TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphities, Molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs



Size	Pound-Inches	Newton metres
1/4 inch	108 to 132	12 to 15
5/16 inch	204 to 252	23 to 28
3/8 inch	420 to 504	48 to 57
Size	Pound-Feet	Newton metres
7/16 inch	54 to 64	73 to 87
1/2 inch	80 to 96	109 to 130
9/16 inch	110 to 132	149 to 179
5/8 inch	150 to 180	203 to 244
3/4 inch	270 to 324	366 to 439
7/8 inch	400 to 480	542 to 651
1.0 inch	580 to 696	787 to 944
1-1/8 inch	800 to 880	1085 to 1193
1-1/4 inch	1120 to 1240	1519 to 1681
1-3/8 inch	1460 to 1680	1980 to 2278
1-1/2 inch	1940 to 2200	2631 to 2983

Grade 8 Bolts, Nuts, and Studs



Size	Pound-Inches	Newton metres
1/4 inch	144 to 180	16 to 20
5/16 inch	288 to 348	33 to 39
3/8 inch	540 to 648	61 to 73
Size	Pound-Feet	Newton metres
7/16 inch	70 to 84	95 to 114
1/2 inch	110 to 132	149 to 179
9/16 inch	160 to 192	217 to 260
5/8 inch	220 to 264	298 to 358
3/4 inch	380 to 456	515 to 618
7/8 inch	600 to 720	814 to 976
1.0 inch	900 to 1080	1220 to 1465
1-1/8 inch	1280 to 1440	1736 to 1953
1-1/4 inch	1820 to 2000	2468 to 2712
1-3/8 inch	2380 to 2720	3227 to 3688
1-1/2 inch	3160 to 3560	4285 to 4827

NOTE: *Use thick nuts with Grade 8 bolts.*

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LUBRICATION & MAINTENANCE CHART model RG 140.B

HOURS	SERVICE POINTS	ITEM	POINTS	SERVICE INTERVAL (hours)				
				CHECK	CHANGE	LUBRICATE	ADJUST	CLEAN/DRAIN
As needed	Air cleaner (Note 1)	1		★				
	Hydraulic filter (Note 2)	2		★				
	Alternator / Air conditioner belt	3		★				
10h or daily	Engine oil level (including filters)	4	1	10				
	Radiator (coolant level) (Note 3)	5	1	10				
	Transmission oil level (warm, engine running)	6	1	10				
50h or weekly	Hydraulic tank (complete system)	7	1	50				
	Fuel filters / separator filter (drain water)	8	2	50				
100h or each 15 days	Blade lift cylinder pivots	9	2			100		
	Side shift cylinder pivots	10	2			100		
	Drawbar pivot and socket	11	1			100		
	Front axle pivot	12	2			250		
	Articulation pivots	13	2			100		
	Articulation cylinders pivots	14	4			100		
	Moldboard lift cylinders balls	15	2			100		
250h or monthly	Engine oil and oil filter	16	1		250			
	Universal joints and drive shaft	17	2			250		
	Differential and planetary drives oil level (Note 4)	18	3			250		
	Circle turn gear housing	19	1			250		
	Alternator and ar conditioning belts	20	2	250				
	Moldboard adjusting link ends	21	4	250				
	Moldboard side shift link ends	22	2			250		
	Front wheel lean link and knuckle pivot	23	8			250		
	Front axle spindle pivot	24	2			250		
	Front wheel lean cylinder	25	2			250		

NOTE: *See "FLUIDS AND LUBRICANTS" table on previous pages for lubricants and fluids detailed specifications and capacities.*

NOTE 1: *Service the air filter elements if air filter restriction indicator is in the red area.*

NOTE 2: *Service the hydraulic filters if hydraulic filter indicator lamp iluminates.*

NOTE 3: *Check the radiator coolant level if the coolant level warning lamp iluminates.*

NOTE 4: *Change the rear axle oil after the first100 hours of operation.*

NOTE 5: *Change the transmission oil and replace the filter after the first100 hours of operation.*

NOTE 6: *Contact your dealer and see the service manual.*

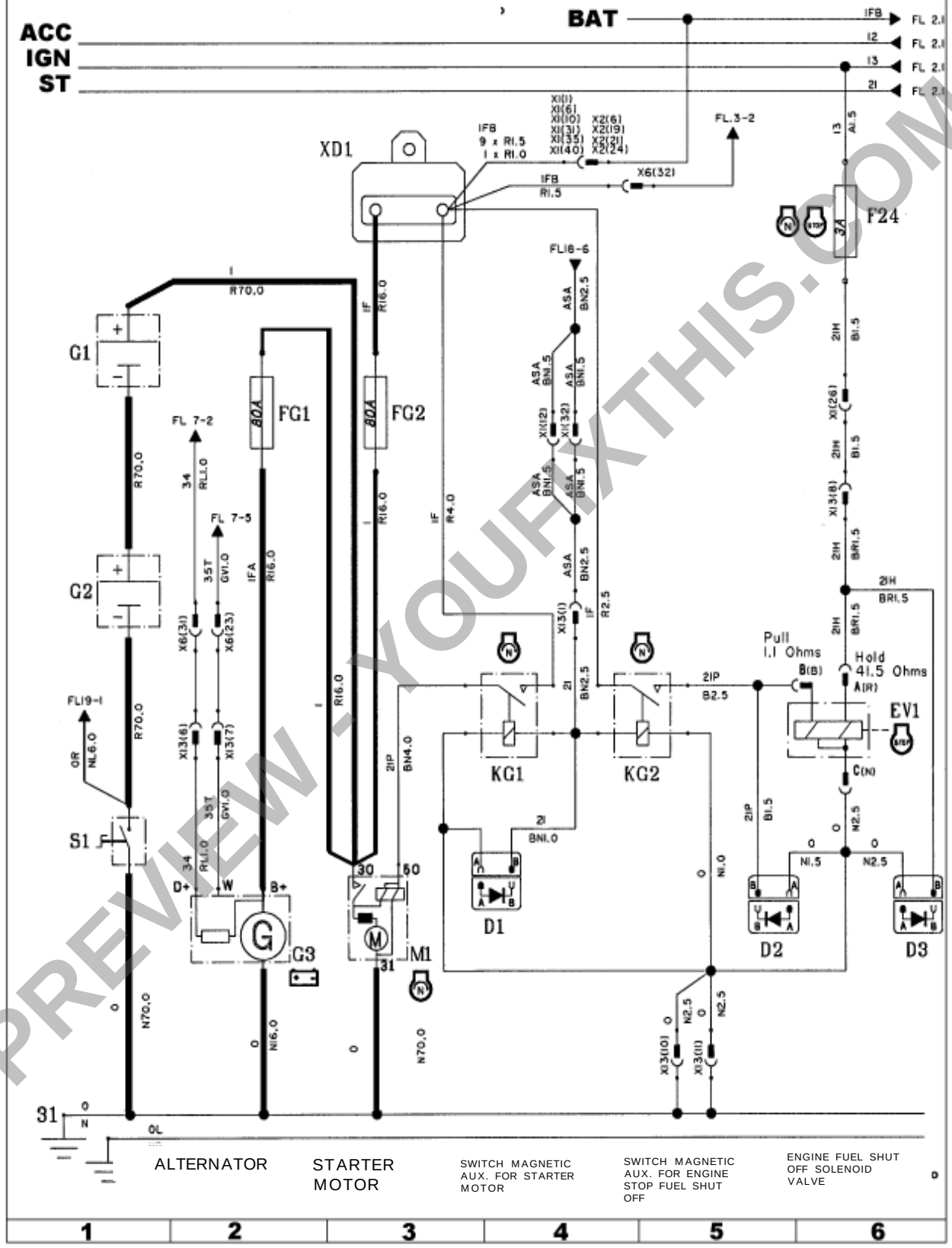
NOTE 7: *Change every 2.000 hours or once a year, whichever comes first.*

