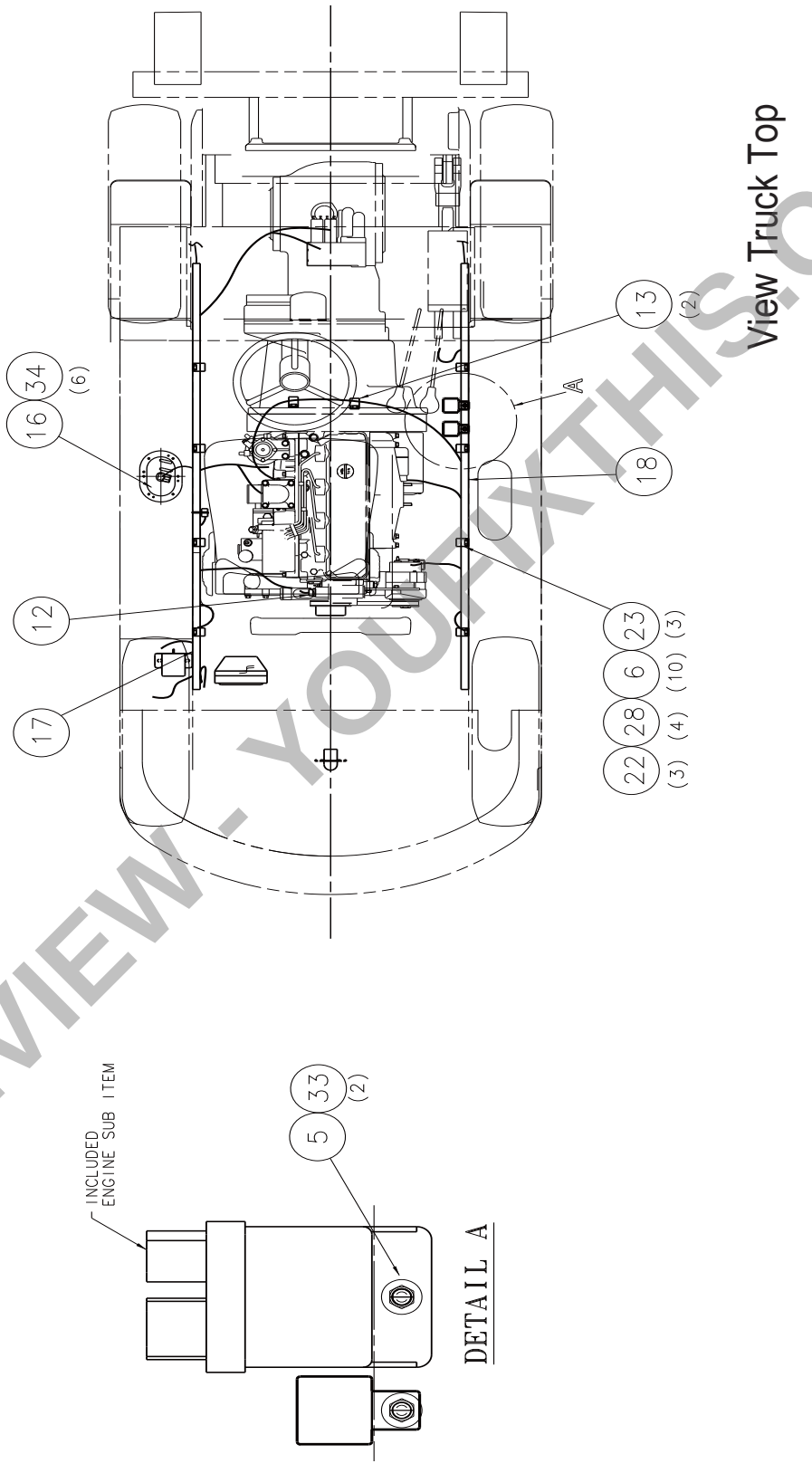
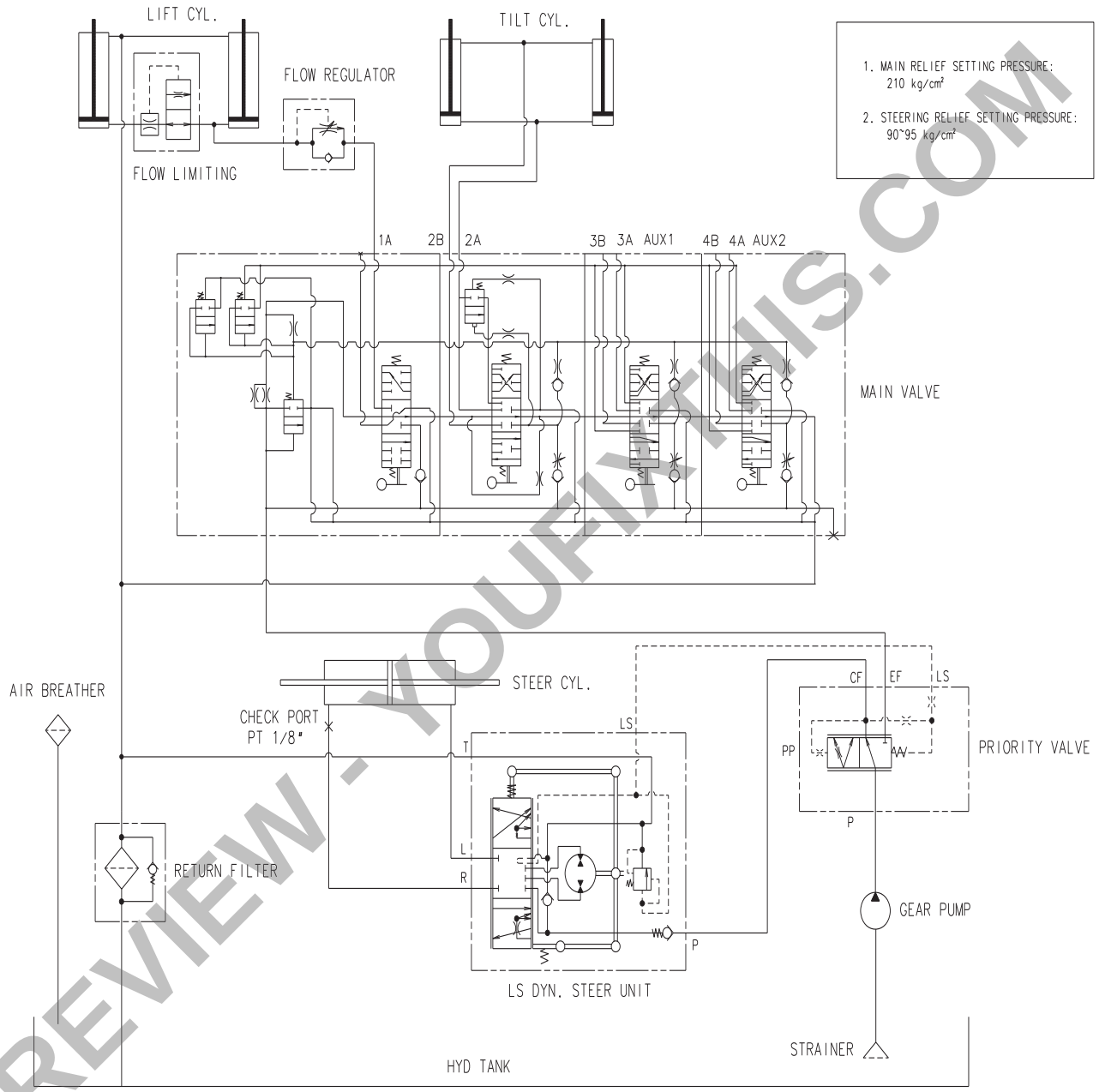
- CQ 20-30 D (SI - 48165) - 2/3



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Hydraulic Sump, Filters, and Pump Schematic(TA18)



