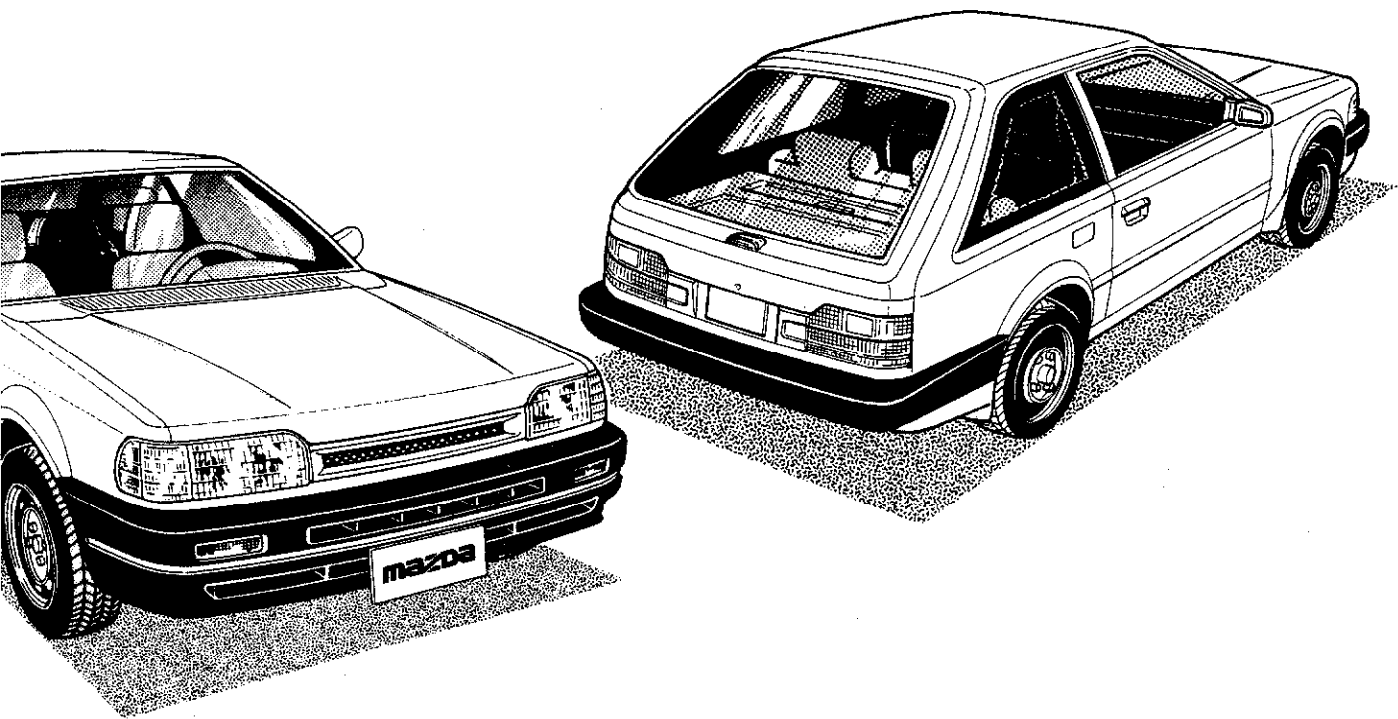


Mazda 323

1988 Workshop Manual



mazda

1988 Mazda 323 Workshop Manual

FOREWORD

This workshop manual is intended for use by service technicians of authorized Mazda dealers to help them service Mazda vehicles. This manual can be also useful for Mazda owners in diagnosing certain problems and performing some repair and maintenance on Mazda vehicles.

For proper repair and maintenance, it is important to be thoroughly familiarized with this manual. It is recommended that this manual always be kept in a handy place for quick and easy reference.

All the contents of this manual, including photographs, drawings, and specifications, are the latest available at the time of printing. As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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**Mazda Motor Corporation
HIROSHIMA JAPAN**

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GENERAL INFORMATION

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83U0GX-001

IMPORTANT INFORMATION

BASIC ASSUMPTIONS

This workshop manual assumes that you have and know how to properly use certain special tools which are necessary for the safe and efficient performance of service operations on Mazda vehicles. The manual also assumes that you are generally familiar with automobile systems and basic service and repair procedures. You should not attempt to use this manual unless these assumptions are correct and you understand the consequences described below.

SAFETY RISK

This manual contains certain notes, warnings, etc., which you should carefully read and follow in order to eliminate the risk of personal injury to yourself or others and the risk of improper service which may damage the vehicle or render it unsafe. The fact that there are not such notes, etc., with respect to any specific service method does not mean that there is no possibility that personal safety or vehicle safety will be jeopardized by the use of incorrect methods or tools.

POSSIBLE LOSS OF WARRANTY

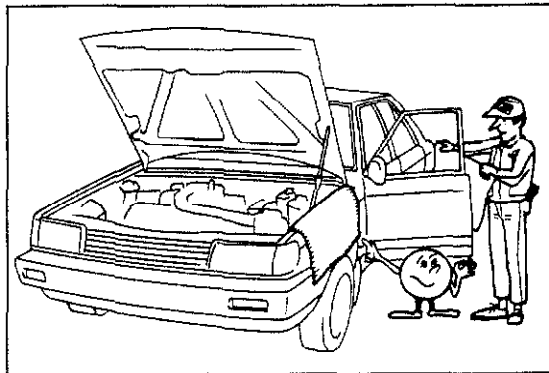
The manufacturer's warranty on Mazda vehicles and engines can be voided if improper service or repairs are performed by persons other than an authorized Mazda dealer.

FUNDAMENTAL PROCEDURES

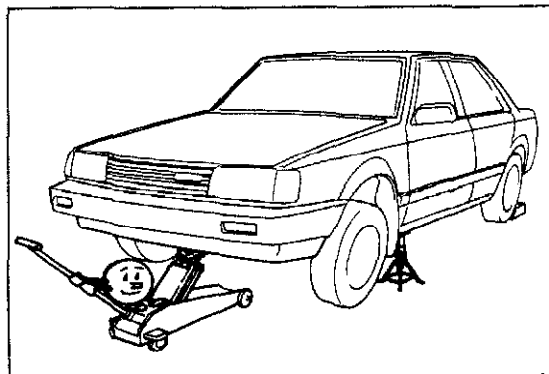
As you read through the procedure, you will come across NOTES, CAUTIONS, and WARNINGS. Each one is there for a specific purpose. **NOTES** give you **added information** that will help you to complete a particular procedure. **CAUTIONS** are given to prevent you from making an error that could **damage the vehicle**. **WARNINGS** remind you to be especially careful in those areas where carelessness can cause **personal injury**. The following list contains some general WARNINGS that you should follow when you work on a vehicle.

PROTECTION OF THE VEHICLE

Always be sure to cover fenders, seats, and floor areas before starting work.



47U0GX-002



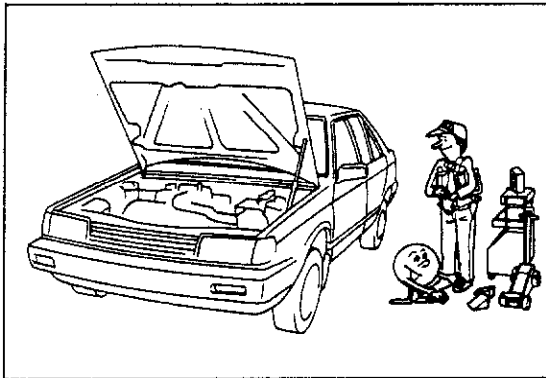
47U0GX-003

A WORD ABOUT SAFETY

The following precautions must be followed when jacking up the vehicle.

1. Block wheels.
2. Use only specified jacking positions.
3. Support vehicle with safety stands (rigid racks).

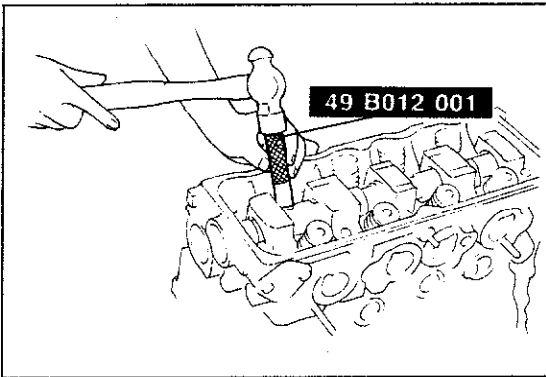
Start the engine only after making certain the engine compartment is clear of tools and people.



47U0GX-004

PREPARATION OF TOOLS AND MEASURING EQUIPMENT

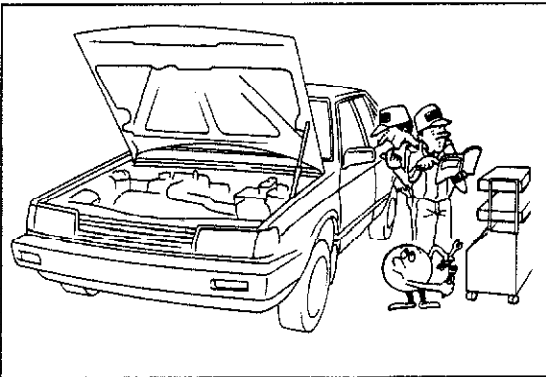
Be sure that all necessary tools and measuring equipment are available before starting work activity.



47G0GX-005

SPECIAL TOOLS

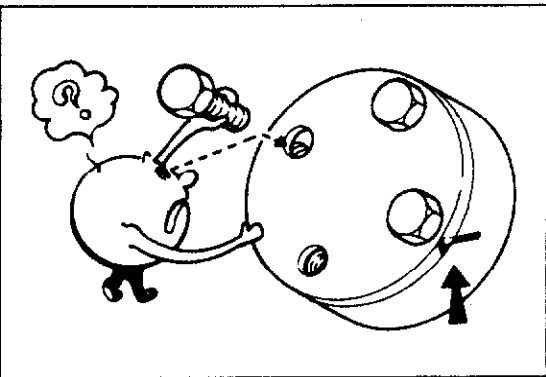
Use special tools when they are required.



47G0GX-006

REMOVAL OF PARTS

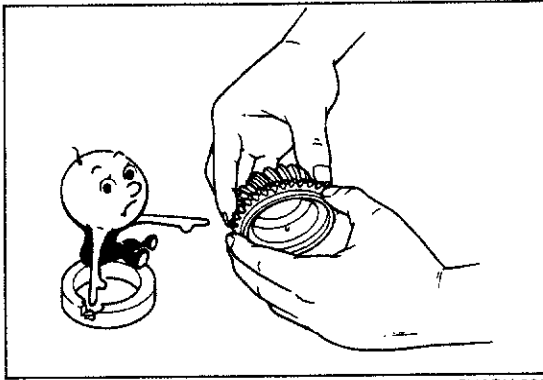
While correcting a problem, try also to determine the cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.



47G0GX-007

DISASSEMBLY

If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and can be identified so that reassembly can be performed efficiently.

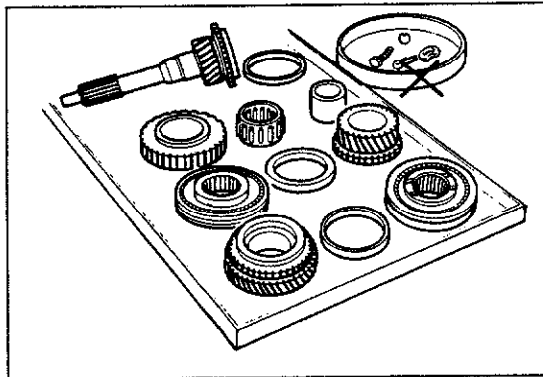


47U0GX-008

DISASSEMBLY

1. Inspection of parts

Each part when removed should be carefully inspected for malfunctioning, deformation, damage or other problems.

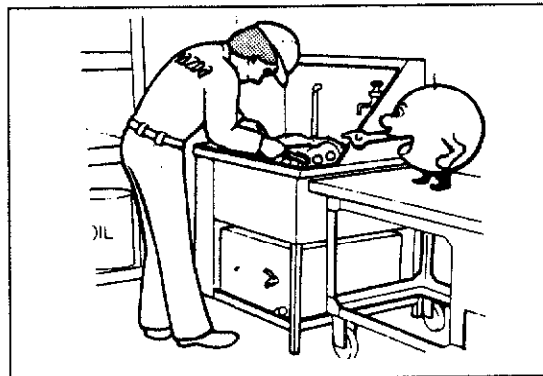


47U0GX-009

2. Arrangement of parts

All disassembled parts should be carefully arranged for reassembly.

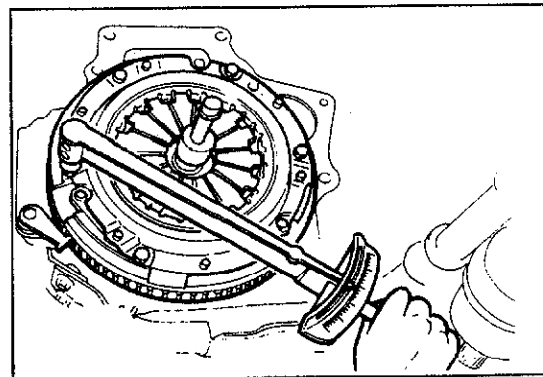
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



47U0GX-010

3. Cleaning parts for reuse

All parts to be reused should be carefully and thoroughly cleaned by the appropriate method.



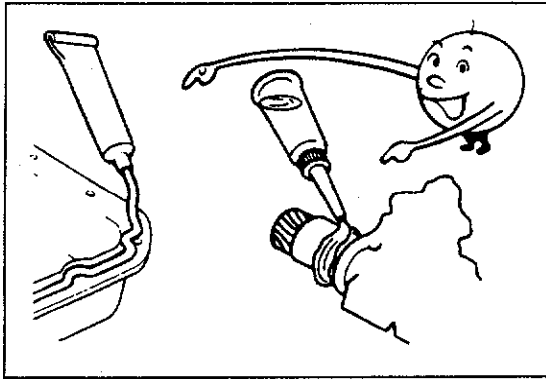
47U0GX-011

REASSEMBLY

Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.

If removed, these parts should be replaced with new ones.

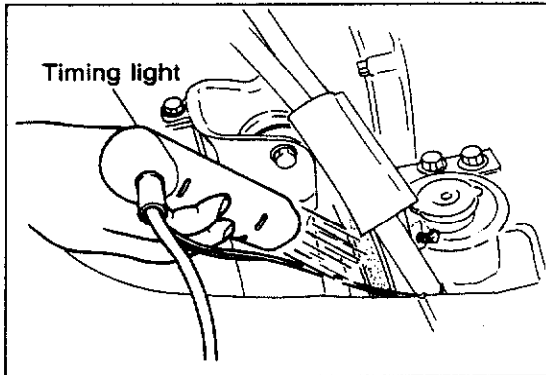
1. Oil seals
2. Gaskets
3. O-rings
4. Lock washers
5. Cotter pins (split pins)
6. Nylon nuts



47U0GX-012

Depending on where they are;

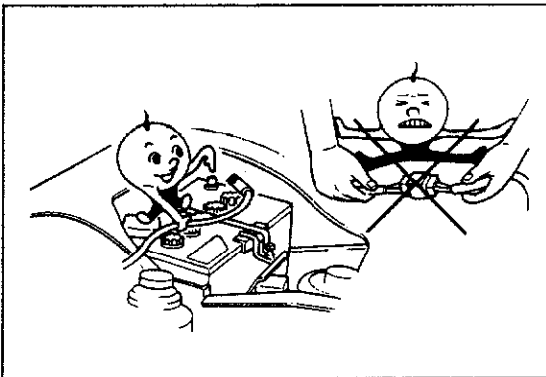
1. Sealant should be applied to gaskets
2. Oil should be applied to moving components of parts
3. Specified oil or grease should be applied at the prescribed locations (oil seals, etc.) before assembly.



47U0GX-013

ADJUSTMENTS

Use gauges and testers to make adjustments to standard values.



47U0GX-014

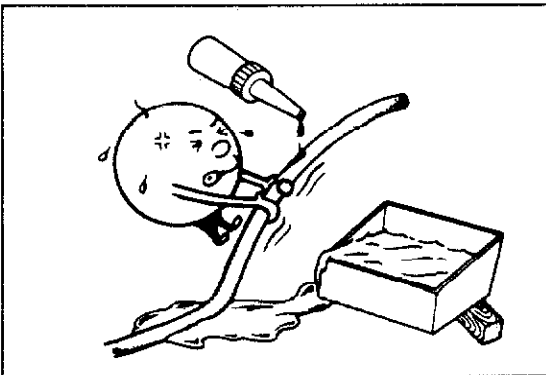
ELECTRICAL SYSTEM

Be sure to disconnect the battery cable from the negative (-) terminal of the battery.

Never pull on the wiring when disconnecting connectors.

Locking connectors must be heard to click for the connector to be secure.

Handle sensors and relays carefully. Be careful not to drop them or hit them against other parts.



47U0GX-015

RUBBER PARTS AND TUBING

Always prevent gasoline or oil from touching rubber parts or tubing.

JACK AND SAFETY STAND (RIGID RACK) POSITIONS

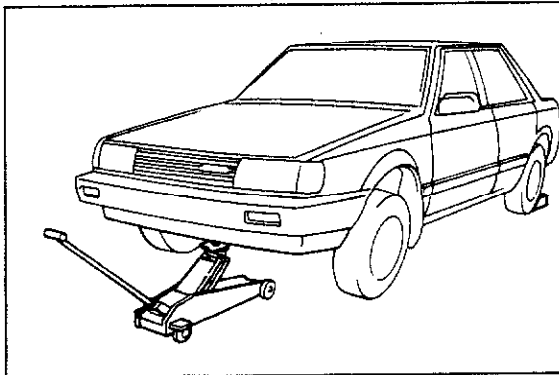
FRONT

Jack position:

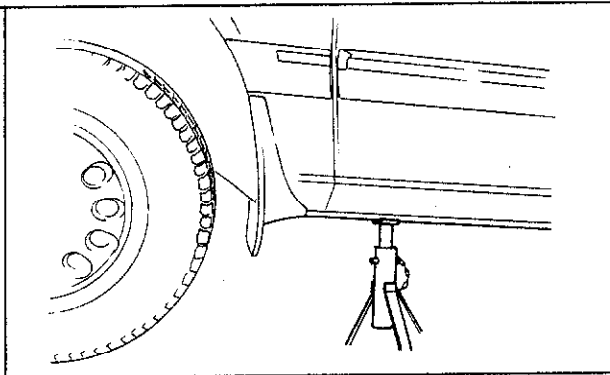
At the front of the engine mount member

Safety stand positions:

On both side sills (front)



63U0GX-001



63U0GX-002

REAR

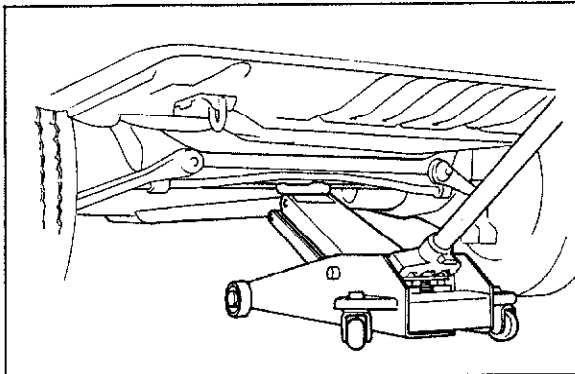
Jack position:

At the center of the rear crossmember (2WD)

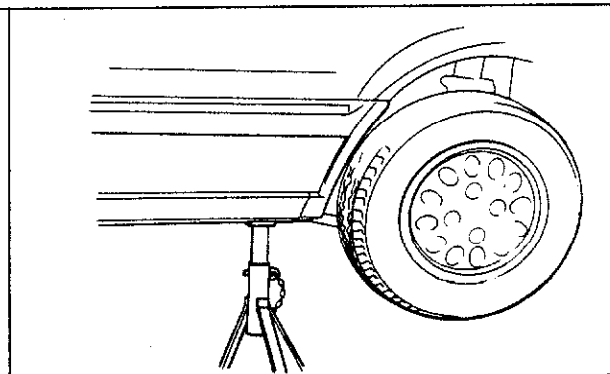
At the rear differential (4WD)

Safety stand positions:

On both side sills (rear)



63U0GX-003



63U0GX-004

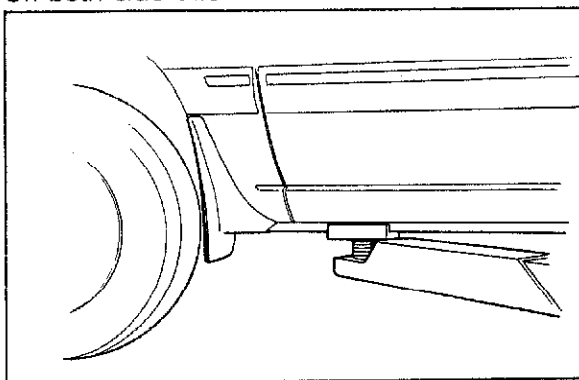
VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

Front

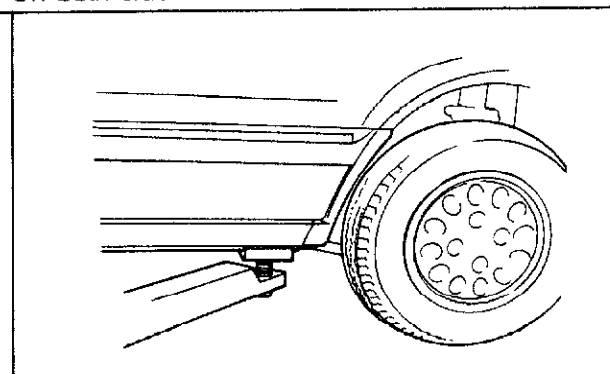
On both side sills

REAR

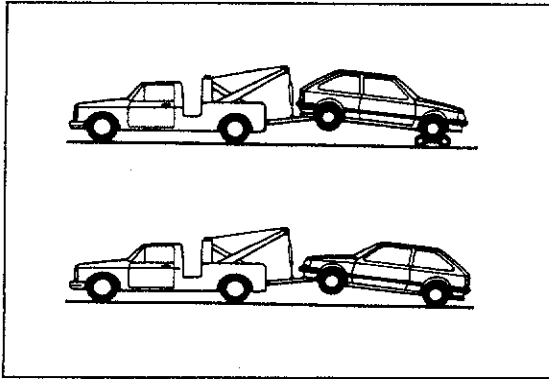
On both side sills



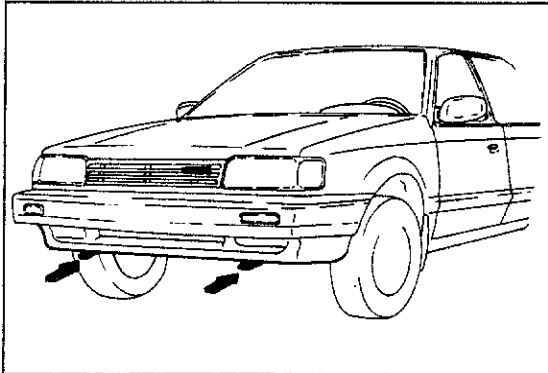
63U0GX-005



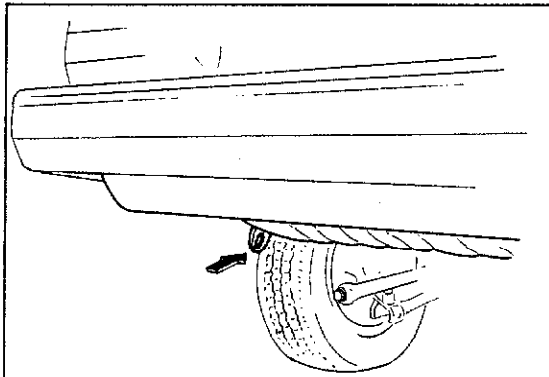
63U0GX-006



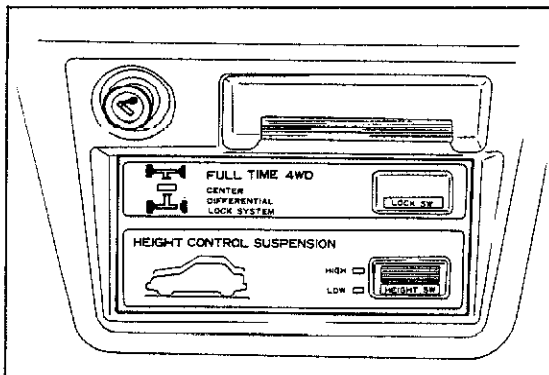
5BU0GX-003



83U0GX-002



63U0GX-008



83U0GX-003

TOWING

Proper towing equipment is necessary to prevent damage to the vehicle during any towing operation. Laws and regulations applicable to vehicles in tow must always be observed.

Release the parking brake, place the shift lever in neutral, and set the ignition key in the "ACC" position. As a rule, towed vehicles should be pulled with the drive wheels off the ground.

If excessive vehicle damage or other conditions prevent towing a vehicle with its drive wheels up, use wheel dollies. With all four wheels on the ground, the vehicle may be towed only forward. In this case, it cannot be towed at a speed exceeding 56 km/h (35 mph) for more than 80 km (50 miles) without danger of damaging the transaxle.

If the towing speed will exceed 56 km/h (35 mph), or if the towing distance will exceed 80 km (50 miles), use either of these two methods:

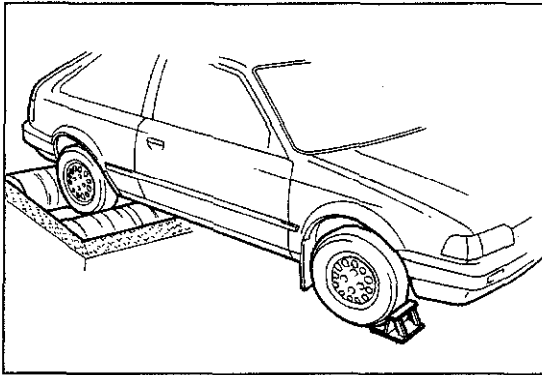
1. Place the front wheels on dollies.
2. Tow with the front wheels raised.

CAUTIONS

- a) The power assistance for the brakes and steering will be in-operable while the engine is off.
- b) When either towing hooks or chains are used, always pull the cable or chain straight away from the hook and do not apply any sideways force to it. To further help prevent damage, do not take up slack too quickly in the cable or chain.
- c) The rear towing hook should be used only in an emergency situation, (e.g., to pull the vehicle from a ditch, a snowbank, or mud).

d) (4WD model)

The center differential must never be in "Lock".



83U0GX-004

MAINTENANCE NOTES (4WD MODEL)

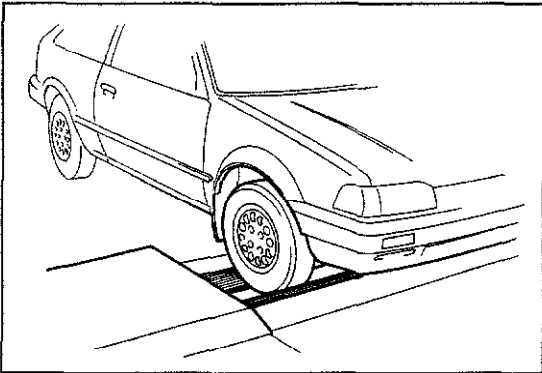
If a speedometer tester or brake tester is used, **unlock the center differential**, and also note the followings.

Speedometer Tester

- Place the rear wheels on the rollers
- Be sure to block the front wheels
- Shift to 2nd gear, carefully engage the clutch at low engine rpm, and increase engine speed gradually
- After completing the test, do not brake suddenly.

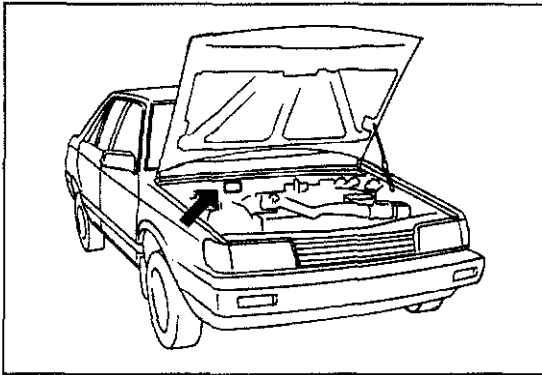
Brake Tester

- Place the wheels to be measured on the rollers.
- Shift to neutral



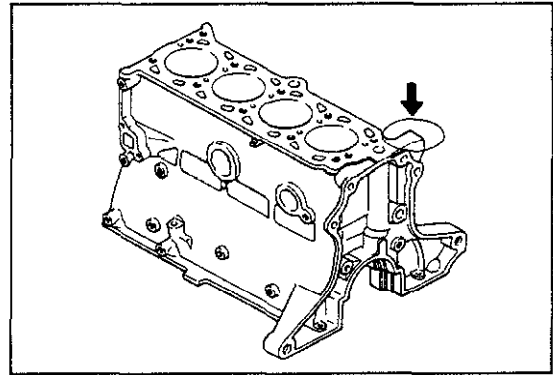
83U0GX-005

CHASSIS NUMBER LOCATION



58U0GX-004

ENGINE MODEL AND NUMBER LOCATION



ABBREVIATIONS

| | |
|----------------|--------------------------------------|
| AAS..... | Air adjust screw |
| AAV..... | Anti-afterburn valve |
| ABDC..... | After bottom dead center |
| ACC..... | Accessories |
| A/C..... | Air conditioner |
| ACV..... | Air control valve |
| ASA..... | Adjustable shock absorber |
| ASS"Y..... | Assembly |
| ATDC..... | After top dead center |
| ATF..... | Automatic transmission fluid |
| ATX..... | Automatic transaxle |
| BAC..... | Bypass air control |
| BBDC..... | Before bottom dead center |
| BTDC..... | Before top dead center |
| CPU..... | Central processing unit |
| CSD..... | Cold start device |
| DOHC..... | Double overhead camshaft |
| EGI..... | Electrical gasoline injection |
| EGR..... | Exhaust gas recirculation |
| E/L..... | Electrical load |
| ELR..... | Emergency locking retractor |
| EX..... | Exhaust |
| Fig..... | Figure |
| IC..... | Integrated circuit |
| IG/IGN..... | Ignition |
| IN..... | Intake |
| INT..... | Intermittent |
| ISC..... | Idle speed control |
| JB..... | Joint Box |
| LH..... | Left hand |
| M..... | Motor |
| MAS..... | Mixture adjust screw |
| MIL..... | Malfunction indicator light |
| M/T..... | Manual transmission |
| MTX..... | Manual transaxle |
| O/D..... | Overdrive |
| OFF..... | Switch off |
| ON..... | Switch on |
| PBV..... | Proportioning by-pass valve |
| PCV Valve..... | Positive crankcase ventilation valve |
| PS..... | Power steering |
| PW..... | Power window |
| QSS..... | Quick start system |
| RH..... | Right hand |
| Sec..... | Second(s) |
| SST..... | Special service tool |
| ST..... | Start |
| SW..... | Switch |
| TDC..... | Top dead center |
| 4WD..... | 4-wheel drive |

UNITS

| | |
|-----------------------------------|-----------------------------|
| N-m (m-kg, ft-lb)..... | Torque |
| rpm..... | Revolutions per minute |
| A..... | Ampere(s) |
| V..... | Volt(s) |
| Ω | Ohm(s)(resistance) |
| KPa (kg/cm ² , psi)... | Pressure (usually positive) |
| mm Hg (in Hg)..... | Pressure (usually negative) |
| W..... | Watt |

83U0GX-009

PRE-DELIVERY INSPECTION AND SCHEDULED MAINTENANCE SERVICES

PRE-DELIVERY INSPECTION..... 0— 2
SCHEDULED MAINTENANCE SERVICES 0— 3

63U00X-025

PRE-DELIVERY INSPECTION TABLE

EXTERIOR

INSPECT and **ADJUST**, if necessary, the following items to specification:

- ☐ Glass, exterior bright metal and paint for damage
- ☐ Wheel lug bolts/nuts 88—118 N·m (9—12 m·kg, 65—87 ft·lb)
- ☐ Tire pressures Front 196 N (2.0 kg/cm², 28 psi)
Rear 177 N (1.8 kg/cm², 26 psi)
- ☐ All weatherstrips for damage or detachment
- ☐ Operation of hood release and lock
- ☐ Operation of trunk lid, back door and fuel lid opener (if equipped)
- ☐ Door operation and alignment
- ☐ Headlight aim

INSTALL following parts:

- ☐ Wheel caps or rings (if equipped)
- ☐ Outside mirror (s)

UNDER HOOD-ENGINE OFF

INSPECT and **ADJUST**, if necessary, the following items to specification:

- ☐ Fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- ☐ Engine oil level
- ☐ Power steering fluid level (if equipped)
- ☐ Brake master cylinder fluid level
- ☐ Clutch master cylinder fluid levels (if equipped)
- ☐ Windshield washer reservoir fluid level
- ☐ Radiator coolant level and specific gravity

| Protection | Specific gravity at 20°C (68°F) |
|---------------------|---------------------------------|
| Above -4°C (25°F) | 1.028 |
| Above -16°C (3°F) | 1.054 |
| Above -26°C (-15°F) | 1.066 |
| Above -40°C (-40°F) | 1.078 |

- ☐ Tightness of battery terminals
- ☐ Manual transaxle oil level
- ☐ Drive belt(s) tension...Refer to section 1
- ☐ Accelerator cable for free movement

CLEAN spark plugs

INTERIOR

INSTALL the following parts:

- ☐ Rubber stopper for inside rear view mirror (if equipped)
- ☐ Fuse for accessories

CHECK the operation of the following items:

- ☐ Seat controls (sliding and reclining) and head rest
- ☐ Seat belts and warning system
- ☐ Ignition switch and steering lock
- ☐ Power window (if equipped)
- ☐ Inhibitor switch (ATX only)
- ☐ All lights including warning and indicator lights
- ☐ Ignition key reminder buzzer (if equipped)
- ☐ Horn, wipers and washers (front and rear, if equipped)
- ☐ Radio and antenna (if equipped)
- ☐ Center differential lock switch
- ☐ Cigarette lighter and clock (if equipped)
- ☐ Remote control outside mirror (S) (if equipped)

- ☐ Heater, defroster and air conditioner at various mode selections (if equipped)
- ☐ Sunroof (if equipped)

ADJUST antenna trimmer on radio (if equipped)

CHECK the following items:

- ☐ Presence of spare fuse
- ☐ Upholstery and interior finish

CHECK and **ADJUST**, if necessary, the following items:

- ☐ Operation and fit of windows
- ☐ Pedal height and free play of brake and clutch pedal

| | | Pedal height mm (in) | Free play mm (in) |
|--------------|-----|-------------------------|---------------------|
| Clutch pedal | 2WD | 214.5—219.5 (8.44—8.64) | 9—15 (0.35—0.59) |
| | 4WD | 229—234 (9.02—9.22) | 0.6—3.0 (0.02—0.12) |
| Brake pedal | | 214—219 (8.43—8.63) | 4—7 (0.16—0.28) |

- ☐ Parking brake
5—7 notches/98 N (10 kg, 22 lb)

UNDER HOOD-ENGINE RUNNING AT OPERATING TEMPERATURE

CHECK following items:

- ☐ Operation of throttle sensor
- ☐ Automatic transaxle fluid level
- ☐ Initial ignition timing...BTDC 2° ± 1° Non turbo
BTDC 12° ± 1° Turbo

ON HOIST

CHECK the following items:

- ☐ Underside fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- ☐ Tires for cuts or bruises
- ☐ Steering linkage, suspension, exhaust system and all underside hardware for looseness or damage

REMOVE protective cover from brake disc (if equipped)

ROAD TEST

CHECK the following items:

- ☐ Brake operation
- ☐ Clutch operation (MTX only)
- ☐ Steering control
- ☐ Operation of meters and gauge
- ☐ Squeaks, rattles or unusual noise
- ☐ Engine general performance
- ☐ Emergency locking retractors
- ☐ Cruise control system (if equipped)

AFTER ROAD TEST

REMOVE seat and floor mat protective covers

CHECK for necessary owner information materials, tools and spare tire in vehicle

SCHEDULED MAINTENANCE SERVICES

Follow the Schedule 1 (Normal Driving Condition) if you mainly operate your vehicle where none of the following conditions apply. Contrary follow the Schedule 2 (Unique Driving Condition) if one or more them apply;

- Repeated short distance driving.
- Driving in dusty condition.
- Driving in extended use of brakes.
- Driving in areas using road salt or other corrosive materials.
- Driving on rough and/or muddy road.
- Extended periods of idling and/or low speed operation.
- Driving for a prolonged period in cold temperature and/or extremely humid climates.

Schedule 1 (Normal Driving Condition)

| MAINTENANCE INTERVALS MAINTENANCE OPERATION | | Number of months or miles (kilometers), whichever comes first | | | | | | | | | Service data and inspection points | Page | | | | | | | | | | | |
|--|------------|---|-----|----|------|----|------|----|------|--|------------------------------------|----------------|---------|-----|-----------|-----------|--------------|------------|-----------|----------|---------|---|----------------------|
| | | Months | 7.5 | 15 | 22.5 | 30 | 37.5 | 45 | 52.5 | 60 | | | | | | | | | | | | | |
| | | x 1,000 miles | 7.5 | 15 | 22.5 | 30 | 37.5 | 45 | 52.5 | 60 | | | | | | | | | | | | | |
| | | x 1,000 km | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | | | | | | | | | | | | | |
| Drive belts | | | | | I | | | | I | <ul style="list-style-type: none">• Check for damage• Tension | 1A—6 1B—6 | | | | | | | | | | | | |
| Engine oil | Non turbo | R | R | R | R | R | R | R | R | <ul style="list-style-type: none">• Oil pan capacity: B6 EGI engine 3.0 liters (3.2 US qt, 2.5 Imp qt) B6 DOHC engine 3.2 liters (3.4 US qt, 2.8 Imp qt) | 1A—5 1B—5 | | | | | | | | | | | | |
| | Turbo | Replace every 5,000 miles (8,000 km) or 5 months | | | | | | | | | | | | | | | | | | | | | |
| Oil filter | Non turbo | R | R | R | R | R | R | R | R | <ul style="list-style-type: none">• Oil filter capacity: 0.3 liter (0.32 US qt, 0.26 Imp qt) | 2A—4 2B—4 | | | | | | | | | | | | |
| | Turbo | Replace every 5,000 miles (8,000 km) or 5 months | | | | | | | | | | | | | | | | | | | | | |
| Engine timing belt *1 | | Replace the timing belt every 60,000 miles (96,000 km) | | | | | | | | | — | 1A—11 1B—11 | | | | | | | | | | | |
| Air cleaner element | | | | | R | | | | R | — | 1A—5 1B—5 | | | | | | | | | | | | |
| Spark plugs | | | | | R | | | | R | <ul style="list-style-type: none">• Plug gap: 1.0—1.1 mm (0.039—0.043 in)• Recommended spark plugs <table><tr><td></td><td>B6 EGI</td><td>B6 DOHC</td></tr><tr><td>NGK</td><td>BPR5ES-11</td><td>BCPR6E-11</td></tr><tr><td>NIPPON DENSO</td><td>W16EXR-U11</td><td>Q20PR-U11</td></tr><tr><td>CHAMPION</td><td>RN11YC4</td><td>—</td></tr></table> | | B6 EGI | B6 DOHC | NGK | BPR5ES-11 | BCPR6E-11 | NIPPON DENSO | W16EXR-U11 | Q20PR-U11 | CHAMPION | RN11YC4 | — | 1A—8 1B—8 5—29 |
| | B6 EGI | B6 DOHC | | | | | | | | | | | | | | | | | | | | | |
| NGK | BPR5ES-11 | BCPR6E-11 | | | | | | | | | | | | | | | | | | | | | |
| NIPPON DENSO | W16EXR-U11 | Q20PR-U11 | | | | | | | | | | | | | | | | | | | | | |
| CHAMPION | RN11YC4 | — | | | | | | | | | | | | | | | | | | | | | |
| Cooling system | | | I | | I | | I | | I | <ul style="list-style-type: none">• Hoses for cracks or wear• Coolant level | 3A—4 3B—4 | | | | | | | | | | | | |
| Engine coolant | | | | | R | | | | R | <ul style="list-style-type: none">• Coolant capacity: B6 EGI: 5.0 liters (5.3 US qt, 4.4 Imp qt)..MTX 6.0 liters (6.3 US qt, 5.3 Imp qt)..ATX B6 DOHC 6.0 liters (6.3 US qt, 5.3 Imp qt) | 3A—4 3B—4 | | | | | | | | | | | | |
| Fuel filter | | | | | | | | | R | — | 1A—45 1B—51 | | | | | | | | | | | | |

Schedule 1 (Normal Driving Condition)

| MAINTENANCE INTERVALS MAINTENANCE OPERATION | Number of months or miles (kilometers), whichever comes first | | | | | | | | | Service data and inspection points | Page |
|--|---|-----|----|------|-----------------|------|----|------|-----------------|---|----------------|
| | Months | 7.5 | 15 | 22.5 | 30 | 37.5 | 45 | 52.5 | 60 | | |
| | x 1,000 miles | 7.5 | 15 | 22.5 | 30 | 37.5 | 45 | 52.5 | 60 | | |
| | x 1,000 km | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | | |
| Idle speed | | | | | A ^{*2} | | | | A ^{*2} | • 850 ± 50 rpm...ATX P range ...MTX N range | — |
| Fuel lines | | | | | 1 ^{*3} | | | | 1 ^{*3} | • Fittings, connections and components for leaks | 4A—33 4B—36 |
| Brake line hoses and connection | | | I | | I | | I | | I | • Proper attachment and connections | — |
| Clutch pedal | | | I | | I | | I | | I | • Operation • Pedal height: 214.5 \pm 5 mm (8.44 \pm 0.2 in) 2WD model 229 \pm 5 mm (9.02 \pm 0.2 in) 4WD model • Free play: 9—15 mm (0.35—0.59 in) 2WD model 0.6—3.0 mm (0.02—0.12 in) 4WD model | 6—5 6—9 |
| Drum brake | | | | | I | | | | I | • Wheel cylinder operation and leakage • Lining for wear or damage • Thickness of lining minimum...1.0 mm (0.039 in) • Drum inner diameter maximum...201 mm (7.91 in) | 11—38 |
| Disc brake | | | I | | I | | I | | I | • Caliper operation • Thickness of disc plate minimum...Front 16 mm (0.63 in) Rear 9 mm (0.35 in) • Thickness of pad minimum...Front 2.0 mm (0.079 in) Rear 1.0 mm (0.039 in) | 11—27 |
| Steering operation and linkage | | | | | I | | | | I | • Operation and looseness • Fluid leakage or oozing • Free play...0—30 mm (0—1.18 in) | 10—7 10—9 |
| Front suspension ball joint | | | | | I | | | | I | • Damage, looseness and grease leakage | — |
| Driveshaft dust boots | | | | | I | | | | I | • Cracking and damage | 9—7 |
| Bolts and nuts on chassis and body | | | T | | | | T | | | • Retighten all loose nuts and bolts | — |
| Exhaust system heat shield | | | | | I | | | | I | • Insulation clearance | 4A—71 4B—86 |
| Transfer oil (4WD model) | | R | | | R | | | | R | • Oil capacity...0.5 liter (0.53 US qt, 0.44 imp qt) | 7C—7 |
| Rear axle oil (4WD model) | | | | | | | | | R | • Oil capacity...0.65 liter (0.69 US qt, 0.57 imp qt) | 9—42 |

83U00X-003

Note

I ...Inspect, and if necessary correct, clean or replace

A...Adjust

R...Replace or change

T...Tighten

L...Lubricate

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance items and intervals periodically.

As for * marked items in this maintenance chart, please pay attention to the following points.

- *1 Replacement of timing belt is required at every 60,000 miles (96,000 km). Failure to replace the timing belt may result in damage to the engine.
- *2 This maintenance operation is required for all states except California. However we do recommended that this operation be performed on California vehicles as well.
- *3 This maintenance operation is recommended by Mazda. However, this maintenance is not necessary for emission warranty coverage or manufacturer recall liability.

Schedule 2 (Unique Driving Condition)

| MAINTENANCE INTERVALS MAINTENANCE OPERATION | | Number of months or miles (kilometers), whichever comes first | | | | | | | | | | | | | Service data and inspection points | Page | | | | | | | | | | | | |
|--|------------|---|---|-----|----|----|-----|----|----|-----|----|----|----|-----|---|----------------|--------|---------|-----|-----------|-----------|--------------|------------|-----------|----------|---------|--|----------------------|
| | | Months | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | | | | | | | | | | | | | | |
| | | x 1,000 miles | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | | | | | | | | | | | | | | |
| | | x 1,000 km | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | | | | | | | | | | | | | | |
| Drive belt | | | | | | | | I | | | | | | I | <ul style="list-style-type: none">• Check for damage• Tension | 1A—6 1B—6 | | | | | | | | | | | | |
| Engine oil | Non turbo | R | R | R | R | R | R | R | R | R | R | R | R | R | <ul style="list-style-type: none">• Oil pan capacity: B6 EGI engine...3.0 liters (3.2 US qt, 2.6 Imp qt)B6 DOHC engine...3.2 liters (3.4 US qt, 2.8 Imp qt) | 1A—5 1B—5 | | | | | | | | | | | | |
| | Turbo | Replace every 3,000 miles (5,000 km) or 3 months | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oil filter | Non turbo | R | R | R | R | R | R | R | R | R | R | R | R | R | <ul style="list-style-type: none">• Oil filter capacity: 0.3 liter (0.32 US qt, 0.26 Imp qt) | 2A—4 2B—4 | | | | | | | | | | | | |
| | Turbo | Replace every 3,000 miles (5,000 km) or 3 months | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Engine timing belt *1 | | Replace the timing belt every 60,000 miles (96,000 km) | | | | | | | | | | | | | — | 1A—11 1B—11 | | | | | | | | | | | | |
| Air cleaner element | | | | I*2 | | | R | | | I*2 | | | | R | | 1A—5 1B—5 | | | | | | | | | | | | |
| Spark plugs | | | | | | | R | | | | | | | R | <ul style="list-style-type: none">• Plug gap: 1.0—1.1 mm (0.039—0.043 in)• Recommended spark plugs <table><tr><td></td><td>B6 EGI</td><td>B6 DOHC</td></tr><tr><td>NGK</td><td>BPR5ES-11</td><td>BCPR6E-11</td></tr><tr><td>NIPPON DENSO</td><td>W16EXR-U11</td><td>Q20PR-U11</td></tr><tr><td>CHAMPION</td><td>RN11YC4</td><td></td></tr></table> | | B6 EGI | B6 DOHC | NGK | BPR5ES-11 | BCPR6E-11 | NIPPON DENSO | W16EXR-U11 | Q20PR-U11 | CHAMPION | RN11YC4 | | 1A—8 1B—8 5—29 |
| | B6 EGI | B6 DOHC | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NGK | BPR5ES-11 | BCPR6E-11 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NIPPON DENSO | W16EXR-U11 | Q20PR-U11 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHAMPION | RN11YC4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cooling system | | | | I | | | I | | | I | | | | I | <ul style="list-style-type: none">• Hoses for cracks or wear• Coolant level | 3A—4 3B—4 | | | | | | | | | | | | |
| Engine coolant | | | | | | | R | | | | | | | R | <ul style="list-style-type: none">• Coolant capacityB6 EGI: 5.0 liters (5.3 US qt, 4.4 Imp qt)...ATX 6.0 liters (6.3 US qt, 5.3 Imp qt)...ATXB6 DOHC 6.0 liters (6.3 US qt, 5.3 Imp qt) | 3A—4 3B—4 | | | | | | | | | | | | |
| Idle speed | | | | | | | A*2 | | | | | | | A*2 | <ul style="list-style-type: none">• 850 ± 50 rpm...ATX P range ...MTX N range | — | | | | | | | | | | | | |
| Fuel filter | | | | | | | | | | | | | | R | — | 1A—45 1B—45 | | | | | | | | | | | | |
| Fuel lines | | | | | | | I*3 | | | | | | | I | <ul style="list-style-type: none">• Fittings connections and components for leaks | 4A—33 4B—36 | | | | | | | | | | | | |
| Brake line hoses and connection | | | | I | | | I | | | I | | | | I | <ul style="list-style-type: none">• Proper attachment and connections | — | | | | | | | | | | | | |
| Brake fluid | | | | | | | R | | | | | | | R | <ul style="list-style-type: none">• Brake fluidFMVSS116 DOT3 or DOT4 or SAEJ1703a | 11—11 | | | | | | | | | | | | |

Schedule 2 (Unique Driving Condition)

| MAINTENANCE INTERVALS | Number of months or miles (kilometers), whichever comes first | | | | | | | | | | | | | Service data and inspection points | Page |
|------------------------------------|---|---|----|----|----|----|----|----|----|----|----|----|----|--|----------------|
| | Months | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | | |
| | x 1,000 miles | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | | |
| MAINTENANCE OPERATION | x 1,000 km | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | | |
| Clutch pedal | | | | I | | | I | | | I | | | I | <ul style="list-style-type: none"> Operation Pedal height: 214.5 \pm 5 mm (8.44 \pm 0.20 in) 2WD model 229 \pm 5 mm (9.02 \pm 0.20 in) 4WD model Free play 9—15 mm (0.35—0.59 in) 2WD model 0.6—3.0 mm (0.02—0.12 in) 4WD model | 6—5 6—9 |
| Drum brake | | | | | | | I | | | | | | I | <ul style="list-style-type: none"> Wheel cylinder operation and leakage Lining for wear or damage Thickness of lining minimum 1.0 mm (0.039 in) Drum inner diameter maximum 201 mm (7.91 in) | 11—29 |
| Disc brake | | | | I | | | I | | | I | | | I | <ul style="list-style-type: none"> Caliper operation Thickness of pad minimum Front...2.0 mm (0.79 in) Rear...1.0 mm (0.039) Thickness of disc plate minimum Front...16 mm (0.63 in) Rear...9 mm (0.35 in) | 11—27 |
| Steering operation and linkage | | | | | | | I | | | | | | I | <ul style="list-style-type: none"> Operation and looseness Fluid leakage or oozing Free play...0—30 mm (0—1.18 in) | 10—7 10—9 |
| Front suspension ball joint | | | | | | | I | | | | | | I | <ul style="list-style-type: none"> Damage looseness and grease leakage | — |
| Front and rear wheel bearing | | | | | | | | | | | | | L | <ul style="list-style-type: none"> Lubricate with lithium grease (NLGI No. 2) All friction surfaces | 9—28 9—33 |
| Drive shaft dust boots | | | | | | | I | | | | | | I | <ul style="list-style-type: none"> Cracking and damage | 9—7 |
| Bolts and nuts on chassis and body | | | | T | | | T | | | T | | | T | <ul style="list-style-type: none"> Retighten all loose nuts and bolts | — |
| Exhaust system heat shield | | | | | | | I | | | | | | I | <ul style="list-style-type: none"> Insulator clearance | 4A—71 4B—86 |
| Transfer oil (4WD model) | R | | | | | | R | | | | | | R | <ul style="list-style-type: none"> Oil capacity...0.5 liter (0.53 US qt, 0.44 imp qt) | 7C—7 |
| Rear axle oil (4WD) model) | | | | | | | | | | | | | R | <ul style="list-style-type: none"> Oil capacity...0.65 liter (0.69 US qt, 0.57 imp qt) | 9—42 |



Note

I ...Inspect, and if necessary correct, clean or replace

A...Adjust

R...Replace or change

T...Tighten

L...Lubricate

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance items and intervals periodically.

