

# ENGINE

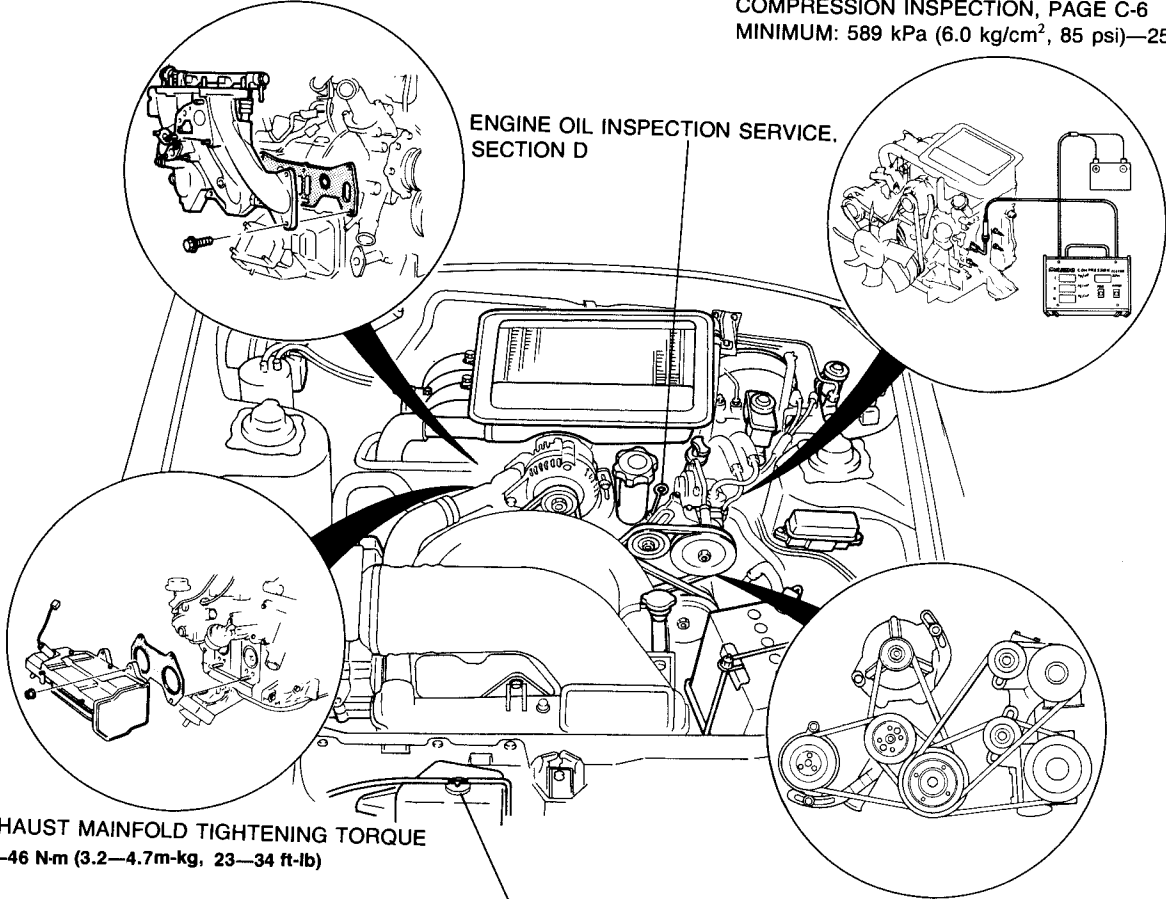
<b>INDEX</b> .....	C- 2
<b>OUTLINE</b> .....	C- 3
SPECIFICATIONS .....	C- 3
<b>TROUBLESHOOTING GUIDE</b> .....	C- 3
<b>ENGINE TUNE-UP PROCEDURE</b> .....	C- 5
DRIVE BELT.....	C- 5
<b>COMPRESSION</b> .....	C- 6
<b>ON-VEHICLE MAINTENANCE</b> .....	C- 8
REAR OIL SEAL .....	C- 8
<b>REMOVAL</b> .....	C-11
REMOVAL (TURBO).....	C-11
REMOVAL (NON-TURBO).....	C-15
<b>ENGINE STAND INSTALLATION</b> .....	C-19
INSTALLATION.....	C-19
<b>DISASSEMBLY</b> .....	C-21
AUXILIARY PARTS (TURBO) .....	C-22
AUXILIARY PARTS (NON-TURBO).....	C-25
MAIN PARTS.....	C-28
<b>CLEANING</b> .....	C-37
<b>INSPECTION AND REPAIR</b> .....	C-39
<b>ASSEMBLY</b> .....	C-47
MAIN PARTS.....	C-48
AUXILIARY PARTS (TURBO) .....	C-64
AUXILIARY PARTS (NON-TURBO).....	C-72
<b>ENGINE STAND REMOVAL</b> .....	C-79
REMOVAL .....	C-79
<b>INSTALLATION</b> .....	C-80
INSTALLATION (TURBO) .....	C-80
INSTALLATION (NON-TURBO) .....	C-84