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TIGHTENING TORQUES FOR STANDARD BOLTS AND NUTS

Item	Nominal Thread Diameter x Pitch	Tightening Torque	Remarks
Hexagon Bolt (7T) and Nut	M6 x 1.0 mm	7 to 9 ft lbs (87 to 104 in lbs, 9.8 to 11.8 N·m, 1.0 to 1.2 kgf·m)	Use 80% of the value at left when the tightening part is aluminum. Use 60% of the value at left for 4T bolts and lock nuts.
	M8 x 1.25 mm	17 to 21 ft lbs (200 to 251 in lbs, 22.6 to 28.4 N·m, 2.3 to 2.9 kgf·m)	
	M10 x 1.5 mm	33 to 40 ft lbs (44.1 to 53.9 N·m, 4.5 to 5.5 kgf·m)	
	M12 x 1.75 mm	58 to 72 ft lbs (78.4 to 98.0 N·m, 8.0 to 10 kgf·m)	
	M14 x 1.5 mm	94 to 108 ft lbs (127.5 to 147.1 N·m, 13 to 15 kgf·m)	
	M16 x 1.5 mm	159 to 174 ft lbs (215.7 235.4 N·m, 22 to 24 kgf·m)	
PT PLug	1/8 mm	7 ft lbs (87 in lbs, 9.8 N·m, 1.0 kgf·m)	-
	1/4 mm	14 ft lbs (173 in lbs, 19.6 N·m, 2.0 kgf·m)	
	3/8 mm	22 ft lbs (29.4 N·m, 3.0 kg·m)	
	1/2 mm	43 ft lbs (58.8 N·m, 6.0 kgf·m)	
Pipe Joint Bolt	M8	9 to 12 ft lbs (112 to 148 in lbs, 12.7 to 16.7 N·m, 1.3 to 1.7 kgf·m)	-
	M10	14 to 19 ft lbs (173 to 225 in lbs, 19.6 to 18.734 N·m, 2.0 to 3.5 kgf·m)	
	M12	18 to 25 ft lbs (24.5 to 34.3 N·m, 2.5 to 3.5 kgf·m)	
	M14	29 to 36 ft lbs (39.2 to 49.0 N·m, 4.0 to 5.0 kgf·m)	
	M16	36 to 43 ft lbs (49.0 to 58.8 N·m, 5.0 to 6.0 kgf·m)	

Note: Lubricating oil is not applied to threaded portion and seat surface.

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REMOVAL OF FUEL INJECTION PUMP

1. Remove fuel supply line from the fuel injection pump.
2. Remove fuel injector return line.
3. Remove fuel tank return line.
4. Disconnect the electrical connection to the magnetic valve (stop solenoid) (Figure 7-32, (1)).

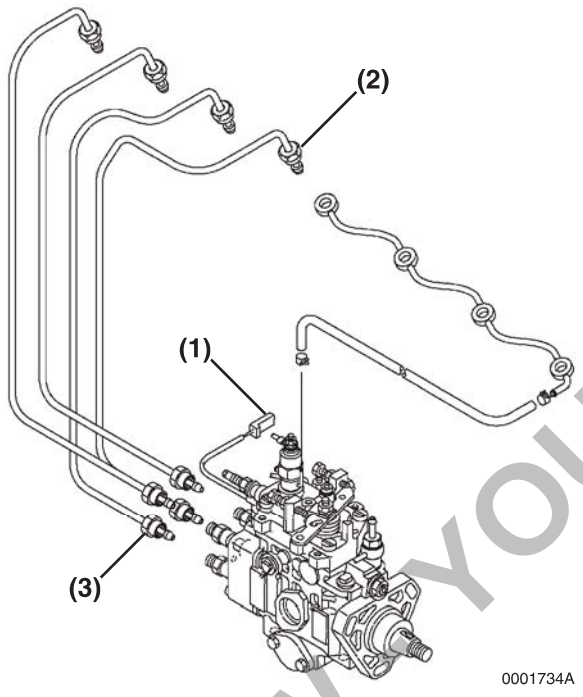


Figure 7-32

5. Disconnect the throttle linkage.
6. Remove the high pressure fuel lines.
   - First loosen the high pressure fuel line nuts (Figure 7-32, (2)) at the fuel injectors.

CAUTION

When loosening or tightening the lines at the fuel injectors, you must hold the fuel injector with a second wrench to prevent the injector from turning and damaging the fuel return line fitting.

   - Then loosen the high pressure fuel line nuts (Figure 7-32, (3)) on the fuel injection pump.
   - Finish loosening all the high pressure fuel line nuts and remove the fuel lines as an assembly.
     Be careful not to bend any of the fuel lines.

Note: It is necessary to remove the bolt (Figure 7-33, (1)) holding the dipstick tube clamp. Rotate the dipstick tube to one side to allow you to remove the high pressure fuel line assembly.

CAUTION

Remove the high-pressure fuel injection lines as an assembly whenever possible. Disassembling the high-pressure fuel injection lines from the retainers or bending any of the fuel lines will make it difficult to reinstall the fuel lines.

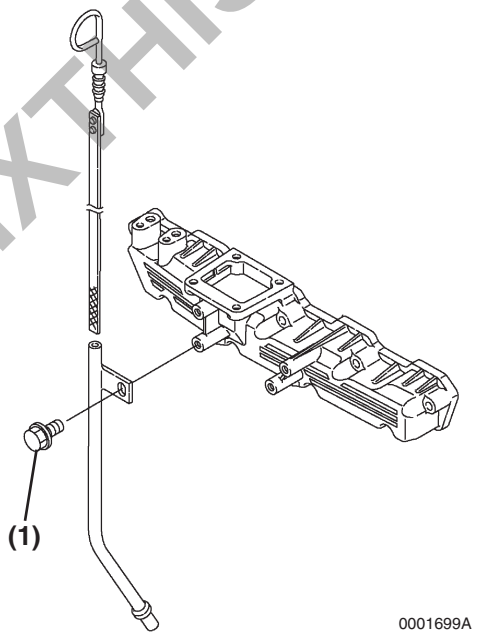
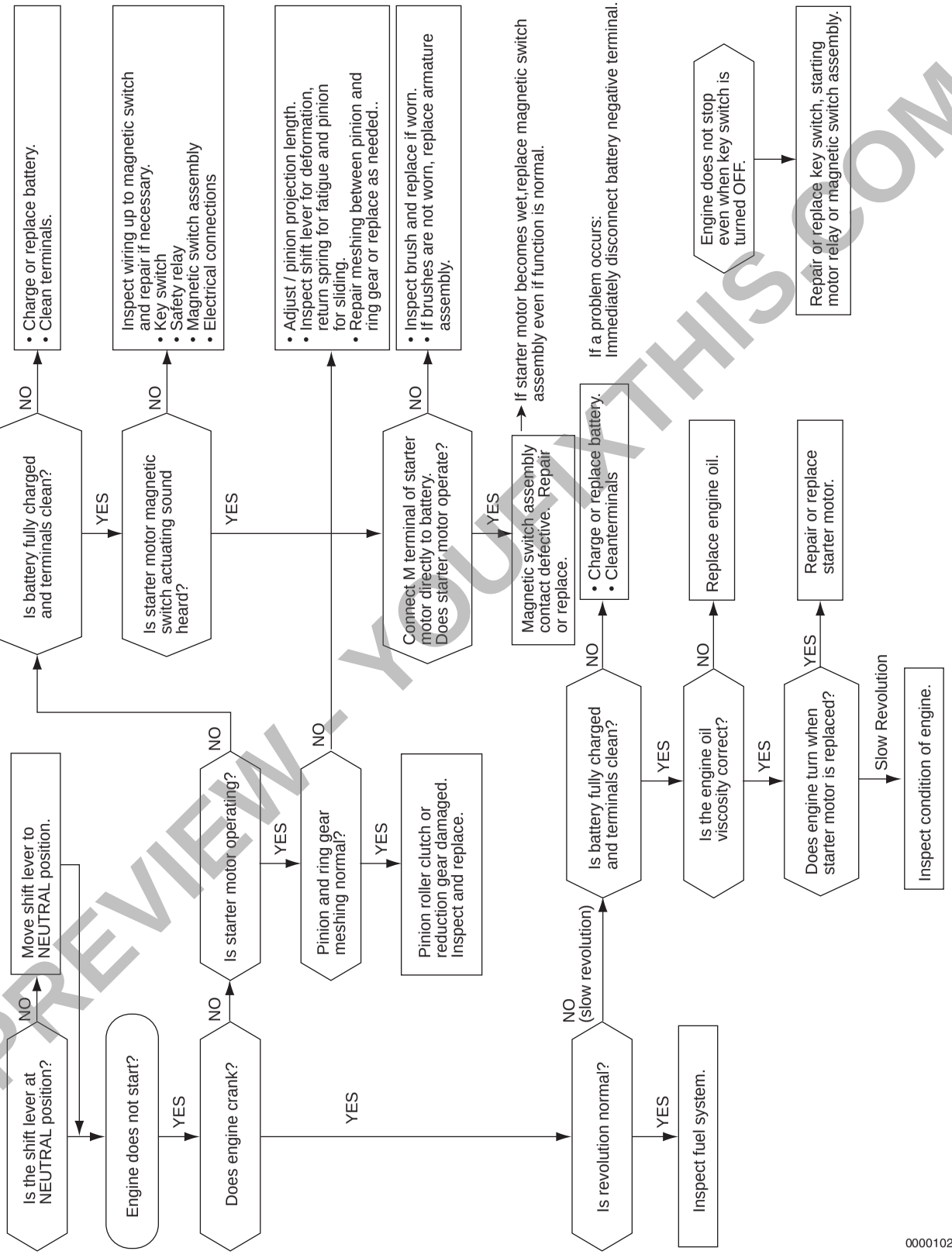


