MITSUBISHI MOTORS

SERVICE BULLETIN

SERVICE GROUP, WARRANTY & SERVICE DEP.
MITSUBISHI MOTOR SALES EUROPE BV

SERVICE BULLETIN	**No.:** ESB-97E11-503	
	Date: 1997-11-24	**<Model>** (EC,EXP) CARISMA / **<M/Y>** 97-10
Subject: CORRECTING VALVE CLEARANCE & INJECTION TIMING INSPECTION & ADJUSTMENT PROCEDURE		
Group: ENGINE		
CORRECTION	O. Kai - E.V.P. & G.M. After Sales Service Dept.	

1. Description:

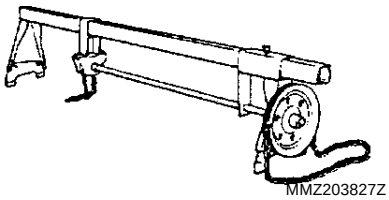
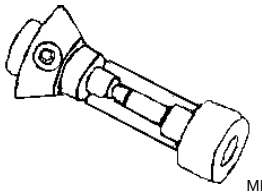
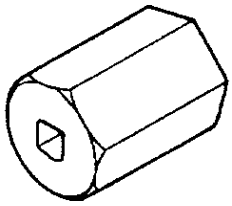
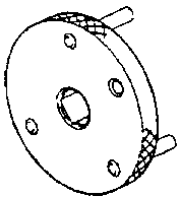
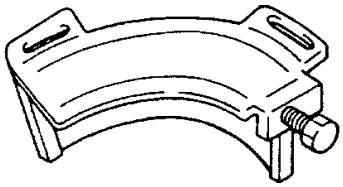
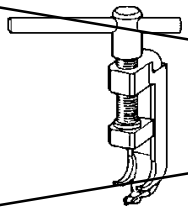
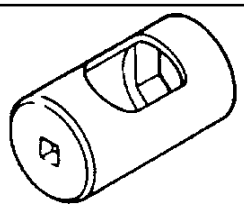
This Service Bulletin informs you of correction to the inspection and adjustment procedure for valve clearance and injection timing.

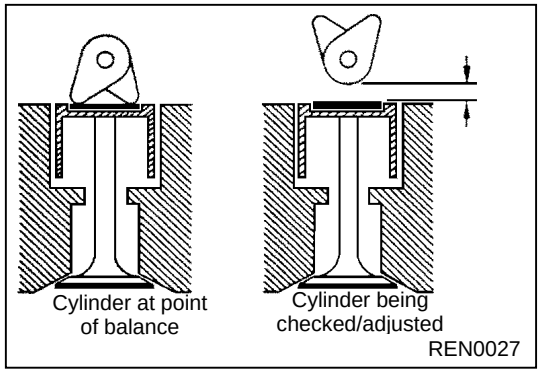
2. Applicable Manuals:

Manual	Pub. No.	Language	Page(s)
'97 CARISMA Workshop Manual chassis (SUPPLEMENT)	PWDE9502-A	(English)	11B-6, 11B-8~11B-9, 11B-10~11B-12
	PWDS9503-A	(Spanish)	
	PWDF9504-A	(French)	
	PWDG9505-A	(German)	
	PWDD9506-A	(Dutch)	
	PWDW9507-A	(Swedish)	
	PWDI96E1-A	(Italian	
ENGINE F8QT Workshop Manual	PWEE9602	(English)	11A-19-3, 11A-19-5, 11A-19-6
	PWES9603	(Spanish)	
	PWEF9604	(French)	
	PWEG9605	(German)	
	PWED9606	(Dutch)	
	PWEW9607	(Swedish)	
	PWEI9602	(Italian)	

3. Details:

Please refer to the attached pages.

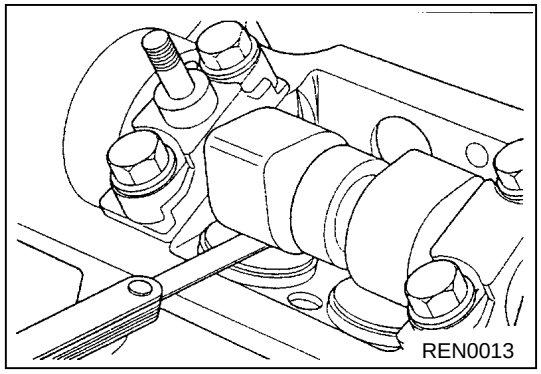
Tool	Number	Name	Use
 MMZ203827Z	GENERAL SERVICE TOOL MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission
 MB996030	MB996030	Measuring device adapter	Adjustment of injection timing
	MB996036	Hexagon socket	
 MB996037	MB996037	Sprocket adapter	
	MB996043	Sprocket stopper	**<Deleted>**
 MB996035	MB996035	Valve lifter	Adjustment of valve clearance
	MB996041	Special socket	Removal of fuel injector
 MB996045	MB996045	Tension gauge	Checking of drive belt tension



VALVE CLEARANCE CHECK AND ADJUSTMENT

1. The valve clearances have to be checked/adjusted in the following sequence:

Cylinder at point of balance	Cylinder being checked/adjusted
1	4
2	3
3	2
4	1



2. Measure the valve clearance.

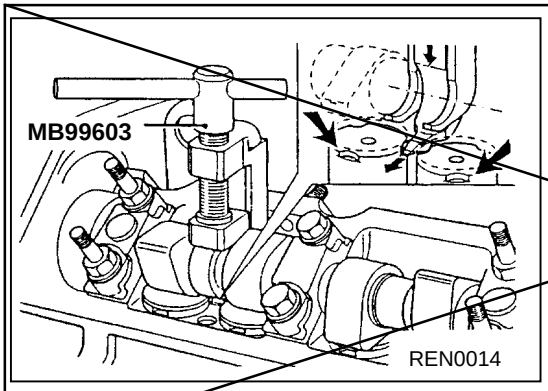
Standard value (cold engine):

~~**Intake valve: 0.15 - 0.25 mm**~~
~~**Exhaust valve: 0.35 - 0.45 mm**~~ **<Incorrect>**

<Correct>

Cold engine	Checking	Adjusting
Intake valve mm	0.15 - 0.20	0.20
Exhaust valve mm	0.35 - 0.45	0.40

3. if the valve clearance is outside the standard value, adjust by replacing the tappet pads using the following procedure.