As for * marked items in this maintenance chart, please pay attention to the following points.

- *1 Replacement of the timing belt is required at every 60,000 miles (96,000 km). Failure to replace the timing belt may result in damage to the engine.
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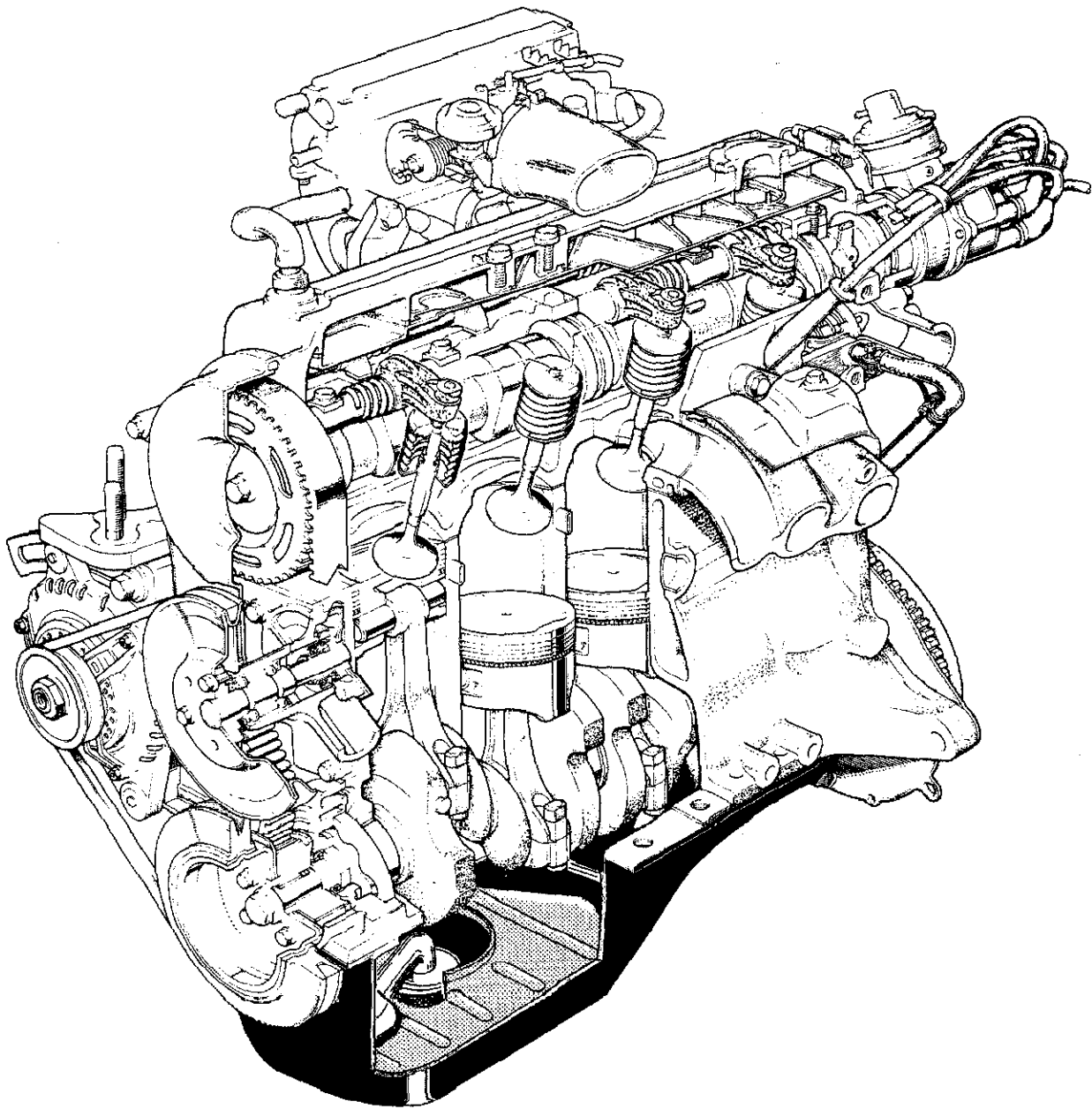
ENGINE (B6 EGI)

| | |
|---------------------------------------|--------------|
| OUTLINE | 1A— 2 |
| STRUCTURAL VIEW..... | 1A— 2 |
| SPECIFICATIONS..... | 1A— 3 |
| TROUBLESHOOTING GUIDE | 1A— 3 |
| TUNE-UP PROCEDURE..... | 1A— 5 |
| ON-VEHICLE MAINTENANCE | 1A—11 |
| TIMING BELT..... | 1A—11 |
| CYLINDER HEAD | 1A—15 |
| VALVE SEAL | 1A—21 |
| REMOVAL AND INSTALLATION | 1A—25 |
| DISASSEMBLY | 1A—28 |
| INSPECTION AND REPAIR..... | 1A—37 |
| ASSEMBLY..... | 1A—51 |

83U01A-001

OUTLINE

STRUCTURAL VIEW



63U01X-002

SPECIFICATIONS

| Item | | Engine model | B6 |
|---|----|------------------------------------|-------------------------|
| Type | | | Gasoline, 4-cycle |
| Cylinder arrangement and number | | | In line 4-cylinders |
| Combustion chamber | | | Multispherical |
| Valve system | | | OHC, belt-driven |
| Displacement | | cc (cu in) | 1,597 (97.4) |
| Bore and stroke | | mm (in) | 78 x 83.6 (3.07 x 3.29) |
| Compression ratio | | | 9.3 : 1 |
| Compression | | kPa (kg/cm ² , psi)—rpm | 1,324 (13.5, 192) — 270 |
| Valve timing | IN | Open BTDC | 14° |
| | | Close ABDC | 50° |
| | EX | Open BBDC | 52° |
| | | Close ATDC | 12° |
| Valve clearance mm (in) | | IN | 0. Maintenance free |
| | | EX | 0. Maintenance free |
| Idle speed (MTX in neutral, ATX in “P” range) rpm | | | 850 ± 50 |
| Ignition timing BTDC | | | 2° ± 1° |
| Firing order | | | 1—3—4—2 |

83U01A-002

TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|----------------------------------|--|---|-------------------------|
| Difficult starting | Malfunction of engine-related components Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket | Replace Replace or repair Replace | 1A—38 1A—46 1A—15 |
| | Malfunction of fuel system | Refer to Section 4A | |
| | Malfunction of electrical system | Refer to Section 5 | |
| Poor idling | Malfunction of engine-related components Malfunction of HLA Poor valve to valve seat contact Failed cylinder head gasket | Replace Repair or replace Replace | 1A—61 1A—41 |
| | Malfunction of fuel system | Refer to Section 4A | |
| Excessive oil consumption | Oil working up Worn piston ring groove or sticking piston ring Worn piston or cylinder | Replace Replace or repair | 1A—46 1A—46 |
| | Oil working down Worn valve seal Worn valve stem or guide | Replace Replace | 1A—21 1A—38 |
| | Oil leakage | Refer to Section 2A | |

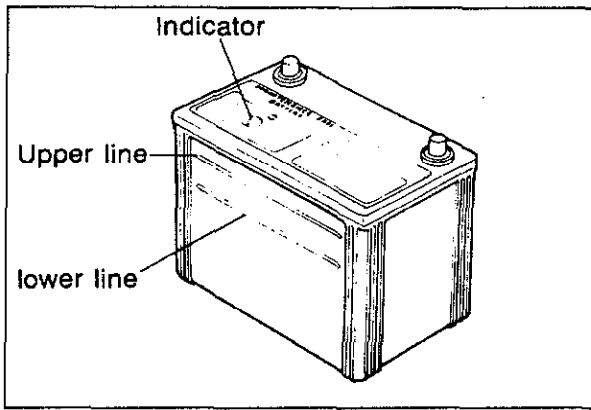
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1A TROUBLESHOOTING GUIDE

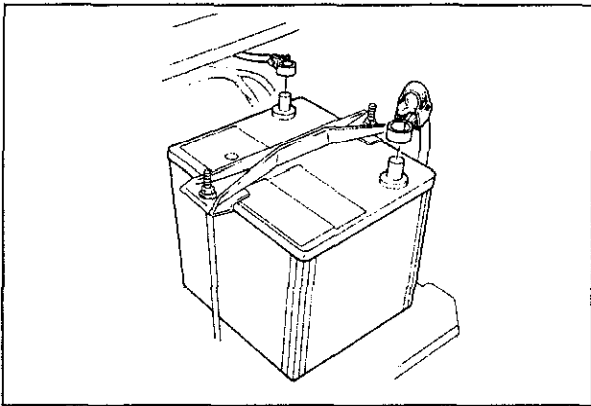
| Problem | Possible Cause | Remedy | Page |
|----------------------------|---|---|--|
| Insufficient power | Insufficient compression Malfunction of HLA Compression leakage from valve seat Seized valve stem Weak or broken valve spring Failed cylinder head gasket Cracked or distorted cylinder head Sticking, damaged, or worn piston ring Cracked or worn piston | Replace Repair Replace Replace Replace Replace Replace Replace | 1A—61 1A—41 1A—38 1A—41 1A—15 1A—37 1A—46 1A—46 |
| | Malfunction of fuel system | Refer to Section 4A | |
| | Others Slipping clutch Dragging brakes Wrong size tires | Refer to Section 6 Refer to Section 11 Refer to Section 12 | |
| Abnormal combustion | Malfunction of engine-related components Malfunction of HLA Sticking or burned valve Weak or broken valve spring Carbon accumulation in combustion chamber | Replace Replace Replace Eliminate carbon | 1A—61 1A—38 1A—41 — |
| | Malfunction of fuel system | Refer to Section 4A | |
| Engine noise | Crankshaft or bearing related parts 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 | 1A—53 1A—53 1A—54 1A—55 1A—55 |
| | Piston related parts Worn cylinder Worn piston or piston pin Seized piston Damaged piston ring Bent connecting rod | Replace or repair Replace Replace Replace Replace | 1A—45 1A—47 1A—46 1A—46 1A—48 |
| | Valves or timing related parts Malfunction of HLA * Broken valve spring Excessive valve guide clearance Malfunction of timing belt tensioner Insufficient lubrication of rocker arm | Replace Replace Replace Replace Replace | 1A—61 1A—41 1A—38 1A—50 1A—43 |
| | Malfunction of cooling system | Refer to Section 3A | |
| | Malfunction of fuel system | Refer to Section 4A | |
| | Others Malfunction of water pump bearing Improper drive-belt tension Malfunction of alternator bearing Exhaust gas leakage | Replace Adjust Replace Repair | — 1A—6 — 1A—37 |
| | | | |
| | | | |

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

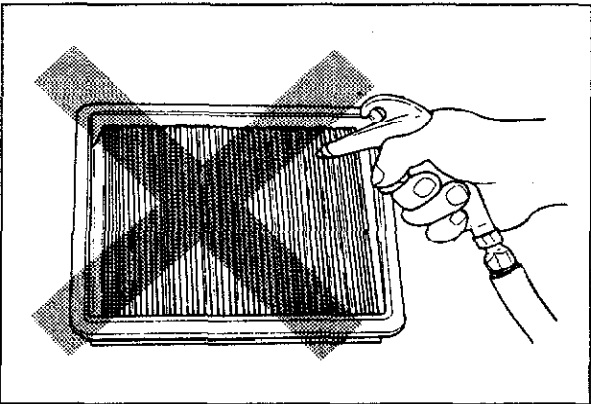
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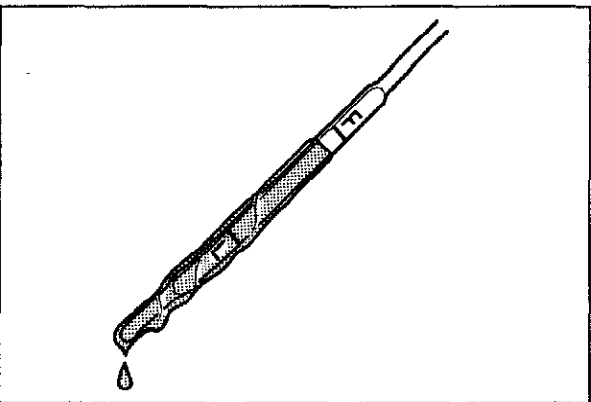
5BU01X-007



5BU01X-008



63G01D-306



4BG01A-010

TUNE-UP PROCEDURE

Tune the engine according to the procedures described below.

5BU01X-006

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, then the electrolyte level of the battery is low and/or the capacity is insufficient.
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 the terminals 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 that the air cleaner element for excessive dirt, damage or oil. Replace if necessary

Caution

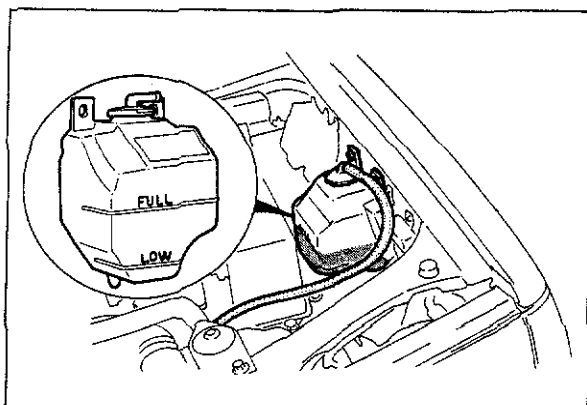
Do not clean the air cleaner element with compressed air.

Engine Oil

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

Add oil, or change it, if necessary.

1A TUNE-UP PROCEDURE



4BG01A-009

Coolant Level

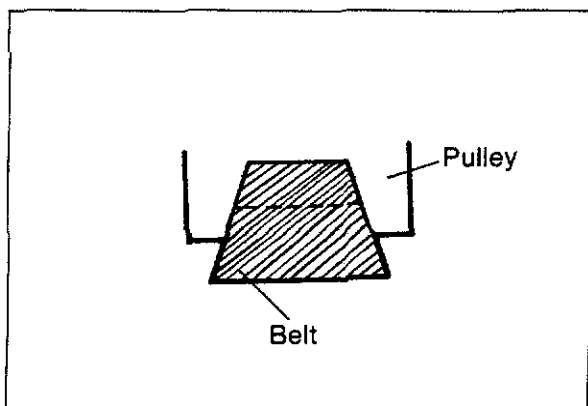
Check that the coolant level is near the radiator inlet port, and that the level in the reserve tank is between the FULL and LOW marks.

Add coolant if the level is low.

Warning

Never remove the radiator cap while the engine is hot.

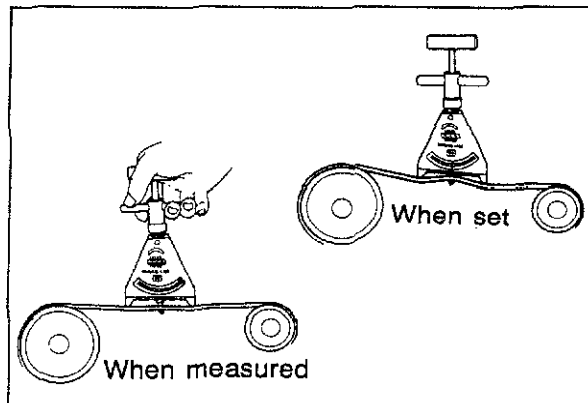
Wrap a thick cloth around the cap and carefully remove the cap.



83U01A-005

Drive Belt

1. Check that the drive belt is positioned in the pulley groove.
2. Check the drive belt for wear, cracks, or fraying.
3. Check the pulley for damage.



83U01A-006

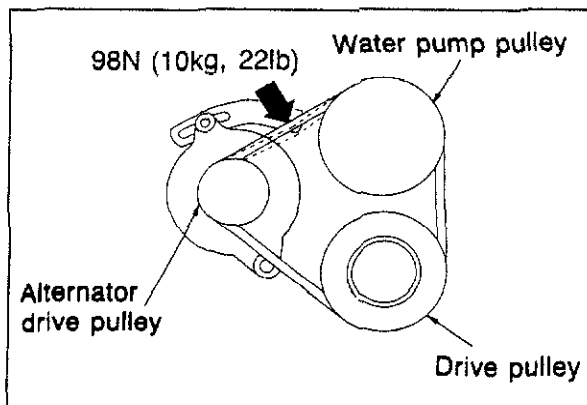
Inspection of belt tension

Check the drive belt tension by using the tension gauge.

Standard tension

N (kg, lb)

| Belt | New | Used |
|-------------|-----------------------------|----------------------------|
| Alternator | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |
| A/C | 491—589 (50—60, 110—132) | 422—461 (43—50, 95—110) |
| P/S | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |
| A/C and P/S | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |



83U01A-007

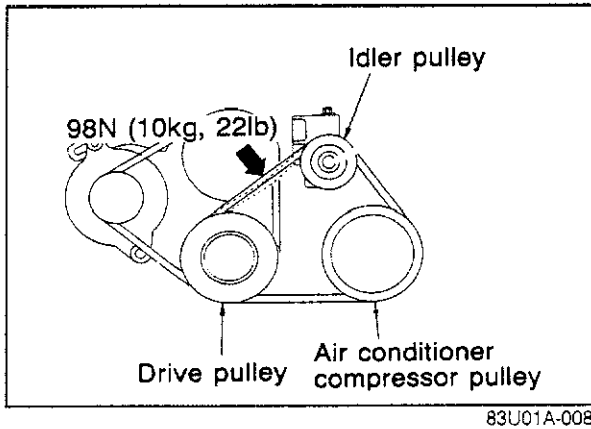
Inspection of belt deflection

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

Alternator drive belt

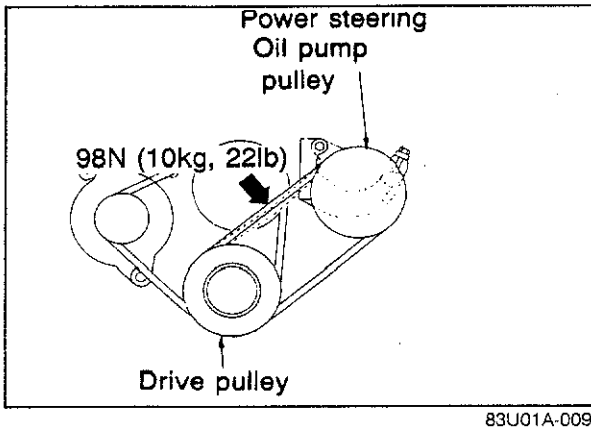
New: 8—9 mm (0.31—0.35 in)

Used: 9—10 mm (0.35—0.39 in)



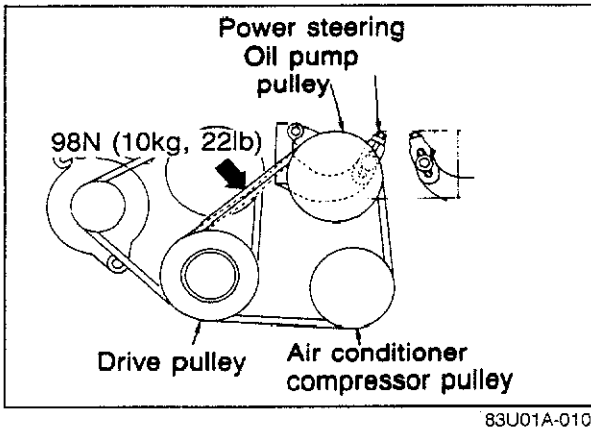
A/C drive belt

New: 8—9 mm (0.31—0.35 in)
Used: 9—10 mm (0.35—0.39 in)



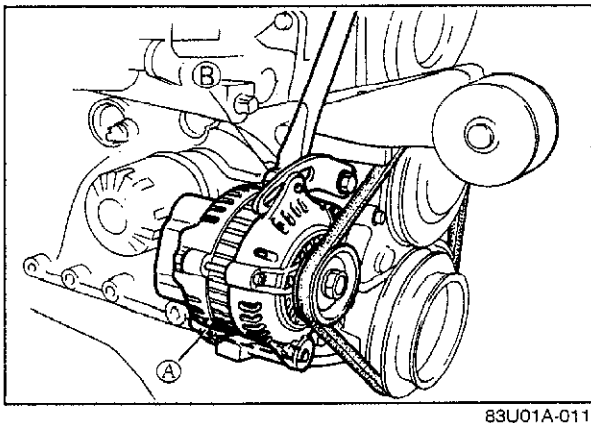
P/S oil pump drive belt

New: 8—9 mm (0.31—0.35 in)
Used: 9—10 mm (0.35—0.39 in)



A/C and P/S oil pump drive belt

New: 8—9 mm (0.31—0.35 in)
Used: 9—10 mm (0.35—0.39 in)



Adjustment of belt deflection

Alternator drive belt

1. Loosen the alternator mounting bolt A and adjusting bolt B.
2. Lever the alternator outward and apply tension to the belt.
3. Tighten the adjusting bolt B.

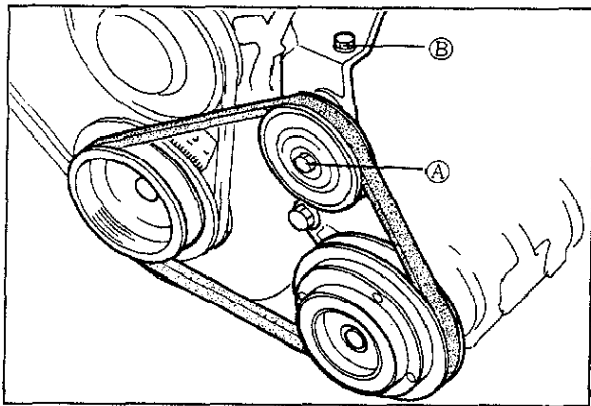
Tightening torque:
 19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

4. Tighten the mounting bolt A.

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

5. Recheck the belt tension or deflection.

1A TUNE-UP PROCEDURE

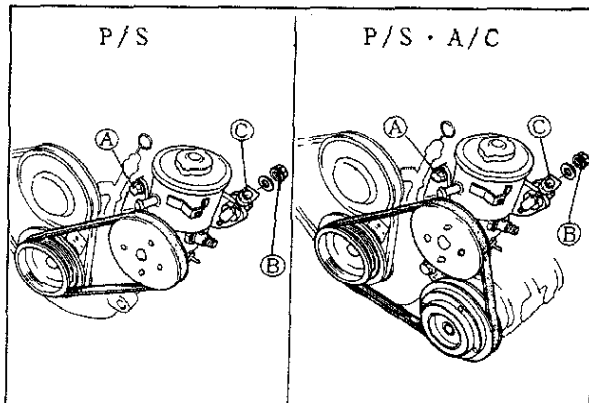


A/C drive belt

1. Loosen the idler pulley lock bolt A.
2. Adjust the belt tension and deflection by turning the adjusting bolt B.
3. Tighten the idler pulley lock bolt A.

Tightening torque:

31—46 N·m (3.2—4.7 m·kg, 24—34 ft·lb)



P/S oil pump drive belt, A/C and P/S oil pump drive belt

1. Loosen the mounting bolt A and adjusting bolt lock nut B.
2. Adjust the belt tension and deflection by turning the adjusting bolt C.
3. Tighten the adjusting bolt lock nut B and mounting bolt A.

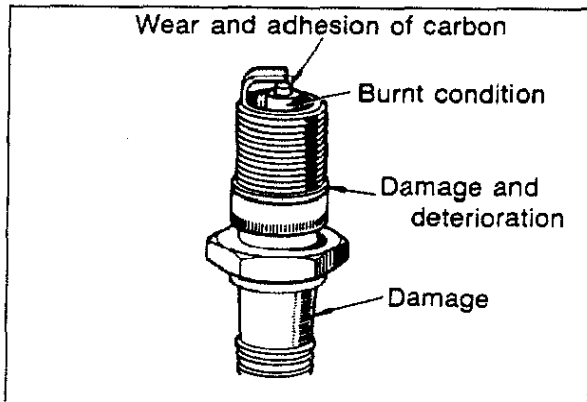
Tightening torque:

Bolt A: 31—46 N·m

(3.2—4.7 m·kg, 24—34 ft·lb)

Nut B: 36—54 N·m

(3.7—5.5 m·kg, 27—40 ft·lb)



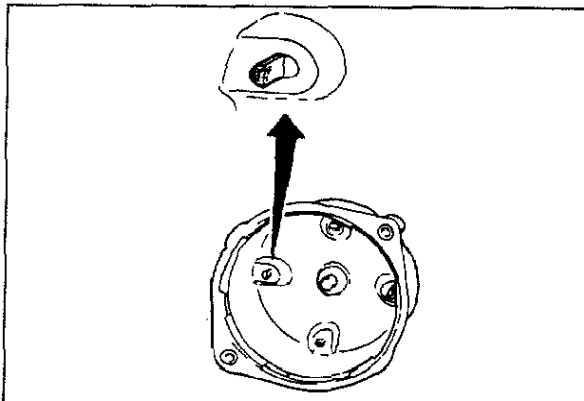
Spark Plug

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

Standard plug gap:

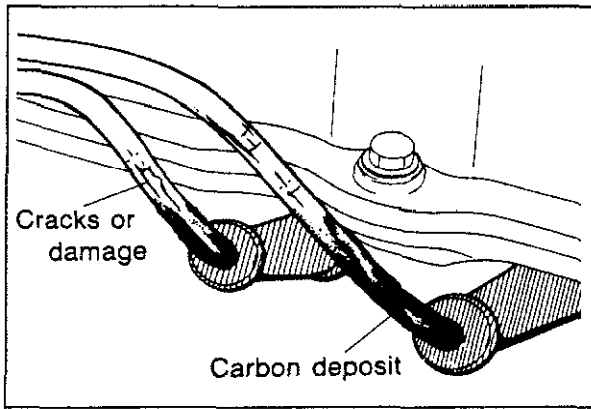
1.00—1.10 mm (0.039—0.043 in)



Distributor Cap

Check the following points. If necessary, replace the distributor cap.

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

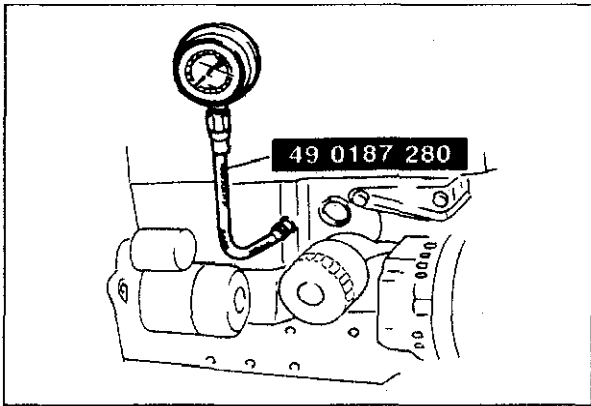


4BG01A-016

High-tension Lead

Check the following points, if necessary clean or replace.

1. Damaged lead
2. Carbon deposits



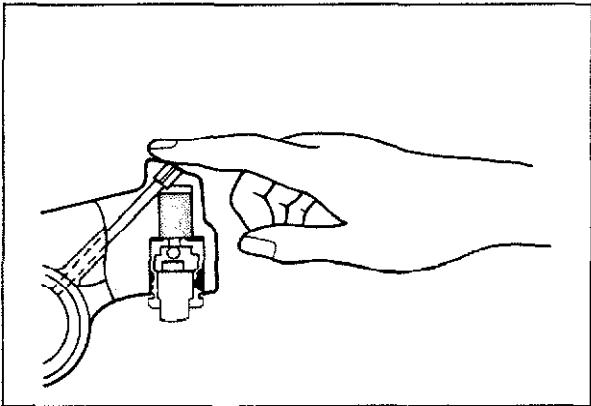
83U01A-014

Hydraulic Lash Adjuster

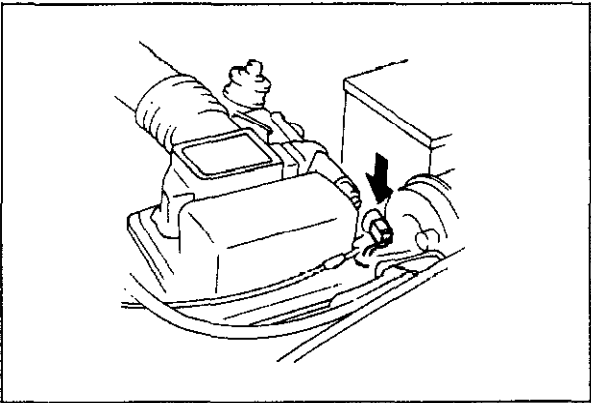
Note

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

1. Check for tappet noise, if noise exists, check the followings:
 - (1) Engine oil condition and level
 - (2) Engine oil pressure (Refer to section 2A)
2. If the noise does not disappear, check for movement of the HLA by pushing down each rocker arm by hand.
3. If the rocker arm moves down, replace the HLA. (Refer to page 1A—61)



83U01A-015

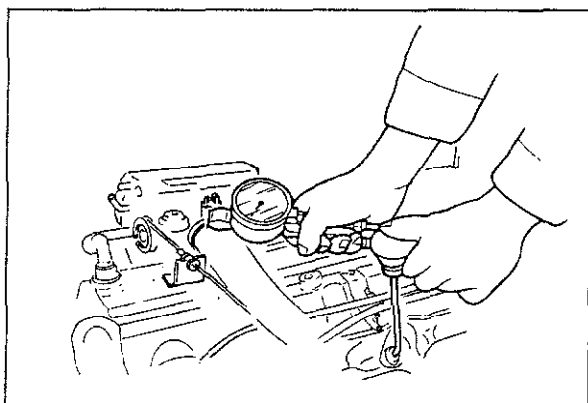


4BG01A-012

Compression

1. Warm up the engine to operating temperature.
2. Turn it off for about 10 minutes to reduce the exhaust pipe temperature.
3. Remove all spark plugs.
4. Disconnect the primary wire connector from the ignition coil.

1A TUNE-UP PROCEDURE



83U01A-016

5. Connect a compression gauge to the No. 1 spark plug hole.
6. Fully depress the accelerator pedal and crank the engine.
7. Check whether the gauge reads within the limits.

Standard compression:

1,324 kPa (13.5 kg/cm², 192 psi)

Compression limit:

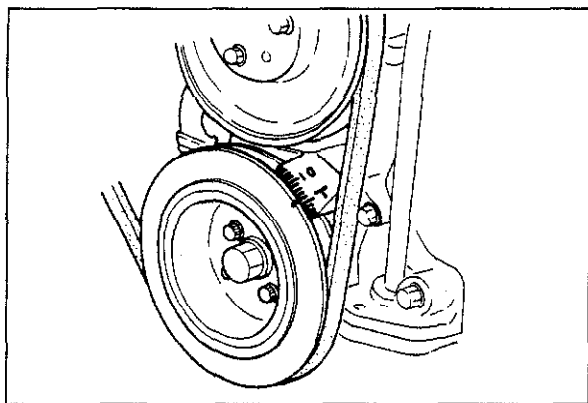
932 kPa (9.5 kg/cm², 135 psi)

8. Check each cylinder.
9. Refit the primary wire connector securely to the ignition coil.
10. Install the spark plugs and high-tension leads.

Ignition Timing

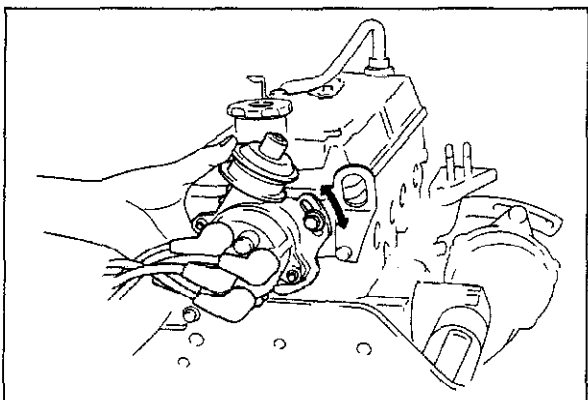
1. Warm up the engine and run it at idle.
2. Turn all electric loads OFF.
3. Connect a timing light tester.
4. Disconnect the vacuum hose from the vacuum control, and plug the hose.
5. Disconnect the black connector at distributor.
6. Check that the ignition timing mark (yellow) on the crankshaft pulley and the timing mark on the timing belt cover are aligned.

Ignition timing: $2 \pm 1^\circ$ BTDC



83U01A-017

7. If necessary, adjust the ignition timing by turning the distributor.
8. Reconnect the vacuum hose and the black connector at distributor.



83U01A-018

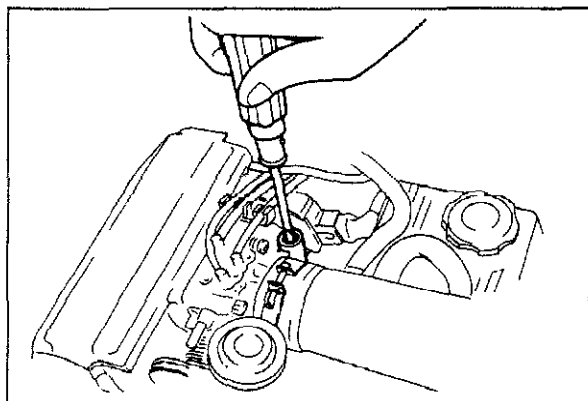
Idle Speed

1. Connect a tachometer to the engine.
2. Turn off all lights and other unnecessary electrical loads.
3. Check the idle speed. If necessary, turn the air adjust screw and adjust to specifications.

Idle speed

MTX: 850 ± 50 rpm (in neutral)

ATX: 850 ± 50 rpm (in "P" range)

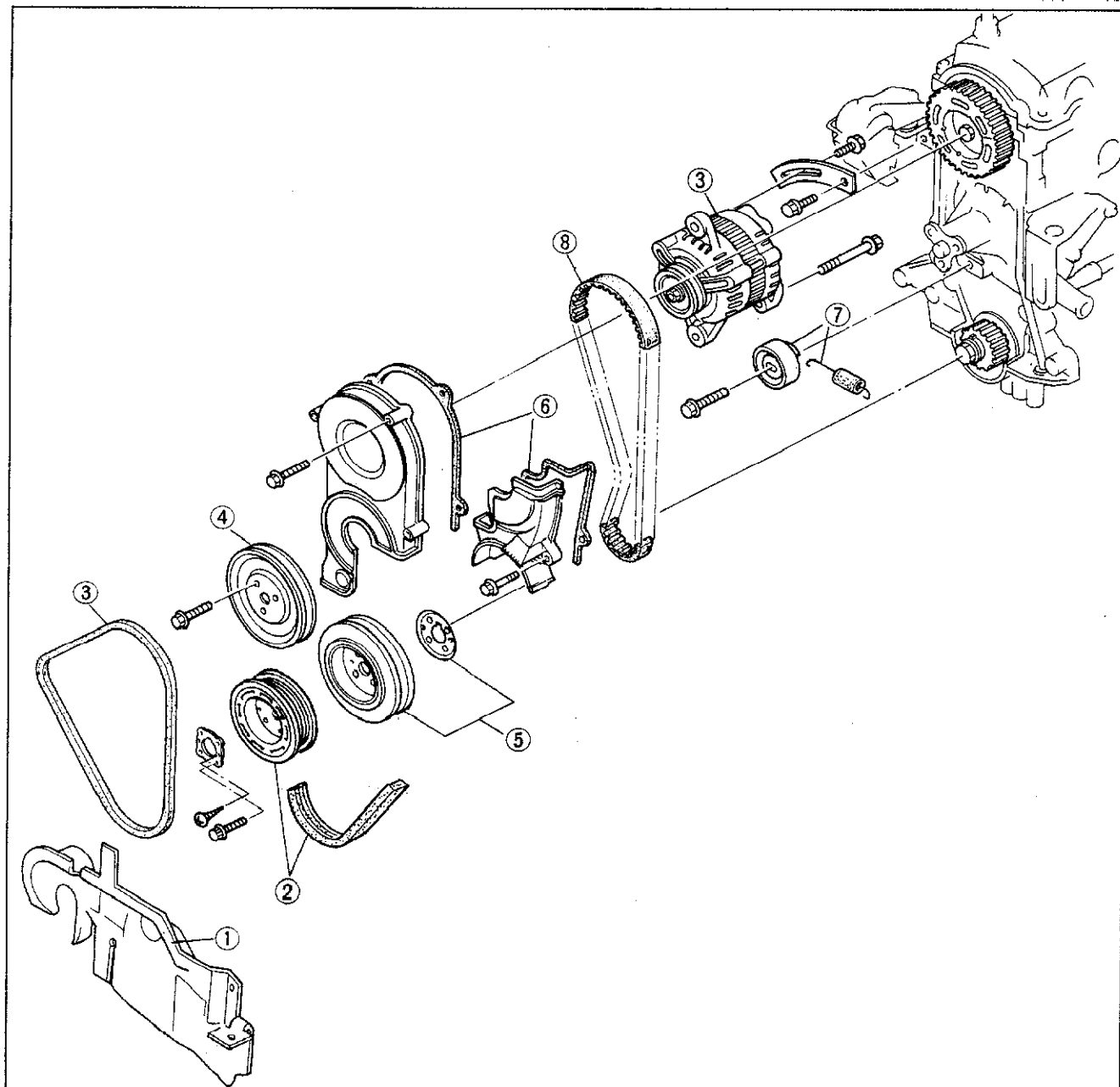


83U01A-019

ON-VEHICLE MAINTENANCE**TIMING BELT****Removal**

1. Disconnect the battery negative cable.
2. Remove the parts in the numbered sequence shown in the figure.

83U01A-020



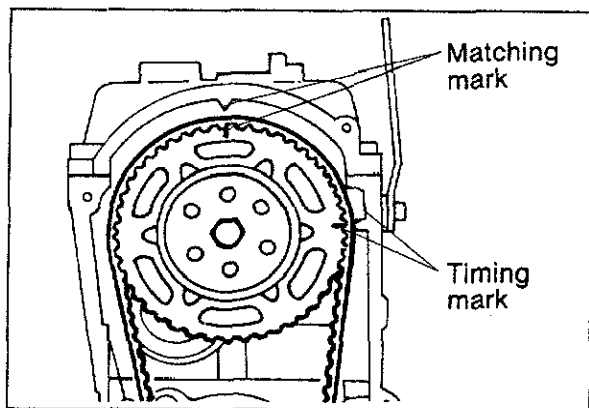
83U01A-021

- | | |
|---|---------------------------------------|
| 1. Engine side cover | 5. Crankshaft pulley and baffle plate |
| 2. A/C and P/S drive belt and pulley | 6. Upper and lower timing belt cover |
| 3. Alternator and alternator drive belt | 7. Timing belt tensioner and spring |
| 4. Water pump pulley | 8. Timing belt |

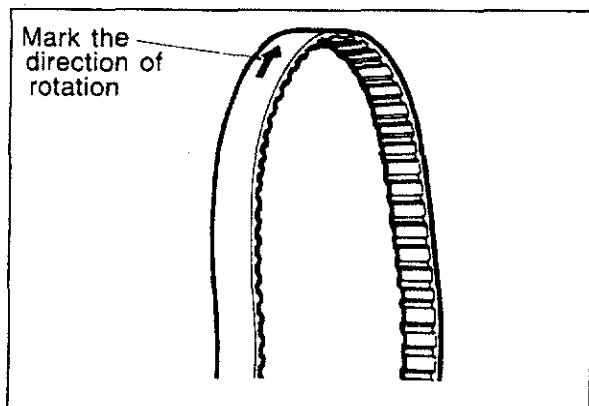
Note

Remove the No.3 engine mount installation nuts and lower the engine to remove A/C and P/S pulley and the crankshaft pulley.

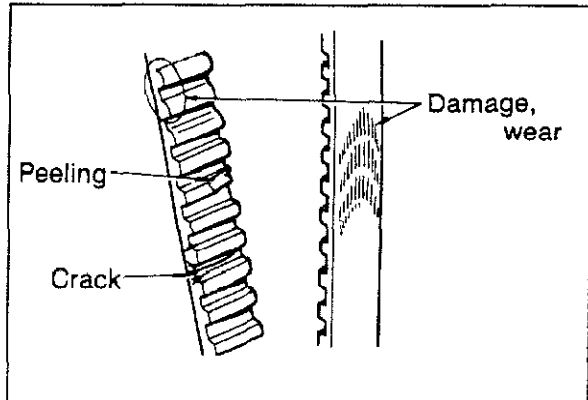
1A ON-VEHICLE MAINTENANCE (TIMING BELT)



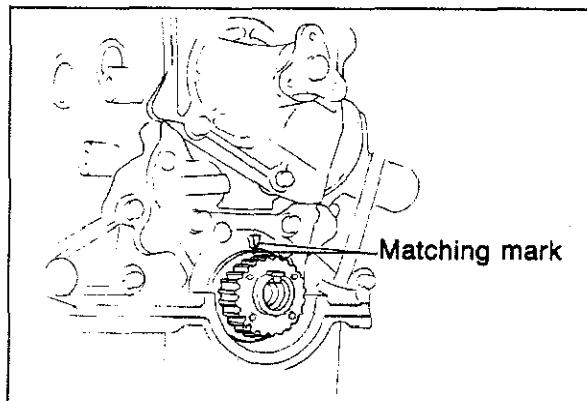
63U01X-018



83U01A-131



83U01A-022



4BG01A-031

Before removing the timing belt, do the following:

1. Turn the crankshaft to align the matching mark of the camshaft pulley with the cylinder head and the cylinder head cover timing mark.

2. Mark the direction of rotation on the timing belt.

Note

The direction arrow is so the belt can be reinstalled in the same direction.

3. Remove the timing belt.

Caution

Do not allow any oil or grease on the timing belt.

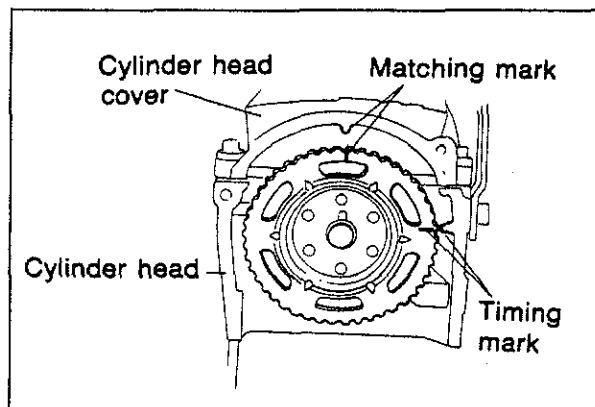
Inspection

Referring to page 1A—49, inspect the following parts:

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

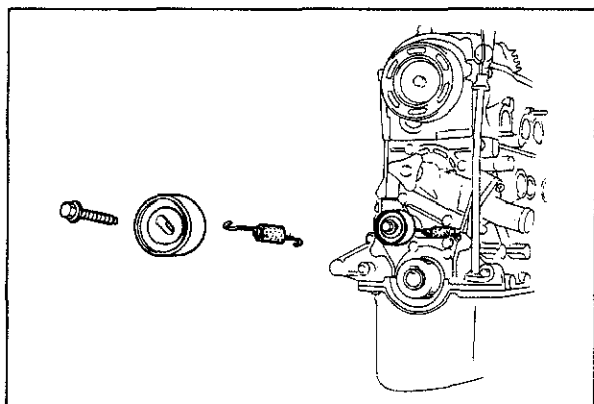
Installation

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



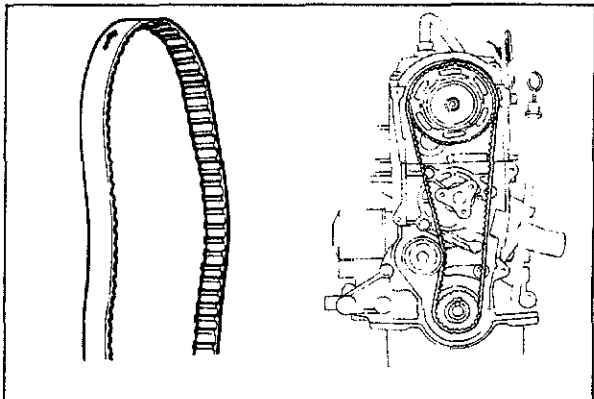
63U01X-021

2. Be sure that the matching mark on the camshaft pulley is aligned with the cylinder head cover matching mark. If it is not aligned, turn the camshaft to align.



4BG01A-033

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



61G01X-100

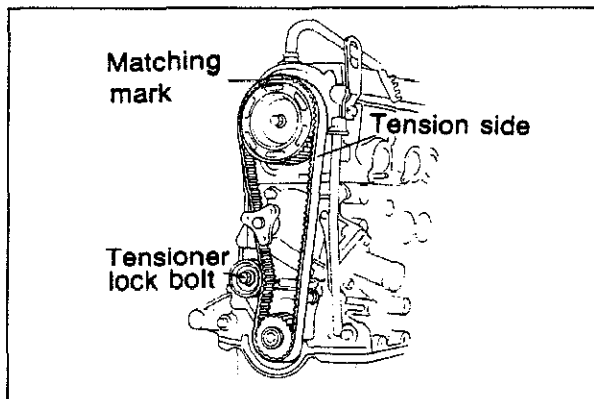
4. Install the timing belt.