Figure 7-33

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STARTER MOTOR TROUBLESHOOTING



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PRINCIPAL ENGINE SPECIFICATIONS

4TNE94L EPA Tier2

Engine Model	4TNE94L EPA Tier2	
Version	VM	
Type	Vertical Inline Diesel Engine	
Combustion System	Indirect Injection, No Turbocharger	
Aspiration	Natural	
No. of Cylinders	4	
Bore × Stroke	3.70 x 4.33 in (94 x 110 mm)	
Displacement	186.3 cu in (3.053 L)	
** Max. Rated Output (Gross)	rpm(min^{-1})	2450
	hp SAE	61.0
	kW	45.5
	PS	61.9
High Idle Speed (Bare Engine)	2725 ± 25 rpm	
Low Idle Speed (Bare Engine)	850 ± 25 rpm	
Engine Weight (Dry)*	496 lb (225 kg)	
PTO Position	Flywheel Side	
Direction of Rotation	Counterclockwise Viewed From Flywheel Side	
Cooling System	Liquid-Cooled With Radiator	
Lubricating System	Forced Lubrication With Trochoid Pump At normal operating speeds, oil pressure is: 42 - 57 psi (0.29 - 0.39 MPa; 3.0 - 4.0 kgf/cm^2) At idle, oil pressure is: No less than 18.5 psi (0.13 MPa; 1.3 kgf/cm^2)	
Starting System	Electric Starting - Starter Motor: DC12V, 3.1 hp (2.3 kW)	
	Alternator: DC12V, 40A	
	Recommended Battery Capacity: 12V, 622 CCA (Cold Cranking Amps)	
Dimensions (L × W × H)*	28.0 x 20.3 x 29.8 in (710 x 516 x 758 mm)	
Engine Oil Pan Capacity	9.7 / 7.6 qt (9.2 / 7.2 L) (Dipstick Upper Limit / Lower Limit)	
Engine Coolant Capacity	1.11 gal (4.2 L) Engine Only	

* Engine Specifications Without Radiator, Muffler, and Air Cleaner.

** The Intake and Exhaust condition of Max. Rated output are
Air Intake Restriction : 250mmAq
Exhaust Gas Restriction : 1000mmAq

*** The detail specifications are refer to the Specification document which is agreed between both engineering.

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Recommended Periodic Service Schedule

This chart lists maintenance tasks that should be done periodically, the suggested time intervals, and the service manual Group in which the task is covered.

Apply as appropriate for diesel, gas, and LPG trucks. Refer to Operator's Manual for **Daily Checks**.

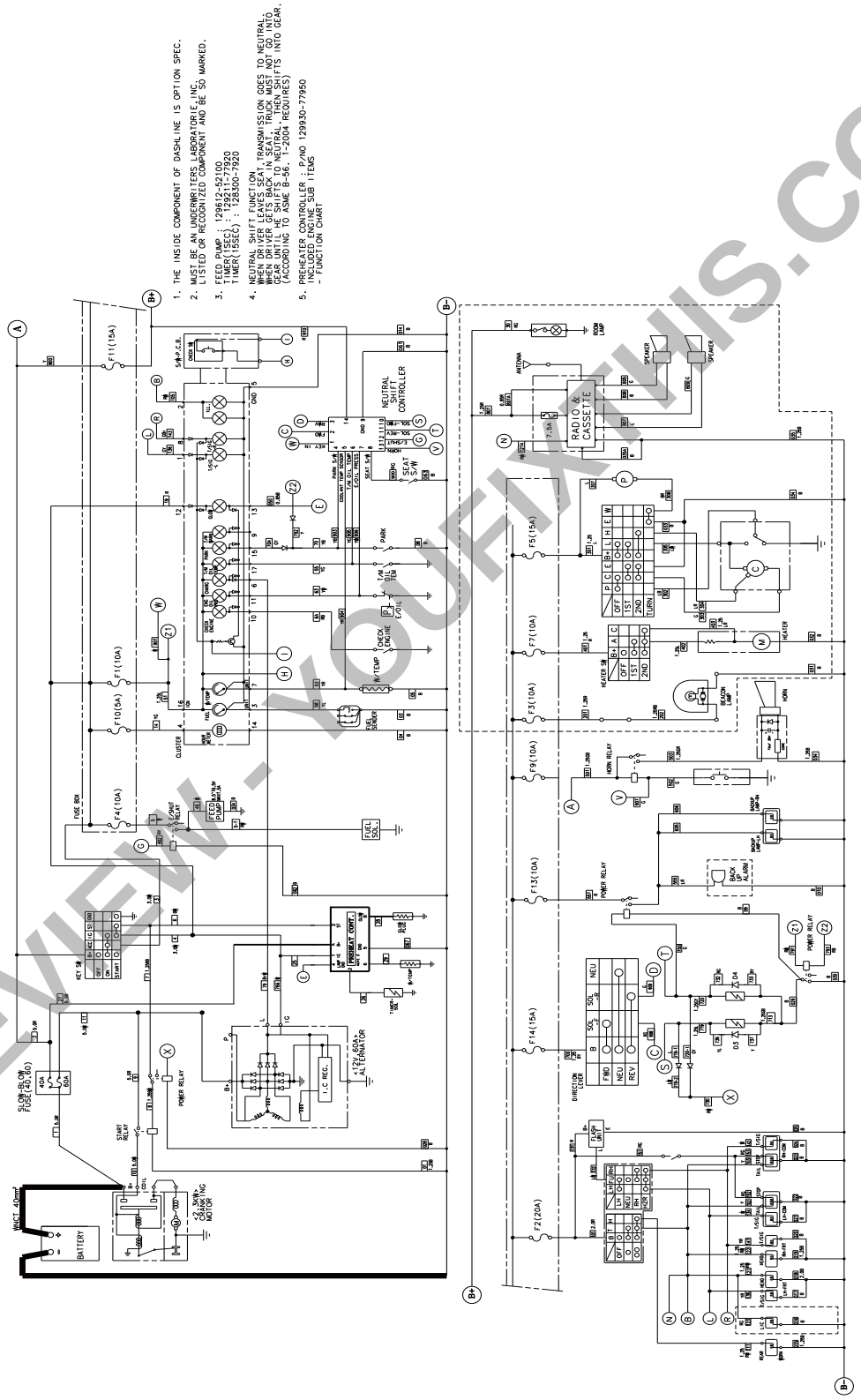
TASKS	First 50 Hours	Every 50-200 Hours (or 1 month)	Every 450-500 Hours (or 3 months)	Every 900-1000 Hours (or 6 months)	Every 2000 Hours (or 1 year)
Group PS - Periodic Maintenance					
Perform Planned Maintenance inspections, lubrications, and adjustments		●			
Group 00 - Engine					
Exhaust smoke from gas engine - inspect (blue-oil ; black-fuel)		●			
Idle / governed rpm - check / adjust		●			
Mounts / brackets - inspect / tighten		●			
Oil change - drain / fill*	●	●			
Oil filter cap & seal - clean / check		●			
Oil filter - replace	●	●			
Oil level / condition - check	●	●			
Stall rpm - check on standard transaxle truck		●			
Tune up - determine if needed by stall check and / or functional test		●			
Valve tappet adjustment - diesel engine		●			
Group 01 - Cooling System					
Coolant level/condition - check / sample		●			
Coolant protection level - hydrometer test				●	
Coolant change - drain & flush					●
Coolant hoses - inspect / replace		●			●
Fan blades - inspect loose / damaged		●			
Fan belt(s) - check tension, wear	●	●			
Radiator cap - inspect / test		●			●
Thermostat - test / replace					●
Water pump - check leaks / wear		●			
Group 02 - Fuel System					
Carburetor idle / air - check / adjust		●			
CO level - check / adjust					●
Diesel injector s /lines - clean / inspect				●	
Filler cap / screen - clean / inspect		●			
Fuel filter, Diesel - replace			●		
Fuel filter, LPG - replace				●	
LPG lock-off valve filter - inspect / replace					●
LPG tank mounting / guard - inspect		●			
LPG tank shut-off valve - inspect / test		●			
LPG vaporizer / regulator / hoses - inspect		●			