★: *As needed*

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CHARGING GUIDE FOR BATTERIES OTHER THAN MAINTENANCE FREE BATTERIES

Recommended Rate* and Time for Fully Discharged Battery

Battery Capacity - See Reserve Capacity under Specifications	Slow Charge	Fast Charge
80 Minutes or Less	10 Hours at 5 Amperes 5 Hours at 10 Amperes	2.5 Hours at 20 Amperes 1.5 Hours at 30 Amperes
Above 80 to 125 Minutes	15 Hours at 5 Amperes 7.5 Hours at 10 Amperes	3.75 Hours at 20 Amperes 1.5 Hours at 50 Amperes
Above 125 to 170 Minutes	20 Hours at 5 Amperes 10 Hours at 10 Amperes	5 Hours at 20 Amperes 2 Hours at 50 Amperes
Above 170 to 250 Minutes	30 Hours at 5 Amperes 15 Hours at 10 Amperes	7.5 Hours at 20 Amperes 3 Hours at 50 Amperes
Above 250 Minutes	24 Hours at 10 Amperes	6 Hours at 40 Amperes 4 Hours at 60 Amperes
*Initial rate for standard taper charger		

PREPARING A DRY CHARGED BATTERY FOR USE

1. Remove the caps from the battery.
2. Fill each cell to the top of the separators with electrolyte. This will permit the volume of electrolyte to increase when heated by charging the battery.
3. Install the caps on the battery. If the battery in your machine must have nonspill caps, install the nonspill caps. See Specifications in Section 4002 to find if the battery in your machine must have nonspill caps.
4. Connect a battery charger to the battery.
5. Charge the battery at 30 amperes until the specific gravity is 1.250 or more and the temperature of the electrolyte is at least 15.5°C (60° F).
6. If necessary, fill each cell with electrolyte until the electrolyte is just below split ring at the bottom of the cell opening.

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REPAIR PROCEDURE

REMOVAL & INSTALLATION



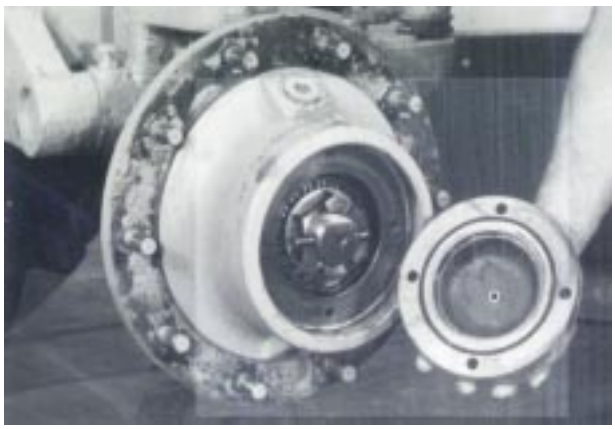
⚠ WARNING

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

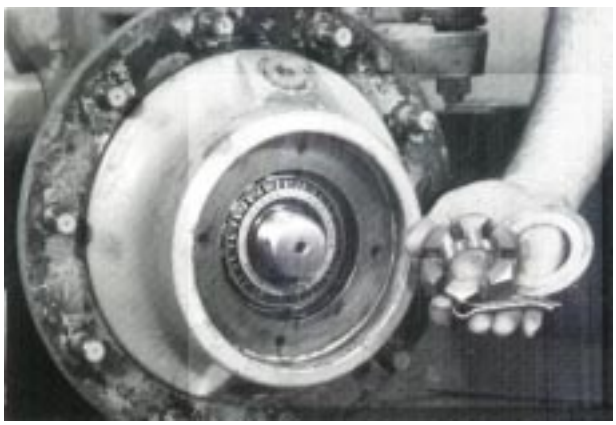


STEP 1
Using a suitable hoist and sling or blade down pressure raise front end of machine. Raise the machine until the tires clear the floor then block

STEP 2
Remove wheel nuts and tires.