**INDEX**

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

**COMPRESSION INSPECTION, PAGE C-6**  
 MINIMUM: 589 kPa (6.0 kg/cm<sup>2</sup>, 85 psi)—250 rpm

**ENGINE OIL INSPECTION SERVICE, SECTION D**



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

**DRIVE BELT ADJUSTING, PAGE C-5**

**ENGINE COOLANT INSPECTION SERVICE, SECTION E**

**DEFLECTION**

mm (in)

DRIVE BELT		NEW	USED
ALTERNATOR		12.0—15.0 (0.47—0.59)	14.0—17.0 (0.55—0.67)
P/S OIL PUMP		11.0—13.0 (0.43—0.51)	14.0—16.0 (0.55—0.63)
A/C COMPRESSOR		6.0—8.0 (0.24—0.31)	8.0—9.0 (0.31—0.35)
AIR PUMP	TURBO	9.0—11.0 (0.35—0.43)	11.0—13.0 (0.43—0.51)
	NON-TURBO	9.0—11.0 (0.35—0.43)	11.0—13.0 (0.43—0.51)

97U0CX-002

**1. Engine**

- Removal ..... page C-11
- Disassembly ..... page C-21
- Inspection and Repair ..... page C-39
- Assembly ..... page C-47
- Installation ..... page C-80

# OUTLINE

## SPECIFICATIONS

Model				Turbo	Non-Turbo
Engine type				Rotary engine	
Displacement cc (cu in)				654x2 (40.0x2)	
Number of cylinders and arrangement				2 rotors, longitudinal	
Combustion chamber type				Bathtub	
Compression ratio				9.0:1	9.7:1
Air induction				4 port induction	6 port induction
Port timing	Intake	Open	Primary	45° ATDC	32° ATDC
			Secondary	32° ATDC	
			Auxiliary	—	45° ATDC
	Close	Primary	50° ABDC	40° ABDC	
		Secondary	50° ABDC	30° ABDC	
		Auxiliary	—	80° ABDC	
Exhaust	Open	75° BBDC			
	Close	48° ATDC			
Fuel supply system				EGI	
Ignition timing			Trailing	20° ± 2° ATDC (RED)	
			Leading	5° ± 1° ATDC (YELLOW)	
Idle speed rpm				750 ± 25	

97U0CX-003

## TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
<b>Difficult starting</b>	<b>Insufficient compression</b> Deformation or abnormal wear of side housing Deformation or abnormal wear of rotor housing Wear of rotor grooves Deformation of or loose rotor seals Worn or weak rotor seal springs	Replace Replace Replace Replace Replace	C-39 C-42 C-44, 45 C-44, 45 —
	<b>Malfunction of metering oil pump</b>		Section D
	<b>Malfunction of fuel system</b>		Section F1,F2
	<b>Malfunction of electrical system</b>		Section G
<b>Poor idling</b>	<b>Insufficient compression</b> Deformation or abnormal wear of side housing Deformation or abnormal wear of rotor housing Wear of rotor grooves Deformation of or loose rotor seals Worn or weak rotor seal springs	Replace Replace Replace Replace Replace	C-39 C-42 C-44, 45 C-44, 45 —
	<b>Malfunction of fuel system</b>		Section F1,F2
	<b>Malfunction of ignition system</b>		Section G

