

ENGINE 4J SERIES

SECTION 00 SERVICE INFORMATION

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TROUBLE SHOOTING

Hard Starting

1. Starter Inoperative

Checkpoint	Possible cause	Correction
Battery	Loose battery cable terminal poor connections due to rusting	Clean and/or retighten the battery cable terminal
	Battery discharged or weak	Recharge or replace the battery
	Fan belt loose or broken	Adjust or replace the fan belt
Fusible link	Fusible link shorted	Replace the fusible link
Starter switch	Defective starter switch or starter relay	Replace the starter switch or the starter relay
Starter motor	Defective magnetic switch or starter relay	Repair or replace the magnetic switch
	Defective starter motor	Repair or replace the starter motor

2. Starter Motor Operates But Engine Does Not Turn Over

Checkpoint	Possible cause	Correction
Battery	Loose battery cable terminal	Clean and/or retighten the battery cable terminal
	Poor connections due to rusting	Recharge or replace the battery
	Battery discharged or weak	Recharge or replace the battery
	Fan belt loose or broken	Adjust or replace the fan belt
Starter	Defective pinion gear	Replace the pinion gear
	Defective magnetic switch	Repair or replace the magnetic switch
	Brush wear, Weak brush spring	Replace the brush and/or the brush spring
Engine	Piston, crank bearing seizure, or other damage	Repair or replace the related parts

3. Engine Turns Over But Does Not Start

Checkpoint	Possible cause	Correction
Engine stop mechanism	Defective fuel cut solenoid valve	Replace the fuel cut solenoid valve
Fuel is not Being Delivered to the Injection Pump		
Fuel	Fuel tank is empty	Fill the fuel tank
Fuel piping	Clogged or damaged fuel lines. Loose fuel line connection	Repair or replace the fuel lines Retighten the fuel line connection
Fuel filter	Fuel filter overflow valve does not close	Repair or replace the fuel filter overflow valve
	Clogged fuel filter element	Replace the fuel filter element or the filter cartridge
Fuel system	Air in the fuel system	Bleed the air from the fuel system
Fuel feed pump	Defective feed pump	Repair or replace the feed pump
Fuel is Being Delivered to the Injection Pump		
Fuel	Use of the wrong fuel	Use the correct fuel
	Water particles in the fuel	Change the fuel
Fuel system	Air in the injection pump	Bleed the air from the fuel system
Injection nozzle	Injection nozzle sticking	
	Injection nozzle injection starting pressure too low Improper spray condition	Adjust or replace the injection nozzle
Injection pump	Defective fuel injection nozzle resulting in the fuel drippage after fuel injection	Replace the delivery valve
	Defective injection pump control rack operation	Repair or replace the injection pump control rack
	Injection pump plunger worn or stuck	Replace the injection pump plunger assembly
	Injection pump drive shaft seizure or other damage	Replace the injection drive shaft
	Injection pump governor spring seizure	Replace the injection pump governor spring

4. Quick-On Start System

Preparation

1. Disconnect the thermoswitch connector.
2. Determine whether or not the glow plugs are receiving power.
 - a. Make sure that the starter switch is "OFF".
 - b. Connect a voltmeter between one of the glow plugs and the cylinder wall.
 - c. Move the starter switch to the "ON" position.
 The voltmeter needle will show the source voltage (12V) if the glow plugs are receiving power.
 If the voltmeter needle does not move, the glow plugs are not receiving power.
3. Perform the troubleshooting procedure.

00-4 SERVICE INFORMATION

Checkpoint	Possible cause	Correction
Glow Plugs are Receiving Power		
Glow plug indicator light does not turn on	Defective indicator light bulb	Replace the indicator light bulb
Quick-on start timer	Defective quick-on start timer	Replace the quick-on start timer
Glow plug indicator light turns on the 0.3 seconds	Defective quick-on start timer	Replace the quick-on start timer
Glow plug indicator light turns on for 3.5 seconds	Return the starter switch to the "ON" position from the "START" position after the engine starts if the glow plug relay remains on less than 14 seconds, the quick-on start timer is defective	Replace the quick-on start timer
	Move the starter switch from the "OFF" position to the "ON" position if the glow plug relay remains on less than 14 seconds, the quick-on start timer is defective	Replace the quick-on start timer
Thermo switch	Defective thermo switch	Replace the thermo switch
Glow plug continuity	No glow plug continuity	Replace the glow plugs
Glow Plugs are not Receiving Power		
Glow plug indicator light does not turn on	Broken indicator light fuse	Replace the fuse
Quick-on start timer	Defective quick-on start timer	Replace the quick-on start timer
Glow plug indicator light turns on for 3.5 seconds	Defective glow plug relay The glow plug relay does not turn on after the starter switch is moved from the "OFF" position to the "ON" position	Replace the glow plug relay
	Defective quick-on start timer	Replace the quick-on start timer
	Defective glow plug relay wiring harness	Repair or replace the wiring harness
	Defective fusible link or wiring harness The glow plug relay turns on when the starter switch is moved from the "OFF" position to the "ON" position	Replace the fusible link or the wiring harness

* When being normal temperature, the indicator lamp of 4JH1TC is not turn on.

Unstable Idling

Checkpoint	Possible cause	Correction
Idling system	Idling improperly adjusted	Adjust the idling
Fast idling speed	Defective fast idling speed control device	Repair or replace the fast idling speed control device
Accelerator control system	Accelerator control system improperly adjusted	Adjust the accelerator control system
Fuel system	Fuel system leakage or blockage	Repair or replace the fuel system
	Air in the fuel system	Bleed the air from the fuel system
	Water particles in the fuel system	Change the fuel
Fuel filter	Clogged fuel filter element	Replace the fuel filter element or the fuel filter cartridge
Fuel feed pump	Defective fuel feed pump	Repair or replace the fuel feed pump
Injection nozzle	Injection nozzle sticking	Replace the injection nozzle
	Injection nozzle injection starting pressure too low	Adjust or replace the injection nozzle
	Improper spray condition	
Injection pump	Defective delivery valve resulting in fuel drippage after fuel injection	Replace the delivery valve
	Injection timing improperly adjusted	Adjust the injection timing
	Insufficient injection volume	Adjust the injection volume
	Defective idle spring	Replace the idle spring
	Defective governor lever operation	Repair or replace the governor lever
	Regulator valve improperly adjustment	Adjust or replace the regulator valve
	Broken plunger spring	Replace the plunger spring
	Worn plunger	Replace the plunger assembly
	Worn cam disc	Replace the cam disc
Valve clearance	Valve clearance improperly adjusted	Adjust the valve clearance
Compression pressure	Blown out cylinder head gasket. Worn cylinder liner. Piston ring sticking	Replace the related parts

*The adjustment of the position which is related to the injection pump is unnecessary for 4JH1TC by the adoption of the electronic control injection pump.

Insufficient Power

Checkpoint	Possible cause	Correction
Air cleaner	Clogged air cleaner element	Clean or replace the air cleaner element
Fuel	Water particle in the fuel	Replace fuel
Fuel filter	Clogged fuel filter element	Replace the fuel filter element or the fuel filter cartridge
Fuel feed pump	Defective fuel feed pump	Repair or replace the fuel feed pump
Injection nozzle	Injection nozzle sticking	Replace the injection nozzle
	Injection nozzle injection starting pressure too low	Adjust or replace the injection nozzle
	Improper spray condition	
Fuel injection pipes	Fuel injection pipes damaged or obstructed	Replace the fuel injection pipes
Injection pump	Defective regulating valve	Repair or replace the regulating valve
	Defective delivery valve	Replace the delivery valve
	Defective timer	Repair or replace the timer
	Worn cam disc	Replace the cam disc
	Improper control lever operation	Adjust or replace the control lever
	Defective injection timing	Adjust the injection timing Repair or replace the injection pump timer
	Weak governor spring	Replace the governor spring
	Worn plunger	Replace the plunger assembly
Compression pressure	Blown out cylinder head gasket. Worn cylinder liner. Piston ring sticking	Replace the related parts
Valve clearance	Valve clearance improperly adjusted	Adjust the valve clearance
Valve spring	Valve spring weak or broken	Replace the valve spring
Exhaust system	Exhaust pipe clogged	Clean the exhaust pipe
Full load adjusting screw seal	Open and improperly set adjusting screw seal	Adjust and reseal the adjusting screw

Excessive Fuel Consumption

Checkpoint	Possible cause	Correction
Fuel system	Fuel leakage	Repair or replace the fuel system related parts
Air cleaner	Clogged air cleaner element	Clean or replace the air cleaner element
Idling speed	Poorly adjusted idling speed	Adjust the idling speed
Injection nozzle	Injection nozzle injection starting pressure too low Improper spray condition	Adjust or replace the injection nozzle
Fuel injection timing	Fuel injection timing improperly	Adjust the fuel injection timing
Injection pump	Defective Delivery valve resulting is fuel drippage after fuel injection	Replace the delivery valve
Valve clearance	Valve clearance improperly adjusted	Adjust the valve clearance
Compression pressure	Blown out cylinder head gasket. Worn cylinder liner. Piston ring sticking	Replace the related parts
Valve spring	Valve spring weak or broken	Replace the valve spring

Excessive Oil Consumption

Checkpoint	Possible cause	Correction
Engine oil	Engine oil unsuitable Too much engine oil	Replace the engine oil Correct the engine oil level
Oil seal and gasket	Oil leakage from the oil seal and/or the gasket	Replace the oil seal and/or the gasket
Air breather	Clogged air breather	Clean the air breather
Intake and exhaust valve	Worn valve stems and valve guides	Replace the intake and exhaust valves and the valve guides

Overheating

Checkpoint	Possible cause	Correction
Cooling water	Insufficient cooling water	Replenish the cooling water
Fan clutch	Oil leakage from the fan clutch	Replace the fan clutch
Fan belt	Fan belt loose or cracked causing slippage	Replace the fan belt
Radiator	Defective radiator cap or clogged radiator core	Replace the radiator cap or clean the radiator core
Water pump	Defective water pump	Repair or replace the water pump
Cylinder head and cylinder body sealing cap	Defective sealing cap resulting in water leakage	Replace the sealing cap
Thermostat	Defective thermostat	Replace the thermostat
Cooling system	Cooling system clogged by foreign material	Clean the foreign material from the cooling system
Fuel injection timing	Fuel injection timing improperly adjusted	Adjust the fuel injection timing

White Exhaust Smoke

Checkpoint	Possible cause	Correction
Cooling water	Insufficient cooling water	Replace the cooling water
Fuel	Water particles in the fuel	Replace the fuel
Fuel injection timing	Delayed fuel injection timing	Adjust the fuel injection timing
Compression pressure	Blown out cylinder head gasket. Worn cylinder liner. Piston ring sticking	Replace the related parts
Inlet and exhaust valve Valves seals	Defective valve seals. Worn valves stems and valve guides	Replace the valve seals, the valves, and the valve guides

Dark Exhaust Smoke

Checkpoint	Possible cause	Correction
Air cleaner	Clogged air cleaner element	Clean or replace the air cleaner element
Injection nozzle	Injection nozzle injection starting pressure too low Improper spray condition	Adjust or replace the injection nozzle
Fuel injection timing	Fuel injection timing improperly adjusted	Adjust the fuel injection timing
Injection pump	Defective delivery valve resulting in fuel drippage after fuel injection	Replace the delivery valve
	Excessive injection volume	Adjust the injection volume

Oil Pressure Does Not Rise

Checkpoint	Possible cause	Correction
Engine oil	Improper viscosity engine oil. Insufficient engine oil	Replace the engine oil Correct the engine oil volume
Oil pressure gauge or unit	Defective oil pressure gauge or unit	Repair or replace the oil pressure gauge or unit
Oil pressure indicator light	Defective indicator light	Replace the indicator light
Oil filter	Clogged oil filter element	Replace the oil filter element or the oil filter cartridge
Relief valve and by-pass valve	Relief valve sticking and/or weak by-pass valve spring	Replace the relief valve and/or the by-pass valve spring
Oil pump	Clogged oil pump strainer	Clean the oil pump strainer
	Worn oil pump related parts	Replace the oil pump related parts
Rocker arm shaft	Worn rocker arm bushing	Replace the rocker arm bushing
Camshaft	Worn camshaft and camshaft bearing	Replace the camshaft and the camshaft bearing
Crankshaft and bearings	Worn crankshaft and bearings	Replace the crankshaft and/or the bearings

Abnormal Engine Noise

1. Engine Knocking

Check to see that the engine has been thoroughly warmed up before beginning the troubleshooting procedure.

Checkpoint	Possible cause	Correction
Fuel	Fuel unsuitable	Replace the fuel
Fuel injection timing	Fuel injection timing improperly adjusted	Adjust the fuel injection timing
Injection nozzle	Improper injection nozzle starting pressure and spray condition	Adjust or replace the injection nozzle
Compression pressure	Blown out head gasket Broken piston ring	Replace the head gasket or the piston ring

2. Gas Leakage Noise

Checkpoint	Possible cause	Correction
Exhaust pipes	Loosely connected exhaust pipes. Broken exhaust pipes	Tighten the exhaust pipe connections Replace the exhaust pipes
Injection nozzles and/or glow plugs	Loose injection nozzles and/or glow plugs	Replace the washers Tighten the injection nozzles and/or the glow plugs
Exhaust manifold	Loosely connected exhaust manifold and/or glow plugs	Tighten the exhaust manifold connections
Cylinder head gasket	Damaged cylinder head gasket	Replace the cylinder head gasket

3. Continuous Noise

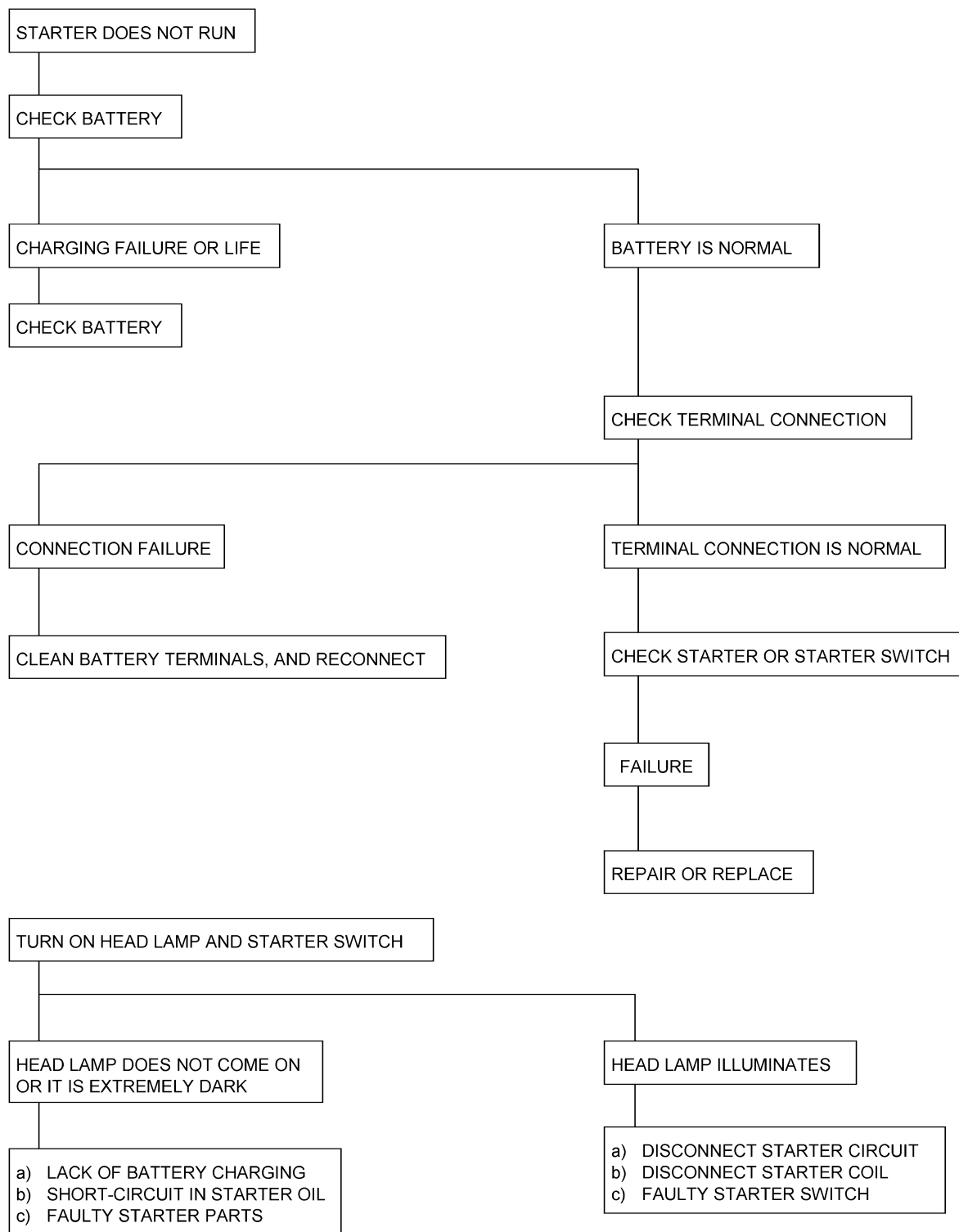
Checkpoint	Possible cause	Correction
Fan belt	Loose fan belt	Readjust the fan belt tension
Cooling fan	Loose cooling fan	Retighten the cooling fan
Water pump bearing	Worn or damaged water pump bearing	Replace the water pump bearing
Generator or vacuum pump	Defective generator or vacuum pump Defective generator or vacuum pump	Repair or replace the generator or the vacuum pump
Valve clearance	Clearance improperly adjust	Adjust the valve clearances

