

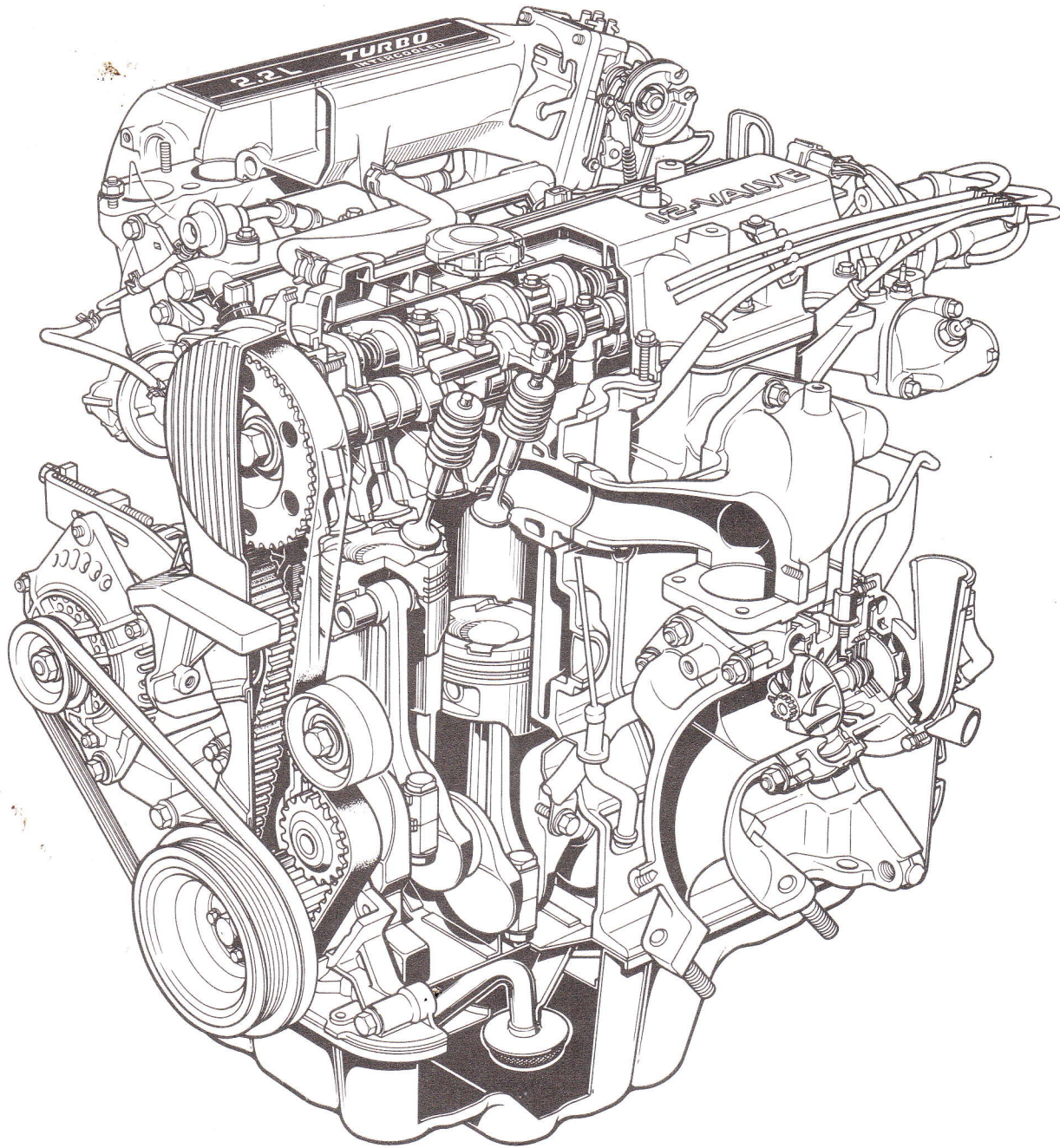
# ENGINE

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# 1 OUTLINE

## OUTLINE

### STRUCTURAL VIEW





## SPECIFICATIONS

Item		Engine model		F2	
				Turbo	Non-Turbo
Type		Gasoline, 4 cycle			
Cylinder arrangement and number		In-line, 4 cylinders			
Combustion chamber		Pentroof			
Valve system		OHC, belt driven 12 valves			
Displacement		cc (cu in)	2,184 (133.2)		
Bore and stroke		mm (in)	86.0 x 94.0 (3.39 x 3.70)		
Compression ratio			7.8	8.6	
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm		Standard	960 (9.8, 139)-260		1,120 (11.4, 162)-270
		Minimum	680 (6.9, 98)-260		780 (8.0, 114)-270
Valve timing		IN	Open BTDC	10°	
			Close ABDC	49°	
		EX	Open BBDC	55°	
			Close ATDC	12°	
Valve clearance		mm (in)	IN	0: Maintenance-free	
			EX	0: Maintenance-free	
Idle speed (MTX in neutral, ATX "P" range)		rpm	750 ± 25		
Ignition timing		BTDC	9° ± 1°		6° ± 1°
Firing order			1-3-4-2		

96U01X-002

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Difficult starting</b>	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket	Replace Replace or repair Replace	1-35 1-41,42 1-15
	<b>Malfunction of fuel system</b>	Refer to Section 4	
	<b>Malfunction of electrical system</b>	Refer to Section 5	
	<b>Poor idling</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Poor valve-to-valve seat contact Failed cylinder head gasket	Replace Replace or repair Replace
	<b>Malfunction of fuel system</b>	Refer to Section 4	
<b>Excessive oil consumption</b>	<b>Oil working up</b> Worn piston ring groove or sticking piston ring Worn piston or cylinder	Replace Replace or repair	1-42 1-41,42
	<b>Oil working down*</b> Worn valve seal Worn valve stem or guide	Replace Replace	- 1-35
	<b>Oil leakage</b>	Refer to Section 2	

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# 1 TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Insufficient power</b>	<b>Insufficient compression</b> Malfunction of HLA Compression leakage from valve seat Seized valve stem Weak or broken valve spring Failed cylinder head gasket Cracked or distorted cylinder head Sticking, damaged, or worn piston ring Cracked or worn piston	Replace Repair Replace Replace Replace Replace Replace Replace	1—57 1—37 1—35 1—38 1—15 1—35 1—42 1—42
	<b>Malfunction of fuel system</b>	Refer to Section 4	
	<b>Others</b> Slipping clutch Dragging brakes Wrong size tires	Refer to Section 6 Refer to Section 11 Refer to Section 12	
<b>Abnormal combustion</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Sticking or burned valve Weak or broken valve spring Carbon accumulation in combustion chamber	Replace Replace Replace Eliminate carbon	1—57 1—35 1—38 —
	<b>Malfunction of fuel system</b>	Refer to Section 4	
<b>Engine noise</b>	<b>Crankshaft or bearing related parts</b> Excessive main bearing oil clearance Main bearing seized or heat-damaged Excessive crankshaft end play Excessive connecting rod bearing oil clearance Connecting rod bearing seized or heat-damaged	Replace or repair Replace Replace or repair Replace or repair Replace	1—48 1—48 1—49 1—50 1—50
	<b>Piston related parts</b> Worn cylinder Worn piston or piston pin Seized piston Damaged piston ring Bent connecting rod	Replace or repair Replace Replace Replace Replace	1—40 1—42,43 1—42 1—42 1—43
	<b>Valves or timing related parts</b> Malfunction of HLA* Broken valve spring Excessive valve guide clearance Malfunction of timing belt tensioner	Replace Replace Replace Replace	1—57 1—38 1—36 1—45
	<b>Malfunction of cooling system</b>	Refer to Section 3	
	<b>Malfunction of fuel system</b>	Refer to Section 4	
	<b>Others</b> Malfunction of water pump bearing Improper drive-belt tension Malfunction of alternator bearing Exhaust gas leakage	Replace Adjust Replace Repair	— 1— 6 — 1—35

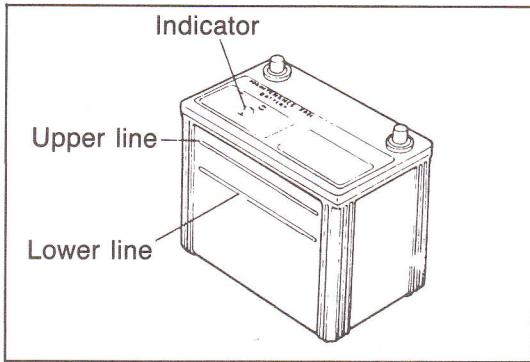
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\* Tappet noise may occur if the engine is not operated for an extended period of time. The noise should stop after the engine has reached normal operating temperature.

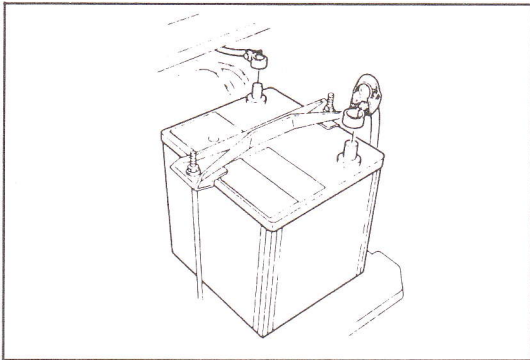


## TUNE-UP PROCEDURE

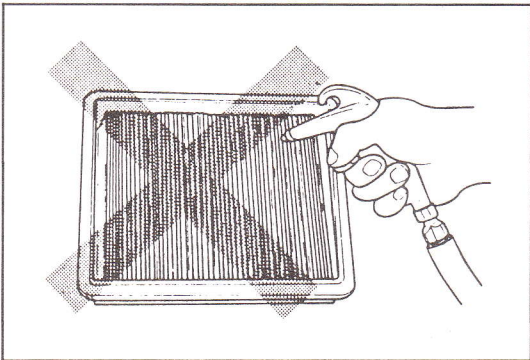
Tune the engine according to the procedures described below.



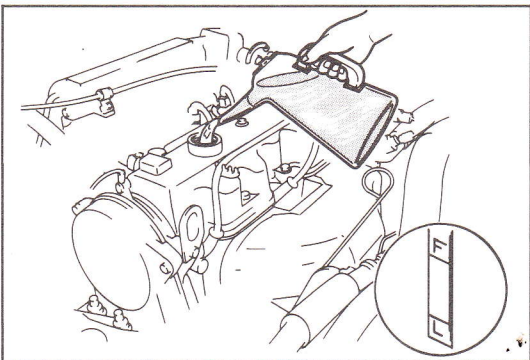
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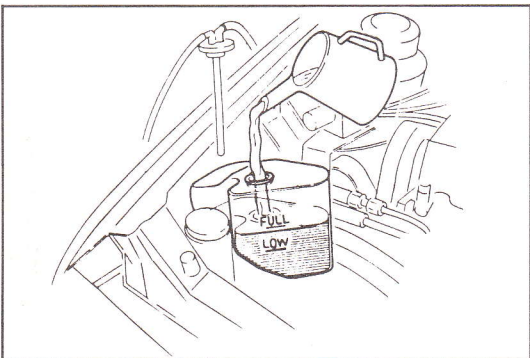
86U01X-006



76G01A-104



4BG01A-010



86U01X-008

### Battery

1. Check the indicator sign on the top of the battery. If the indicator sign is blue, the battery is normal.
2. If the blue indicator sign is not visible, the electrolyte level of the battery is low and/or the battery is discharged.
3. Add distilled water and/or recharge according to the procedures described in Section 5.
4. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat them with grease.
5. Inspect for corroded or frayed battery cables.
6. Check the rubber protector on the positive terminal for proper coverage.

### Air Cleaner Element

Visually check the air cleaner element for excessive dirt, damage, or oil. Replace if necessary.

### Caution

**Do not clean the air cleaner element with compressed air, replace if necessary.**

### Engine Oil

Check the engine oil level and condition with the oil level gauge.

Add oil, or change it, if necessary.

### Coolant Level (Cold engine)

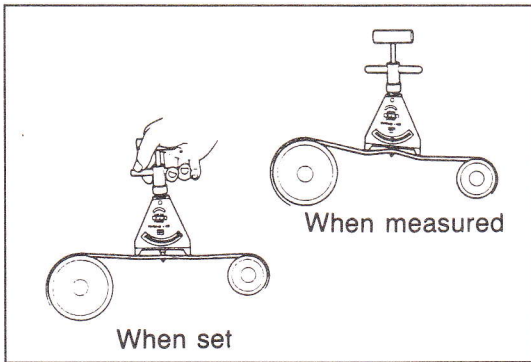
1. Check that the coolant level is near the radiator inlet port.
2. Check that the level in the coolant reservoir is between the FULL and LOW marks.

Add coolant if necessary.

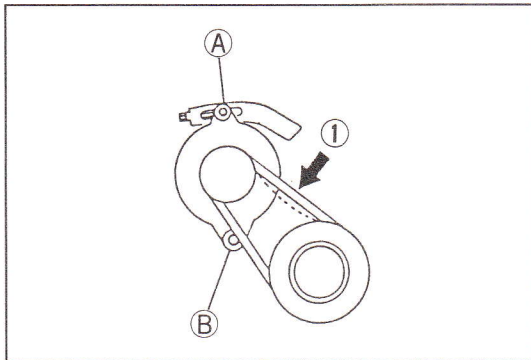
### Warning

- a) **Never remove the radiator cap while the engine is hot.**
- b) **Wrap a thick cloth around the cap and carefully remove it.**

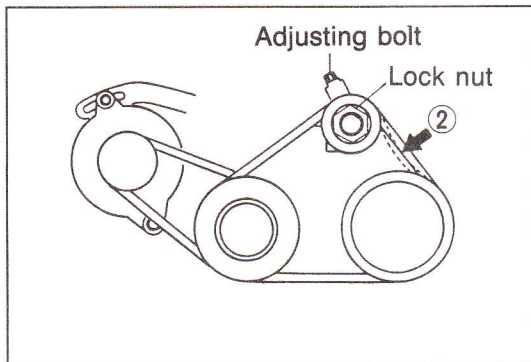
# 1 TUNE-UP PROCEDURE



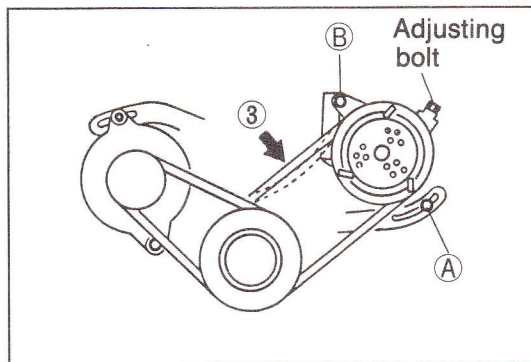
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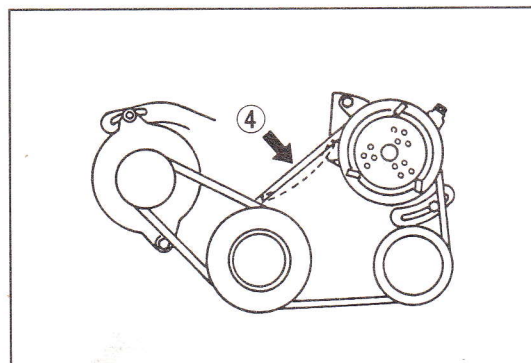
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76F01A-049



76G01A-009



76G01A-010

## Drive Belt

1. Check the drive belt for wear, cracks, or fraying. Replace if necessary.
2. Check the drive belt tension by using the tension gauge.

## Standard belt tension

N (kg, lb)

Belt	New	Used
Alternator	589-785 (60-80, 132-176)	491-687 (50-70, 110-154)
P/S	687-883 (70-90, 154-198)	589-785 (60-80, 132-176)
A/C	687-883 (70-90, 154-198)	589-785 (60-80, 132-176)

3. Check the drive belt deflection by applying moderate pressure (**98 N, 10 kg, 22 lb**) midway between the pulleys.

- (1) Alternator belt deflection

**New : 6-8 mm (0.24-0.31 in)**

**Used: 7-9 mm (0.27-0.35 in)**

If necessary, loosen the alternator mounting bolts and adjust the belt deflection by turning the adjusting bolt.

## Tightening torque

**(A) : 31-46 N·m (3.2-4.7 m·kg, 23-34 ft·lb)**

**(B) : 37-52 N·m (3.8-5.3 m·kg, 27-38 ft·lb)**

- (2) P/S belt deflection

**New : 8-10 mm (0.31-0.39 in)**

**Used: 9-11 mm (0.35-0.43 in)**

If necessary, loosen the idler pulley lock nut and adjust the belt deflection by turning the adjusting bolt.

## Tightening torque of lock nut:

**31-46 N·m (3.2-4.7 m·kg, 23-34 ft·lb)**

- (3) A/C belt deflection

**New : 7-9 mm (0.27-0.35 in)**

**Used: 8-10 mm (0.31-0.39 in)**

If necessary, loosen the A/C mounting bolts and adjust the belt deflection by turning the adjusting bolt.

## Tightening torque

**(A) : 37-52 N·m (3.8-5.3 m·kg, 27-38 ft·lb)**

**(B) : 37-52 N·m (3.8-5.3 m·kg, 27-38 ft·lb)**

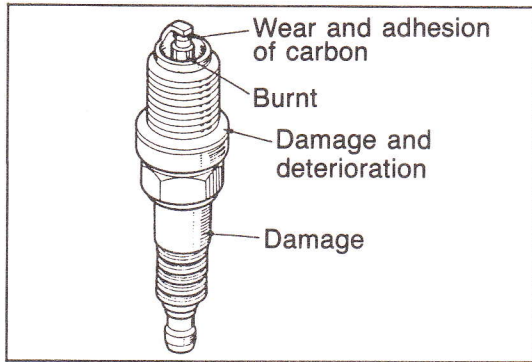
- (4) P/S and A/C belt deflection

**New : 7-9 mm (0.27-0.35 in)**

**Used: 8-10 mm (0.31-0.39 in)**

If necessary, adjust the belt deflection using the same procedure as used for the A/C belt deflection.





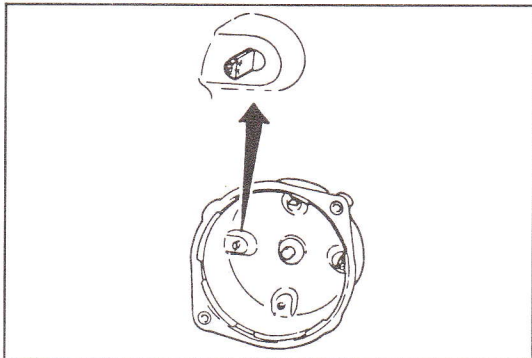
86U01X-012

## Spark Plug

Check the following points. Clean or replace if necessary.

1. Damaged insulation
2. Worn electrodes
3. Carbon deposits
4. Damaged gasket
5. Burnt spark insulator
6. Plug gap

**Plug gap: 1.0—1.1 mm (0.039—0.043 in)**

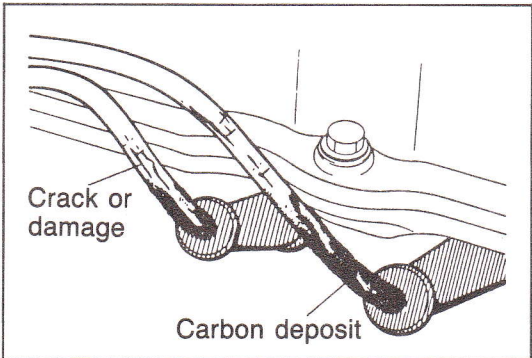


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## Distributor Cap

Check the following points. Replace if necessary.

1. Cracks or carbon deposits
2. Burnt or corroded terminals
3. Worn distributor center contact

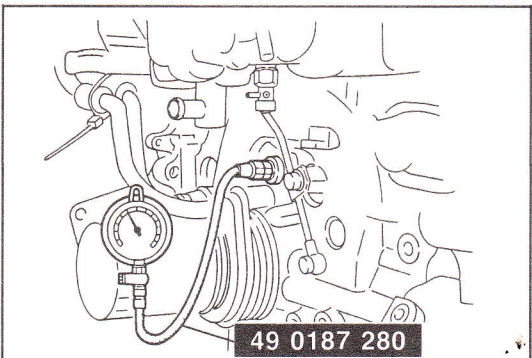


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## High-Tension Lead

Check the following points. Clean or replace if necessary.

1. Damaged lead
2. Carbon deposits



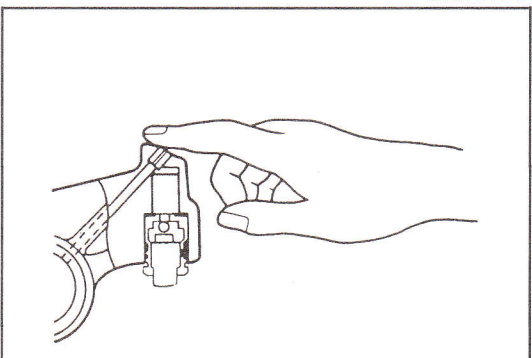
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## Hydraulic Lash Adjuster (HLA)

### Note

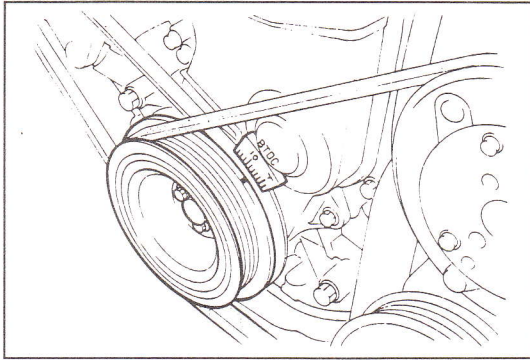
**Tappet noise may occur if the engine is not operated for an extended period of time. The noise should stop after the engine has reached normal operating temperature.**

1. Check for tappet noise. If noise exists, check the following points.
  - (1) Engine oil condition and level
  - (2) Engine oil pressure (Refer to Section 2)
2. If the noise does not stop, check for movement of each HLA by pushing down each rocker arm by hand while at TDC of compression stroke.
3. If the rocker arm moves down, replace the HLA. (Refer to page 1—57.)

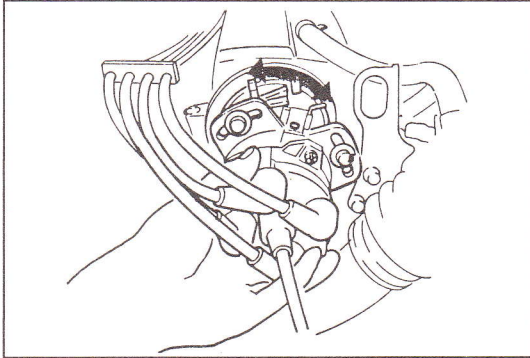


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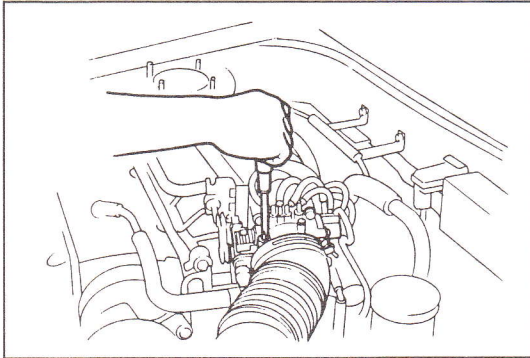
# 1 TUNE-UP PROCEDURE



96U01X-007



86U01X-210



96U01X-008

## Ignition Timing

1. Warm up the engine and run it at idle.
2. Turn all electric loads OFF.
3. Ground the test connector to the vehicle with a jumper wire. (Turbo)
4. Connect a timing light tester.
5. Disconnect the vacuum hose from the vacuum control, and plug the hose. (Non-turbo)
6. Check that the ignition timing mark (yellow) on the crankshaft pulley and the timing mark on the timing belt cover are aligned.

## Ignition timing (at idle speed)

**Turbo :  $9^{\circ} \pm 1^{\circ}$  BTDC**

**Non-Turbo:  $6^{\circ} \pm 1^{\circ}$  BTDC**

7. If necessary, adjust the ignition timing by turning the distributor.

## Idle Speed

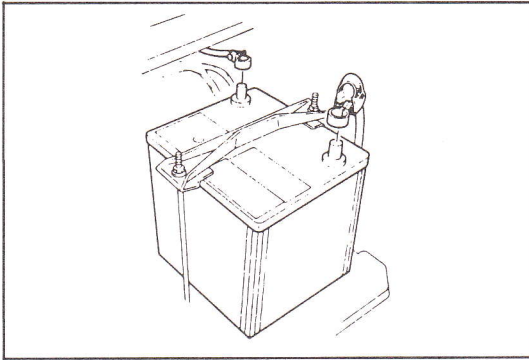
1. Ground the test connector to the vehicle with a jumper wire.
2. Connect a tachometer to the engine.
3. Turn all electric loads off.
4. Check the idle speed.

## Idle speed (MTX in neutral, ATX "P" range):

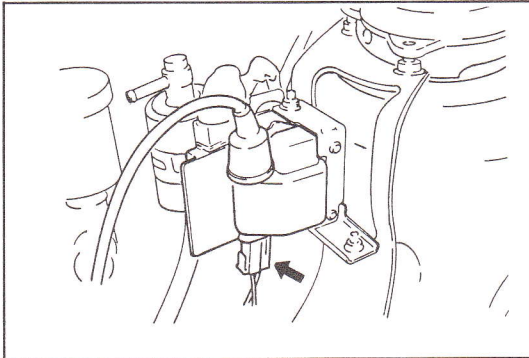
**$750 \pm 25$  rpm**

5. If necessary, remove the blind cap from the throttle body and adjust by turning the air-adjust screw.
6. Install the blind cap and disconnect the jumper wire from the test connector.

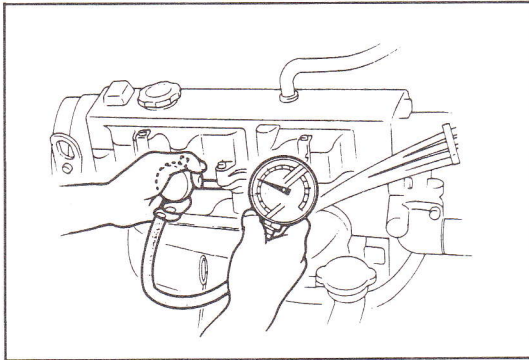




96U01X-009



86U01X-020



86U01X-021

## ON-VEHICLE INSPECTION

If the engine exhibits low power, poor fuel economy, or poor idle, check the following points.

1. Ignition system (Refer to Section 5)
2. Compression
3. Fuel system (Refer to Section 4)

### COMPRESSION

1. Check that the battery is fully charged. Recharge it if necessary.
2. Warm up the engine to the normal operating temperature.
3. Turn it off for about 10 minutes to allow the exhaust manifold to cool.
4. Remove all spark plugs.
5. Disconnect the primary wire connector from the ignition coil.

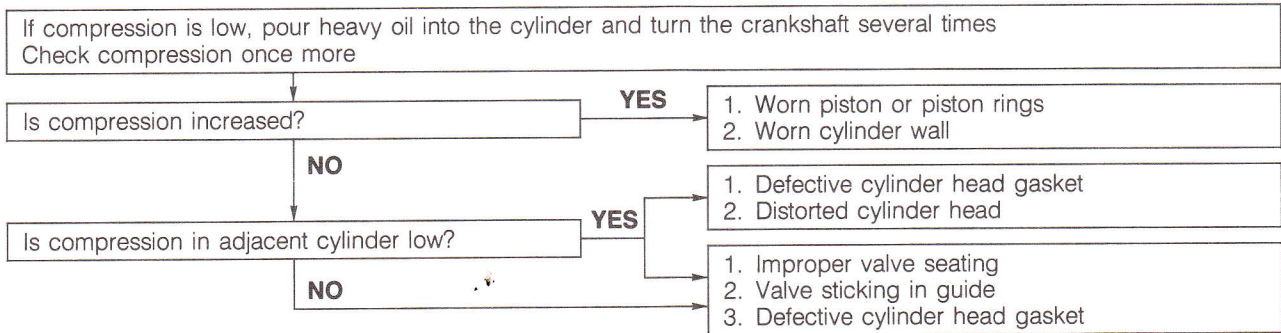
6. Connect a compression gauge to No. 1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Note the maximum gauge reading.
9. Check each cylinder.

### Compression pressure

kPa (kg/cm<sup>2</sup>, psi)-rpm

	Standard	Minimum
Turbo	960 (9.8, 139)—260	680 (6.9, 98)—260
Non-Turbo	1,120 (11.4, 162)—270	780 (8.0, 114)—270

### Possible Cause



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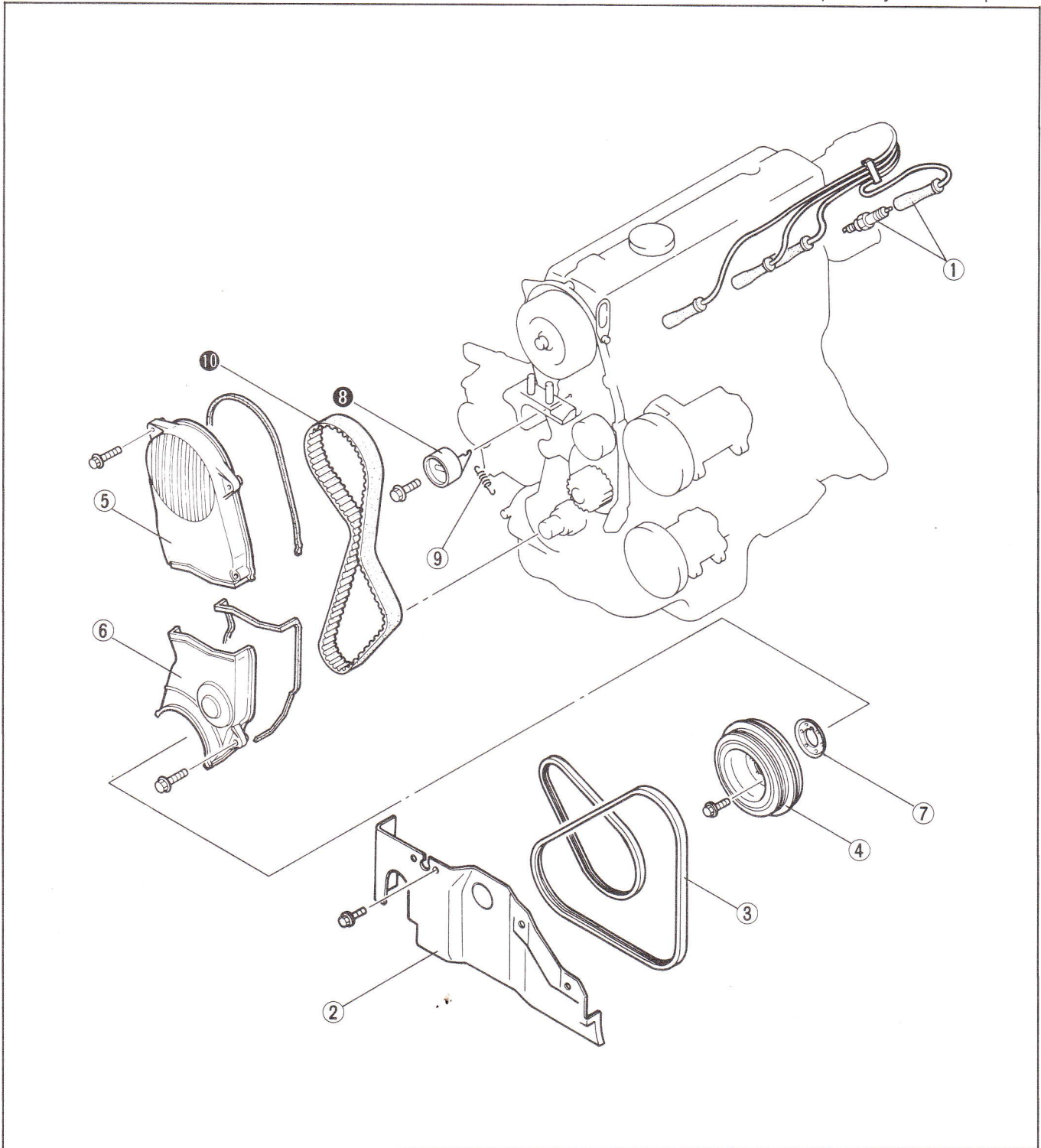
# 1 ON-VEHICLE MAINTENANCE (TIMING BELT)

## ON-VEHICLE MAINTENANCE

### TIMING BELT

#### Removal

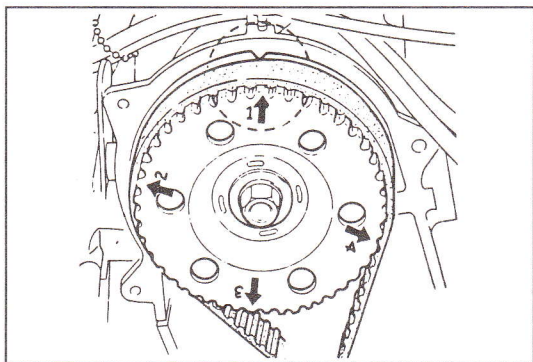
1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.



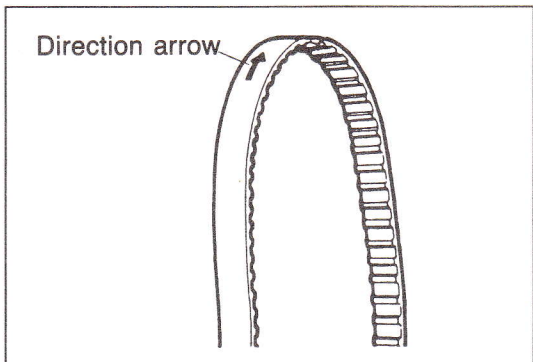
96U01X-010

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| 1. High-tension lead and spark plug | 6. Lower timing belt cover      |
| 2. Engine side cover                | 7. Baffle plate                 |
| 3. Drive belt                       | 8. Timing belt tensioner        |
| 4. Crankshaft pulley                | 9. Timing belt tensioner spring |
| 5. Upper timing belt cover          | 10. Timing belt                 |

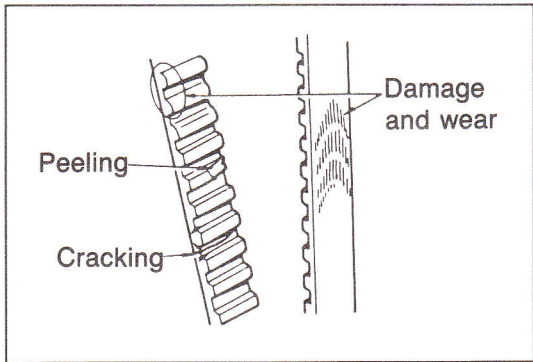




96U01X-011



86U01X-024



96U01X-012

## Removal note

### Timing belt tensioner

1. Turn the crankshaft to align the **↑1** mark of the camshaft pulley with the front housing matching mark.
2. Remove the tensioner.

### Timing belt

Mark the timing belt rotation for proper reinstallation if it is reused.

### Caution

**Be careful not to allow oil, grease, or water on the belt.**

### Inspection and Repair

Check the following parts. (Refer to page 1—44, 45.)