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Electrical Circuit Diagram

- Diesel (Tier 2) - IN 28342



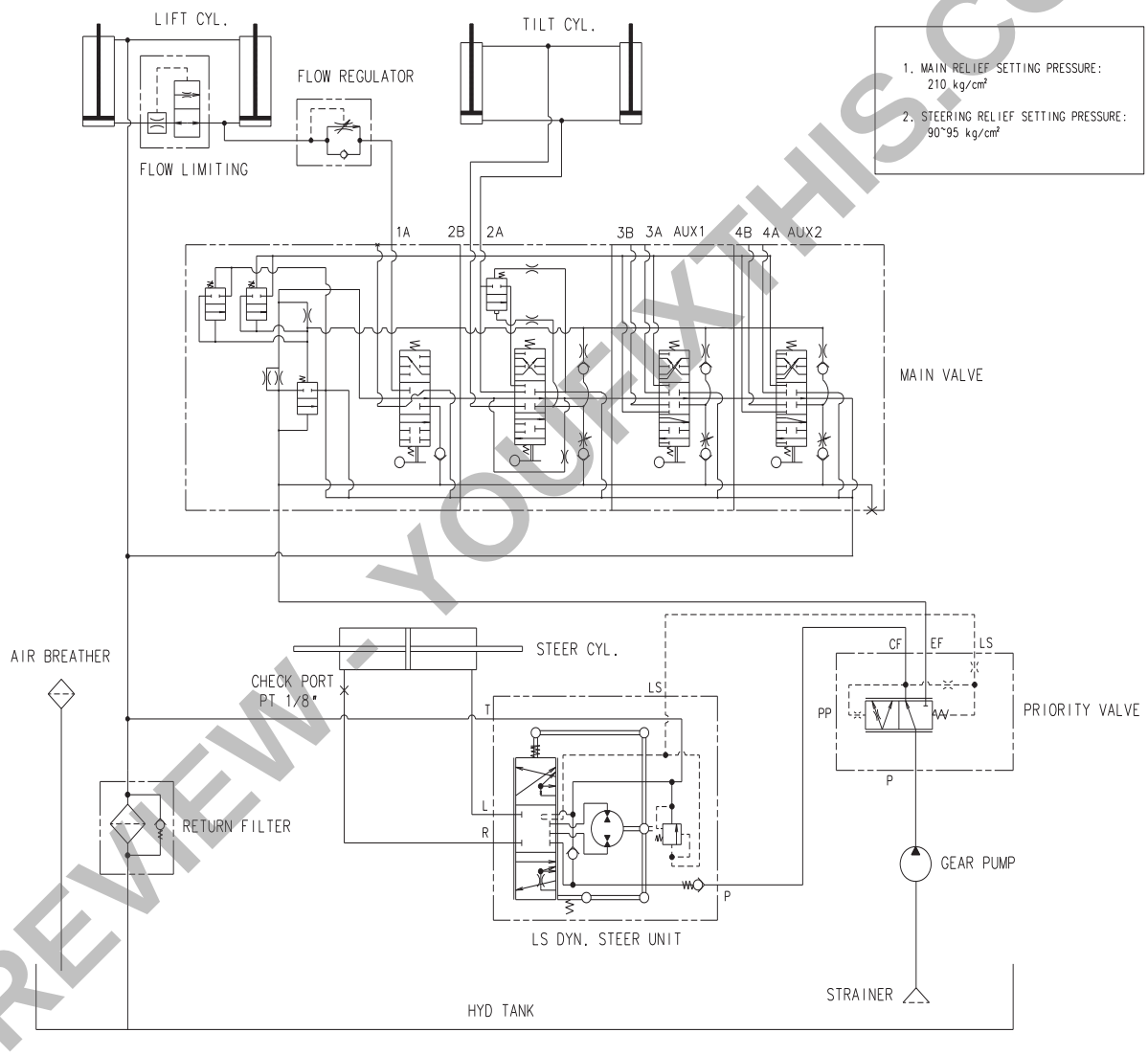
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Section 2

Hydraulic System Schematics

Schematic for Standard Transaxle Truck<TA18>



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STANDARD TORQUE CHART

Thread size x Pitch mm		M6x1.0	M8x1.25	M10x1.5	M12x1.75	M14x1.5	M16x1.5
Tightening Torque	in·lbs	96.0 ± 9.0	-	-	-	-	-
	ft·lbs	-	19.0 ± 2.0	36.0 ± 4.0	65.0 ± 7.0	101.0 ± 7.0	167.0 ± 7.0
	N·m	10.8 ± 1.0	25.5 ± 2.9	49.0 ± 4.9	88.3 ± 9.8	137 ± 9.8	22.6 ± 9.8
	kgf·m	1.1 ± 0.1	2.6 ± 0.3	5.0 °± 0.5	9.0 ± 1.0	14.0 ± 1.5	23.0 ± 2.0

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INSTALLATION OF THE FUEL INJECTION PUMP

1. Secure the fuel injection pump mounting flange to the rear of the gear case housing with three nuts. Be sure to match the marks (Figure 7-40, (1)) on the rear of the gear case housing and on the fuel injection pump mounting flange.

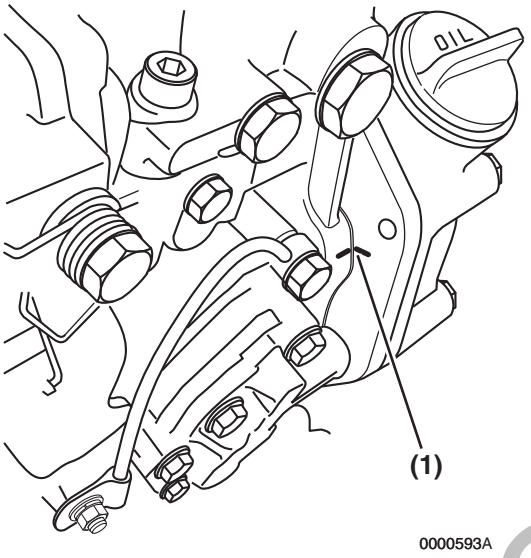


Figure 7-40

2. Install the injection pump drive gear (Figure 7-42, (3)) on the injection pump shaft lining up the two marks you made on the pump drive gear with the mark you made on the idle gear. See (Figure 7-37).

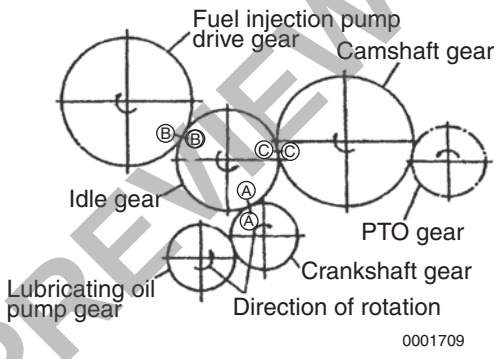


Figure 7-41

3. Install the drive gear retaining nut (Figure 7-42, (1)) and washer (Figure 7-42, (2)). While holding the engine with a wrench on the crankshaft pulley bolt, torque the retaining nut to 43.5 - 51 ft lbs (59-69 N.m, 5 - 5.4 kg.m).

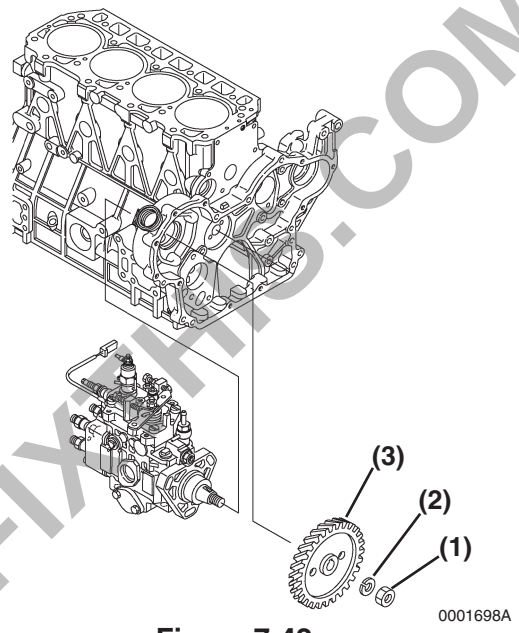


Figure 7-42

4. Thoroughly clean all old sealant from the fuel injection pump cover (Figure 7-43, (1)) and gear case housing. Apply ThreeBond, Yanmar Part No. 977770-01212, or equivalent sealant to the fuel injection pump cover. Install the fuel injection pump cover on the front gear case with seven bolts. Tighten the bolts to the specified torque.