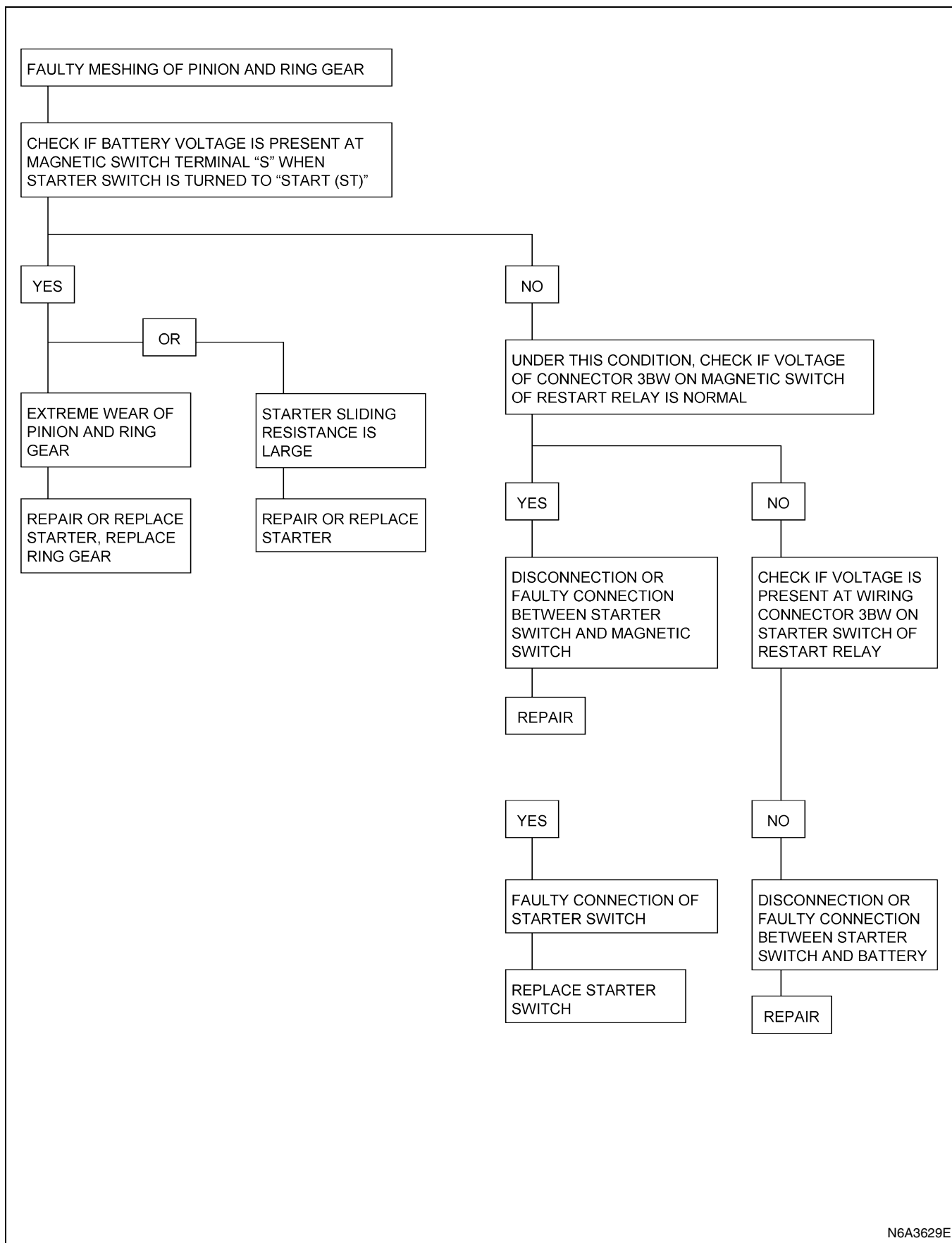
4. Slapping Noise

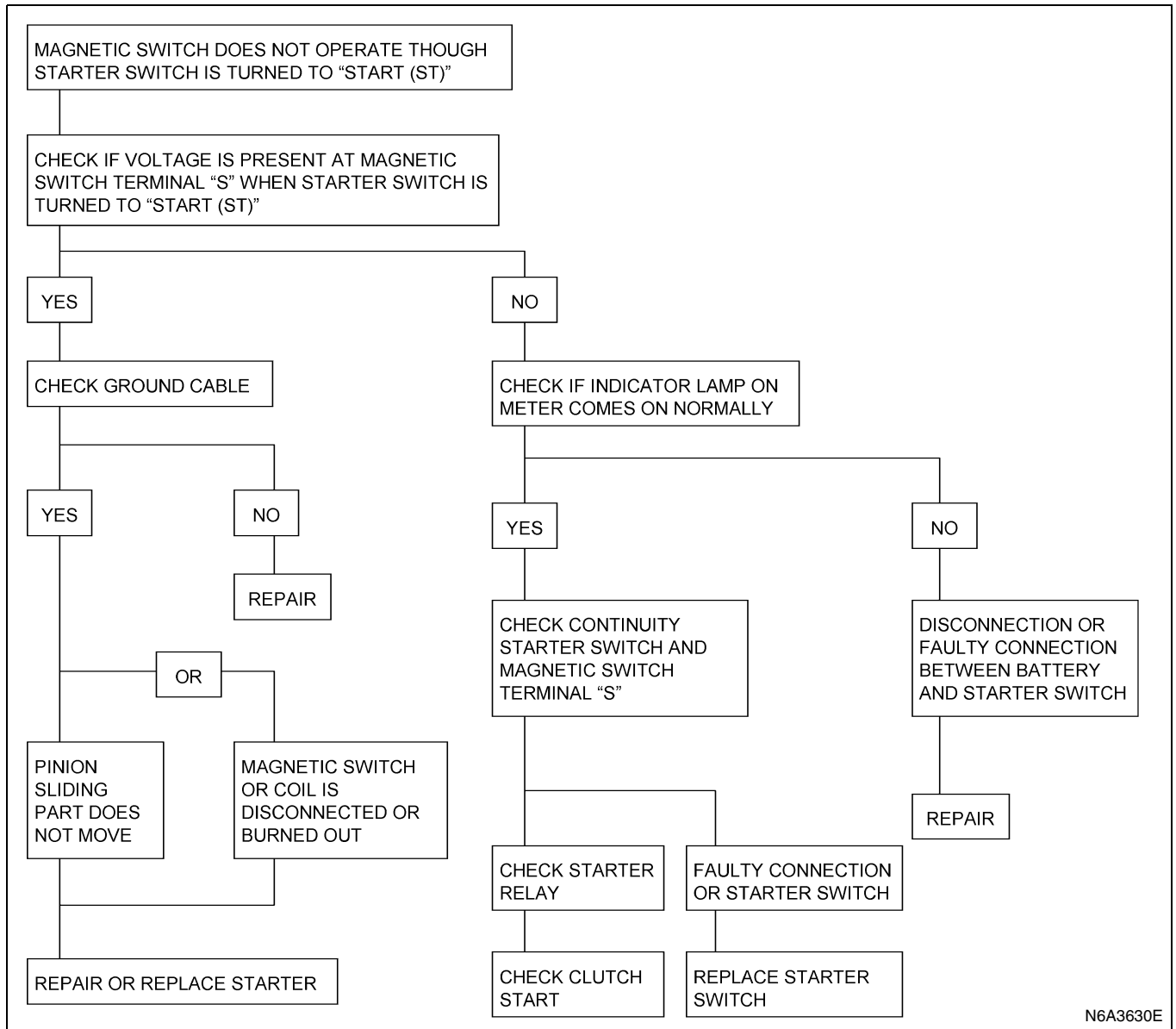
Checkpoint	Possible cause	Correction
Valve clearance	Valve clearance improperly adjusted	Adjust the valve clearance
Rocker arm	Damaged rocker arm	Replace the rocker arm
Flywheel	Loose flywheel bolts	Retighten the flywheel bolts
Crankshaft and thrust bearings	Worn or damaged crankshaft and/or thrust bearings	Replace the crankshaft and/or the thrust bearings
Crankshaft and connecting rod bearings	Worn or damaged crankshaft and/or connecting rod bearings	Replace the crankshaft and/or the connecting rod bearings
Connecting rod bushing and piston pin	Worn or damaged connecting rod bushing and piston pin	Replace the connecting rod bushing and/or the piston pin
Piston and cylinder liner	Worn or damaged piston and cylinder liner.	Replace the piston and the cylinder liner.

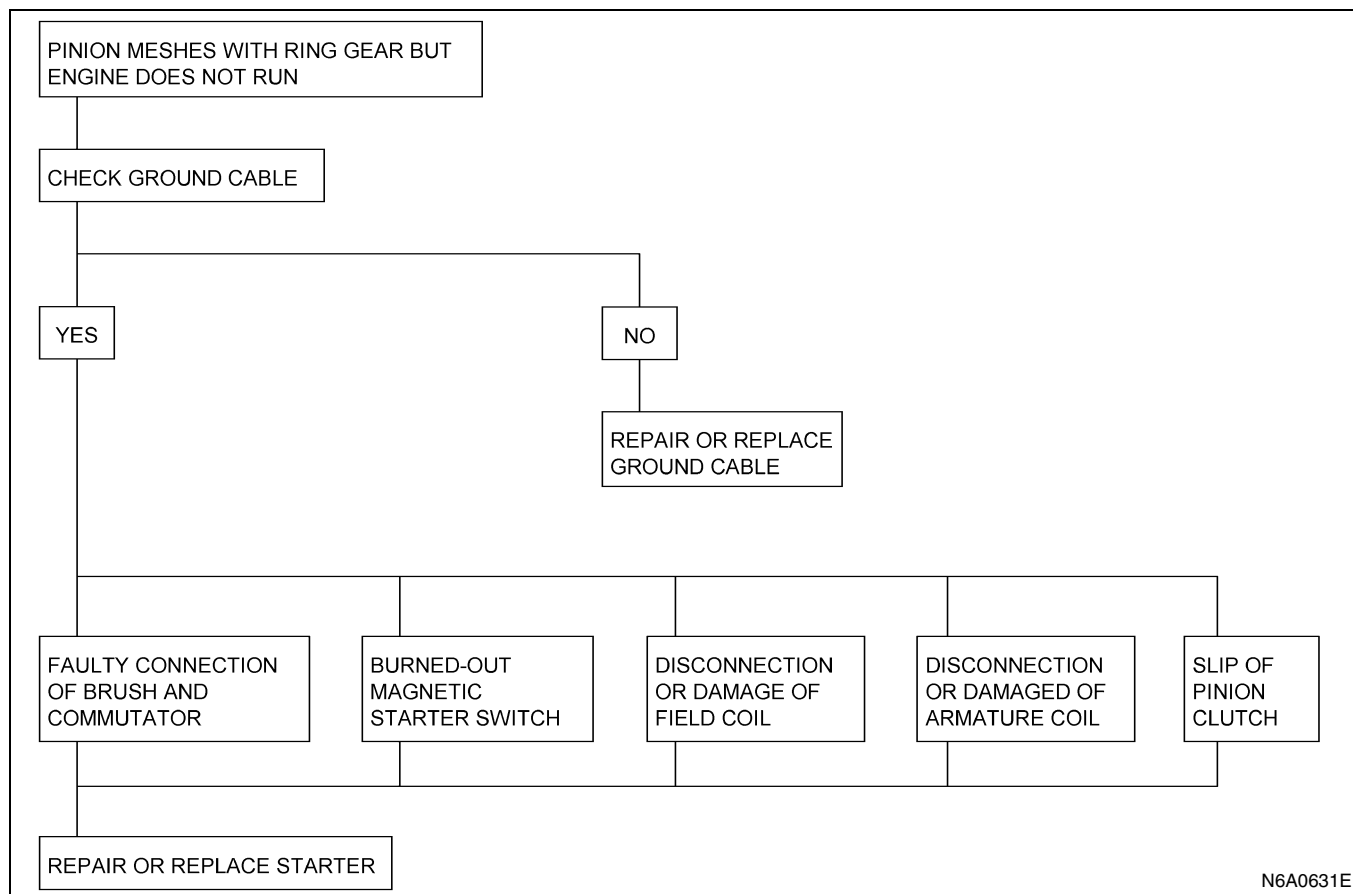
Engine Cooling Trouble

Checkpoint	Possible cause	Correction
Engine overheating	Low coolant level	Replenish
	Thermo unit faulty	Replace
	Faulty thermostat	Replace
	Faulty coolant unit	Repair or replace
	Clogged radiator	Clean or replace
	Faulty radiator cap	Replace
	Low engine oil level or use of improper engine oil	Replenish or change oil Replenish
	Damaged cylinder head gasket	Replace
	Clogged exhaust system	Clean exhaust system or replace faulty parts
	Loose fan belt	Adjust
	Excessive fuel injected	Adjust
	Improper injection timing	Adjust
Engine overcooling	Faulty thermostat	Replace
Too long engine warm-up time	Faulty thermostat	Replace
	Thermo unit faulty	Replace

Engine Electrical Part Trouble





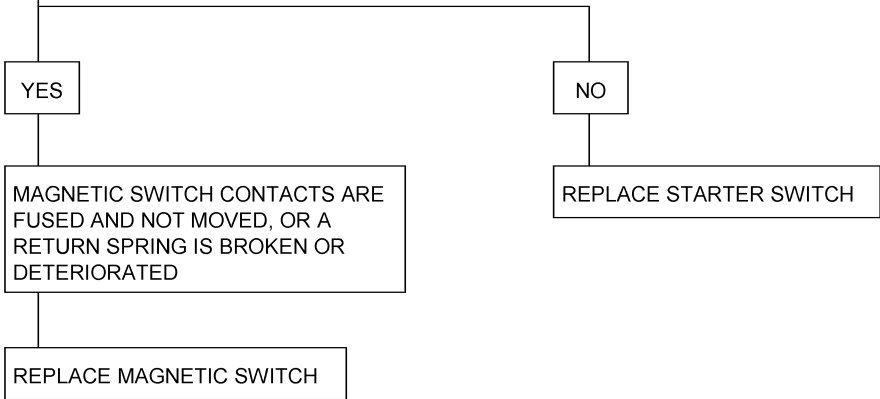


STARTER DOES NOT STOP THOUGH STARTER SWITCH IS RETURNED TO "ON" FROM "START"

DISCONNECTED STARTER SWITCH WIRING CONNECTOR, AND CHECK STARTER SWITCH OPERATION.

KEY POSITION	BATTERY B1	IGNITION IG1	BATTERY B2	ACCESSORIES ACC	IGNITION IG2	STARTER ST
LOCK						
OFF						
ACC			●	●		
ON	●	●	●	●	●	
START	●	●	●		●	●

THERE MUST BE NO CONTINUITY EXCEPT ABOVE LINES.



Turbocharger**Engine Has Less Than Normal Power**

Checkpoint		Trouble Cause	Countermeasure
Air cleaner	NG	Restricted	Clean or replace
OK			
Intake pipe and hose	NG	Restricted	Clean or replace
OK			
Compressor/Intake manifold	NG	Loose (Leaking)	Repair
OK			
Exhaust manifold/turbine inlet	NG	Loose (Leaking)	Repair
OK			
Exhaust piping and silencers	NG	Restricted	Clean or replace
OK			
Air breather	NG	Restricted	Clean or replace
OK			
Boost compensator (Injection pump)	NG	Defective	Repair or replace
Continued on the next page			

Checkpoint**Trouble Cause****Countermeasure**

Continued from the previous page

OK |

Compressor wheel

NG

Impact damage

Replace

OK |

Turbine wheel

NG

Impact damage

Replace

NG

Carbon build-up

Replace

OK |

Rotating assembly

NG

Dragging or seized

Replace

Blue or Black Smoke

Checkpoint		Trouble Cause	Countermeasure
Air cleaner or intercooler	NG	Restricted	Clean, repair, or replace
	OK		
Turbocharger oil seal	NG	Leakage	Replace
	OK		
Turbocharger oil drain pipe	NG	Restricted	Repair or replace
	OK		
Air breather	NG	Restricted	Clean
	OK		
Boost compensator (Injection pump)	NG	Defective	Repair or replace
	OK		
Compressor wheel	NG	Impact damage	Replace
	OK		
Turbine wheel	NG	Impact damage	Replace
	OK		
Center housing oil drain passage	NG	Restricted	Clean or replace
	OK		

Excessive Oil Consumption

Checkpoint		Trouble Cause	Countermeasure
Air breather	NG	Restricted	Clean
	OK		
Boost compensator (Injection pump)	NG	Defective	Repair or replace
	OK		
Turbocharger oil seal	NG	Leakage	Replace
	OK		
Turbocharger oil drain pipe	NG	Restricted	Clean or replace
	OK		
Turbine wheel	NG	Impact damage	Replace
	OK		
Compressor wheel	NG	Impact damage	Replace
	OK		
Oil pressure	NG	Excessive	Repair
	OK		
Center housing oil drain passage	NG	Restricted	Clean or replace
	OK		

Excessive Turbocharger Noise

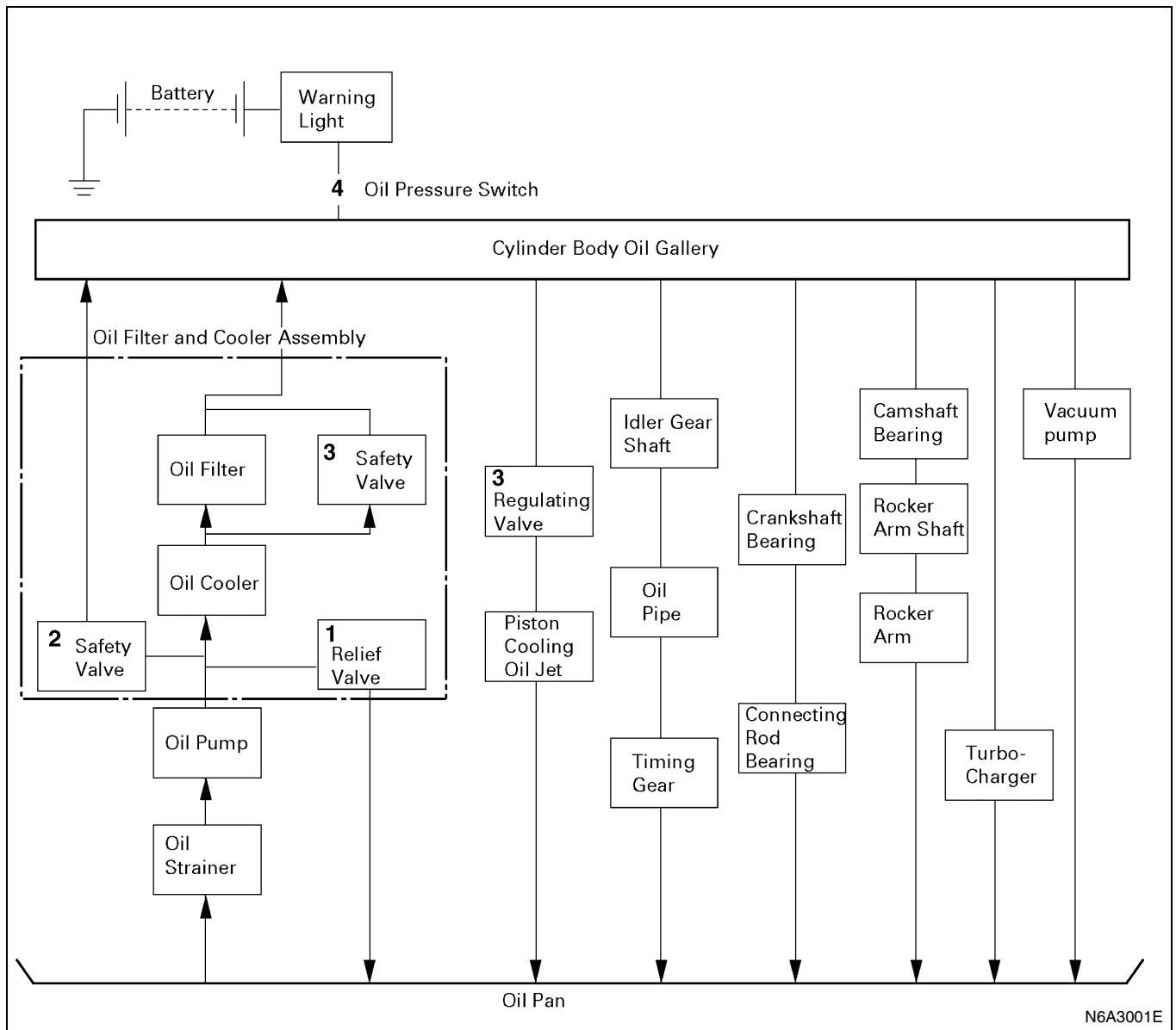
Checkpoint		Trouble Cause	Countermeasure
Intake and exhaust system joints	NG	Restricted	Repair
OK			
Intake and exhaust system gaskets	NG	Damaged	Replace
OK			
Turbocharger rotating parts	NG	Rough rotation	Replace
Compressor wheel	NG	Rubbing against housing	Repair or replace
	NG	Damaged	Replace
OK			
Turbine wheel	NG	Rubbing against housing	Repair or replace
	NG	Damaged	Replace
	NG	Carbon deposits	Clean or replace

Continued on the next page

Checkpoint		Trouble Cause	Countermeasure
Continued from the previous page			
OK			
Oil level	NG	Too low	Correct
	NG	Contaminated	Replace oil
OK			
Turbocharger oil feed pipe	NG	Restricted	Repair or replace
OK			
Turbine housing	NG	Carbon deposits	Clean
OK			
Compressor housing	NG	Dirty	Clean
OK			
Turbine shaft bearings	NG	Worn	Replace

Excessive Rotating Part Wear

Checkpoint		Trouble Cause	Countermeasure
Engine oil	NG	Contaminated	Change
	NG	Wrong grade or type	Change
OK			
Turbocharger oil feed pipe	NG	Restricted	Clean or replace
OK			
Turbocharger oil seal	NG	Defective	Replace
OK			
Center housing oil drain passage	NG	Restricted	Clean or replace
OK			
Turbine shaft	NG	Oil sludge and coking	Replace
OK			
Engine lubrication system	NG	Inadequate oil supply	Correct

Lubrication Chart**4JB1, 4JB1-TC, 4JG2, 4JH1-TC, Oil Filter & Oil Cooler**

N6A3001E

Operating PressureOil filter relief valve (1): 559 — 618 kPa (5.7 — 6.3 kg/cm²/81 — 90 psi)Oil cooler safety valve (2): 314 — 373 kPa (3.2 — 3.8 kg/cm²/46 — 54 psi)Oil filter safety valve (3): 78 — 118 kPa (0.8 — 1.2 kg/cm²/11 — 19 psi)Oil pressure switch (4): 29.4 — 49.0 kPa (0.3 — 0.5 kg/cm²/4.3 — 7.1 psi)

The 4J Series engine lubricating system is a full flow type.

Lubricating oil is pumped from the oil pump to the cylinder body oil gallery through the oil cooler and the oil filter (replaceable type oil filters have on oil cooler). It is then delivered to the vital parts of the engine from the cylinder body oil gallery.

