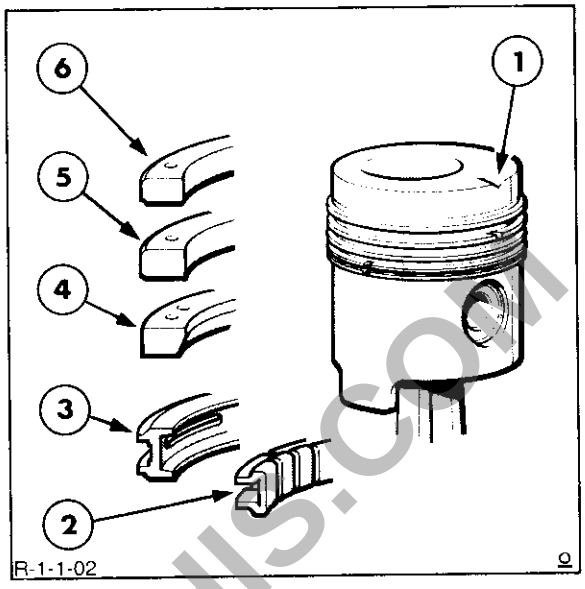


FIGURE 1-2

Conventional Piston And Rings

1 Notch to front of engine
2 Expanded for oil control ring
3 Oil control ring
4 1st Compression ring
5 2nd Compression ring
6 Top compression ring

The piston is connected to the crankshaft by a heavy I-beam connecting rod. The crankshaft end of the connecting rod has an insert-type copper lead or aluminum tin alloy bearing. The piston end of the connecting rod has a replaceable bronze bushing. The piston pin is a free-floating steel pin held in place in the piston by two snap rings.

Front and rear crankshaft oil sealing is effected by one piece, single lip-type seals.

Pistons

Pistons are an aluminum alloy with combustion chambers recessed into the piston crowns. Each piston, Figure 1-2, has three compression rings and one oil control ring, all of which are located above the piston pin.

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CYLINDER HEAD

Valve Guide Bore Diameter	0.3728″ - 0.3735″ (9.469 mm - 9.487 mm)
Head to Block Surface Flatness	0.003″ (0.08 mm) in any 6″ (152 mm) or 0.006″ (0.15 mm) overall limit.

EXHAUST VALVES

Face Angle	44° - Relative to Head of Valve
Stem Diameter	Std. 0.3701″ - 0.3708″ (9.401 mm - 9.418 mm) 0.003″ (0.076 mm) Oversize: 0.3731″ - 0.3738″ (9.477 mm - 9.495 mm) 0.015″ (0.38 mm) Oversize: 0.3851″ - 0.3858″ (9.781 mm - 9.799 mm) 0.030″ (0.76 mm) Oversize 0.4001″ - 0.4008″ (10.163 mm - 10.180 mm)
Head Diameter	1.495″ - 1.505″ (37.97 mm - 38.23 mm)
Stem-to-Guide Clearance	0.0020″ - 0.0037″ (0.051 mm - 0.094 mm)
Lash Clearance (Cold)	0.017″ - 0.021″ (0.43 mm - 0.53 mm)

INTAKE VALVES

Face Angle	44° - Relative to Head of Valve
Stem Diameter	Std. 0.3711″ – 0.3718″ (9.426 mm – 9.444 mm) 0.003″ (0.076 mm) Oversize: 0.3741″ - 0.3748″ (9.502 mm - 9.520 mm) 0.015″ (0.381 mm) Oversize: 0.3861″ - 0.3868″ (9.807 mm - 9.825 mm) 0.030″ (0.762 mm) Oversize: 0.4011″ - 0.4018″ (10.188 mm - 10.206 mm)
Head Diameter	1.800″ - 1.810″ (45.72 mm - 45.97 mm)
Stem-to-Guide Clearance	0.0010″ - 0.0027″ (0.025 mm - 0.069 mm)
Lash Clearance (Cold)	0.014″ - 0.018″ (0.36 mm - 0.46 mm)

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The main gallery also supplies oil to the crankshaft main bearings and to the connecting rod journals via drillings in the crankshaft. Drilled passages from each main bearing direct oil to the camshaft bearings.

The camshaft drive gear bushing is pressure lubricated through a drilled passage from the front main bearing. The gear has small oil passages machined on both sides which allow the oil to escape.

The timing gears are lubricated by oil from the cam follower chamber and the pressure lubricated camshaft drive gear bushing.

Cylinder walls, piston and piston pins are splash lubricated by the connecting rods and rotating crankshaft.

An intermittent flow of oil is directed to the valve rocker arm shaft assembly via a drilled passage in the cylinder block located vertically above No. 1 camshaft bearing. This drilling aligns with a corresponding hole in the cylinder head.

As the camshaft turns, holes in the camshaft and camshaft bearing align and a regulated stream of oil is directed to the cylinder head and on up the rocker arm shaft support bolt to the rocker shaft.

The oil flows from the shaft through drilled holes in each rocker arm bushing to lubricate both ends of the arms. Excess oil flows down the push rods and assists in lubricating the cam followers before draining back into the sump through cored openings in the block.

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Installation

Installation of the components to effect complete reassembly of the engine follows the removal procedure in reverse.

CAMSHAFT

Removal

NOTE: The camshaft bearings and/or tappets can only be serviced with the engine removed from the tractor and mounted on an engine stand. See "Separating the Tractor".

1. Remove the engine front cover and cylinder head.
2. Remove the oil pump drive gear and shaft.
3. Check the camshaft end play as previously described in this section. If the end play exceeds the specified limit of 0.001-0.007″ (0.025-0.18 mm), install a new thrust plate during reassembly.
4. Invert the engine on the stand and remove the oil pan sump if the camshaft bearings and/or the tappets are to be removed.
5. Remove the bolt and flat washer and remove the camshaft gear.
6. Remove the bolts and lock washers and remove the camshaft thrust plate.
7. For engines without a gear on the rear end of the camshaft, the camshaft can be removed from the front of the engine. If the camshaft is equipped with a gear, the flywheel and rear cover plate must be removed and the camshaft rear cover driven out with a punch, Figure 1-69. Remove the key and spacer from the front of the camshaft and carefully remove the camshaft from the rear of the engine.
8. Lift out the tappets and place in a numbered rack to help in reassembly.

