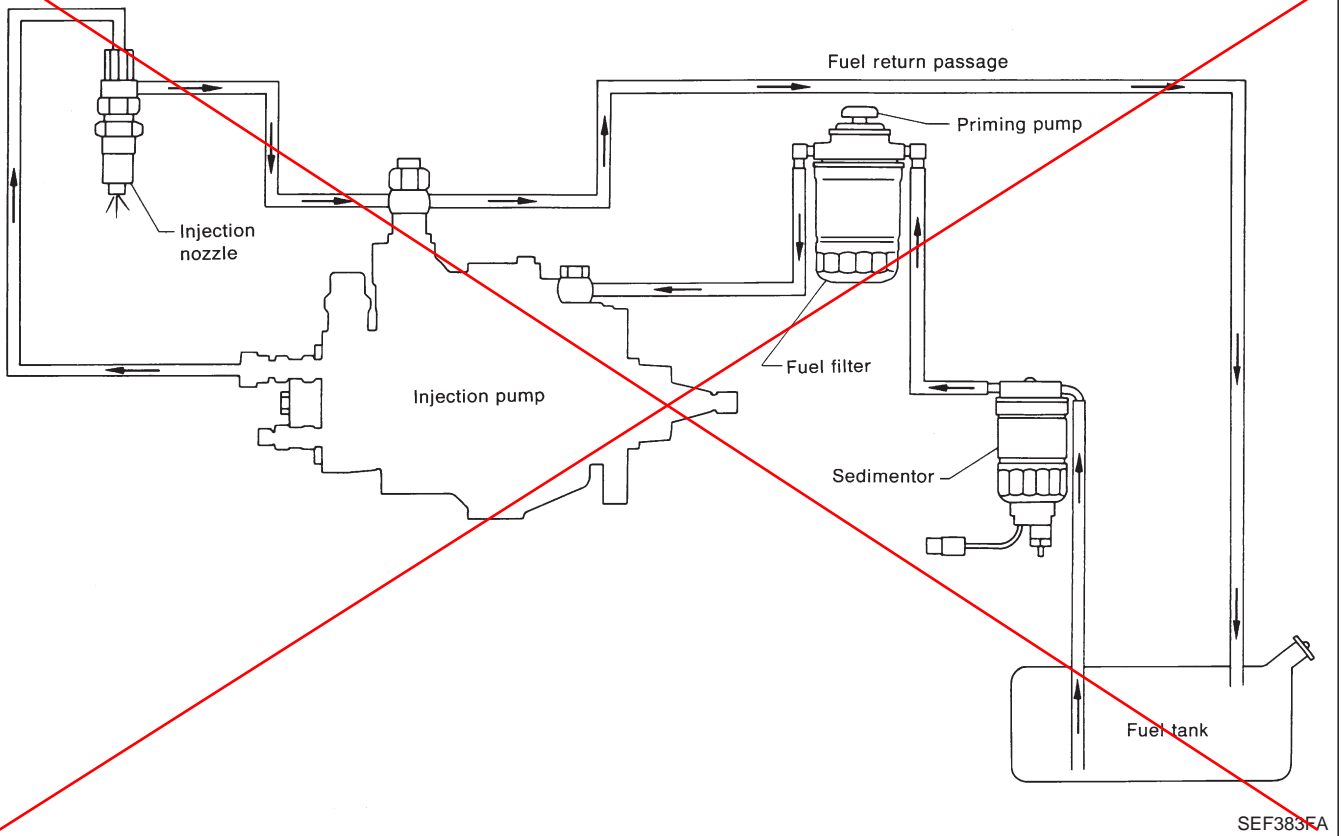
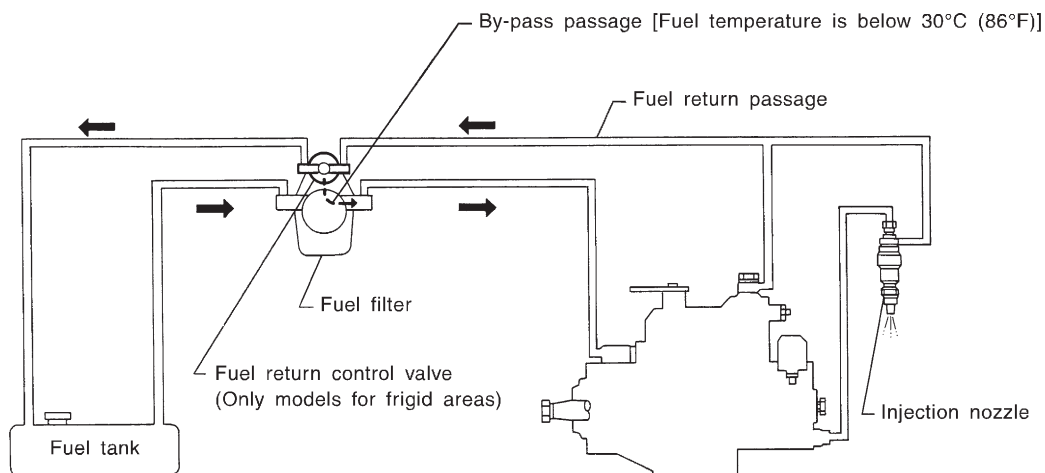