MAIN DATA AND SPECIFICATIONS

Main Data and Specifications

		Engine model		
		4JB1 / 4JB1-TC	4JG2	4JH1-TC
Item	Engine type	Four-cycle, overhead valve, water injection		
	Combustion chamber type	Direct injection	Swirl	Direct injection
	Cylinder liner type	Dry type, chrome plate, stainless steel tube		
	Timing train system	Gear drive	Gear and Belt Drive	Gear drive
	No. of cylinders — Bore × stroke	4 — 93 × 102 (3.66 × 4.02)	4 — 95.4 × 107 (3.76 × 4.21)	4 — 95.4 × 104.9 (3.76 × 4.16)
	No. of piston rings	Compression rings: 2 / Oil ring: 1		
	Total piston displacement	2,771 (169.0)	3,059 (186.6)	2,999 (183.3)
	Compression ratio (to 1)	18.2 (4JB1) 18.1 (4JB1-TC)	20.1	18.3
	Compression pressure	3,038 (31/441)	3,334 (34/483.8)	2,746 (28/398)
	Engine weight (Dry)	Approximately 2,245 (229/505) (4JB1) 2,511 (256/564) (4JB1-TC)	Approximately 2,403 (245/540)	Approximately 2,500 (255/562)
	Fuel injection order	1 — 3 — 4 — 2		
	Fuel injection timing	BTDC 12 ('91/542A) (4JB1) BTDC 4 (4JB1-TC)	TDC 0° (Belt '91/ 542B)	Not Adjustment
	Specified fuel type	SAE No. 2 diesel fuel		
	Idling speed	750 — 790	700 — 740	675 — 725
	Valve clearance (AT cold)	0.40 (0.016)		
	Exhaust: mm (in)	0.40 (0.016)		
	Valve clearance (AT hot)	0.45 (0.018)		
	Exhaust: mm (in)	0.45 (0.018)		
	Intake valves	Open at (BTDC) deg	24.5	
		Close at (BTDC) deg	55.5	
	Exhaust valves	Open at (BTDC) deg	54	
		Close at (BTDC) deg	26	

Notice:

G.EXP: General Export Model

EC: European Countries

Emission Gas Control Standard

'91/542A: Euro 1

'91/543 B: Euro 2

		Engine model		
		4JB1 / 4JB1-TC	4JG2	4JH1-TC
Item	Lubrication system			
	Lubrication method	Pressurized circulation		
	Specified engine oil (API grade)	CC (4JB1) CD (4JB1-TC)	CC	CD
	Oil pump type	Gear		
	Oil filter type	Disposable cartridge (Spin-on) Paper element		
	Oil capacity lit (US/UK gal) (Including oil filter)	6.6 — 7.1 (1.74 — 1.87/2.62 — 2.82) (For EC 6.2 — 8.2 (2.17 — 1.64/1.36 — 1.80))		6.0 — 8.0 (1.59 — 2.11/2.38 — 3.18)
	Oil cooler type	Water cooled		
	Fuel system			
	Injection pump type	Bosch distributor		Bosch VP44
	Governor type	Mechanical (Partially variable speed) (For EC Variable speed)		Electronically controlled fuel injection system
	Injection nozzle type	Hole	Pinttle	Hole
	Injection nozzle opening pressure kPa (kg/cm ² /psi)	18,142 (185/2,631) (4JB1) 1st: 19,500 (199/2,830) 2nd: 26,500 (270/3,840) (4JB1-TC)	14,710 (150/2,133)	1st: 19,500 (199/2,830) 2nd: 33,800 (345/4,906)
	Main fuel filter type	Cartridge paper element and water separator		Cartridge paper element with built in water separator
	Air cleaner type	Dry paper element		
	Generator capacity V — A (W)	12 — 40 (480) and 12 — 15 (600)	12 — 50	12 — 60 (720) 12 — 80 (960)
	Starter motor output V — kW	12 — 2.0 and 12 — 2.2	12 — 2.0	12 — 2.2 12 — 2.0 (For Taiwan)
	Turbocharger	IHI RHF4 (4JB1-TC)		IHI RHF5

Engine Cooling

Cooling system	Coolant forced circulation	
Radiator	(2 tube in row) Tube type Corrugated	
Heat radiation capacity	kcal/h	71400
Heat radiation area	m ² (ft ²)	11.78 (126.8)
Front area	m ² (ft ²)	0.216 (2.325)
Dry weight	N (kg/lb)	105 (10.7/23.6)
Radiator cap		
Valve opening pressure	kPa (kg/cm ² /psi)	88.2 — 116.7 (0.899 — 1.199/12.78 — 17.05)
Coolant capacity	lit (Imp.qt./US qt.)	3.1 (2.73/3.28) (For EC 5.8 (5.1/6.13))
Coolant pump		
Pulley type	Centrifugal impeller type	
Pulley ratio	1.2	
Thermostat type	Wax pellet with jiggle valve.	
Valve opening	°C (°F)	82 (180)
Valve full open	°C (°F)	95 (203)
Coolant total capacity	lit (Imp.qt./US qt.)	10 (8.80/10.57) (For EC 7.3 (6.42/7.71))

Starting System

Manufacturer		DENSO		
Engine model		4JB1 / 4JB1-TC	4JG2 (G. EXP)	4JH1-TC
Rating				
Voltage	V	12		
Output	kW	2.0	2.2	2.2
Time	Sec.	30		
Number of tooth of pinion		9		
Rotating direction (as viewed from pinion)		Clockwise		
Weight (approx.)	kg	4.6	5.4	6.0
No-load characteristics				
Voltage / current	V/A	11.5/100 or less		11.5/120
Speed	rpm	3700 or more		4000
Load characteristics				
Voltage / current	V/A	7.5/500 or less		7.5/500
Torque	N·m (kg·m/lb·ft)	13.7 (1.4/10.1)		12.7 (1.3/9.4)
Speed	rpm	1200 or more	1400 or more	1400
Locking characteristics				
Voltage / current	V/A	2.4/800 or less	2.0/850 or less	2.0/850
Torque	N·m (kg·m/lb·ft)	18 (1.8/13 or more)	16 (1.6/12) or more	15.7 (1.6/12)

Charging system

Manufacturer		HITACHI LR150-449B	HITACHI LR160-502B	HITACHI LR180-512
Rated voltage	V	12	12	12
Rated out put	A	50	60	80
Rotating direction (As viewed from pulley)		Clockwise	Clockwise	Clockwise
Pulley effective diameter	mm (in)	80 (3.15)	82 (3.23)	82 (3.23)
Weight (with pump)	kg (lb)	6.0 (13.27) 4JB1-TC 4JB1/4JG2	5.8 (12.78) 4JH1-TC	6.3 (13.88) 4JH1-TC

SERVICE STANDARD

Engine Mechanical

mm (in)								
Parts	Item	Service standard			Service limit			Remarks
		4JH1-TC	4JG2	4JB1 / 4JB1-TC	4JH1-TC	4JG2	4JB1 / 4JB1-TC	
Cylinder Head	Cylinder head deck, and exhaust manifold mating surface for flatness	0.05 (0.002) or less			0.2 (0.0079)			Cannot be Reground
	Cylinder head height	92.0 (3.622)			91.55 (3.6043)			
	Cylinder Head Lower Face Warpage.	0.05 (0.002) or less			0.20 (0.008)			
	Manifold Warpage.	0.05 (0.002) or less			0.20 (0.008)			
	Hot plug sinking	—			0.02 (0.0008)			
	Hot plug exert pressure	4,500 — 5,500 kg (9922.5 — 12127.5 lbs)			—			
Valve Spring	Free height	48.0 (1.891)			47.10 (1.856)			At installed height 38.9 (1.531)
	Squareness	—			1.7 (0.067)			
	Spring tension N (kg/lb)	296 (30.2/66.4)			257.9 (26.3/57.9)			
Valve and Valve Guide	Diameter	IN	7.946 — 7.961 (0.3128 — 0.3134)		7.880 (0.3102)			
	Valve Stem	EX	7.921 — 7.936 (0.3118 — 0.3124)		7.850 (0.3090)			
	Valve and valve guide clearance	IN	0.039 — 0.069 (0.0015 — 0.0027)		0.200 (0.0079)			
		EX	0.064 — 0.096 (0.0025 — 0.0038)		0.250 (0.0098)			
	Valve guide upper end height (Measured from the Cylinder head upper face)		13.0 (0.512)		—			
	Valve guide margin		1.1 (0.0433)		1.6 (0.0630)			
	Valve thickness	IN	1.41 (0.0556)	1.79 (0.0705)	1.1 (0.0433)	1.5 (0.06)		
		EX	1.39 (0.0547)	1.83 (0.0720)	1.1 (0.0433)	1.5 (0.06)		
	Valve seat contact surface angle		45°					
	Valve seat contact width	IN	1.7 (0.0669)		2.2 (0.0866)			
EX		2.0 (0.0787)		2.5 (0.0984)				
Push rod	Curvature	—			0.4 (0.0157) or less			

mm (in)								
Parts	Item	Service standard			Service limit			Remarks
		4JH1-TC	4JG2	4JB1 / 4JB1-TC	4JH1-TC	4JG2	4JB1 / 4JB1-TC	
Cam-shaft	End play	0.08 (0.0031)			0.2 (0.0079)			
	Cam lobe height	42.02 (1.6543)			41.65 (1.6397)			
	Journal diameter	49.945 — 49.975(1.9663 — 1.9675)			49.60 (1.9527)			
	Runout	0.02 (0.0008) or less			0.10 (0.0039)			
	Camshaft bearing inside diameter	50.000 — 50.030 (1.9685 — 1.9697)			50.08(1.9716)			
	Camshaft oil clearance	0.025 — 0.085 (0.0098 — 0.00334)			0.12 (0.0047)			
Tappet	Outside diameter	12.97 — 12.99 (0.5106 — 0.5114)			12.95 (0.5098)			
	Oil clearance (Between tappet and cylinder body)	0.03 (0.0118)			0.10 (0.0039)			
Rocker arm Assembly	Rocker shaft outside diameter	18.98 — 19.00 (0.7472 — 0.7480)			18.90 (0.7440)			
	Rocker arm inside diameter	19.036 — 19.060 (0.7494 — 0.7504)			19.10 (0.7520)			
	Oil clearance (Between rocker arm and rocker shaft)	0.06 — 0.08 (0.00235 — 0.00315)			0.10 (0.004)			
	Rocker shaft runout	—			0.2 (0.0079) or less			
Oil pump	Oil clearance Body and gear	0.14 (0.0055)			0.20 (0.0079)		0.15 (0.0059)	
	Body cover and gear	0.06 (0.0024)			0.15 (0.0059)			
Crank-shaft	Thrust clearance	0.10 (0.0039)			0.30 (0.018)			
	Main bearing clearance (Between main bearing and Crankshaft)	0.037—0.068 (0.0015 — 0.0027)	0.031 — 0.063 (0.0012 — 0.0025)	0.035 — 0.080 (0.0014 — 0.0032)	0.11 (0.0043)			
	Crankshaft runout	0.05 (0.00197) or less			0.08 (0.0031)			
	Main journal diameter	69.917 — 69.932 (2.7526 — 2.7532)			69.91 (2.7524)			
	Crankshaft pin diameter	52.915 — 52.930 (2.0833 — 2.0839)			52.90 (2.0827)			
	Crankshaft Journal and Crank Pin uneven wear	0.05 (0.002) or less			0.08 (0.003)			
	Crank Pin and Bearing Clearance.	0.029 — 0.066 (0.0011 — 0.0026)			0.100 (0.0039)			

00-30 SERVICE INFORMATION

mm (in)												
Parts	Item	Service standard			Service limit			Remarks				
		4JH1-TC	4JG2	4JB1 / 4JB1-TC	4JH1-TC	4JG2	4JB1 / 4JB1-TC					
Piston, Piston pin, Piston ring and Connecting rod	Piston diameter	95.355	95.365	92.985								
		—	—	—								
		95.394	95.404	93.024					—			
		(3.7541	(3.7545	(3.6600								
	—	—	—									
	3.7557)	3.9039)	3.6623)									
	Piston Clearance (Between piston and Cylinder liner)	0.025 —										
		0.045										
		(0.0019 — 0.0026)										
		—										
	Piston ring gap	1st	0.30 —							0.20 —	0.20 —	1.5 (0.0591)
			0.50							0.35	0.40	
			(0.0118		(0.0079	(0.0079						
			—		—	—						
		2nd	0.0197)		0.0138)	0.0157)	1.5 (0.0591)					
			0.30 —		0.37 —	0.20 —						
			0.50	0.52	0.40							
			(0.0118	(0.0146	(0.0079							
		Oil	—	—	—	1.5 (0.0591)						
			0.0197)	0.0205)	0.00157)							
0.25 —			0.20 —	0.10 —								
0.45			0.40	0.30								
Piston ring clearance	1st	(0.0098	(0.0079	(0.0039	0.15 (0.0059)							
		—	—	—								
		0.0177)	0.00157)	0.0118)								
		0.09 — 0.13 (0.0035 — 0.0051)										
	2nd	0.090 — 0.125 (0.0035 — 0.0049)					0.15 (0.0059)					
		—										
		0.050 — 0.075 (0.0020 — 0.0030)										
		0.05 — 0.09 (0.002 — 0.0035)										
	Oil	0.0030)				0.15 (0.0059)						
		0.03 — 0.07 (0.0012 — 0.0028)										
	Piston pin diameter	30.995	33.995	30.995				33.970 (1.3374)	30.970 (1.2190)			
		—	—	—								
31.000		34.000	31.000									
(1.2202		(1.3384	(1.2202									
Fitting interference (Between connecting rod and piston pin)	—	—	—	0.05 (0.0020)								
	1.2204)	1.3386)	1.2204)									
	0.008 — 0.020 (0.0003 — 0.0008)											
	0.002 — 0.015 (0.0001 — 0.0006)											
Fitting interference (Between piston and piston pin)	0.04 (0.0016)											

mm (in)								
Parts	Item	Service standard			Service limit			Remarks
		4JH1-TC	4JG2	4JB1 / 4JB1-TC	4JH1-TC	4JG2	4JB1 / 4JB1-TC	
Piston, Piston pin, Pis- ton ring and Con- necting rod	Connecting rod align- ment	0.08 (0.0031) or less			0.20 (0.0079)			Per 100 (3.94)
	Twist	0.05 (0.0020) or less			0.15 (0.0059)			Per 100 (3.94)
	Piston pin and Con- necting Rod Bushing Clearance	0.008 — 0.020 (0.0003 — 0.0008)			0.050 (0.0020)			
	Connecting rod thrust clearance	0.230 (0.0091)			0.35 (0.0138)			
	Oil clearance (Between crank pin and Connecting rod)	0.029 — 0.083 (0.0014 — 0.0033)		0.029 — 0.066 (0.0011 — 0.0026)	0.100 (0.0039)			
Cylinder Block	Warpage (Upper sur- face of the cylinder block)	—			0.20 (0.0079)			
	Cylinder bore diame- ter	97.000 — 97.040 (3.8189 — 3.8205)		95.011 — 95.040 (3.7406 — 3.7417)				
	Cylinder liner projec- tion	0.0 — 0.1 (0.00 — 0.0039)						
	Cylinder liner inside diameter	95.420 — 95.460 (3.7567 — 3.7583)		93.020 — 93.060 (3.6622 — 3.6638)				
	Cylinder liner outside diameter	97.011 — 97.050 (3.8193 — 3.8209)		95.011 — 95.050 (3.7405 — 3.7421)				

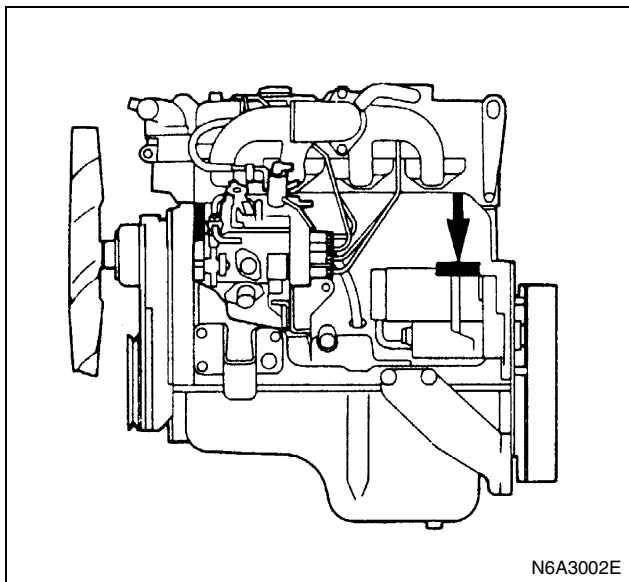
SERVICING

Servicing refers to general maintenance procedures to be performed by qualified service personnel.

Model Identification

Engine Serial Number

The engine number is stamped on the front left hand side of the cylinder body.



Air Cleaner

Dry Type Paper Element

Element cleaning procedures will vary according to the condition of the element.

Dust Fouled Element

Rotate the element with your hand while applying compressed air to the inside of the element. This will blow the dust free.

Compressed air pressure	kPa (kg/cm ² /psi)
392 — 490 (4 — 5/57 — 71)	

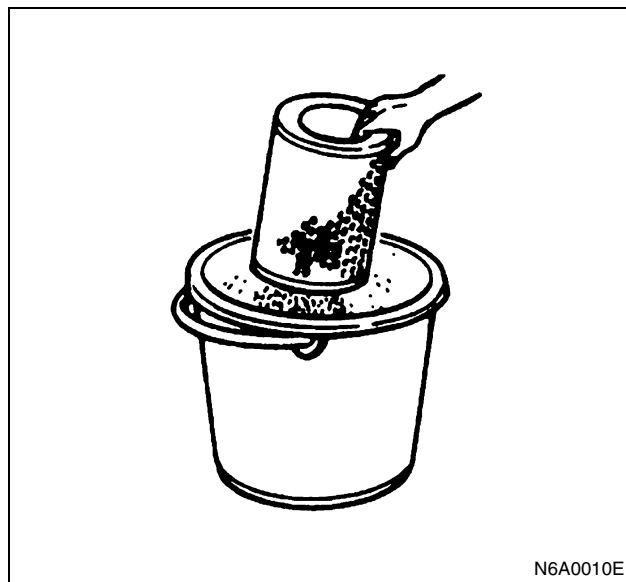


Caution:

Do not bang the element against another object in an attempt to clean it. Damage to the element will result.

Carbon and Dust Fouled Element

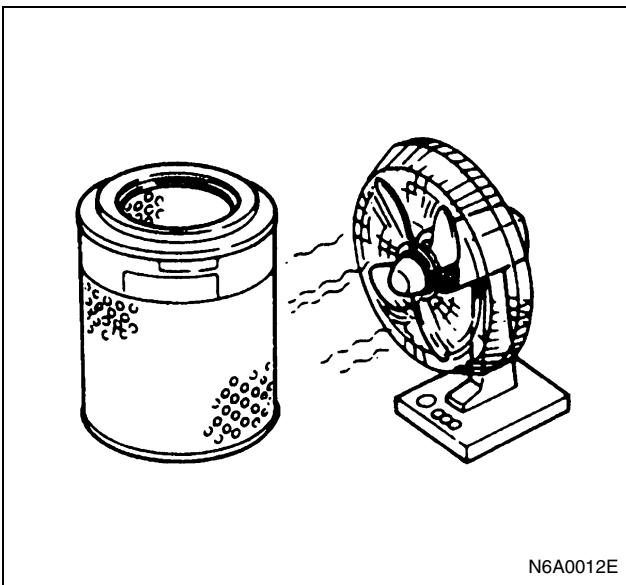
1. Prepare a cleaning solution of Isuzu Genuine Element Cleaner (Donaldson D1400) diluted with water.
2. Submerge the element in the solution for twenty minutes.



3. Remove the element from the solution and rinse it well with running water.
Water pressure must not exceed 274 kPa (2.8 kg/cm²/40 psi)



4. Dry the element in a well ventilated area. An electric fan will hasten drying.



Notice:

Do not use compressed air or an open flame to dry the element quickly. Damage to the element will result. It will usually take two or three days for the element to dry completely. Therefore, it is a good idea to have a spare on hand to use in the interim.