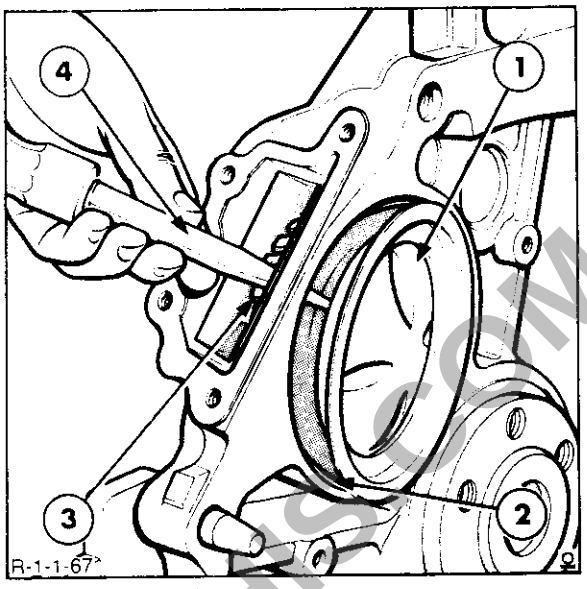


FIGURE 1-69

Camshaft Rear Cover Plate Removal

1 Rear cover plate
2 Sealant
3 Hydraulic pump drive gear
4 Punch

Inspection and Repair

1. Inspect the camshaft journals and lobes for damage, pitting or heat discoloration. If any of these conditions exist, install a new camshaft.
2. Inspect the oil pump drive gear on the camshaft for broken or worn teeth. Check the mating gear on the oil pump drive shaft. If any damage is apparent, install a new camshaft and/or oil pump drive gear.
3. Check each tappet for signs of chipping or other damage. Measure the diameter and replace tappets if worn beyond the limits specified:

   Tappet diameter - 0.9889-0.9894″ (25.118- 25.130 mm).

4. Measure the diameter and out-of-round of the bearing journals. If the journals exceed the specified limits shown below, install a new camshaft.

   Bearing journal diameter - 2.83895-2.3905″ (60.696-60.719 mm).

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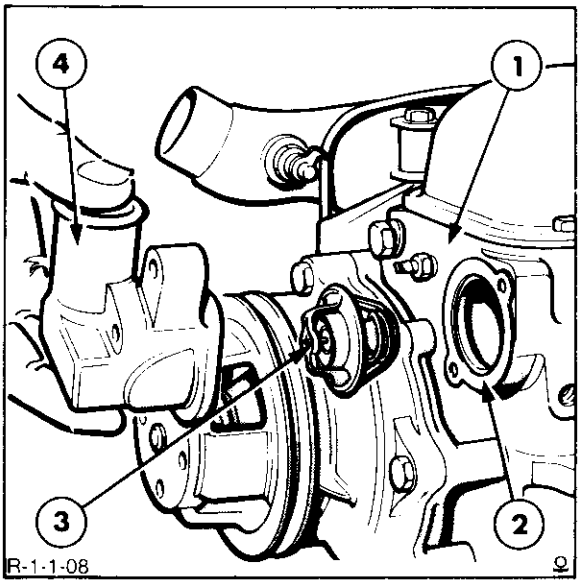


FIGURE 1-77

Coolant Outlet And Thermostat Removal

1 Cylinder head
2 Gasket
3 Thermostat
4 Coolant outlet connection

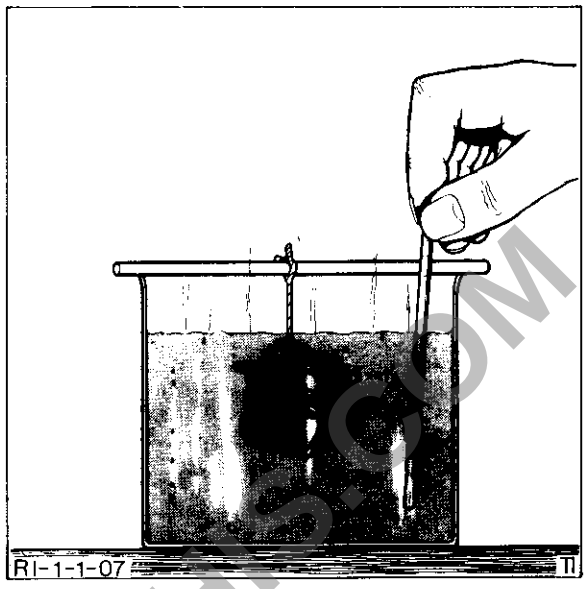


FIGURE 1-78

Checking Thermostat Opening Temperature

Inspection and Repair

Inspect the fins for damage and make sure they are free from obstruction. Check the radiator for leaks.

Installation

1. Installation of the radiator follows the removal procedures in reverse. On installation, observe the following requirements:
   - Tighten all bolts and clips.
   - Make sure the correct grade and quantity of water, antifreeze and chemical inhibitor is added to the cooling system, see relevant operator's manual for details.
   - Start and run the engine for several minutes and check all connections for leaks.

THERMOSTAT

Removal

1. Drain the cooling system to below the level of the coolant outlet connection.
2. Remove the coolant outlet connection retaining bolts and slide the connection with the hose attached to one side.
3. Remove the thermostat and gasket, Figure 1-77.

Inspection and Repair

Place the thermostat in a container of water and heat the water, Figure 1-78. If the thermostat valve does not open at or near 168 degrees F (76 degrees C), or fails to close, install a new thermostat.

Installation

1. Installation of the thermostat follows the removal procedure in reverse. On installation, observe the following requirements:
   - Coat a new coolant outlet connection gasket with sealer and position on the cylinder head prior to installing the thermostat.
   - Coat the edge of the thermostat with grease and install with the heat element located in the cylinder head.

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PROBLEM	POSSIBLE CAUSES	CORRECTION
Oil pressure warning light fails to operate	Bulb burnt out	Replace bulb
	Warning light pressure switch faulty	Replace pressure switch
	Warning light circuit faulty	Check and replace wiring
Excessive exhaust smoke	Exhaust leak on exhaust manifold side of turbocharger, where fitted	Install new gasket
	Air cleaner dirty or restricted	Clean
	Excessive fuel delivery	Overhaul injection pump/injectors
Water temperature gauge fails to reach normal operating temperature	Faulty temperature sender switch	Replace sender switch
	Incorrect or faulty thermostat	Replace thermostat
	Faulty water temperature gauge	Replace temperature gauge

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SECTION 7

STEERING AND FRONT AXLE

STEERING

STEERING - DESCRIPTION AND OPERATION

DESCRIPTION

The Models 250C, 345D, 445D, 260C, and 545D steering system is a hydraulic power assisted hydrostatic system. The major components are serviced separately and consist of steering column shaft, a steering motor, a power steering pump, steering cylinders, a front axle assembly, and the hoses and tubes required to connect the system.

The system is "closed", that is, the hydraulic oil is stored in the power steering oil reservoir, is pumped through the steering system, and returned to the reservoir. The reservoir and the power steering pump are an integral unit.

STEERING COLUMN SHAFT

The steering wheel is secured to the steering column shaft which is protected by a steel outer tube. The lower end of the shaft is joined to the power steering motor input shaft by a coupling secured with a pinch bolt.

The power steering motor and steering column assembly are bolted to the power steering motor support by 4 bolts which is in turn bolted to the transmission case.