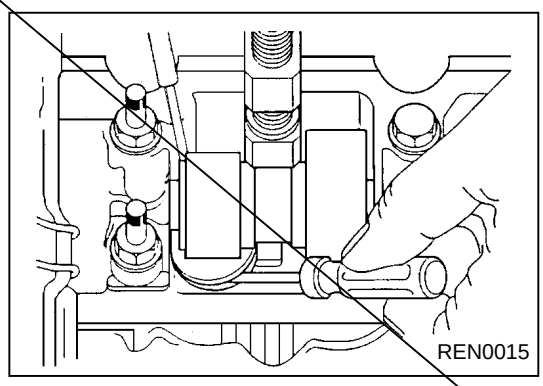
~~4. Unscrew the base of special tool a distance of 6 mm.~~
~~5. Turn the slots in the tappet to the correct position; see the illustration.~~
~~6. Position special tool with the base in the slots of the tappets and then push the tool forwards as far as possible.~~
~~7. Depress the tappets.~~

~~**Caution**~~
~~**When changing tappet pads the piston must not be at TDC. The crankshaft must be turned on to bring it just past TDC, otherwise the valves may strike the piston when the tappets are depressed**.~~

<Incorrect>

<Correct>

4. If out of the standard value, measure the valve clearance again and record the measurements.
5. Based on the measurements, select a tappet pad that will bring the valve clearance within the standard value.
   Thickness of adjusting tappet pad =
   Thickness of tappet pad installed at inspection + (Measured value - Standard value)
   NOTE
   1. Measure the thickness of the tappet pad with a micrometer.
   2. Always use new tappet pads.
   3. Tappet pads are available in thickness from 3.25 mm to 4.25 mm. Increasing by increments of 0.05 mm; and in thickness from 4.30 mm to 4.50 mm. Increasing by increments of 0.10 mm.
6. Remove the camshaft and install a selected tappet pad.
7. Reinstall the camshaft.
8. Give the crankshaft one turn, and check that the valve clearance is within the standard value.


REN0015

8. Use a small screwdriver to remove the tappet pad.
9. Select tappet pads which will bring the valve clearance to the standard value.

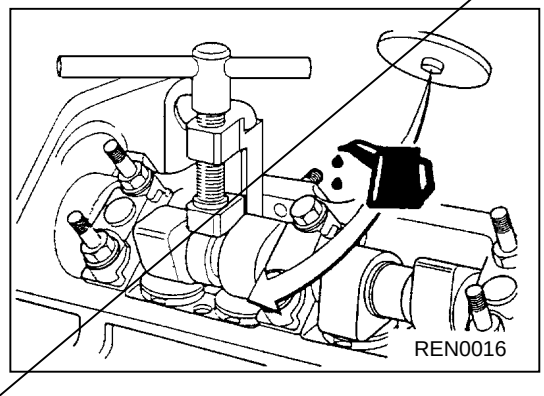
Standard value (cold engine):

Intake valve: 0.20 mm
Exhaust valve: 0.40 mm

Example
If the measured valve clearance is 0.25 mm and the required valve clearance is 0.40 mm, then the old tappet pad must be replaced by a new pad which is 0.15 mm thinner.

NOTE
1. Measure the thickness of the tapped pad with a micrometer.
2. Always use new tappet pads.
3. Tappet pads are available in thicknesses from 3.25 mm to 4.25 mm, increasing by increments of 0.05 mm; and in thicknesses from 4.30 to 4.50 mm, increasing by increments of 0.10 mm.

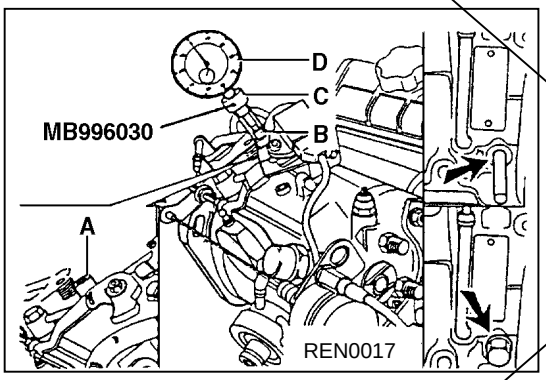
10. The tappet pad must be lubricated with oil and installed with the projection facing towards the tappet.


