ENGINE FUEL

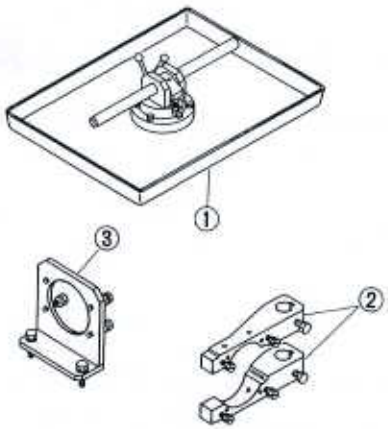
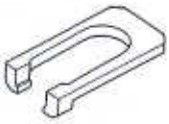
SECTION EF

EF

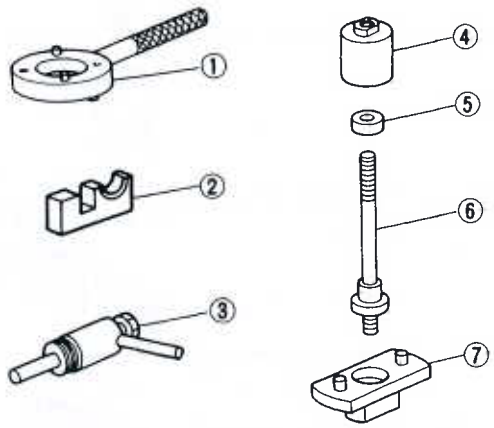
CONTENTS

SPECIAL SERVICE TOOLS

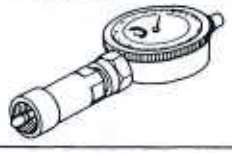
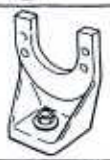
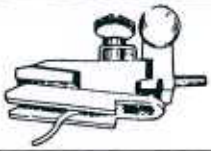
In-line type injection pump

Tool number Tool name	Description
① KV11244852 Universal vise ② KV11244872 Bracket ③ KV11244782 Bracket **PE type:** ① + ② **PES type:** ① +②+ ③	
KV11216432 (DK57916432)* Timer wrench	
KV11226512 (DK57926512)* Extractor	
KV11231612 (DK57931612)* Tappet clamp	
KV11231410 Tappet holder	

*: These tools have two different tool numbers. If thse S.S.T.s are required, place an order using KVxxxxxxxx.

Tool number Tool name	Description
KV11290502 (DK05790502)* Special tool set (For timer) ①KV11216432 (DK57916432)* Timer wrench ②KV11232020 (DK57932020)* Timer spring support ③KV11226581 (DK57926581)* Timer extractor KV11224162 (DK57924162)* Base assembly ④KV11224190 (DK57924190)* Bushing ⑤KV11224180 (DK57924180)* Bushing guide ⑥KV11224170 (DK57924170)* Bushing guide ⑦KV11224161 (DK57924161)* Base	
KV11231250 Tappet holder	
KV11215010 (DK57915010)* Special wrench	
KV11221012 (DK57921012)* Tappet insert	
KV11221562 Plunger insert	

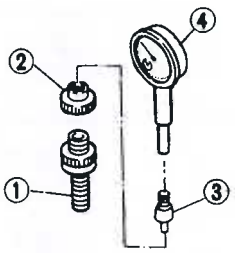
*: These tools have two different tool numbers. If thse S.S.T.s are required, place an order using KVxxxxxxxx.

Tool number Tool name	Description
KV11215422 (DK57915422)* Special wrench	
KV11257802 Nozzle holder	
KV11257800 Nozzle	
KV11282618 (DK05782618)* Measuring device	
KV11282601 (DK05782601)* Measuring device	
KV11257805 Injection tube	
KV11205781 Securing stand	
KV11282402 Measuring device	
KV11284019 Timer coupling	
KV11282433 Measuring device for plunger pre-stroke	

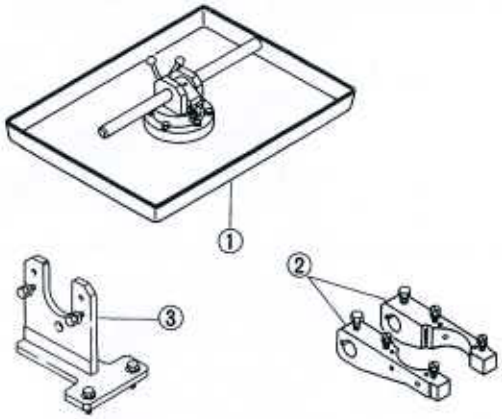
*: These tools have two different tool numbers. If thse S.S.T.s are required, place an order using KVxxxxxxxx.

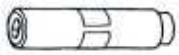
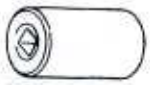
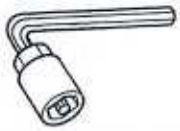
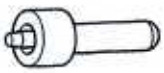
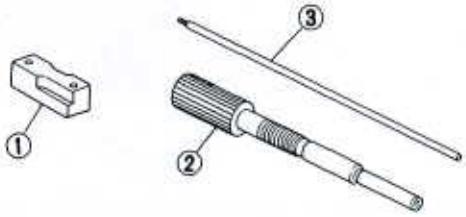
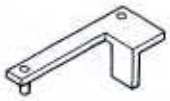
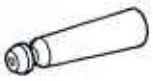
SPECIAL SERVICE TOOLS
VE-type injection pump

Adjusting device on car

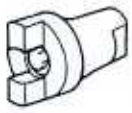
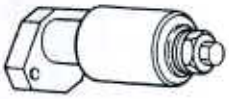
Tool number Tool name	Description
KV11229352 Measuring device (Set length of plunger spring) ① KV11229350 Holder ② KV11229360 Nut ③ KV11229370 Pin ④ KV11254410 Dial gauge	

Disassembling and assembling tools

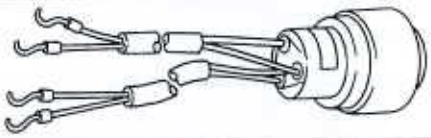
① KV11244852 Universal vise ② KV11244872 Bracket ③ KV11244792 Bracket	
KV11229072 Insert device	
KV11214110 Socket wrench for delivery valve	
KV11214270 Socket wrench for governor pivot bolt	

Tool number Tool name	Description
KV11214260 Socket wrench for regulating valve	
KV11214250 Socket wrench for distributor head plug	
KV11215842 Governor shaft adjusting device	
KV11229542 Feed pump holder	
"MS" measuring device set ① KV11229110 Block gauge ② KV11241920 Dummy shaft ③ KV11229830 Rod	
KV11229752 Block gauge (For high altitude compensator)	
KV11229762 Block gauge (For high altitude compensator)	
KV11229042 "K" & "KF" measuring device	
KV11222090 Oil seal guide (For drive shaft)	

Adjusting device on pump tester

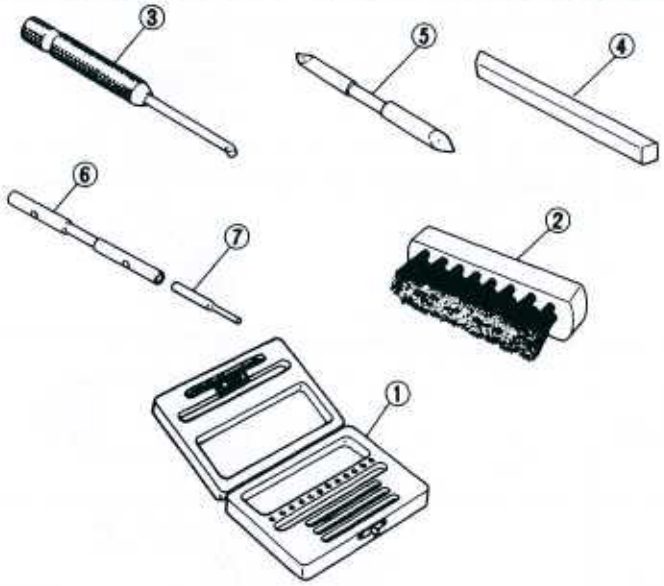
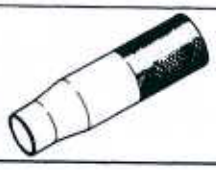
Tool number Tool name	Description
KV11281036 Fixing stand	
KV11242442 Coupling	
KV11282815 Measuring device (Timer advance angle)	
KV11205032 Injection pipe [840 mm (33.07 in)]	
KV11229462 Extractor (Disassembling of regulating valve)	
KV11229522 Insert device (Assembling of regulating valve)	
KV11257802 Nozzle holder (Bosch type EF8511-9A)	
KV11257800 Nozzle (Bosch type DN12SD12T)	

Adjusting device for potentiometer

KV11229882 Voltage check harness (For potentiometer)	
KV11244582 Voltage adjusting harness (For potentiometer)	

SPECIAL SERVICE TOOLS

Injection nozzle

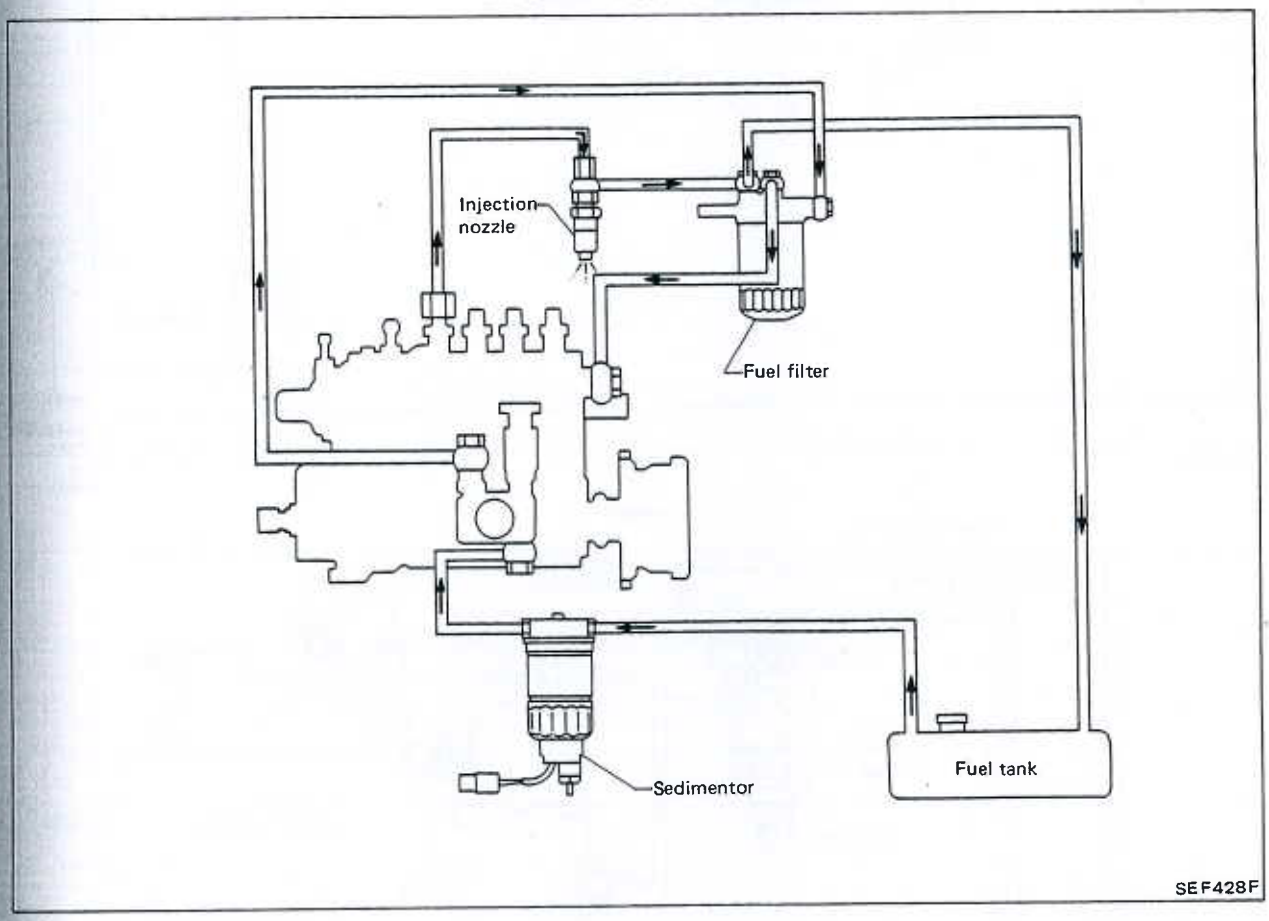
KV11289004 Nozzle cleaning kit ①KV11290012 Box ②KV11290110 Brush ③KV11290122 Nozzle oil sump scraper ④KV11290140 Nozzle needle tip cleaner ⑤KV11290150 Nozzle seat scraper ⑥KV11290210 Nozzle holder ⑦KV11290220 Nozzle hole cleaning needle	
KV11292210 Nozzle centering device	
KV11290632 Nozzle oil sump scraper	
KV11290620 Nozzle seat scraper	

CAUTION:

- Disassembly and assembly of the injection pumps should be done only in service shops authorized by NISSAN or by the pump manufacturer.
- The pump tester is required for servicing the pump.
- Before removing fuel injection pump from vehicle, check closely to make sure that it is definitely malfunctioning.

Fuel System

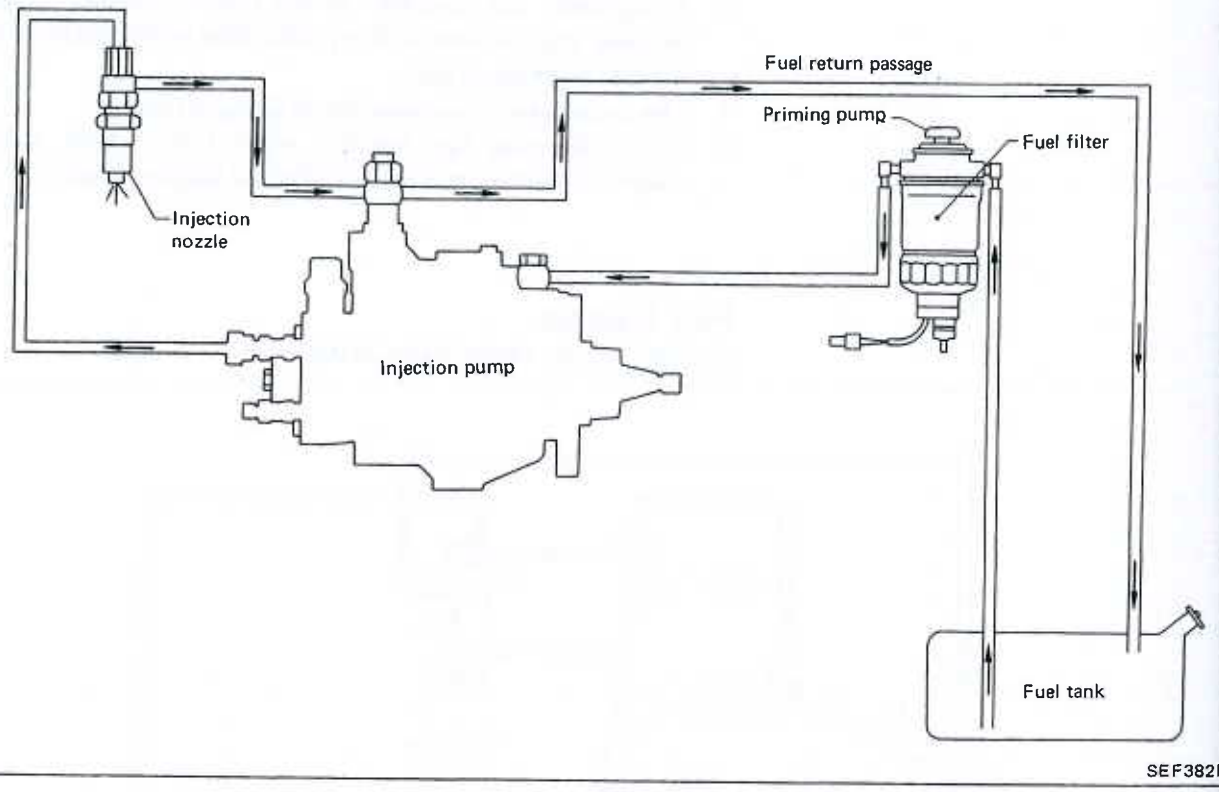
IN-LINE TYPE INJECTION PUMP



Fuel System (Cont'd)

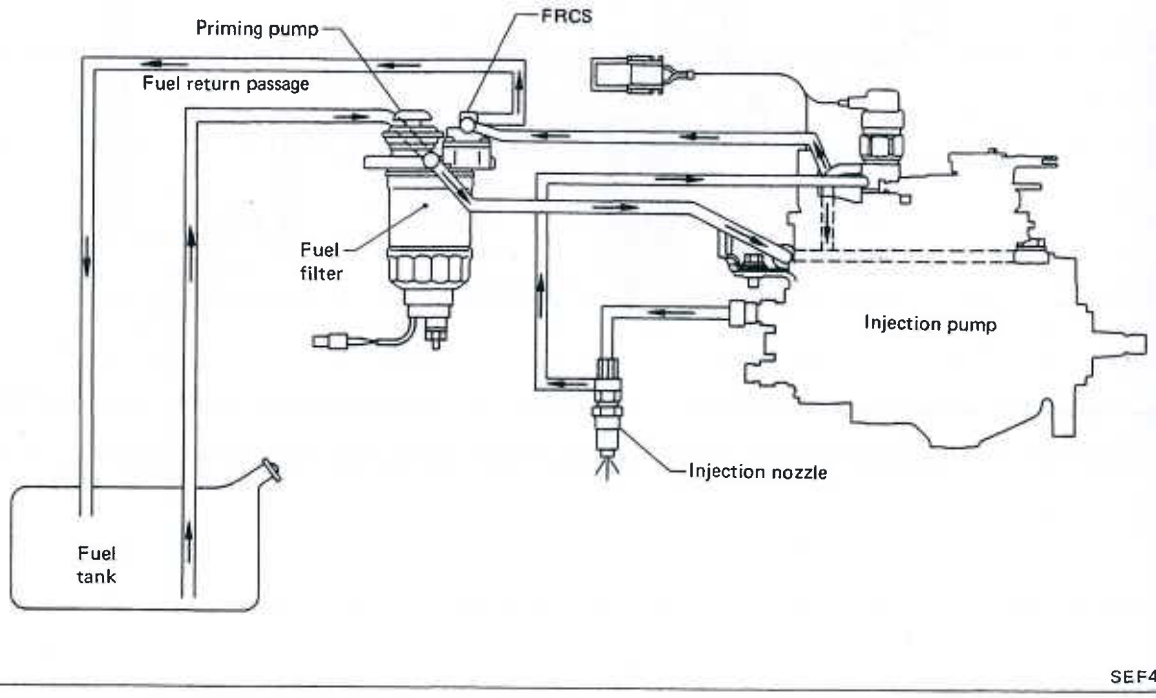
VE-TYPE INJECTION PUMP

Type 1



SEF382F

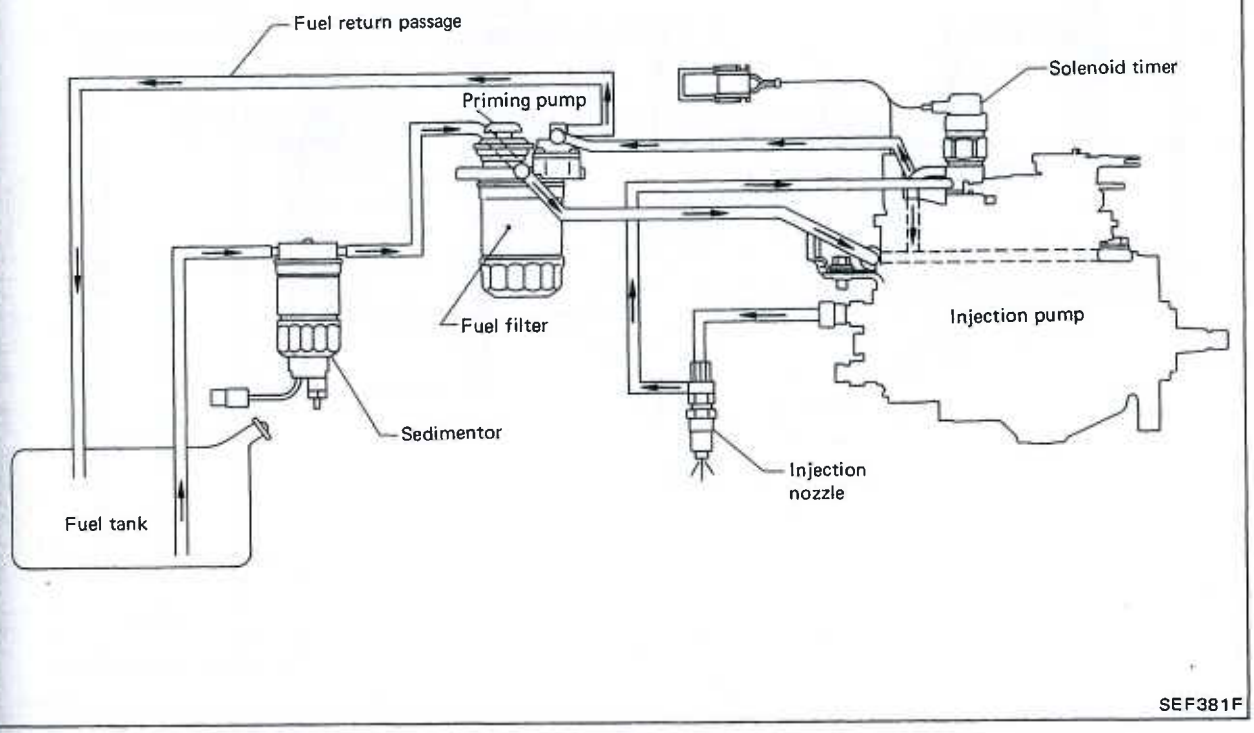
Type 2



SEF491F

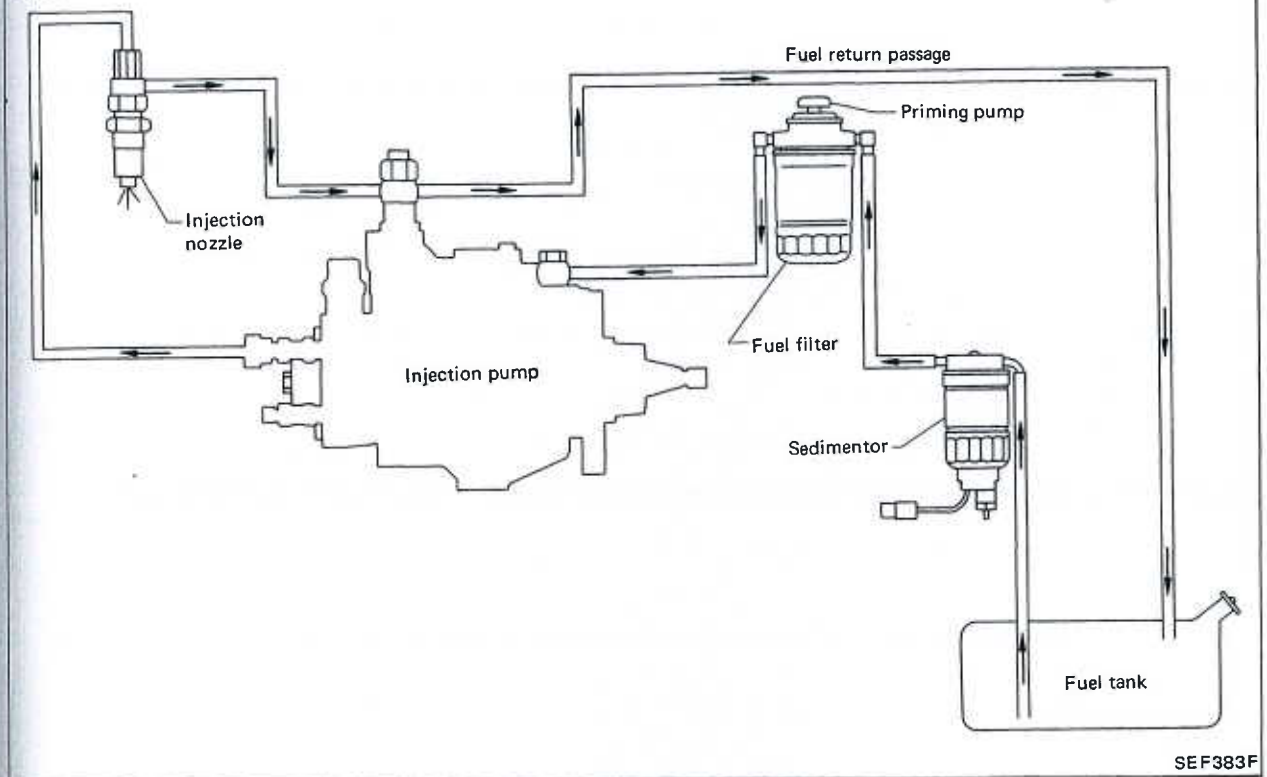
Fuel System (Cont'd)

Type 3



SEF381F

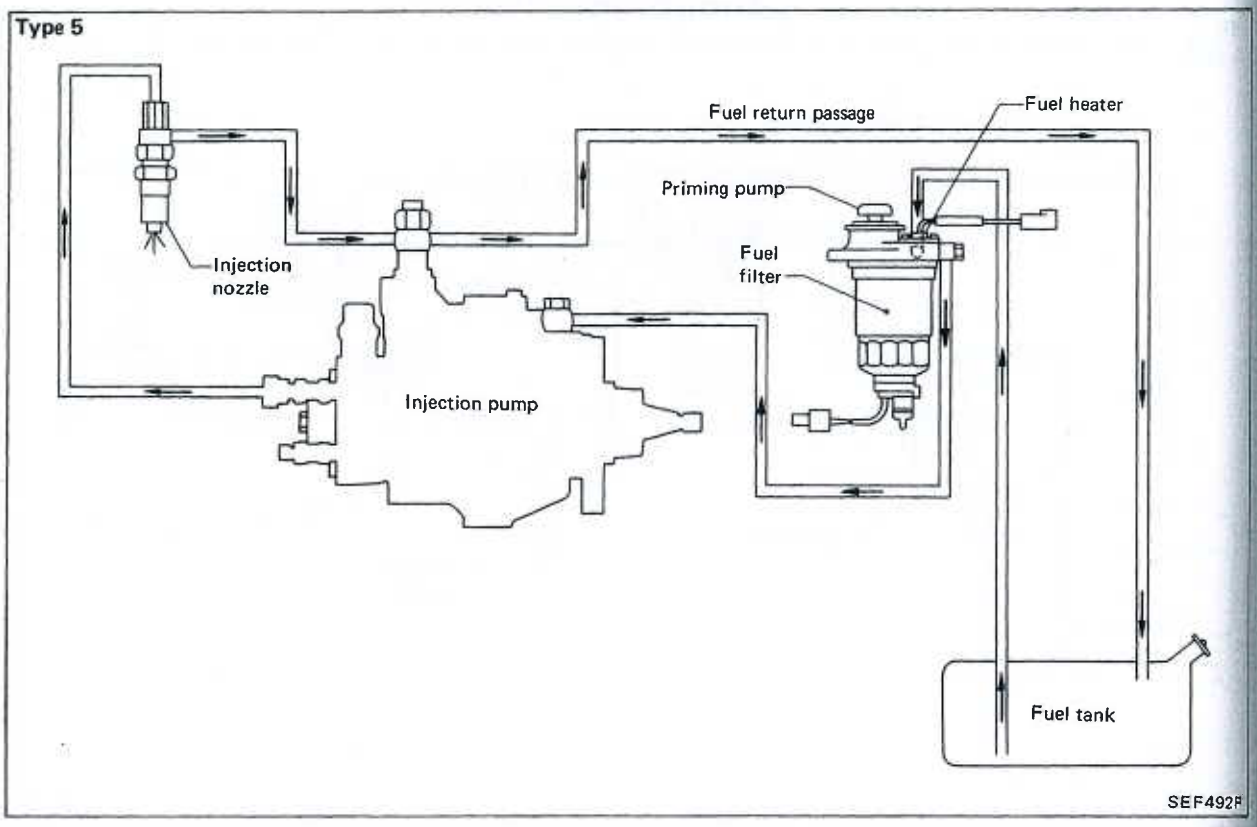
Type 4

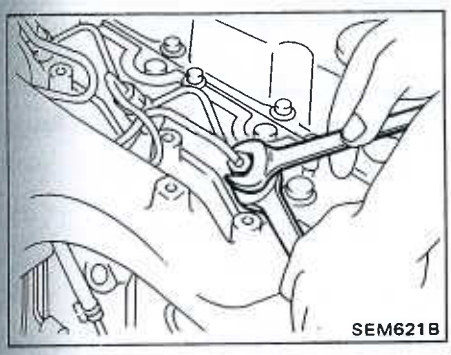


SEF383F

Fuel System (Cont'd)

Type 5



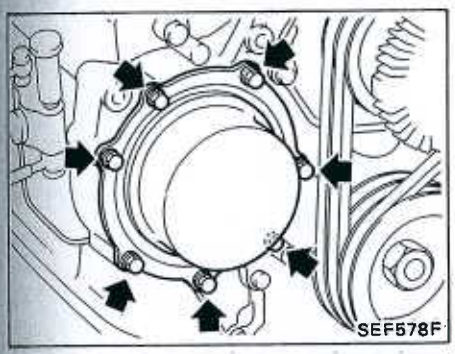

SEM621B

Removal

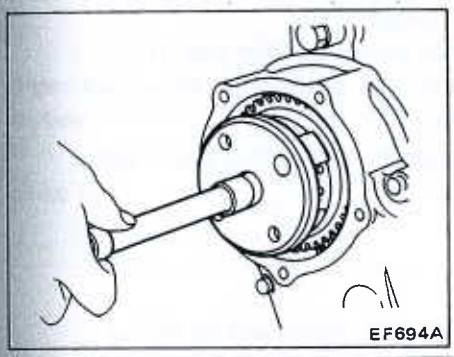
1. Remove injection tube.

Cover the delivery holders of the injection pump and injection nozzle assembly with a clean rag to prevent dust entry.

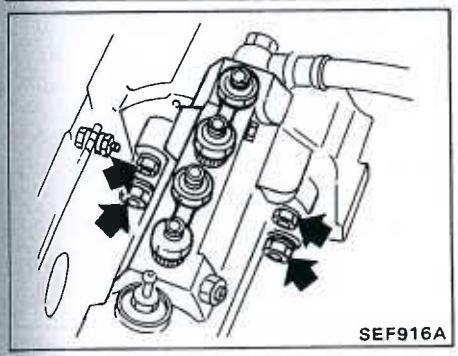
2. Disconnect governor hoses, fuel hoses and engine control wire from injection pump assembly and oil feed pipe (if so equipped).


SEF578F

3. Remove timing gear cover.

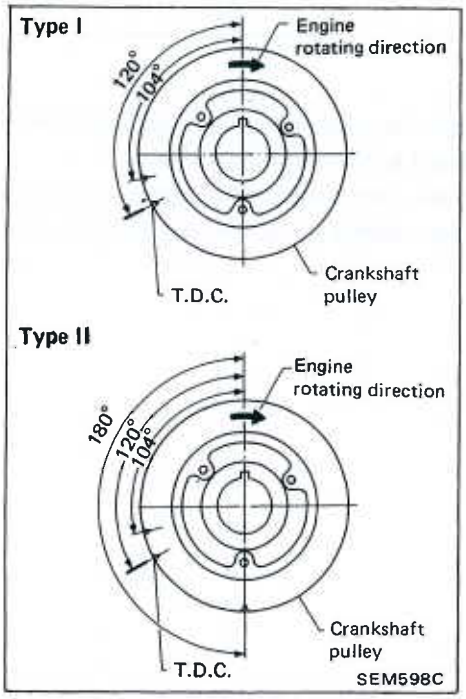

EF694A

4. Remove timer round nut.
5. Remove timer assembly.


SEF916A

6. Remove injection pump assembly.

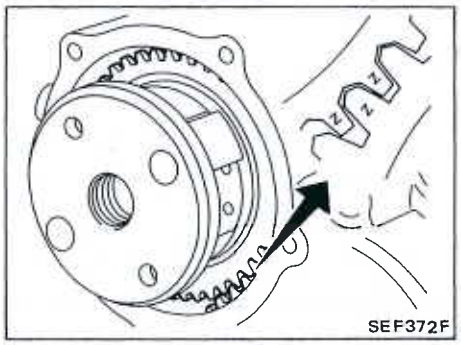
F492F



Installation and Adjustment

1. Install injection pump assembly with new gasket temporarily.
2. Install timer assembly.

Align crank pulley and timing gear case cover marks so that No. 1 piston is at top dead center.

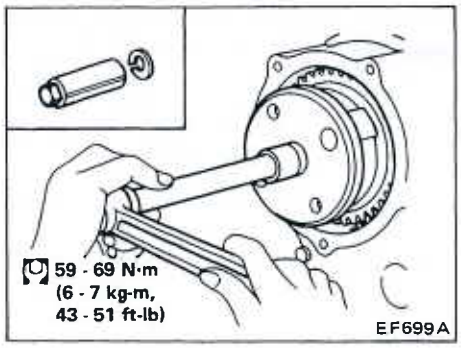


3. Injection pump

(1) Temporarily set injection pump.

(2) Mesh injection pump drive gear with idler gear at "Z" mark and then align gear to key way of injection pump camshaft while turning crank pulley.

Coat key with grease to prevent it from falling into front cover, and lay a rag on front cover.



(3) Secure timer assembly with lock washer and round nut.

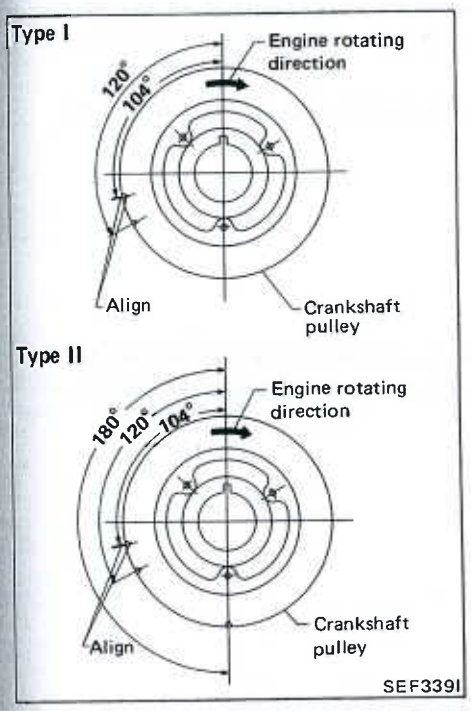
Installation and Adjustment (Cont'd)

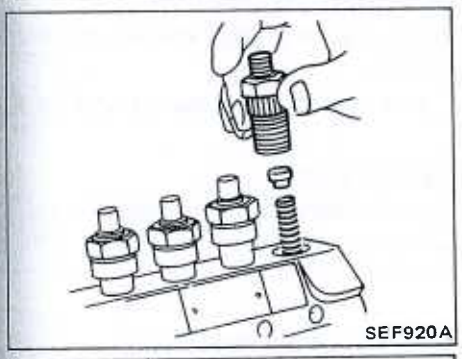
INJECTION TIMING ADJUSTMENT

1. Turn crank pulley in standard rotating direction and set No. 1 piston at applicable B.T.D.C.

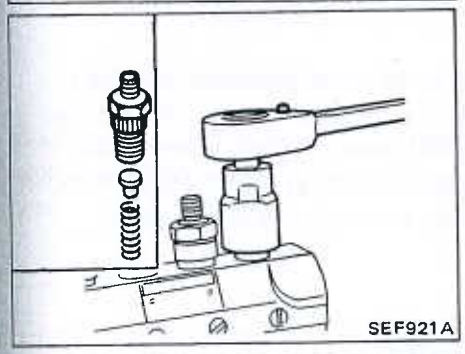
Select the right mark as applicable B.T.D.C.

2. Remove all injection tubes and governor hoses.

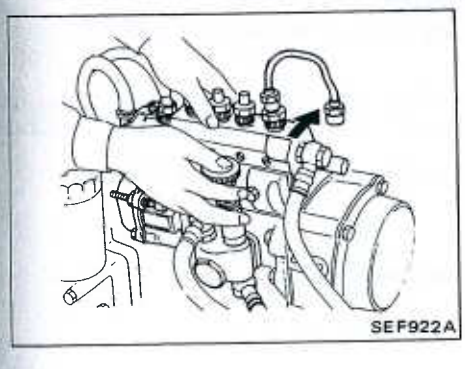




3. Remove No. 1 lock plate and delivery valve holder, and then pull out delivery stopper (if so equipped), delivery valve spring and delivery valve.

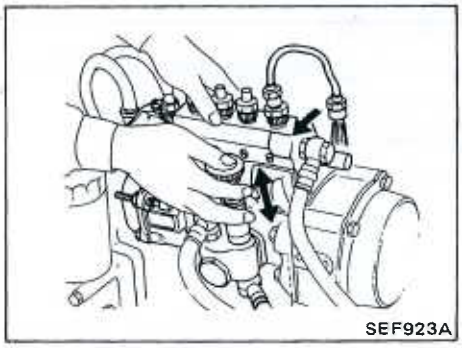


4. Install delivery valve holder without delivery valve spring, delivery valve stopper and delivery valve.

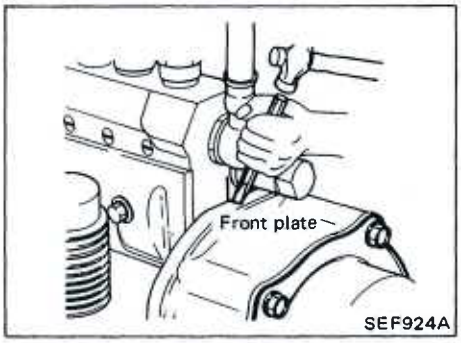


5. Connect test tube to the No. 1 delivery valve holder.
6. Push injection pump assembly fully down toward engine side.

Installation and Adjustment (Cont'd)

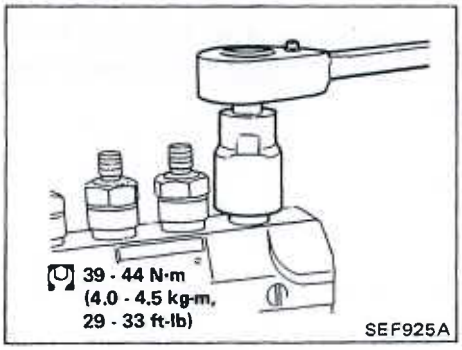

SEF923A

7. While feeding fuel by operating priming pump, slowly move injection pump until fuel flow from No. 1 injection tube stops.
8. Fix injection pump in the position where fuel flow stops.



SEF924A

9. Check whether or not the injection timing marks of injection pump and front plate are aligned. If not aligned, stamp a new mark on front plate.



SEF925A

10. Remove No. 1 test tube and delivery valve holder.
11. Install delivery valve spring, delivery valve stopper, delivery valve holder and delivery valve.
12. Install injection tubes, new timing cover gasket and timer cover.

Coat sealant with new timing cover gasket.

13. Connect governor hoses, fuel hoses and engine control wire.
14. Bleed air. Refer to Bleeding Fuel System.

IDLE AND MAXIMUM SPEED ADJUSTMENT

CAUTION:

a. **Do not remove sealing wires unless absolutely necessary.**
b. **Maximum speed adjusting screw is retained by sealing wire and need not be adjusted under normal circumstances. However, if it should become necessary, adjust it with the screw. After adjustment, always wind up with sealing wire.**

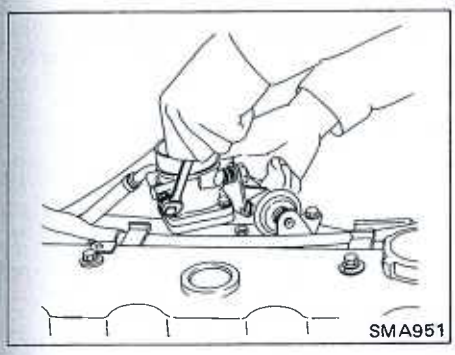
Throttle control wire adjustment

1. Make sure that free play is 1 mm (0.04 in) at venturi's throttle lever.
2. If not within the specified range, adjust with wire adjusting nut.
3. After adjusting free play properly, tighten lock nut.

Idle adjustment

Refer to section MA for idle adjustment.

Installation and Adjustment (Cont'd)



Maximum speed adjustment

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

1. Start engine and warm it up until coolant temperature indicator points to middle of gauge.
2. Connect tachometer's pick-up to No. 1 fuel injection tube.

To obtain accurate reading of engine rpm, loosen clamp that secures No. 1 fuel injection tubes.

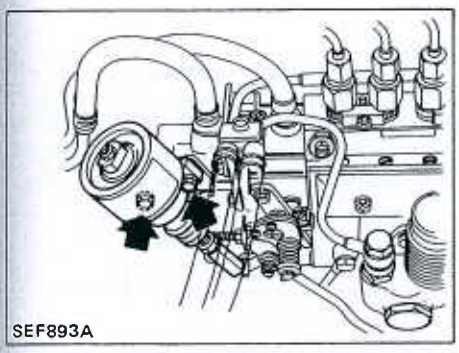
3. To obtain maximum speed, turn the adjusting screw either direction while fully depressing accelerator pedal.

   Maximum engine speed
   (Under no load):

   $$5{,}100^{+50}_{-150}\ \text{rpm}$$

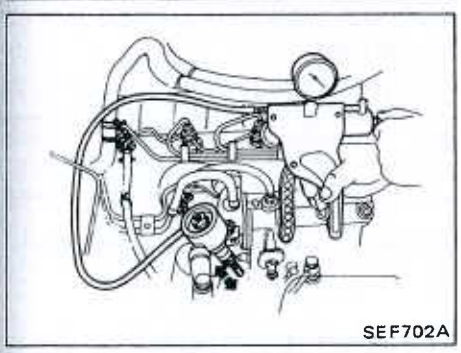
4. After adjustment, tighten lock nut securely.
5. Wind up with a sealing wire.

Altitude Compensator (Engine on vehicle)



REMOVAL AND INSTALLATION

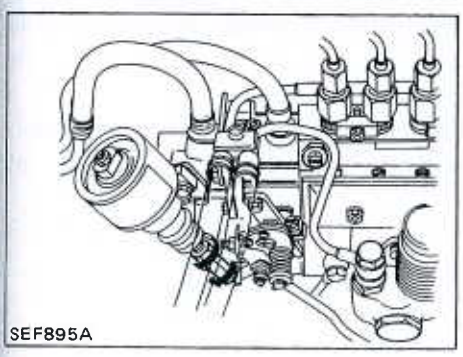
1. Remove altitude compensator from bracket.
2. Disconnect vacuum hose and remove bracket from injection pump.
3. Install altitude compensator in the reverse order of removal.



INSPECTION

1. Check for loose connections.
2. Check for altitude compensator movement.

If it does not move, contact a service shop authorized by the pump manufacturer.

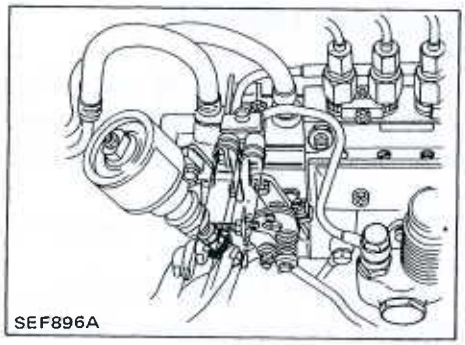


ADJUSTMENT

This adjustment should be performed with injection lever in free position.

1. Loosen lock nut and cap nut of altitude compensator.

Altitude Compensator (Engine on vehicle) (Cont'd)


SEF896A

2. Turn cap nut touch with injection lever and temporary tighten lock nut.

3. Determining position of cap nut

(1) Precise method

a. Using a barometer, measure atmospheric pressure in areas where vehicles are to be operated.

b. Determine how much the cap nut should be loosened by using the equation below.

$$R = 9.878 \times 10^{-3} \times (760 - P)$$

where

R: Amount of loosening of cap nut (No. of revolutions of cap nut)

P: Measured atmospheric pressure (mmHg)

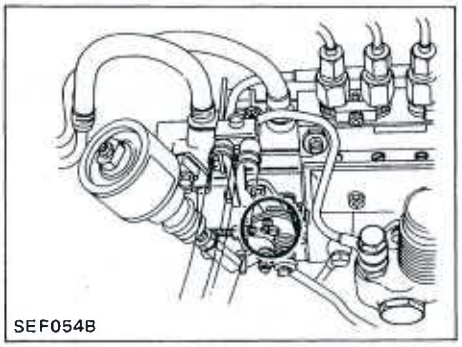
Reference table

Atmospheric pressure P kPa (mbar, mmHg, inHg)	101.3 (1,013, 760, 29.92)	100.0 (1,000, 750, 29.53)	93.3 (933, 700, 27.56)	86.6 (866, 650, 25.59)	80.0 (800, 600, 23.62)	73.3 (733, 550, 21.65)	66.7 (667, 500, 19.69)
Amount of loosening of cap nut (No. of revolutions of cap nut)	0	0.1 - 0.3	0.4 - 0.8	0.9 - 1.3	1.4 - 1.8	1.9 - 2.3	2.4 - 2.6

(2) Expedient method

Determine how much the cap nut should be loosened, according to altitude above sea level.

Approximate altitude m (ft)	0 (0)	120 (394)	700 (2,297)	1,300 (4,265)	2,000 (6,562)	2,700 (8,859)	3,400 (11,155)
Amount of loosening of cap nut (No. of revolutions of cap nut)	0	0.1 - 0.3	0.4 - 0.8	0.9 - 1.3	1.4 - 1.8	1.9 - 2.3	2.4 - 2.6

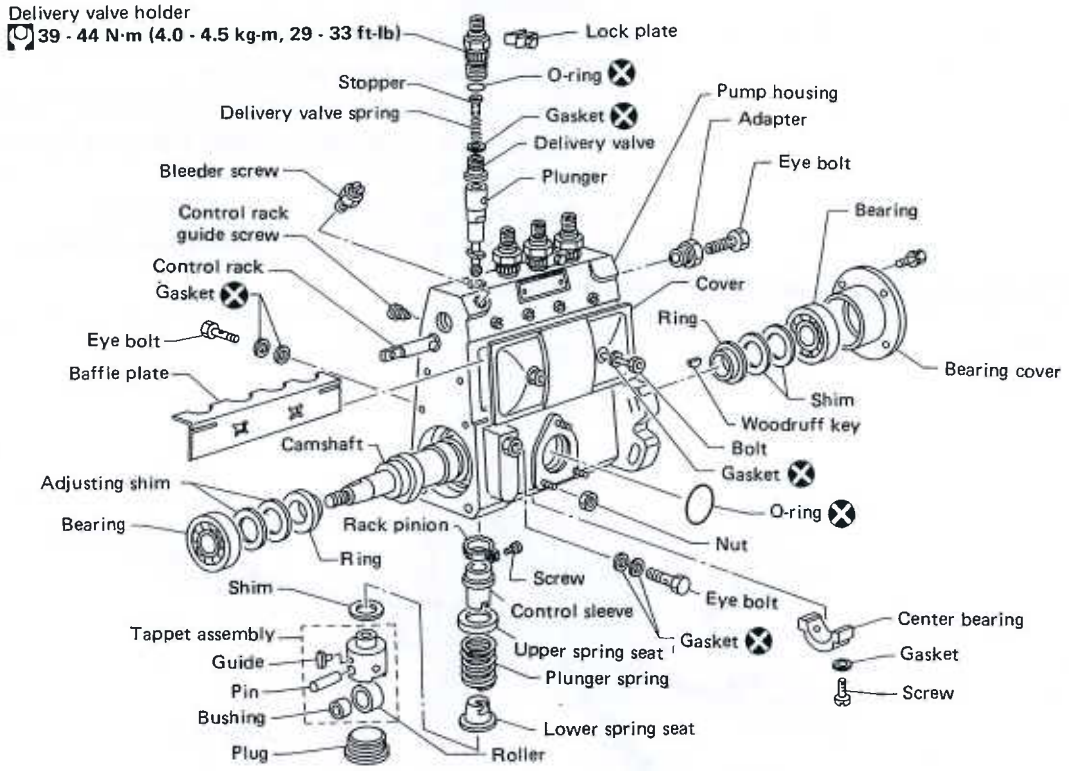

SEF054B

4. Mark cap nut indicating the number of times cap nut should be rotated according to altitudes in which vehicles are to be operated.

5. Tighten lock nut.

Ensure that bolt comes into contact with injection pump lever. If it does not, loosen the bolt and readjust.

Disassembly

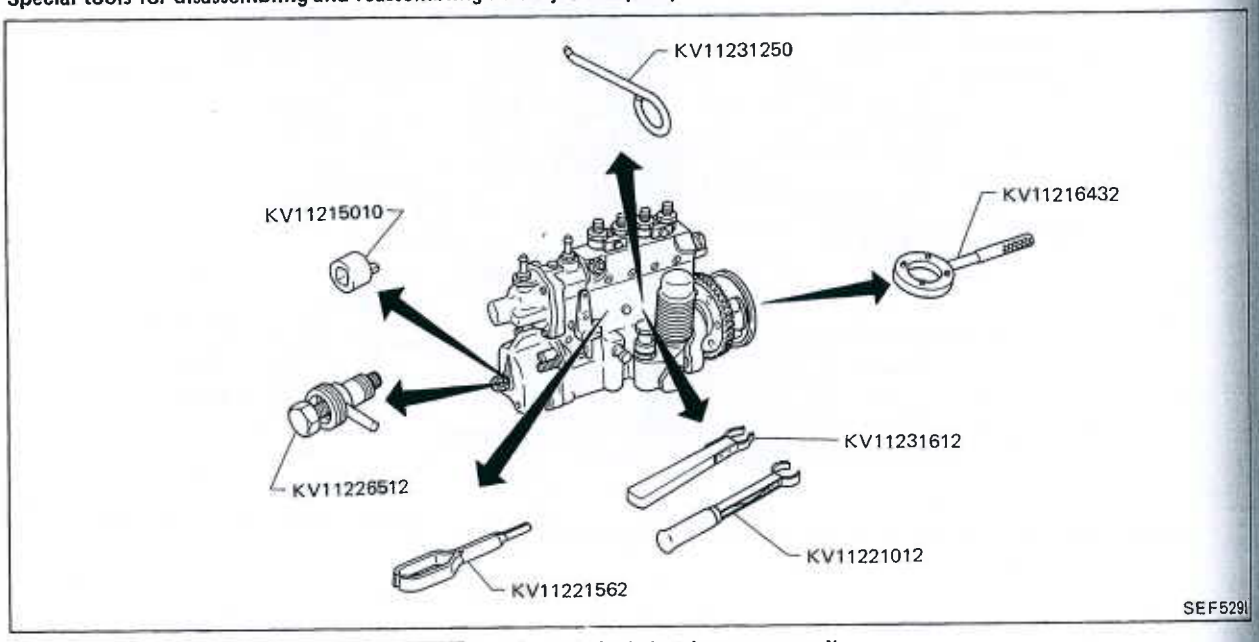


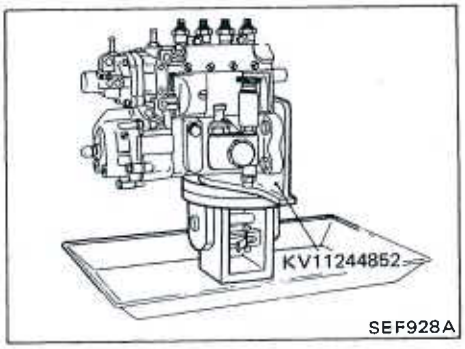
Disassembly (Cont'd)

PREPARATION

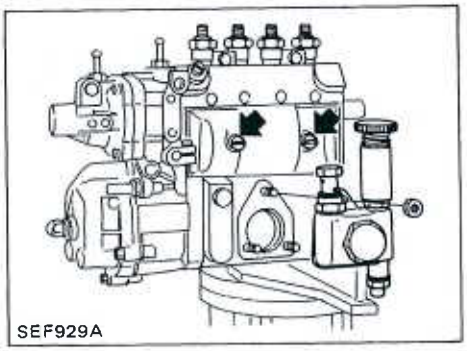
- Before performing disassembly and adjustment, test fuel injection pump and note test results except when testing is impossible.
- Prior to beginning to disassemble fuel injection pump, clean all dust and dirt from its exterior.
- Clean work bench completely, removing all foreign matter.
- Collect only those service tools necessary for disassembling and reassembling.
- Be careful not to bend or scratch any parts.
- Be careful not to mix parts of different cylinders.

Special tools for disassembling and reassembling fuel injection pump





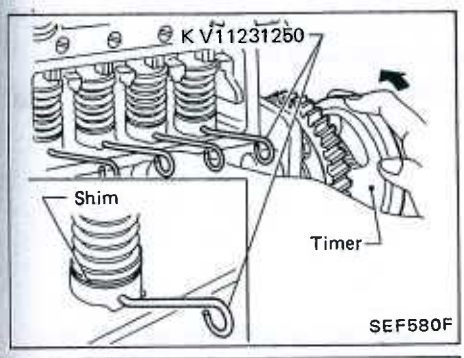
1. Drain injection pump oil.
2. Attach injection pump with Tool.



3. Remove feed pump, cover plate and baffle plate.
4. Check backlash between control rack and control pinion.

Refer to Inspection.

Disassembly (Cont'd)



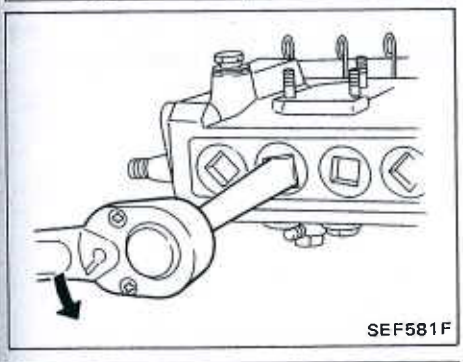
5.
(1) Temporarily install timer to injection pump.
(2) Turn timer until tappet is raised to T.D.C. for each cylinder and then install Tool into the small hole on tappet body.

6. Check camshaft end play.

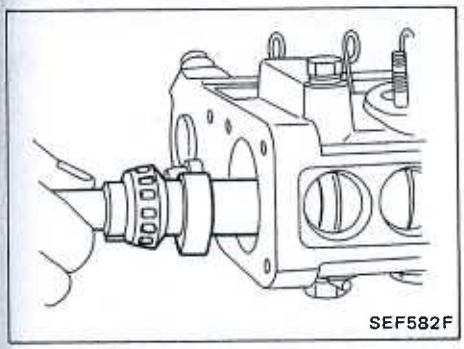
Refer to Inspection.