POWER STEERING PUMP AND RESERVOIR

The integral power steering pump and reservoir, Figure 7-1, are mounted on the engine front cover plate on the left hand side of the engine. The pump and reservoir are connected to the steering motor by two tubes.

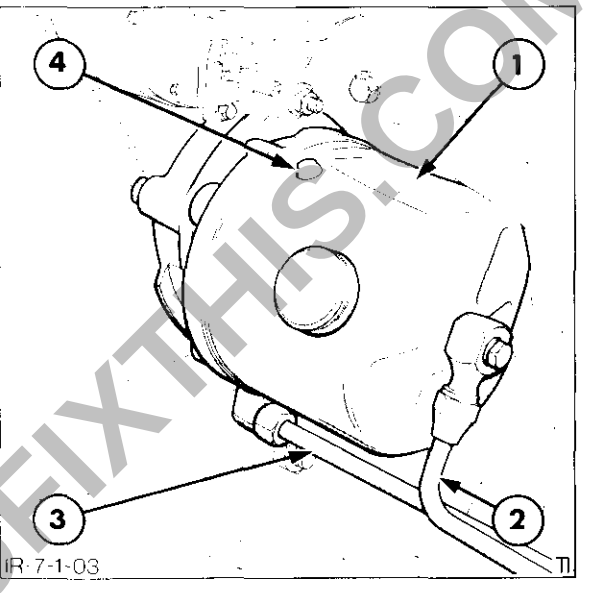


FIGURE 7-1

Steering Pump and Reservoir Installation

1 Reservoir
2 Return tube - low pressure
3 Outlet tube - pressurized
4 Breather

The gear type pump is driven counterclockwise by the camshaft gear. The pump driven gear is half the diameter of the camshaft drive gear, thus the pump is driven at engine speed.

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INTRODUCTION

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all equipment as well as the personal safety of the individual doing the work. This Service Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help insure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing equipment, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that he does not compromise his own personal safety nor the safety of others by his choice of methods or tools.

As you read through this manual, you will come across NOTES and WARNINGS. Each one is there for a specific purpose. NOTES are given to prevent you from making an error that could damage the vehicle. WARNINGS remind you to be especially careful in those areas where carelessness can cause personal injury.

Any reference in this manual to right, left, rear, front, top or bottom is as viewed from the operator's seat looking forward towards the loader.

Ford New Holland policy is one of continuous improvement, and the right to change prices, specifications, equipment or design at any time without notice is reserved. All data in this manual is subject to production variations, so overall dimensions and weights should be considered as approximate only, and the illustrations do not necessarily depict the tractor as it is.

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VALVE SPRINGS

Number per Valve 1

Free Length . . . . . 2.15″ (54.6 mm)

Load at 1.74″ Length (44.20 mm) . . . . . 61.69 lb. (27.7 kg - 31.3 kg)

Load at 1.32″ Length (33.53 mm) . . . . . 125 lbs. - 139 lbs. (57.8 kg - 63.1 kg)

VALVE TIMING

Intake Opening	14°	Before Top Dead Center
Intake Closing	38°	After Bottom Dead Center
Exhaust Opening	41°	Before Bottom Dead Center
Exhaust Closing	11°	After Top Dead Center

VALVE INSERTS

Insert Oversize	Exhaust Valve Insert	Intake Valve Seat Insert
	Counterbore Diameter in Cylinder Head	Counterbore Diameter in Cylinder Head
0.010″ (0.254 mm)	1.607″ - 1.608″ (40.82 mm - 40.84 mm)	1.907″ - 1.908″ (43.44 mm - 43.46 mm)
0.020″ (0.508 mm)	1.617″ - 1.618″ (41.07 mm - 41.10 mm)	1.917″ - 1.918″ (43.69 mm - 43.72 mm)
0.030″ (0.762 mm)	1.627″ - 1.628″ (41.33 mm - 41.36 mm)	1.927″ - 1.928″ (32.95 mm - 43.97 mm)

VALVE SEATS

Exhaust Valve Seat Angle . . . . . 45°

Intake Valve Seat Angle . . . . . 45°

Interference Angle Valve Face to Valve Seat . . . . . 1.0°

Seat Runout . . . . . 0.0015″ (0.038 mm) Total Indicator Reading Max.

Seat Width

Exhaust . . . . . 0.084″ - 0.106″ (2.13 mm - 2.69 mm)

Intake . . . . . 0.080″ - 0.102″ (2.03 mm - 2.59 mm)

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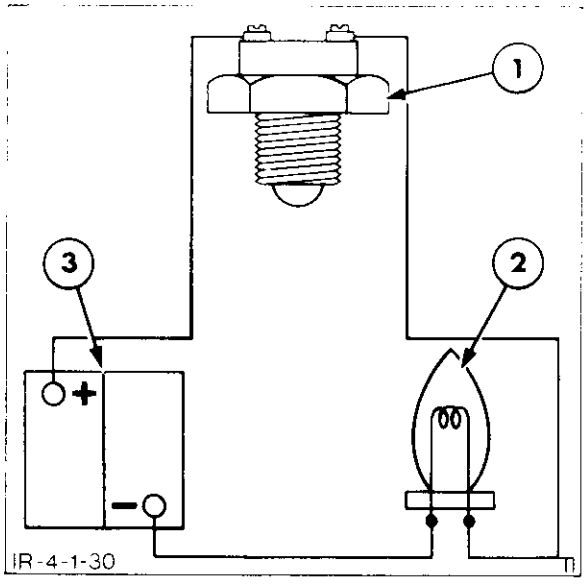


FIGURE 3-17

Safety Start Switch Test

1 Switch
2 Bulb
3 Battery

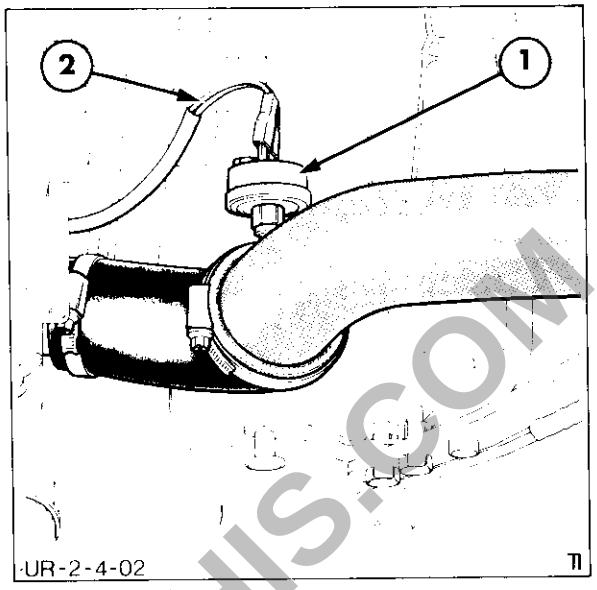


FIGURE 3-18

Air Cleaner Restriction Switch

1 Switch
2 Wire Harness

Safety Start Switch

For removal of the safety start switch, see "Transmission Systems" under the applicable transmission.