Lubricating System

Main Oil Filter (Cartridge Type Paper Element) Replacement Procedure

1. Loosen the used oil filter by turning it counterclockwise with the filter wrench.
2. Clean the oil filter fitting face. This will allow the new oil filter to seat properly.
3. Apply a light coat of engine oil to the O-ring.
4. Turn in the new oil filter until the filter O-ring is fitted against the sealing face.

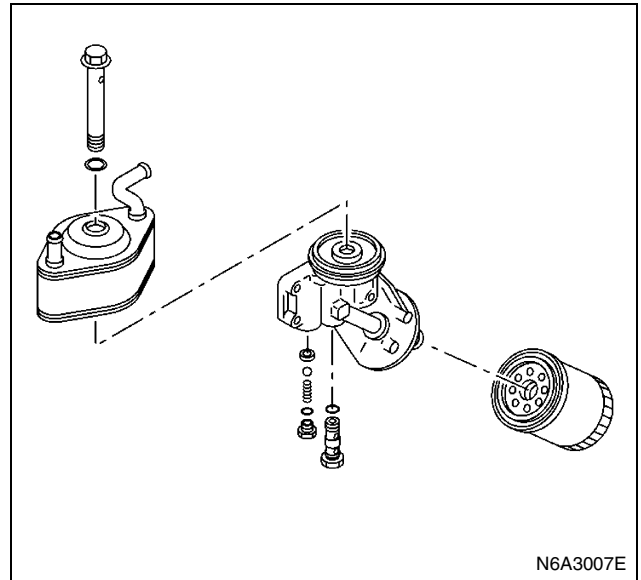
5. Use the filter wrench to turn in the filter an additional 1 and 1/4 turns.

Filter Wrench:

5-8840-0200-0 (89mm/3.5in)

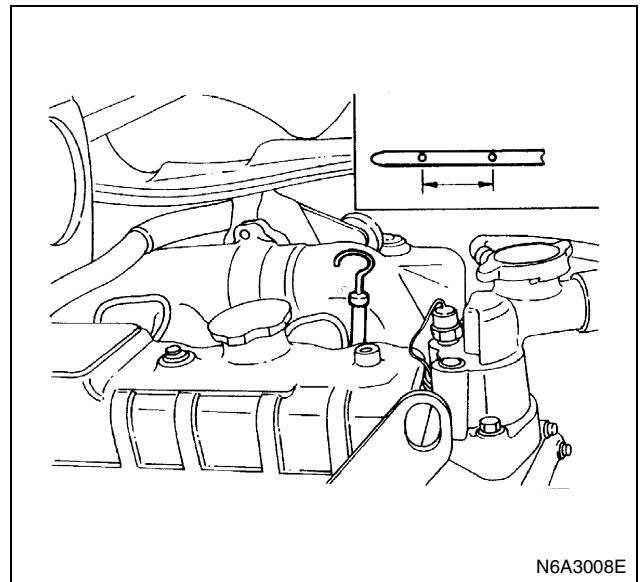
5-8840 0202-0 (106mm/4.2in)

5-8840-2209-0 (100.6mm/4.0in)



6. Check the engine oil level and replenish to the specified level if required.

Replenishment Engine Oil	lit (Imp qt/US qt)
0.7 (0.62/0.74)	

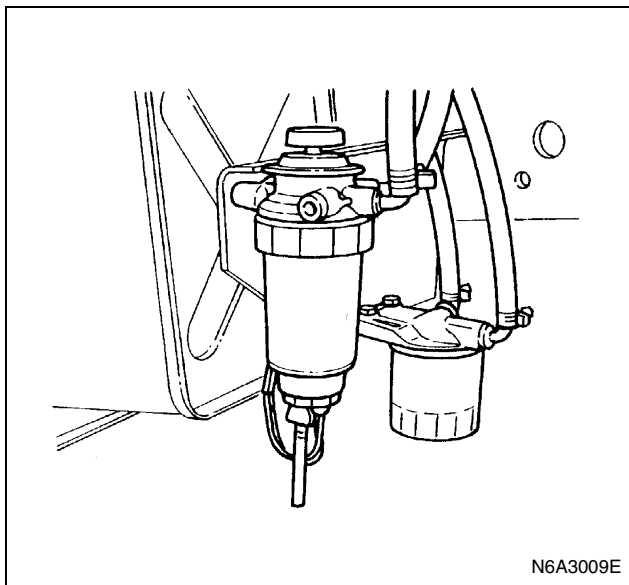


7. Start the engine and check for oil leakage from the main oil filter.

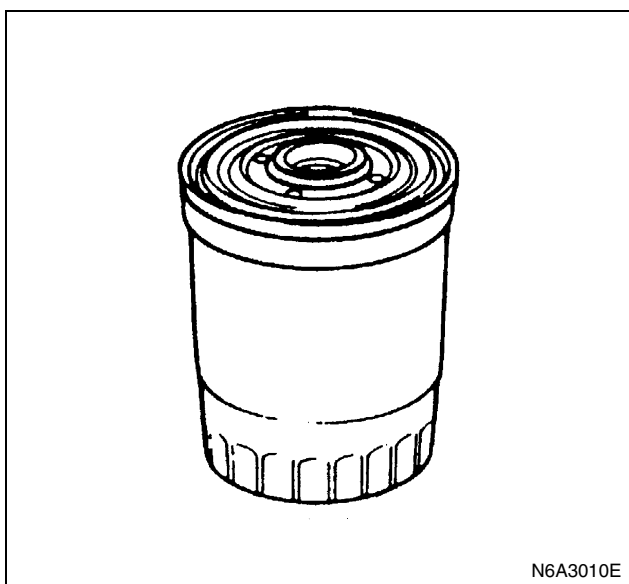
Fuel System

Fuel Filter Replacement Procedure

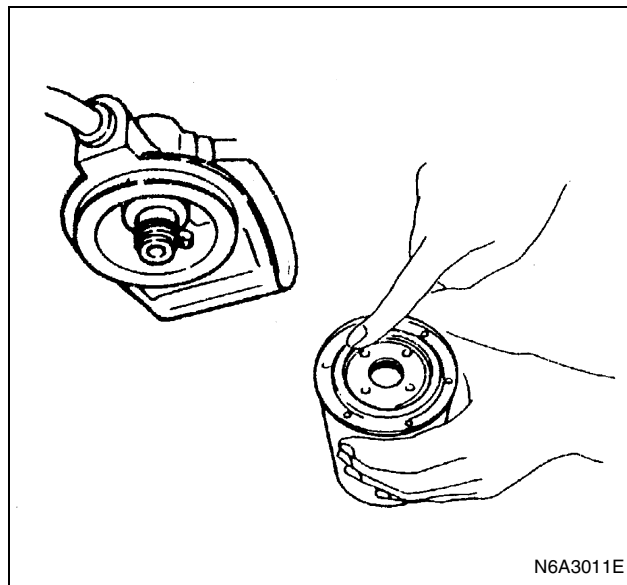
1. Loosen the used fuel filter by turning it counterclockwise with the filter wrench.
- Filter Wrench: 5-8840-0253-0 (J-22700)



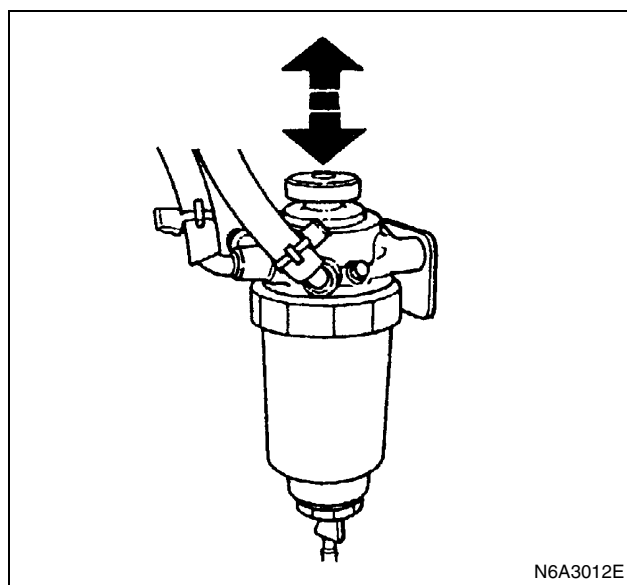
2. Clean the filter cover fitting faces.
This will allow the new fuel filter to seat properly.



3. Turn in the fuel filter until the sealing face comes in contact.



4. Turn in the fuel filter an additional 2/3 of a turn with a filter wrench.
Filter Wrench: 5-8840-0253-0 (J-22700)
5. Loosen the bleeder plug on the injection pump overflow valve.



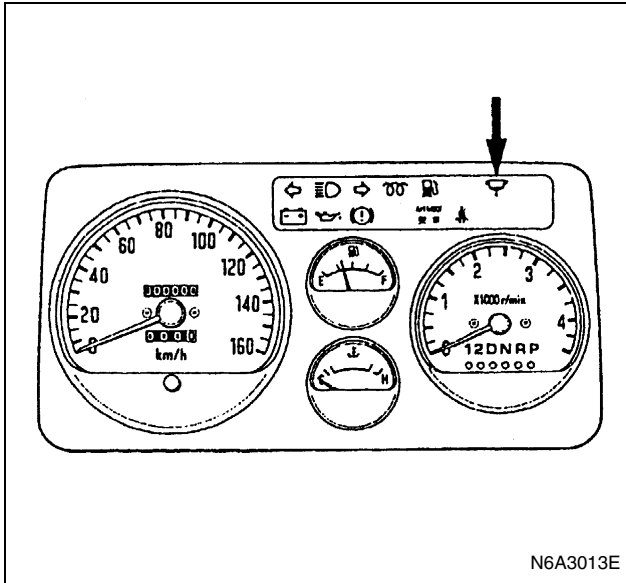
6. Operate the priming pump until fuel begins to flow from the fuel filter.
7. Retighten the bleeder plug.
8. Operate the priming pump several times and check for fuel leakage.

Notice:

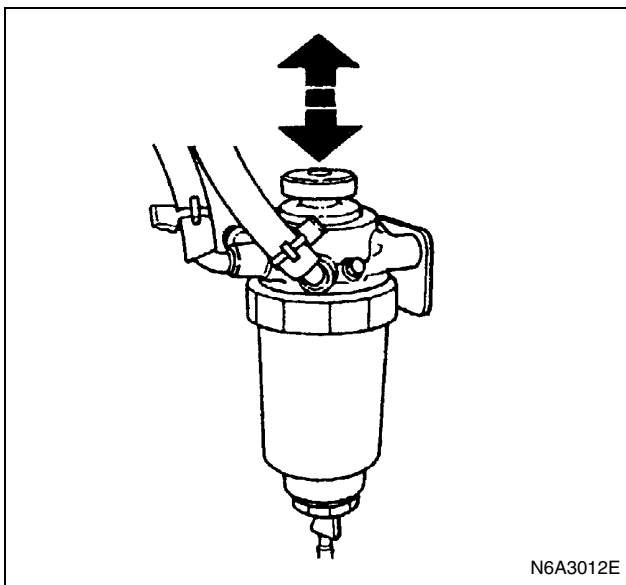
The use of an ISUZU genuine fuel filter is strongly recommended.

Fuel Filter Water Draining Procedure

The indicator light will come on when the water level in the water separator exceeds the specified level. Drain the water and foreign material from the water separator with the following procedure.



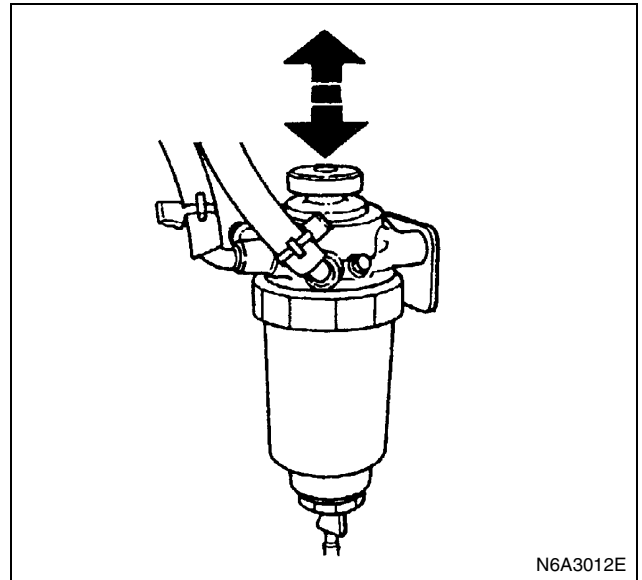
1. Find a safe place to park the vehicle.
2. Open the engine hood and place a container (Approximately 0.2 liter capacity) at the end of the vinyl hose beneath the drain plug on the separator.
3. Loosen the drain plug by turning it counterclockwise (Approximately 5 turns) and operate the priming pump up and down about 10 times until water is drained approximately 0.1 liter.



4. After draining, securely tighten the drain plug by turning it clockwise and operate the priming pump manually up and down several times.
5. After starting the engine, check to see that there is no fuel leak from the drain plug. Also check to see that the fuel filter water indicator light has turned off.
If water separator requires frequent draining, have the fuel tank drained for removal of water at your Isuzu Dealer.

Air Bleeding

1. Loosen the bleeding plug on the injection pump overflow valve.
2. Operate the priming pump until fuel mixed with foam flows from the bleeding plug.
3. Tighten the bleeding plug.
4. Operate the priming pump several times and check for fuel leakage.



Injection Pump Air Bleeding (4JH1-TC only)

Injection pump air bleeding is required to start the engine when —

- The fuel supply has been exhausted (running out of gas).
- The fuel filter has been replaced.
- The injection pump has been replaced.

Caution:

If the injection pump has been replaced, the air bleeding procedure will require more time and effort (this is because there is no fuel in the pump).

1. Loosen the air bleed nut on the priming pump plunger (at the top of the fuel filter).
2. Move the priming pump plunger up-and-down until strong resistance is felt (about 15 cycles).
3. Stop pumping and tighten the air bleed nut.
4. Wait for 1 minute.
5. Loosen the air bleed nut on the priming pump plunger again.
6. Move the priming pump plunger up-and-down until strong resistance is felt (about 10 cycles).
7. Stop pumping and tighten the air bleed nut.
8. Wait for 1 minute.
9. Loosen the air bleed nut on the priming pump plunger again.
10. Move the priming pump plunger up-and-down until strong resistance is felt (about 5 cycles).
11. Stop pumping and tighten the air bleed nut.

12. Press the accelerator and clutch pedals all the way to the floor and hold them down. Turn the ignition switch to the ON position. Wait until the glow indicator lamp turns on and off.

Caution:

If the engine is cold, the glow indicator light will stay on for 4 — 7 seconds before turning off.

However, if the engine is hot, the lamp will not turn on.

13. Turn the ignition switch to the START position and crank the engine until it starts (do not crank the engine for more than 10 seconds).

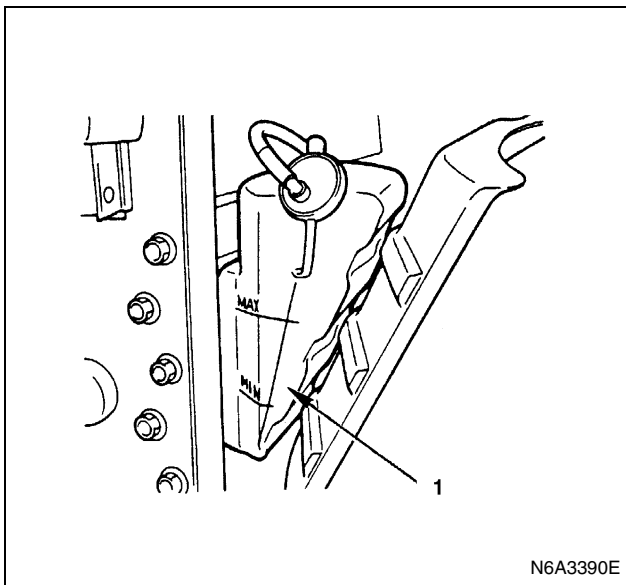
If the engine does not start, repeat Steps 9 — 13.

14. Allow the engine to idle for 5 minutes.

Cooling System**Coolant Level**

Check the coolant level and replenish the radiator reserve tank as necessary.

If the coolant level falls below the "MIN" line, carefully check the cooling system for leakage. Then add enough coolant to bring the level up to the "MAX" line.

**Legend**

1. Reserve tank

Engine Coolant Change Procedure

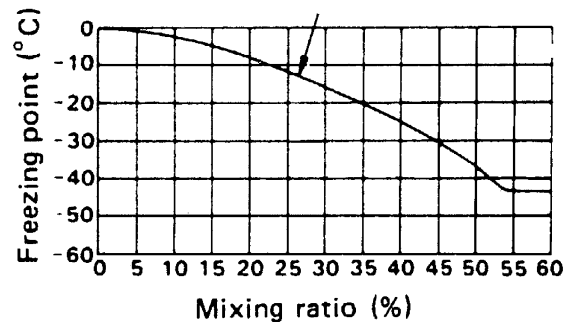
1. To change engine coolant, make sure that the engine is cool.

WARNING:

WHEN THE COOLANT IS HEATED TO A HIGH TEMPERATURE, BE SURE NOT TO LOOSEN OR REMOVE THE RADIATOR CAP. OTHERWISE YOU MIGHT GET SCALDED BY HOT VAPOR OR BOILING WATER. TO OPEN THE RADIATOR CAP, PUT A PIECE OF THICK CLOTH ON THE CAP AND LOOSEN THE CAP SLOWLY TO REDUCE THE PRESSURE WHEN THE COOLANT HAS BECOME COOLER.

2. Open radiator cap and drain the cooling system by loosening the drain valve on the radiator and on the cylinder body.

Good Quality Ethylene Glycol Anti-freeze



N6A3015E

Notice:

For best result it is suggested that the engine cooling system be flushed at least once a year. It is advisable to flush the interior of the cooling system including the radiator before using anti-freeze (ethylene-glycol based). Replace damaged rubber hoses as the engine anti-freeze coolant is liable to leak out even minor cracks. Isuzu recommends to use Isuzu genuine anti-freeze (ethylene-glycol based) or equivalent, for the cooling system and not add any inhibitors or additives.

Caution:

A failure to correctly fill the engine cooling system in changing or topping up coolant may sometimes cause the coolant to overflow from the filler neck even before the engine and radiator are completely full. If the engine runs under this condition, shortage of coolant may possibly result in engine overheating. To avoid such trouble, the following precautions should be taken in filling the system.

3. To refill engine coolant, pour coolant up to filler neck using a filling hose which is smaller in outside diameter of the filler neck. Otherwise air between the filler neck and the filling hose will block entry, preventing the system from completely filling up.
4. Keep a filling rate of 9 liter/min. or less. Filling over this maximum rate may force air inside the engine and radiator. And also, the coolant overflow will increase, making it difficult to determine, whether or not the system is completely full.
5. After filling the system to the full, pull out the filling hose and check to see if air trapped in the system is dislodged and the coolant level goes down. Should the coolant level go down, repeat topping-up until there is no more drop in the coolant level.

6. After directly filling the radiator, fill the reservoir to the maximum level.
7. Install and tighten radiator cap and start the engine. After idling for 2 to 3 minutes, stop the engine and reopen radiator cap. If the water level is lower, replenish.

WARNING:

WHEN THE COOLANT IS HEATED TO A HIGH TEMPERATURE, BE SURE NOT TO LOOSEN OR REMOVE THE RADIATOR CAP. OTHERWISE YOU MIGHT GET SCALDED BY HOT VAPOR OR BOILING WATER. TO OPEN THE RADIATOR CAP, PUT A PIECE OF THICK CLOTH ON THE CAP AND LOOSEN THE CAP SLOWLY TO REDUCE THE PRESSURE WHEN THE COOLANT HAS BECOME COOLER.

