PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements ("**DANGER**", "**WARNING**", and "**CAUTION**") 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.

⚠ DANGER ⚠

This word "DANGER" indicates an immediate hazardous situation that, if not avoided, will result in death or serious injury. The color associated with Danger is RED.

⚠ WARNING ⚠

This word "WARNING" indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.

⚠ CAUTION ⚠

This word "CAUTION" indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

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

MACHINE SAFETY

The precautionary statement ("**IMPORTANT**") is followed by specific instructions. This statement is intended for machine safety.

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.*

INFORMATION

NOTE: *Instructions used to identify and present supplementary information.*

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ENGINE SPECIFICATIONS

Model	Unit	5610 S	6610 S	7610 S	7010	8010
Turbocharged Engine		No	No	Yes	Yes	No
Cylinders		4	4	4	4	6
Bore	mm	111.8	111.8	111.8	111.8	111.8
	in	4.4	4.4	4.4	4.4	4.4
Stroke	mm	111.8	127.0	127.0	127.0	127.0
	in	4.4	5.0	5.0	5.0	5.0
Displacement	cu cm	4392	4987	4987	4987	7480
	cu in	268	304	304	304	456
Compression Ratio		17.5:1	17.5:1	17.5:1	17.5:1	17.5:1
Cylinder Bore Compression (at cranking speed of 200 rpm)	bar	25.85	25.85	25.85	25.85	25.85
	psi ± 50	375	375	375	375	375
Firing Order		1·3·4·2	1·3·4·2	1·3·4·2	1·3·4·2	1·5·3·6·2·4
Low-Idle Speed	rev/min ± 25	750	750	750	750	750
High-Idle Speed	rev/min ± 25	2350	2350	2250	2250	2250
Maximum No-Load Speed	rev/min	2375	2375	2375	2250	2250
Rated Engine Speed	rev/min	2200	2200	2100	2200	2100

CYLINDER BLOCK

Cylinder Bore Taper	maximum wear limit	0.127 mm	0.005 in.
	maximum repair limit	0.025 mm	0.001 in.
Cylinder Bore Out-of-Round	maximum wear limit	0.127 mm	0.005 in.
	maximum repair limit	0.030 mm	0.001 in.
Cylinder Bore Diameter		110.017-110.080 mm	4.331-4.334 in.
Rear Oil Seal Diameter		140.77-140.87 mm	5.542-5.546 in.
Head-to-Block Surface Flatness Limit	any 152 mm (6 in.) area	0.080 mm	0.003 in.
	any 25.40 mm (1 in.) area	0.030 mm	0.001 in.
	overall	0.127 mm	0.005 in.

CYLINDER HEAD

Valve Guide Bore Diameter	9.469-9.495 mm	0.3728-0.3738 in.

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TORQUE VALUES

Description	N·m	Ft.-Lb.
Main Bearing Bolts	197	145
Connecting Rod Bolts	149	110
Cylinder Head Bolts (engine cold) Final Torque	217	160
Intake Manifold-to-Cylinder Head	35	26 (312 in.-lb.)
Exhaust Manifold-to-Cylinder Head	38	28 (336 in.-lb.)
Exhaust Pipe-to-Flange	31	23 (276 in.-lb.)
Flywheel-to-Crankshaft	197	145
Oil Pan Drain Plug	41	30
Valve Rocker Cover Bolts	24	18 (216 in.-lb.)
Crankshaft Pulley-to-Crankshaft	284	210
Valve Rocker Arm Self Locking Screw	24	18 (216 in.-lb.)
Injector Attachment Bolts	23	17 (204 in.-lb.)
Cover Bolts	31	23 (276 in.-lb.)
Oil Pump-to-Block	23	17 (204 in.-lb.)
Water Pump-to-Cylinder Block	35	26 (312 in.-lb.)
Water pump Cover-to-Pump	27	20 (239 in.-lb.)
Oil Pan-to-Cylinder Block (cast)	38	28 (336 in.-lb.)
Injector Line Banjo Bolts	24	18 (216 in.-lb.)
Leak-Off Tube Banjo Fitting Bolts	11	8 (96 in.-lb.)
Injection Pump-to-Front Cover	24	18 (216 in.-lb.)
Camshaft Idler Drive Gear-to-Block	237	175
Front Cover-to-Cylinder Block	24	18 (216 in.-lb.)
Thermostat Housing Bolts	24	18 (216 in.-lb.)
Camshaft Gear Bolt	69	51
Camshaft Rear Gear Plate Bolts	47	35
Oil Filter Adapter Bolts	42	31
Oil Filter Mounting Bolt Insert	34	25 (300 in.-lb.)
Starting Motor-to-Rear Adapter Plate	31	23 (276 in.-lb.)
Injection Pump-to-Gear Nut (4-cylinder)	79	58
Oil Pressure Switch Assembly	31	23 (276 in.-lb.)
Turbocharger-to-Exhaust Manifold Nut	44	33
Fan Blade-to-Support Body	27	20 (239 in.-lb.)
Crankshaft Rear Oil Seal Retainer Initial Torque	12	9 (108 in.-lb.)
Crankshaft Rear Oil Seal Retainer Final Torque	23	17 (204 in.-lb.)
Belt Tension Pulley	54	40
Temperature Senders	20	15 (180 in.-lb.)
Tensioner-to-Water Pump Bolt	54	40
Idler Pulley Bolt	54	40
Pump Connector-to-Block	24	18 (216 in.-lb.)
Dynamic Balancer-to-Cylinder Bore	117	86
Cylinder Block Plugs (1/4 in-27 NPT)	11	8 (96 in.-lb.)
Cylinder Block Plugs (1/4 in-18 NPT)	30	22 (266 in.-lb.)
Cylinder Block Plugs (3/4 in-18 NPT)	38	28 (336 in.-lb.)
Cylinder Block Plugs (3/4 in-14 NPT)	27	20 (240 in.-lb.)

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FAULT FINDING

IMPORTANT: *Investigate and correct the causes of malfunctions during the repair cycle. This will prevent repeat failures.*

NOTE: *Quantify all complaints of excessive oil consumption before initiating repairs. Maximum (North American) engine oil consumption should be no more than three tenths of one percent (0.3%) of the fuel consumed by volume, or no more than 1 quart of oil for every 83 gallons (US) of fuel usage. Record fuel and engine oil usage for a minimum of 50 engine hours before calculating the rate of oil consumption. Oil consumption less than that specified is not considered excessive.*

The following table lists problems, their possible causes, and recommended remedial action.

PROBLEM	POSSIBLE CAUSES	REMEDY
Engine does not develop full power	1. Clogged air cleaner	1. Clean or replace element
	2. Fuel line obstructed	2. Remove obstruction
	3. Faulty injectors	3. Clean and reset or replace
	4. Incorrect valve lash adjustment	4. Check and reset
	5. Burnt, worn or sticking valves	5. Replace valves or oversize, and/or machine the valve guide bores
	6. Blown head gasket	6. Check head flatness and replace gasket
	7. Incorrect fuel delivery	7. Check injectors and fuel pump
	8. Low cylinder compression	8. Replace piston rings or re-bore/re-sleeve as necessary
Excessive exhaust smoke	1. Oil leak on compressor or turbine side of turbocharger, (where installed)	1. Overhaul turbocharger
	2. Exhaust leak on exhaust manifold side of turbocharger, (where installed)	2. Install new gasket
	3. Air cleaner dirty or restricted	3. Clean
	4. Excessive fuel delivery	4. Overhaul injection pump and injectors, check timing
Water temperature gauge fails to reach normal operating temperature	1. Faulty temperature sender	1. Replace sender switch
	2. Incorrect or faulty thermostat	2. Replace thermostat
	3. Faulty water temperature gauge	3. Replace temperature gauge