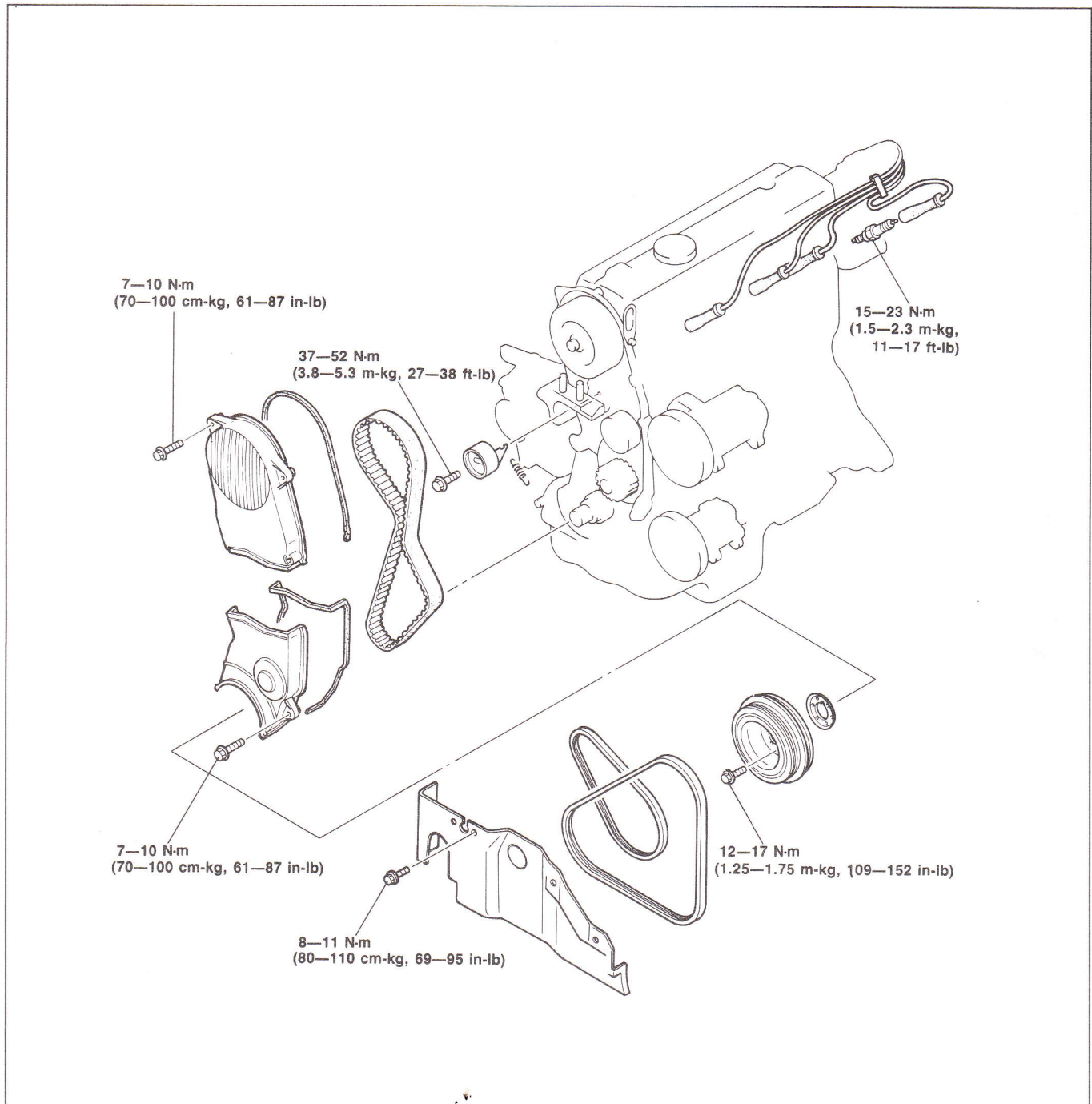
1. Timing belt
2. Timing belt tensioner and spring
3. Timing belt idler pulley
4. Timing belt pulley
5. Camshaft pulley

# 1 ON-VEHICLE MAINTENANCE (TIMING BELT)

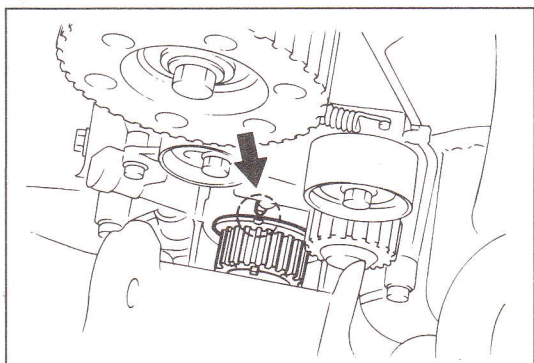
## Installation

Install in the reverse order of removal, referring to the installation note.

## Torque Specifications



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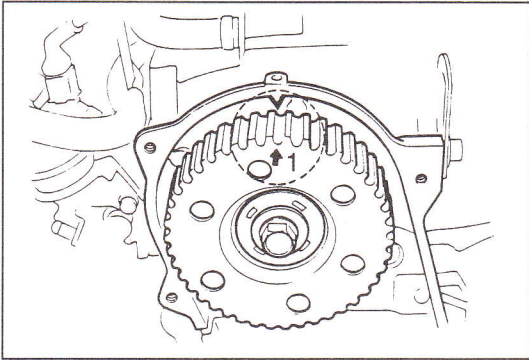
## Installation note

### Timing belt

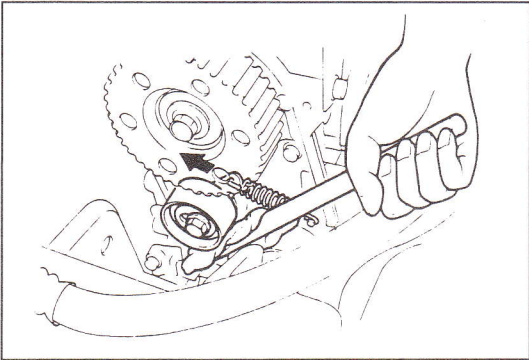
1. Check that the mark on the timing belt pulley is aligned with the matching mark.



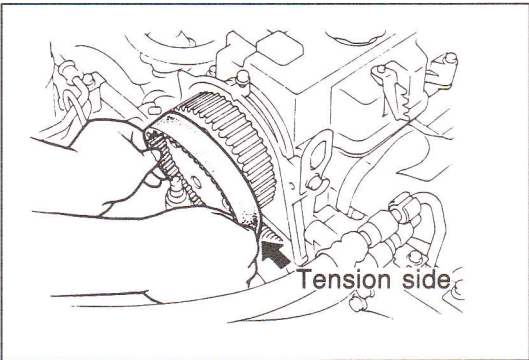
# ON-VEHICLE MAINTENANCE (TIMING BELT) 1



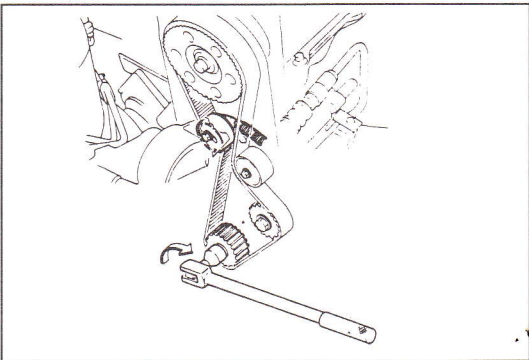
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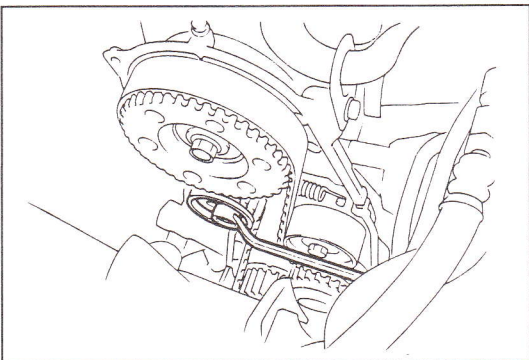
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86U01X-027



96U01X-067



69G01B-028

2. Check that the **↑1** mark of the camshaft pulley is aligned with the matching mark. If it is not aligned, turn the camshaft to align.

3. Install the timing belt tensioner and spring. Temporarily secure it with the spring fully extended.

4. Install the timing belt so that there is no looseness at the water pump pulley and idler pulley side.

### Caution

**a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.**

**b) Check that there is no oil, grease, or dirt on the timing belt.**

### Note

**Remove all spark plugs for easier rotation.**

5. Turn the crankshaft twice clockwise in the direction of rotation.

6. Check that the matching marks are correctly aligned. If not, repeat the above-mentioned procedure.

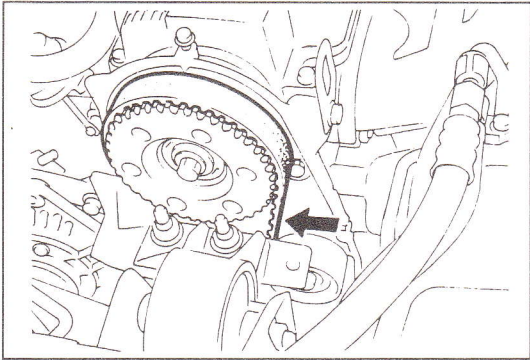
7. Loosen the tensioner lock bolt and apply tension to the belt.

8. Tighten the timing belt tensioner lock bolt.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

# 1 ON-VEHICLE MAINTENANCE (TIMING BELT)



96U01X-015

9. Turn the crankshaft twice in the direction of rotation and align the matching marks.
10. Check the timing belt deflection. If the deflection is not correct, repeat the adjustment from step 5 above.

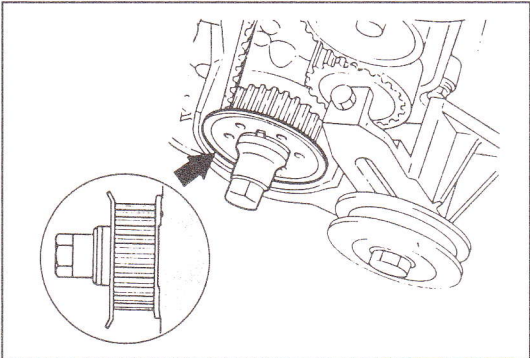
### Timing belt deflection/98 N (10 kg, 22 lb)

New : 8.0—9.0 mm (0.31—0.35 in)

Used: 9.0—10.0 mm (0.35—0.39 in)

### Caution

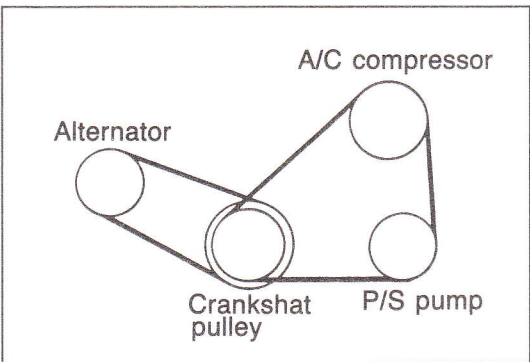
Be sure not to apply tension other than that of the tensioner spring.



69G01B-030

### Baffle plate

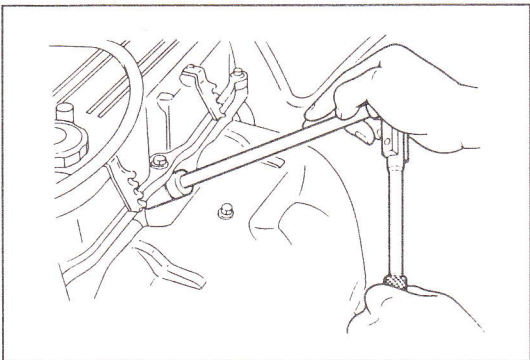
Install the baffle plate as shown in the figure.



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### Drive belt

Install each drive belt, and check the belt deflection. (Refer to page 1—6.)



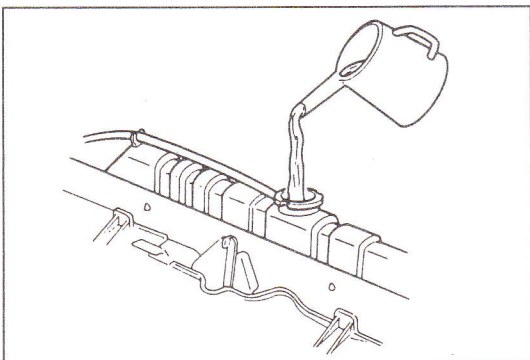
79G01C-021

### Spark plug

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

### Tightening torque:

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)



86U01X-029

### Steps After Installation

Perform the necessary engine adjustment. (Refer to TUNE-UP PROCEDURE.)



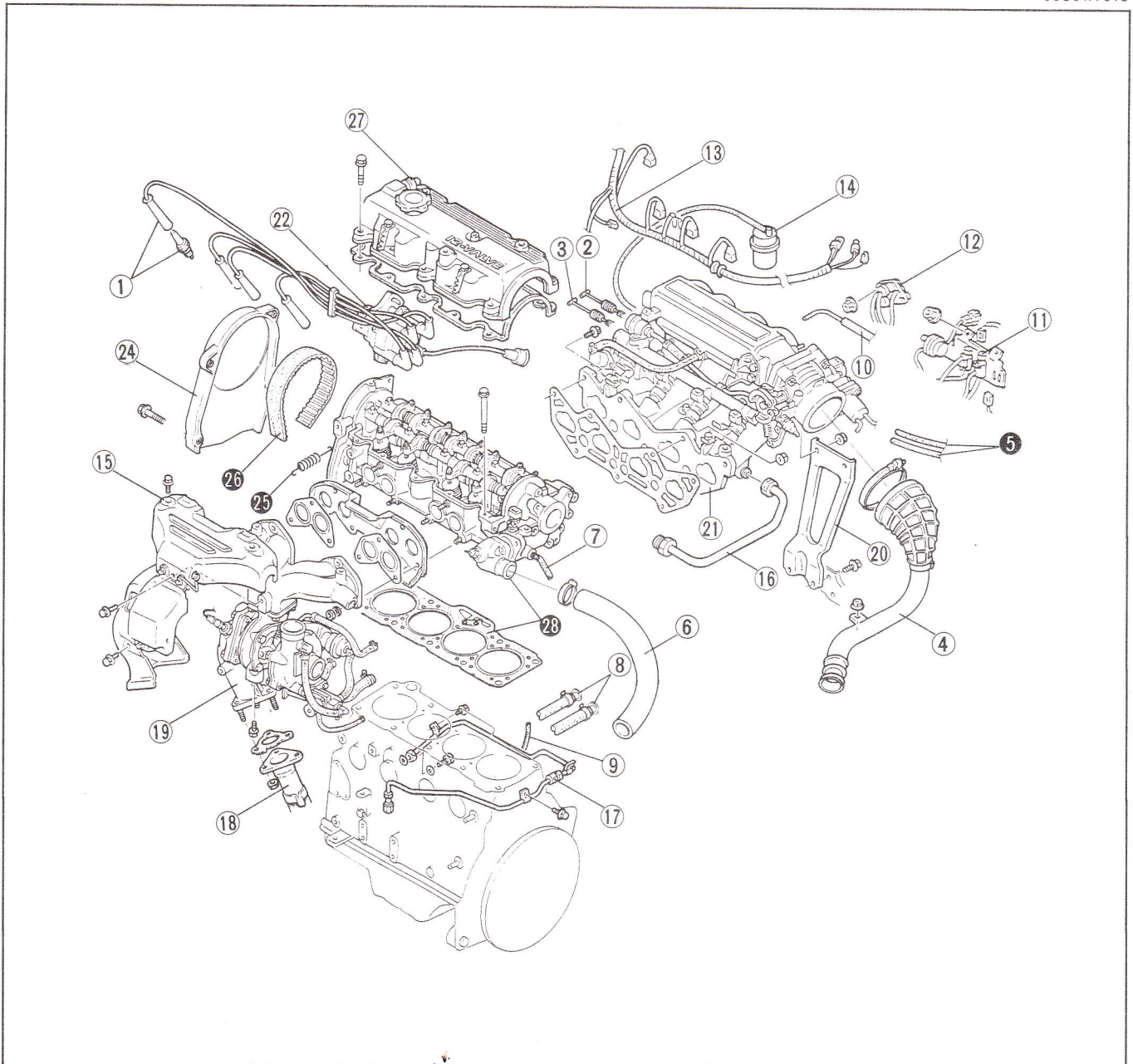
## CYLINDER HEAD

### Removal

**Warning: Release the fuel pressure. (Refer to Section 4.)**

1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.

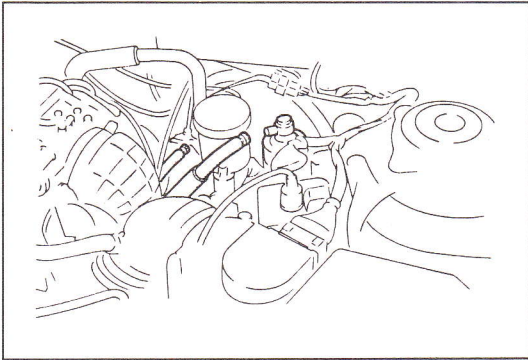
96U01X-016



96U01X-017

- |                                     |   |                                  |
|-------------------------------------|---|----------------------------------|
| 1. High-tension lead and spark plug | 11. Three-way solenoid assembly         | 20. Intake manifold bracket      |
| 2. Accelerator cable                | 12. EGR solenoid assembly               | 21. Intake manifold assembly     |
| 3. Throttle cable (ATX)             | 13. Engine harness connector and ground | 22. Distributor                  |
| 4. Air intake pipe                  | 14. Vacuum chamber                      | 23. A/C compressor and bracket   |
| 5. Fuel hose                        | 15. Exhaust manifold insulator          | 24. Upper timing belt cover      |
| 6. Upper radiator hose              | 16. EGR pipe                            | 25. Timing belt tensioner spring |
| 7. Water bypass hose                | 17. Turbocharger oil pipe               | 26. Timing belt                  |
| 8. Heater hose                      | 18. Exhaust pipe                        | 27. Cylinder head cover          |
| 9. Oil cooler hose (turbo)          | 19. Exhaust manifold and turbocharger   | 28. Cylinder head and gasket     |
| 10. Brake vacuum hose               |   |                                  |

# 1 ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



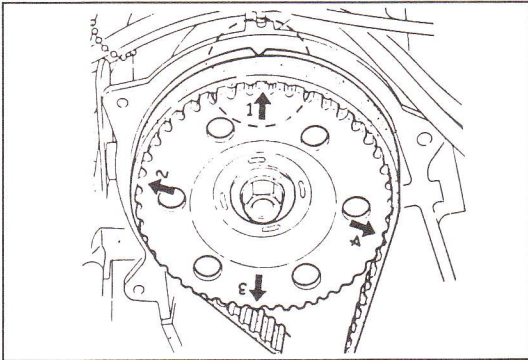
86U01X-032

## Removal note Fuel hose

### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

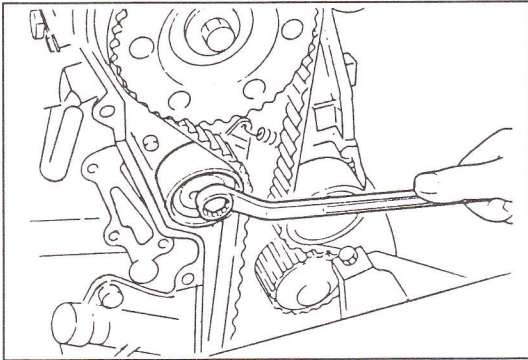
Plug the disconnected hoses to avoid fuel leakage.



96U01X-018

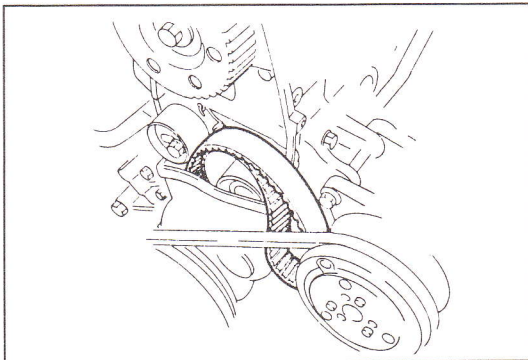
## Timing belt

1. Before removing the timing belt, turn the crankshaft to align the **↑1** mark of the camshaft pulley with the front housing matching mark.



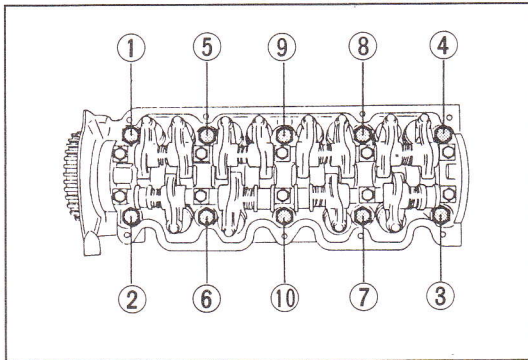
69G01B-036

2. Loosen the timing belt tensioner lock bolt.
3. Shift the tensioner outward as far as possible, then temporarily tighten it.



69G01B-037

4. Remove the timing belt and secure it out of the way to prevent damage during removal and installation of the cylinder head.

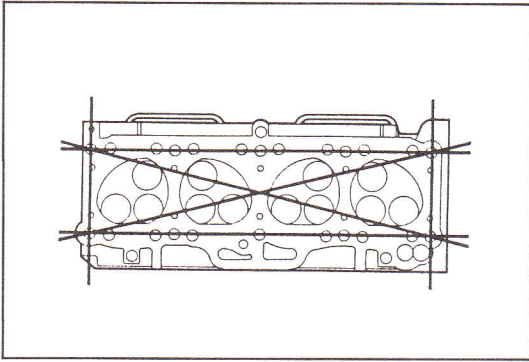


76G01A-111

## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.





96U01X-019

## **Disassembly of Cylinder Head**

Refer to page 1—29.

## **Inspection of Cylinder Head**

Refer to page 1—35.

## **Assembly of Cylinder Head**

Refer to page 1—55.

# 1 ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

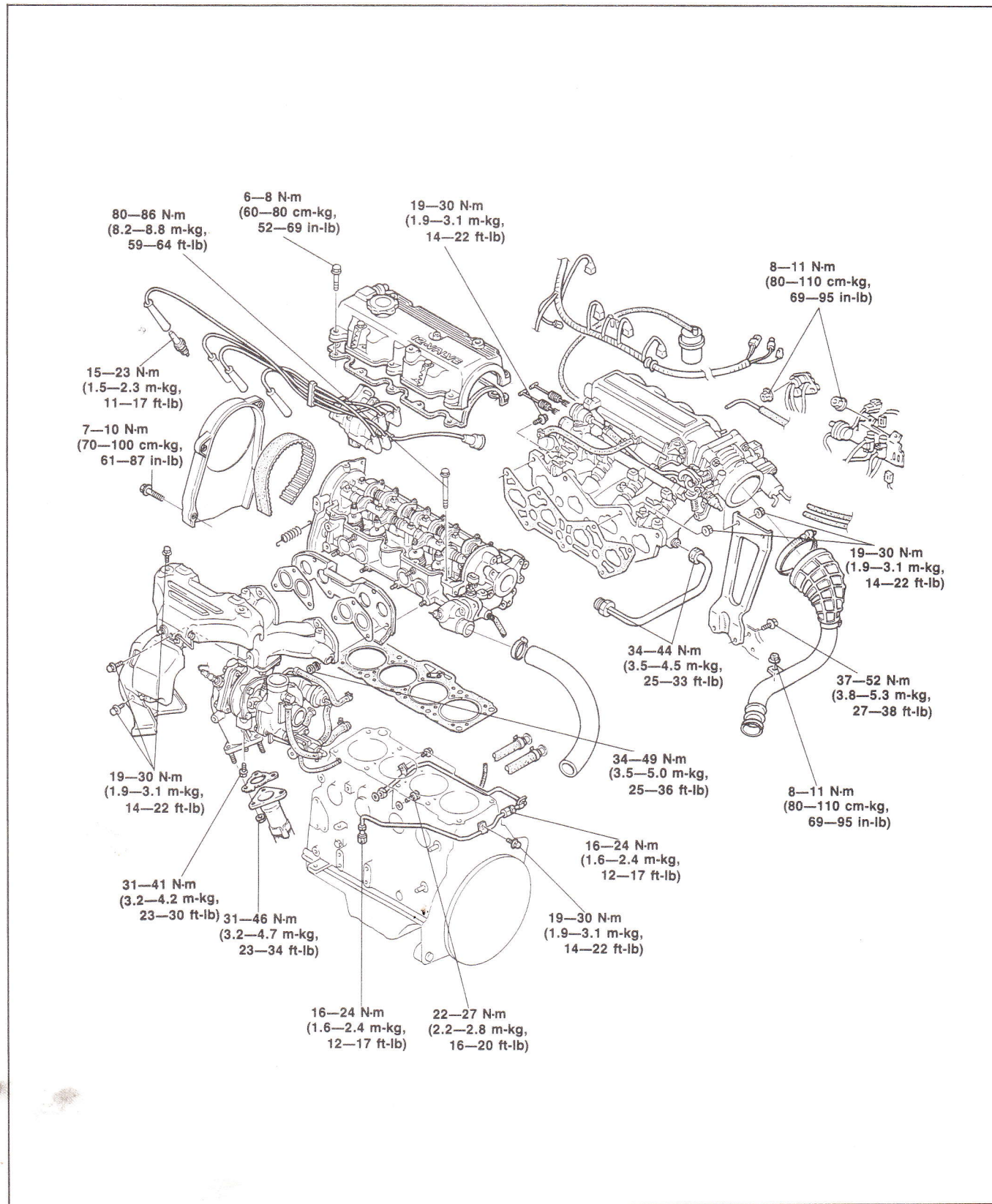
## Installation

Install in the reverse order of removal, referring to the installation note.

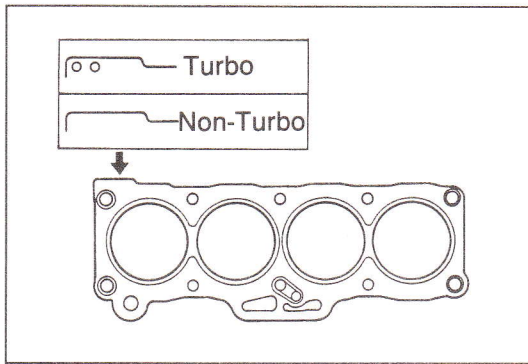
### Note

- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

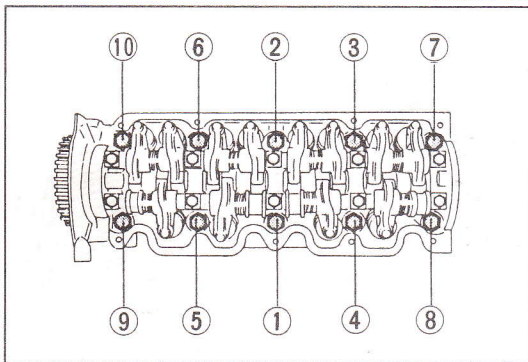
## Torque Specifications



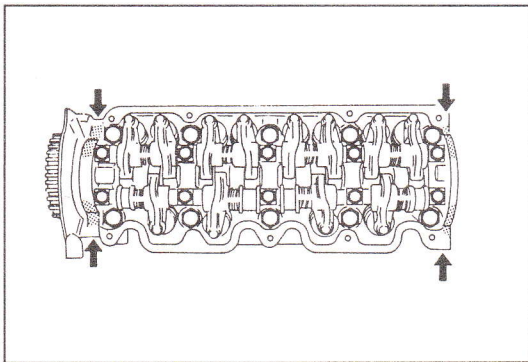




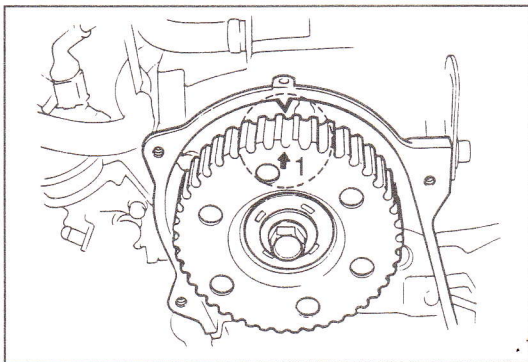
86U01X-035



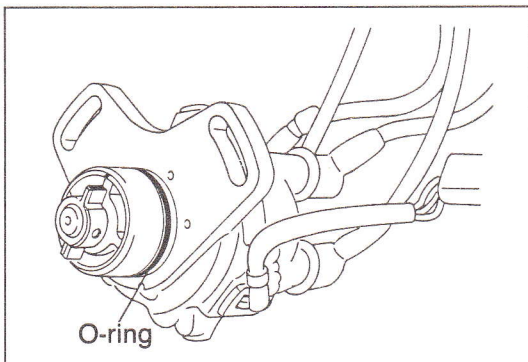
86U01X-036



86U01X-037



96U01X-021



86U01X-039

## Installation note

### Cylinder head

1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Place a new cylinder head gasket in position.

3. Set the cylinder head in place.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**

### Cylinder head cover

1. Apply silicon sealant to the shaded area shown in the figure.
2. Install the cylinder head cover.

### Tightening torque:

**6—8 N·m (60—80 cm·kg, 52—69 in·lb)**

### Timing belt

1. Align the **↑1** mark of the camshaft pulley with the front housing matching mark.
2. Install the timing belt. (Refer to TIMING BELT of ON-VEHICLE MAINTENANCE.)

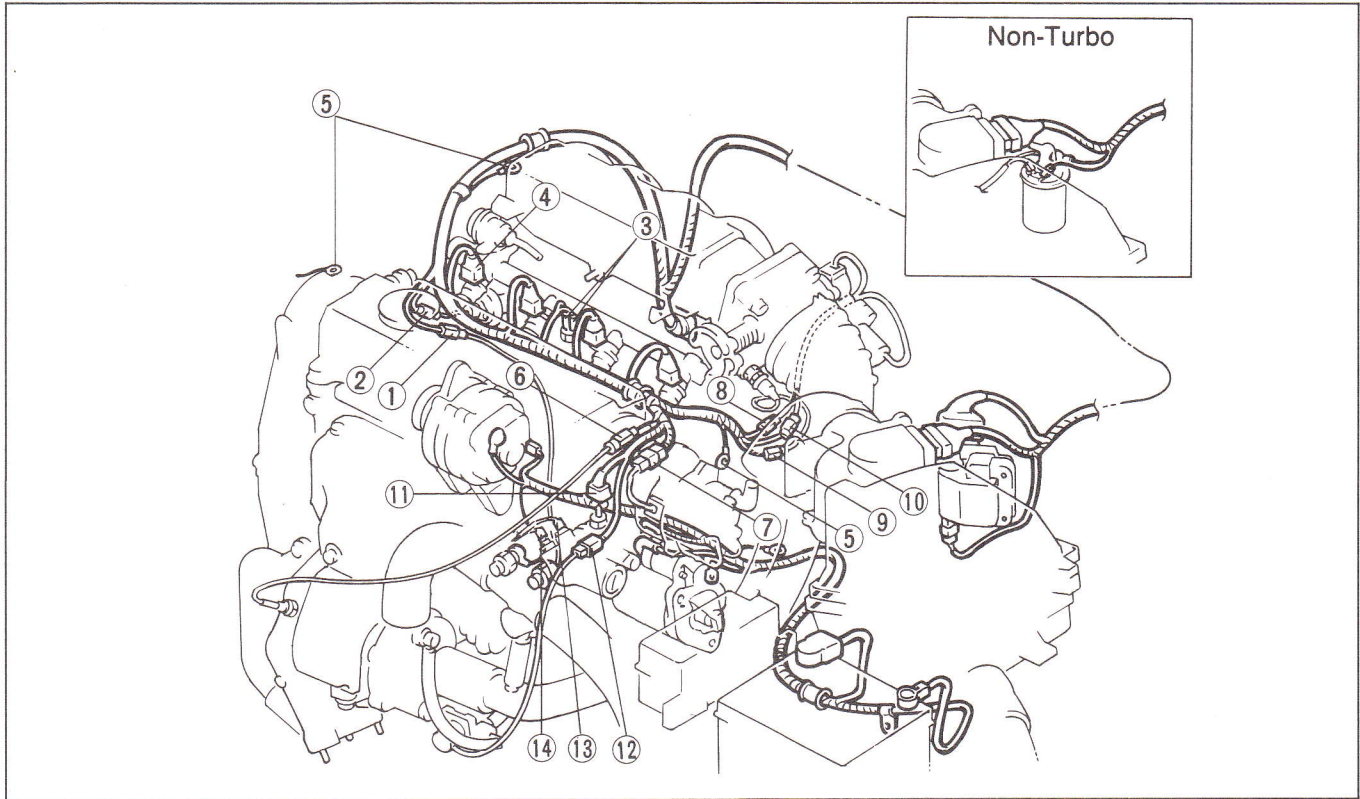
### Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade.
3. Install the distributor into the rear housing.
4. Loosely tighten the distributor mounting bolt.

# 1 ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

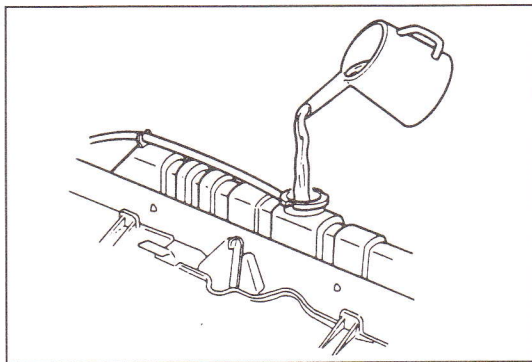
## Engine harness connector

Install the engine harness connectors.



86U01X-040

- |                                |  |
|--------------------------------|--|
| 1. Knock sensor (turbo)        | 8. Solenoid valve (idle speed control) |
| 2. EGR position sensor (turbo) | 9. Idle switch                         |
| 3. Water thermo switch         | 10. Throttle sensor                    |
| 4. Injector                    | 11. Water thermo sensor                |
| 5. Engine ground               | 12. Waste gate solenoid valve (turbo)  |
| 6. Oxygen sensor               | 13. Heat gauge unit                    |
| 7. Crank angle sensor (turbo)  | 14. Water thermo switch                |



96U01X-022

### Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant.
2. Perform the necessary engine adjustments. (Refer to TUNE-UP PROCEDURE.)

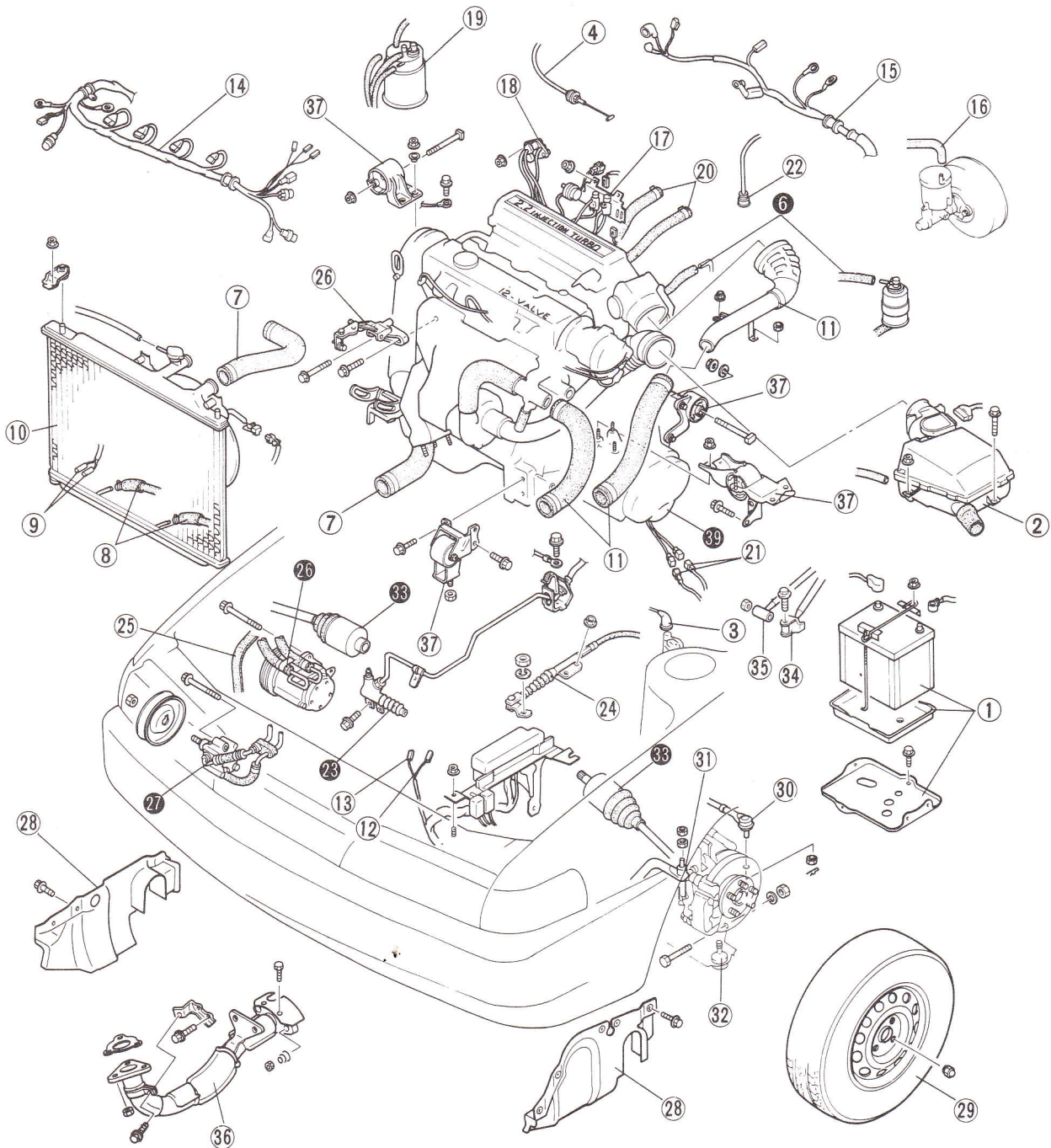


## REMOVAL

**Warning: Release the fuel pressure. (Refer to Section 4.)**

1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.

