FUEL SYSTEM

DIESEL

CONTENTS

1. SPECIFICATIONS

FUEL INJECTION PUMP SPECIFICATIONS – ZEXEL TYPE

Fuel injection pump identification No.	Plunger diameter mm (in.)	Gover-nor	Cold start device	Fuel cut sole-noid valve	Dash pot	Boost compensa-tor	Diesel altitude compen-sator (DAC)	Speed sensor	Lever position sensor (LPS)	Timer
MD155249	10 (0.394)	*1	*3	X	–	–	–	X	–	X
MD155251	10 (0.394)	*1	*4	X	–	X	–	X	–	X
MD155252	10 (0.394)	*2	*4	X	–	–	–	–	–	X
MD155253	10 (0.394)	*2	*4	X	–	–	–	–	–	X
MD155254	10 (0.394)	*2	*4	X	–	–	–	–	–	X
MD155255	10 (0.394)	*1	*4	X	–	X	–	X	–	X
MD155256	10 (0.394)	*1	*4	X	–	–	–	X	–	X
MD155257	10 (0.394)	*2	*4	X	–	–	–	X	–	X
MD155261	10 (0.394)	*1	*4	X	–	X	–	X	–	X
MD155262	10 (0.394)	*1	*4	X	–	X	–	X	–	X
MD155263	10 (0.394)	*1	*4	X	–	–	–	X	–	X
MD155265	10 (0.394)	*2	*4	X	–	–	–	X	–	X
MD155266	10 (0.394)	*2	*4	X	–	–	–	–	–	X
MD155267	10 (0.394)	*2	*4	X	–	–	–	–	–	X
MD155269	10 (0.394)	*2	*4	X	–	–	–	X	–	X
MD163890	10 (0.394)	*2	*4	X	–	X	–	X	–	X
MD167342	10 (0.394)	*1	*4	X	–	X	–	X	X	X
MD167344	10 (0.394)	*1	*4	X	–	X	–	X	X	X
MD167345	10 (0.394)	*1	*4	X	–	X	–	X	X	X

Fuel	Fuel	Diesel	Lever

Fuel injection	Plunger	Gover-	Cold start	Fuel cut	Dash	Boost	Diesel altitude	Speed	Lever position	

Fuel injection pump identification No.	Plunger diameter mm (in.)	Gover-nor	Cold start device	Fuel cut sole-noid valve	Dash pot	Boost compensa-tor	Diesel altitude compen-sator (DAC)	Speed sensor	Lever position sensor (LPS)	Timer
MD315197	10 (0.394)	*2	*3	X	–	–	–	–	–	X

Fuel injection	Plunger	Gover-	Cold start	Fuel cut	Dash	Boost	Diesel altitude	Speed	Lever position

Fuel injection pump identification No.	Plunger diameter mm (in.)	Gover-nor	Cold start device	Fuel cut sole-noid valve	Dash pot	Boost compensa-tor	Diesel altitude compen-sator (DAC)	Speed sensor	Lever position sensor (LPS)	Timer
ME201902	11 (0.433)	*1	*3	X	–	–	–	X	X	X

FUEL INJECTION PUMP SPECIFICATIONS – NIPPONDENSO TYPE

Fuel injection	Plunger	Fuel cut	Boost	Diesel altitude	Lever

ELECTRONICALLY CONTROLLED FUEL INJECTION PUMP SPECIFICATIONS – NIPPONDENSO TYPE

Fuel injection pump identification No.	Plunger diameter mm (in.)	Solenoid-type spill valve	Timing control solenoid valve	Diesel fuel temperature sensor	Pump operation sensor	Fuel cut solenoid valve
MD321175	10 (0.394)	X	X	X	X	X

INJECTION NOZZLE SPECIFICATIONS – ZEXEL TYPE

Injection nozzle part No.	Type	Injection spray angle (deg.)	Nozzle type	Holder type
MD074540	A	15	Throttle type	Screw-on type

INJECTION NOZZLE SPECIFICATIONS – NIPPONDENSO TYPE

Injection nozzle part No.	Type	Injection spray angle (deg.)	Nozzle type	Holder type
MD080288	F	0	Throttle type	Screw-on type
MD165282	G	15	Throttle type	Screw-on type