Inspection

1. Check the safety start switch for operation by connecting the switch to a suitable bulb and battery, Figure 3-17.
2. Depress and then release the operating ball. The switch is operating correctly if the light comes on when the ball is depressed, and goes out when the ball is released. If the switch is faulty, install a new switch.

Oil Pressure Sender Switch

Removal

1. Disconnect the wire from the switch and unscrew the switch from the engine.

Installation

1. Screw the switch into the engine and tighten to 20 - 25 ft. lbs. (27 - 34 N·m).
2. Reconnect the wire to the switch.

Coolant Temperature Sender

Removal

1. Disconnect the wire and unscrew the sender from the engine.

Installation

1. Coat the threads of a new sender assembly with sealant. Screw the sender into place and tighten to 20 - 30 ft. lbs. (27 - 41 N·m).
2. Reconnect the wire to the sender.

IMPORTANT: The use of a sealer which is not to the Ford specification may insulate the sender from the cylinder head and cause the unit to fail to operate.

Dry Air Cleaner Restriction Switch

Removal

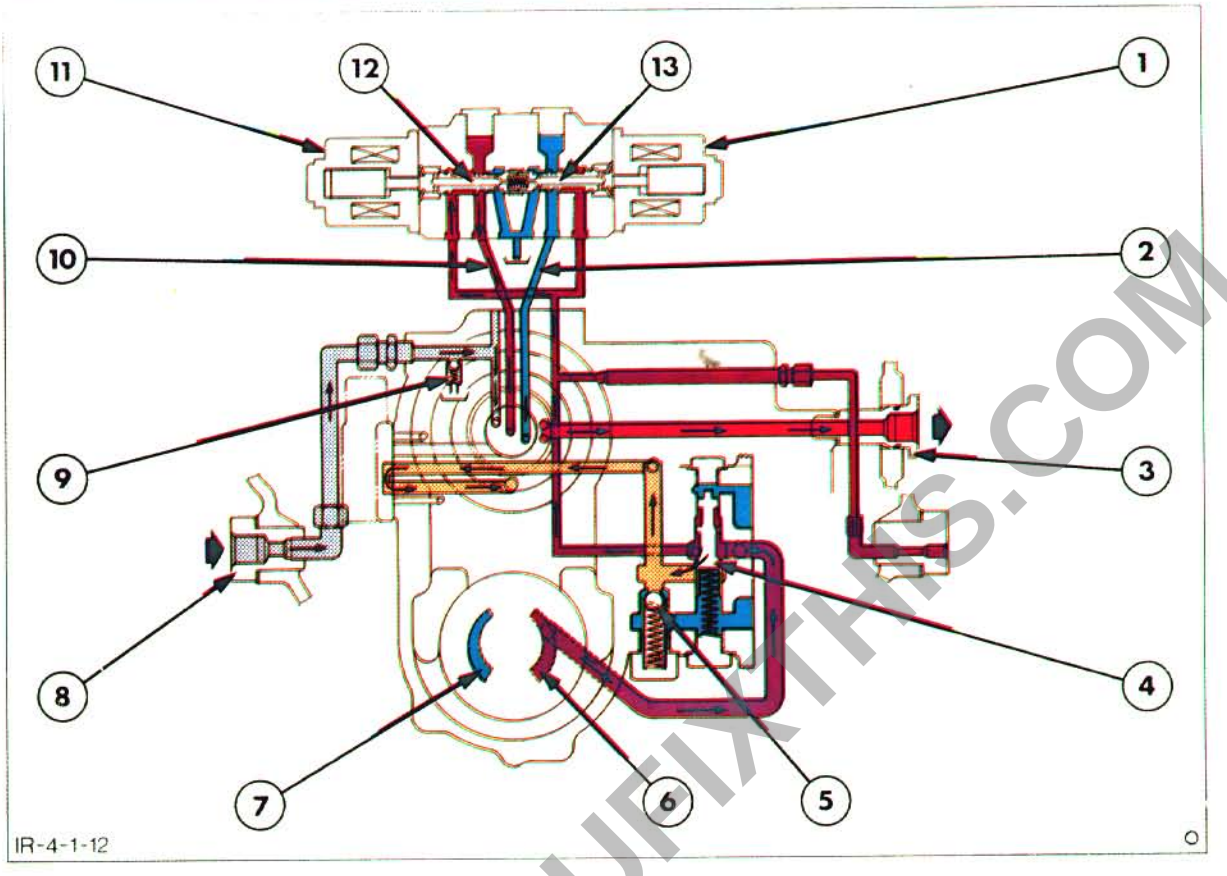
1. Disconnect the wires and unscrew the switch from the air cleaner outlet tube, Figure 3-18.

Installation

1. Screw the switch into place and tighten to the correct torque.
2. Reconnect the wires.

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Pump Pressure Oil
Torque Converter Pressure Oil
Torque Converter Return Oil
Lubrication Oil
Reservoir and Exhaust Oil

FIGURE 4-12

Oil Flow in Reverse

1 Forward solenoid
2 Forward clutch oil gallery
3 Feed port to oil cooler
4 Regulating valve
5 Bypass valve
6 Oil pump outlet
7 Oil pump inlet
8 Return port from oil cooler
9 Cooler bypass valve
10 Reverse clutch oil gallery
11 Reverse solenoid
12 Reverse spool
13 Forward spool

Selecting reverse travel sends a signal from the modulating unit to the reverse solenoid of the control valve. The operation of the reverse section of the control valve is the same as the forward section, however, now the pressure regulated oil is directed to the reverse clutch pack, Figure 4-12, and power is delivered to the transmission gearbox via the rear input gear (reverse clutch hub).

De-energized, the forward solenoid moves back to the neutral position under spring pressure and the spool aligns the forward clutch pack oil gallery with the exhaust port.