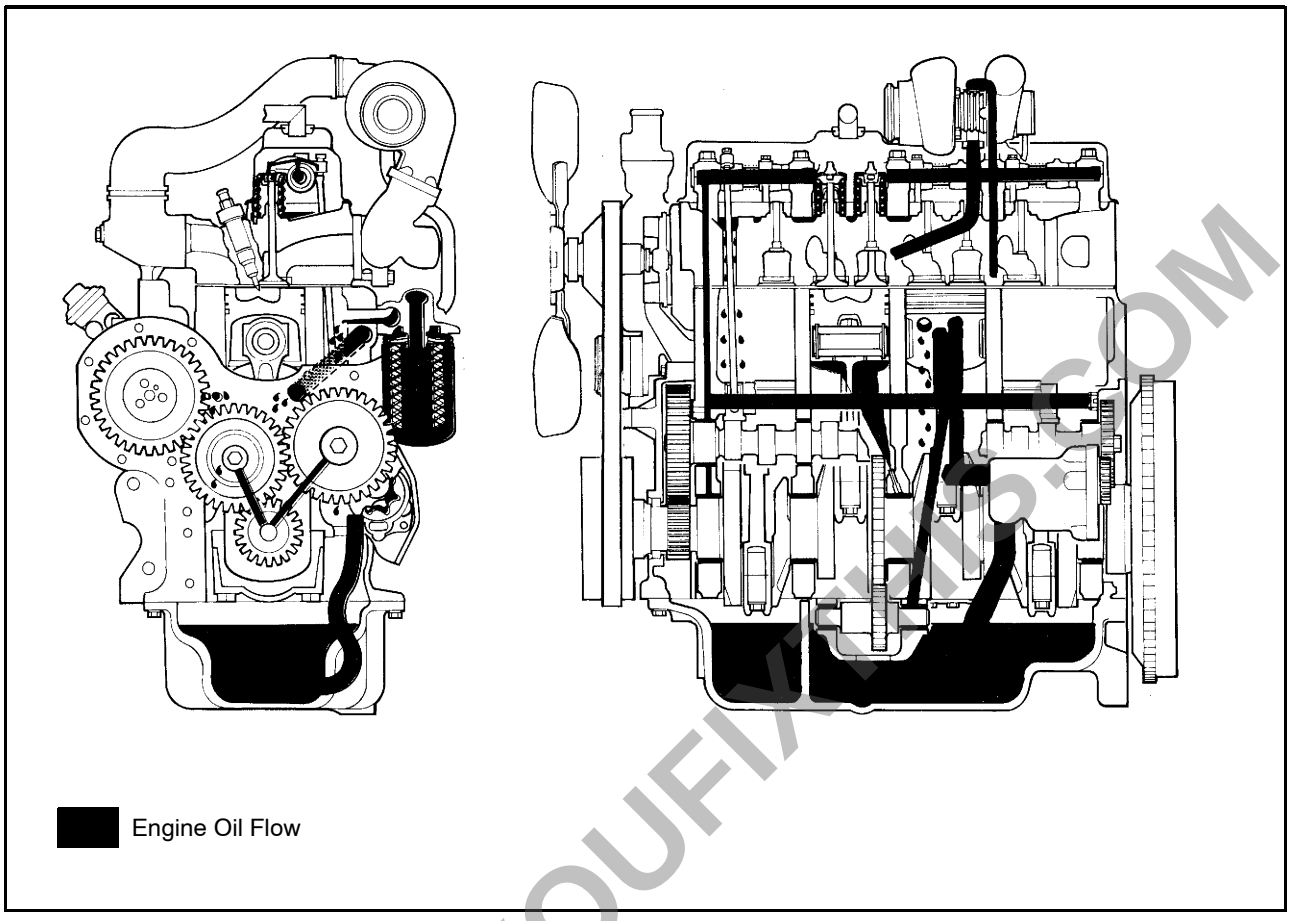
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PROBLEM	POSSIBLE CAUSES	REMEDY
Low oil pressure	1. Engine oil level low	1. Top off as necessary
	2 Wrong grade of oil	2. Drain and refill with correct grade of oil
	3 Blocked oil pump sump screen	3. Clean pump screen
	4 Oil pressure relief valve faulty	4. Install new relief valve
	5 Oil pump worn	5. Replace Oil Pump
	6 Excessive oil pump rotor and shaft assembly clearance	6. Overhaul pump
	7 Excessive main or connecting rod bearing clearance	7. Install new bearing inserts and/ or regrind crankshaft
Excessive oil consumption	1. Engine oil level too high	1. Reduce oil level
	2. External oil leaks	2. Replace gaskets and seals, where necessary. Check mating surfaces for damage or distortion
	3. Worn valves, valve guides or bores	3. Replace defective parts
	4. Cylinder head gasket leaking	4. Replace gasket. Check head for damage or distortion
	5. Oil loss past the pistons and rings	5. Replace rings and/or re-bore, or re-sleeve block as necessary
	6. Oil cooler leak	6. Repair/replace oil cooler assembly
	7. Overfilling engine crankcase	7. Reduce oil level
	8. Plugged crankcase breather	8. Remove obstruction
	9. Failed turbocharger compressor seal	9. Replace seal

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Engine Lubrication System with Turbocharger Installed

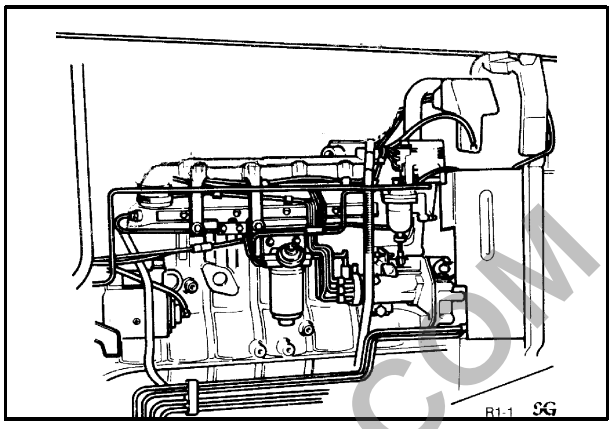
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DISASSEMBLY AND OVERHAUL

Dismantle the engine following conventional techniques, or by referring to the following removal procedure. Refer to the Engine Specifications section.

NOTE: *Replace gaskets, seals, and O-rings when reassembling components and/or the engine.*



7

Right Hand View of Engine

CYLINDER HEAD, VALVES, AND RELATED PARTS

Removal

1. Disconnect battery and swing battery tray away from engine.
2. Remove vertical exhaust muffler (where installed) and the exhaust extension pipe.
3. Remove left and right hood assemblies.
4. Remove air pre-cleaner. Raise and secure the front hood assembly.
5. Remove engine side panels and guards.
6. Drain coolant from the radiator and engine block. Refer to Section 10, Chapter 2 “Cooling System”.
7. Shut off heater hose taps. Disconnect and plug heater hoses.
8. Remove radiator top hose. Cap and plug all openings to prevent contamination.
9. Remove air cleaner-to-intake manifold tube.
10. Shut off fuel valve at bottom of fuel tank.
11. Disconnect low-pressure fuel pipes and remove inlet manifold. Cap and plug openings
12. Disconnect and remove fuel pipes to the fuel injector pump. Cap and plug all openings.
13. Disconnect ‘thermostart’ fuel pipe on the intake manifold. Cap and plug all openings.
14. Disconnect and remove the ventilation tube on the rocker cover.
15. Loosen the belt tension and remove the alternator.
16. Disconnect tacho-drive on the engine front cover. (where installed)
17. Disconnect all loom connections on engine harness and secure clear of the engine.

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SPECIFICATIONS

CLEARANCES AND TOLERANCES

Item			
Clutch Spring	Free Length	48.0 mm	1.89 in
Output Shaft Bearings	Rolling Resistance	1.5-3.5 kgs	3.3-7.7 lb
Idler Gear Bearing	Rolling Resistance	0.4-1.0 kgs	0.90-2.2 lb
Output Shaft	End-Float	0.025-0.075 mm	0.001-0.003 in

SHIM THICKNESS AVAILABLE

Item		
Output Shaft Bearings and Idler Gear Bearing	0.1 mm	0.004 in
	0.25 mm	0.010 in
	0.3 mm	0.012 in
	0.5 mm	0.020 in
Shaft End-Float	1.00-2.25 mm (in increments of 0.05 mm)	0.04-0.089 in (in increments of 0.002 in.)