Shims for breaking pressure adjustment

Thickness mm (in.)	Part No.
1.20 (0.0472)	MD603489
1.25 (0.0492)	MD603490
1.30 (0.0512)	MD603491

Thickness mm (in.)	Part No.
1.45 (0.0571)	MD603494
1.50 (0.0591)	MD603495
1.55 (0.0610)	MD603496

TORQUE SPECIFICATIONS

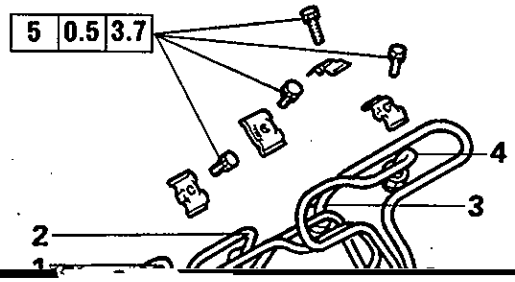
2. SPECIAL TOOLS

Tool	Number	Name	Use
	105789-0010 Zexel	Nozzle cleaning tool	Cleaning fuel injection nozzle assembly (4M40)

NOTES

3. FUEL INJECTION PUMP AND INJECTION NOZZLE

REMOVAL AND INSTALLATION – 4D65

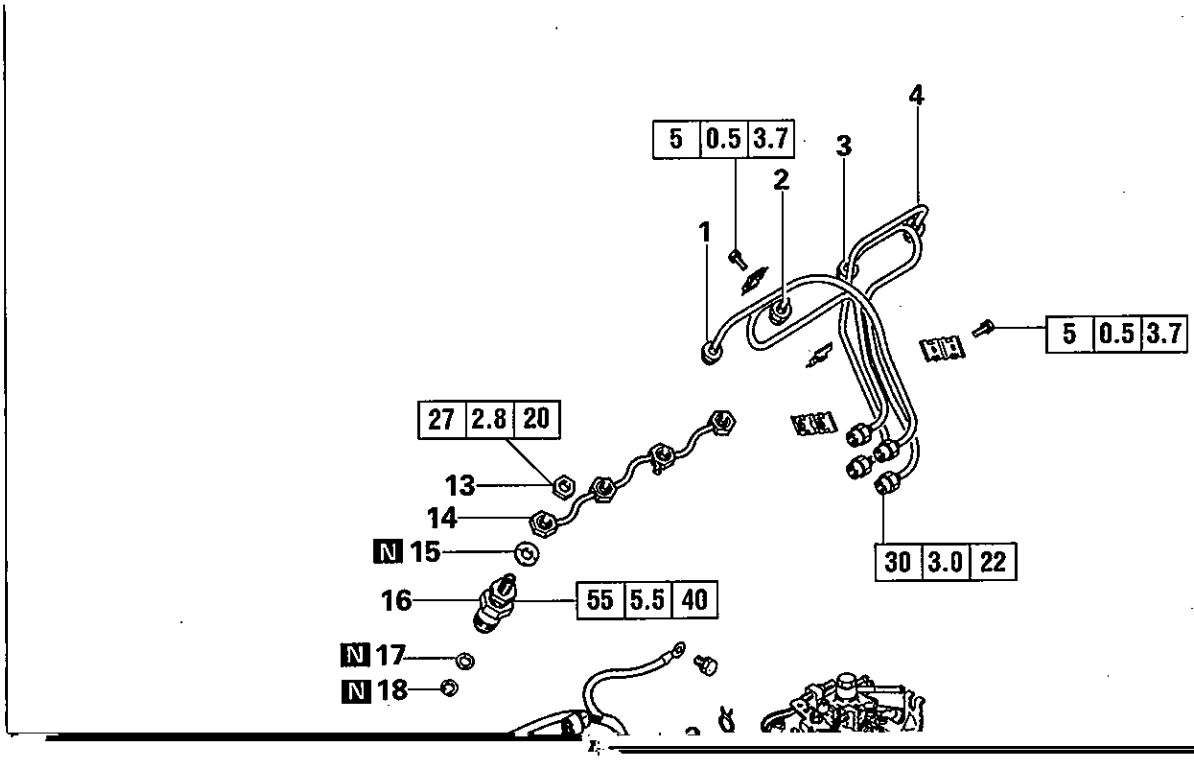


Pre-removal Operation
- Removal of Timing Belt (Refer to Group 11A – 4D65 engine.)