INJECTION SYSTEM Fuel System (Cont'd)

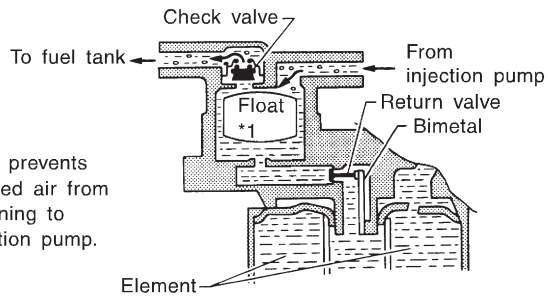
Type 2



Type 3

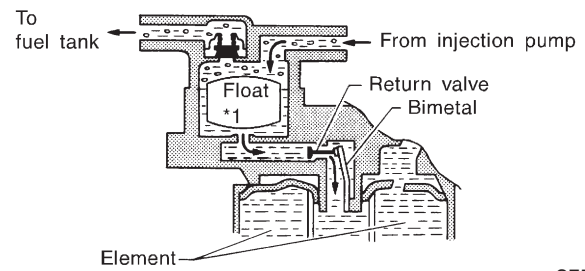


Fuel temperature: Hot



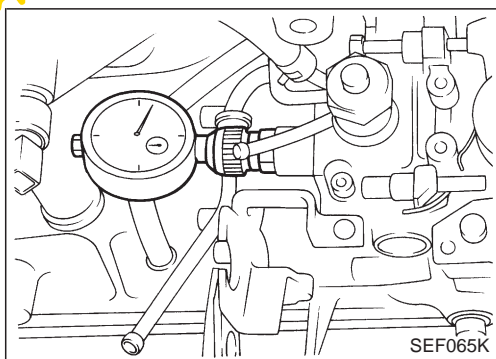
*1: Float prevents trapped air from returning to injection pump.

Fuel temperature: Cold



SEF151RA

INJECTION PUMP

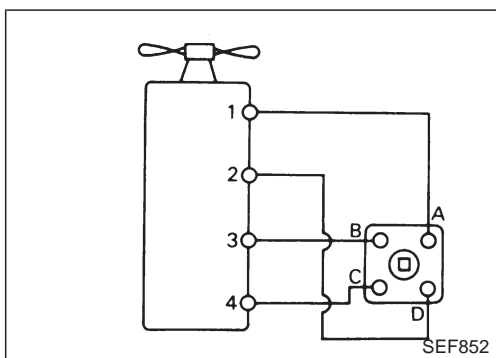


Inspection

PLUNGER LIFT INSPECTION

1. Remove injection tubes.
2. Remove plug bolt from distributor head and install dial gauge.
3. Plunger lift measurement
 - (1) Turn crankshaft counterclockwise 20 to 25 degrees from No. 1 piston at TDC.
 - (2) Find dial gauge's needle rest position at step (1) set position, then set the gauge to zero.
 - (3) Turn crankshaft clockwise until No. 1 piston is set at TDC.
 - (4) Read dial gauge indication.
 0.71 ± 0.05 mm (0.0280 ± 0.0020 in)
 - (5) If it is not within the above range, adjust it within adjustment standard range.

Refer to EC-181.