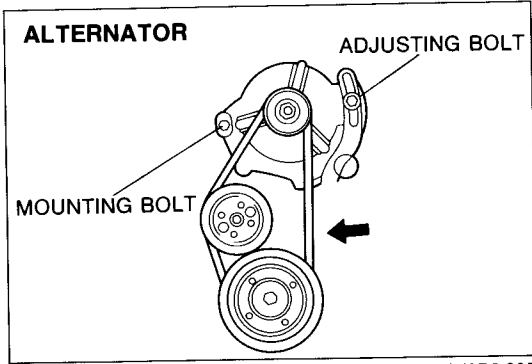
97U0CX-004

# C TROUBLESHOOTING GUIDE

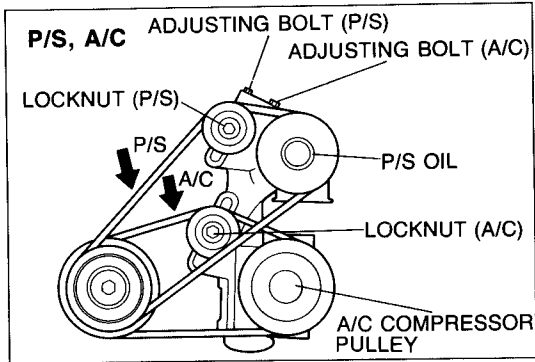
Problem	Possible cause	Action	Page
<b>Insufficient power</b>	<b>Insufficient compression</b> Deformation or abnormal wear of side housing Deformation or abnormal wear of rotor housing Wear of rotor grooves Deformation or loose rotor seals Worn or weak rotor seal springs	Replace Replace Replace Replace	C-39 C-42 C-44, 45 C-44, 45
	<b>Malfunction of fuel system</b>		Section F1,F2
	<b>Malfunction of ignition system</b>		Section G
<b>Abnormal combustion</b>	<b>Malfunction in combustion chamber</b> Carbon accumulation	Remove and clean	C-37
	<b>Malfunction of fuel system</b>		Section F1,F2
	<b>Malfunction of ignition system</b>		Section G
<b>Excessive oil consumption</b>	<b>Leakage into combustion chamber</b> Deformation or abnormal wear of side housing Malfunction of rotor (blow holes) Scratched or burred rotor land Malfunction of oil seal (incorrect angle)	Replace Replace Replace Replace	C-39 C-42 C-42 C-43
	<b>Leakage into coolant passages</b> Deformed rotor housing Malfunction of sealing rubber	Replace Replace	C-42 —
	<b>Leakage to outside of engine</b>		Section D
	<b>Malfunction of lubrication system</b>		Section D
<b>Engine noise</b>	<b>Rotor seal noise</b> Malfunction of rotor seals Malfunction of housing Malfunction of seal spring Malfunction of metering oil pump	Replace Replace Replace	C-44 C-39, 42 C-44 Section D
	<b>Knocking noise</b> Accumulation of carbon	Remove and clean	C-37
	<b>Hitting noise</b> Malfunction of main bearing or rotor bearing Excessive end play Foreign matter in internal gear or stationary gear or malfunction of gear	Replace Adjust Replace	C-41, 43 C-60 C-40
	<b>Other</b> Malfunction of water pump bearing Loose drive belt Malfunction of alternator bearing Exhaust gas leakage Malfunction of fuel system	Adjust	Section E C- 5 Section G Section F1,F2 Section F1,F2

97U0CX-005

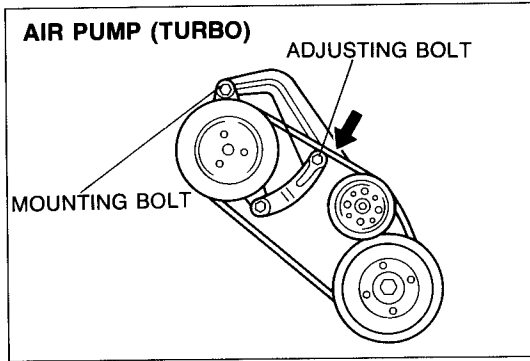
## ENGINE TUNE-UP PROCEDURE



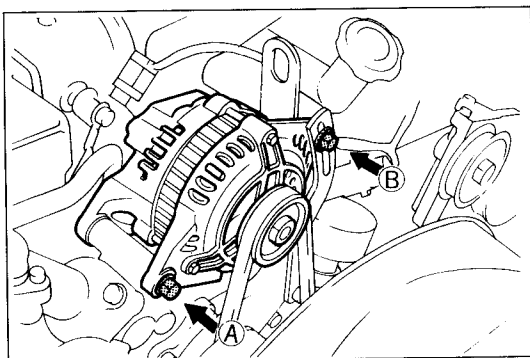
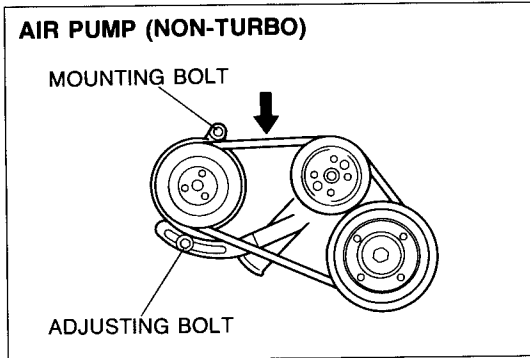
9MU0B2-005