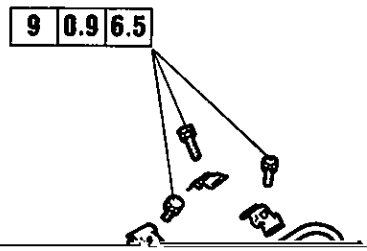
Post-installation Operation
- Installation of Timing Belt (Refer to Group 11A – 4D65 engine.)

Removal steps

REMOVAL AND INSTALLATION – 4D56



REMOVAL AND INSTALLATION – 4D68 EXCEPT ELECTRONICALLY CONTROLLED FUEL INJECTION PUMP



Pre-removal Operation
- Removal of Timing Belt (Refer to Group 11B – 4D68 engine.)

Post-installation Operation
- Installation of Timing Belt (Refer to Group 11B – 4D68 engine.)

Removal steps

〈A〉 〈D〉 1. Injection pipe No. 1
〈A〉 〈D〉 2. Injection pipe No. 2
〈A〉 〈D〉 3. Injection pipe No. 3

REMOVAL AND INSTALLATION – 4D68 ELECTRONICALLY CONTROLLED FUEL INJECTION PUMP

[redacted]

5 0 6 3 6

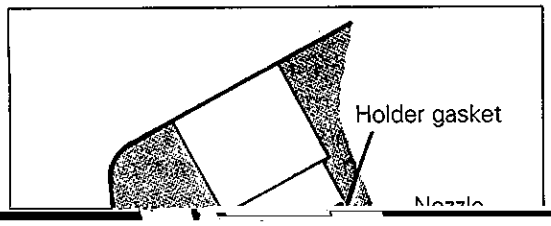
SERVICE POINTS OF REMOVAL

◊E◊ REMOVAL OF INJECTION NOZZLE

(1) Write the number of the cylinder on the injection nozzle that has been removed.

SPRAY TEST

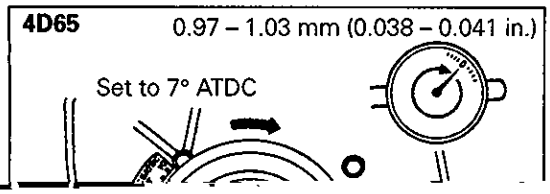
(1) Move the nozzle tester lever with a fast stroke [illegible]



SERVICE POINTS OF INSTALLATION

▶A◀ INSTALLATION OF NOZZLE GASKET / HOLDER GASKET

(1) Clean nozzle holder installation area of the cylinder head.
(2) Fit a new nozzle gasket and holder gasket into the nozzle holder hole in the cylinder head.



(6) Turn the crankshaft clockwise to bring the notch in the pulley to 7° ATDC (for 4D65 engine) or 9° ATDC (for 4D68 engine), and check that the dial indicator reading is within the standard value range.

Standard value:

Caution

- **Do not turn the adjusting screw.**

(c) Remove the screwdriver.

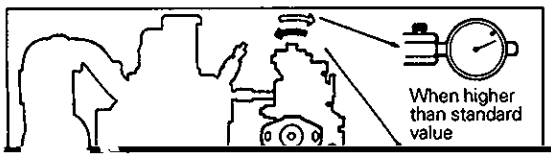
(2) Loosen (but do not remove) two nuts and two bolts holding the injection pump.

(3) Loosen (but do not remove) the 4 nuts on the injection pump side which hold the injection pipes.