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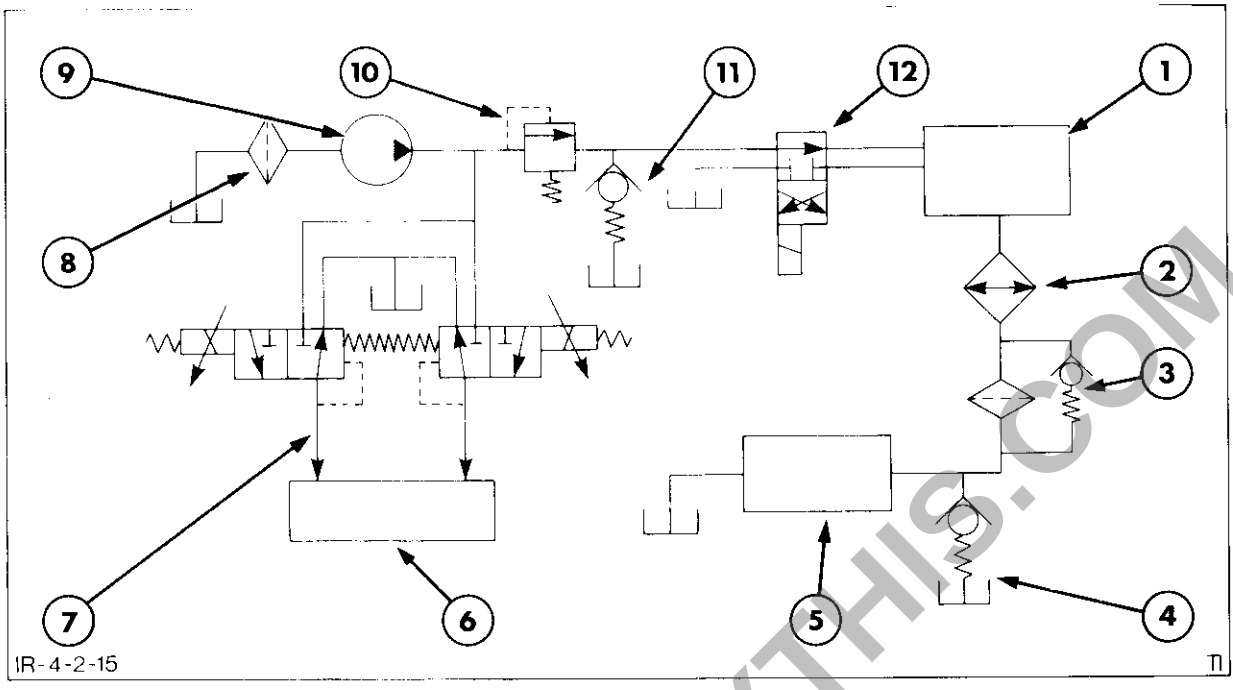


FIGURE 4-110

Transmission Oil Flow Circuit Diagram

1 Torque converter
2 Oil cooler
3 Line filter
4 Cooler line bypass valve
5 Transmission lubrication
6 Hydraulic clutch
7 Solenoid control valve
8 Inlet filter
9 Oil pump
10 Regulating valve
11 Bypass valve
12 Lock-up valve

OIL FLOW

Transmission oil flows from the reservoir to the distributor then to the solenoid control valve assembly as previously described. Oil from the bypass valve flows to the lock-up valve and is then directed via a central drilling in the front input shaft to the torque converter in the normal mode or between the stator support and the torque converter hub into the converter in the lock-up mode, Figures 4-111 and 4-112.

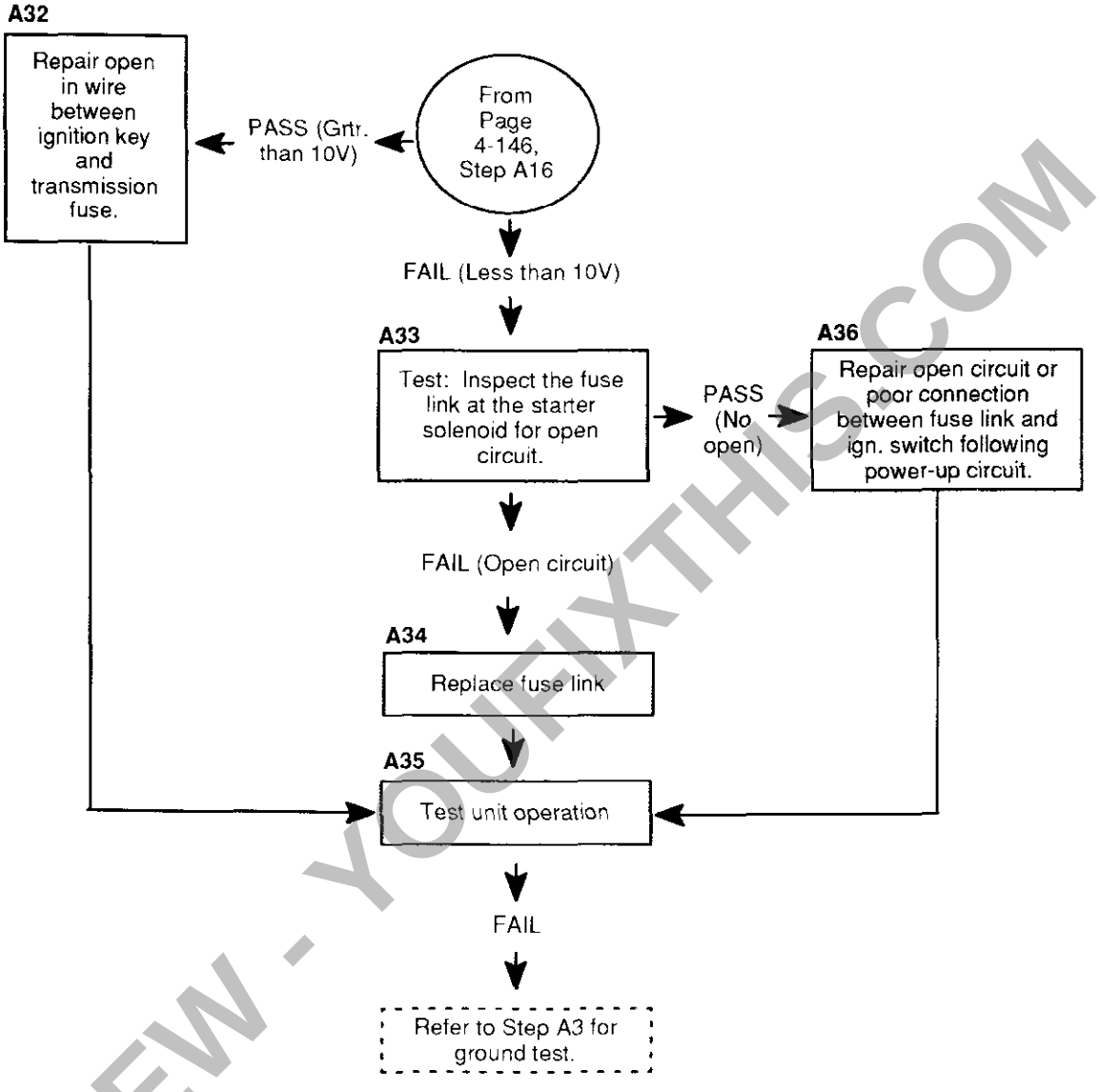
Oil from the torque converter then flows back to the distributor between the stator support and the front input shaft. It is then picked up by the cooler tube on the left-hand side of the transmission case and directed to the cooler.