Caution

- a) The timing belt must be reinstalled in the same direction of previous rotation if it is reused.
- b) Be sure that there is no oil, grease, or dirt on the timing belt.

Note

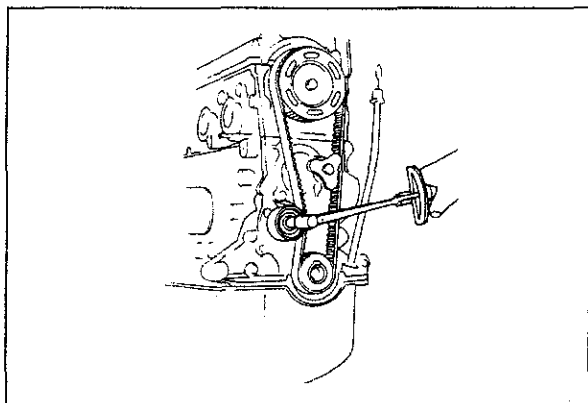
Remove all spark plugs for easier rotation.



83U01X-137

5. Turn the crankshaft twice in the direction of rotation. (Clockwise)
6. Check that the timing marks are correctly aligned. If not repeat the above-mentioned procedure.
7. Loosen the tensioner lock bolt and apply tension to the belt.

1A ON-VEHICLE MAINTENANCE (TIMING BELT)



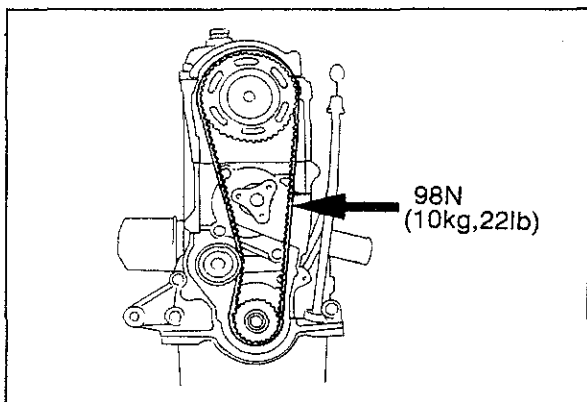
83U01A-129

8. Tighten the timing belt tensioner to specification.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

9. Turn the crankshaft twice in the direction of rotation and check the matching marks for alignment.



83U01A-023

10. Measure the tension between the crankshaft pulley and the camshaft pulley.

If the timing belt tension is not correct, temporarily secure tensioner lock bolt so the spring is fully extended and repeat steps 5—9 above or replace the tensioner spring.

Timing belt deflection:

12—13 mm (0.47—0.51 in)

/ 98 N (10 kg, 22 lb)

Caution

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

11. Install the lower and upper timing belt cover.

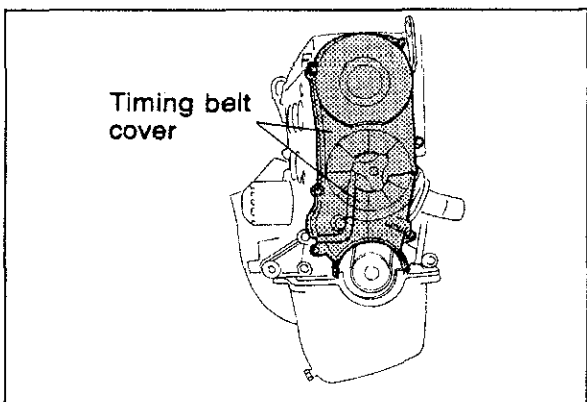
Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

12. Install the spark plugs.

Tightening torque:

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)



83U01A-130

13. Install the baffle plate and the crankshaft pulley.

Tightening torque: 12—17 N·m

(1.25—1.75 m·kg, 109—152 in·lb)

14. Install the No.3 engine mount bracket.

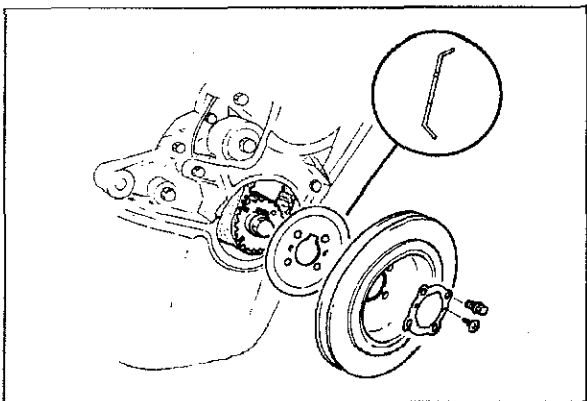
Tightening torque:

60—85 N·m (6.1—8.7 m·kg, 44—63 ft·lb)

15. Install the drive belt and adjust the belt tension (refer to page 1A—6).

16. Install the engine side cover.

17. Connect the battery negative cable.



83U01A-024

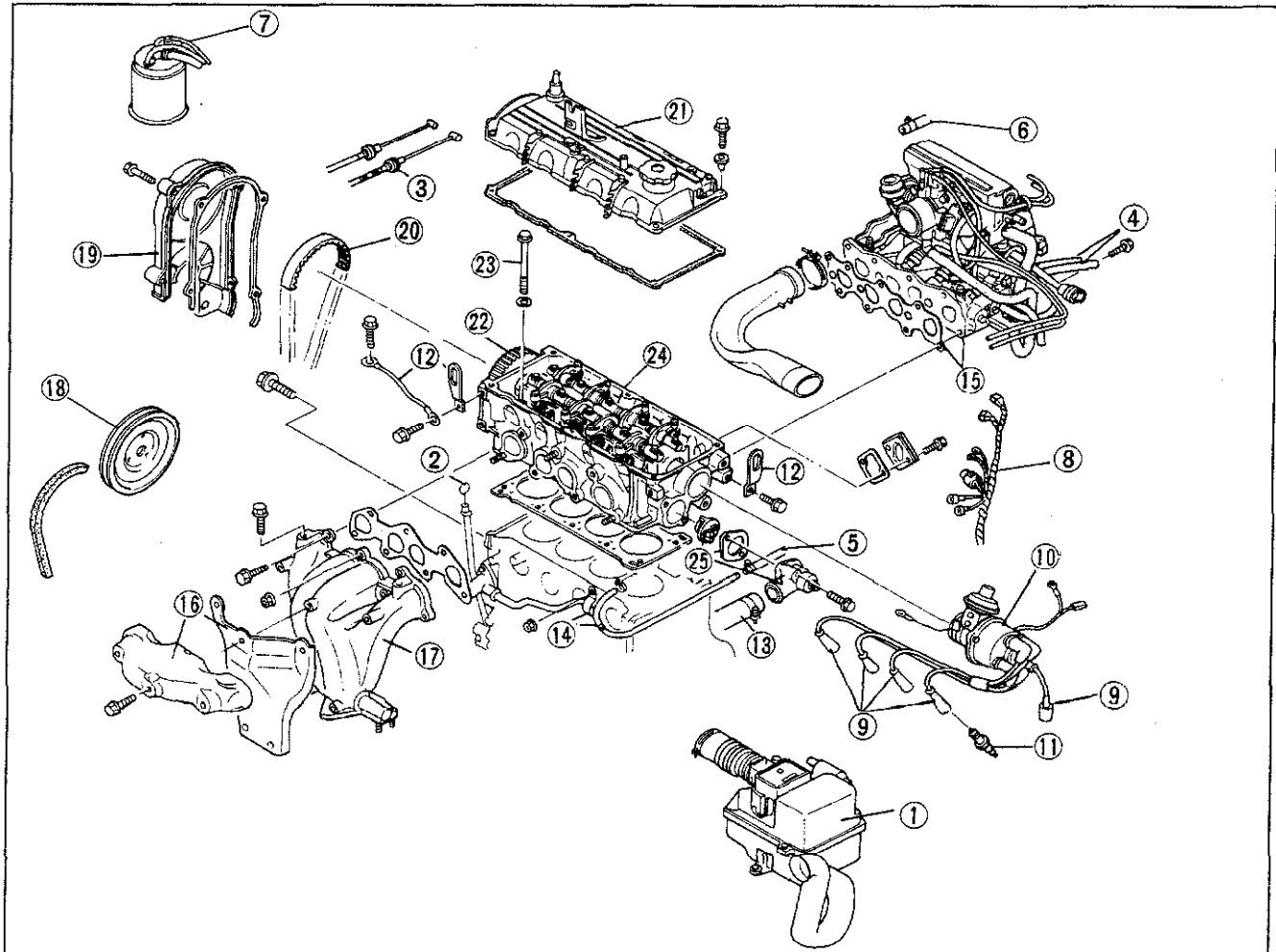
CYLINDER HEAD Removal

Warning

Release the fuel pressure (Refer to FUEL PRESSURE RELEASE of FUEL SYSTEM section).

1. Disconnect the battery negative cable.
2. Drain the coolant.
3. Remove the parts in the numbered sequence shown in the figure.

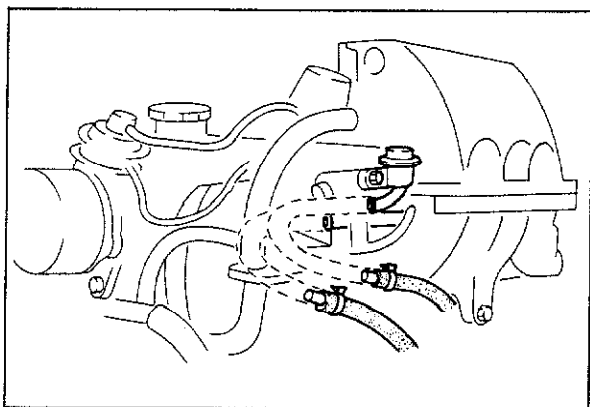
83U01A-025



83U01A-026

- | | | |
|--|--------------------------------------|--------------------------------|
| 1. Air cleaner assembly | 9. High-tension leads | 16. Exhaust manifold insulator |
| 2. Oil level gauge | 10. Distributor | 17. Exhaust manifold |
| 3. Accelerator cable and cruise control cable | 11. Spark plugs | 18. Water pump pulley |
| 4. Fuel hoses | 12. Engine hanger and ground wire | 19. Upper timing belt cover |
| 5. Heater hoses | 13. Upper radiator hose | 20. Timing belt |
| 6. Brake vacuum hose | 14. Water bypass hose and bracket | 21. Cylinder head cover |
| 7. Canister hose | 15. Intake manifold assembly | 22. Camshaft pulley |
| 8. Engine harness connectors | | 23. Cylinder head bolts |
| | | 24. Cylinder head |
| | | 25. Thermostat assembly |

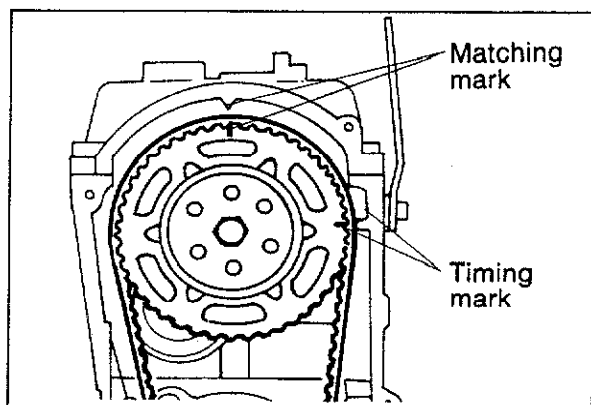
1A ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



4BG01A-051

Fuel hose

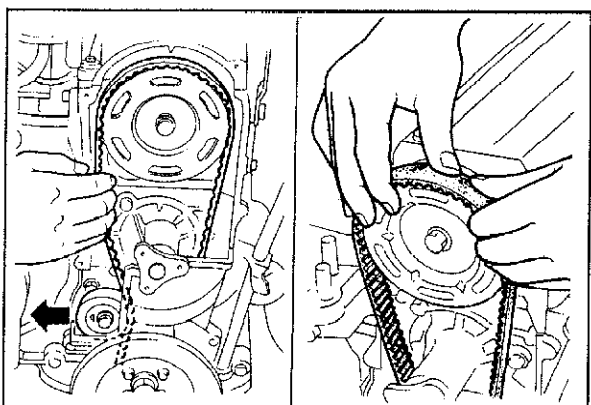
After disconnecting the inlet and return fuel hoses, plug them.



61G01X-009

Timing belt

1. Before removal of timing belt, turn the crankshaft to align the matching mark on the camshaft pulley with the matching mark on the cylinder head cover.

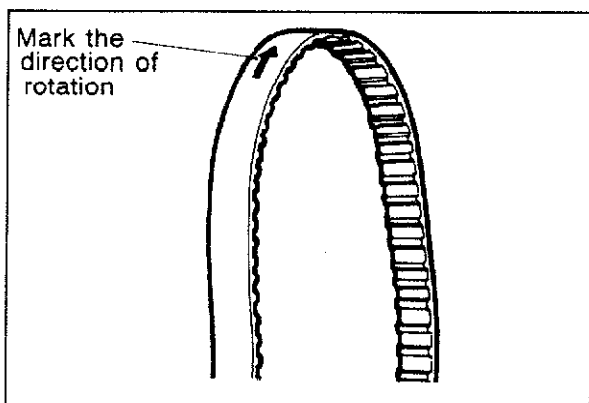


83U01A-133

2. Loosen the timing belt tensioner lock bolt.
3. Pull the tensioner in the direction indicated by arrow and temporarily tighten the lock bolt.
4. Remove the timing belt.

Caution

Do not allow any oil or grease on the timing belt.

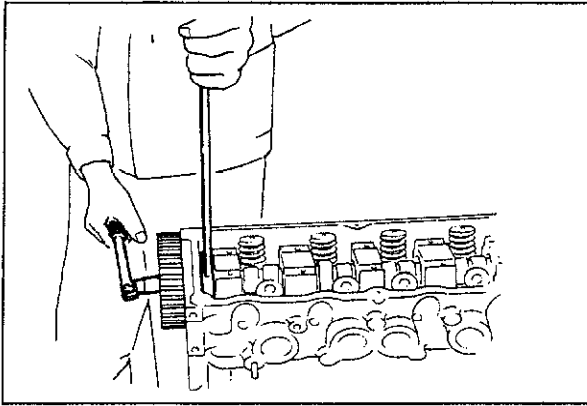


61G01X-011

5. Mark the forward direction arrow on the timing belt.

Note

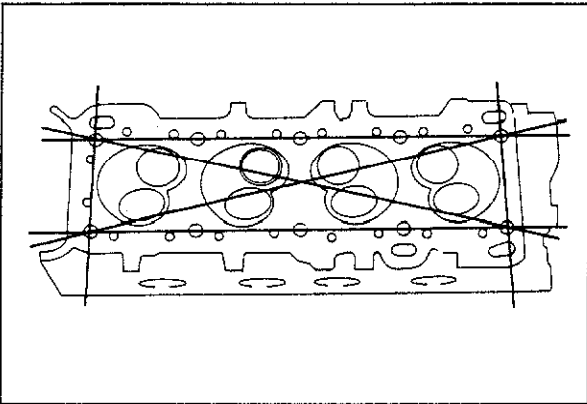
Direction arrow is for reassembling the timing belt in the same direction.



61G01X-108

Camshaft pulley

1. Remove the cylinder head cover.
2. Hold the camshaft using a suitable wrench on the cast hexagon.
3. Remove the camshaft pulley.



83U01A-027

Disassembly of Cylinder Head

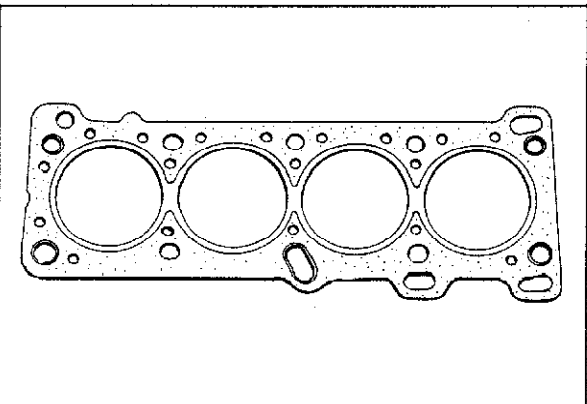
Refer to page 1A—32

Inspection

Refer to page 1A—37

Assembly

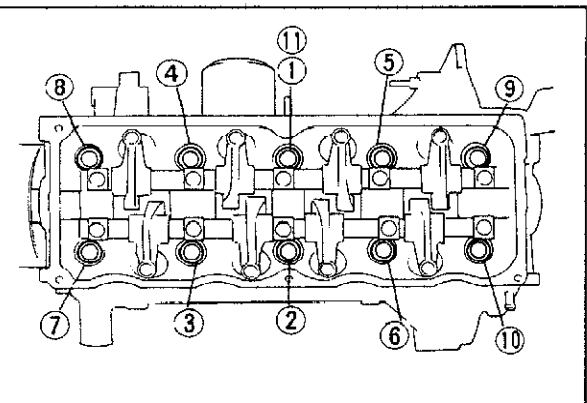
Refer to page 1A—59



63U01X-033

Installation

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



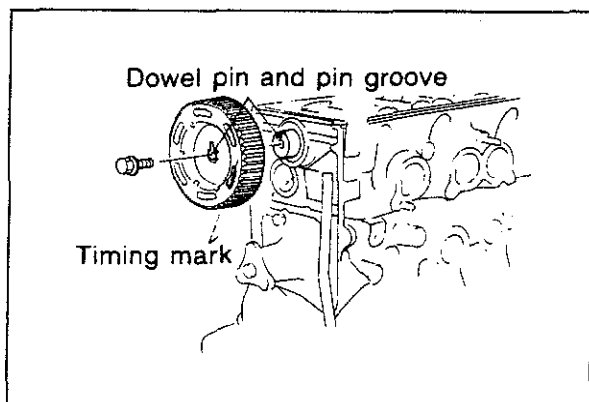
63U01X-034P

3. Install the cylinder head, and tighten the cylinder head bolts gradually in the order shown in the figure.

Tightening torque:

75—81 N·m (7.7—8.3 m·kg, 56—60 ft·lb)

1A ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

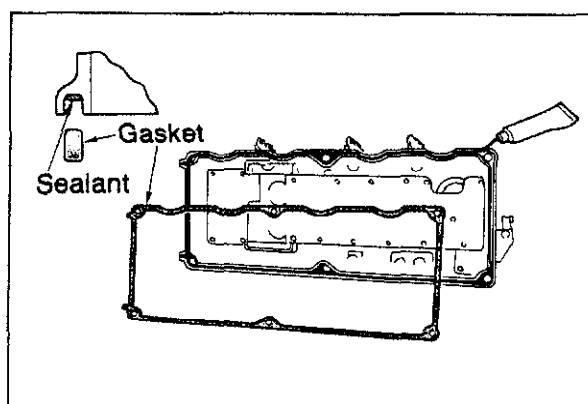


83U01A-028

4. Install the camshaft pulley onto the dowel pin and keyway with the matching mark straight up, so that the timing marks on the camshaft pulley and cylinder head align.

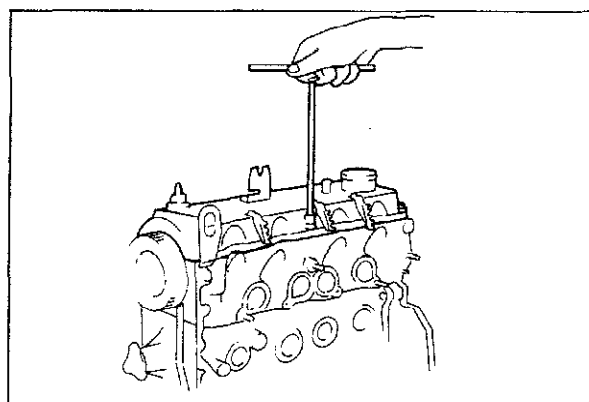
Tightening torque:

49—61 N·m (5.0—6.2 m·kg, 36—45 ft·lb)



83U01A-029

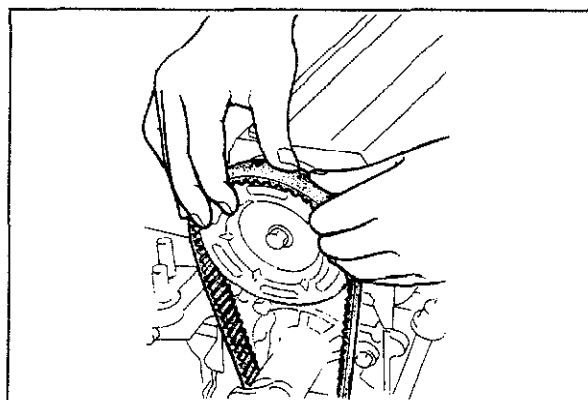
5. Apply a coat of sealant to the cylinder head cover as shown in the figure.



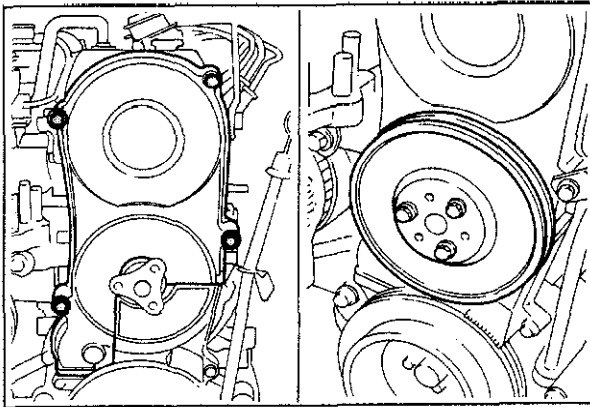
6. Install the cylinder head cover.

Tightening torque:

5—9 N·m (0.5—0.9 m·kg, 43—78 in·lb)



7. Install the timing belt (Refer to page 1A—11).



83U01A-032

8. Install the upper timing belt cover.

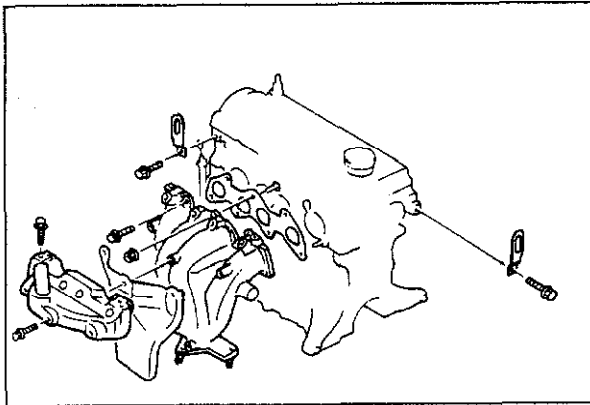
Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

9. Install the water pump pulley.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



83U01A-033

10. Install engine ground, front and rear engine hanger.

Tightening torque:

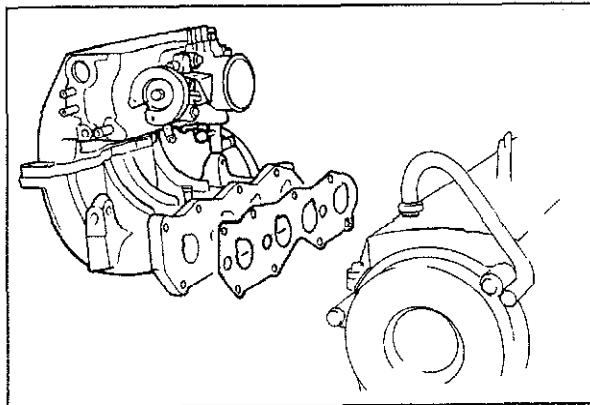
Front: 37—63 N·m
(3.8—6.4 m·kg, 27—46 ft·lb)

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

11. Install the exhaust manifold.

Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

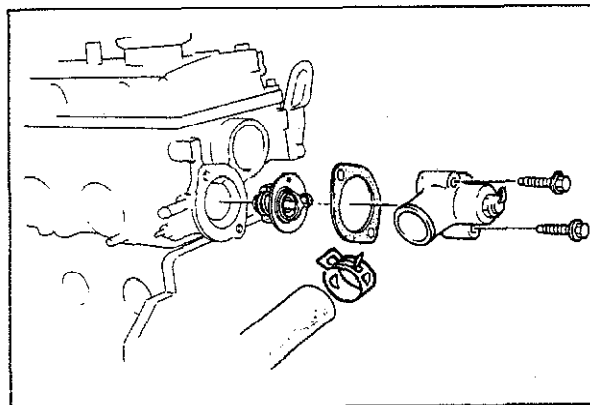


83U01A-034

12. Install the exhaust manifold insulator.
13. Install the water bypass hose bracket.
14. Install the intake manifold assembly.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



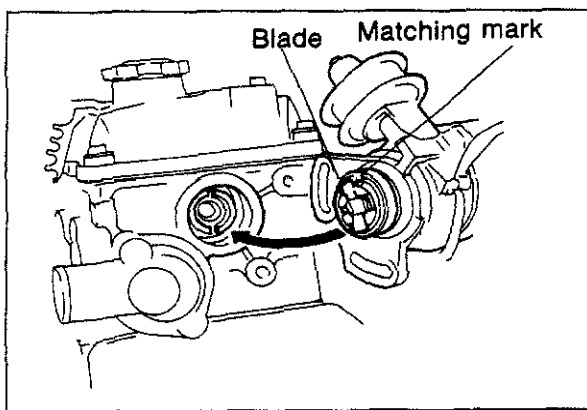
83U01A-035

15. Install the thermostat assembly. (Refer to 1A—66.)
16. Connect the upper radiator hose.

Note

Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.

1A ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



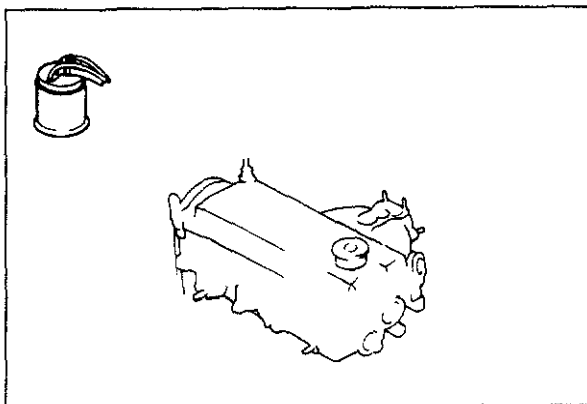
83U01A-036

17. Align the distributor blade with the small oil holes, then install the distributor by referring to Section 5.
18. Install the spark plugs.

Tightening torque:

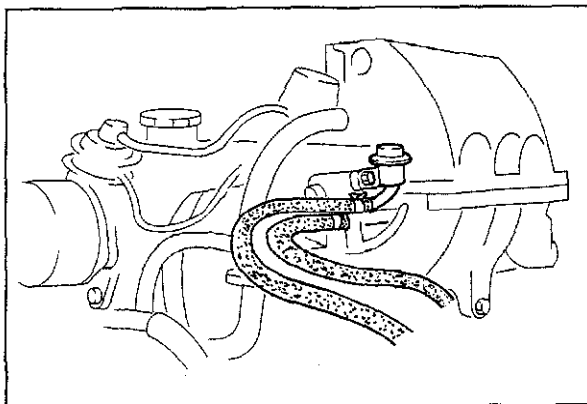
15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)

19. Install the high-tension leads.



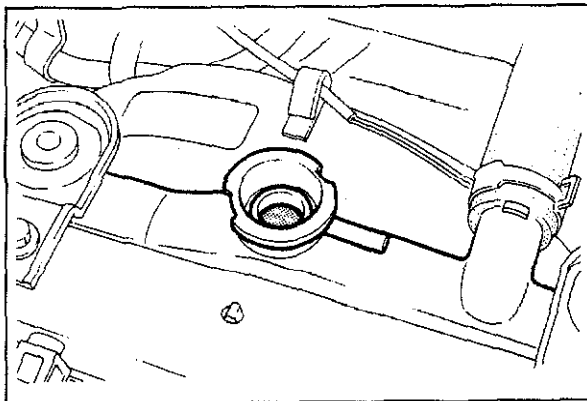
83U01A-037

20. Install the engine harness connectors.
21. Install the canister hoses.
22. Install the vacuum hoses.



83U01A-038

23. Install the brake vacuum hose.
24. Install the heater hoses.
25. Install the fuel hose.
26. Install the accelerator cable and cruise control cable.



83U01A-039

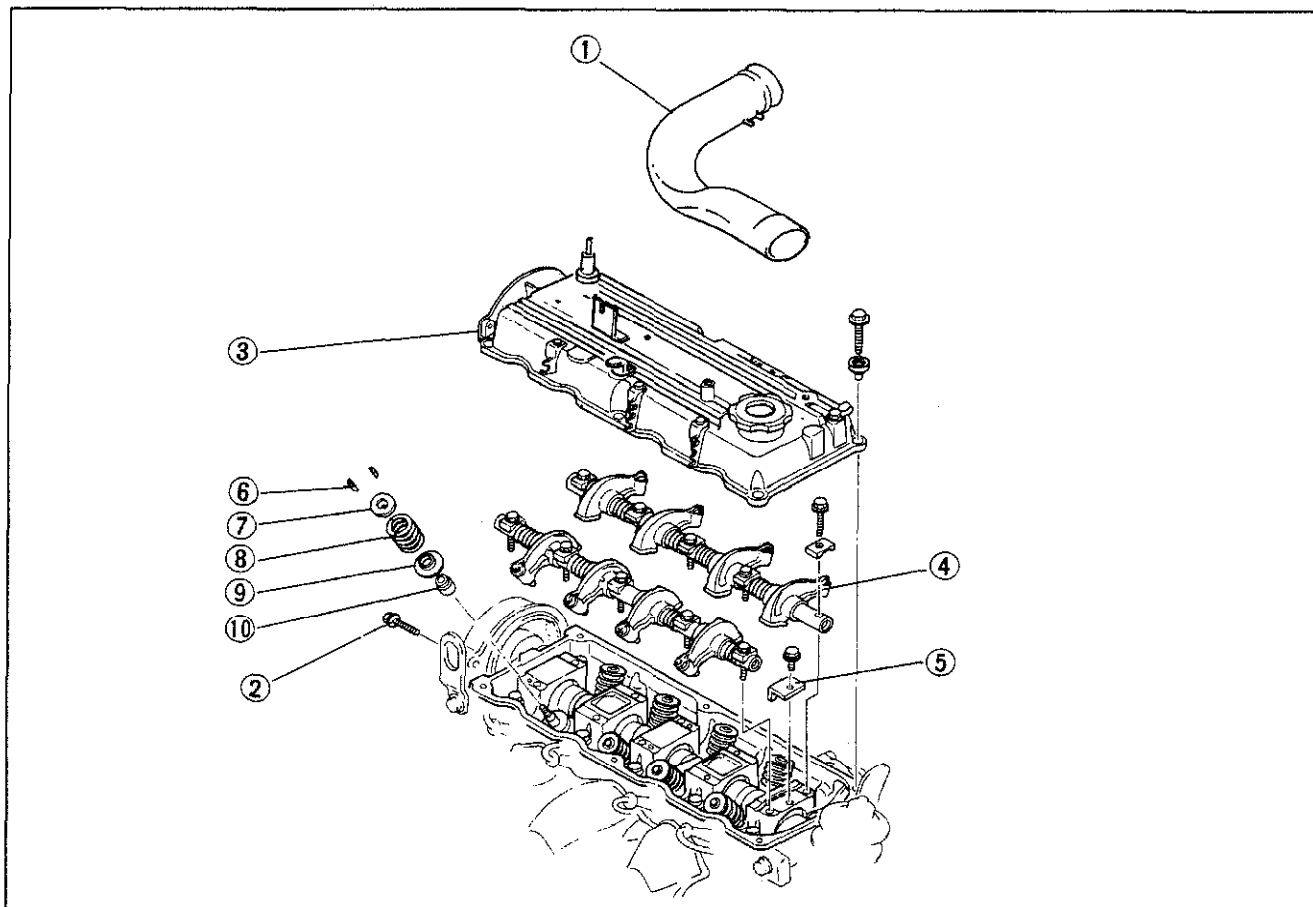
27. Install the oil level gauge.
28. Install the air cleaner assembly.
29. Fill the radiator with coolant.
30. Perform the necessary engine adjustments referring to TUNE-UP PROCEDURE section.

VALVE SEAL

Removal

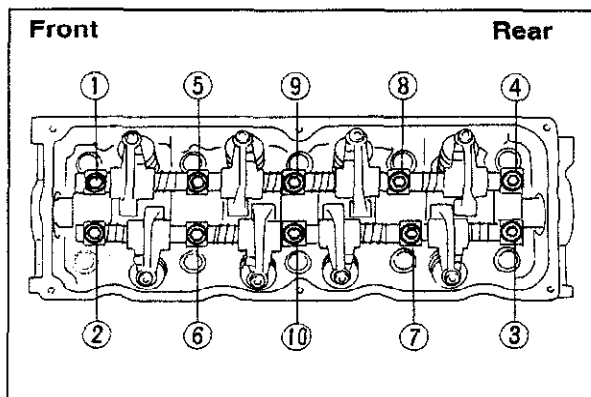
1. Disconnect the battery negative cable.
2. Remove each part in the numbered sequence shown in the figure.

61G01X-025



83U01A-040

- | | |
|---|----------------------------|
| 1. Air intake pipe | 6. Spring retainer |
| 2. Upper timing belt cover bolt | 7. Upper valve spring seat |
| 3. Cylinder head cover | 8. Valve spring |
| 4. Rocker arm and rocker shaft assembly | 9. Lower valve spring seat |
| 5. Thrust plate | 10. Valve seal |

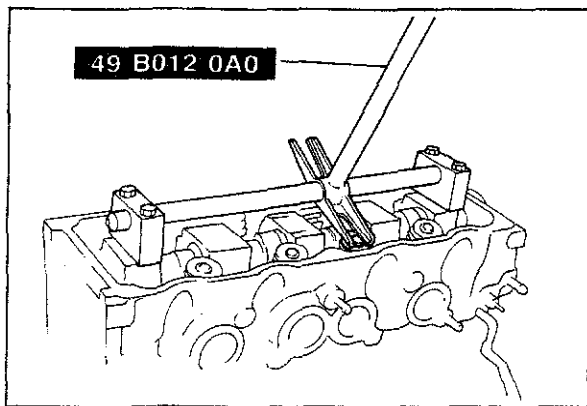


61G01X-027

Rocker arm and rocker shaft assembly

1. Remove the rocker arm and rocker shaft assembly by gradually loosening the bolts in the order shown in the figure.
2. Plug the oil drain hole with a rag to prevent the spring retainer from falling into the oil pan.

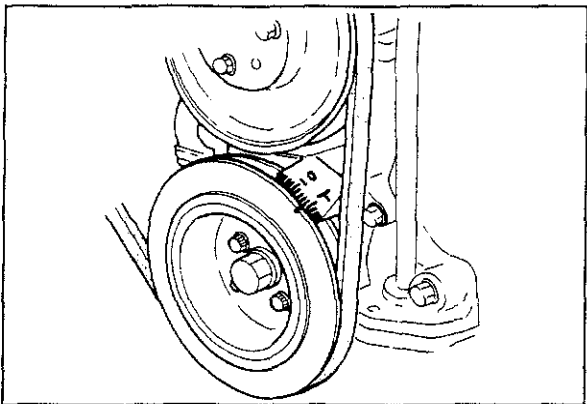
1A ON-VEHICLE MAINTENANCE (VALVE SEAL)



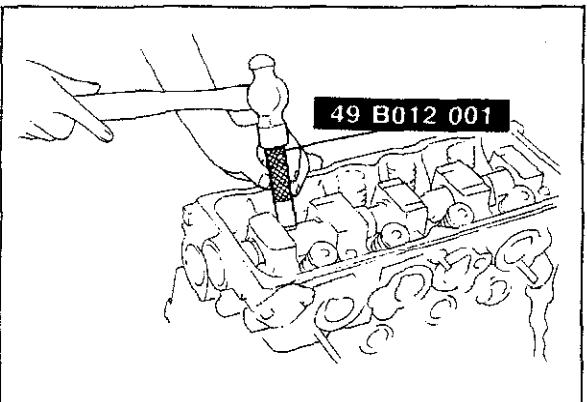
83U01X-138

Valve seal

1. Remove the thrust plate.
2. Install the **SST** on the rocker arm shaft assembly installation hole.



3. Position the piston of the valve seal to be replaced at top dead center by turning the crankshaft pulley.
4. Remove the spring retainer by pressing down on the **SST**.
5. Remove the valve spring and spring seats (upper and lower).
6. Remove the valve seal from the valve guide with pliers or the **SST** (49 S120 170).



83U01X-140

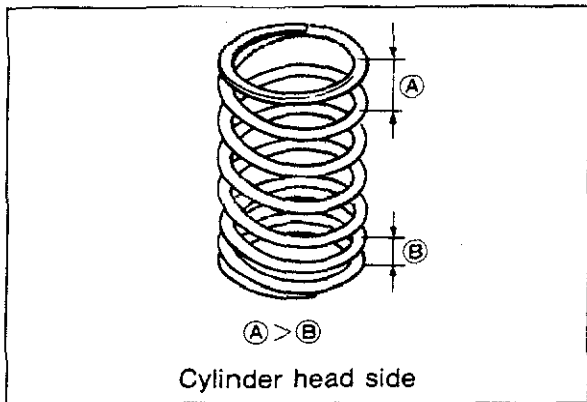
Installation

1. Apply a coat of engine oil to the inner surface of the new valve seal.
2. Push it on gently, with the **SST**.

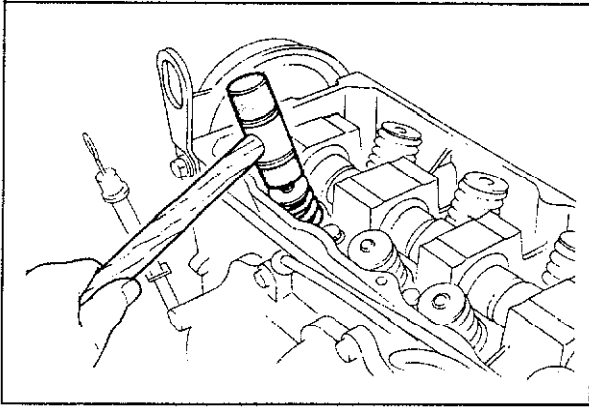
3. Install the valve spring.

Note

Install the valve spring with its narrow pitch end toward the cylinder head.

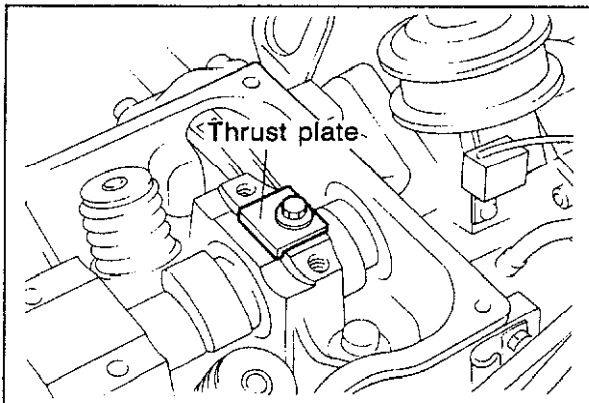


61G01X-030



83U01X-141

4. Install the spring retainer with the **SST** (49 B012 0A0), and lightly tap the end to confirm correct assembly.

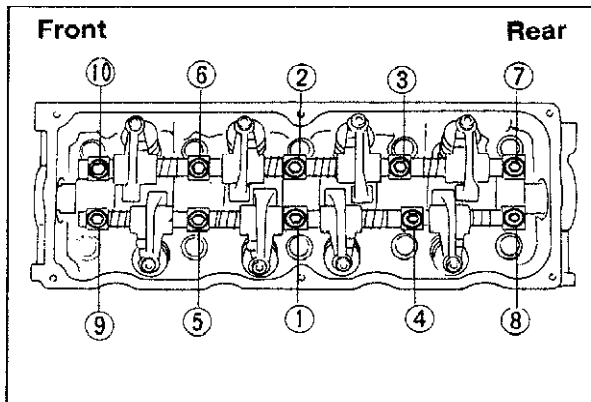


61G01X-032

5. Install the thrust plate.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



61G01X-033

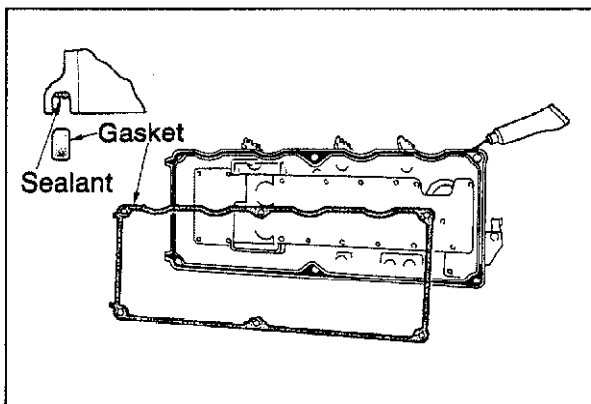
6. Install the rocker arm and rocker shaft assembly on the cylinder head and tighten it gradually in the order shown in the figure.

Note

Use the installation bolts for alignment when installing.

Tightening torque:

22—28 N·m (2.2—2.9 m·kg, 16—21 ft·lb)



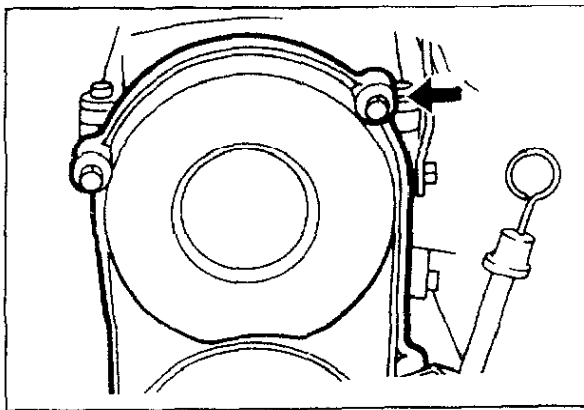
83U01A-041

7. Apply a coat of sealant to the cylinder head cover as shown in the figure.
8. Install the cylinder head cover.

Tightening torque:

5—9 N·m (0.5—0.9 m·kg, 43—78 in·lb)

1A ON-VEHICLE MAINTENANCE (VALVE SEAL)



83U01A-042

9. Install the upper timing belt cover bolt.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

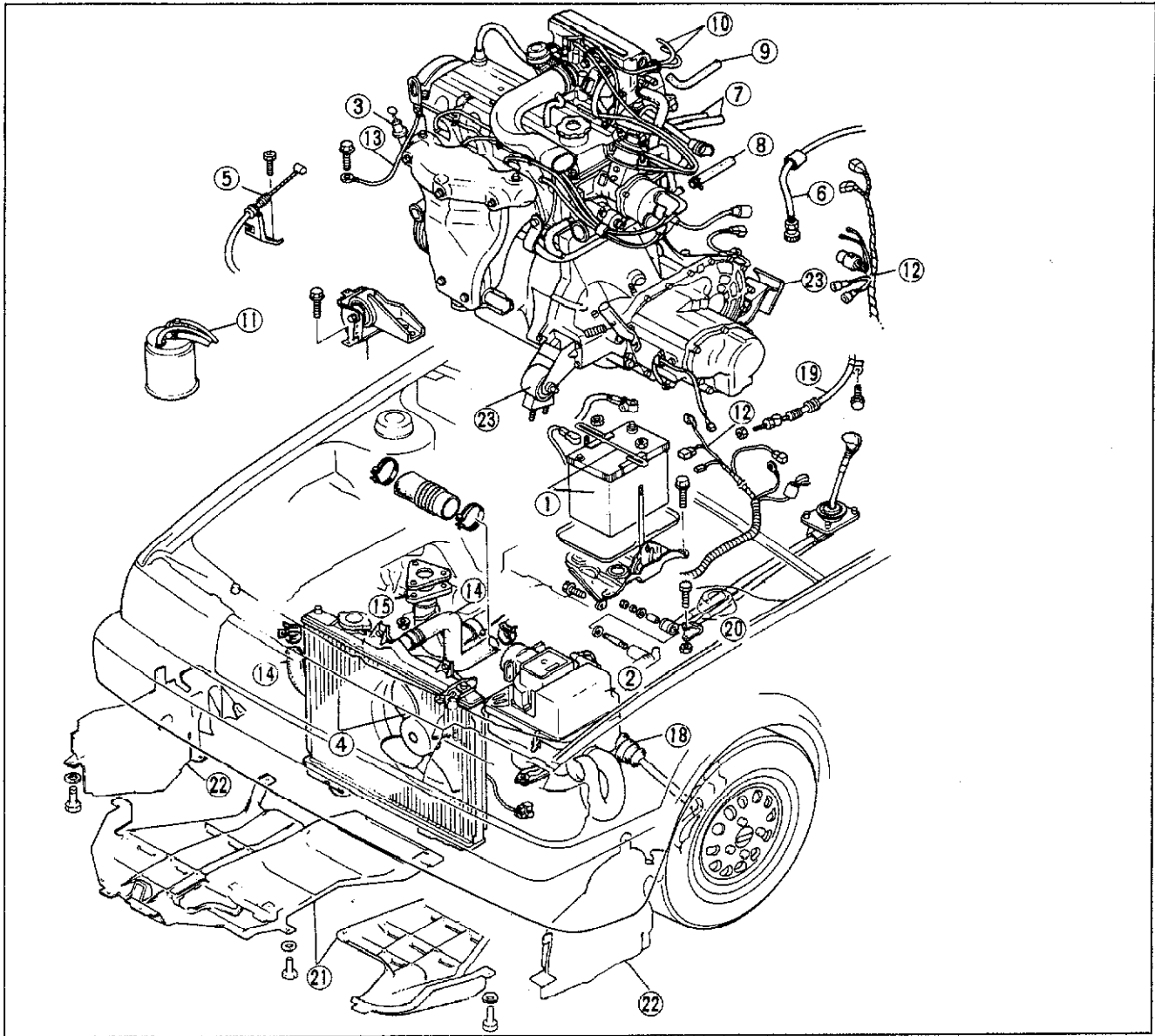
10. Install the air intake pipe.

REMOVAL AND INSTALLATION**Warnig**

Release the fuel pressure (Refer to FUEL PRESSURE RELEASE of FUEL SYSTEM section).

1. Disconnect the battery negative cable.
2. Drain the engine oil, transaxle oil and coolant.
3. Remove the parts in the numbered sequence shown below.
4. Install in the reverse order of removal.

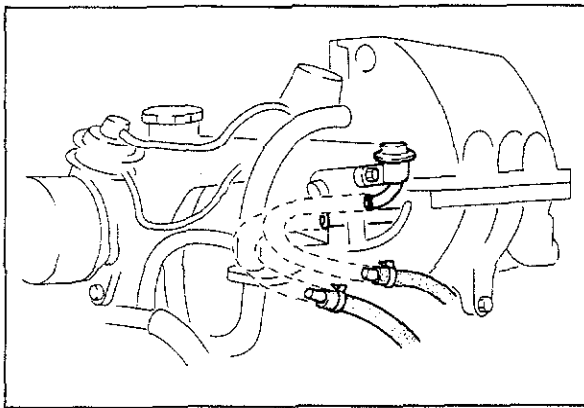
83U01A-043



83U01A-044

- | | | |
|---|-----------------------------------|--|
| 1. Battery and battery carrier | 7. Fuel hoses | 16. A/C compressor (if equipped) |
| 2. Air cleaner assembly | 8. Heater hoses | 17. P/S oil pump (if equipped) |
| 3. Oil level gauge | 9. Brake vacuum hose | 18. Driveshafts |
| 4. Cooling fan and radiator assembly | 10. 3-way solenoid valve hoses | 19. Clutch control cable (MTX) |
| 5. Accelerator cable and cruise control cable (if equipped) | 11. Canister hose | 20. Shift control rod (MTX) or shift control cable (ATX) |
| 6. Speedometer cable | 12. Engine harness connectors | 21. Under cover |
| | 13. Engine ground | 22. Side cover |
| | 14. Upper and lower radiator hose | 23. Engine mount |
| | 15. Exhaust pipe | |

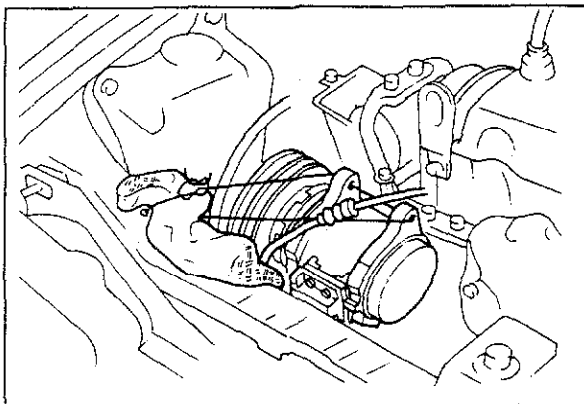
1A REMOVAL AND INSTALLATION



4BG01A-080

Fuel Hose

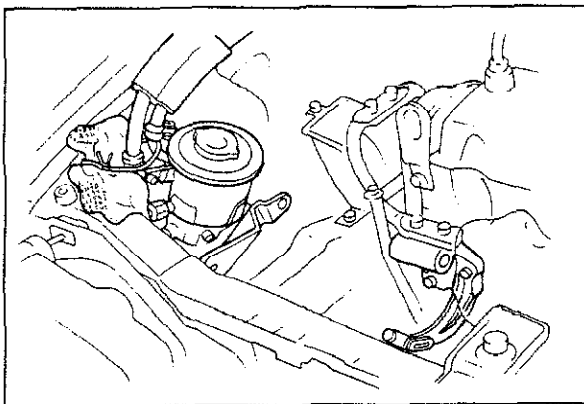
After disconnecting the fuel hoses (inlet and return), plug them to avoid fuel leakage.