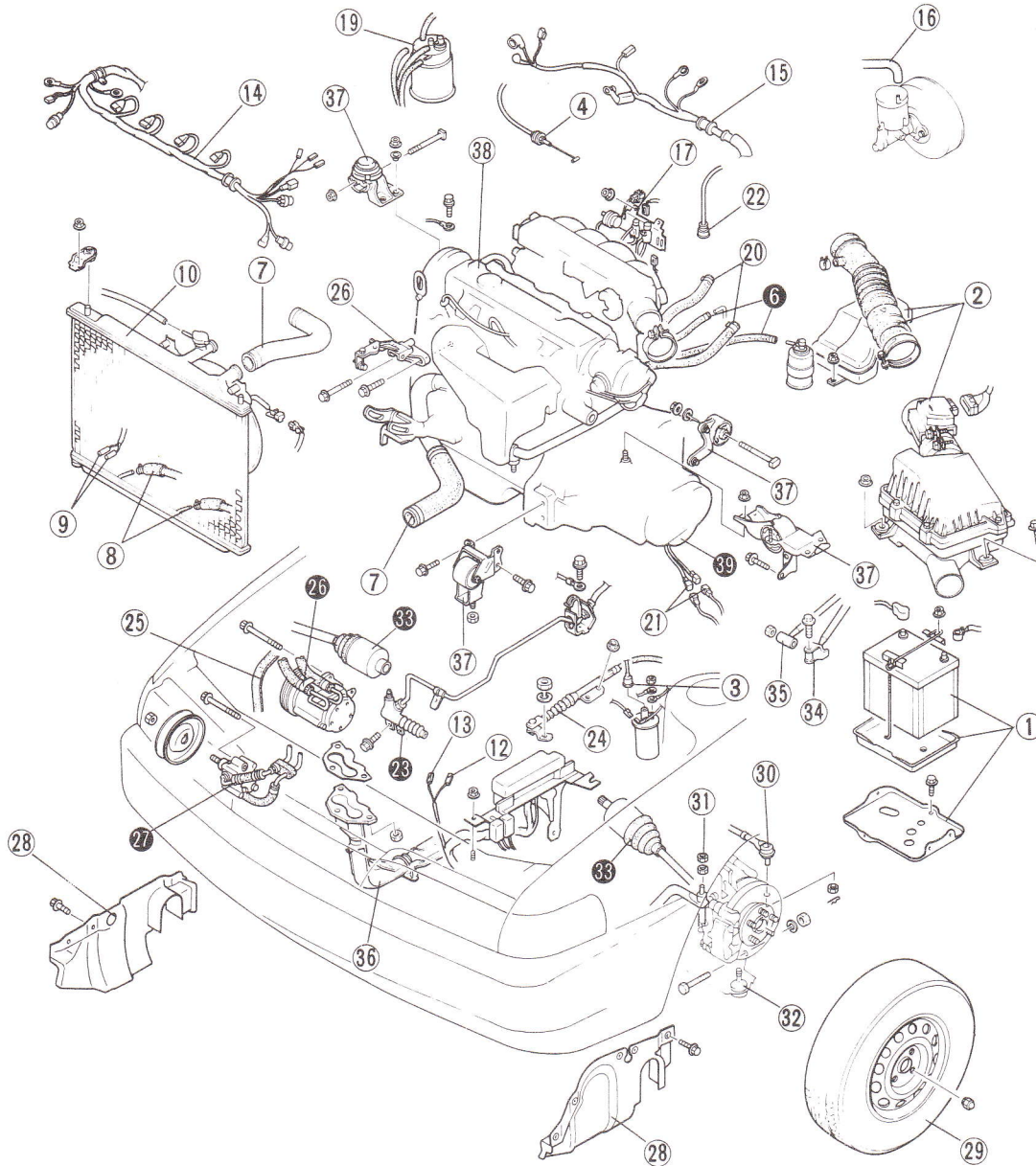
### TURBO





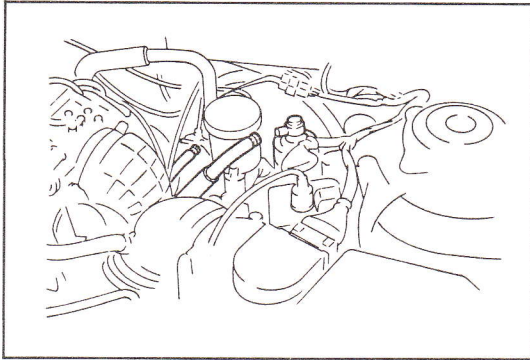
# 1 REMOVAL

## NON-TURBO



96U01X-024

- |  |                                   |                            |
|--|-----------------------------------|----------------------------|
| 1. Battery and battery carrier         | 14. EGI harness                   | 27. P/S oil pump           |
| 2. Air-cleaner assembly                | 15. Engine harness                | 28. Engine side cover      |
| 3. High-tension lead                   | 16. Brake vacuum hose             | 29. Front wheel            |
| 4. Accelerator cable                   | 17. Three-way solenoid assembly   | 30. Tie-rod end            |
| 5. Throttle cable (ATX)                | 18. EGR solenoid assembly (turbo) | 31. Stabilizer control rod |
| 6. Fuel hose                           | 19. Canister hose                 | 32. Lower arm bushing      |
| 7. Radiator hose                       | 20. Heater hose                   | 33. Driveshaft             |
| 8. ATF hose (ATX)                      | 21. Transaxle harness             | 34. Change rod (MTX)       |
| 9. Radiator harness                    | 22. Speedometer cable             | 35. Extension bar (MTX)    |
| 10. Radiator and cooling fan           | 23. Clutch release cylinder (MTX) | 36. Exhaust pipe           |
| 11. Turbocharger pipe and hose (turbo) | 24. Control cable (ATX)           | 37. Engine mount           |
| 12. Heat gauge unit connector          | 25. Drive belt                    | 38. Engine and transaxle   |
| 13. Water thermo switch connector      | 26. A/C compressor and bracket    | 39. Transaxle              |



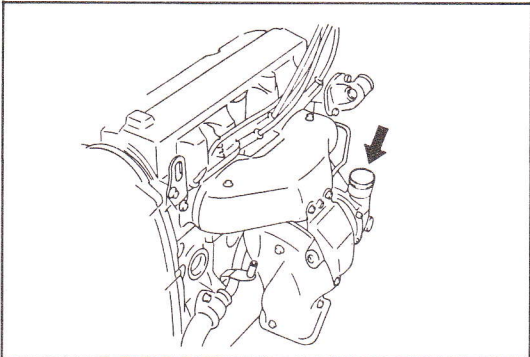
76G01A-118

## Removal Note Fuel hose

### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

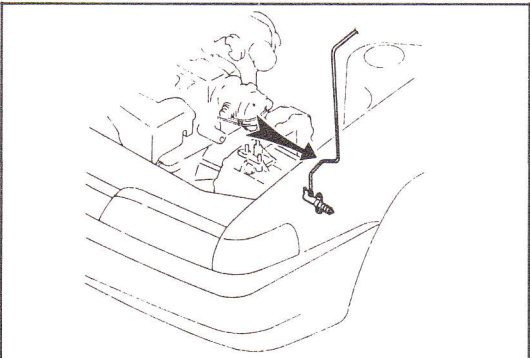
Plug the disconnected hoses to avoid fuel leakage.



76F01C-046

## Turbocharger

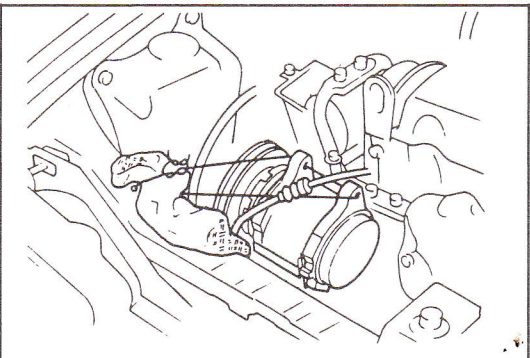
Remove the turbocharger pipe and hose, then cover the turbocharger with a clean rag.



86U01X-059

## Clutch release cylinder (MTX)

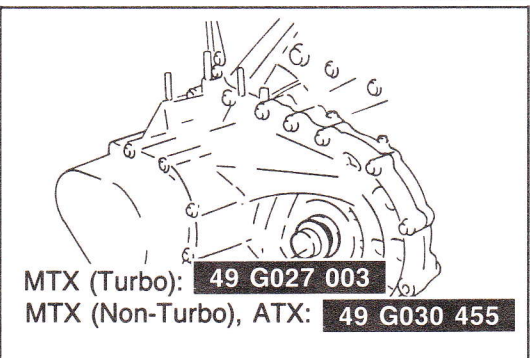
Remove the clutch release cylinder with the pipe still connected.



67U01X-029

## P/S pump, A/C compressor

Remove the P/S pump and A/C compressor with the hoses still connected to them, secure the pump and compressor as shown in the figure.



MTX (Turbo): **49 G027 003**  
 MTX (Non-Turbo), ATX: **49 G030 455**

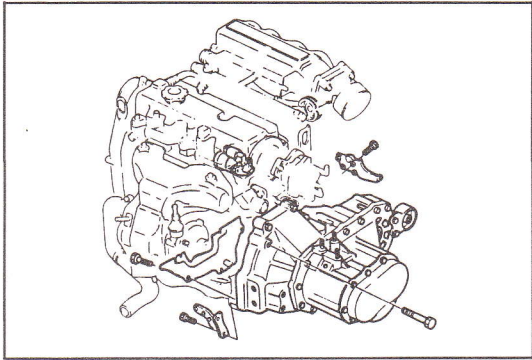
86U01X-060

## Driveshaft

Remove the driveshafts. (Refer to Section 9.) Slide the **SST** into the transaxle.

# 1 REMOVAL

---



86U01X-213

## **Transaxle**

Separate the transaxle from the engine.



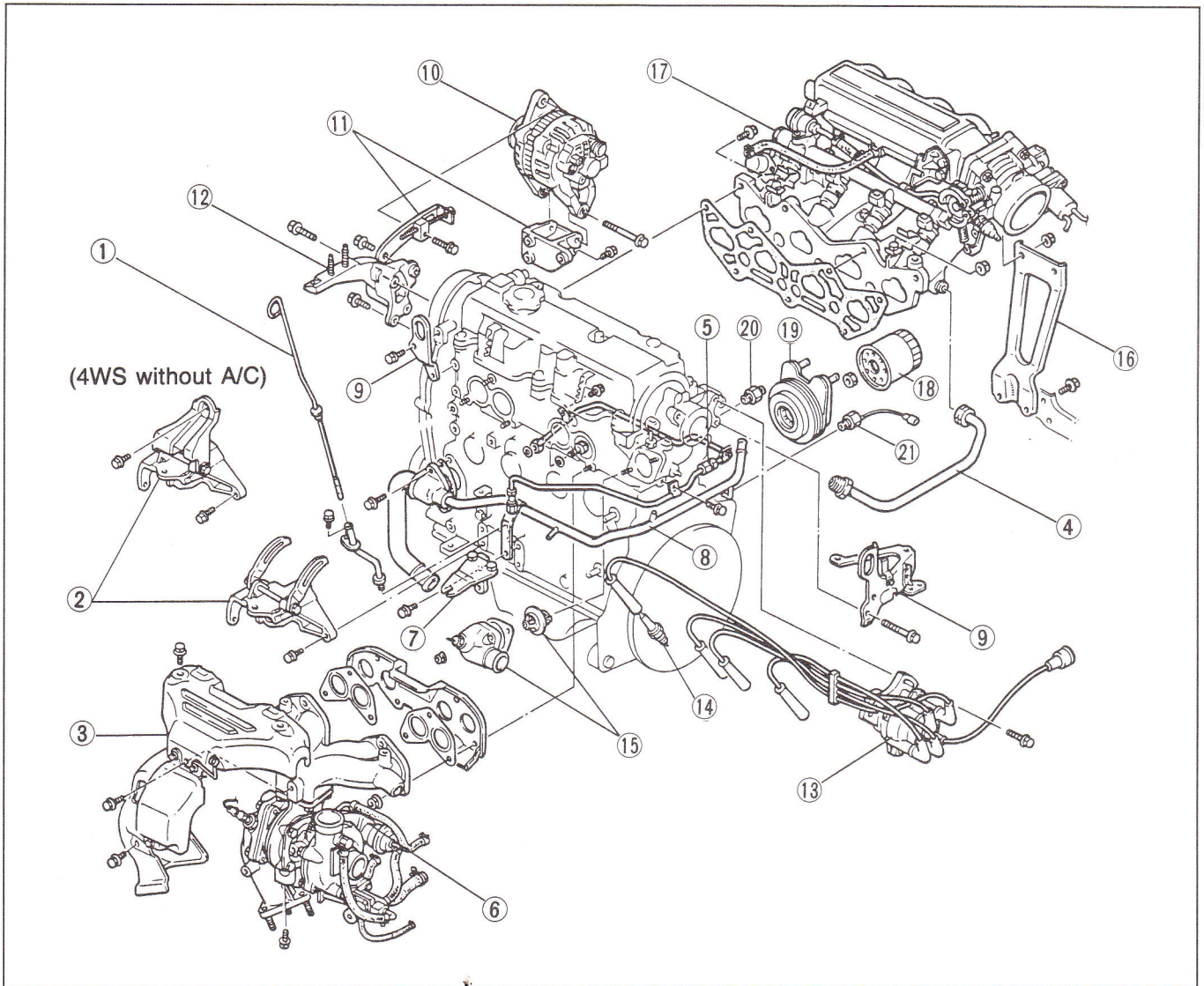
## DISASSEMBLY

1. Remove in the sequence shown in the figure, referring to the disassembly note for specially marked parts.
2. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
3. Clean the parts with steam, blow off any remaining water with compressed air.

### Note

Care should be taken during the disassembly of any part or system to study its order of assembly. Any deformation, wear, or damage should also be noted.

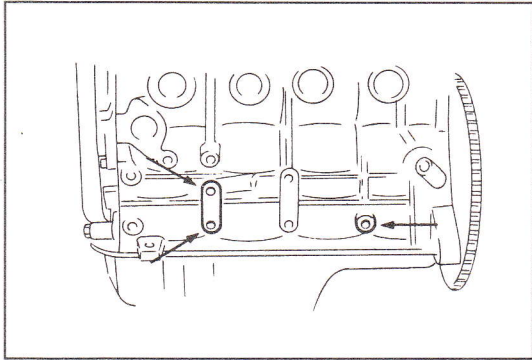
## AUXILIARY PARTS



96U01X-025

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 1. Oil level gauge                    | 12. Engine mount bracket              |
| 2. P/S oil pump bracket               | 13. Distributor and high-tension lead |
| 3. Exhaust manifold insulator         | 14. Spark plug                        |
| 4. EGR pipe                           | 15. Thermostat and thermostat cover   |
| 5. Turbocharger oil pipe (turbo)      | 16. Intake manifold bracket           |
| 6. Exhaust manifold assembly          | 17. Intake manifold assembly          |
| 7. Turbocharger bracket (turbo)       | 18. Oil filter                        |
| 8. Coolant inlet pipe and bypass pipe | 19. Oil cooler (turbo)                |
| 9. Engine hanger                      | 20. Oil pressure switch               |
| 10. Alternator                        | 21. Knock sensor (turbo)              |
| 11. Alternator strap and bracket      |                                       |

# 1 DISASSEMBLY (AUXILIARY PARTS)

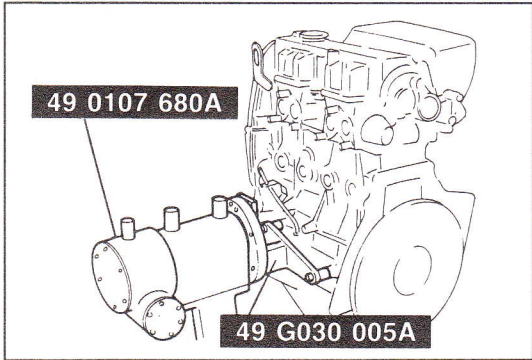


76G01A-120

## Disassembly Note

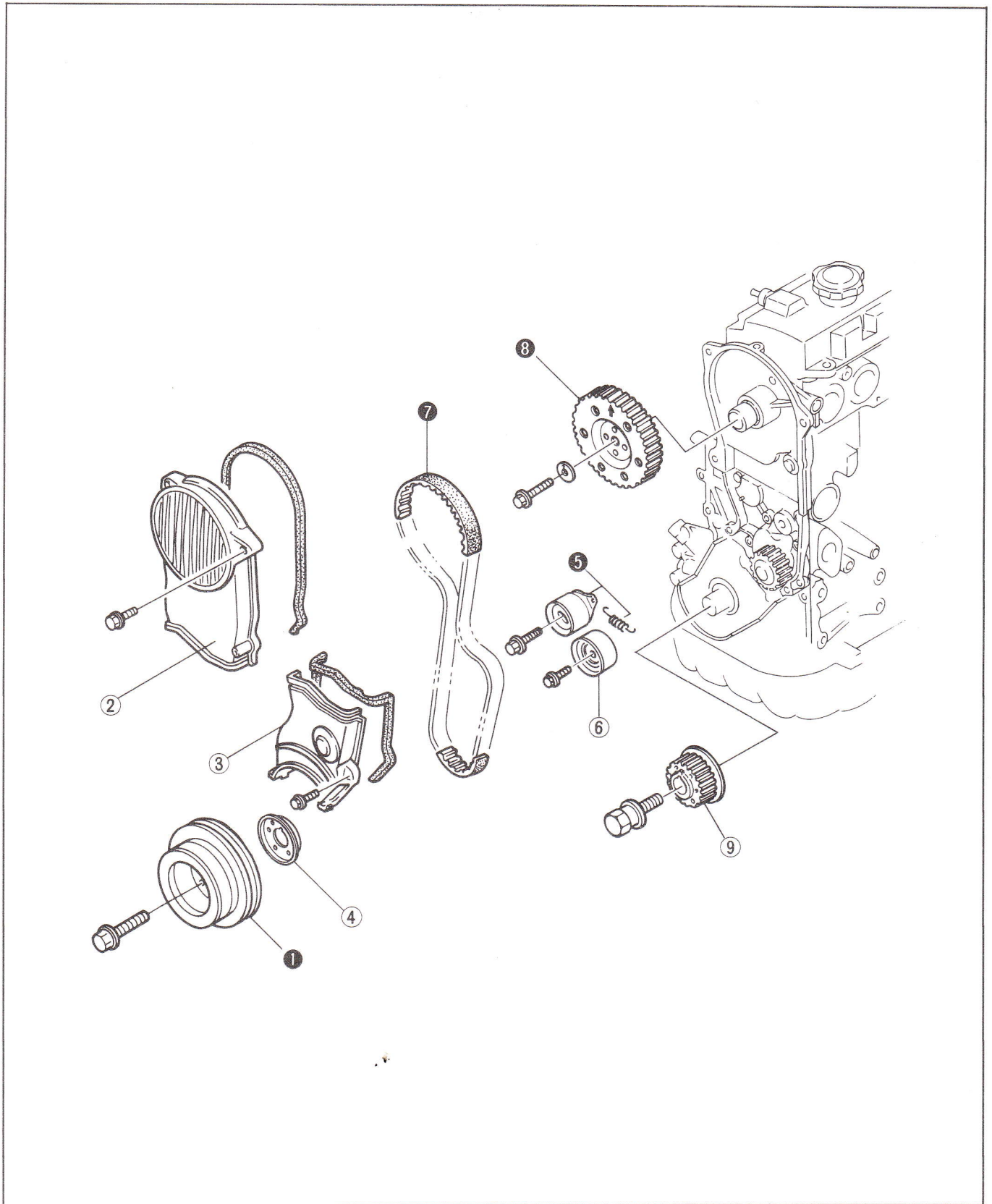
### Engine hanger

Remove the exhaust manifold; then connect the **SST** to the engine.



69G01X-000

## TIMING BELT



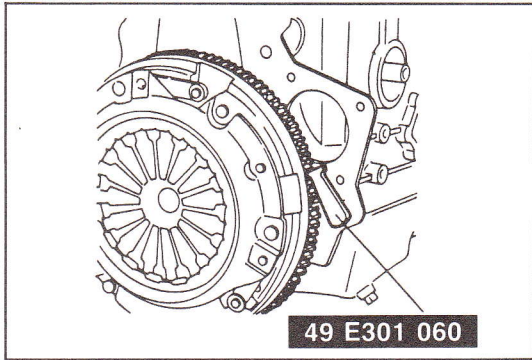
69G01B-072

1. Crankshaft pulley
2. Upper timing belt cover
3. Lower timing belt cover
4. Baffle plate
5. Timing belt tensioner and spring

6. Timing belt idler pulley
7. Timing belt
8. Camshaft pulley
9. Timing belt pulley



# 1 DISASSEMBLY (TIMING BELT)

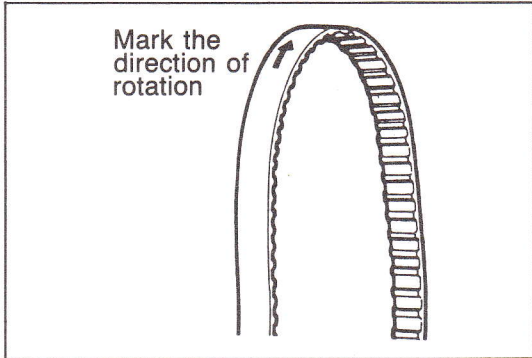


76G01A-121

## Disassembly Note

### Crankshaft pulley

1. Set the **SST** against the flywheel.
2. Remove the crankshaft pulley.



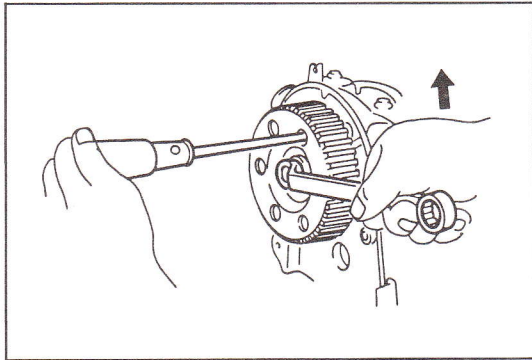
76G01A-122

### Timing belt

1. Loosen the tensioner lock bolt, and remove the tensioner spring.
2. Mark the timing belt rotation for proper reinstallation if it is reused.
3. Remove the timing belt.

### Caution

**Be careful not to allow oil or grease on the belt.**

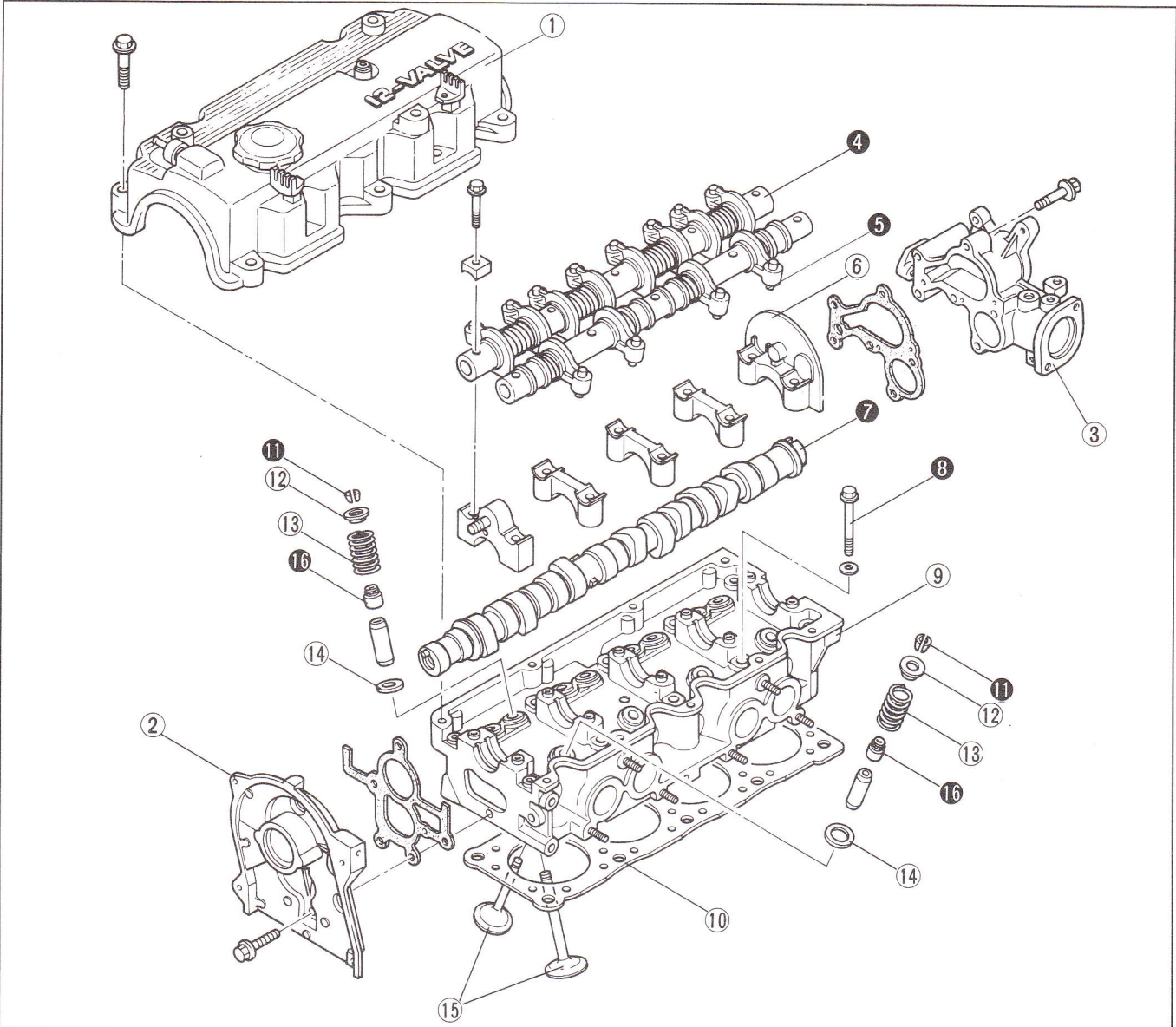


76G01A-123

### Camshaft pulley

Remove the pulley lock bolt using a screw driver to prevent the camshaft from turning.

CYLINDER HEAD



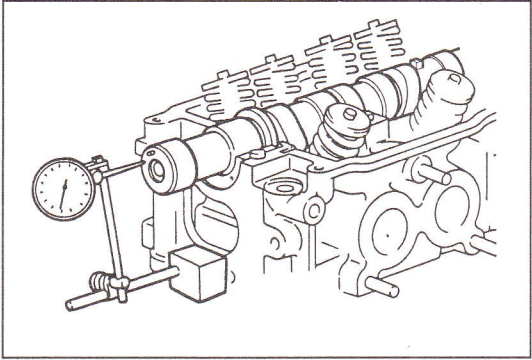
86U01X-065

- 1. Cylinder head cover
- 2. Front housing
- 3. Rear housing
- 4. Rocker arm and shaft assembly
- 5. Hydraulic lash adjuster (HLA)
- 6. Camshaft cap
- 7. Camshaft
- 8. Cylinder head bolt
- 9. Cylinder head
- 10. Cylinder head gasket
- 11. Valve keeper
- 12. Upper spring seat
- 13. Valve spring
- 14. Lower spring seat
- 15. Valve
- 16. Valve seal

**Disassembly Note  
Camshaft**

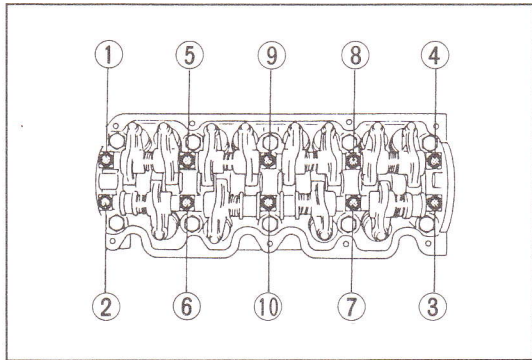
Before removing the rocker arm and shaft assembly, clean the bearings and journals, and measure the following:

- 1. Camshaft end play. (Refer to page 1—40.)
- 2. Camshaft journal oil clearance. (Refer to page 1—39.)

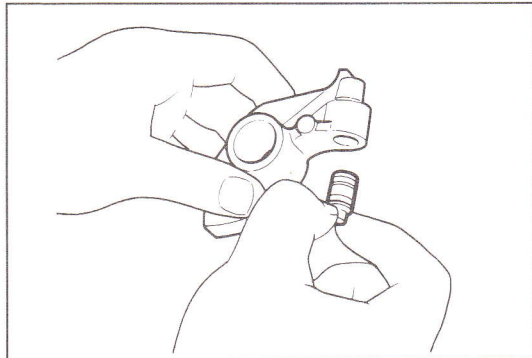


96U01X-026

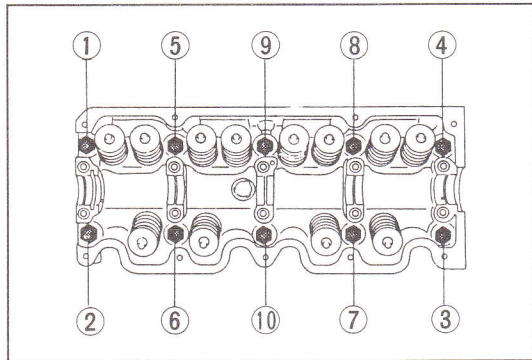
# 1 DISASSEMBLY (CYLINDER HEAD)



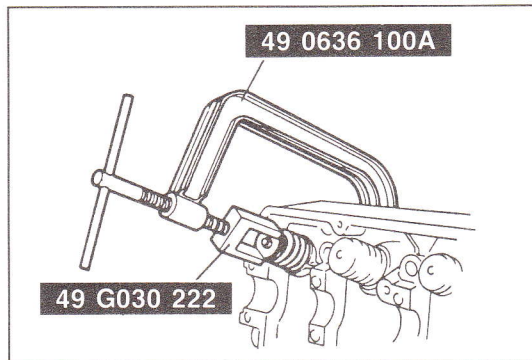
86U01X-067



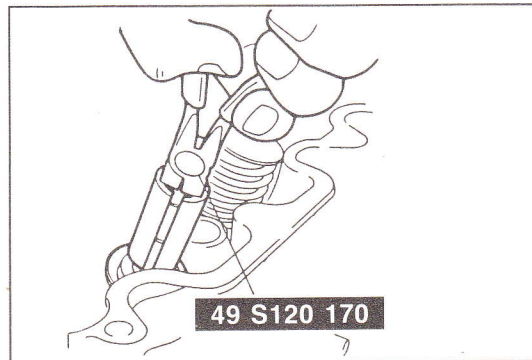
96U01X-077



86U01X-068



96U01X-068



96U01X-069

## Rocker arm and shaft assembly

1. Loosen the bolts in two or three steps in the order shown in the figure.
2. Remove the rocker arm and shaft assembly together with the bolts.

### Caution

- a) Do not mixup the various parts of the rocker arm and shaft assembly.
- b) Do not remove the HLA unless necessary.

## Hydraulic lash adjuster (HLA)

Remove the HLA by hand. If it is difficult, remove the HLA by using pliers.

### Caution

Do not remove the HLA unless necessary because oil leakage will occur if the O-ring is damaged.

## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.

## Valve keeper

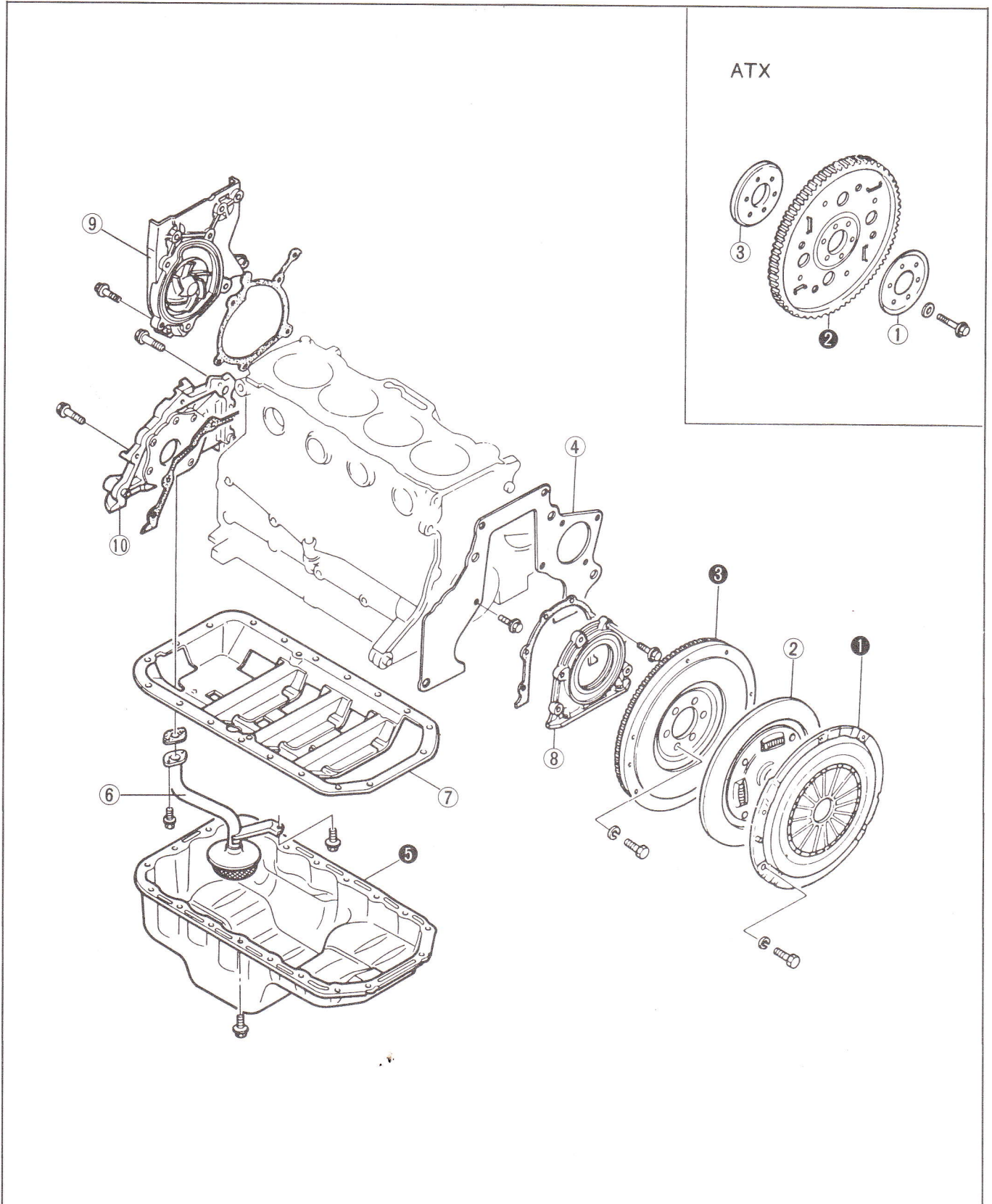
Remove the valve keeper from the cylinder head with the SST.