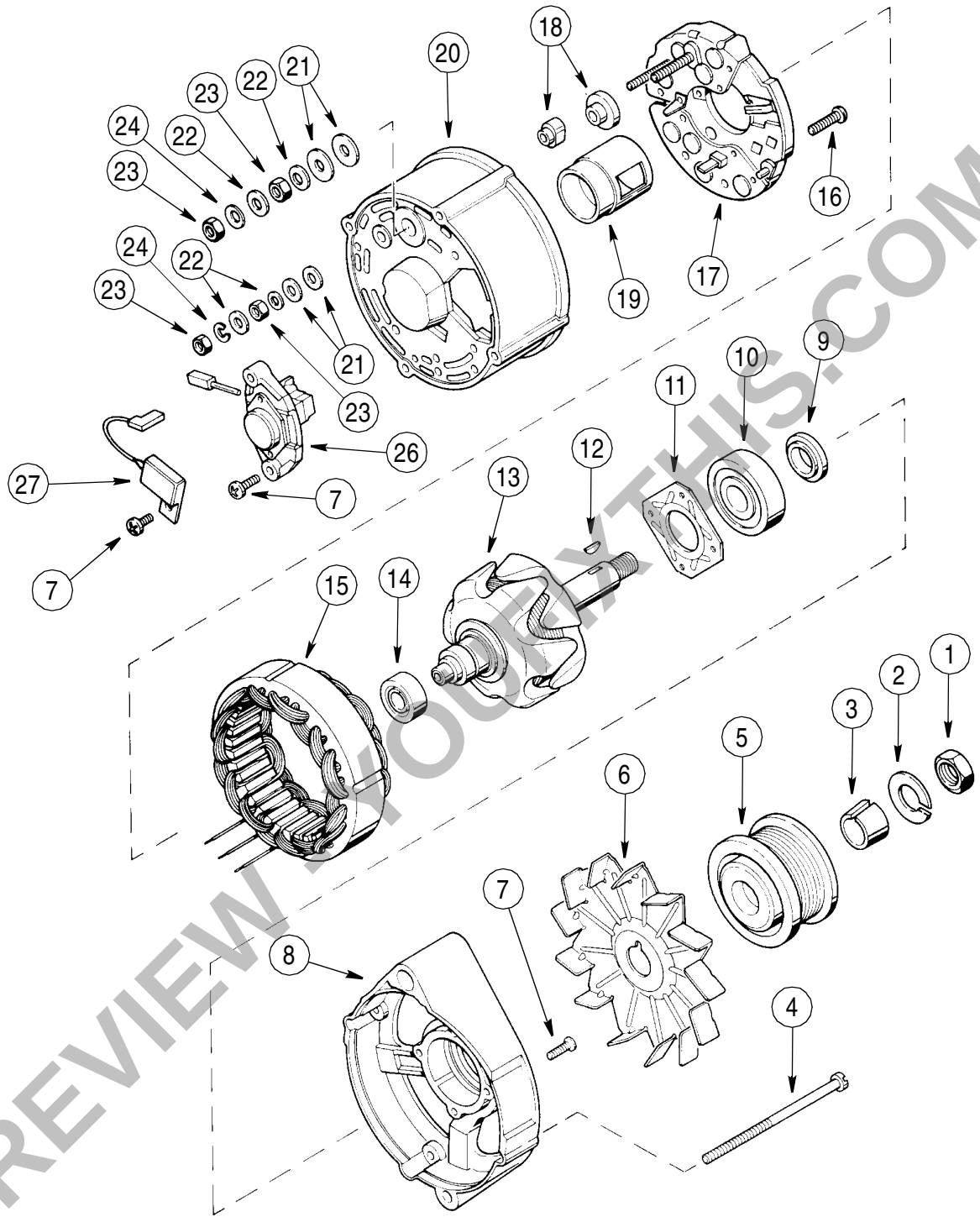


STEP 3
Remove wheel and cover,



STEP 4
Remove cotter pin, nut, and washer from spindle shaft.

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BS01B125

1. NUT
2. WASHER
3. RETAINER
4. SCREW
5. PULLEY
6. FAN
7. SCREW
8. COVER
9. SPACER
10. FRONT BEARING
11. BEARING RETAINER
12. KEY
13. ROTOR
14. REAR BEARING
15. STATOR
16. SCREW
17. RECTIFIER BRIDGE
18. INSULATOR
19. SHIELD
20. HOUSING
21. FIBER WASHER
22. FLAT WASHER
23. NUT
24. LOCK WASHER
25. BRUSH
26. VOLTAGE REGULATOR AND BRUSH HOLDER
27. CAPACITOR

45 AMPERE ALTERNATOR

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RG 140.B - RG 170.B - RG200.B GRADERS
Service Manual
75314236

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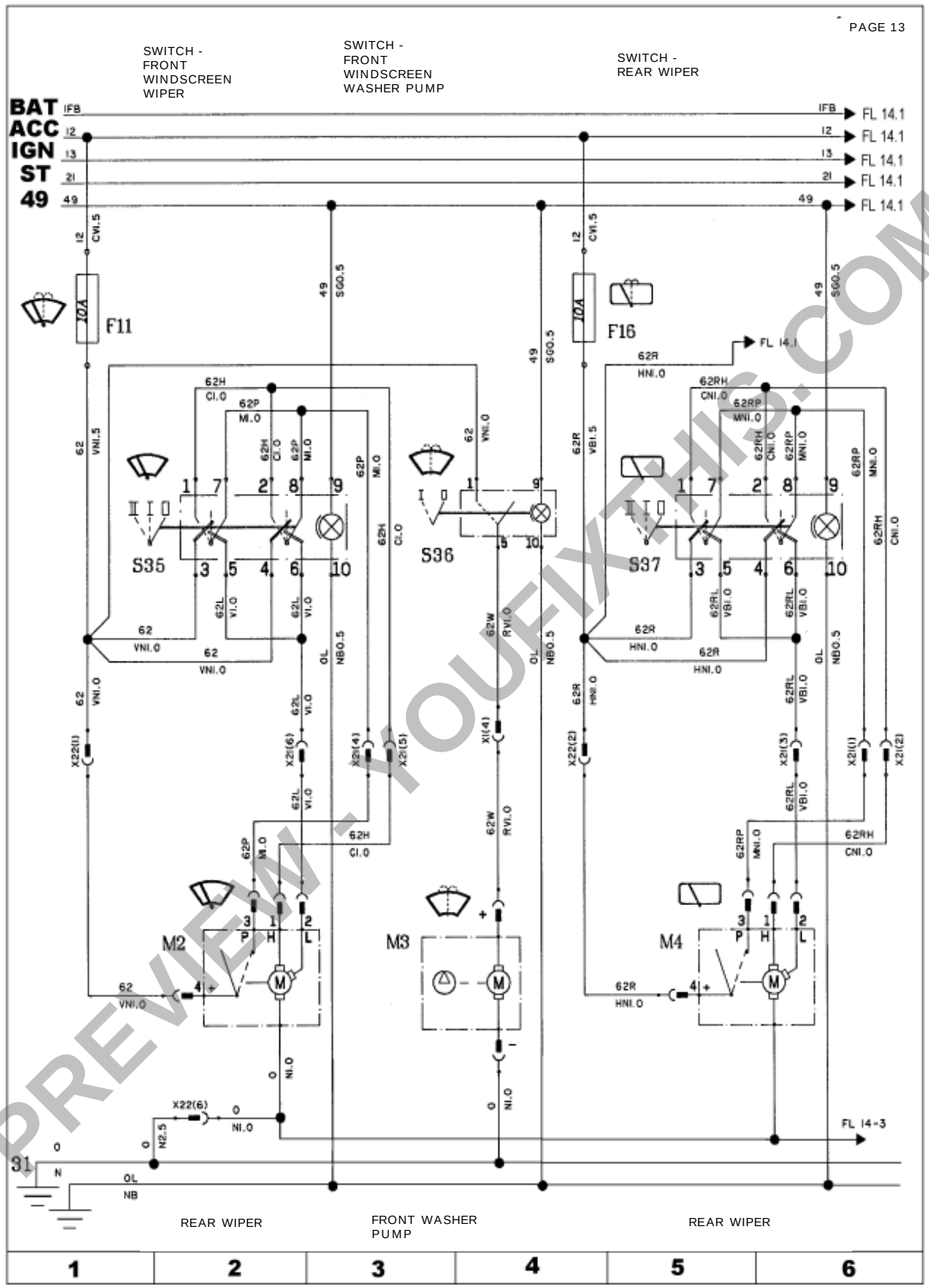
CHARGE AIR COOLER SYSTEM

Specifications

MAKE/MODEL:	DENSO
TYPE:	Air to air; aluminum herringbone tube and fin; cast aluminum tanks
CORE SIZE	27.6 High x 8.3 wide x 5.7 (700 x 211.2 x 144)
CORE DESCRIPTION:	Rows: 2 Tube spacing: 10 per row Fin spacing: 13 fins per inch