REN0016

<Incorrect>

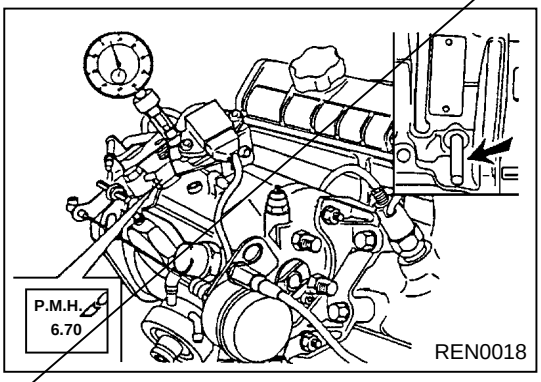
INJECTION TIMING CHECK AND ADJUSTMENT

1. Turn the cranckshaft clockwise to set the No.1 cylinder to top dead compression centre.
2. Turn the crankshaft 1 ¾ revolutions in its normal direction of rotation
3. Remove the plug (A).



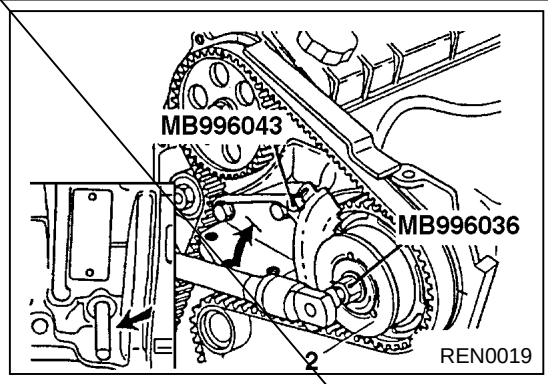
4. Fit special tool:
   - Locate the guide bush in the pump.
   - Slide the measuring pin (B), which is part of the special tool, into the guideway of the pump.
   - Locate and secure the holder (C).
   - Position the clock gauge (D) and make sure that the plunger is pressed in at least 0.2 mm. Secure the clock gauge and set it at zero.

NOTE
The measuring pin and guide bush can only be supplied and used as a set.



5. Turn the crankshaft in its normal direction of rotation until the clock gauge indicates approximately 5.00 mm.
6. Apply pressure on the locking pin and turn the crankshaft in its normal direction of rotation until the locking pin engages the recess in the crankshaft web.
7. Read off the value on the clock gauge.
8. The reference value for checking purposes is approximately 0.02 mm; this is shown on the pump control arm.
9. If the reference value is not obtained, the pump will have to be adjusted.

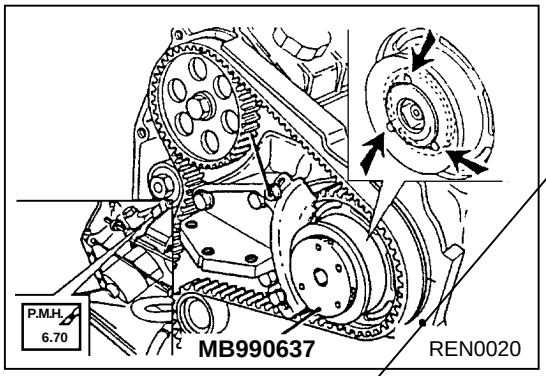
<Incorrect>



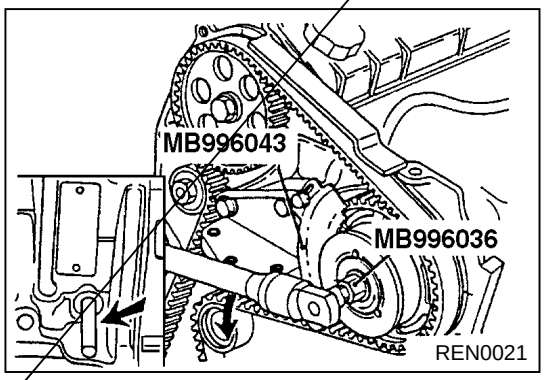
10. Locate special tool (sprocket stopper) between the pump bracket and the sprocket. Secure the tool with the bolt supplied with the set.
11. Insert special tool (hexagon socket) in the screwed sleeve and nut assembly. Back off (turning clockwise) the screwed sleeve and nut assembly one eighten of a turn. It should now be possible to move the flange (2)
12. Remove special tool (sprocket stopper), the locking pin and the clock gauge.

Caution
The plunger is not spring-mounted! When turning over the engine it is possible to break the clock gauge.

13. Turn the crankshaft 1 ¾ revolutions further, locate the clock gauge and make sure that the plunger is pressed in at least 0.2 mm. Check and adjust the injection timing.



14. Fit special tool in the three holes of the flange.
15. turn the tool with the flange until the jaws of the tool engage the three internal recesses of the sprocket.
16. Turn the tool with the flange clockwise until the backlash in the pump is eliminated and than turn it to 0.5 mm below the adjustment reference value.
17. Now turn the tool with the flange counter-clockwise until the adjustment reference value is obtained as shown on the pump ± 0.02 mm.
18. Locate special tool (sprocket stopper) and secure it with the bolt supplied with the set.
19. Turn the bracket with the bolt (F) so that the bracket is free from play.



Caution
The pump sprocket must not be displaced (the pointer of the micrometer must not move).

20. Insert special tool (hexagon socket) in the screwed sleeve and nut assembly and tighten the assembly steadily (turning counter-clockwise) to the specified torque.
21. Remove special tool (sprocket stopper), the locking pin and the clock gauge.

<Incorrect>

22. Turn the crackshaft 1¾ revolutions further, locate the clock gauge and make sure that the plunger is pressed in at least 0.2 mm.
23. Check the injection timing.
24. Remove special tool together with the clock gauge and measuring pin. Fit the plug with a new O-ring.
25. Tighten the plug to the specified torque.

    Specified torque: 10 Nm

26. remove the lacking pin and fit the plug with a new sealing washer.
27. Tighten the plug to the specified torque.