## Valve seal

Remove the valve seal from the valve guide with the SST.



## CYLINDER BLOCK—I

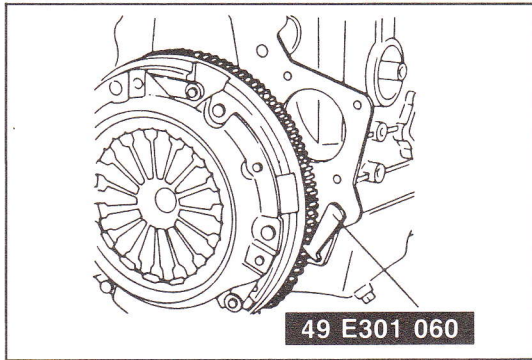


- 1. Clutch cover (MTX), Backing plate (ATX)
- 2. Clutch disc (MTX), Drive plate (ATX)
- 3. Flywheel (MTX), Adaptor (ATX)
- 4. End plate
- 5. Oil pan

- 6. Oil strainer
- 7. Stiffener
- 8. Rear cover
- 9. Water pump assembly
- 10. Oil pump assembly

86U01X-070

# 1 DISASSEMBLY (CYLINDER BLOCK)

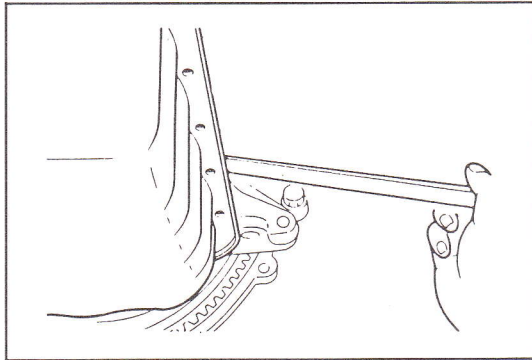


76G01A-125

## Disassembly Note

### Clutch cover, flywheel (MTX) or drive plate (ATX)

Remove the clutch cover and flywheel (MTX), or drive plate (ATX) with the **SST**.



## Oil pan

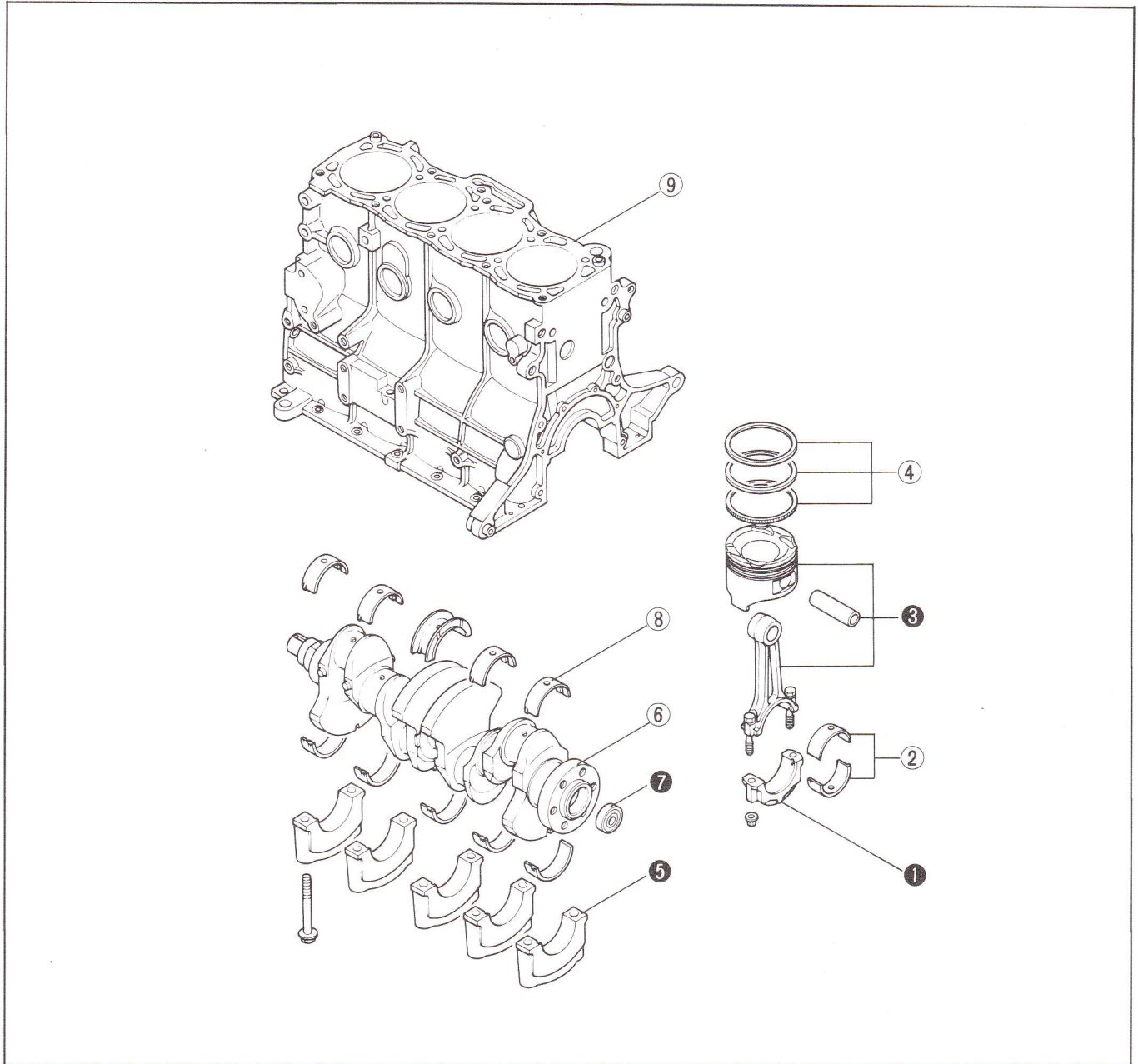
1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the stiffener to separate them.

## Caution

**Do not bend the oil pan when prying loose.**

3. Remove the oil pan.

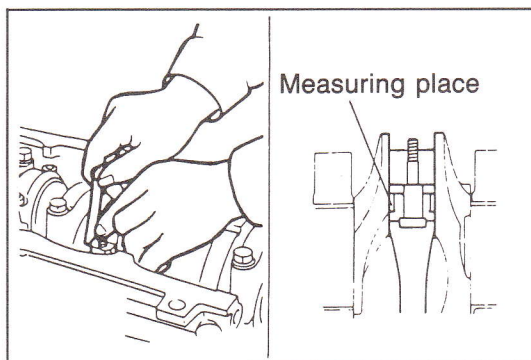
## CYLINDER BLOCK—II



86U01X-073

1. Connecting rod cap
2. Connecting rod bearing
3. Connecting rod and piston
4. Piston ring
5. Main bearing cap

6. Crankshaft
7. Pilot bearing (MTX)
8. Main bearing
9. Cylinder block



96U01X-027

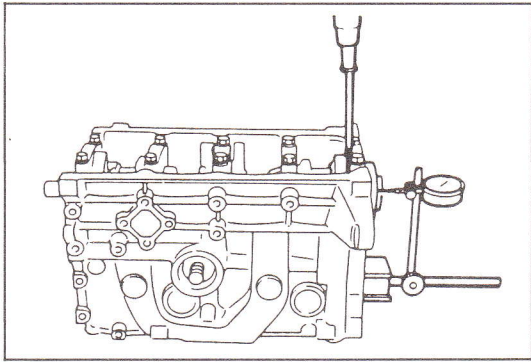
### Disassembly Note Connecting rod and cap

Before removing the connecting rod, clean the bearing, connecting rod, and crank pin, and measure the following:

1. Connecting rod side clearance. (Refer to page 1—50.)
2. Crankpin oil clearance. (Refer to page 1—50.)



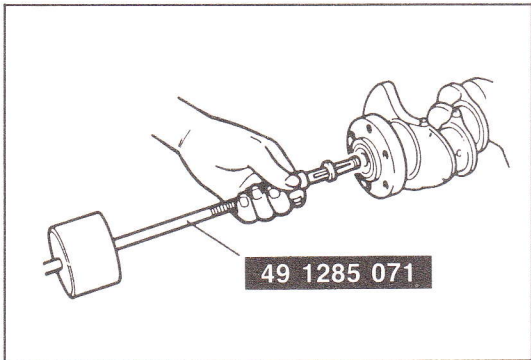
# 1 DISASSEMBLY (CYLINDER BLOCK)



## Main bearing cap

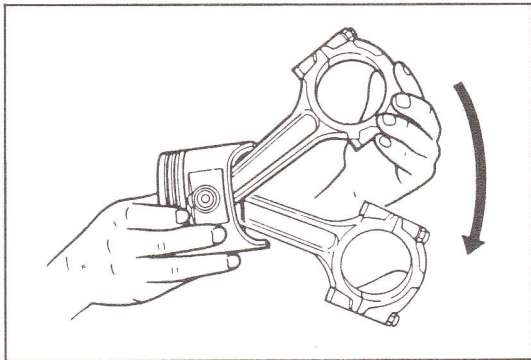
Before removing the main bearing caps, clean the bearings, main journals, and caps, then measure the following:

1. Crankshaft end play. (Refer to page 1—49.)
2. Main journal oil clearance. (Refer to page 1—48.)



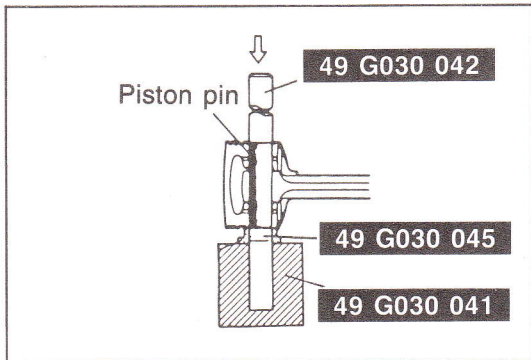
## Pilot bearing (MTX)

Remove the pilot bearing from the crankshaft with the **SST**.



## Piston and connecting rod

1. Before disassembling the piston and connecting rod, check the oscillation torque as shown in the figure. If the large end does not drop by its own weight, replace the piston or the piston pin.



2. Remove the piston pin with the **SST**.

While removing the piston pin, check the pressure. If it is lower than **5kN (500kg, 1,100 lb)**, replace the piston pin or connecting rod.

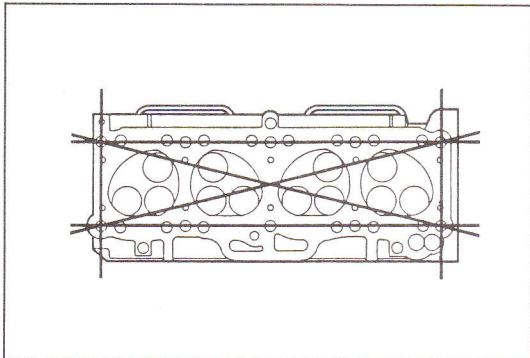
## INSPECTION AND REPAIR

1. Clean all parts, taking care to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign materials.
2. Inspect and repair must be performed in the order specified.

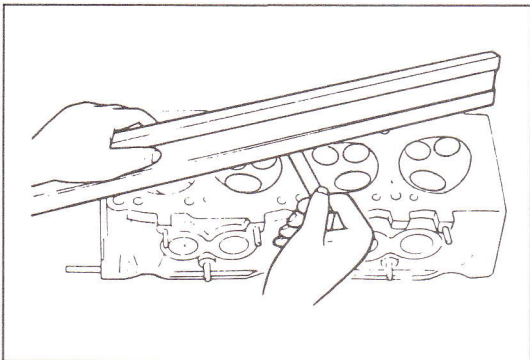
**Caution**

**Be careful not to damage the joints or friction surfaces of aluminum alloy components (such as the cylinder head or pistons).**

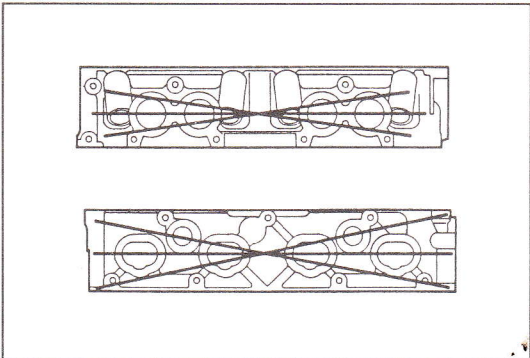
86U01X-077



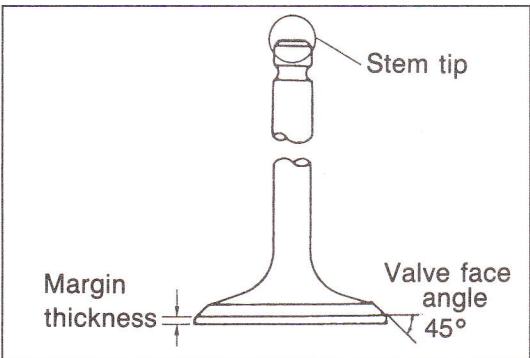
79G01C-106



96U01X-070



96U01X-029



86U01X-078

**Cylinder Head**

1. Inspect the cylinder head for damage, cracks, and leakage of water or oil. Replace if necessary.
2. Measure the cylinder head distortion in the six directions shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**

3. If the cylinder head distortion exceeds specification, grind the cylinder head surface.  
If the cylinder head height is not within specification, replace it.

**Height: 91.95—92.05 mm (3.620—3.624 in)**  
**Grinding: 0.20 mm (0.008 in) max.**

**Note**

**Before grinding the cylinder head, first check the following. Replace if necessary.**

- Sinking of valve seat
- Damage of manifold contact surface
- Camshaft oil clearance and end play

4. Measure the manifold contact surface distortion in the six directions shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**

5. If distortion exceeds specification, grind the surface or replace the cylinder head.

**Valve and Valve Guide**

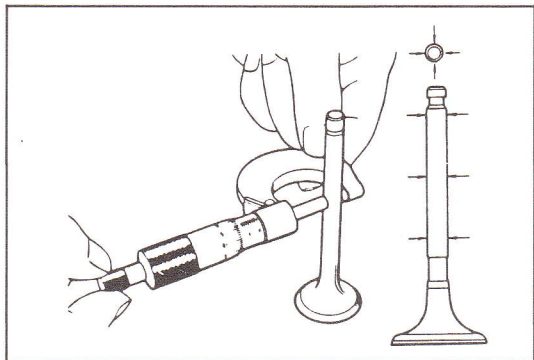
1. Inspect each valve for the following. Replace or resurface if necessary.
  - (1) Damaged or bent stem
  - (2) Roughness or damage to face
  - (3) Damage or uneven wear of stem tip
2. Check the valve head margin thickness. Replace if necessary

**Margin thickness**

**IN : 0.5 mm (0.020 in) min.**  
**EX : 1.0 mm (0.039 in) min.**



# 1 INSPECTION AND REPAIR



86U01X-079

3. Measure the valve length.

### Length

**IN : 115.81 mm (4.5594 in)**

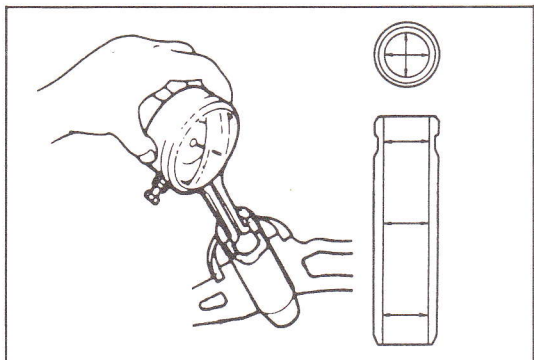
**EX: 116.21 mm (4.5752 in)**

4. Measure the valve stem diameter.

### Diameter

**IN : 6.970—6.985 mm (0.2744—0.2750 in)**

**EX: 6.965—6.980 mm (0.2742—0.2748 in)**



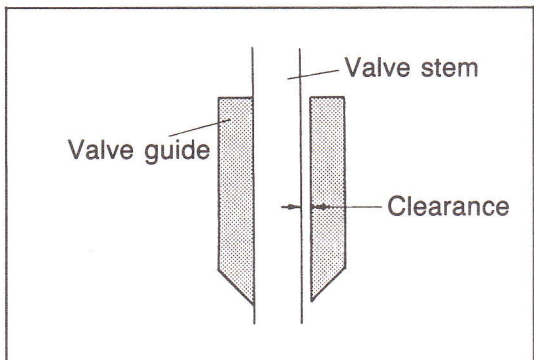
86U01X-080

5. Measure the valve guide inner diameter.

### Inner diameter

**IN : 7.01—7.03 mm (0.2760—0.2768 in)**

**EX: 7.01—7.03 mm (0.2760—0.2768 in)**



86U01X-081

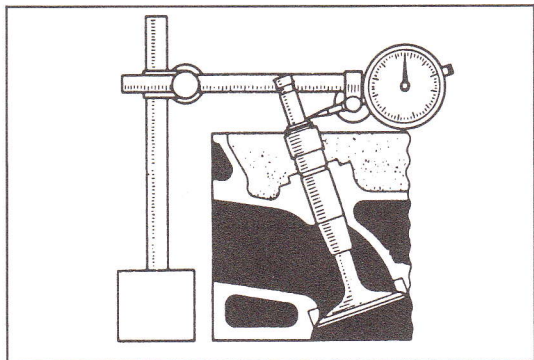
6. Measure the valve stem to guide clearance.

### (1) Method No. 1

Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

### (2) Method No. 2

Measure the valve stem play at a point close to the valve guide with the valve lifted slightly off the valve seat.



96U01X-030

### Clearance

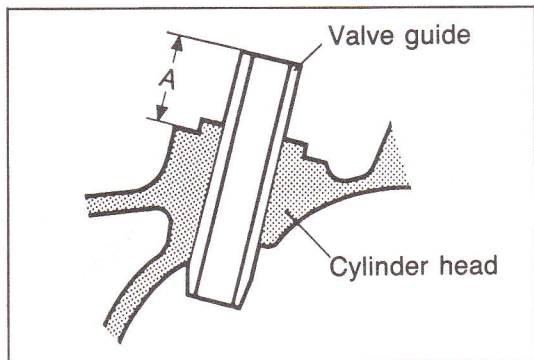
**IN : 0.025—0.060 mm (0.0010—0.0024 in)**

**EX: 0.030—0.065 mm (0.0012—0.0026 in)**

**Maximum: 0.20 mm (0.0079 in)**

7. If the clearance exceeds specification, replace the valve and/or valve guide.

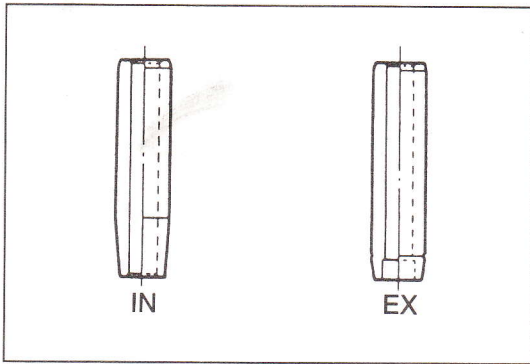
8. Check that the valve guide protrusion height (dimension A in the figure). Replace if necessary.



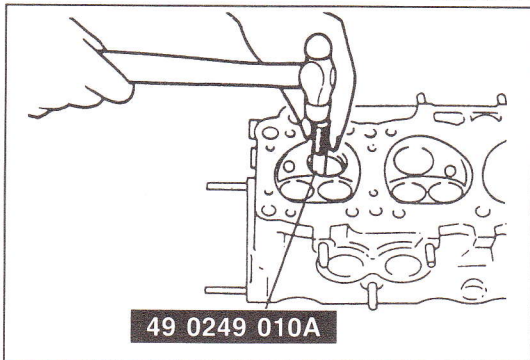
96U01X-031

**Height: 19.8—20.3 mm (0.780—0.799 in)**

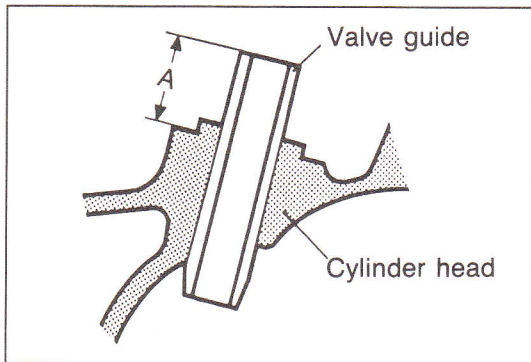




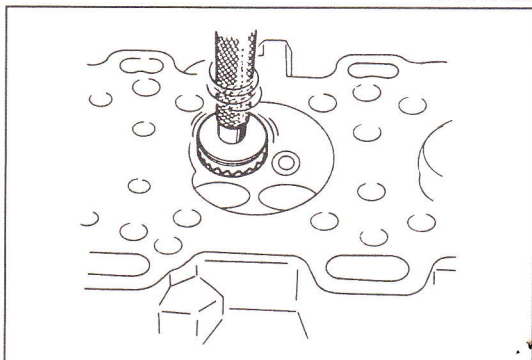
86U01X-214



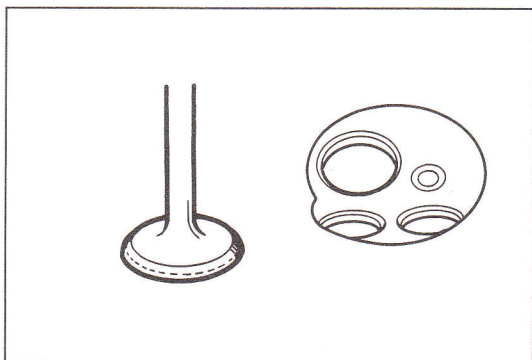
96U01X-032



96U01X-033



86U01X-087



69G01A-101

## Replacement of valve guide

### Note

Although the shapes of the intake and exhaust valve guides are different, use the exhaust valve guide on both sides as a replacement.

### Removal

Remove the valve guide from the side opposite the combustion chamber with the **SST**.

### Installation

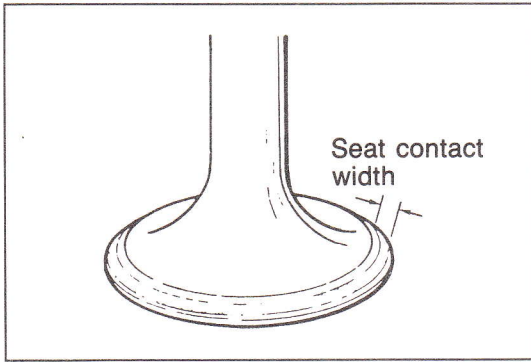
Tap the valve guide in from the side opposite the combustion chamber with the **SST** until the protrusion height is as specified.

**Height: 19.8—20.3 mm (0.780—0.799 in)**

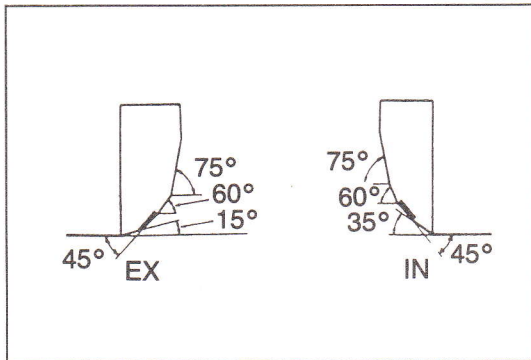
### Valve Seat

1. Inspect the contact surface of the valve seat and valve face for the following.
  - (1) Roughness
  - (2) Damage
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.
3. Apply a thin coat of prussian blue to the valve face.
4. Check the valve seating by rotating the valve against the seat.
  - (1) If blue does not appear 360° around the valve face, replace the valve.
  - (2) If blue does not appear 360° around the valve seat, resurface the seat.

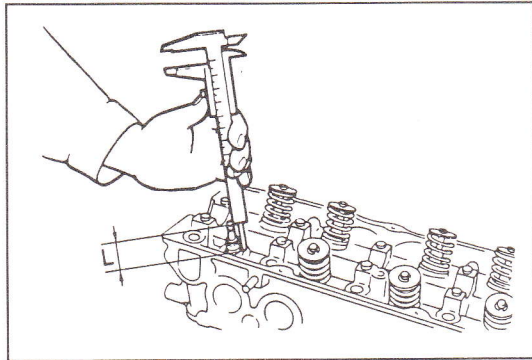
# 1 INSPECTION AND REPAIR



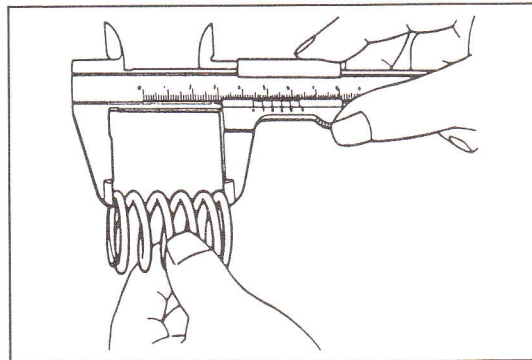
76G01A-128



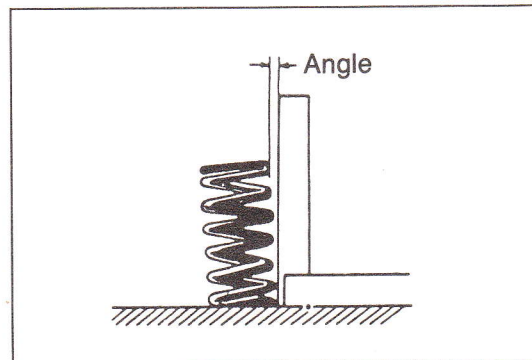
86U01X-088



96U01X-071



86U01X-090



86U01X-091

5. Check the seat contact width.

**Width: 1.2—1.6 mm (0.047—0.063 in)**

6. Check that the valve seating position is at the center of the valve face.

(1) If the seating position is too high, correct the valve seat with a **60°** cutter and a **45°** cutter.

(2) If the seating position is too low, correct the valve seat with a **35° (IN)** or **15° (EX)** cutter and a **45°** cutter.

7. Seat the valve to the valve seat with a lapping compound.

8. Check the sinking of the valve seat.

Measure protruding length (dimension L) of each valve stem.

**Dimension L: 50.2 mm (1.976 in)**

(1) If L is as below, it can be used as it is.

**50.2—51.0 mm (1.976—2.008 in)**

(2) If L is as below, insert a spacer between the spring seat and cylinder head to adjust.

**51.0—51.7 mm (2.008—2.035 in)**

(3) If L is more than as below, replace the cylinder head.

**51.7 mm (2.035 in) or more**

## Valve Spring

1. Inspect each valve spring for cracks or damage.

2. Check the free length and angle. Replace if necessary.

### Free length

**IN Standard: 49.5 mm (1.949 in)**

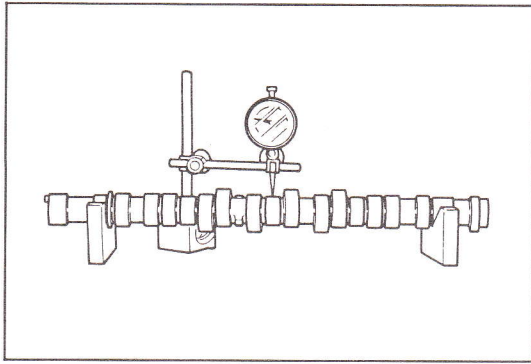
**Minimum: 48.3 mm (1.902 in)**

**EX Standard: 50.4 mm (1.984 in)**

**Minimum: 49.2 mm (1.937 in)**

**Angle: 1.7 mm (0.067 in) max.**



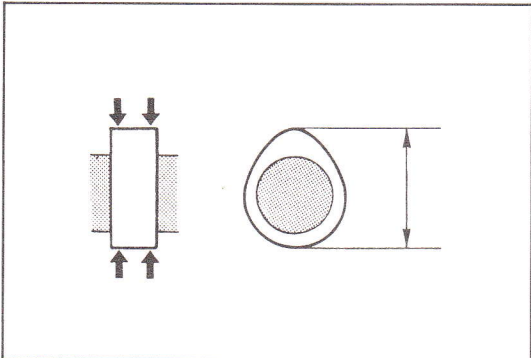


86U01X-092

### Camshaft

1. Set the front and rear journals on V-blocks. Check the camshaft runout. Replace if necessary.

**Runout: 0.03 mm (0.0012 in) max.**



86U01X-093

2. Check the cam for wear or damage. Replace if necessary.
3. Check the cam lobe height at the two points as shown in the figure.

### Height

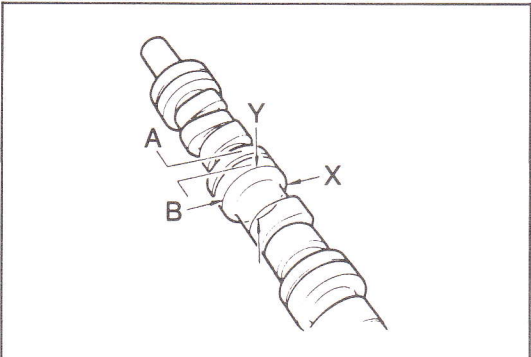
**IN : 41.29—41.39 mm (1.626—1.630 in)**

**EX: 41.80—41.90 mm (1.646—1.650 in)**

### Minimum

**IN : 41.14 mm (1.620 in)**

**EX: 41.65 mm (1.640 in)**



86U01X-094

4. Measure wear of the journals in X and Y directions at the two points as shown in the figure.

### Diameter

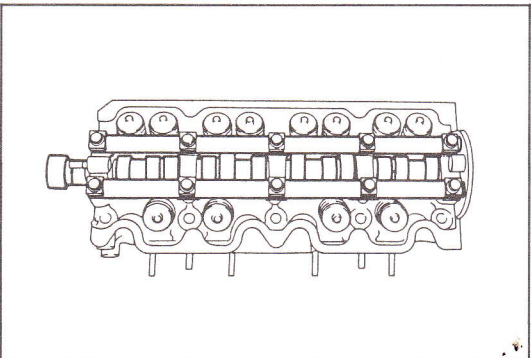
#### Front and rear:

**31.940—31.965 mm (1.2575—1.2585 in)**

#### Center three journals:

**31.910—31.935 mm (1.2563—1.2573 in)**

**Out-of-round: 0.05 mm (0.002 in) max.**



86U01X-095

5. Measure the oil clearance of the camshaft and camshaft caps.

- (1) Remove any oil, or dirt from the journals and bearing surface.
- (2) Set the camshaft onto the cylinder head.
- (3) Position plasti-gauge on top of the journals in the axial direction.
- (4) Place the camshaft caps and rocker arm shafts in position, and tighten them to the specified torque.

### Tightening torque:

**18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)**

- (5) Remove the camshaft caps and measure the oil clearance at each cap.

### Oil clearance

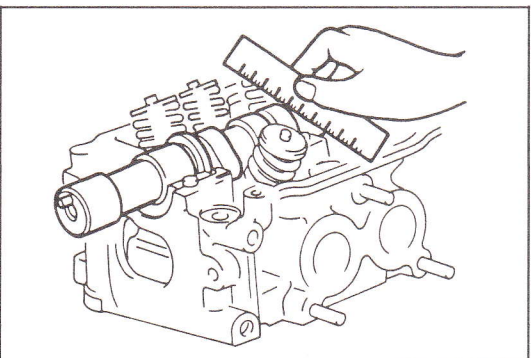
#### Front and rear:

**0.035—0.085 mm (0.0014—0.0033 in)**

#### Center three journals:

**0.065—0.115 mm (0.0026—0.0045 in)**

**Maximum: 0.15 mm (0.0059 in)**

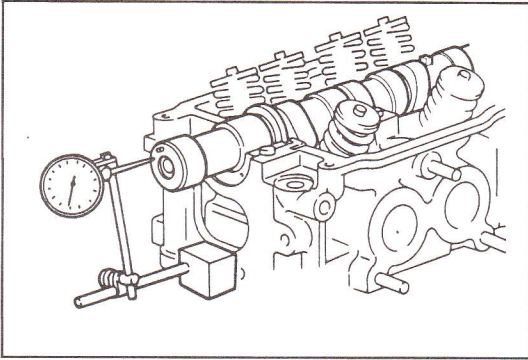


96U01X-034

- (6) If the oil clearance exceeds specification, replace the cylinder head.



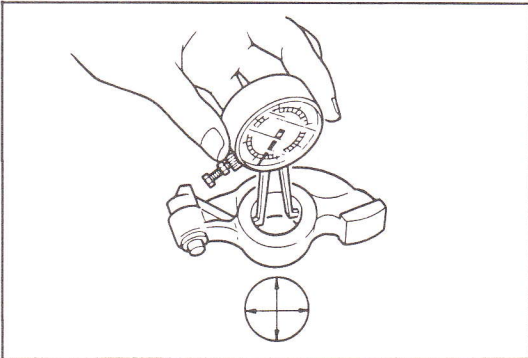
# 1 INSPECTION AND REPAIR



96U01X-035

6. Measure the camshaft end play. If the end play exceeds specification, replace the camshaft and/or the cylinder head.

**End play : 0.08—0.16 mm (0.003—0.006 in)**  
**Maximum: 0.20 mm (0.008 in)**



86U01X-098

## Rocker Arm and Rocker Arm Shaft

1. Check for wear or damage to the contact surface of the rocker arm shaft and the rocker arm. Replace if necessary.
2. Check the oil clearance between the rocker arm and shaft.  
Replace if necessary.
  - (1) Measure the rocker arm inner diameter.

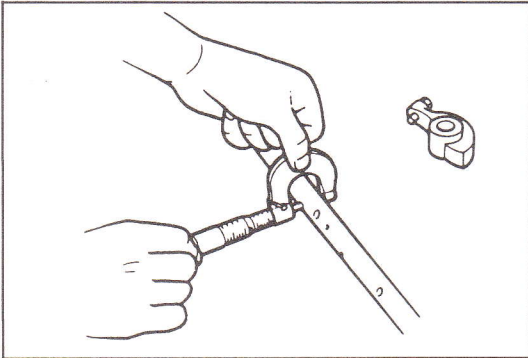
**Diameter: 19.000—19.033 mm (0.7480—0.7493 in)**

- (2) Measure the rocker arm shaft diameter.

**Diameter: 18.959—18.980 mm (0.7464—0.7472 in)**

- (3) Subtract the shaft diameter from the rocker arm diameter.

**Oil clearance: 0.020—0.074 mm (0.0008—0.0029 in)**  
**Maximum: 0.10 mm (0.0039 in)**



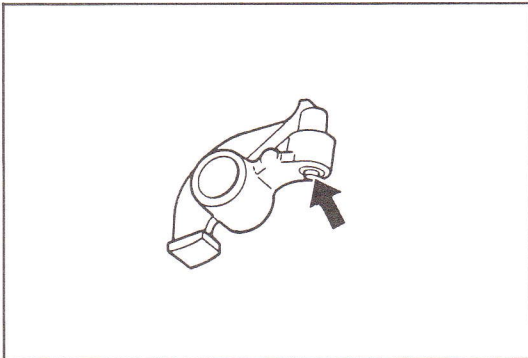
69G01A-115

## Hydraulic Lash Adjuster (HLA)

Check the HLA face for wear or damage. Replace if necessary.