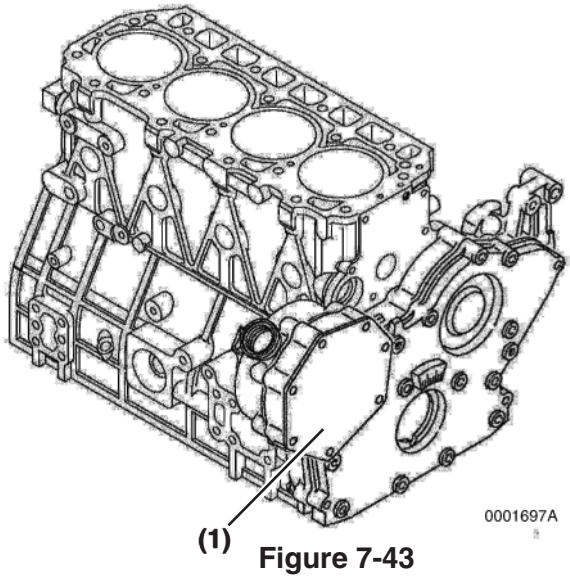
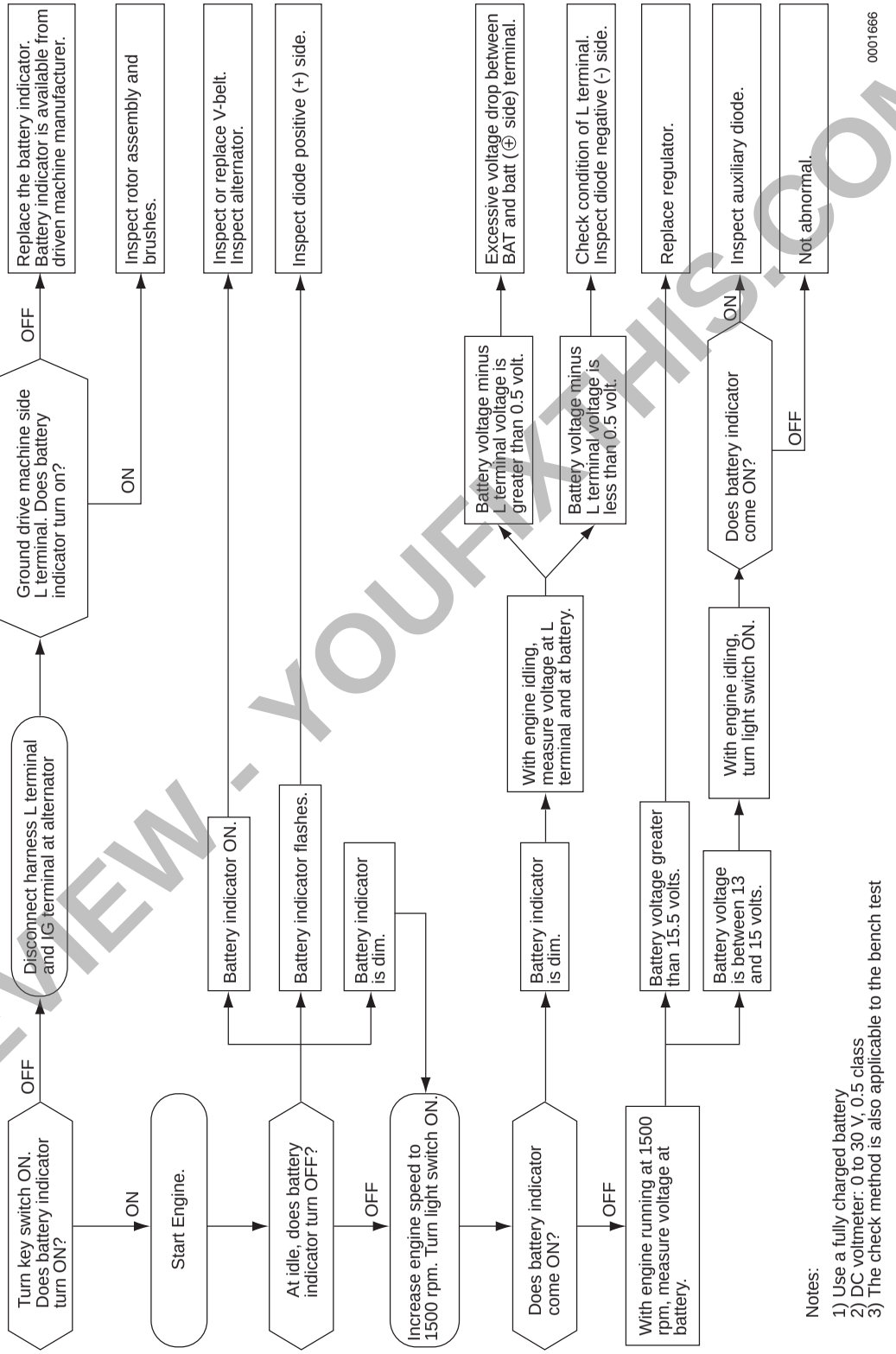


Figure 7-43

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ALTERNATOR TROUBLESHOOTING



Notes:
1) Use a fully charged battery
2) DC voltmeter: 0 to 30 V, 0.5 class
3) The check method is also applicable to the bench test

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4TNE98 EPA Tier3

Engine Model	4TNE98 EPA Tier3	
Version	VM	
Type	Vertical Inline Diesel Engine	
Combustion System	Indirect Injection, No Turbocharger	
Aspiration	Natural	
No. of Cylinders	4	
Bore × Stroke	3.86 x 4.33 in (98 x 110 mm)	
Displacement	202.5 cu in (3.319 L)	
** Max. Rated Output (Gross)	rpm(min^{-1})	2300
	hp SAE	61.7
	kW	46.0
	PS	62.5
High Idle Speed (Bare Engine)	2725 ± 25 rpm	
Low Idle Speed (Bare Engine)	850 ± 25 rpm	
Engine Weight (Dry)*	496 lb (225 kg)	
PTO Position	Flywheel Side	
Direction of Rotation	Counterclockwise Viewed From Flywheel Side	
Cooling System	Liquid-Cooled With Radiator	
Lubricating System	Forced Lubrication With Trochoid Pump At normal operating speeds, oil pressure is: 42 - 57 psi (0.29 - 0.39 MPa; 3.0 - 4.0 kgf/cm^2) At idle, oil pressure is: No less than 18.5 psi (0.13 MPa; 1.3 kgf/cm^2)	
Starting System	Electric Starting - Starter Motor: DC12V, 3.1 hp (2.3 kW)	
	Alternator: DC12V, 40A	
	Recommended Battery Capacity: 12V, 622 CCA (Cold Cranking Amps)	
Dimensions (L × W × H)*	28.0 x 20.3 x 29.8 in (710 x 516 x 758 mm)	
Engine Oil Pan Capacity	9.7 / 7.6 qt (9.2 / 7.2 L) (Dipstick Upper Limit / Lower Limit)	
Engine Coolant Capacity	1.11 gal (4.2 L) Engine Only	

* Engine Specifications Without Radiator, Muffler, and Air Cleaner.