OIL CAPACITY

Lubricated by Rear Axle Oil		
Transfer Box Increases Rear Axle Oil Level by	1.3 liters	1.4 qt

SPECIAL TOOLS

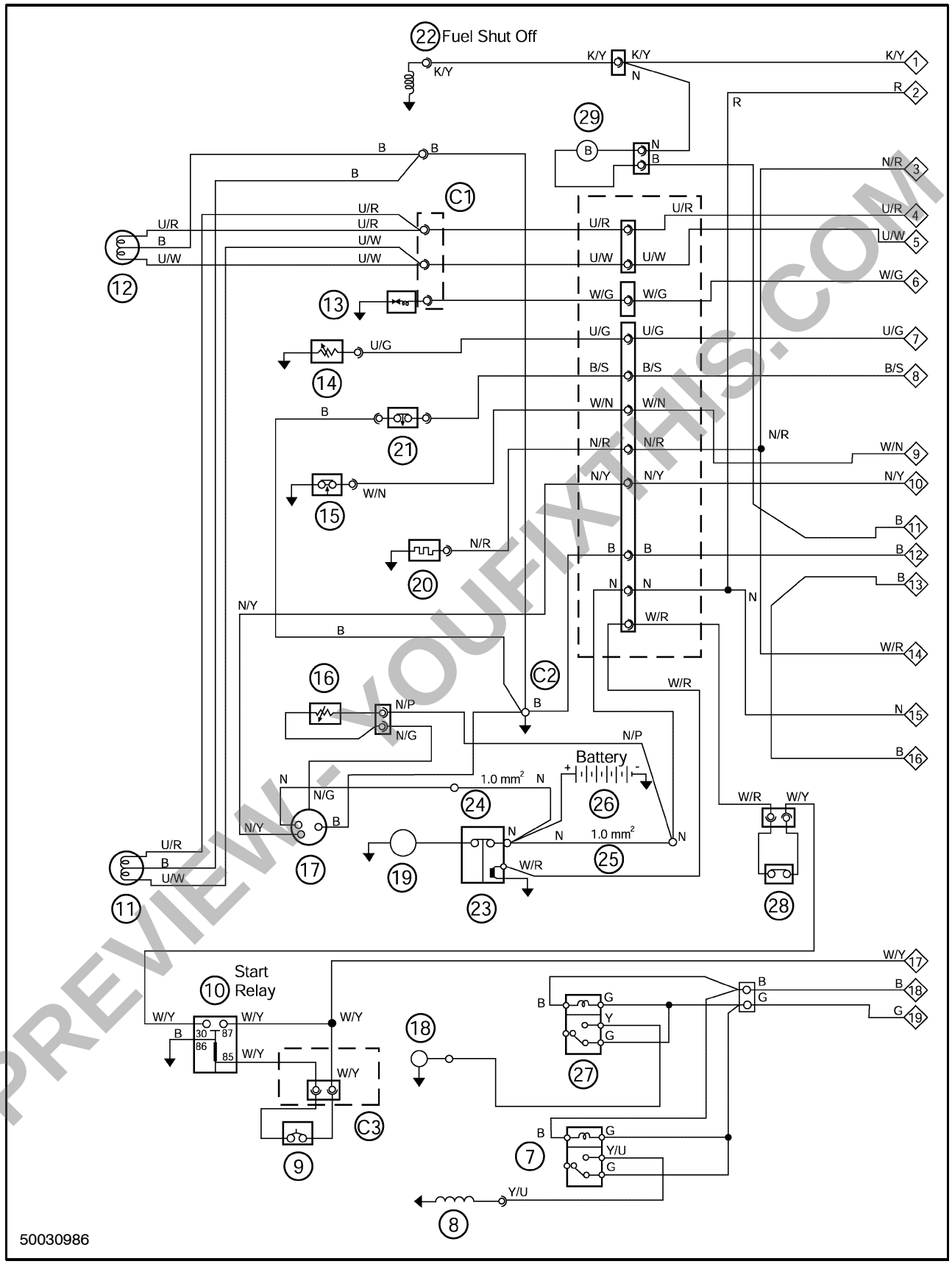
Tool	New Holland / Other	Globel Part No.
Attachment, Bearing Pulling	FNH09190	
Puller, Grip-O-Matic	FNH09516	
Shaft Protectors, (Set of 6)	FNH09212	380000564
Gauge, Shim	FTC307979	

TORQUE VALUES

Component		
Rear Bearing End-Plate Retaining Bolts	40 N·m	30 ft.-lbs.
Front Bearing End-Plate Retaining Bolts	40 N·m	30 ft.-lbs.
Idler Gear Retaining Bolt	80 N·m	59 ft.-lbs.
Transfer Box Retaining Bolts	80 N·m	59 ft.-lbs.
Drive Shaft-to Drive Flange Attaching Bolts	57 N·m	42 ft.-lbs.

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1

Non-Emissionized Engine - Refer to Legend 1 / Table 1
(Sheet 1 of 2)

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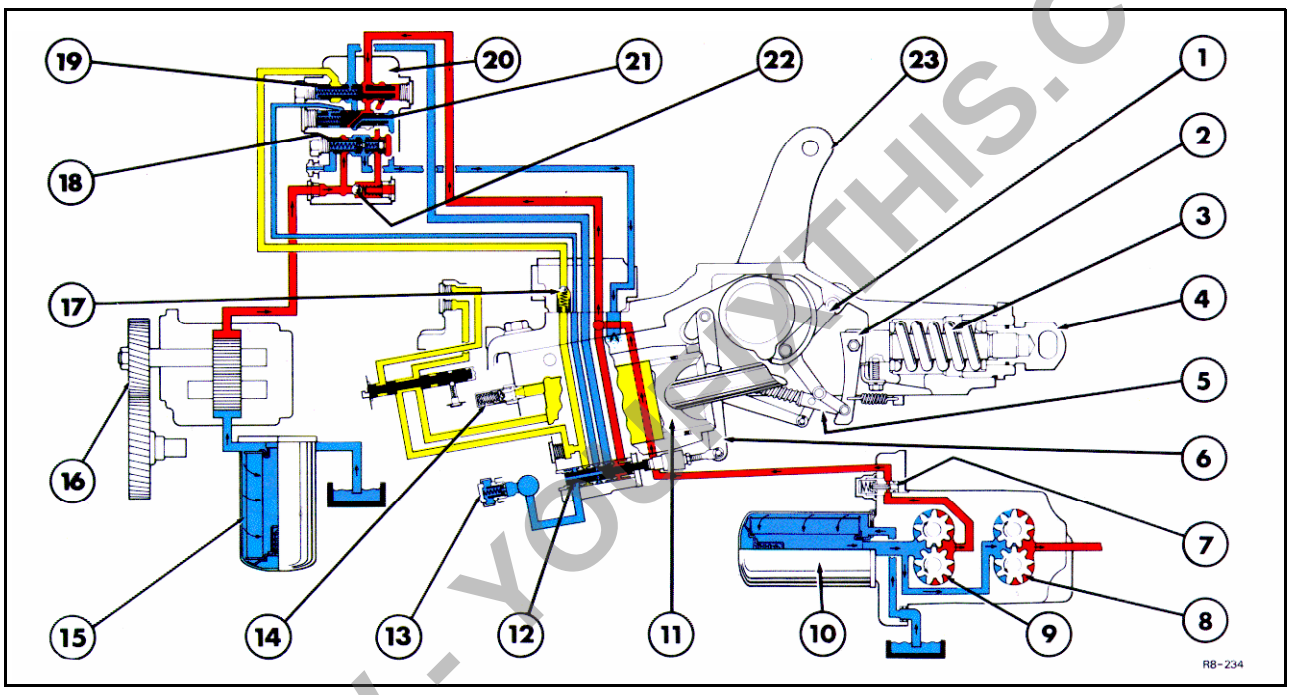
High-Pressure Circuit
Refer to Figure 3.

Operating with a maximum pressure of 183 bar (2650 psi), the high-pressure circuit supplies oil for control of the hydraulic lift assembly, remote control valve(s), and auxiliary equipment (where installed).

With two or more remote valves installed on the tractor, it is necessary to supplement the (tandem gear) type transmission mounted pump output, with an engine mounted (auxiliary) pump.