### Caution

**Do not remove the HLA unless necessary to prevent damaging the O-ring.**



86U01X-099

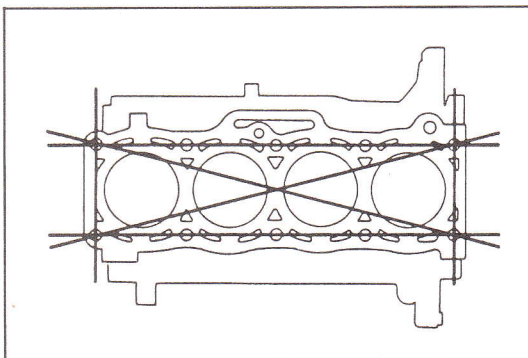
## Cylinder Block

### Note

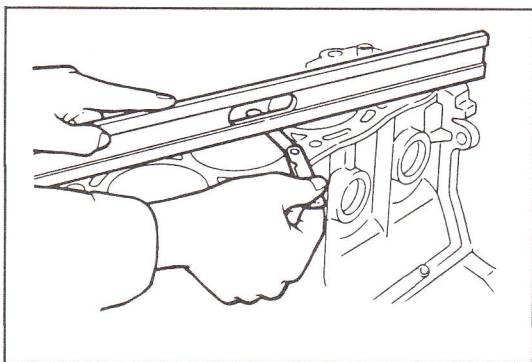
**If the cylinder block is replaced, install the dowel pin to the cylinder block.**

1. Check the cylinder block. Repair or replace if necessary.
  - (1) Leakage damage
  - (2) Cracks
  - (3) Scoring of wall
2. Measure the distortion of the top surface of the cylinder block in the six directions as shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**



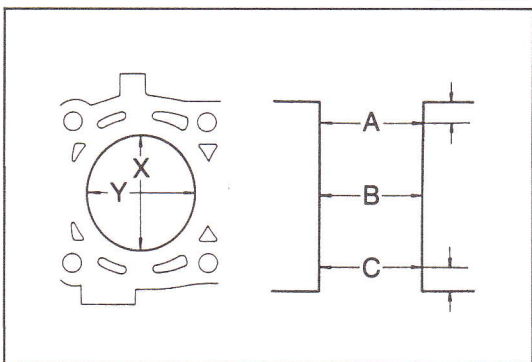
96U01X-036



96U01X-037

3. If the distortion exceeds specification, repair by grinding, or replace the cylinder block.

**Grinding: 0.20 mm (0.008 in) max.**

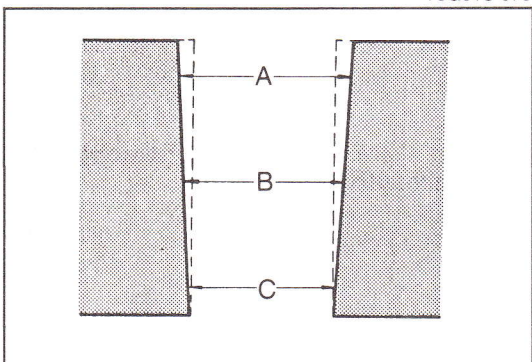


79G01C-070

4. Measure the cylinder bore in directions X and Y at three levels in each cylinder as shown.

**Cylinder bore** mm (in)

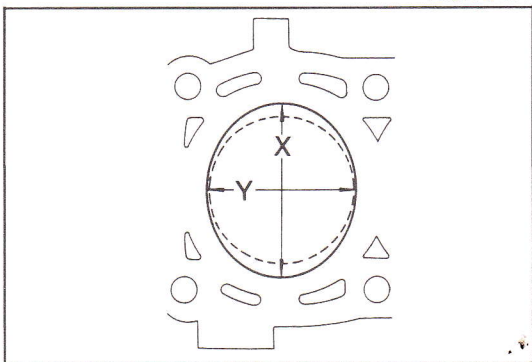
Size	Bore
Standard	86.000—86.019 (3.3858—3.3866)
0.25 (0.010) oversize	86.250—86.269 (3.3957—3.3964)
0.50 (0.020) oversize	86.500—86.519 (3.4055—3.4063)



79G01C-071

- (1) If the difference between the measurement A and C exceeds the maximum taper, rebore the cylinder to oversize.

**Taper: 0.019 mm (0.0007 in) max.**



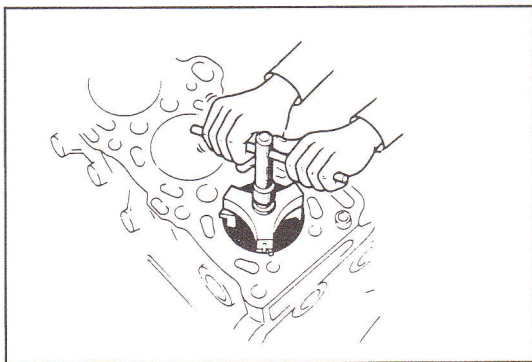
79G01C-072

- (2) If the difference between the measurement X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

**Out-of-round: 0.019 mm (0.0007 in) max.**

**Caution**

**The boring size should be based on the size of an oversize piston and be the same for all cylinders.**

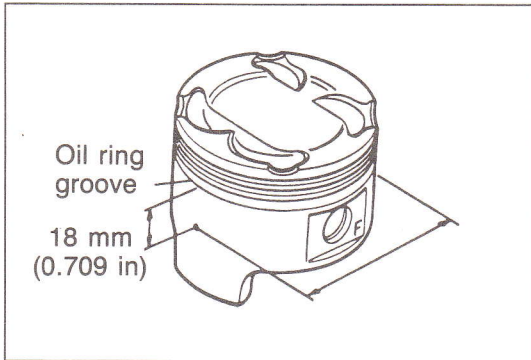


86U01X-102

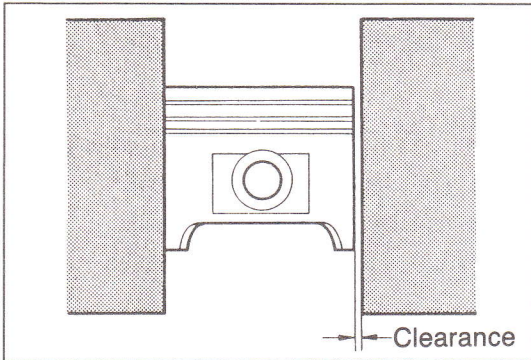
5. If the upper part of the cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



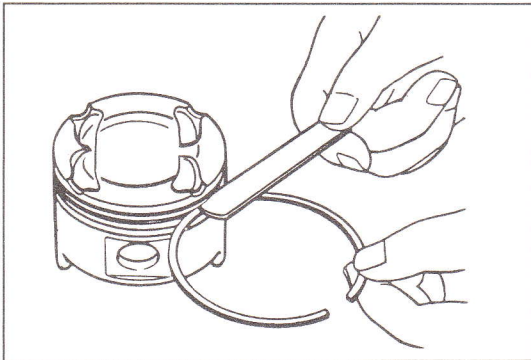
# 1 INSPECTION AND REPAIR



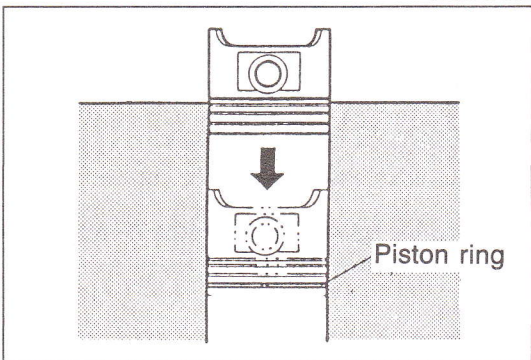
79G01C-073



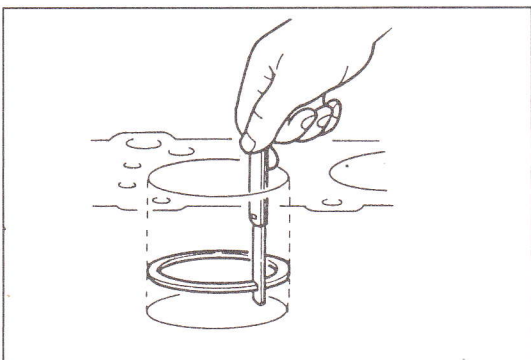
96U01X-038



96U01X-039



86U01X-104



96U01X-040

## Piston

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace if necessary.
2. Measure the outer diameter of each piston at a right angle ( $90^\circ$ ) to the piston pin, **18 mm (0.709 in) below** the oil ring land lower edge.

## Piston diameter

mm (in)

Size	Diameter
Standard	85.944—85.964 (3.3836—3.3844)
0.25 (0.010) oversize	86.194—86.214 (3.3935—3.3942)
0.50 (0.020) oversize	86.444—86.464 (3.4033—3.4041)

3. Check the piston-to-cylinder clearance.

**Clearance: 0.036—0.075 mm (0.0014—0.0030 in)**  
**Maximum: 0.15 mm (0.0059 in)**

4. If the clearance exceeds specification, replace the piston or rebores the cylinders to fit oversize pistons.

## Caution

**If the piston is replaced, replace the piston rings also.**

## Piston and Piston Ring

1. Measure the piston ring to ring land clearance around the entire circumference using a new piston ring.

**Clearance (Top and Second):**  
**0.03—0.07 mm (0.001—0.003 in)**  
**Maximum: 0.15 mm (0.006 in)**

2. If the clearance exceeds specification, replace the piston.

3. Inspect the piston rings for damage, abnormal wear, or breakage. Replace if necessary.

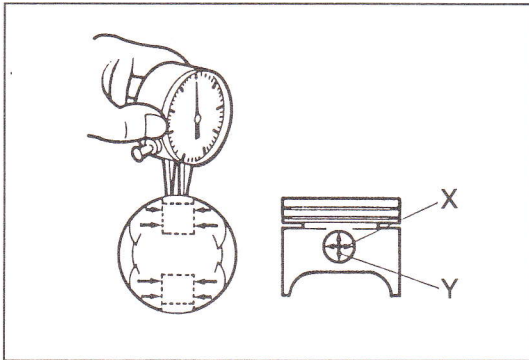
4. Insert the piston ring into the cylinder by hand and push it to the bottom of the ring travel in using the piston.

5. Measure each piston ring end gap with a feeler gauge. Replace if necessary.

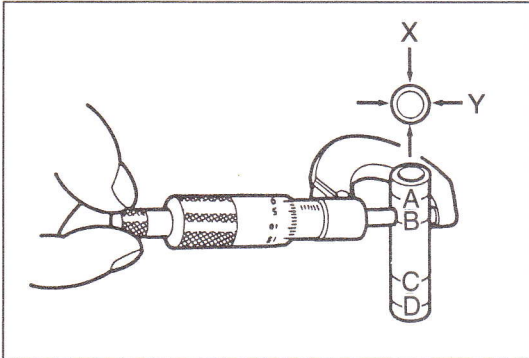
## End gap

**Top : 0.20—0.35 mm (0.008—0.014 in)**  
**Second: 0.15—0.30 mm (0.006—0.012 in)**  
**Oil rail : 0.20—0.70 mm (0.008—0.028 in)**  
**Maximum: 1.0 mm (0.039 in)**

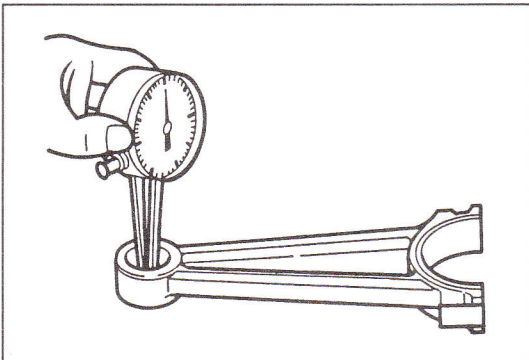




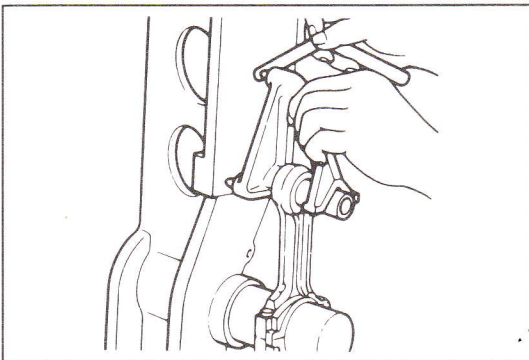
86U01X-106



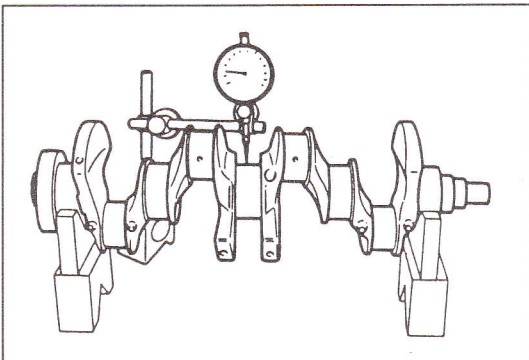
96U01X-041



79G01C-076



96U01X-042



86U01X-109

## Piston and Piston Pin

1. Measure the piston pin hole diameter in X and Y directions at four points.

**Diameter: 21.988—21.998 mm (0.8657—0.8661 in)**

2. Measure the piston pin diameter.

**Diameter: 21.974—21.980 mm (0.8651—0.8654 in)**

3. Determine the piston pin-to-piston clearance by subtracting the two figures.

**Clearance: 0.008—0.024 mm (0.0003—0.0009 in)**

4. If the clearance exceeds specification, replace the piston and/or piston pin.

## Connecting Rod

1. Measure the connecting rod small end bore.

**Diameter: 21.943—21.961 mm (0.8640—0.8646 in)**

2. Check the interference between the small end bore and piston pin.

**Interference: 0.013—0.037 mm (0.0005—0.0015 in)**

3. Check each connecting rod for bending or twisting. Repair or replace if necessary.

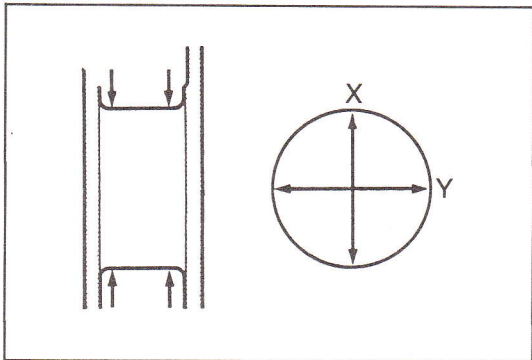
**Bend: 0.24 mm (0.0094 in) max.**

## Crankshaft

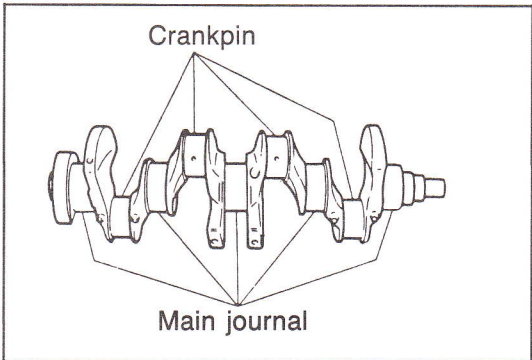
1. Check the journals and pins for damage, scoring, or oil hole clogging.
2. Set the crankshaft on V-blocks.
3. Check the crankshaft runout at the center journal. Replace if necessary.

**Runout: 0.03 mm (0.0012 in) max.**

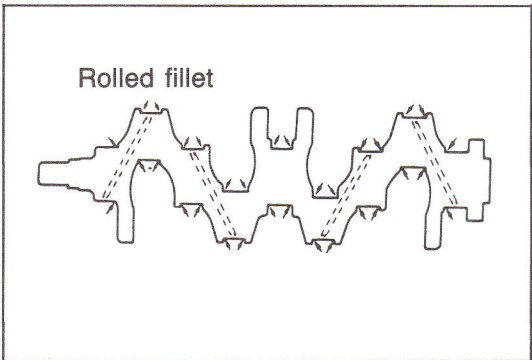
# 1 INSPECTION AND REPAIR



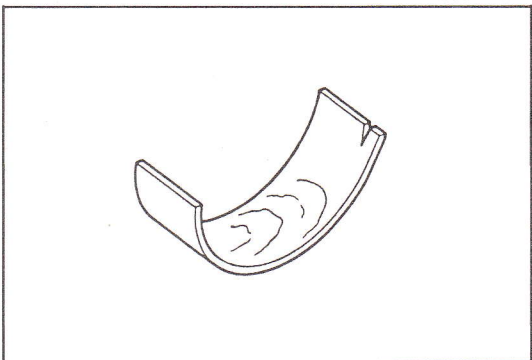
76G01A-131



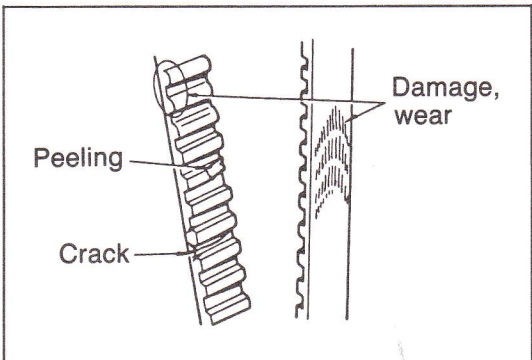
96U01X-043



96U01X-044



79G01C-077



86U01X-113

4. Measure each journal diameter in X and Y directions at two points.

### Main journal

#### Diameter:

**59.937—59.955 mm (2.3597—2.3604 in)**

**Out-of-round: 0.05 mm (0.0020 in) max.**

### Crankpin journal

#### Diameter:

**50.940—50.955 mm (2.0055—2.0061 in)**

**Out-of-round: 0.05 mm (0.0020 in) max.**

5. If necessary, grind the journals to match undersize bearings.

**Undersize bearing: 0.25 mm (0.010 in),  
0.50 mm (0.020 in), 0.75 mm (0.030 in)**

### Main journal diameter undersize mm (in)

Bearing size		Journal diameter
0.25 (0.010) undersize	No.1,2,4,5	59.693—59.711 (2.3501—2.3508)
	No.3	59.687—59.705 (2.3499—2.3506)
0.50 (0.020) undersize	No.1,2,4,5	59.443—59.461 (2.3403—2.3410)
	No.3	59.437—59.455 (2.3400—2.3407)
0.75 (0.030) undersize	No.1,2,4,5	59.193—59.211 (2.3304—2.3311)
	No.3	59.187—59.205 (2.3302—2.3309)

### Crankpin journal diameter undersize mm (in)

Bearing size	Journal diameter
0.25 (0.010) undersize	50.690—50.705 (1.9957—1.9963)
0.50 (0.020) undersize	50.440—50.455 (1.9858—1.9864)
0.75 (0.030) undersize	50.190—50.205 (1.9760—1.9766)

### Caution

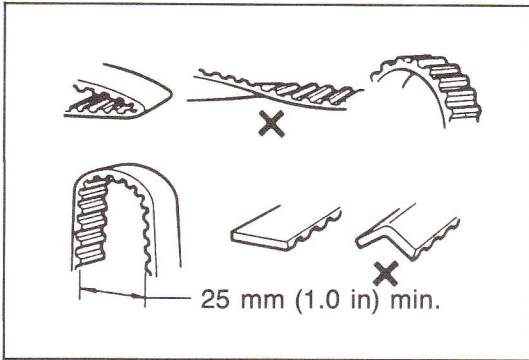
**Do not grind the rolled fillet area.**

### Main Bearing and Connecting Rod Bearing

Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.

### Timing Belt

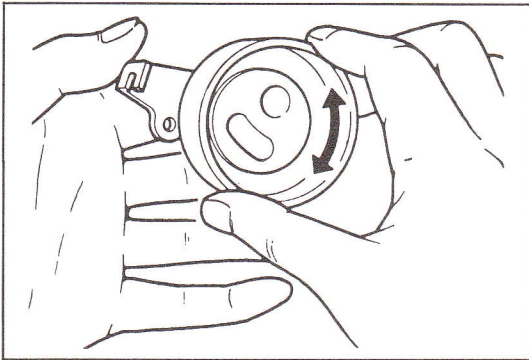
1. Replace the timing belt if there is any oil or grease on it.
2. Check the timing belt for damage, wear, peeling, cracks, or hardening. Replace if necessary.



86U01X-114

**Caution**

- a) Never forcefully twist turn inside out, or bend the timing belt.
- b) Be careful not to allow oil or grease on the belt.



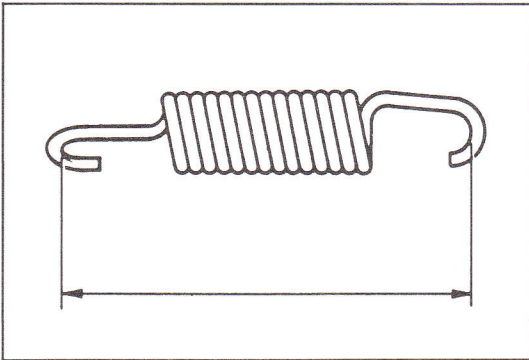
86U01X-115

**Timing Belt Tensioner and Idler Pulley**

Check the timing belt tensioner and idler pulley for smooth rotation and abnormal noise. Replace if necessary.

**Caution**

Do not clean the tensioner with cleaning fluids. If necessary, use a soft rag to wipe it clean, and avoid scratching it.

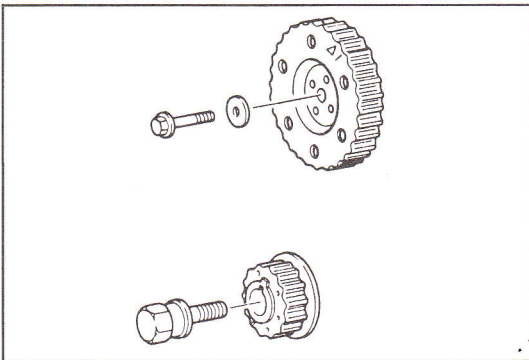


96U01X-045

**Timing Belt Tensioner Spring**

Check the free length of the tensioner spring. Replace if necessary.

**Free length: 63.0 mm (2.480 in)**



86U01X-117

**Timing Belt Pulley and Camshaft Pulley**

Inspect the pulley teeth for wear, deformation, or other damage. Replace if necessary.

**Caution**

Do not clean the pulley with cleaning fluids. If necessary, use a rag to wipe it clean.

**Timing Belt Cover (lower and upper)**

Inspect the timing belt covers for damage or cracks. Replace if necessary.



# 1 ASSEMBLY (CYLINDER BLOCK)

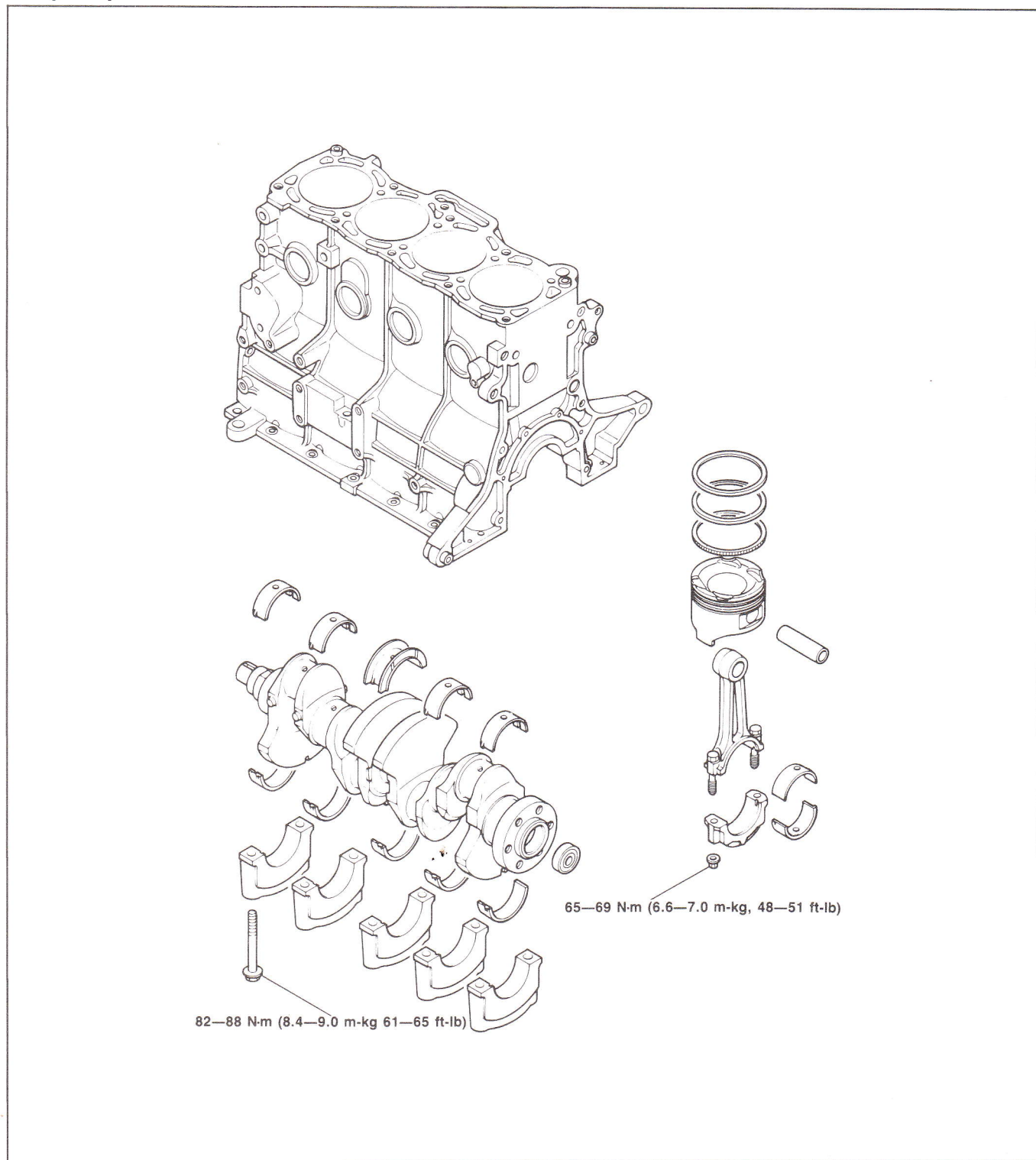
## ASSEMBLY

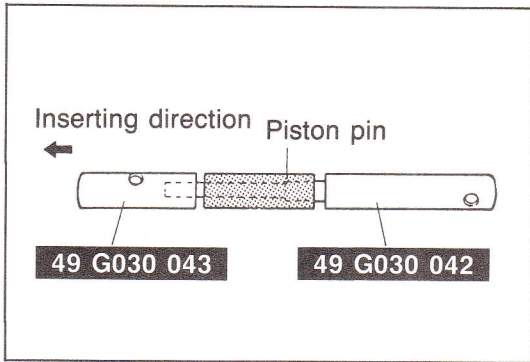
1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace plain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

### Caution

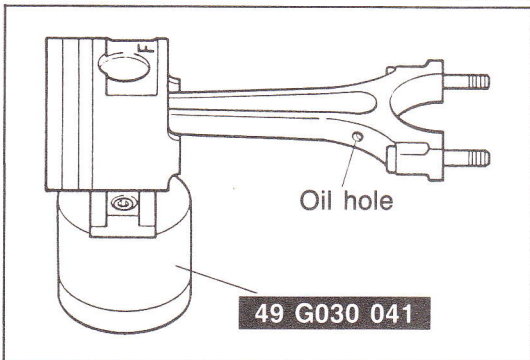
Do not reuse gaskets or oil seals.

### CYLINDER BLOCK—I Torque Specifications

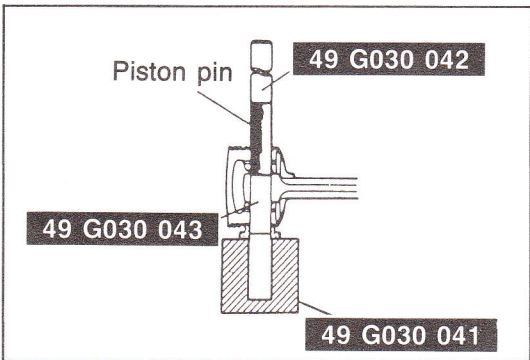




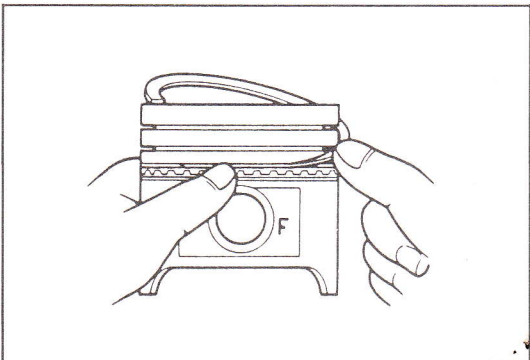
86U01X-118



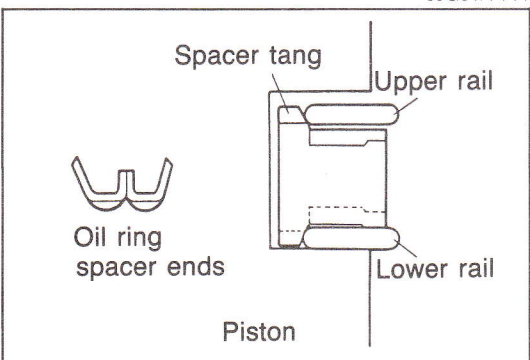
76G01A-135



96U01X-046



69G01A-144



69G01A-145

## Connecting Rod

1. Assemble the **SST** to the piston pin.
2. Apply engine oil to the piston pin.

3. Set the piston on the **SST** with the **F** mark facing upward.
4. Set the connecting rod in piston with the oil hole in the large end opposite the **F** mark.

5. Press the piston pin into the piston and connecting rod until the **SST** contacts the block.
6. While inserting the piston pin, check the pressure force. If it is less than specified, replace the piston pin or the connecting rod.

**Press force: 5—15 kN (500—1,500 kg, 1,100—3,300 lb)**

7. Check the oscillation torque of the connecting rod. (Refer to page 1—34.)

## Piston Ring

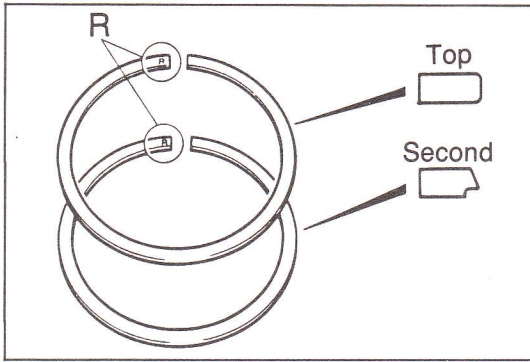
1. Install the three-piece oil rings on the pistons.
  - (1) Apply engine oil to the oil ring spacer and rails.
  - (2) Install the oil ring spacer so that the opening faces upward.
  - (3) Install the upper rail and lower rail.

### Note

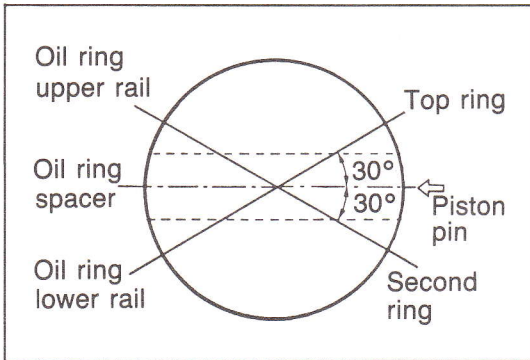
- a) The upper rail and lower rail are the same.
- b) Each rail can be installed with either face upward.

2. Check that both rails are expanded by the spacer tangs as shown in the figure by checking that both rails turn smoothly in both directions.

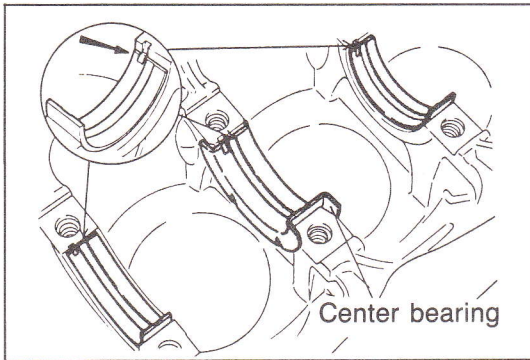
# 1 ASSEMBLY (CYLINDER BLOCK)



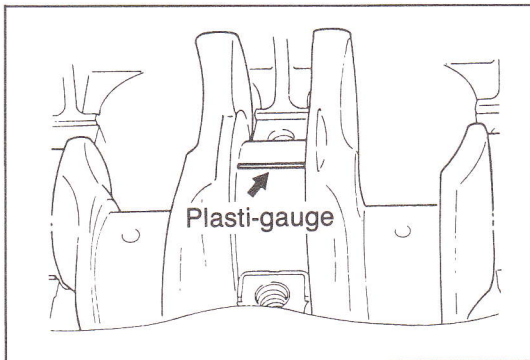
86U01X-121



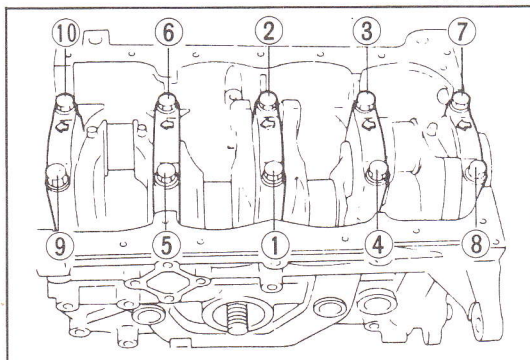
69G01A-147



86U01X-215



86U01X-122



86U01X-123

3. Install the second ring to the piston first, then install the top ring. Use a piston ring expander.

## Caution

The rings must be installed with the "R" marks facing upward.

4. Apply a liberal amount of clean engine oil to the second and top piston rings.

5. Position the opening of each ring as shown in the figure.

## Crankshaft

1. Before installing the crankshaft, inspect the main bearing oil clearances as described.

## Note

The bearing with thrust shoulders is the center bearing in the cylinder block.

## Oil clearance inspection

- (1) Remove any foreign material and oil from the journals and bearings.
- (2) Install the upper main bearings in the cylinder block.
- (3) Set the crankshaft into the cylinder block.
- (4) Position the plasti-gauge on top of the journals in the axial direction.

- (5) Install the main bearing caps along with the lower main bearings according to the cap number and ← mark.
- (6) Tighten the caps in two or three steps in the order in the figure.

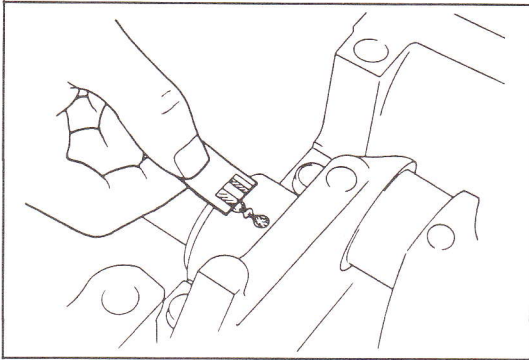
## Tightening torque:

82—88 N·m (8.4—9.0 m·kg, 61—65 ft·lb)

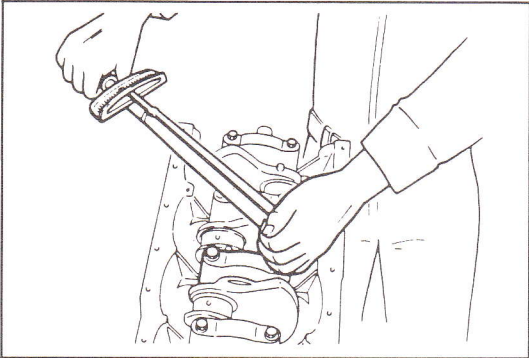
## Caution

Do not rotate the crankshaft when measuring the oil clearances.

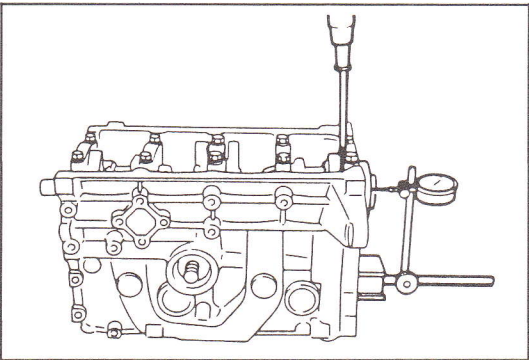




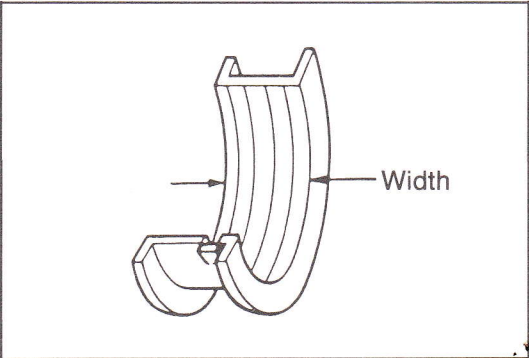
96U01X-047



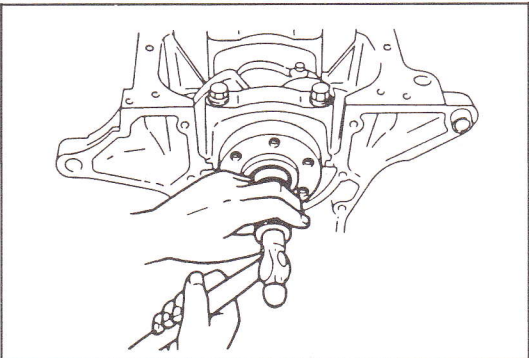
86U01X-125



96U01X-048



86U01X-216



86U01X-127

- Remove the main bearing caps, and measure the plasti-gauge at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance.