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TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	TEST	SOLUTION
Wheel lean fails to function	Wheel lean safety bolt installed Control valve malfunction Wheel lean link frozen or seized Damaged hydraulic cylinder Damaged hydraulic hose	Observation Conduct pressure test Observation Conduct pressure test Observation	Remove bolt Repair valve if pressure incorrect Free link joint Replace Replace
Front wheels will not remain in desired position	Leaking control valve Leaking hydraulic cylinder Hydraulic lines or joints leaking	Conduct pressure test Observation	Repair valve if pressure incorrect Repair hydraulic cylinder Repair or replace
Front wheels wobble	Improper toe-in Rims improperly installed on wheel Wheel bearing loose Steering arm loose Spindle bearing loose Drag link damage	Observation Observation Observation Observation Observation Observation	Correct toe – in Straighten rim or wheel Adjust wheel bearings Tighten nut Adjust bearing Repair
Hard to steer in either direction	Low air pressure in front tires Steering links Improper toe-in Malfunction in power assist hydraulic system Damaged wheel lean link Axle pivot pin and bushing worn	Observation Conduct pressure test	Inflate to proper pressure Repair Adjust toe-in Insure pressure is correct Repair or replace Replace
Excessive free play in steering wheel	Worn drag link socket or swivel joints Loose wheel or spindle bearing Damaged or worn power steering Loose steering arm		Repair or replace Adjusting bearings Repair or replace Adjusting bearings
Improper caster in front wheels	Worn or loose spindle bearing Wheel bearings loose Bent wheel lean link Knuckle bushing or pin worn		Replace bearing and / or adjust shims Adjust bearings Straighten link or replace Replace
Uneven or abnormal tire wear	Tires over or under inflated Misalignment of tires		Inflate to specified pressure Correct alignment

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THEORY OF OPERATION HYDRAULIC SYSTEM

Oil is picked up by the transmission charge pump from the transmission sump through a suction screen. It travels through an external suction tube to the inlet side of the charge pump. The charge pump is an external gear pump with fixed clearance end plates and the gear shafts supported by bushings. The pump is driven by a gear train directly coupled to the engine and has a displacement such that it pumps 25 to 27 gpm at engine high idle speed.

From the pump the oil is directed to a filter assembly. The filter head has an internal bypass valve that bypasses oil to a dedicated port when the pressure drop across the filter element exceeds 60 psi. Bypassed oil is directed to the lube system and back to the transmission sump, not to the proportional control valves. The filter head also contains a pressure switch that can be used to alert the operator of nearing bypass conditions. This switch actuates at a pressure drop across the filter element of 50 psi.

Filtered oil from the filter assembly is directed to the valve body located on the transmission. The flow of oil is available for the proportional control valves and clutch transmission. The flow of oil is available for the proportional control valves and clutch engagement. The pressure in the system is controlled by the main regulator valve and is regulated to 270 psi at a flow of 27 gpm. A small amount of this flow leaks through the pilot orifices in the proportional control valves and past the seal rings in the shafts when a clutch is engaged. The balance of the flow is dumped by the main regulator valve to the charge circuit controlled by the flow restrictions in the heat exchanger and the lube circuits.

The cooled oil returning to the valve body from the heat exchanger is directed to the lube circuit. An internal manifold in the transmission main case directs the lube oil to the ends of each of the clutch shafts. This oil flow passes through the lube shut-off washers on the engaged clutches and provides the cooling for the clutches. There is also leakage flow to the disengaged clutches to lubricate and cool them and many orifices provide flow to lubricate the bearings on these shafts. After exiting the clutch and bearings on these shafts the oil returns to the transmission sump where it is again picked up by the charge pump. If the pressure in the lube circuit exceeds 45 psi, the lube relief valve opens and dumps the excess flow to the transmission sump. This condition is normal when the transmission is in neutral with all lube shut-off washers closed and the engine is at high idle.

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Diagnostic Code: 166

Probable Cause: Safety FET A failed ON.

Diagnostic Code: 167

Probable Cause: Safety FET B failed OFF.

Diagnostic Code: 168

Probable Cause: Safety FET B failed ON.

Diagnostic Code: 169

Probable Cause: Safety FET C failed OFF.

Diagnostic Code: 170

Probable Cause: Safety FET C failed ON.

Diagnostic Code: 171

Probable Cause: Group one enable high should be low.

Diagnostic Code: 172

Probable Cause: Group two enable high should be low.

Diagnostic Code: 173

Probable Cause: Group three enable high should be low.

Diagnostic Code: 174

Probable Cause: EEPROM checksum error.

Diagnostic Code: 175

Probable Cause Code: Solenoid 11 cannot get up to requested current.

Probable Cause: Open or short to ground in circuit from output pin J3-H2 to return pin J3-H3.

Diagnostic Code: 176

Probable Cause Code: Solenoid 12 cannot get up to requested current.

Probable Cause: Open or short to ground in circuit from output pin J3-J1 to return pin J3-J2.

Diagnostic Code: 177

Probable Cause Code: Solenoid 13 cannot get up to requested current.

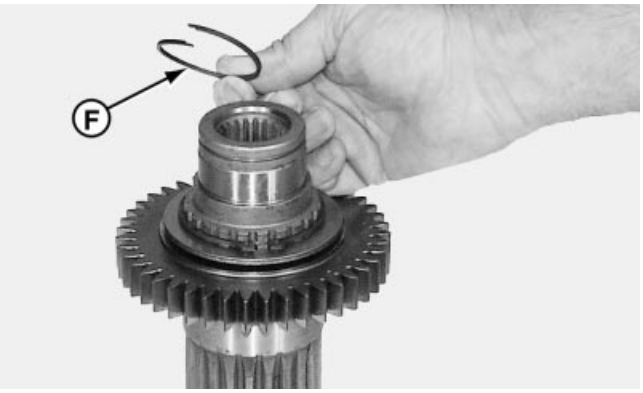
Probable Cause: Open or short to ground in circuit from output pin J3-J3 to return pin J3-K1.

Diagnostic Code: 178

Probable Cause Code: Solenoid 11 cannot drop to requested current.

Probable Cause: Short to positive in circuit from output pin J3-H2 to return pin J3-H3.

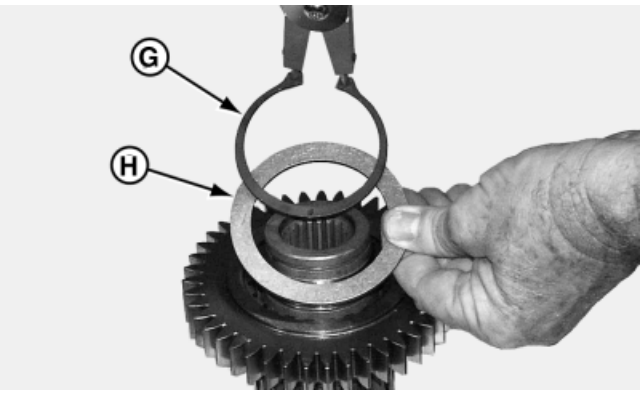
4. Remove and discard seal ring (F).