The front pump within the (tandem gear) main pump assembly circulates pressurized hydraulic oil to the priority valve pack. A relief valve installed in the pump protects the circuit from overload, with an operating pressure of 176-183 bar (2550-2650 psi).

The oil supply from the auxiliary pump flows to the priority valve pack via external tubing, while the supply from the main pump flows to the priority valve pack through internal galleries within the hydraulic top cover.



3

Hydraulic Circuit for Tractor with Fixed Displacement Tandem Gear Type Pump, Engine Mounted Single Gear Type Pump, and Top Link Sensing Hydraulic Lift Assembly

1. Position Control Link
2. Selector Link
3. Draft Control Mainspring
4. Yoke
5. Selector Rod and Roller Assembly
6. Actuating Link
7. Pressure Relief Valve
8. Steering Pump
9. Hydraulic Lift Pump
10. Pump Intake Filter
11. Lift Piston
12. Control Valve
13. Exhaust Valve
14. Lift Cylinder Safety Valve
15. Auxiliary Pump Intake Filter
16. Engine Mounted Auxiliary Hydraulic Pump (where installed)
17. Check Valve
18. Combining (Sequencing) Valve
19. Flow Control Valve
20. Priority Valve Pack
21. Unload Valve
22. Check Valve
23. Lift Arms

Pump Pressure Oil
Trapped Oil
Suction/Return to Reservoir Oil

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SECTION 10 - ENGINE

BOOK 1 - 87032902

Chapter 1 - Diesel Engines (Continued)

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SECTION 10 - ENGINE

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Chapter 2 - Engine Cooling System

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LOAD INDEX CHART

Load Index	kg	lbs.	Load Index	kg	lbs.	Load Index	kg	lbs.
80	450	990	**110**	1060	2340	**140**	2500	5520
81	462	1020	**111**	1090	2400	**141**	2575	5680
82	475	1050	**112**	1120	2470	**142**	2650	5840
83	487	1070	**113**	1150	2540	**143**	2725	6000
84	500	1100	**114**	1180	2600	**144**	2800	6150
85	515	1140	**115**	1215	2680	**145**	2900	6400
86	530	1170	**116**	1250	2760	**146**	3000	6600
87	545	1200	**117**	1285	2830	**147**	3075	6800
88	560	1230	**118**	1320	2910	**148**	3150	6950
89	580	1280	**119**	1360	3000	**149**	3250	7150
90	600	1320	**120**	1400	3080	**150**	3350	7400
91	615	1360	**121**	1450	3200	**151**	3450	7600
92	630	1390	**122**	1500	3300	**152**	3550	7850
93	650	1430	**123**	1550	3420	**153**	3650	8050
94	670	1480	**124**	1600	3520	**154**	3750	8250
95	690	1520	**125**	1650	3640	**155**	3875	8550
96	710	1570	**126**	1700	3740	**156**	4000	8800
97	730	1610	**127**	1750	3860	**157**	4125	9100
98	750	1650	**128**	1800	3960	**158**	4250	9350
99	775	1710	**129**	1850	4080	**159**	4375	9650
100	800	1760	**130**	1900	4180	**160**	4500	9900
101	825	1820	**131**	1950	4300	**161**	4625	10200
102	850	1870	**132**	2000	4400	**162**	4750	10500
103	875	1930	**133**	2060	4540	**163**	4875	10700
104	900	1980	**134**	2120	4680	**164**	5000	11000
105	925	2040	**135**	2180	4800	**165**	5150	11400
106	950	2090	**136**	2240	4940	**166**	5300	11700
107	975	2150	**137**	2300	5080	**167**	5450	1200
108	1000	2200	**138**	2360	5200	**168**	5600	12300
109	1030	2270	**139**	2430	5360	**169**	5800	12800

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Inspection and Repair

1. Clean the piston and connecting rod assemblies in a suitable solvent. Inspect for damage to ring lands, skirts, or pin bosses.
2. Check connecting rod components for damage, and place in an alignment fixture (where available) to check for distortion. Ensure that any distortion found is within specification as follows:

   Maximum twist - 0.30 mm (0.012 in.)

   Maximum bend - 0.10 mm (0.004 in.)
3. Check piston pin bushing for damage or wear in the following manner:

   Measure the outside diameter of the piston pin, and inside diameter of the connecting rod bushing to:

   - Piston Pin Outside Diameter

     Naturally Aspirated – 38.095 - 38.100 mm (1.4998 - 1.5000 in.)

     Turbocharged – 41.270 - 41.275 mm (1.6248 - 1.6250 in.)
   - Connecting Rod Bushing Internal Diameter (small end)

     Naturally Aspirated – 38.113 - 38.120 mm (1.5005 - 1.5008 in.)

     Turbocharged – 41.288 - 41.295 mm (1.6255 - 1.6258 in.)

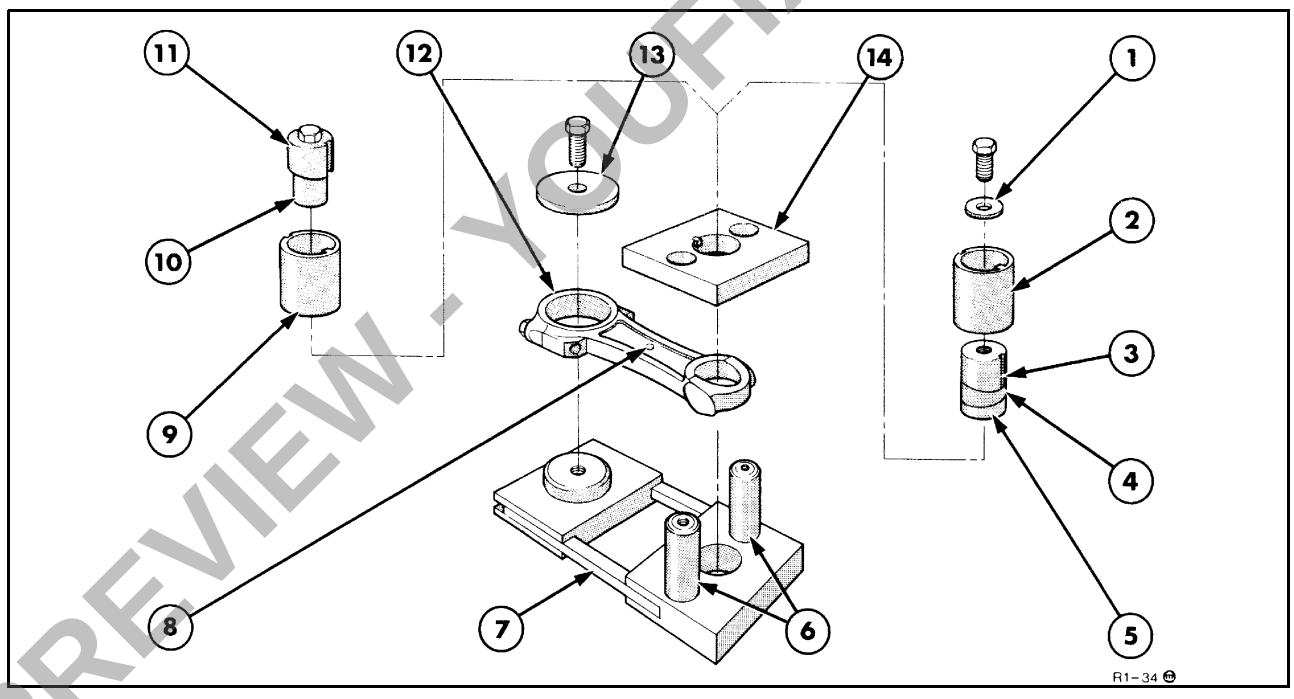
CONNECTING ROD BUSHINGS

Repair

1. If necessary, replace connecting rod bushing. Use Tool No. FNH00053, Figure 47 to press out defective bushing, and press in new bushing. Remove sharp edges and burrs upon completion.