4BG01A-081

A/C Compressor

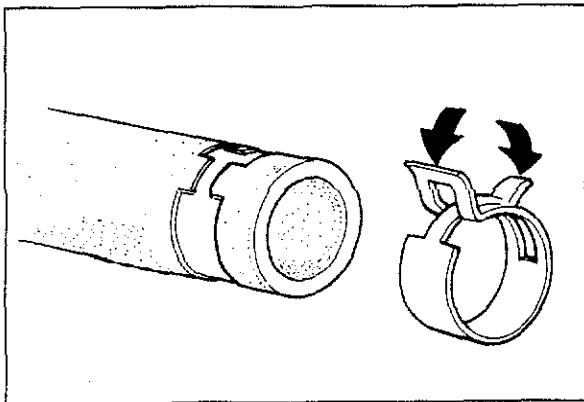
Remove the compressor, and then, with the high-pressure and low-pressure hoses still connected to it, secure the compressor as shown in the figure.



83U01A-045

P/S Pump

Secure the P/S pump as shown in the figure. Be careful not to damage the pipe when the engine is removed and installed.



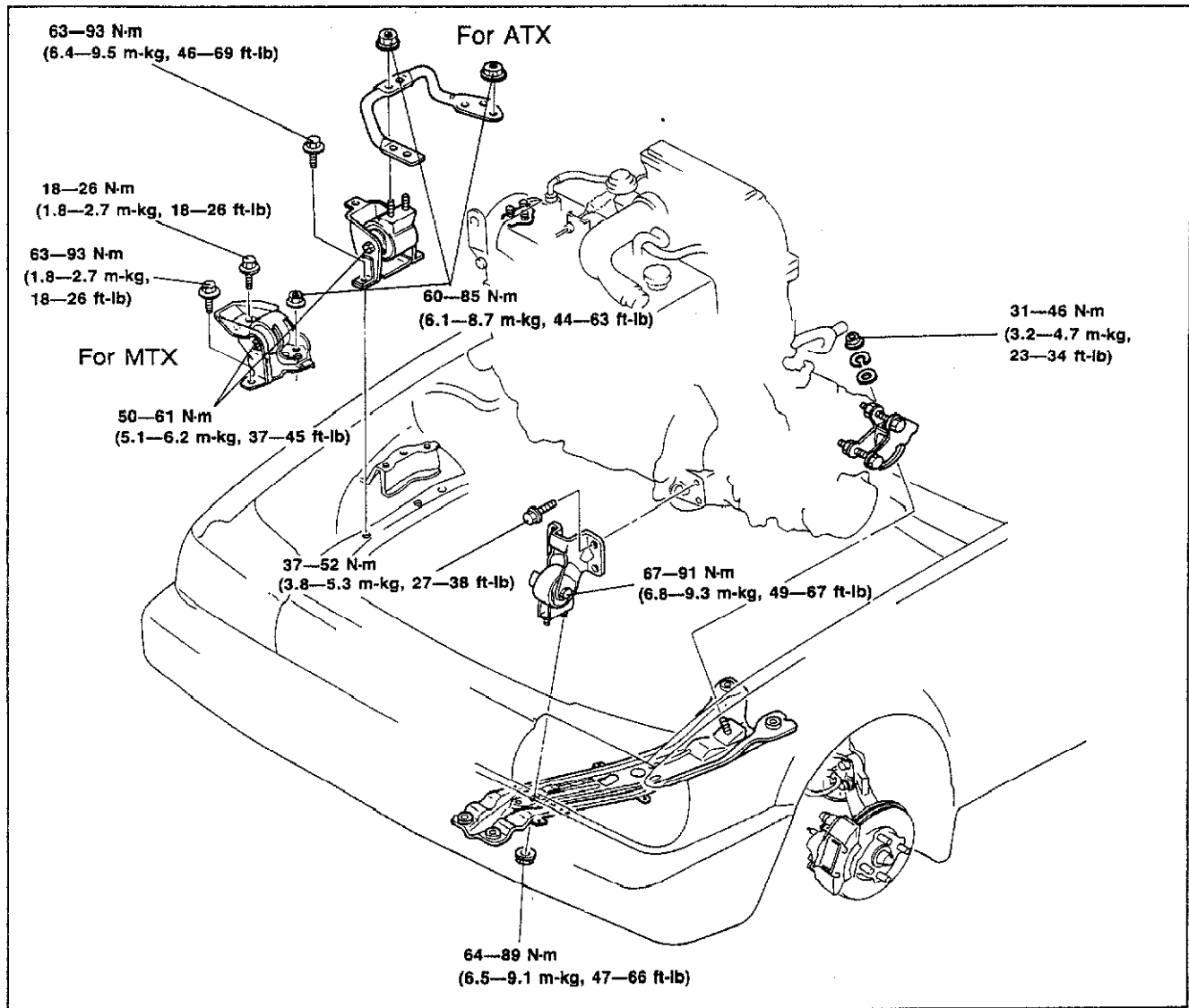
83U01A-046

Hose Clamp

1. Position the hose clamp in the original location on the hose.
2. Squeeze the clamp lightly with large pliers to ensure a good fit.

Engine Mount Torque Specification

After installing the engine into the engine room, tighten the engine mount bolts to the specified torque.



83U01A-047

Steps After Installation

1. Adjust the drive belt tension. (Refer to 1A—6)
2. Fill the radiator and sub tank with coolant.
3. Fill the engine with engine oil.
4. Fill the transaxle with transaxle oil.

Check Engine Condition

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

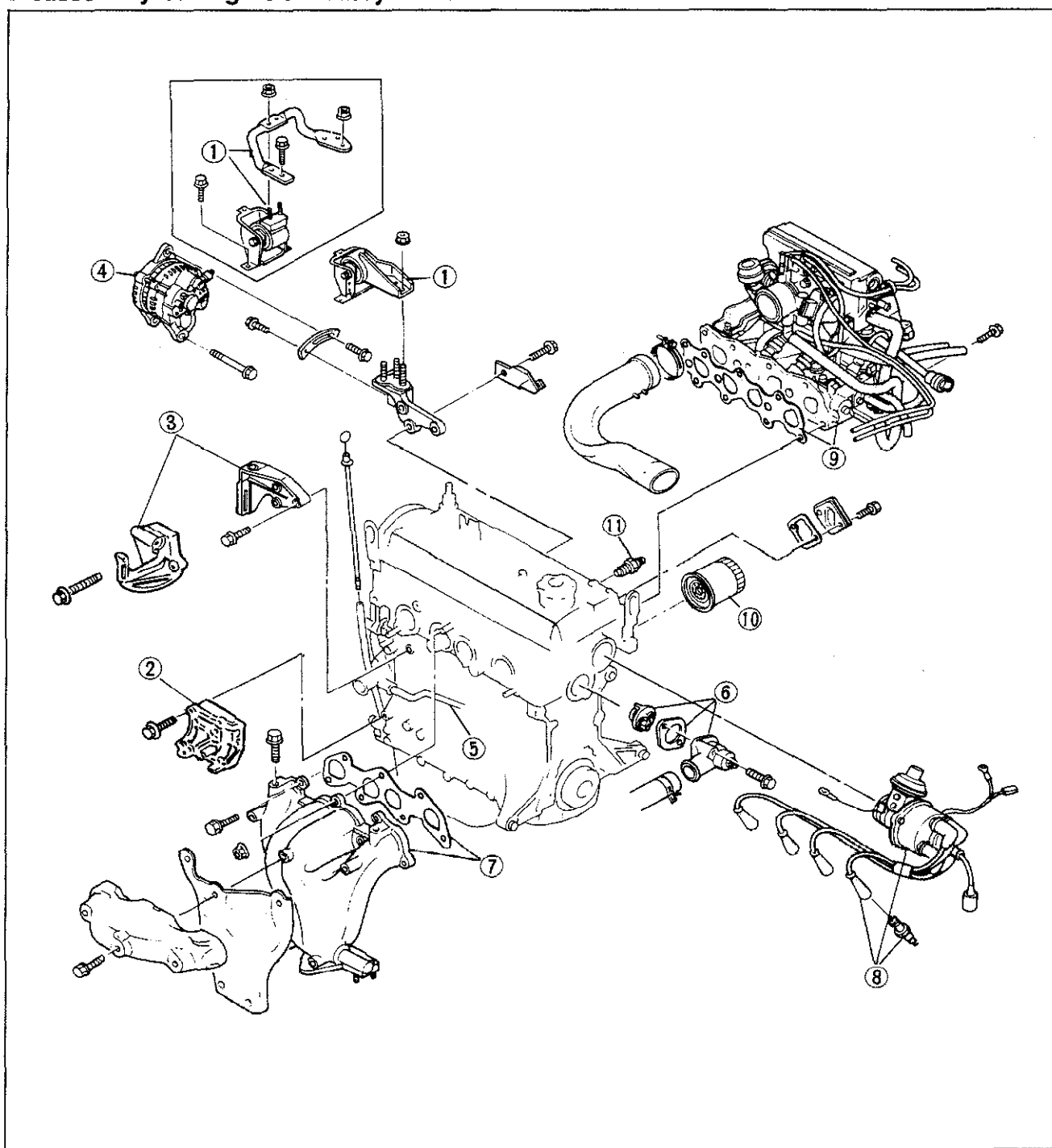
83U01A-048

DISASSEMBLY

Disassembly Note

1. Care should be taken during the disassembly of any part or system to study its order of assembly. Any deformation, wear, or damage also should be noted.
2. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the position from which they were removed.
3. After steam cleaning the parts, use compressed air to blow off any remaining water.
4. Remove the parts in the order shown in the figure.

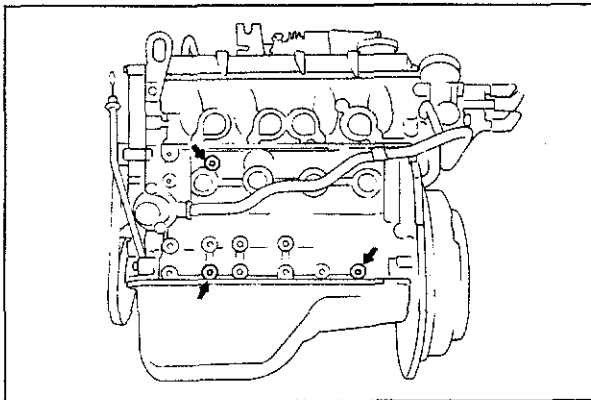
Disassembly of Engine Auxiliary Parts



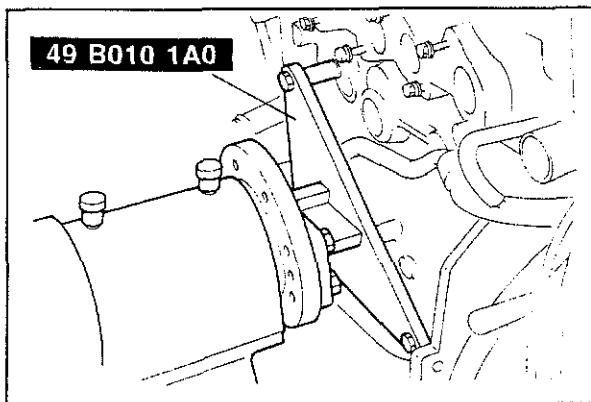
63U01X-056

1. Engine mount and engine bracket
2. A/C compressor bracket
3. P/S pump bracket
4. Alternator
5. Coolant bypass pipe and hose
6. Thermostat cover and thermostat
7. Exhaust manifold and gasket
8. High-tension leads, spark plugs and distributor
9. Intake manifold assembly and gasket
10. Oil filter
11. Oil pressure switch

83U01A-049



83U01X-142



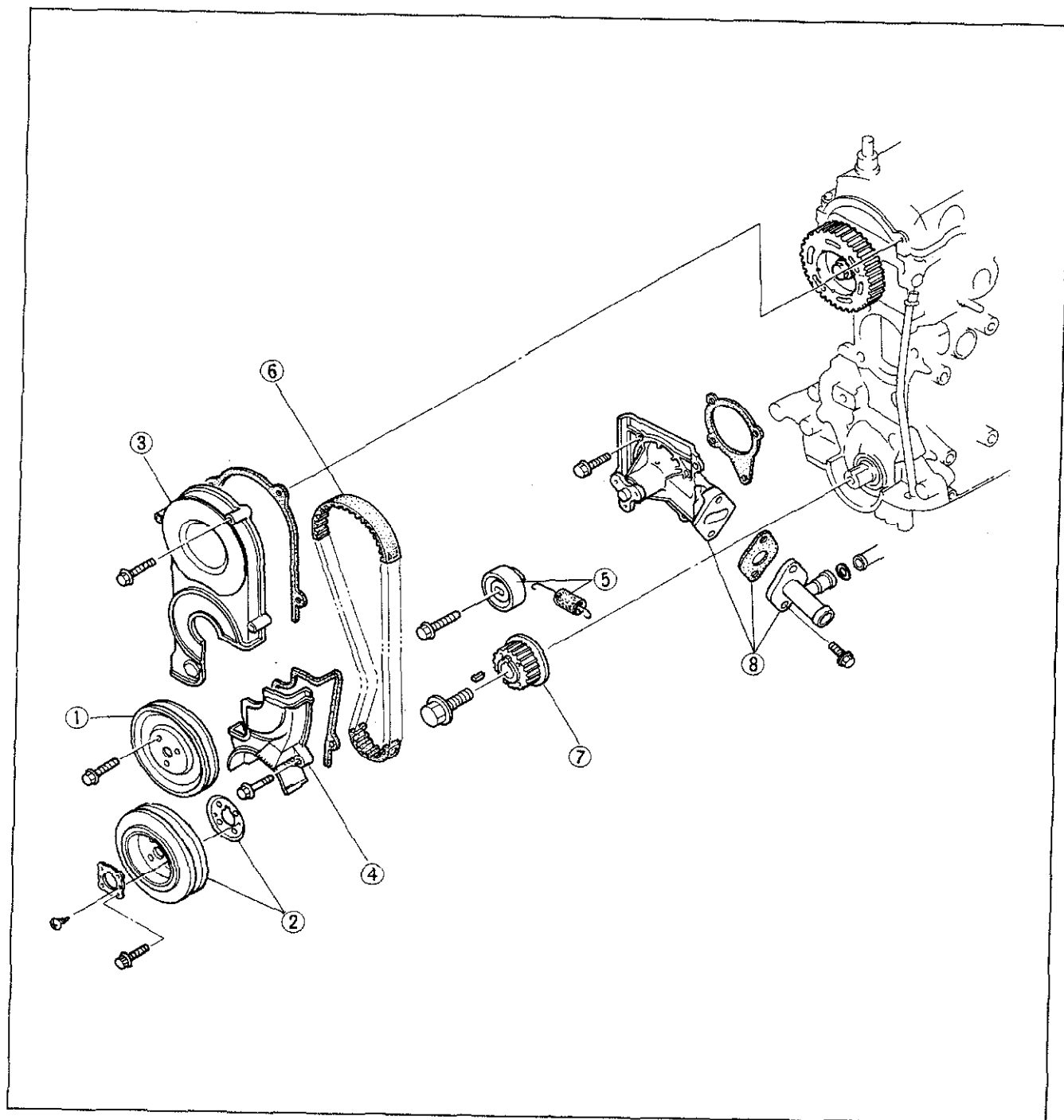
83U01A-050

Engine hanger

After removing the exhaust manifold, install the engine on the **SST**.

1A DISASSEMBLY

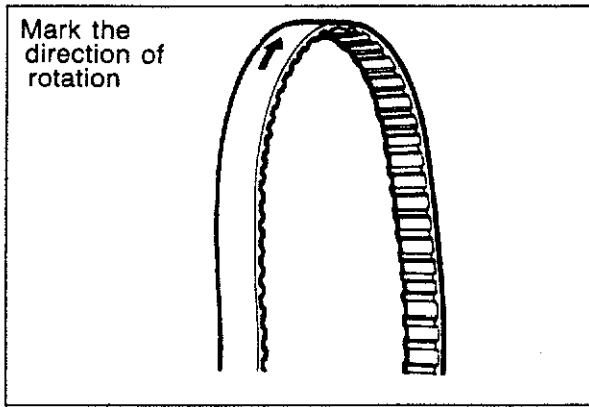
Disassembly of front of Engine



83U01A-051

- 1. Waterpump pulley
- 2. Crankshaft pulley and baffle plate
- 3. Upper timing belt cover
- 4. Lower timing belt cover

- 5. Timing belt tensioner and spring
- 6. Timing belt
- 7. Timing belt pulley
- 8. Water pump and coolant inlet pipe



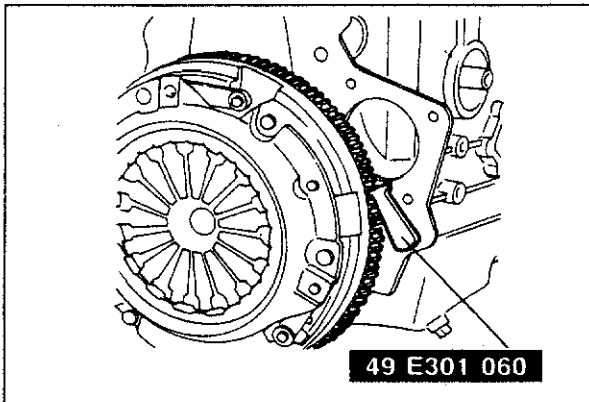
83U01A-134

Timing belt

1. Remove the tensioner spring after loosening the tensioner lock bolt.
2. Mark the direction of rotation on the timing belt.
3. Remove the timing belt.

Caution

Do not allow any oil or grease on the timing belt.



83U01X-143

Crankshaft pulley and timing belt pulley

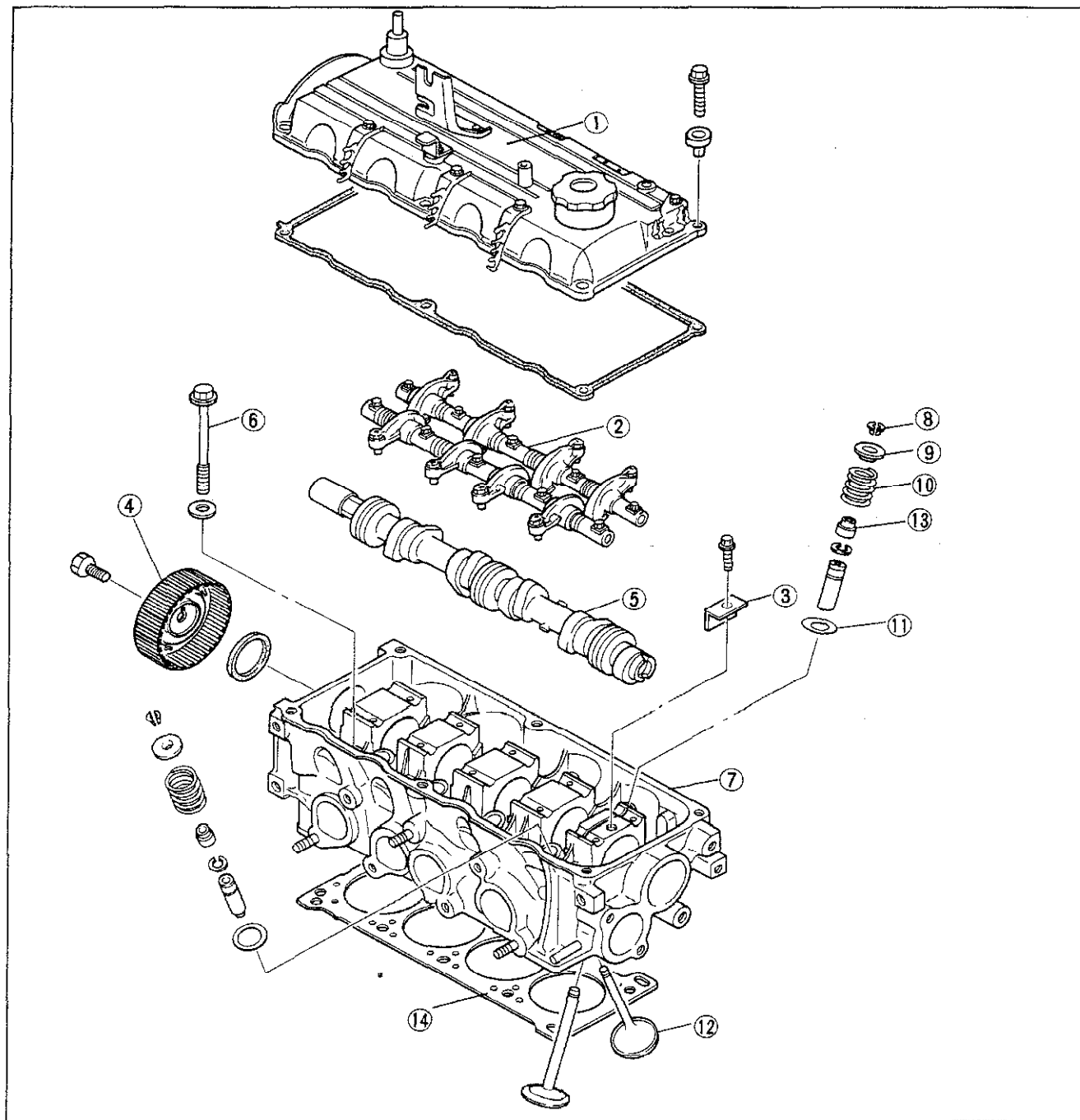
Set the **SST** to the flywheel. Remove the crankshaft pulley and the timing belt pulley.

1A DISASSEMBLY

Disassembly Related to Cylinder Head

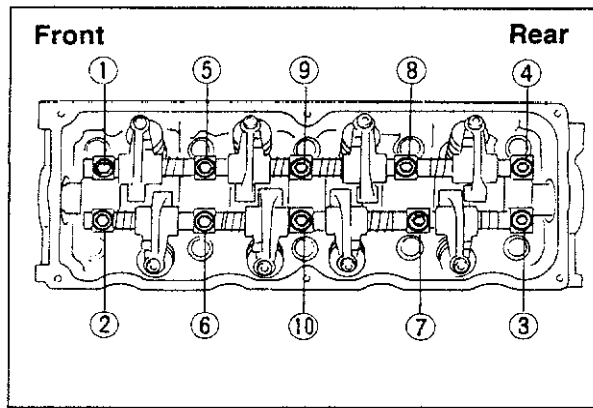
Note

During disassembly, inspect the camshaft end play, camshaft bearing oil clearance referring to INSPECTION AND REPAIR section



83U01A-052

- | | |
|---|--------------------------|
| 1. Cylinder head cover | 8. Spring retainers |
| 2. Rocker arm and rocker shaft assembly | 9. Upper spring seats |
| 3. Thrust plate | 10. Valve springs |
| 4. Camshaft pulley | 11. Lower spring seats |
| 5. Camshaft | 12. Valves |
| 6. Cylinder head bolts | 13. Valve seals |
| 7. Cylinder head | 14. Cylinder head gasket |



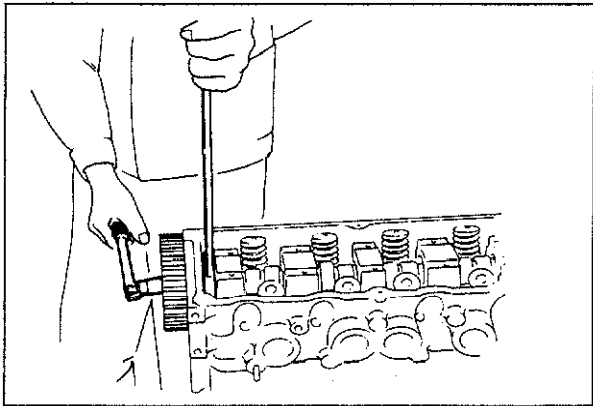
4BG01A-095

Rocker arm and rocker shaft assembly

1. Loosen the bolts gradually in the sequence shown in the figure.
2. Remove the rocker arm and rocker shaft assembly with bolts.

Caution

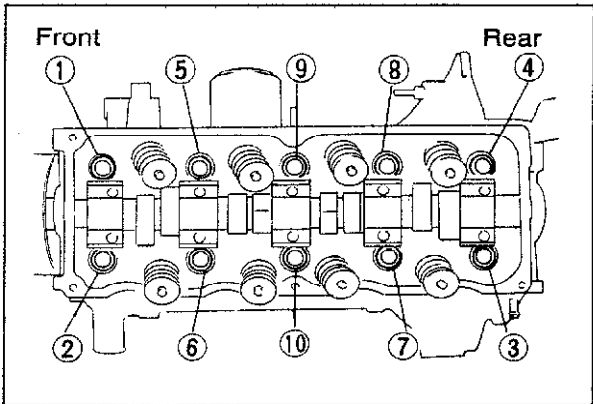
Do not mix up the various parts of the rocker arm and rocker shaft assembly.



83U01A-053

Camshaft pulley

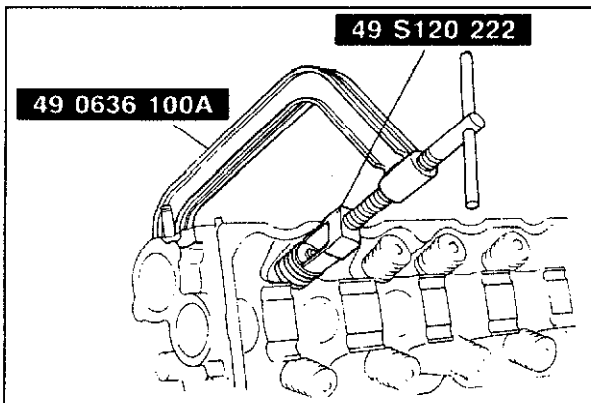
1. Hold the camshaft using a suitable wrench on the cast hexagon.
2. Remove the camshaft pulley.



4BG01A-096

Cylinder head bolt

Remove the cylinder head bolts in the numbered order shown in the figure. Loosen them gradually, in order.



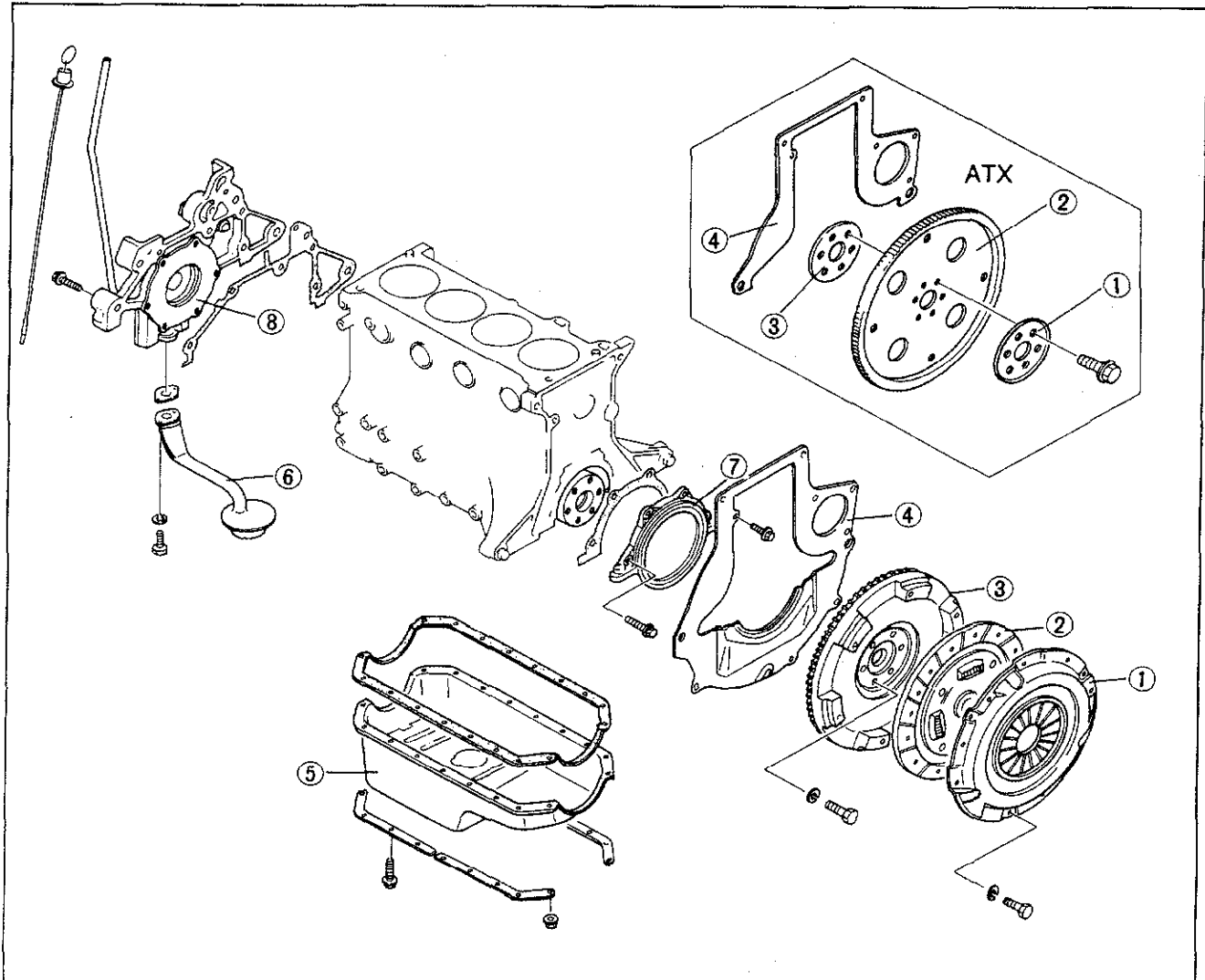
83U01B-042

Valve

Remove the valves from the cylinder head with the SST.

1A DISASSEMBLY

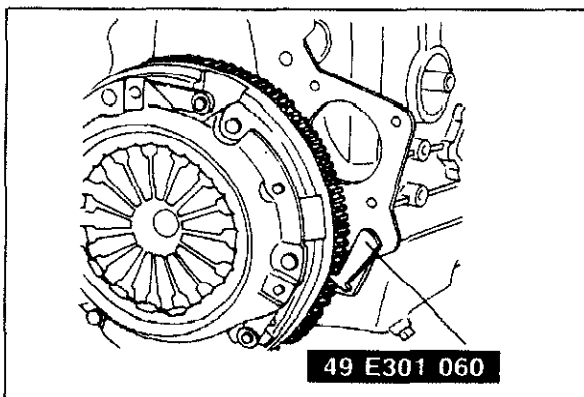
Disassembly Related to Lubrication System and Flywheel



83U01A-054

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. Rear cover
8. Oil pump



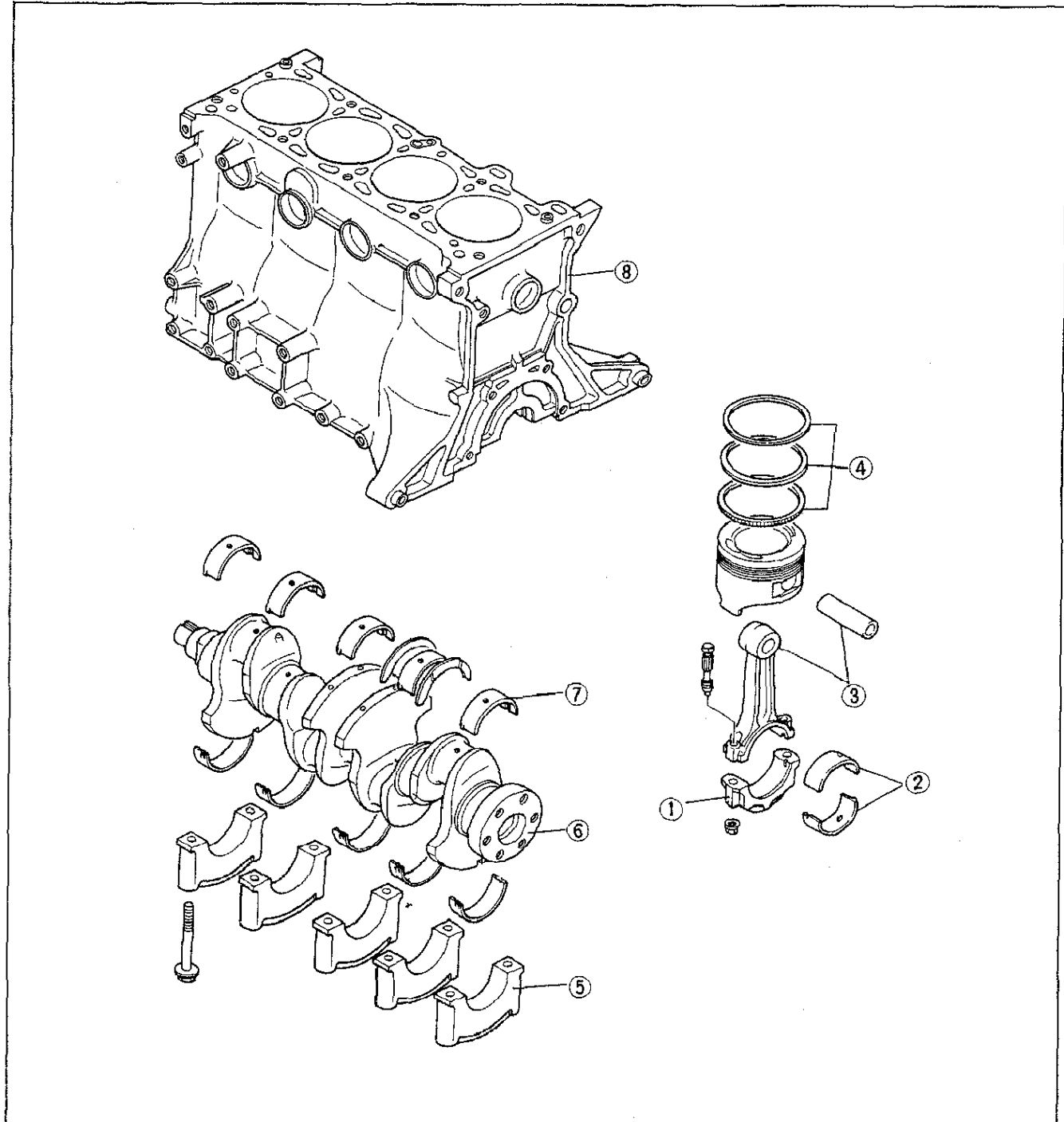
83U01X-144

Clutch cover and flywheel

Remove the clutch cover and flywheel with the **SST** as shown in the figure.

Disassembly Related to Crankshaft and Piston**Note**

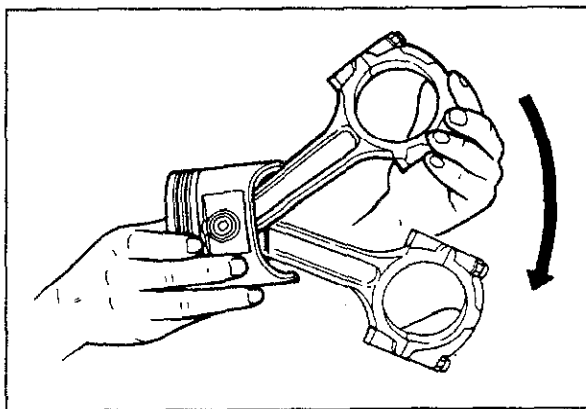
During disassembly, inspect the crankshaft end play, main journal bearing oil clearance, connecting rod bearing oil clearance, connecting rod side clearance referring to ASSEMBLY section.



83U01A-055

1. Connecting rod caps
2. Connecting rod bearings
3. Connecting rod and piston pin
4. Piston rings

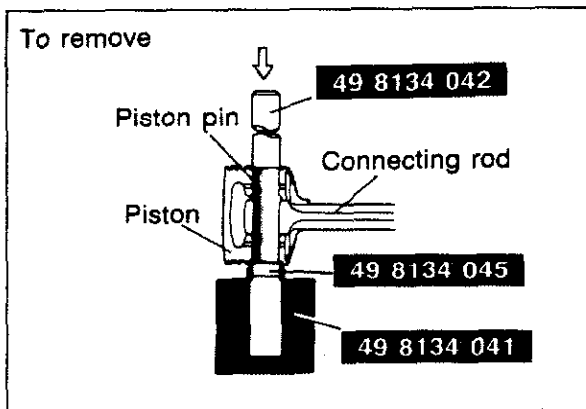
5. Main bearing caps
6. Crankshaft
7. Main bearings
8. Cylinder block



83U01A-056

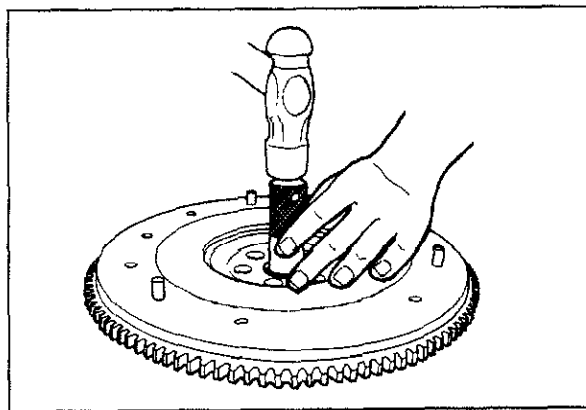
Piston and connecting rod

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



83U01A-057

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



63U01X-065

Flywheel pilot bearing

Use suitable pipe and punch out to the crankshaft side of the flywheel, as shown in the figure.

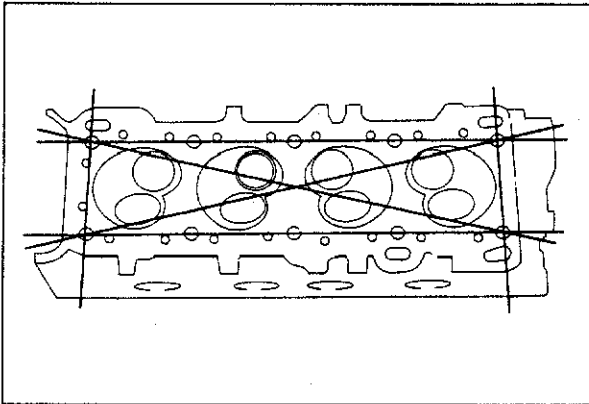
INSPECTION AND REPAIR

1. Clean all parts, taking care to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign material.
2. Inspect and repair 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.

83U01A-058

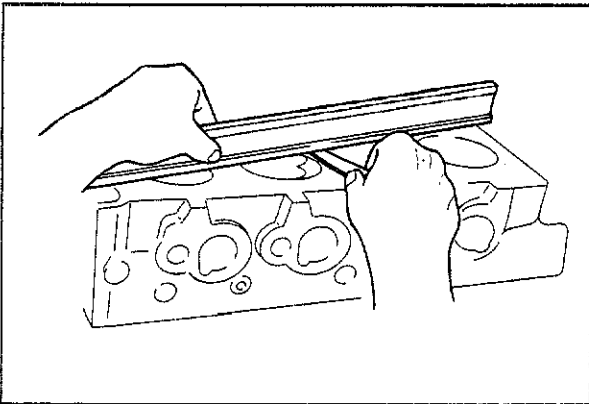


83U01A-059

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.



83U01A-060

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:

107.4—107.6 mm (4.228—4.236 in)

Grinding: 0.20 mm (0.008 in) max.

Note

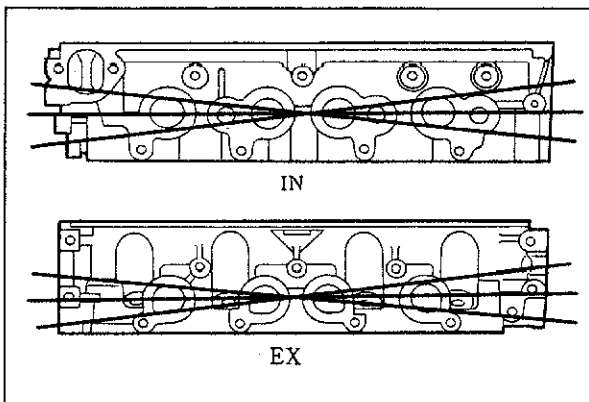
Before grinding the cylinder head, first check the following and replace the head if necessary.

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

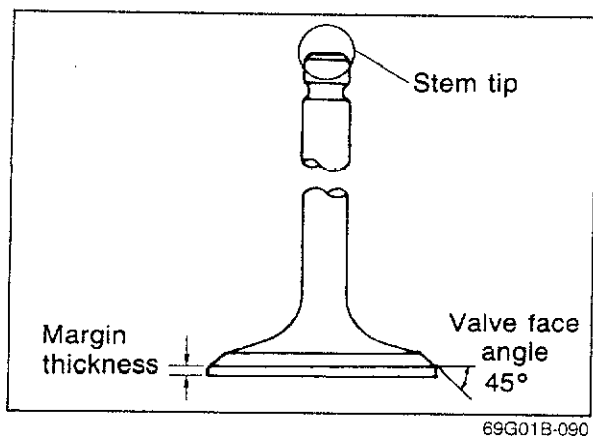
4. Measure the manifold contact surface distortion in the six directions shown in the figure.

Distortion: 0.15 mm (0.006 in) max.

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



83U01A-061



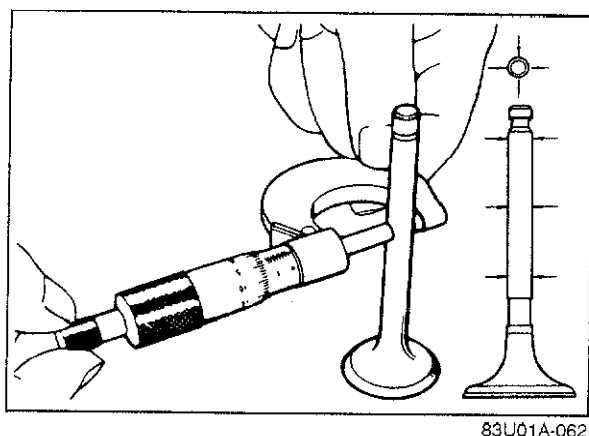
Valve and Valve Guide

1. Inspect each valve for the following, replace or resurface as necessary.
 - (1) Damaged or bent stem
 - (2) Roughness or damage to the face
 - (3) Damage or uneven wear of the 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.



3. Measure the valve length.

Length

IN : 103.77 mm (4.0854 in)

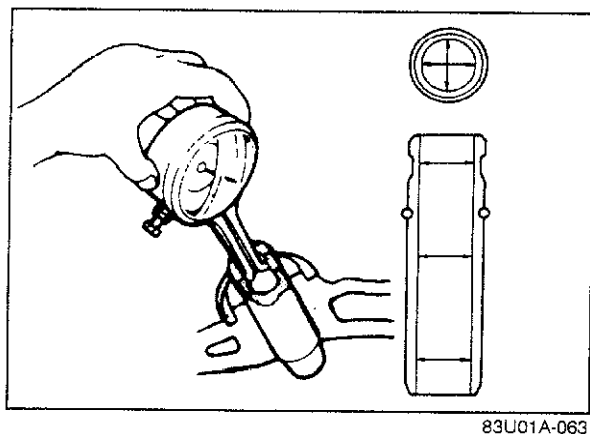
EX: 102.67 mm (4.0421 in)

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)

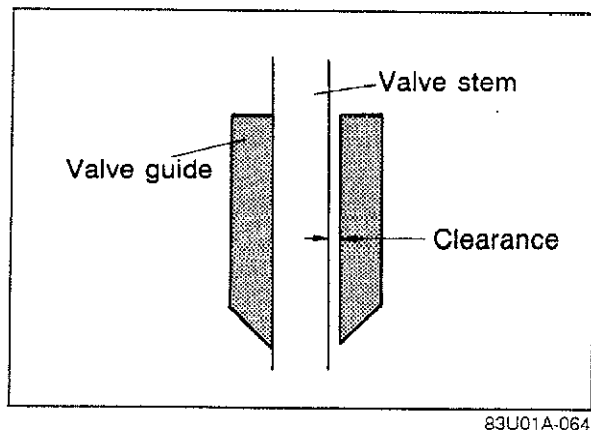


5. Measure the valve guide inner diameter.

Inner diameter

IN : 7.01—7.03 mm (0.2760—0.2768 in)

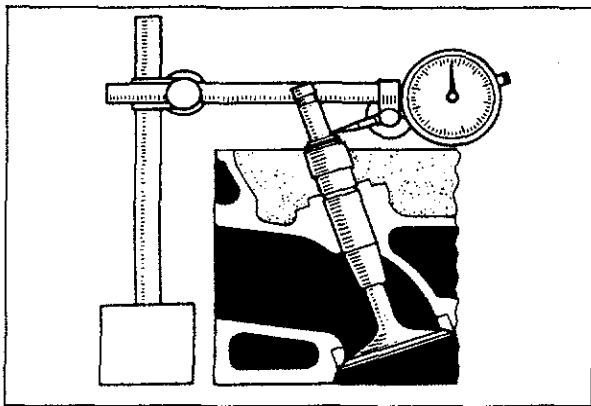
EX: 7.01—7.03 mm (0.2760—0.2768 in)



6. Measure the valve stem to guide clearance.

(1) Method No. 1

Subtract the valve stem measurement from the corresponding valve guide inner diameter measurement.



83U01A-065

(2) Method No. 2

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

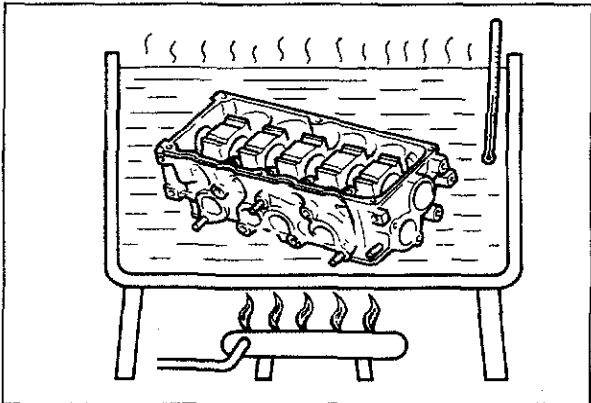
Clearance

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)

- If the clearance exceeds the maximum, replace the valve and/or valve guide.