7. Remove mechanical governor cover, diaphragm cover, diaphragm, flyweight and governor housing.

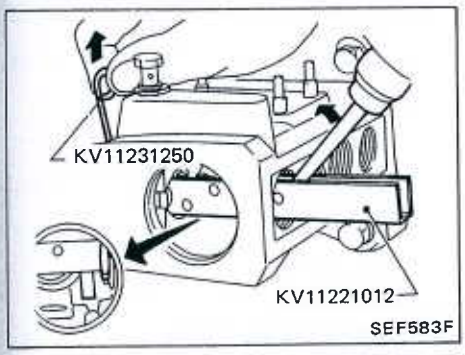
Refer to Governor for removal.



8. Remove the four plugs and then remove the two screws with a screwdriver.



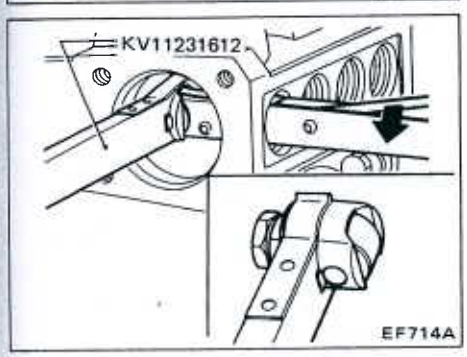
9. Draw out camshaft together with center bearing.



10. Remove Tool (KV11231250) by pushing tappet with Tool (KV11221012).

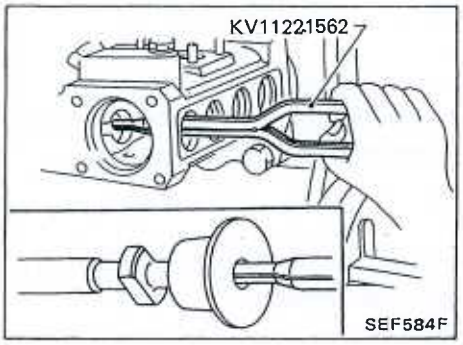
CAUTION:

Be careful not to damage housing plug hole threads.



11. Withdraw tappet assembly with Tool (KV11231612) from camshaft chamber by loosening Tool (KV11221012).

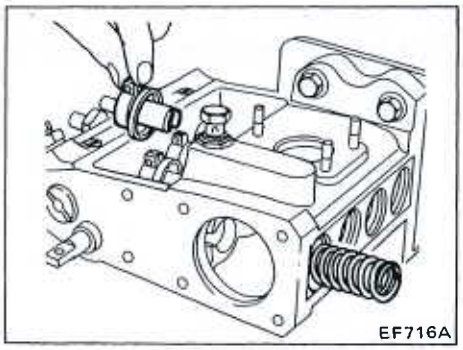
Disassembly (Cont'd)



12. Remove plungers together with lower spring seat with Tool.

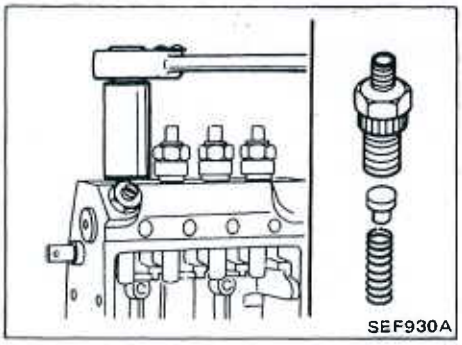
CAUTION:

Lay out plunger and plunger barrel in order in a pan of kerosene or solvent. Do not touch plunger with hand.

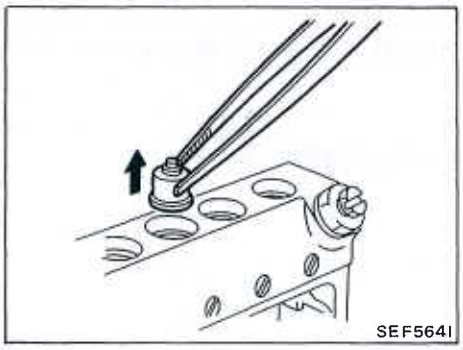


13. Remove plunger spring, upper spring seat and control sleeve assembly.

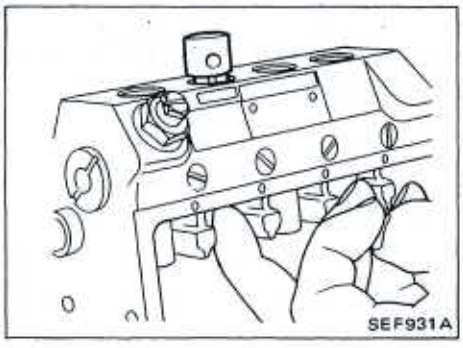
When disassembling control sleeve assembly, put matching mark.



14. Remove lock plate.
15. Remove delivery valve holder and then remove delivery valve spring, and delivery valve stopper.



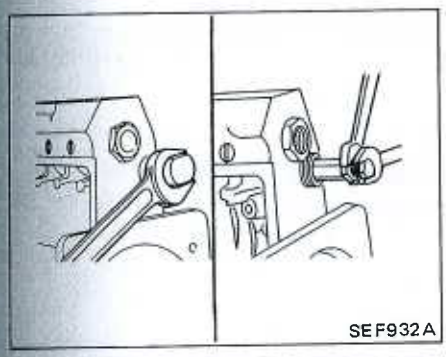
16. Remove delivery valve and gasket using a pair of tweezers.

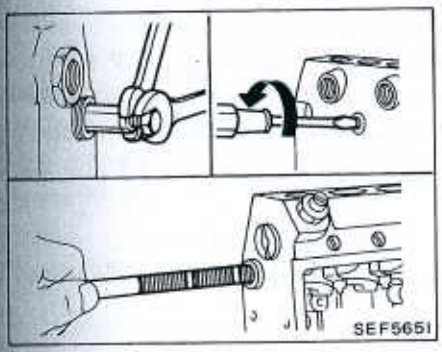


17. Remove plunger barrel by pushing it from below.

Disassembly (Cont'd)

18. Remove cap and bolt and nut on control rack.





19. Remove control rack guide screw and then draw out control rack.

Inspection

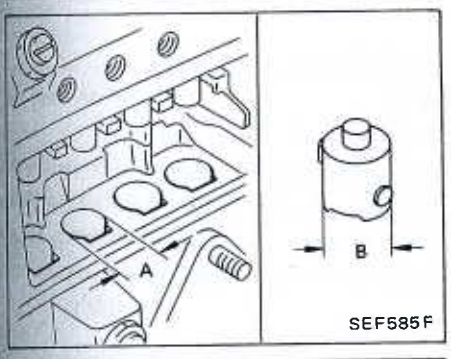
Pump housing

1. Inspect for damage, cracks, etc.
   If excessively damaged, replace it with a new housing.
2. Check plunger barrel drum surface for proper contact with plunger barrel seating hole. Also, check for damage or cracks.
   If faulty, replace with a new plunger and plunger barrel.
3. Measure tappet to housing clearance. If worn beyond wear limit, replace tappet or housing.

Tappet to housing clearance (A—B):

Limit

0.2 mm (0.008 in)



Camshaft

1. Measure cam profile for uneven or excessive wear. If excessively or unevenly worn, replace camshaft with a new one.
2. Check for damage, cracks, etc.
   If excessively damaged, replace it with a new one.
3. Measure camshaft end play by pushing camshaft from timer end so as to move camshaft in shaft direction.

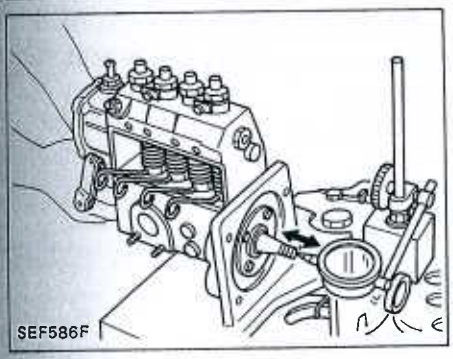
Camshaft end play:

Standard

0 - 0.02 mm (0 - 0.0008 in)

Limit

0.1 mm (0.004 in)



If camshaft end play is over limit, adjust as follows:

(1) Remove bearing inner race from camshaft.

(2) Based upon end play measurement, increase or decrease adjusting shims.

Use the same shim thickness on each end.

(3) Re-install bearing inner race on camshaft.

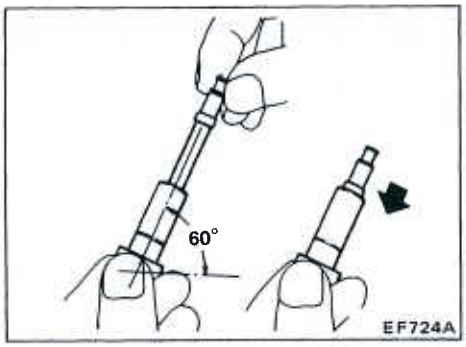
Inspection (Cont'd)

Bearings

Check for wear or discoloration. If faulty, replace with a new one.

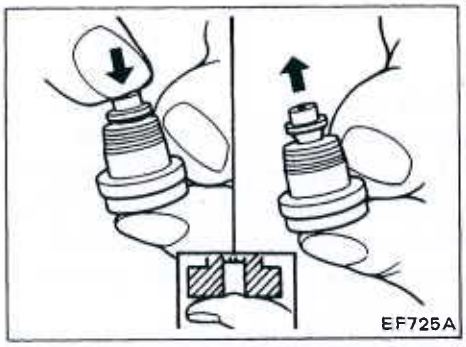
Plunger and plunger barrel

The operation of the plunger should be checked based on the results of fuel injection volume measurement.



Oil-tightness check

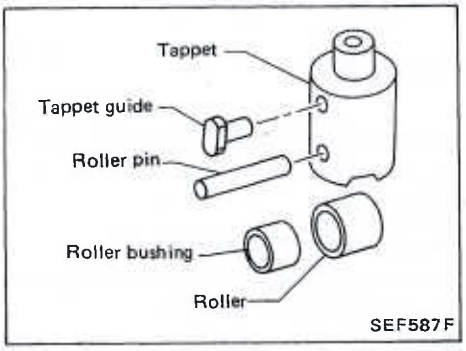
1. Thoroughly clean plunger barrel in clear kerosene or solvent.
2. Tilt it to approximately 60°. Then, let plunger slide down through barrel, making sure that plunger slides smoothly. Repeat this procedure by turning plunger to various positions, making sure that plunger slides smoothly in any of the positions.
   When replacement is required, replace both the plunger and plunger barrel as a set.



Delivery valve

Air-tightness check

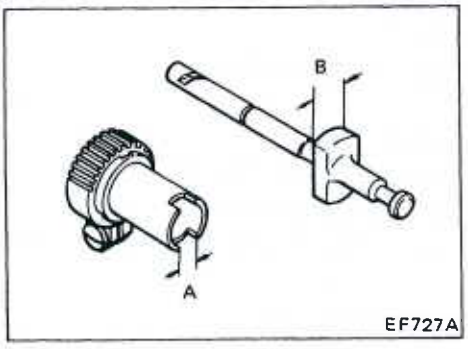
1. Thoroughly clean delivery valve and delivery valve seat in clear kerosene or solvent.
2. Place finger over lower part of valve seat, lightly depress delivery valve with your finger tip, and make sure that valve springs back when released. If valve falls to valve seat, it is not operating properly due to excessive piston wear. If faulty, replace with a new valve and valve seat assembly.



Tappet

Inspect tappet, roller, roller bushing, and pin for wear or damage. If faulty, replace with new components, as required.

Roller end play limit:
0.20 mm (0.0079 in)

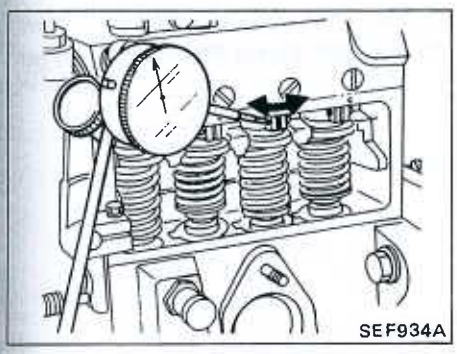


Control rack and control sleeve assembly

1. Inspect control rack for bending and damage.
   If faulty, repair or replace with a new control rack, as required.
2. Measure control sleeve to plunger lug clearance. If worn excessively, replace control sleeve or plunger, as required.

Control sleeve to plunger lug clearance (A—B):
Limit
0.12 mm (0.0047 in)

Inspection (Cont'd)



3. Measure backlash between control rack and control pinion.

Backlash between control rack and control pinion:
Limit
0.30 mm (0.0118 in)

Spring

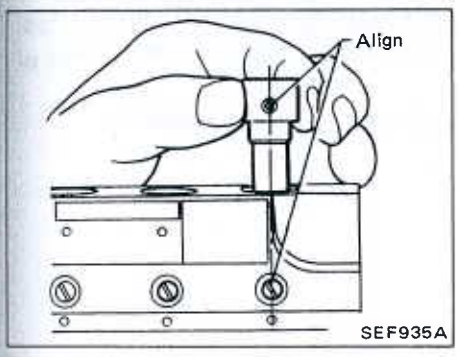
Inspect plunger and delivery valve springs for damage and squareness.

Assembly

Clean parts thoroughly and apply a thin coat of engine oil to rotating and sliding parts.

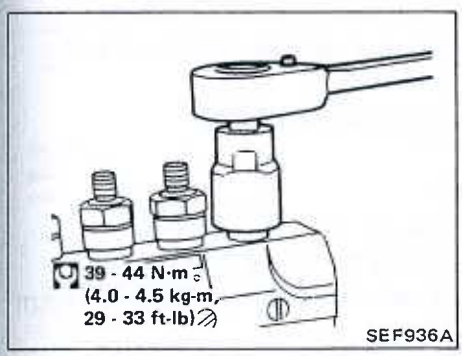
Assemble injection pump in the reverse order of disassembly.

Note the following items.

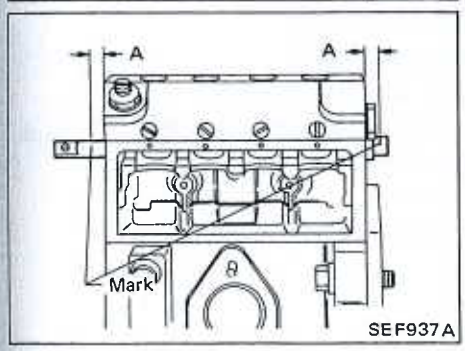


1. Set plunger barrel in position, with hole in barrel aligned with dowel pin of housing.

2. Install delivery valve with new gasket on plunger barrel.

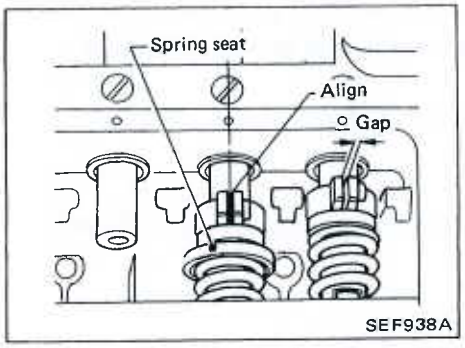


3. Install delivery valve spring, delivery valve stopper and delivery valve holder.
   Tighten the delivery valve holder to the specified torque.

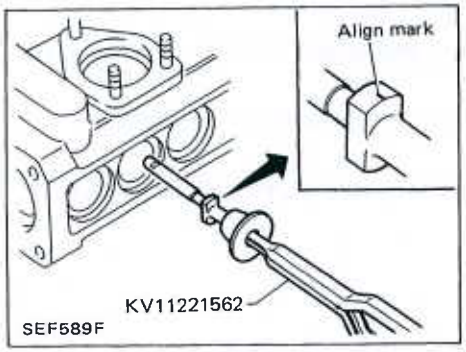


4. Install lock plates.
5.
(1) Set the control rack so that marks on both sides are same distance "A" from each end of pump housing.
(2) Then install control rack guide screw.

Assembly (Cont'd)

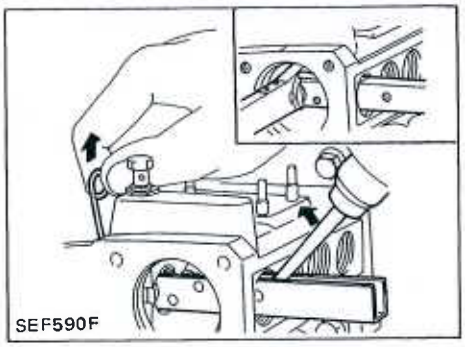


6. Install control sleeve assembly with gap of control sleeve facing straight up. Then install upper spring seats and plunger springs.

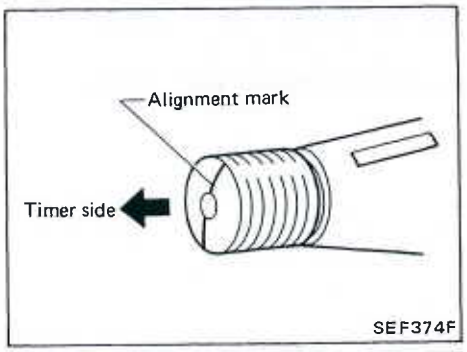


7. Install plunger together with lower spring seat by using Tool with plunger alignment mark facing upward (cover side of pump housing).

Do not use plunger with a barrel from a different cylinder.



8. Install tappet assembly by reversing the removal procedure.



9. Install camshaft so that its alignment mark is toward timer.
10. Install governor housing and then adjust camshaft end play.

Refer to Inspection.

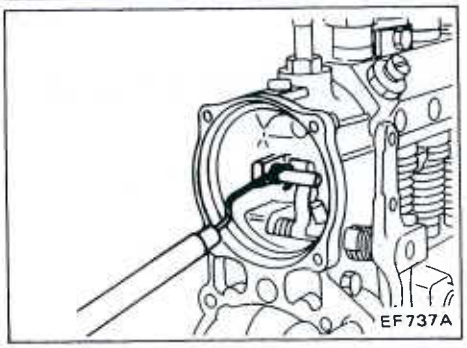
11. Install screw plug on bottom of pump housing.

Seal the plug with sealant.

[O] : Screw plug
54 - 74 N·m
(5.5 - 7.5 kg-m, 40 - 54 ft-lb)

12. Temporarily install timer and remove Tool (KV11231250) while turning timer.
13. Measure control rack sliding resistance.

Control rack sliding resistance:
Less than 1.471 N (150 g, 5.29 oz)



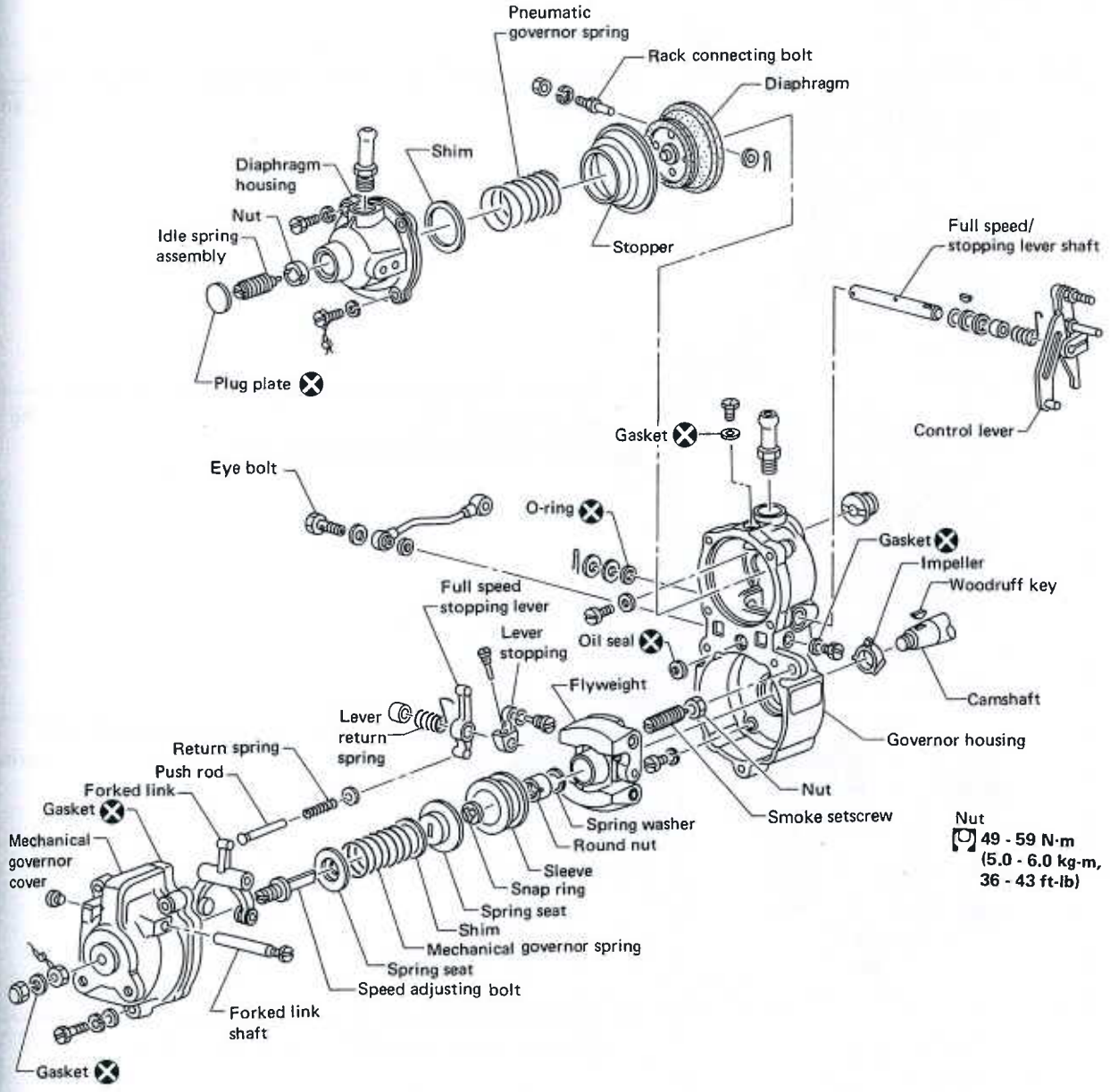
14. Install flyweight, diaphragm, diaphragm cover and mechanical governor cover in that order.

Refer to Governor for installation.

15. Install control rack cap, cover and feed pump.

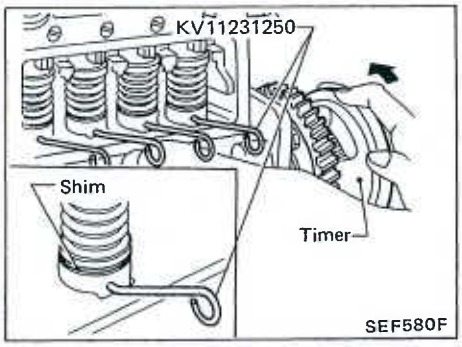
Governor

DISASSEMBLY



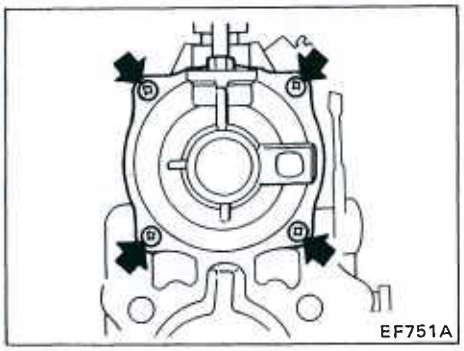
SEF592F

Governor (Cont'd)

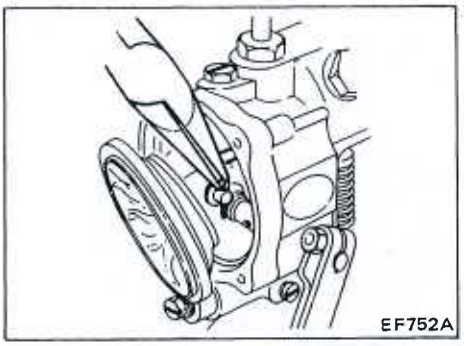


1. Attach injection pump with Tool (KV11244852) and then remove feed pump and cover plate.
2. Install Tool into the small hole on tappet body.

Refer to Injection pump for tappet holder installation.

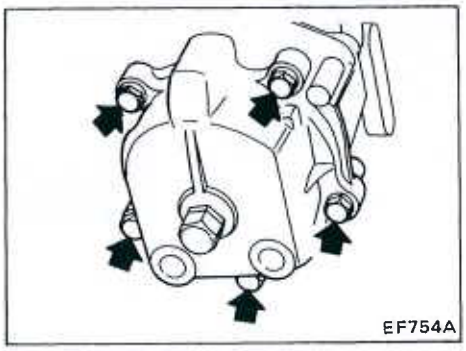


3. Remove diaphragm cover, pneumatic governor spring and shims.



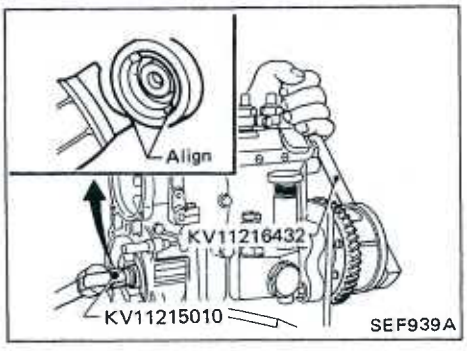
4. Remove diaphragm by pulling cotter pin out with pulling it out from housing.

Be careful not to damage the diaphragm.



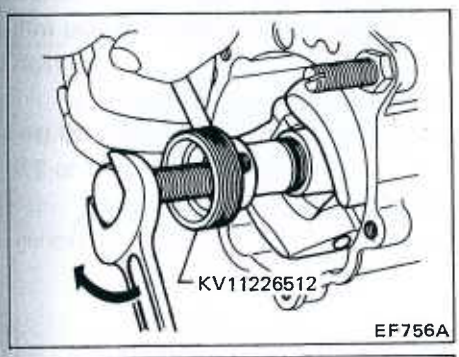
5.

(1) Remove mechanical governor cover gasket, push rod, spring and shim.

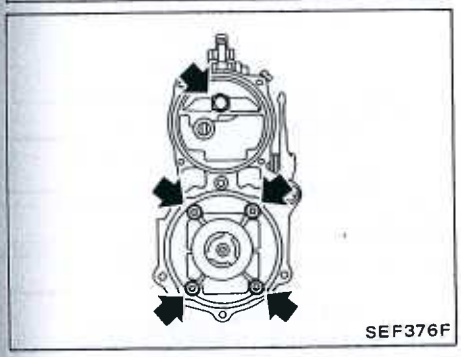


(2) Attach timer and lock camshaft with Tool (KV11216432). Remove round nut with Tool (KV11215010).

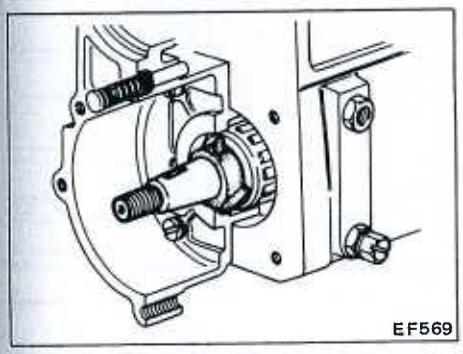
Governor (Cont'd)



(3) Remove flyweight with Tool.
(4) Remove oil drain pipe.



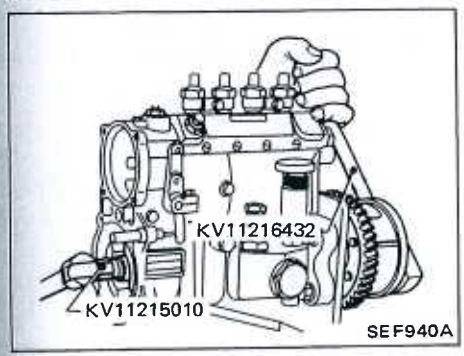
6. Remove governor housing.



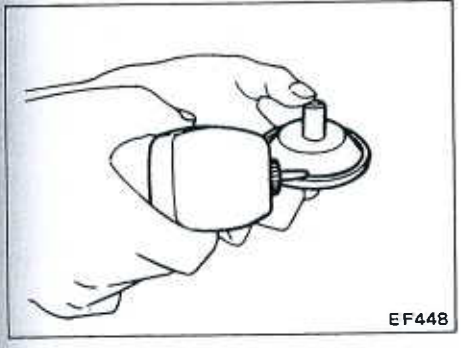
ASSEMBLY

Assemble governor in the reverse order of disassembly, noting following item.
Do not install plate plug until idle adjustment is made.

1. Make sure that impeller is installed to the camshaft with flat blade side toward governor.



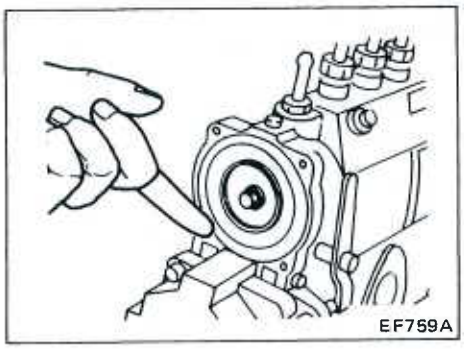
2. Apply liquid sealant to new governor cover gasket.
   : **Flyweight round nut**
   49 - 59 N·m
   (5.0 - 6.0 kg-m, 36 - 43 ft-lb)



3. Apply diaphragm oil to diaphragm.

CAUTION:

- **Do not allow gasoline to be left on diaphragm.**
- **Use diaphragm oil.**


EF759A

Governor (Cont'd)

4. Coat caulking part of diaphragm and governor housing with grease. Be careful not to allow grease to get on the diaphragm surface.
5. Tighten the four bolts securing diaphragm cover to a tightening torque of 2.5 to 3.9 N·m (0.25 to 0.4 kg-m, 1.8 to 2.9 ft-lb).
6. Adjust injection pump with a pump tester. Refer to "Testing Injection Pump for Governor".

Test

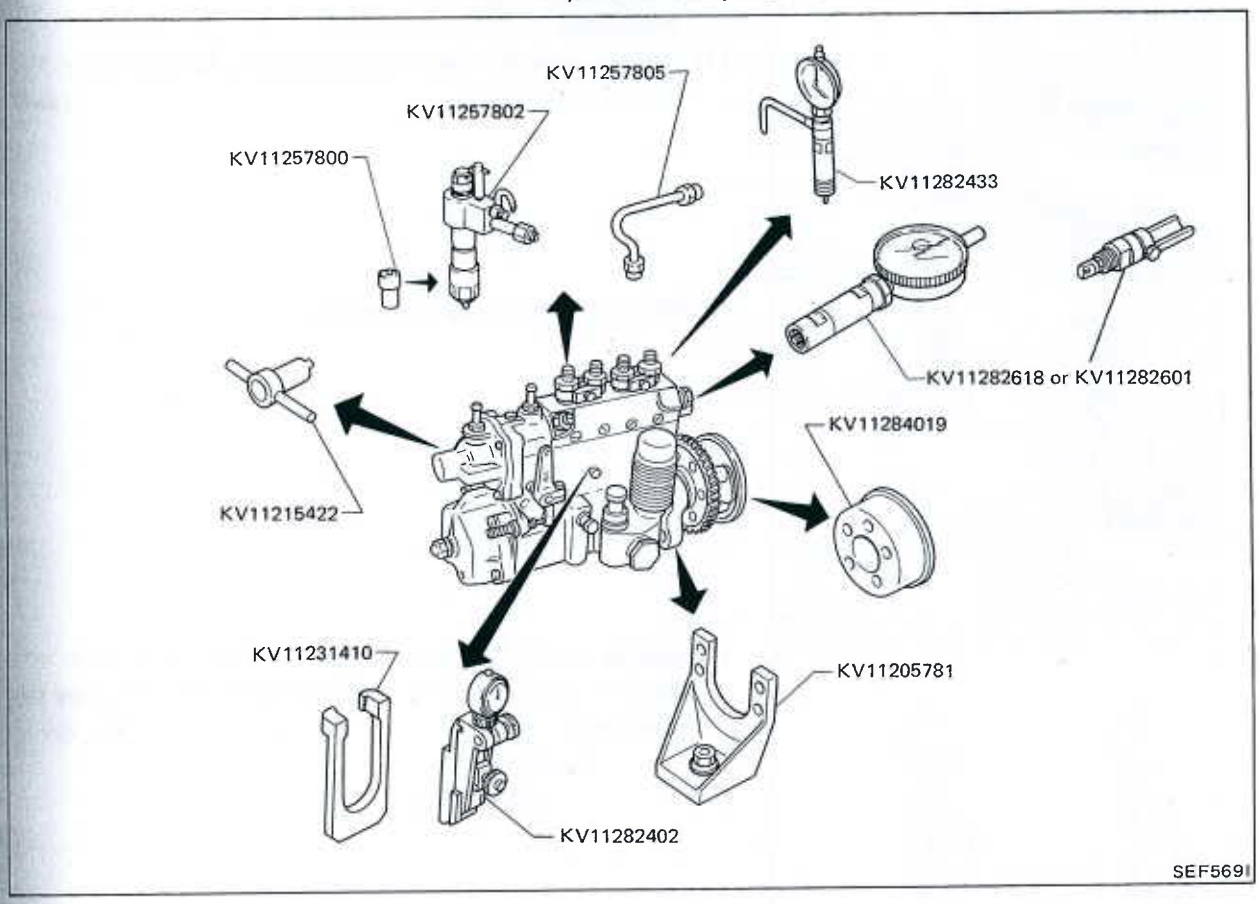
PREPARATION

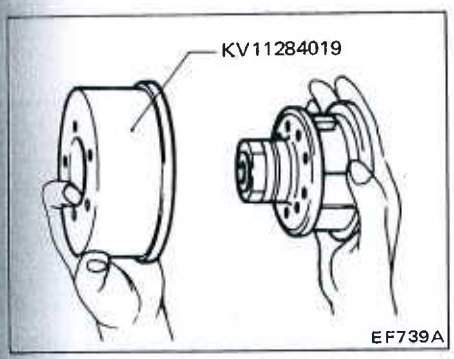
Injection pump test conditions

Nozzle		KV11257800
Nozzle holder		KV11257802
Nozzle starting pressure	kPa (bar, kg/cm^2, psi)	17,162 (171.6, 175, 2,489)
Nozzle tube Inner dia. x outer dia. x length	mm (in)	KV11257805 2.0 x 6.0 x 600 (0.079 x 0.236 x 23.62)
Fuel feed pressure	kPa (bar, kg/cm^2, psi)	147 - 157 (1.47 - 1.57, 1.5 - 1.6, 21 - 23)
Fuel (test oil)		ISO 4113 or SAE Standard Test Oil (SAE J967d)
Fuel temperature	°C (°F)	40 - 45 (104 - 113)
Rotating direction		Right (observed from the drive shaft)
Injection sequence		1-3-4-2

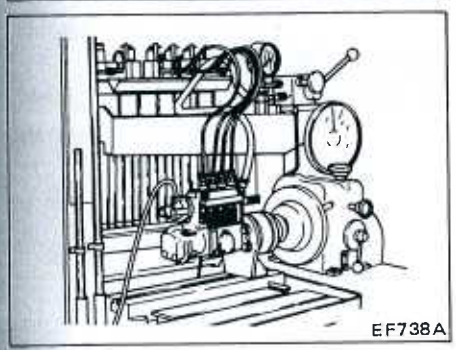
Test (Cont'd)

1. Prepare necessary service tools.





2. Remove fuel feed pump and cover plate.
3. Remove timer drive gear and attach coupling.



4. Install fuel injection pump on the bed of tester with Tool (KV11205781). Then attach pump to timer.
5. Connect coupling to tester drive shaft with coupling disc.
6. Connect flexible hose from tester to injection pump.
7. Bleed air from injection pump.

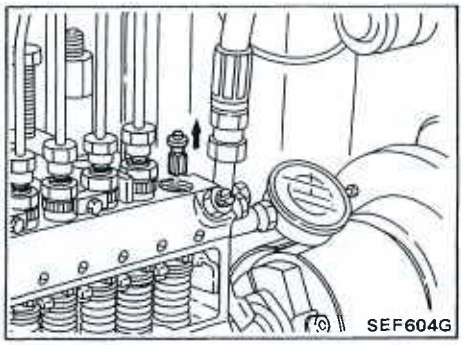
Test (Cont'd)

ADJUSTMENT

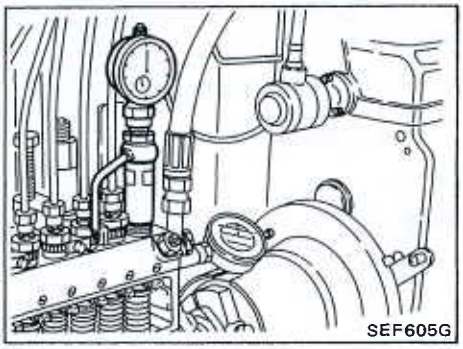
Adjusting injection timing

1. Adjust No. 1 injection timing.

(1) Remove injection tube, delivery valve holder, spring and valve for No. 1 cylinder.

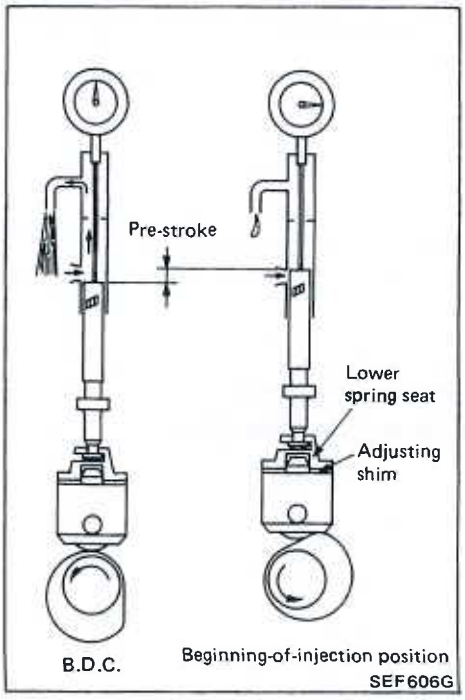

SEF604G

(2) Set a Tool to the pump housing.


SEF605G

(3) Rotate camshaft (pump tester) clockwise, and measure the lift of 1st plunger when fuel flow from the measuring device pipe stops.

Pre-stroke:
Refer to S.D.S.

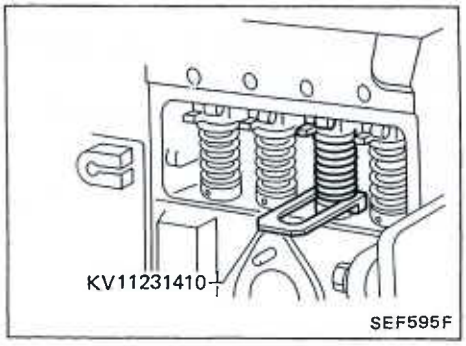


SEF606G

2. If pre-stroke is not within specification, adjust injection timing.

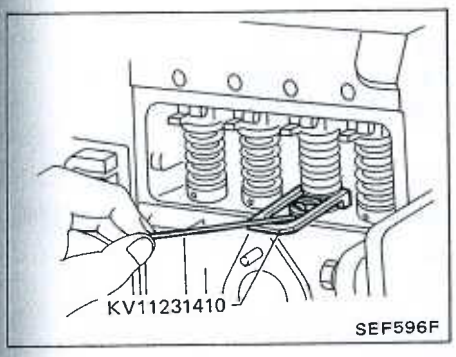
(1) Rotate camshaft until cam reaches T.D.C. position.

(2) Insert plunger spring holder between lower spring seat and tappet.



SEF595F

Test (Cont'd)



(3) Remove adjusting shim and adjust shim thickness so that desired prestroke can be obtained. Adjusting shim thickness varies in 0.05 mm (0.0020 in) steps.

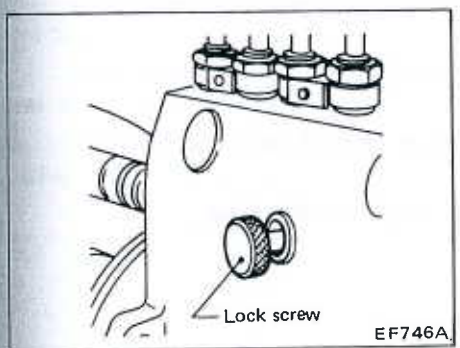
3. Adjust No. 2 to No. 4 cylinder injection timing.

(1) Set No. 1 cylinder to injection start timing position, and set angle scale on tester flywheel at "0°".

(2) Turn tester flywheel to the angle shown below, and make sure that fuel flow from test nozzle stops.
If pre-stroke (injection timing) is incorrect, adjust the timing by following step 2.

Cylinder No.	1	3	4	2
Injection starting angle	0	89°30' - 90°30'	179°30' - 180°30'	269°30' - 270°30'

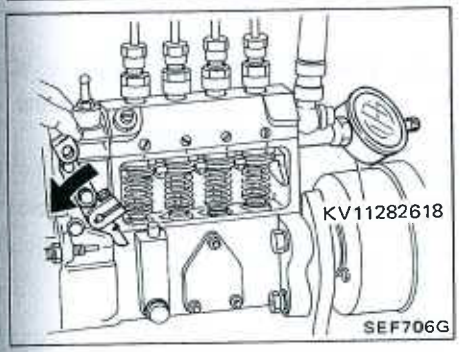
4. Check top clearance.
For shim-type tappet adjustment pump:
With shim-type tappet, top clearance cannot be measured. Confirm that camshaft rotates smoothly by manually rotating camshaft slowly.



Adjusting injection volume

1. Remove control rack guide screw and install lock screw to fix control rack on pump housing.

CAUTION:
Tighten lock screw by hand.



2. Set Tool (KV11282618 or KV11282601) to control rack.

(1) When setting tool, push control rack fully toward governor side, and align the "0" on measuring device scale.

(2) Take off diaphragm cover together with governor spring. Otherwise, "0" position may not be obtained.

(3) Pull down control lever fully toward fuel increasing side, and check the stroke of control rack.

Control rack stroke:
Refer to S.D.S.

Test (Cont'd)

3. Set fuel feed pressure.

Fuel feed pressure:
147 - 157 kPa (1.47 - 1.57 bar, 1.5 - 1.6 kg/cm², 21 - 23 psi)

4.

(1) Measure injection volume for each cylinder at rated pump speed and control rack position.

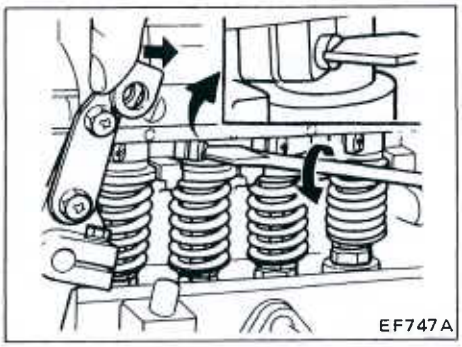
Injection volume:
Refer to S.D.S.

(2) Compute allowable imbalance of fuel injection volume.

Allowable imbalance =

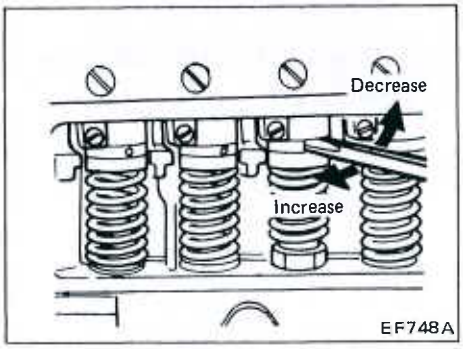
$$\frac{\left(\begin{array}{l}\text{Max. or min.}\\ \text{injection volume}\\ \text{for each plunger}\end{array}\right) - \left(\begin{array}{l}\text{Mean}\\ \text{injection}\\ \text{volume}\end{array}\right)}{\text{Mean injection volume}} \times 100$$

Allowable imbalance:
Refer to S.D.S.


EF747A

5. Adjust injection volume so that specified injection volume and allowable imbalance are obtained.

(1) Loosen control pinion clamp screw.



EF748A

(2) Place suitable tool into hole in control sleeve and adjust by rotating control sleeve.

(3) After adjustment is completed, tightly secure pinion set screw.

(4) Remove lock screw from control rack and reinstall guide screw.

6. Install diaphragm cover and governor spring.

GOVERNOR

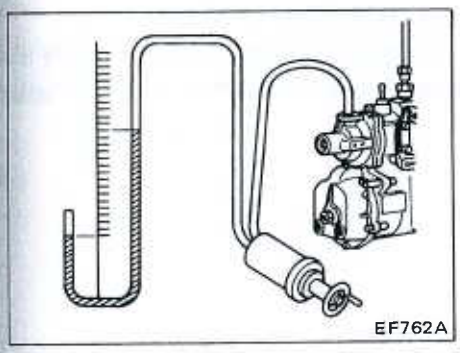
Adjustment

a. When making a governor performance test, maintain the pump speed at 500 rpm.

b. Gradually step up negative pressure when adjusting.

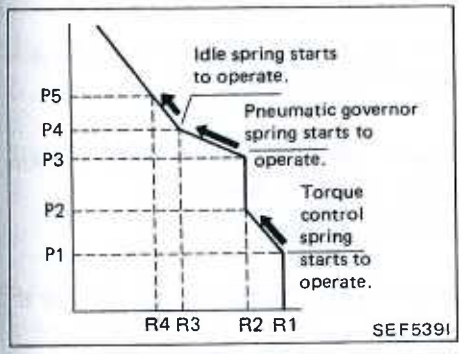
c. Test and adjust injection timing and injection volume before testing governor.

Test (Cont'd)


EF762A

Air-tight test

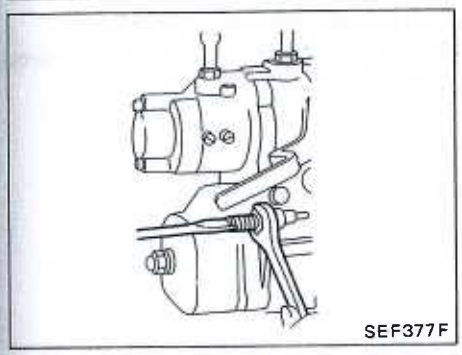
1. Apply a negative pressure of 4.904 kPa (49.04 mbar, 500 mmH_2O, 19.69 inH_2O) to governor with rack set at position R1.



2. Make sure that negative pressure will not drop below the specified value within 10 seconds.

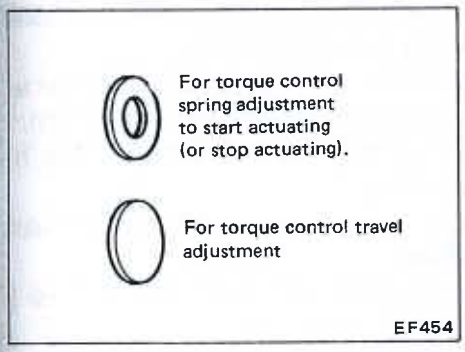
Negative pressure:
4.904 - 4.707 kPa (49.04 - 47.07 mbar, 500 - 480 mmH_2O, 19.69 - 18.90 inH_2O)/ more than 10 seconds

If it drops in less than 10 seconds, check the diaphragm and replace if necessary.


SEF377F

Smoke setscrew adjustment

With no negative pressure applied, adjust the smoke setscrew so that the rack is set at position R_1.



Torque mechanism adjustment

1. Check that torque control spring starts to actuate at negative pressure P_1 and stops at P_2. In other words, torque control travel is $R_1 - R_2$.

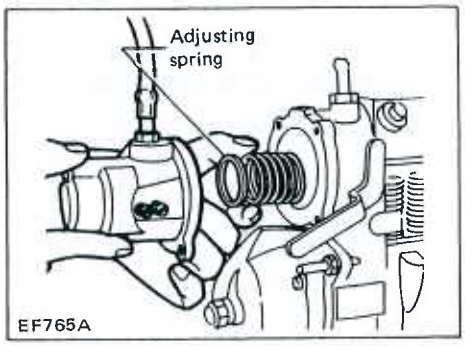
Torque control travel:
Refer to S.D.S.

2. If torque mechanism adjustment is not within the specifications:

(1) Remove diaphragm.
(2) Add or remove shim(s) (two types) as required until correct torque mechanism adjustment is made.

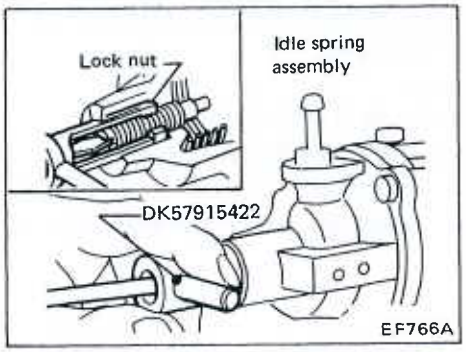
After installing diaphragm, make an air-tight test again.

Test (Cont'd)



High-speed adjustment (Pneumatic governor section)

Increase negative pressure. Adjust governor shim until there is a balanced condition between rack position R_2 and negative pressure P_3.



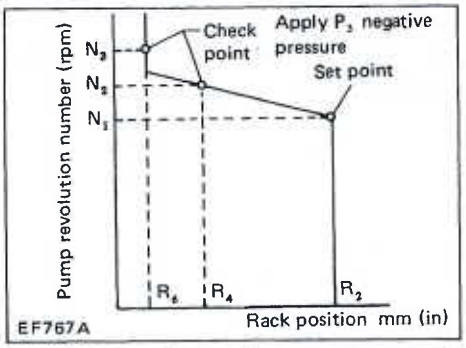
Idle adjustment

1. With negative pressure kept at P_4, turn idle spring screw in with Tool until rack is set at position R_3.
2. Tighten lock nut.
3. Gradually increase negative pressure. Make sure that negative pressure is P_5 when rack is moved to position R_4.

If necessary, replace idle spring as an assembly.

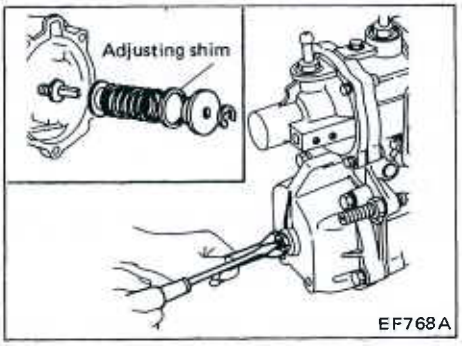
4. Install plate plug.

Apply adhesive to the plug in order to prevent air leaks or the plug from detaching.



High-speed adjustment (Mechanical governor section)

1. With negative pressure kept in condition P_3, increase pump speed.



2. Adjust adjusting bolt of governor spring so that pump speed is N_1 when rack starts to be pulled from R_2.

If above adjustment cannot be made properly by means of adjusting bolt, add or remove mechanical governor spring shim(s).

3. Increase pump speed, and make sure that pump speed is N_2 when rack is set at point R_4.

If pump speed is within specified range, replace mechanical governor spring and readjust.

4. Further increase pump speed, and make sure that rack is set at point R_6 when pump speed is N_3.

a. If rack is not properly set at position R_6, check for wear on part(s) between flyweight and push rod and for proper assembly of pump housing.

b. If necessary, replace push rod.

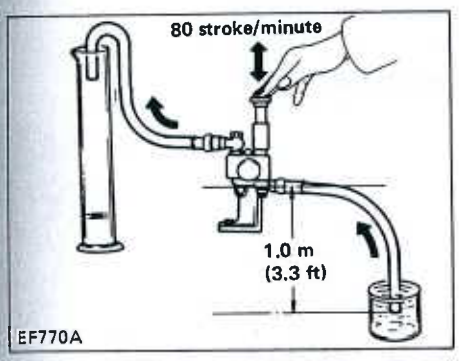
Feed Pump

After installing feed pump, bleed air from system.

TEST

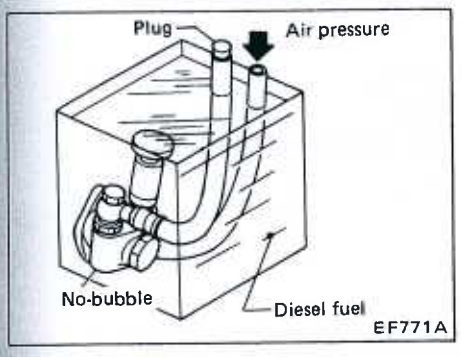
Standard fuel feed volume

The volume of fuel displaced by the feed pump is more than 405 mℓ (14.3 Imp fl oz) per 15 seconds at 1,000 rpm.
The maximum discharge pressure is 333 to 412 kPa (3.33 to 4.12 bar, 3.4 to 4.2 kg/cm², 48 to 60 psi) at 600 rpm.



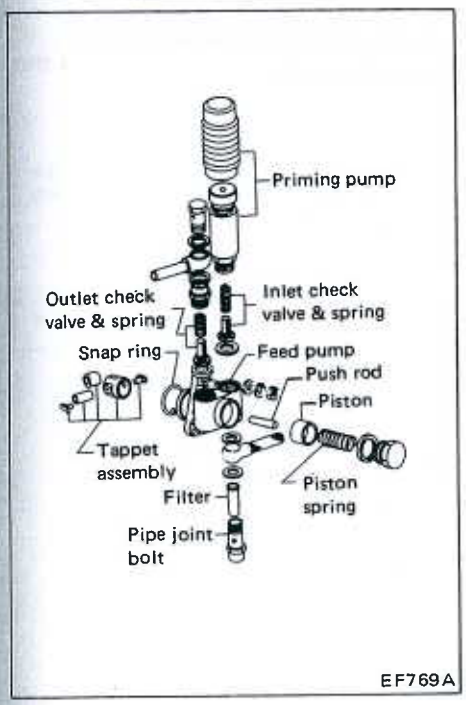
Pump performance test

1. Connect a pipe to intake side of feed pump, and set pump so that fuel can be sucked up from fuel level 1.0 m (3.3 ft) below the pump.
2. Operate priming pump at 80 strokes per minute, and make sure that fuel can be sucked up within 25 strokes.



Air-tightness test

1. Stop up fuel feed pump discharge port and apply 196 kPa (1.96 bar, 2.0 kg/cm², 28 psi) of air pressure to intake side of pump.
2. Immerse pump in kerosene (light oil) and make sure that no air leaks from any of pump connections. If bubbles larger than one grain come from fuel feed pump housing or push rod joint continuously, replace oil seal at push rod or push rod.
   Replace feed pump assembly, if necessary.



INSPECTION

Feed pump housing

1. Check check valve seats. If they are damaged or excessively worn, replace housing.
2. Check push rod hole. If hole is excessively worn, replace housing.