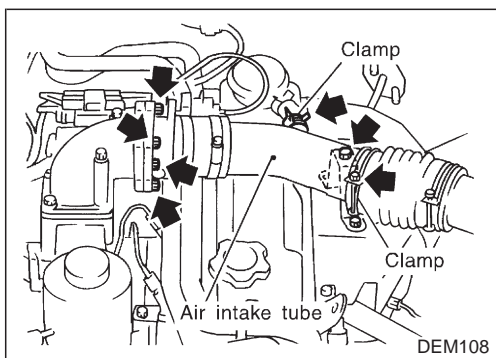


4. Disconnect dial gauge and reinstall plug bolt with new washer.
Torque: **$14 - 20$ N·m ($1.4 - 2.0$ kg-m, $10 - 14$ ft-lb)**
5. Connect injection tubes.
Flare nut:
Torque: **$20 - 25$ N·m ($2.0 - 2.5$ kg-m, $14 - 18$ ft-lb)**
6. Bleed air from fuel system.
Refer to EC-191.

INJECTION PUMP CALIBRATION

Calibrate injection pump on injection pump tester.

Refer to "Injection Pump Calibration Standard" in SDS, EC-235.



Removal

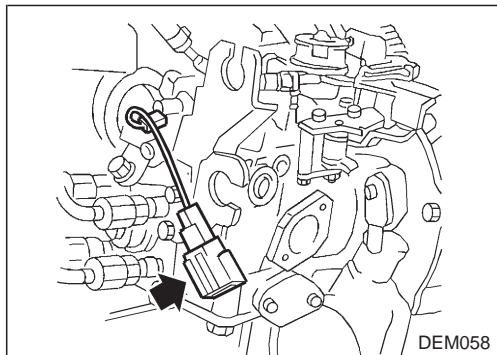
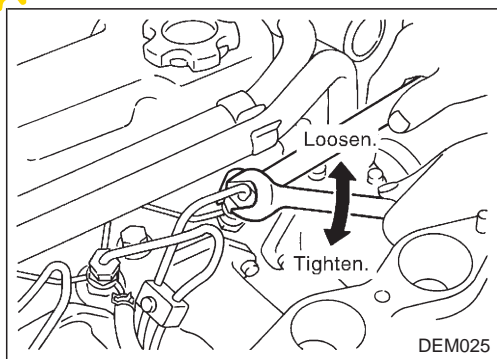
1. Disconnect air duct and air intake housing.

INJECTION PUMP

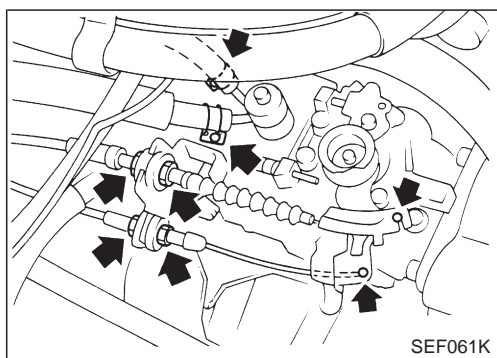
Removal (Cont'd)

2. Remove injection tube.

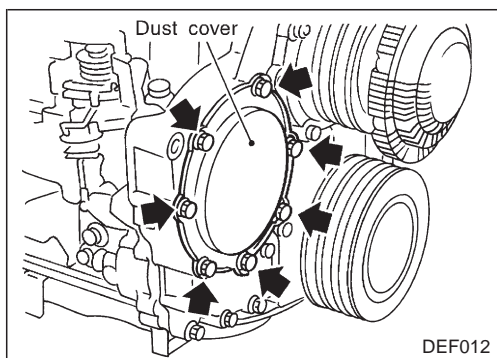
Cover the injection nozzle assembly with a plug to prevent dust entry.



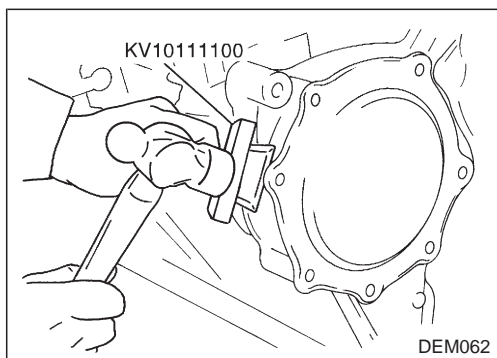
3. Turn ignition switch to OFF position and disconnect wire harness connectors connected to the injection pump.