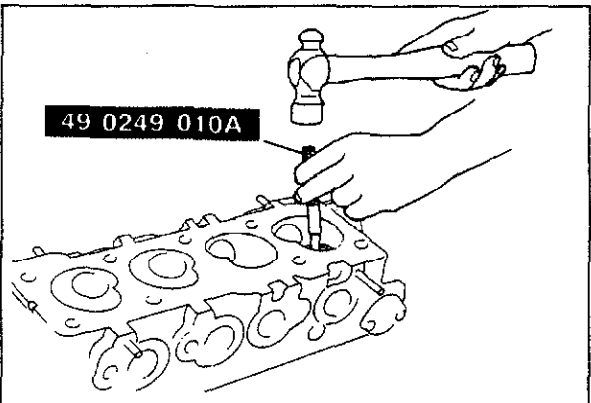


69G01B-093

Replacement of valve guide

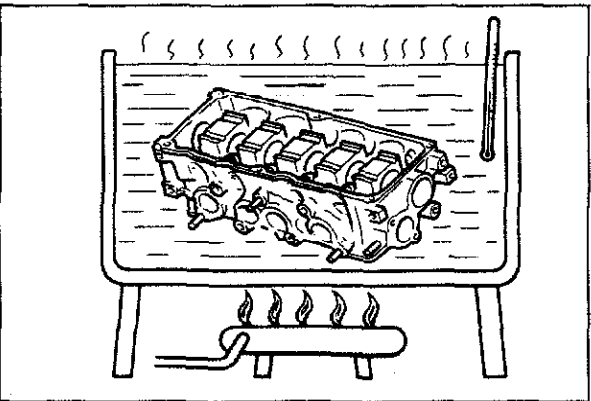
Removal

- Gradually heat the cylinder head in water to approx. **90°C (190°F)**.



83U01A-066

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

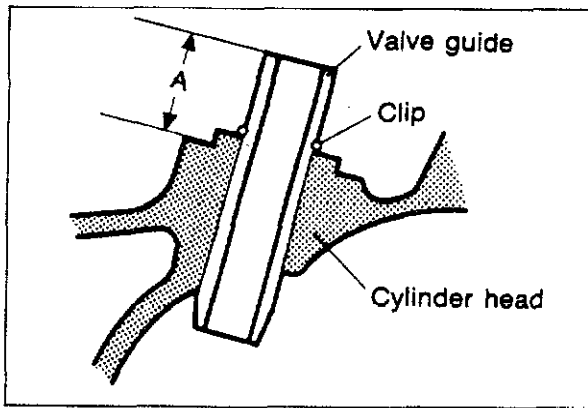


83U01A-135

Installation

- Fit the clip onto the valve guide.
- Gradually heat the cylinder head in water to approx. **90°C (190°F)**.
- Tap the valve guide in from the side opposite the combustion chamber until the clip contacts the cylinder head with the **SST** (49 0249 010A).

1A INSPECTION AND REPAIR



83U01A-067

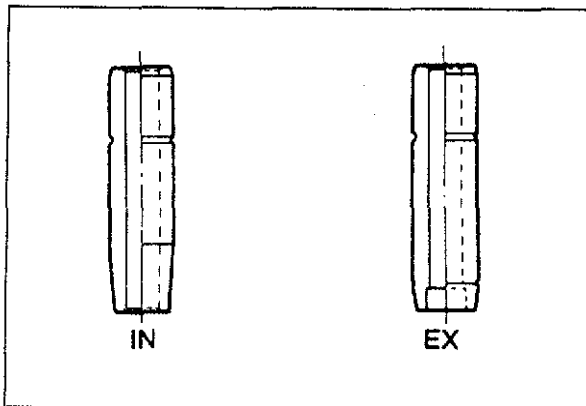
4. Check that the protrusion height (dimension A in the figure) is within specification.

Height:

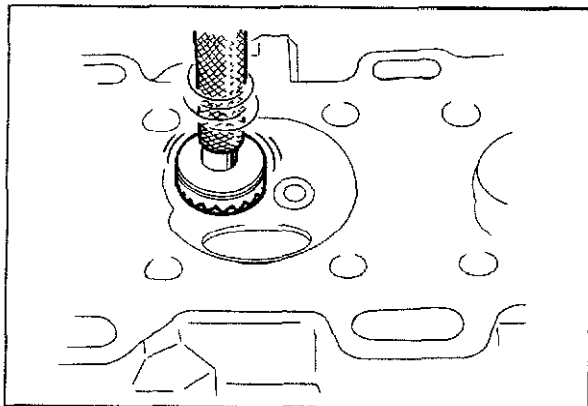
13.2—13.8 mm (0.520—0.543 in)

Note

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



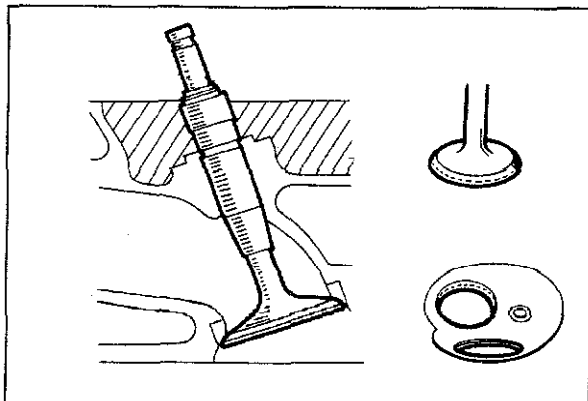
69G01B-098



83U01A-068

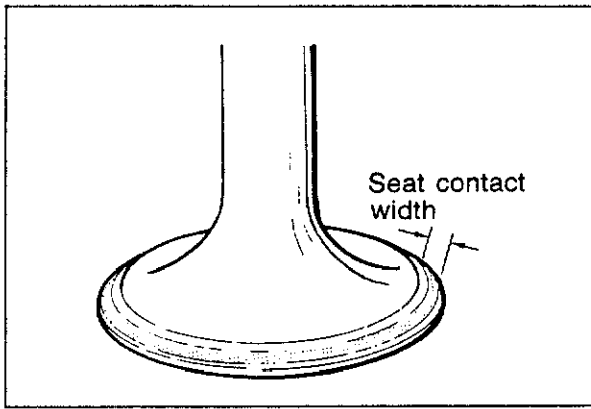
Valve Seat

1. Inspect the contact surface of the valve seat and valve face.
 - (1) Roughness
 - (2) Damage
2. If necessary, resurface the valve seat using a **45°** valve seat cutter and/or resurface the valve face.



83U01A-136

3. Apply a thin coat of prussian blue to the valve face.
4. Check the valve seating by pressing 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.



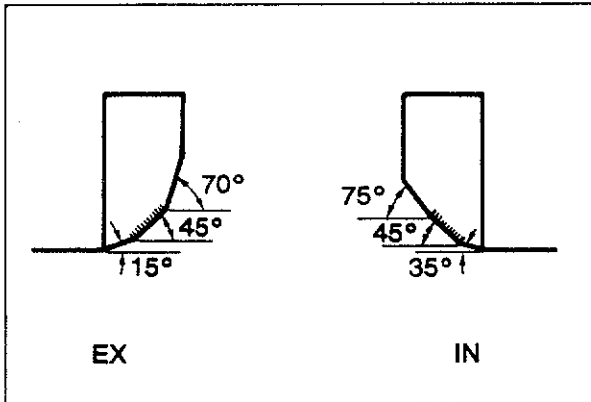
83U01A-069

5. Check the seat contact width and valve seating position on the valve face.

Width:

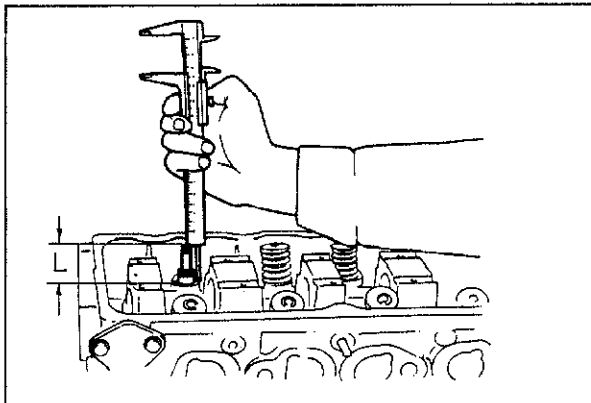
1.1—1.7 mm (0.043—0.067 in)

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



83U01A-070

- (1) If the seating position is too high, correct the valve seat using a **75°** cutter, and a **45°** cutter.
- (2) If the seating position is too low, correct the valve seat using a **35° (IN)** or **15° (EX)**, and a **45°** cutter.
7. Seat the valve to the valve seat using a lapping compound.



83U01A-071

8. Check the sinking of the valve seat. Measure protruding length (dimension "L") of the valve stem.

Dimension "L": 39.0 mm (1.535 in)

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

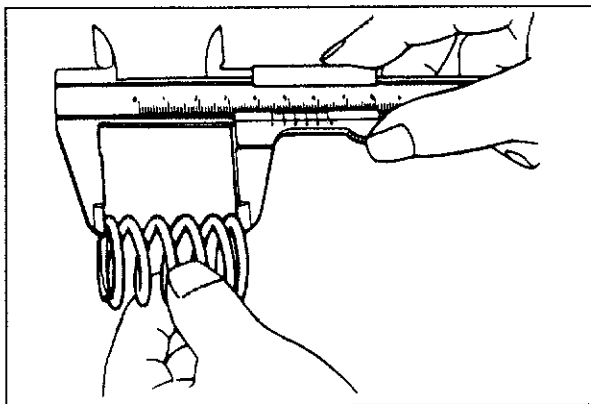
39.0—39.5 mm (1.535—1.555 in)

- (2) If "L" is as below, insert a spacer between the spring seat and cylinder head so that "L" will be as specified.

39.5—40.5 mm (1.555—1.594 in)

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

40.5 mm (1.594 in) or more



83U01A-072

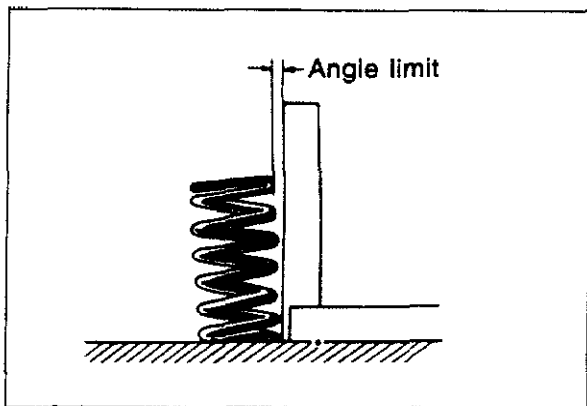
Valve Spring

1. Inspect each valve spring for cracks or damage.
2. Check the free length and angle, replace if necessary.

Free length

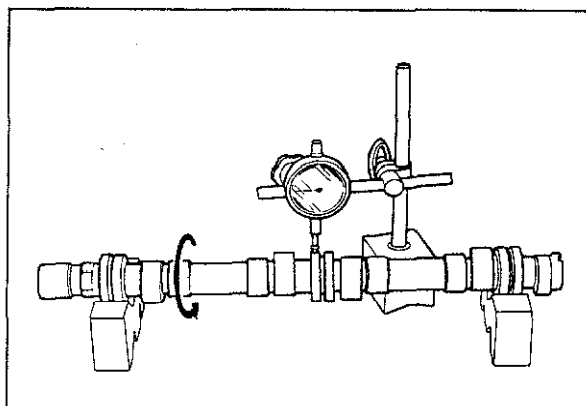
Standard: 43.7 mm (1.720 in)

Minimum: 42.3 mm (1.665 in)



83U01A-073

Angle: 1.5 mm (0.059 in) max.

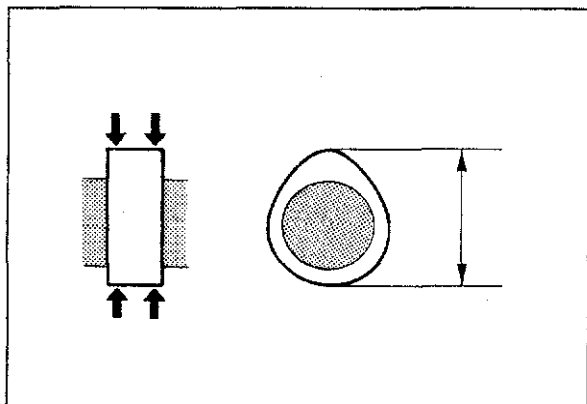


83U01A-074

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.



83U01A-075

2. Check the cam for wear or damage, replace if necessary.
3. Check the cam lobe height at the two places as shown.

Height

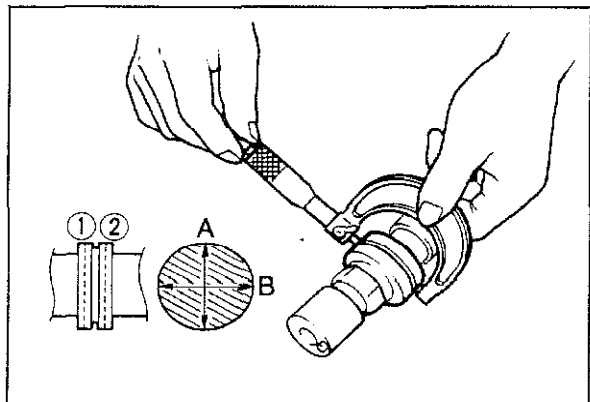
IN : 36.38—36.53 mm (1.432—1.438 in)

EX: 36.38—36.53 mm (1.432—1.438 in)

Minimum

IN : 36.23 mm (1.426 in)

EX: 36.23 mm (1.426 in)



83U01A-076

4. Measure wear of the journals in X and Y directions at the two places shown.

Diameter

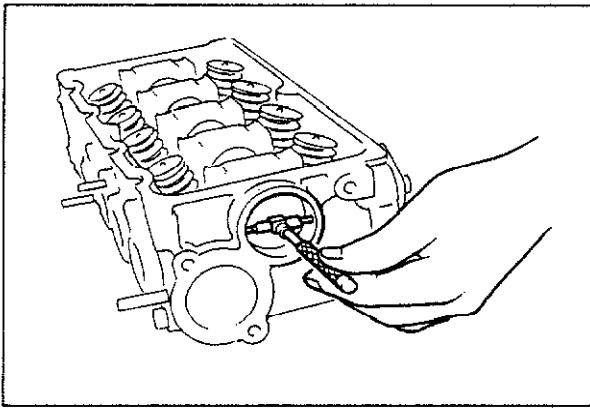
Front and rear:

43.440—43.465 mm (1.7102—1.7112 in)

Center:

43.410—43.435 mm (1.7091—1.7100 in)

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



83U01A-077

5. Measure the oil clearances between the camshaft and cylinder head.
 - (1) Remove any oil or dirt from the journals and the camshaft bore.
 - (2) Measure the camshaft bore diameter.

Diameter:

43.500—43.525 mm (1.7126—1.7135 in)

- (3) Subtract the journal diameter from the bore diameter.

Oil clearance

Front and Rear

0.035—0.085 mm (0.0013—0.0033 in)

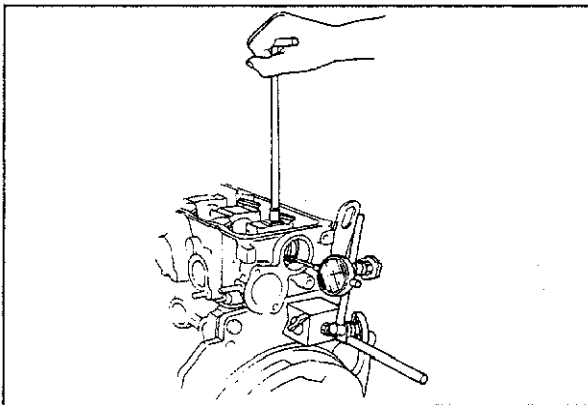
Center:

0.065—0.115 mm (0.0026—0.0045 in)

Maximum: 0.15 mm (0.0059 in)

- (4) If the clearance exceeds the maximum, replace the camshaft or cylinder head.

83U01A-078



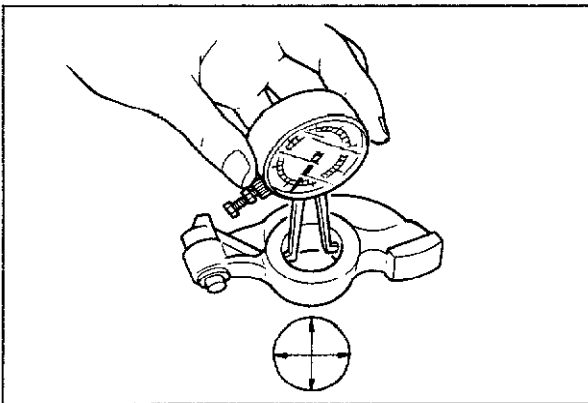
83U01A-079

6. Measure the camshaft end play. If it exceeds the maximum, replace the thrust plate or camshaft.

End play:

0.05—0.18 mm (0.0020—0.0071 in)

Maximum: 0.20 mm (0.0079 in)



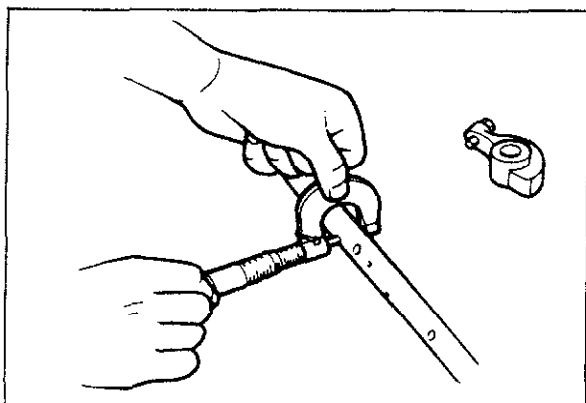
83U01A-080

Rocker Arm and Rocker Arm Shaft

1. Check for wear or damage to the contact surface of the rocker arm shaft or 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:

18.000—18.027 mm (0.7087—0.7097 in)



83U01A-081

- (2) Measure the rocker arm shaft diameter.

Diameter:

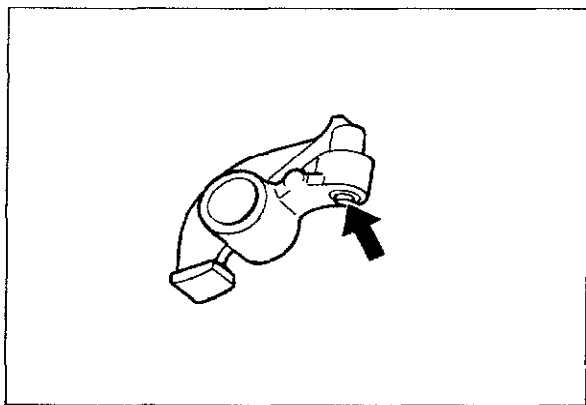
17.959—17.980 mm (0.7070—0.7078 in)

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

Oil clearance:

0.020—0.068 mm (0.0008—0.0027 in)

Maximum: 0.10 mm (0.0039 in)



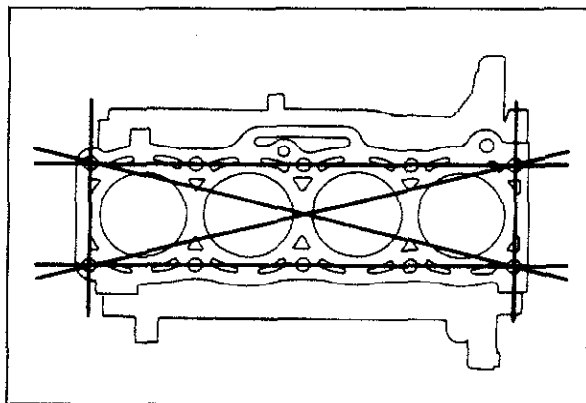
69G01A-116

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 damage to the "O" ring.

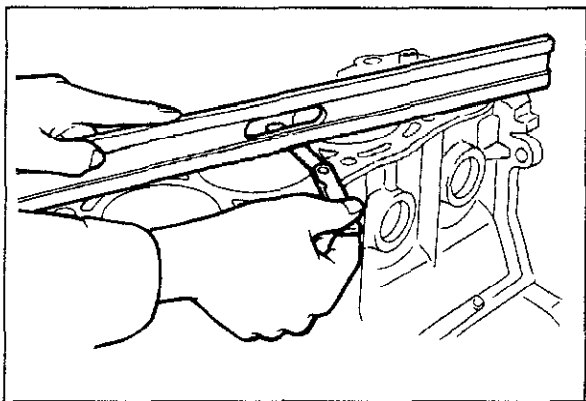


69G01A-117

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 shown in figure.

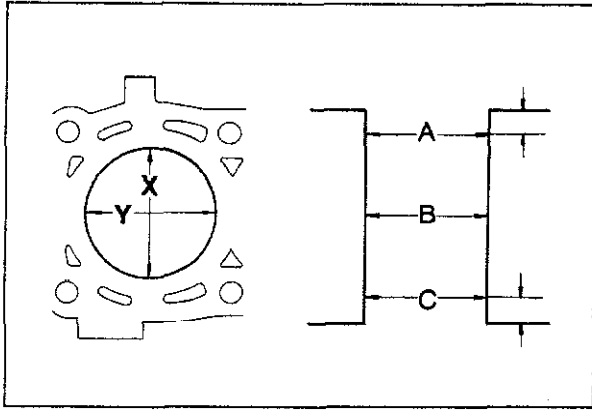
Distortion: 0.15 mm (0.006 in) max.



69G01A-118

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

Grinding: 0.20 mm (0.008 in) max.



83U01A-082

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

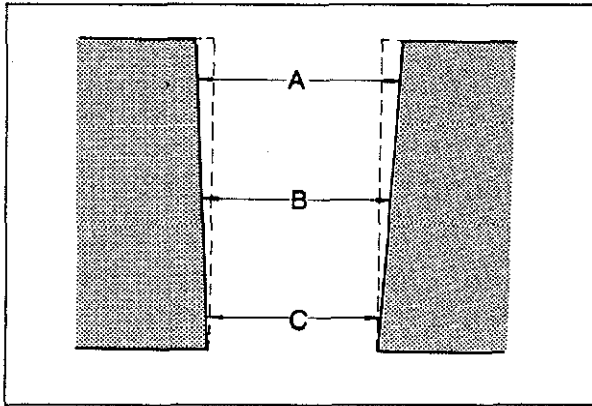
Cylinder bore

mm (in)

| Size | Bore |
|-----------------------|----------------------------------|
| Standard | 78.000—78.019 (3.0709—3.0717) |
| 0.25 (0.010) oversize | 78.250—78.269 (3.0807—3.0815) |
| 0.50 (0.020) oversize | 78.500—78.519 (3.0905—3.0913) |

- (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.



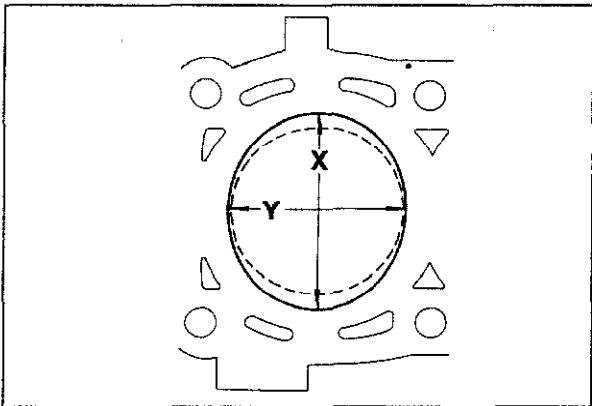
83U01A-083

- (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.

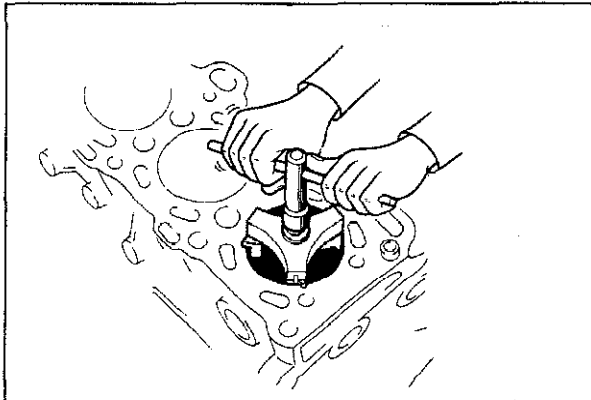
Caution

The boring size should be the same for all cylinders.

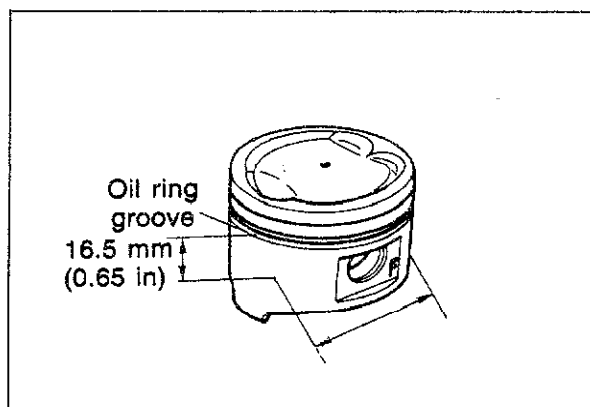


83U01A-084

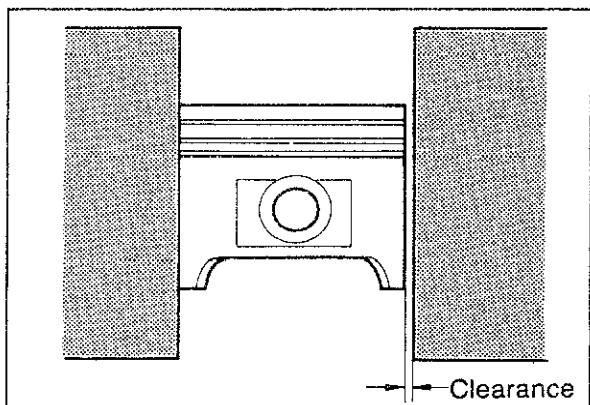
5. If the upper part of the cylinder wall shows uneven wear, remove the ridge using a ridge reamer.



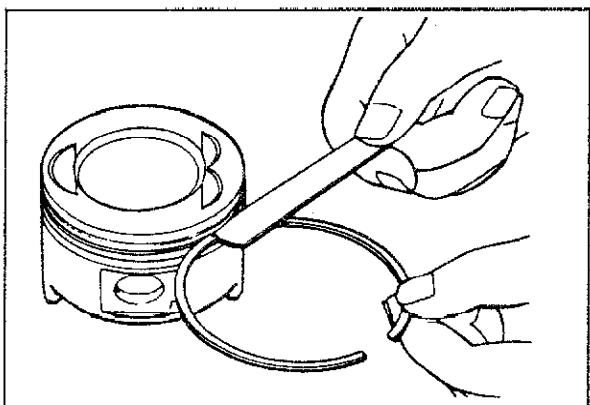
69G01A-122



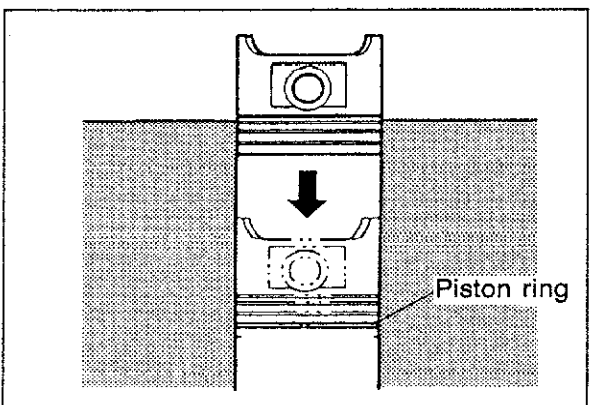
83U01A-085



83U01A-086



83U01A-087



83U01A-088

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°) to the piston pin, **16.5 mm (0.650 in)** below the oil ring land lower edge.

Piston diameter

mm (in)

| Size | Diameter |
|-----------------------|----------------------------------|
| Standard | 77.954—77.974 (3.0690—3.0698) |
| 0.25 (0.010) oversize | 78.204—78.224 (3.0789—3.0797) |
| 0.50 (0.020) oversize | 78.454—78.474 (3.0887—3.0895) |

3. Check the piston to cylinder clearance.

Clearance:

0.026—0.065 mm (0.0010—0.0026 in)

Maximum: 0.15 mm (0.0059 in)

4. If the clearance exceeds the maximum, replace the piston or rebores the cylinder to oversize.

Note

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):

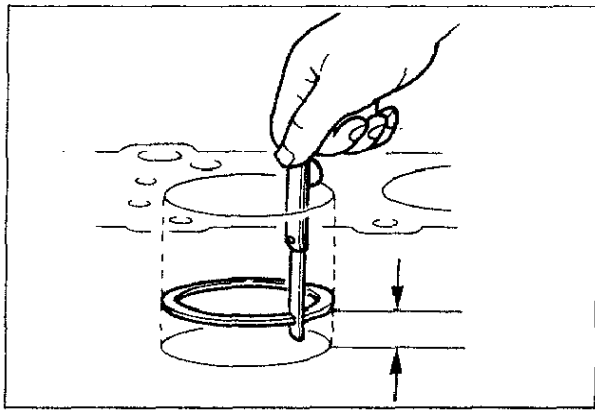
0.030—0.065 mm (0.0012—0.0026 in)

Maximum: 0.15 mm (0.006 in)

2. If the clearance exceeds the maximum, 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.

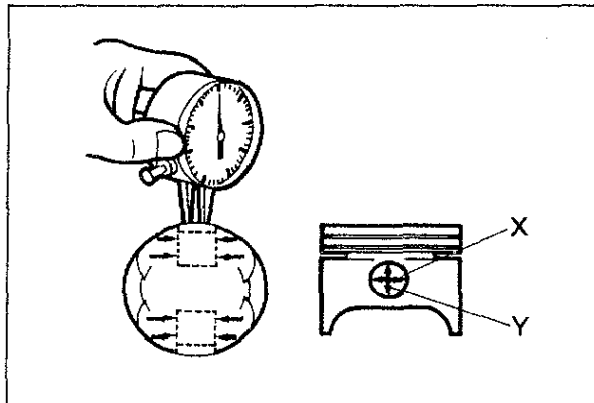


83U01A-089

5. Measure each piston ring end gap using a feeler gauge, replace if necessary.

End gap

Top : 0.20—0.40 mm (0.008—0.016 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)



83U01A-090

Piston and Piston Pin

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

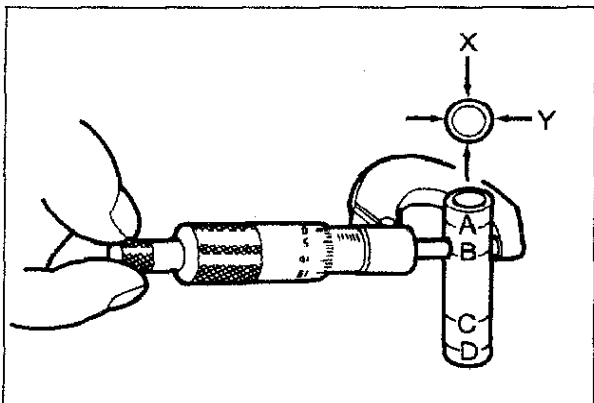
Diameter:

19.988—20.000 mm (0.7869—0.7874 in)

2. Measure the piston pin diameter in the same manner.

Diameter:

19.974—19.980 mm (0.7864—0.7866 in)



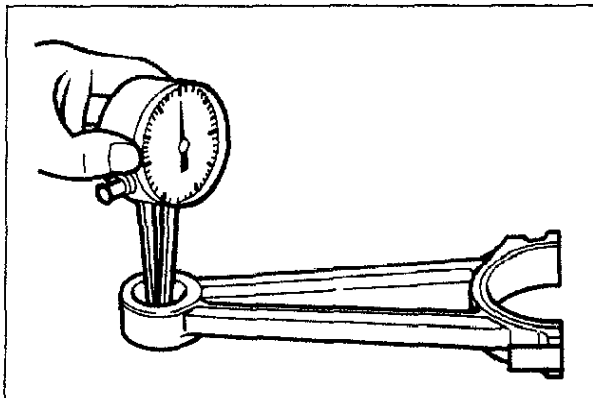
83U01A-091

3. Check the piston pin to piston clearance.

Clearance:

0.008—0.026 mm (0.0003—0.0010 in)

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



83U01A-092

Connecting Rod

1. Measure the connecting rod small end bore.

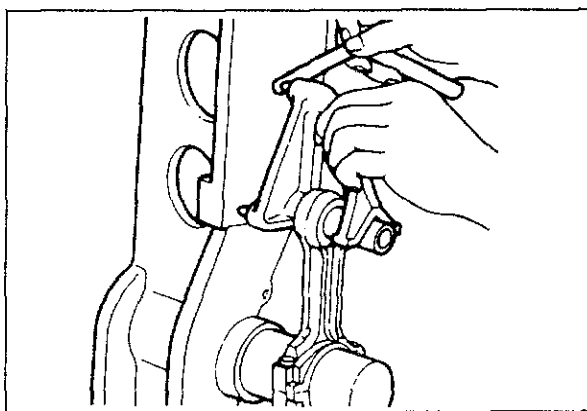
Diameter:

19.948—19.961 mm (0.7854—0.7859 in)

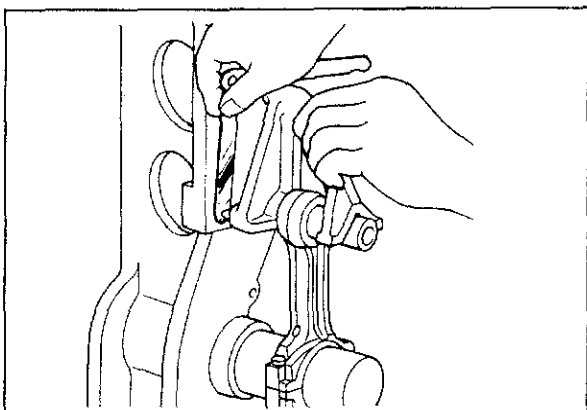
2. Check the interference between the small end bore and piston pin.

Interference:

0.013—0.032 mm (0.0005—0.0013 in)



69G01B-115

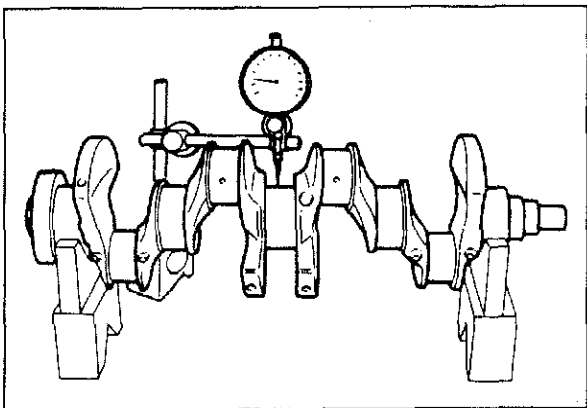


69G01B-116

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

Bend: 0.04 mm (0.0016 in) max.

Twist: 0.04 mm (0.0016 in) max.

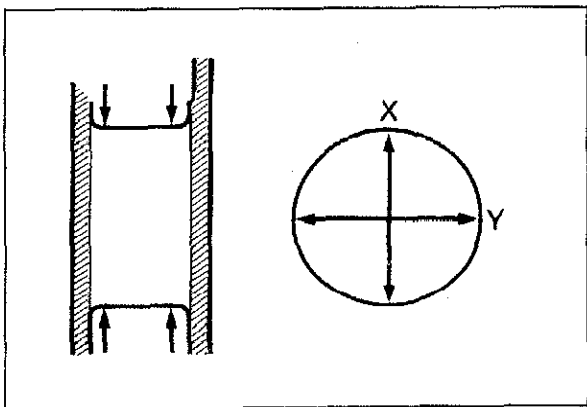


83U01A-093

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: 0.04 mm (0.0016 in) max.



83U01A-094

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

Main journal

Diameter:

49.938—49.956 mm (1.9661—1.9668 in)

Minimum: 49.89 mm (1.964 in)

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

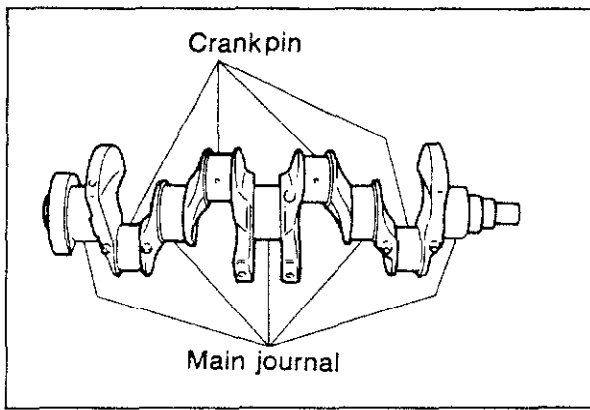
Crankpin journal

Diameter:

44.940—44.956 mm (1.7693—1.7699 in)

Minimum: 44.89 mm (1.7673 in)

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



83U01A-095

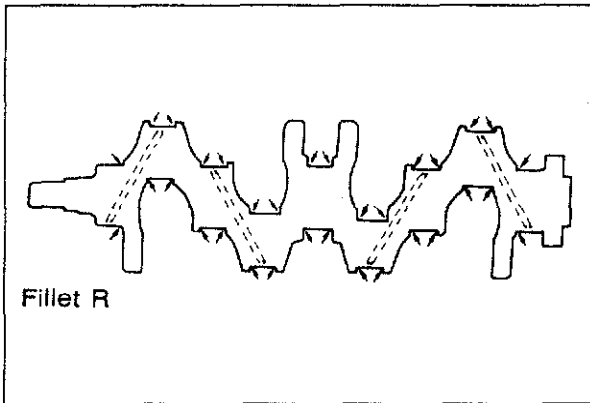
- If the diameter is below the minimum, grind the journals to match undersize bearings.

Undersize bearing:

0.25 mm (0.010 in), 0.50 mm (0.020 in)

Main journal diameter undersize mm (in)

| Bearing size | Journal diameter |
|----------------|-------------------------------|
| 0.25 undersize | 49.688—49.706 (1.9562—1.9569) |
| 0.50 undersize | 49.438—49.456 (1.9464—1.9471) |



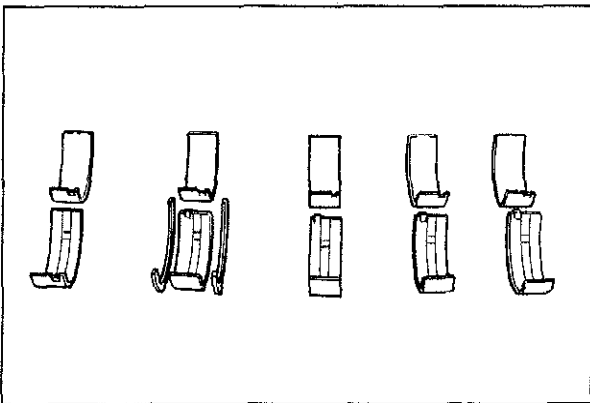
83U01A-096

Crankpin journal diameter undersize mm (in)

| Bearing size | Journal diameter |
|----------------|-------------------------------|
| 0.25 undersize | 44.690—44.706 (1.7594—1.7601) |
| 0.50 undersize | 44.440—44.456 (1.7496—1.7502) |

Caution

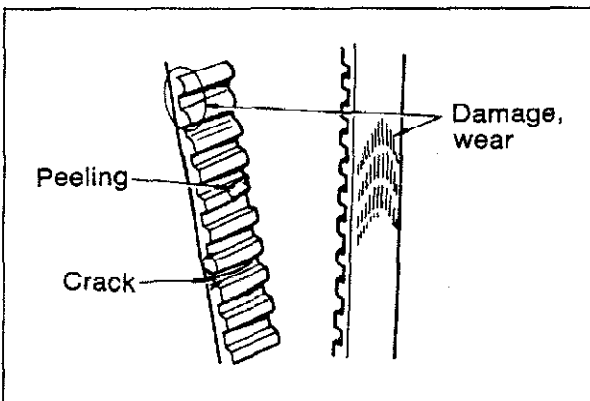
Do not grind the fillet roll.



83U01A-097

Main Bearing and Connecting Rod Bearing

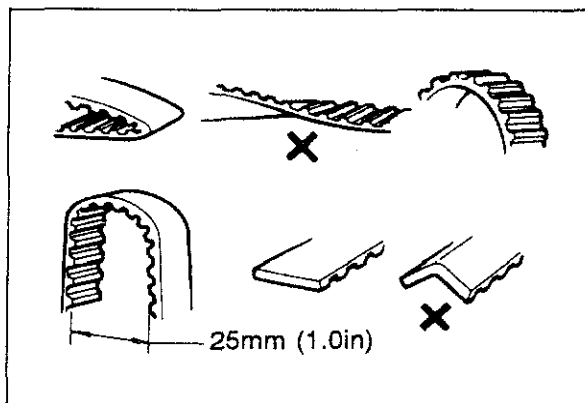
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.



69G01B-121

Timing Belt

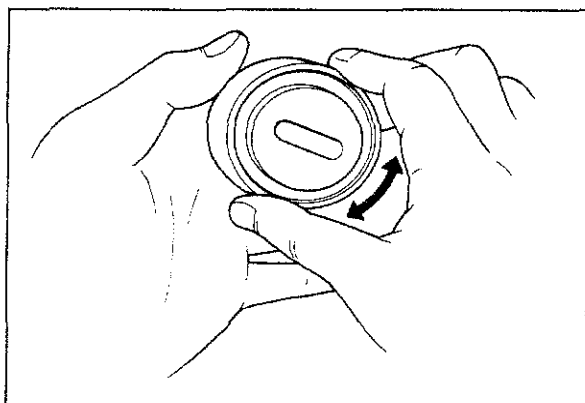
- Replace the timing belt if there is any oil or grease on it.
- Check the timing belt for damage, wear, peeling, cracks, or hardening, replace if necessary.



69G01B-122

Caution

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



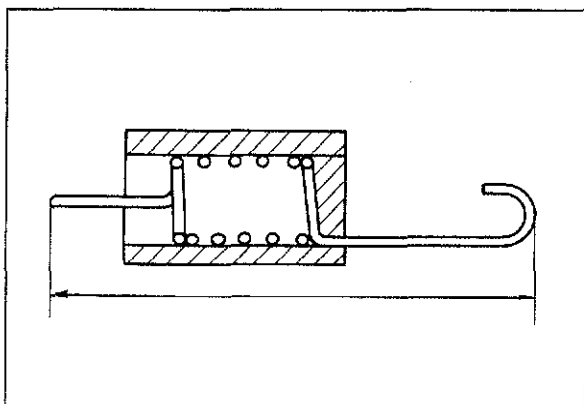
83U01A-098

Timing Belt Tensioner and Idler Pulley

Check the timing belt tensioner and idler pulley for smooth rotation or 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.

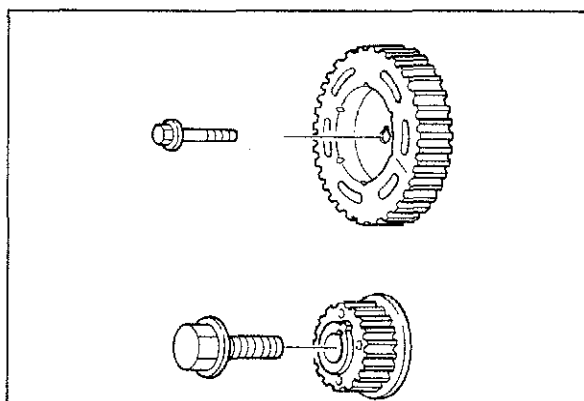


83U01A-099

Timing Belt Tensioner Spring

Check the free length of the tensioner spring, replace if necessary.

Free length:
64.0 mm (2.520 in)



69G01B-125

Timing Belt Pulley and Camshaft Pulley

Inspect the pulley teeth for wear, deformation, or other damage, replace the pulley 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)

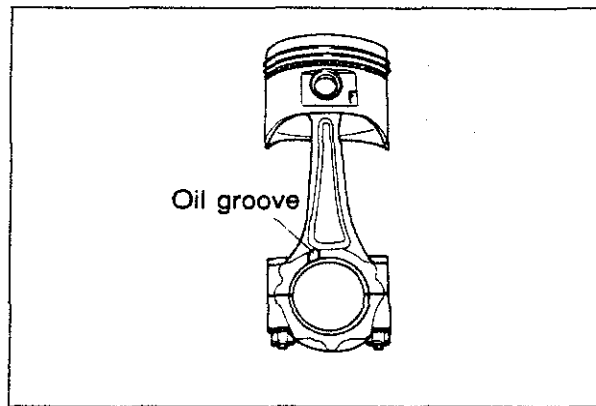
Inspect the timing belt covers for deformation or cracks, replace if necessary.

ASSEMBLY

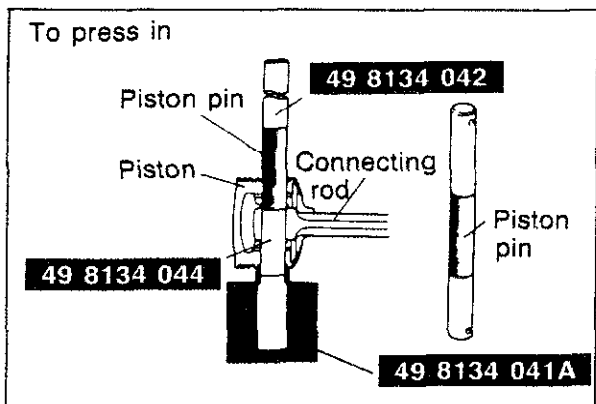
Assembly Note

1. Be sure all parts are clean before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Do not reuse gaskets or oil seals.
4. During assembly, inspect all critical clearances, end plays and oil clearances.
5. Tighten bolts to the specified torques.
6. Replace bearings if they are peeling, burned, or otherwise damaged.

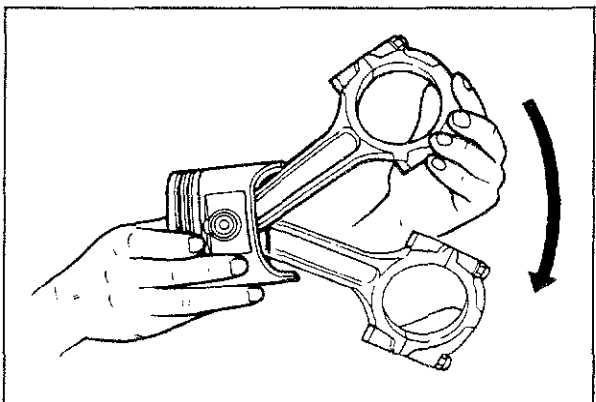
4BG01A-136



63U01X-093



83U01A-100



4BG01A-142

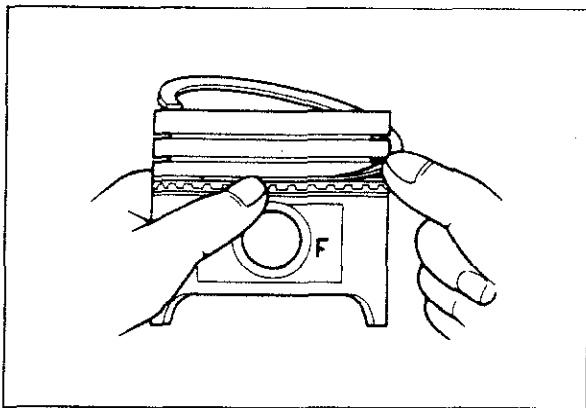
Connecting Rod

1. Align the oil groove in the large end of the connecting rod opposite the "F" mark on the piston.
2. Apply a coat of engine oil to the circumference of each piston pin and to the small end of each connecting rod.

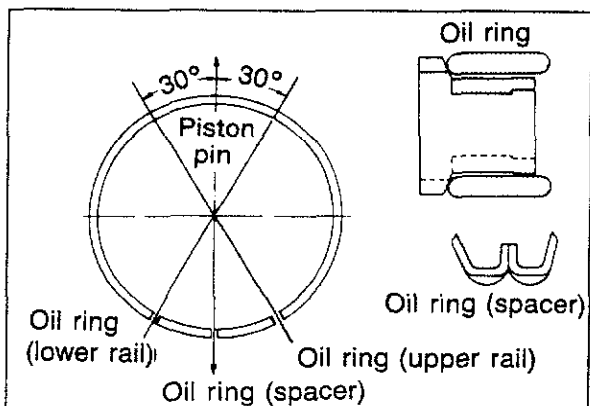
3. Set the **SST** in position as shown in the figure.
4. Insert the piston pin from the direction of the "F" mark on the piston.
5. Press the upper part of the **SST** (49 8134 042) with a press to force in the piston pin.
6. The piston pin should go in until the lower end of the **SST** (49 8134 044) meets the bottom of the **SST** (49 8134 041A).