NOTE: *When installation a new bushing on the smaller end of the connecting rod, position the slot in the bushing at a right angle to the center line of the connecting rod.*

NOTE: *Change connecting rods as a matched set.*



47

Connecting Rod Bushing Installation

1. Washer
2. Collar
3. Installation Insert 1
4. Bushing
5. Installation Insert 2
6. Pins
7. Fixture
8. Connecting Rod Facing Up
9. Remover Insert 1
10. Remover Insert 2
11. Remover Insert 3
12. Connecting Rod Location
13. Washer
14. Location Plate

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SECTION 10 - ENGINE

Chapter 3 - Air Cleaning System

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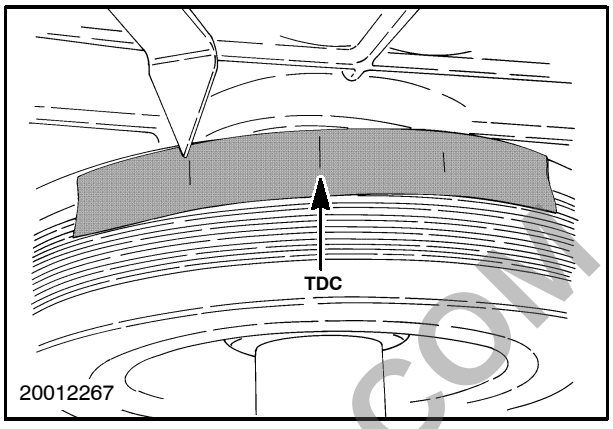
21. Measure the distance between the two points using a mechanic's ruler. Divide the distance by two and measure this distance from either mark toward the center. Mark the tape at this point, Figure 69.

    For example:

    Distance between the two points where the piston hit the piston position tool = 41.0 mm (1.61 in)

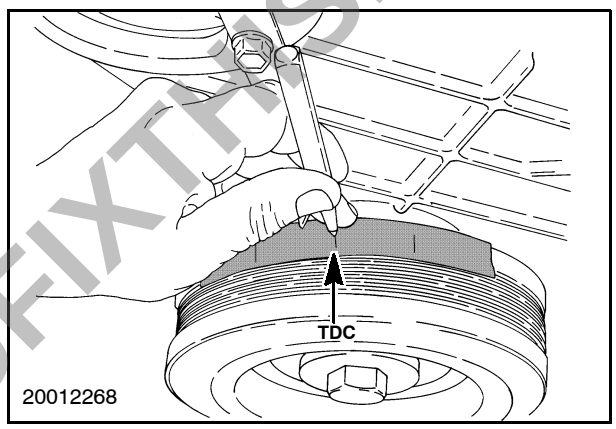
    41.0 mm (1.61 in) divided by 2= 20.5 mm (0.81 in)

    So, you would measure 20.5 mm (0.81 in) from one of the points toward the center and mark the tape. This is TDC.



69

22. Mark the TDC point on the flywheel pulley with a punch, Figure 70.



70

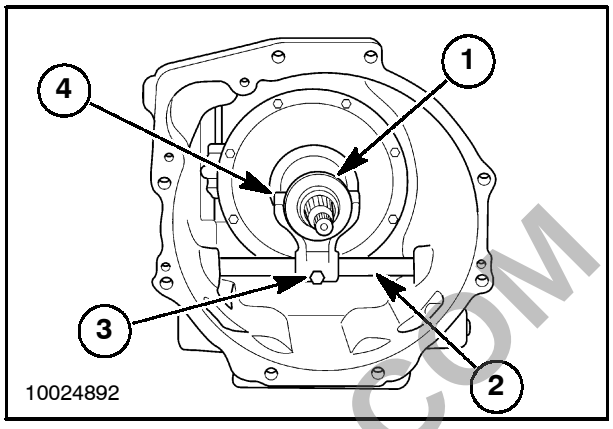
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CLUTCH RELEASE BEARING

DESCRIPTION

Standard agricultural tractors incorporate a pre-lubricated clutch release bearing. The optional heavy-duty clutch assembly features an external greaser, mounted on the front end of the transmission housing, connected to the release-bearing hub by a flexible tube.



3

OVERHAUL

Removal

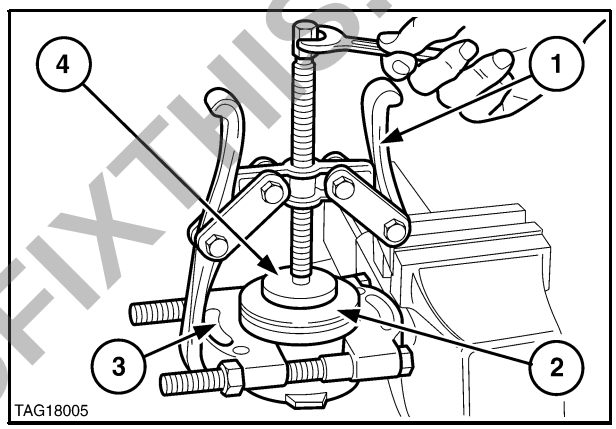
1. Separate the engine and front axle from the front transmission.
2. Disconnect the front end of the clutch control rod by removing the split pin and clevis pin. For models with an external greaser, disconnect the flexible tube from the release-bearing hub.
3. Remove the retaining bolt (3), securing the clutch release shaft fork (2), to the shaft (4), Figure 3.
4. Support the fork and release bearing hub assembly, and extract the release shaft.

NOTE: *Remove the left-hand steps to facilitate removal of the release shaft, on models with a cab.*

5. Remove the fork, and withdraw the release bearing assembly (1), Figure 3.

IMPORTANT: *Do not attempt to remove the bearing from the hub on models with an external greaser. Perform servicing as a complete assembly.*

6. For models without an external greaser, use Bearing Puller Attachment (3), Tool No. FNH 09190 and the "Grip-O-Matic" Puller (1), Tool No. FNH 09198, and a suitable Step Plate (4), to separate the release bearing from the hub (2), Figure 4.



4

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21. Inspect the valve spool bore in the valve body for damage or wear.
22. Inspect the valve spool lands for scratches, wear or other damage. Remove minor burrs or scratches with a fine abrasive material. Clean and dry thoroughly prior to reassembly.
23. Inspect the solenoid for cracks or damage. if any doubt exists as to the serviceability of this component, replace with a new solenoid assembly.

Assembly

Assembly of the direct drive clutch, the underdrive clutch and control valve follows the disassembly procedure in reverse, with the following requirements:

1. Apply a proprietary thread sealant on the pilot valve assembly threads and tighten the nut to a torque of 5.4 N·m (4 ft.-lb.)
2. Ensure the gap of the underdrive clutch retaining snap ring is placed in line with the lubrication port of the Dual Command Housing.

PLANETARY GEAR SET SHIMMING PROCEDURE

IMPORTANT: *Perform the planetary gear set shimming procedure after installing a new cover, bearing, ring gear, planetary carrier, sun gear, direct drive clutch or planetary housing.*

A shim located between the bearing and the step on the ring gear shaft, effects free play between planetary housing components.

The free play must be between 0.10-0.51 mm (0.004-0.020 in.). For free play available shims, see Specifications.

Determine the shim required to give the specified free play as follows:

1. Install the sun gear in the inner splines of the direct drive clutch assembly.
2. Place the thrust washer in the planetary carrier and align the splines.
3. Install the planetary carrier and thrust washer onto the sun gear and ensure the splines of the planetary carrier engage with all of the direct drive clutch friction plates.
4. Hold the components tightly together and install the planetary shaft from the rear. Tap the shaft, if necessary, to ensure full engagement.
5. Press the pilot bearing onto the shaft using a sleeve of 41.2 mm (1.62 in.) internal diameter and 47.8 mm (1.88 in.) external diameter.
6. Position the planetary housing (with underdrive clutch installed) on a bench.

NOTE: *Support the planetary housing on blocks so that the rear of the planetary shaft does not contact workbench, when installing the direct drive clutch and planetary gear set.*

7. Place the thrust washer in the housing with the tab up and towards the rear of the transmission.
8. Install the direct drive clutch and planetary gear set assembly in the housing. Ensure the assembly is fully seated in the housing.
9. Install the ring gear and shaft assembly (without the ring gear bearing or shim) in the housing. Place the Ring Gauge, Tool No. FNH01303, on the step of the ring gear shaft.
10. Position the cover on the planetary housing without the gasket.