If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings. (Refer to page 1—44.)

### Oil clearance

**No. 1, 2, 4, 5:**

**0.025—0.043 mm (0.0010—0.0017 in)**

**No. 3: 0.031—0.049 mm (0.0012—0.0019 in)**

**Maximum: 0.08 mm (0.0031 in)**

- Apply a liberal amount of engine oil to the main bearings and main journals.
- Install the crankshaft and the main bearing caps according to the cap number and ← mark.

- Inspect the crankshaft end play.

**End play: 0.08—0.18 mm (0.0031—0.0071 in)**

**Maximum: 0.30 mm (0.012 in)**

- If the end play exceeds specification, grind the crankshaft (Refer to page 1—44) and install an undersize center main bearing. Or replace the crankshaft and main bearings.

### Center main bearing width

**Standard: 27.94—27.99 mm (1.1000—1.1020 in)**

**0.25 mm (0.010 in) undersize:**

**28.04—28.09 mm (1.1040—1.1059 in)**

**0.50 mm (0.020 in) undersize:**

**28.12—28.17 mm (1.1071—1.1091 in)**

**0.75 mm (0.030 in) undersize:**

**28.20—28.25 mm (1.1102—1.1122 in)**

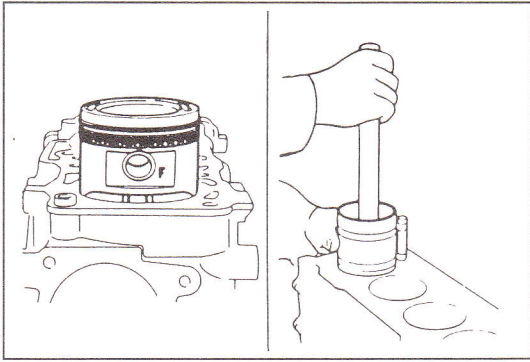
### Note

**Wider thrust width is available only in undersize center main bearing**

### Pilot Bearing (MTX)

- Apply engine oil to the outer circumference of the bearing.
- Set a piece of pipe (outer diameter 30—34 mm, 1.18—1.34 in) against the outer race of the bearing, then tap it evenly into the crankshaft.
- Lubricate the bearing with grease.

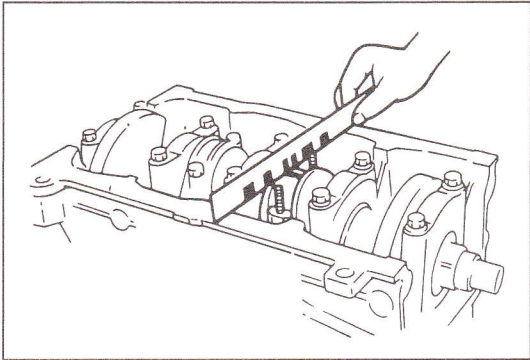
# 1 ASSEMBLY (CYLINDER BLOCK)



76G01A-136

## Piston and Connecting Rod Assembly

1. Apply a liberal amount of clean engine oil to the cylinder walls, piston, and rings.
2. Check the piston rings for the end gap alignment.
3. Insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine. Use a piston installer tool (commercially available).



69G01B-137

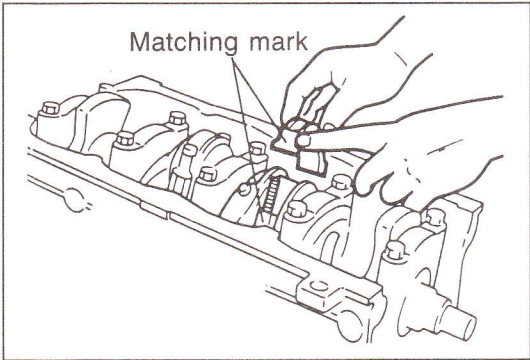
## Connecting Rod Cap

1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

### Connecting rod cap tightening torque:

**65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)**

**Oil clearance: 0.027—0.067 mm (0.0011—0.0026 in)**  
**Maximum: 0.10 mm (0.0039 in)**

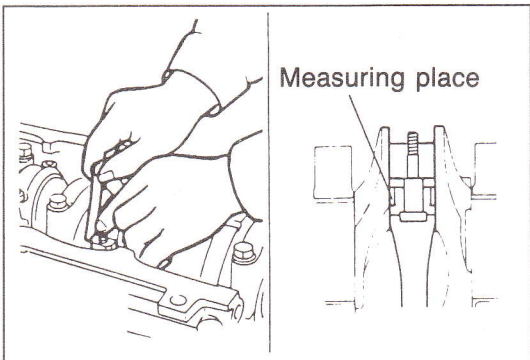


96U01X-049

## Caution

**Align the matching marks on the cap and on the connecting rod when installing the connecting rod cap.**

2. If the oil clearance exceeds specification, grind the crankshaft and use undersize bearings. (Refer to page 1—44.)

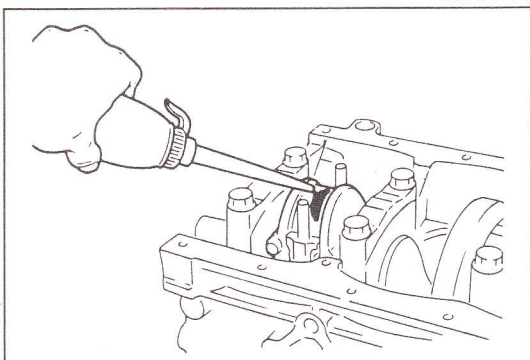


96U01X-050

3. Check the side clearance of each connecting rod without the cap installed.

**Side clearance: 0.110—0.262 mm (0.004—0.010 in)**  
**Maximum: 0.30 mm (0.012 in)**

If the clearance exceeds specification, replace the connecting rod.



86U01X-130

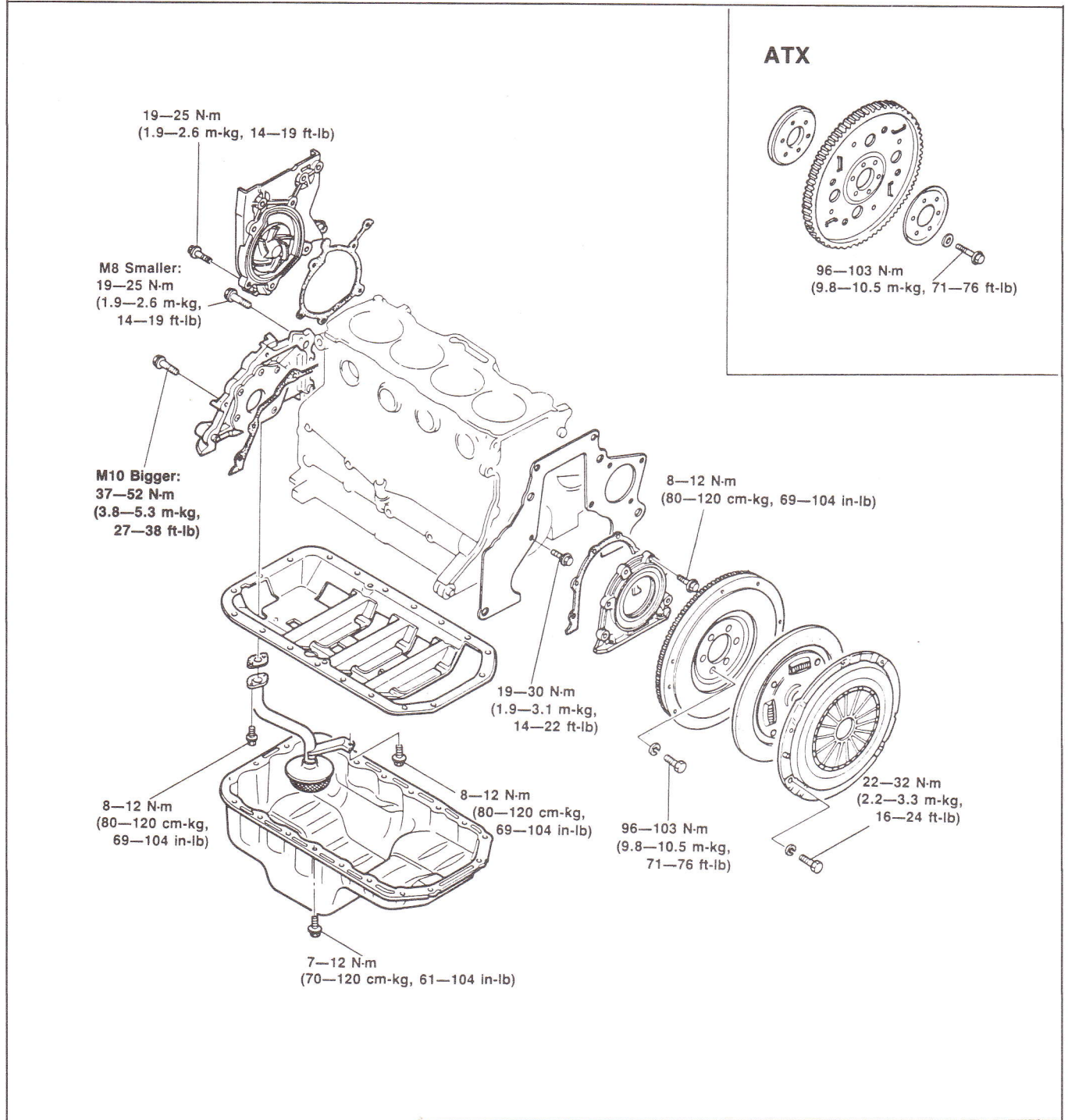
4. Apply a liberal amount of engine oil to the crankpin journal and connecting rod bearing.
5. Install the connecting rod cap with the alignment marks aligned.

### Tightening torque:

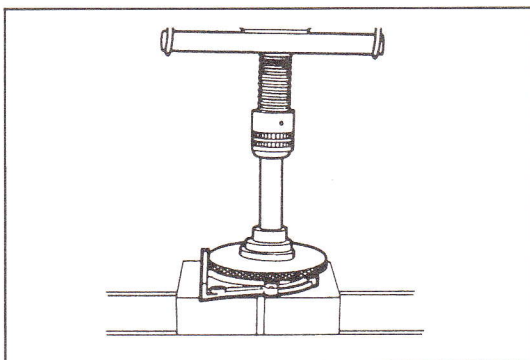
**65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)**



## CYLINDER BLOCK—II Torque Specifications



69G01A-166



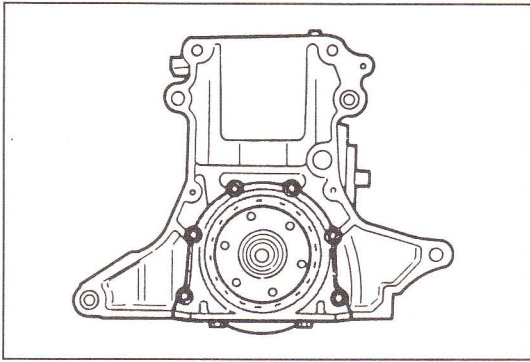
4BG01A-158

### Rear Cover

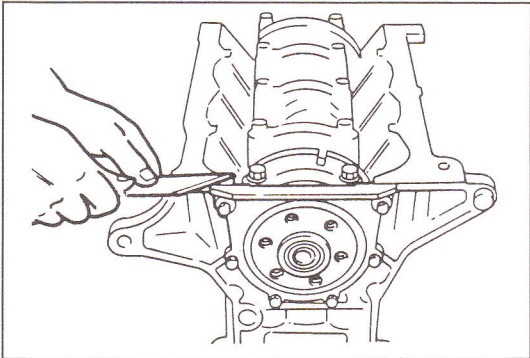
1. Apply engine oil to the rear cover, oil seal and oil seal lip.
2. Press the oil seal into the rear cover.



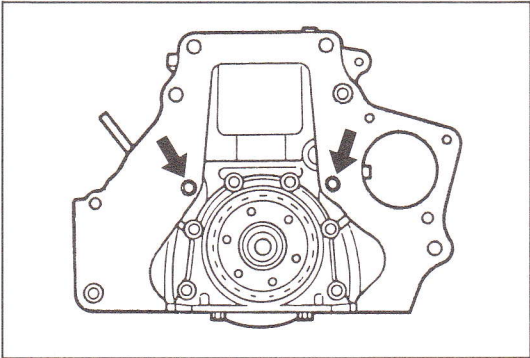
# 1 ASSEMBLY (CYLINDER BLOCK)



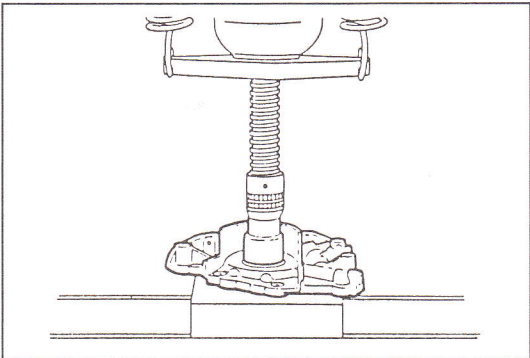
86U01X-131



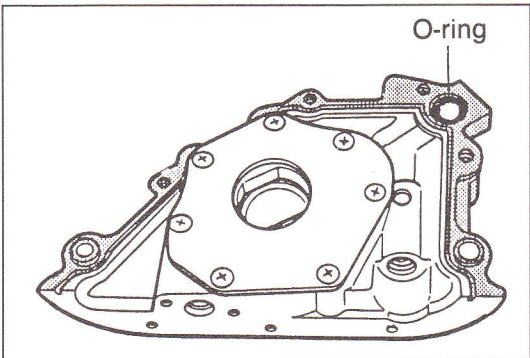
86U01X-132



4BG01A-160



96U01X-078



96U01X-072

3. Install the rear cover and a new gasket.

### Tightening torque:

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

4. Cut away the portion of the gasket that projects out from the rear cover assembly toward the oil pan side.

### Caution

**Do not scratch the rear cover assembly.**

### End Plate

Install the end plate.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

### Oil Pump

1. Apply engine oil to a new oil pump oil seal and the oil pump body.
2. Press the oil seal with a suitable pipe (outer diameter: 48 mm (1.89 in)).

3. Apply engine oil to the oil seal lip.

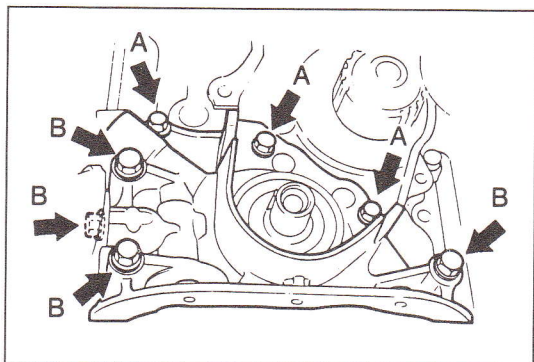
4. Remove any dirt or other material from the contact surfaces.

5. Apply a continuous bead of silicon sealant to the contact surface of the oil pump.

6. Install a new O-ring into the pump body.

### Caution

**Do not allow any sealant to get into the oil hole.**



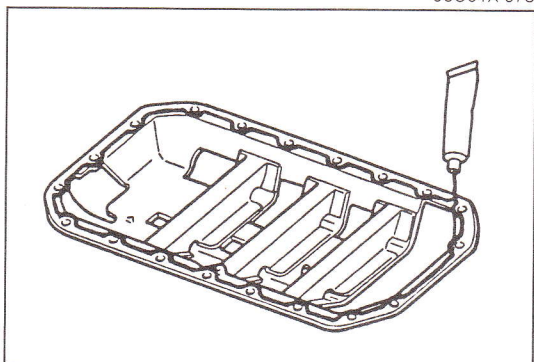
96U01X-073

7. Install the oil pump.

### Tightening torque

- Ⓐ: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)
- Ⓑ: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

8. Remove any sealant which has been squeezed out.



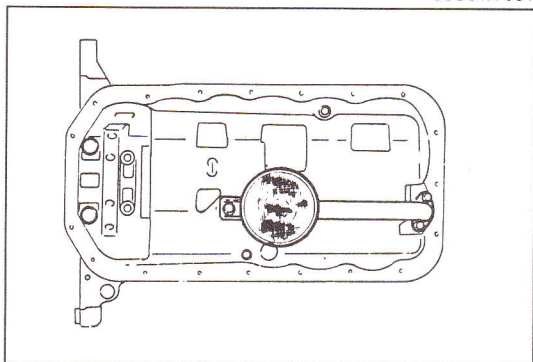
96U01X-051

### Stiffener

1. Remove any dirt or other material from the contact surface.
2. Apply a continuous bead of silicon sealant to the stiffener along the inside of the bolt holes, and overlap the ends.
3. Install the stiffener.

### Tightening torque:

7—12 N·m (70—120 cm·kg, 61—104 in·lb)



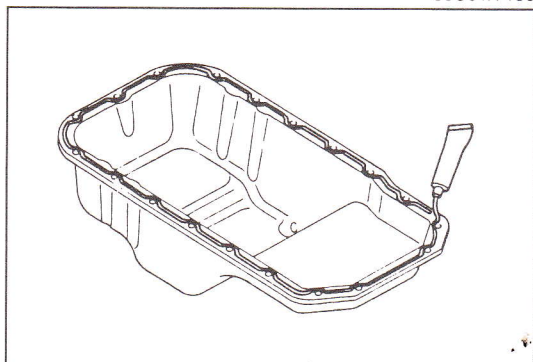
86U01X-136

### Oil Strainer

Install the oil strainer and a new gasket.

### Tightening torque:

8—12 N·m (80—120 cm·kg, 69—104 in·lb)



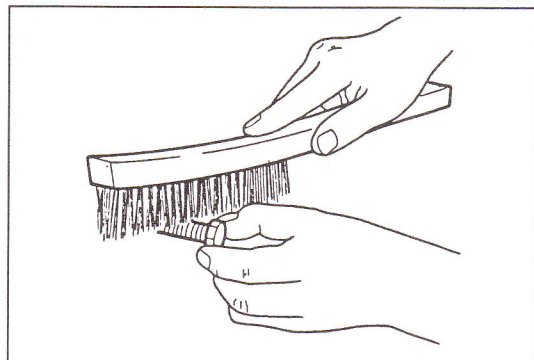
96U01X-052

### Oil Pan

1. Apply a continuous bead of silicon sealant to the oil pan around the inside of the bolt holes and overlap the ends.
2. Install the oil pan.

### Tightening torque:

7—12 N·m (70—120 cm·kg, 61—104 in·lb)



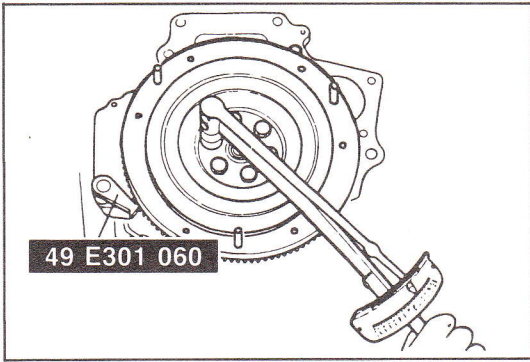
86U01X-138

### Flywheel (MTX), Drive Plate (ATX)

1. Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it.
2. Apply sealant to the bolt threads.



# 1 ASSEMBLY (CYLINDER BLOCK)



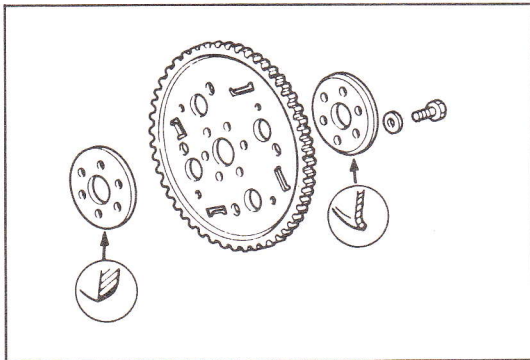
86U01X-139

(MTX)

3. Install, and tighten the flywheel with the **SST**.

**Tightening torque:**

**96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)**

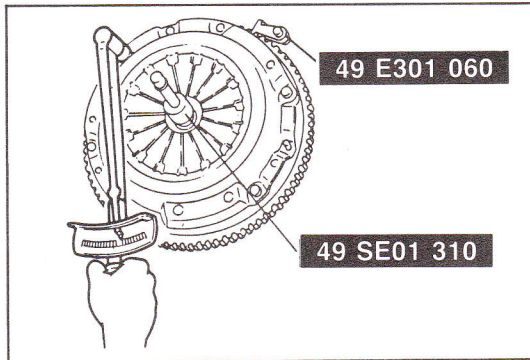


(ATX)

4. Install, and tighten the drive plate adaptor, drive plate, and backing plate with the **SST**.

**Tightening torque:**

**96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)**



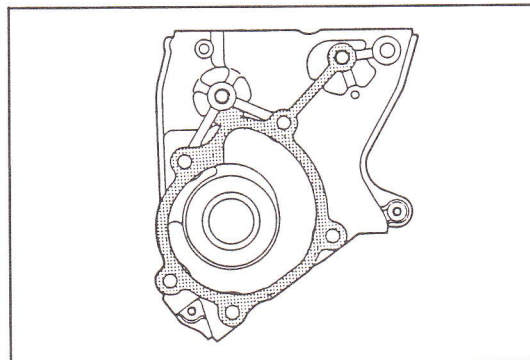
86U01X-141

**Clutch Disc and Clutch Cover (MTX)**

Install the clutch disc and clutch cover using the **SST**. (Refer to Section 6.)

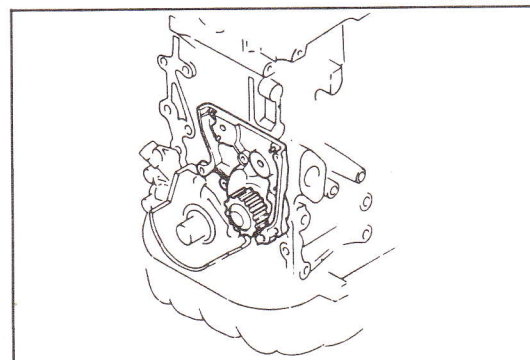
**Tightening torque:**

**22—32 N·m (2.2—3.3 m·kg, 16—24 ft·lb)**



**Water Pump**

1. Remove all dirt, grease, and other material from the water pump mounting surface.
2. Place a new gasket in position.



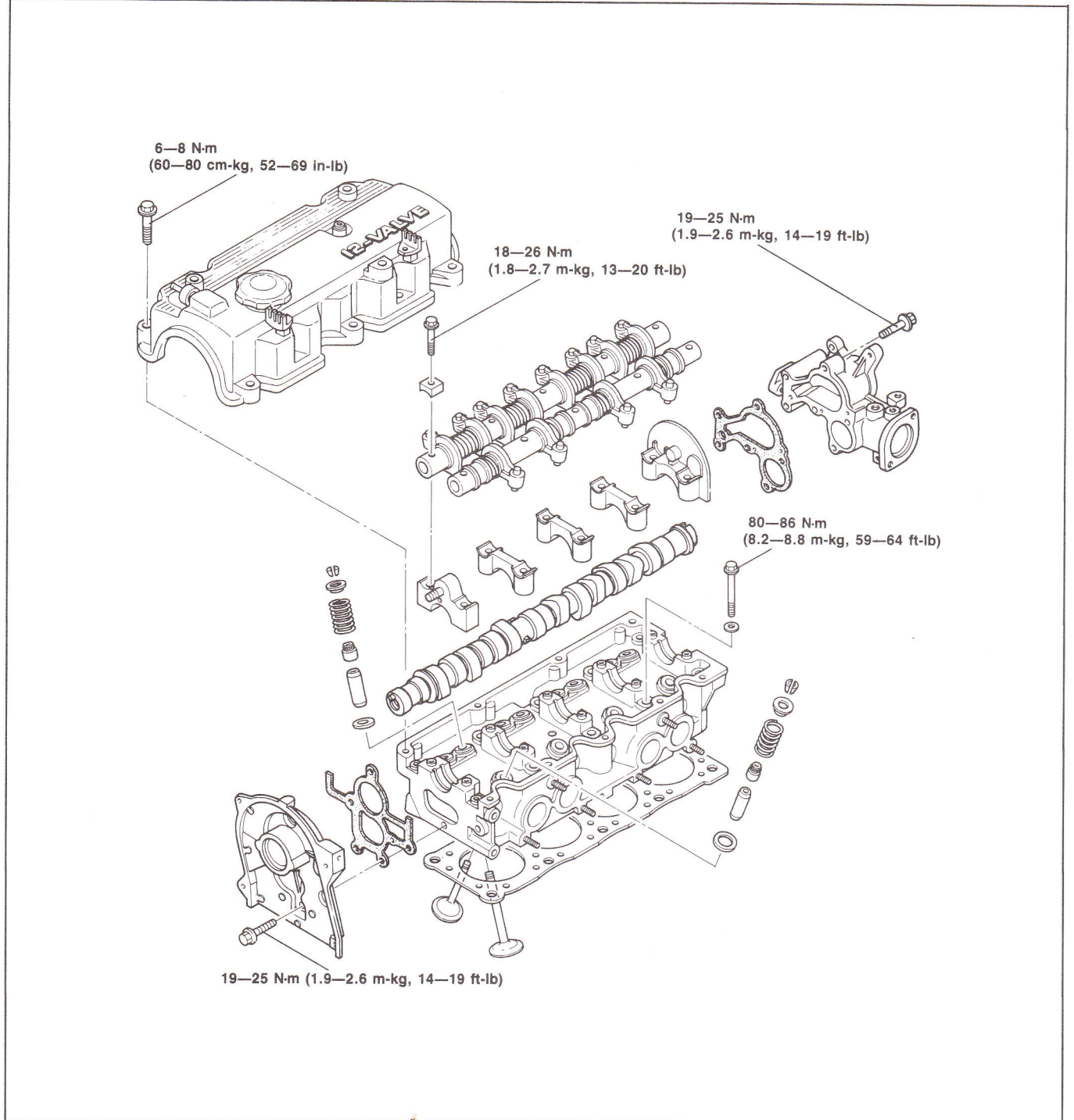
3. Install the water pump.

**Tightening torque:**

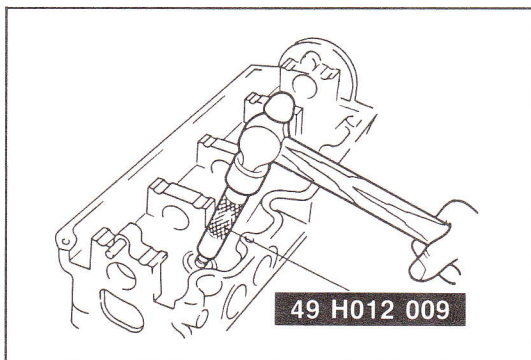
**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



## CYLINDER HEAD Torque Specifications



69G01B-152

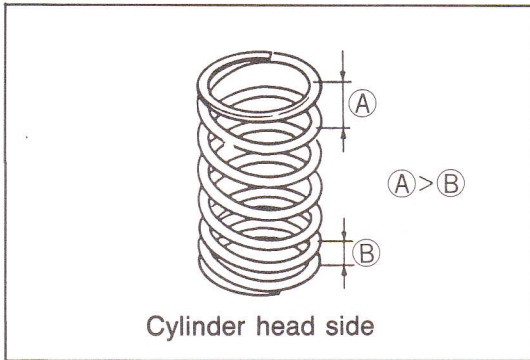


### Valve Seal

1. Apply engine oil to the inside of the new valve seal.
2. Install the valve seal onto the valve guide with the **SST**.

86U01X-143

# 1 ASSEMBLY (CYLINDER HEAD)

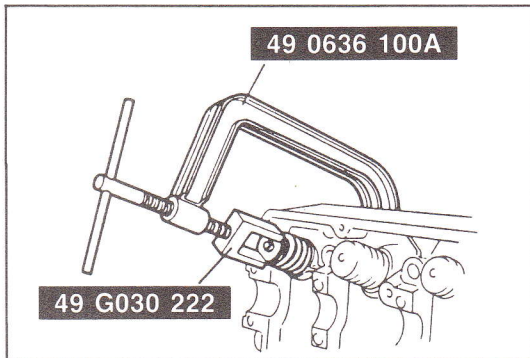


## Valve and Valve Spring

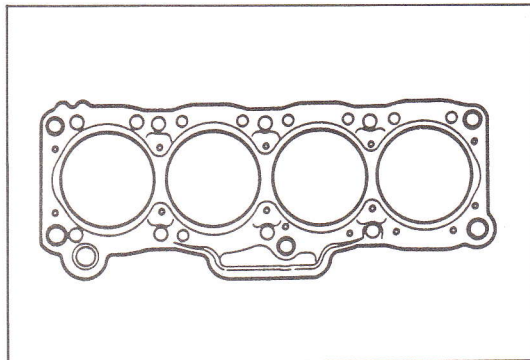
1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

### Note

**Install the valve spring with the narrow pitch toward the cylinder head.**

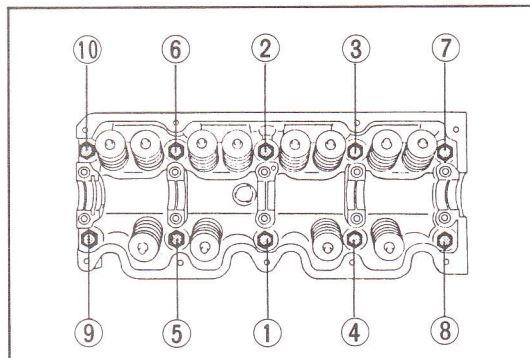


4. Compress the valve spring with the **SST**; then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



## Cylinder Head

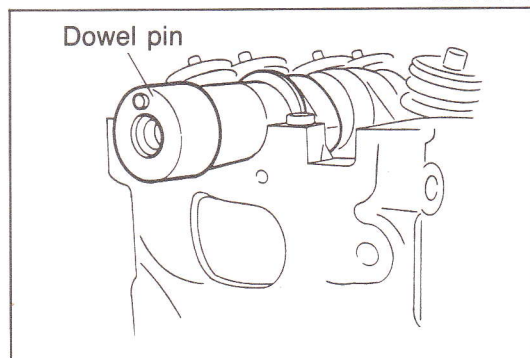
1. Thoroughly remove all dirt, oil, or other material from the top of the cylinder block.
2. Place the new cylinder head gasket in position.



3. Install the cylinder head.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

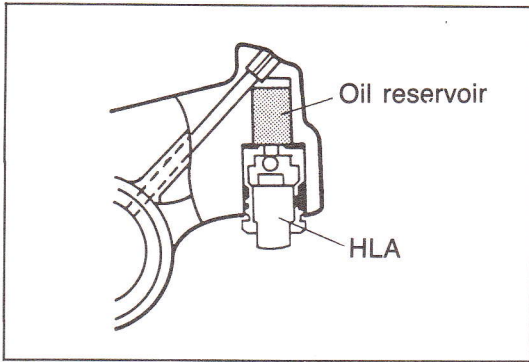
**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**



## Camshaft

1. Apply a liberal amount of engine oil to the journals and bearings.
2. Place the camshaft in position with the dowel pin facing straight up.





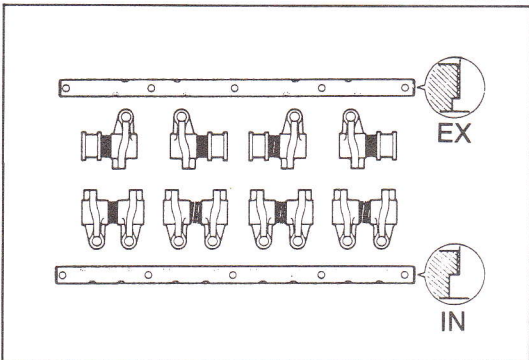
86U01X-149

## Hydraulic Lash Adjuster (HLA)

1. Pour engine oil into the oil reservoir in the rocker arm.
2. Apply engine oil to the new HLA.
3. Carefully install the HLA into the rocker arm.

### Caution

**Be careful not to damage the O-ring when installing the HLA.**



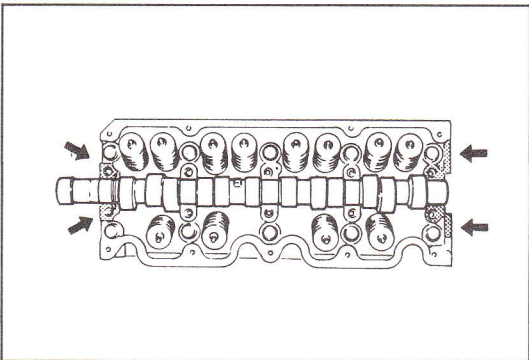
86U01X-150

## Camshaft Cap, Rocker Arm and Shaft Assembly

1. Assemble the rocker arm and shaft assembly as shown in the figure.

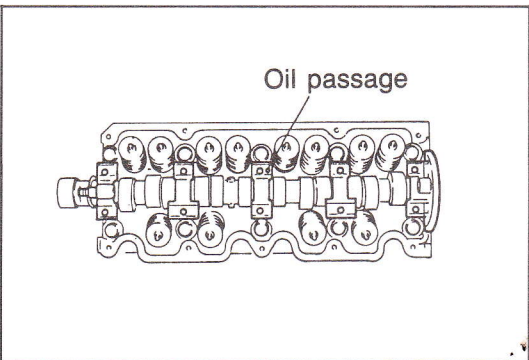
### Note

- a) The intake side shaft has twice as many oil holes as the exhaust side shaft.
- b) The stepped ends are the rear of the shafts.



76G01A-140

2. Apply silicon sealant to the shaded areas shown in the figure.

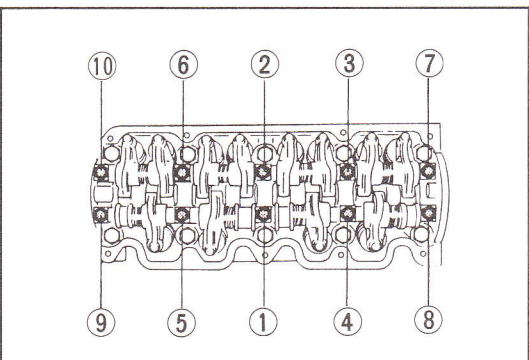


86U01X-152

3. Apply liberal amount of clean engine oil to the cam lobes and journals.
4. Position the camshaft caps according to the ← mark.

### Note

**The No. 3 camshaft cap has an oil passage from the cylinder head, be certain it is installed correctly.**



86U01X-153

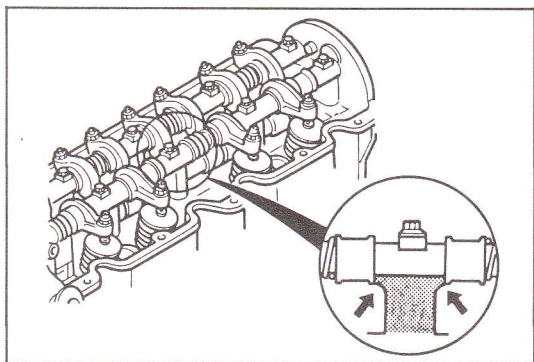
5. Install the rocker arm and shaft assemblies. Tighten the bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)**



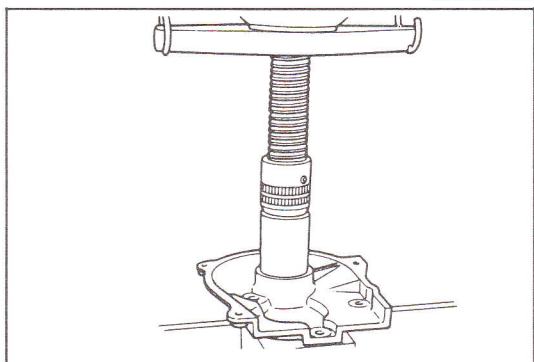
# 1 ASSEMBLY (CYLINDER HEAD)



86U01X-154

## Caution

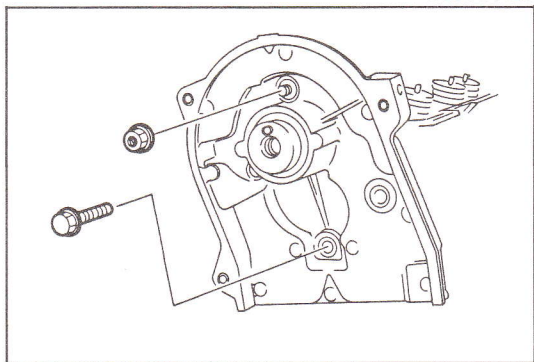
Be careful that the rocker arms or spacers do not get caught between the shaft and camshaft cap.