    Specified torque: 20 Nm **<Incorrect>**

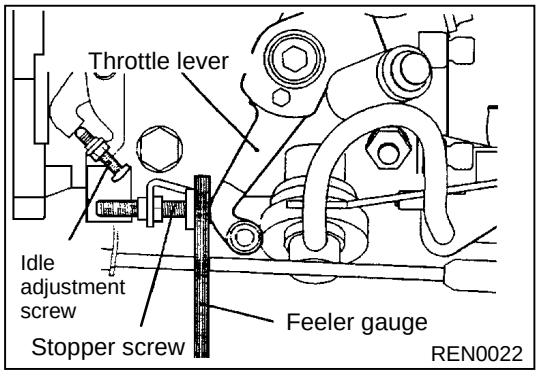
<Pages 5 through 7 (upper half) should be replaced by pages 7 (lower half) through 11.>

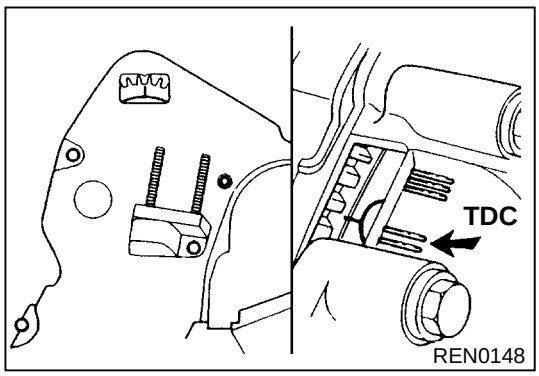
IDLE SPEED CHECK AND AJUSTMENT

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Connect the MUT-II to the diagnosis connector.
3. Check the idle speed.

   Standard value: 825 ± 25 r/min

4. If the idle speed is outside the standard value range, adjust by the following procedure.
5. Loosen the lock nut, and then turn the idle adjustment screw to adjust the idle speed to the standard value.
6. tighten the lock nut to secure the idle adjustment screw.
7. Insert a feeler guage with a thickness of 4 mm between the throttle elver and the stopper screw.
8. Check that the idle speed is at 1,250 ± 100 r/min. If the idle speed is outside this range, adjust by turning the stopper screw.
9. Tighten the lock nut to secure the stopper screw.
10. Remove the feeler gauge.
11. Check that the idle speed is within the standard value range. If the idle speed is outside the standard value range, repeat the adjustment procedure from step 5.
12. Disconnect the MUT-II.

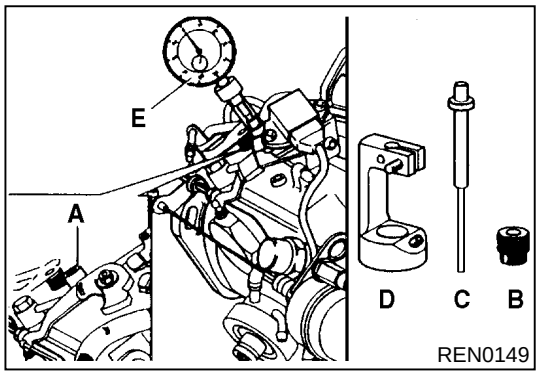




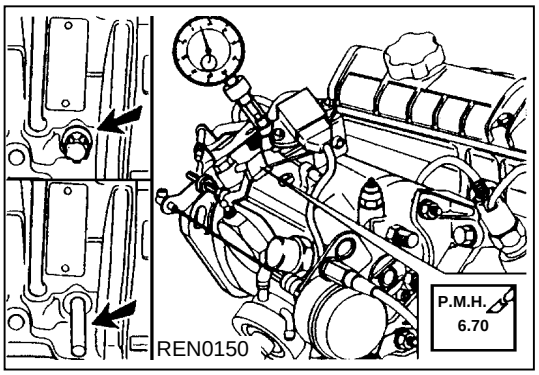
INJECTION TIMING CHECK AND AJUSTMENT

INJECTION TIMING CHECK

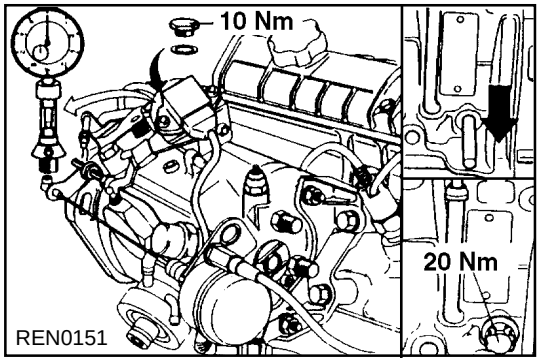
1. Turn the crankschaft clockwise so that the piston of No.1 cylinder (flywheel end) is at TDC, with the following marks in line with each other:
   - flywheel/clutch housing
   - timing belt cover/camshaft sprocket
2. Turn the crankshaft (clockwise) 1¾ revolutions.
3. Remove the plug **A**.



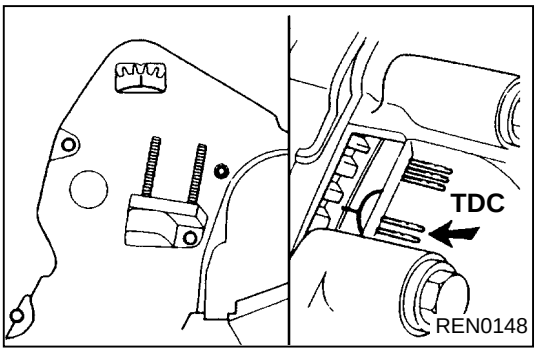
4. Fit measuring device adaptor MB996030:
   - Locate the guide bush **B** in the pump.
   - Slide the measuring pin **C**, which is part of the measuring tool, into the guideway of the pump.
   - Locate and secure the holder **D**.
5. Position the clock gauge **E** and make sure that the plunger is pressed in at least 0.2 mm.
   Secure the clock gauge and set it at zero.
   NOTE
   If the engine is turned above stroke limit of the clock gauge, it may damage the clock gauge.
   The measuring pin and guide bush can only be supplied and used as a set.