IMPORTANT: *Ensure proper seating of all components in the housing.*

11. Measure the distance between the face of the cover and the face of the housing at three conveniently spaced intervals. Average the three measurements.

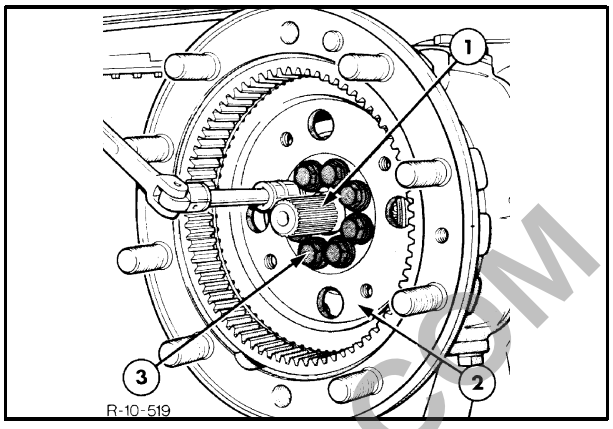
If the average measurement falls between 1.17-1.52 mm (0.046-0.060 in.) the free play is within the required limits and no shims are necessary. If the average measurement is less than the range stated, determine the shim thickness required by referring to the relevant chart listed in Specifications.

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NOTE: *The hub bearings, hub housing, and the swivel stub, are machined to fine limits, eliminating the need for bearing pre-load or rolling resistance adjustments.*

5. Assemble the ring gear and carrier with the retaining rings.
6. Bolt the ring gear and carrier to the swivel assembly, Ensure the correct position of the larger bushing, Figure 16.
7. Tighten the bolts evenly to a torque of 95 N·m (70 ft.-lbs.).

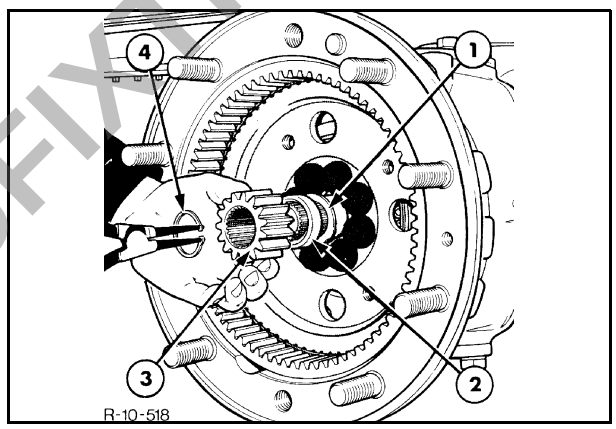


16

Tightening Ring Gear and Carrier Assembly Retaining Bolts

1. Axle Shaft
2. Ring Gear and Carrier
3. Retaining Bolts

8. Install the thrust washer, spacer, sun gear and a new snap ring, Figure 17.
9. Coat the mating surfaces of the planetary carrier and the hub with a suitable sealant.

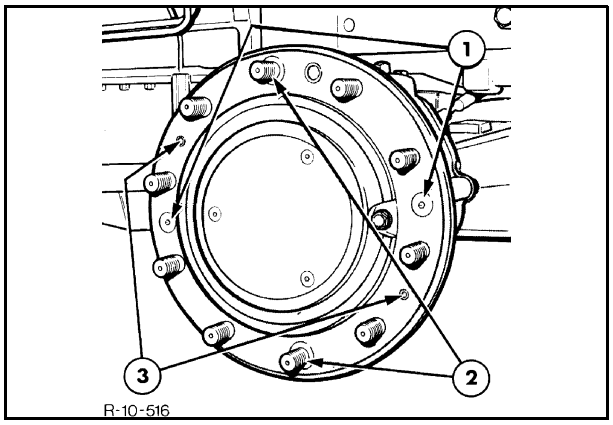


17

Installing Sun Gear Components

1. Thrust Washer
2. Spacer
3. Sun Gear
4. Snap Ring

10. Install the thrust pad in the center of the carrier assembly and position the carrier on hub. Install the two 8 mm socket screws and tighten to a torque of 80 N·m (59 ft.-lbs.).
11. Install the two shouldered wheel studs and tighten to a torque of 70 N·m (52 ft.-lbs.), Figure 18.
12. Install the drain plug and replenish hub with oil.



18

Installing Planetary Carrier Retainers

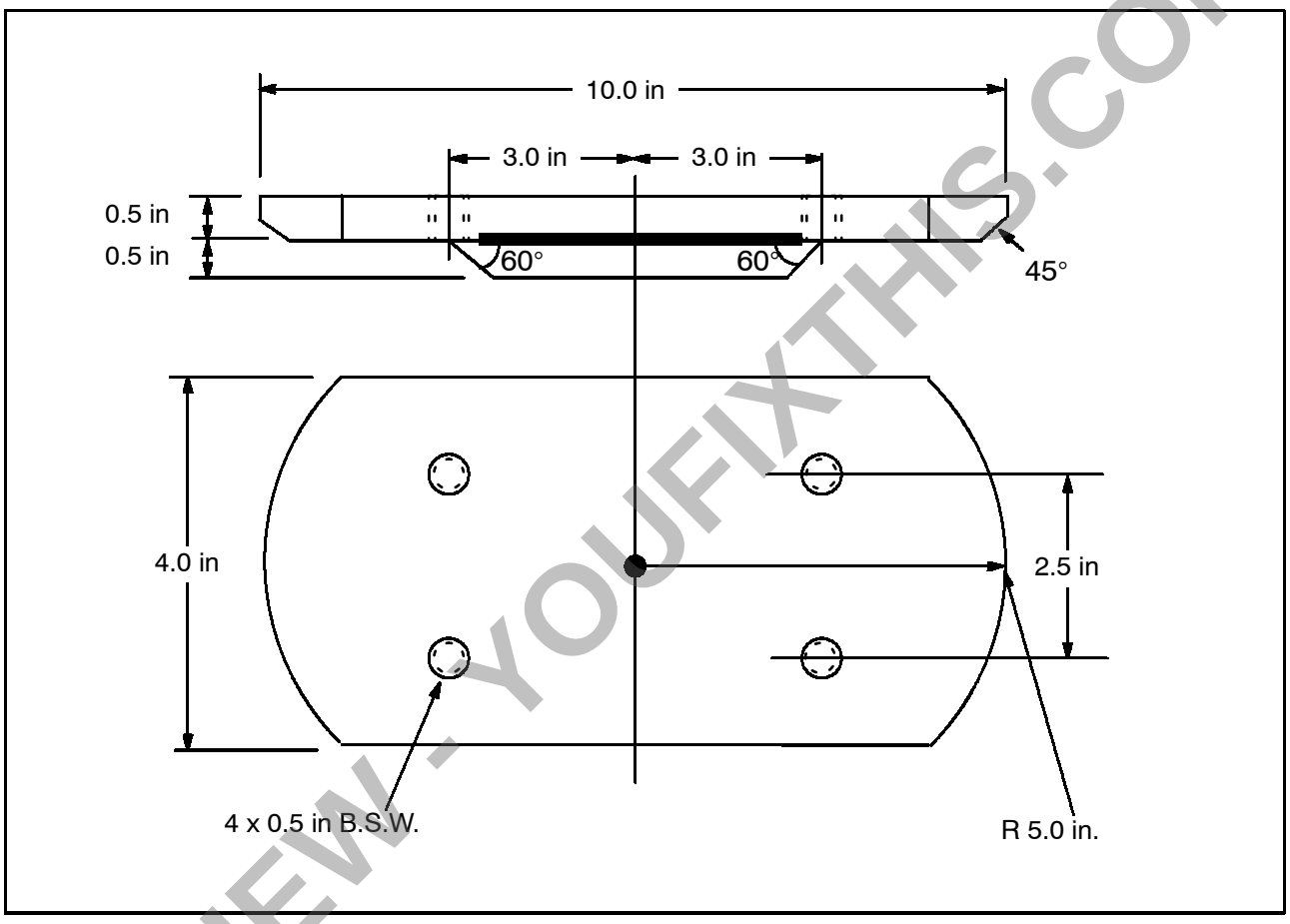
1. Socket Screws
2. Shouldered Studs

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B. Position the axle housing under a hydraulic press with the ball end of the housing downward. Insert a bar between the Special Tool No. SW6 and the press ram. Press the ring gear out.