4. Remove accelerator wire and disconnect overflow hose, fuel inlet hose and fuel return hose.



5. Remove injection pump drive gear cover.

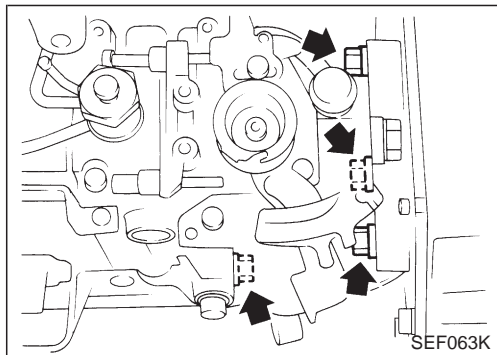


6. Loosen injection pump drive gear nut and remove drive gear by using puller.

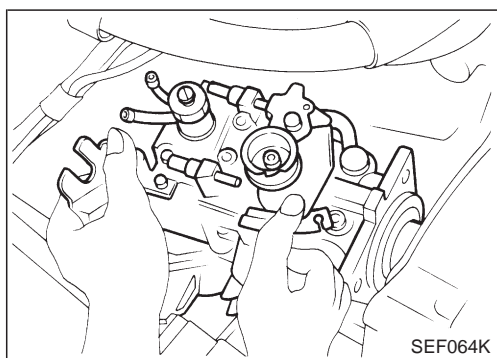
INJECTION PUMP

Removal (Cont'd)

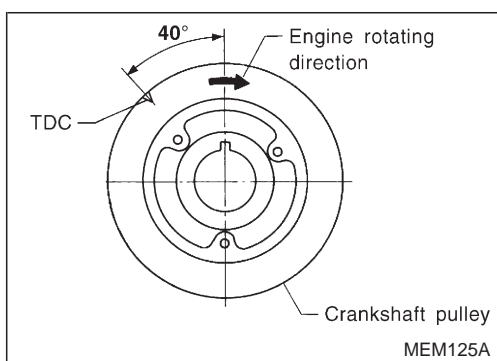
7. Remove vacuum pump.
 - Remove the eye bolt securing the oil tube. Remove the vacuum pump. Be careful not to bend the oil tube during vacuum pump removal.



8. Remove injection pump fixing nuts and bolts.

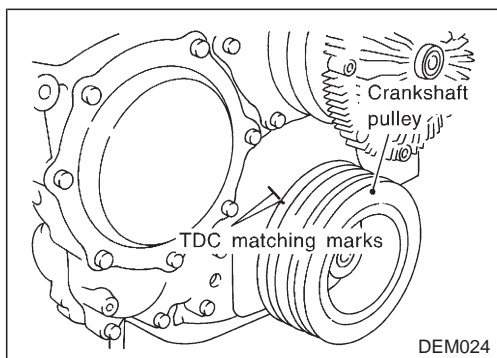


9. Remove injection pump with injection tubes.
Disconnect injection tube from pump once it is removed.



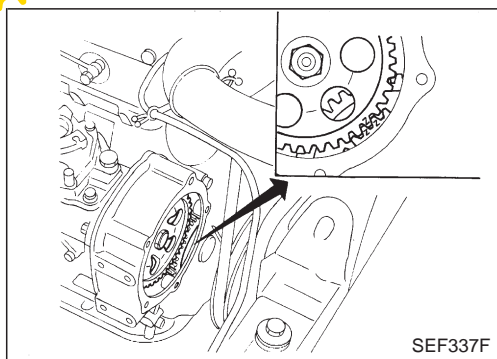
Installation and Adjustment

1. Confirm that No. 1 piston is set at TDC on its compression stroke.



INJECTION PUMP

Installation and Adjustment (Cont'd)

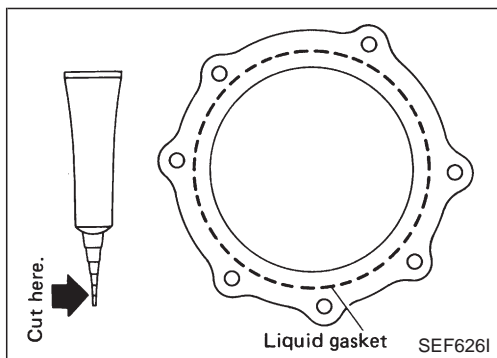


2. Install injection pump.
- (1) Temporarily set injection pump so that the flange of pump is aligned with aligning mark on front cover.
- (2) Install injection drive gear over the key.