6. Turn the crankshaft **exactly** to TDC (clockwise).
   To achieve this:
   - Insert an 8 mm diameter locking pin in the hole of torxbolt.
   - Apply pressure just before TDC on this pin until it engages the recess in the crankshaft.
7. Read off the value on the clock gauge.
   This value should not differ more the 0.02 mm as the set value shown on the pump control arm.
   If the calue is not obtained, the pump has to be adjusted.

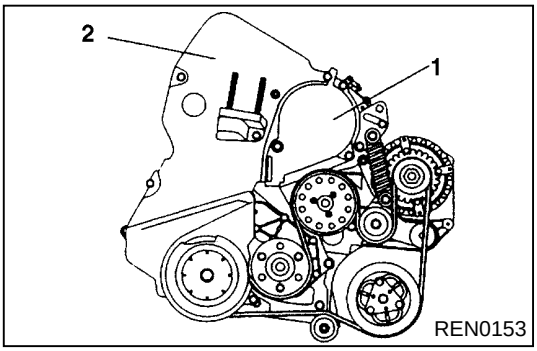


8. Remove measuring divice adaptor MB996030 with the clock gauge. Fit the plug with a new O-ring.
9. Tighten the plug to the specified torque.
   Specified torque: 10 Nm
10. Remove the locking pin and fit the plug with a new sealing washer.
11. Tighten the plug to the specified torque.
    Specified torque: 20 Nm

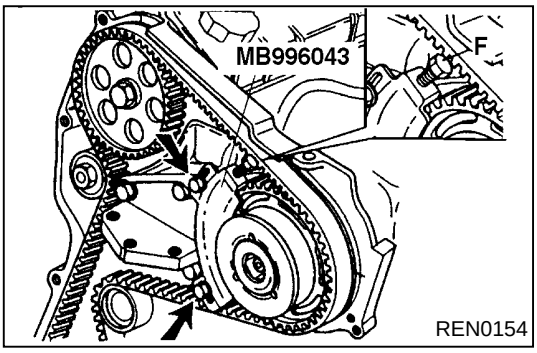


INJECTION TIMING ADJUSTMENT

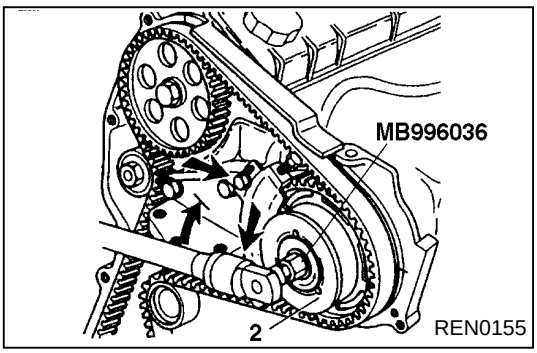
1. Turn the crankshaft clockwise so that the piston of No. 1 cylinder (flywheel end) is at TDC, with the following marks in line with each other:
   - flywheel/clutch housing
   - timing belt cover/camshaft sprocket



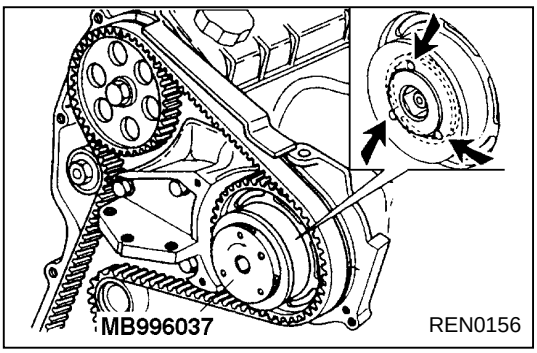
2. Remove cover **1** and the bolts of cover **2**.



3. Locate sprocket stopper MB996043 between the pump bracket and the sprocket. Secure the tool with the two bolts supplied with the set.
   Bolt **F** is not needed now.

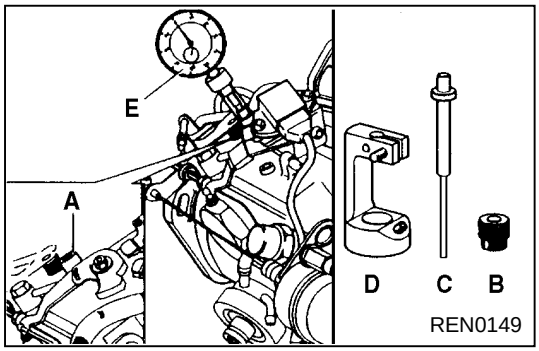


4. Insert Hexagon socket spanner MB996036 in the nut assembly. Loosen nut assembly (approx. ¼ of turn **clock-wise**) until it is possible to move the flange **2**.
5. Remove sprocket stopper MB996043.



6. Fit sprocket adaptor MB996037 in the three holes of the flange.
   Turn the tool with the flange until the jaws of the tool engage the three internal recesses of the sprocket.
7. Turn the tool by hand with the flange clockwise until the stop
   Remove sprocket adaptor MB996037.