C. Install a new ring gear with the bell end of the axle housing up. Press the ring gear in, until completely seated and no gap exist between bottom of the gear and the housing shoulder.



15

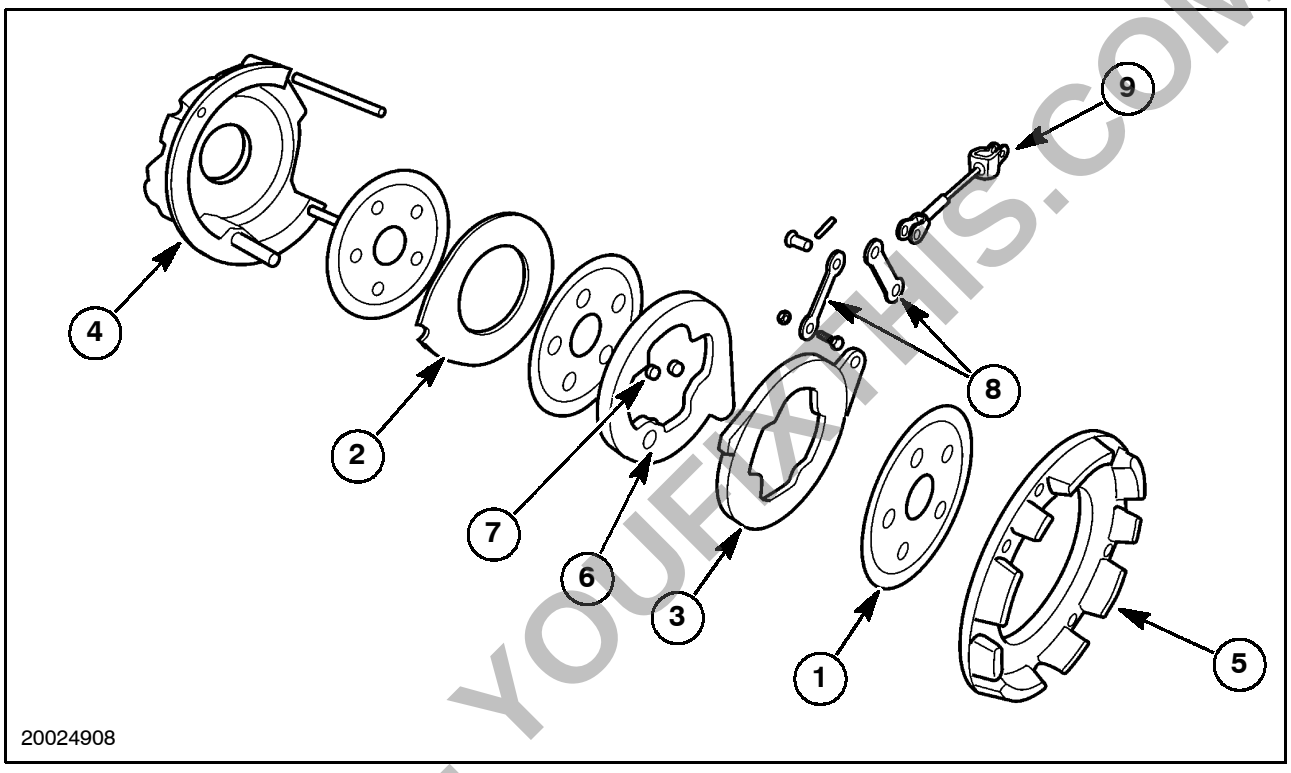
Ring Gear Removal Adaptor Plate

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DESCRIPTION AND OPERATION

The standard braking system consists of two mechanically operated brake assemblies installed in the left and right rear axle housings. Brake pedals transmit input to the brake assemblies via mechanical linkage. A T-handle and ratchet assembly locks the pedals for parking and emergency stopping.



1

Brake Assembly

1. Brake Disc
2. Intermediate Disc
3. Actuating Disc
4. Inner Brake Housing
5. Outer Brake Housing
6. Ball
7. Spring
8. Actuating Links
9. Brake Actuating Rod

Rear Brake Assemblies

The brake assembly contains brake discs (1) with an internal spline, intermediate discs (2), and a two-disc actuating assembly (3). In addition, the brake assembly splits to an inner (4) and outer (5) housing, Figure 1.

The actuating assembly discs incorporate ramp pockets in which steel balls (6) ride during the braking process. Springs (7) hold the actuating discs together, and two links (8) connect the actuating rod (9) to the actuating assembly, Figure 1.

The left brake pedal connects to the left actuating rod by way of a cross-shaft and lever. The right brake pedal connects to the right actuating rod via an attachment on the shaft of the right pedal assembly.

When the bake pedals are depressed, rotation of the actuating assembly discs relative to one another cause the steel balls to ride up the disc ramps, forcing the actuating discs apart.

Upon moving apart, the actuating discs force the brake discs against the brake housing, providing a braking action on the intermediate shaft.

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Inspection and Repair

1. Clean all components in a suitable solvent. Allow parts to dry.
2. Inspect bushings and bearing blocks for wear or damage. Check for blocked lubrication scrolls in the bushings. Replace the gears and bearing blocks as a matched set if required. DO NOT service separately.
3. Inspect pump gears for wear or damage, particularly the bearing journals, gear teeth and side facings.
4. To ensure maximum pump efficiency, the width of each pair of pump gears must be within 0.005 mm (0.0002 in) of one another, and the journals within 0.013 mm (0.0005 in).
5. Remove light scoring marks on the gear facing areas using a sheet of 'O' grade wet or dry abrasive paper and lubrication on a true flat surface. Polish the area repaired using light pressure in a rotating motion. Polished journals will achieve free movement in the body.
6. Inspect the gear track, embedded during the manufacturing process for the gear teeth, on the suction side of the pump. The track depth must not exceed 0.10 mm (0.004 in), or continue beyond the suction half of the gear aperture. Replace the pump when gear tracks do not fall within specification.
7. Burrs found at the edge of the gear track should be removed with 'O' grade emery paper.
8. Inspect the pump cover for damage or cracks, particularly adjacent to the inlet and outlet ports, filter connection and pump face. Check internal passages for blockage.
9. Any component found unserviceable should necessitate replacing the pump assembly. If in an emergency, worn components are replaced individually, note the following points:
    - The installation of new bearings will re-center the gears and prevent the tips of the gear teeth from bottoming, if continuing to use a pump body where the track is out of specifications. Thereby resulting in pump inefficiency.
    - Under working conditions, hydraulic pressure within the pump loads the gears towards the inlet side of the pump body. Continued use of worn bearing and gear journals causes the gears to shift, thus deepening the gear track in the pump body.

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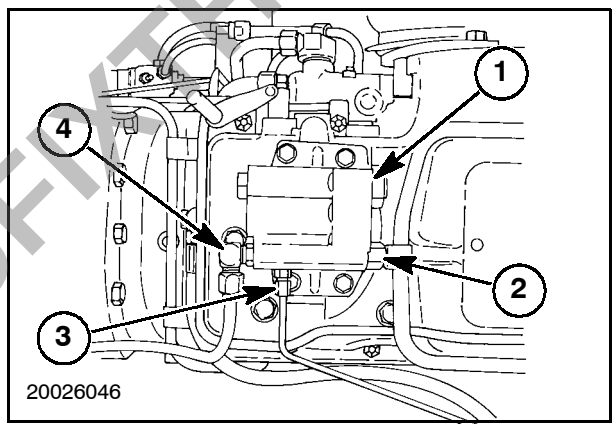
HYDRAULIC LIFT COVER - OVERHAUL

Removal

1. Place lift arms in the lowest position.
2. Remove the cotter pin and clevis pin from both lift arms. Remove left and right-hand lift rods.
3. Remove the top link and disconnect the lift linkage.
4. Remove the clips and clevis pin securing the draft control main spring yoke to the rocker and swing the rocker away from the yoke.
5. Disconnect the control levers from the remote valve(s) by removing cotter pins.
6. Disconnect and remove the remote valve(s), support bracket and tubing.
7. Remove the oil cooler feed tube in front of the hydraulic lift cover.
8. Disconnect the remote feed (2), pilot line (3) and auxiliary feed (4) tubing from the priority valve pack (1). Plug and cap all exposed ports and connections.
9. Remove the retaining bolt and support bracket for the rear transmission dipstick.
10. Remove seat retaining bolts and seat assembly.