Check valve and check valve spring

1. If seat of check valve is excessively worn or scarred, replace check valve with a new one.
2. If check valve spring is damaged or permanently stressed, replace valve spring.

Piston and piston spring

1. If periphery of piston is excessively worn or scarred, replace piston with a new one.
2. If piston spring is damaged or weakened, replace valve spring.

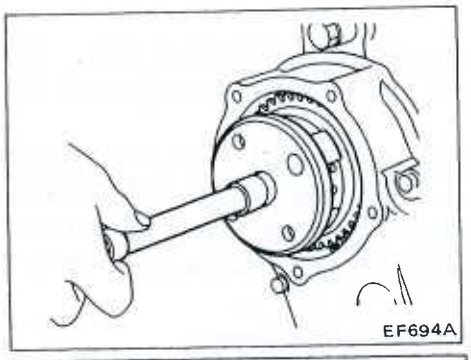
Feed Pump (Cont'd)

Tappet assembly

1. Tappet
   If periphery of tappet is worn or scarred, replace it with a new one.
2. Tappet roller
   If periphery of tappet roller is excessively worn or scarred, replace it with a new one.

Roller to pin clearance:
Limit
0.30 mm (0.0118 in)

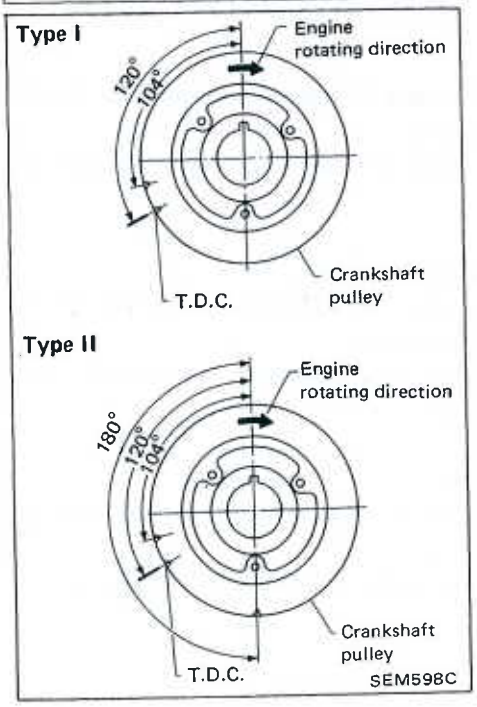
Tappet roller outside diameter:
Wear limit
14.9 mm (0.587 in)


EF694A

Timer

REMOVAL

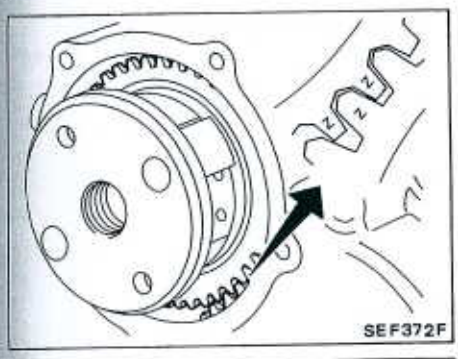
1. Remove timing gear cover.
2. Remove timer round nut.
3. Remove timer assembly by threading in Tool.



INSTALLATION

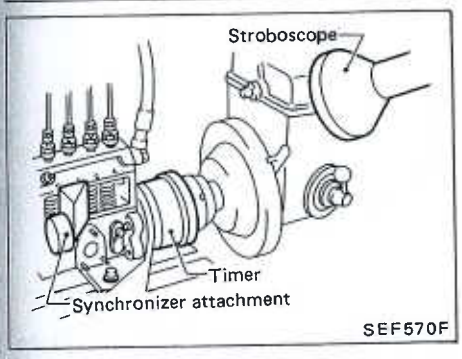
1. Align crank pulley and timing gear case cover marks so that No. 1 piston is at top dead center.

Timer (Cont'd)



2. Mesh injection pump drive gear with idler gear at Z-mark, and then align gear to key way of injection pump camshaft while turning crank pulley.
3. Secure timer assembly with lock washer and round nut.

   ⓞ : **Round nut**
   59 - 69 N·m
   (6 - 7 kg-m, 43 - 51 ft-lb)
4. Install timing gear cover with new gasket sealed.



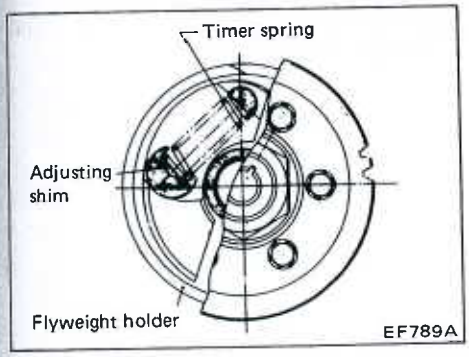
ADJUSTMENT

1. Install stroboscope, using cover plate bolts, so that synchronizer lever attachment is applied to tappet.
2. Operate fuel injection pump, turn "ON" switch of stroboscope illuminating dial (angle scale) on flywheel, and measure angular change based on variations in pump speed.

If tester does not have a dial (angle scale):

(1) Attach a dial to timer coupling and mount a pointer on tester drive shaft.

(2) Operate fuel injection pump and turn stroboscope "ON" so as to illuminate dial.



3. If advance angle is not within specified range, adjust by changing timer spring shims.

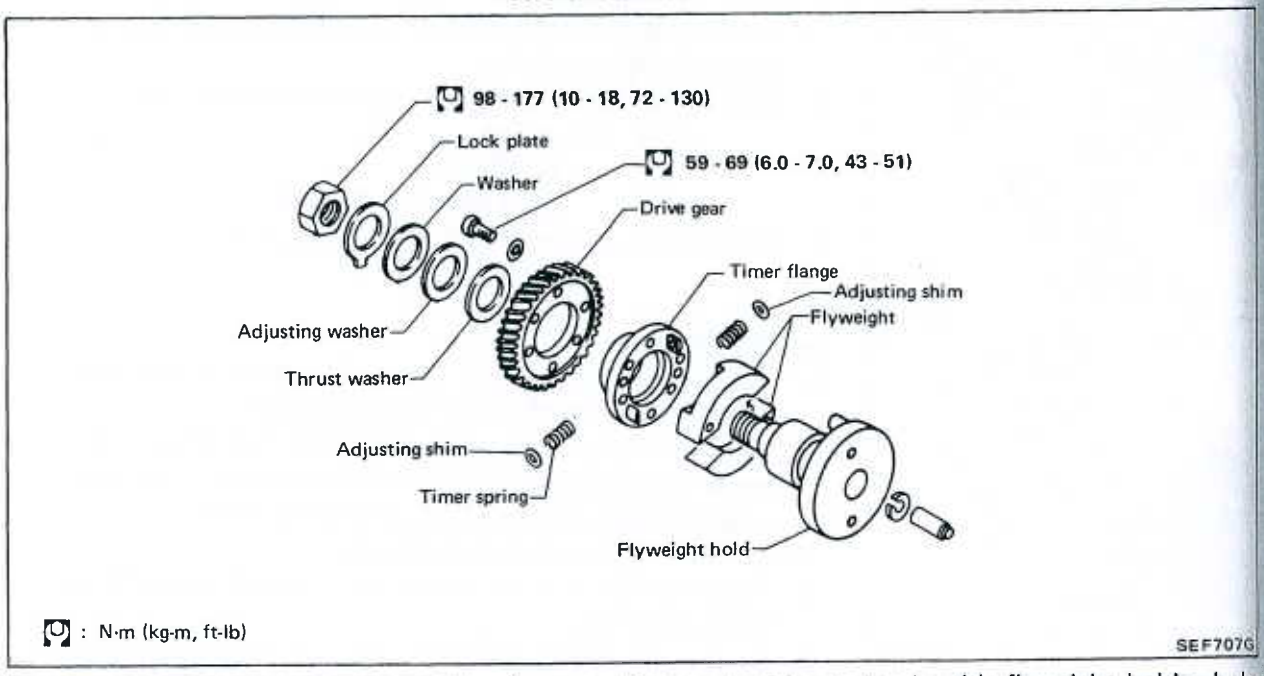
a. When injection timing is retarded, decrease shim thickness.

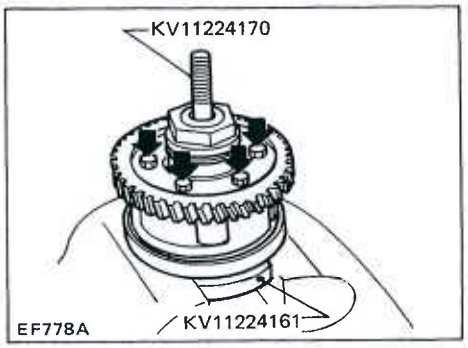
b. When injection timing is advanced, increase shim thickness.

Timer advance curve:
Refer to S.D.S.

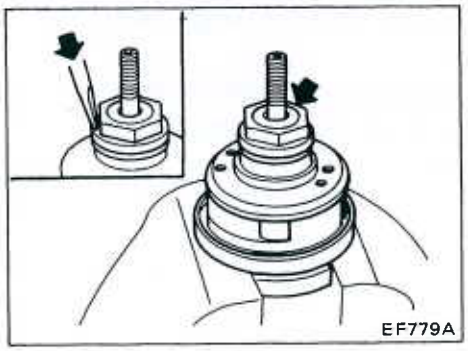
Timer (Cont'd)

DISASSEMBLY

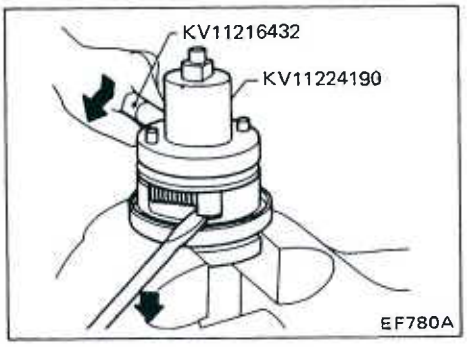




1. Place timer assembly on Tools with flyweight holder hole positioned on base pin.
2. Remove injection pump drive gear.



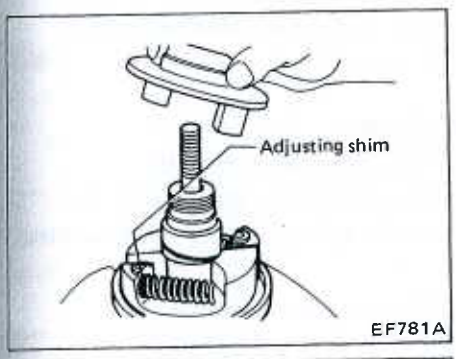
3. Remove nut, lock washer, lock plate, adjusting shim and thrust washer after unbending lock washer.



4. Remove timer flange by prying with lever while pressing spring with Tool (KV11216432).

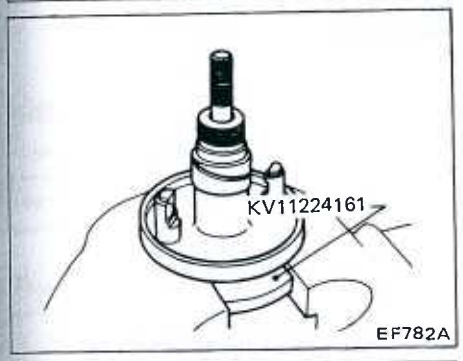
Timer (Cont'd)

5. Remove timer spring, adjusting shim and flyweight.

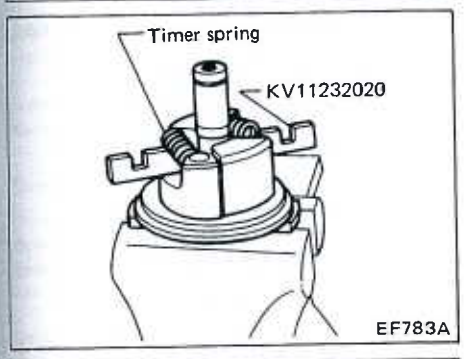


ASSEMBLY

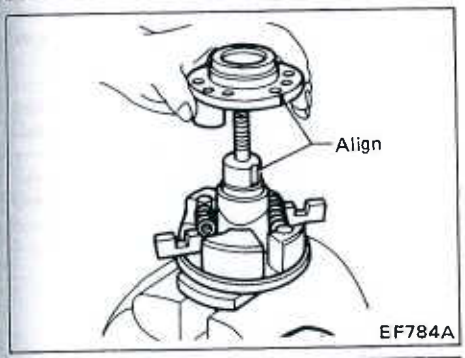
1. Set flyweight holder on Tools with flyweight holder pin hole positioned on base pin.



2. Apply grease to flyweight holder pin and flyweight holder hole.
3. Install flyweight and insert Tool under timer spring, positioning spring on flyweight.



4. Insert suitable adjusting shim into hole at pin part of timer flange.
5. Cover timer flange to flyweight holder by matching notch of flange and key groove of flyweight holder.

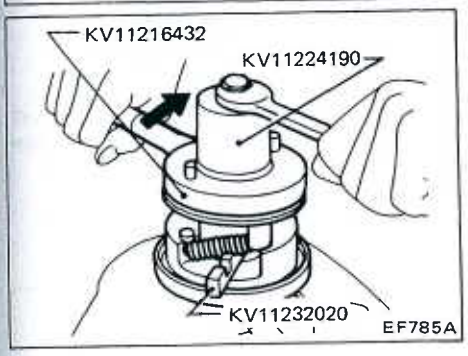


6.

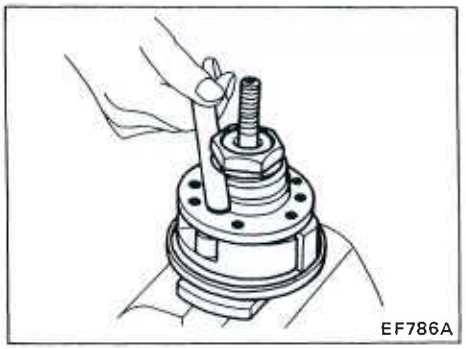
(1) Turn Tool (KV11216432) in direction to compress timer spring, thread in Tool (KV11224190), and then remove Tool (KV11232020).

(2) Using a lever, insert timer spring into flange hole, thread in Tool (KV11224190) all the way and install flange in its proper position.

Make sure that spring is fully seated in holes in flange and flyweight holder.



Timer (Cont'd)


EF786A

7. Adjust flyweight holder and flange clearance.

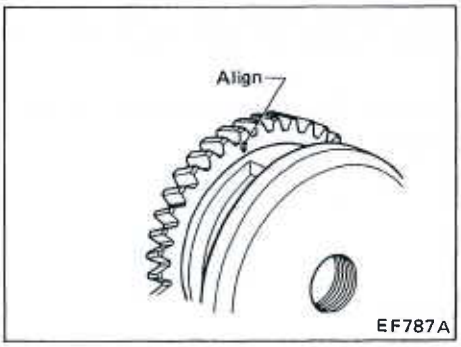
(1) Install thrust washer, lock plate and adjusting washer, and completely tighten them with nut.

: Nut

98 - 177 N·m
(10 - 18 kg-m, 72 - 130 ft-lb)

(2) Measure lock plate and thrust washer clearance. If the clearance is not within specifications, adjust with adjusting washer.

Lock plate and thrust washer clearance:
0.02 - 0.10 mm
(0.0008 - 0.0039 in)



EF787A

8. Align "O" mark on drive gear with notch in timer flange, and install drive gear.

Service Data and Specifications (S.D.S.)

TABLE OF MODELS AND CORRESPONDING PUMP NUMBERS

Engine	Destination	Part number	Pump number	Applied model				Remarks
				Y31	D21	E24	F22	
TD27	General areas	16700-11T61	101441-9551	–	–	–	○	Without high altitude compensator
		16700-11T62	101441-9561					With high altitude compensator

INSPECTION AND ADJUSTMENT

Injection timing

Injection timing	B.T.D.C. 16°

Injection pump

		Standard mm (in)	Limit mm (in)
Pump housing to tappet clearance		0.02 - 0.062 (0.0008 - 0.0024)	0.20 (0.0079)
Control sleeve to plunger trunnion shaft clearance		0.02 - 0.08 (0.0008 - 0.0031)	0.12 (0.0047)
Camshaft end play		0 - 0.02 (0 - 0.0008)	0.10 (0.0039)
Control rack to pinion backlash		0.15 (0.0059)	0.30 (0.0118)
Control rack sliding resistance	Pump rpm = 0	Less than 1.471N (150 g, 5.29 oz)	–
	Pump rpm = 1,000	Less than 0.490N (50 g, 1.76 oz)	–
Injection internal (cam angle)		89°30′ - 90°30′	–
Injection starting timing (pre-stroke: plunger lift from B.D.C.)		2.10 - 2.20 (0.0827 - 0.0866)	–

Camshaft end play adjusting shim	Thickness mm (in)	Part number
	0.10 (0.0039)	16741-37500
	0.12 (0.0047)	16741-37501
	0.14 (0.0055)	16741-37502
	0.16 (0.0063)	16741-37503
	0.18 (0.0071)	16741-37504
	0.30 (0.0118)	16741-37505
	0.50 (0.0197)	16741-37506

Governor

	Thickness mm (in)	Part number
Pneumatic governor spring adjusting shim	0.2 (0.008)	19241-37504
	0.3 (0.012)	19241-37505
	0.5 (0.020)	19241-37500
	1.0 (0.039)	19241-37501
	1.5 (0.059)	19241-37502
	2.0 (0.079)	19241-37503
Torque control travel adjusting shim	0.1 (0.004)	19227-37500
	0.2 (0.008)	19227-37501
	0.3 (0.012)	19227-37502
	0.5 (0.020)	19227-37503
	1.0 (0.039)	19227-37504
Torque control spring adjusting shim	0.1 (0.004)	19229-37500
	0.2 (0.008)	19229-37501
	0.3 (0.012)	19229-37502
	0.5 (0.020)	19229-37503
	1.0 (0.039)	19229-37504

Service Data and Specifications (S.D.S.) (Cont'd)

Feed pump

	Standard mm (in)	Wear limit mm (in)
Roller to pin clearance	0.04 - 0.08 (0.0016 - 0.0031)	0.30 (0.0118)
Roller outer diameter	15.0 (0.591)	14.9 (0.587)
Oil feed rate	405 mℓ (14.3 Imp fl oz) or more within 15 seconds at a pump speed of 1,000 rpm.	
Pumping capacity	Discharge should occur within 40 seconds with a pump speed of 100 rpm and intake head of 1.0 meter (3.3 ft).	
Oil feed pressure	The time required to develop an oil feed pressure of 157 kPa (1.57 bar, 1.6 kg/cm², 23 psi) with a feed pump speed of 600 rpm should be within 30 seconds.	
Pumping capacity (priming pump)	Operate the priming pump at a rate of 60 to 100 strokes per minute and verify that pumping is started within 25 strokes.	

Timer

Flyweight holder to flange clearance (Lock plate to thrust washer clearance) mm (in)	0.02 - 0.10 (0.0008 - 0.0039)	
	Thickness mm (in)	Part number
Timer spring adjusting shim	0.1 (0.004)	16822-37500
	0.3 (0.012)	16822-37501
	0.5 (0.020)	16822-37502
Timer plate bearing adjusting shim	0.10 (0.0039)	16826-99007
	0.12 (0.0047)	16828-99000
	0.14 (0.0055)	16826-99001
	0.16 (0.0063)	16826-99002
	0.18 (0.0071)	16826-99003
	0.20 (0.0079)	16826-99005
	0.30 (0.0118)	16826-99006
	0.50 (0.0197)	16826-99004

Fuel filter

Type	Full-flow, paper type filter
Overflow valve opening pressure kPa (bar, kg/cm², psi)	98 - 137 (0.98 - 1.37, 1.0 - 1.4, 14 - 20)

TIGHTENING TORQUE

Unit	N-m	kg-m	ft-lb
Injection pump			
Injection pump to engine front plate	20 - 25	2.0 - 2.5	14 - 18
Delivery valve holder	39 - 44	4.0 - 4.5	29 - 33
Screw plug	54 - 74	5.5 - 7.5	40 - 54
Governor			
Flyweight round nut	49 - 59	5.0 - 6.0	36 - 43
Timer			
Round nut	59 - 69	6.0 - 7.0	43 - 51
Lock nut	98 - 177	10 - 18	72 - 130
Injection nozzle assembly			
Nozzle retaining nut	29 - 49	3.0 - 5.0	22 - 36
Injection nozzle assembly to cylinder head	54 - 64	5.5 - 6.5	40 - 47
Injection tube flare nut	20 - 25	2.0 - 2.5	14 - 18
Spill tube nut	29 - 39	3.0 - 4.0	22 - 29
Fuel filter			
Lead line connector bolt	25 - 29	2.5 - 3.0	18 - 22

INJECTION PUMP

Service Data and Specifications (S.D.S.) (Cont'd)

INJECTION PUMP CALIBRATION DATA (Pump parts No. 16700-11T61, 16700-11T62)

Injection timing

Pre-stroke: No. 1 plunger 2.15±0.05 mm (0.0846±0.0020 in)

Injection order: $1 \xrightarrow[90°\pm30']{} 3$, $1 \xrightarrow[180°\pm30']{} 4$, $1 \xrightarrow[270°\pm30']{} 2$

Plungers are numbered from the Drive side.

Tappet clearance : Bolt adjustment type ; More than 0.3 mm (0.012 in) for all cylinders.
: Shim adjustment type; Manually rotate the camshaft 2 to 3 times and confirm that it rotates smoothly.

Injection quantity

Adjusting point	Rod position mm (in)	Pump speed (rpm)	Injection q'ty mℓ (Imp fl oz)/ 1,000 strokes	Max. var bet. cyl (%)	Fixed	Remarks
	12.2 (0.480)	1,100	47.5 - 49.5 (1.67 - 1.74)	±2.5	Rack	Basic
	10.8 (0.425)	2,150	45.3 - 49.3 (1.59 - 1.74)	—	Rack	
	Approx. 8.2 (0.323)	350	6.9 - 9.1 (0.24 - 0.32)	±15	Rack	

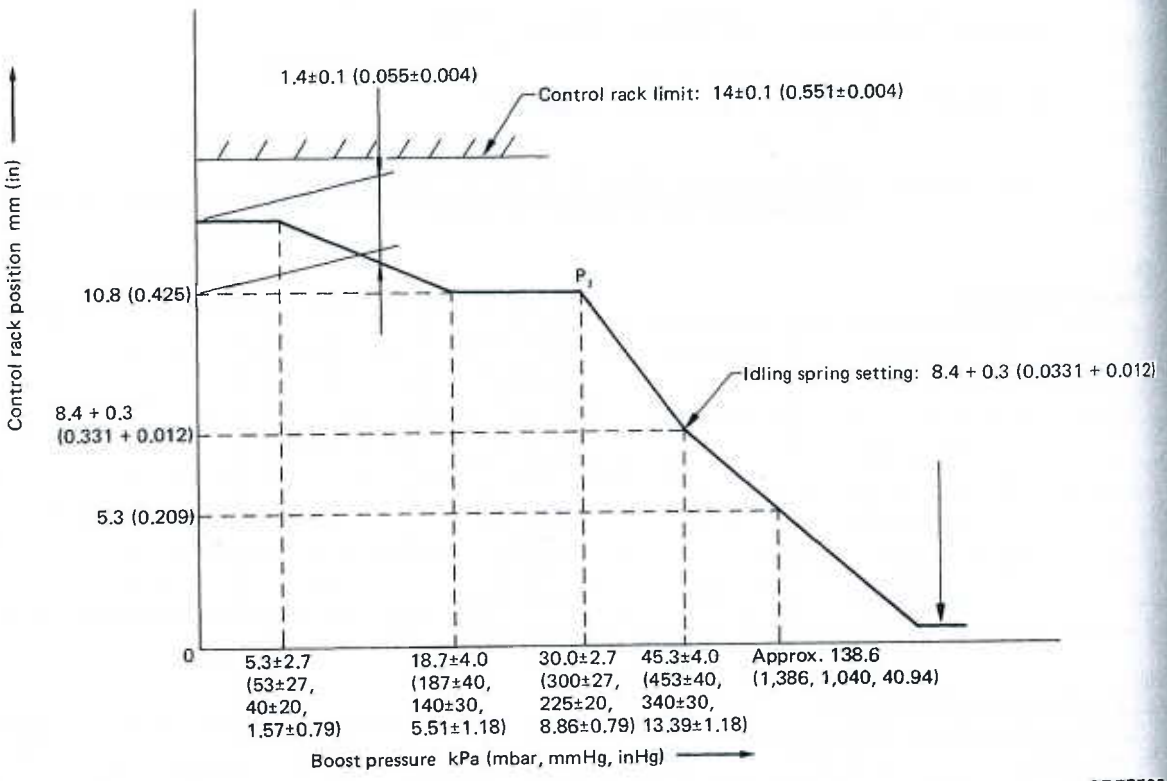
Timing advance specification

Pump speed	(rpm)	Below 550	500	2,150
Advance angle	(deg.)	Start	Below 0.5	Finish 5.5 - 6.5

Service Data and Specifications (S.D.S.) (Cont'd)

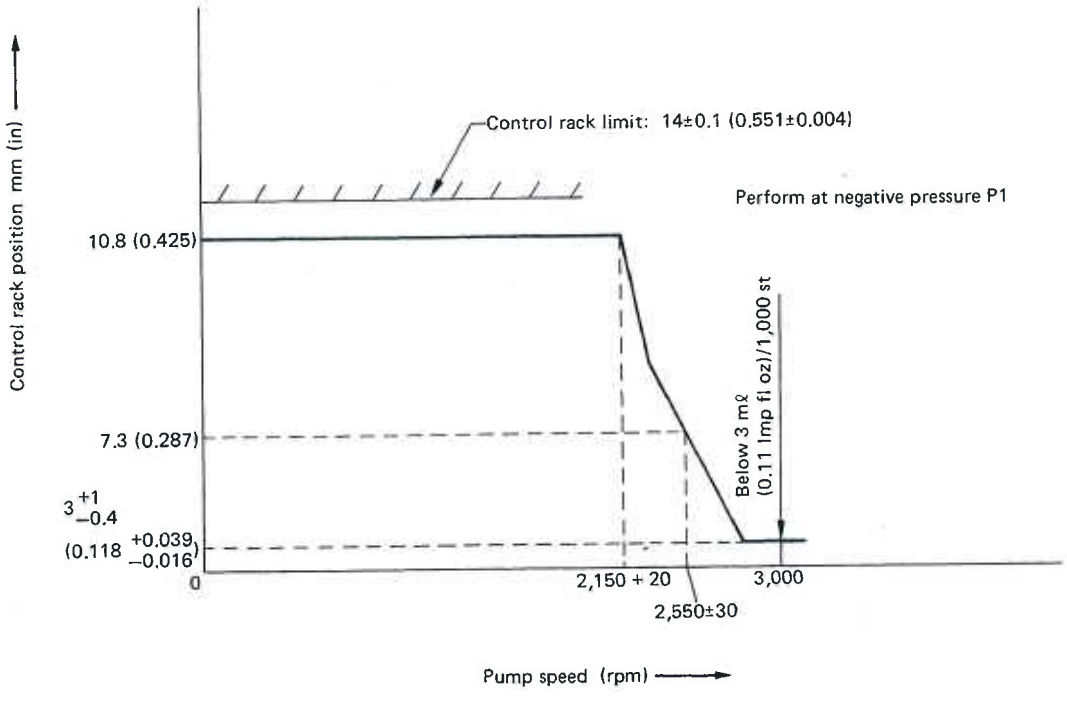
Governor adjustment

Pneumatic governor



SEF770F

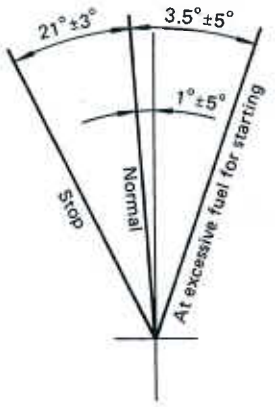
Mechanical governor



SEF771F

Service Data and Specifications (S.D.S.) (Cont'd)

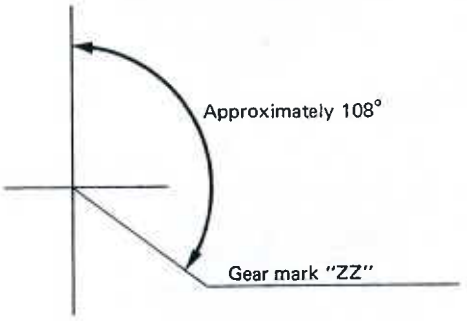
Stop lever angle



SEF772F

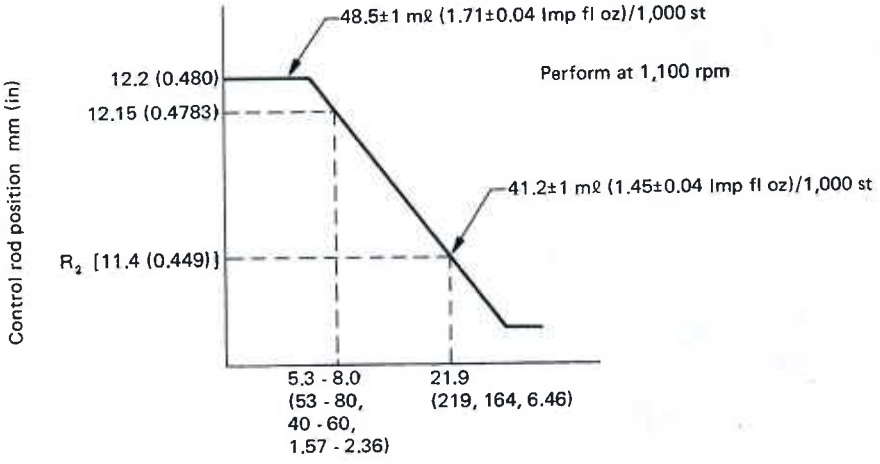
Timing setting

At No. 1 plunger beginning of injection
B.T.D.C.: 16°

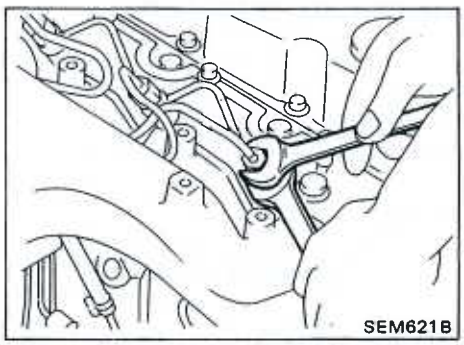


SEF773F

For high altitude compensator model



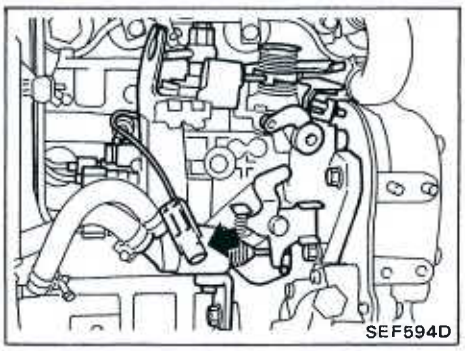
SEF774F



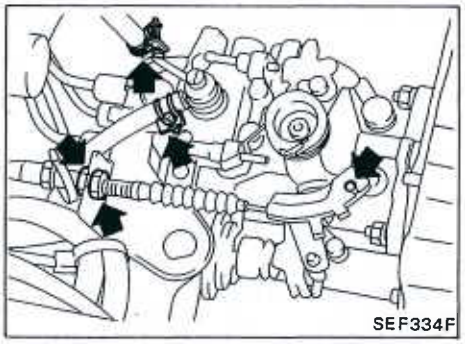
Removal

1. Remove injection tube.

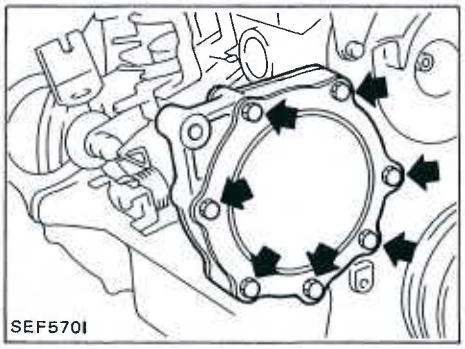
Cover the injection nozzle assembly with a plug to prevent dust entry.



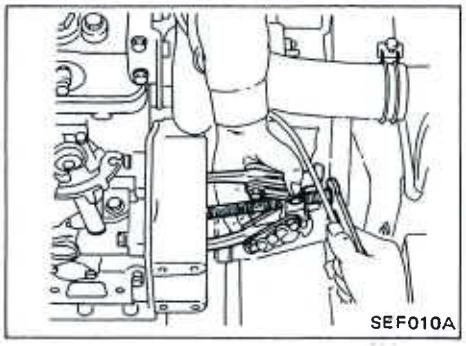
2. Remove fuel cut solenoid wire.



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



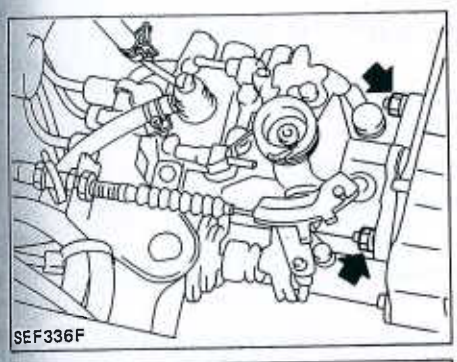
4. Remove injection pump drive gear cover.



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

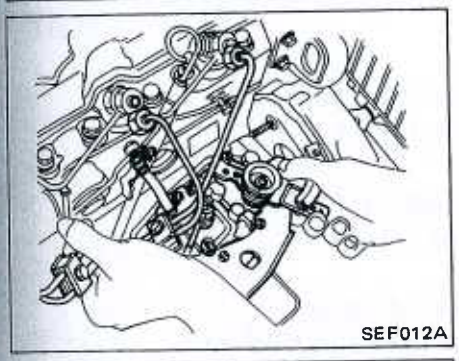
Removal (Cont'd)

6. Remove injection pump fixing nuts and bolts.


SEF336F

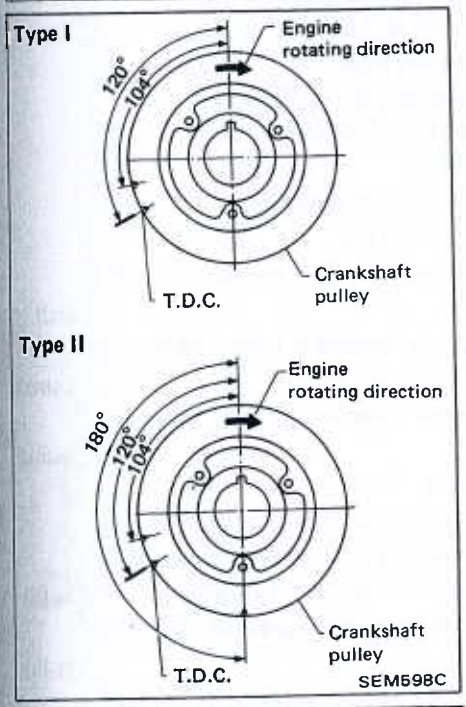
7. Remove injection pump with injection tubes.

Disconnect injection tube from pump once it is removed.


SEF012A

Installation and Adjustment

1. Confirm that No. 1 piston is set at T.D.C. on its compression stroke.

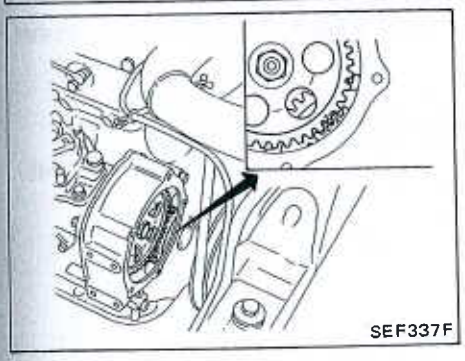


2. Install injection pump.
(1) Temporarily set injection pump so that the flange of pump is aligned with aligning mark on front cover.
(2) Install injection drive gear.

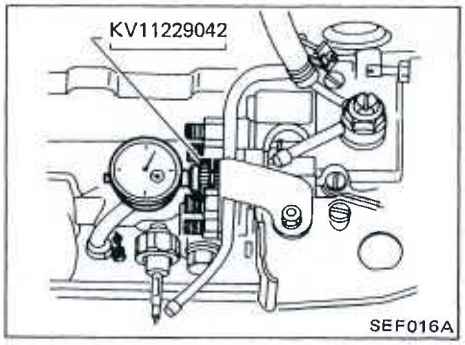
[O] : **59 - 69 N·m (6 - 7 kg-m, 43 - 51 ft-lb)**

Make sure that the key does not fall into the front cover.
Make sure that "Z" marks are aligned.

(3) Install drive gear cover with new gasket.


SEF337F

Installation and Adjustment (Cont'd)



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 T.D.C.

(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 T.D.C.

(4) Read dial gauge indication.

TD23:
0.54±0.02 mm (0.0213±0.0008 in)
(equivalent to 5° B.T.D.C.)

TD25:
0.71±0.02 mm (0.0280±0.0008 in)
(equivalent to 6° B.T.D.C.)

TD27:
Except D21 double cab model
0.65±0.02 mm (0.0256±0.0008 in)
(equivalent to 5° B.T.D.C.)
Only D21 Double cab model
0.49±0.02 mm (0.0193±0.0008 in)
(equivalent to 3° B.T.D.C.)

TD27T:
0.59±0.02 mm (0.0232±0.0008 in)
(equivalent to 4° B.T.D.C.)

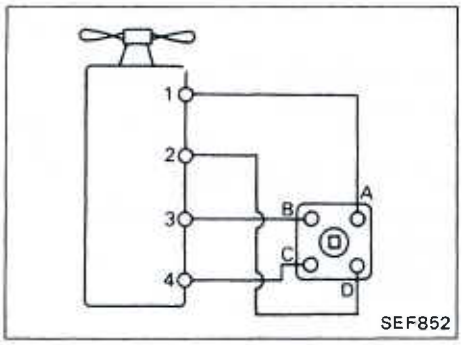
(5) If it is not within the above range, turn pump body until it comes within standard range.

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.

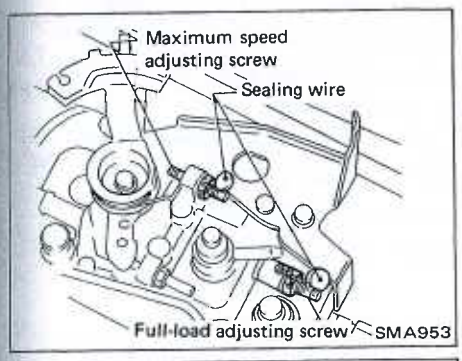
Injection pump fixing bolt
19 - 25 N·m (1.9 - 2.5 kg-m, 14 - 18 ft-lb)
Injection pump to mounting bracket
30 - 41 N·m (3.1 - 4.2 kg-m, 22 - 30 ft-lb)



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

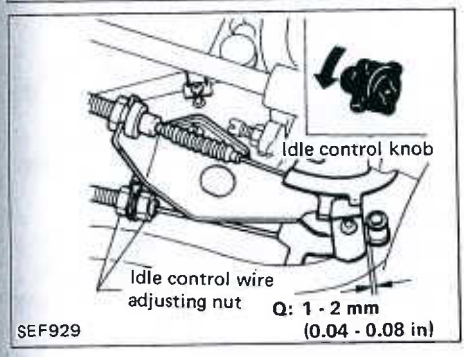
Installation and Adjustment (Cont'd)

IDLE AND MAXIMUM SPEED ADJUSTMENT



CAUTION:

a. **Do not remove sealing wires unless absolutely necessary.**
b. **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.**
c. **If maximum speed adjusting screw is turned in direction that increases control lever angle, engine damage may result.**



Throttle control wire adjustment

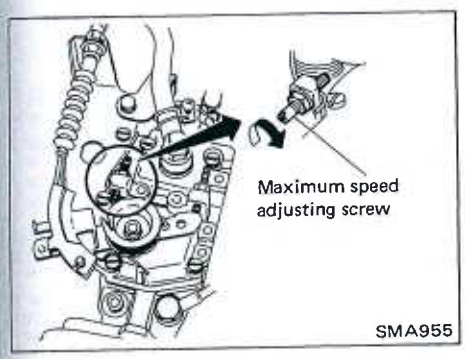
1. Turn idle control knob fully counterclockwise.
2. Make sure that clearance between idle control lever pin and fuel injection pump control lever is within the specified range.

   Clearance:

   1 - 2 mm (0.04 - 0.08 in)
3. If not within the specified range, adjust with idle control wire adjusting nut.
4. After adjusting clearance, tighten lock nut.

Idle adjustment

Refer to 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:

1. Start engine and warm it up until coolant temperature indicator points to middle of gauge.
2. Connect tachometer's pick-up to No. 1 fuel injection tube.

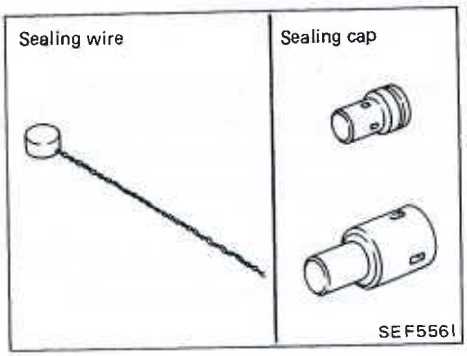
To obtain accurate reading of engine rpm, remove clamps that secure No. 1 fuel injection tube.

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

   Maximum engine speed (Under no load):

   5,100 $^{+50}_{-150}$ rpm (Except for Europe)

   5,100 $^{+50}_{-150}$ rpm (For Europe)



Installation and Adjustment (Cont'd)

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.

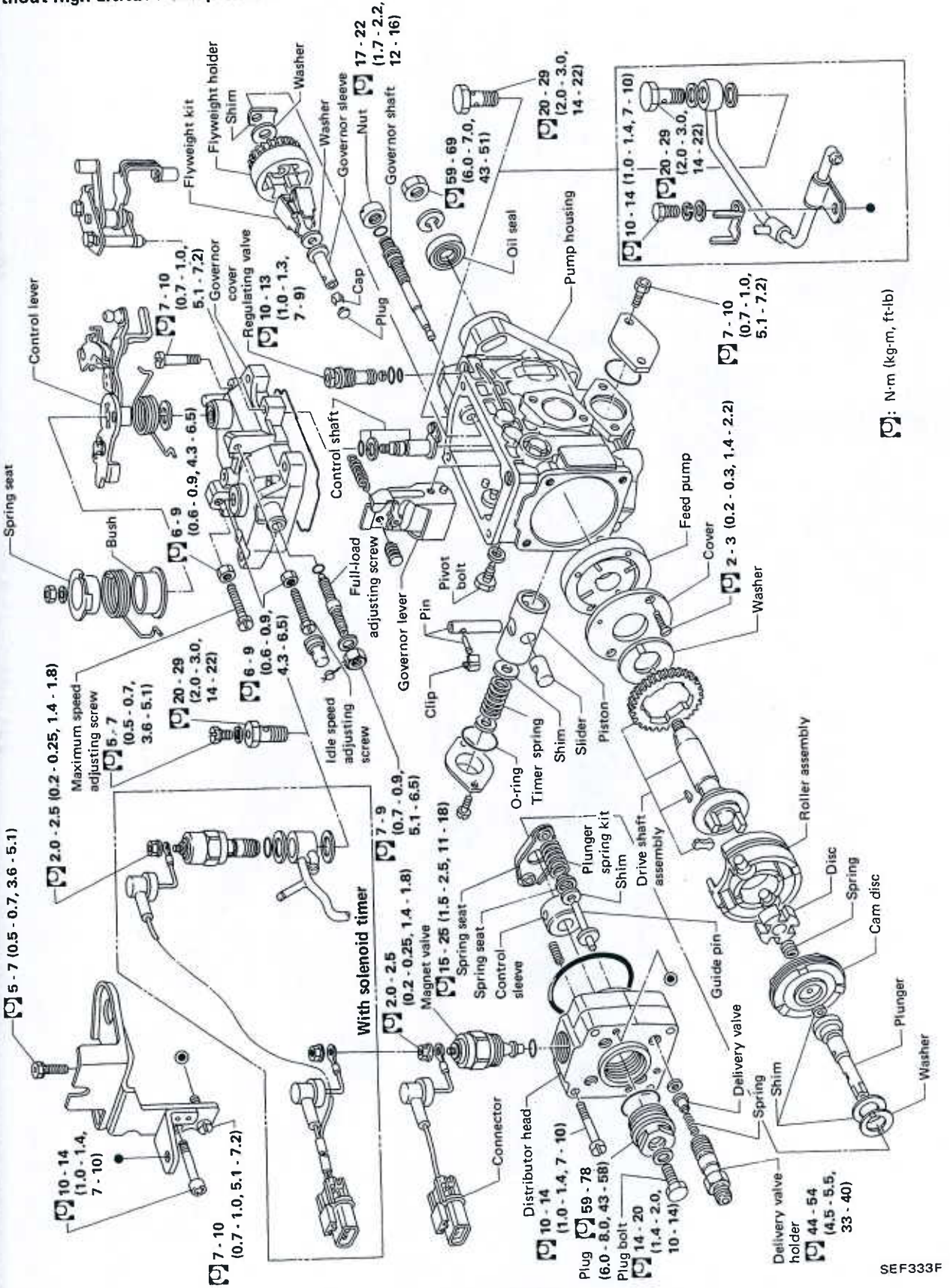
Disassembly

PREPARATION

- Before performing disassembly and adjustment, test the fuel injection pump and note test results.
- Prior to beginning disassembly of fuel injection pump, clean all dust and dirt from its exterior.
- Disconnect overflow valve and drain fuel.
- Clean work bench completely, removing all foreign matter.
- Collect only those service tools necessary for disassembling and reassembling.
- Be careful not to bend or scratch any parts.

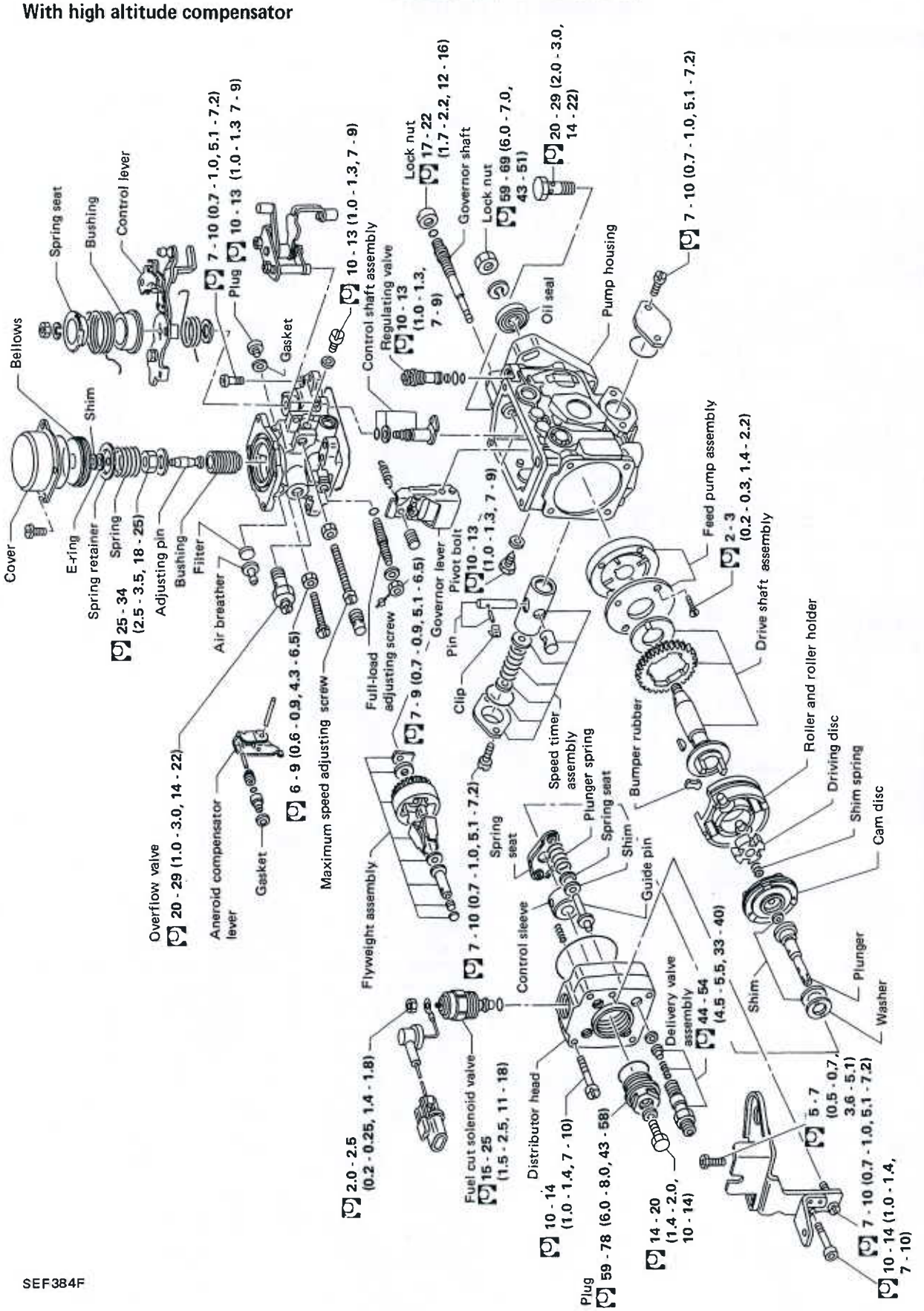
Disassembly (Cont'd)

Without high altitude compensator



Disassembly (Cont'd)

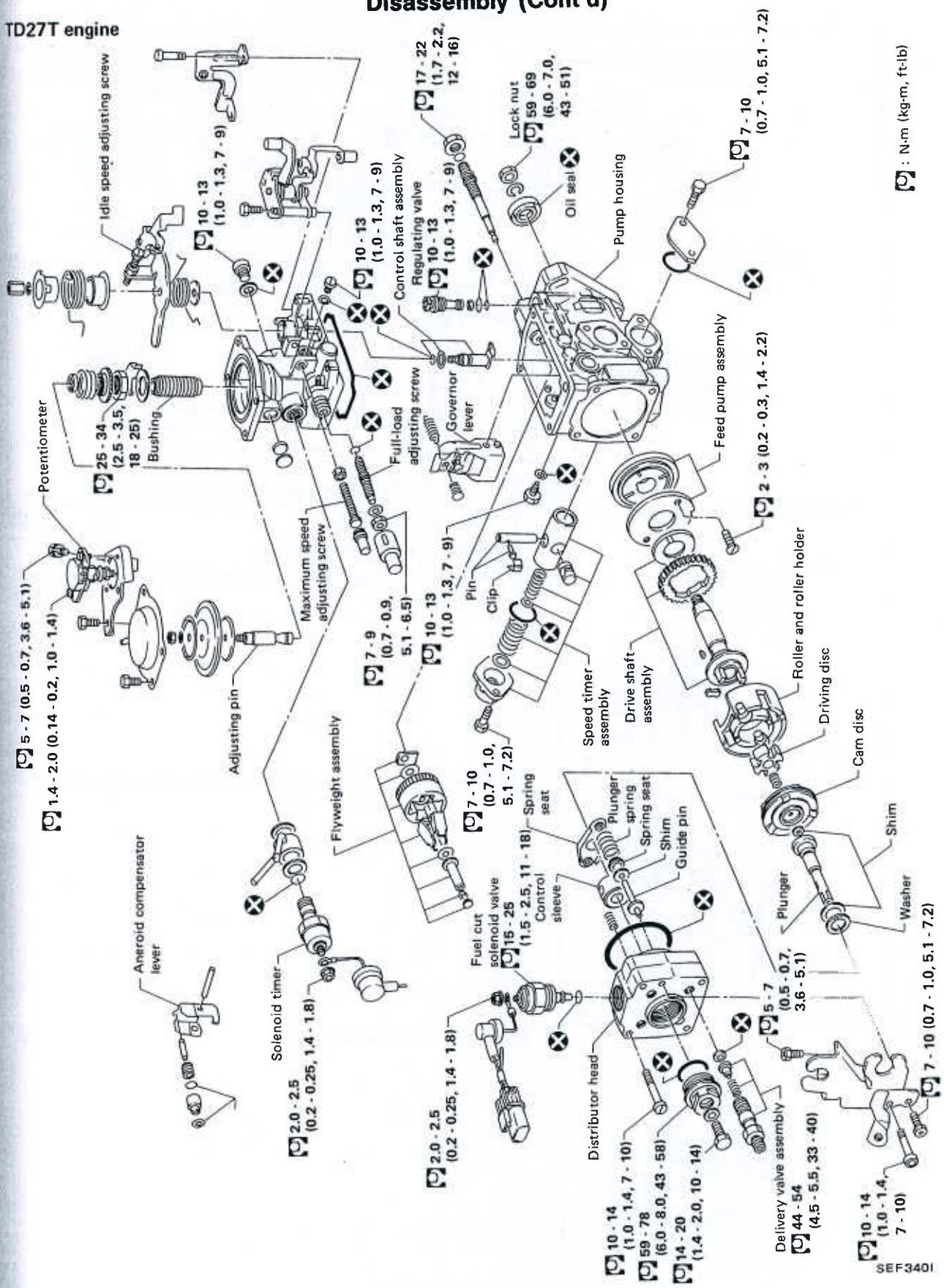
With high altitude compensator



SEF384F

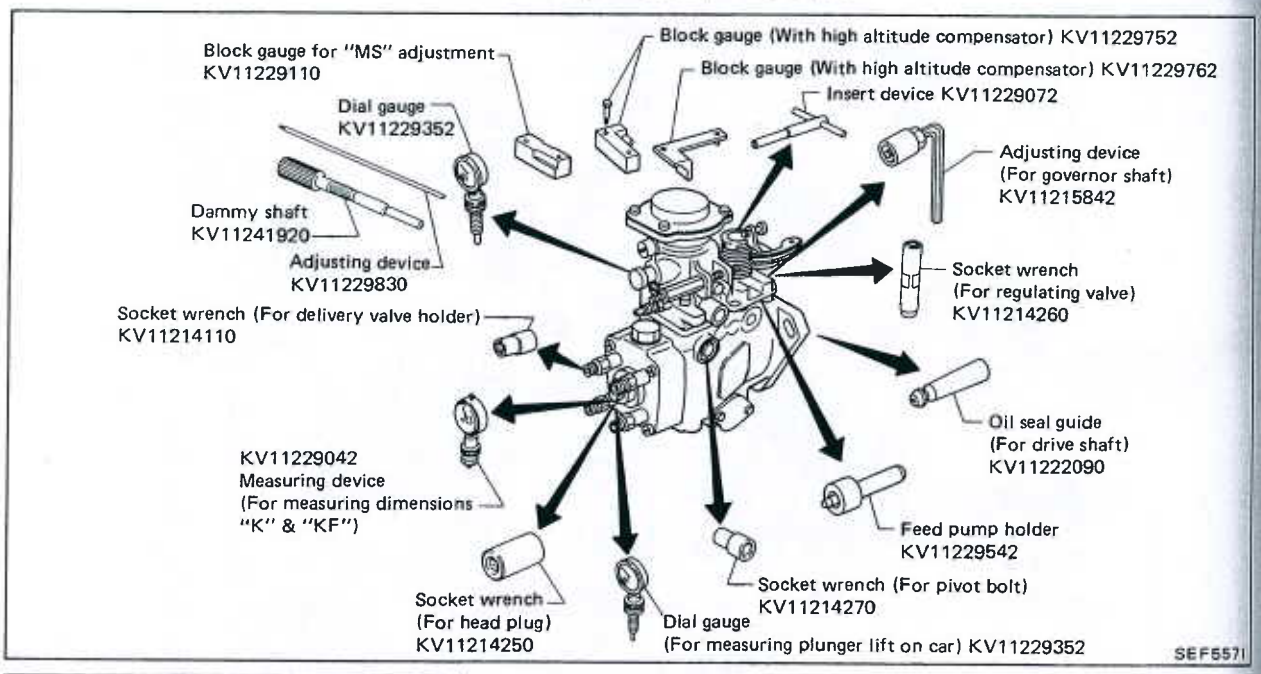
Disassembly (Cont'd)

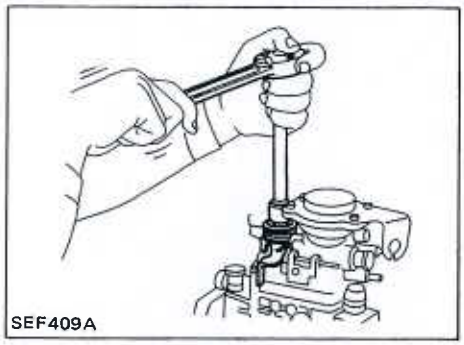
TD27T engine



Disassembly (Cont'd)

SPECIAL SERVICE TOOLS

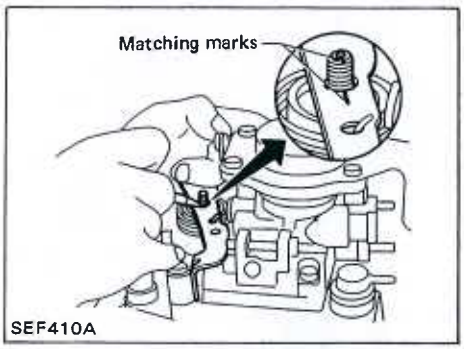




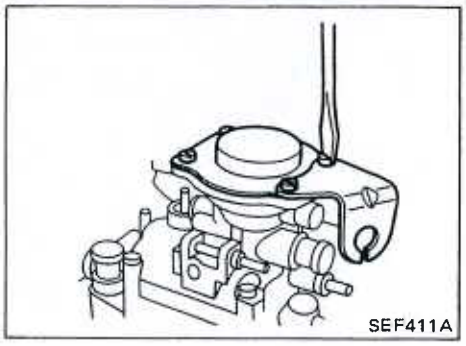
1. Remove pump cover.