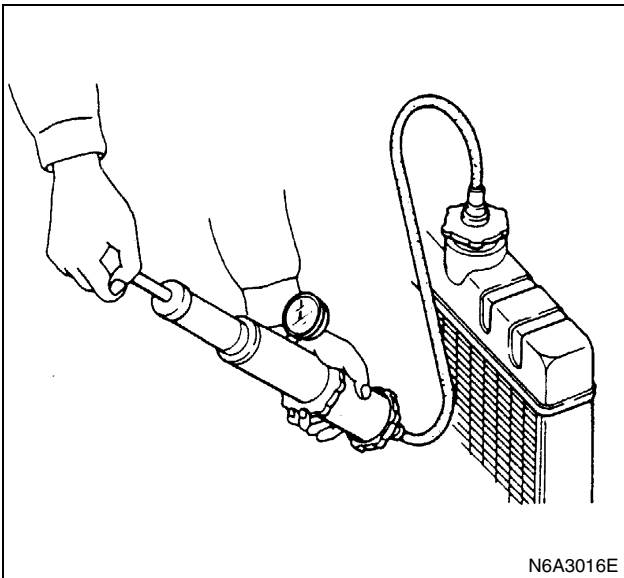
8. After tightening radiator cap, warm up the engine at about 2,000 rpm. Set heater adjustment to the highest temperature position, and let the coolant circulate also into heater water system.
9. Check to see the thermostat has opened through the needle position of water thermometer, conduct a 5 minutes idling again and stop the engine.
10. When the engine has been cooled, check filler neck for water level and replenish if required. Should extreme shortage of coolant is found, Check the coolant system and reservoir tank hose for leakage.
11. Fill the coolant into the reservoir tank up to "MAX" line.

Cooling System Inspection

Install a radiator filler cap tester to the radiator. Apply testing pressure to the cooling system to check for leakage.

The testing pressure must not exceed the specified pressure.

Testing Pressure	kPa (Kg/cm ² /psi)
147 (1.5/21)	

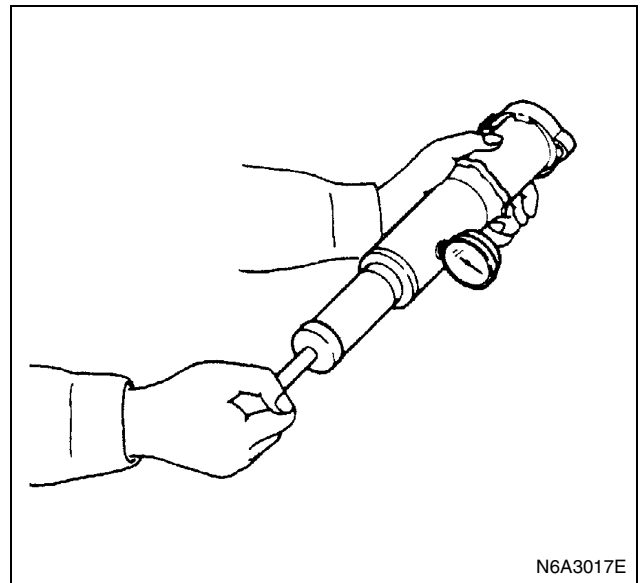
**Radiator Cap Inspection**

The radiator filler cap is designed to maintain coolant pressure in the cooling system at 1.05 kg/cm² (15 psi / 103 kPa). Check the radiator filler cap with a radiator filler cap tester. The radiator filler cap must be replaced if it fails to hold the specified pressure during the test procedure.

Radiator Filler Cap Pressure

Pressure Valve	kPa (kg/cm ² /psi)
88 — 118 (0.9 — 1.2/12.8 — 17.1)	

Negative Valve (Reference)	kPa (kg/cm ² /psi)
1.0 — 13.9 (0.01 — 0.04/0.14 — 0.57)	

**Thermostat Operating Test**

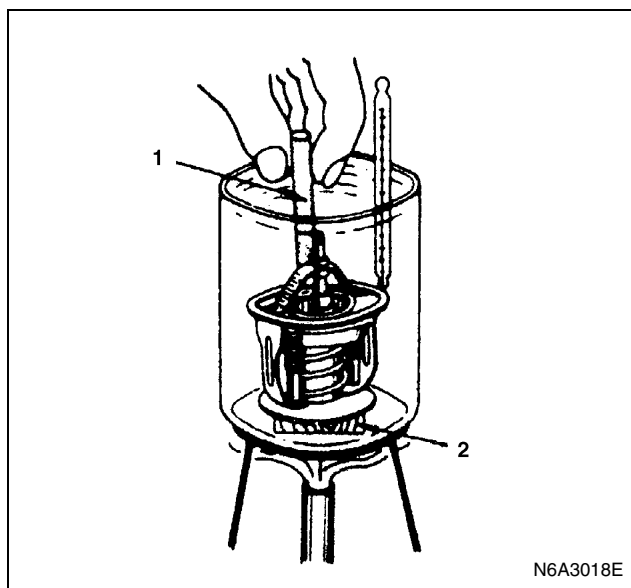
1. Completely submerge the thermostat in water.
2. Heat the water.
Stir the water constantly by suitable wood bar (1) to avoid direct heat being applied use wood plate (2) to the thermostat.
3. Check the thermostat initial opening temperature.

Thermostat Initial Opening Temperature	°C (°F)
82 (180)	

4. Check the thermostat full opening temperature.

Thermostat Full Opening Temperature	°C (°F)
95 (203)	

Valve Lift at Fully Open Position	mm (in)
10 (0.39)	



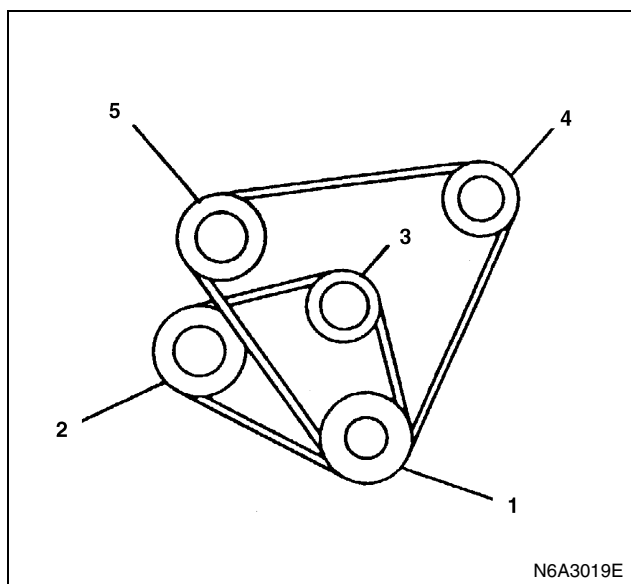
Drive Belt Adjustment

Depress the drive belt mid portion with a 98 N (10 kg / 22 lb) force.

Drive Belt Deflection	mm (in)
8 — 12 (0.32 — 0.47)	

Check the drive belt for cracking and other damage.

1. Crankshaft damper pulley (1)
2. Generator pulley (2)
3. Cooling fan pulley (3)
4. Oil pump pulley or idler pulley (4)
5. Compressor pulley or idle pulley (5)

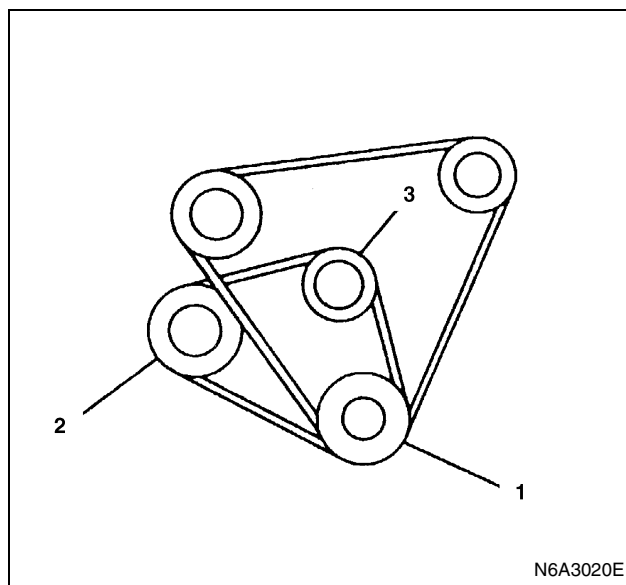


Cooling Fan Pulley Drive Belt

Fan belt tension is adjusted by moving the generator. Depress the drive belt mid portion with a 98 N (10 kg / 22 lb) force.

1. Crankshaft damper pulley (1)
2. Generator pulley (2)

3. Cooling fan pulley (3)



Compressor Pulley Drive Belt

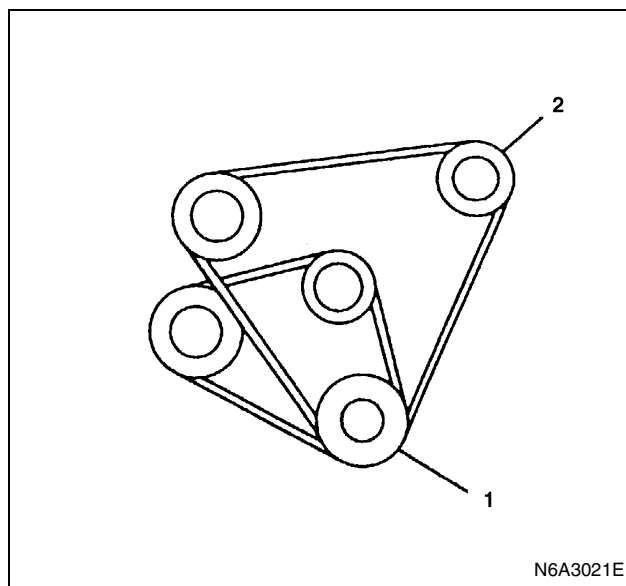
Move the idler pulley as required to adjust the compressor drive belt tension.

If the vehicle is equipped with power steering, move the oil pump as required.

Depress the drive belt mid portion with a 98 N (10 kg / 22 lb) force.

Belt Deflection	mm (in)
8 — 12 (0.32 — 0.47)	

1. Crankshaft damper pulley (1)
2. Oil pump pulley or idler pulley (2)



Power Steering Oil Pump Pulley Drive Belt

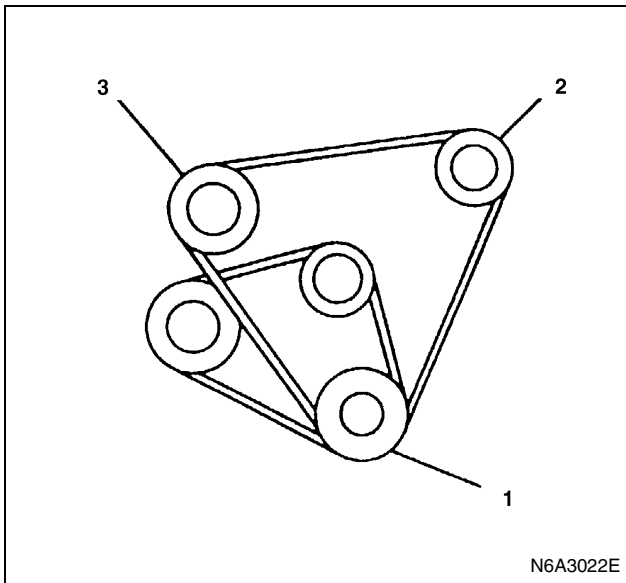
Move the oil pump as required to adjust the oil pump drive belt tension.

On air conditioner equipped models, both drive belts pulley must always be replaced as a set.

Depress the drive belt mid portion with a 98 N (10 kg / 22 lb) force.

Belt Deflection	mm (in)
8 — 12 (0.32 — 0.47)	

1. Crankshaft damper pulley (1)
2. Oil pump pulley (2)
3. Compressor pulley or idler pulley (3)



Engine Control

Idling Speed Inspection

1. Set the vehicle parking brake and choke the drive wheels.
2. Place the transmission in neutral.
3. Start the engine and allow it to warm up.
4. Disconnect the engine control cable from the control lever.
5. Set a tachometer to the engine.
6. Check the engine idling speed.
If the engine idling speed is outside the specified range, it must be adjusted.

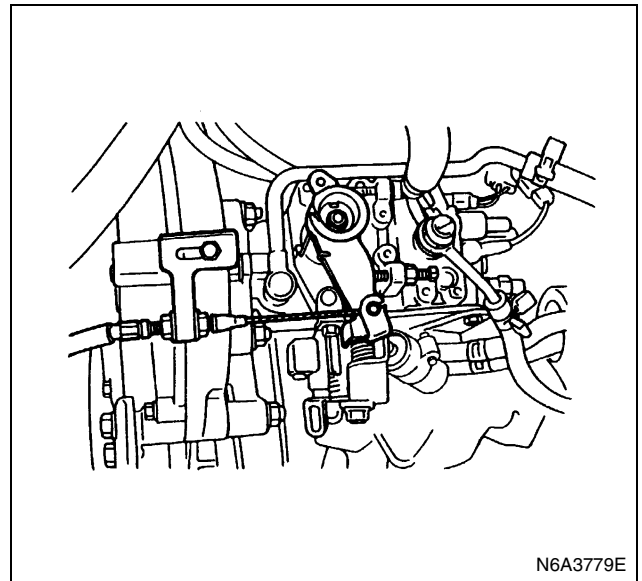
Engine Idling Speed		rpm
4JB1 / 4JB1-TC	750 — 790	
4JG2	700 — 740	
4JH1-TC	675 — 725	

Idling Speed Adjustment

(4JB1/4JB1-TC/4JG2 only)

1. Loosen the idling set bolt lock nut on the injection pump idling set bolt.
2. Adjust the idling speed to the specified range by turning the idling set bolt.
3. Lock the idling set bolt with the idling set bolt lock nut.

4. Check that the idling control cable is tight (free of slack).
If required, remove the slack from the cable.



Accelerator Control Cable Adjustment

(4JB1/4JB1-TC/4JG2 Only)

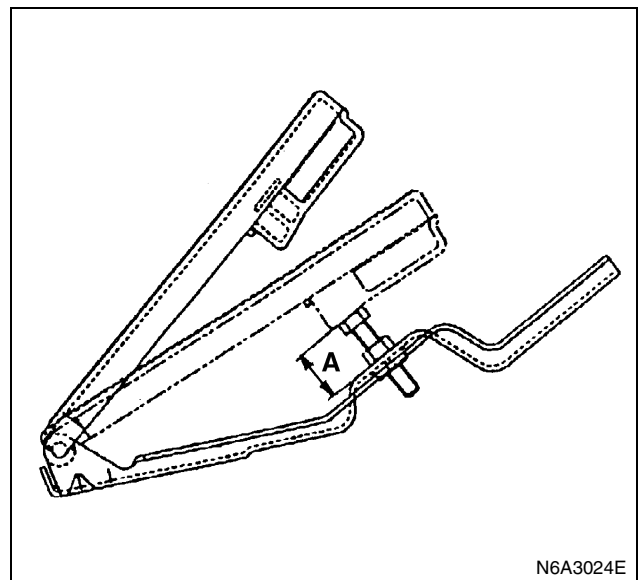
1. Loosen the accelerator cable clamp bolt.
2. Check that the idling control knob on the instrument panel is in the engine idling position.
3. Hold the accelerator lever in the fully closed position and stretch the control cable in the direction indicated by the arrow to remove any slack.

Accelerator Pedal Adjustment

LHD

1. Loosen the lock nut.
2. Adjust bolt height from floor.

Adjust Bolt Height (A)	mm (in)
18 — 28 (0.71 — 1.1)	

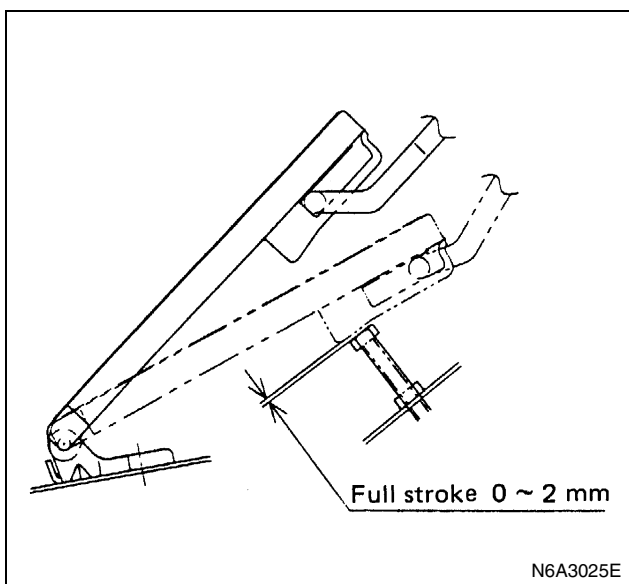


3. Check to see if the accelerator pedal play is in the range of 5 to 10mm above the pedal pad.
4. Press down on the accelerator pedal fully and check to see if the engine rotates at its maximum speed with each of the linkage in the smooth operation.
5. In the operating range of accelerator pedal and the injection pump lever returns to their respective original positions without fail.

RHD

1. Hold the accelerator pedal pad securely by hand, and give it a full stroke.
2. Adjust the stopper bolt so that the clearance between the pad stopper bolt and the rear side of the pad becomes the specified length.

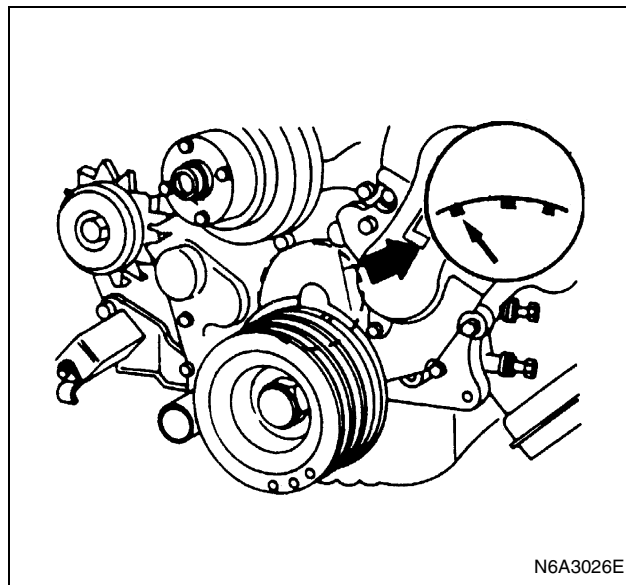
	mm (in)
	0 — 2 (0 — 0.079)



3. Check to see if the accelerator pedal play is in the range of 5 to 10mm above the pedal pad.
4. Press down on the accelerator pedal fully and check to see if the engine rotates at its maximum speed with each of the linkage in the smooth operation.
5. In the operating range of accelerator pedal and the injection pump lever returns to their respective original positions without fail.

Valve Clearance Adjustment

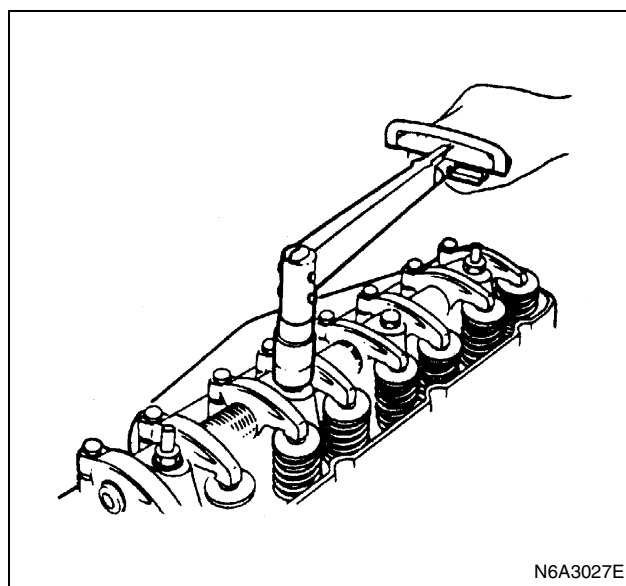
1. Bring the piston in either the No. 1 cylinder or the No. 4 cylinder to TDC on the compression stroke by turning the crankshaft until the crankshaft damper pulley TDC line is aligned with the timing pointer.



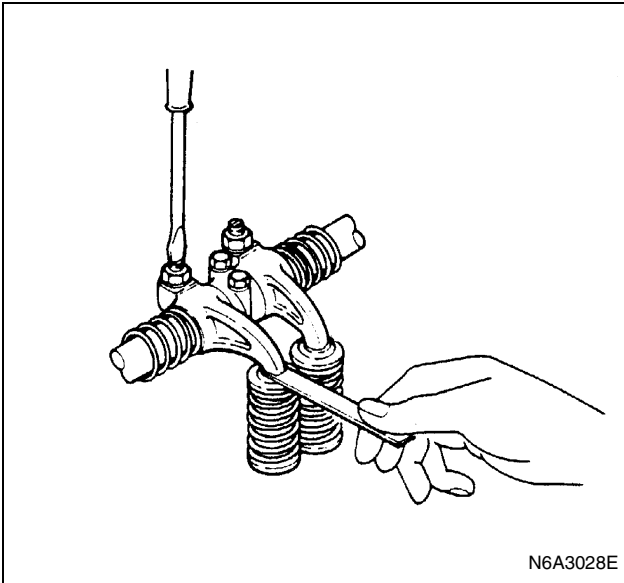
2. Check the rocker arm shaft bracket nuts for looseness.
Tighten any loose rocker arm shaft bracket nuts before adjusting the valve clearance.