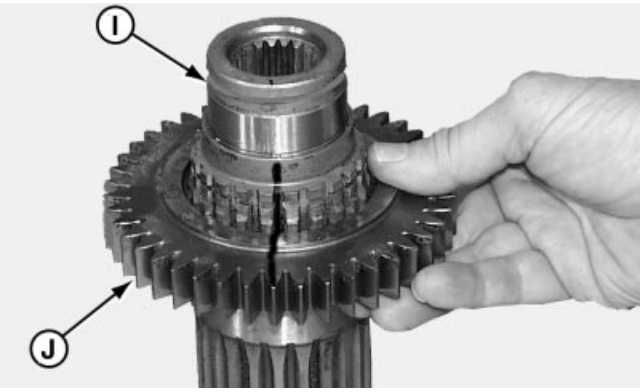
CAUTION: Wear safety glasses when removing or installing snap ring.

5. Remove snap ring (G).

6. Remove thrust race (H).



7. Mark input shaft (I) and gear (J) for reassembly.



8. Remove gear from input shaft.

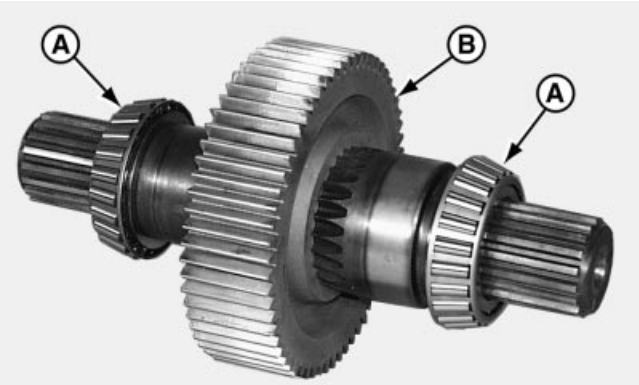
9. Inspect all parts for wear and damage.



DISASSEMBLE OUTPUT GROUP

IMPORTANT: Do not attempt to remove gear from shaft. This is a permanent assembly. Damage to parts will result.

1. Remove bearing cones (A).



Assemble Output Group

1. Install new bearing cones (A).

2. Lubricate two new bearings with clean transmission fluid.

6. Remove cap screw, washer and yoke from output shaft.



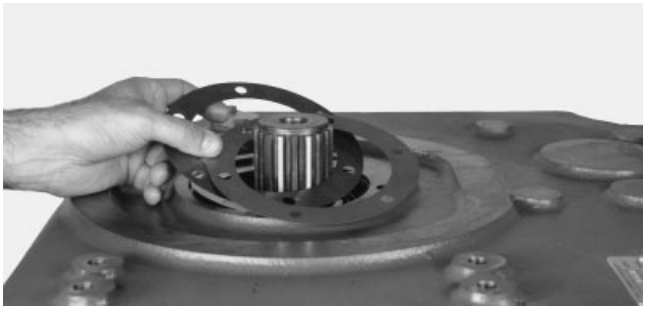
7. Remove bolts from bearing retainer.

8. Remove bearing retainer from rear housing.

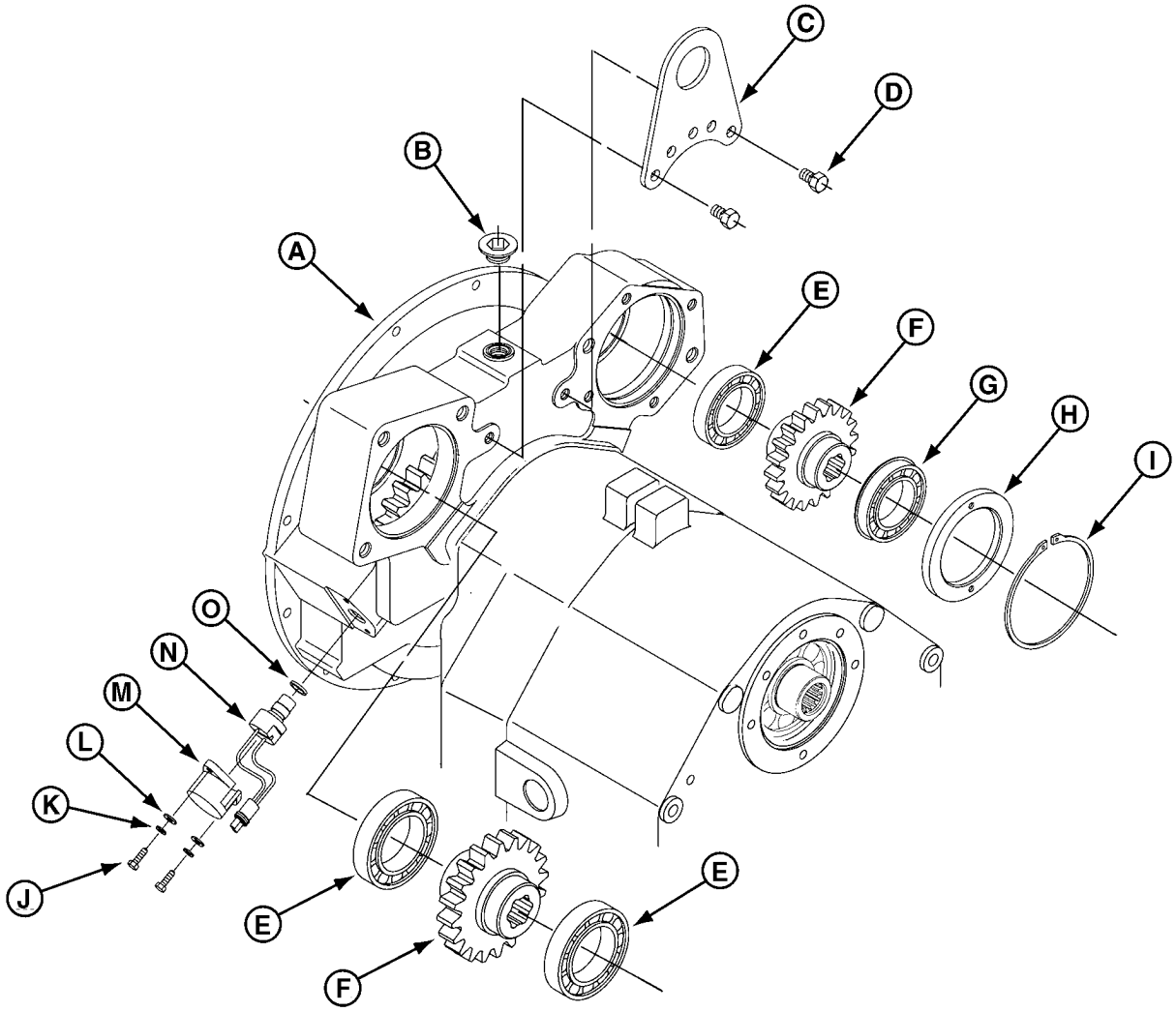


NOTE: Use guide pins for installation of shims and retainer. Shims can be .003 thickness and roll onto retainers outside diameter causing possible leak or damage to o-ring.