97U0CX-006



97U0CX-007



97U0CX-008

### DRIVE BELT

1. Check the drive belts for wear, cracks, or fraying; replace if necessary.
2. Check the drive belt deflection by applying moderate pressure (**98 N, 10 kg, 22 lb**) midway between the pulleys. Adjust if necessary.

### Deflection

mm (in)

Drive belt		New	Used
Alternator		12.0—15.0 (0.47—0.59)	14.0—17.0 (0.55—0.67)
P/S oil pump		11.0—13.0 (0.43—0.51)	14.0—16.0 (0.55—0.63)
A/C compressor		6.0—8.0 (0.24—0.31)	8.0—9.0 (0.31—0.35)
Air pump	Turbo	9.0—11.0 (0.35—0.43)	11.0—13.0 (0.43—0.51)
	Non-turbo	9.0—11.0 (0.35—0.43)	11.0—13.0 (0.43—0.51)

3. Check the drive belt tension with the tension gauge.

### Tension

N (kg, lb)

Drive belt		New	Used
Alternator		245—343 (25—35, 55.0—77.0)	196—294 (20—30, 44.0—66.0)
P/S oil pump		392—491 (40—50, 88.0—110.0)	284—353 (29—36, 63.8—79.2)
A/C compressor		392—540 (40—55, 88.0—121.0)	284—363 (29—37, 63.8—81.4)
Air pump	Turbo	275—373 (28—38, 61.6—83.6)	177—275 (18—28, 39.6—61.6)
	Non-turbo	275—373 (28—38, 61.6—83.6)	177—275 (18—28, 39.6—61.6)

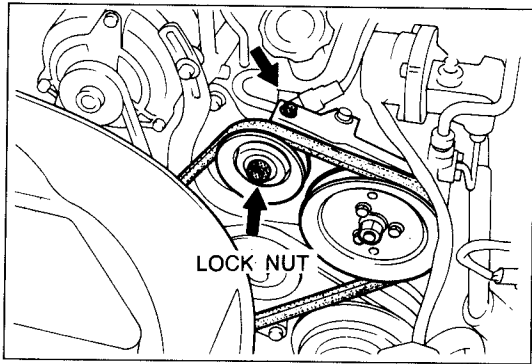
### Adjustment

- (1) Alternator belt  
If necessary, loosen the alternator bolts and adjust the belt deflection by turning the adjusting bolt.

### Tightening torque:

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

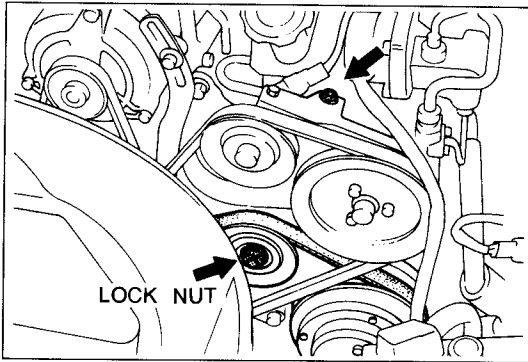
# C ENGINE TUNE-UP PROCEDURE, COMPRESSION



97U0CX-009

- (2) P/S oil pump belt  
If necessary, loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

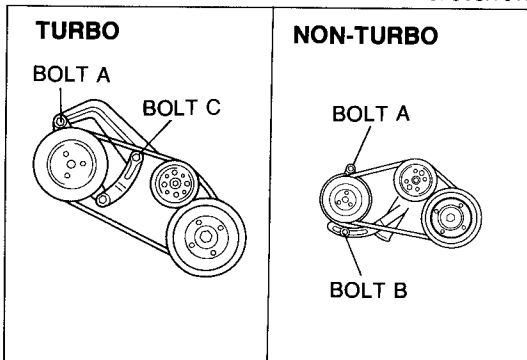
**Tightening torque:**  
**36—54 N·m (3.7—5.5 m·kg, 27—40 ft·lb)**



97U0CX-010

- (3) A/C Compressor belt  
If necessary, loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

**Tightening torque:**  
**36—54 N·m (3.7—5.5 m·kg, 27—40 ft·lb)**



97U0CX-011

- (4) Air pump belt  
If necessary, loosen the air pump bolts and adjust the belt deflection by turning the adjusting bolt.