Tighten:

- Rocker arm shaft bracket nut to 54 N·m (5.5 kg·m / 40 lb·ft)



3. Check for play in the No. 1 intake and exhaust valve push rods.
If the No. 1 cylinder intake and exhaust valve push rods have play, the No. 1 piston is at TDC on the compression stroke.
If the No. 1 cylinder intake and exhaust valve push rods are depressed, the No. 4 piston is at TDC on the compression stroke.

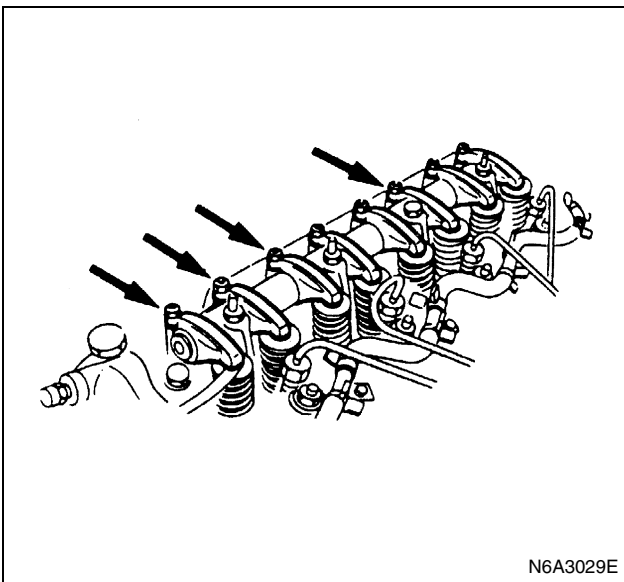


Adjust the No. 1 or the No. 4 cylinder valve clearance while their respective cylinders are at TDC on the compression stroke.

Valve Clearance (At Cold)	mm (in)
0.4 (0.016)	

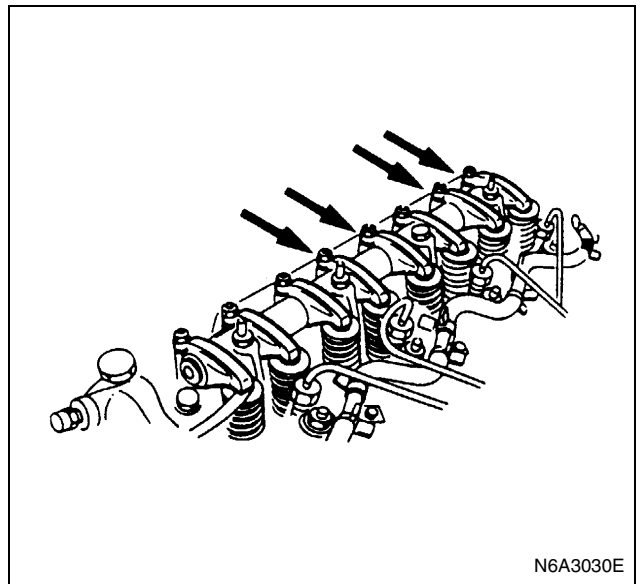
4. Loosen each valve clearance adjusting screw as shown in the illustration.

- No.1 Cylinder T.D.C. (Compression stroke)



5. Insert a feeler gauge of the appropriate thickness between the rocker arm and the valve stem end.
6. Turn the valve clearance adjusting screw until a slight drag can be felt on the feeler gauge.
7. Tighten the lock nut securely.
8. Rotate the crankshaft 360°.
9. Realign the crankshaft damper pulley TDC notched line with the timing pointer.
10. Adjust the clearance for the remaining valves as shown in the illustration.

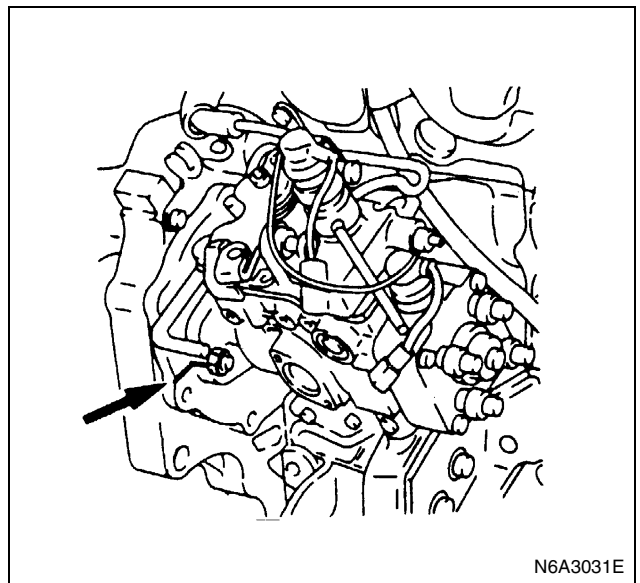
- No.4 Cylinder T.D.C. (Compression stroke)



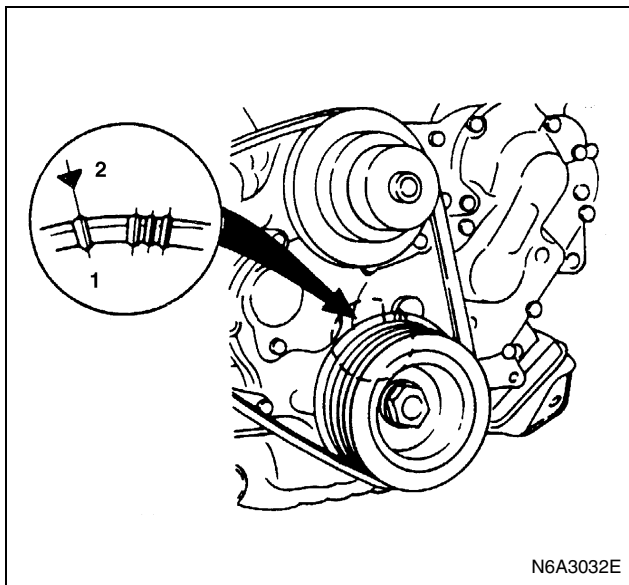
Injection Timing Adjustment

(4JB1/4JB1-TC/4JG2 Only)

1. Check that the notched line on the injection pump flange is aligned with the front plate or the timing gear case notched line.



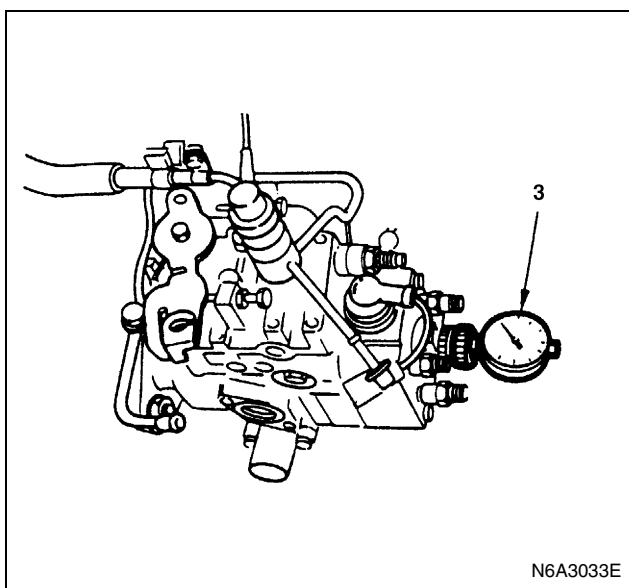
2. Bring the piston in the No. (1) cylinder to TDC 1 on the compression stroke by turning the crankshaft until the crankshaft pulley TDC line is aligned with the timing mark (2).

**Notice:**

Check for play in the No. 1 intake and exhaust valve push rods.

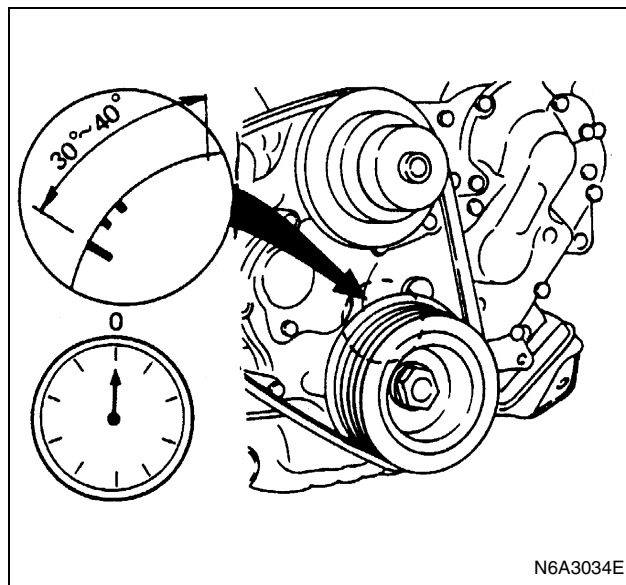
If the No. 1 cylinder intake and exhaust valve push rods have play, the No. 1 piston is at TDC on the compression stroke.

3. Disconnect the injection pipe from the injection pump.
4. Remove one bolt from the distributor head.
5. Insert a screwdriver into a hole in the fast idle lever and turn the lever to release the W-C.S.D. function. (If so equipped)
6. Install the static timing gauge (3).
The probe of the gauge should be depressed inward approximately 2 mm (0.079 in).
Static Timing Gauge: 5-8840-0145-0 (J-28827)



7. Rotate the crankshaft to bring the piston in the No. 1 cylinder to a point 30 — 40° BTDC.
8. Set the timing gauge needle to zero.

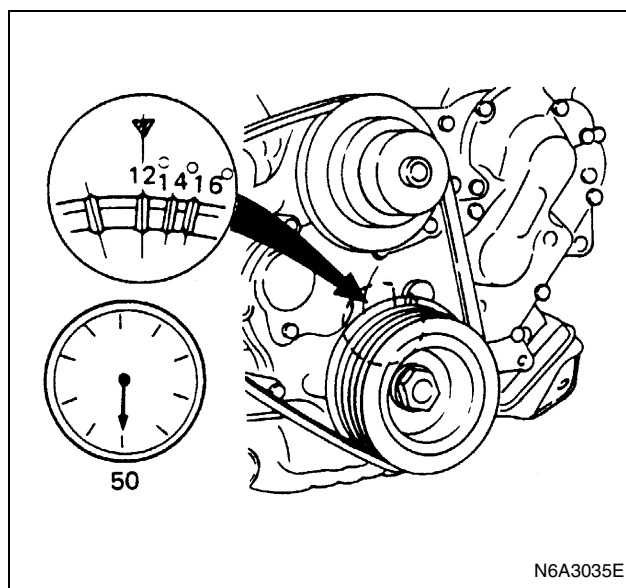
9. Move the crankshaft pulley slightly in both directions to check that the gauge indication is stable.



10. Turn the crankshaft clockwise and read the gauge indication when the crankshaft pulley timing mark is aligned with the pointer.

4JB1	BTDC 14°
4JB1-TC	BTDC 4°
4JG2	ATDC 2°

Standard Reading	mm (in)
0.5 (0.02)	



If the injection timing is outside the specified range, continue with the following steps.

11. Loosen the injection pump fixing nuts and bracket bolts.
12. Adjust the injection pump setting angle.

	When large than standard value	When smaller than standard value
Gear drive	A	B

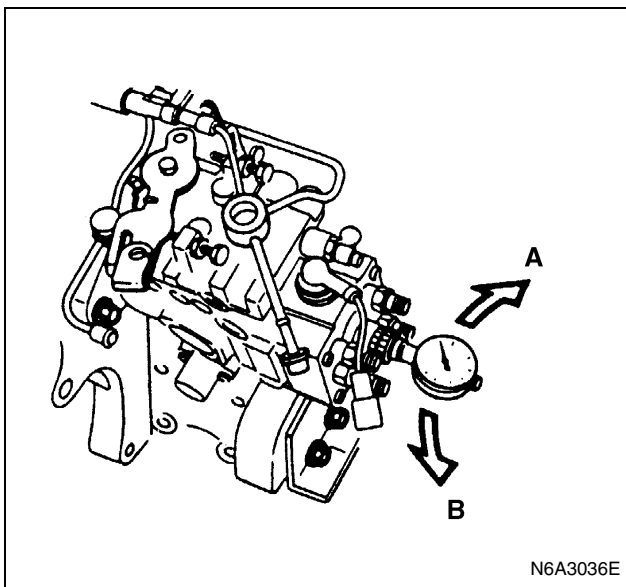
A: Move the injection pump toward the engine.

B: Move the injection pump away from the engine.

Tighten the pump fixing nut, adjust bolt and pump distributor head plug to the specified torque.

Tighten:

- Pump fixing bolt to 24 N·m (2.4 kg·m / 17 lb·ft)
- Adjust bolt to 19 N·m (1.9 kg·m / 14 lb·ft)
- Injection pump distributor head plug to 17 N·m (1.7 kg·m / 12 lb·ft)



Legend

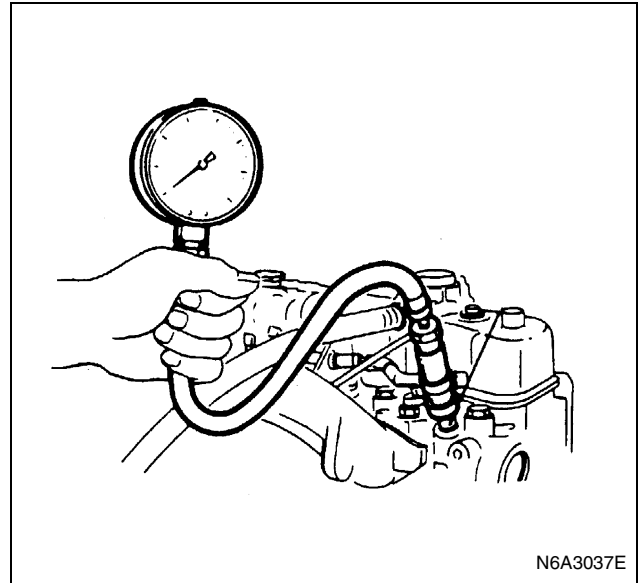
- A. To advance
B. To retard

Caution:

When installing the distributor head/plug, be sure to use new copper washer.

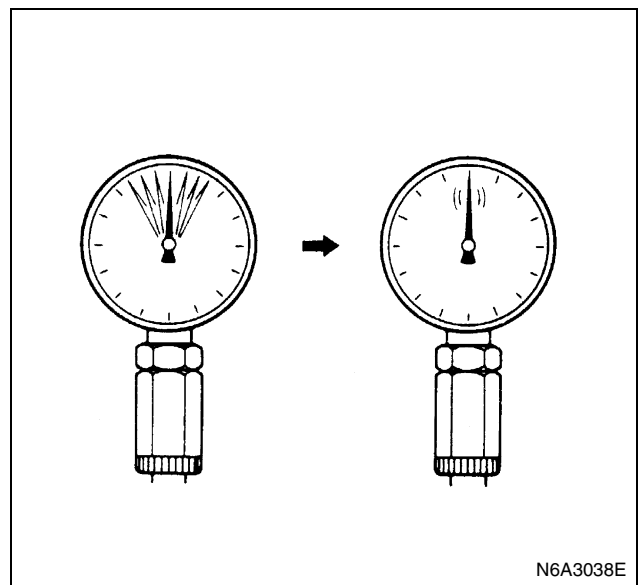
Compression Pressure Measure-ment

1. Start the engine and allow it to idle until the coolant temperature reaches 70 — 80°C (158 — 176°F).
2. Remove the following parts.
 - Glow plugs
 - Fuel cut solenoid connector
 - QOS (Quick-On Start System) fusible link wire at the connector.
3. Set the adapter and compression gauge to the No. 1 cylinder glow plug hole.
Compression Gauge
(with Adapter): 5-8840-2008-0 (J-29762)
Adapter: 5-8531-7001-0



4. Turn the engine over with the starter motor and take the compression gauge reading.

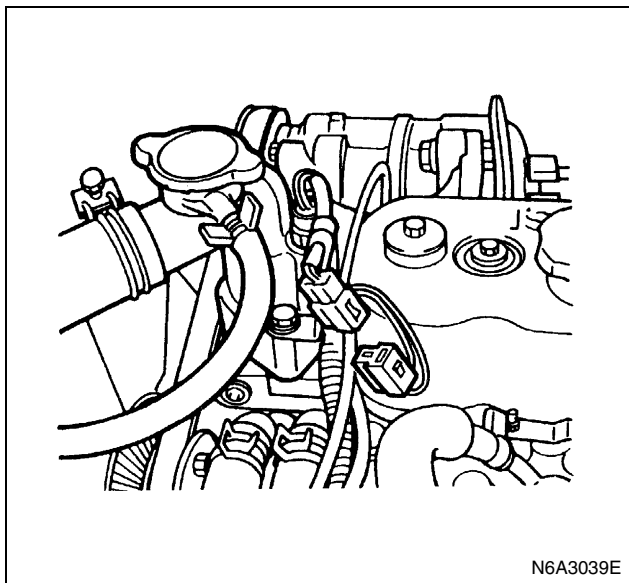
Compression Pressure at 200 rpm kPa (kg/cm ² /psi)		
	Standard	Limit
4JB1	3,038 (31/441)	2,157 (22/313)
4JG2	3,334 (34/484)	2,452 (25/356)



5. Repeat the procedure (Steps 3 and 4) for the remaining cylinders.
If the measured value is less than the specified limit, refer to "Troubleshooting" in this Manual.

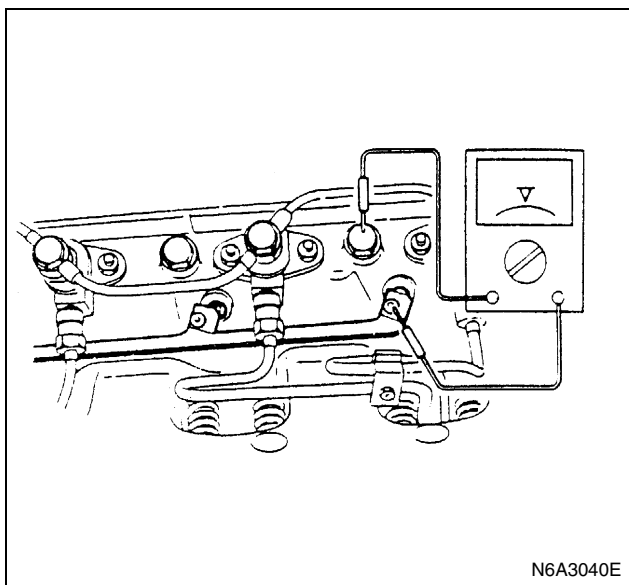
Quick-On Start II System (4JB1 / 4JB1-TC / 4JH1-TC only)**Quick-On Start System Inspection Procedure**

1. Disconnect the thermo-sensor connection on the thermostat outlet pipe.

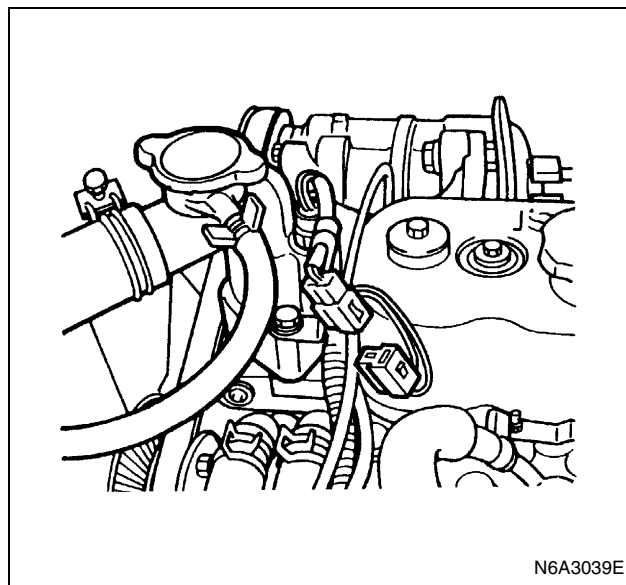


2. Turn the starter switch to the "ON" position. If the Quick-On Start II System is operating properly, the glow relay will make a clicking sound within 15 seconds after the starter switch is turned on.
3. Measure the glow plug terminal voltage with a circuit tester immediately after turning the starter switch to the "ON" position.