Pressure force: 4.9—14.7 kN
(500—1,500 kg, 1,100—3,300 lb)

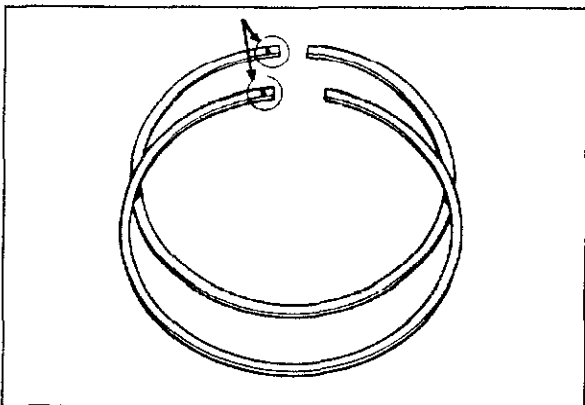
7. If the piston pin cannot be pressed in within the specified pressures, replace the piston pin or the connecting rod.
8. Check the oscillation torque of the connecting rod as shown in the figure. If the large end does not drop by its own weight, replace the piston and piston pin.



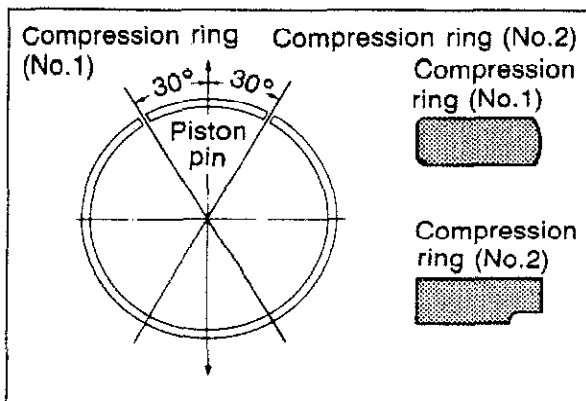
4BG01A-143



4BG01A-144



4BG01A-145



5BU01X-208

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.
 - (3) Install the upper rail and lower rail.

Caution

- a) After installation of the upper and lower side rails, make certain they turn smoothly in both directions.
- b) Do not align the end gaps, stagger them.

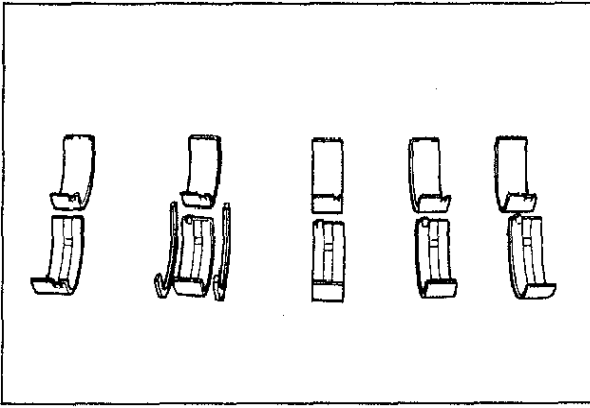
2. Install the second and top ring.

- (1) Apply a liberal coat of engine oil to the piston rings.
- (2) Install the second ring to the piston first, then the top one, using a piston ring insertion tool, (commercially available).

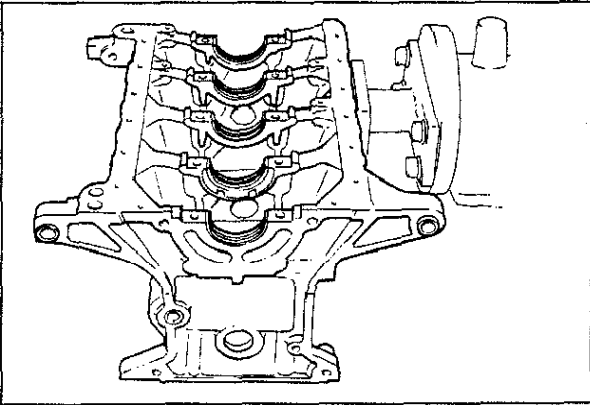
Caution

The rings must be installed so the "R" marks face upward.

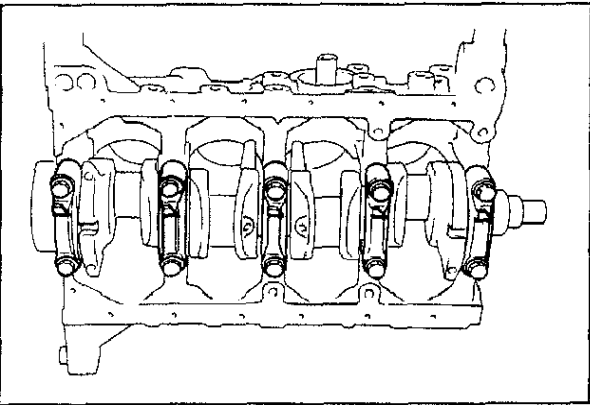
- (3) Position the opening of each ring as shown in the figure.



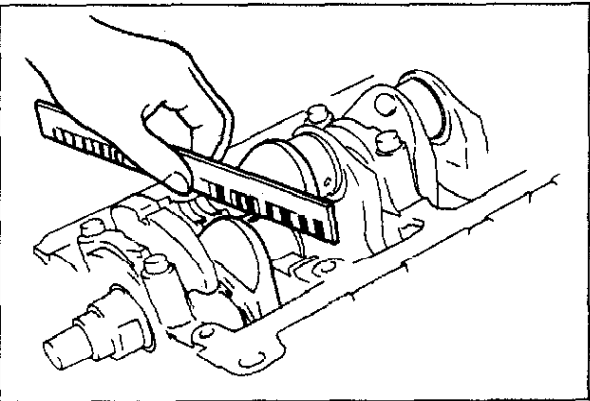
73U01X-004



4BG01A-147



63U01X-096



63U01A-101


Crankshaft

1. Inspect the oil clearances of the crankshaft and main bearings.

Caution

The main bearing with the oil grooves must be installed in the cylinder block.

- (1) Remove any foreign material and oil from the journal and bearing.
- (2) Install the main bearings and the crankshaft.
- (3) Position the plasti-gauge on top of each journal (in the journal axial direction), away from the oil hole.

- (4) Set the main bearing caps according to the cap number and  mark, and tighten it.

Note

Do not rotate the crankshaft when measuring the oil clearances.

Tightening torque:

54—59 N·m (5.5—6.0 m·kg, 40—43 ft·lb)

- (5) Remove the main bearing cap, 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.

Oil clearance:

0.024—0.042 mm (0.0009—0.0017 in)

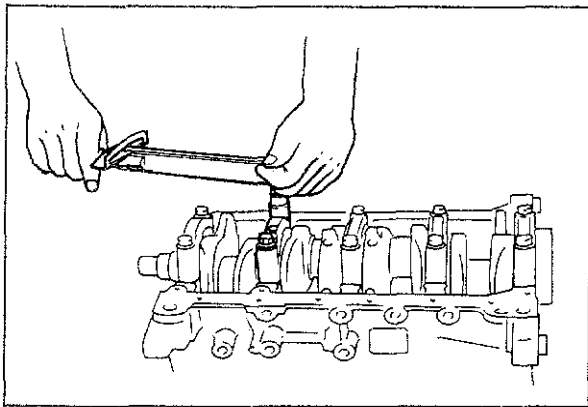
Maximum:

0.10 mm (0.0039 in)


- (6) If the oil clearance exceeds the limit, grind the crankshaft and use undersize main bearings.

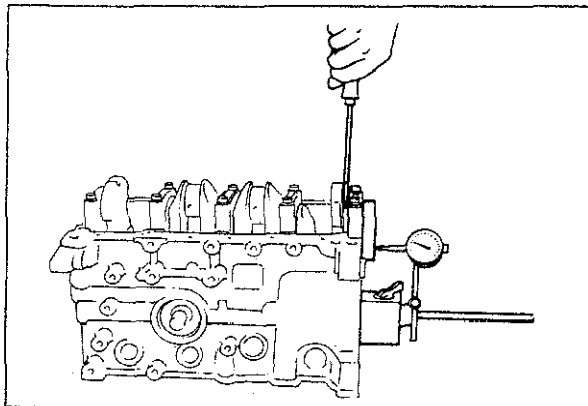
Undersize main bearings:

0.25 mm (0.010 in), 0.50 mm (0.020 in)



63U01X-098

2. Apply engine oil to the main bearings and main journals.
3. Install the thrust bearings to the cylinder block side.
4. Install the crankshaft, and install the main bearing caps according to the cap number and  mark.



63U01X-099

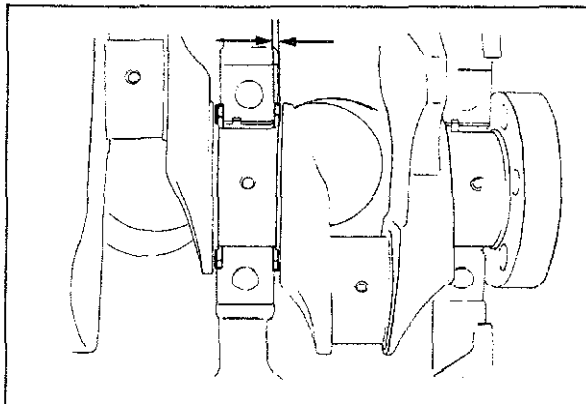
5. Inspect crankshaft end play.

End play:

0.08—0.282 mm (0.0031—0.0111 in)

Maximum:

0.30 mm (0.012 in)



83U01A-102

If end play exceeds the limit, adjust the end play with thrust bearings.

Standard thickness:

2.50—2.55 mm (0.0984—0.1004 in)

Undersize width:

0.25 mm (0.010 in):

2.625—2.675 mm (0.1033—0.1053 in)

0.50 mm (0.020 in):

2.750—2.800 mm (0.1083—0.1102 in)

Note

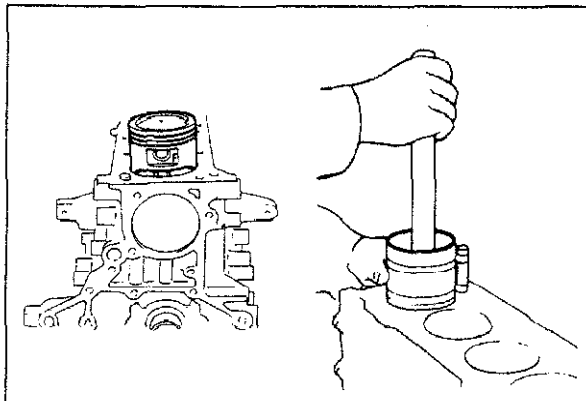
Oil groove of the thrust bearing must face the crankshaft.

Piston and Connecting Rod Assembly

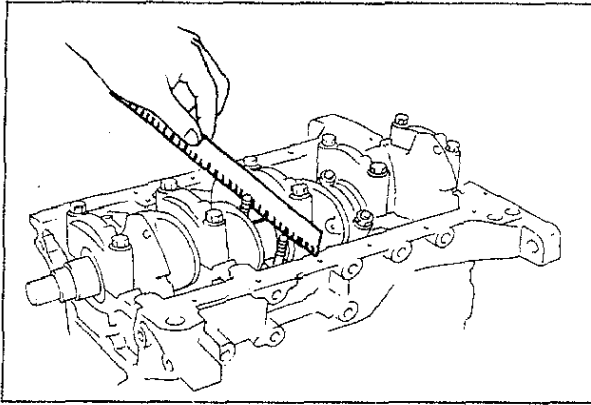
1. Apply engine oil to the cylinder walls, piston circumference, and rings.
2. Insert each piston and connecting rod into the cylinder block by using a piston insertion tool, (commercially available).

Caution

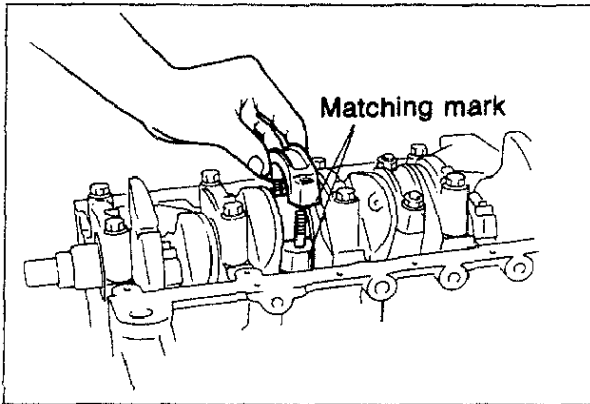
The pistons must be inserted so that the "F" marks face the front of the cylinder block.



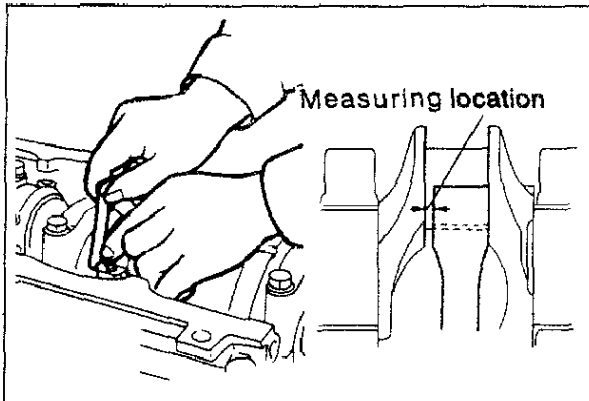
4BG01A-154



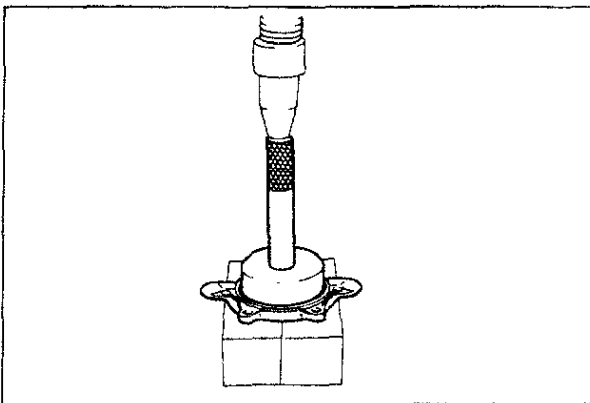
83U01A-103



4BG01A-156



4BG01A-157



63U01X-102

Connecting Rod Cap

1. Inspect and adjust the connecting rod bearing and crankshaft pin journal oil clearance by the same procedure used for the crankshaft and main bearing oil clearance.

Connecting rod cap tightening torque:

47—52 N·m (4.8—5.3 m·kg, 35—38 ft·lb)

Oil clearance:

0.028—0.068 mm (0.0011—0.0027 in)

Maximum:

0.10 mm (0.0039 in)

Undersize connecting rod bearing:

0.25 mm (0.010 in), 0.50 mm (0.020 in)

Caution

Be sure to align the matching marks on the cap and on the connecting rod when installing the connecting rod cap.

2. Check the side clearance of the connecting rod.

Clearance: 0.30 mm (0.012 in) max.

Caution

The connecting rod side clearance must be measured before installation.

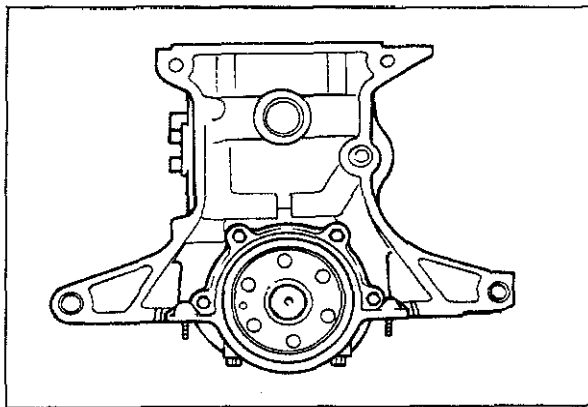
3. Apply engine oil to the crankpin journal and connecting rod bearing.
4. Install the connecting rod cap to align the matching mark and tighten it.

Tightening torque:

47—52 N·m (4.8—5.3 m·kg, 35—38 ft·lb)

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.

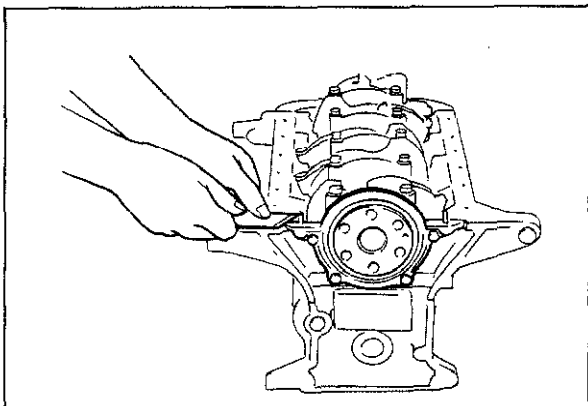


63U01X-103

3. Install the rear cover along with a new gasket.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

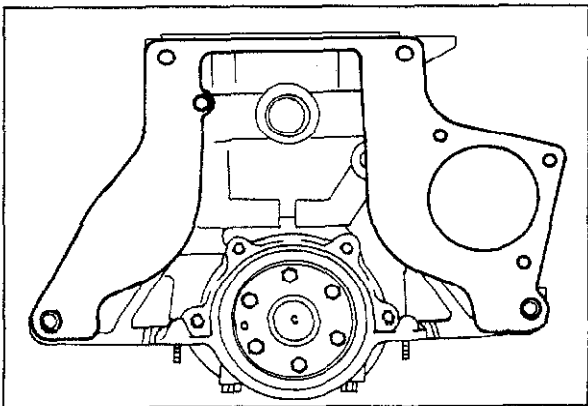


4EG01A-166

4. Cut away the part of the gasket that projects out from the rear cover assembly.

Caution

Do not scratch the rear cover assembly.



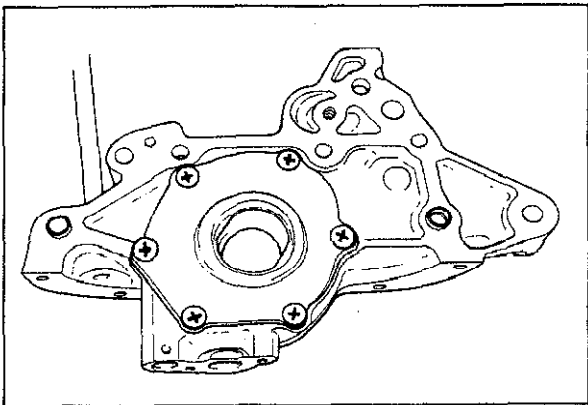
63U01X-104

End Plate

Install the end plate.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



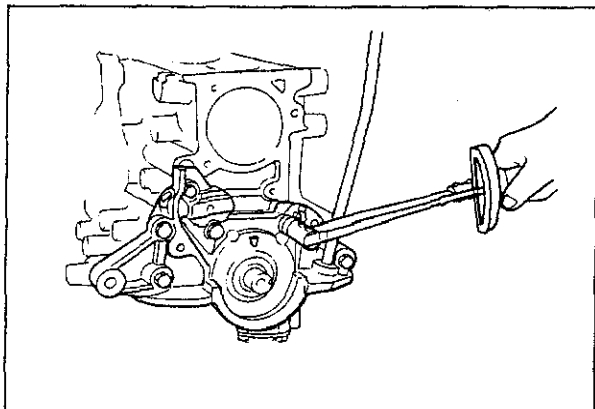
63U01X-105

Oil Pump

1. Remove any dirt or grease from the contact surfaces of the cylinder block and oil pump with a rag.
2. Apply engine oil to the oil seal lip.
3. Install new gasket.

Caution

Do not allow any sealant in the oil hole.



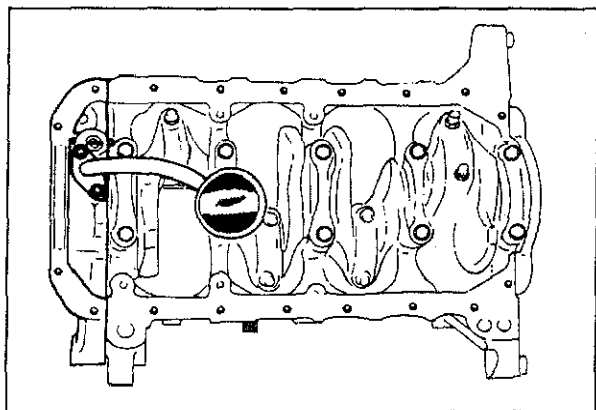
83U01A-104

4. Install the oil pump.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

5. Remove any sealant which is squeezed out.



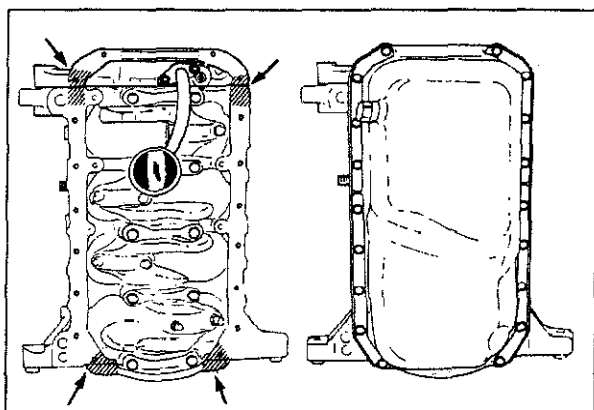
63U01X-107

Oil Strainer

Install the oil strainer along with a new gasket.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



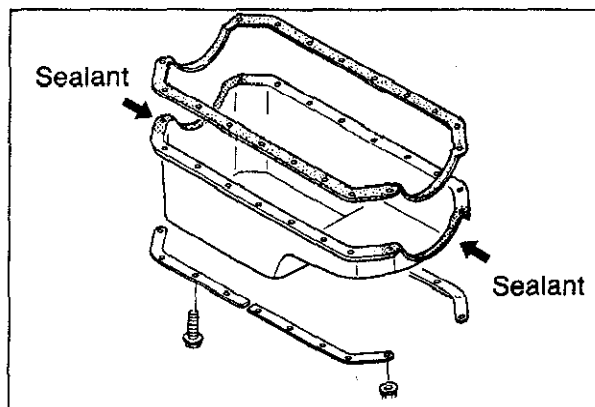
83U01A-105

Oil Pan

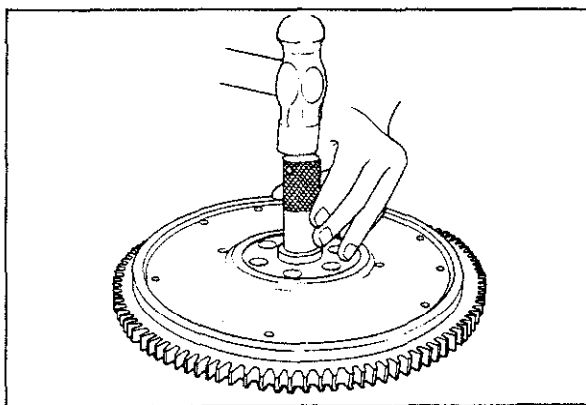
1. Apply sealant to the shaded areas as in the figure.
2. Install the oil pan along with the gasket and stiffener.

Tightening torque:

6—9 N·m (0.6—0.9 m·kg, 52—78 in·lb)



83U01A-106



83U01A-107

Flywheel (MTX)

1. Tap the pilot bearing in with a suitable pipe and hammer.
2. Apply sealant to the flywheel bolts.

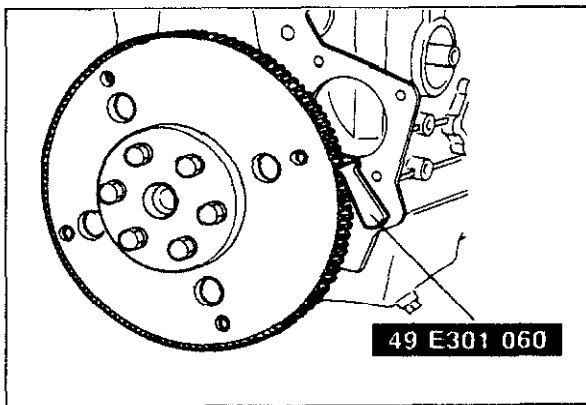
Caution

If reinstalling flywheel bolts, clean threads to remove old sealant, apply new sealant and tighten to specification.
If old sealant can not be removed, replace bolts.

3. Install the flywheel, with the **SST** while tightening.

Tightening torque:

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



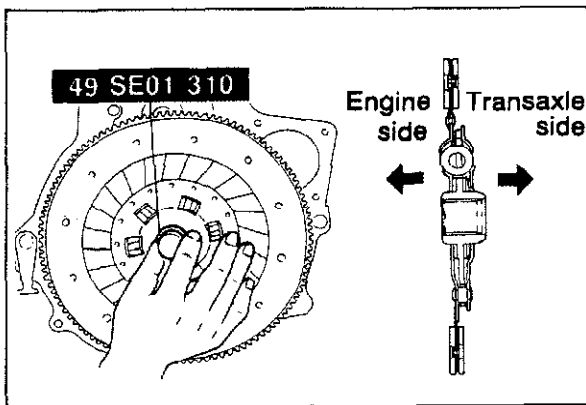
83U01A-108

Drive Plate (ATX)

Install the drive plate along with the adapter and backing plate with the **SST**.

Tightening torque:

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



83U01A-109

Clutch Disc and Clutch Cover

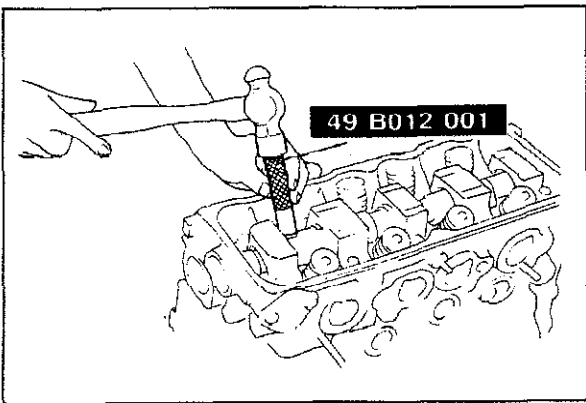
Install the clutch disc and clutch cover with the **SST**, and tighten the clutch cover.

Tightening torque:

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

Note

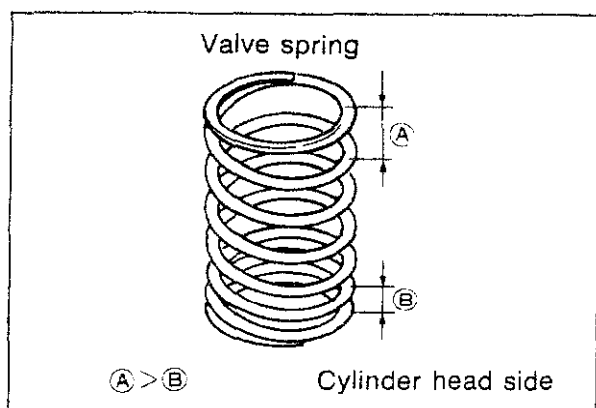
Follow the clutch disc installation directions exactly (See Section 6).



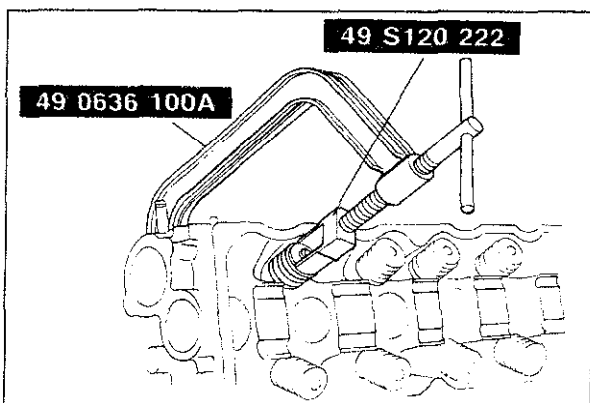
83U01X-145

Valve Seal

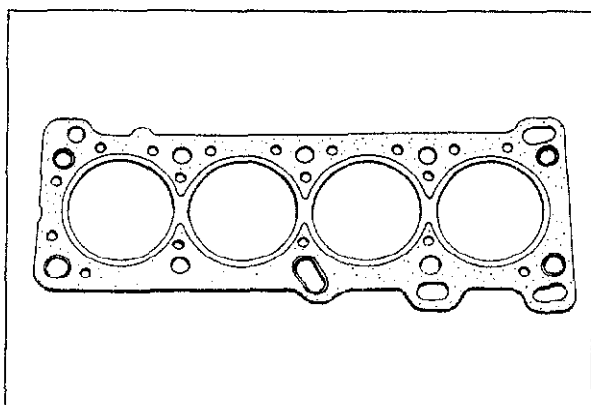
1. Apply engine oil to the inner surface of the new valve seal.
2. Install the valve seal onto the valve guide with the **SST**.



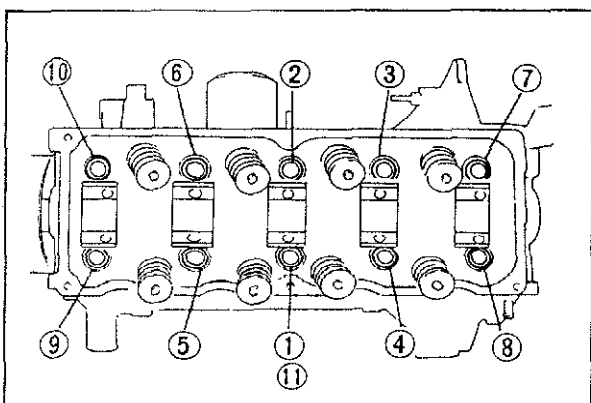
63U01X-091



63U01X-092



4BG01A-170



83U01A-110

Valve and Valve Spring

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

Note

Install the spring with its narrow pitch end toward the cylinder head.

4. Install the spring retainer after compressing the valve spring with the **SST**.

Cylinder Head

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

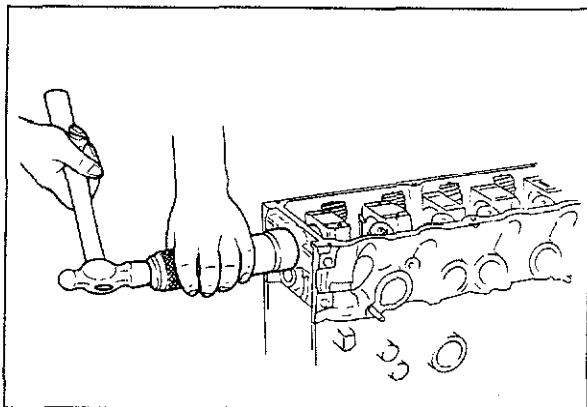
3. Install the cylinder head.

Tightening torque:

76—81 N·m (7.7—8.3 m·kg, 56—60 ft·lb)

Caution

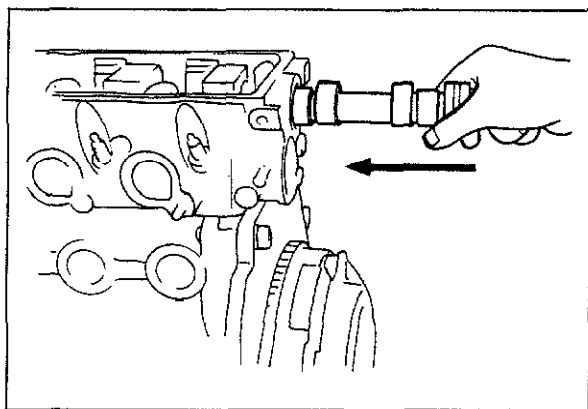
Tightening the bolts must be done gradually and in the order shown in the figure.



63U01X-118

Camshaft Oil Seal

1. Apply a thin coat of engine oil to the camshaft oil seal and cylinder head.
2. Tap the camshaft oil seal into the cylinder head.



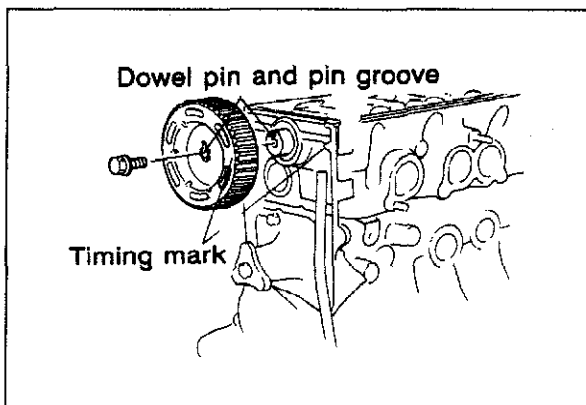
83U01A-111

Camshaft

Apply engine oil to the journals and bearings, then insert the camshaft in position with the thrust plate.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



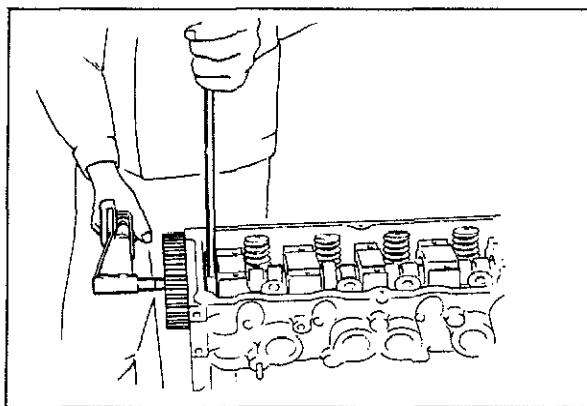
63U01X-121

Camshaft Pulley

1. Install the camshaft pulley onto the dowel pin with the pin groove facing straight upward.

Note

Be certain that the dowel pin of the camshaft also faces straight upward.

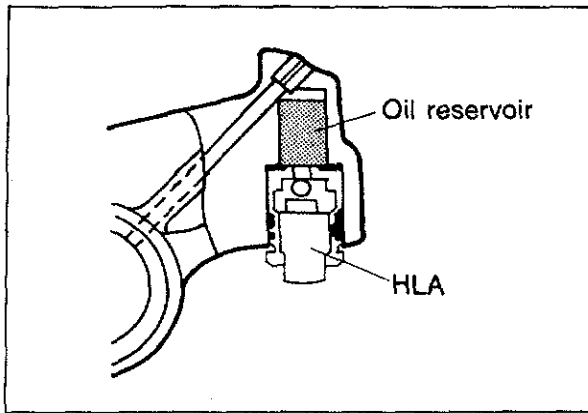


63U01X-122

2. Tighten the camshaft pulley bolt. Hold the camshaft using a suitable wrench on the cast hexagon, as shown.

Tightening torque:

49—61 N·m (5.0—6.2 m·kg, 36—45 ft·lb)



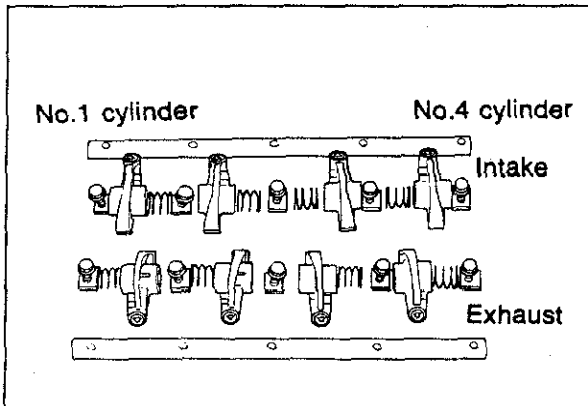
73G01A-076

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. Install the HLA in the rocker arm.

Caution

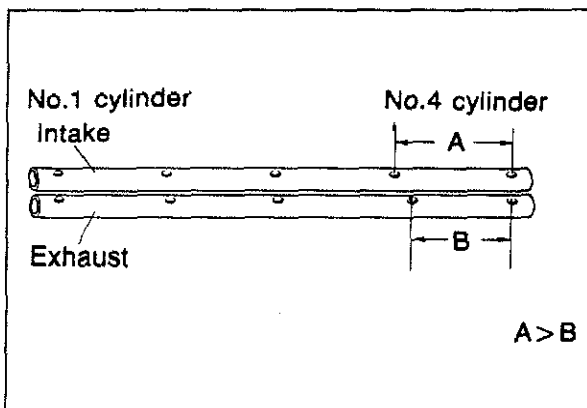
- a) Do not remove the HLA from the rocker arm unless necessary.
- b) Be careful not to damage the O-ring when installing.



63U01X-114

Rocker Arm and Rocker Shaft Assembly

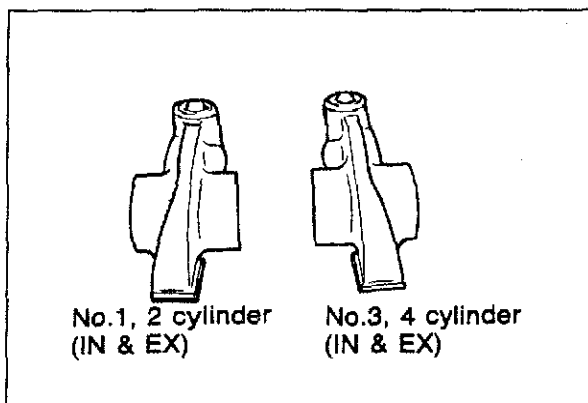
1. Assemble the rocker arm and rocker shaft assembly as shown in the figure.



63U01X-115

Caution

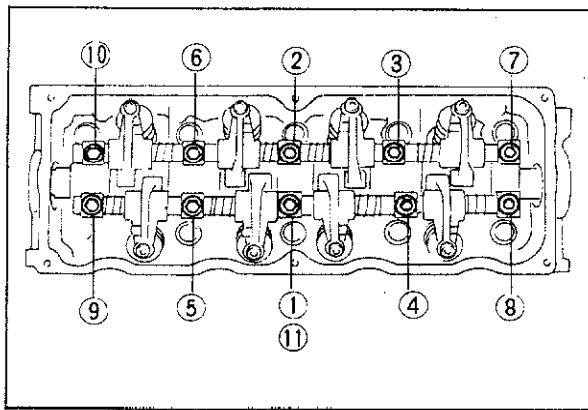
- a) Be sure both rocker arm shaft oil holes face downward.
- b) The installation bolt holes are different for the exhaust and intake sides as shown in the figure.



63U01X-116

Note

There are two types of rocker arms with different offsets. The rocker arms used for No. 1 and No. 2 cylinder are the same for exhaust and intake. No. 3 and No. 4 also use the same rockers.



63U01X-117P

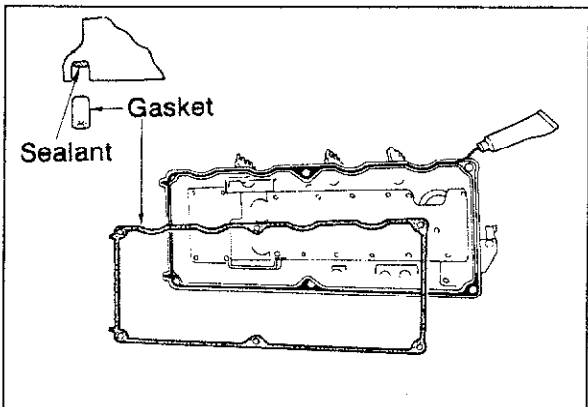
2. Install the rocker arm and rocker shaft assembly.

Caution

The bolts must be tightened evenly and in the order shown in the figure.

Tightening torque:

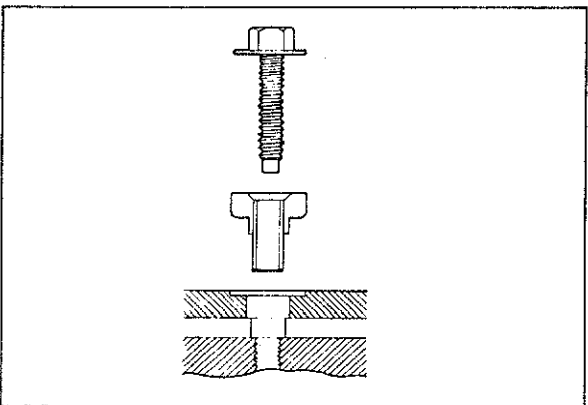
22—28 N·m (2.2—2.9 m·kg, 16—21 ft·lb)



63U01X-131

Cylinder Head Cover

1. Apply a coat of sealant in the groove as shown.
2. Place the gasket in position.



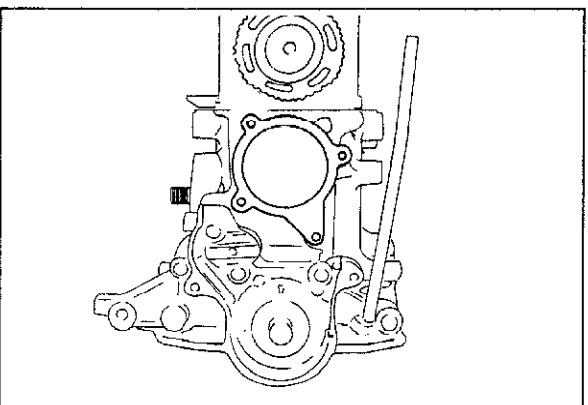
83U01A-112

3. Install the cylinder head cover with new seal washers.

Tightening torque:

5—9 N·m (0.5—0.9 m·kg, 43—78 in·lb)

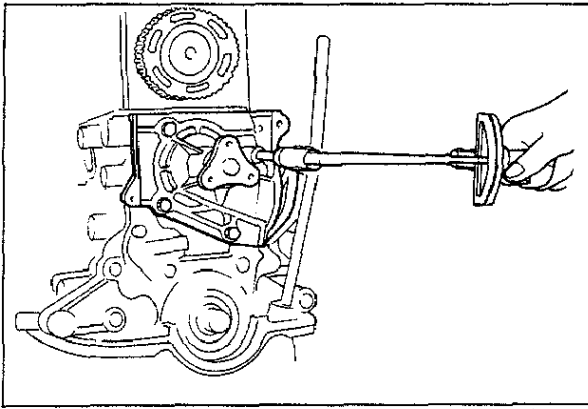
4. Install the filler cap and the ventilation hose.



4BG01A-168

Water Pump

1. Remove any dirt or old gasket from the water pump mounting surface.
2. Place a new water pump gasket in position.

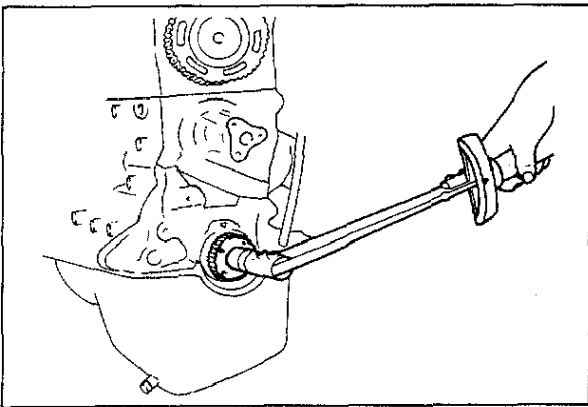


4BG01A-169P

3. Install the water pump.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



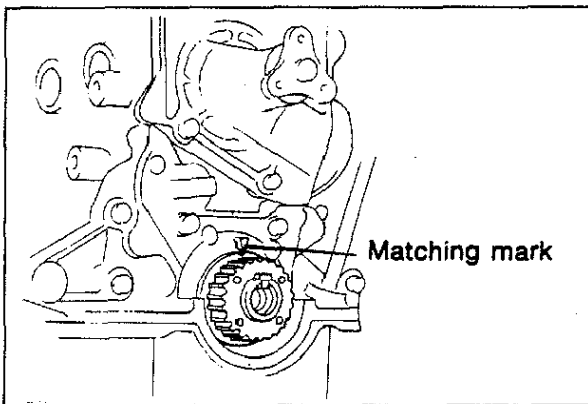
83U01A-113

Timing Belt Pulley

1. Reverse the direction of the (49 E301 060).
2. Install the timing belt pulley and key.
3. Apply sealant to the timing belt pulley bolt then tighten it.

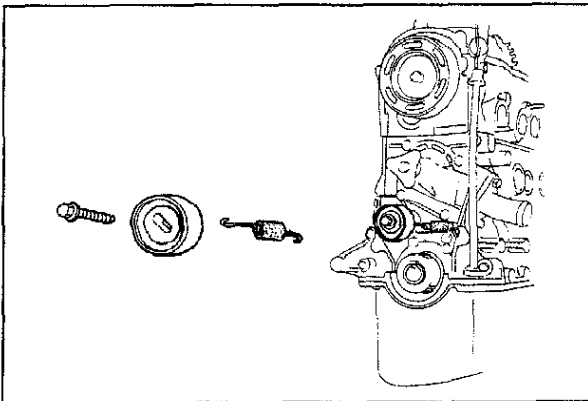
Tightening torque:

108—128 N·m (11.0—13.0 m·kg, 80—94 ft·lb)



83U01X-147

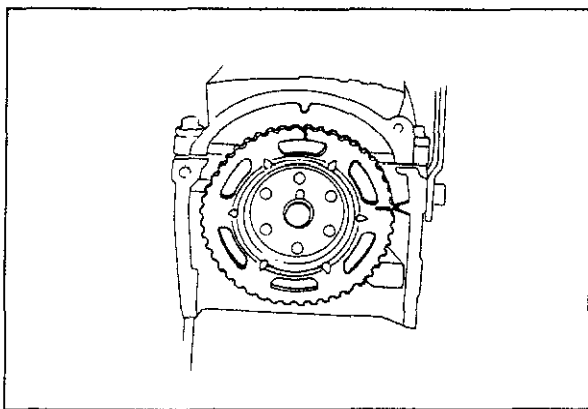
4. Release the **SST** (49 E301 060).
5. Turn the crankshaft so that the timing mark on the oil pump body is aligned with the groove.



4BG01A-183

Timing Belt Tensioner

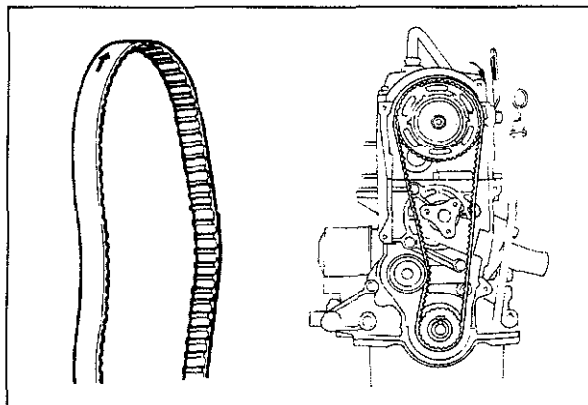
1. Install the timing belt tensioner.
2. Install the tensioner spring.
3. Temporarily secure the tensioner so the spring is fully extended.



83U01A-114

Timing Belt

1. Be sure that the timing mark on the cylinder head and the timing mark on the camshaft pulley are aligned.

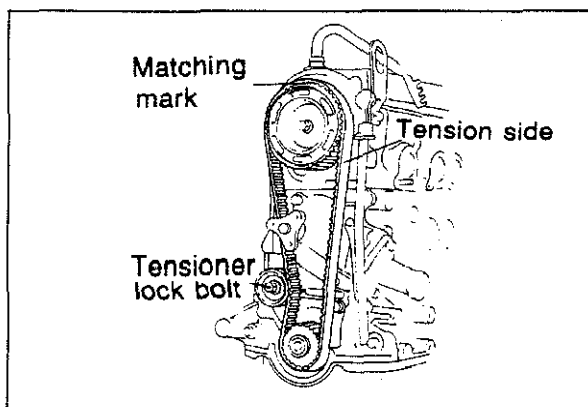


83U01A-115

2. Install the timing belt.

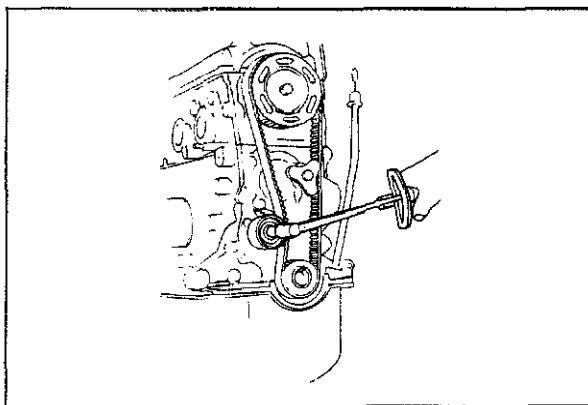
Caution

- a) The timing belt must be reinstalled in the direction of previous rotation if it is reused.
- b) Be sure that there is no oil, grease, or dirt on the timing belt.