9. Remove or install correct amount of shims to reach a 0 ± .051 mm (0 ± .002 in) amount of end play.

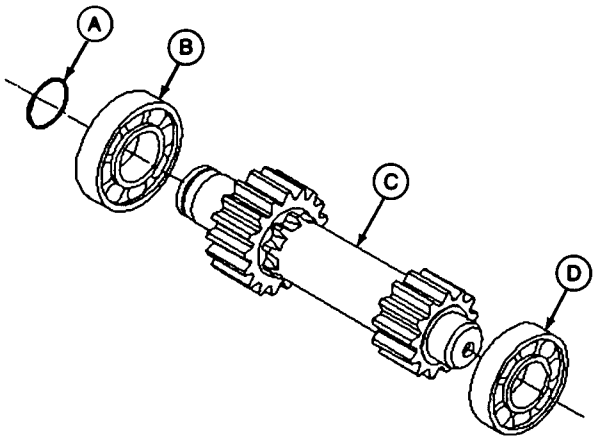


ASSEMBLE INPUT ASSEMBLY



A—Input housing
B—Hex socket plug
C—Lift hanger
D—Cap screw M12x20mm 8.8 (2 used)
E—Bearing (3 used)
F—Driven gear 36T
G—Bearing (with snap ring)
H—Bearing spacer
I—Snap ring
J—Cap screw M6x20mm 8.8 (2 used)
K—Lock washer (2 used)
L—Washer (2 used)
M—Magnetic pickup cover
N—Magnetic pickup sensor
O—O-ring

FIRST STAGE SHAFT ASSEMBLY



A—Seal ring **B—Bearing** **C—First stage shaft assembly** **D—Bearing**

DISASSEMBLE FIRST STAGE ASSEMBLY

1. Remove and discard Seal Ring (A).
2. Remove and discard Bearing (B).
3. Remove and discard Bearing (D).
4. Inspect first stage shaft assembly (C).

ASSEMBLE FIRST STAGE ASSEMBLY

NOTE: Press only on inner race of bearing.

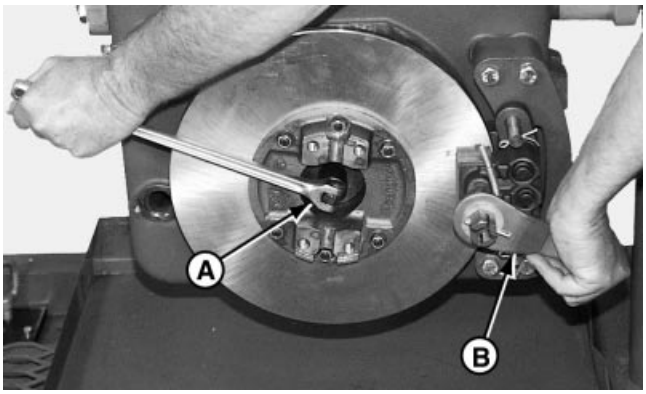
1. Install new bearing (B).
2. Install new bearing (D).

NOTE: Refer to Sizing Seal Rings in this group.

3. Install new seal ring (A).

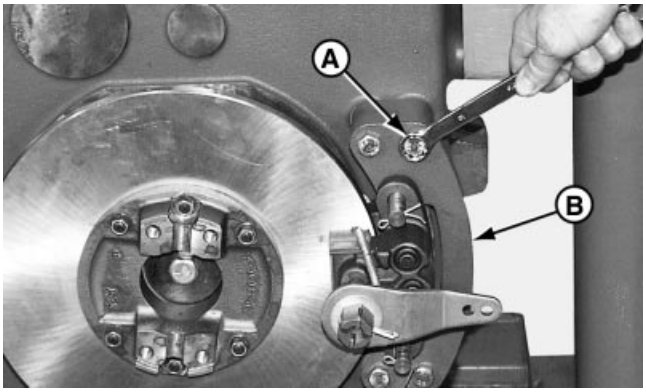
DISASSEMBLE DISC BRAKE

1. Loosen cap screw (A) to keep output shaft from turning.



2.Remove four cap screws (A).

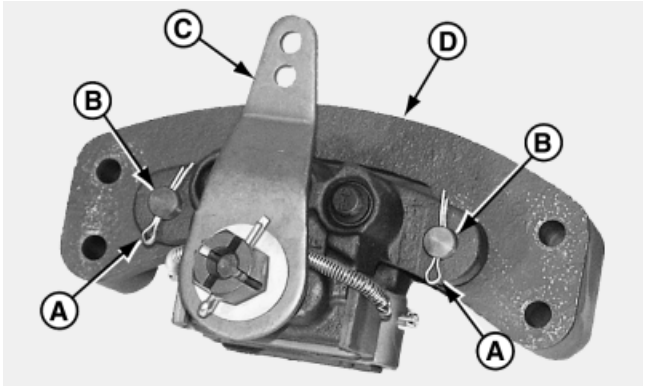
3.Remove caliper assembly and brake bracket (B) as a group.



4. Remove two cotter pins (A).

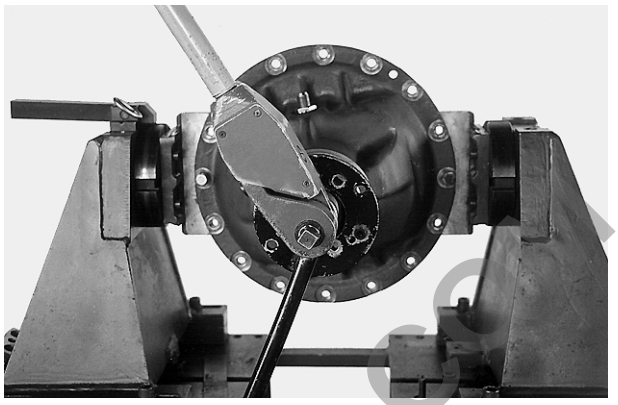
5. Remove two mount pins (B).

6. Remove caliper assembly (C) from brake bracket (D).



STEP 48

Straighten lock ring notches on pinion nut collar, then position reaction tool on drive flange to unlock nut, remove pinion nut.