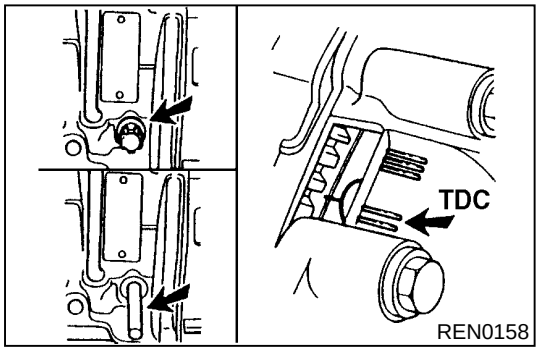
8. Turn the crankshaft (clockwise) 1¾ revolutions.
9. Remove the plug **A**.
10. Fit measuring device adaptor MB996030:
    - Locate the guide bush **B** in the pump.
    - Slide the measuring pin **C**, which is part of the measuring tool, into the guideway of the pump.
    - Locate and secure the holder **D**.



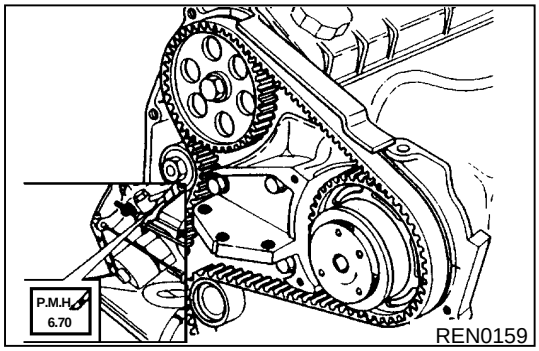
11. Position the clock gauge E and make sure that the plunger is pressed in at least 0.2 mm.
    Secure the clock gauge and set it at zero.

    Caution
    - **If the engine is turned above stroke limit of the clock gauge, it may damage the clock gauge.**

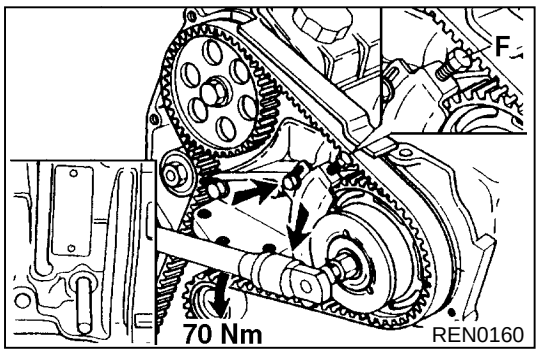
    NOTE
    The measuring pin and guide bush can only be supplied and used as a set.



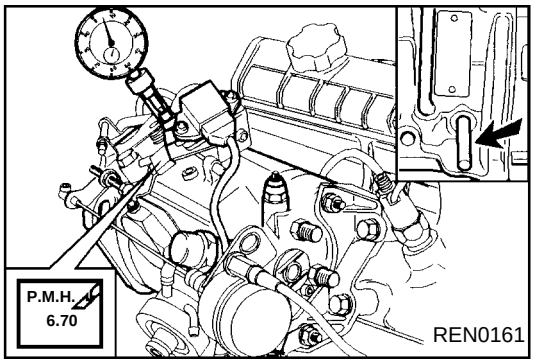
12. Turn the crankshaft **exactly** to TDC (clockwise).
    To achieve this:
    - Insert an 8 mm diameter locking pin in the hole of torxbolt.
    - Apply pressure just before TDC on this pin until it engages the recess in the crankshaft.



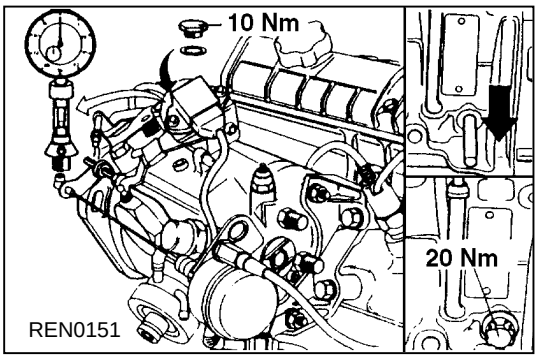
13. Now turn the flange with sprocket adaptor MB996037 counterclockwise until the adjustment value is obtained as shown on the pump ± 0.02 mm.



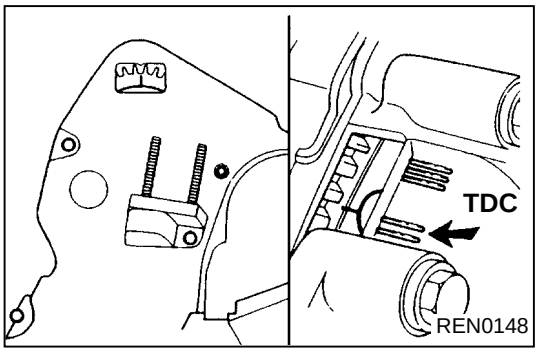
14. Locate sprocket stopper MB996043.
    Fix the bracket with the two bolts supplied with the set.
    Secure the bracket with bolt **F** so that it is free from play
    Caution
    The pump sprocket must not be displaced (the pointer of the micrometer must not move).
15. Insert Hexagon socket spanner MB996036 in the nut assembly and tighten the assembly steadily (turning counterclockwise) to 70 Nm.
    Remove sprocket stopper MB996043, the locking pin and clock gauge.
    Check the injection timing.