NOTE: *If overhauling or removing the lift cylinder loosen the lift cylinder retaining bolts before removing the lift cover. Do not remove the lift cylinder bolts completely.*

11. Clean the lift cover before removing to prevent contamination.
12. Remove the retaining bolts, and lift the cover clear of the rear axle center casing. Support the cover with the internal linkage facing upward. DO NOT let the assembly rest on any of the controls.

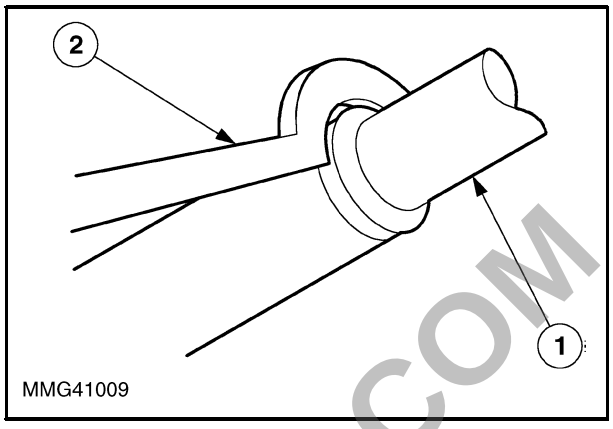


3

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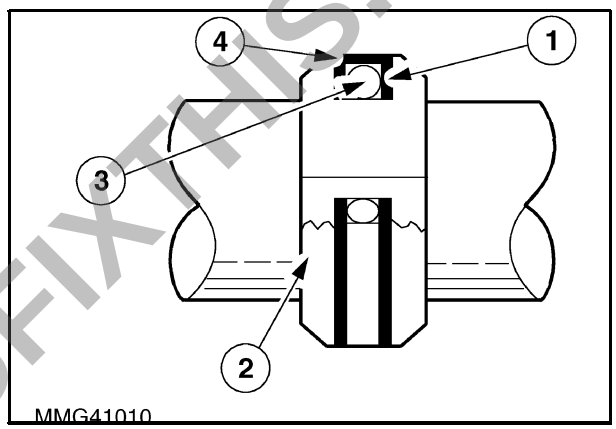
5. Using a suitable spanner wrench (2) as shown in Figure 34, unscrew the extension tube (1) and gland assembly.
6. Remove the gland and piston rod assembly from the cylinder.
7. Remove and discard O-rings and seals.



34

Inspection

1. Wash all components in a suitable solvent. Allow parts to dry.
2. Inspect all parts for obvious damage and wear. Replace defective components.
3. Inspect ball joints for looseness.



35

Assembly

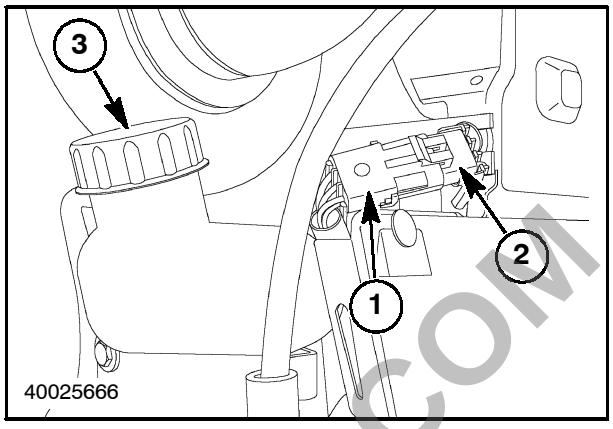
1. Install new O-ring (3), piston seal (4) and wear ring (1) onto piston (2), Figure 35.

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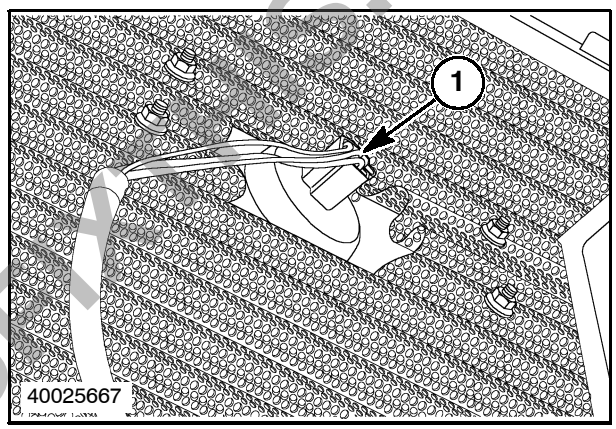
Grille Mounted Headlamp Harness - Description and Location

The grille mounted headlamp harness (1) connects to the front-main harness (2) to form connector C1 behind the coolant overflow tank (3), in front of the radiator, Figure 1.



1

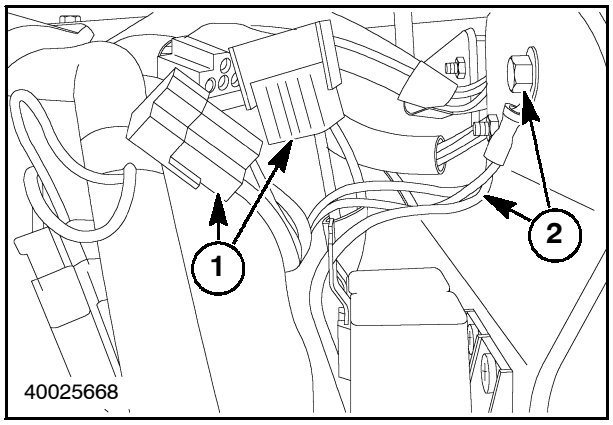
The harness connects to each headlamp assembly (1), at the back of the grille, Figure 2.



2

Front-Main Harness - Description and Location

The front-main harness begins at two multi-connector plugs (1), located forward of the main fuel tank. The connectors attach to the rear main-harness to form connectors C2-A and C2-B. In addition, a ground wire (2) connects to the rear support assembly, Figure 3.



3

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Table 4
Emissionized Engine (with added Fuel Pump Harness after July 1999)
Includes Electronic Tachometer Instrument Cluster

Fuse No.	Rating	Color	Circuit
1	15 A*	Blue	Horn
2	5 A	Orange	Fuel Shut-off Relay
3	Not Used		
4	7.5 A	Brown	Lights Switch
5	15 A	Blue	Headlamps HIGH
6	10 A	Red	Headlamps LOW
7	7.5 A*	Brown	Instruments/Gauges
8	7.5 A	Brown	Accessories

(Items changed in July 1999 marked with asterisk)

Table 5
Emissionized Engine and Non-Emissionized Engine with Changes Incorporated in 1997

Fuse No.	Rating	Color	Circuit
1	7.5 A*	Brown	Horn*
2	10 A	Red	Fuel Shut-off Relay*
3	Not Used*		
4	7.5 A*	Brown	Lights Switch*
5	15 A*	Blue	Headlamps HIGH*
6	10 A	Red	Headlamps LOW*
7	5 A*	Orange	Instruments/Gauges*
8	7.5 A*	Brown	Accessories*

(Items changed in 1997 marked with asterisk)

Table 6
Non-Emissionized Engine

Fuse No.	Rating	Color	Circuit
1	10 A	Red	Accessories
2	10 A	Red	Horn, Fuel Shut-off Relay
3	10 A	Red	Headlamps LOW
4	10 A	Red	Headlamps HIGH
5	10 A	Red	Tail Lights
6	10 A	Red	Instrument Panel Lights
7	15 A	Blue	Lights Switch
8	10 A	Red	Instruments/Gauges

Replacing Fuses

IMPORTANT: *Do not replace blown fuse with another of a different rating.*

1. To remove fuse, firmly grasp fuse and pull directly out. Install a new fuse by pushing the fuse evenly into the fuse box until fully seated.

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