** The Intake and Exhaust condition of Max. Rated output are
Air Intake Restriction : 250mmAq
Exhaust Gas Restriction : 1000mmAq

*** The detail specifications are refer to the Specification document which is agreed between both engineering.

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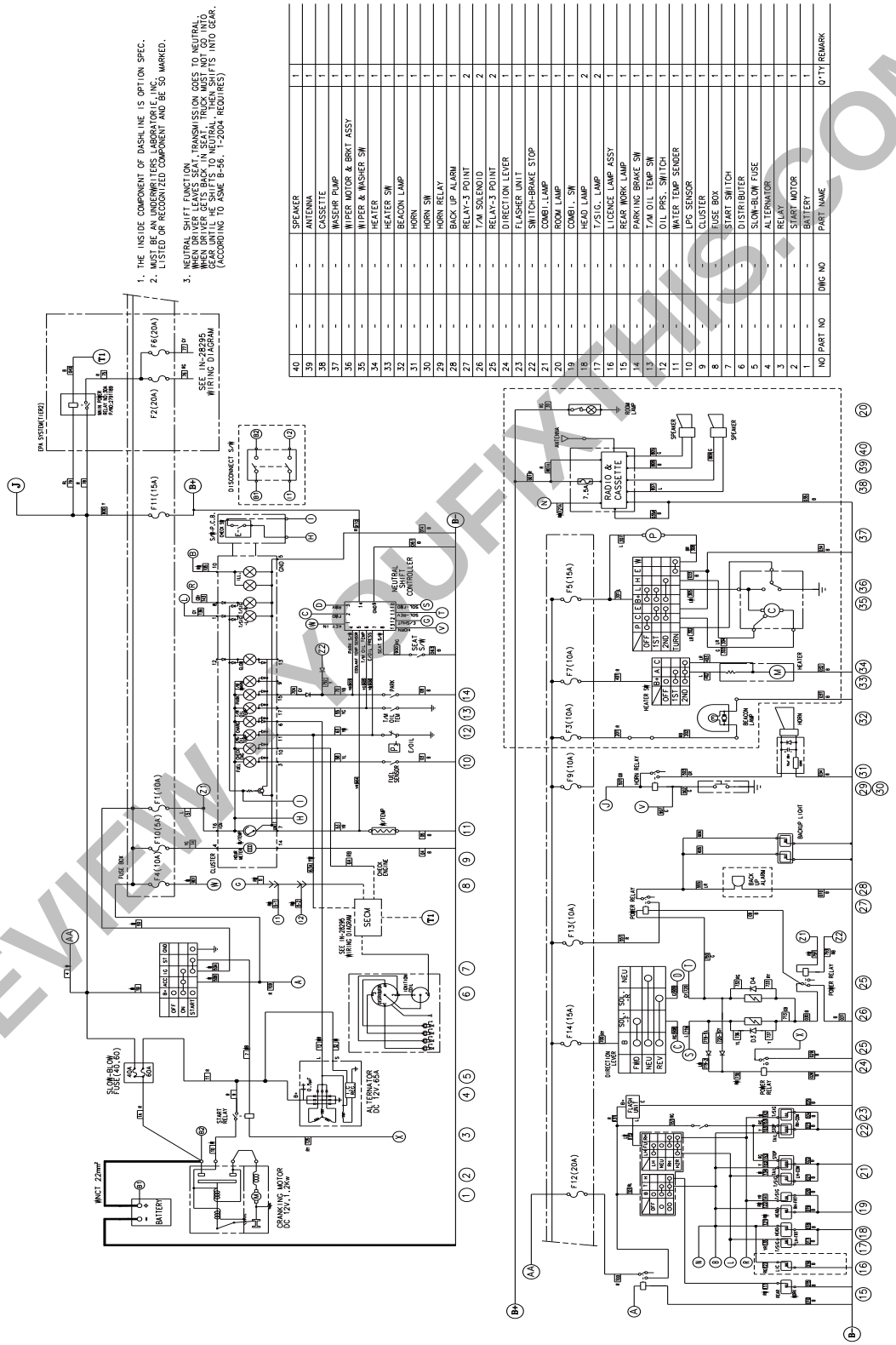
TASKS	First 50 Hours	Every 50-200 Hours (or 1 month)	Every 450-500 Hours (or 3 months)	Every 900-1000 Hours (or 6 months)	Every 2000 Hours (or 1 year)
Throttle linkage - check / adjust		●			
Group 03 - Air Intake & Exhaust					
Air filter element - replace				● (Diesel)	● (Gas/LPG)
Air hoses / clamps - inspect		●			
Exhaust pipe / muffler - inspect		●			
Group 06 - Transaxle					
Charging pump - stall test standard transaxle		●			
Clutch pack operation - stall test standard transaxle		●			
Pressure checks					●
Fluid replace - drain / fill	●			●	
Fluid filter - replace	●			●	
Fluid level / condition - check / sample	●		●		
Inching operation - check / test		●			
Oil cooler / lines - inspect		●			
Strainer - clean on standard transaxle					●
Group 12 - Ignition System					
Diesel cold starting plug - test					●
Distributor cap / rotor - inspect		●			
Electronic ignition - test					●
Ignition timing - check / adjust			●		
Ignition wiring - inspect		●			
Neutral start - check		●			
Parking brake interlock - check		●			
Spark plugs - regap / replace			●		
Starter motor - inspect / test					●
Starter solenoid - inspect / test					●
Group 13 - Electrical System					
Hourmeter - check		●			
Lamp check - at start-up		●			
Wiring harness - inspect				●	
Group 20 - Driveaxle					
Axle end lube - clean / repack					●
Axle mounting bolts - inspect / tighten		●			
Fluid replace	●			●	
Group 22 - Wheels And Tires					
Wheel mounting bolts - tighten	●	●			
Tire pressure / condition - check	●	●			
Group 23 - Brake System					
Operation - check		●			
Service brake - check wear					●
Brake lines - check	●	●			
Parking brake - check / adjust	●	●			
Fluid check / lubricate		●			

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Electrical Circuit Diagram

- CQ 20-30 L (Tier 0) - IN 28343



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STANDARD TORQUE CHART

Thread size x Pitch mm		M6x1.0	M8x1.25	M10x1.5	M12x1.75	M14x1.5	M16x1.5
Tightening Torque	in·lbs	96.0 ± 9.0	-	-	-	-	-
	ft·lbs	-	19.0 ± 2.0	36.0 ± 4.0	65.0 ± 7.0	101.0 ± 7.0	167.0 ± 7.0
	N·m	10.8 ± 1.0	25.5 ± 2.9	49.0 ± 4.9	88.3 ± 9.8	137 ± 9.8	22.6 ± 9.8
	kgf·m	1.1 ± 0.1	2.6 ± 0.3	5.0 °± 0.5	9.0 ± 1.0	14.0 ± 1.5	23.0 ± 2.0

PERIODIC MAINTENANCE SCHEDULE

Daily and periodic maintenance is important to keep the engine in good operating condition. The following is a summary of maintenance items by periodic maintenance intervals. Periodic maintenance intervals vary depending on engine application, loads, diesel fuel and engine oil used and are hard to establish definitively. The following should be treated only as a general guideline.

⚠ CAUTION

Establish a periodic maintenance plan according to the engine application and make sure you perform the required periodic maintenance at intervals indicated. Failure to follow these guidelines will impair the engine's safety and performance characteristics, shorten the engine's life and may affect the warranty coverage on your engine.

Consult your authorized Yanmar industrial engine dealer or distributor for assistance when checking items marked with a ● .

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5. Reinstall the cooling fan (Figure 7-44, (1)), spacer (if equipped) (Figure 7-44, (2)) and V-belt (Figure 7-44, (3)).

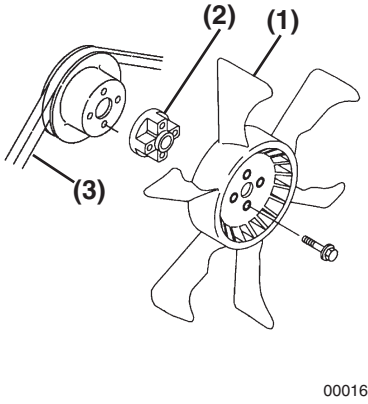


Figure 7-44

6. Pivot the alternator away from the engine and adjust the V-belt tension. See Check and Adjust Cooling Fan V-belt on page 5-15.
7. Tighten the alternator adjusting bolt. See Check and Adjust Cooling Fan V-belt on page 5-15.
8. Pivot the bracket that fastens the fuel injection pump to the cylinder back up and toward the fuel injection pump. Retighten the bolt (Figure 7-45, (2)) that fastens it to the cylinder block.

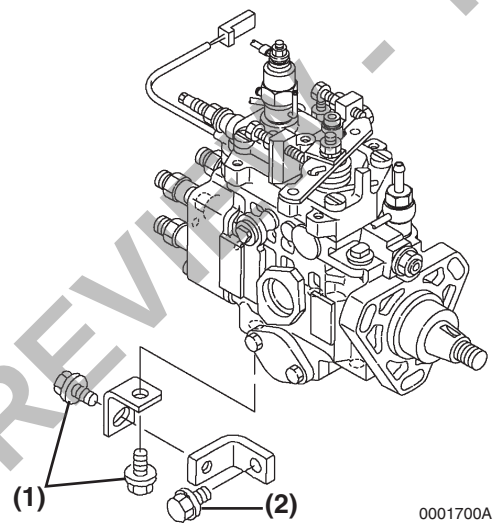


Figure 7-45

9. Reinstall the two bolts (Figure 7-45, (1)) to the L-shaped bracket that holds the injection pump at the bottom / rear. Tighten the two bolts and the bolt that secures the bracket to the cylinder block to specified torque.
10. Reinstall the high pressure fuel lines.
    - Replace the high pressure fuel lines as an assembly. Be careful not to bend any of the high pressure fuel lines.
    - Start all the high pressure fuel line nuts by hand, leaving those nuts on the fuel injection pump and fuel injectors untightened.
    - Tighten the high pressure fuel line nuts (Figure 7-46, (2)) on the fuel injection pump.
    - Tighten the high pressure fuel line nuts (Figure 7-46, (1)) on the fuel injectors.