With high altitude compensator

(1) Remove nut, spring washer, spring seat and spring from control lever.



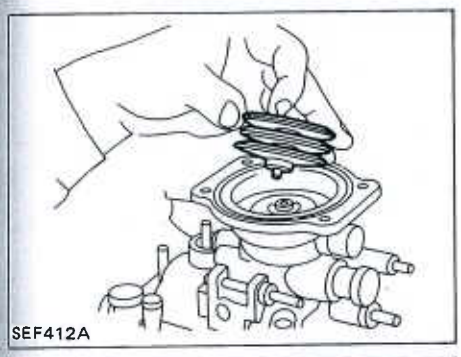
(2) Draw aligning marks on control lever and control shaft.



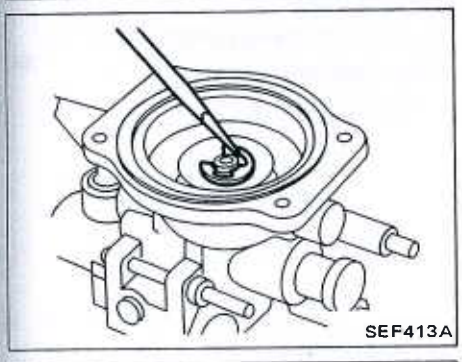
(3) Remove compensator cover.

Disassembly (Cont'd)

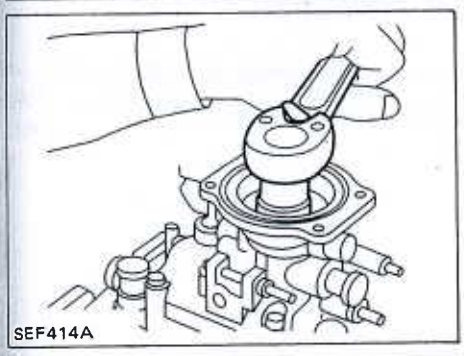
(4) Remove bellows and adjusting shim.


SEF412A

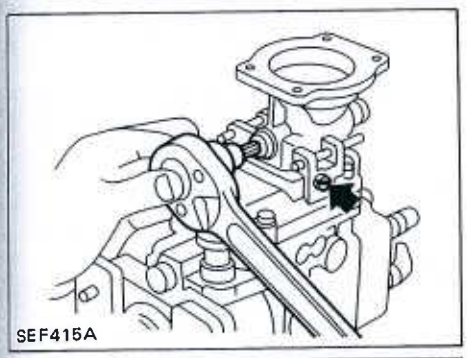
(5) Remove E-ring, then remove spring seat and spring.


SEF413A

(6) Loosen nut.

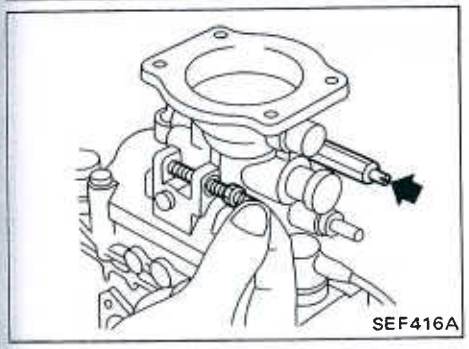

SEF414A

(7) Remove governor cover plugs.

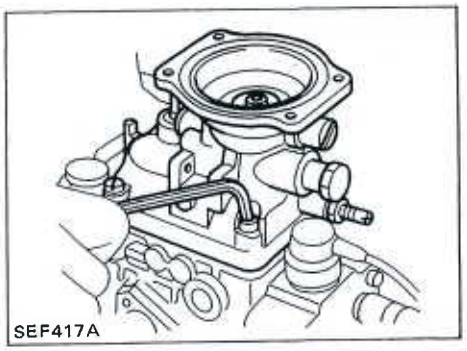

SEF415A

(8) Remove governor cover.

a. Remove sealing wire and idle and maximum speed adjusting screws.

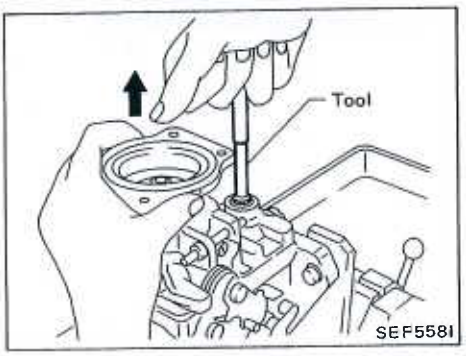

SEF416A

Disassembly (Cont'd)



b. Remove governor cover fixing bolts and screws.

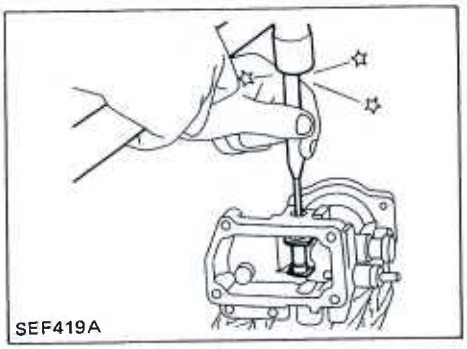
Use hexagon wrench.



c. Remove full-load adjusting screw.

d. Remove governor cover, by holding control shaft with Tool (KV11229072) and lifting governor cover.

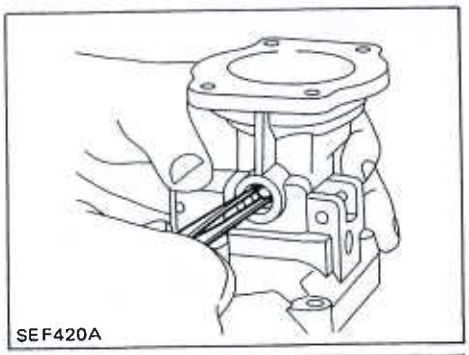
Do not tap control shaft with a hammer.



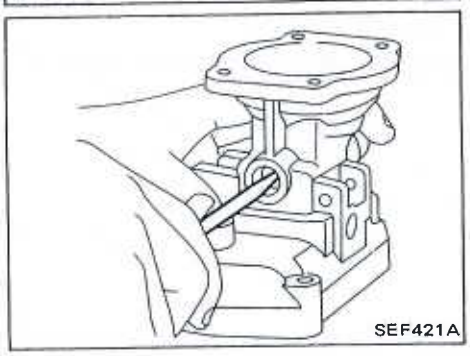
(9) Remove high altitude compensator parts.

a. Remove plugs.

b. Remove lever pin and lever using a suitable drift and a plastic mallet, by tapping it from the right-hand side (viewed from the drive side).



c. Remove plug and pin.

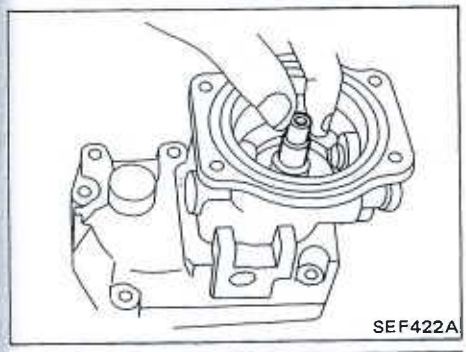


d. Remove retainer, sleeve and washer.

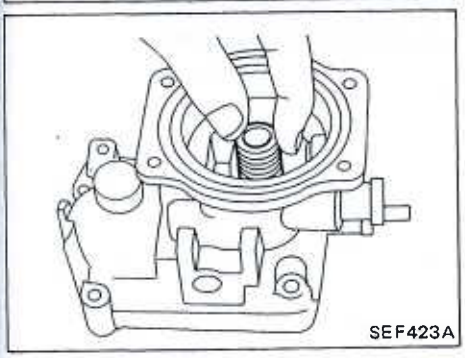
Use a suitable screwdriver to remove retainer.

Disassembly (Cont'd)

e. Remove nut and adjusting rod.

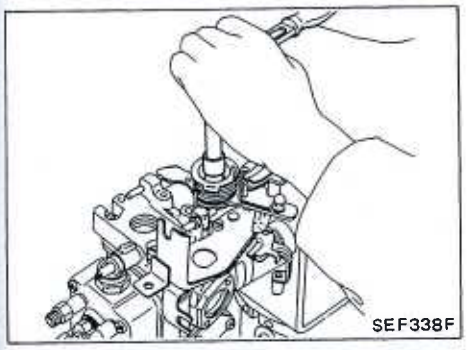


f. Remove bushing.

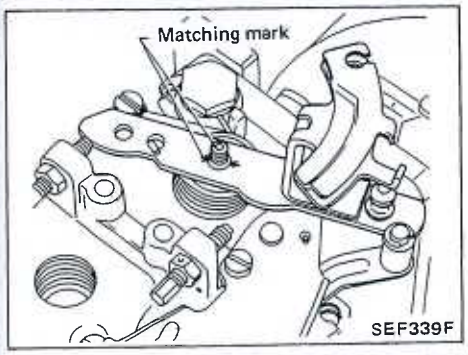


Without high altitude compensator

(1) Remove nut, spring washer, spring seat and spring from control lever.

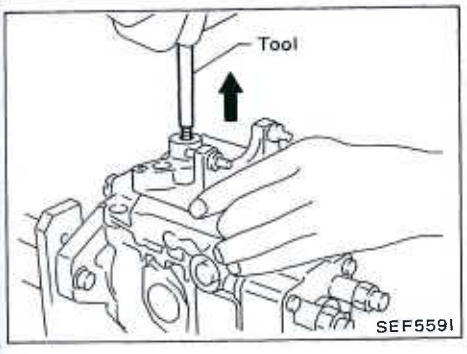


(2) Check aligning marks on control lever and control shaft.



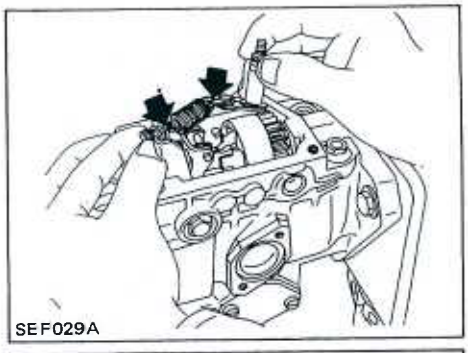
(3) Remove pump cover.
Lift and separate governor cover from control shaft, while holding control shaft with Tool (KV11229072).

Do not tap control shaft with a hammer.

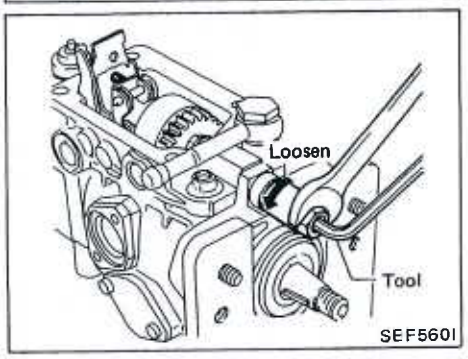


Disassembly (Cont'd)

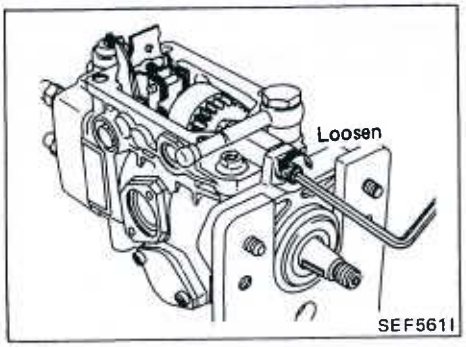
2. Remove control shaft from tension lever.


SEF029A

3. Remove governor shaft with Tool (KV11215842).
Loosen lock nut by turning it counterclockwise.

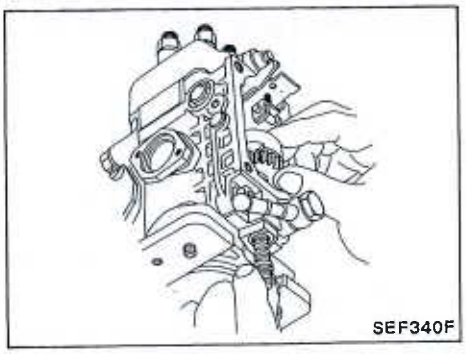


SEF560I

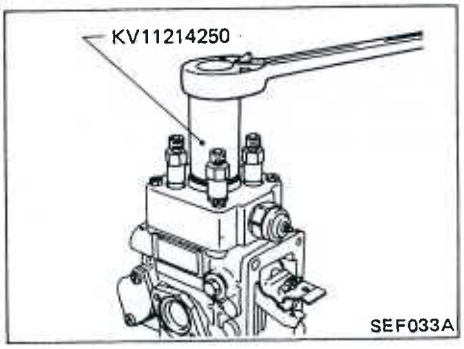


SEF561I

4. Remove governor sleeve, washer and flyweight, along with flyweight holder, then remove washer and shims.

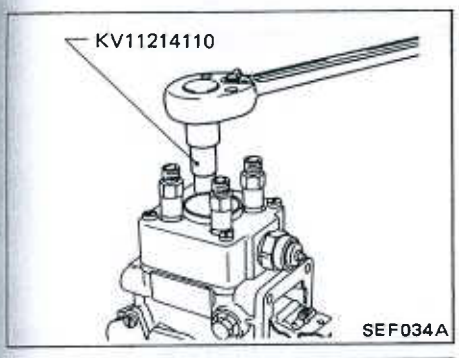

SEF340F

5. Remove plug with special service tool.



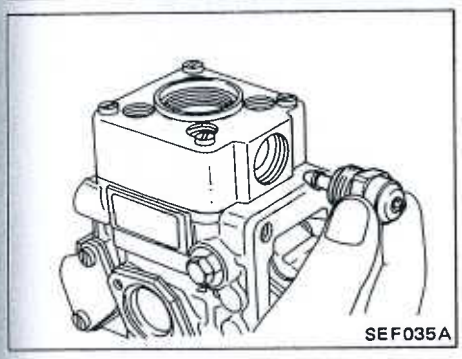
SEF033A

Disassembly (Cont'd)



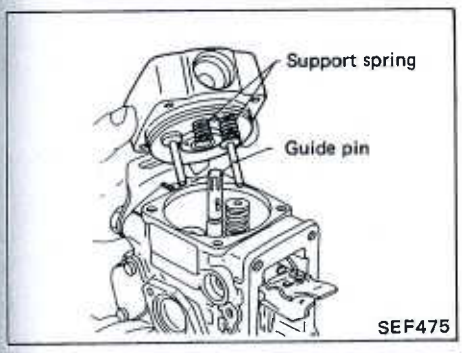
6. Remove delivery valve holder, spring, delivery valve and gasket.

Distributor head has letters (A, B, C, D) stamped on it. Remove lettered parts in alphabetical order and arrange neatly.



7. Remove fuel-cut solenoid valve.

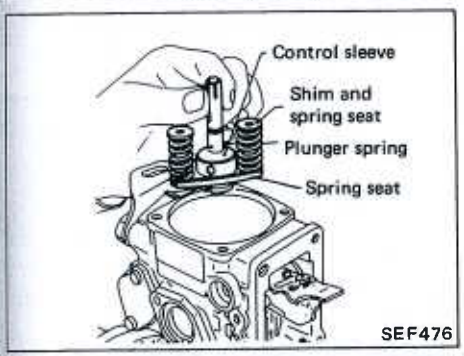
Be careful not to drop the spring and armature.



8. Remove distributor head.

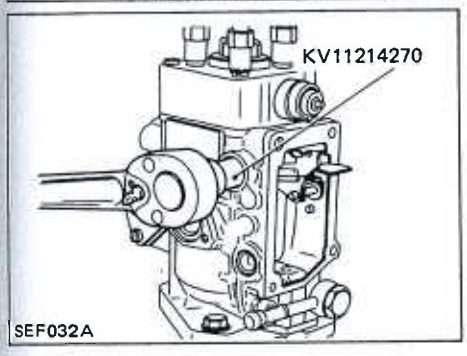
Be careful not to drop the two support springs and guide pins.

with



9. Remove plunger assembly.

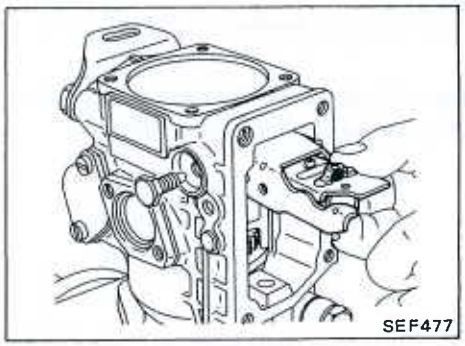
Lift plunger, along with control sleeve, shim, spring seat, plunger spring, washer and shim.



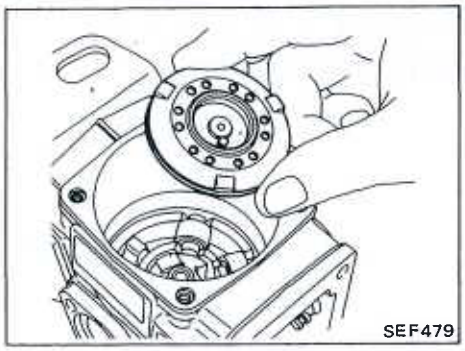
10. Loosen left and right governor pivot bolts.

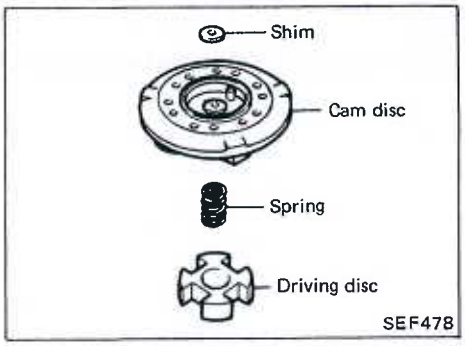
Disassembly (Cont'd)

11. Remove governor pivot bolts and lever assembly.
Avoid pulling on start spring and start idle spring.


SEF477

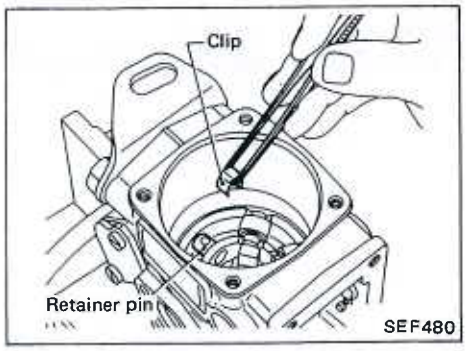
12. Remove shim, cam disc, spring and driving disc.


SEF479



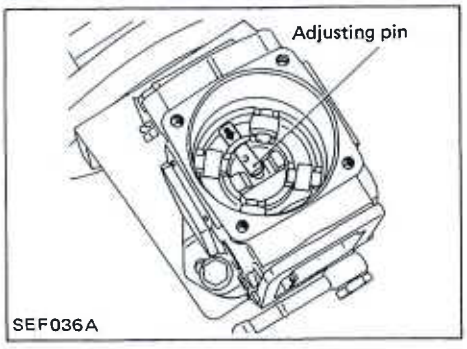
SEF478

13. Remove clip and pin.



SEF480

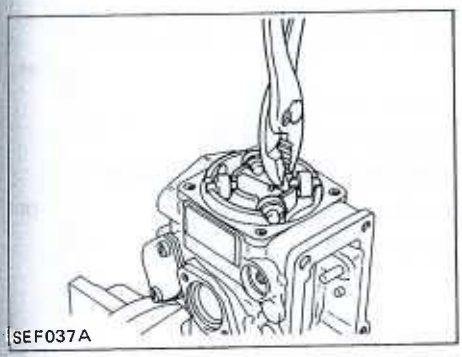
14. Move adjusting pin to center of roller holder, as shown.

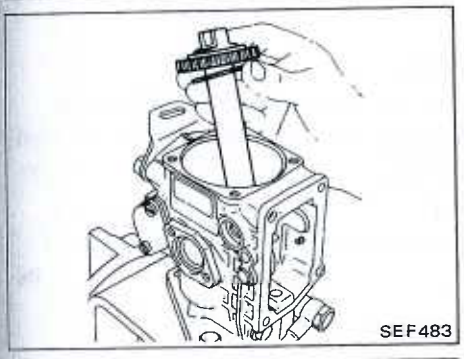


SEF036A

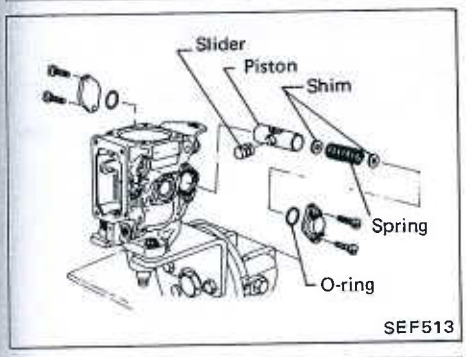
Disassembly (Cont'd)

15. Lift out roller holder with rollers without tilting.
Be careful not to drop rollers.


SEF037A

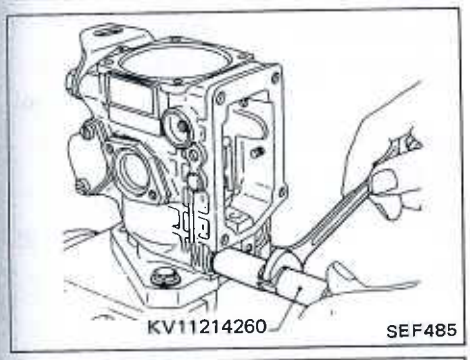

SEF483

16. Remove drive shaft.
a. **Rotate drive shaft until keyway faces the top of injection pump.**
b. **Remove drive gear side key.**
c. **Attach oil seal guide (KV11222090) onto drive shaft to prevent keyway from damaging oil seal.**
d. **Be careful not to scratch inner surface of fuel injection pump body.**
e. **Be careful not to drop the key.**



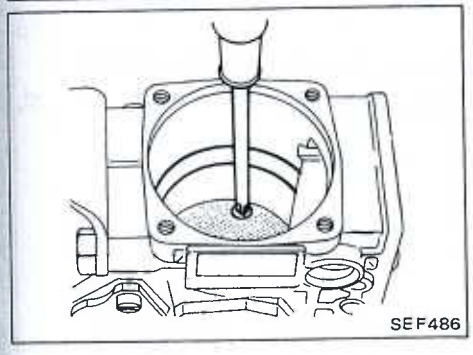
SEF513

17. Remove speed timer cover, O-ring, shims, spring, piston and slider.



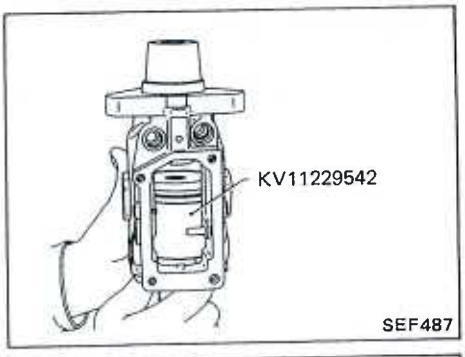
SEF485

18. Remove regulating valve with special service tool.


SEF486

19. Loosen the two screws from feed pump cover.

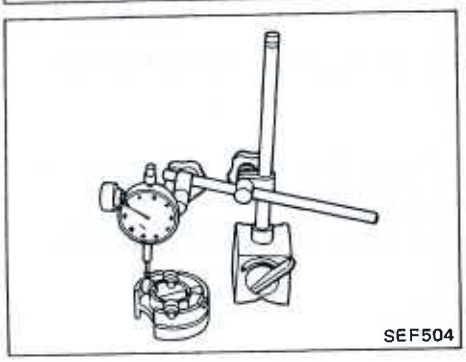
Disassembly (Cont'd)



20. Remove cover and feed pump assembly as a unit.
1) Insert feed pump holder (KV11229542) into fuel injection pump housing.
2) Turn injection pump upside down, as shown.
3) Remove cover and feed pump assembly as a unit.

a. If cover and feed pump assembly are hard to remove or stuck midway, strike the pump body lightly.

b. Do not change positions of vanes.



Inspection

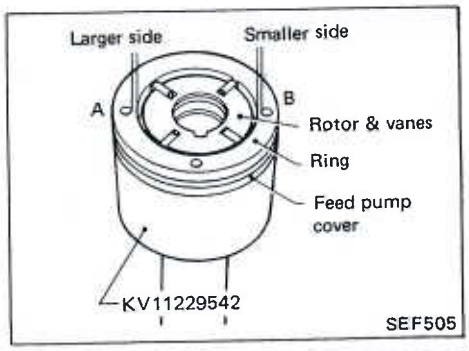
1. Wash all parts completely.
2. Replace worn or damaged parts.
3. Control edge of plunger must be sharp and contact surfaces must not exhibit any noticeable running tracks. If the condition is not good, replace plunger.
4. Check for height of all rollers.

Difference in maximum and minimum roller height should be less than 0.02 mm (0.0008 in).

Assembly

Always replace the following service parts as assembly units.

- Distributor head, control sleeve and plunger
- Feed pump assembly (pump impeller and vanes with eccentric ring)
- Plunger spring kit
- Roller assembly
- Flyweight kit
- Governor lever assembly

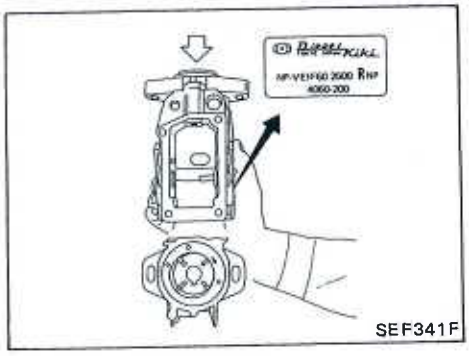


PREPARATION

Dip all movable parts and O-rings in test oil, then clean.

1. Set feed pump cover, rotor with vanes, and ring on Tool (KV11229542).

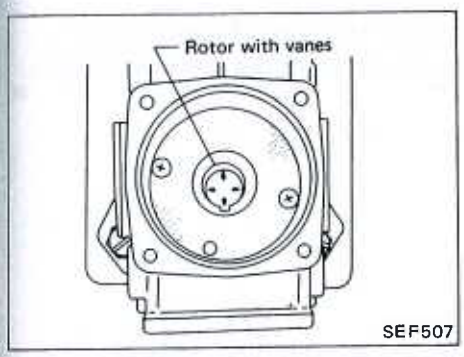
1) Align the three holes in feed pump cover and ring.
2) Do not change positions of vanes.
3) Holes A and B in ring are not equally spaced to inner wall of ring.



2. Install feed pump cover, rotor with vanes, and ring to pump housing.

Be careful to install ring correctly. If left and right are reversed fuel will not be discharged from feed pump.

Assembly (Cont'd)



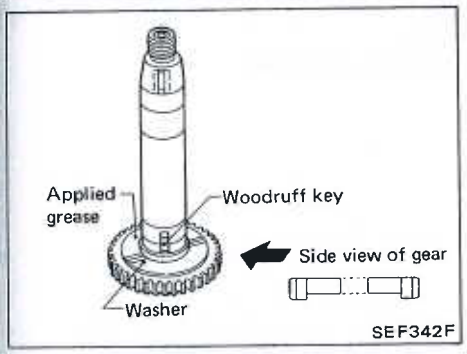
When fuel injection pump rotates in direction "R"

The following description applies to fuel injection pumps that rotate in direction "R".

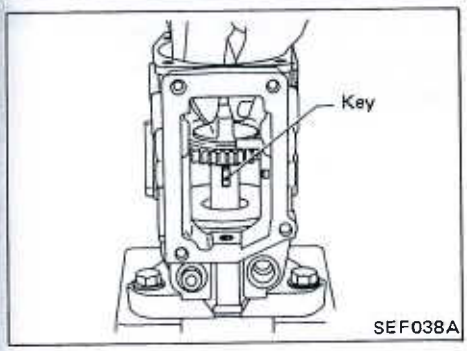
3. Turn fuel injection pump 180°, and remove Tool (KV11229542). Tighten screw to retain pump cover.

a. **When tightening screws, be careful not to scratch inner wall of pump housing.**

b. **After tightening screws, make sure that rotor with vanes moves smoothly.**



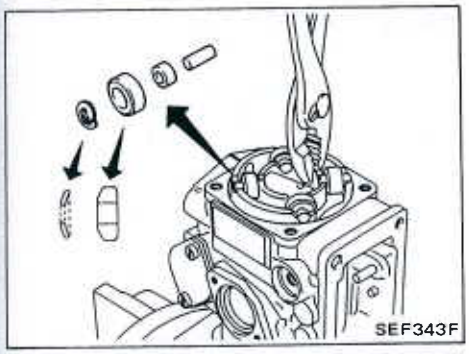
4. Make sure that drive shaft and gear are assembled properly, as shown.



5. Install drive shaft to housing while key in drive shaft engages with key groove in rotor.

a. **Before installing drive shaft, attach oil seal guide (KV11222090) onto drive shaft.**

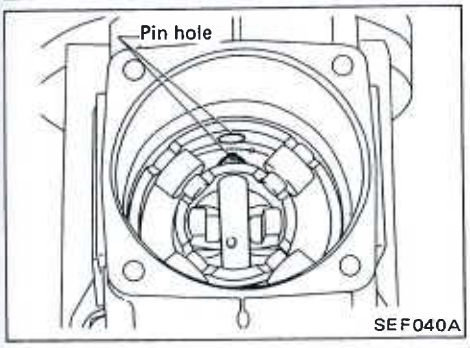
b. **Be careful not to scratch oil seals and inner wall of housing.**



6. Set drive shaft's nail parallel to timer.
7. Install roller and holder.

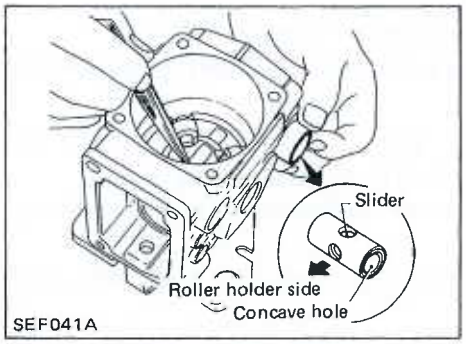
a. **Do not interchange roller positions. If they are interchanged, refer to Inspection for correction.**

b. **Make sure that washer is situated outward of rollers.**

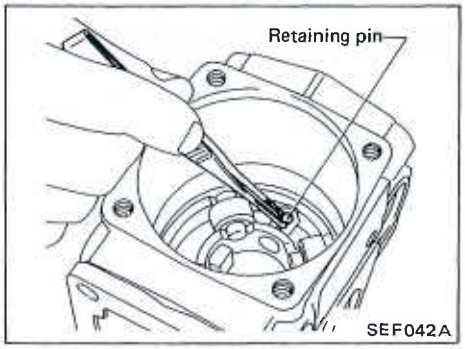


8. Align holder and timer adjusting pin holes.

Assembly (Cont'd)

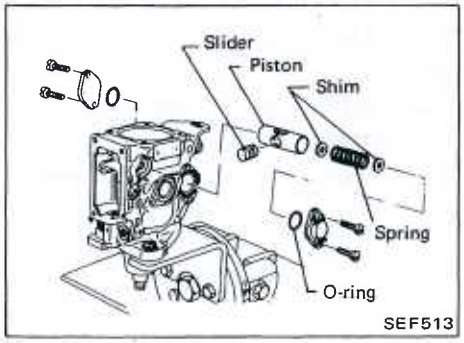


9. Install timer piston and slider as a unit.
   a. **Make sure that hole in slider faces towards roller holder.**
   b. **Make sure that concave hole in piston is on same side as return hole.**

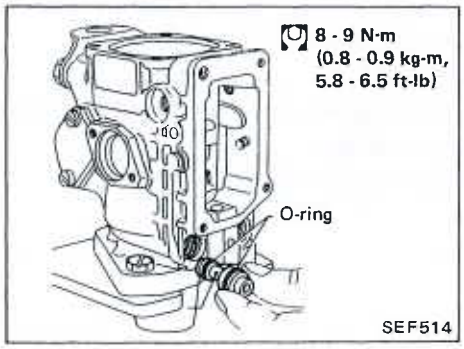


10. Insert timer adjusting pin into timer piston slider, and secure with retaining pin and clip.

Make sure that timer piston moves smoothly.

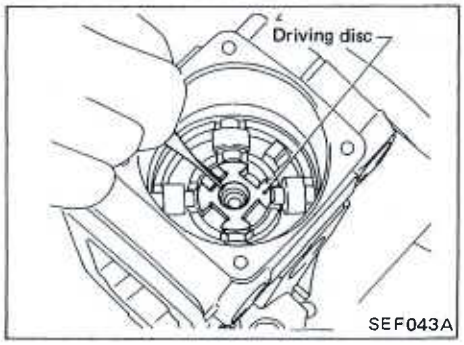


11. Install timer, using a 0.6 mm (0.024 in) thick shim, then install timer spring, shim, O-ring, and cover, in that order.
   a. **Use at at least one shim on each side of timer spring.**
   b. **Use shims that were selected during bench test.**



12. Install regulating valve.

Be careful not to scratch O-rings.



13. Install driving disc with its concave side facing up.

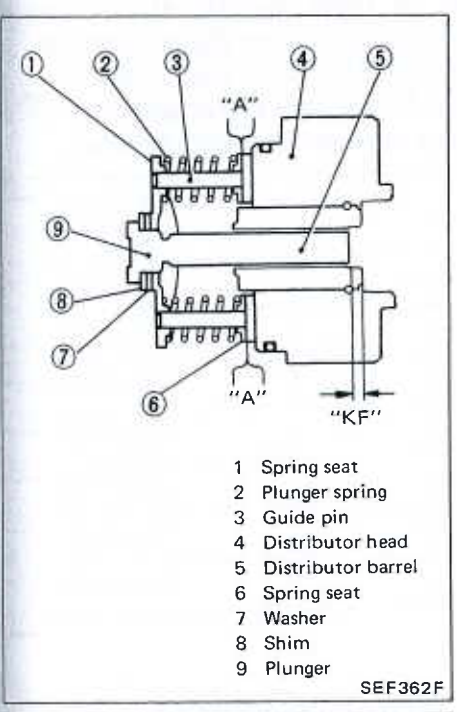
Assembly (Cont'd)

14. Measurement of plunger spring set length (dimension "KF")

Dimension "KF" is the distance between the end face of the distributor barrel and the end face of the plunger.

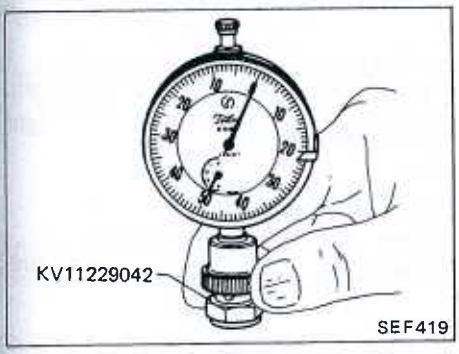
(1) Install distributor head, as shown.

- **Do not insert shim into "A" portion before measuring.**



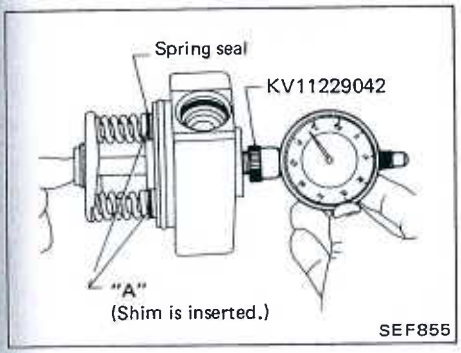
1 Spring seat
2 Plunger spring
3 Guide pin
4 Distributor head
5 Distributor barrel
6 Spring seat
7 Washer
8 Shim
9 Plunger

SEF362F



SEF419

(2) Set dial gauge so that it can compress 0 to 10 mm (0 to 0.39 in), and reset to zero.



SEF855

(3) Apply force (not enough to compress plunger spring) to plunger's bottom in axial direction, and measure dimension "KF" with dial gauge, as shown.

(4) Determine the shim to be used by calculating difference between standard and measured dimensions.

Standard dimension "KF":

5.7 - 5.9 mm (0.224 - 0.232 in)

[Example]

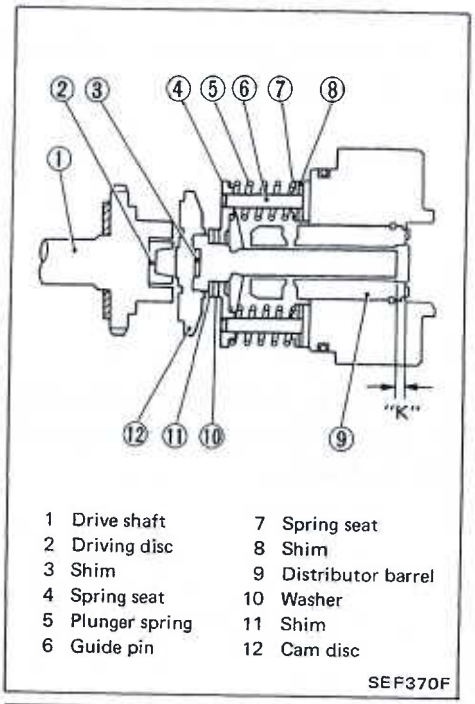
When measured (dial gauge reading) value is 5.2 mm,

5.7 mm – 5.2 mm = 0.5 mm (shim thickness to be used)

Assembly (Cont'd)

a. When there are no shims available of a thickness which matches specified dimensions, use slightly thicker shims.
b. Use selected shim with distributor head in step 14-(3) above.
c. Use the same size shim on each side of distributor head.
d. Shims are available in seven different thicknesses.

Part number	Thickness mm (in)
16882-V0700	0.5 (0.020)
16882-V0701	0.8 (0.031)
16882-V0702	1.0 (0.039)
16882-V0703	1.2 (0.047)
16882-V0704	1.5 (0.059)
16882-V0705	1.8 (0.071)
16882-V0706	2.0 (0.079)



1 Drive shaft
2 Driving disc
3 Shim
4 Spring seat
5 Plunger spring
6 Guide pin
7 Spring seat
8 Shim
9 Distributor barrel
10 Washer
11 Shim
12 Cam disc

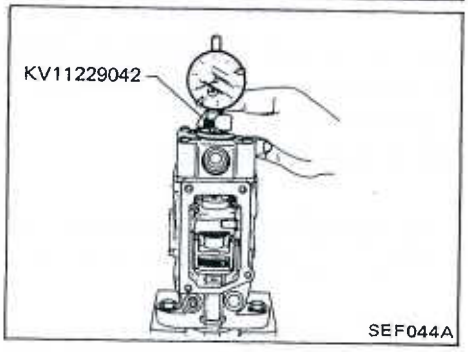
SEF370F

15. Adjustment of plunger dimensions (Measurement of dimension "K")

Dimension "K" is the distance from the end face of the distributor barrel to the end face of the plunger top, when the plunger is at the bottom dead center position.

(1) Install parts as shown.

a. **Do not install "spring" on driving disc.**
b. **When inserting plunger and shim into cam disc, make sure that drive pin is situated in groove at bottom of plunger.**

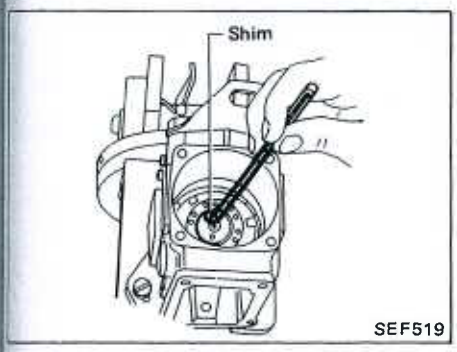


SEF044A

(2) Using a dial gauge, measure dimension as shown.

a. **Rotate drive shaft so that plunger is set at bottom dead center.**
b. **Securely mount distributor head with screws.**

SEF04



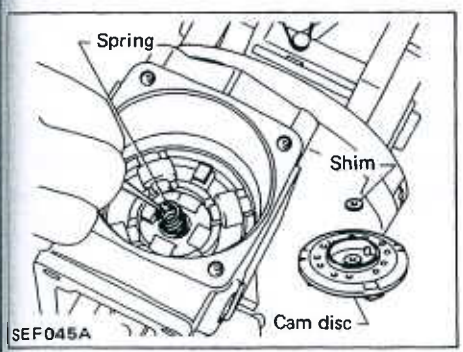
Assembly (Cont'd)

(3) Determine shim to be used by calculating difference between measured (dial gauge reading) value and standard dimension "K", and position that shim on plunger's bottom.

"K" = 3.2 - 3.4 mm
(0.126 - 0.134 in)

a. **When measured value is greater than standard dimension "K", use a thicker shim.**
b. **After shim has been positioned, measure dimension again to ensure that it is correct.**
c. **Shims are available in 25 different thicknesses.**

Part number	Thickness mm (in)	Part number	Thickness mm (in)
16884-V0700	1.92 (0.0756)	16742-R8100	1.96 (0.0772)
16884-V0701	2.00 (0.0787)	16742-R8101	2.04 (0.0803)
16884-V0702	2.08 (0.0819)	16742-R8102	2.12 (0.0835)
16884-V0703	2.16 (0.0850)	16742-R8103	2.20 (0.0866)
16884-V0704	2.24 (0.0882)	16742-R8104	2.28 (0.0898)
16884-V0705	2.32 (0.0913)	16742-R8105	2.36 (0.0929)
16884-V0706	2.40 (0.0945)	16742-R8106	2.44 (0.0961)
16884-V0707	2.48 (0.0976)	16742-R8107	2.52 (0.0992)
16884-V0708	2.56 (0.1008)	16742-R8108	2.60 (0.1024)
16884-V0709	2.64 (0.1039)	16742-R8109	2.68 (0.1055)
16884-V0710	2.72 (0.1071)	16742-R8110	2.76 (0.1087)
16884-V0711	2.80 (0.1102)	16742-R8111	2.84 (0.1118)
16884-V0712	2.88 (0.1134)		



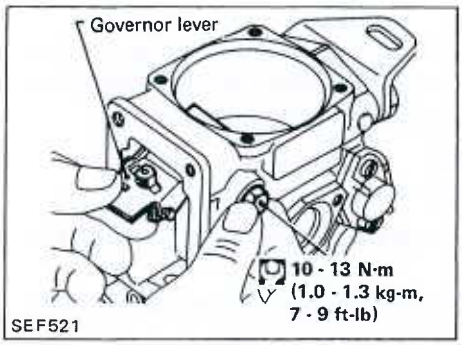
16. Install spring in top of driving disc, then install cam disc and shim.

Make sure cam disc drive pin and drive shaft key way face upwards.

Assembly (Cont'd)

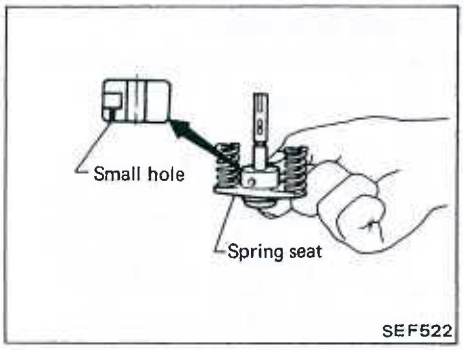
17. Install governor lever.

Avoid pulling on start spring and start idle spring.

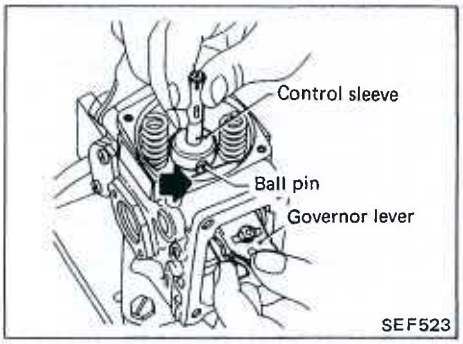


18. Install plunger assembly.

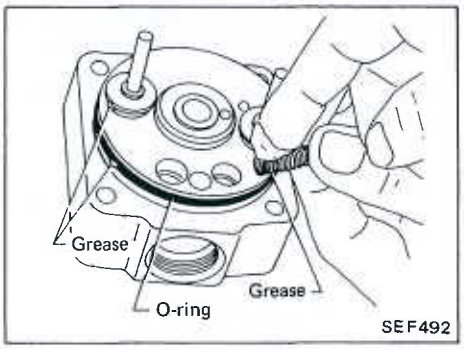
a. **Make sure control sleeve is installed with its small hole facing spring seat side.**



b. **Insert ball pin for governor lever into hole in control sleeve (shown by arrow).**

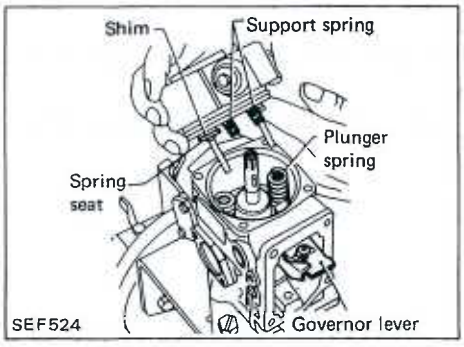


19. Apply a coat of grease to guide pin, shim and spring seat, and attach these parts to distributor head.



20. Install distributor head.

a. **Always face support spring toward governor lever.**
b. **Be careful not to drop spring.**
c. **Make sure that ball pin for governor lever is inserted properly into hole in control sleeve.**
d. **After installing distributor head, make sure that plunger spring is at guide pin in spring seat.**

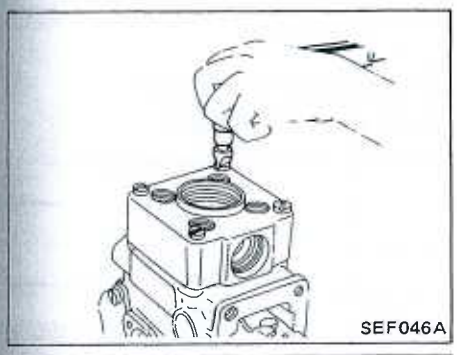


Assembly (Cont'd)

21. Tighten distributor head.

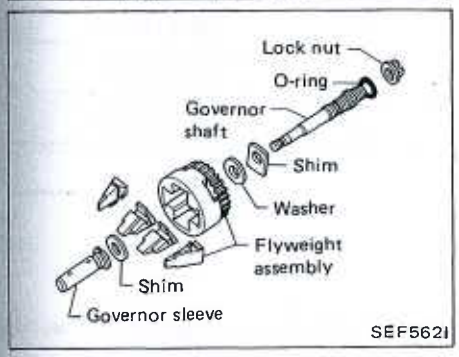
Distributor head bolts:

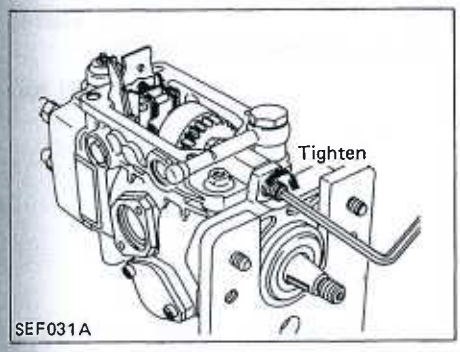
(O) : 10 - 14 N·m (1.0 - 1.4 kg-m, 7 - 10 ft-lb)



22. Attach flyweight assembly.

When installing governor shaft, be careful not to scratch O-rings.





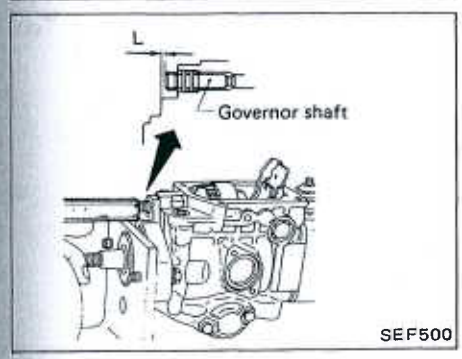
23. Adjust dimension "L".

"L":

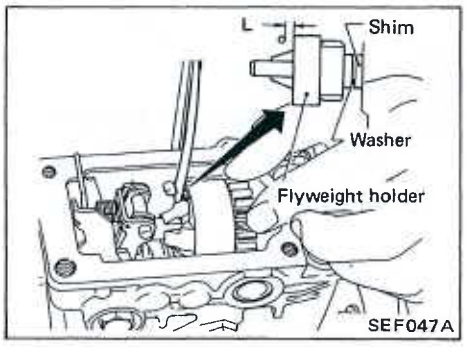
1.5 - 2.0 mm (0.059 - 0.079 in)

Lock nut:

(O) : 17 - 22 N·m (1.7 - 2.2 kg-m, 12 - 16 ft-lb)



Assembly (Cont'd)



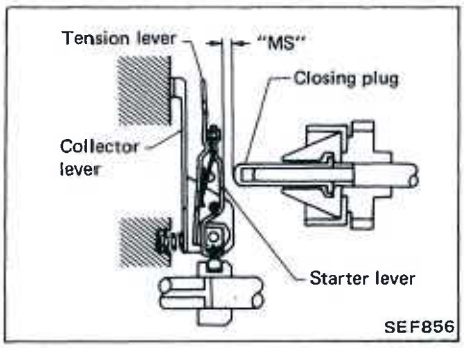
24. Measure axial play of flyweight holder. If it is not within specified range, adjust it by means of shims.

"L":

0.15 - 0.35 mm (0.0059 - 0.0138 in)

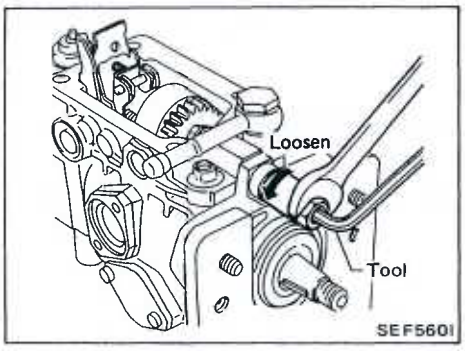
Shims are available in 5 different thicknesses.

Part number	Thickness mm (in)
19208-V0700	1.05 (0.0413)
19208-V0701	1.25 (0.0492)
19208-V0702	1.45 (0.0571)
19208-V0703	1.65 (0.0650)
19208-V0704	1.85 (0.0728)

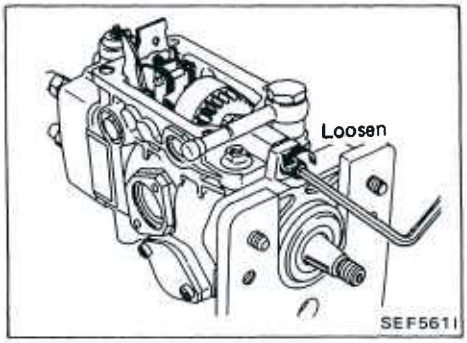


25. Measurement of dimension "MS" (for determining starting amount of fuel injection)

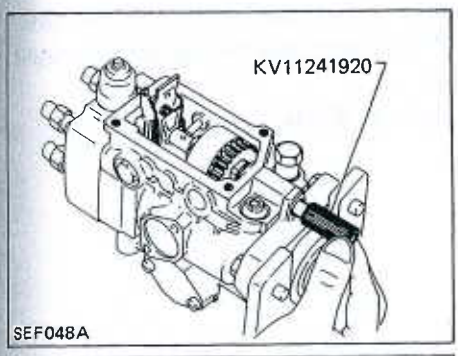
Dimensions "MS" is the distance between closing plug and start lever.