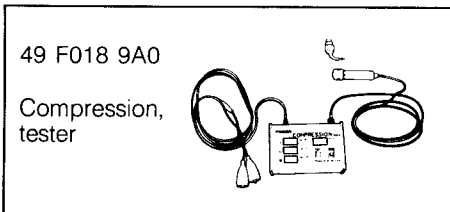
**Tightening torque:**  
**Bolt A: 16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**  
**Bolt B: 24—30 N·m (2.4—3.1 m·kg, 17—22 ft·lb)**  
**Bolt C: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

## COMPRESSION

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

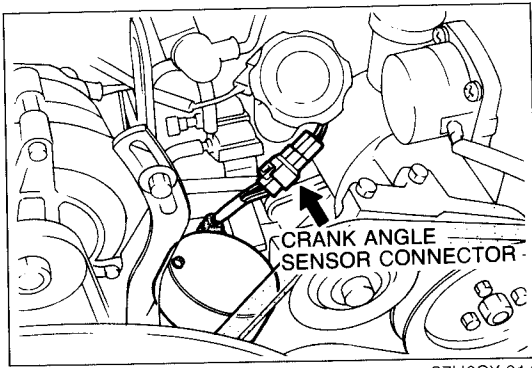
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Section F1, F2.)

### COMPRESSION PREPARATION SST

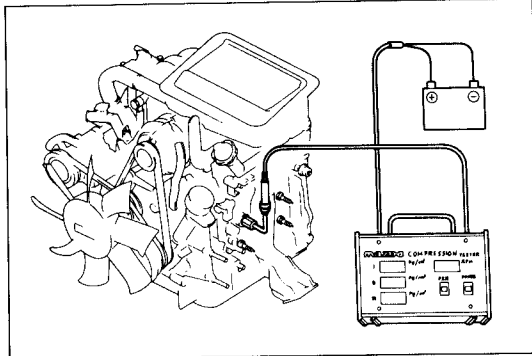


97U0CX-013

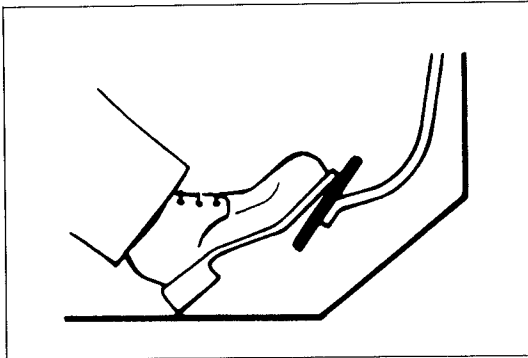
97U0CX-012



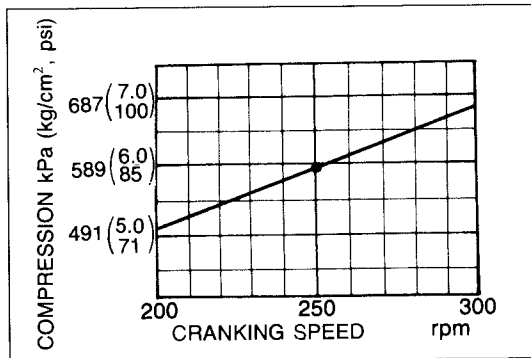
97U0CX-014



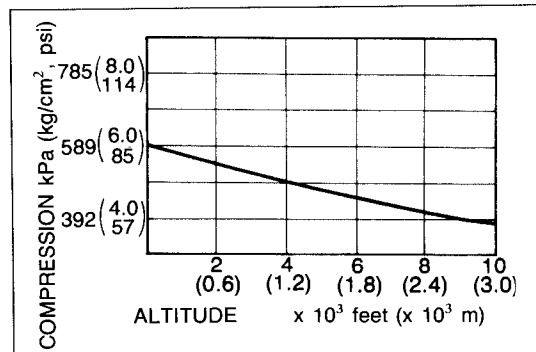
97U0CX-015



97U0CX-016



97U0CX-017



97U0CX-018

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 the front and rear trailing-side spark plugs.
5. Disconnect the crank angle sensor connector.