Oil from the cooler is returned to the transmission via a tube on the left-hand side of the tractor to the oil filter then over the transmission housing and through a tube on the right-hand side of the transmission case.

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Symptom: Transmission Won't Operate in Forward or Reverse Mode



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SPECIFICATIONS

POWER REVERSING TRANSMISSIONS (4X4 AND 8X8)

LUBRICANT

Capacity . . . . . 4.5 US Gal. (18 litres) (31.7 Imp Pts) Ford M2C 134-D
For lubricant viscosity and type refer to the Ford Tractor Loader Backhoe Operators manual.

SEALANT

Gasket sealant . . . . . Ford Specification ESE-M4G234A1 (Loctite 518)
Thread sealant . . . . . Ford Specification SJ-M4G9102A (Loctite 572)

GEAR RATIOS

Synchronized 4x4 Transmission

1st	4.2656:1	R1	4.2875:1
2nd	2.5:1	R2	2.508:1
3rd	1.2735:1	R3	1.28:1
4th	0.7281:1	R4	0.7318:1

Synchronized 8x8 Transmission

1st	7.9608:1	R1	8.0016:1
2nd	5.3724:1	R2	5.4000:1
3rd	3.5265:1	R3	3.5446:1
4th	2.4014:1	R4	2.4137:1
5th	2.2474:1	R5	2.2690:1
6th	1.5234:1	R6	1.5313:1
7th	1.0000:1	R7	1.0051:1
8th	0.6810:1	R8	0.6844:1

BY-PASS VALVE SPRING

Outside diameter	0.543″	(13.8 mm)
Free length (Approx)	2.610″	(66.3 mm)
Maximum solid height	1.205″	(30.6 mm)
Height under load 8.6 kg	1.811″	(46.0 mm)

REGULATING VALVE SPRING

Outside diameter	0.610″	(15.5 mm)
Free length (Approx)	2.717″	(69.0 mm)
Maximum solid height	1.181″	(30.0 mm)
Height under load 6.83 kg	2.205″	(56.0 mm)

CLUTCH PISTON SPRING

Outside diameter	3.012″	(76.5 mm)
Free length (Approx)	2.362″	(60.0 mm)
Maximum solid height	1.043″	(26.5 mm)
Height under load 114.6 kg	1.181″	(30.0)

Clutch Pack Clearance . . . . . 0.063″ – 0.070″ (1.6 mm – 1.8 mm)

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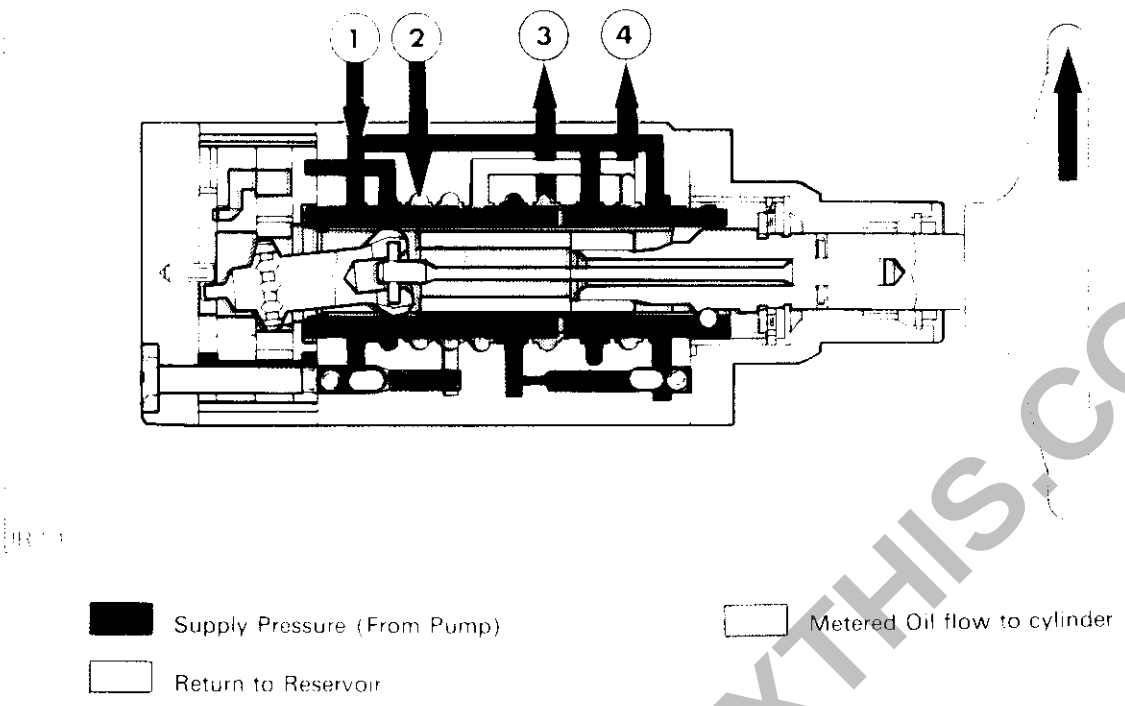


FIGURE 7-6

Steering Motor Oil Flow - Right Turn

1 Pump feed
2 Cylinder feed (left turn)
3 Cylinder feed (right turn)
4 Return to reservoir

In a right turn, Figure 7-6, the oil is directed to the metering section through two ports in the base of the valve housing. The oil enters a space between the retaining bolts and bolt holes where it flows to the commutator and is directed through ports in the manifold to the rotor in the metering element. The seven ports in the manifold index with the seven cavities in the metering stator. The commutator is so designed that as it rotates it is always channeling oil to the inlet side of the metering element and away from the outlet side. As the rotor turns and begins to mesh with the stator, the oil is forced out and through ports in the manifold and back to the commutator. The oil is now directed to the center of the metering section, then up past the drive link to the center of the spool. Ports in the spool are aligned with the right turn circuit in the valve housing and the oil flows to the right turn port and to the steering cylinder.

In a left turn the oil flows in the opposite direction. The metering element and the commutator now turn in the opposite direction and the inlet and outlet sides are reversed. The oil enters the center of the spool through the ports and flows down past the drive link and rotor. The revolving rotor forces the measured amount of oil back down to the commutator, which itself has now moved. The commutator now directs the oil up the retaining bolt holes to the spool and from the spool to the steering cylinder.