Caution

- **When loosening the nuts, hold the delivery valve holder with a wrench to prevent it from turning along with the nut.**

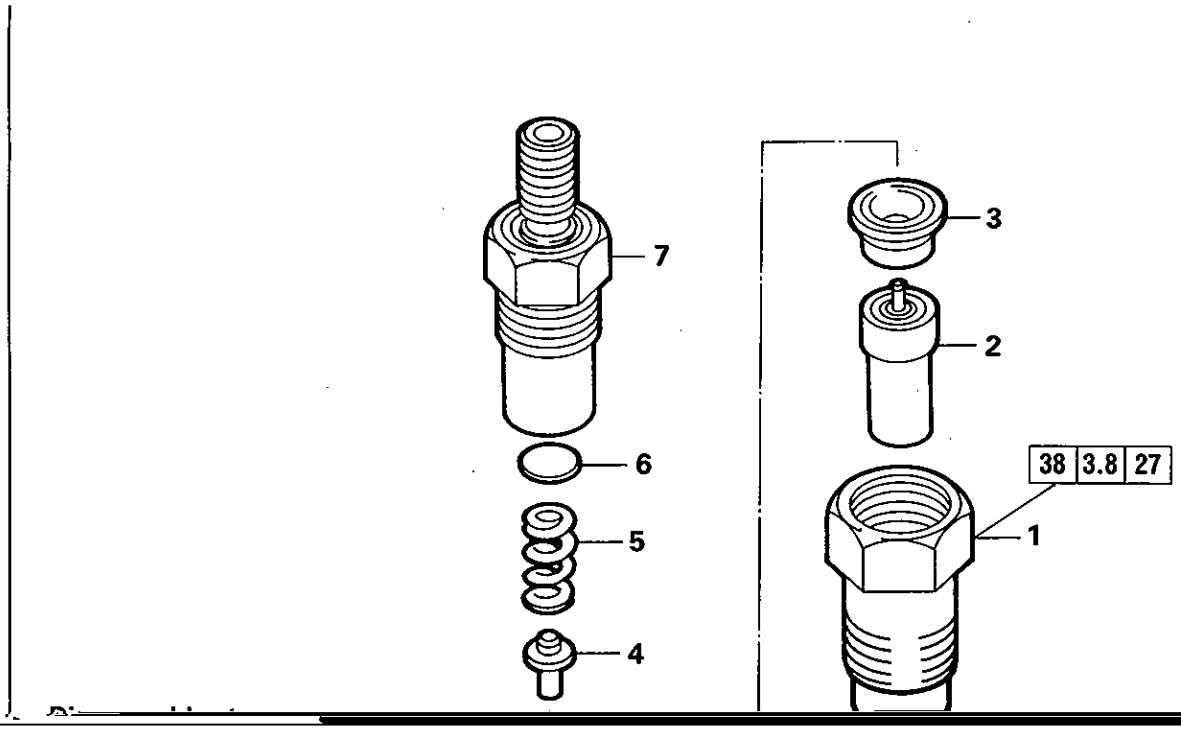
(4) Remove the plug from the rear of injection pump and attach

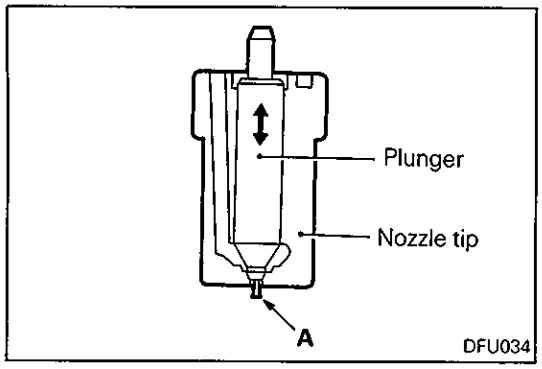


(7) If dial indicator reading is not within the standard value range, tilt the injection pump body to the right or left until the reading is within the standard value range. Then, temporarily tighten the injection pump nuts and bolts.
(8) Repeat Steps (5) and (7) to make sure that the adjustment