6. Connect the **SST** to the front rotor housing and the battery.
7. Fully depress the accelerator pedal and crank the engine for 5 to 10 seconds.
8. Make a note of the compression of the three combustion chambers and cranking speed.

**Compression:**

**589 kPa (6.0 kg/cm<sup>2</sup>, 85 psi) — 250 rpm**

**Differential limit of chambers:**

**147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi) — 250 rpm**

**Note**

- 1) If pressure below 294 kPa (3.0 kg/cm<sup>2</sup>, 43 psi) exists in one or two chambers of a rotor, the tester indicates one correct measurement and two 00.0 readings.
- 2) If three chamber pressure are below 294 kPa (3.0 kg/cm<sup>2</sup>, 43 psi), the tester indicates three 00.0 readings.
- 3) In both two cases, the cranking speed readings are all 00.0.

9. Check the rear chambers with the same procedure.

**Note**

**Compensate for the compression values if they are measured at cranking speeds different than standard or if they are measured at a high altitude.**

**Cranking speed compensation**

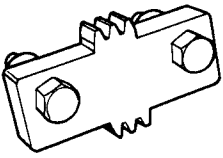
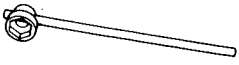

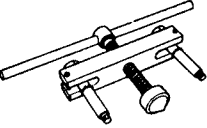
Compensate for the cranking speed.

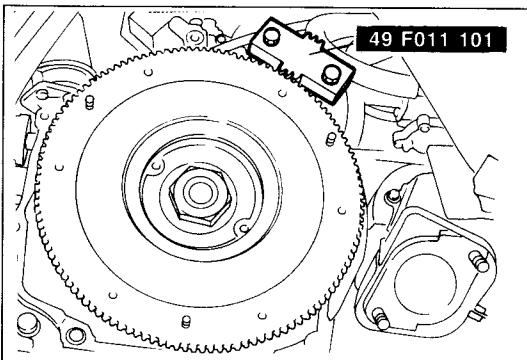
**Altitude compensation**

Compensate for the altitude.

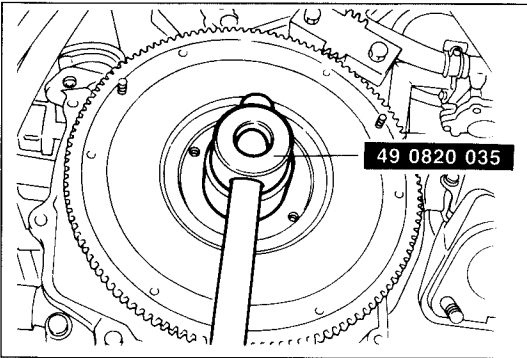
## ON-VEHICLE MAINTENANCE

### REAR OIL SEAL PREPARATION SST

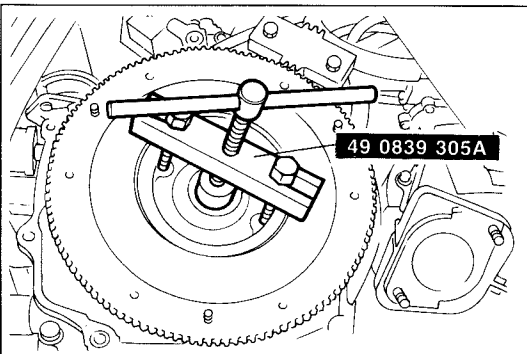
49 F011 101 Ring gear brake 	49 0820 035 Flywheel box wrench 	49 1881 055 Counter weight stopper 
49 0839 305A Counter weight puller 	97U0CX-019	



97U0CX-020



97U0CX-021



97U0CX-022

### Removal

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the manual transmission. (Refer to Section J.)  
Remove the automatic transmission. (Refer to Section K.)
4. Remove the clutch cover and clutch disc.  
(Refer to Section H.)