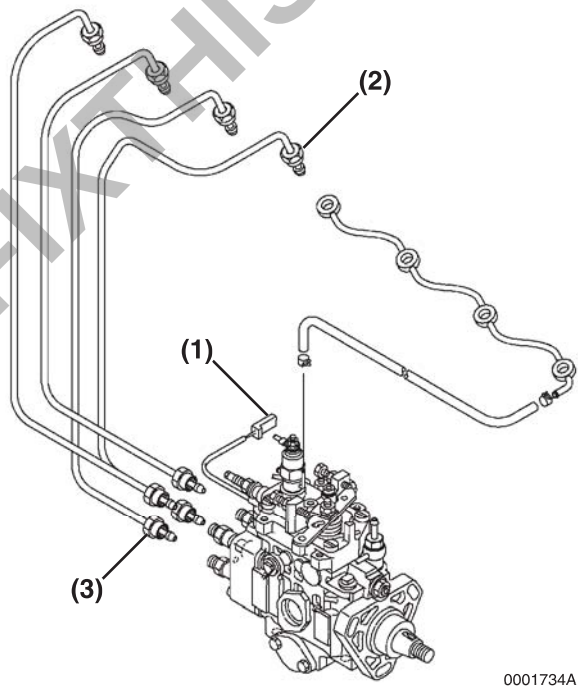


Figure 7-46

11. Reconnect the throttle linkage.
12. Reconnect the electrical connection to the magnetic valve (stop solenoid) (Figure 7-46, (1)).
13. Reinstall fuel tank return line.
14. Reinstall fuel injector return line.
15. Reinstall fuel supply line to the fuel injection pump.
16. Prime the fuel system and check for leaks.

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Cause \ Trouble Symptom		Starting Problem				Insufficient Engine Output			Poor Exhaust Color		High Knocking Sound During Combustion	Abnormal Engine Sound	Uneven Combustion Sound	Engine Surging		Excessive Engine Vibration	Difficulty in Returning to Low Speed	Excessive Fuel Consumption	Engine Oil				Excessive Blow-by Gas	Engine Coolant		Air Intake		Exhaust Temperature Rise	Corrective Action
		Engine Does Not Start.	Engine Starts But Stops Soon.			Exhaust Color			During Work					During Idling	During Work Operation				Excessive Oil Consumption	Dilution by Diesel Fuel	Oil with Water	Low Oil Pressure		Overheat	Low Water Temperature	Pressure Drop	Pressure Rise		
			Exhaust Smoke																										
			None	Little	Much	Ordinary	White	Black	White	Black																				
Engine System	Improper Intake/Exhaust Valve Clearance	O	O			O						O													O		O	Adjust the Valve Clearance.
	Compression Leakage from Valve Seat					O		O		O		O						O					O		O		O	Lap the Valve Seat.
	Intake/Exhaust Valve Seizure	O			O	O		O		O		O			O	O				O			O		O			Correct or Replace Intake/Exhaust Valve.
	Cylinder Head Gasket Blowout					O						O												O				Replace the Gasket.
	Seized or Broken Piston Ring	O			O		O		O			O		O		O			O	O			O	O			O	Replace the Piston Ring.
	Worn Piston Ring, Piston or Cylinder	O			O		O		O										O	O			O					Perform Honing and Use Oversize Parts.
	Seized Crankpin Metal or Bearing	O	O									O		O	O	O							O					Repair or Replace.
	Improper Arrangement of Piston Ring Joints		O				O												O				O					Correct the Ring Joint Positions.
	Reverse Assembly of Piston Rings						O		O										O				O					Reassemble Correctly.
	Worn Crankpin and Journal Bearing					O						O		O	O	O						O						Measure and Replace.
	Loose Connecting Rod Bolt											O				O						O						Tighten to the Specified Torque.
	Foreign Matter Trapped in Combustion Chamber	O						O											O				O					Disassemble and Repair.
	Excessive Gear Backlash											O																Adjust Gear Meshing.
	Worn Intake/Exhaust Valve Guide						O						O										O					Measure and Replace.
	Governor Adjusted Incorrectly		O											O	O	O	O											Make Adjustment.
	Improper Open/Close Timing of Intake/Exhaust Valves	O					O	O	O	O		O																Adjust the Valve Clearance.
Turbocharger	Fouled Blower							O		O																		Wash the Blower.
	Waste Gate Malfunction							O		O																		Disassemble and Inspect.
	Worn Radial Bearing						O		O																			Disassemble and Inspect.

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ENGINE SERVICE INFORMATION

Engine Tuning

Inspection Item		Standard	Limit
Intake / Exhaust Valve Gap		0.006 - 0.010 in (0.15 - 0.25 mm)	-
Fuel Injection Pressure		1711 - 1842 psi (11.8 - 12.7 MPa 120 - 130 kgf / cm^2)	-
Fuel Injection Timing with Plunger Lifted 0.039 in (1 mm)		6°±1°ATDC	-
Compression Pressure at 250 rpm (250 min^{-1})		425 - 428 psi (2.93 - 2.95 MPa 29 - 31 kgf / cm^2)	341 psi (2.35 MPa 24 kgf / cm^2)
Lubricating Oil Pressure	Max. (when cold)	86 psi (0.59 MPa, 6.0 kgf/cm^2)	-
	At rated output	42 - 57 psi (0.29 - 0.39 MPa, 2.96 - 3.98 kgf/cm^2)	-
	When idling	8.5 psi (0.06 MPa, 0.6 kgf/cm^2) or greater	-
Thermostat		Valve Opening Temperature	Full Opening Lift Temperature
		160°F (71°C)	0.32 in (8 mm) or Above 185°F (85°C)

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TASKS	First 50 Hours	Every 50-200 Hours (or 1 month)	Every 450-500 Hours (or 3 months)	Every 900-1000 Hours (or 6 months)	Every 2000 Hours (or 1 year)
Fluid replace - drain / fill					●
Group 26 - Steer Axle and Lines					
Operation - check		●			
Power steering relief pressure - check					●
Steer axle mounting - inspect		●			
Steer wheel bearings - check		●			
Steer wheel bearings - lubricate / adjust					●
Steering cylinder seals - check leakage		●			
Steering linkage - lubricate		●			
Group 29 - Hydraulic Pump, Sump, and Filter					
Hydraulic fluid level/condition - check / sample		●			
Hydraulic fluid change - drain / fill					●
Hydraulic suction screen - clean					●
Hydraulic fluid filter - replace	●		●		
Hydraulic tank breather - clean / replace					●
Group 30 - Hydraulic Valve & Linkage					
Hydraulic system relief pressure - test / adjust					●
Group 32 - Tilt Cylinders					
Tilt cylinder adjustment - check / adjust		●			
Tilt cylinder drift - test		●			
Tilt cylinder mounting - check / tighten		●			
Tilt cylinder rod ends - check / tighten / lubricate		●			
Tilt cylinder rod / seals - check for leaks		●			
Group 34 - Upright, Lift Cylinder, Carriage, Forks					
Operation - check		●			
Carriage and lift chain - lubircate		●			
Carriage chain condition - inspect / adjust		●			
Forks, latches, stop pin - inspect / check wear		●			
Lift chain condition - inspect / adjust		●			
Load backrest		●			
Upright lift cylinder downdrift-test		●			
Upright rollers - check		●			
Upright trunnion bolts - tighten		●			