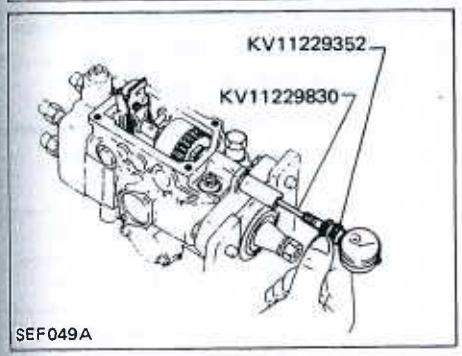
(1) Remove lock nut and governor shaft with Tool (KV11215842).



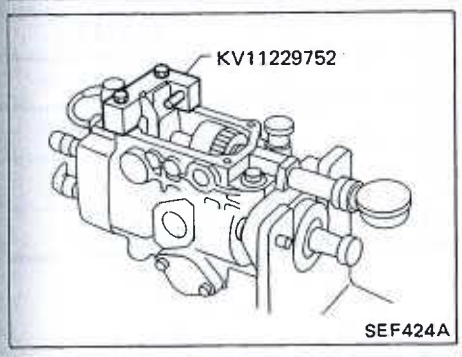
Assembly (Cont'd)



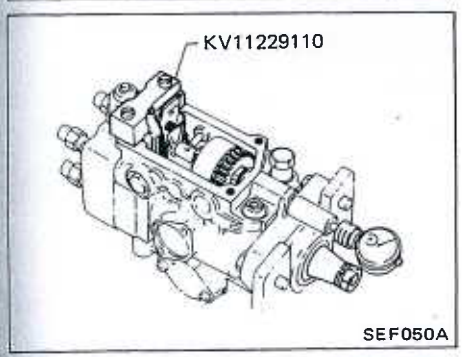
(2) Install special service tool (dummy shaft) at governor shaft position.



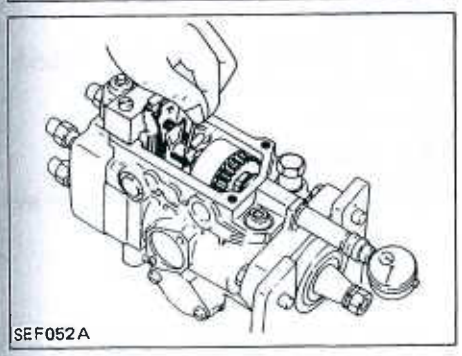
(3) Install special service tool (dial gauge) with rod.



(4) Install special service tool (block gauge) to pump housing.
KV11229752 is for pump with high altitude compensator.

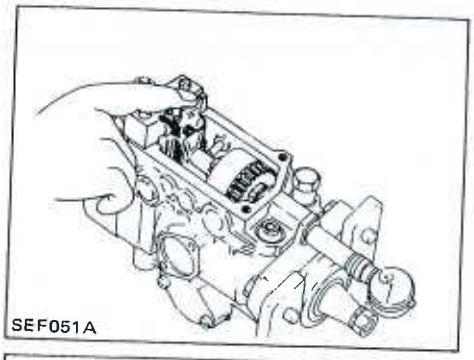


KV11229110 is for pump without high altitude compensator.



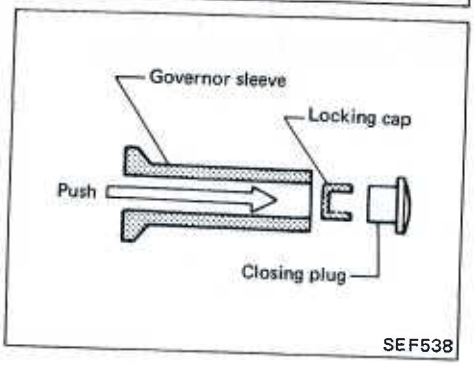
(5) Push governor sleeve against flyweight. Hold governor sleeve in that position and set dial gauge to zero.

Assembly (Cont'd)


SEF051A

(6) Push tension lever until it touches stopper pin. Back governor sleeve up until start lever touches tension lever. At this point read dial gauge.

MS: Refer to S.D.S.

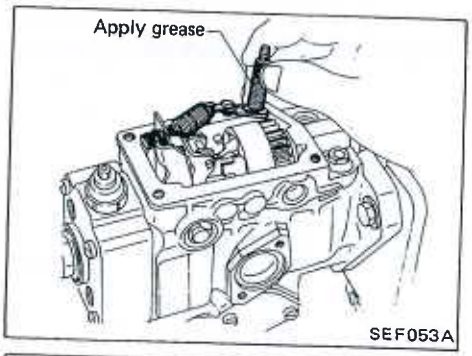


SEF538

(7) If dial gauge indication is not within this range, replace closing plug and adjust dimension "MS" to that range.

Closing plugs are available in 8 different lengths.

Part number	Length mm (in)
16268-R8100	3.10 (0.1220)
16268-R8101	3.30 (0.1299)
16268-R8102	3.50 (0.1378)
16268-R8103	3.70 (0.1457)
16268-R8104	3.90 (0.1535)
16268-R8105	4.10 (0.1614)
16268-R8106	4.30 (0.1693)
16268-R8107	4.50 (0.1772)

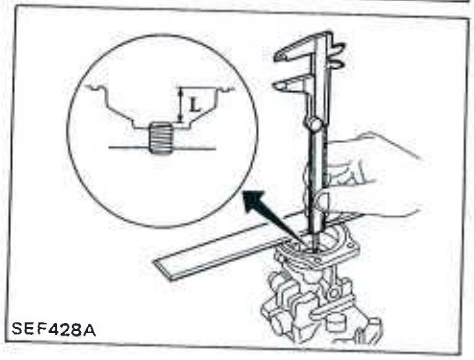


SEF053A

26. Install control lever shaft.

Apply a coat of grease to lever shaft end.

27. Install governor cover.



SEF428A

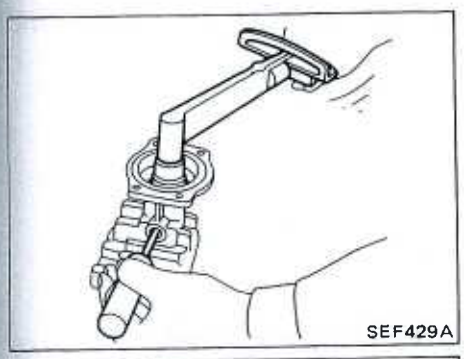
With high altitude compensator

(1) Position adjusting rod bushing so that its height above upper surface of governor cover is within specified range.

L = 20.5 ± 0.5 mm (0.807 ± 0.020 in)

Ensure that holes in adjusting rod bushing and governor cover are aligned properly.

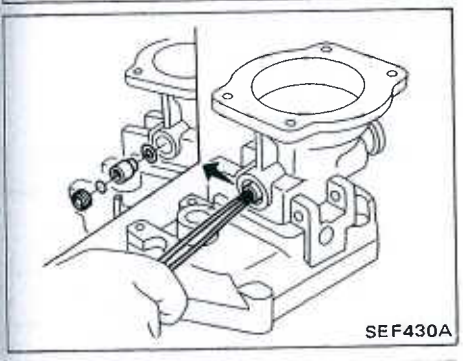
Assembly (Cont'd)



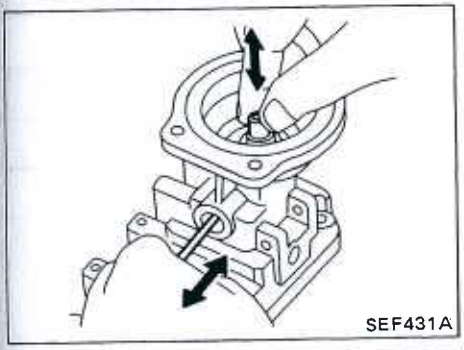
(2) Install adjusting rod.
(3) Install washer and nut.
(4) Tighten nut.

Ⓣ : **Adjusting rod bushing lock nut**
25 - 34 N·m (2.5- 3.5 kg-m, 18 - 25 ft-lb)

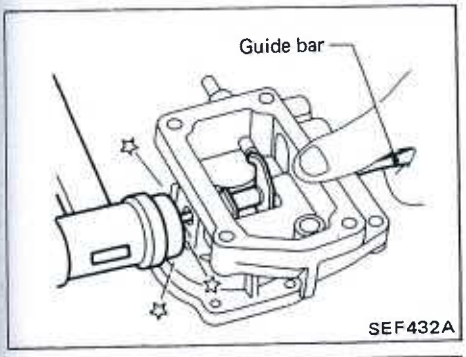
a. **Prevent adjusting rod bushing from rotating by locking its nut.**
b. **If nut and bushing rotate together, bushing height above upper surface of governor cover is insufficient.**



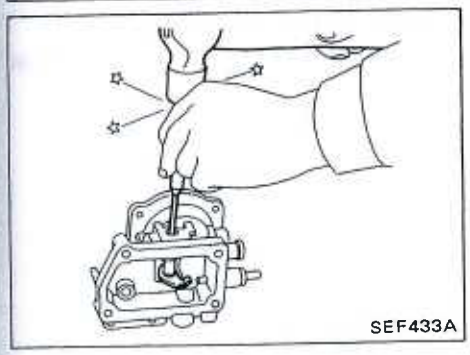
(5) Install washer, sleeve and retainer.



(6) Install pin.
Ensure that pin moves smoothly when adjusting rod is moved up or down.

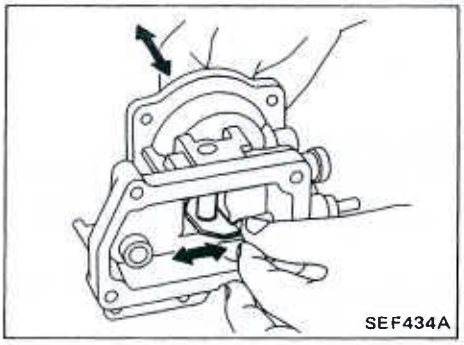


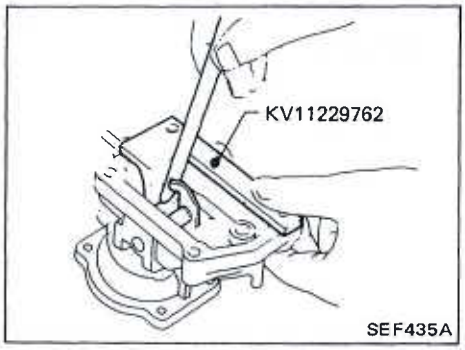
(7) Install lever.
Use a suitable bar as a guide to properly install lever.



Assembly (Cont'd)

Ensure that lever moves smoothly when adjusting rod is moved up or down.


SEF434A



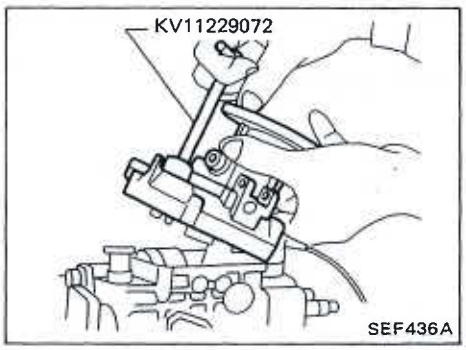
SEF435A

(8) Check clearance between block gauge and lever.
If not within specifications, change the pin.

Clearance:
0.1 mm (0.004 in)

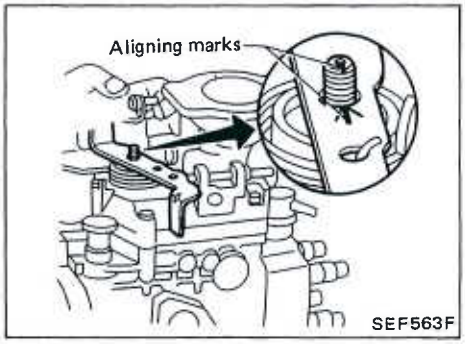
Pin

Part number	Length mm (in)
19276-02N00	24.6 (0.969)
19276-02N01	24.8 (0.976)
19276-02N02	25.0 (0.984)
19276-02N03	25.2 (0.992)
19276-02N04	25.4 (1.000)



SEF436A

(9) Install governor cover.

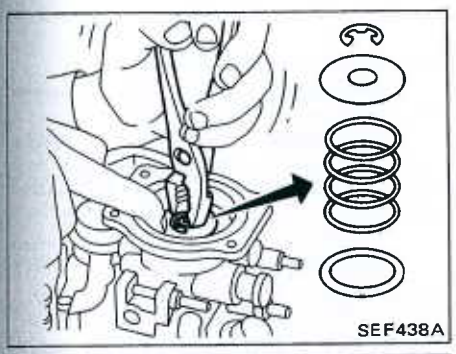


SEF563F

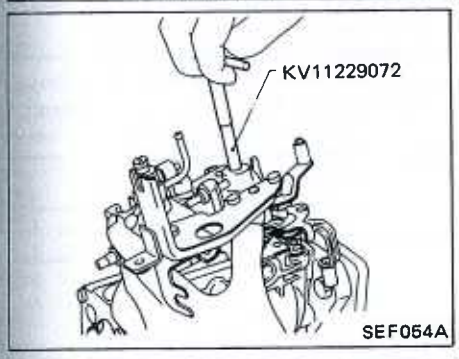
(10) Install control lever.
Align aligning marks of speed control lever and control lever shaft.

Assembly (Cont'd)

(11) Install spring seat, spring and E-ring.
(12) Install adjusting shim and bellows.
(13) Install compensator cover.

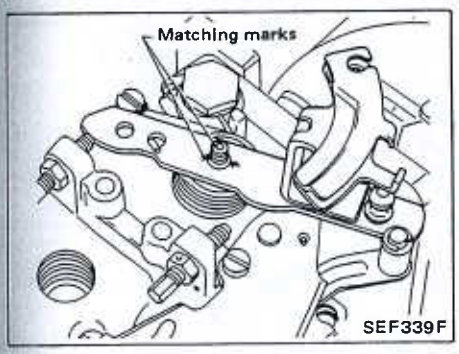

SEF438A

Without high altitude compensator
(1) Install pump governor cover.



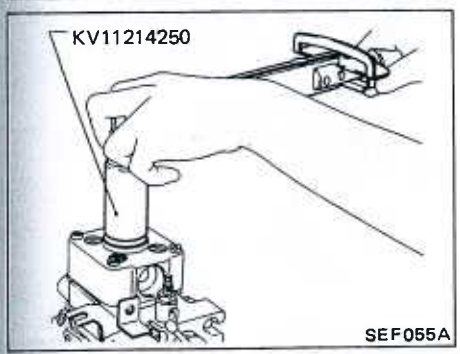
SEF054A

(2) Install speed control lever assembly.
Align aligning marks of speed control lever and control lever shaft.



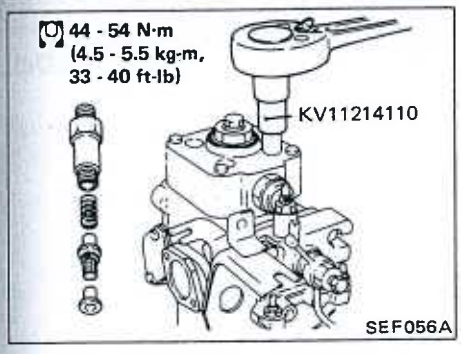
SEF339F

28. Install plug with new O-ring.
Always replace plug with a new one.
Plug:
[O] : 59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)
29. Install plug bolt with a new gasket.



SEF055A

30. Install fuel cut solenoid valve.
31. Install delivery valve.
a. **Always use new washers.**
b. **Make sure that delivery valve is reinstalled in its original position.**



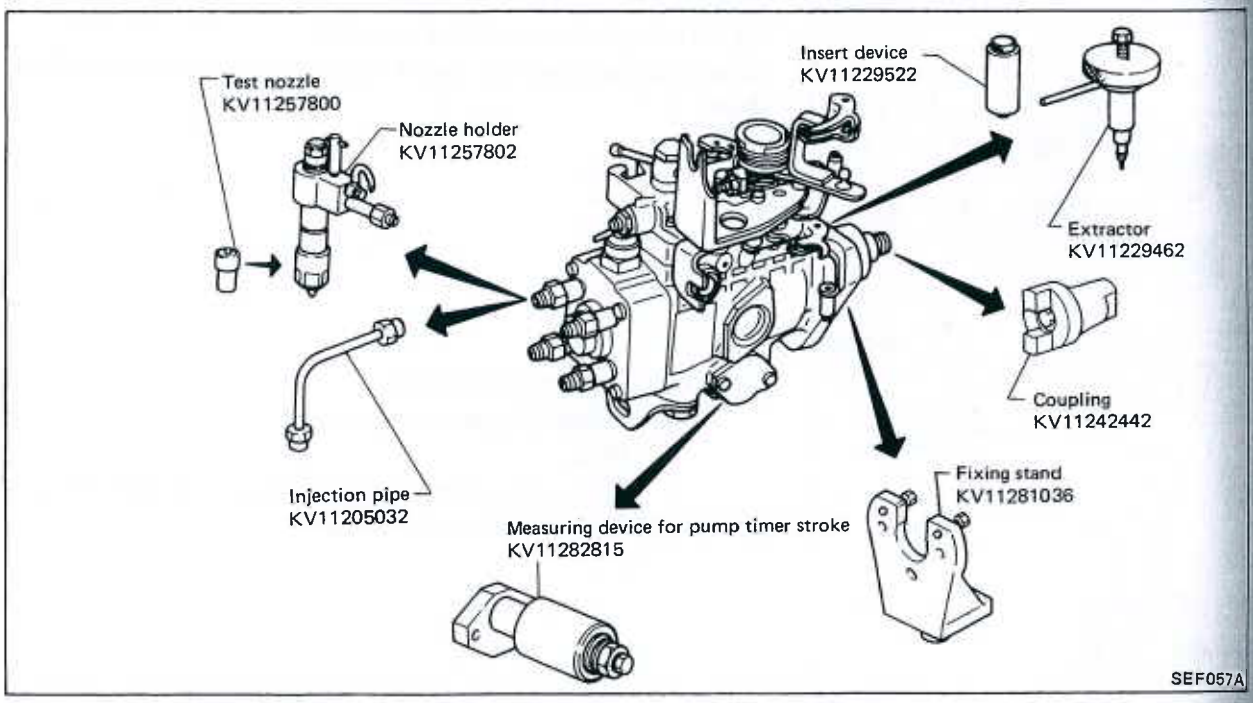
SEF056A

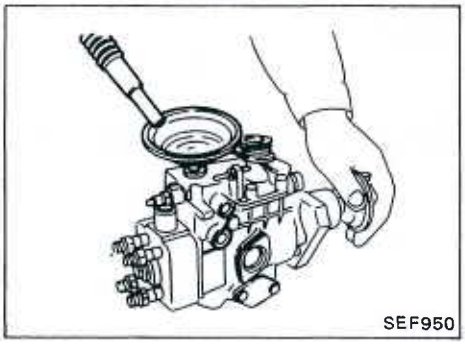
Test

PREPARATION

Nozzle		KV11257800
Nozzle holder		KV11257802
Nozzle starting pressure	kPa (bar, kg/cm^2, psi)	14,711 - 15,201 (147.1 - 152.0, 150 - 155, 2,133 - 2,204)
Nozzle tube Inner dia. x outer dia. x length	mm (in)	KV11205032 2.0 x 6.0 x 840 (0.079 x 0.236 x 33.07)
Fuel feed pressure	kPa (bar, kg/cm^2, psi)	20 (0.20, 0.2, 2.8)
Fuel (test oil)		ISO 4113 or SAE Standard Test Oil (SAE J967d)
Fuel temperature	°C (°F)	45 - 50 (113 - 122)
Rotating direction		Right (observed from the drive shaft)
Injection sequence		1-3-4-2

1. Prepare necessary service tools.

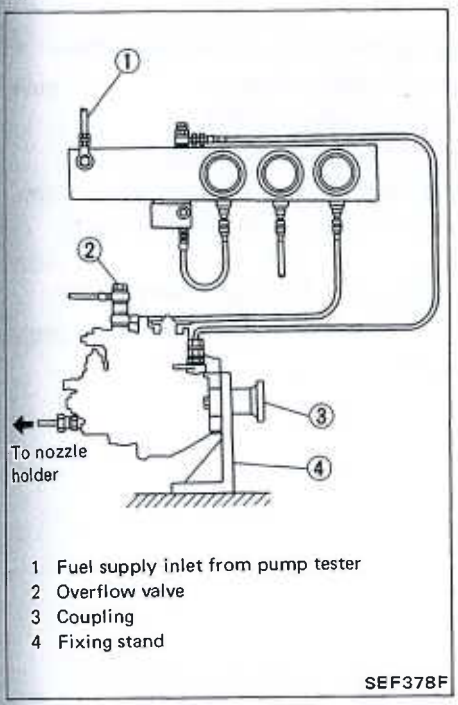




2. Pour test oil into fuel injection pump.
Test oil should be ISO 4113, SAE Standard Test Oil (SAE J967d) or its equivalent.

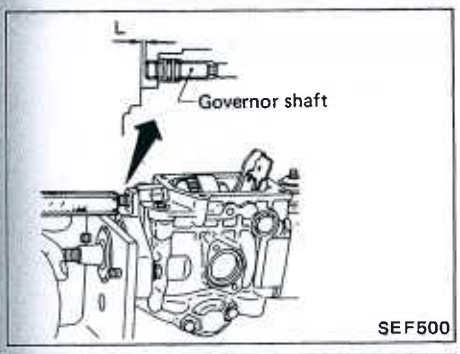
Test (Cont'd)

3. Install fuel injection pump to pump tester.
4. Connect necessary piping.



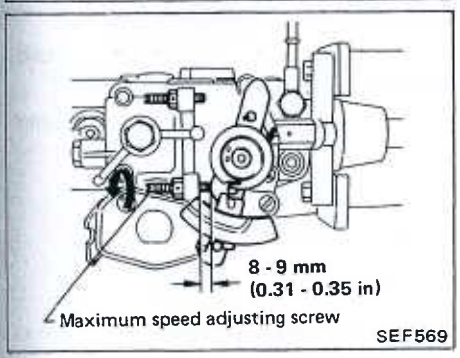
1 Fuel supply inlet from pump tester
2 Overflow valve
3 Coupling
4 Fixing stand

SEF378F



SEF500

5. Make sure that governor shaft is properly installed.
   Adjust dimension "L".
   "L":
   1.5 - 2.0 mm (0.059 - 0.079 in)
   Governor shaft lock nut:
   : 17 - 22 N·m (1.7 - 2.2 kg-m, 12 - 16 ft-lb)



SEF569

6. Run fuel injection pump as follows:
(1) Maintain test oil in tank at 45 to 50°C (113 to 122°F).
(2) Set control lever at "full speed" using a spring.
Set maximum speed adjusting screw in position shown, by turning it counterclockwise.
(3) Furnish specified voltage of 12 volts to fuel-cut solenoid valve to activate it.
(4) Rotate fuel injection pump by hand to see if it moves smoothly.
(5) Rotate fuel injection pump at 300 rpm to make sure that all air inside pump chamber is discharged through overflow valve.
(6) Set feed oil pressure at 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi).
(7) Run fuel injection pump at 1,000 rpm for ten minutes.
If fuel leakage, fuel injection failure or unusual noise is noticed, immediately stop pump tester operation and check fuel injection pump for abnormalities.

Test (Cont'd)

ADJUSTMENT

Preadjust full-load delivery

If equipped with high altitude compensator, remove high altitude compensator cover, bellows and adjusting shim.

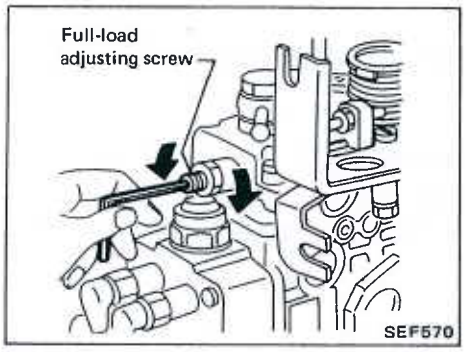
1. Set control lever at "full speed" using a spring.

Set maximum speed adjusting screw in position shown, by turning it counterclockwise. Refer to step 6-(2) in Preparation.

2. Furnish specified voltage of 12 volts to activate fuel-cut solenoid valve.
3. Rotate fuel injection pump at 1,100 rpm, and measure amount of fuel injection.

Standard fuel injection:

Refer to S.D.S.



4. If fuel injection is less than standard, adjust it with full-load adjusting screw.

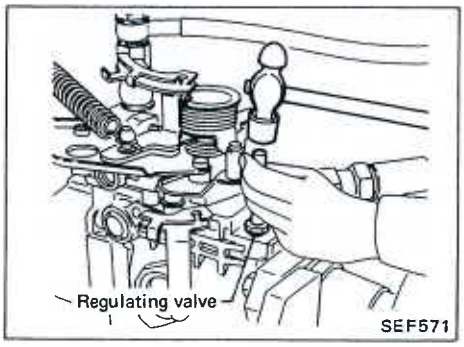
Turn adjusting screw clockwise to increase fuel injection.

Adjustment of feed pump pressure

1. Repeat steps 1 and 2 outlined under "Preadjust Full-Load Delivery" heading.
2. Measure feed pump pressure at specified fuel injection pump rpm.

Standard fuel injection:

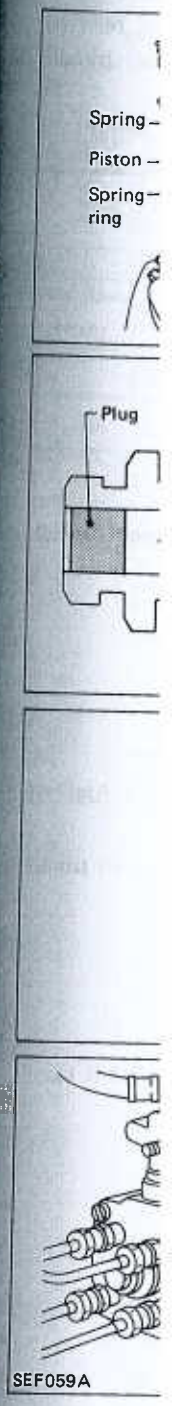
Refer to S.D.S.



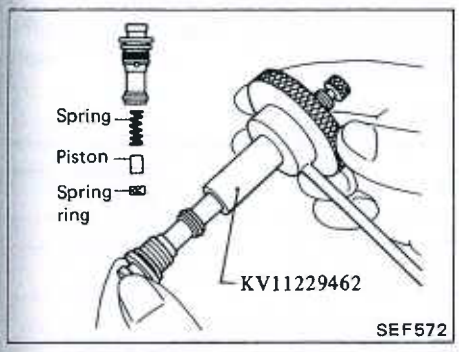
a. When measured pressure is lower than specifications.

Push in plug that is driven into regulating valve body.

Be careful not to push plug in too far.

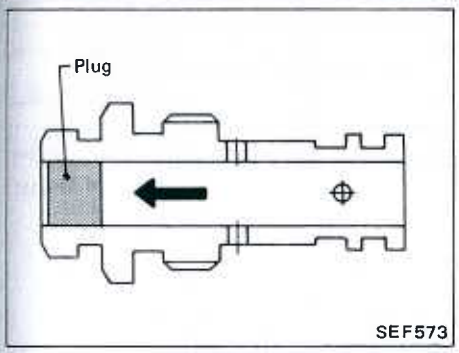


Test (Cont'd)



b. When measured pressure is higher than specifications.

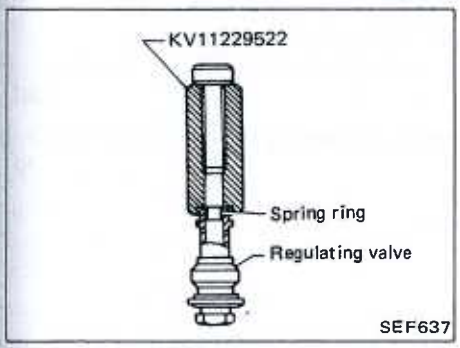
Remove regulating valve from fuel injection pump, and disassemble regulating valve using Tool (KV11229462).



Drive plug out until it is flush with end face of regulating valve.

Install spring, piston and spring ring, in that order, to regulating valve.

Make sure that spring ring is flush with end face of regulating valve body when it is pushed in.

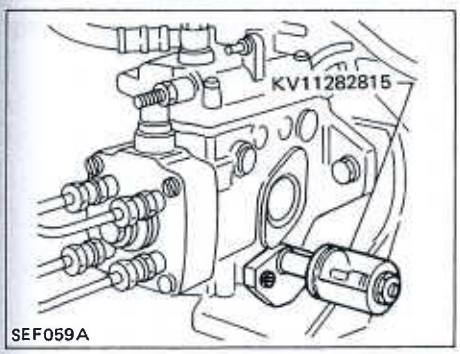


Attach regulating valve to fuel injection pump.

Regulating valve:

: 10 - 13 N·m (1.0 - 1.3 kg-m, 7 - 9 ft-lb)

Adjust supply pump pressure to specifications. Refer to step 2-a.



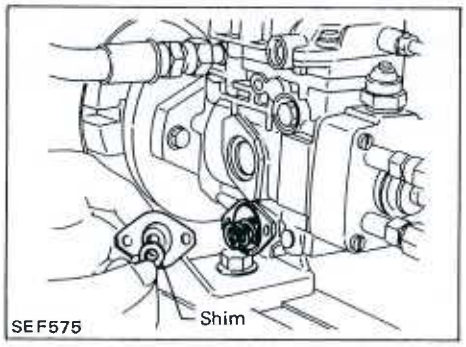
Adjustment of speed timer

1. Repeat steps 1 and 2 outlined under "Preadjust Full-Load Delivery" heading.
2. Remove cover from high-pressure side (side without spring) of timer, and attach Tool (KV11282815) to that side.
3. Measure timer piston strokes at specified fuel injection pump rpm indicated below.

Standard fuel injection:

Refer to S.D.S.

Test (Cont'd)



4. If timer piston stroke is not within specified range, remove cover from low-pressure side of timer and adjust piston stroke by adding shim(s).

a. Shims (service parts)

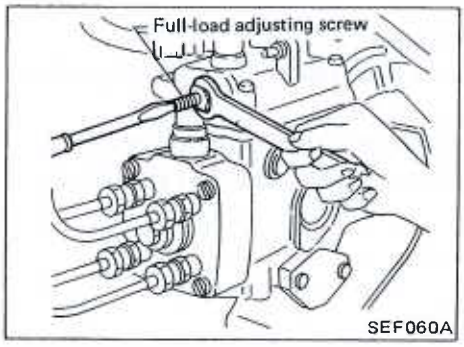
Part number	Thickness mm (in)
16880-V0700	0.6 (0.024)
16880-V0701	0.7 (0.028)
16880-V0702	0.9 (0.035)
16880-V0703	1.0 (0.039)
16880-V0704	1.2 (0.047)

b. Make sure that at least one shim is used on each side of timer spring.

Adjustment of fuel injection under full-load

1. Set control lever at "full speed" using a spring.
2. Furnish specified voltage of 12 volts to activate fuel-cut solenoid valve.
3. Measure fuel injection at each specified fuel injection pump rpm.

Standard fuel injection:
Refer to S.D.S.



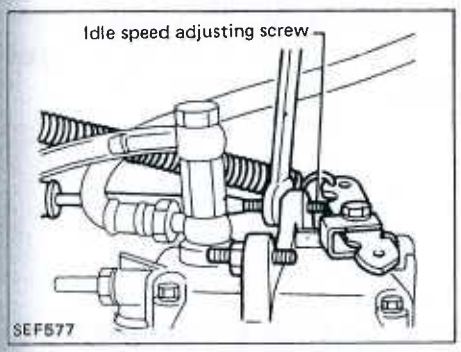
4. If fuel injection is not within standard range, adjust it using full-load adjusting screw.

Adjustment of fuel injection during idle

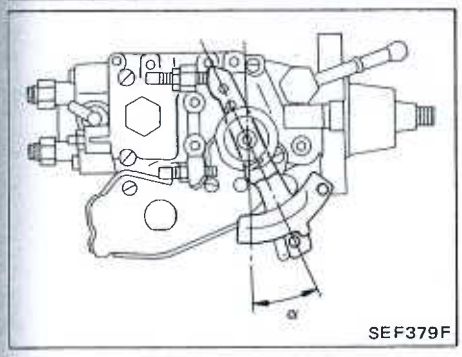
1. Pull spring until control lever touches idle speed adjusting screw.
2. Furnish specified voltage of 12 volts to activate fuel-cut solenoid valve.
3. Measure fuel injection at specified fuel injection pump rpm.

Standard fuel injection:
Refer to S.D.S.

Test (Cont'd)



4. If fuel injection is not within specified range, adjust using idle speed adjusting screw.



a. **Tightening this screw will increase fuel injection amount.**
b. **Make sure that control lever angle (α) is set at the specified range.**

   α: **Refer to S.D.S.**

   If control lever angle is not within specified range, adjust it by repositioning control lever on control shaft. (One serration pitch: 15°)

   After control lever has been repositioned, be sure to measure amount of fuel injection at idle speed again.

Adjustment of fuel injection during start

1. Set control lever at "full speed" by pulling spring.
2. Furnish specified voltage of 12 volts to activate fuel-cut solenoid valve.
3. Measure fuel injection at specified fuel injection pump rpm.

Standard fuel injection:

Refer to S.D.S.

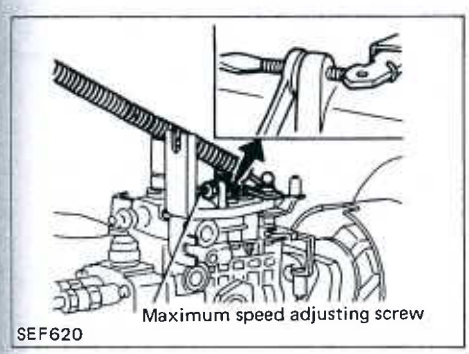
4. If fuel injection is lower than standard, check, "MS" dimension. Refer to step 25 for Injection Pump Assembly.

Adjustment of fuel injection at maximum pump rpm

1. Set control lever at "full speed" by pulling spring.
2. Furnish specified voltage of 12 volts to activate fuel-cut solenoid valve.
3. Measure fuel injection at specified fuel injection rpm.

Standard fuel injection:

Refer to S.D.S.



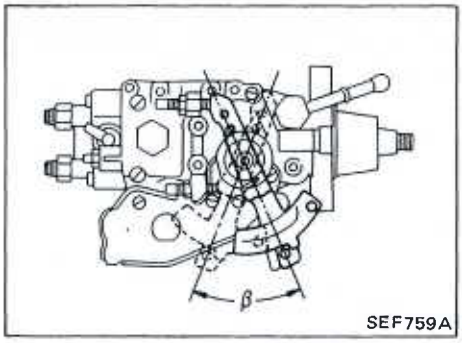
4. If fuel injection is not within standard range, adjust using maximum speed adjusting screw.

Test (Cont'd)

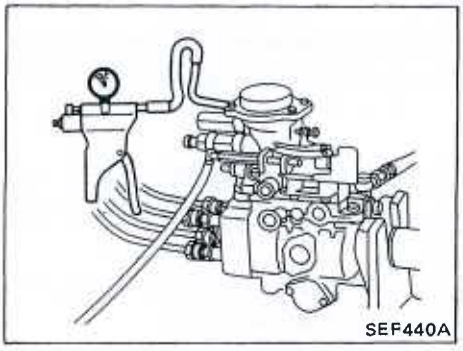
a. Tightening screw will decrease fuel injection.

b. Make sure that control lever angle (β) is within the specified range.

β: Refer to S.D.S.



SEF759A



SEF440A

ADJUSTMENT OF HIGH ALTITUDE COMPENSATOR

1. Install bellows and adjusting shim.
2. Install a vacuum pump.

Check that there is no vacuum leakage.

3. Measure fuel injection volume.

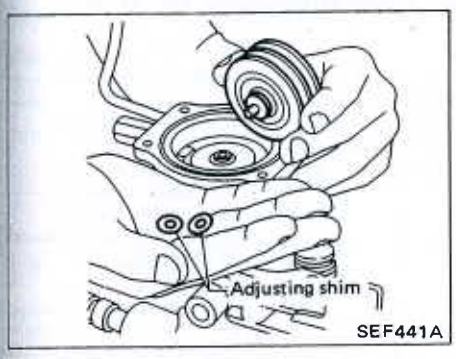
1) Below 2,000 m (6,562 ft)

Item \ Altitude m (ft)	0 (0)	250 (820)	500 (1,641)	750 (2,461)	1,000 (3,281)	1,250 (4,101)	1,500 (4,922)	1,750 (5,742)	2,000 (6,562)
Applied vacuum kPa (mbar, mmHg, inHg)	21.2 - 22.5 (212 - 225, 159 - 169, 6.26 - 6.65)	18.3 - 19.6 (183 - 196, 137 - 147, 5.39 - 5.79)	15.3 - 16.7 (153 - 167, 115 - 125, 4.53 - 4.92)	12.4 - 13.7 (124 - 137, 93 - 103, 3.66 - 4.06)	9.5 - 10.8 (95 - 108, 71 - 81, 2.80 - 3.19)	6.9 - 8.3 (69 - 83, 52 - 62, 2.05 - 2.44)	4.4 - 5.7 (44 - 57, 33 - 43, 1.30 - 1.69)	1.9 - 3.2 (19 - 32, 14 - 24, 0.55 - 0.94)	0 (0, 0, 0)
Fuel injection pump rpm	1,000								
Standard fuel injection mℓ (Imp fl oz)/ 1,000 stroke	29.4 - 33.4 (1.03 - 1.18)								

2) Above 2,000 m (6,562 ft)

Item \ Altitude m (ft)	2,250 (7,382)	2,500 (8,203)	2,750 (9,023)	3,000 (9,843)	3,250 (10,663)	3,500 (11,484)	3,750 (12,304)	4,000 (13,124)
Fuel injection pump rpm	1,000							
Standard fuel injection mℓ (Imp fl oz)/1,000 stroke	28.4 - 32.5 (1.00 - 1.14)	27.4 - 31.5 (0.96 - 1.11)	26.5 - 30.5 (0.93 - 1.07)	25.5 - 29.6 (0.90 - 1.04)	24.5 - 28.6 (0.86 - 1.01)	23.6 - 27.6 (0.83 - 0.97)	22.7 - 26.7 (0.80 - 0.94)	21.7 - 25.7 (0.76 - 0.90)

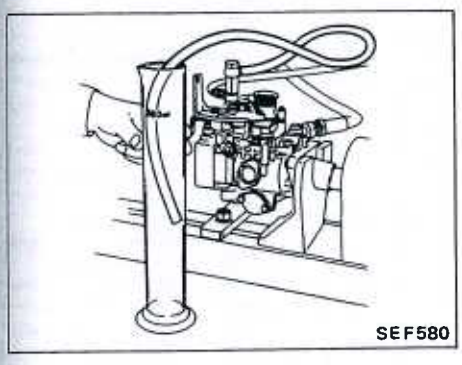
Test (Cont'd)



4. If fuel injection is not within the standard range, increase or decrease the adjusting shims.

Shims (Service parts)

Part number	Thickness mm (in)
19275-W3300	0.2 (0.008)
19275-W3301	0.3 (0.012)
19275-W3302	0.4 (0.016)
19275-W3303	0.7 (0.028)
19275-W3304	1.0 (0.039)



Measurement of overflow amount

1. Set control lever at "full speed" by pulling spring.
2. Furnish specified voltage of 12 volts to activate fuel cut solenoid valve.
3. Measure fuel overflow at specified fuel injection rpm.

Fuel overflow:

43 - 87 mℓ

(1.51 - 3.06 Imp fl oz)/10 sec. at 1,100 rpm

Operation check of fuel-cut solenoid valve

When engine is idling and fuel cut solenoid valve current is OFF, be sure there is no injection. This check has to be done for approx. 5 seconds.

Service Data and Specifications (S.D.S.)

APPLICATION

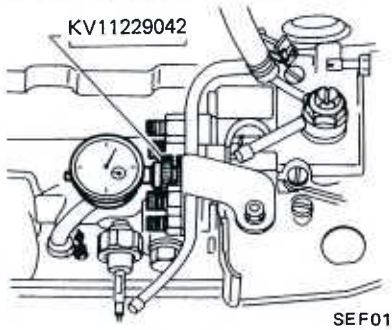
Engine	Destination	Part No.	Pump assembly No.	Applied model				Remarks
				Y31	D21	E24	F22	
TD23	General areas	16700-35V07	104740-7340	○	–	–	–	For standard models
		16700-35V05	104740-9743					For Hong Kong, Singapore and tropical areas
		16700-35V06	104740-9753					With high altitude compensator
		16700-21T09	104740-9821	–	–	–	○	For standard models
		16700-21T10	104740-9831					For cold areas
		16700-21T11	104740-9841					With high altitude compensator
TD25	Australia, General areas	16700-44G03	104740-9622	–	○	–	–	For standard models
	Europe, General areas	16700-44G04	104740-9632					For cold areas
	General areas	16700-44G05	104740-9642					With high altitude compensator
	Europe	16700-44G06	104740-7180					With load timer
	General areas	16700-30N04	104740-7200	–	–	○	○	For standard models
	Europe, General areas	16700-30N05	104740-7210	–	–	○	–	For cold areas, M/T
	General areas	16700-30N06	104740-7220	–	–	○	○	With high altitude compensator
	West Germany, Austria	16700-30N07	104740-7230	–	–	○	–	M/T
	Europe	16700-30N08	104740-7240					A/T
	Switzerland	16700-30N09	104740-7310					M/T
	Europe, General areas	16700-21T12	104740-9782	–	–	–	○	For cold areas
	Europe	16700-21T13	104740-7260					With load timer
	Switzerland	16700-21T14	104740-7320					
TD27	Australia, General areas	16700-43G13	104740-9562	–	○	–	–	For standard models
	General areas	16700-43G16	104740-9592					For cold areas
	General areas	16700-43G14	104740-9572					With high altitude compensator
	Australia	16700-03T04	104740-9471	–	–	○	–	M/T
		16700-11T18	104740-9422					A/T
	Australia	16700-22T04	104740-9881	–	–	–	○	M/T
TD27T	Europe	16700-80G07	104740-7111	–	○	–	–	

Service Data and Specifications (S.D.S.) (Cont'd)

INSPECTION AND ADJUSTMENT

Injection timing

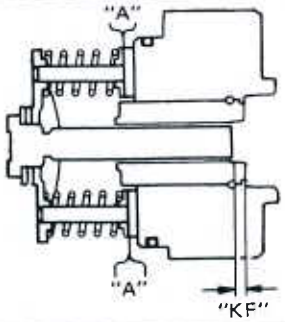
Engine	Plunger lift mm (in)
TD23	0.54±0.02 (0.0213±0.0008) (equivalent to 5° B.T.D.C.)
TD25	0.71±0.02 (0.0280±0.0008) (equivalent to 6° B.T.D.C.)
TD27	0.65±0.02 (0.0256±0.0008) (equivalent to 5° B.T.D.C.) ... Except D21 double cab model 0.49±0.02 (0.0193±0.0008) (equivalent to 3° B.T.D.C.) ... Only D21 double cab model
TD27T	0.59±0.02 (0.0232±0.0008) (equivalent to 4° B.T.D.C.)



SEF016A

Use of adjustment value and adjusting shim when installing injection pump.

Dimension "KF" mm (in)	5.7 - 5.9 (0.224 - 0.232)

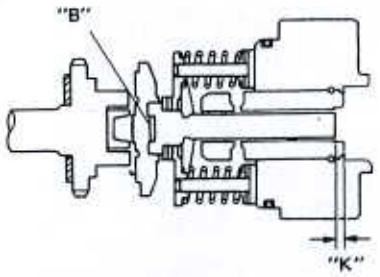


SEF638

Adjusting shim ("A" position)

Part number	Thickness mm (in)
16882-V0700	0.5 (0.020)
16882-V0701	0.8 (0.031)
16882-V0702	1.0 (0.039)
16882-V0703	1.2 (0.047)
16882-V0704	1.5 (0.059)
16882-V0705	1.8 (0.071)
16882-V0706	2.0 (0.079)

Dimension "K" mm (in)	3.2 - 3.4 (0.126 - 0.134)

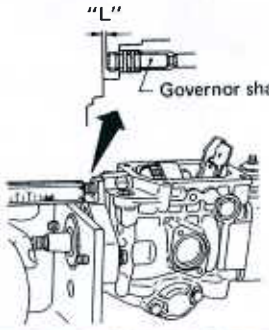


SEF639

Adjusting shim ("B" position)

Part number	Thickness mm (in)	Part number	Thickness mm (in)
16884-V0700	1.92 (0.0756)	16742-R8100	1.96 (0.0772)
16884-V0701	2.00 (0.0787)	16742-R8101	2.04 (0.0803)
16884-V0702	2.08 (0.0819)	16742-R8102	2.12 (0.0835)
16884-V0703	2.16 (0.0850)	16742-R8103	2.20 (0.0866)
16884-V0704	2.24 (0.0882)	16742-R8104	2.28 (0.0898)
16884-V0705	2.32 (0.0913)	16742-R8105	2.36 (0.0929)
16884-V0706	2.40 (0.0945)	16742-R8106	2.44 (0.0961)
16884-V0707	2.48 (0.0976)	16742-R8107	2.52 (0.0992)
16884-V0708	2.56 (0.1008)	16742-R8108	2.60 (0.1024)
16884-V0709	2.64 (0.1039)	16742-R8109	2.68 (0.1055)
16884-V0710	2.72 (0.1071)	16742-R8110	2.76 (0.1087)
16884-V0711	2.80 (0.1102)	16742-R8111	2.84 (0.1118)
16884-V0712	2.88 (0.1134)		

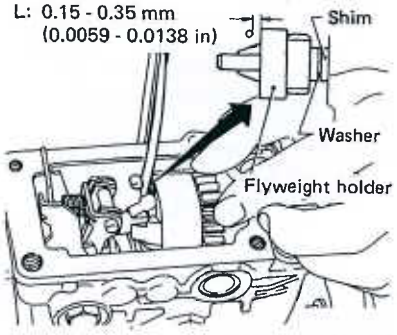
Diemnsion "L" mm (in)	1.5 - 2.0 (0.059 - 0.079)



SEF500

Service Data and Specifications (S.D.S.) (Cont'd)

Axial play of flyweight holder "L" mm (in)	0.15 - 0.35 (0.0059 - 0.0138)

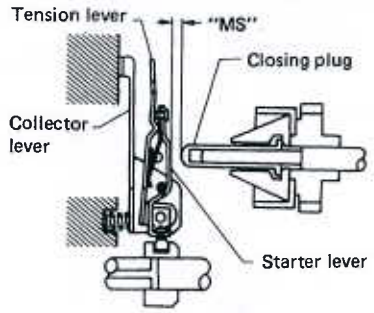


SEF047A

Adjusting shim

Part number	Thickness mm (in)
19208-V0700	1.05 (0.0413)
19208-V0701	1.25 (0.0492)
19208-V0702	1.45 (0.0571)
19208-V0703	1.65 (0.0650)
19208-V0704	1.85 (0.0728)

Dimension "MS" mm (in)	0.9 - 1.1 (0.035 - 0.043)



SEF856

Adjusting closing plug

Part number	Length mm (in)
16268-R8100	3.10 (0.1220)
16268-R8101	3.30 (0.1299)
16268-R8102	3.50 (0.1378)
16268-R8103	3.70 (0.1457)
16268-R8104	3.90 (0.1535)
16268-R8105	4.10 (0.1614)
16268-R8106	4.30 (0.1693)
16268-R8107	4.50 (0.1772)

Service Data and Specifications (S.D.S.) (Cont'd)

TD23 ENGINE MODEL

Injection pump assembly No.	104740-7340
Part No.	16700-35V07

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)

1 - 2 Nozzle holder: 105780-2080 (EF8511/9)

1 - 3 Nozzle opening pressure: $14{,}711^{+490}_{0}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2{,}133^{+71}_{0}$ psi)

1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)

1 - 5 Fuel oil temperature: 45^{+5}_{0}°C (113^{+9}_{0}°F)

1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1	Timing device travel	1,100	2.3 - 2.7 mm (0.091 - 0.106 in)	–	–
2 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm², 58 - 67 psi)		–
2 - 3	Full-load delivery	1,100	40.7 - 41.7 mℓ (1.43 - 1.47 Imp fl oz)/1,000 st		3.0 (0.11)
2 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st	–	2.0 (0.07)
2 - 5	Start	100	47.0 - 59.0 mℓ (1.65 - 2.08 Imp fl oz)/1,000 st		–
2 - 6	Full-load speed regulation	2,500	6.9 - 10.9 mℓ (0.24 - 0.38 Imp fl oz)/1,000 st		–

3. Test specifications

3 - 1 Timing device	N = rpm mm (in)	1,100 2.2 - 2.8 (0.087 - 0.110)	1,700 4.0 - 5.2 (0.157 - 0.205)	2,500 6.4 - 7.4 (0.252 - 0.291)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 667 - 726 (6.67 - 7.26, 6.8 - 7.4, 97 - 105)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

3 - 4 Fuel injection quantities

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	40.2 - 42.2 (1.42 - 1.49)	–	–
	600	37.7 - 41.7 (1.33 - 1.47)		
	2,150	32.6 - 36.8 (1.15 - 1.30)		
	2,300	27.2 - 34.2 (0.96 - 1.20)		
	2,500	6.4 - 11.4 (0.23 - 0.40)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	400	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

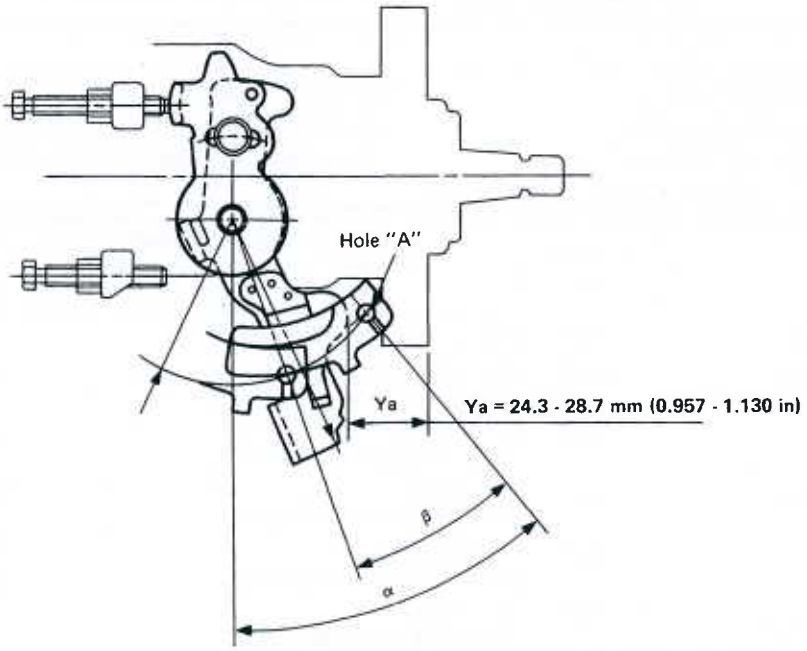
4. Dimensions

K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

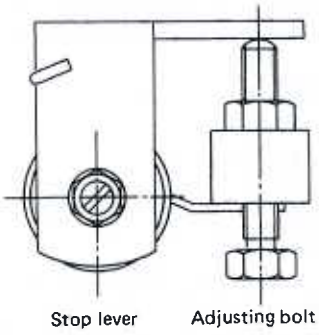
Measure the control lever angles (α, β) at hole "A".



SEF906K

Starting injection quantity adjustment

Adjust the starting injection quantity using the adjusting bolt (as shown in the figure).



SEF769G

ont'd)

Service Data and Specifications (S.D.S.) (Cont'd)

023 ENGINE MODEL

ection pump assembly No.	104740-9743
t No.	16700-35V05

Pump rotation: Clockwise--viewed from drive side
Pre-stroke: –

Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Differeence in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	2.3 - 2.7 mm (0.091 - 0.106 in)	–	–
1 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm², 58 - 67 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	40.7 - 41.7 mℓ (1.43 - 1.47 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure	–	–		–
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	300	39.5 - 43.5 mℓ (1.39 - 1.53 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,500	6.9 - 10.9 mℓ (0.24 - 0.38 Imp fl oz)/1,000 st		–

Test specifications

1 Timing device	N = rpm mm (in)	1,100 2.2 - 2.8 (0.087 - 0.110)	1,700 4.0 - 5.2 (0.157 - 0.205)	2,500 6.4 - 7.4 (0.252 - 0.291)
2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 667 - 726 (6.67 - 7.26, 6.8 - 7.4, 97 - 105)
3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

4 Fuel deliveries

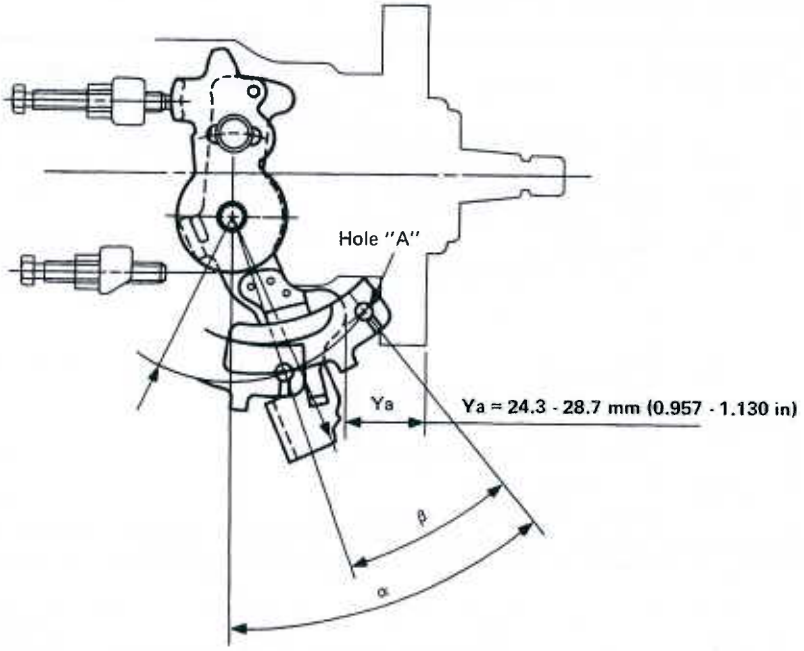
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
id stop	1,100	40.2 - 42.2 (1.42 - 1.49)	–	–
	600	37.7 - 41.7 (1.33 - 1.47)		
	2,150	32.6 - 36.8 (1.15 - 1.30)		
	2,300	27.2 - 34.2 (0.96 - 1.20)		
	2,500	6.4 - 11.4 (0.23 - 0.40)		
	2,700	Below 5.0 (0.18)		
witch OFF	350	0 (0)	–	–
dle stop	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	400	Below 3.0 (0.11)		
5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

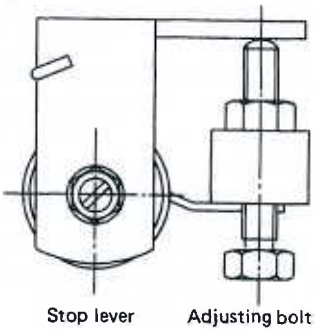
Measure the control lever angles (α, β) at hole "A".