83U01A-116

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



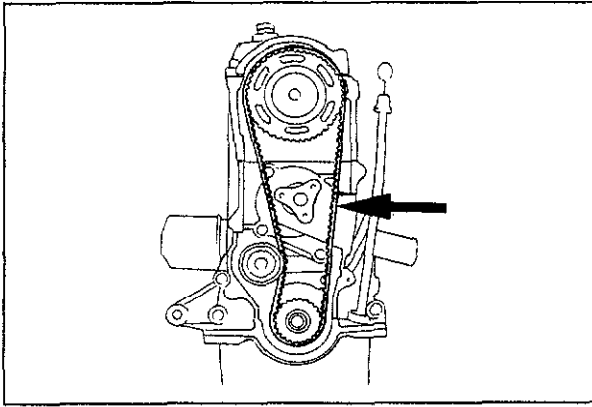
83U01A-117

6. Tighten the timing belt tensioner to specification.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

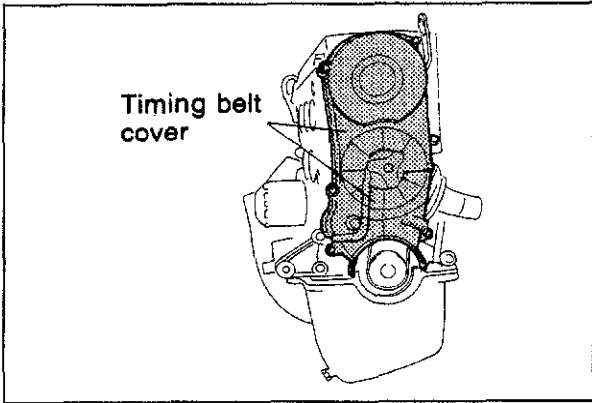
7. Turn the crankshaft twice in the direction of rotation and check the matching marks for alignment.



83U01A-118

8. Measure the tension between the crankshaft pulley and the camshaft pulley.
If the timing belt tension is not correct, temporarily secure tensioner lock bolt so the spring is fully extended and repeat steps 3—7 above or replace the tensioner spring.

**Timing belt deflection: 12—13 mm
(0.47—0.51 in)/98 N (10 kg, 22 lb)**

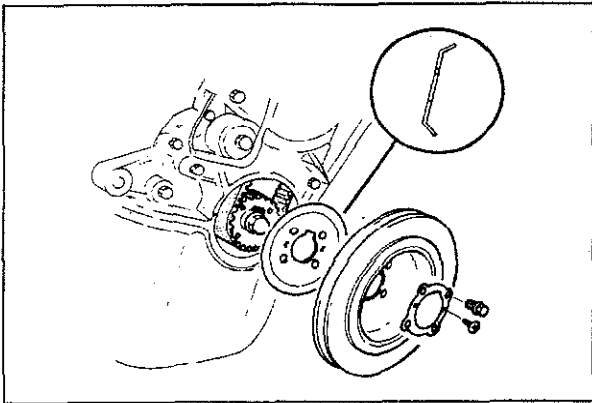


83U01A-119

Timing Belt Cover

Install the lower and upper timing belt covers and new gaskets.

**Tightening torque:
8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)**

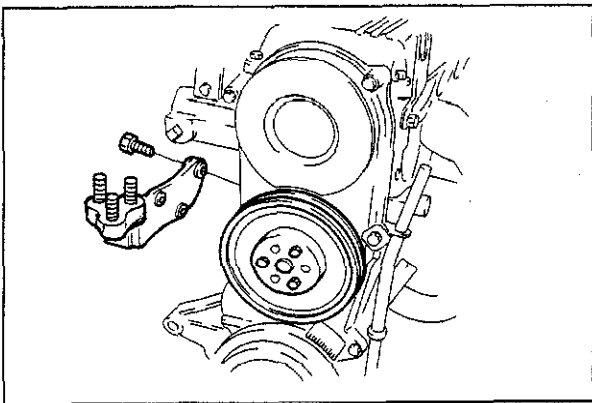


83U01A-120

Crankshaft Pulley

Install the crankshaft pulley and baffle plate.

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



63U01X-138

Water Pump Pulley

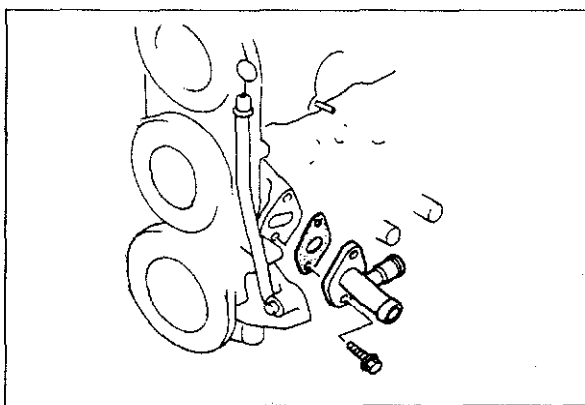
Install the water pump pulley.

**Tightening torque:
8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)**

Engine Bracket

Install the engine bracket.

**Tightening torque:
93—113 N·m (9.5—11.5 m·kg, 69—83 ft·lb)**



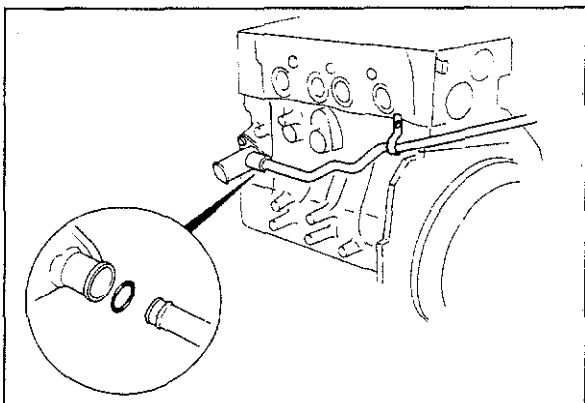
4BG01A-203

Coolant Inlet Pipe

Install the coolant inlet pipe and a new gasket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



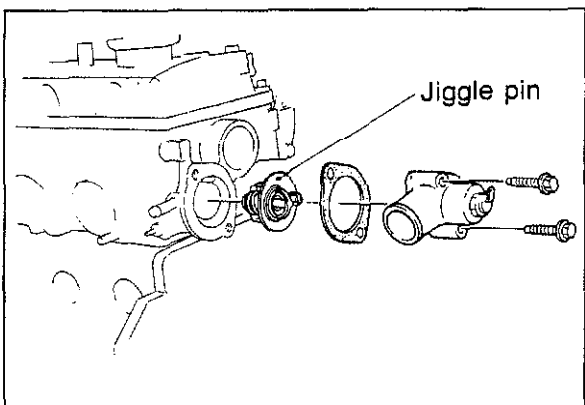
83U01A-121

Coolant Bypass Hose

1. Apply a coat of vegetable oil to the "O" ring.
2. Install the coolant bypass hose.

Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)



83U01A-122

Thermostat and Thermostat Cover

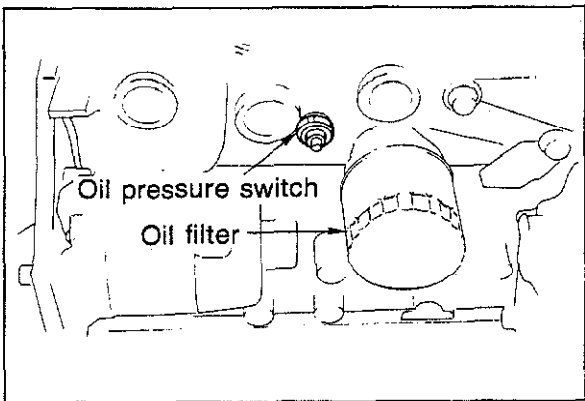
1. Install the thermostat with the jiggle pin facing upward.
2. Install the thermostat cover and gasket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Caution

The printed side of the gasket must face the thermostat.



83U01A-148

Oil Pressure Switch

Install the oil pressure switch.

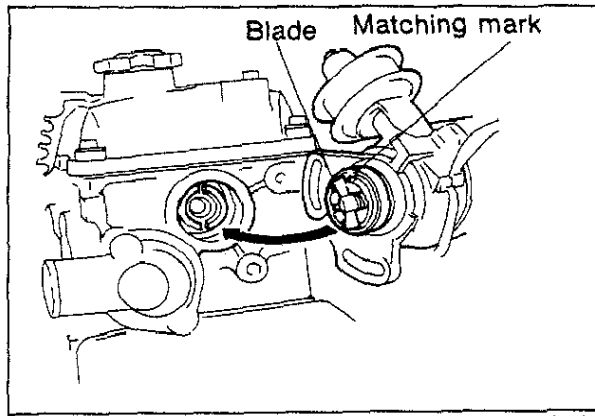
Tightening torque:

12—18 N·m

(1.2—1.8 m·kg, 8.7—13.0 ft·lb)

Oil Filter

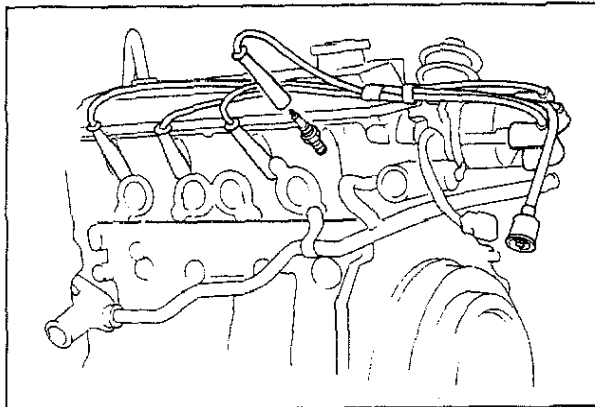
Apply engine oil to the oil filter "O" ring and install the filter, tightening thoroughly by hand.



83U01A-123

Distributor

1. Apply engine oil to the "O" ring, and position it on the distributor.
2. Apply engine oil to the drive gear.
3. Install the distributor with the blade into the camshaft groove.
4. Temporarily, loosely tighten the distributor installing bolt.



4BG01A-200

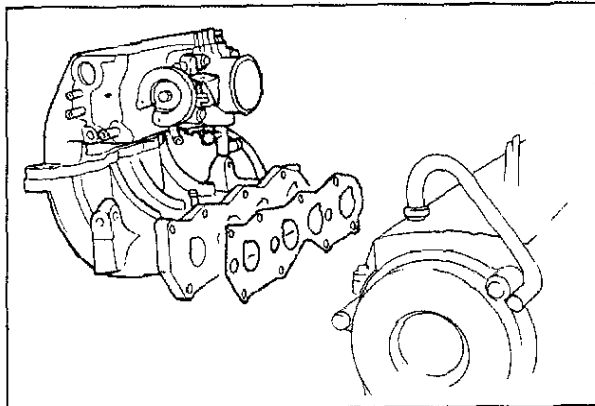
Spark Plug and High Tension Lead

1. Install the spark plugs.

Tightening torque:

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)

2. Connect the high tension leads.



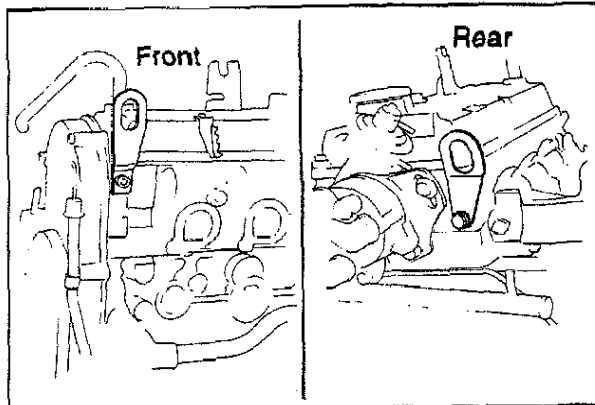
83U01X-136

Intake Manifold Assembly

1. Install the intake manifold assembly and new gasket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



83U01A-124

Engine Hanger

Install the front and rear engine hangers.

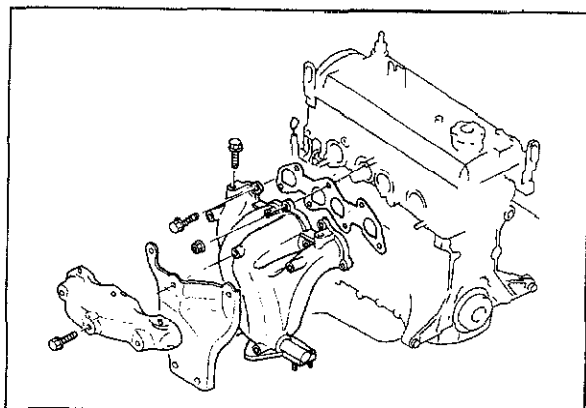
Tightening torque:

Front: 37—63 N·m

(3.8—6.4 m·kg, 27—46 ft·lb)

Rear: 19—30 N·m

(1.9—3.1 m·kg, 14—22 ft·lb)



83U01A-125

Exhaust Manifold

1. Remove the engine from the engine hanger and engine stand.
2. Install the exhaust manifold and gasket.

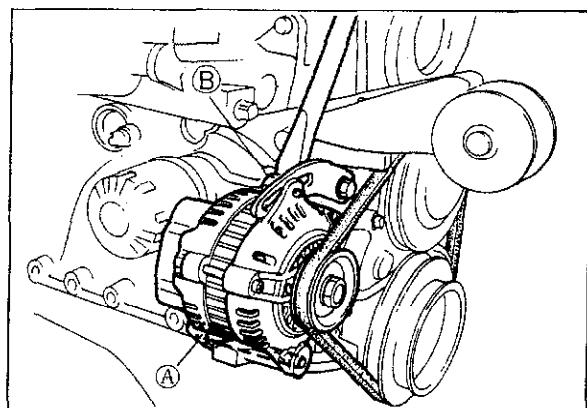
Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

3. Install the exhaust manifold insulator.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



83U01A-126

Alternator

1. Install the alternator strap.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

2. Install the alternator and alternator drive belt. Loosely tighten the alternator installation bolt.
3. Adjust the drive belt deflection by referring to page 1A—6.

Tightening torque:

Alternator installation bolt:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

Belt adjusting bolt:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Power Steering Pump Bracket

Install the power steering pump bracket.

Tightening torque:

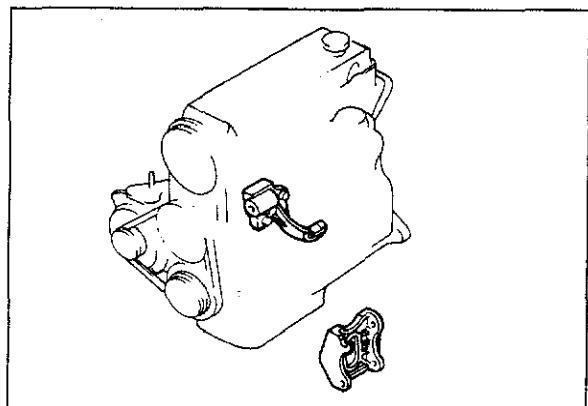
47—66 N·m (4.8—6.7 m·kg, 35—48 ft·lb)

Air Conditioner Compressor Bracket

Install the air conditioner compressor bracket.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)



83U01A-127

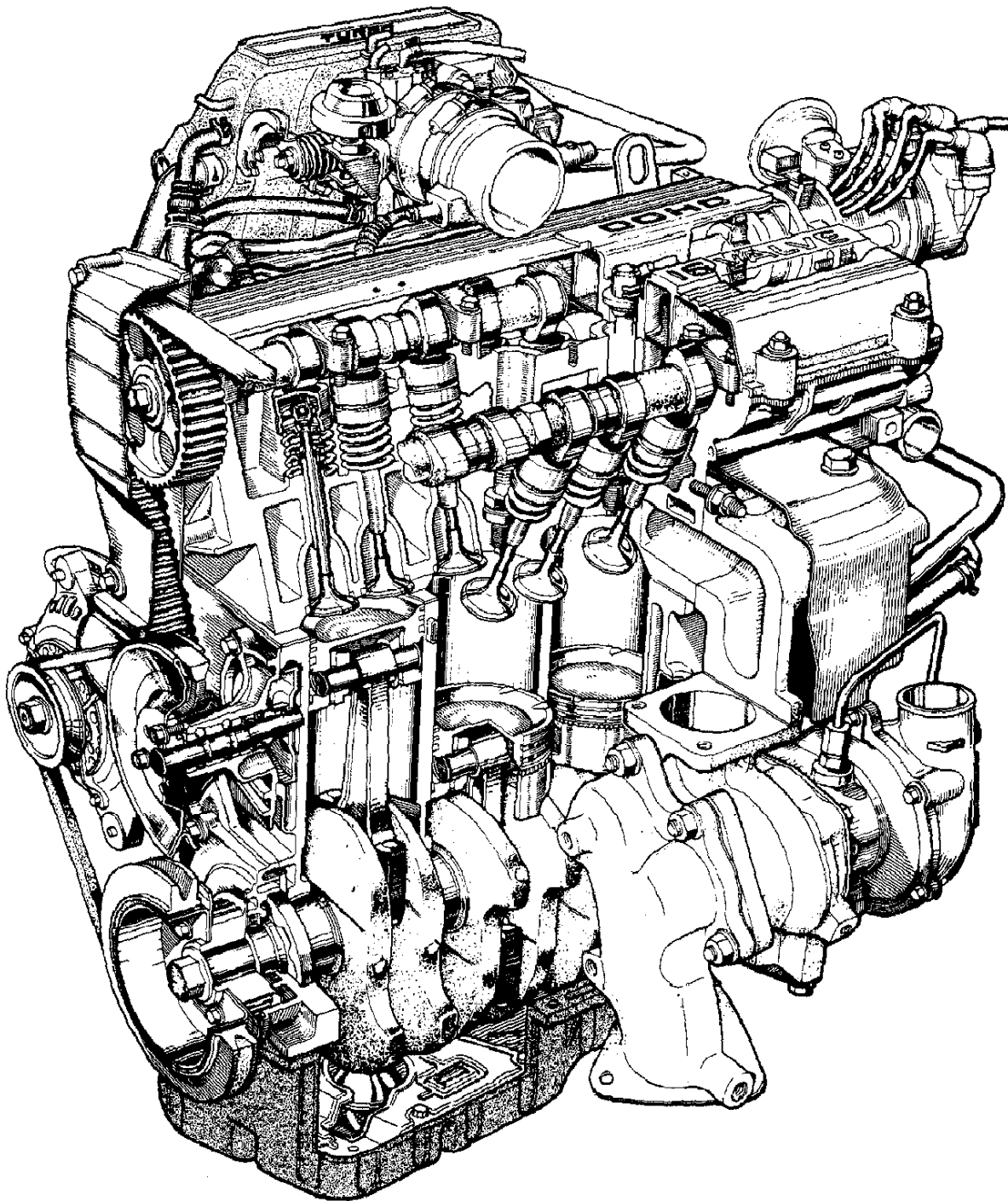
ENGINE (B6 DOHC)

| | |
|---------------------------------------|--------------|
| OUTLINE | 1B— 2 |
| STRUCTURAL VIEW | 1B— 2 |
| SPECIFICATIONS | 1B— 3 |
| TROUBLESHOOTING GUIDE | 1B— 3 |
| TUNE-UP PROCEDURE | 1B— 5 |
| ON-VEHICLE MAINTENANCE | 1B—11 |
| TIMING BELT | 1B—11 |
| CYLINDER HEAD | 1B—15 |
| REMOVAL AND INSTALLATION | 1B—22 |
| DISASSEMBLY | 1B—26 |
| INSPECTION AND REPAIR | 1B—36 |
| ASSEMBLY | 1B—51 |

83U01B-001

OUTLINE

STRUCTURAL VIEW



SPECIFICATIONS

| Item | | Engine model | | B6 DOHC | |
|---------------------------------|----|------------------------------------|------|-------------------------|---------------------|
| Type | | | | Gasoline, 4-cycle | |
| Cylinder arrangement and number | | | | In-line 4-cylinders | |
| Combustion chamber | | | | Pent-roof | |
| Valve system | | | | OHC, belt-driven | |
| Displacement | | cc (cu in) | | 1,597 (97.4) | |
| Bore and stroke | | mm (in) | | 78 x 83.6 (3.07 x 3.29) | |
| Compression ratio | | | | 7.9 | |
| Compression | | kPa (kg/cm ² , psi)—rpm | | 1,079 (11.0, 156) — 300 | |
| Valve timing | IN | Open | BTDC | 5° | |
| | | Close | ABDC | 51° | |
| | EX | Open | BBDC | 69° | |
| | | Close | BTDC | 1° | |
| Valve clearance | | mm (in) | | IN | 0. maintenance-free |
| | | EX | | 0. maintenance-free | |
| Idle speed (MTX in neutral) | | | | rpm | 850 ± 50 |
| Ignition timing | | | | BTDC | 12° ± 1° |
| Firing order | | | | | 1—3—4—2 |

83U01B-002

TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|----------------------------------|--|---|-------------------------|
| Difficult starting | Malfunction of engine-related components Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket | Replace Replace or repair Replace | 1B—37 1B—45 1B—15 |
| | Malfunction of fuel system | Refer to Section 4B | |
| | Malfunction of electrical system | Refer to Section 5 | |
| Poor idling | Malfunction of engine-related components Malfunction of HLA Poor valve to valve seat contact Failed cylinder head gasket | Replace Repair or replace Replace | 1B—60 1B—39 |
| | Malfunction of fuel system | Refer to Section 4B | |
| Excessive oil consumption | Oil working up Worn piston ring groove or sticking piston ring Worn piston or cylinder | Replace Replace or repair | 1B—45 1B—45 |
| | Oil working down Worn valve seal Worn valve stem or guide | Replace Replace | 1B—59 1B—37 |
| | Oil leakage | Refer to Section 2B | |

83U01B-003

1B TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|----------------------------|---|---|--|
| Insufficient power | Insufficient compression 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 | 1B—60 1B—39 1B—37 1B—40 1B—15 1B—36 1B—46 1B—46 |
| | Malfunction of fuel system | Refer to Section 4B | |
| | Others Slipping clutch Dragging brakes Wrong size tires | Refer to Section 6 Refer to Section 11 Refer to Section 12 | |
| Abnormal combustion | Malfunction of engine-related components Malfunction of HLA Sticking or burned valve Weak or broken valve spring Carbon accumulation in combustion chamber | Replace Replace Replace Eliminate carbon | 1B—60 1B—37 1B—40 — |
| | Malfunction of fuel system | Refer to Section 4B | |
| Engine noise | Crankshaft or bearing related parts 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 | 1B—54 1B—53 1B—54 1B—55 1B—55 |
| | Piston related parts Worn cylinder Worn piston or piston pin Seized piston Damaged piston ring Bent connecting rod | Replace or repair Replace Replace Replace Replace | 1B—44 1B—45, 46 1B—45 1B—46 1B—47 |
| | Valves or timing related parts Malfunction of HLA* Broken valve spring Excessive valve guide clearance Malfunction of timing belt tensioner | Replace Replace Replace Replace | 1B—60 1B—40 1B—37 1B—49 |
| | Malfunction of cooling system | Refer to Section 3B | |
| | Malfunction of fuel system | Refer to Section 4B | |
| | Others Malfunction of water pump bearing Improper drive-belt tension Malfunction of alternator bearing Exhaust gas leakage | Replace Adjust Replace Repair | — 1B—6 — 1B—36 |

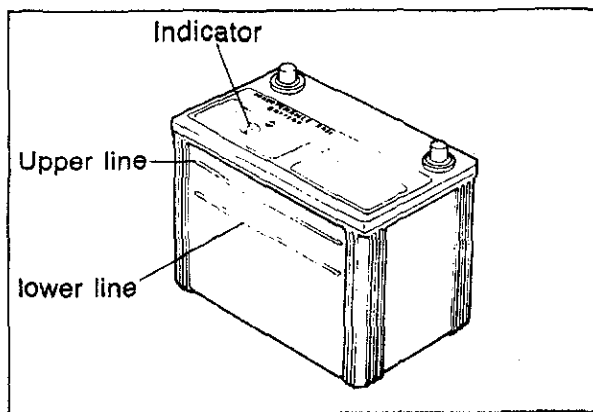
* Tappet noise may occur if the engine is not operated for an extended period of time. The noise should disappear after the engine has reached normal operating temperature.

83U01B-004

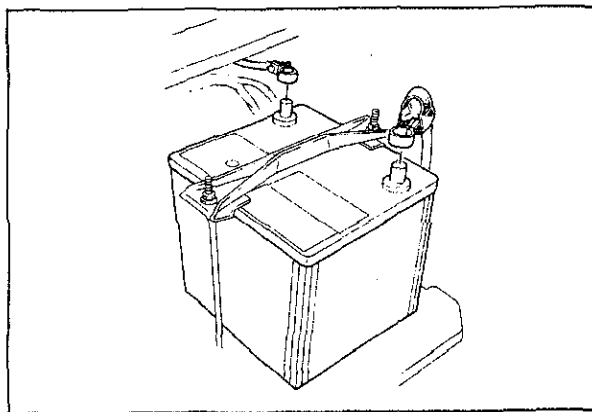
TUNE-UP PROCEDURE

Tune the engine according to the procedures described below.

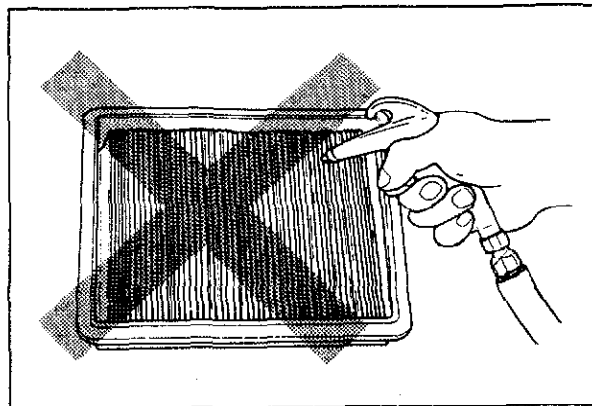
5BU01X-006



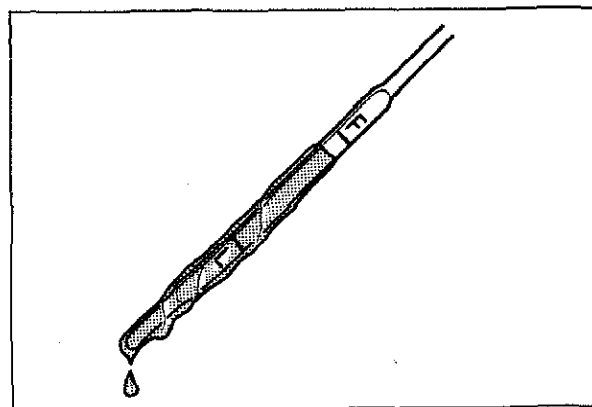
5BU01X-007



5BU01X-008



63G01D-306



4BG01A-010

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, then the electrolyte level of the battery is low and/or the capacity is insufficient.
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 the terminals 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 that the air cleaner element for excessive dirt, damage or oil. Replace if necessary

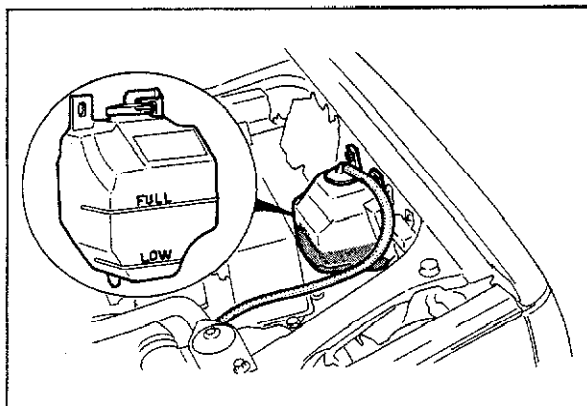
Caution

Do not clean the air cleaner element with compressed air.

Engine Oil

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

Add oil, or change it, if necessary.



4BG01A-009

Coolant Level

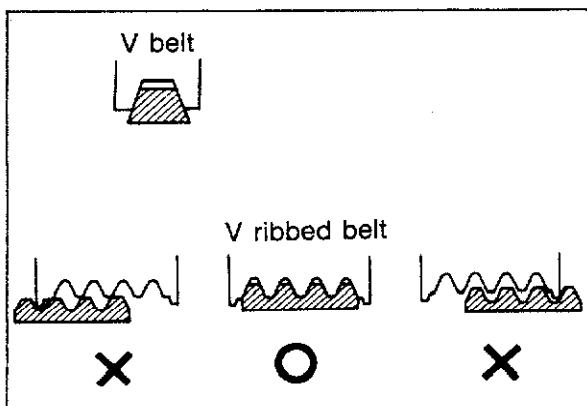
Check that the coolant level is near the radiator inlet port, and that the level in the reserve tank is between the FULL and LOW marks.

Add coolant if the level is low.

Warning

Never remove the radiator cap while the engine is hot.

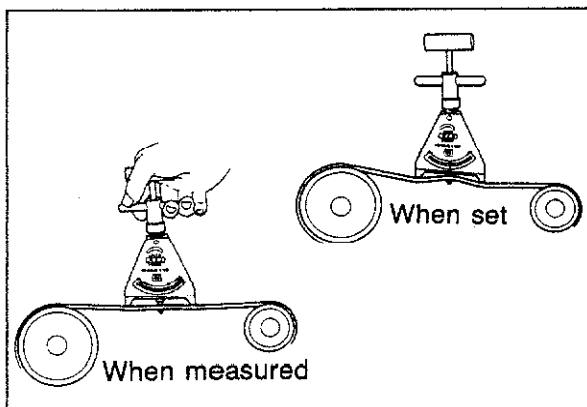
Wrap a thick cloth around the cap and carefully remove the cap.



83U01A-005

Drive Belt

1. Check that the drive belt is positioned in the pulley groove.
2. Check the drive belt for wear, cracks, or fraying.
3. Check the pulley for damage.



83U01A-006

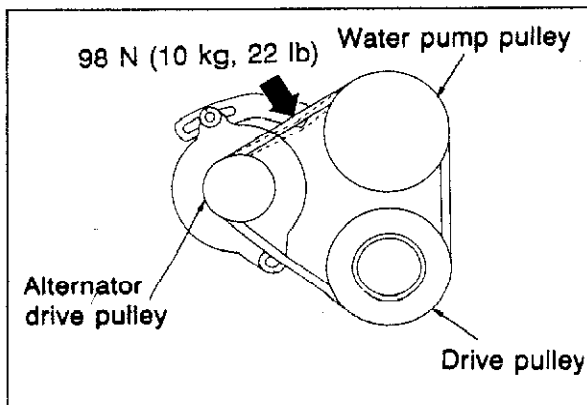
Inspection of belt tension

Check the drive belt tension by using the tension gauge.

Standard tension

N (kg, lb)

| Belt | New | Used |
|-------------|-----------------------------|----------------------------|
| Alternator | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |
| A/C | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |
| P/S | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |
| A/C and P/S | 491—589 (50—60, 110—132) | 422—491 (43—50, 95—110) |



83U01A-007

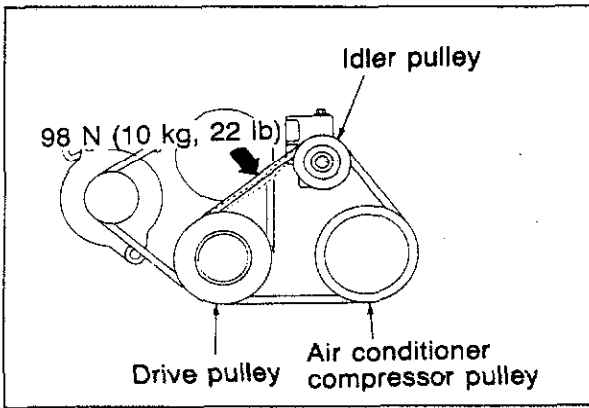
Inspection of belt deflection

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

Alternator drive belt

New: 8—9 mm (0.31—0.35 in)

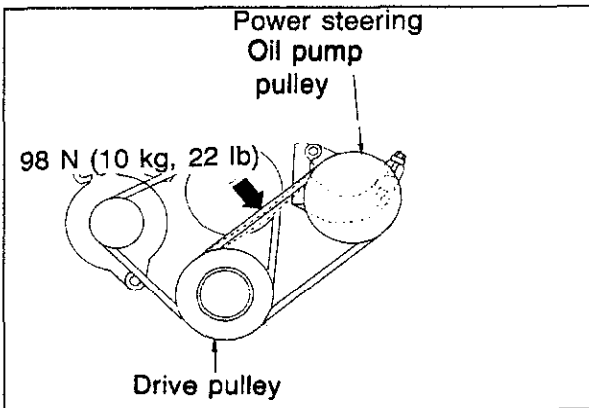
Used: 9—10 mm (0.35—0.39 in)



83U01A-008

A/C drive belt

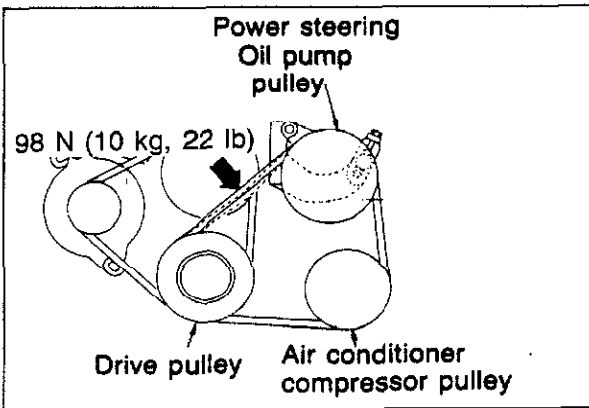
New: 8—9 mm (0.31—0.35 in)
Used: 9—10 mm (0.35—0.39 in)



83U01A-009

P/S oil pump drive belt

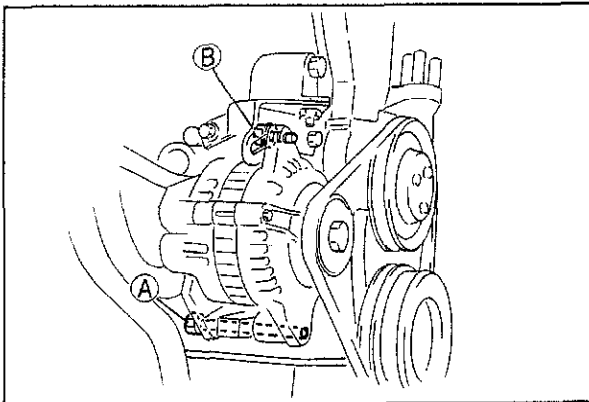
New: 8—9 mm (0.31—0.35 in)
Used: 9—10 mm (0.35—0.39 in)



83U01A-010

A/C and P/S oil pump drive belt

New: 8—9 mm (0.31—0.35 in)
Used: 9—10 mm (0.35—0.39 in)



83U01A-011

Adjustment of belt deflection

Alternator drive belt

1. Loosen the alternator mounting bolt A and adjusting bolt B.
2. Lever the alternator outward and apply tension to the belt.
3. Tighten the adjusting bolt B.

Tightening torque:

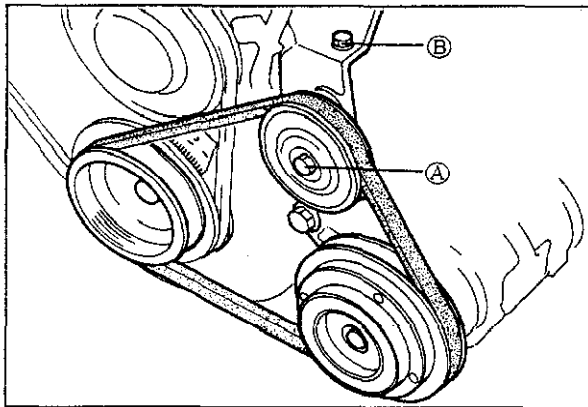
19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

4. Tighten the mounting bolt A.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

5. Recheck the belt tension or deflection.



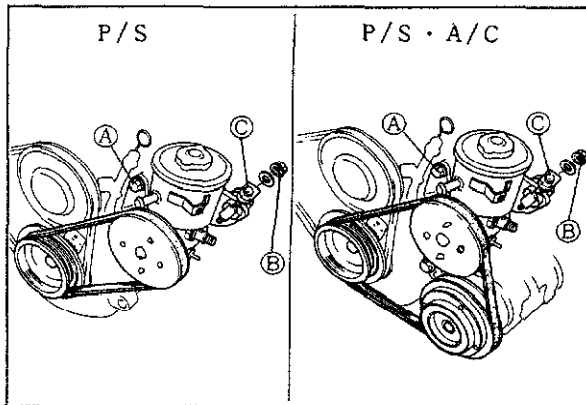
83U01A-012

A/C drive belt

1. Loosen the idler pulley lock bolt A.
2. Adjust the belt tension and deflection by turning the adjusting bolt B.
3. Tighten the idler pulley lock bolt A.

Tightening torque:

31—46 N·m (3.2—4.7 m·kg, 24—34 ft·lb)



83U01A-013

P/S oil pump drive belt, A/C and P/S oil pump drive belt

1. Loosen the mounting bolt A and adjusting bolt lock nut B.
2. Adjust the belt tension and deflection by turning the adjusting bolt C.
3. Tighten the adjusting bolt lock nut B and mounting bolt A.

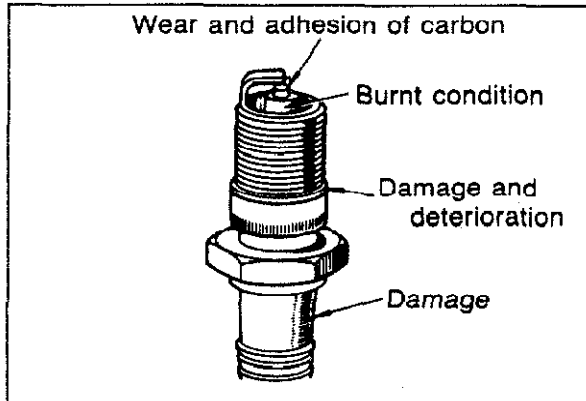
Tightening torque:

Bolt A: 31—46 N·m

(3.2—4.7 m·kg, 24—34 ft·lb)

Nut B: 36—54 N·m

(3.7—5.5 m·kg, 27—40 ft·lb)



63U01X-010

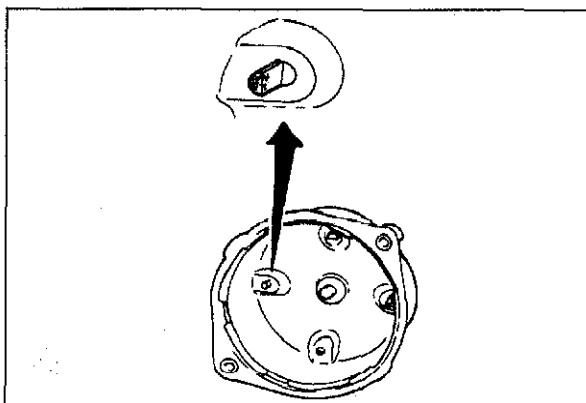
Spark Plug

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

Standard plug gap:

1.00—1.10 mm (0.039—0.043 in)

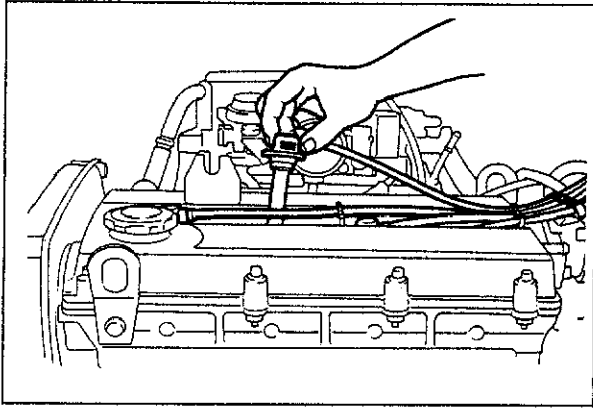


4BG01A-015

Distributor Cap

Check the following points. If necessary, replace the distributor cap.

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

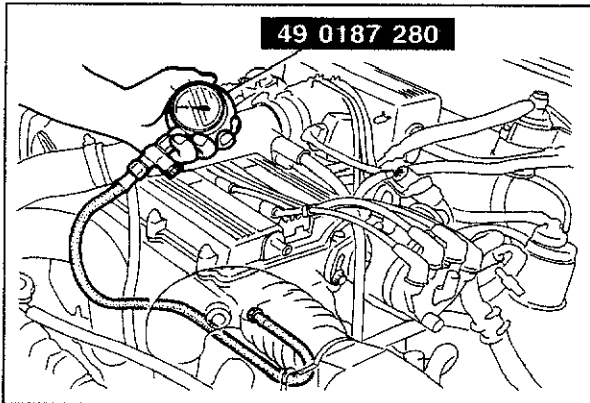


4BG01A-016

High-tension Lead

Check the following points, if necessary clean or replace.

1. Damaged lead
2. Carbon deposits



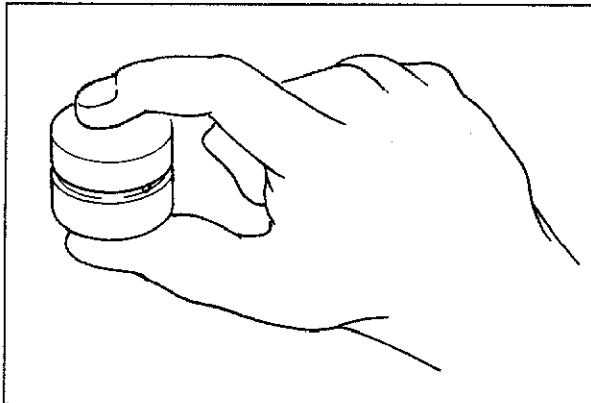
83U01B-005

Hydraulic Lash Adjuster

Note

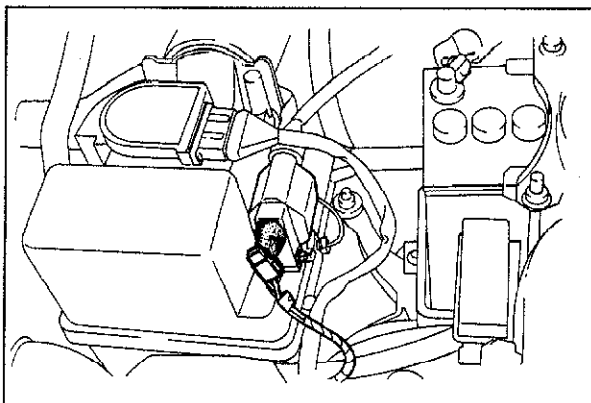
Tapet noise may occur if the engine is not operated for an extended period of time. The noise should disappear after the engine has reached normal operating temperature.

1. Check for tappet noise, if noise exists, check the followings:
 - (1) Engine oil condition and level
 - (2) Cylinder head oil pressure (Refer to section 2B)



83U01B-006

2. If the noise does not disappear, check for movement of the HLA by pushing it during disassembly.
3. If the HLA moves, replace the HLA.

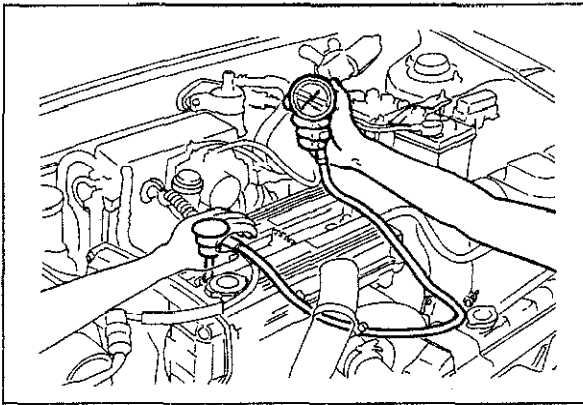


4BG01A-012

Compression

1. Warm up the engine to operating temperature.
2. Turn it off for about 10 minutes to reduce the exhaust pipe temperature.
3. Remove all spark plugs.
4. Disconnect the primary wire connector from the ignition coil.

1B TUNE-UP PROCEDURE



83U01B-007

5. Connect a compression gauge to the No. 1 spark plug hole.
6. Fully depress the accelerator pedal and crank the engine.
7. Check whether the gauge reads within the limits.

Standard compression:

1,079 kPa (11.0 kg/cm², 156 psi)

Compression limit:

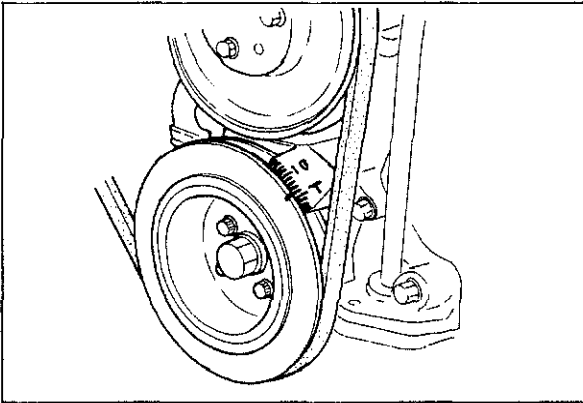
755 kPa (7.7 kg/cm², 109 psi)

8. Check each cylinder.
9. Refit the primary wire connector securely to the ignition coil.
10. Install the spark plugs and high-tension leads.

Ignition Timing

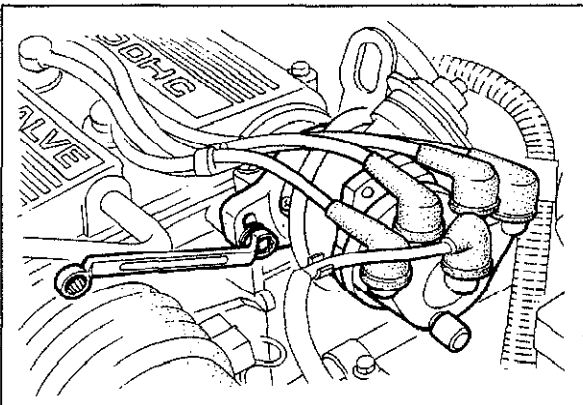
1. Warm up the engine and run it at idle.
2. Turn all electric loads OFF.
3. Connect a timing light tester.
4. Disconnect the vacuum hose from the vacuum control, and plug the hose.
5. Disconnect the black connector at distributor.
6. Check that the ignition timing mark (yellow) on the crankshaft pulley and the timing mark on the timing belt cover are aligned.

Ignition timing: 12° ± 1° BTDC



83U01B-008

7. If necessary, adjust the ignition timing by turning the distributor.
8. Reconnect the vacuum hose and the black connector at distributor.

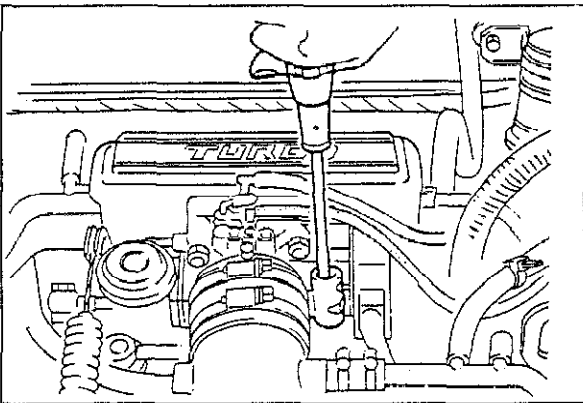


83U01A-018

Idle Speed

1. Connect a tachometer to the engine.
2. Turn off all lights and other unnecessary electrical loads.
3. Check the idle speed. If necessary, turn the air adjust screw and adjust to specifications.