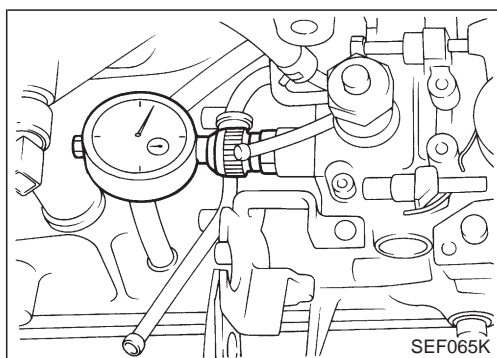
⚙️: 59 - 69 N·m (6 - 7 kg-m, 43 - 51 ft-lb)

Coat key with grease to prevent it from falling into the front cover. Make sure that "Z" marks are aligned.

- (3) Install drive gear cover while applying a continuous bead of liquid gasket.



- Be sure liquid gasket is 2.5 to 3.5 mm (0.098 to 0.138 in) wide.
- Attach timing gear case cover to timing gear case within 5 minutes after coating.
- Wait at least 30 minutes before refilling engine oil.
- Use Genuine Liquid Gasket or equivalent.



PLUNGER LIFT ADJUSTMENT

1. Loosen injection pump mounting nuts and mounting bracket bolt.
2. Remove plug bolt from distributor head and install dial gauge.
3. Plunger lift measurement and adjustment
- (1) Turn crankshaft counterclockwise 20 to 25 degrees from No. 1 piston at TDC.
- (2) Find dial gauge's needle rest position at step (1) set position, then set the gauge to zero.
- (3) Turn crankshaft clockwise until No. 1 piston is set at TDC.
- (4) Read dial gauge indication.

0.71±0.02 mm (0.0280±0.0008 in)

- (5) If it is not within the above range, turn pump body until it comes within standard range.

- a. If indication is smaller than the specified value, turn pump body counterclockwise.
- b. If indication is larger than the specified value, turn pump body clockwise.

4. Tighten injection pump securely.

Injection pump fixing bolt:

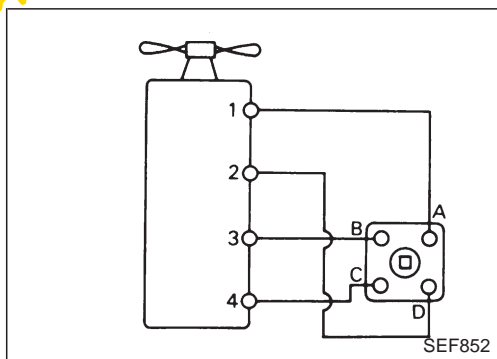
⚙️: 20 - 25 N·m (2.0 - 2.5 kg-m, 14 - 18 ft-lb)

Injection pump to mounting bracket:

⚙️: 30 - 41 N·m (3.1 - 4.2 kg-m, 22 - 30 ft-lb)

INJECTION PUMP

Installation and Adjustment (Cont'd)



5. Disconnect dial gauge and reinstall plug bolt with new washer.

Plug: 14 - 20 N·m (1.4 - 2.0 kg-m, 10 - 14 ft-lb)

6. Connect injection tubes.

Flare nut:

Plug: 20 - 25 N·m (2.0 - 2.5 kg-m, 14 - 18 ft-lb)

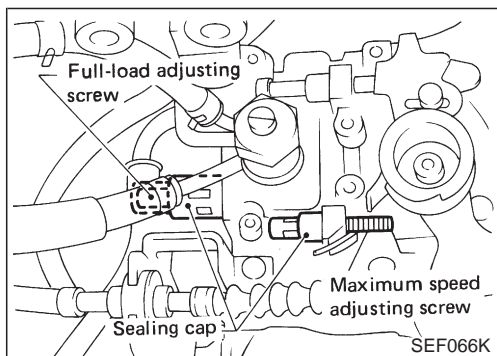
7. Bleed air from fuel system.

Refer to EC-191.