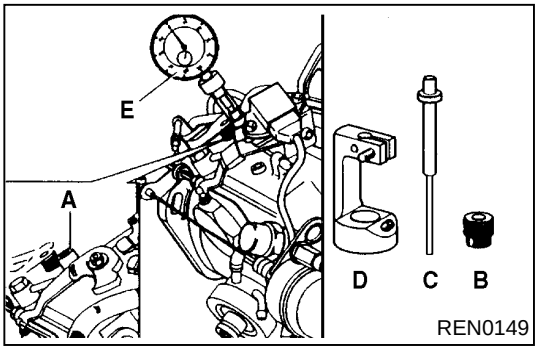


17. Turn the crankshaft 1¾ revolutions clockwise.
18. Position the clock gauge and make sure that the plunger is pressed in at least 0.2 mm.
    Secure the clock gauge and set it at zero.
19. Turn the crankshaft exactly to TDC (clockwise).
    to achieve this:
    - Insert an 8 mm diameter locking pin in the hole of torxbolt.
    - Apply pressure just before TDC on this pin until it engeges the recess in the crankshaft.
20. Read off the value on the clock gauge.
    This value should not differ more the 0.02 mm as the set value shown on the pump control arm.
    If the value is not obtained, the pump has to be adjusted



21. Remove measuring divice adaptor MB996030 with the clock gauge. Fit the plug with a new O-ring.
22. Tighten the plug to the specified torque.
    Specified torque: 10 Nm
23. Remove the locking pin and fit the plug with a new sealing washer.
24. Tighten the plug to the specified torque.
    Specified torque: 20 Nm





FUEL INJECTION TIMING CHECK

MEASURING TOOL INSTALLATION

(1) Turn the crankshaft clockwise so that the piston of No. 1 cylinder (flywheel end) is at TDC, with the following marks in line with each other:
- flywheel/clutch housing
- timing belt cover/camshaft sprocket.

(2) Turn the crankshaft (clockwise) 1 ¾ revolutions.
(3) Remove the plug **A**.
(4) Fit measuring device adaptor MB996030:
- Locate the guide bush **B** in the pump.
- Slide the measuring pin **C**, which is part of the measuring tool, into the guideway of the pump.
- Locate and secure the holder **D**.

(5) Position the clock gauge **E** and make sure that the plunger is pressed in at least 0.2 mm.
Secure the clock gauge and set it at zero.

<Incorrect>

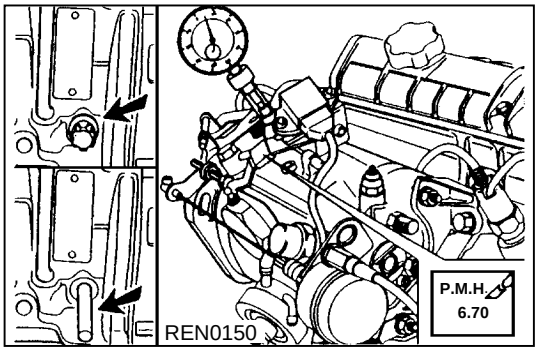
NOTE

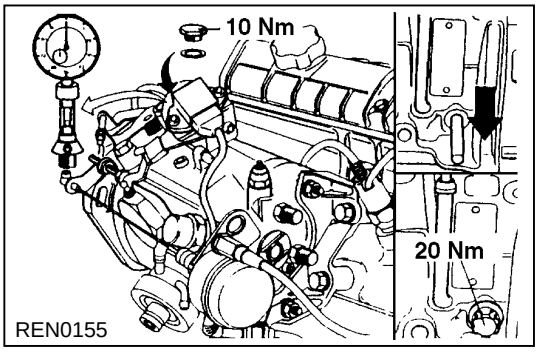
~~When turning the engine with the gauge installed you might damage the clock gauge.~~

The measuring pin and guide bush can only be supplied and used as a set.

<Correct>

If the engine is turned above stroke limit of the clock gauge, it may damage the clock gauge.





CHECKING THE INJECTION TIMING

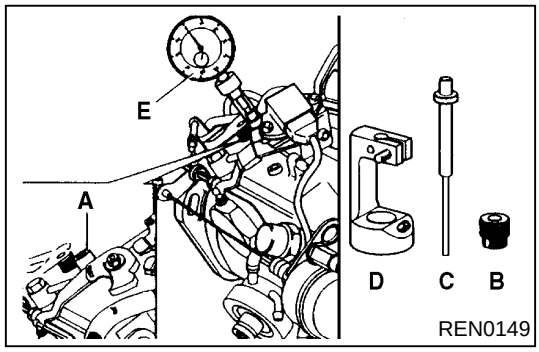
(1) Turn the crankshaft **exactly** to TDC (clockwise).
To achieve this:
- Insert an 8 mm diameter locking pin in the hol e of torxbolt.
- Apply pressure just before TDC on this pin until it engages the recess in the crankshaft.

(2) Read off the value on the clock gauge.
This value should not differ more the 0.02 mm as the set value shown on the pump control arm.
If the value is not obtained, the pump has to be adjusted

MEASURING TOOL REMOVAL

(1) Remove measuring device adaptor MB996030 with the clock gauge. Fit the plug with a new O-ring.
Tighten the plug to the 10 Nm.
Remove the locking pin and fit the torxbolt with a new sealing washer.
Tighten the plug to 20 Nm.

(5) Turn the crankshaft (clockwise) 1¾ revolutions
(6) Remove the plug **A**.
(7) Fit the measuring device adaptor MB996030.
- Locate the guide bush **B** in the pump.
- Slide the measuring pin **C**, which is part of the measuring tool, into the guideway of the pump.
- Locate and secure the holder **D**.