STEP 49

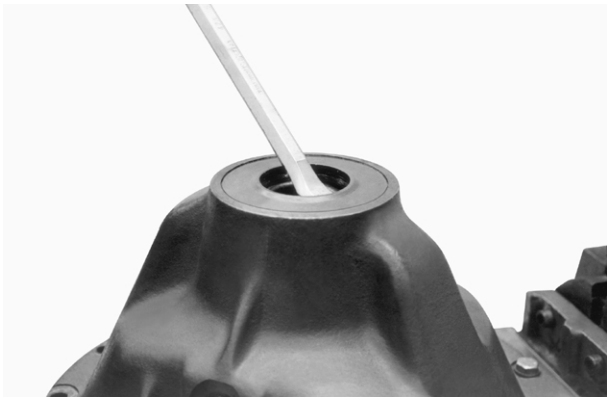
Remove drive flange from pinion shank.

Remove bevel pinion from differential support, hammer pinion shank by a proper punch, taking care not to damage threads.



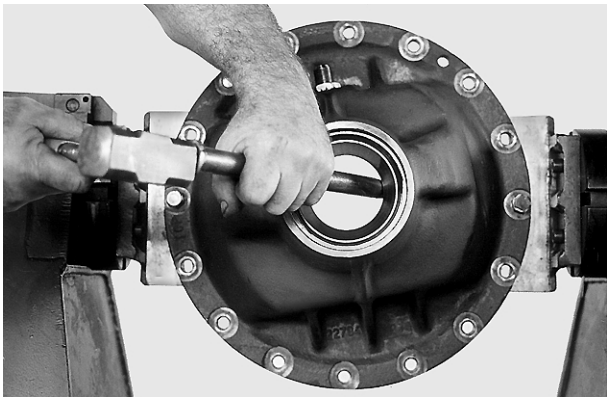
STEP 50

Pry off oil seal from differential support.



STEP 51

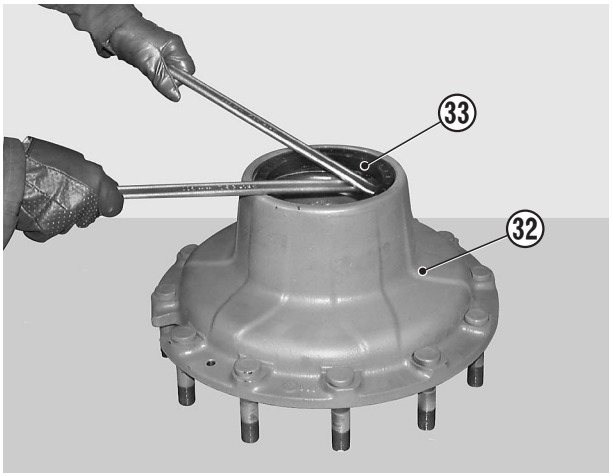
Remove outer races of outer and inner pinion bearings.



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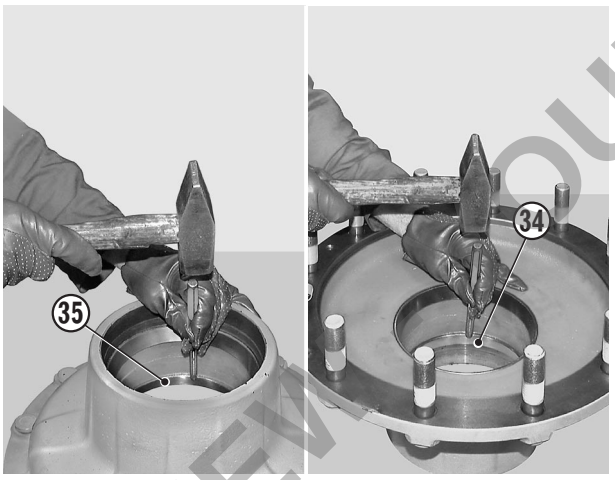
STEP 125
Remove sealing ring (33) from hub (32).



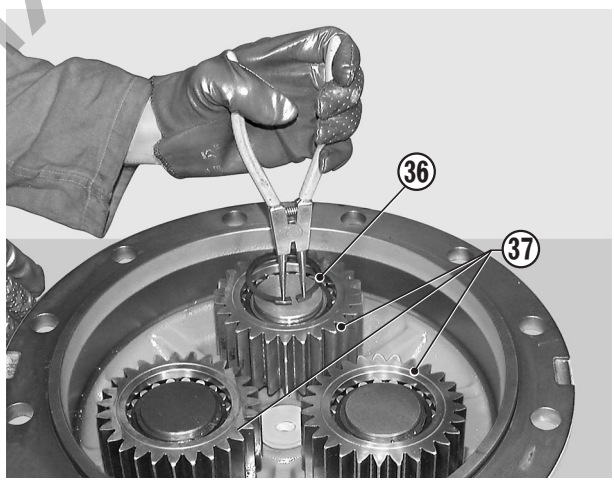
STEP 126
Extract sealing ring (33) and inner bearing (34).



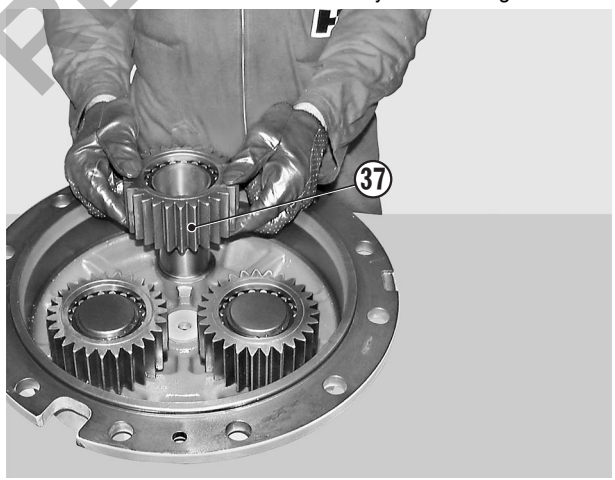
STEP 127
Remove the external thrust blocks of bearings (34) and (35).



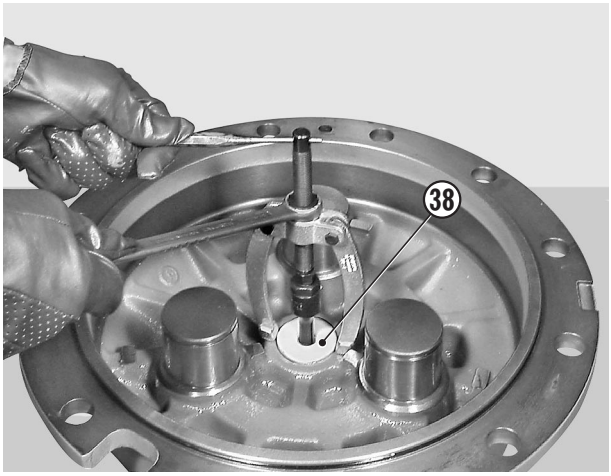
STEP 128
Remove the snap rings (36) that check the planetary gear (37).



STEP 129
Extract the planetary gear (37).
NOTE. Note down assembly direction of gears.



STEP 130
ONLY IF NECESSARY
Using an extractor for inner parts, remove shim (38).