86U01X-155

## Front Housing

1. Apply engine oil to the front housing and a new oil seal.
2. Press the oil seal into the front housing.

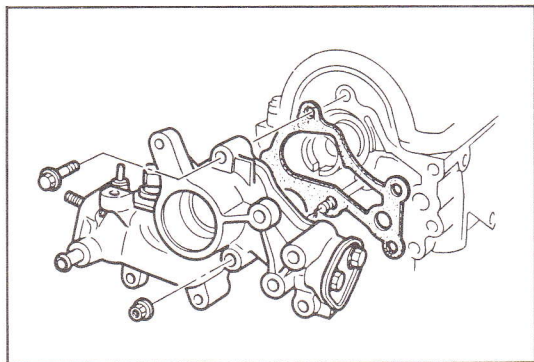


86U01X-156

3. Apply engine oil to the oil seal lip.
4. Install the front housing and a new gasket.

## Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



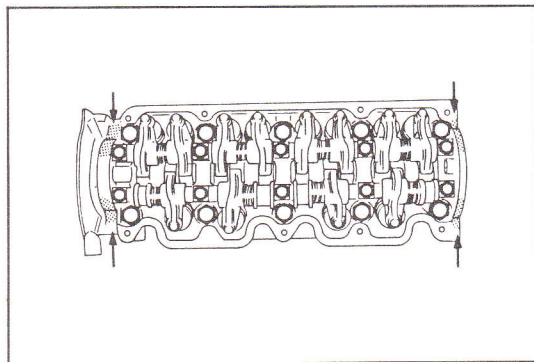
86U01X-157

## Rear Housing

Install the rear housing and a new gasket.

## Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



96U01X-055

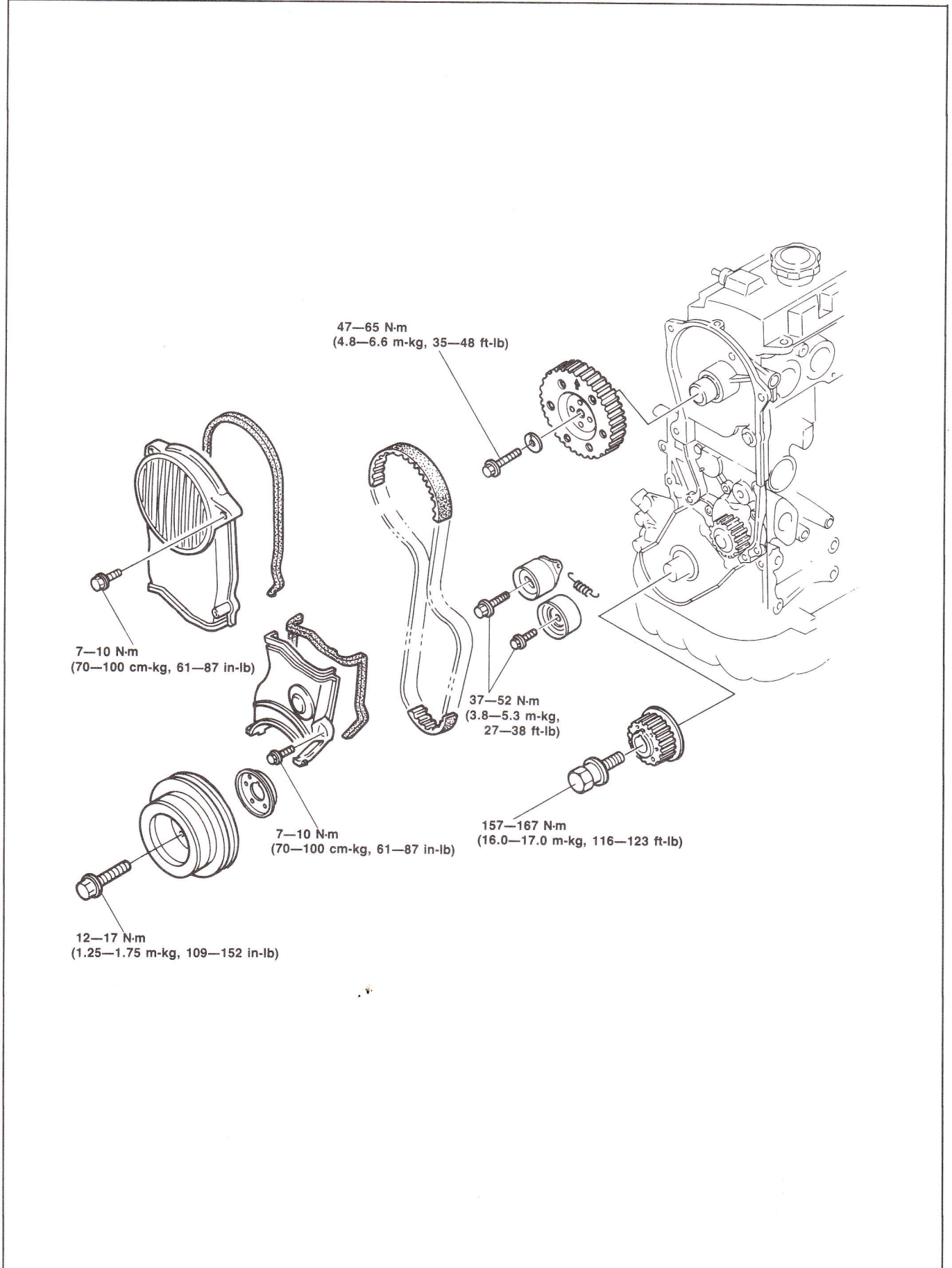
## Cylinder Head Cover

1. Apply silicon sealant to the shaded areas shown in the figure.
2. Install the cylinder head cover.

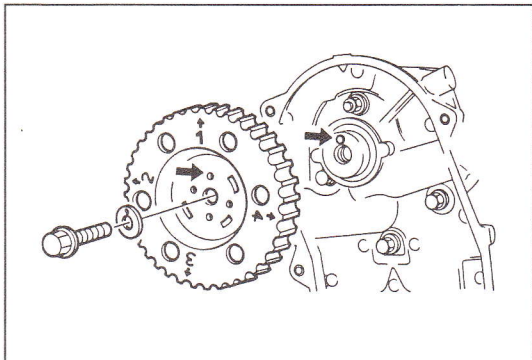
## Tightening torque:

**6—8 N·m (60—80 cm·kg, 52—69 in·lb)**

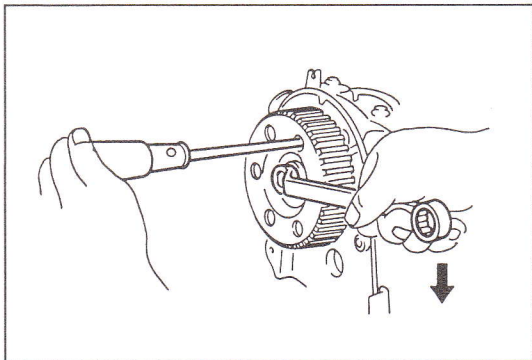
## TIMING BELT Torque Specifications



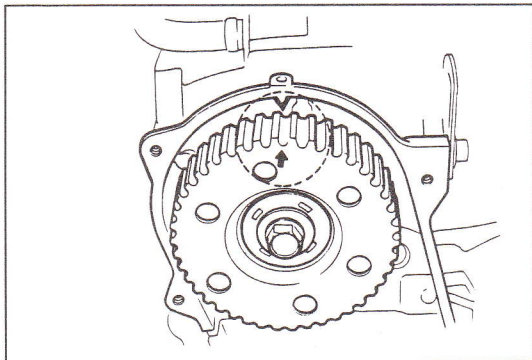
# 1 ASSEMBLY (TIMING BELT)



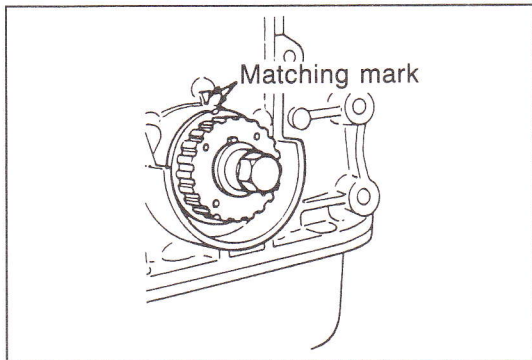
96U01X-056



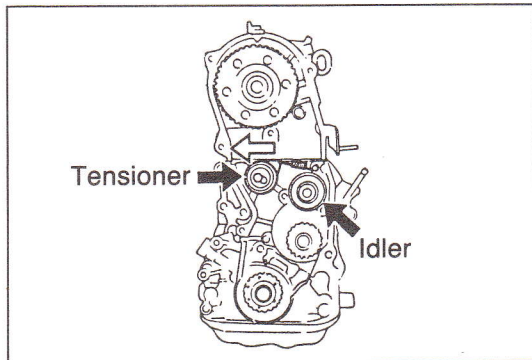
76G01A-141



96U01X-057



96U01X-058



69G01B-165

## Camshaft Pulley

1. Install the camshaft pulley on the camshaft with the dowel pin fit into the hole at the **↑1** mark.

2. Tighten the camshaft pulley lock bolt.

### Tightening torque:

**47—65 N·m (4.8—6.6 m·kg, 35—48 ft·lb)**

3. Align the **↑1** mark on the pulley with the matching mark on the front housing.

## Timing Belt Pulley

1. Reverse the direction of the **SST** (ring gear brake).
2. Install the crankshaft key.
3. Install the timing belt pulley on the crankshaft.

### Tightening torque:

**157—167 N·m (16.0—17.0 m·kg, 116—123 ft·lb)**

4. Release the ring gear brake.
5. Align the timing belt pulley and the pump body matching marks.

## Timing Belt Idler Pulley

Install the timing belt idler pulley.

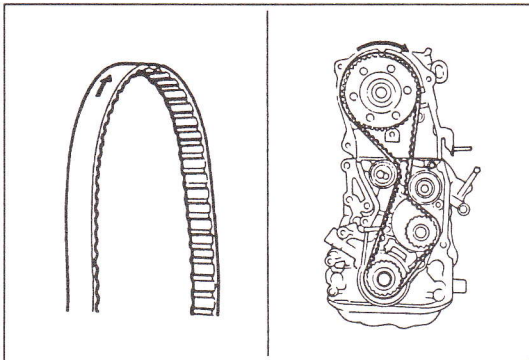
### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

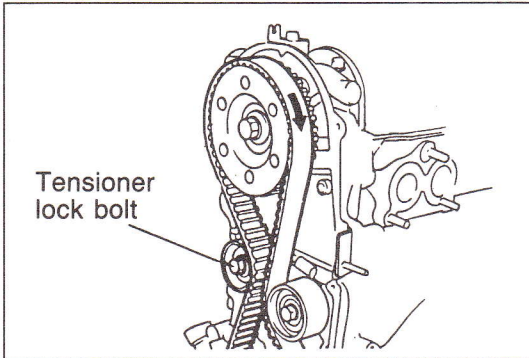
## Timing Belt Tensioner

1. Install the timing belt tensioner and tensioner spring.
2. Tentatively secure the tensioner with the spring fully extended.

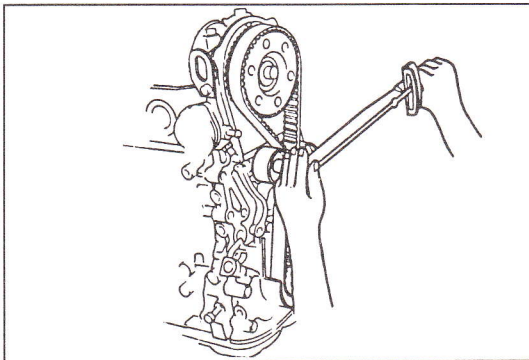




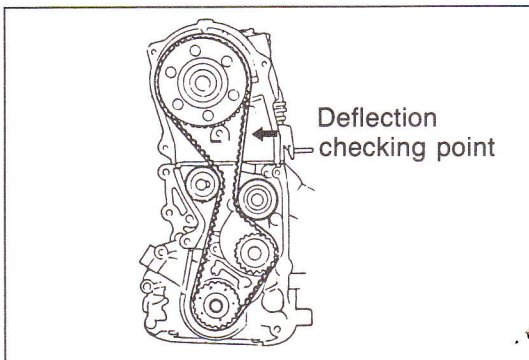
76G01A-085



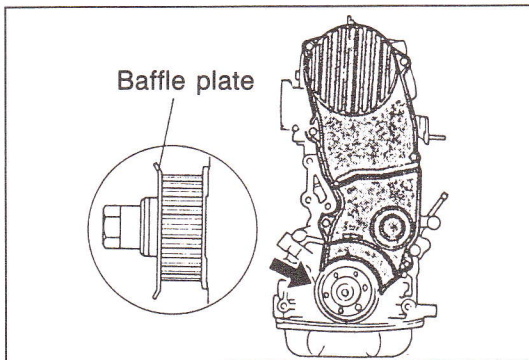
96U01X-059



96U01X-060



96U01X-061



86U01X-163

## Timing Belt

1. Install the timing belt. (keep the tension side of belt as tight as possible.)

### Caution

- a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.
- b) Check that there is no oil, grease, or dirt on the timing belt.

2. Turn the crankshaft twice in the direction of rotation.
3. Check that the matching marks are correctly aligned. If not aligned, remove the timing belt and tensioner, and repeat the above-mentioned procedure.
4. Loosen the tensioner lock bolt and apply tension to the belt.

5. Tighten the timing belt tensioner lock bolt.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

6. Turn the crankshaft twice in the direction of rotation and align the matching marks.

6. Check the timing belt deflection.

If the deflection is not correct, loosen the tensioner lock bolt and repeat steps 3—5 above. Replace the tensioner spring if necessary.

### Belt deflection/98 N (10 kg, 22 lb)

**New : 8.0—9.0 mm (0.31—0.35 in)**

**Used: 9.0—10.0 mm (0.35—0.39 in)**

## Baffle Plate

Position the baffle plate on the timing belt pulley.

## Timing Belt Cover

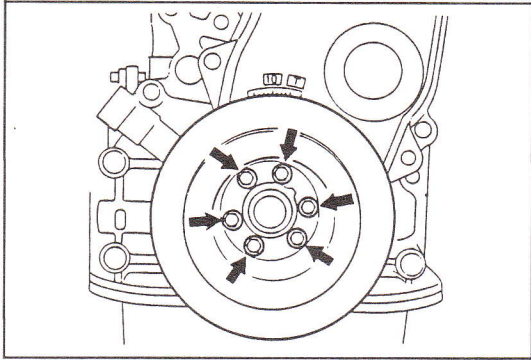
Install the lower timing belt cover, upper timing belt cover, and new gaskets.

### Tightening torque:

**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**

# 1 ASSEMBLY (TIMING BELT)

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69G01B-170

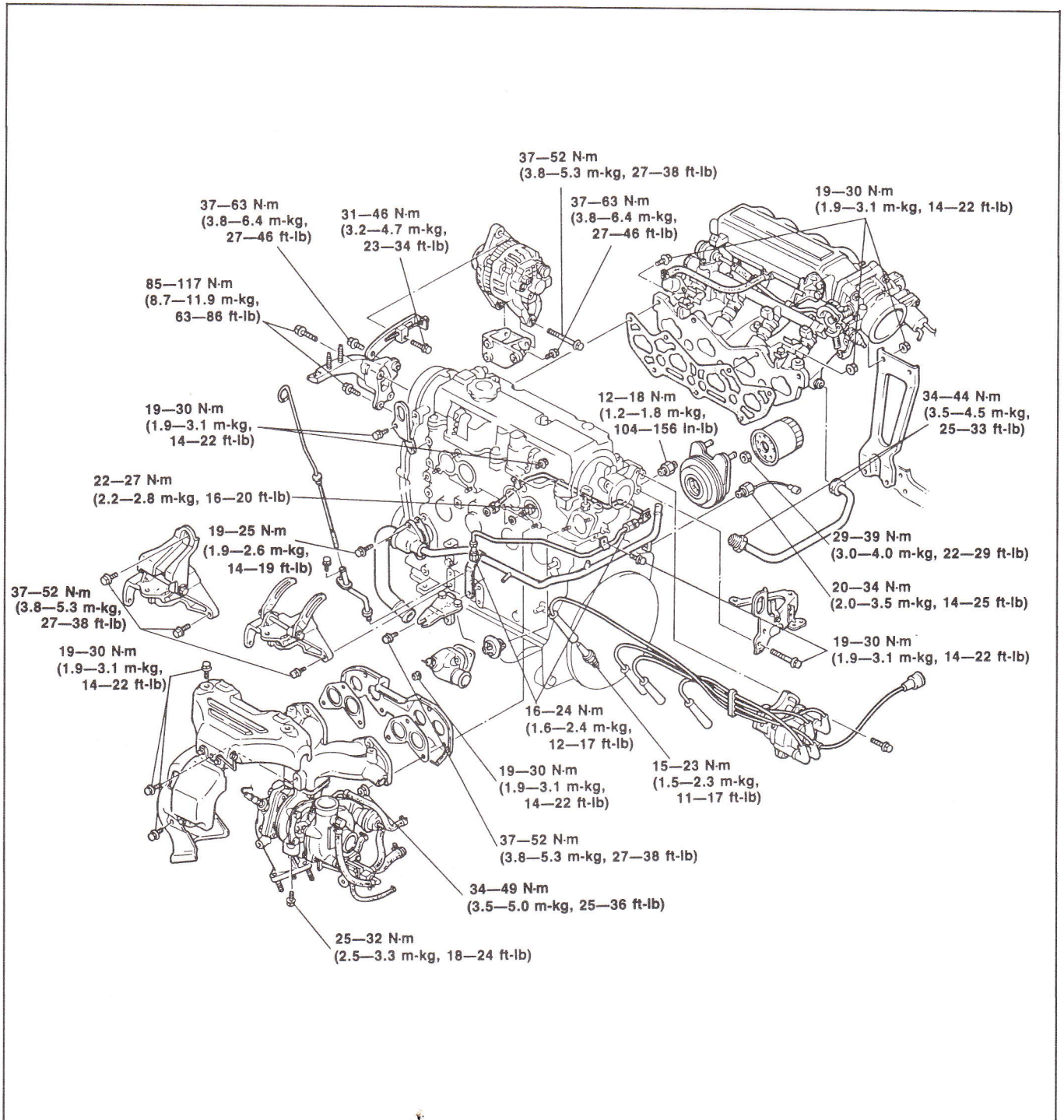
## **Crankshaft Pulley**

Install the crankshaft pulley.

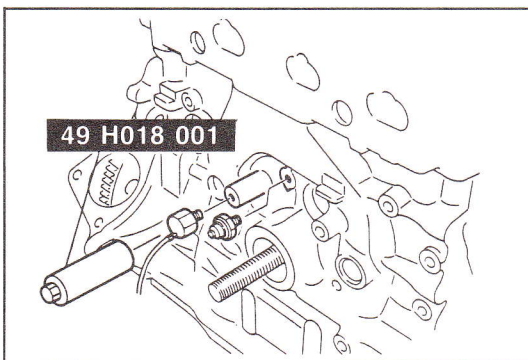
### **Tightening torque:**

**12—17 N·m (1.25—1.75 m·kg, 109—152 in·lb)**

## AUXILIARY PARTS Torque Specifications



86U01X-164



76G01X-612

### Knock Sensor (Turbo)

Install the knock sensor with the SST.

#### Tightening torque:

20—34 N-m (2.0—3.5 m-kg, 14—25 ft-lb)

### Oil Pressure Switch

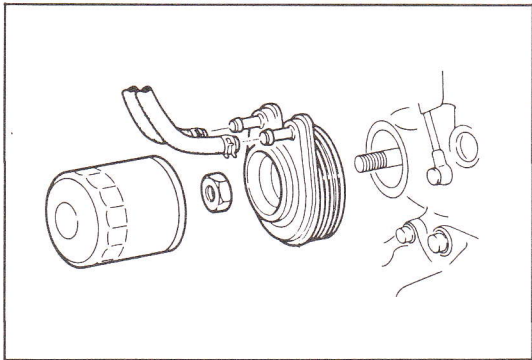
Install the oil pressure switch.

#### Tightening torque:

12—18 N-m (1.2—1.8 m-kg, 104—156 in-lb)



# 1 ASSEMBLY (AUXILIARY PARTS)



96U01X-062

## Oil Cooler (Turbo)

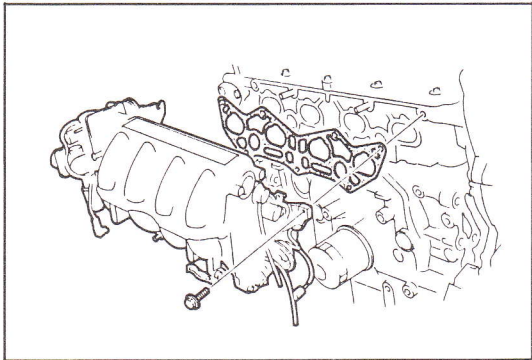
Install the oil cooler.

### Tightening torque:

**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

## Oil Filter

1. Apply a small amount of engine oil to the rubber seal of the new filter.
2. Install the oil filter and tighten it by hand only. Do not use a wrench.



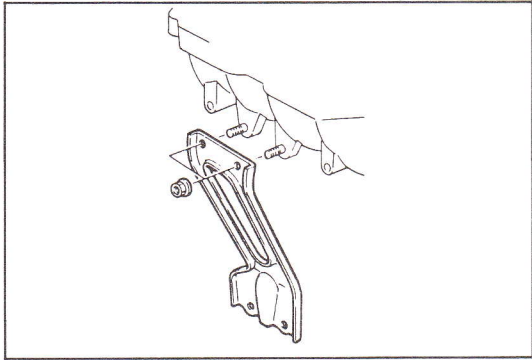
86U01X-167

## Intake Manifold Assembly

1. Place the new gasket in position.
2. Install the intake manifold assembly.
3. Tighten the nuts in two or three steps.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



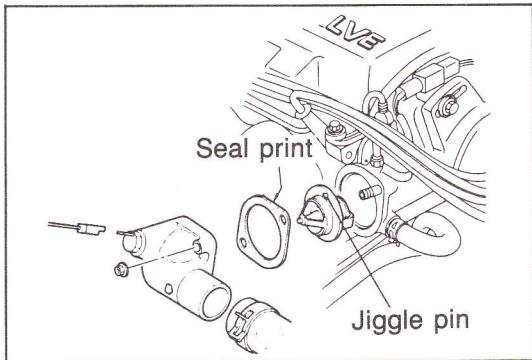
86U01X-168

## Intake Manifold Bracket

Install the intake manifold bracket.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



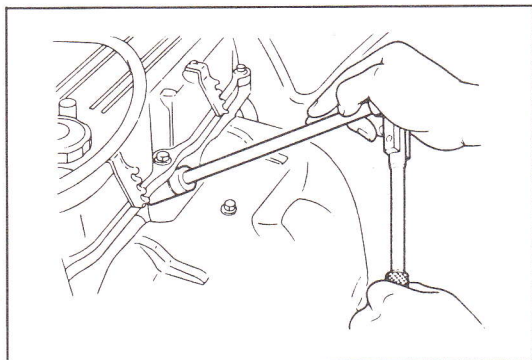
86U01X-169

## Thermostat and Thermostat Cover

1. Install the thermostat into the cylinder head with the jiggle pin at the top.
2. Position a new gasket with the printed side facing the cylinder head.
3. Install the thermostat cover.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



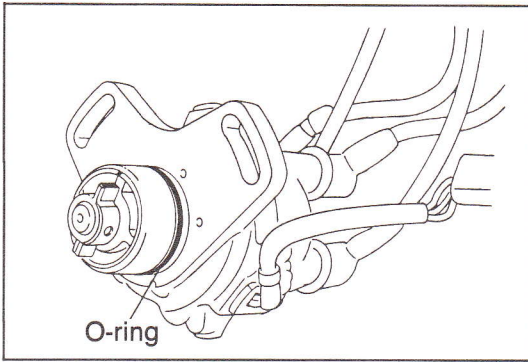
86U01X-219

## Spark Plug

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

### Tightening torque:

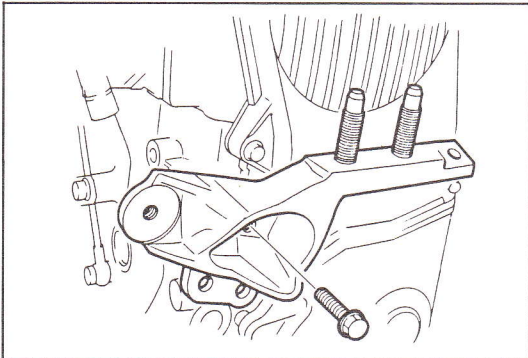
**15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)**



86U01X-039

## Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade.
3. Install the distributor into the rear housing.
4. Loosely tighten the distributor mounting bolt.



96U01X-063

## High-Tension Lead

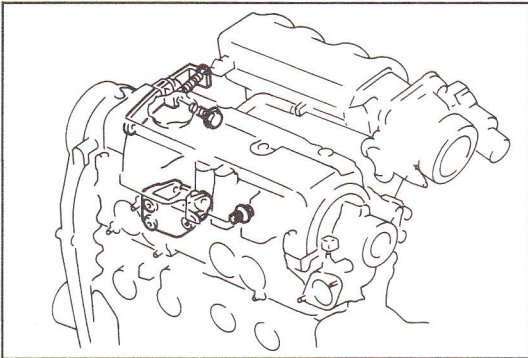
Install the high-tension leads.

## Engine Mount Bracket

Install the engine mount bracket.

### Tightening torque:

**85—117 N·m (8.7—11.9 m·kg, 63—86 ft·lb)**



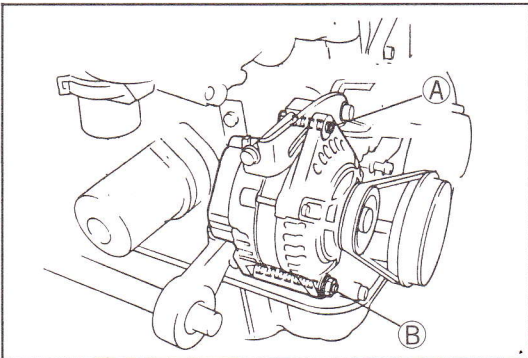
86U01X-171

## Alternator

1. Install the alternator strap and bracket.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



86U01X-172

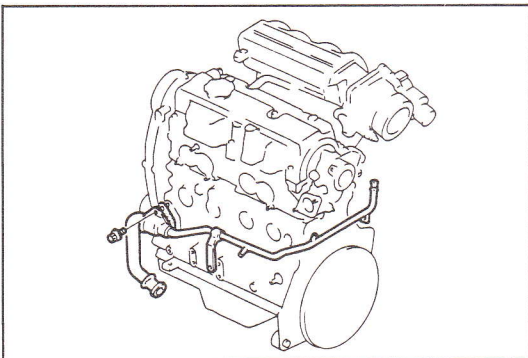
2. Install the alternator.

### Tightening torque

**A : 31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

**B : 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

3. Install the alternator drive belt, and adjust the belt deflection. (Refer to page 1—6.)



96U01X-074

## Coolant Inlet Pipe and Bypass Pipe

1. Install the coolant inlet pipe.

### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

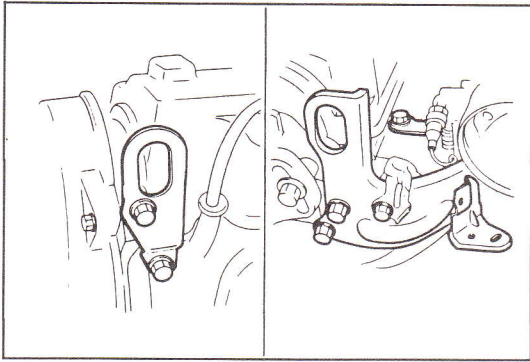
2. Apply vegetable oil to the O-ring.
3. Install the coolant bypass pipe.

### Tightening torque: 37—52 N·m

**(3.8—5.3 m·kg, 27—38 ft·lb).....Non-Turbo**



# 1 ASSEMBLY (AUXILIARY PARTS)



86U01X-174

## Engine Hanger

Install the front and rear engine hangers.

### Tightening torque:

19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)

## Turbocharger Bracket (Turbo)

1. Remove the engine from the engine stand.
2. Install the turbocharger bracket.

### Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

## Exhaust Manifold Assembly

1. Place the new gaskets in position with the ridge facing the cylinder head.
2. Install the exhaust manifold assembly.
3. Tighten the nuts in two or three steps.

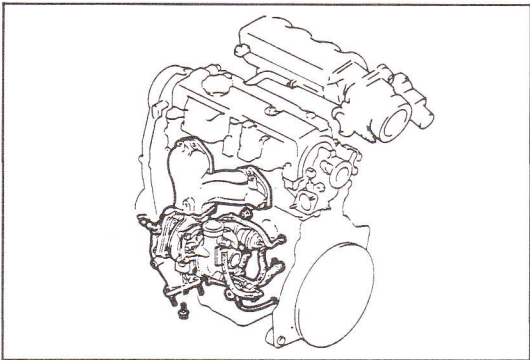
### Tightening torque:

34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)

4. Tighten the turbocharger to the bracket (Turbo).

### Tightening torque:

25—32 N·m (2.5—3.3 m·kg, 18—24 ft·lb)



96U01X-075

## Oil Pipe and Turbocharger Hose (Turbo)

1. Install the oil pipe.

### Tightening torque:

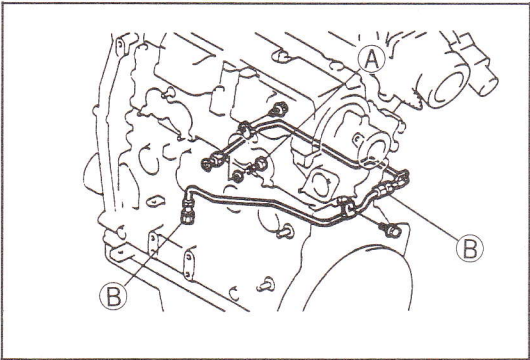
Ⓐ : 22—27 N·m (2.2—2.8 m·kg, 16—20 ft·lb)

Ⓑ : 16—24 N·m (1.6—2.4 m·kg, 12—17 ft·lb)

2. Tighten the oil pipe bracket and connect the oil hose and water hoses.

### Tightening torque:

19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)



86U01X-176

## EGR Pipe

Install the EGR pipe.

### Tightening torque:

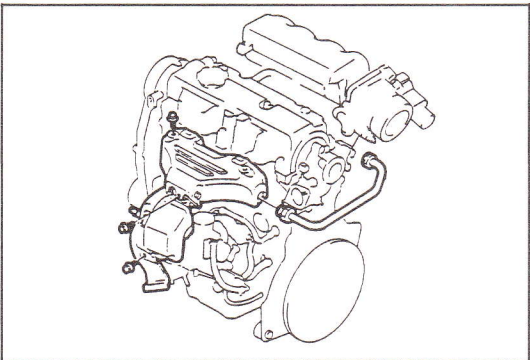
34—44 N·m (3.5—4.5 m·kg, 25—33 ft·lb)

## Exhaust Manifold Insulator

Install the exhaust manifold insulator.

### Tightening torque:

19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)



86U01X-177

## P/S Oil Pump Bracket

1. Install the P/S oil pump bracket.

### Tightening torque:

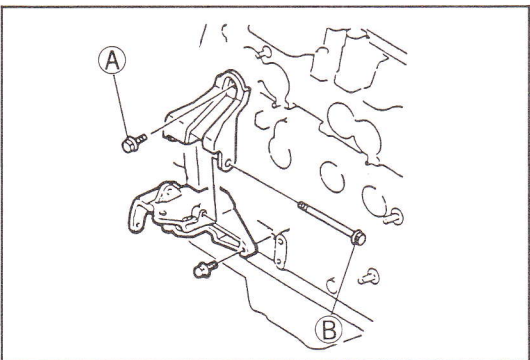
37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

2. Install the P/S oil pump bracket stay (only 4WS without A/C).

### Tightening torque:

Ⓐ : 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

Ⓑ : 29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



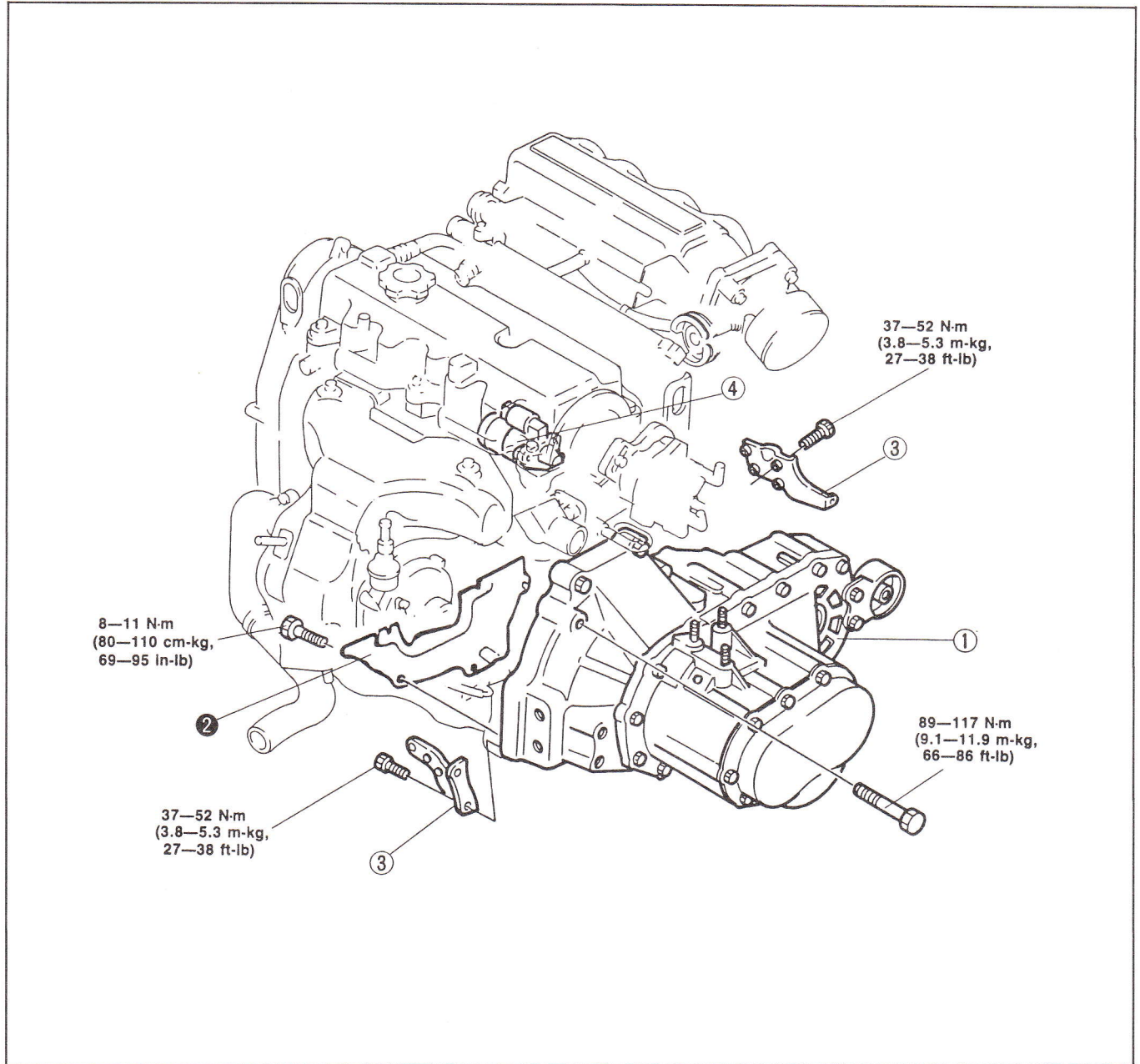
96U01X-064



## INSTALLATION

### TRANSAXLE ASSEMBLY

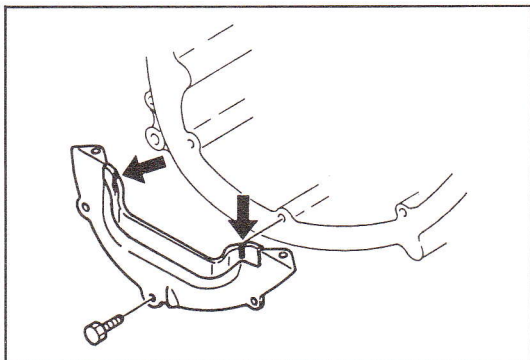
Assemble the transaxle to the engine in the sequence shown in the figure, referring to the installation note.