(M/T)

5. Install the **SST** against the flywheel.

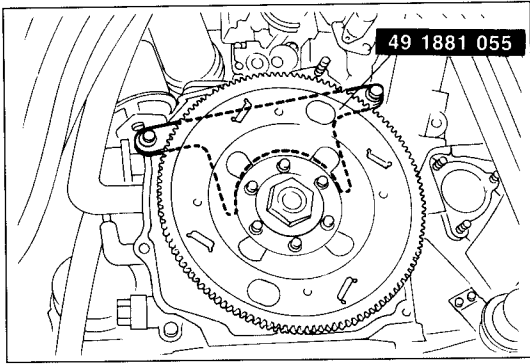
### Caution

**Place a rag between the SST and the vacuum pipes to protect the pipes.**

6. Remove the locknut with the **SST**.

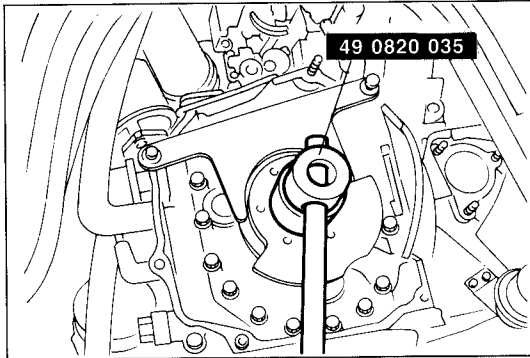
7. Remove the flywheel with the **SST**.
8. Remove the key.





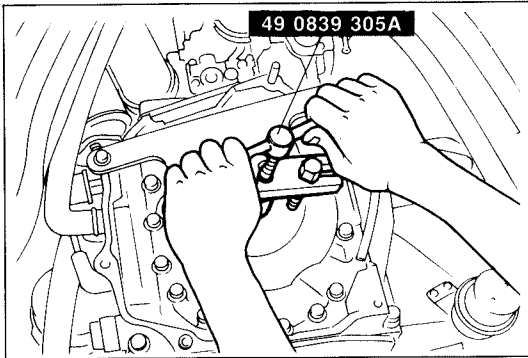
97U0CX-023

- (A/T)
5. Install the **SST** against the counter weight.



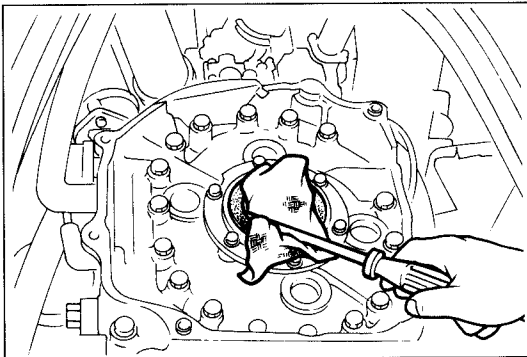
97U0CX-024

6. Remove the back plate and drive plate.
7. Remove the locknut with the **SST**.



97U0CX-025

8. Remove the counter weight with the **SST**.



97U0CX-026

- (M/T and A/T)
9. Remove the oil seal with a screwdriver and a rag.

### Installation

Install in the reverse order of removal referring to the **Installation Note**.

### Installation note

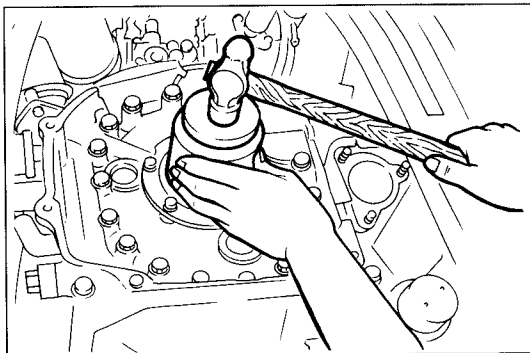
#### Rear oil seal

1. Apply engine oil to the seal lip.
2. Fit the oil seal onto the stationary gear.
3. Tap the oil seal in evenly using a suitable pipe.

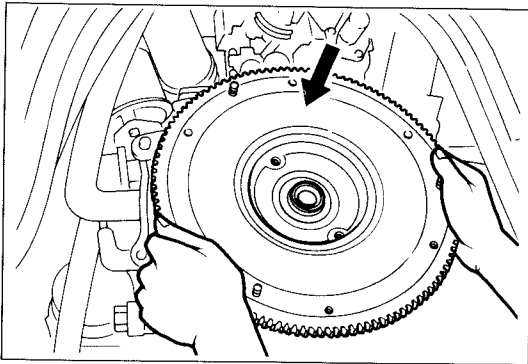
**Oil seal outer diameter: 94mm (3.70 in)**