4. INJECTION NOZZLE HOLDER

DISASSEMBLY AND REASSEMBLY





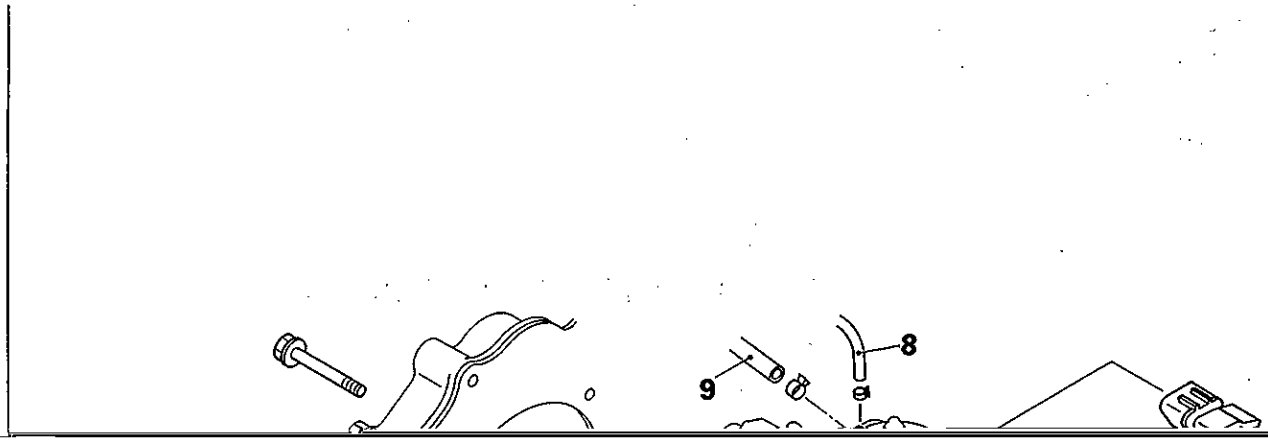
INSPECTION

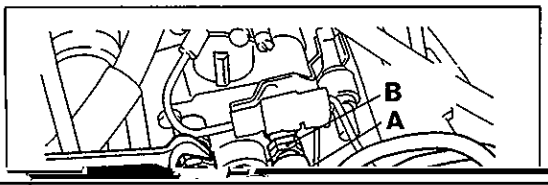
INSPECTION OF NOZZLE TIP

(1) Check the nozzle tip for carbon deposits. Scrape off carbon deposits with a piece of wood and clean each part with petrol. After cleaning, keep parts submerged in diesel fuel. Take particular care to protect the nozzle tip needle valve from damage.
(2) While the nozzle tip is submerged in diesel fuel, check that the needle valve slides smoothly.
If the needle valve does not slide smoothly, replace the nozzle tip.
When replacing the nozzle tip, completely wash off the

5. FUEL INJECTION PUMP ASSEMBLY (4M40 ENGINE)

REMOVAL AND INSTALLATION

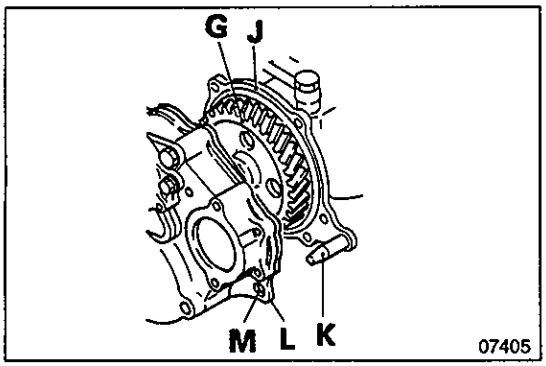




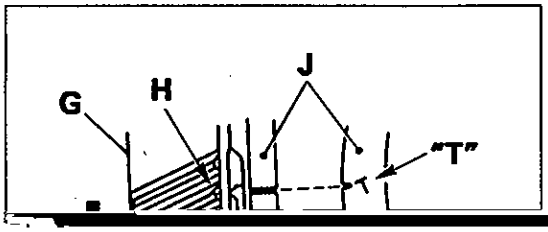
REMOVAL SERVICE POINT

◇A◇ FUEL INJECTION PIPE REMOVAL

(1) Loosen the union nut **A** of the fuel injection pipe **11** while locking the delivery valve holder **B** to prevent it from rotating

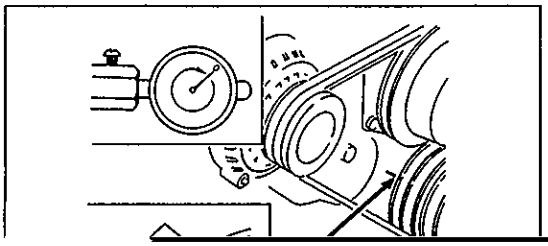


(3) Insert guide bar **K** of flange plate **J** into guide hole **M** of front plate **L** and press it in up to a point just before injection pump gear **G** comes in mesh with the idler gear.