IDLE AND MAXIMUM SPEED ADJUSTMENT

CAUTION:

- Do not remove sealing wires unless absolutely necessary.
- Disturbing full-load adjusting screw will change fuel flow characteristics, resulting in an improperly adjusted engine. Readjustment of fuel injection pump should be done using a pump tester.
- If maximum speed adjusting screw is turned in direction that increases control lever angle, engine damage may result.



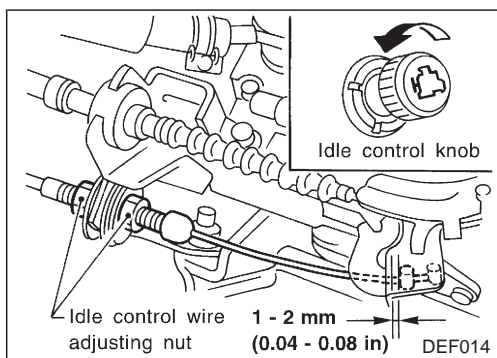
Throttle control wire adjustment

- Turn idle control knob fully counterclockwise.
- Make sure that clearance between idle control lever pin and fuel injection pump control lever is within the specified range.

Clearance:

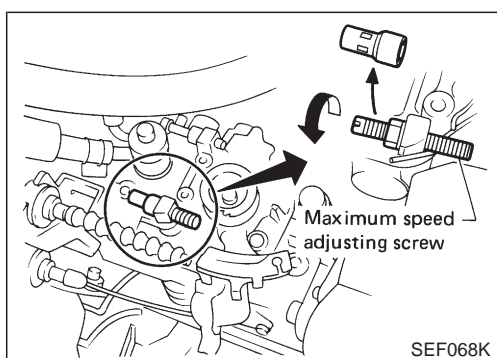
1 - 2 mm (0.04 - 0.08 in)

- If not within the specified range, adjust with idle control wire adjusting nut.
- After adjusting clearance, tighten lock nut.



Idle adjustment

Refer to "Checking Idle Speed", "ENGINE MAINTENANCE" in MA section.



Maximum speed adjustment

Maximum speed adjusting screw is retained by sealing wire and need not be adjusted under normal circumstances. However, if it becomes necessary to adjust it, the following procedure should be followed:

- Start engine and warm it up until coolant temperature indicator points to middle of gauge.
 - Connect tachometer's pick-up to No. 1 fuel injection tube.
- To obtain accurate reading of engine rpm, remove clamps that secure No. 1 fuel injection tube.

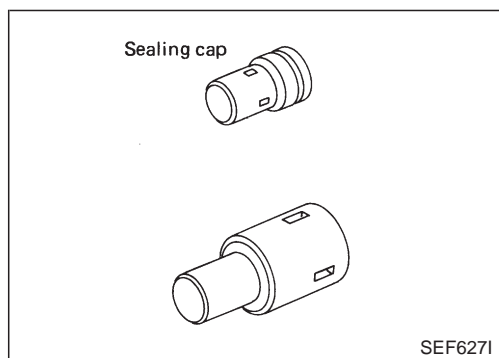
INJECTION PUMP

Installation and Adjustment (Cont'd)

3. Depress accelerator pedal fully under no load and, at this point, read the tachometer indication.

Maximum engine speed (Under no load):

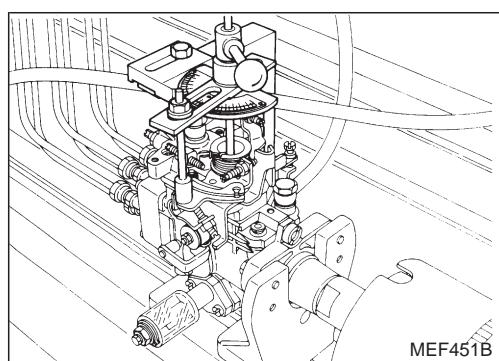
5,000⁺¹⁰⁰₋₂₀₀ rpm



4. If indication is lower than specified maximum engine speed, turn maximum speed adjusting screw counterclockwise 1 or 2 rotations. Then depress accelerator pedal to floor under no load and, at this point, read indication.
5. If indication is still lower than specified speed, repeat step 4 above until specified engine speed is reached.
6. After adjustment, tighten lock nut securely.
7. Seal with a sealing wire or install a sealing cap.