96U01X-065

1. Transaxle
2. Clutch under cover

3. Gusset plate
4. Starter



76G01A-144

#### Installation Note Clutch under cover

Before installation, fill the notches with silicon as shown in the figure.

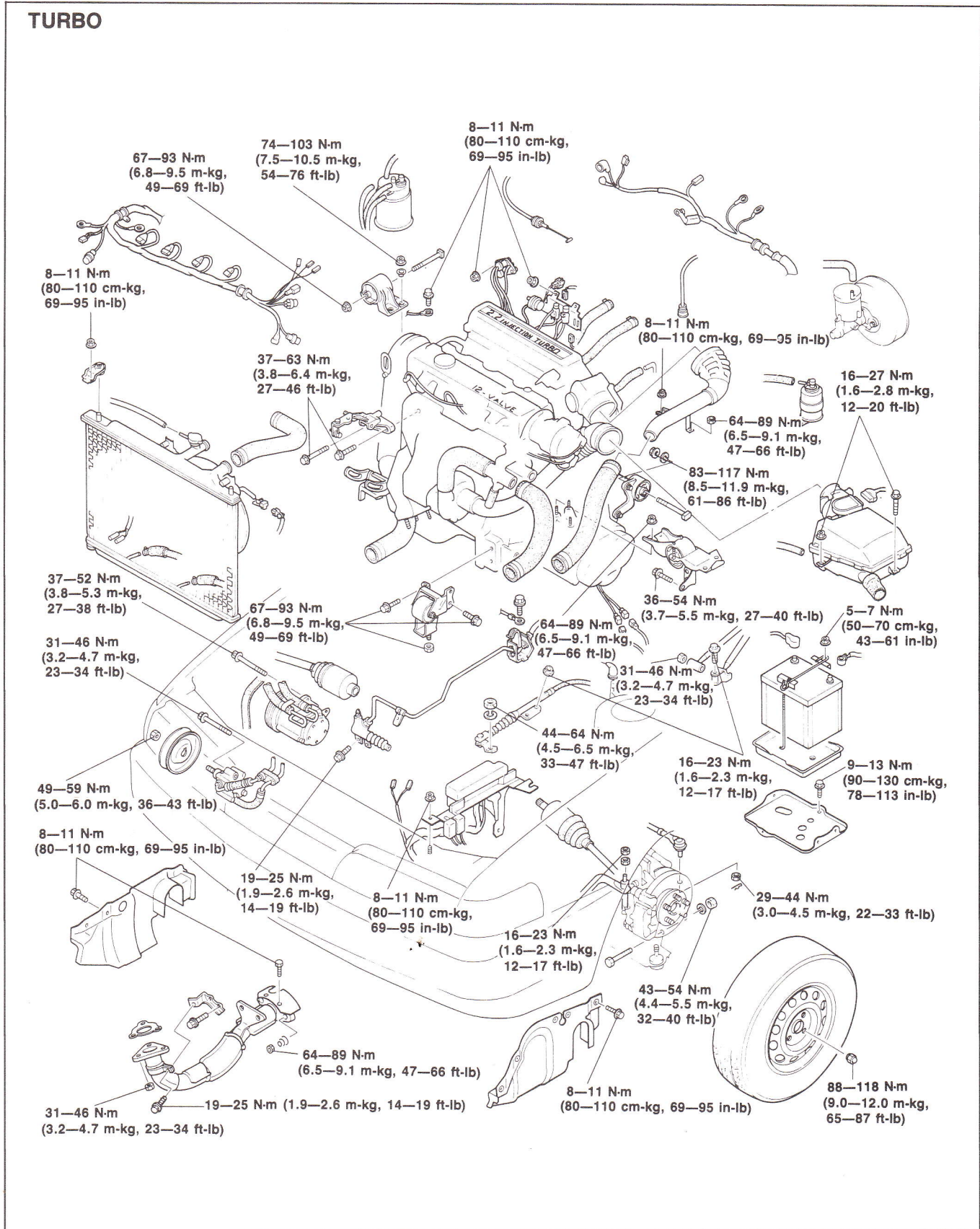
# 1 INSTALLATION

## ENGINE INSTALLATION

Install the engine and transaxle assembly.

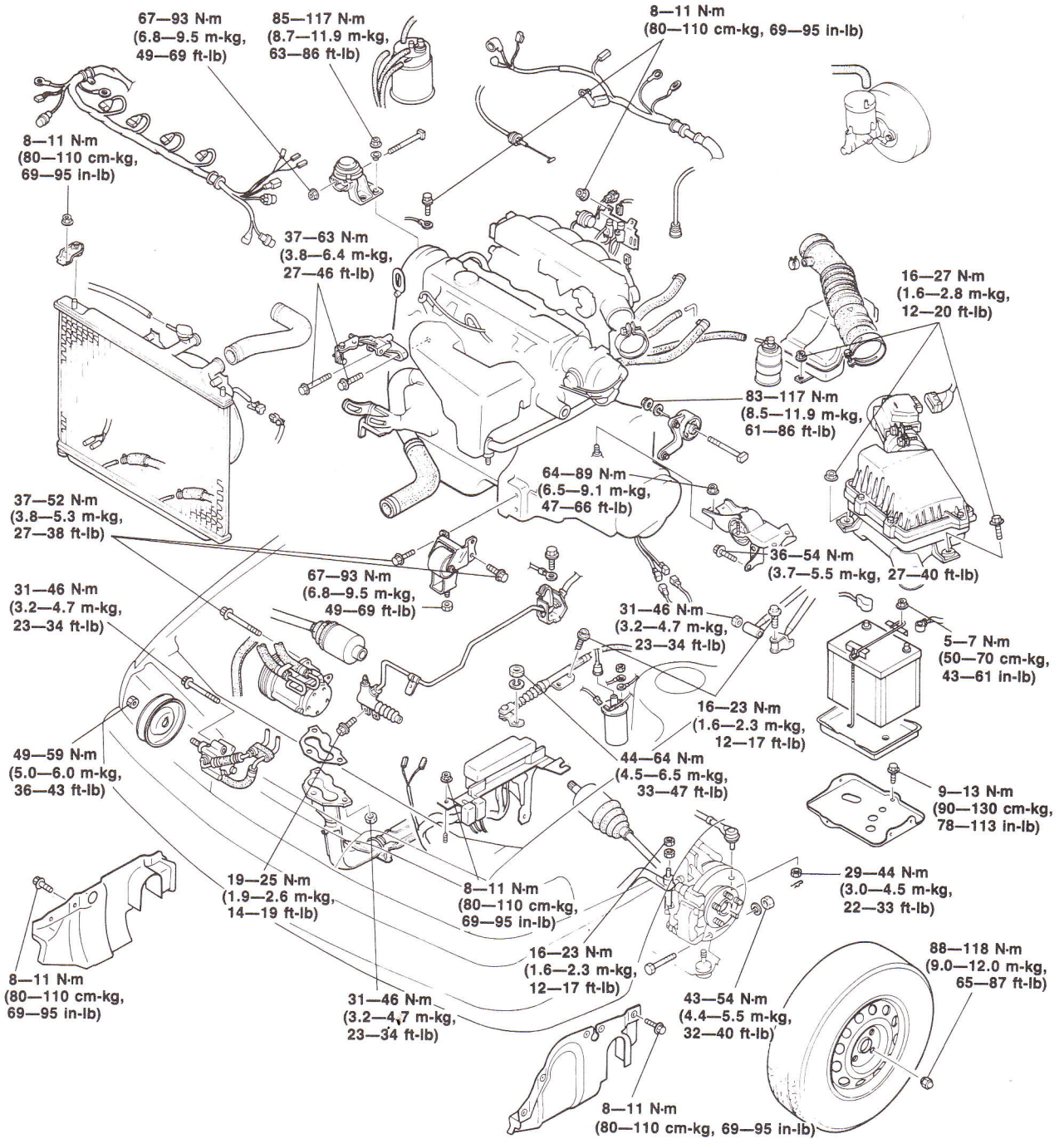
**Warning: Be sure the vehicle is securely supported.**

### Torque Specifications





## NON-TURBO

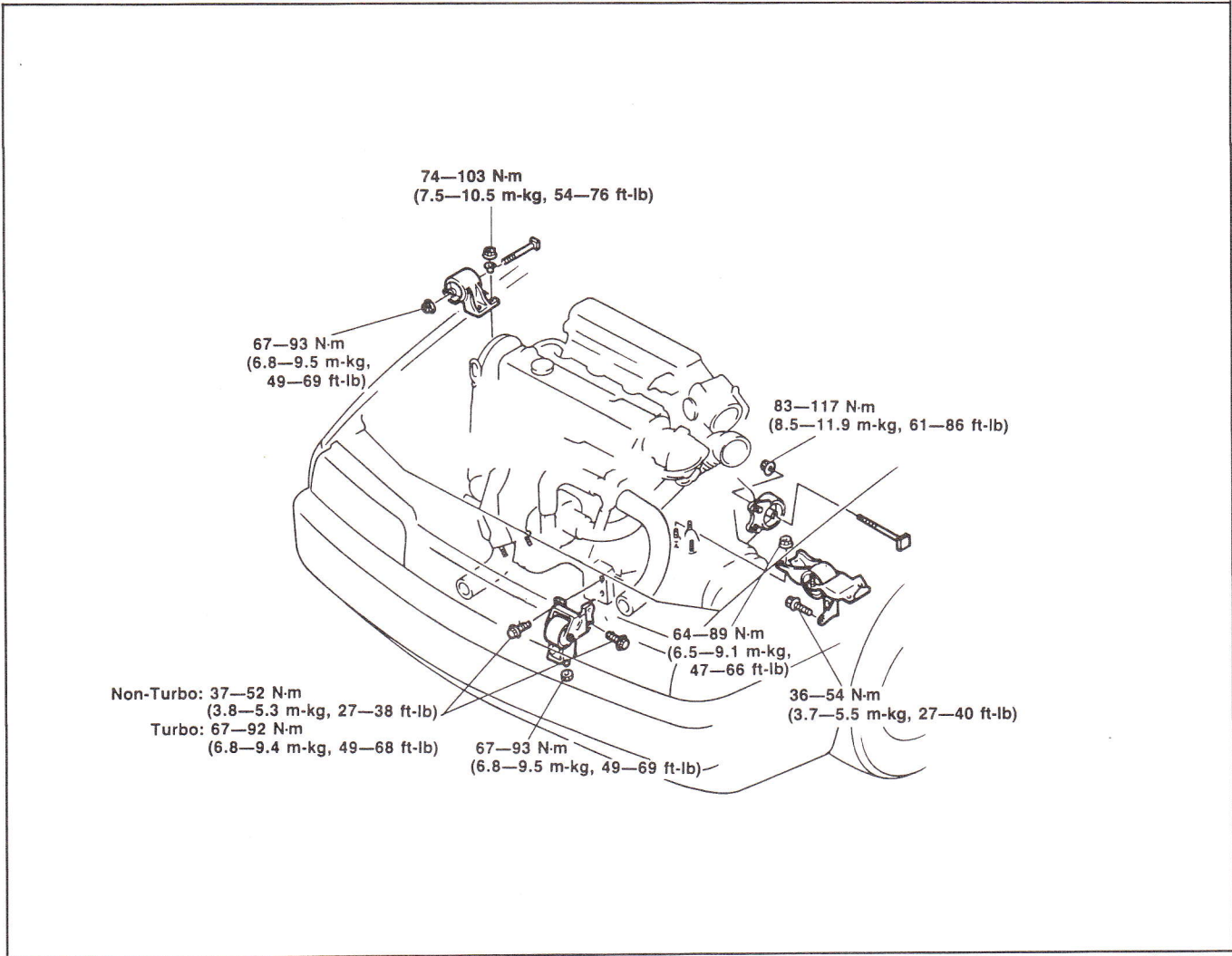




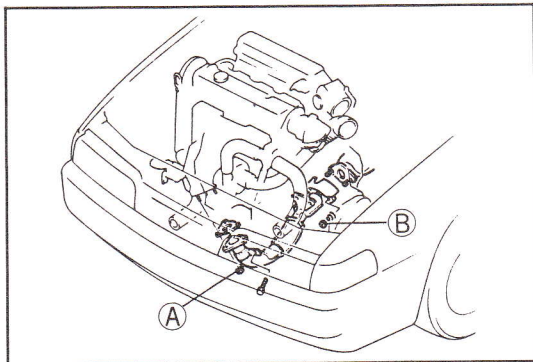
# 1 INSTALLATION

## Engine Mount

Install the engine mount.



86U01X-181



86U01X-182

### Exhaust Pipe

1. Install the exhaust pipe.

#### Tightening torque:

- Ⓐ : 31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)
- Ⓑ : 64—89 N·m (6.5—9.1 m·kg, 47—66 ft·lb)

2. Tighten the bracket bolt.

#### Tightening torque:

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

### Extension Bar (MTX)

Install the extension bar to the transaxle.

#### Tightening torque:

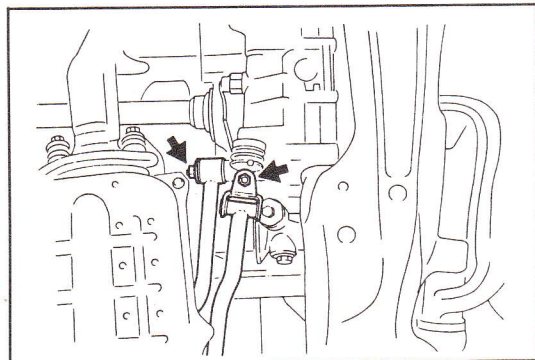
31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)

### Change Rod (MTX)

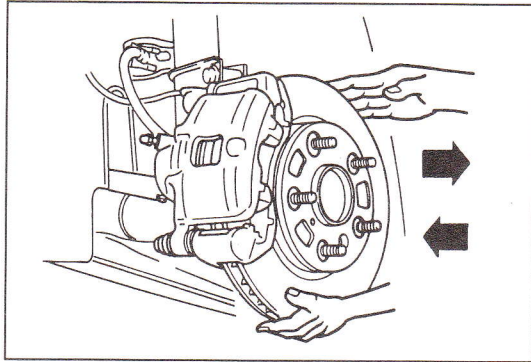
Install the change rod to the transaxle.

#### Tightening torque:

16—22 N·m (1.6—2.3 m·kg, 12—17 ft·lb)



86U01X-183



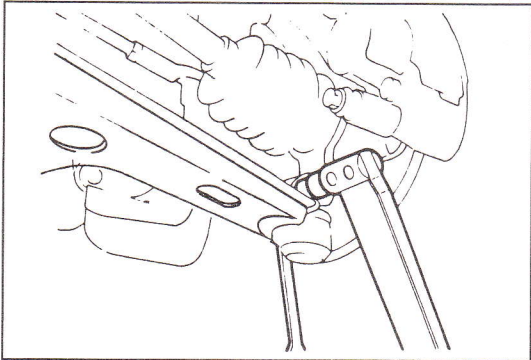
86U01X-184

## Driveshaft

1. Apply grease to the end of the driveshaft.
2. Install the driveshaft and a new clip.

### Caution

- a) When installing the driveshaft, be careful not to damage the oil seal.
- b) After installation, pull the front hub outward to confirm that the driveshaft is securely held by the clip.



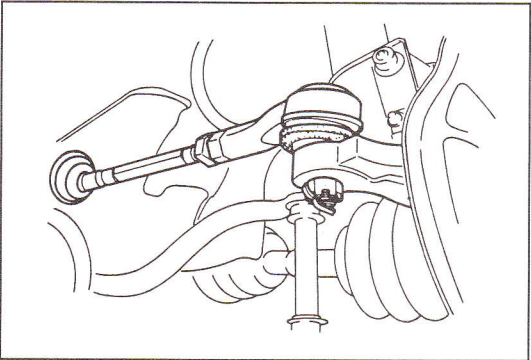
86U01X-185

## Lower Arm

Install the lower arm ball-joint to the knuckle; then tighten the lock nut.

### Tightening torque:

**43—54 N·m (4.4—5.5 m·kg, 32—40 ft·lb)**



86U01X-186

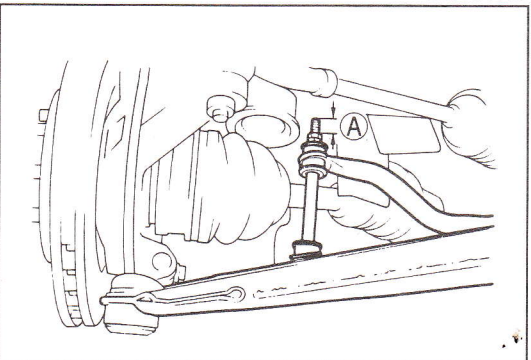
## Tie-Rod End

1. Install the tie-rod end to the knuckle.

### Tightening torque:

**29—44 N·m (3.0—4.5 m·kg, 22—33 ft·lb)**

2. Install the cotter pin.



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## Stabilizer Control Rod

Install and adjust the front stabilizer control rods.

**Dimension A: 20.1 ± 2 mm (0.79 ± 0.08 in)**

### Tightening torque:

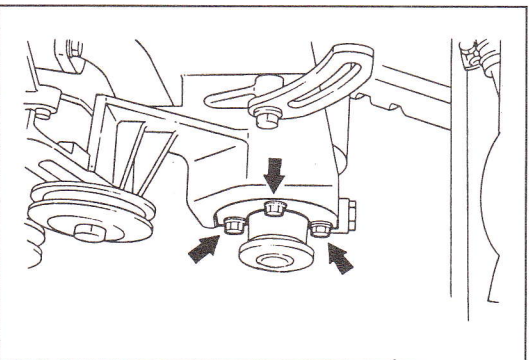
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

## Front Wheel

Install the front wheel.

### Tightening torque:

**88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**



96U01X-066

## P/S Oil Pump

1. Install the P/S oil pump.

### Tightening torque:

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

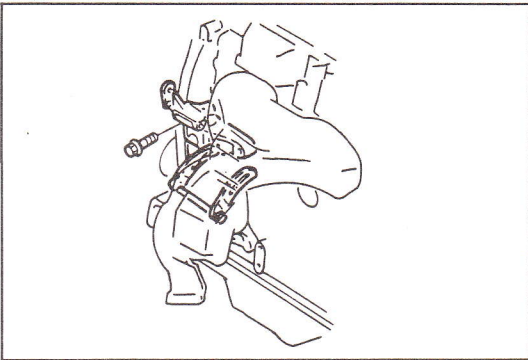
2. Tighten the pulley lock nut.

### Tightening torque:

**49—59 N·m (5.0—6.0 m·kg, 36—43 ft·lb)**



# 1 INSTALLATION



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## A/C Compressor

1. Install the A/C compressor strap to the P/S oil pump bracket.

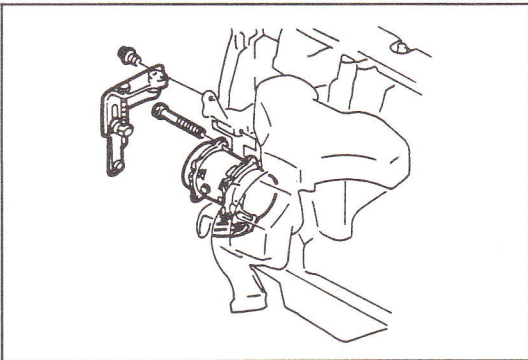
### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Install the A/C compressor bracket.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



86U01X-190

3. Install the A/C compressor.

4. Install the A/C compressor upper bracket.

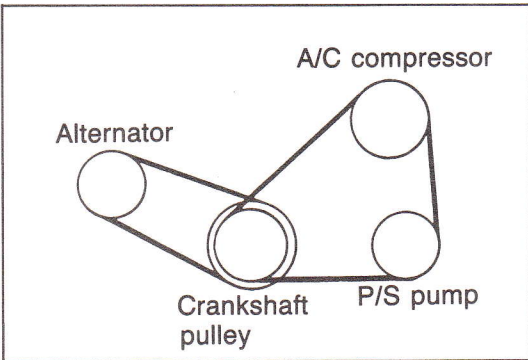
### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**

5. Tighten to the lock nut and mounting bolts.

### Tightening torque:

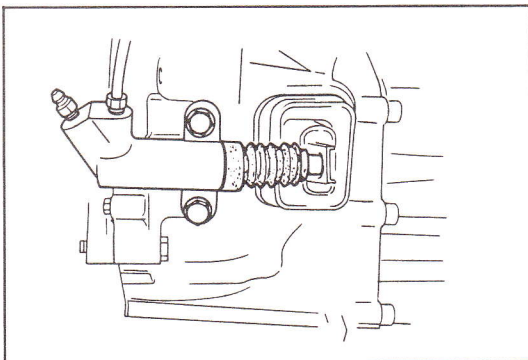
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



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## Drive Belt

Install the drive belt and adjust the belt deflection. (Refer to page 1—6.)



86U01X-192

## Clutch Release Cylinder (MTX)

1. Set the pipe bracket in position.

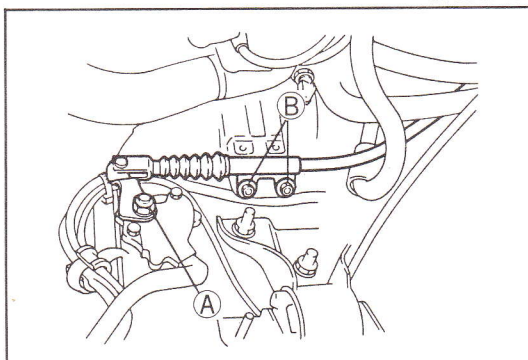
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Install the clutch release cylinder.

### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



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## Control Cable (ATX)

Install the control cable and adjust the shift selector position. (Refer to Section 7B.)

### Tightening torque

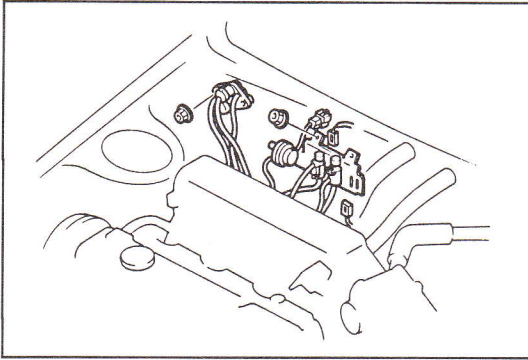
**(A) : 44—64 N·m (4.5—6.5 m·kg, 33—47 ft·lb)**

**(B) : 16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

## Speedometer Cable

Install the speedometer cable.





86U01X-194

### Three-Way Solenoid Assembly

Install the three-way solenoid assembly.

#### Tightening torque:

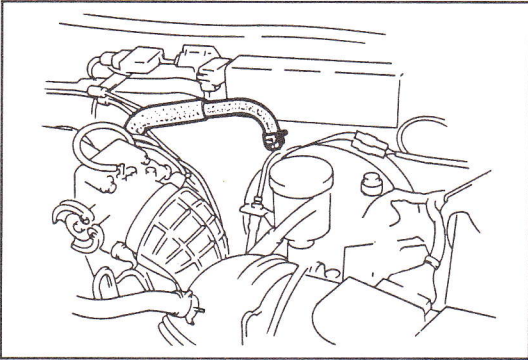
8—11 N·m (80—110 cm·kg, 69—95 in·lb)

### EGR Solenoid Assembly (Turbo)

Install the EGR solenoid assembly.

#### Tightening torque:

8—11 N·m (80—110 cm·kg, 69—95 in·lb)



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### Brake Vacuum Hose

Connect the brake vacuum hose.

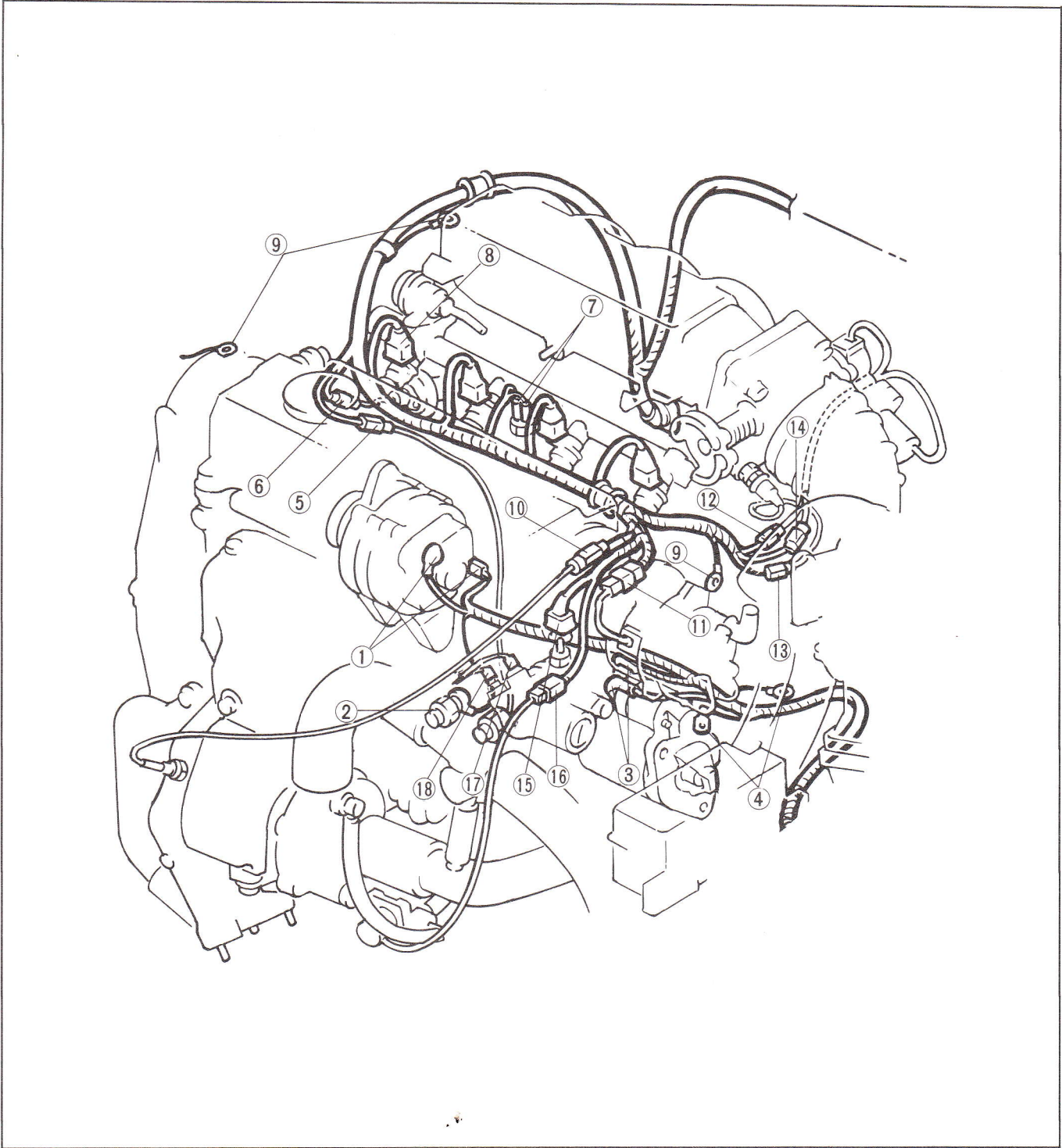
### Canister Hose

Connect the canister hoses.

# 1 INSTALLATION

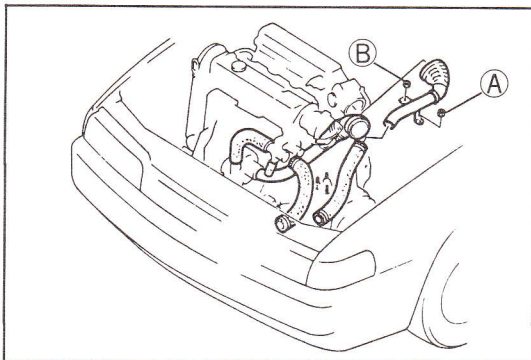
## Connector Location

Install each harness as shown in the figure.



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- |                                |                                       |
|--------------------------------|---------------------------------------|
| 1. Alternator                  | 11. Crank angle sensor (turbo)        |
| 2. Oil pressure switch         | 12. Idle speed control solenoid valve |
| 3. Starter                     | 13. Idle switch                       |
| 4. Engine ground               | 14. Throttle sensor                   |
| 5. Knock sensor (turbo)        | 15. Water thermo sensor               |
| 6. EGR position sensor (turbo) | 16. Waste gate solenoid (turbo)       |
| 7. Water thermo switch         | 17. Heat gauge unit                   |
| 8. Injector                    | 18. Water thermo switch               |
| 9. Engine ground               | 19. Transaxle harness                 |
| 10. Oxygen sensor              |                                       |



76F01C-043

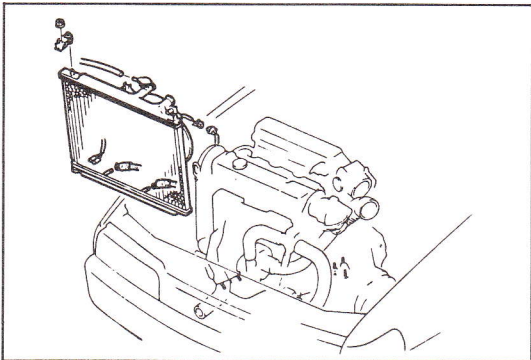
## Turbocharger Oil Pipe and Hose (Turbo)

1. Install the turbocharger pipe.

### Tightening torque

- Ⓐ : 64—89 N·m (6.5—9.1 m·kg, 47—66 ft·lb)
- Ⓑ : 8—11 N·m (80—110 cm·kg, 69—95 in·lb)

2. Connect the turbocharger hoses.



76G01A-147

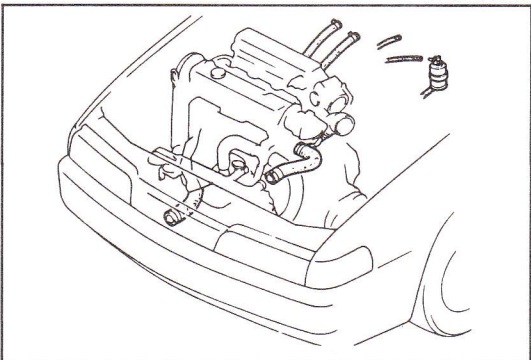
## Radiator

1. Install the radiator and cooling fan.

### Tightening torque:

- 8—11 N·m (80—110 cm·kg, 69—95 in·lb)

2. Connect the radiator harness.
3. Connect the ATF hoses (ATX).



86U01X-199

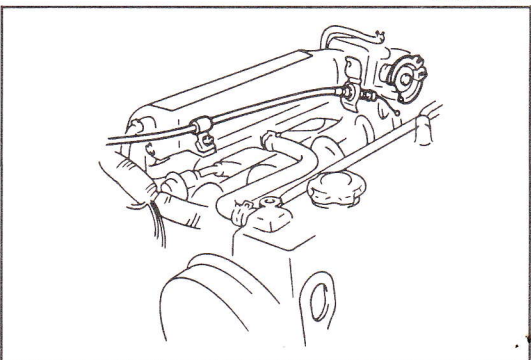
4. Connect the upper and lower radiator hoses.

### Note

- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

## Heater Hose and Fuel Hose

Connect the heater hoses and the fuel hoses.



96U01X-076

## High-Tension Lead

Connect the high-tension lead to the ignition coil.

## Accelerator Cable

1. Install the accelerator cable and the throttle cable (ATX).
2. Check the deflection of the cable.

**Deflection: 1—3 mm (0.04—0.12 in)**

## Battery and Battery Carrier

1. Install the battery carrier.

### Tightening torque:

- 9—13 N·m (90—130 cm·kg, 78—113 in·lb)

2. Install the fuse box.

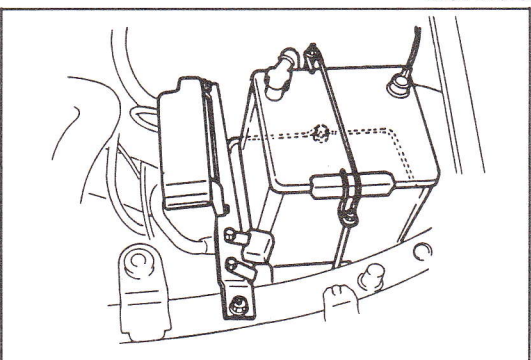
### Tightening torque:

- 8—11 N·m (80—110 cm·kg, 69—95 in·lb)

3. Install the battery tray and battery.

### Tightening torque:

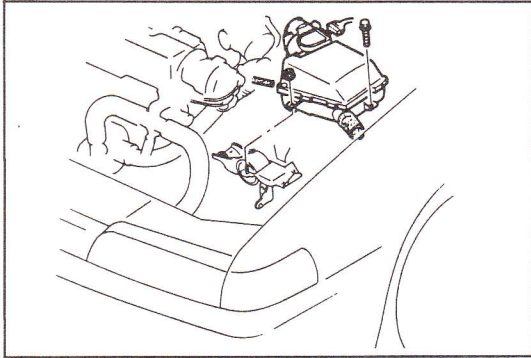
- 5—7 N·m (50—70 cm·kg, 43—61 in·lb)



76G01A-148



# 1 INSTALLATION



76F01C-044

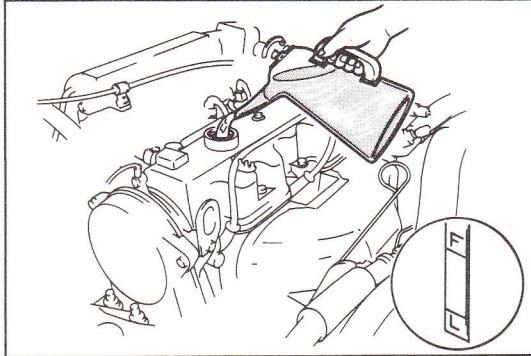
## Air Cleaner Assembly

1. Install the air cleaner assembly.

### Tightening torque:

**16—27 N·m (1.6—2.8 m·kg, 12—20 ft·lb)**

2. Connect the air flow sensor connector, air intake pipe, and EGR air hose.



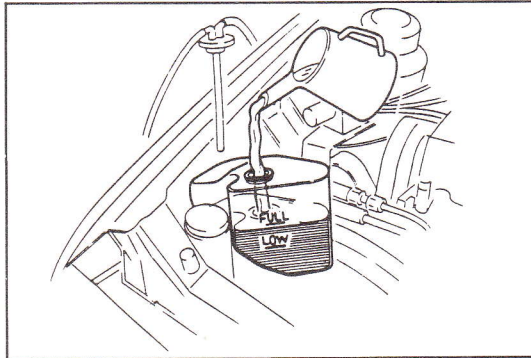
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## Engine Oil

Add the specified amount and type of engine oil. (Refer to Section 2.)

## Coolant

Close the drain plug, fill the radiator and reservoir tank with the specified amount and type of coolant. (Refer to Section 3.)



86U01X-204

## Check Engine Condition

1. Check for leaks.
2. Perform engine adjustments if necessary.
3. Perform a road test.
4. Recheck the oil and coolant levels.