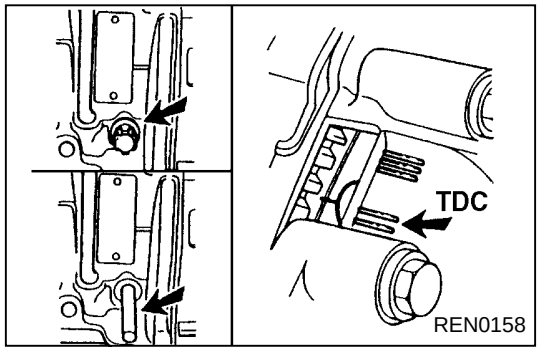
(8) Position the clock gauge **E** and make sure that the plunger is pressed in at least 0.2 mm.
Secure the clock gauge and set it at zero.

Caution **<Incorrect>**

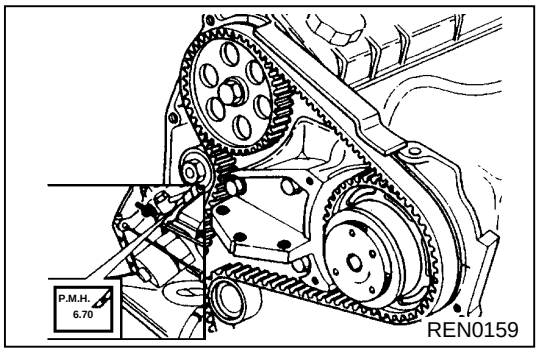
- **When turning the engine with the gauge installed you might damage the clock gauge.**

NOTE

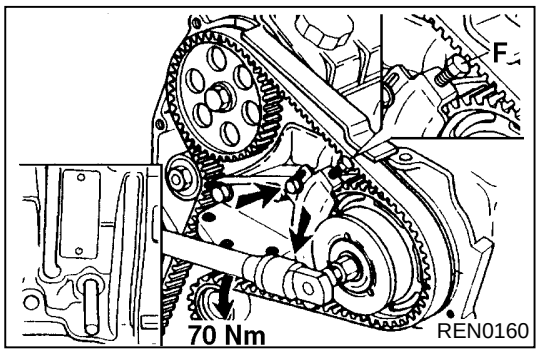
The measuring pin and guide bush can only be supplied and used as a set



(9) Turn the crankshaft exactly to TDC (clockwise).
To achieve this:
- Insert an 8 mm diameter locking pin in the hole of torxbolt.
- Apply pressure just before TDC on this pin until it engages the recess in the crankshaft.



(10) Now turn the flange with sprocket adaptor MB996037 counterclockwise until the adjustment value is obtained as shown on the pump ± 0.02 mm.



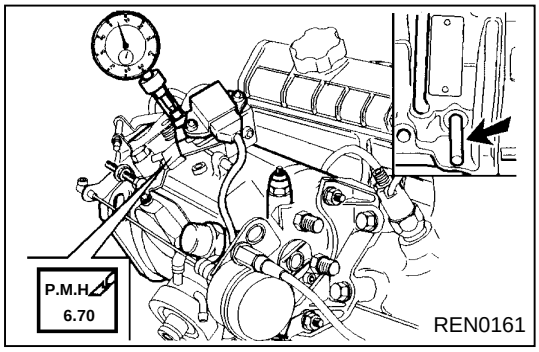
(11) Locate sprocket stopper MB996043
Fix the bracket with the two bolts supplied with the set.
Secure the bracket with bolt **F** so that it is free from play.

Caution
The Pump sprocket must not be displaced (the pointer of the micrometer must not move).

(12) Insert Hexagon socket spanner MB996036 in the nut assembly and tighten the assembly steadily (turning counter-clockwise) to 70 Nm.
Remove sprocket stopper MB996043, the locking pin and clock gauge.
Check the injection timing.

<Added>

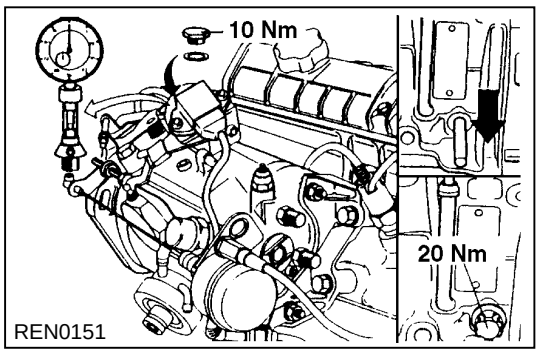
NOTE
If the engine is turned above stroke limit of the clock gauge, it may damage the clock gauge



CHECKING THE INJECTION TIMING

(1) Turn the crankshaft 1¾ revolutions clockwise.
(2) Position the clock gauge and make sure that the plunger is pressed in at least 0.2 mm.
Secure the clock gauge and set it at zero.
(3) Turn the crankshaft **exactly** to TDC (clockwise).
To achieve this:
- Insert an 8 mm diameter locking pin in the hole of torxbolt.
- Apply pressure just before TDC on this pin until it engages the recess in the crankshaft.

(4) Read off the value on the clock gauge.
This value should not differ more the 0.02 mm as the set value shown on the pump control arm.
If the value is not obtained, the pump has to be adjusted



MEASURING TOOL REMOVAL

(1) Remove measuring device adaptor MB996030 with the clock gauge. Fit the plug with a new O-ring.
Tighten the plug to the 10 Nm.
Remove the locking pin and fit the torxbolt with a new sealing washer.
Tighten the plug to 20 Nm.