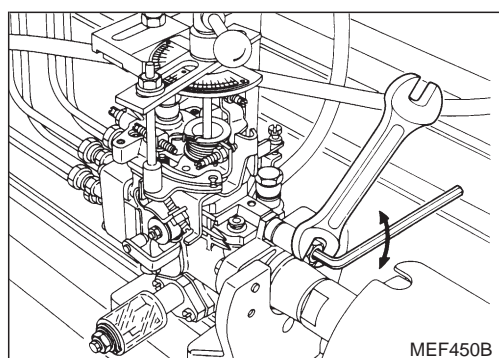
Disassembly

Refer to "VE INJECTION PUMP" in EF section of Service Manual for TD series diesel engine (1st Revision).



Load Timer Adjustment

1. After adjusting the timer stroke, find the control lever position where the injection quantity is as specified and then fix the control lever using the adjusting device (KV11282617).



2. Run the injection pump at the specified speed and then adjust the governor shaft installation position so that the timer stroke is as specified.
Refer to "Injection Pump Calibration Standard" in SDS for the timer stroke.

INJECTION PUMP

Start Q Adjustment Lever

DISASSEMBLY

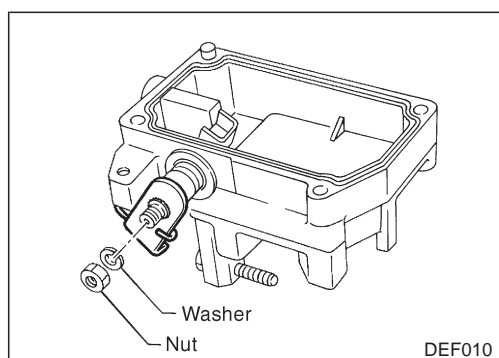
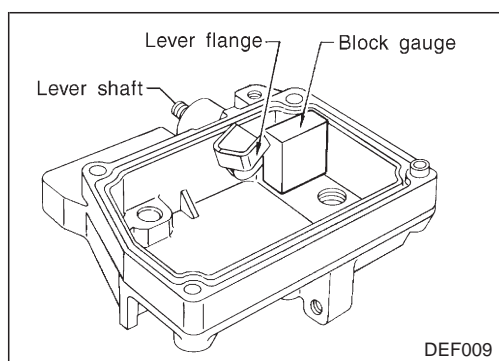
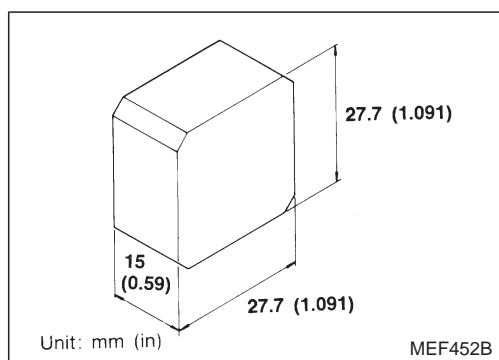
1. Attach injection pump to bracket using two bolts.
2. Remove start Q adjustment lever by removing nut after marking the installation position.
3. Remove nut and washer from the tip of lever shaft and then remove start Q adjustment lever, spring, washer and O-ring.
4. Remove lever shaft and washer from the inside of governor cover.

INSPECTION

1. Check that lever shaft's sliding surface is not worn, scratched or damaged excessively and that lever shaft's flange is not bent, worn or damaged excessively.
Replace lever shaft if defective.
2. Inspect the other parts carefully. If they are damaged, worn, rusted or bent excessively they must be replaced.

REASSEMBLY

During reassembly of a fuel injection pump equipped with start Q adjustment lever, a block gauge must be used to determine the start Q adjustment lever installation position.



1. Using block gauge, ensure that the distance from the inside face of cover to the tip of lever flange is 27.7 mm (1.091 in). Maintain lever shaft in this position.

2. Install start Q adjustment lever on lever shaft so that start Q adjustment lever contacts (or almost contacts) the under side of the adjusting bolt base.
Then, fix start Q adjustment lever on lever shaft using washer and nut.

If start Q adjustment lever cannot be installed as described above, use start Q adjustment lever with differently phased serrations.

INJECTION PUMP

Start Q Adjustment Lever (Cont'd) ADJUSTMENT

Adjust adjusting bolt on the normal operating side so that the starting injection quantity is as specified.

Refer to "Injection Pump Calibration Standard" in SDS for the starting injection quantity.