SEF906H

Starting injection quantity adjustment

Adjust the starting injection quantity using the adjusting bolt (as shown in the figure).



SEF769G

INJECTION PUMP

Service Data and Specifications (S.D.S.) (Cont'd)

TD23 ENGINE MODEL

Injection pump assembly No.	104740-9753
Part No.	16700-35V06

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Differeence in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	2.3 - 2.7 mm (0.091 - 0.106 in)	—	—
1 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm², 58 - 67 psi)	—	—
1 - 3	Full-load delivery without charge air pressure	1,100	43.1 - 44.1 mℓ (1.52 - 1.55 Imp fl oz)/1,000 st	—	3.0 (0.11)
	Full-load delivery with charge air pressure	—	—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st	—	2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st	—	—
1 - 6	Full-load speed regulation	2,500	6.8 - 10.9 mℓ (0.24 - 0.38 Imp fl oz)/1,000 st	—	—
1 - 7	A.C.S. adjustment	1,100	36.4 - 39.4 mℓ (1.28 - 1.39 Imp fl oz)/1,000 st	−21.9±0.7 (−219±7, −164±5, −6.46±0.20)	—

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.2 - 2.8 (0.087 - 0.110)	1,700 4.1 - 5.1 (0.161 - 0.201)	2,500 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 667 - 726 (6.67 - 7.26, 6.8 - 7.4, 97 - 105)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	42.6 - 44.6 (1.50 - 1.57)	—	
	1,100	35.9 - 39.9 (1.26 - 1.40)	−21.9±0.7 (−219±7, −164±5, −6.46±0.20)	
	600	40.1 - 44.1 (1.41 - 1.55)	—	
	2,150	34.9 - 39.1 (1.23 - 1.38)	—	—
	2,300	27.2 - 34.2 (0.96 - 1.20)	—	
	2,500	6.4 - 11.4 (0.23 - 0.40)	—	
	2,700	Below 5.0 (0.18)	—	
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	400	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

F906H

Service Data and Specifications (S.D.S.) (Cont'd)

Full-load fuel injection quantity and A.C.S. adjusting procedure at high altitudes

1. Full-load fuel injection quantity adjustment

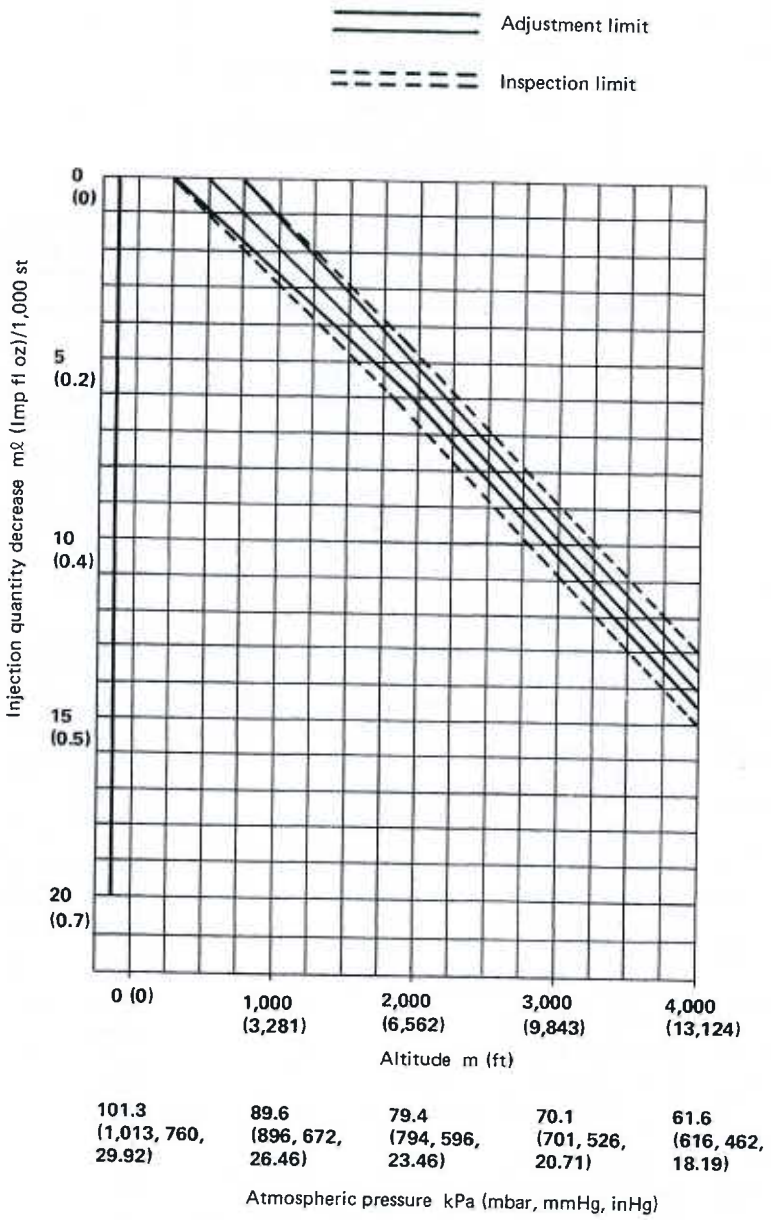
(1) Remove the A.C.S. cover, the bellows and the adjusting shims.

(2) Perform all adjustments as described in the adjusting specifications, except for A.C.S. adjustment.

2. A.C.S. adjustment

(1) Attach the A.C.S. cover, the bellows and the adjusting shims.

(2) At a pump speed of 1,100 rpm and referring to the graph below, use the shims to adjust the fuel injection quantity decrease quantity according to the altitude.

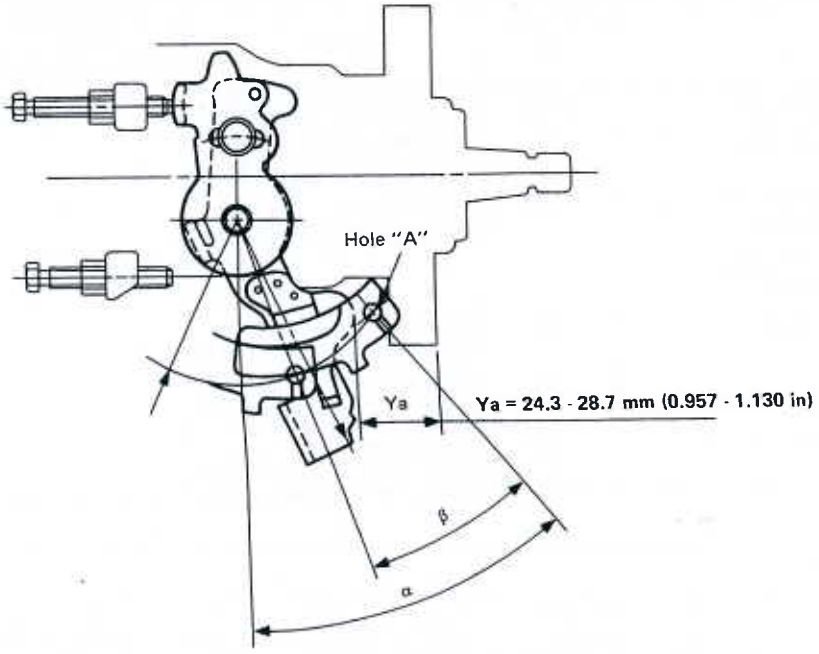


SEF541I

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

TD23 ENGINE MODEL

Injection pump No.	104740-9821
Part No.	16700-21T09

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: –

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	4.4 - 4.8 mm (0.173 - 0.189 in)	–	–
1 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	44.1 - 45.1 mℓ (1.55 - 1.59 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		–		–
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,350	28.3 - 32.3 mℓ (1.00 - 1.14 Imp fl oz)/1,000 st		–

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.1 - 2.9 (0.083 - 0.114)	1,700 4.3 - 4.9 (0.169 - 0.193)	2,550 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

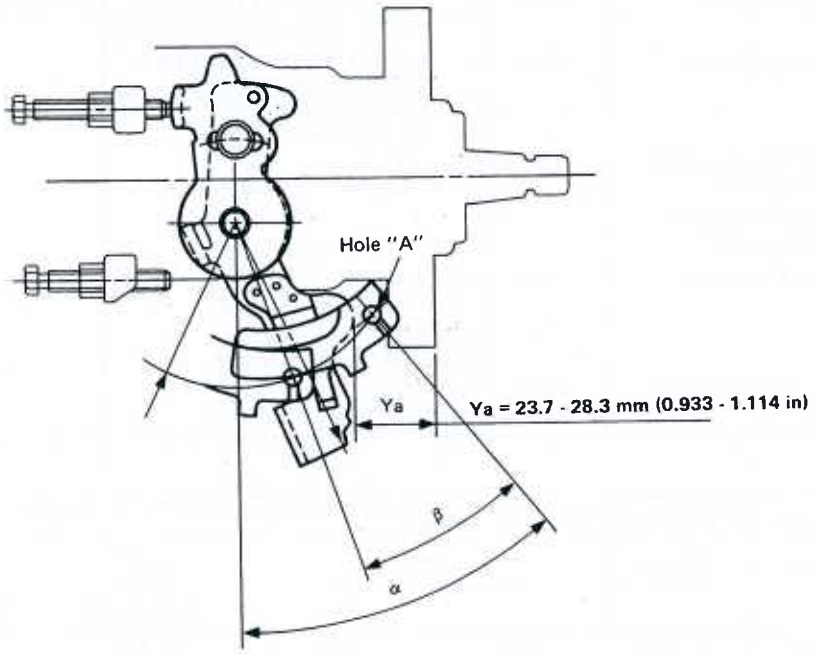
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	43.6 - 45.6 (1.53 - 1.61)	–	–
	600	41.5 - 45.5 (1.46 - 1.60)		
	2,150	35.9 - 40.1 (1.26 - 1.41)		
	2,350	27.8 - 32.8 (0.98 - 1.15)		
	2,550	5.3 - 12.4 (0.19 - 0.44)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	–	–
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	400	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Control lever angle	
α	50.0 - 58.0 degree
Ya	23.7 - 28.3 mm (0.933 - 1.114 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

TD23 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump No. 104740-9831
Part No. 16700-21T10

[Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —]

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	S/T ON: 5.8 - 6.6 mm (0.228 - 0.260 in) OFF: 4.4 - 4.8 mm (0.173 - 0.189 in)	S/T: Solenoid timer	—
1 - 2	Supply pump pressure	1,100	S/T ON: 579 - 657 kPa (5.79 - 6.57 bar, 5.9 - 6.7 kg/cm², 84 - 95 psi) OFF: 481 - 539 kPa (4.81 - 5.39 bar, 4.9 - 5.5 kg/cm², 70 - 78 psi)		—
1 - 3	Full-load delivery without charge air pressure	1,100	44.1 - 45.1 mℓ (1.55 - 1.59 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,350	28.3 - 32.3 mℓ (1.00 - 1.14 Imp fl oz)/1,000 st		—

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,700 5.7 - 6.7 (0.224 - 0.264)		1,100 2.1 - 2.9 (0.083 - 0.114)	1,700 4.3 - 4.9 (0.169 - 0.193)	2,550 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

2 - 4 Fuel deliveries

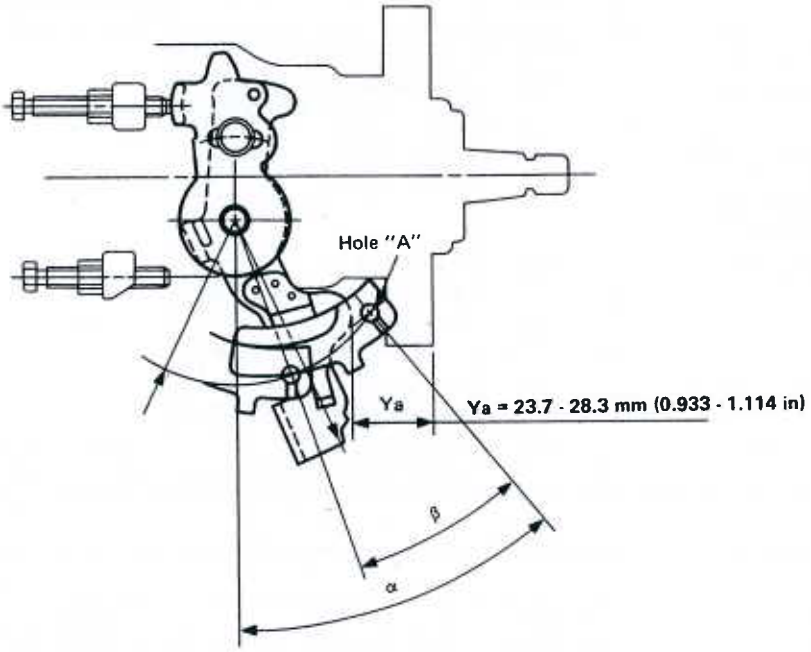
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	43.6 - 45.6 (1.53 - 1.61)	—	—
	600	41.5 - 45.5 (1.46 - 1.60)		
	2,150	35.9 - 40.1 (1.26 - 1.41)		
	2,350	27.8 - 32.8 (0.98 - 1.15)		
	2,550	5.3 - 12.4 (0.19 - 0.44)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	400	Below 2.0 (0.07)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	50.0 - 58.0 degree
Ya	23.7 - 28.3 mm (0.933 - 1.114 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

If there is no designation in the specifications for the solenoid timer's ON-OFF position, then the position should be regarded as OFF.

TD23 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump No. 104740-9841
Part No. 16700-21T11

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	2.3 - 2.7 mm (0.091 - 0.106 in)	—	—
1 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm² (58 - 67 psi)	—	—
1 - 3	Full-load delivery without charge air pressure	1,100	44.1 - 45.1 mℓ (1.55 - 1.59 Imp fl oz)/1,000 st	—	3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st	—	2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st	—	—
1 - 6	Full-load speed regulation	2,350	28.3 - 32.3 mℓ (1.00 - 1.14 Imp fl oz)/1,000 st	—	—
1 - 7	A.C.S. adjustment	1,100	33.0 - 36.0 mℓ (1.16 - 1.27 Imp fl oz)/1,000 st	−21.9±0.7 (−219±7, −164±5, −6.46±0.20)	—

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.2 - 2.8 (0.087 - 0.110)	1,700 4.0 - 5.2 (0.157 - 0.205)	2,550 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

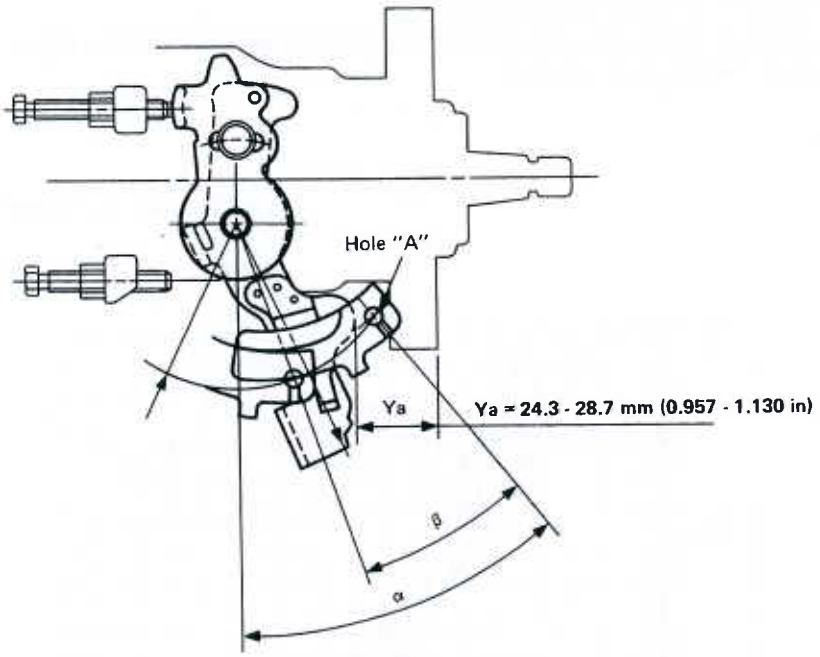
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	43.6 - 45.6 (1.53 - 1.61)	—	
	1,100	32.5 - 36.5 (1.14 - 1.28)	−21.9±0.7 (−219±7, −164±5, −6.46±0.20)	
	600	41.5 - 45.5 (1.46 - 1.60)	—	
	2,150	35.9 - 40.1 (1.26 - 1.41)	—	—
	2,350	27.8 - 32.8 (0.98 - 1.15)	—	
	2,550	5.3 - 12.4 (0.19 - 0.44)	—	
	2,700	Below 5.0 (0.18)	—	
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	400	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

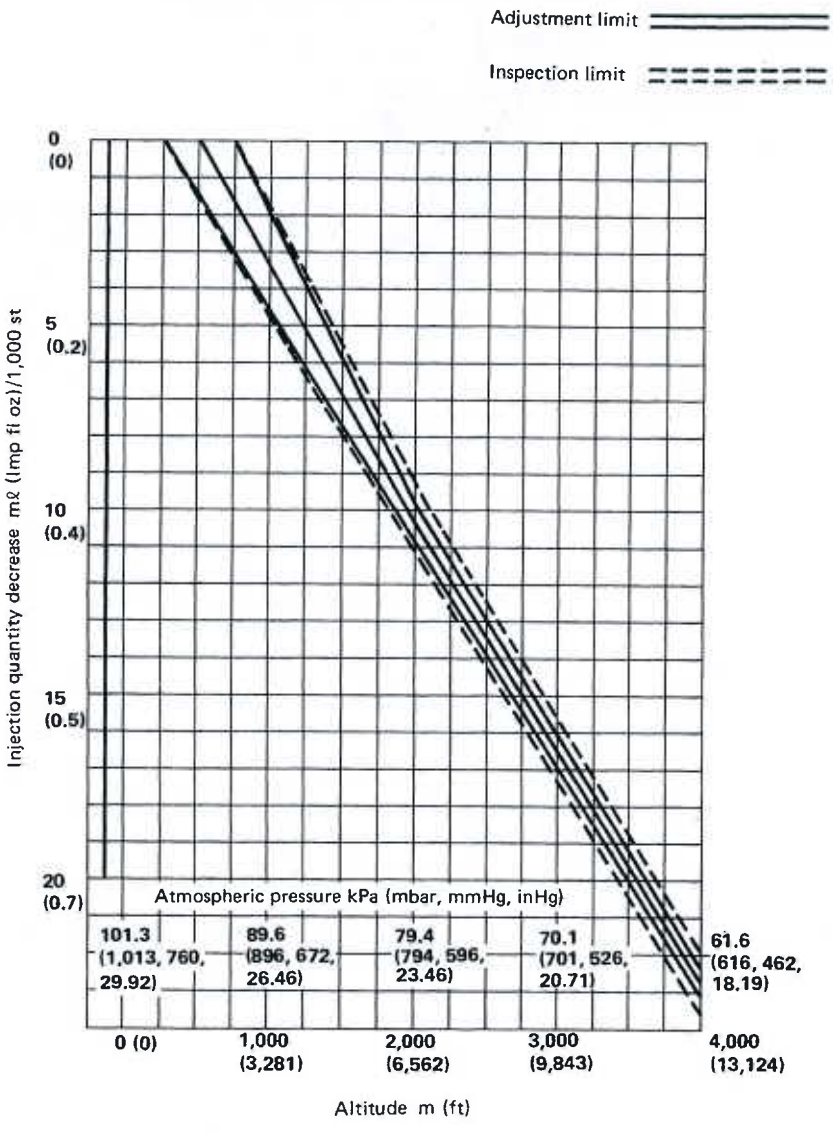
Full-load fuel injection quantity and A.C.S. adjusting procedure at high altitudes

- Full-load fuel injection quantity adjustment

1) Remove A.C.S. cover, bellows and adjusting shims.
2) Perform all adjustments as described in adjusting specifications, except for A.C.S. adjustment.

- A.C.S. adjustment

1) Attach A.C.S. cover, bellows and adjusting shims.
2) At a pump speed of 1,100 rpm and referring to graph below, use shims to adjust fuel injection quantity decrease amount according to altitude.



SEF908H

Service Data and Specifications (S.D.S.) (Cont'd)

TD25 ENGINE MODEL

Injection pump assembly No.	104740-9622
Part No.	16700-44G03

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: –

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	4.7 - 5.1 mm (0.185 - 0.201 in)		–
1 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		–	–	–
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.0 - 3.2 (0.079 - 0.126)	1,700 4.6 - 5.2 (0.181 - 0.205)	2,300 6.0 - 7.0 (0.236 - 0.276)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 -67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.8 (1.36 - 1.51)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	–	–
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 2.0 (0.07)		

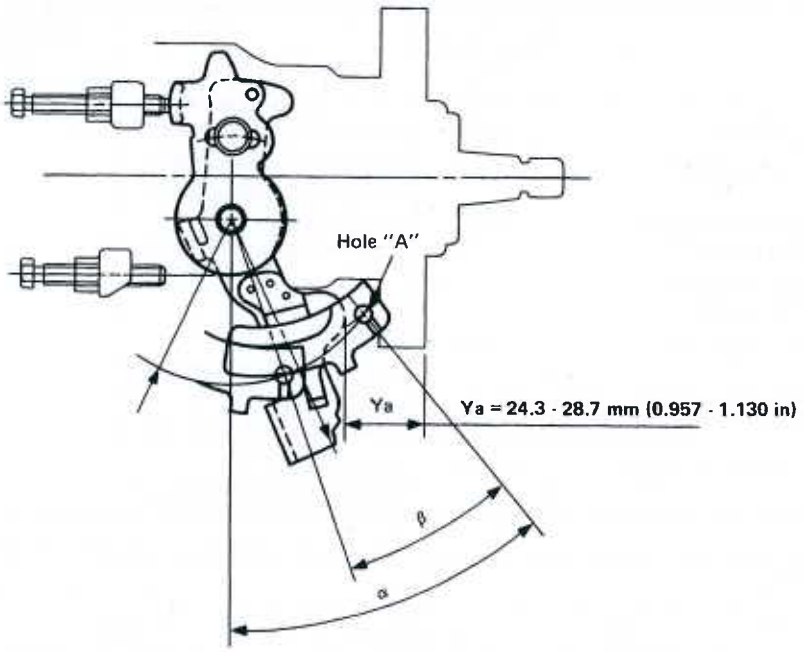
2 - 5 Solenoid — Max. cut-in voltage: 8V
Test voltage: 12 - 14V

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 47.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-9632
Part No.	16700-44G04

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	—		—
1 - 2	Supply pump pressure	1,700	—		—
1 - 3	Full-load delivery without charge air pressure	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		—

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,700 6.0 - 7.0 (0.236 - 0.276)		1,700 4.6 - 5.2 (0.181 - 0.205)	2,300 6.0 - 7.0 (0.236 - 0.276)	
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 (Without O-ring) 60 - 103 (2.1 - 3.6)			

2 - 4 Fuel deliveries

Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	47.5 - 49.5 (1.67 - 1.74)	—	—
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.8 (1.36 - 1.51)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	450	Below 3.0 (0.11)		

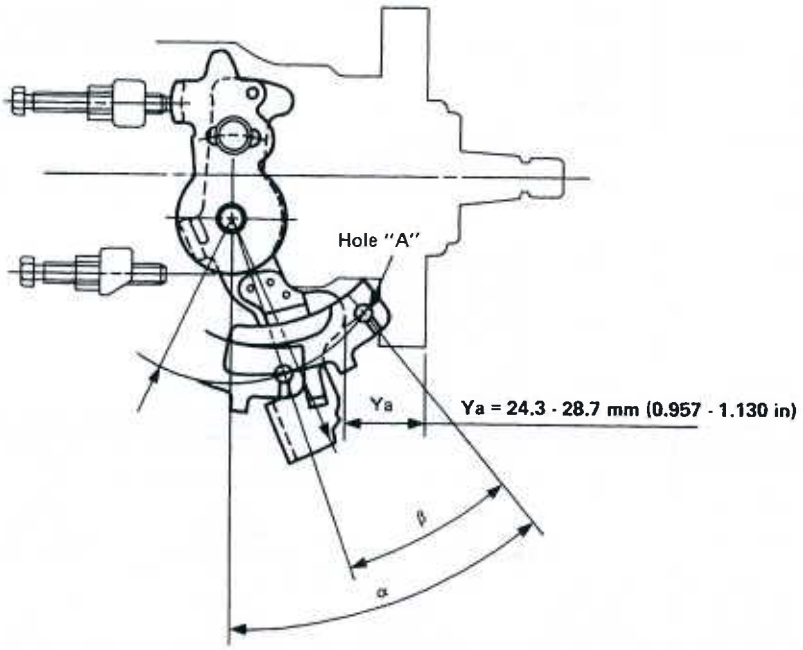
2 - 5 Solenoid: Max. cut-in voltage: 8V
Test voltage: 12 - 14V

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-9642
Part No.	16700-44G05

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	4.7 - 5.1 mm (0.185 - 0.201 in)		—
1 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)		—
1 - 3	Full-load delivery without charge air pressure	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		—
1 - 7	ACS adjustment	1,100	37.9 - 40.9 mℓ (1.33 - 1.44 Imp fl oz)/1,000 st	-21.9±0.7 (-219±7, -164±5, -6.46±0.20)	—

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.0 - 3.2 (0.079 - 0.126)	1,700 4.6 - 5.2 (0.181 - 0.205)	2,300 6.0 - 7.0 (0.236 - 0.276)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 -67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

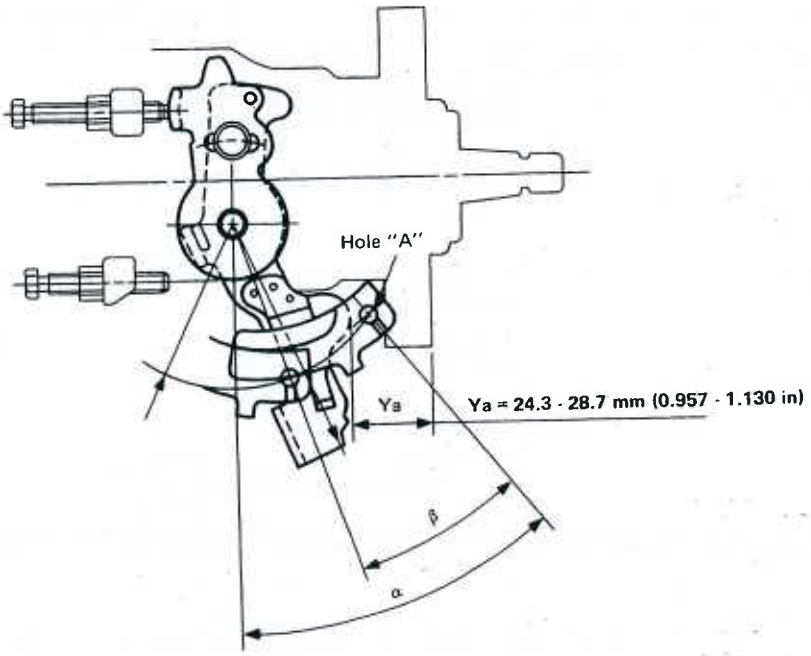
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	47.5 - 49.5 (1.67 - 1.74)	—	
	600	45.1 - 49.1 (1.59 - 1.73)	—	
	1,100	37.4 - 41.4 (1.32 - 1.46)	-21.9±0.7 (-219±7, -164±5, -6.46±0.20)	—
	2,150	38.5 - 42.8 (1.36 - 1.51)	—	
	2,300	28.3 - 37.3 (1.00 - 1.31)	—	
	2,500	9.6 - 14.6 (0.34 - 0.51)	—	
	2,700	Below 5.0 (0.18)	—	
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	400	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



025 ENGINE MOD

ection pump assembly No.
rt No.

Setting

- 1	Timing device travel
- 2	Supply pump pressu
- 3	Full-load delivery wi charge air pressure
	Full-load delivery wi charge air pressure
- 4	Idle speed regulation
- 5	Start
- 6	Full-load speed regul
- 7	Load timer adjustme

est specifications	Sole
Timing device	N m
Supply pump	N kF kg/
Overflow delivery	N mℓ (i 1

Fuel deliveries

d control lever	Pump sp rpm
top	1,10
	60
	2,15
	2,30
	2,50
	2,70
OFF	35
p	35
	45
Solenoid	

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-7180
Part No.	16700-44G06

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: –

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) S/T OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)	S/T: Solenoid timer	–
1 - 2	Supply pump pressure	1,100	S/T ON: 441 - 520 kPa (4.41 - 5.20 bar, 4.5 - 5.3 kg/cm², 64 - 75 psi) S/T OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		–	–	–
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–
1 - 7	Load timer adjustment	1,100	T - 1.0±0.2 mm (0.039±0.008 in)		–

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 (Without O-ring) 60 - 103 (2.1 - 3.6)			

2 - 4 Fuel deliveries

Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.7 (1.36 - 1.50)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	–	–
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Load timer adjustment

- Adjustment
  1) Fix control lever in position satisfying the following conditions.
     Boost Pressure : –
     Pump Speed : 1,100 rpm
     Fuel Injection Quantity : 38.0±0.5 mℓ (1.34±0.02 Imp fl oz)/1,000 st

  2) With control lever positioned as described in 1) above, adjust governor sleeve so that timer stroke conforms to specified values.

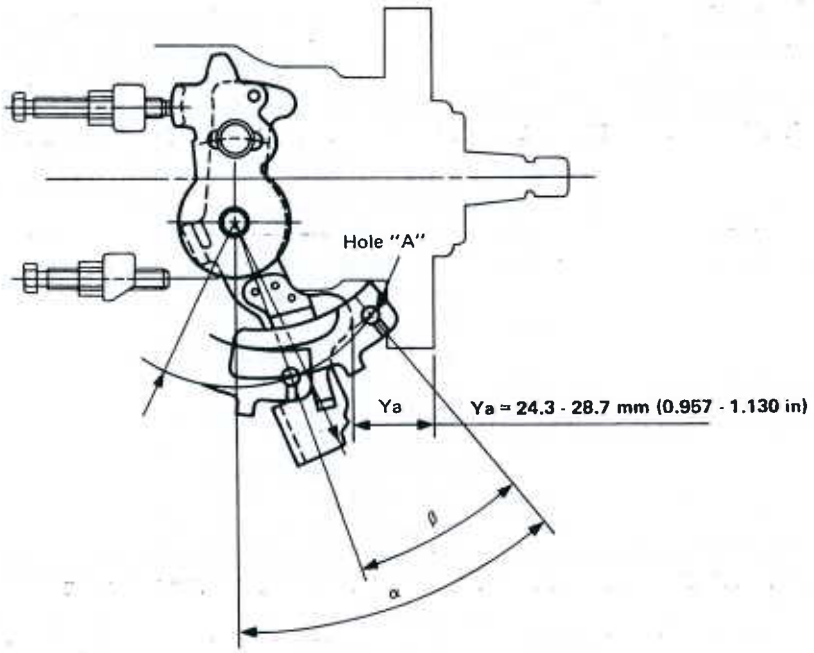
Control lever position			Specified values	
Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Boost pressure kPa (mbar, mmHg, inHg)	Timer stroke mm (in)	Timer stroke reduction value mm (in)
1,100	37.0 - 39.0 (1.30 - 1.37)	–	–	0.7 - 1.3 (0.028 - 0.051)
1,100	28.5 - 31.5 (1.00 - 1.11)	–	–	1.2 - 2.2 (0.047 - 0.087)

If there is no designation in the specifications for the solenoid timer's ON-OFF position, then the position should be regarded as OFF.

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

TD25 ENGINE MODEL

Injection pump assembly No.	104740-7200
Part No.	16700-30N04

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)

1 - 2 Nozzle holder: 105780-2080 (EF8511/9)

1 - 3 Nozzle opening pressure: $14{,}711^{+490}_{0}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2{,}133^{+71}_{0}$ psi)

1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)

1 - 5 Fuel oil temperature: 45^{+5}_{0} °C (113^{+9}_{0} °F)

1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1	Timing device travel	1,700	4.7 - 5.1 mm (0.185 - 0.201 in)	–	–
2 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)		–
2 - 3	Full-load delivery	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
2 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st	–	2.0 (0.07)
2 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
2 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–

3. Test specifications

3 - 1 Timing device	N = rpm mm (in)	1,100 2.0 - 3.2 (0.079 - 0.126)	1,700 4.6 - 5.2 (0.181 - 0.205)	2,300 6.0 - 7.0 (0.236 - 0.276)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

3 - 4 Fuel injection quantities

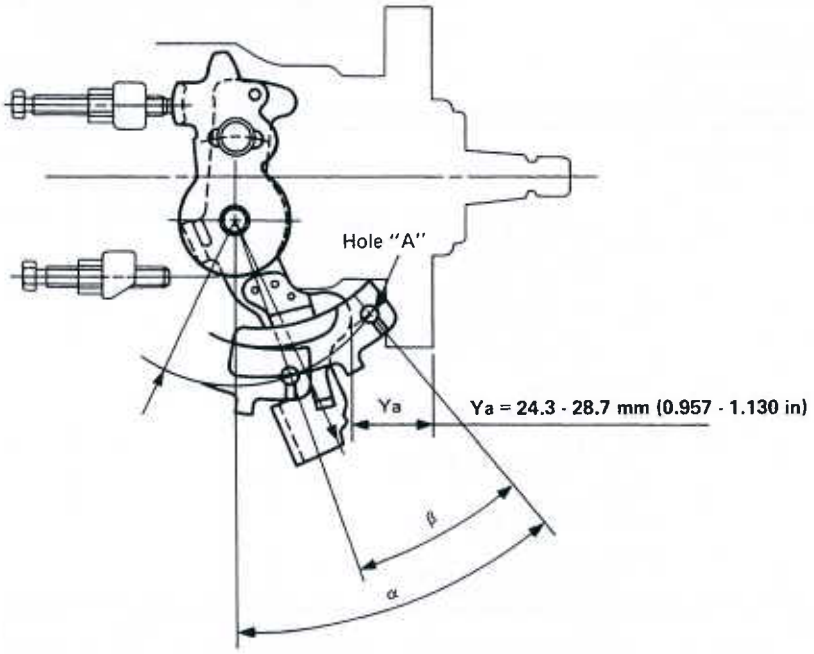
Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.8 (1.36 - 1.51)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

4. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF906H

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-7210
Part No.	16700-30N05

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)

1 - 2 Nozzle holder: 105780-2080 (EF8511/9)

1 - 3 Nozzle opening pressure: $^{14,711}_{0}{}^{+490}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2,133^{+21}_{0}$ psi)

1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)

1 - 5 Fuel oil temperature: 45^{+5}_{0}°C (113^{+9}_{0}°F)

1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)		–
2 - 2	Supply pump pressure	1,100	S/T ON: 441 - 520 kPa (4.41 - 5.20 bar, 4.5 - 5.3 kg/cm², 64 - 75 psi) OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)		–
2 - 3	Full-load delivery	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st	–	3.0 (0.11)
2 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
2 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
2 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–

3. Test specifications	Solenoid timer	ON		OFF		
3 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

3 - 4 Fuel injection quantities

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.8 (1.36 - 1.51)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

4. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

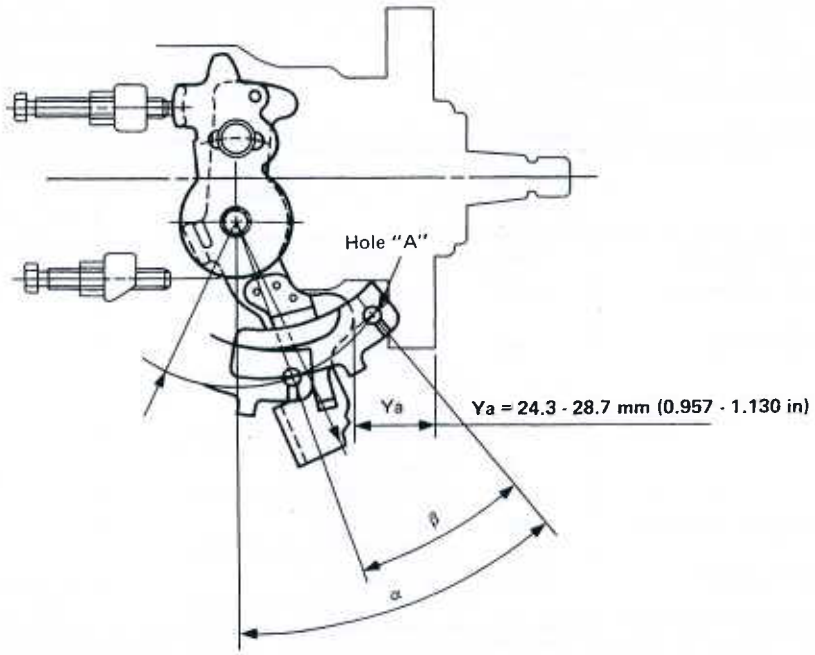
Control lever angle m
Measure the control le

If there is no designat
should be regarded as

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF906H

If there is no designation in the specifications for the Solenoid Timer's ON-OFF position, then the position should be regarded as OFF.

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No. 104740-7220
Part No. 16700-30N06

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)
1 - 2 Nozzle holder: 105780-2080 (EF8511/9)
1 - 3 Nozzle opening pressure: $14{,}711^{+490}_{0}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2{,}133^{+71}_{0}$ psi)
1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)
1 - 5 Fuel oil temperature: 45^{+5}_{0} °C (113^{+9}_{0} °F)
1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting

		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1	Timing device travel	1,700	4.7 - 5.1 mm (0.185 - 0.201 in)	–	–
2 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)	–	–
2 - 3	Full-load delivery	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st	–	3.0 (0.11)
2 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st	–	2.0 (0.07)
2 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st	–	–
2 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st	–	–
2 - 7	A.C.S. adjustment	1,100	36.1 - 39.1 mℓ (1.27 - 1.38 Imp fl oz)/1,000 st	–21.9±0.7 (–219±7, –164±5, –6.46±0.20)	–

3. Test specifications

3 - 1 Timing device	N = rpm mm (in)	1,100 2.0 - 3.2 (0.079 - 0.126)	1,700 4.6 - 5.2 (0.181 - 0.205)	2,300 6.0 - 7.0 (0.236 - 0.276)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	–		

3 - 4 Fuel injection quantities

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	47.5 - 49.5 (1.67 - 1.74)	–	
	1,100	35.6 - 39.6 (1.25 - 1.39)	–21.9±0.7 (–219±7, –164±5, –6.46±0.20)	
	600	45.1 - 49.1 (1.59 - 1.73)	–	
	2,150	38.5 - 42.8 (1.36 - 1.51)	–	–
	2,300	28.3 - 37.3 (1.00 - 1.31)	–	
	2,500	9.6 - 14.6 (0.34 - 0.51)	–	
	2,700	Below 5.0 (0.18)	–	
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

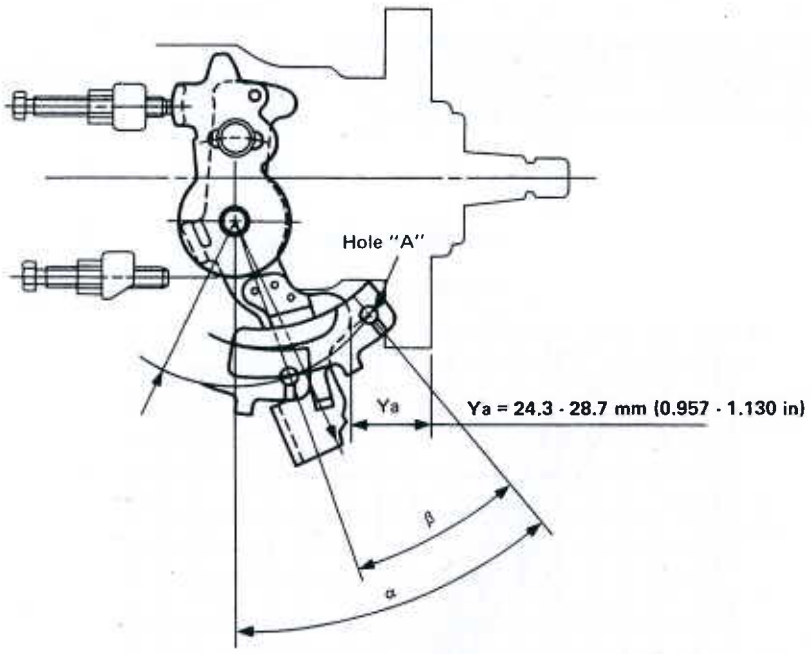
4. Dimensions

K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.5 - 48.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".

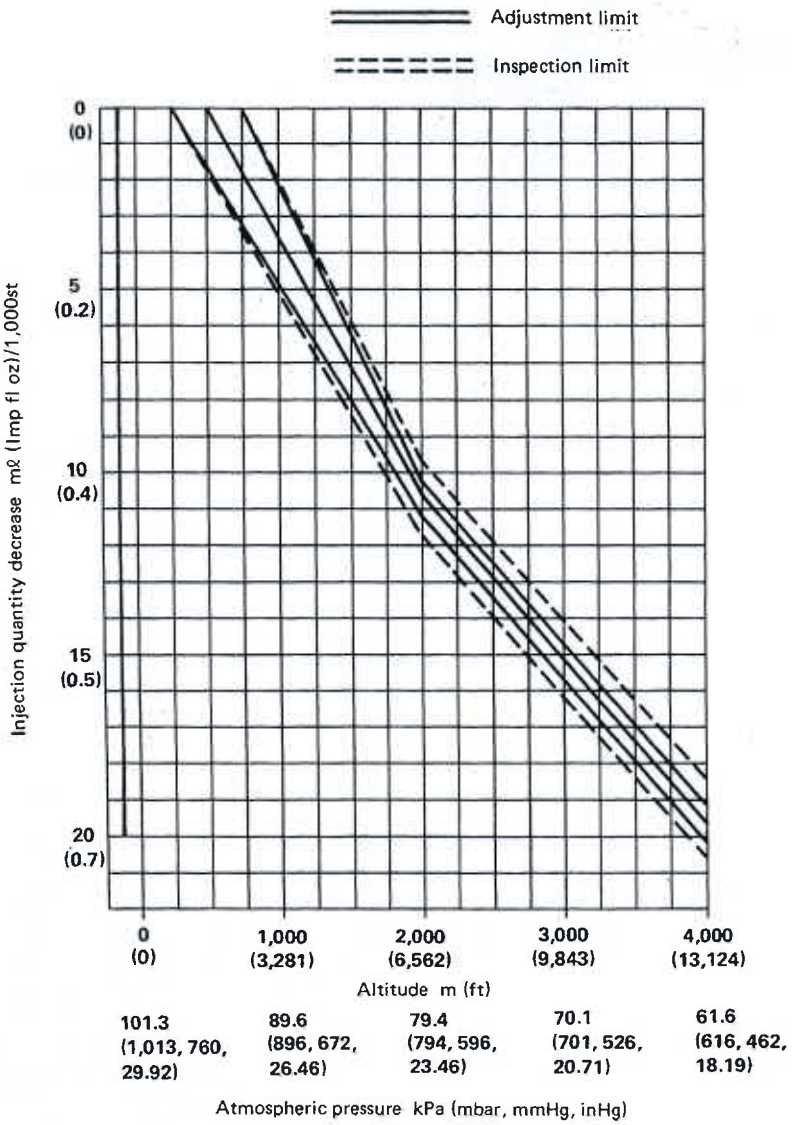


SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

Full-load fuel injection quantity and A.C.S. adjusting procedure at high altitudes

1. Full-load fuel injection quantity adjustment
(1) Remove the A.C.S. cover, the bellows and the adjusting shims.
(2) Perform all adjustments as described in the adjusting specifications, except for A.C.S. adjustment.
2. A.C.S. adjustment
(1) Attach the A.C.S. cover, the bellows and the adjusting shims.
(2) At a pump speed of 1,100 rpm and referring to the graph below, use the shims to adjust the fuel injection quantity decrease quantity according to the altitude.



SEF371I

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No. 104740-7230
Part No. 16700-30N07

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)
1 - 2 Nozzle holder: 105780-2080 (EF8511/9)
1 - 3 Nozzle opening pressure: $14{,}711^{+490}_{0}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2{,}133^{+71}_{0}$ psi)
1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)
1 - 5 Fuel oil temperature: 45^{+5}_{0}°C (113^{+9}_{0}°F)
1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)		–
2 - 2	Supply pump pressure	1,100	S/T ON: 471 - 549 kPa (4.71 - 5.49 bar, 4.8 - 5.6 kg/cm², 68 - 80 psi) OFF: 373 - 432 kPa (3.73 - 4.32 bar, 3.8 - 4.4 kg/cm², 54 - 63 psi)		–
2 - 3	Full-load delivery	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st	–	3.0 (0.11)
2 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
2 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
2 - 6	Full-load speed regulation	1,100	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–
2 - 7	Load-timer adjustment	1,100	T – 0.7±0.2 mm (0.028±0.008 in)		–

3. Test specifications	Solenoid timer	ON		OFF		
3 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)	1,700 5.7 - 7.3 (0.224 - 0.287)	1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 471 - 549 (4.71 - 5.49, 4.8 - 5.6, 68 - 80)	1,700 608 - 686 (6.08 - 6.86, 6.2 - 7.0, 88 - 100)	1,100 373 - 432 (3.73 - 4.32, 3.8 - 4.4, 54 - 63)	1,700 510 - 569 (5.10 - 5.69, 5.2 - 5.8, 74 - 82)	2,150 598 - 657 (5.98 - 6.57, 6.1 - 6.7, 87 - 95)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

3 - 4 Fuel injection quantities

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.7 (1.36 - 1.50)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

4. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.4 - 43.4 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications

If there is no designation in the specifications for the Solenoid Timer's ON-OFF p should be regarded as OFF.

Load-timre adjustment

1. Adjustment

(1) Fix the control lever in the position satisfying the following conditions.

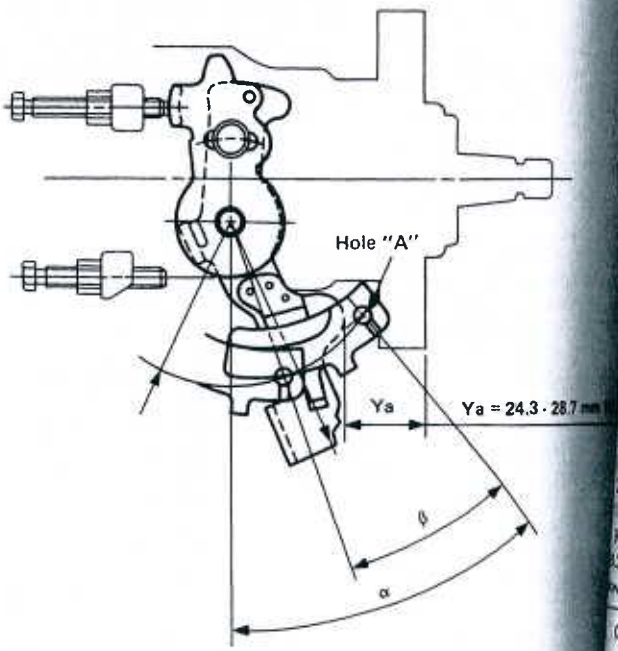
Boost pressure: –
Pump speed: **1,100 rpm**
Fuel injection quantity: **39.0±0.5 mℓ (1.37±0.02 Imp fl oz)/1,000 st**

(2) With the control lever positioned as described in (1) above, adjust the governo stroke conforms to the specified values (item 2 - 7).

Control lever position			
Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Boost pressure kPa (mbar, mmHg, inHg)	Timer stroke mm (in)
1,100	39.0±1.0 (1.37±0.04)	–	–
1,100	30.0±2.5 (1.06±0.09)	–	–

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



Service Data and

104740-7240
16700-30N08

Pump rota

N12SD12T)
EF8511/9)
1 - 4 Injection
1 - 5 Fuel oil t
1 - 6 Supply pu

Pump speed rpm	Settings
1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)
1,100	ON: 441 - 520 kPa (4.41 - 5.20 bar, S/T 4.5 - 5.3 kg/cm², 64 - 75 psi) OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)
1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st
350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st
100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st
2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st

ON		
1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)
1,100 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)
1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)	

Fuel delivery (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
47.5 - 49.5 (1.67 - 1.74) 45.1 - 49.1 (1.59 - 1.73) 36.5 - 42.7 (1.26 - 1.50) 28.3 - 37.3 (1.00 - 1.31) 9.6 - 14.6 (0.34 - 0.51) 5.0 (0.18)	–	–
0 (0)	–	–
4.5 - 8.5 (0.16 - 0.30) 3.0 (0.11)	–	–

Max. cut-in voltage: 8V
Test voltage: 12 - 14V

4. Di
K
KF
MS
BCS
Pre-strok
α
Ya
β
B
γ
C

Service Data and Specifications (S.D.S.) (Cont'd)

If there is no designation in the specifications for the Solenoid Timer's ON-OFF position, then the position should be regarded as OFF.

Load-timre adjustment

1. Adjustment

(1) Fix the control lever in the position satisfying the following conditions.

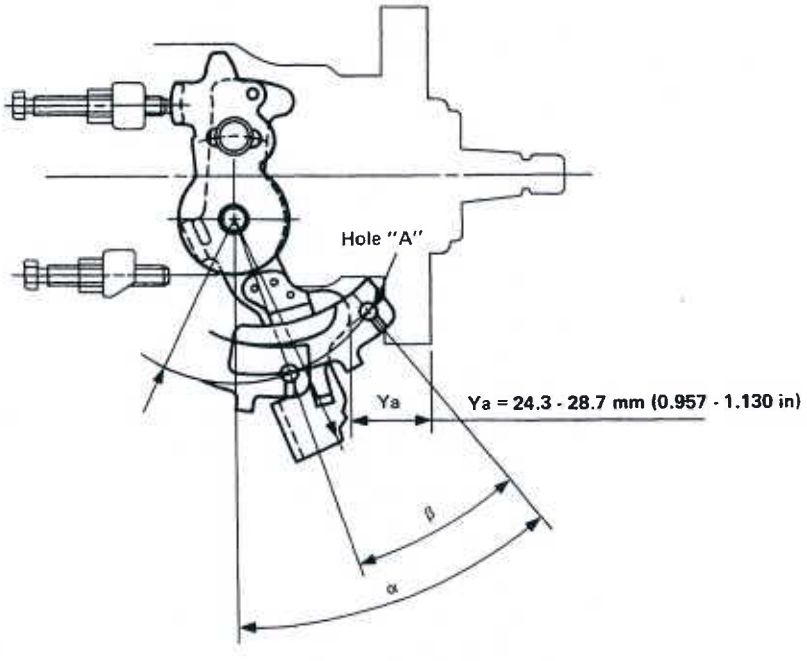
Boost pressure: –
Pump speed: **1,100 rpm**
Fuel injection quantity: **39.0±0.5 mℓ (1.37±0.02 Imp fl oz)/1,000 st**

(2) With the control lever positioned as described in (1) above, adjust the governor sleeve so that the timer stroke conforms to the specified values (item 2 - 7).

Control lever position			Specified values	
Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Boost pressure kPa (mbar, mmHg, inHg)	Timer stroke mm (in)	Timer stroke reduction value mm (in)
1,100	39.0±1.0 (1.37±0.04)	–	–	0.7±0.2 (0.028±0.008)
1,100	30.0±2.5 (1.06±0.09)	–	–	1.4±0.5 (0.055±0.020)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF906H

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-7240
Part No.	16700-30N08

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1-1 Nozzle: 105780-0000 (NP-DN12SD12T)

1-2 Nozzle holder: 105780-2080 (EF8511/9)

1-3 Nozzle opening pressure: $14{,}711^{+490}_{0}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2{,}133^{+71}_{0}$ psi)

1-4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)

1-5 Fuel oil temperature: 45^{+5}_{0}°C (113^{+9}_{0}°F)

1-6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2-1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)		–
2-2	Supply pump pressure	1,100	S/T ON: 441 - 520 kPa (4.41 - 5.20 bar, 4.5 - 5.3 kg/cm², 64 - 75 psi) OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)		–
2-3	Full-load delivery	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st	–	3.0 (0.11)
2-4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
2-5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
2-6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–

3. Test specifications	Solenoid timer	ON		OFF		
3-1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
3-2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
3-3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

3-4 Fuel injection quantities

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.7 (1.36 - 1.50)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
3-5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

4. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	50.0 - 58.0 degree
Ya	23.7 - 28.3 mm (0.933 - 1.114 in)
β	37.0 - 47.0 degree
B	10.7 - 14.8 mm (0.421 - 0.583 in)
γ	–
C	–

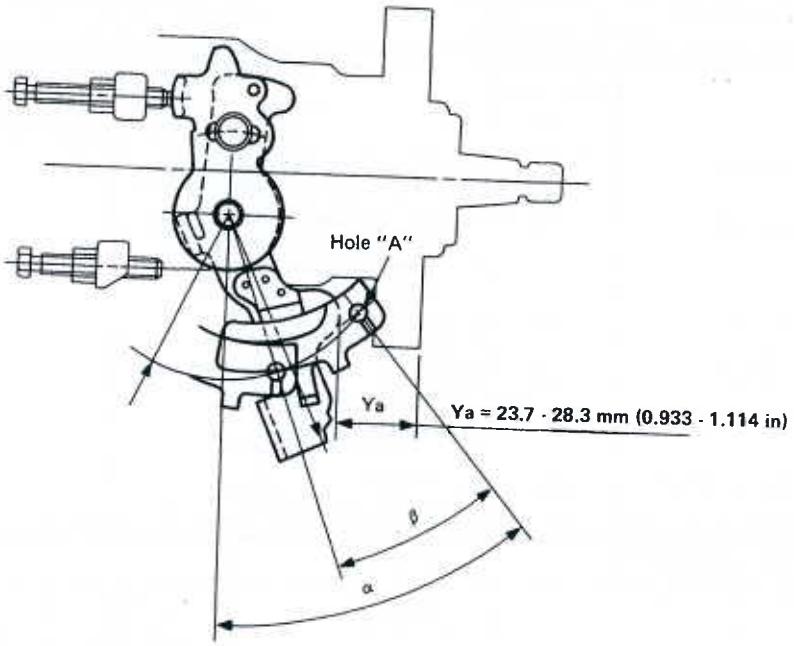
SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

If there is no designation in the specifications for the Solenoid Timer's ON-OFF position, then the position should be regarded as OFF.