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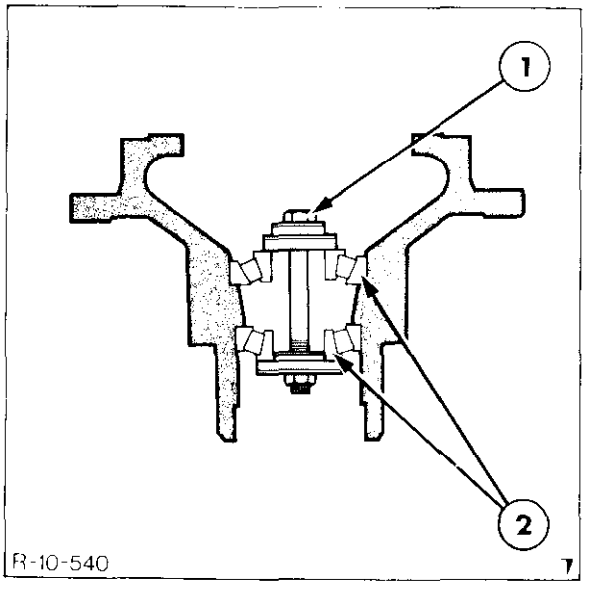


FIGURE 7-110

Pinion Bearings Clamped in Housing

1 Part of pinion setting gauge tool no. FT3135 or FNH04775
2 Pinion bearing assemblies

Calculate the shim thickness as follows:

a. Install the pinion bearings in the differential support housing as shown in Figure 7-110, and lightly clamp the bearings using part of tool No. FT3135 (FNH04775). Make sure the disc part of the tool with the cut-away side is uppermost. Tighten the clamp so that the bearing cones can just be turned by hand - do not overtighten.

b. Install the differential support housing bearing caps (not the bearing tracks) and tighten the cap retaining nuts to 115 ft. lbs. (156 N·m) torque.

c. Using an internal micrometer or vernier gauge, measure the side bearing bore dimension, A, shown in Figure 7- 111.

d. Locate the circular bar of tool No. FT3135 (FNH04775) across the two bearing bores in the support housing, Figure 7-112, and using a depth gauge, measure the dimension B.

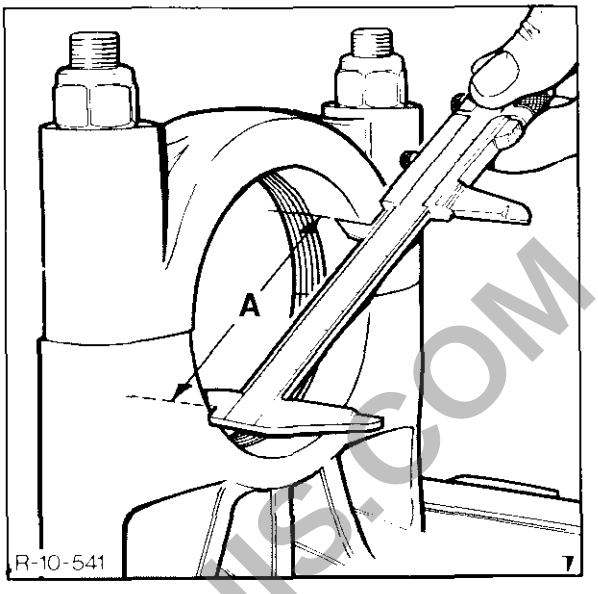


FIGURE 7-111

Measuring Diameter of Differential Support Housing Bearing Bores

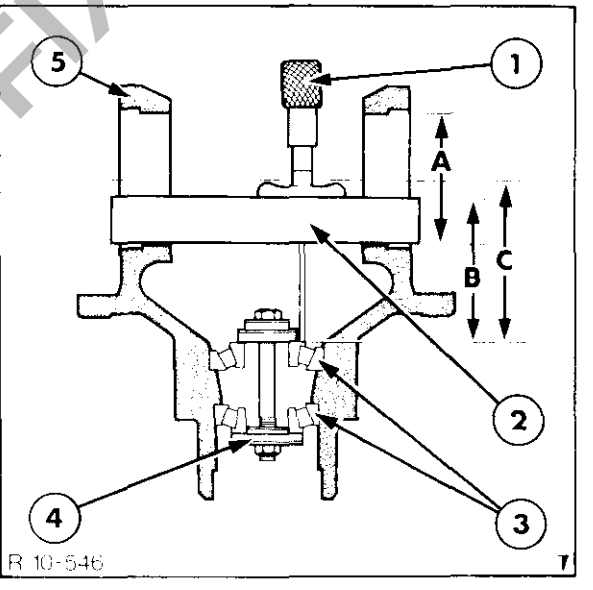


FIGURE 7-112

Measuring Dimension "B"

1 Depth gauge
2 Bar gauge - part of tool no FT3135 or FNH04775
3 Pinion shaft bearings
4 Pinion setting gauge tool no FT3135 or FNH04775
5 Differential support housing

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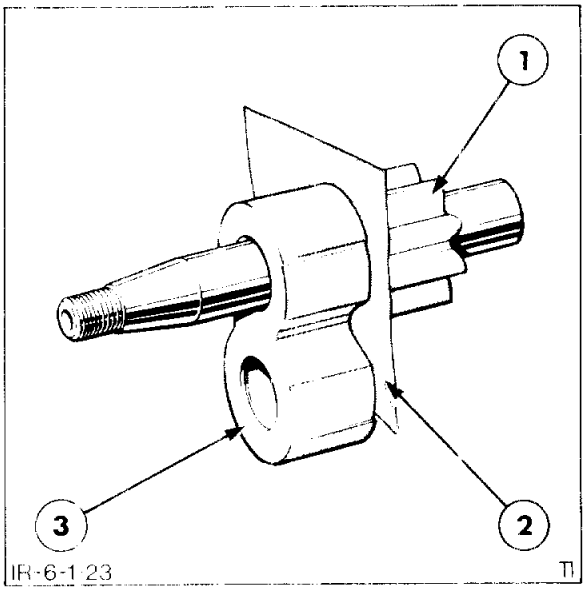


FIGURE 8-57

Polishing Gear Faces

1 Gear
2 Emery paper 'O' grade
3 Scrap bearing

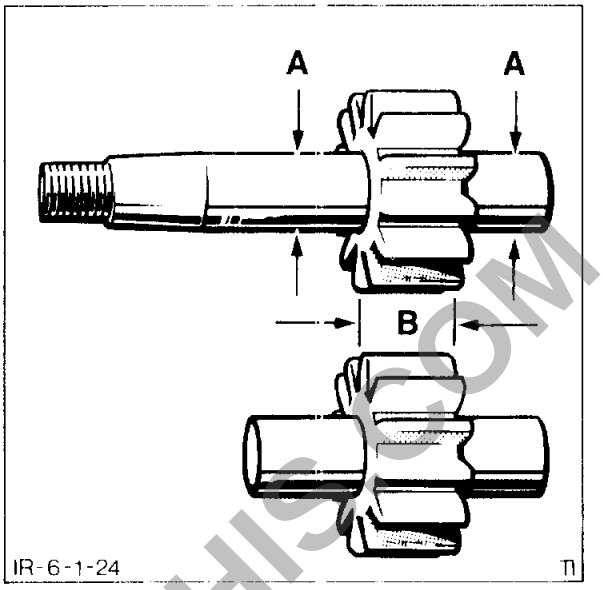


FIGURE 8-58

Gear Pairing

A Journals paired within 0.005 in. (0.013 mm)
B Gear widths paired within 0.002 in (0.005 mm)

4. Examine the gears for scored or worn side faces or journals, damaged teeth, thread or keyway and surface cracks. Slight wear and scoring on the journals may be erased by mounting between lathe centers and polishing with O grade emery paper lubricated with paraffin. Lightly scored side faces may be renovated by sandwiching emery paper between the gear face and a scrap bearing and rotating the gear, Figure 8-57.