(4) Check to see that alignment mark "**N**"<non-turbo> or "**T**" <turbo> of flange plate **J** is in alignment with notch **H** of injection pump gear **G**. Then press the injection pump assembly in.
In this case, notch **H** of the gear comes in mesh as it turns in direction **P**.

(4) Remove all the glow plugs.
(5) Crank up the engine to place No.1 piston at the TDC on the



(14) Set No.1 cylinder piston to the fuel injection timing by turning the crankshaft clockwise. At this point, read the dial gauge to measure the valve lift.

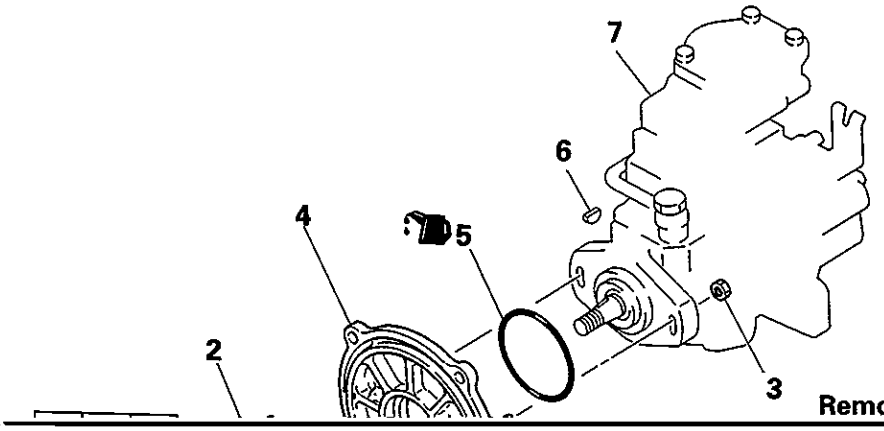
NOTE
For the fuel injection timing refer to "SERVICE SPECIFICATIONS".

Plunger lift: 1 + 0.03 mm (0.039 + 0.0012 in.)

NOTES

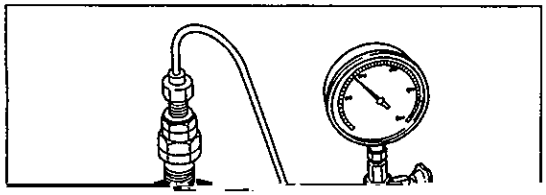
6. FUEL INJECTION PUMP GEAR (4M40 ENGINE)

REMOVAL AND INSTALLATION



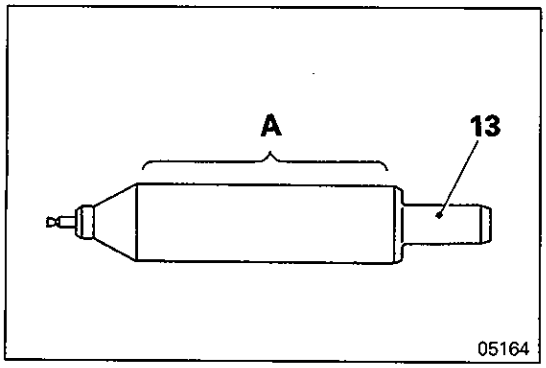
Removal steps

NOTES



Valve Opening Pressure Check

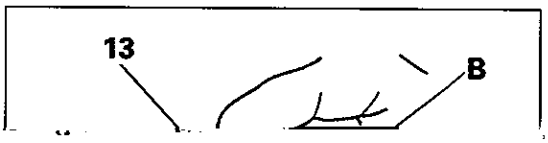
(1) Push down the nozzle tester lever slowly. The pointer of the pressure gauge rises gradually and deflects sharply at a certain point. Read the pressure at that point.
(2) If the reading deviates from the standard value, disassemble



◇B◇ NEEDLE VALVE / NOZZLE TIP REMOVAL

Caution

- **Be sure not to touch the sliding contact surface A of the needle valve 13.**
- **Be sure not to change the original combination of the needle valve 13 and nozzle tip 14 removed.**



CLEANING

NEEDLE VALVE / NOZZLE TIP

(1) Wash the needle valve **13** and nozzle tip **14** removed in clean