* Oil change interval may be determined by laboratory analysis

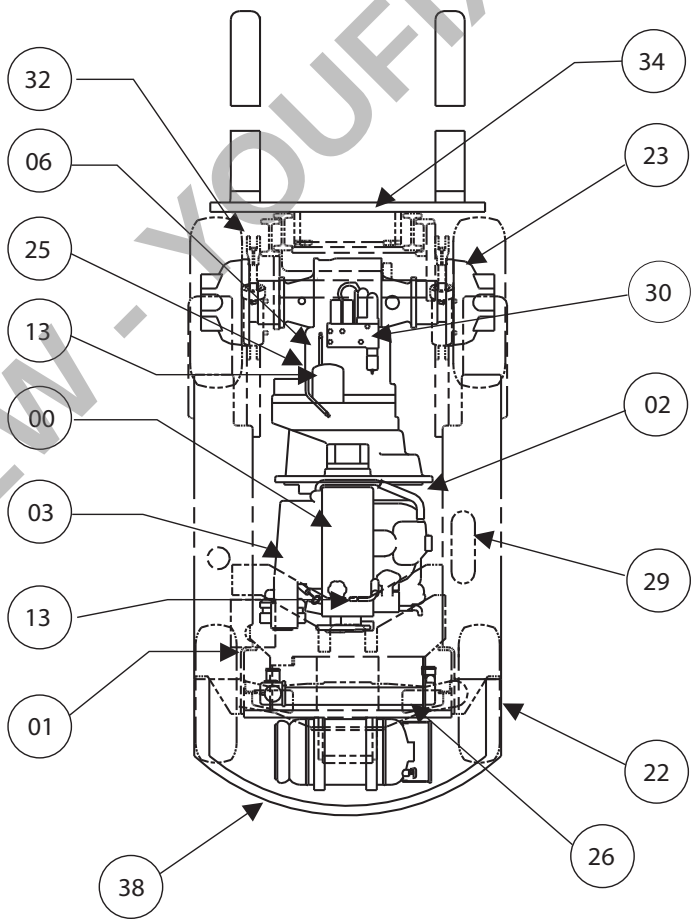
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Section 1

Safety

SAFETY STATEMENTS

Yanmar is concerned for your safety and your machine's condition. Safety statements are one of the primary ways to call your attention to the potential hazards associated with Yanmar TNE engine operation. Follow the precautions listed throughout the manual before operation, during operation and during periodic maintenance procedures for your safety, the safety of others and to protect the performance of your engine. Keep the labels from becoming dirty or torn and replace them if they are lost or damaged. Also, if you need to replace a part that has a label attached to it, make sure you order the new part and label at the same time.

NOTE

This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

DANGER

(the word "DANGER" is in white letters with a red rectangle behind it) – indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Danger is limited to the most extreme situations.

WARNING

Warning (the word "WARNING" is in black letters with an orange rectangle behind it) . indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Caution (the word "CAUTION" is in black letters with a yellow rectangle behind it) . indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Caution without the safety alert symbol indicates a potentially hazardous situation that can cause damage to the machine, personal property and / or the environment or cause the machine to operate improperly.

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GROUP PS

PERIODIC SERVICE

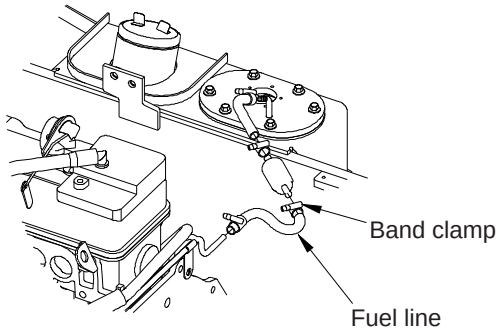
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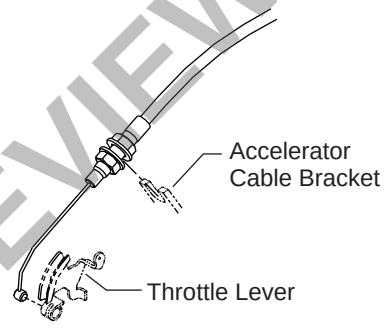
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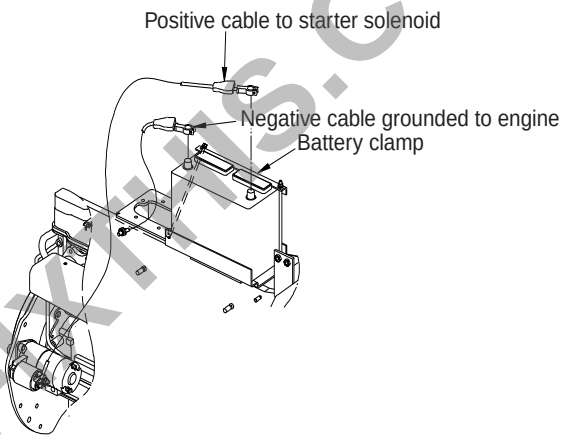
10. Replace the upper radiator shroud and venturi as described in Group 01.
11. Reconnect the radiator hoses between the radiator and the water pump and the thermostat of the engine, as described in Group 01. Before reinstallation, check that hoses are in good condition with no drying, cracking, or splitting.
12. Uncap and reconnect the fuel line at the fuel tank. Make sure the hose is in good condition with no drying, cracking, or splitting evident. Torque band clamp to 0.8-1.0 N·m (0.6-0.73 ft-lb).



13. 13.Reconnect the wiring. See Group 14 for drawings that show the wiring harness and component connection points on the engine.
14. On the standard transaxle truck, reconnect the accelerator linkage and adjust length using the adjustment nuts. See Group 02 for throttle linkage adjustments.



15. Replace the engine air cleaner and hoses. See Group 3 for complete details. Set the canister and hoses in place and align before tightening clamps and mounting nuts. Torque the base-mounting nuts to 20-25 N·m (14.8-18.5 ft-lb); torque hose-to-engine clamp to 1.9-2.9 N·m (1.4-2.1 ft-lb).
16. Replace the battery and reconnect the cables to the battery posts and to the starter and ground.

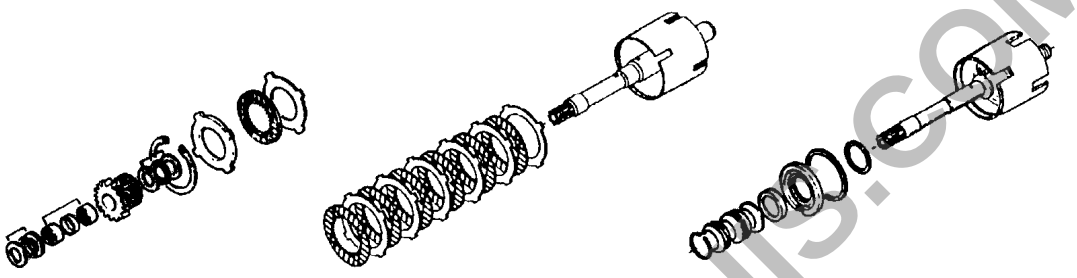


    a. Torque the terminal nuts at the battery posts to 14-20 N·m (10.3-14.8 ft-lb).
    b. Torque the nut on the starter terminal to 10-12 N·m (90-110 in-lb; 7.5-9.1 ft-lb).
    c. Install covers over cable ends after assembly.
17. Replace the seat deck according to the procedures in Group 38.
18. Close engine drain valve and fill radiator according to the prodedures presented in “Engine Cooling System Testing and Maintenance” in Group 01. Check inlet and outlet hoses for leaks.
19. Restart the engine and check all truck electrical, hydraulic, and mechanical components for proper operation before returning the truck to service.

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Clutch Assembly



Forward clutch reassembly is the same as reverse clutch (shown).

WARNING

Before reassembly, clean, inspect and lubricate all parts with a light layer of engine oil.

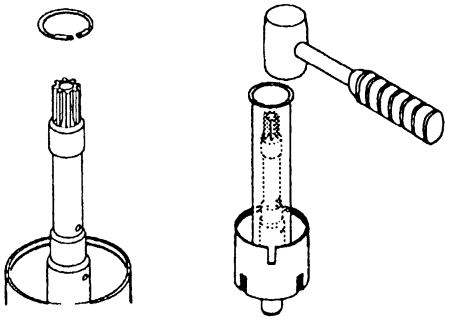
1. Install new clutch piston inner and outer oil seal rings in piston grooves.
   See figure above.

WARNING

The rings must be sized before piston installation onto shaft and into the clutch drum :

- Sizing is best accomplished by rotating the piston while holding a round object against the new seal rings.
- Rotate the piston until the seal rings are sized flush with the inner and outer diameters of the piston.

2. Install clutch piston over turbine (clutch) shaft and into clutch drum.
3. Install clutch piston wear plate (flange towards piston).
4. Install piston return springs (Belleville washers).
   Install first washer with large diameter of bevel toward wear plate.
   Alternate five (5) washers.
5. Position return spring retainer ring on clutch shaft. Start ring on shaft with snap ring pliers.
6. Install retainer ring using a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a soft hammer will compress springs and seat retainer ring. Be sure ring is seated fully in position in ring groove.



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