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

Load-timer adjustment

1. Adjustment

(1) Fix the control lever in the position satisfying the following conditions.

Boost pressure: –
Pump speed: 1,100 rpm
Fuel injection quantity: 35.0±0.5 mℓ (1.23±0.02 Imp fl oz)

(2) With the control lever positioned as described in (1) above, adjust the governor sleeve so that the timer stroke conforms to the specified values (item 2 - 7).

Control lever position			Specified values	
Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Boost pressure kPa (mbar, mmHg, inHg)	Timer stroke mm (in)	Timer stroke reduction value mm (in)
1,100	35.0±1.0 (1.23±0.04)	–	–	1.0±0.3 (0.039±0.012)
1,100	28.0±1.5 (0.99±0.05)	–	–	1.7±0.5 (0.067±0.020)

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No. 104740-7310
Part No. 16700-30N09

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)
1 - 2 Nozzle holder: 105780-2080 (EF8511/9)
1 - 3 Nozzle opening pressure: $14{,}711^{+490}_{0}$ kPa ($147.1^{+4.9}_{0}$ bar, 150^{+5}_{0} kg/cm², $2{,}133^{+71}_{0}$ psi)
1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)
1 - 5 Fuel oil temperature: 45^{+5}_{0} °C (113^{+9}_{0} °F)
1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)		–
2 - 2	Supply pump pressure	1,100	S/T ON: 481 - 539 kPa (4.81 - 5.39 bar, 4.9 - 5.5 kg/cm², 70 - 78 psi) OFF: 373 - 432 kPa (3.73 - 4.32 bar, 3.8 - 4.4 kg/cm², 54 - 63 psi)		–
2 - 3	Full-load delivery	1,100	44.8 - 45.8 mℓ (1.58 - 1.61 Imp fl oz)/1,000 st	–	3.0 (0.11)
2 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
2 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
2 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–
2 - 7	Load-timer adjustment	1,100	T – 1.0±0.2 mm (0.039±0.008 in)		–

3. Test specifications	Solenoid timer	ON		OFF		
3 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	1,700 618 - 677 (6.18 - 6.77, 6.3 - 6.9, 90 - 98)	1,100 373 - 432 (3.73 - 4.32, 3.8 - 4.4, 54 - 63)	1,700 510 - 569 (5.10 - 5.69, 5.2 - 5.8, 74 - 82)	2,150 598 - 657 (5.98 - 6.57, 6.1 - 6.7, 87 - 95)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

3 - 4 Fuel injection quantities

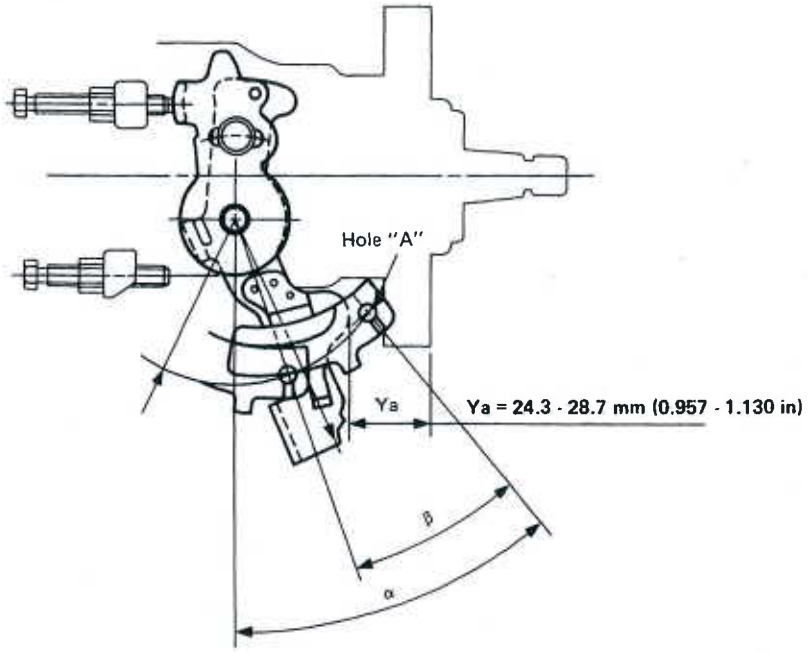
Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	44.3 - 46.3 (1.56 - 1.63)	–	–
	600	41.9 - 45.9 (1.47 - 1.62)		
	2,150	35.3 - 39.5 (1.24 - 1.39)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

4. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF906H

If there is no designation in the specifications for the Solenoid Timer's ON-OFF position, then the position should be regarded as OFF.

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump No. 104740-9782
Part No. 16700-21T12

[Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —]

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)	S/T: Solenoid timer	–
1 - 2	Supply pump pressure	1,100	S/T ON: 441 - 520 kPa (4.41 - 5.20 bar, 4.5 - 5.3 kg/cm², 64 - 75 psi) OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
	Full load delivery with charge air pressure		–	–	–
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		–

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,700 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

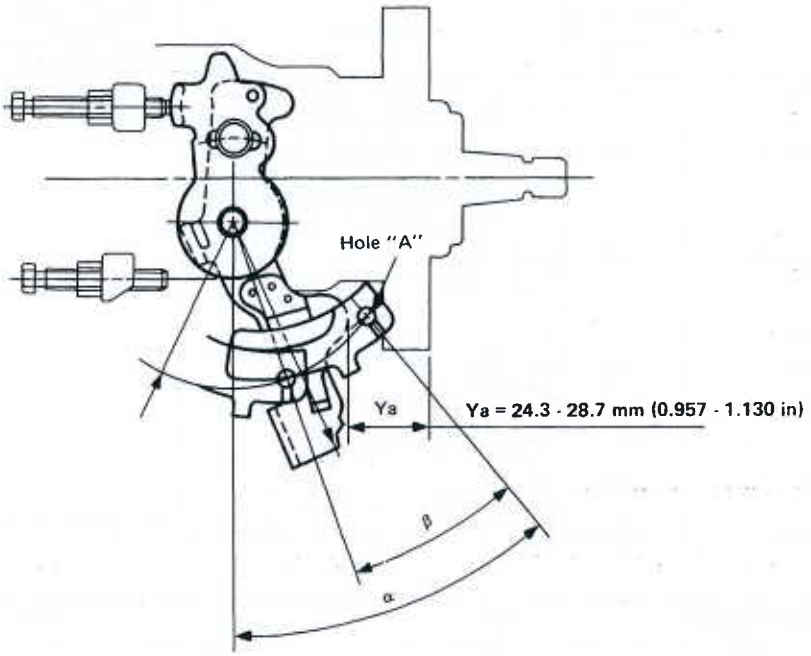
2 - 4 Fuel deliveries

Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	47.5 - 49.5 (1.67 - 1.74)	–	–
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.8 (1.36 - 1.51)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	–	–
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

If there is no designation in the specifications for the solenoid timer's ON-OFF position, then the position should be regarded as OFF.

TD25 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump No. 104740-7260
Part No. 16700-21T13

[Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —]

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)	S/T: Solenoid timer	—
1 - 2	Supply pump pressure	1,100	S/T ON: 441 - 520 kPa (4.41 - 5.20 bar, 4.5 - 5.3 kg/cm², 64 - 75 psi) OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)		—
1 - 3	Full-load delivery without charge air pressure	1,100	48.0 - 49.0 mℓ (1.69 - 1.72 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st		—
1 - 7	Load timer adjustment	1,100	T — 1.0±0.2 mm (0.039±0.008 in)		—

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

2 - 4 Fuel deliveries

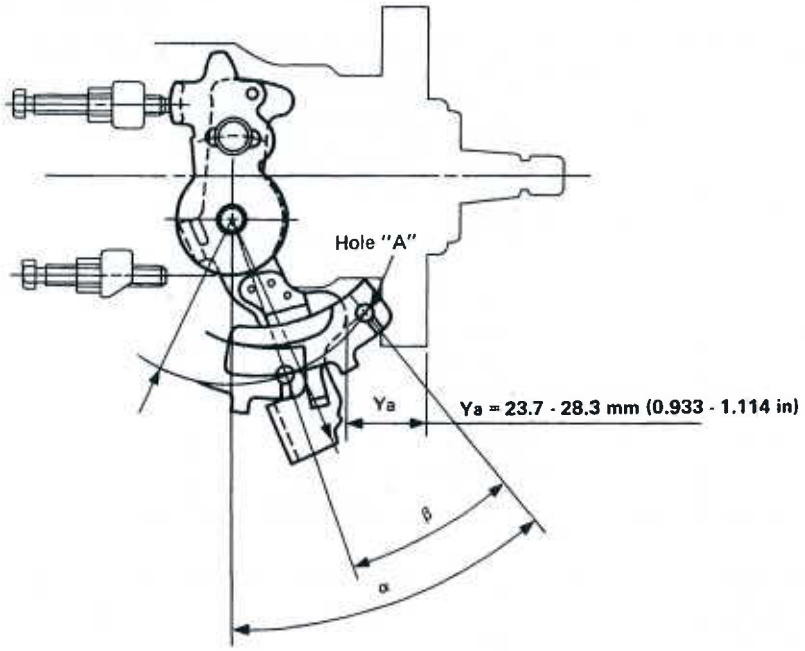
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	47.5 - 49.5 (1.67 - 1.74)	—	—
	600	45.1 - 49.1 (1.59 - 1.73)		
	2,150	38.5 - 42.7 (1.36 - 1.50)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.7 mm (0.126 - 0.146 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	50.0 - 58.0 degree
Ya	23.7 - 28.3 mm (0.933 - 1.114 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

Load timer adjustment

- Adjustment

1) Fix control lever in position under the following conditions.
   Pump speed : 1,100 rpm
   Fuel injection quantity : 37.5 - 38.5 mℓ (1.32 - 1.36 Imp fl oz)/1,000 st
2) With control lever positioned as described in 1) above, adjust governor sleeve so that timer stroke conforms to specified values.

Control lever position			Specified values	
Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Boost pressure kPa (mbar, mmHg, inHg)	Timer stroke mm (in)	Timer stroke reduction value mm (in)
1,100	37.0 - 39.0 (1.30 - 1.37)	–	–	0.7 - 1.3 (0.028 - 0.051)
1,100	28.5 - 31.5 (1.00 - 1.11)	–	–	1.2 - 2.2 (0.047 - 0.087)

Service Data and Specifications (S.D.S.) (Cont'd)

TD25 ENGINE MODEL

Injection pump assembly No.	104740-7320
Part No.	16700-21T14

Pump rotation: Clockwise—viewed from drive side

1. Test conditions

1 - 1 Nozzle: 105780-0000 (NP-DN12SD12T)

1 - 2 Nozzle holder: 105780-2080 (EF8511/9)

1 - 3 Nozzle opening pressure: $^{14,711}_{0}{}^{+883}$ kPa ($147.1^{+8.8}_{0}$ bar, 150^{+9}_{0} kg/cm², $2,133^{+128}_{0}$ psi)

1 - 4 Injection pipe: 2 x 6 x 840 mm (0.08 x 0.24 x 33.07 in)

1 - 5 Fuel oil temperature: 45^{+5}_{0}°C (113^{+9}_{0}°F)

1 - 6 Supply pump pressure: 20 kPa (0.20 bar, 0.2 kg/cm², 2.8 psi)

2. Setting	Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
2 - 1 Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)	–	–
2 - 2 Supply pump pressure	1,100	S/T ON: 481 - 539 kPa (4.81 - 5.39 bar, 4.9 - 5.5 kg/cm², 70 - 78 psi) OFF: 373 - 432 kPa (3.73 - 4.32 bar, 3.8 - 4.4 kg/cm², 54 - 63 psi)	–	–
2 - 3 Full-load delivery	1,100	44.8 - 45.8 mℓ (1.58 - 1.61 Imp fl oz)/1,000 st	–	3.0 (0.11)
2 - 4 Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st	–	2.0 (0.07)
2 - 5 Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st	–	–
2 - 6 Full-load speed regulation	2,500	10.1 - 14.1 mℓ (0.36 - 0.50 Imp fl oz)/1,000 st	–	–
2 - 7 Load-timer adjustment	1,100	T – 1.0±0.2 mm (0.039±0.008 in)	–	–

3. Test specifications	Solenoid timer	ON		OFF		
3 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.3 - 5.5 (0.169 - 0.217)	2,300 6.0 - 7.0 (0.236 - 0.276)
3 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	1,700 618 - 677 (6.18 - 6.77, 6.3 - 6.9, 90 - 98)	1,100 373 - 432 (3.73 - 4.32, 3.8 - 4.4, 54 - 63)	1,700 510 - 569 (5.10 - 5.69, 5.2 - 5.8, 74 - 82)	2,150 598 - 657 (5.98 - 6.57, 6.1 - 6.7, 87 - 95)
3 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

3 - 4 Fuel injection quantities

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
Max. speed	1,100	44.3 - 46.3 (1.56 - 1.63)	–	–
	600	41.9 - 45.9 (1.47 - 1.62)		
	2,150	35.3 - 39.5 (1.24 - 1.39)		
	2,300	28.3 - 37.3 (1.00 - 1.31)		
	2,500	9.6 - 14.6 (0.34 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF Magnet valve	350	0 (0)	–	–
Idling	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	400	Below 3.0 (0.11)		
3 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

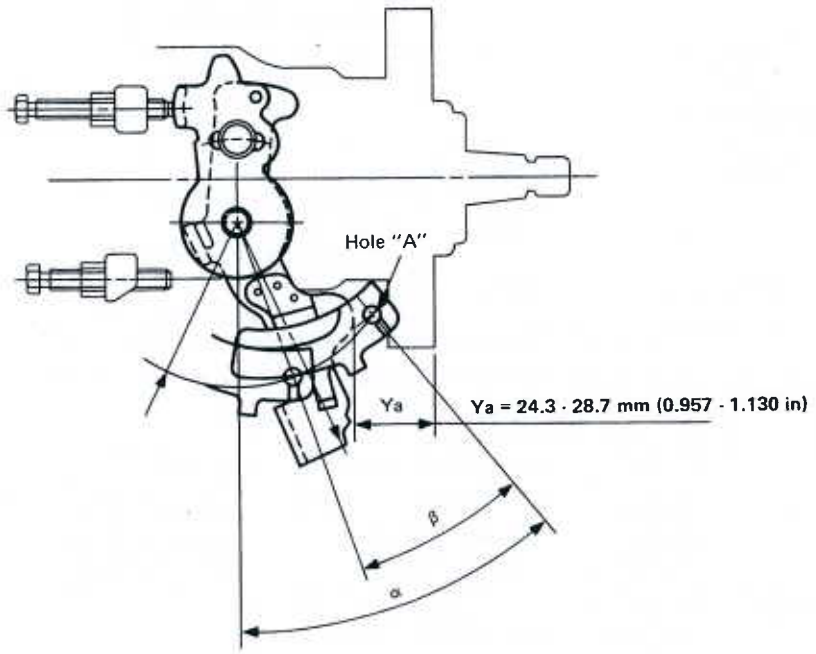
4. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Pre-stroke	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

If there is no designation in the specifications for the Solenoid Timer's ON-OFF position, then the position should be regarded as OFF.

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF906H

Load timer adjustment

1. Adjustment

(1) Fix the control lever in the position satisfying the following conditions.

Boost pressure: –
Pump speed: 1,100 rpm
Fuel injection quantity: 35.0±0.5 mℓ (1.23±0.02 Imp fl oz)/1,000 st

(2) With the control lever positioned as described in (1) above, adjust the governor sleeve so that the timer stroke conforms to the specified values (item 2 - 7).

Control lever position			Specified values	
Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Boost pressure kPa (mbar, mmHg, inHg)	Timer stroke mm (in)	Timer stroke reduction value mm (in)
1,100	35.0±1.0 (1.23±0.04)	–	–	1.0±0.3 (0.039±0.012)
1,100	28.0±1.5 (0.99±0.05)	–	–	1.7±0.5 (0.067±0.020)

TD27 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-9562
Part No.	16700-43G13

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: –

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	4.7 - 5.1 mm (0.185 - 0.201 in)		–
1 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	51.8 - 52.8 mℓ (1.82 - 1.86 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		–	–	–
1 - 4	Idle speed regulation	350	5.3 - 9.3 mℓ (0.19 - 0.33 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,350	31.0 - 35.0 mℓ (1.09 - 1.23 Imp fl oz)/1,000 st		–

2. Test specifications				
2 - 1 Timing device	N = rpm mm (in)	1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.4 - 5.4 (0.173 - 0.213)	2,550 6.8 - 7.8 (0.268 - 0.307)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 -67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

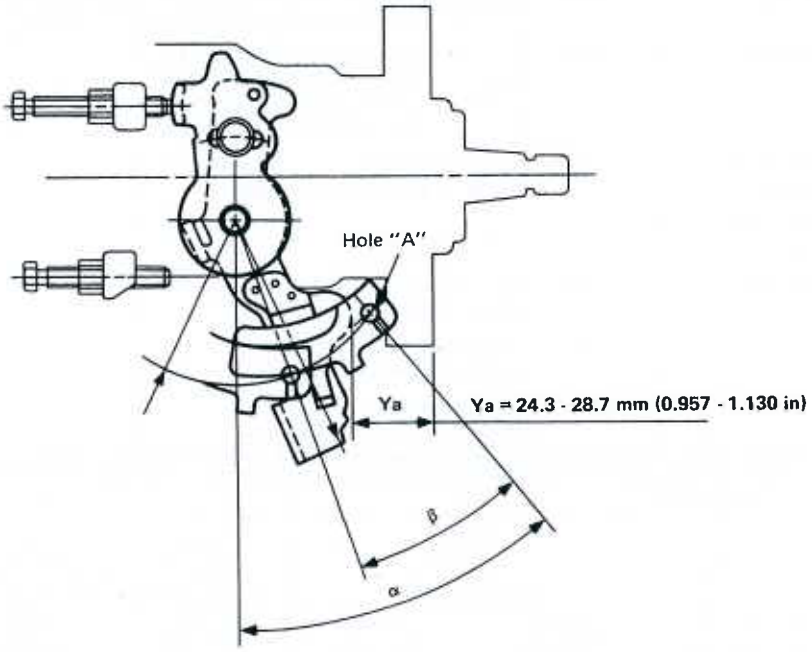
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	51.3 - 53.3 (1.81 - 1.88)	–	–
	600	50.8 - 54.8 (1.79 - 1.93)		
	2,150	40.8 - 45.0 (1.44 - 1.58)		
	2,350	30.5 - 35.5 (1.07 - 1.25)		
	2,550	5.6 - 14.6 (0.20 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	–	–
Idle stop	350	5.3 - 9.3 (0.19 - 0.33)	–	–
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.8 - 1.0 mm (0.031 - 0.039 in)
BCS	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

TD27 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No.	104740-9592
Part No.	16700-43G16

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	S/T ON: 3.9 - 4.7 mm (0.154 - 0.185 in) S/T OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)	S/T: Solenoid timer	—
1 - 2	Supply pump pressure	1,100	S/T ON: 441 - 520 kPa (4.41 - 5.20 bar, 4.5 - 5.3 kg/cm², 64 - 75 psi) S/T OFF: 343 - 402 kPa (3.43 - 4.02 bar, 3.5 - 4.1 kg/cm², 50 - 58 psi)		—
1 - 3	Full-load delivery without charge air pressure	1,100	51.8 - 52.8 mℓ (1.82 - 1.86 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	5.3 - 9.3 mℓ (0.19 - 0.33 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,350	31.0 - 35.0 mℓ (1.09 - 1.23 Imp fl oz)/1,000 st		—

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,100 3.8 - 4.8 (0.150 - 0.189)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.4 - 5.4 (0.173 - 0.213)	2,550 6.8 - 7.8 (0.268 - 0.307)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 441 - 520 (4.41 - 5.20, 4.5 - 5.3, 64 - 75)	1,700 579 - 657 (5.79 - 6.57, 5.9 - 6.7, 84 - 95)	1,100 343 - 402 (3.43 - 4.02, 3.5 - 4.1, 50 - 58)	1,700 481 - 539 (4.81 - 5.39, 4.9 - 5.5, 70 - 78)	2,150 569 - 628 (5.69 - 6.28, 5.8 - 6.4, 82 - 91)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 (Without O-ring) 60 - 103 (2.1 - 3.6)			

2 - 4 Fuel deliveries

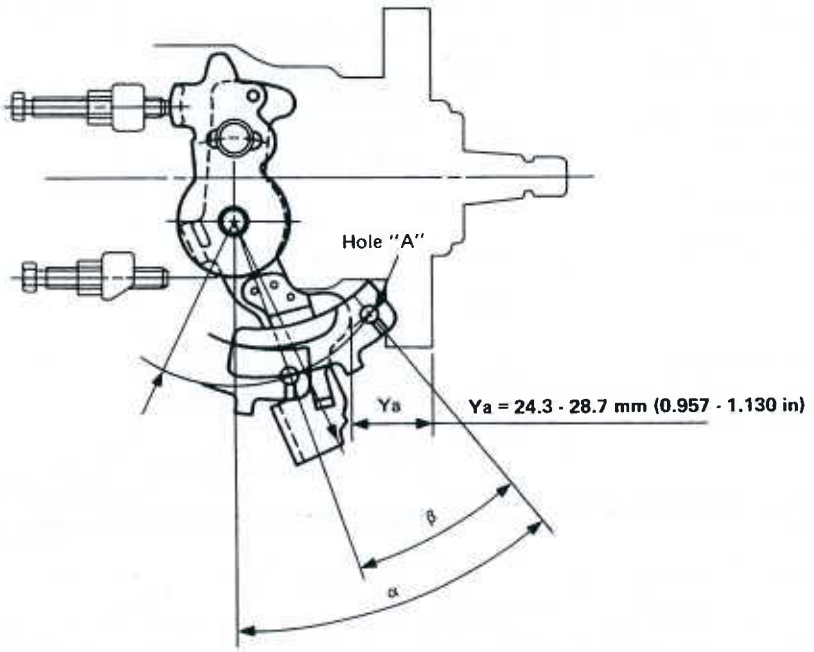
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	51.3 - 53.3 (1.81 - 1.88)	—	—
	600	50.8 - 54.8 (1.79 - 1.93)		
	2,150	40.8 - 45.0 (1.44 - 1.58)		
	2,350	30.5 - 35.5 (1.07 - 1.25)		
	2,550	5.6 - 14.6 (0.20 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	—	—
Idle stop	350	5.3 - 9.3 (0.19 - 0.33)	—	—
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.8 - 1.0 mm (0.031 - 0.039 in)
BCS	—
Control lever angle	
α	35.4 - 43.4 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

If there is no designation in the specifications for the solenoid timer's ON-OFF position, then the position should be regarded as OFF.

TD27 ENGINE MODEL — Service Data and Specifications (S.D.S.) (Cont'd)

Injection pump assembly No. 104740-9572
Part No. 16700-43G14

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: –

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,700	4.7 - 5.1 mm (0.185 - 0.201 in)		–
1 - 2	Supply pump pressure	1,700	549 - 608 kPa (5.49 - 6.08 bar, 5.6 - 6.2 kg/cm², 80 - 88 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	51.8 - 52.8 mℓ (1.82 - 1.86 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		–	–	–
1 - 4	Idle speed regulation	350	5.3 - 9.3 mℓ (0.19 - 0.33 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,350	31.0 - 35.0 mℓ (1.09 - 1.23 Imp fl oz)/1,000 st		–
1 - 7	A.C.S. adjustment	1,100	41.8 - 44.8 mℓ (1.47 - 1.58 Imp fl oz)/1,000 st	–21.9±0.7 (–219±7, –164±5, –6.46±0.20)	–

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.4 - 5.4 (0.173 - 0.213)	2,550 6.8 - 7.8 (0.268 - 0.307)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 -67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

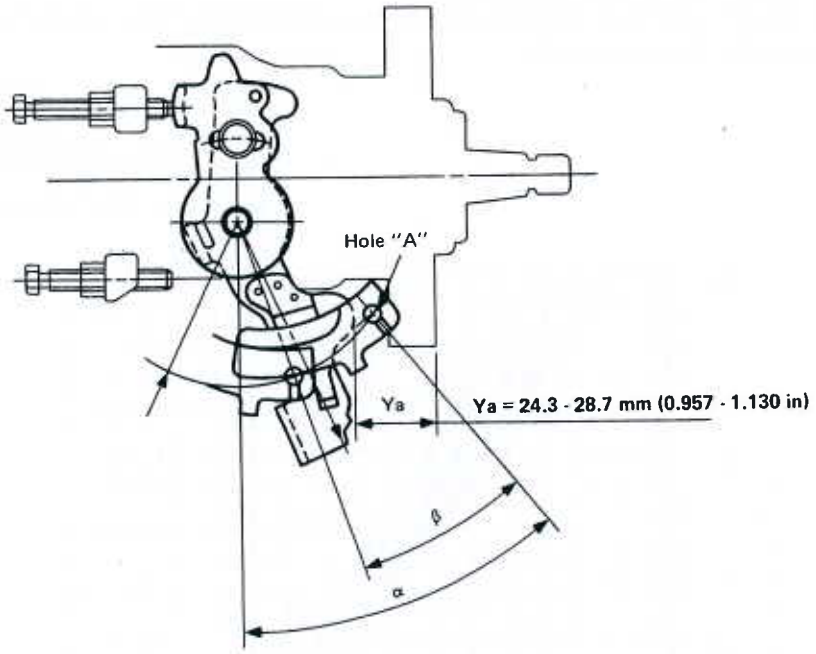
2 - 4 Fuel deliveries

Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	51.3 - 53.3 (1.81 - 1.88)	–	–
	1,100	41.2 - 45.2 (1.45 - 1.59)	–21.9±0.7 (–219±7, –164±5, –6.46±0.20)	
	600	50.8 - 54.8 (1.79 - 1.93)	–	
	2,150	40.8 - 45.0 (1.44 - 1.58)	–	
	2,350	30.5 - 35.5 (1.07 - 1.25)	–	
	2,550	5.6 - 14.6 (0.20 - 0.51)	–	
	2,700	Below 5.0 (0.18)	–	
Switch OFF	350	0 (0)	–	–
Idle stop	350	5.3 - 9.3 (0.19 - 0.33)	–	–
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.8 - 1.0 mm (0.031 - 0.039 in)
BCS	–
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	–
C	–

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

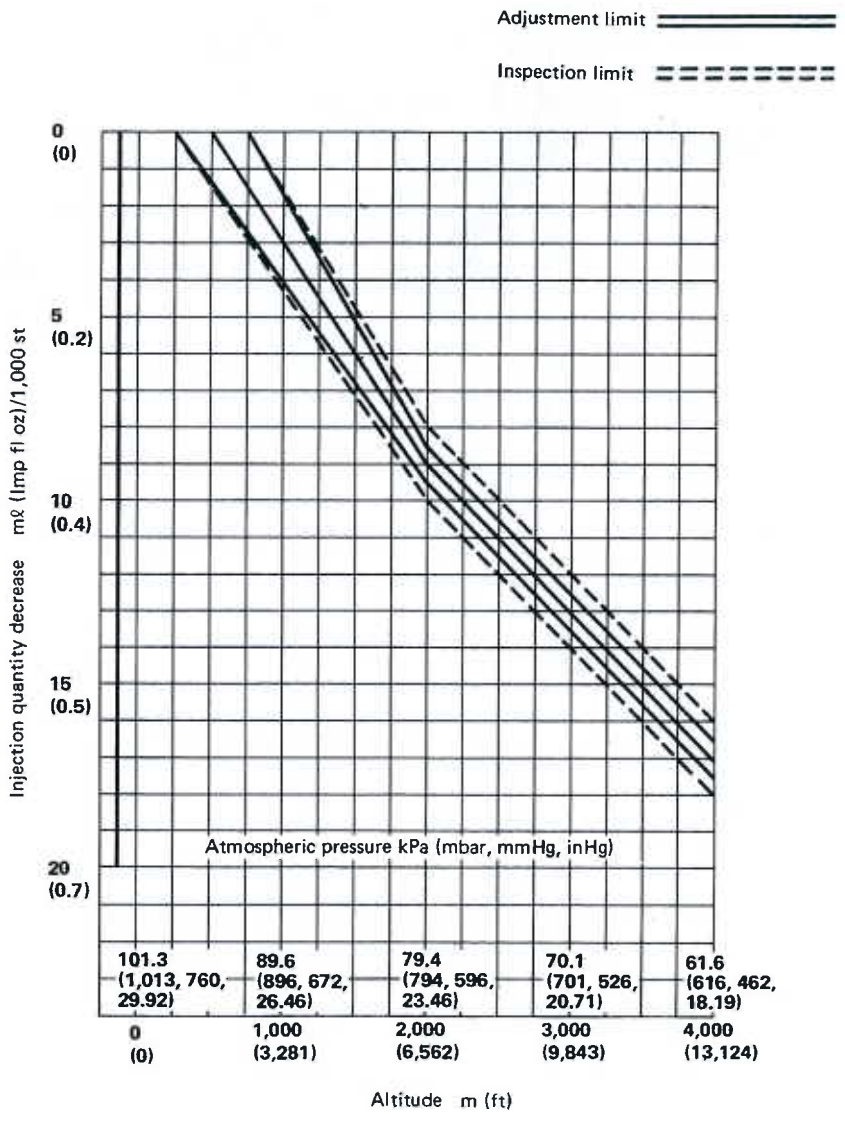
Full-load fuel injection quantity and A.C.S. adjusting procedure at high altitudes

- Full-load fuel injection quantity adjustment

1) Remove A.C.S. cover, bellows and adjusting shims.
2) Perform all adjustments as described in adjusting specifications, except for A.C.S. adjustment.

- A.C.S. adjustment

1) Attach A.C.S. cover, bellows and adjusting shims.
2) At a pump speed of 1,100 rpm and referring to graph below, use shims to adjust fuel injection quantity decrease amount according to altitude.



SEF910H

INJECTION PUMP

Service Data and Specifications (S.D.S.) (Cont'd)

TD27 ENGINE MODEL

Injection pump assembly No.	104740-9471
Part No.	16700-03T04

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: –

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	2.3 - 2.7 mm (0.091 - 0.106 in)		–
1 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm², 58 - 67 psi)		–
1 - 3	Full-load delivery without charge air pressure	1,100	51.8 - 52.8 mℓ (1.82 - 1.86 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		–	–	–
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		–
1 - 6	Full-load speed regulation	2,350	31.8 - 35.8 mℓ (1.12 - 1.26 Imp fl oz)/1,000 st		–

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.2 - 2.8 (0.087 - 0.110)	1,700 4.1 - 5.1 (0.161 - 0.201)	2,550 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

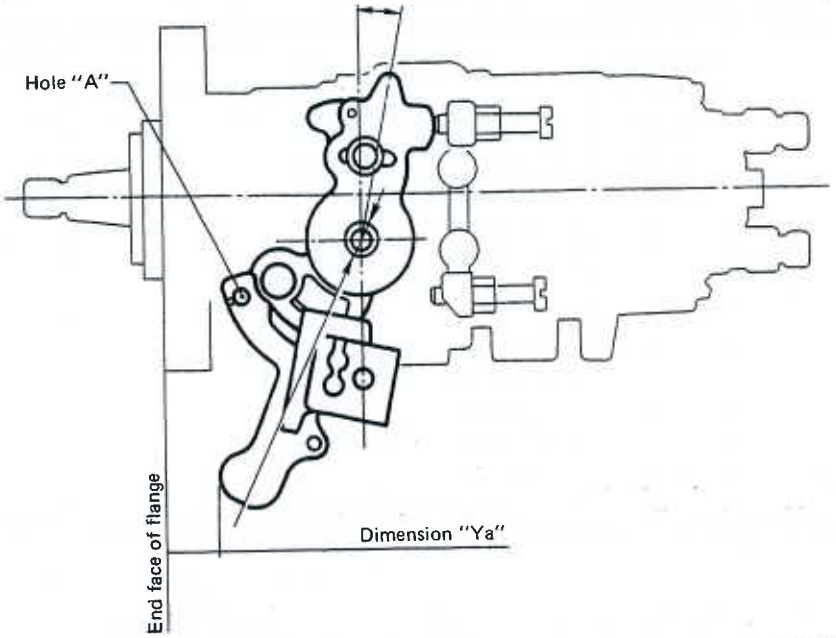
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	51.3 - 53.3 (1.81 - 1.88)	–	–
	600	49.4 - 53.4 (1.74 - 1.88)		
	2,150	42.4 - 46.6 (1.49 - 1.64)		
	2,350	31.3 - 36.3 (1.10 - 1.28)		
	2,550	7.4 - 14.4 (0.26 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	–	–
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	–	–
	450	Below 2.0 (0.07)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	–
Control lever angle	
α	50.0 - 58.0 degree
Ya	23.7 - 28.3 mm (0.933 - 1.114 in)
β	37.0 - 47.0 degree
B	10.7 - 14.8 mm (0.421 - 0.583 in)
γ	–
C	–

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF767G

TD27 ENGINE

Injection pump assemb
Part No.

1. Setting	
1 - 1	Timing device
1 - 2	Supply pump
1 - 3	Full-load deliv charge air pres
	Full-load deliv charge air pres
1 - 4	Idle speed regu
1 - 5	Start
1 - 6	Full-load speed
2. Test specifications	
2 - 1	Timing device
2 - 2	Supply pump
2 - 3	Overflow delivery
2 - 4	Fuel deliveries
Speed control lever	
End stop	
Switch OFF	
Idle stop	
2 - 5	Solenoid

TD27 ENGINE MODEL

Injection pump assembly No.	104740-9422
Part No.	16700-11T18

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	2.3 - 2.7 mm (0.091 - 0.106 in)		—
1 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm², 58 - 67 psi)		—
1 - 3	Full-load delivery without charge air pressure	1,100	51.8 - 52.8 mℓ (1.82 - 1.86 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	4.5 - 8.5 mℓ (0.16 - 0.30 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,350	31.8 - 35.8 mℓ (1.12 - 1.26 Imp fl oz)/1,000 st		—

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.2 - 2.8 (0.087 - 0.110)	1,700 4.1 - 5.1 (0.161 - 0.201)	2,550 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

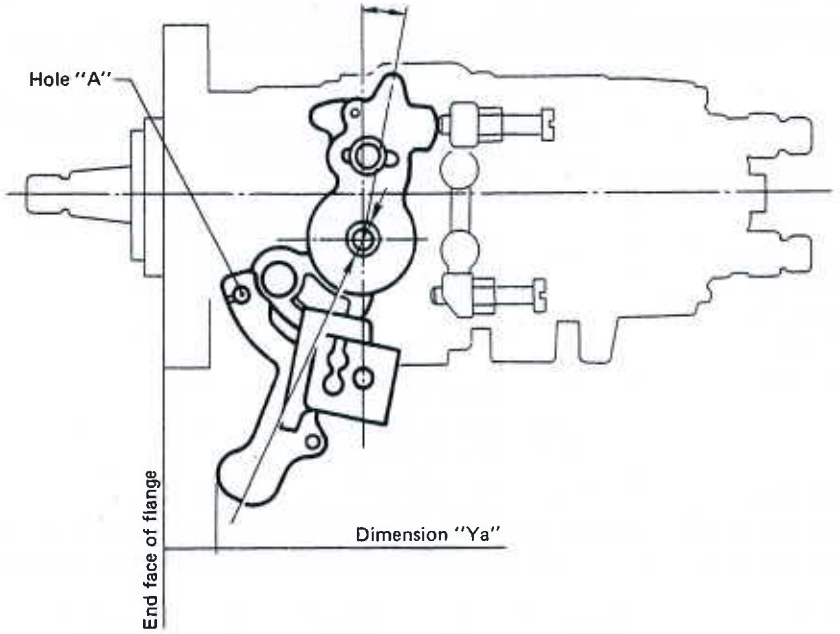
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	51.3 - 53.3 (1.81 - 1.88)	—	—
	600	49.4 - 53.4 (1.74 - 1.88)		
	2,150	42.4 - 46.6 (1.49 - 1.64)		
	2,350	31.3 - 36.3 (1.10 - 1.28)		
	2,550	7.4 - 14.4 (0.26 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	—	—
Idle stop	350	4.5 - 8.5 (0.16 - 0.30)	—	—
	450	Below 2.0 (0.07)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.9 - 1.1 mm (0.035 - 0.043 in)
BCS	—
Control lever angle	
α	50.0 - 58.0 degree
Ya	23.7 - 28.3 mm (0.933 - 1.114 in)
β	37.0 - 47.0 degree
B	10.7 - 14.8 mm (0.421 - 0.583 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure the control lever angles (α, β) at hole "A".



SEF767G

Service Data and Specifications (S.D.S.) (Cont'd)

TD27 ENGINE MODEL

Injection pump No.	104740-9881
Part No.	16700-22T04

[Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —]

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	2.4 - 2.8 mm (0.094 - 0.110 in)		—
1 - 2	Supply pump pressure	1,100	402 - 461 kPa (4.02 - 4.61 bar, 4.1 - 4.7 kg/cm², 58 - 67 psi)		—
1 - 3	Full-load delivery without charge air pressure	1,100	51.7 - 52.7 mℓ (1.82 - 1.86 Imp fl oz)/1,000 st		3.0 (0.11)
	Full-load delivery with charge air pressure		—	—	—
1 - 4	Idle speed regulation	350	5.3 - 9.3 mℓ (0.19 - 0.33 Imp fl oz)/1,000 st		2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st		—
1 - 6	Full-load speed regulation	2,350	31.0 - 35.0 mℓ (1.09 - 1.23 Imp fl oz)/1,000 st		—

2. Test specifications

2 - 1 Timing device	N = rpm mm (in)	1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.4 - 5.4 (0.173 - 0.213)	2,550 6.8 - 7.8 (0.268 - 0.307)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 402 - 461 (4.02 - 4.61, 4.1 - 4.7, 58 - 67)	1,700 549 - 608 (5.49 - 6.08, 5.6 - 6.2, 80 - 88)	2,150 647 - 706 (6.47 - 7.06, 6.6 - 7.2, 94 - 102)
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)		

2 - 4 Fuel deliveries

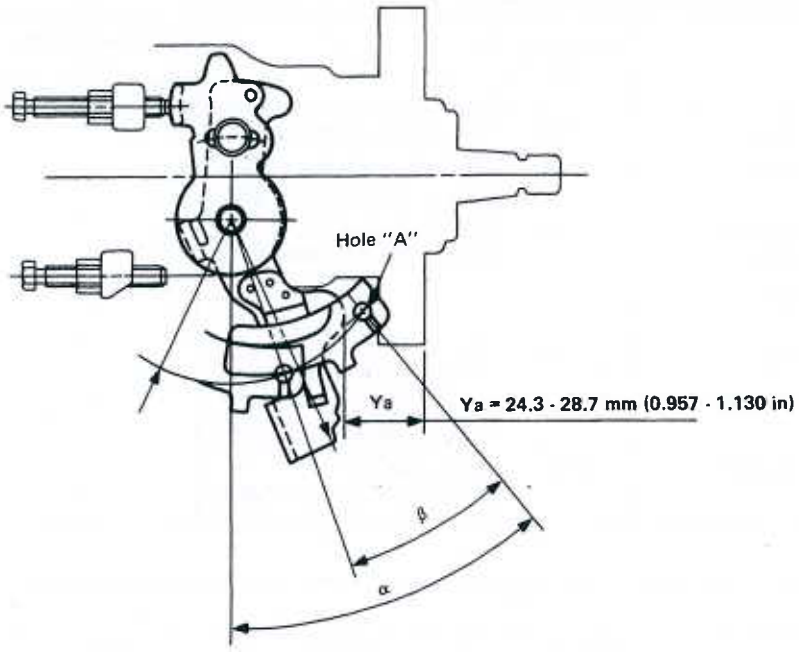
Speed control lever	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	51.2 - 53.2 (1.80 - 1.87)	—	—
	600	50.8 - 54.8 (1.79 - 1.93)		
	2,150	40.8 - 45.0 (1.44 - 1.58)		
	2,350	30.5 - 35.5 (1.07 - 1.25)		
	2,550	5.6 - 14.6 (0.20 - 0.51)		
	2,700	Below 5.0 (0.18)		
Switch OFF	350	0 (0)	—	—
Idle stop	350	5.3 - 9.3 (0.19 - 0.33)	—	—
	450	Below 3.0 (0.11)		
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.4 mm (0.126 - 0.134 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.8 - 1.0 mm (0.031 - 0.039 in)
BCS	—
Control lever angle	
α	35.5 - 43.5 degree
Ya	24.3 - 28.7 mm (0.957 - 1.130 in)
β	31.0 - 41.0 degree
B	9.3 - 12.9 mm (0.366 - 0.508 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

Control lever angle measurement position

Measure control lever angles (α, β) at hole "A".



SEF906H

Service Data and Specifications (S.D.S.) (Cont'd)

TD27T ENGINE MODEL

Injection pump assembly No.	104740-7111
Part No.	16700-80G07

Pump rotation: Clockwise—viewed from drive side
Pre-stroke: —

1. Setting		Pump speed rpm	Settings	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
1 - 1	Timing device travel	1,100	S/T ON: 4.3 - 5.1 mm (0.169 - 0.201 in) OFF: 2.4 - 2.8 mm (0.094 - 0.110 in)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	—
1 - 2	Supply pump pressure	1,100	S/T ON: 549 - 628 kPa (5.49 - 6.28 bar, 5.6 - 6.4 kg/cm², 80 - 91 psi) OFF: 392 - 451 kPa (3.92 - 4.51 bar, 4.0 - 4.6 kg/cm², 57 - 65 psi)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	—
1 - 3	Full-load delivery without charge air pressure	1,100	61.8 - 62.8 mℓ (2.18 - 2.21 Imp fl oz)/1,000 st	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	3.0 (0.11)
	Full-load delivery with charge air pressure	850	58.4 - 59.4 mℓ (2.06 - 2.09 Imp fl oz)/1,000 st	32.0 - 34.7 (320 - 347, 240 - 260, 9.45 - 10.24)	—
1 - 4	Idle speed regulation	375	6.4 - 10.4 mℓ (0.23 - 0.37 Imp fl oz)/1,000 st	0 (0, 0, 0)	2.0 (0.07)
1 - 5	Start	100	45.0 - 80.0 mℓ (1.58 - 2.82 Imp fl oz)/1,000 st	0 (0, 0, 0)	—
1 - 6	Full-load speed regulation	2,250	40.8 - 44.8 mℓ (1.44 - 1.58 Imp fl oz)/1,000 st	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	—

2. Test specifications	Solenoid timer	ON		OFF		
2 - 1 Timing device	N = rpm mm (in)	1,100 4.2 - 5.2 (0.165 - 0.205)		1,100 2.3 - 2.9 (0.091 - 0.114)	1,700 4.5 - 5.7 (0.177 - 0.224)	2,500 6.4 - 7.4 (0.252 - 0.291)
2 - 2 Supply pump	N = rpm kPa (bar, kg/cm², psi)	1,100 549 - 628 (5.49 - 6.28, 5.6 - 6.4, 80 - 91)	1,700 726 - 804 (7.26 - 8.04, 7.4 - 8.2, 105 - 117)	1,100 392 - 451 (3.92 - 4.51, 4.0 - 4.6, 57 - 65)	1,700 579 - 637 (5.79 - 6.37, 5.9 - 6.5, 84 - 92)	
2 - 3 Overflow delivery	N = rpm mℓ (Imp fl oz)/ 10 sec.	1,100 43.0 - 87.0 (1.51 - 3.06)	1,100 60 - 103 (2.1 - 3.6) (Without O-ring)			

2 - 4 Fuel deliveries

Speed control lever position	Pump speed rpm	Fuel delivery mℓ (Imp fl oz)/ 1,000 st	Charge air press kPa (mbar, mmHg, inHg)	Difference in delivery mℓ (Imp fl oz)
End stop	1,100	61.3 - 63.3 (2.16 - 2.23)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	—
	1,100	47.6 - 52.6 (1.68 - 1.85)	0 (0, 0, 0)	
	850	57.9 - 59.9 (2.04 - 2.11)	32.0 - 34.7 (320 - 347, 240 - 260, 9.45 - 10.24)	
	2,000	52.2 - 57.2 (1.84 - 2.01)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	
	2,150	48.9 - 53.9 (1.72 - 1.90)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	
	2,250	40.3 - 45.3 (1.42 - 1.59)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	
	2,500	13.3 - 22.3 (0.47 - 0.78)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	
	2,700	Below 3.0 (0.11)	54.7 - 57.3 (547 - 573, 410 - 430, 16.14 - 16.93)	
Switch OFF	375	0 (0)	0 (0)	—
Idle stop	375	6.4 - 10.4 (0.23 - 0.37)	0 (0)	—
	450	Below 5.0 (0.18)	0 (0)	
2 - 5 Solenoid	Max. cut-in voltage: 8V Test voltage: 12 - 14V			

3. Dimensions	
K	3.2 - 3.7 mm (0.126 - 0.146 in)
KF	5.7 - 5.9 mm (0.224 - 0.232 in)
MS	0.8 - 1.0 mm (0.031 - 0.039 in)
BCS	3.4 - 3.6 mm (0.134 - 0.142 in)
Control lever angle	
α	6.0 - 14.0 degree
A	4.0 - 9.2 mm (0.157 - 0.362 in)
β	31.0 - 41.0 degree
B	8.8 - 12.8 mm (0.346 - 0.504 in)
γ	—
C	—

Service Data and Specifications (S.D.S.) (Cont'd)

- When confirming timing device travel and supply pump pressure characteristics, apply a boost pressure of 54.7 to 57.3 kPa (547 to 573 mbar, 410 to 430 mmHg, 16.14 to 16.93 inHg) to the boost chamber.
- If there is no designation in the specifications for the Solenoid Timer's ON-OFF position, then the position should be regarded as OFF.
- After adjustment of full load fuel injection quantity [1,100 rpm, 61.8 to 62.8 mℓ (2.18 to 2.21 Imp fl oz)/1,000 st], set the boost pressure at 32.0 to 34.7 kPa (320 to 347 mbar, 240 to 260 mmHg, 9.45 to 10.24 inHg), and at a pump speed of 850 rpm adjust the fuel injection quantity using the B.C.S. spring set screw.

Potentiometer adjustment

Under the following conditions, alter the potentiometer's installation position so that the output voltage equals the specified value.

Adjustment conditions			Specified value	Remarks
Control lever position	Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/1,000 st	Output voltage V	
Measure	750	16.8 - 18.8 (0.59 - 0.66)	4.0±0.03	Adjusting point
Idle	–	–	–	Check point
Full speed	–	–	–	Check point

[Input voltage: 10V]

TIGHTEN

Unit

Distributor h pump housir

Plug to distri

Delivery valv distributor h

Pivot pin to housing

Regulating v pump housir

Control shaf lever

Injection pu gear nut

Injection pu

Injection pu mounting br

Injection no cylinder hea

Injection tul

Spill tube nu

Feed pump pump housi

Speed timer pump housi

Governor sh

Overflow val

Maximum a adjusting scr

Full-load ad lock nut

Fuel cut sol

Plug bolt

Adjusting rc lock nut

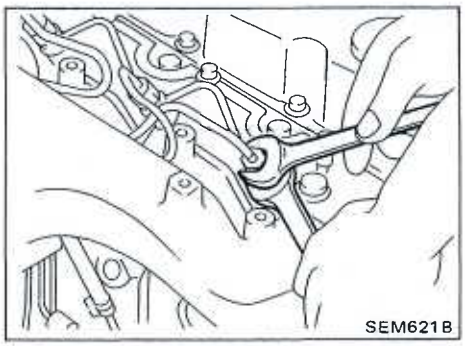
*: Part No.

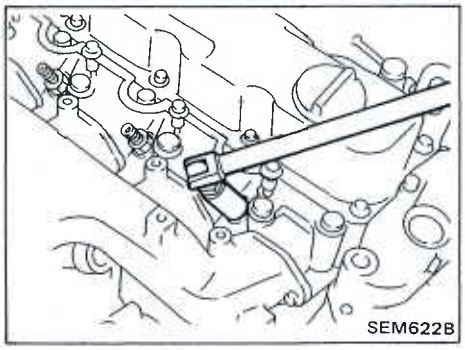
Service Data and Specifications (S.D.S.) (Cont'd)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Distributor head to pump housing	10 - 14	1.0 - 1.4	7 - 10
Plug to distributor head	59 - 78	6.0 - 8.0	43 - 58
Delivery valve to distributor head	44 - 54	4.5 - 5.5	33 - 40
Pivot pin to pump housing	10 - 13	1.0 - 1.3	7 - 9
Regulating valve to pump housing	10 - 13	1.0 - 1.3	7 - 9
Control shaft to control lever	7 - 10	0.7 - 1.0	5.1 - 7.2
Injection pump drive gear nut	59 - 69	6.0 - 7.0	43 - 51
Injection pump fixing bolt	19 - 25	1.9 - 2.5	14 - 18
Injection pump to mounting bracket	30 - 41	3.1 - 4.2	22 - 30
Injection nozzle to cylinder head*	54 - 64	5.5 - 6.5	40 - 47
Injection tube flare nut	20 - 25	2.0 - 2.5	14 - 18
Spill tube nut	29 - 39	3.0 - 4.0	22 - 29
Feed pump cover to pump housing	2 - 3	0.2 - 0.3	1.4 - 2.2
Speed timer cover to pump housing	6 - 8	0.6 - 0.8	4.3 - 5.8
Governor shaft lock nut	17 - 22	1.7 - 2.2	12 - 16
Overflow valve	20 - 29	2.0 - 3.0	14 - 22
Maximum and idle speed adjusting screw lock nuts	6 - 9	0.6 - 0.9	4.3 - 6.5
Full-load adjusting screw lock nut	7 - 9	0.7 - 0.9	5.1 - 6.5
Fuel cut solenoid valve	15 - 25	1.5 - 2.5	11 - 18
Plug bolt	14 - 20	1.4 - 2.0	10 - 14
Adjusting rod bushing lock nut	25 - 34	2.5 - 3.5	18 - 25

*: Part No. of injection nozzle: 16600-43G02


SEM621B


SEM622B

REMOVAL AND INSTALLATION

1. Remove injection tube assembly.
2. Remove spill tube assembly.

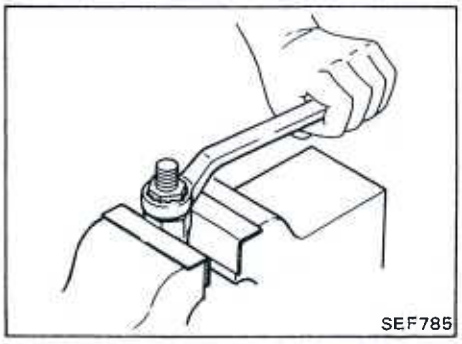
To prevent spill tube from breaking, remove it by gripping nozzle holder.

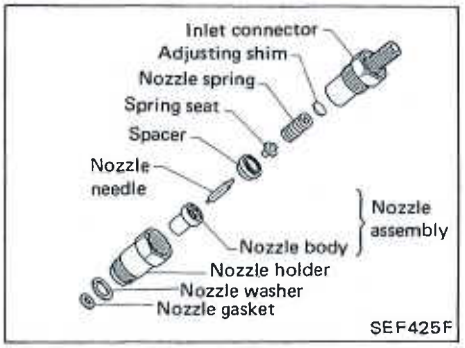
3. Remove injection nozzle assembly using deep socket wrench.
4. Install injection nozzle in the reverse order of removal.

[O] : Injection nozzle to cylinder head
54 - 64 N·m
(5.5 - 6.5 kg-m, 40 - 47 ft-lb)
Spill tube nut
29 - 39 N·m
(3.0 - 4.0 kg-m, 22 - 29 ft-lb)
Injection tube flare nut
20 - 25 N·m
(2.0 - 2.5 kg-m, 14 - 18 ft-lb)

a. **Nozzle gaskets should always be replaced.**
b. **To prevent spill tube from breaking later, spill tube nuts should be tightened gradually in sequence.**

5. Bleed air from fuel system.
Refer to BLEEDING FUEL SYSTEM.


SEF785



SEF425F

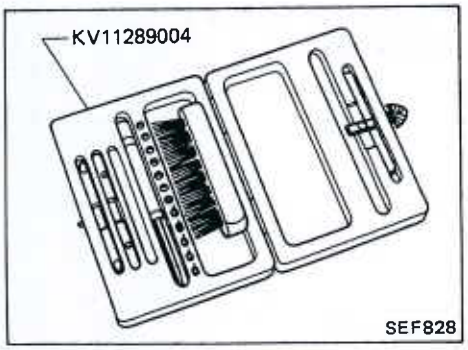
DISASSEMBLY

1. Loosen inlet connector while keeping nozzle top from turning.
2. Arrange all disassembled parts in order shown at left.

INSPECTION

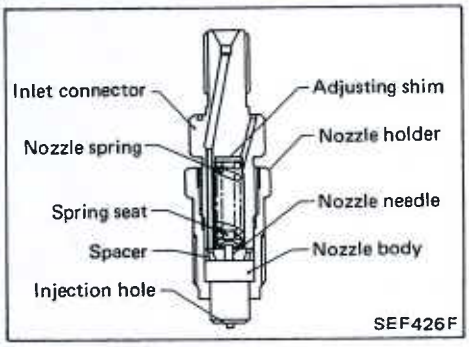
Thoroughly clean all disassembled parts with fresh kerosene or solvent.

- If nozzle needle is damaged or fused, replace nozzle assembly with a new one.
- If end of nozzle needle is seized or excessively discolored, replace nozzle assembly.
- Check nozzle body and distance piece for proper contact. If excessively worn or damaged, replace nozzle assembly or nozzle holder assembly.
- Check distance piece and nozzle holder for proper contact. If excessively worn or damaged, replace nozzle holder assembly.
- Check nozzle spring for excessive wear or damage. If excessively worn or damaged, replace nozzle holder assembly.

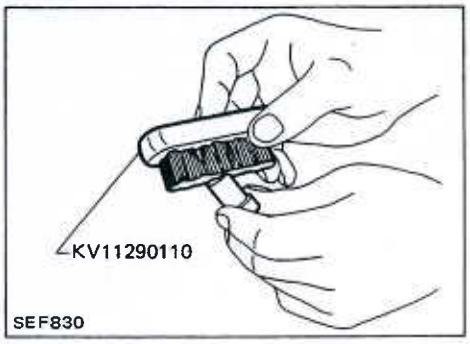


CLEANING

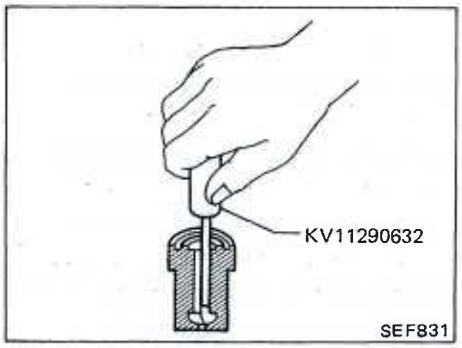
1. Clean nozzle assembly using the Nozzle Cleaning Kit.