### Caution

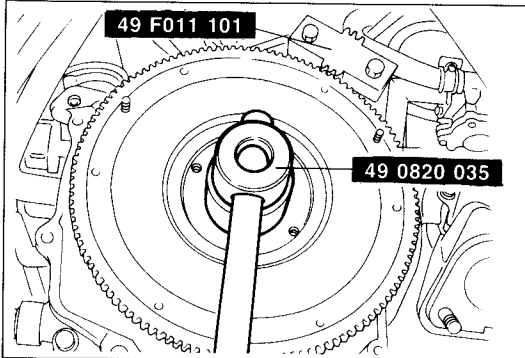
**The oil seal must be tapped in until it is flush with the edge of the rear cover.**



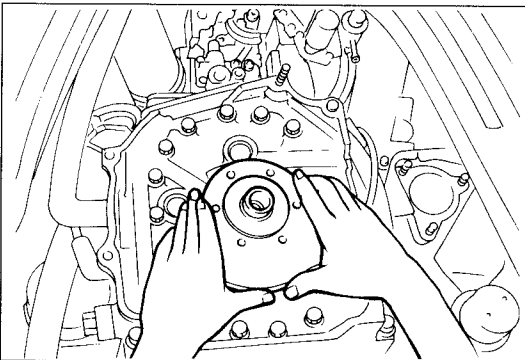
97U0CX-027



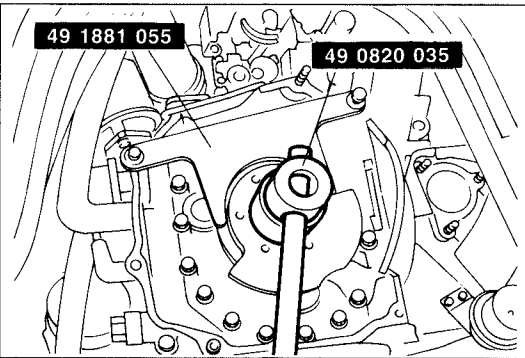
97U0CX-028



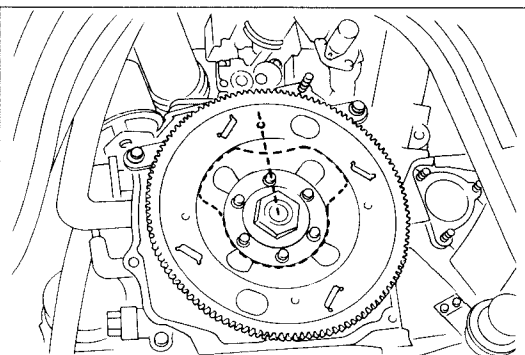
97U0CX-029



97U0CX-030



97U0CX-031



97U0CX-032

## Flywheel (M/T)

1. Fit the key to the eccentric shaft.
2. Install the flywheel to the eccentric shaft.
3. Apply thread locking compound to the eccentric shaft threads.
4. Apply sealant to the contact surface of the locknut.

5. Install the locknut and tighten it with the **SST**.

## Tightening torque:

**392—491 N·m (40—50 m·kg, 289—362 ft·lb)**

## Caution

**Place a rag between the SST and the vacuum pipes to protect pipes.**

## Drive plate (A/T)

1. Fit the key to the eccentric shaft.
2. Install the counter weight to the eccentric shaft.
3. Apply thread locking compound to the eccentric shaft threads.
4. Apply sealant to the contact surface of the locknut.

5. Install the locknut and tighten it with the **SST**.

## Tightening torque:

**392—491 N·m (40—50 m·kg, 289—362 ft·lb)**

6. Install the drive plate so that the holes in the drive plate and counter weight are positioned as shown in the figure. Install the back plate and tighten.

## Tightening torque:

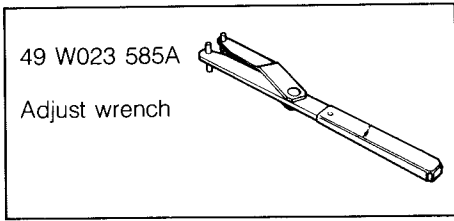
**43—61 N·m (4.4—6.2 m·kg, 32—45 ft·lb)**

## Steps After Installation

1. Add engine oil to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine oil.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil levels.

**REMOVAL**

**REMOVAL (TURBO)  
PREPARATION  
SST**



97U0CX-033

**Warning: Release the fuel pressure. (Refer to Section F2.)**

1. Disconnect the negative battery cable.
2. Remove the under cover.
3. Drain the engine oil and coolant.
4. Remove in the sequence shown in the figure referring to the **Removal Note**.

**STEP 1**