Glow Plug Terminal Voltage	V
Approx. 11	

**Quick-On Start III System (4JG2 only)****Quick-On Start System Inspection Procedure**

1. Disconnect the thermo-sensor connection on the thermostat outlet pipe.



2. Turn the starter switch to the "ON" position. If the Quick-On Start III System is operating properly, the glow relay will make a clicking sound within seven seconds after the starter switch is turned on.
3. Measure the glow plug terminal voltage with a circuit tester immediately after turning the starter switch to the "ON" position.

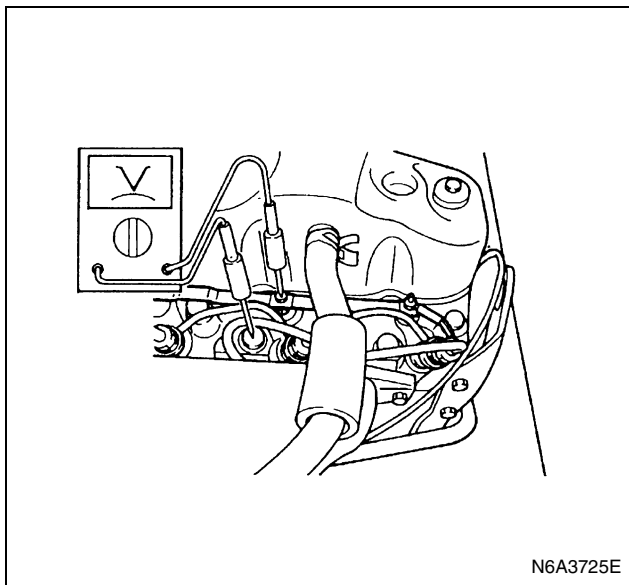
Glow Plug Terminal Voltage	V
8 — 9	

Notice:

Electrical power to the quick-on start system will be cut after the starter has remained in the "ON" position for twenty seconds.

Turn the starter switch to the "OFF" position and back to the "ON" position.

This will reset the Quick-On Start III System.



FIXING TORQUE

Cylinder Head Cover, Cylinder Head Rocker, Shaft Braker

N·m (kg·m / lb·ft)

13(1.3/113 lb-in)

54(5.5/40)

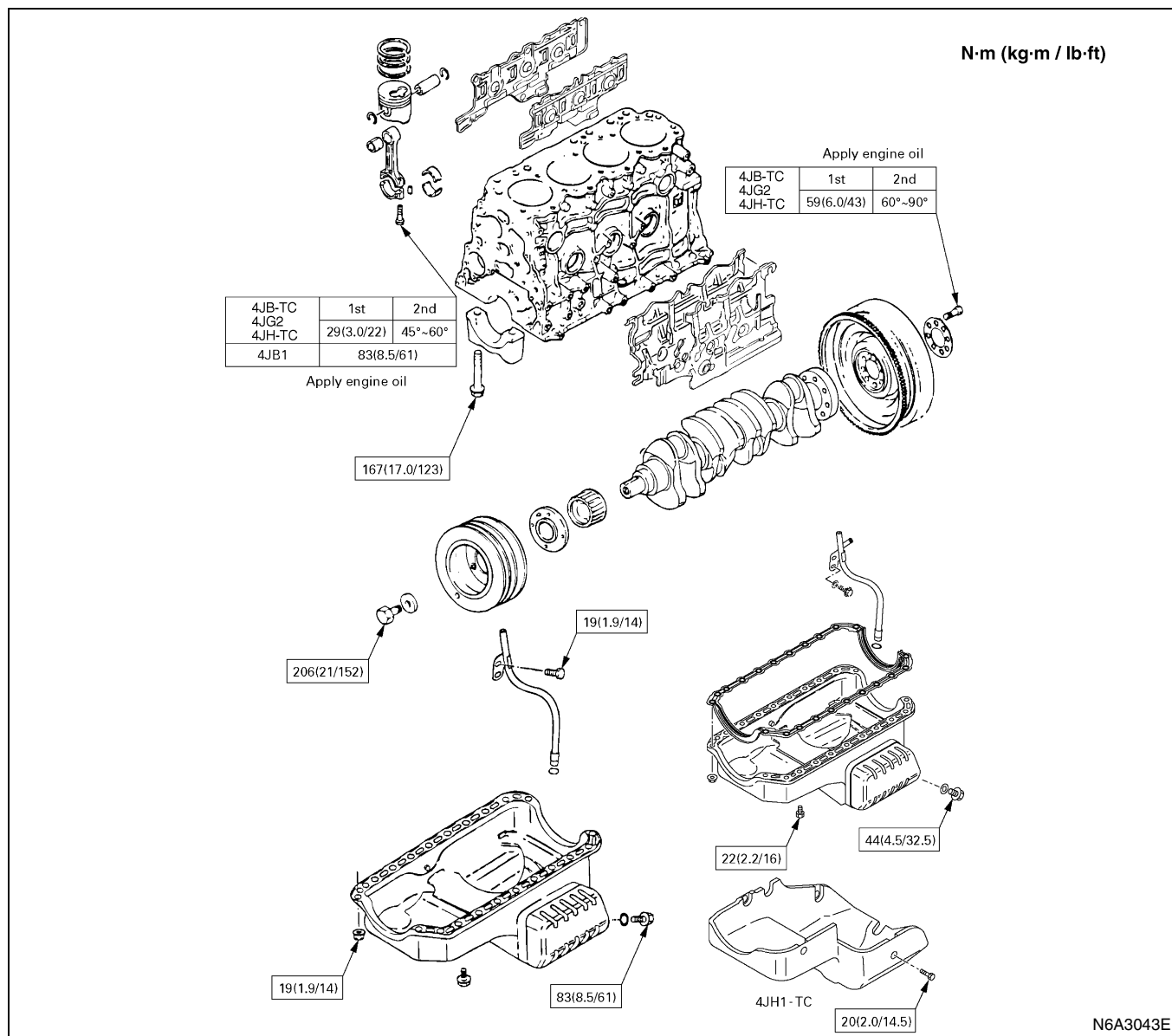
18(1.8/13)

1st Step	2nd Step	3rd Step
49(5.0/36)	60 ~75	60 ~75

Apply molybdenum disulfide grease

N6A3042E

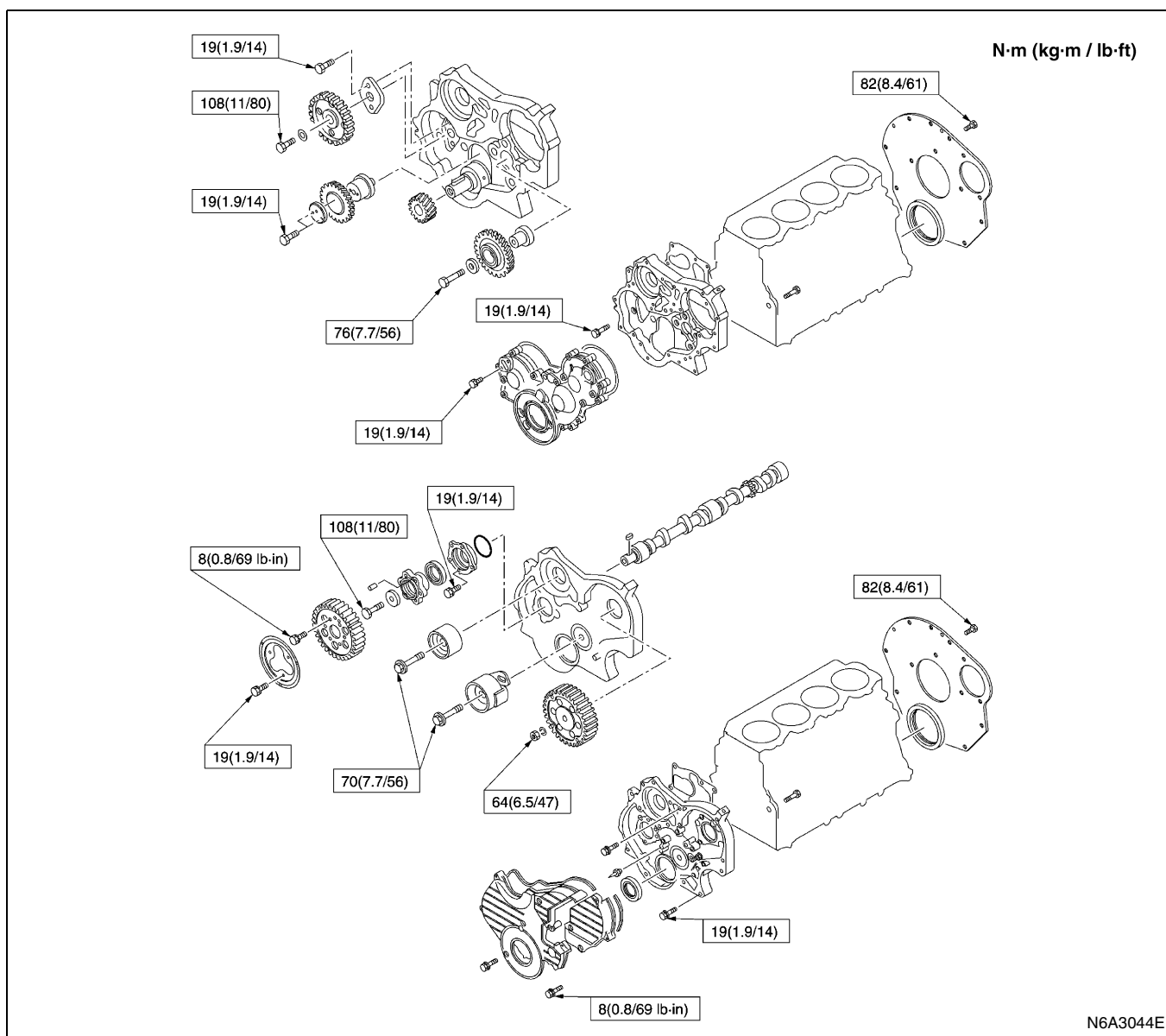
Crankshaft, Bearing Cap, Connecting Rod Bearing Cap, Crankshaft Damper Pulley, Flywheel, Oil Pan



Legend

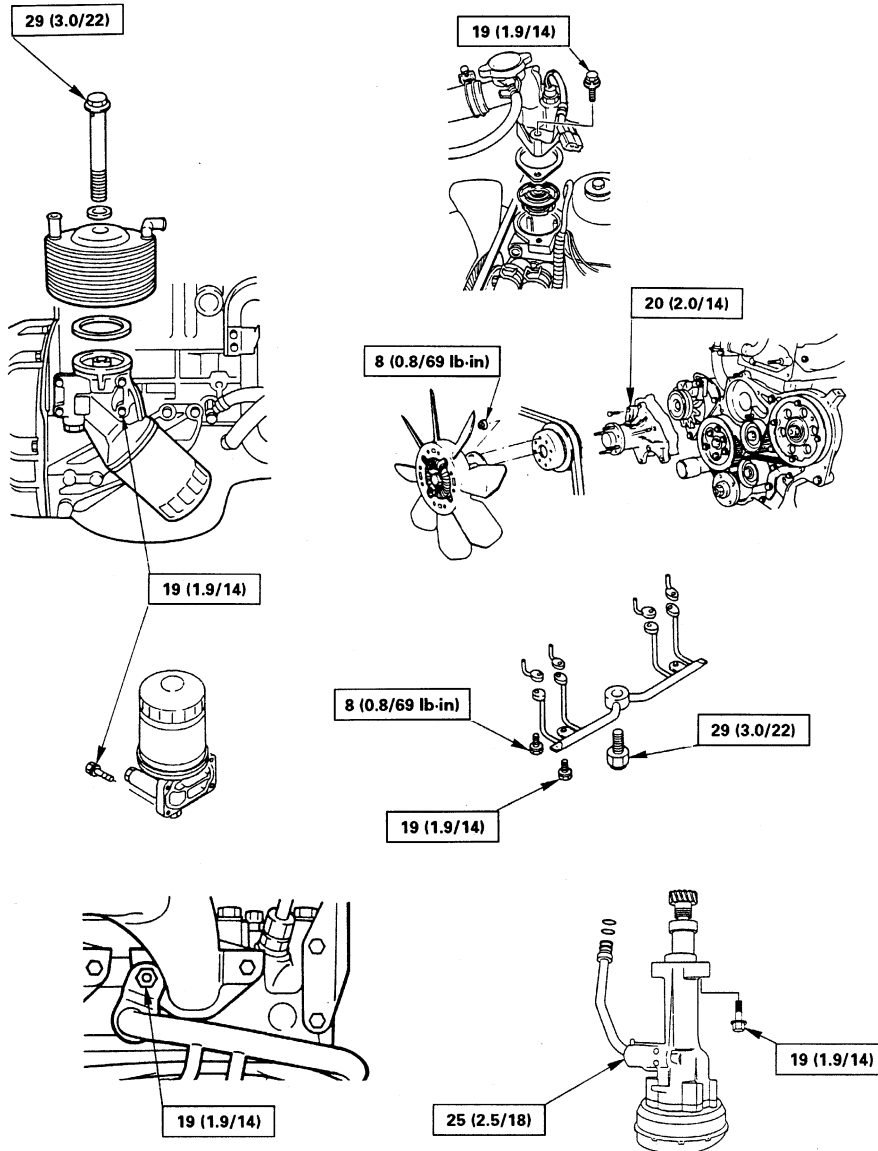
A. Apply engine oil

Timing Pulley Housing, Timing Pulley, Timing Gear, Camshaft Oil Seal Retainer



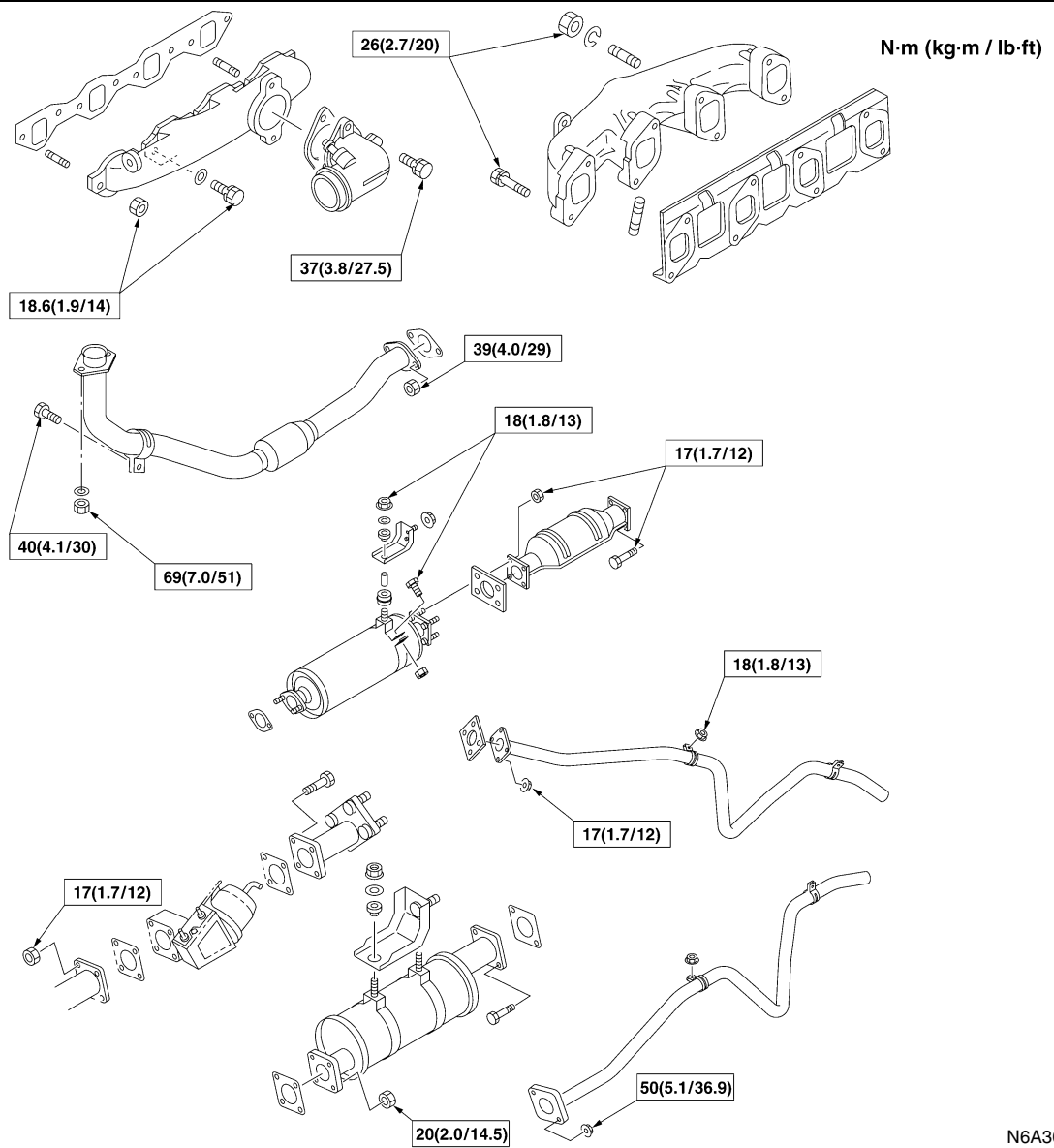
Cooling System and Lubrication System

N·m (kg·m / lb·ft)