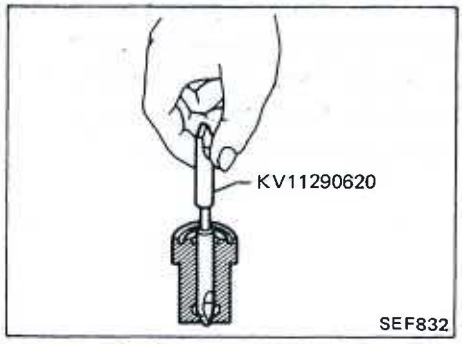
2. Portions which should be cleaned are indicated in the left figure.



3. Remove any carbon from exterior of nozzle body (except wrapping angle portion) by using Tool.

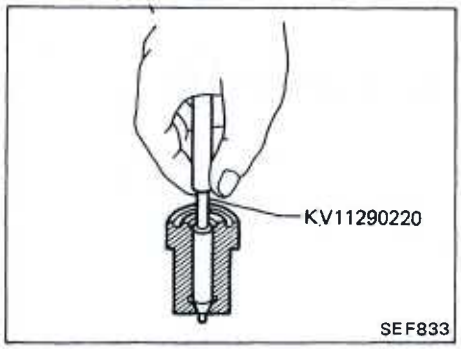


4. Clean fuel sump of nozzle body using Tool.



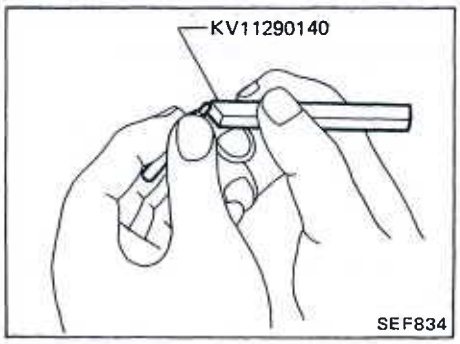
5. Clean nozzle seat by using Tool.

This job should be performed with extra precautions, since efficiency of nozzle depends greatly on a good nozzle seat.

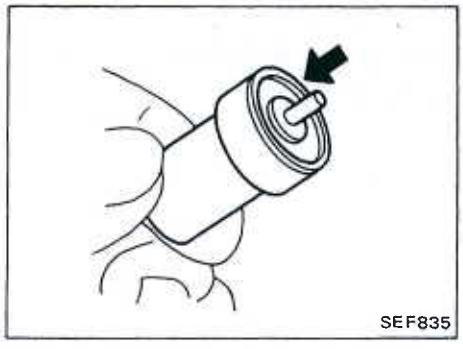


6. Clean spray hole of nozzle body by using Tool.

To prevent spray hole from canting, always clean it by starting with inner side and working towards outside.

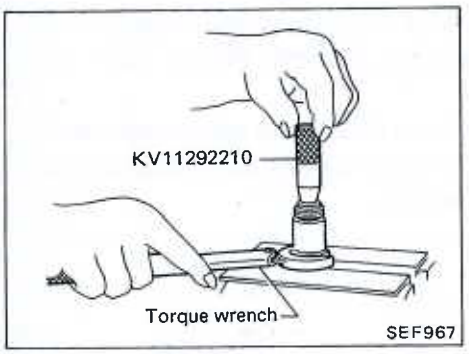


7. Decarbon nozzle needle tip by using Tool.



8. Check needle for proper position.
(1) Pull needle about halfway out from body and then release it.
(2) Needle should sink into body very smoothly from just its own weight.
(3) Repeat this test and rotate needle slightly each time.

If needle fails to sink smoothly from any position, replace both needle and body as a unit.



ASSEMBLY

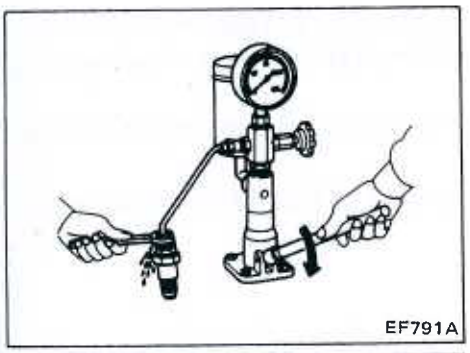
Assemble in the reverse order of disassembly.

[O] : **Inlet connector to nozzle holder**
29 - 49 N·m
(3.0 - 5.0 kg-m, 22 - 36 ft-lb)

TEST AND ADJUSTMENT

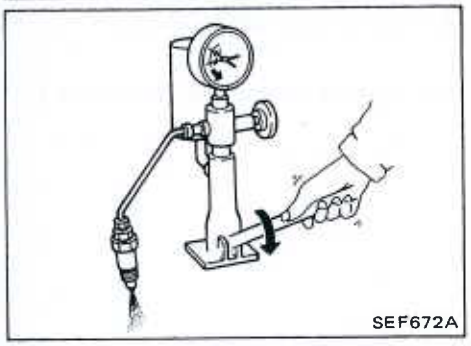
WARNING:

When using nozzle tester, be careful not to allow fuel sprayed from nozzle to come into contact with your hand or body, and make sure that your eyes are properly protected with goggles.



Injection pressure test

1. Install nozzle to injection nozzle tester and bleed air from flare nut.



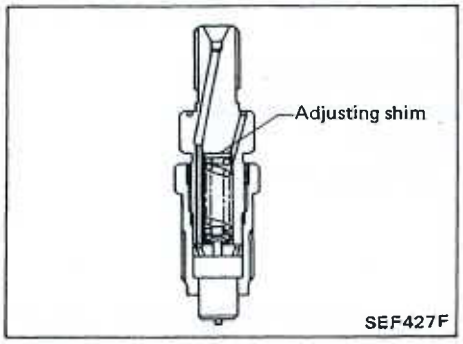
2. Pump the tester handle slowly (one time per second) and watch the pressure gauge.
3. Read the pressure gauge when the injection pressure just starts dropping.

Initial injection pressure:

Used **9,807 - 10,297 kPa**
(98.1 - 103.0 bar, 100 - 105 kg/cm^2, 1,422 - 1,493 psi)

New **10,297 - 11,278 kPa**
(103.0 - 112.8 bar, 105 - 115 kg/cm^2, 1,493 - 1,635 psi)

New nozzle is required to always check initial injection pressure.

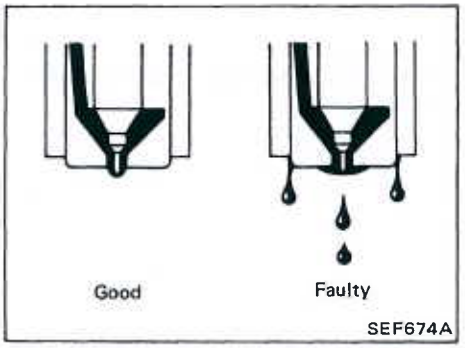


4. To adjust injection pressure, change adjusting shims.

a. Increasing the thickness of adjusting shims increases initial injection pressure. Decreasing thickness reduces initial pressure.

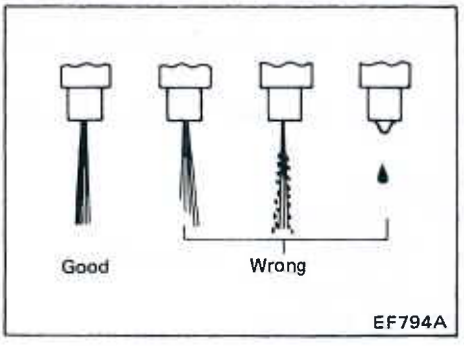
b. A shim thickness of 0.04 mm (0.0016 in) corresponds approximately to a difference of 471 kPa (4.71 bar, 4.8 kg/cm², 68 psi) in initial injection pressure.

Thickness mm (in)	Part No.
0.1 (0.004)	16613-43G00
0.2 (0.008)	16613-43G01
0.3 (0.012)	16613-43G02
0.4 (0.016)	16613-43G03
0.5 (0.020)	16613-43G04
0.52 (0.0205)	16613-43G05
0.54 (0.0213)	16613-43G06
0.56 (0.0220)	16613-43G07
0.58 (0.0228)	16613-43G08
0.8 (0.031)	16613-43G09



Leakage test

1. Maintain the pressure at about 981 to 1,961 kPa (9.8 to 19.6 bar, 10 to 20 kg/cm², 142 to 284 psi) below initial injection pressure.
2. Check that there is no dripping from the nozzle tip or around the body.
3. If there is leakage, clean, overhaul injection nozzle or replace it.



Spray pattern test

1. Pump the tester handle 4 to 6 times per second or more.
2. Check the spray pattern.
3. If the spray pattern is not correct, clean injection nozzle or replace it.

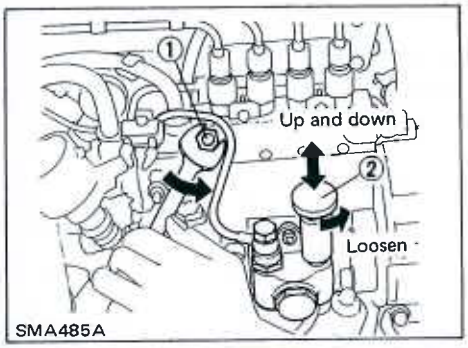
BLEEDING FUEL SYSTEM (Engine on vehicle)

Air should be bled out of fuel system when injection pump is removed or fuel system is repaired.

Protect pump and engine mounts from fuel splash with rags.

If engine will not start after bleeding air, loosen injection tubes at nozzle side and crank engine until fuel overflows from injection tube. Tighten injection tube flare nuts.

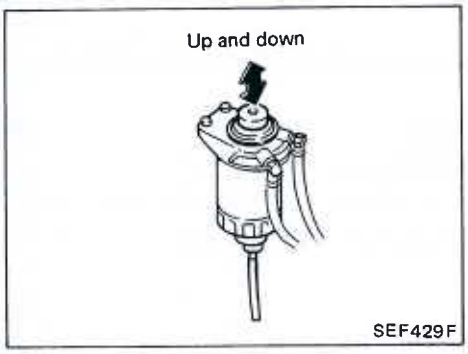
If the engine does not operate smoothly after it has started, race it two or three times.



SMA485A

In-line pump

1. Remove the cap that covers the priming pump ②.
2. Turn the priming pump ② counterclockwise.
3. Loosen the air vent screws ①.
4. Move the priming pump ② up and down until no further air-bleed comes out of the air vent screws ①.
5. Tighten the air vent screws ①.
6. Push and turn the priming pump clockwise.
7. Install the cap.

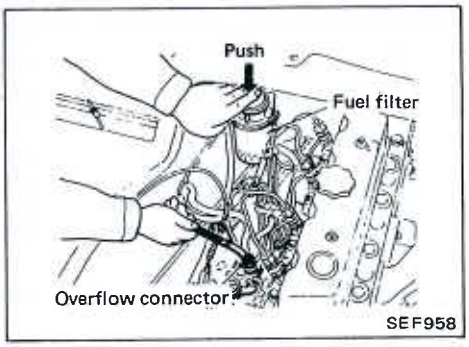


SEF429F

VE pump without air vent screw

- **Method A**

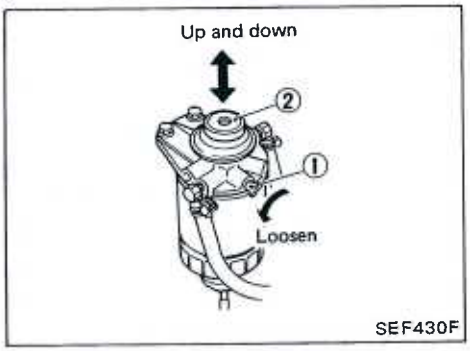
Move the priming pump up and down until there is suddenly more resistance in the movement.



SEF958

- **Method B**

1. Loosen injection pump bleeder screw/or disconnect return hose and priming.
2. Make sure that fuel overflows at bleeder screw/tube end, then tighten it/connect hose.

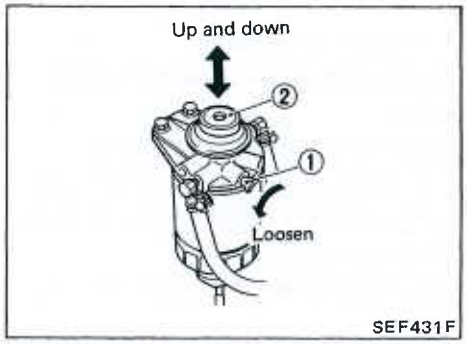


SEF430F

VE pump with air vent screw

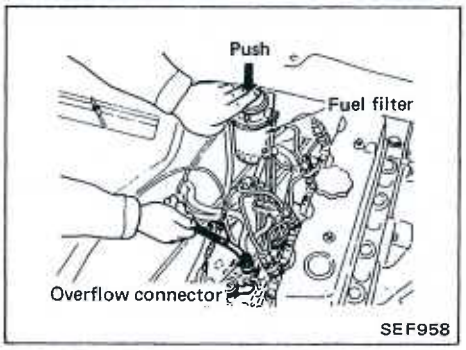
- **Method A**

1. Loosen the air vent screw ①.
2. Move the priming pump ② up and down until no further air-bleed comes out of the air vent screw ①.
3. Tighten the air vent screw ①.
4. Move the priming pump ② up and down until there is suddenly more resistance in the movement.

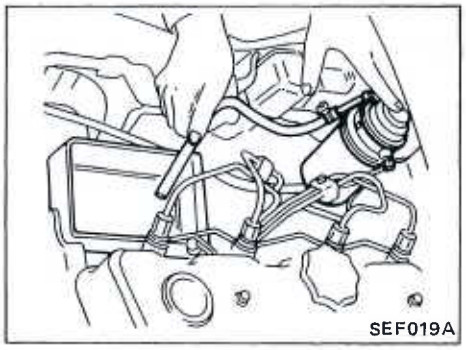


- **Method B**

1. Loosen the air vent screw ①.
2. Move the priming pump ② up and down until no further air-bleed comes out of the air vent screw ①.
3. Tighten the air vent screw ①.



4. Loosen injection pump bleeder screw/or disconnect return hose and priming.
5. Make sure that fuel overflows at bleeder screw/tube end, then tighten it/connect hose.



CHECKING PRIMING PUMP

- **VE pump**

Before checking priming pump, make sure that fuel filter is filled with fuel.

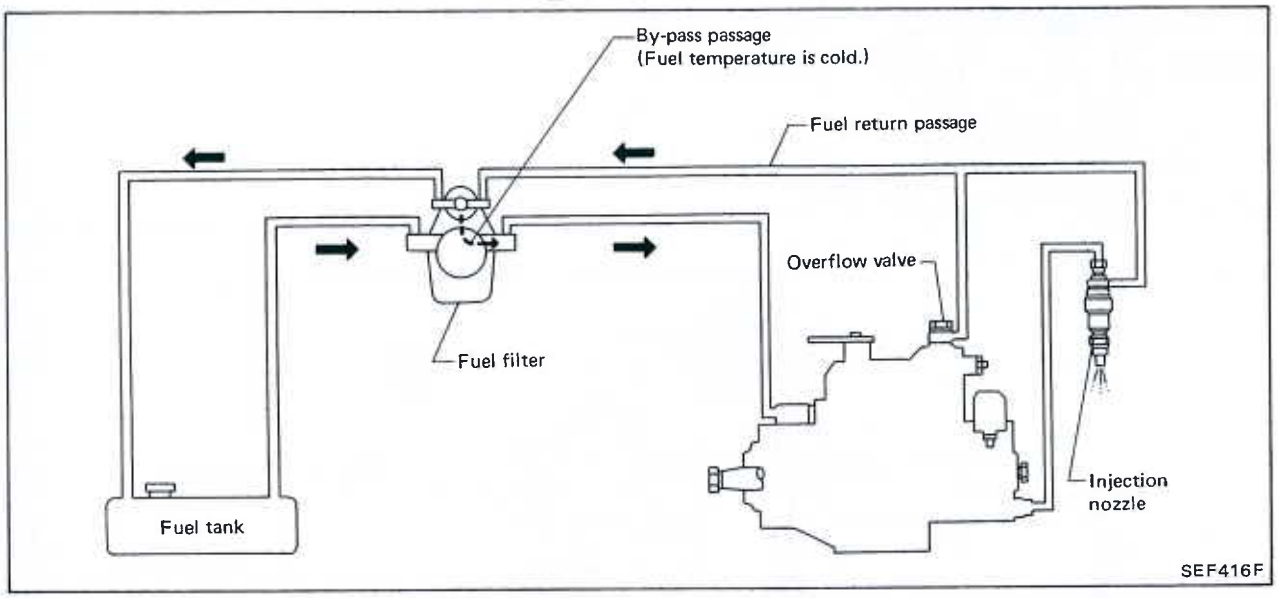
1. Disconnect fuel return hose.

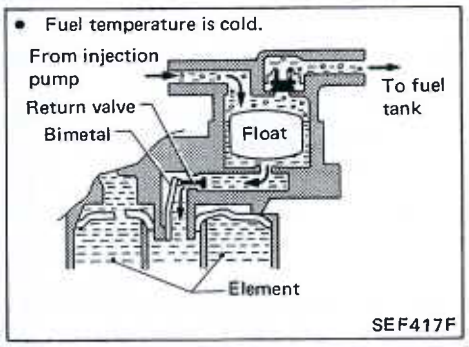
Place a suitable container beneath hose end.

2. Pump priming pump and check that the fuel overflows from the hose end. If not, replace priming pump.

Fuel Return Control System

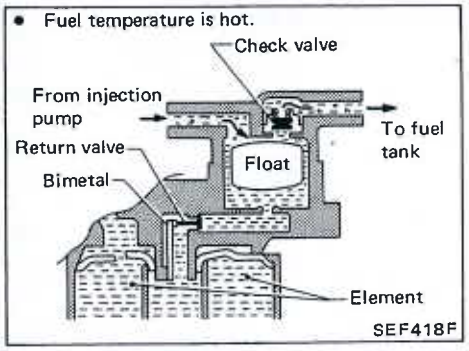
- Fuel return control system is used on models for Europe and cold areas.

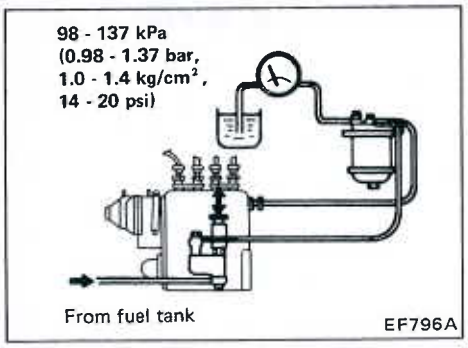




Fuel Return Control System (FRCS) prevents clogging of the fuel filter by circulating overflow fuel warmed by the fuel injection pump when ambient temperatures are low. The float valve in the system prevents trapped air from circulating through the fuel line and the check valve prevents reverse flow of fuel from the fuel tank.

When the fuel temperature is above 30°C (86°F), a bimetal valve activates to stop fuel circulation.

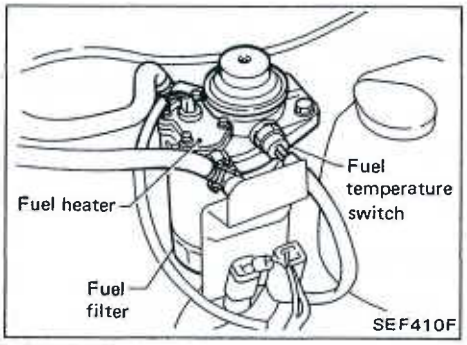




Overflow Valve

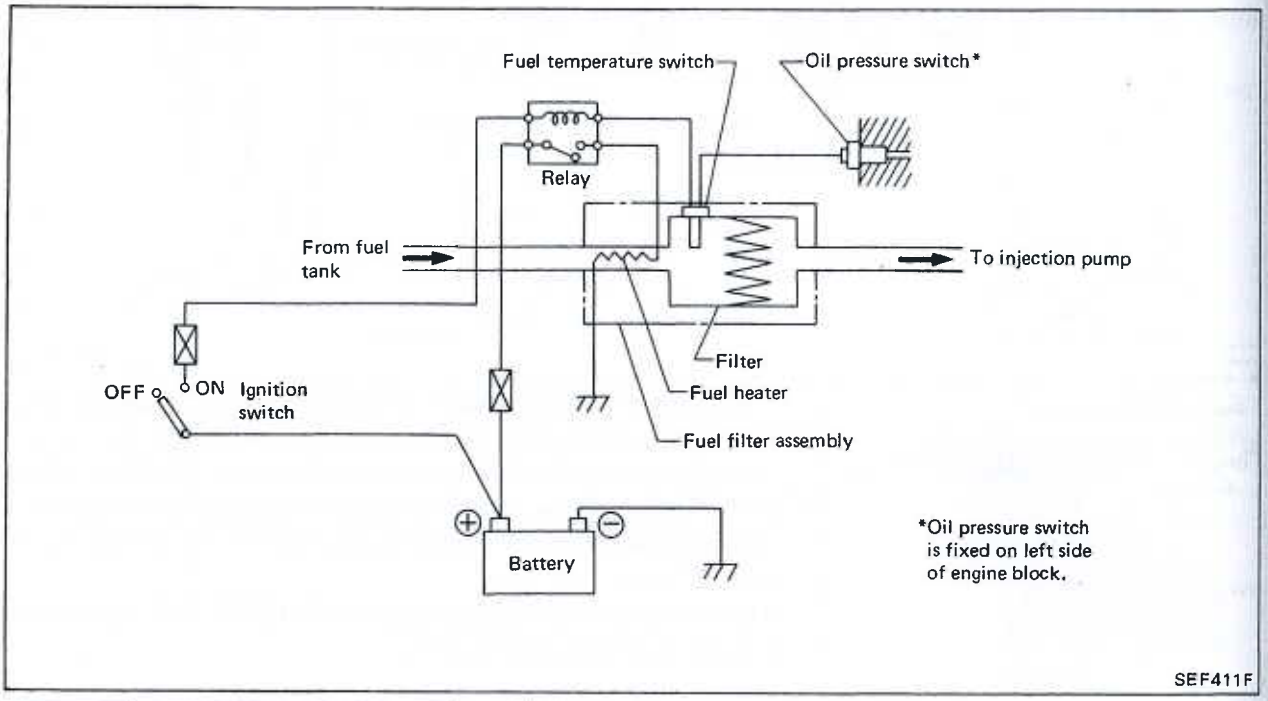
In-line pump

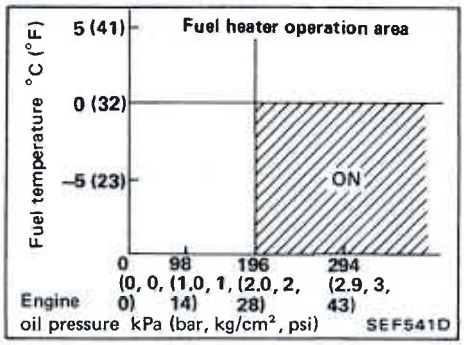
Attach a pressure gauge to fuel filter discharge port, and check valve opening pressure by operating priming pump. If pressure is not within range of 98 to 137 kPa (0.98 to 1.37 bar, 1.0 to 1.4 kg/cm², 14 to 20 psi), replace overflow valve.



DESCRIPTION

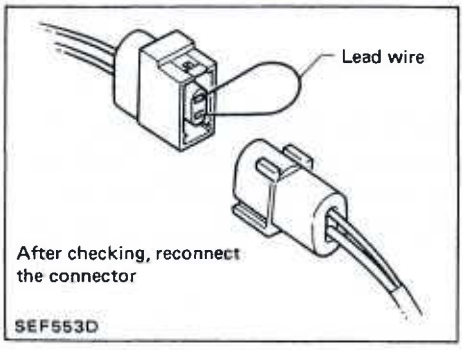
Fuel heater system is designed to improve startability at low atomospheric temperatures for models destined for cold areas. This system prevents fuel filter from clogging with fuel wax.





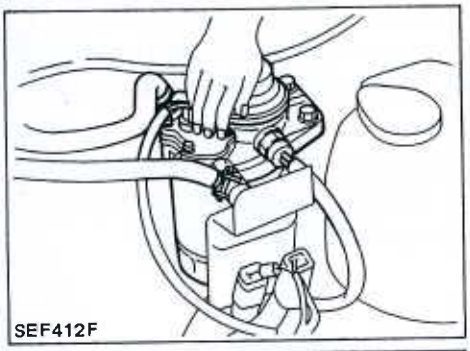
OPERATION

Fuel heater system operates when fuel temperature switch and oil pressure switch are on.



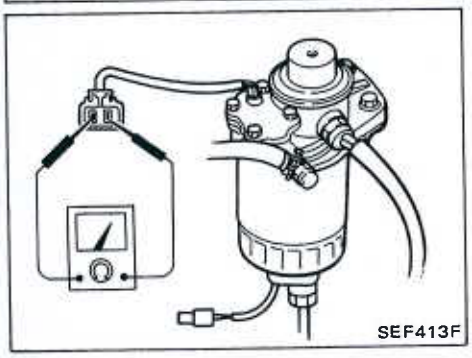
INSPECTION

1. Connect a lead wire, as shown, between terminals of fuel temperature switch.


SEF412F

2. Run engine at about 1,000 rpm. After several minutes, make sure that fuel heater is hot.

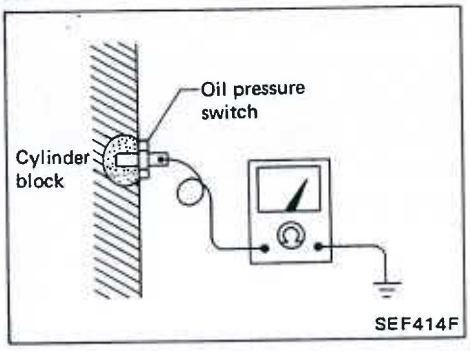
Be careful not to burn yourself.


SEF413F

3. If fuel heater does not operate, check fuel heater system as follows.

Fuel heater

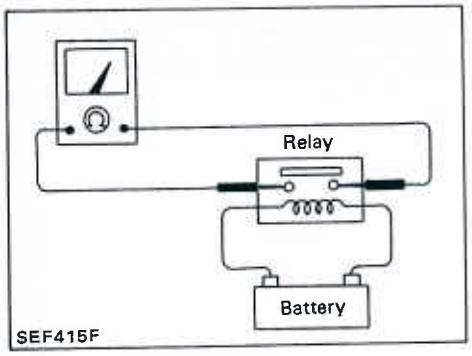
1. Check continuity for fuel heater.
2. If fuel heater has malfunction, replace fuel filter bracket.



SEF414F

Oil pressure switch

1. Run engine at about 1,000 rpm.
2. Check continuity for oil pressure switch.
3. If oil pressure switch has malfunction, replace it.



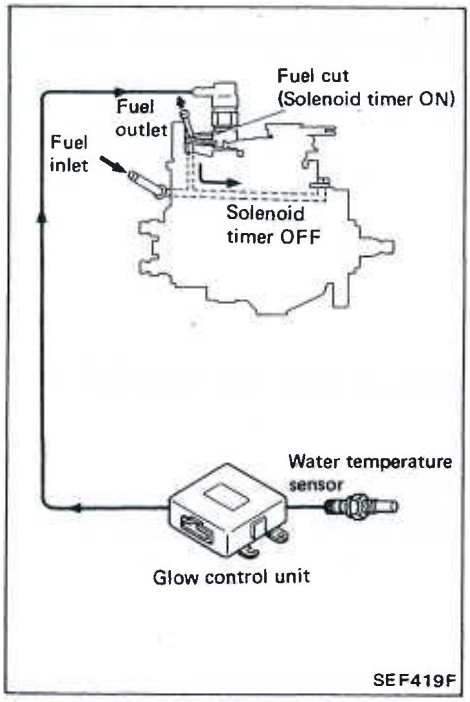
SEF415F

Fuel heater relay

1. Check fuel heater relay operation.
2. If fuel heater relay does not operate, replace it.

Harness

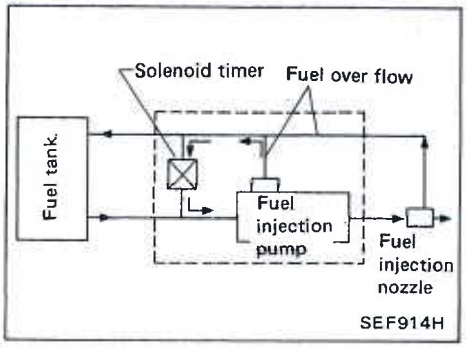
Check harness and fuse continuity.



DESCRIPTION

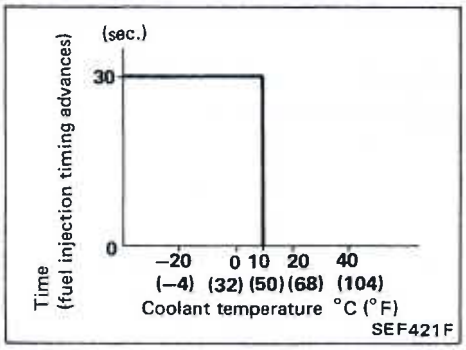
To improve startability, a solenoid timer is used on models for Europe and cold areas. Its purpose is to advance fuel injection timing in relation to coolant temperature for a certain period after starting the engine.

This timer is controlled by the signal from the glow control unit. The glow control unit sends a signal to activate the advance mechanism of the fuel injection pump during cold starting.

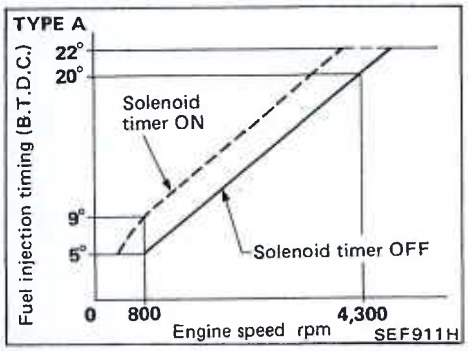


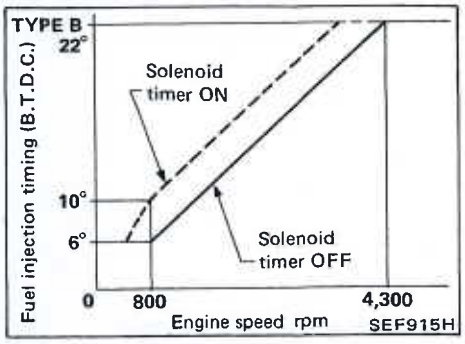
OPERATION

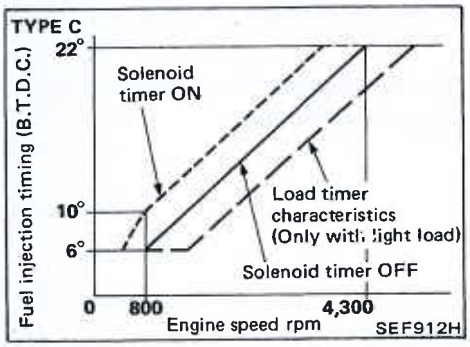
Part of the fuel in the return line returns to the fuel injection pump inlet, when the solenoid timer is OFF. When cold starting, the solenoid timer comes ON to stop the return of fuel to the inlet. This increases the fuel pressure in the fuel injection pump so that fuel injection timing advances. The duration of fuel injection timing advance varies with changes in coolant temperature.

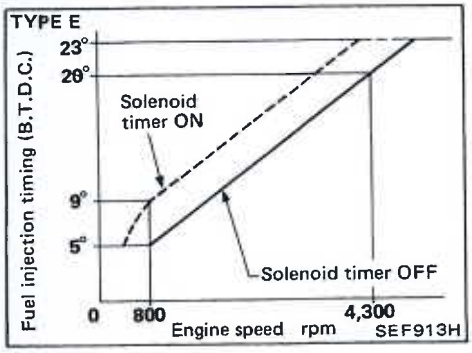


The advance duration of fuel injection timing is 30 seconds (constant) when coolant temperature is below 10°C (50°F). Above 10°C (50°F), fuel injection timing does not advance.









Timer characteristics

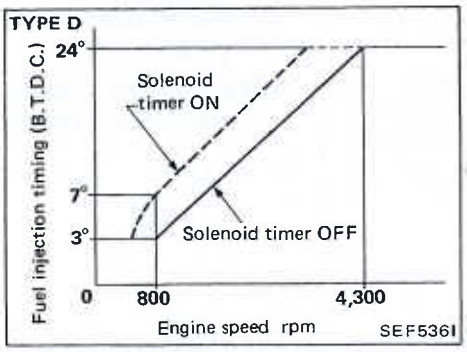
The following figures show the differences in fuel injection timing in relation to engine speed when the solenoid timer is both ON and OFF.

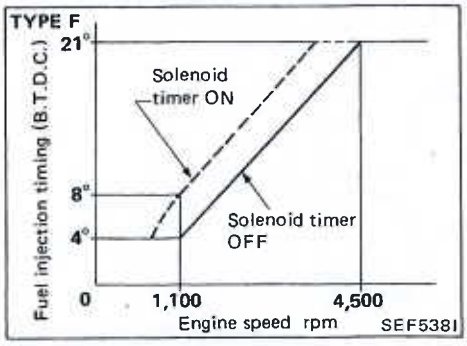
When the solenoid timer turns ON, fuel injection timing advances approximately 5°. Thus, cold engine starting in cold weather is greatly improved.

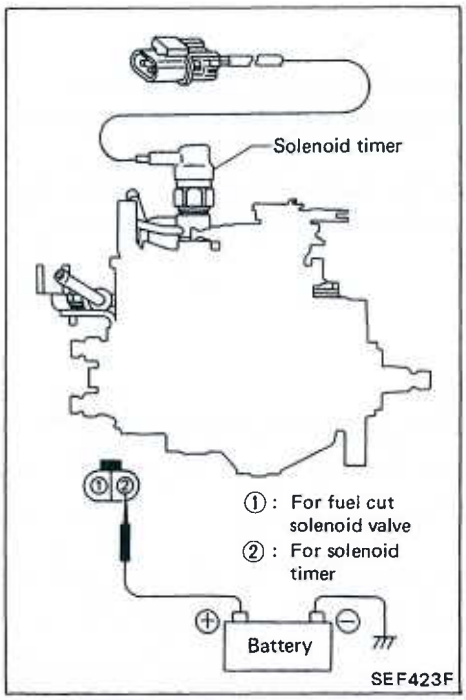
Type of fuel injection timing:

	Y31	D21	E24	F22
TD23	–	–	–	Ⓐ
TD25	–	Ⓑ	Ⓑ	Ⓑ*1, Ⓒ
TD27	–	Ⓐ, Ⓓ*2	–	Ⓔ
TD27T	–	Ⓕ	–	–

*1: Only for Switzerland
*2: Only double cab model



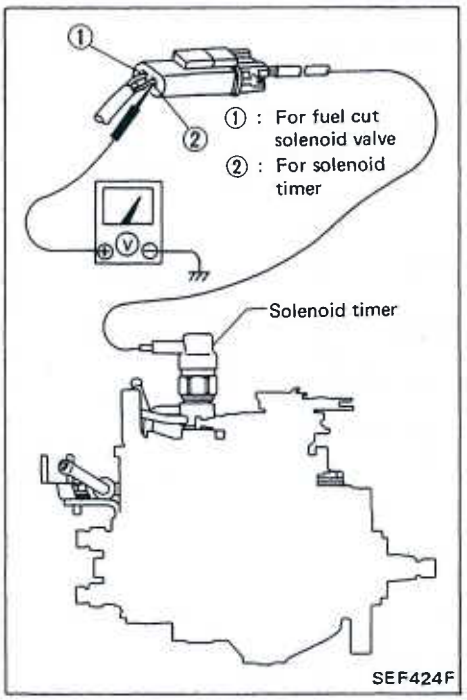




INSPECTION

1. Disconnect solenoid timer harness and check for "clicking" sound from solenoid when battery is connected and disconnected.
   If solenoid has malfunction, replace it.

After checking, reconnect the connector.



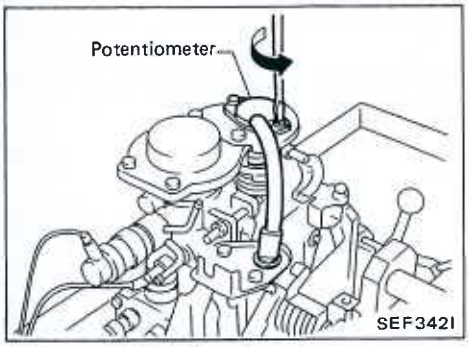
2. Disconnect water temperature sensor harness connector.
3. Start engine and check voltage between terminal ② and ground.

Battery voltage should exist for 30 seconds after starting engine.
If not, check harness and glow control unit.

Timer piston stroke (Using pump tester)

Measure timer piston strokes at specified fuel injection pump speed when solenoid timer is on and off.

Refer to Service Data and Specifications (S.D.S.) of injection pump.

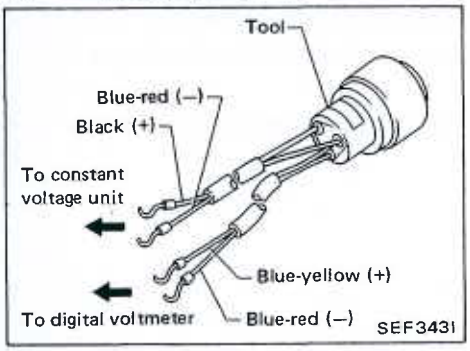


Removal

1. Loosen screws which secure potentiometer to bracket.
2. Remove potentiometer.
3. Remove bracket.

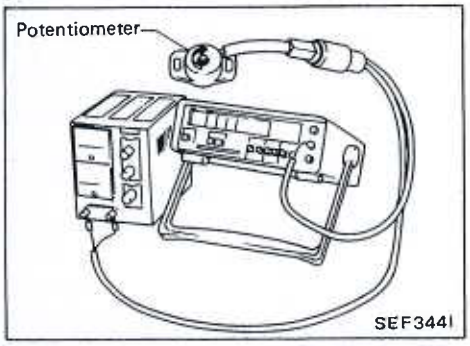
CAUTION:

a. **Do not remove adjusting bolt unless necessary.**
b. **Do not attempt to disassemble potentiometer.**

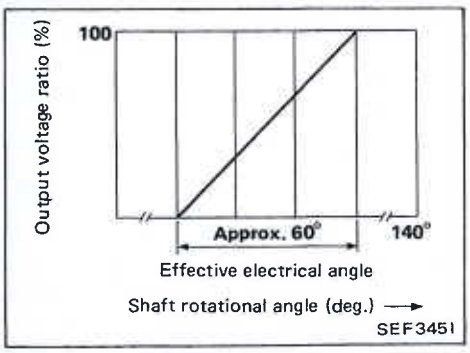


Inspection

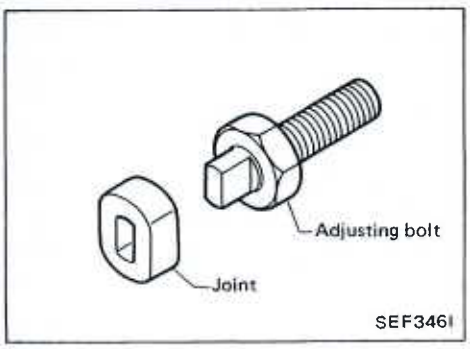
1. Using Tool (KV11229882), connect potentiometer to digital voltmeter and voltage-regulating unit.
2. Apply an input of 10 volts.

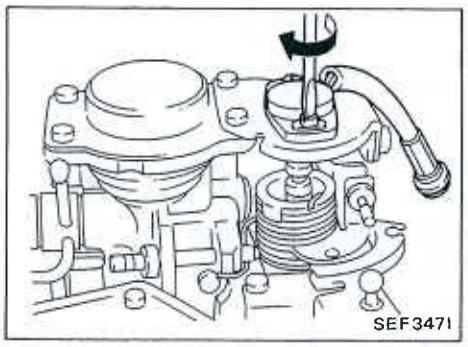


3. Ensure that output voltage indicated on digital voltmeter increases when potentiometer pin is turned clockwise.
4. Figure shows an example of potentiometer characteristics. Effective electrical angle of TD27T engine is 36°.



5. Position potentiometer pin and adjusting bolt in joint. Ensure that there is no free play.

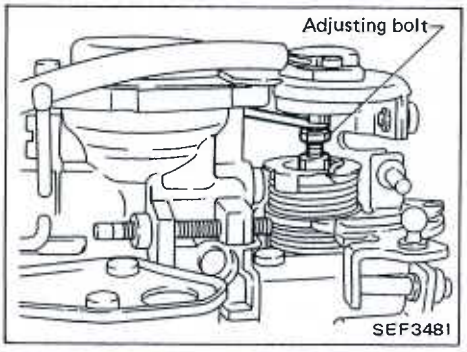




Installation

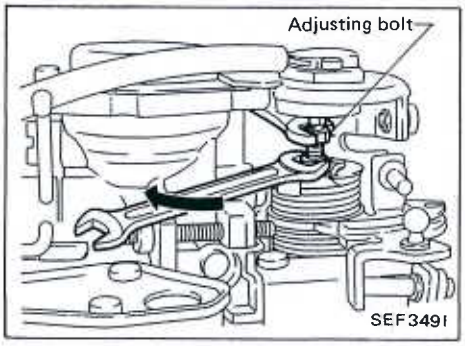
If adjusting bolt is removed during disassembly, install it as follows:

1. Temporarily install adjusting bolt, lock nut and potentiometer. Joint need not be installed.

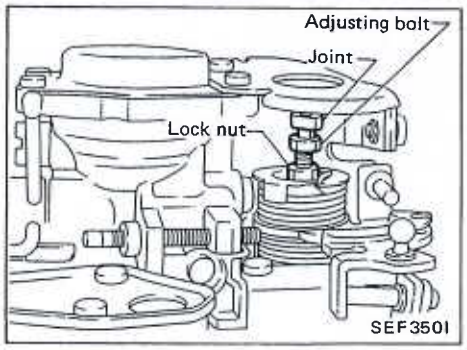


2. Tighten or loosen adjusting bolt so that clearance between adjusting bolt end surface and potentiometer pin is adjusted to specifications. Clearance can be measured using a feeler gauge.

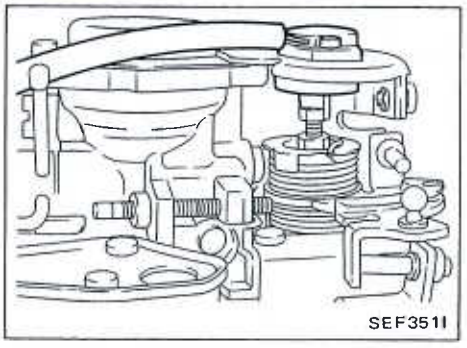
   Specified clearance: 0.2 - 0.8 mm (0.008 - 0.031 in)



3. Secure adjusting bolt using a lock nut.

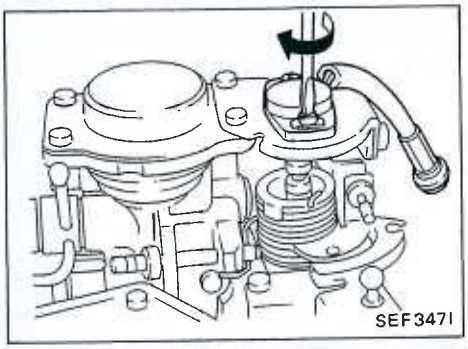


4. Remove potentiometer and install joint on adjusting bolt.



5. While positioning potentiometer pin in joint, install potentiometer on bracket.

Installation (Cont'd)



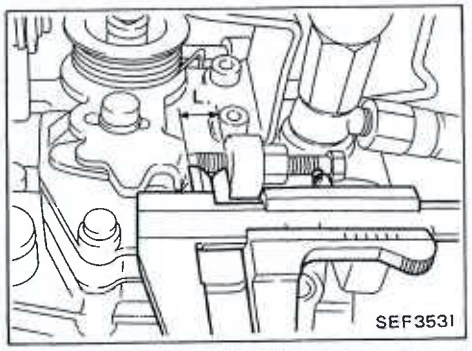
6. Secure potentiometer using screws and spring washers.
7. Ensure that control lever moves smoothly.

Adjustment

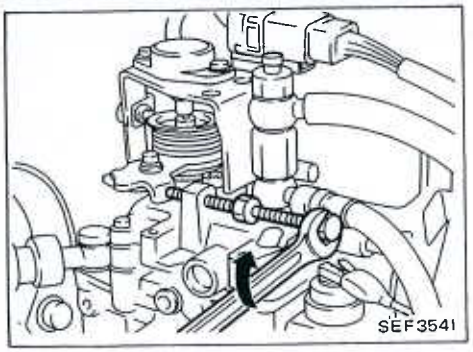
Part No. of pump assembly:

Adjustment conditions			Specified value	Remarks
Control lever position	Pump speed rpm	Fuel injection quantity mℓ (Imp fl oz)/ 1,000 st	Output voltage	
Measure	750	17.8±1 (0.63±0.04)	4.0	Adjusting point
Idle	–	–	–	Check point
Full speed	–	–	–	Check point

[Input voltage: 10V]
[Boost pressure: 0V]

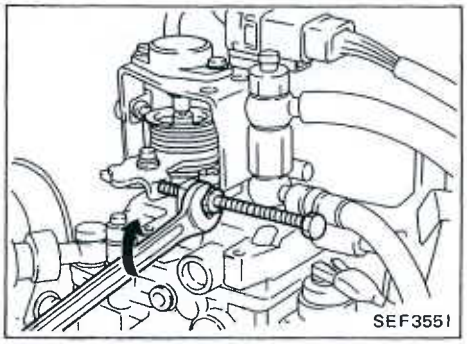


1. Measure required "tightening" length "L" of idling stopper bolt in advance.

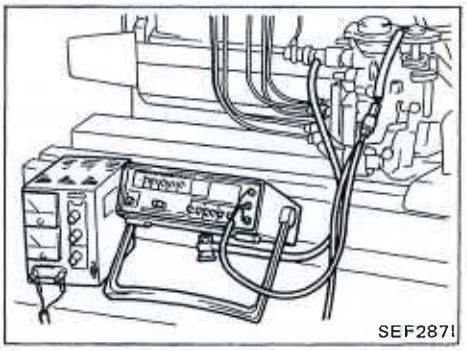


2. Remove idling stopper bolt and tighten dummy bolt (M6 x pitch: 1.0 mm).

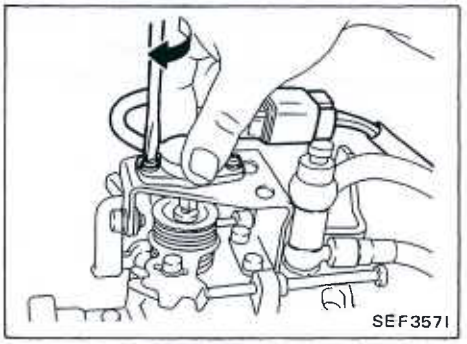
Adjustment (Cont'd)


SEF355I

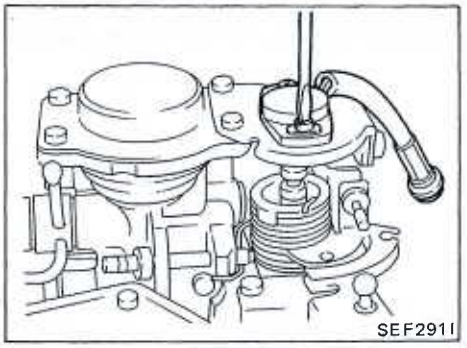
3. Operate fuel injection pump at 750 rpm. Adjust control lever position using dummy bolt so that fuel injected is in the 16.8 to 18.8 mℓ (0.59 to 0.66 Imp fl oz)/1,000 stroke range.


SEF287I

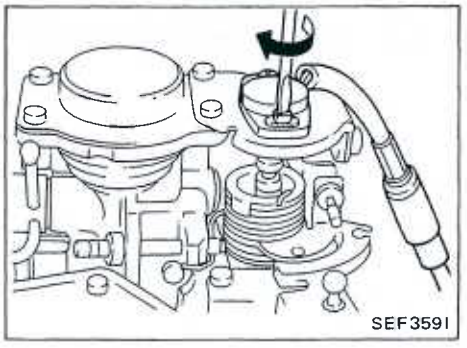
4. Connect Tool (KV11229882) to digital voltmeter and voltage-regulating unit.
5. Connect Tool (KV11244582) to potentiometer and Tool (KV11229882).


SEF357I

6. After ensuring that digital voltmeter registers 4.0 volts (which is equivalent to potentiometer output voltage), adjust potentiometer position. An oblong hole is used to adjust potentiometer.

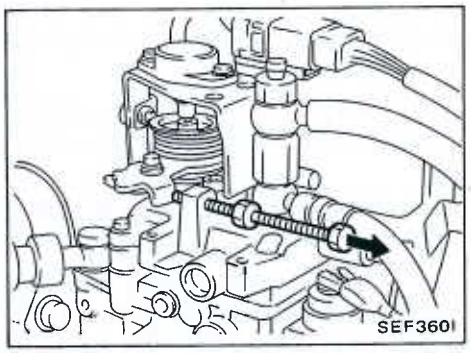

SEF291I

7. If potentiometer output is outside specifications, remove potentiometer and adjust adjusting bolt (310/5).

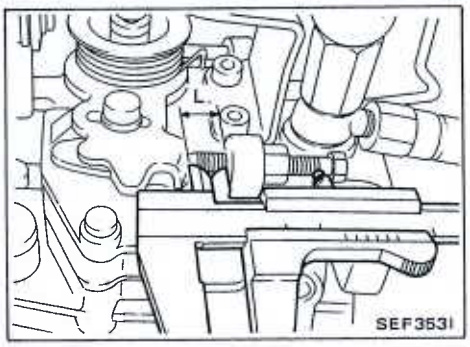

SEF359I

8. Set output voltage of voltage-regulating unit to 10 volts (which is input voltage to potentiometer), and adjust potentiometer position.

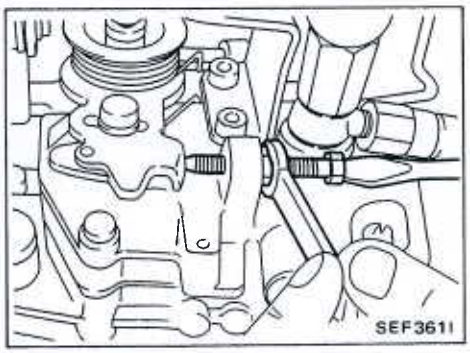
Adjustment (Cont'd)



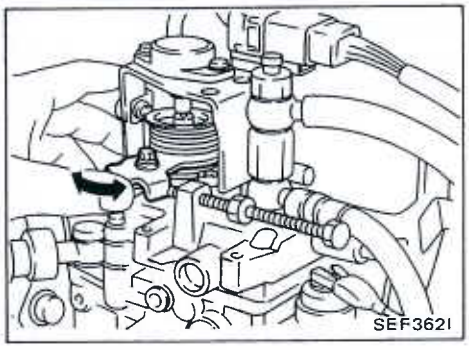
9. After properly positioning potentiometer, remove dummy bolt.



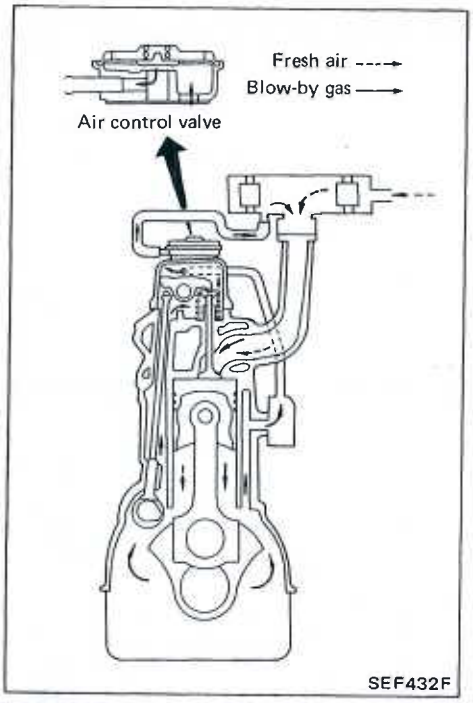
10. Tighten regular idling stopper bolt so that "L" measured in step 1 is obtained.



11. Adjust idling stopper bolt so that fuel injected during idling is in the specified range.



12. Ensure that control lever properly returns to the idle position by means of idling spring.



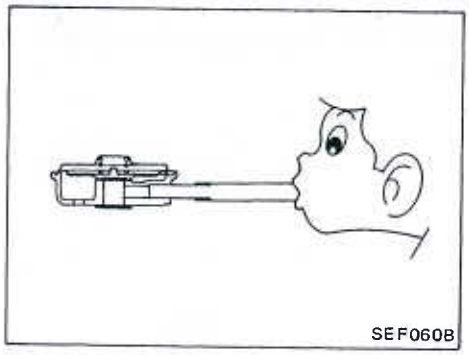
DESCRIPTION

The closed-type crankcase ventilation system is utilized as a crankcase emission control system.

The closed-type crankcase emission control system prevents blow-by gas from entering the atmosphere and keeps the internal crankcase pressure constant.

During the valve operation, the blow-by gas is fed into the intake manifold by the air control valve.

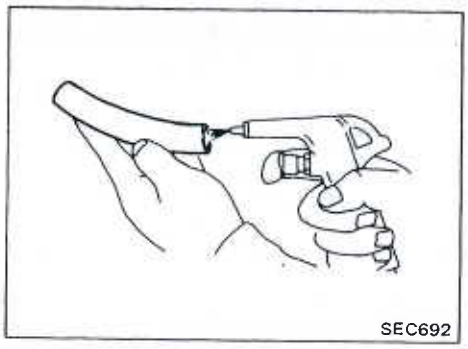
This is activated by the internal rocker cover pressure. When the intake air flow is restricted by the throttle chamber, the internal rocker cover pressure decreases. At this point, the crankcase emission control valve keeps the internal rocker cover pressure constant so that air or dust is not sucked in around the crankshaft oil seal.



INSPECTION

Air control valve

1. Remove rocker cover.
2. Remove control valve from rocker cover.
3. After plugging the center hole with adhesive tape, check that air flows from inlet by blowing air from outlet and that air does not flow by inhaling air.



VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air.
   If any hose cannot be freed of obstructions, replace.