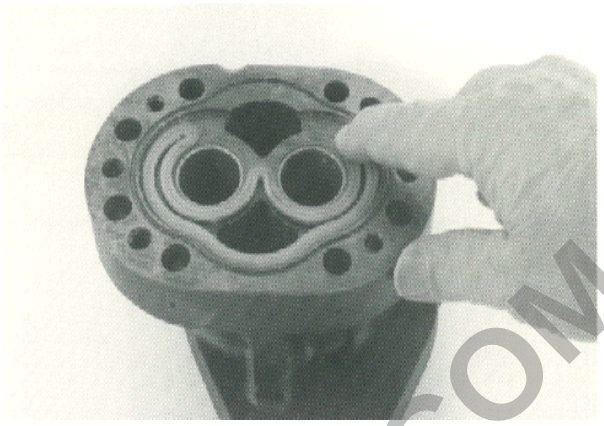
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DEFECTS

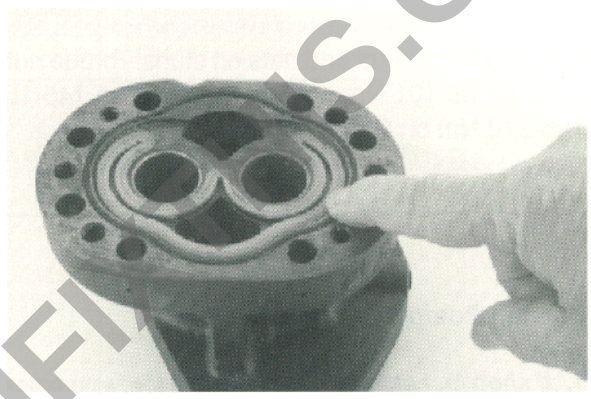
TROUBLE	PROBABLE CAUSE	REMEDIES
The braking action does not stop after releasing the brake pedal.	Brake pedal seized. Brake pedal not completely released.	Repair or replace brake pedal valve. Check that no hardened mud or foreign material are located under the pedal. Check that with the pedal is totally released and there is no output pressure from the brake valve.
Hard pedal travel.	Brake pedal valve pistons seized.	Repair brake pedal valve.
Hard braking operation.	Wrong pressure setting.	Checkpressure.
Weak braking effect.	Low brake pressure. Brake discs (axle) need to be replaced. Air in the system. Oil leaks in system. Recharge pressure of accumulators below nominal value or brake accumulators inefficient.	Check pressure. Replace discs. Bleed system. Inspect and eliminate leaks. Check pressure.
The accumulators do not recharge.	Contamination seized the priority valve (in brake pedal valve).	Repair or replace brake pedal valve.
Braking pressure fluctuating.	Recharge pressure of accumulators lower than nominal value. (If recharge pressure of accumulators is low, the brake low pressure indicator on panel should be ON. The pressure switch is set at 65 ± 5 bar (942 ± 72 psi). Check the precharging pressure of the accumulators.	Check recharge pressure.
The brake charge pump overheats.	The recharge pressure of the accumulators is lower than nominal value (refer to description above). Oil leaks from brake pedal valve.	Check recharge pressure. Repair or replace brake pedal valve.

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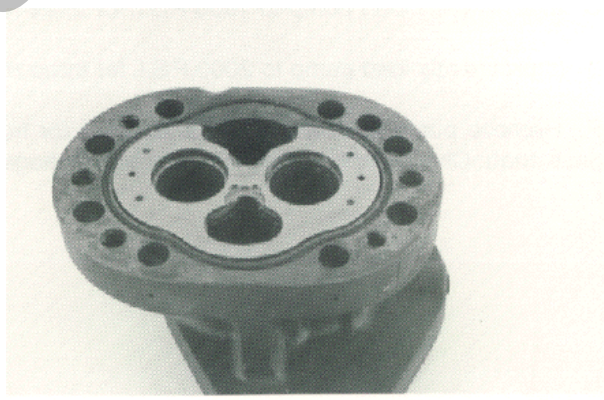
Install the assembly on the front cover cavity. Carefully press the assembly into place; checking whether it is firmly seating in place. This is very important for the installation of the wear plate.



Apply graphite grease to the square section housing of the o-ring, and carefully install it on the front cover housing. Be very careful: the o-ring must not spin within the housing or the pump will leak at this spot.



Lubricate the steel side of the bronze wear plate with graphite grease and install it on top of the retainer.



Install the washers and nuts on the top bolts. Torque of the top bolts: 196 - 210 Nm. (145-155 ft.lbs)



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L 7)REPLACE CONDENSER, RECEIVER DRIER AND PRESSURE SWITCH .

7.1) Remove charge with proper equipment. Never let refrigerant charge flow to air.
If is necessary, replace only switch pressure, do not remove charge.

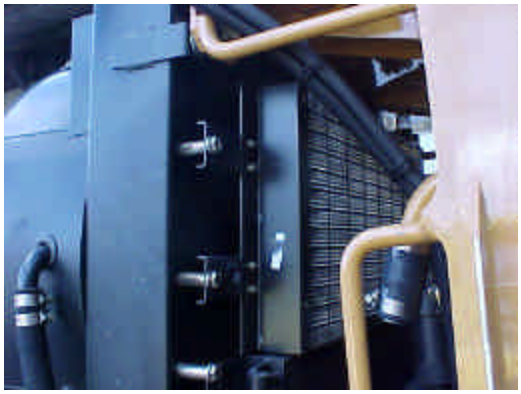
7.2) Remove condenser hose fitting. Use 19 and 22mm wrench. Remove receiver drier hose fitting. Use 16 and 19mm wrench.





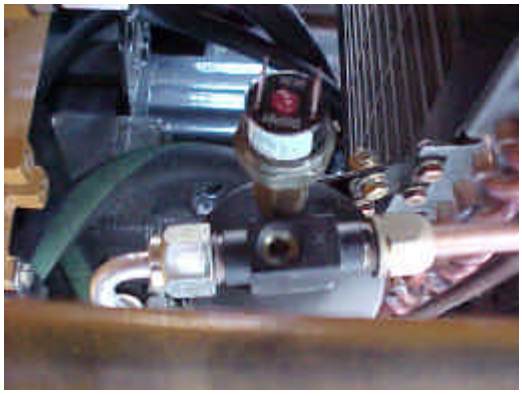
7.3) Remove 04 (four) bolts from condenser supports. Use a 17mm wrench. Put it on a workbench.





7.4) Replace condenser and receiver drier (it is important to replace receiver drier in order to prevent moisture contamination). Follow these steps in reverse order to reassembly these parts.
NOTE: be sure the correct position of inlet (**IN**) is mounted.

7.5) If it is necessary replace only pressure switch , do not remove charge and condenser. Remove only switch pressure fitting. Use a 17mm wrench. Do not remove pressure switch nut.



8) REPLACE AIR CONDITONING HOSE ASSY.
8.1) Hose assy assembly chart.

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