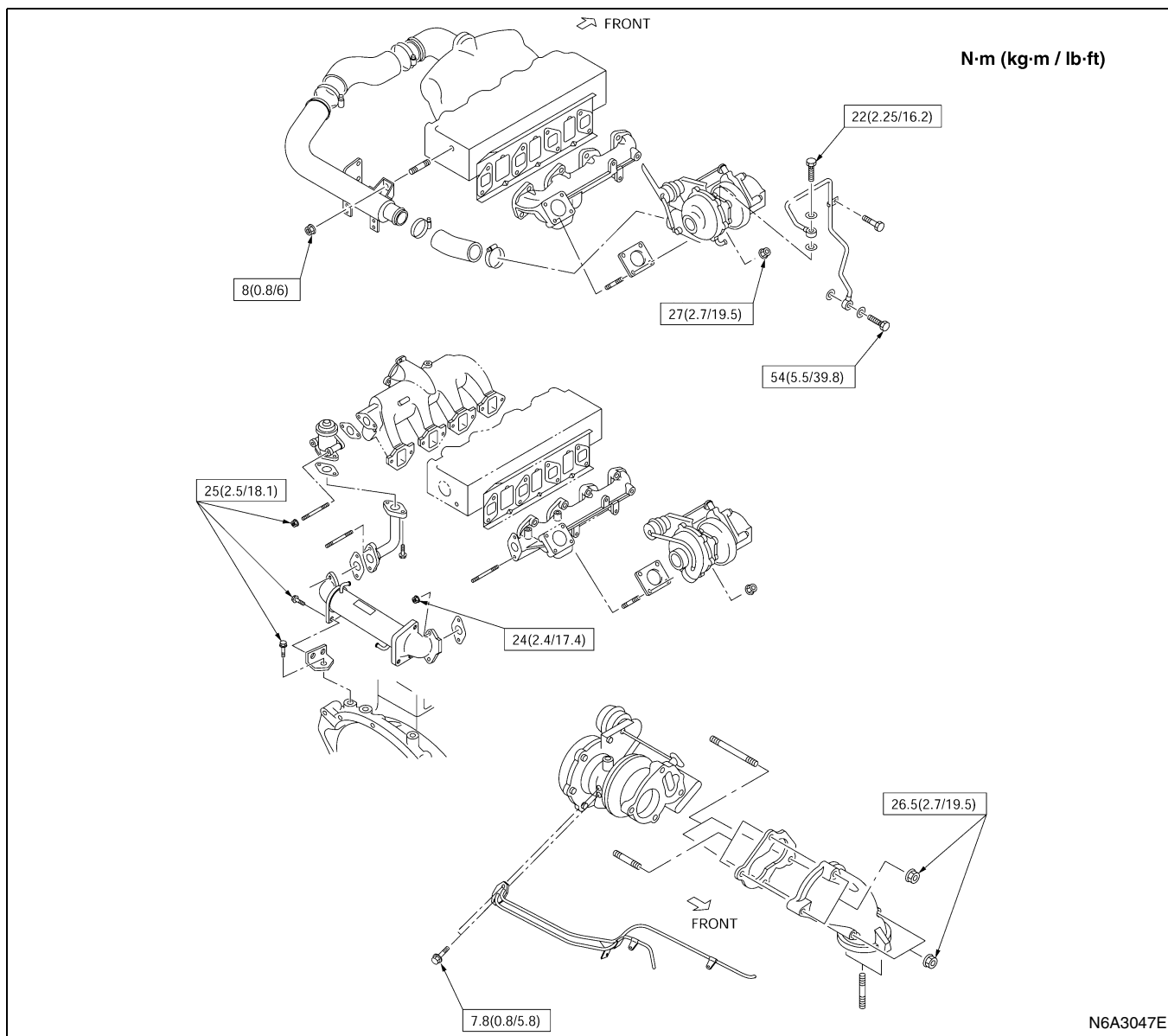


N6A3045E

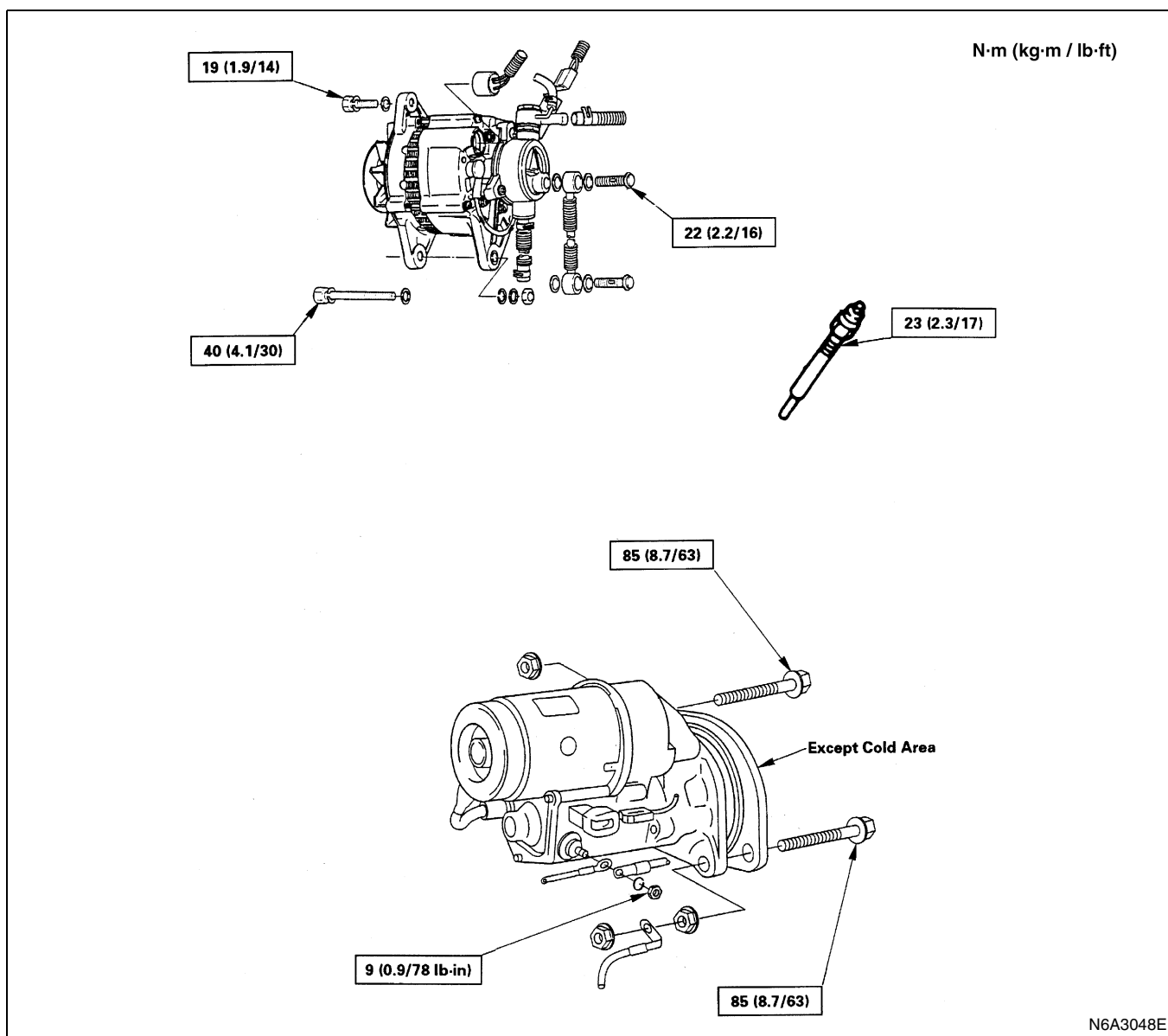
Intake Manifold, Exhaust Manifold, Exhaust Pipe



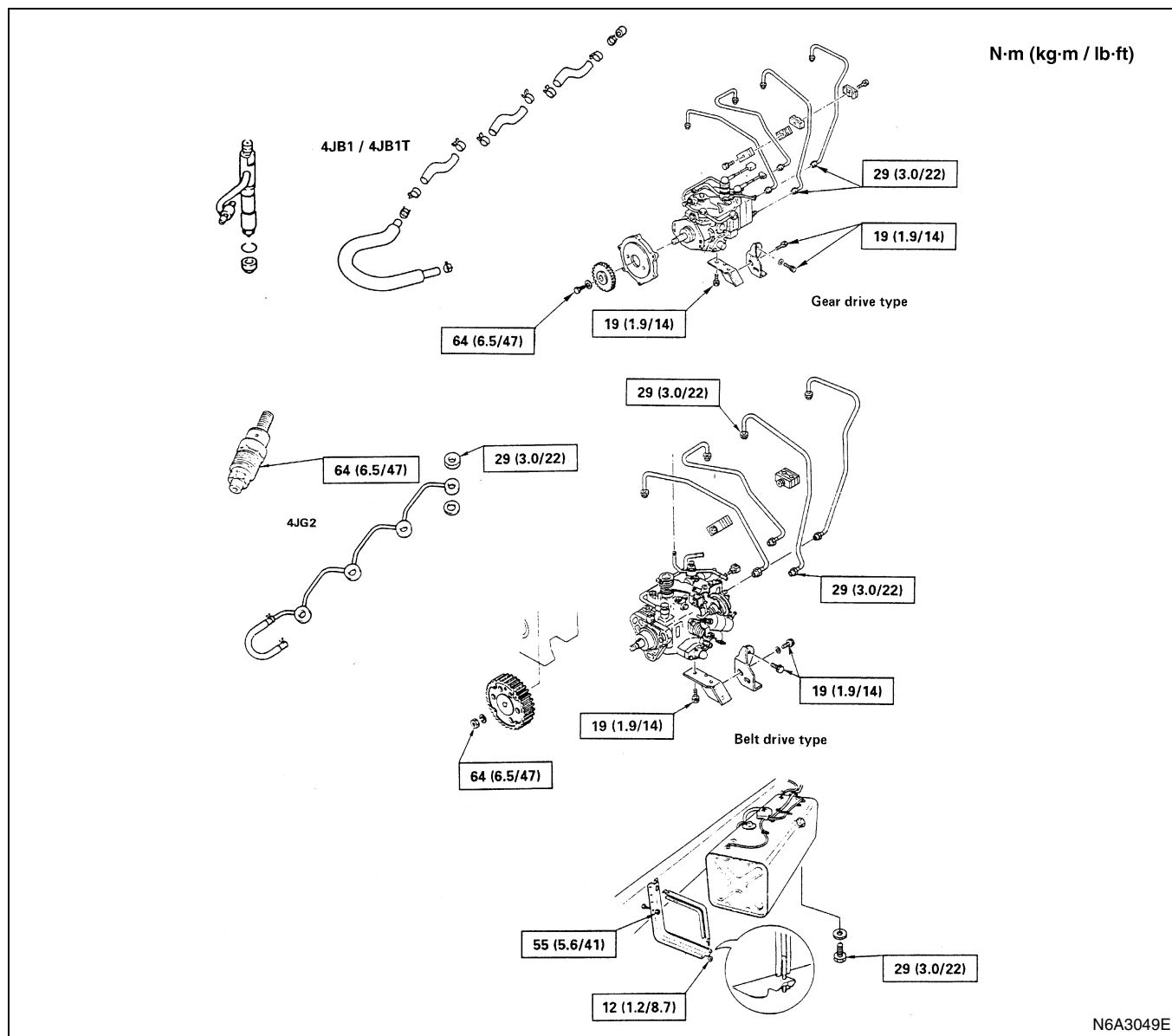
N6A3046E



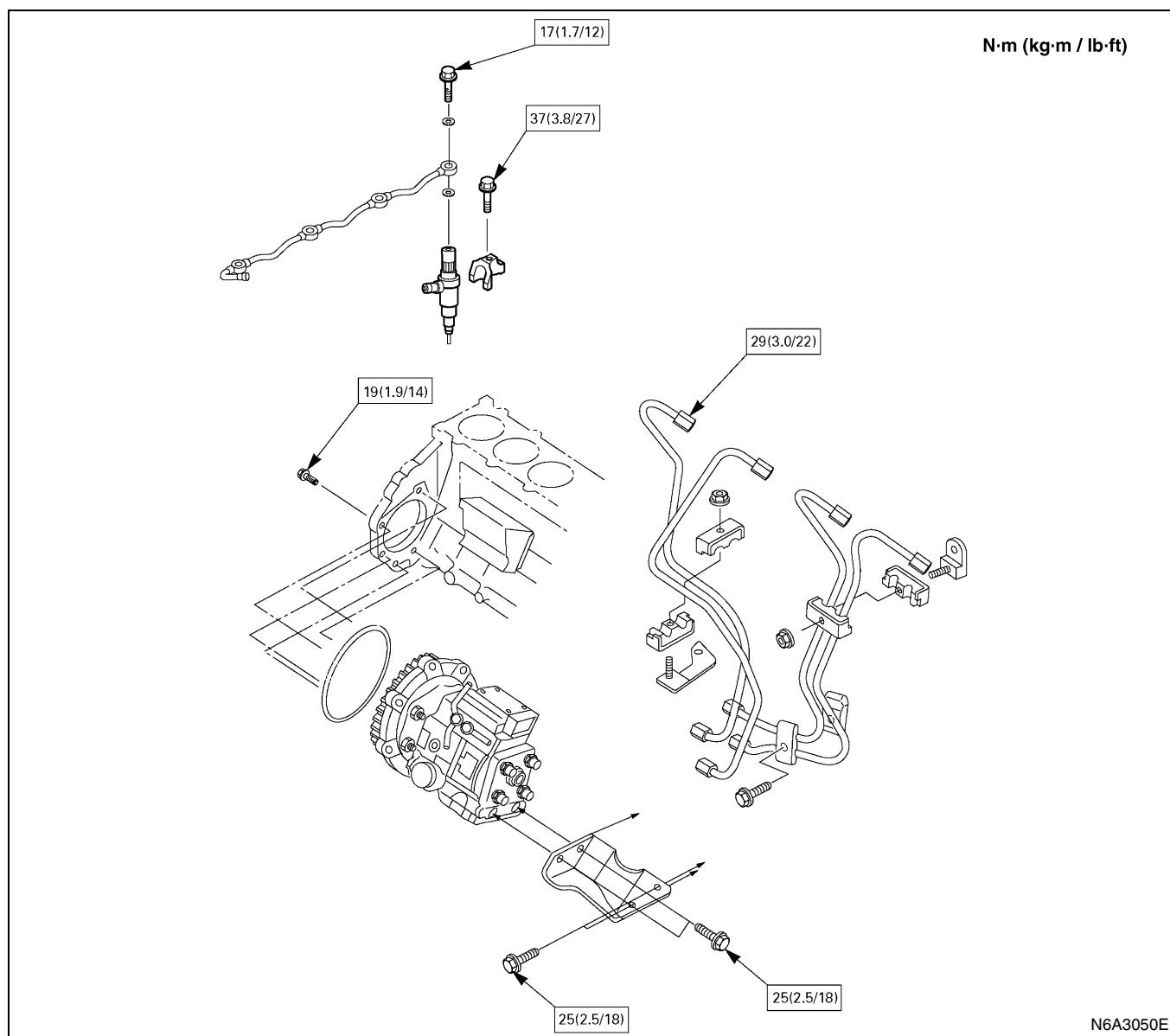
Engine Electricals



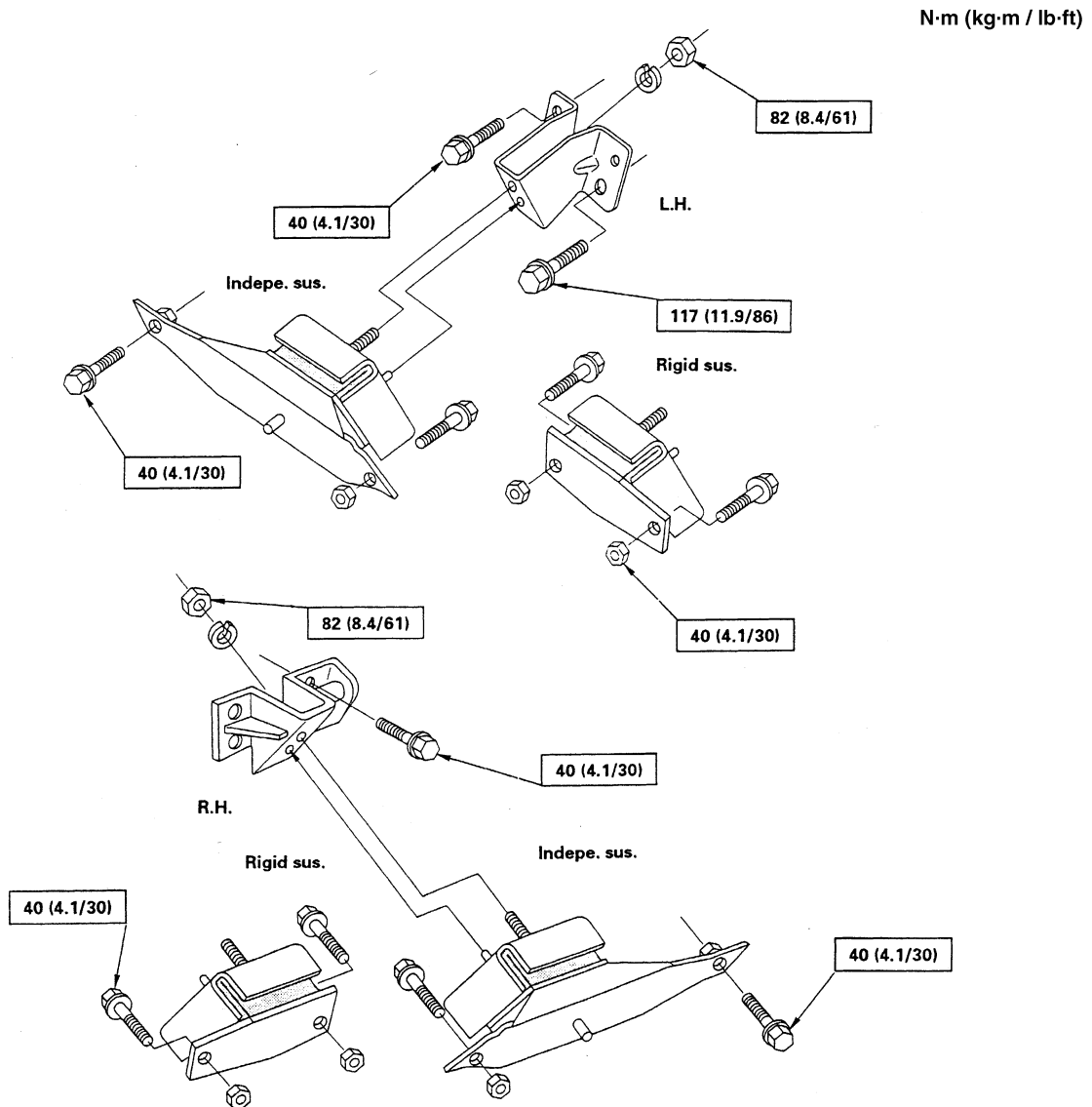
Engine Fuel Except 4JH1-TC



4JH1-TC



Engine Mounting Bracket



N6A3051E

SPECIAL TOOLS

Illustration	Tool Number / Description / Remarks
 5884020350	5-8840-2035-0 / Crank Timing Pulley (4JG2 Belt Drive only)
 5884002000	5-8840-0200-0 / Oil Filter Wrench (89.0 mm/3.5 in)
 5884002020	5-8840-0202-0 / Oil Filter Wrench (106.0 mm/4.2 in)
 5884022090	5-8840-2209-0 / Oil Filter Wrench (100.6 mm/4.0 in)
 9852314230	9-8523-1423-0 (J-29760) / Valve Spring Compres- sor
 5884020330	5-8840-2033-0 / Oil Seal Installer

Illustration	Tool Number / Description / Remarks
 5884090180	5-8840-9018-0 / Piston Ring Compressor
 5884020930	5-8840-2093-0 / Tacho Meter
 9852312120	9-8523-1212-0 / Valve Guide Replacer
 5884000860	5-8840-0086-0 / Cam- shaft Timing Pulley Remover (4JG2 Belt Drive only)
 5884001990	5-8840-0199-0 / Rubber Hardness Tester
 5884026750	5-8840-2675-0 / Com- pression gauge

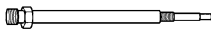
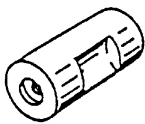
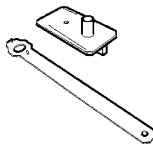
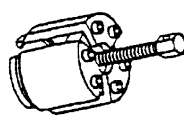
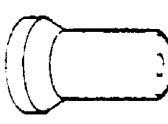
Illustration	Tool Number / Description / Remarks
 5853170010	5-8531-7001-0 / Gauge Adapter
 5853170020	5-8531-7002-0 / Gauge Adapter
 5884001450	5-8840-0145-0 / Measur- ing Device
 -1	x-xxxx-xxxx-x / Crank- shaft Timing Pulley Installer (4JG2 Belt Drive only)
 5884002660	5-8840-0266-0 / Angle Gauge
 5884090160	5-8840-9016-0 / Injec- tion Nozzle Tester
 5884020340	5-8840-2034-0 / Nozzle Holder Remover (4JB1 only)

Illustration	Tool Number / Description / Remarks
 5884020380	5-8840-2038-0 / Cam- shaft Bearing Replacer
 5884020360	5-8840-2036-0 / Front Oil Seal Installer (4JB1, 4JG2, Gear Drive only)
 5867391490	Base 5-86739-149-0 / Lever 5-86739-150-0 / Scissor gear setting tool
 5884002590	5-8840-0259-0 / Nozzle Holder Wrench (4JG2 only)
 5884002530	5-8840-0253-0 / (J- 22700) Fuel Filter Wrench
 5884023620	5-8840-2362-0 / Front Oil Seal Remover (4JG2, Belt Drive only)
 5884023610	5-8840-2361-0 / Front Oil Seal Installer (4JG2, Belt Drive only)

00-58 SERVICE INFORMATION

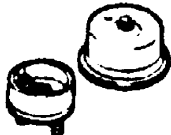
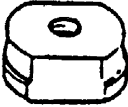
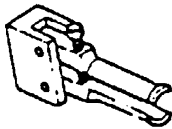
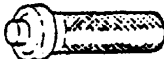
Illustration	Tool Number / Description / Remarks
 5884023600	5-8840-2360-0 / Rear Oil Seal Remover
 5884023590	5-8840-2359-0 / Rear Oil Seal Installer
 5884020400	5-8840-2040-0 / Cylin- der Liner Installer (4JB1 only)
 5884023130	5-8840-2313-0 / Cylin- der Liner Installer (4JG2 only)
 5884020390	5-8840-2039-0 / Cylin- der Liner Remover (4JB1 only)
 5884023040	5-8840-2304-0 / Cylin- der Liner Remover Ankle (4JG2 only)
 5884020000	5-8840-2000-0 / Pilot Bearing Remover

Illustration	Tool Number / Description / Remarks
 5884000190	5-8840-0019-0 / Sliding Hammer
 5852200240	5-8522-0024-0 / Pilot Bearing Installer