   IMPORTANT: While servicing the drive and driven gears, particular attention must be paid to the following points:

   a. Gear widths of drive and driven gears must be within 0.0002" (0.005 mm) of each other to ensure satisfactory pump efficiency, Figure 8-58.

   b. Journals must be within 0.0005" (0.013 mm) of each other, Figure 8-58.

   c. Gear faces must be flat. This feature may be checked by blueing a bearing face and rotating against the gear. This check will also reveal any sharp edges on the teeth.

5. Inspect the cover for damage or cracks, particularly adjacent to the ports, filter connection and pump face. Ensure the internal passages are clear.

6. Check the external gears and housing for damage, wear or cracks. Ensure the idler gear runs freely on the shaft.

7. New seals and O rings should be installed when servicing the pump.

   In the event of components being unsuitable for further use, the advisable action is to clean out the hydraulic system and replace the complete pump unit. Worn components can, in an emergency, be replaced, but the following points must be noted:

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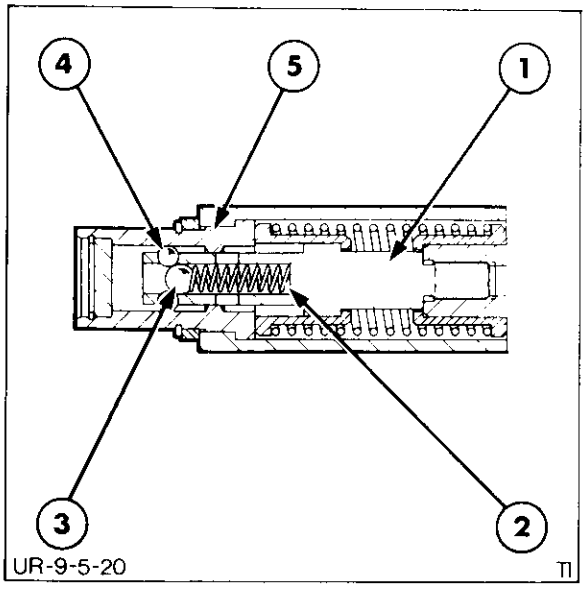


FIGURE 8-131

Float Mechanism

1 Detent plunger
2 Detent spring
3 Detent ball
4 Radial balls
5 Detent sleeve

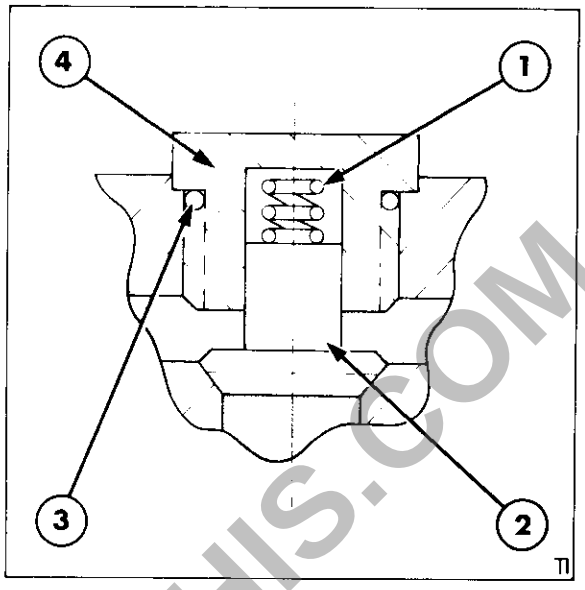


FIGURE 8-132

Check Valve Assembly

1 Spring
2 Poppet
3 'O' ring
4 Plug

Float Mechanism

The "float" mechanism is engaged by moving the control lever "full forward". This action actuates a detent mechanism in which the radial balls, Figure 8-131, fall into the grooved portion of the detent sleeve. The detent spring exerts pressure against the detent ball holding the radial balls in position.

When the float is engaged, the bucket will follow the contour of the working surface. To disengage the float mechanism, the control lever must be returned to the neutral position.

Check Valves

The check valve assemblies, Figure 8-132, are located in the control valve high pressure passages above each valve spool. When a hydraulic cylinder is under load and a valve spool is moved to actuate a cylinder, there would be a momentary tendency for oil to flow in the opposite direction.

The check valves keep the circuits closed until there is sufficient flow and pressure to overcome the load on the cylinders.

When pressure and flow are sufficient to overcome the cylinder pressure, the poppet is lifted from its seat allowing oil to pass through the high pressure ports of the control valve. When pressure is decreased, the check valve spring seats the poppet, thus stopping oil flow.

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SEPARATING THE TRACTOR BETWEEN THE FRONT AXLE AND THE ENGINE

SEPARATION

1. With the tractor positioned on a hard level surface, raise the loader bucket to full height and install a suitable safety prop onto the loader lift cylinder. Stop the engine and relieve any residual pressure in the loader hydraulic system.
2. Lift the engine hood panel and disconnect the battery cables.
3. Remove the retaining bolts, then lift the engine hood panels from the tractor.
4. Remove the radiator grill retaining bolts and remove the grill from the tractor.
5. Disconnect any clips retaining the front wiring harness to the front section of the tractor.
6. Drain the radiator of coolant.
7. Disconnect the power reversing transmission oil cooler tubes at the left-hand side of the engine. Cap all exposed lines to prevent contamination.
8. Disconnect the power steering tubes at the front axle support. Cap all exposed lines to prevent contamination.
9. Disconnect the loader hydraulic pump driveshaft at the engine crankshaft pulley.
10. Remove the four wheel drive driveshaft and shield assemblies (where fitted).
11. Drain the loader hydraulic system oil into a suitable receptacle by disconnecting the loader pressure and return lines at the right-hand loader subframe. Cap all exposed lines to prevent contamination.
12. Loosen the retaining clamps, then disconnect the radiator hoses at the radiator and the air cleaner hose at the engine intake manifold. Cap all exposed openings to prevent contamination.
13. Insert wooden wedges between the axle support and the front axle to prevent movement.
14. Position the tractor splitting stands, Tool No. FTC60296, under the transmission as shown in Figure 10-8.
15. Position suitable stands or blocks under the loader subframes just in front of the transmission as shown in Figure 10-8.
16. Remove the subframe to front axle support retaining bolts.

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