Idle speed: 850 ± 50 rpm

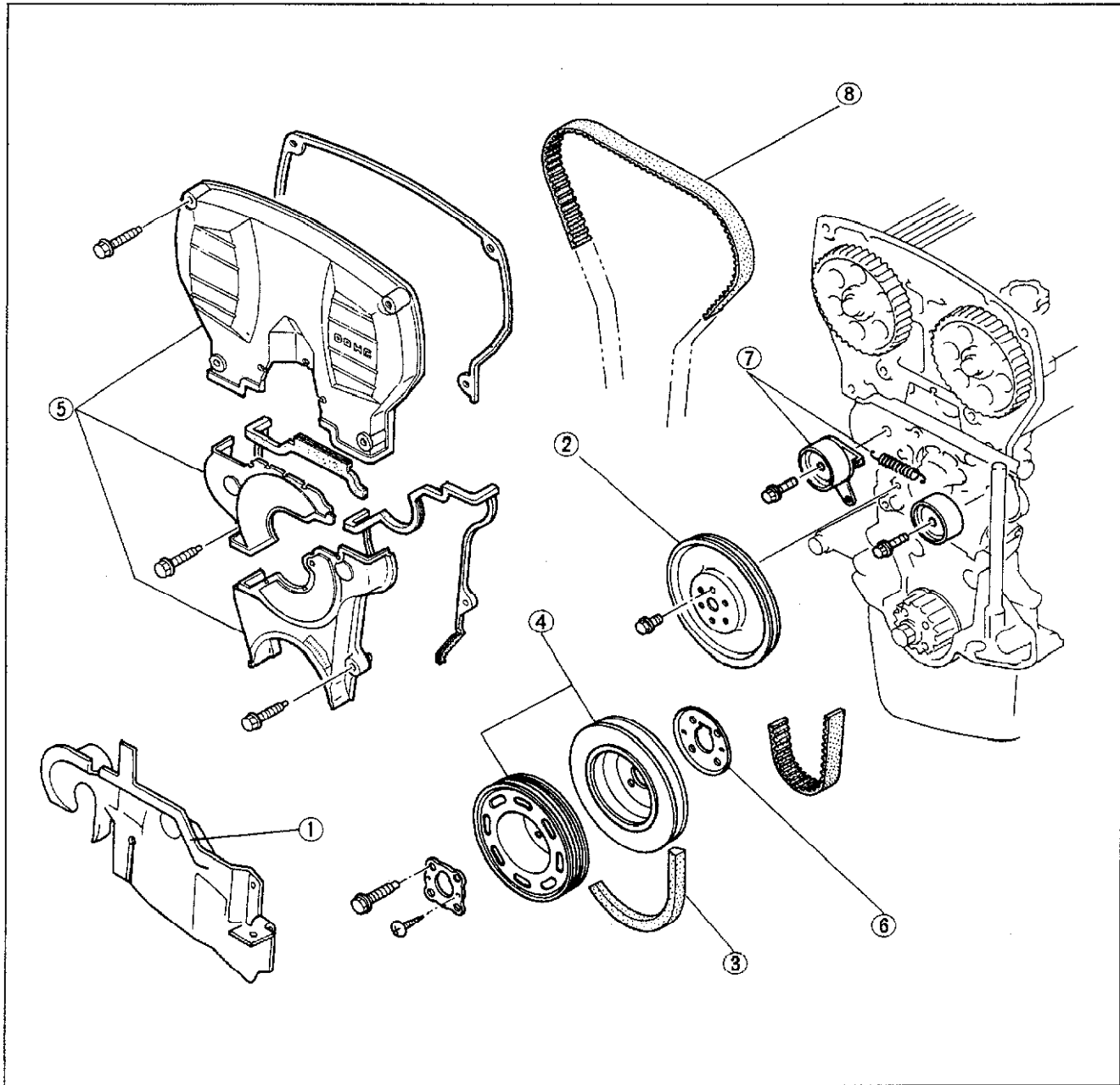


83U01B-009

ON-VEHICLE MAINTENANCE**TIMING BELT****Removal**

1. Disconnect the battery negative cable.
2. Remove the parts in the numbered sequence shown in the figure.

83U01A-020

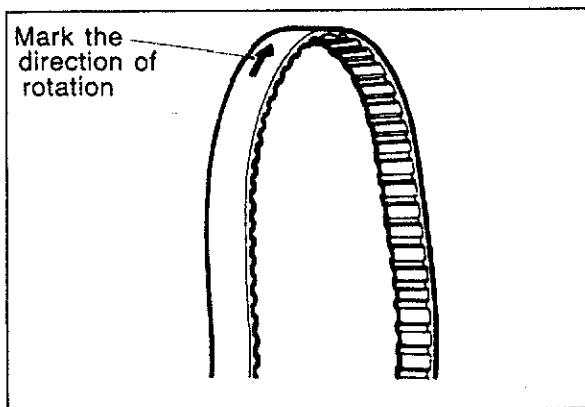


83U01B-010

- | | |
|----------------------|---|
| 1. Side cover | 5. Timing belt cover (upper, middle, lower) |
| 2. Water pump pulley | 6. Baffle plate |
| 3. Drive belt | 7. Timing belt tensioner and spring |
| 4. Crankshaft pulley | 8. Timing belt |

Note

Remove the No. 3 engine mount installation nuts and lower the engine to remove the A/C and P/S pulley and the crankshaft pulley.



83U01B-108

1. Mark the direction of rotation on the timing belt.

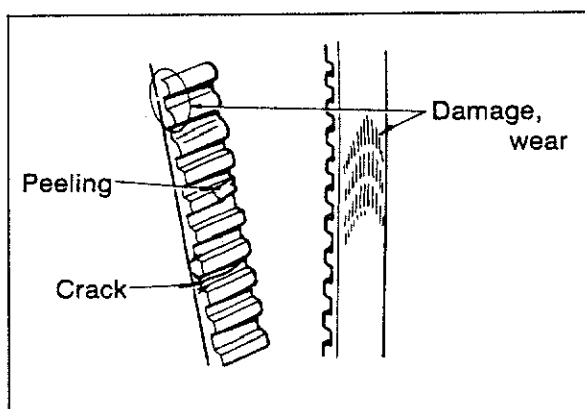
Note

The direction arrow is so the belt can be reinstalled in the same direction.

2. Remove the timing belt.

Caution

Do not allow any oil or grease on the timing belt.

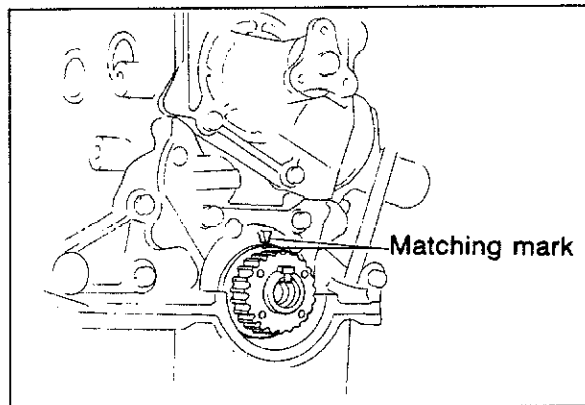


83U01B-011

Inspection

Referring to page 1B—49, inspect the following parts:

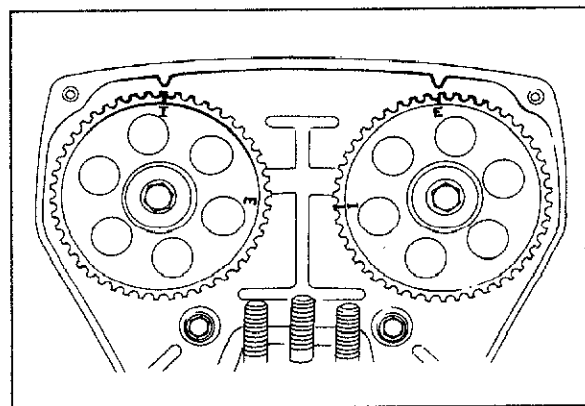
1. Timing belt
2. Timing belt tensioner and spring
3. Timing belt pulley
4. Camshaft pulley



4BG01A-031

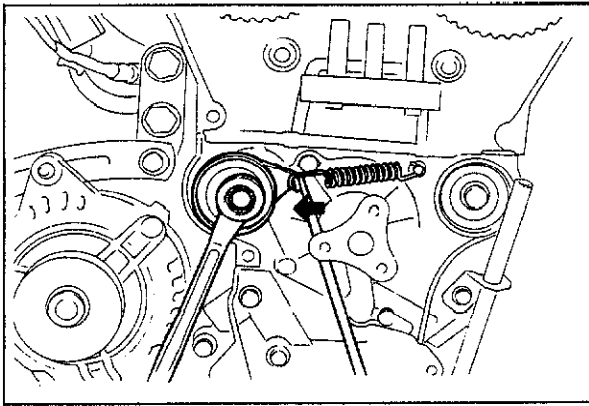
Installation

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



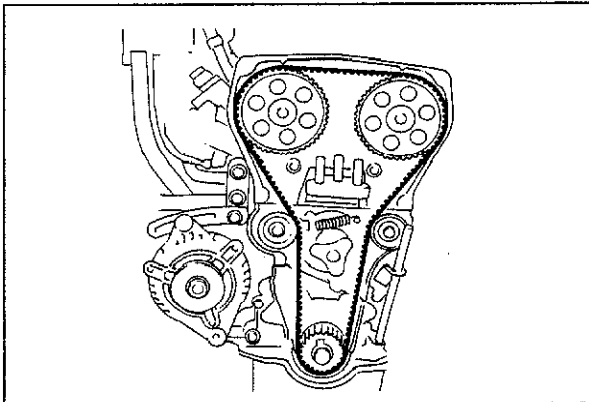
63G01C-012

2. Be sure that the matching mark on the camshaft pulley is aligned with seal plate matching mark. If it is not aligned, turn the camshaft to align.



4BG01A-033

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

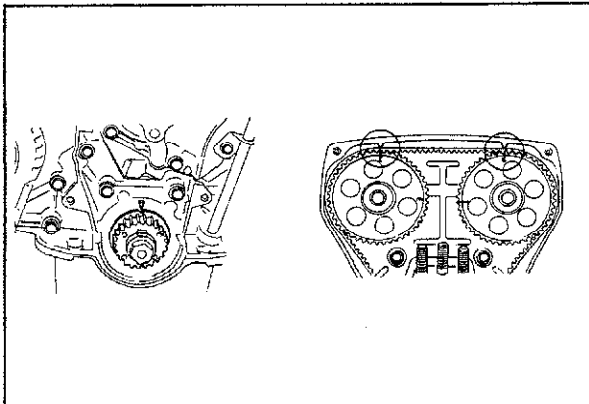


83U01A-109

4. Install the timing belt. (keep the right side of belt as tight as possible)

Caution

- a) The timing belt must be reinstalled in the same direction of previous rotation if it is reused.
- b) Be sure that there is no oil, grease, or dirt on the timing belt.

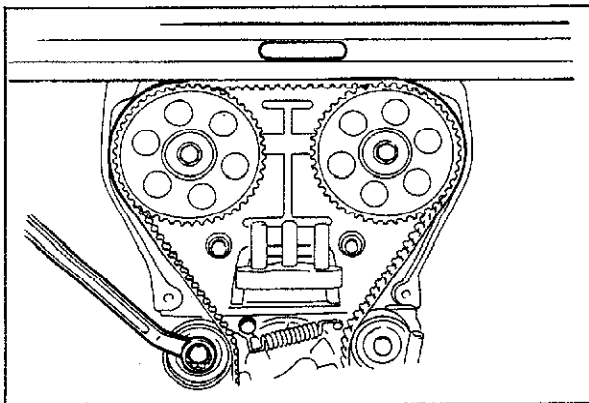


83U01A-110

Note

Remove all spark plugs for easier rotation.

5. Turn the crankshaft twice in the direction of rotation. (Clockwise)
6. Check that the timing marks are correctly aligned. If not repeat steps 1—5.
7. Loosen the tensioner lock bolt and apply tension to the belt.



63U01X-024p

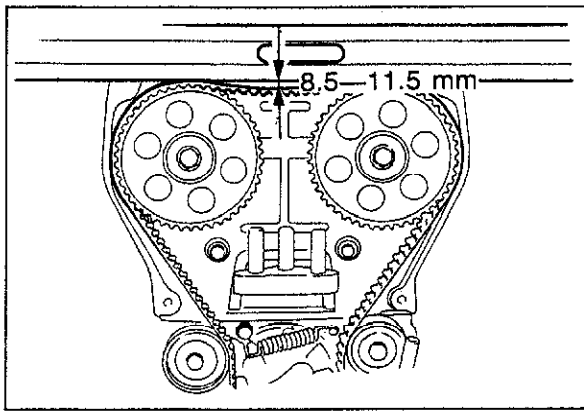
8. Tighten the timing belt tensioner lock bolt.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

9. Turn the crankshaft twice in the direction of rotation and check the matching marks for alignment.

1B ON-VEHICLE MAINTENANCE (TIMING BELT)



83U01B-012

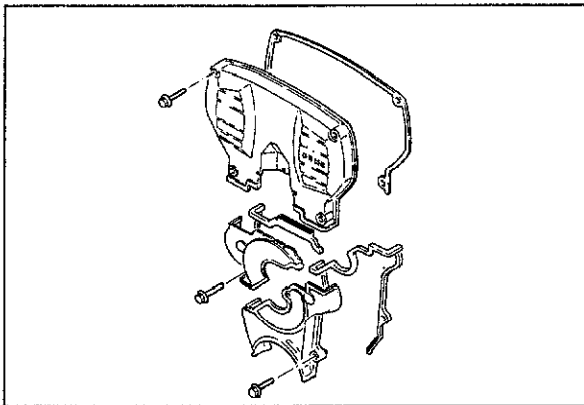
10. Measure the tension between the intake side camshaft pulley and the exhaust side camshaft pulley. If the timing belt tension is not correct, loosen the tensioner lock bolt and repeat steps 3—9 above or replace the tensioner spring.

Timing belt deflection:

8.5—11.5 mm (0.33—0.45 in)
/ 98 N (10 kg, 22 lb)

Caution

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



83U01A-111

11. Install the lower and upper timing belt cover.

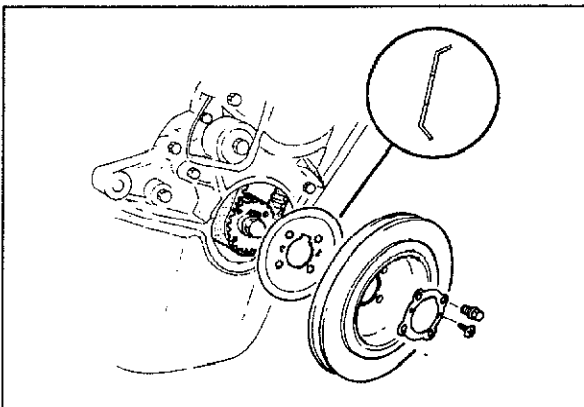
Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

12. Install the spark plugs.

Tightening torque:

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)



83U01B-013

13. Install the baffle plate and the crankshaft pulley.

Tightening torque: 12—17 N·m

(1.25—1.75 m·kg, 109—152 in·lb)

14. Install the No.3 engine mount bracket.

Tightening torque:

60—85 N·m (6.1—8.7 m·kg, 44—63 ft·lb)

15. Install the drive belt and adjust the belt tension (refer to page 1B—6).

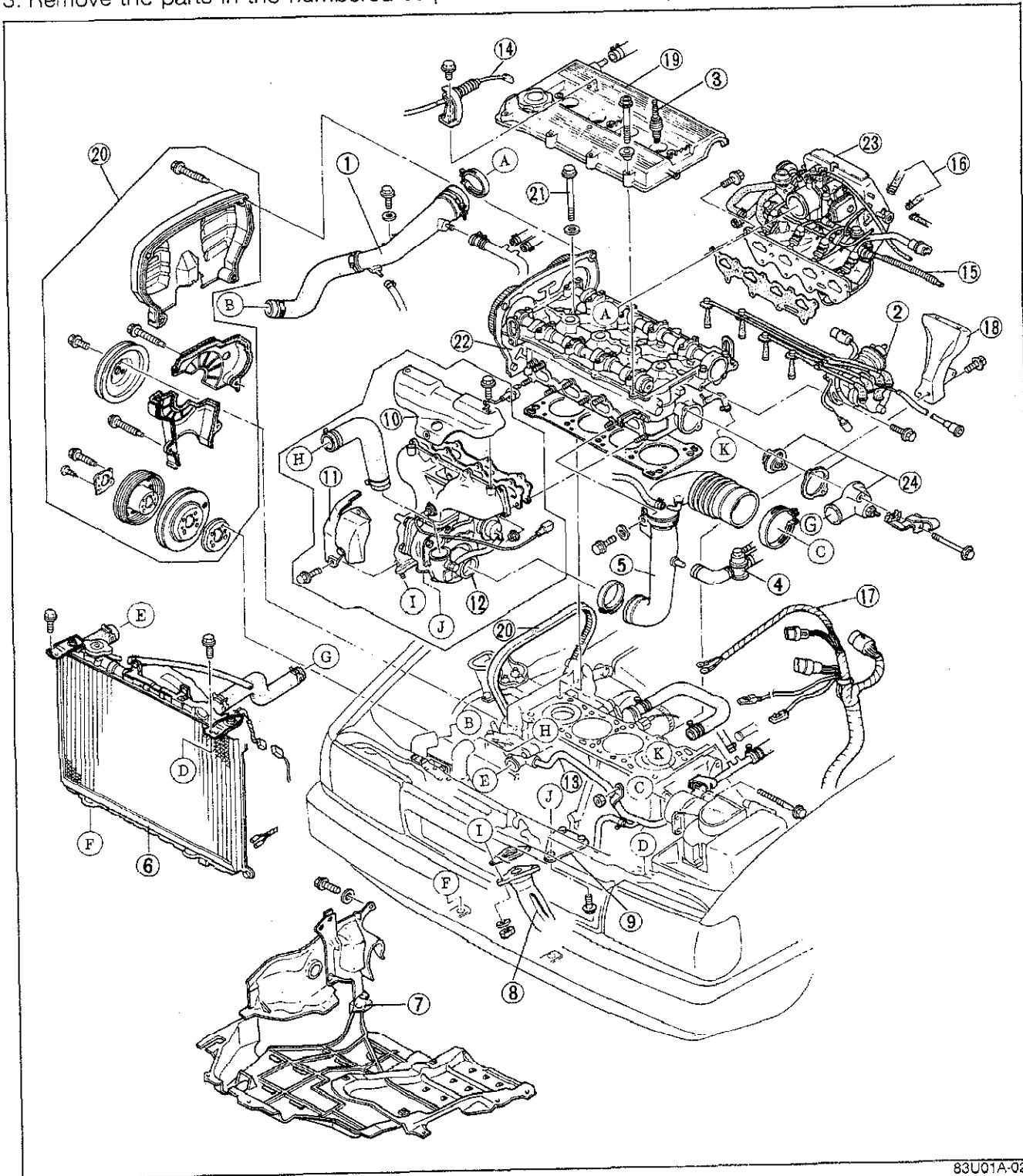
16. Install the engine side cover.

17. Connect the battery negative cable.

**CYLINDER HEAD
Removal****Warning**

Release the fuel pressure (Refer to FUEL PRESSURE RELEASE of FUEL SYSTEM section).

1. Disconnect the battery negative cable.
2. Drain the coolant.
3. Remove the parts in the numbered sequence shown in the figure.



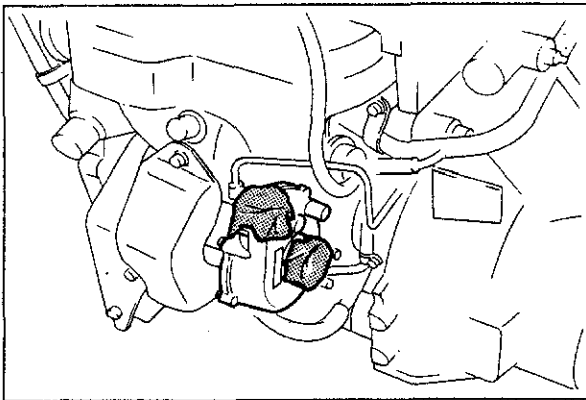
83U01A-025

1B ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

1. Air intake pipe
2. Distributor and high-tension leads
3. Spark plugs
4. Air bypass valve and hoses assembly
5. Air pipe
6. Radiator (Refer to 3B—10)
7. Engine side cover and under cover
8. Exhaust pipe
9. Turbocharger bracket
10. Exhaust manifold insulator
11. Turbocharger insulator
12. Exhaust manifold and turbocharger assembly

13. Coolant bypass pipe
14. Accelerator cable
15. Fuel hoses
16. Vacuum hoses
17. Engine harness connectors
18. Surge tank bracket
19. Cylinder head cover
20. Timing belt (Refer to 1B—11)
21. Cylinder head bolts
22. Cylinder head and intake manifold assembly
23. Intake manifold assembly
24. Thermostat and thermostat cover

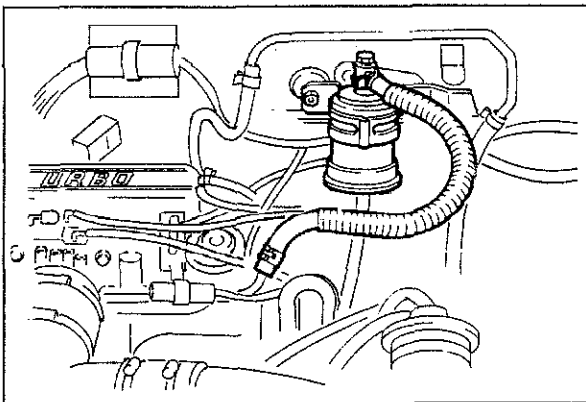
83U01B-014



77U01X-017

Turbocharger

Cover the intake and exhaust ports and oil passage to prevent dirt or other contaminants from entering.



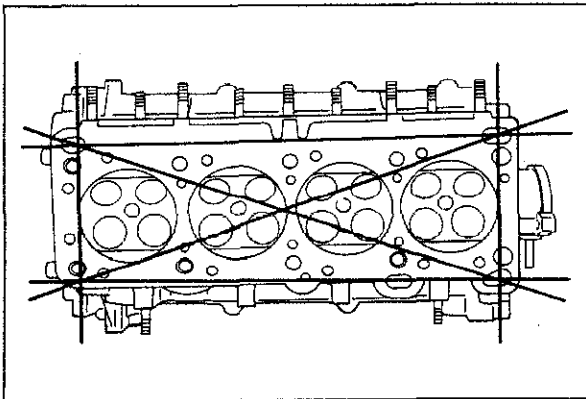
63G01C-104

Fuel hose

After disconnecting the inlet and return fuel hoses, plug them.

Warning

Cover the hose with a rag because fuel will be splashed out when disconnecting the hose.



83U01B-015

Disassembly of Cylinder Head

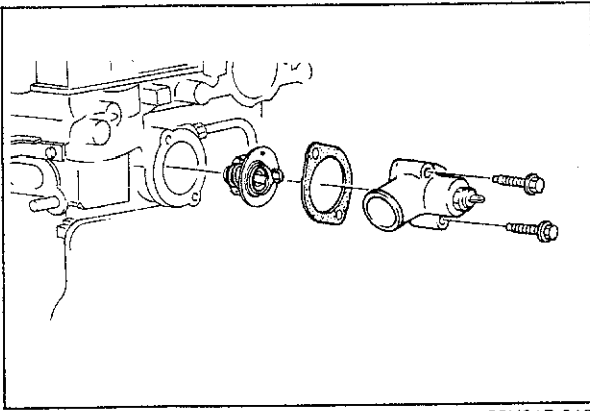
Refer to page 1B—30

Inspection

Refer to page 1B—36

Assembly

Refer to page 1B—59



83U01B-016

Installation

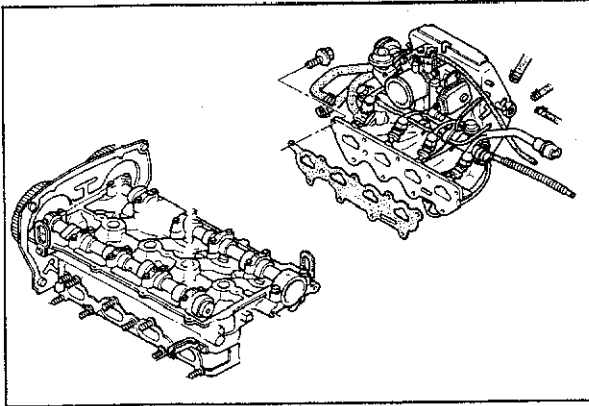
1. Install the thermostat with the jiggle pin facing upward.
2. Install the thermostat cover and gasket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Caution

The printed side of the gasket must face the thermostat.

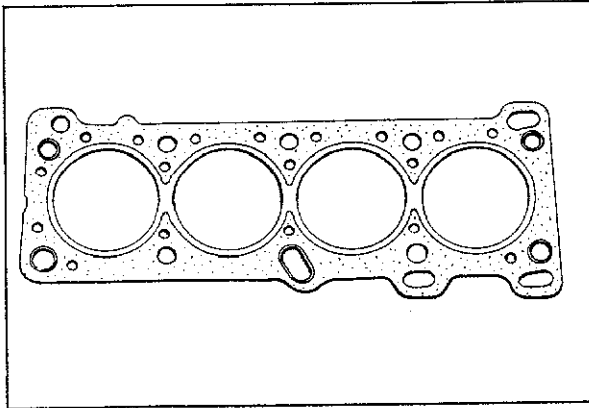


83U01B-017

3. Install the intake manifold assembly and new gasket.

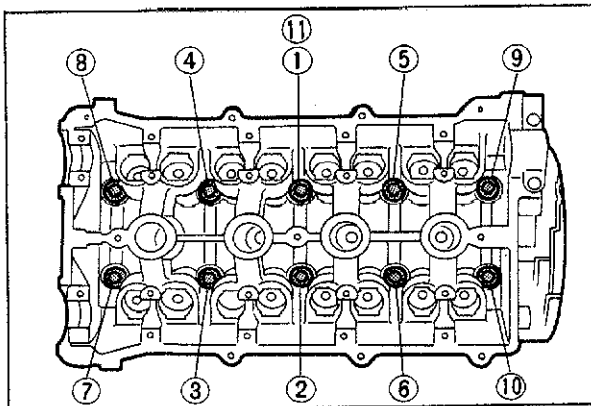
Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



83U01B-018

4. Thoroughly remove all dirt and grease from the top of the cylinder block with a rag.
5. Place the new cylinder head gasket in position.



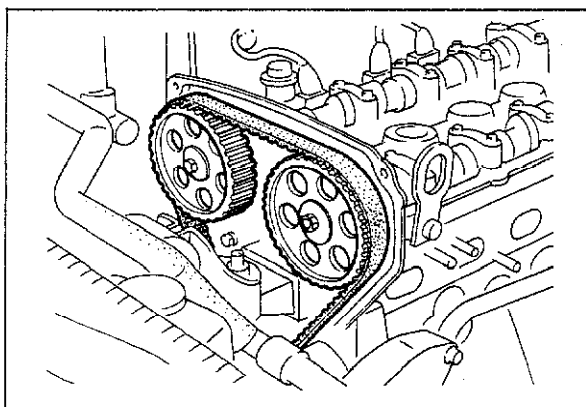
83U01B-019

6. Install the cylinder head, and tighten the cylinder head bolts gradually in the order shown in the figure.

Tightening torque:

76—81 N·m (7.7—8.3 m·kg, 56—60 ft·lb)

1B ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



83U01B-020

7. Referring to the TIMING BELT section pages 1B—11 to 1B—14, install the timing belt.
8. Install the timing belt covers.

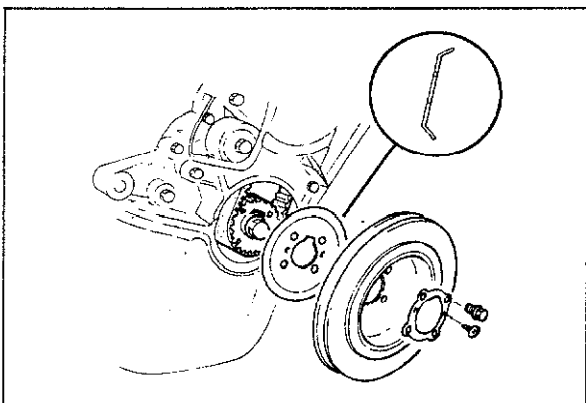
Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

9. Install the water pump pulley.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

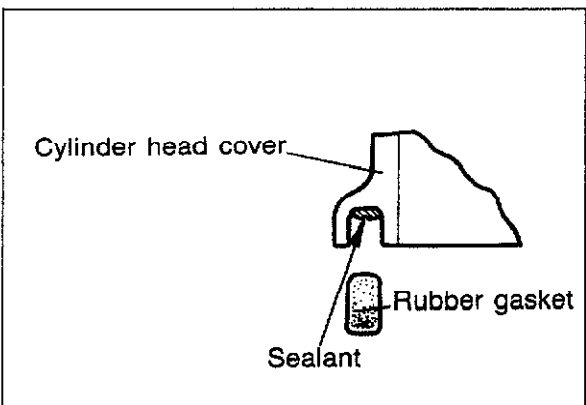


83U01B-021

10. Install the crankshaft pulley pulley and baffle plate.

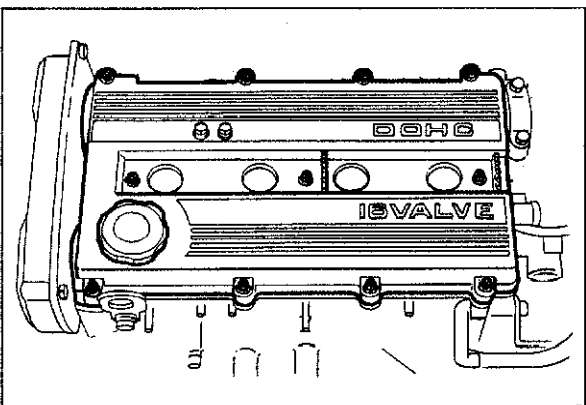
Tightening torque:

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



83U01B-022

11. Install the cylinder head cover.
 - (1) Apply a coat of sealant to the cylinder head cover as shown in the figure.

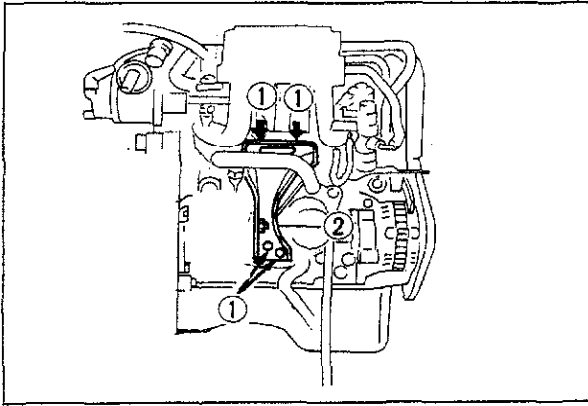


83U01B-023

- (2) Install the cylinder head cover.

Tightening torque:

3—4 N·m (0.3—0.4 m·kg, 26—35 in·lb)



83U01B-024

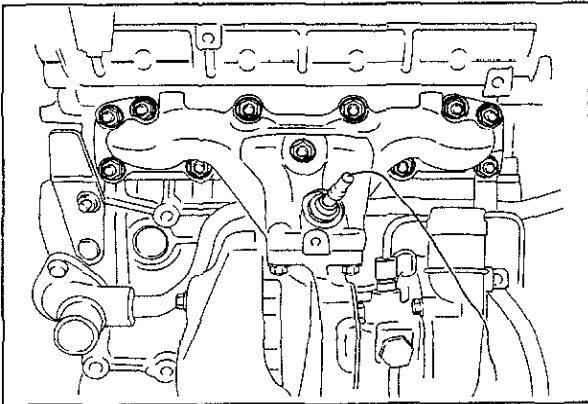
12. Install the surge tank bracket.

Tightening torque:

Bolt ①: 31—46 N·m
(3.2—4.7 m·kg, 23—34 ft·lb)

Bolt ②: 19—26 N·m
(1.9—2.6 m·kg, 14—19 ft·lb)

13. Connect the engine harness connectors.
14. Connect the vacuum hoses.
15. Connect the Fuel hoses.
16. Install the accelerator cable.

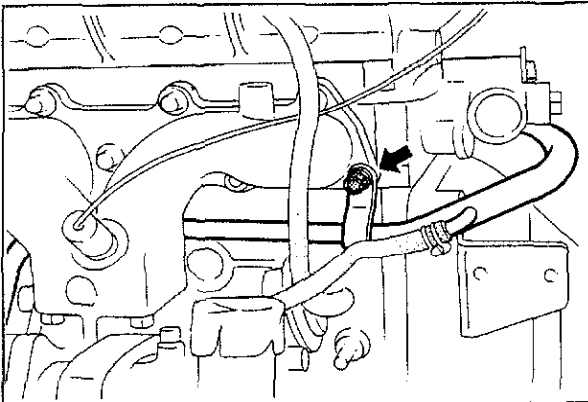


83U01B-025

17. Install the exhaust manifold and turbocharger assembly along with new gasket.

Tightening torque:

39—57 N·m (4.0—5.8 m·kg, 29—42 ft·lb)

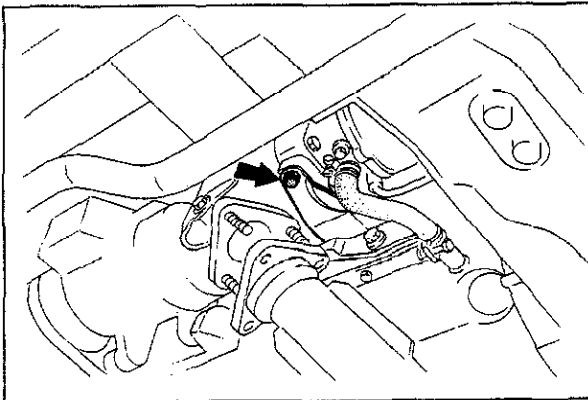


83U01B-026

18. Install the coolant bypass pipe bracket.

Tightening torque:

39—57 N·m (4.0—5.8 m·kg, 29—42 ft·lb)



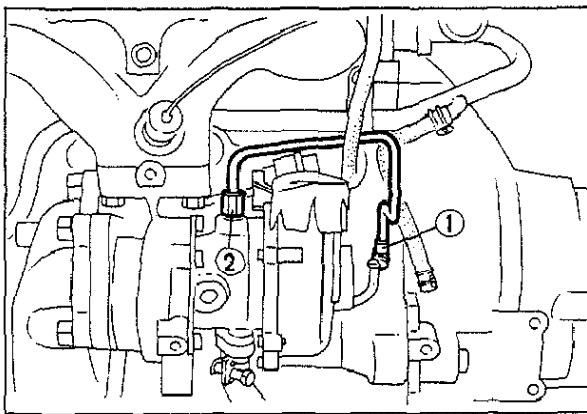
83U01B-027

19. Connect the turbocharger and turbocharger bracket.

Tightening torque:

22—30 N·m (2.2—3.1 m·kg, 16—22 ft·lb)

1B ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



83U01B-028

20. Connect the oil pipe to the turbocharger and cylinder block.

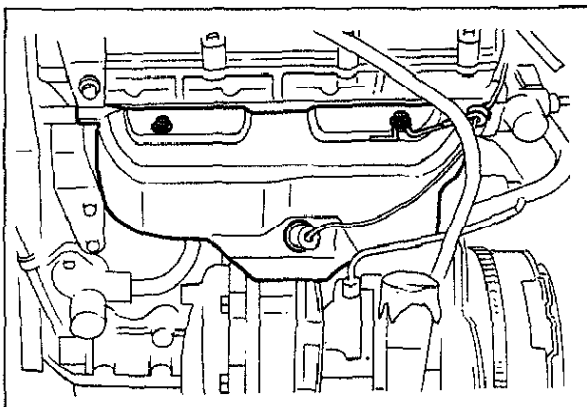
Tightening torque:

Bolt ①: 12—18 N·m

(1.2—1.8 m·kg, 104—156 in·lb)

Nut ②: 16—24 N·m

(1.6—2.4 m·kg, 12—17 ft·lb)

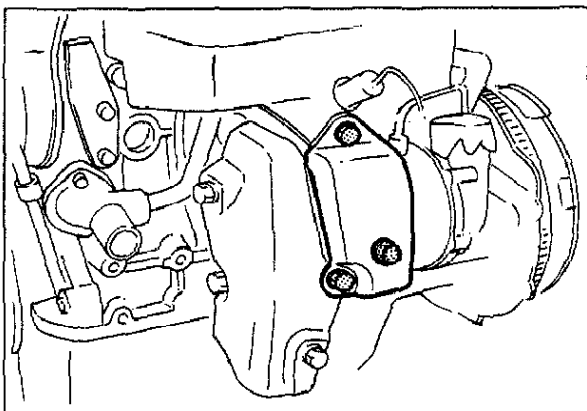


83U01B-029

21. Install the exhaust manifold insulator.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

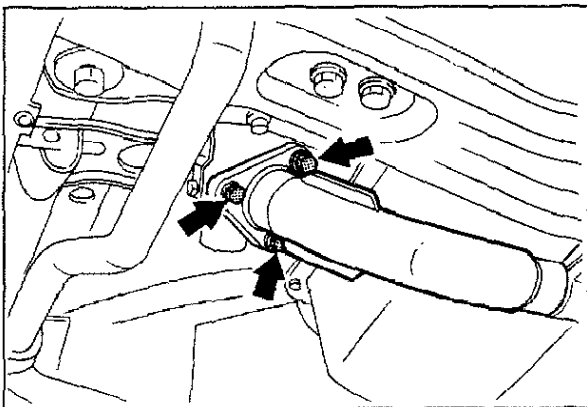


83U01B-030

22. Install the turbocharger insulator.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



83U01B-031

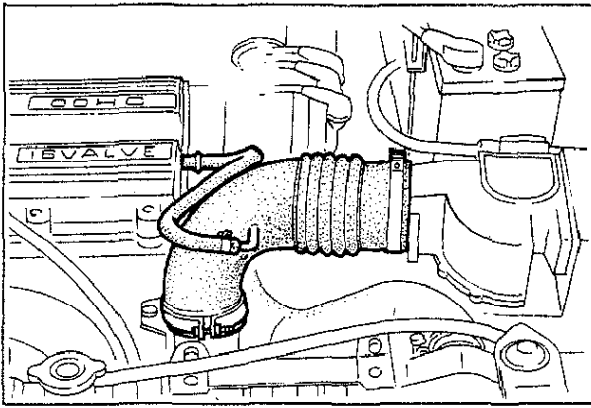
23. Connect the exhaust pipe to the turbocharger.

Tightening torque:

31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)

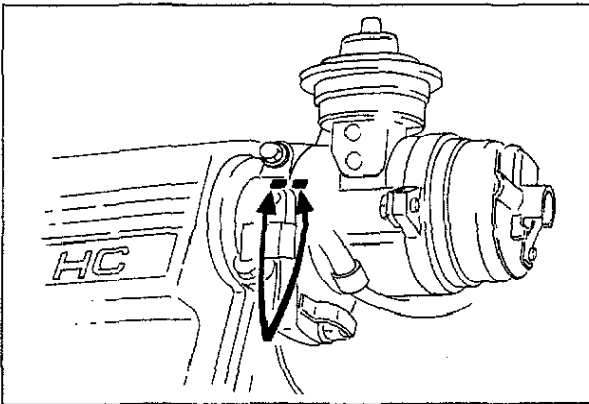
24. Install the engine side cover and under cover.

25. Install the radiator. (Refer to 3B—10)



83U01B-032

26. Install the air pipe.
27. Install the air bypass valve and hoses assembly.



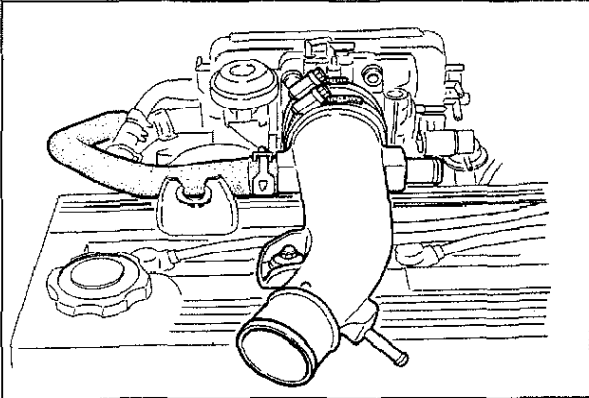
83U01B-033

28. Align the distributor blade with the grooved matching mark on the body, then install the distributor by referring to Section 5.
29. Install the spark plugs.

Tightening torque:

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)

30. Install the high-tension leads.



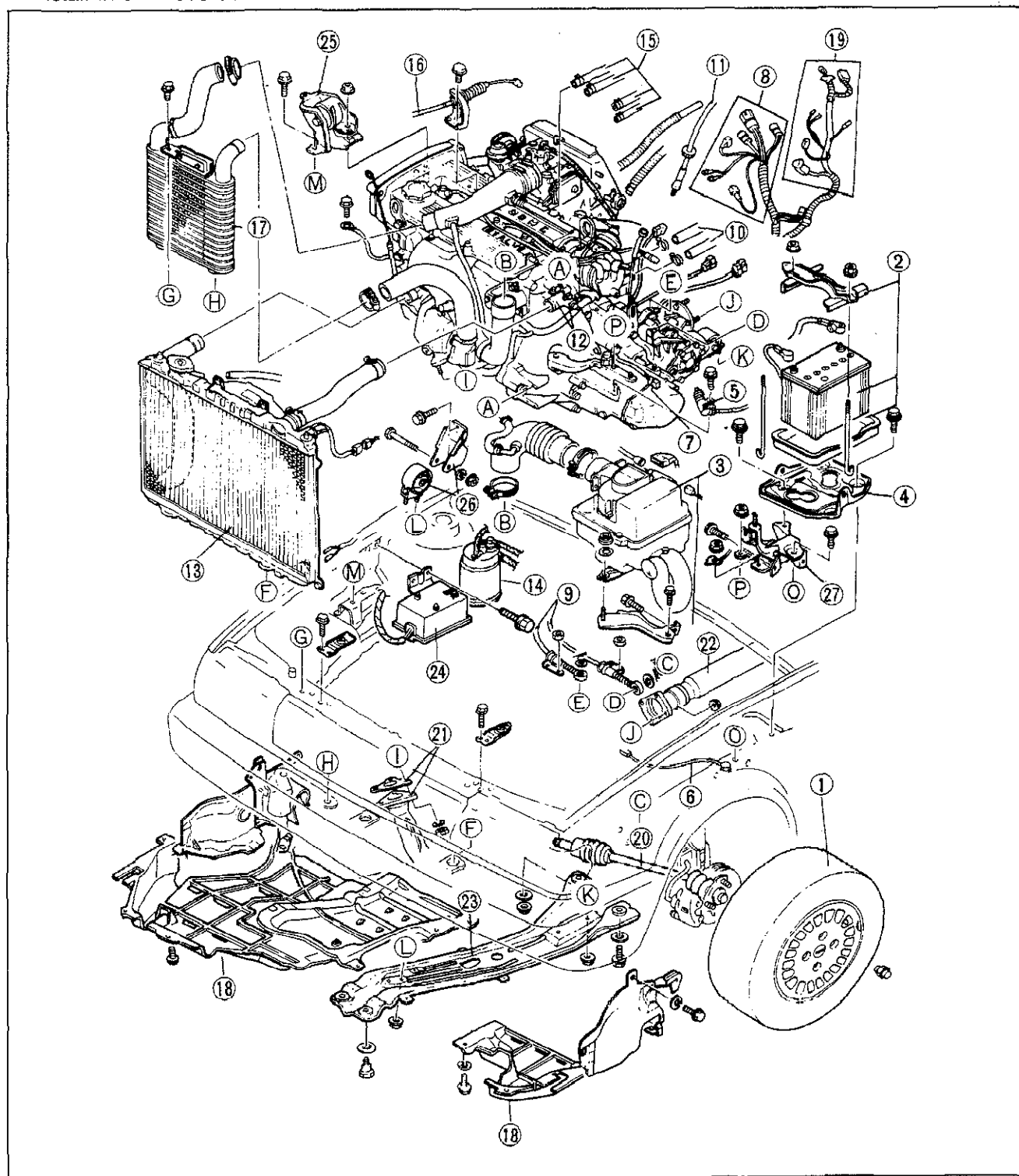
83U01B-034

31. Install the air intake pipe.
32. Fill the radiator with coolant.
33. Perform the necessary engine adjustments, refer to TUNE-UP PROCEDURE section.

REMOVAL AND INSTALLATION

Warning: Release the fuel pressure (Refer to FUEL PRESSURE RELEASE of FUEL SYSTEM section).

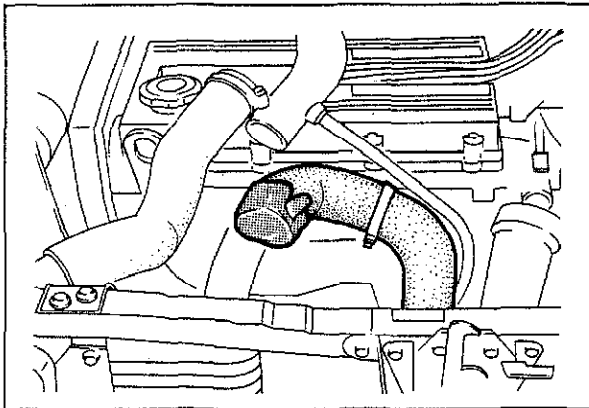
1. Disconnect the battery negative cable.
2. Drain the engine oil, transaxle oil and coolant.
3. Remove the parts in the numbered sequence shown below.
4. Install in the reverse order of removal.



63U01A-043

- | | | |
|-------------------------------|---|----------------------------------|
| 1. Front wheels | 12. Connectors (thermometer, electric fan switch) | 20. Driveshafts |
| 2. Battery | 13. Radiator | 21. Exhaust pipe |
| 3. Air cleaner | 14. Canister hoses | 22. Propeller shaft (for 4WD) |
| 4. Battery carrier | 15. Vacuum hoses | 23. Engine mount member |
| 5. Clutch release cylinder | 16. Accelerator cable | 24. Control unit |
| 6. Ground (body-transmission) | 17. Intercooler | 25. No. 3 engine mount |
| 7. Back up lamp connector | 18. Under cover and side cover | 26. No. 2 engine mount |
| 8. Engine harness connectors | 19. Connectors (starter motor, oil pressure switch, alternator) | 27. No. 4 engine mount (for 4WD) |
| 9. Shift control cables | | |
| 10. Heater hoses | | |
| 11. Speedometer cable | | |

83U01B-035



83U01B-036

Intercooler

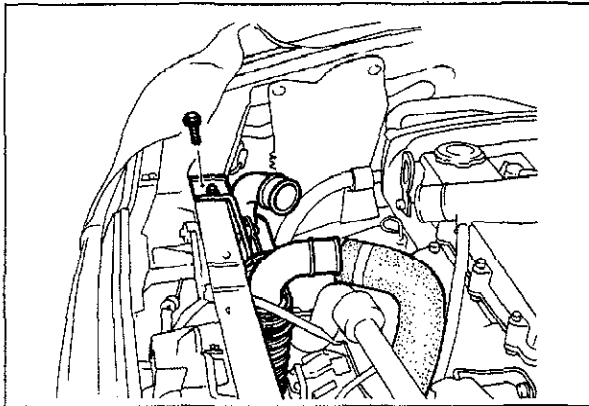
1. Disconnect the air hose from intercooler.

Caution

Cover the end of air pipes and hoses with rag to prevent any foreign material from falling into the turbocharger or intake system.

Note

Do not insert screw driver or other between air hose and intercooler pipe, when disconnecting

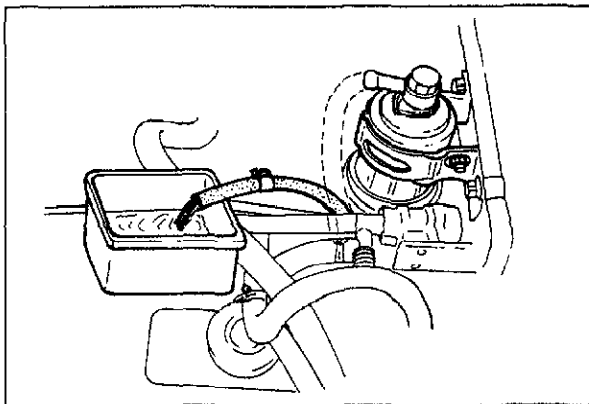


83U01B-037

2. Remove the intercooler

Note

Be careful not to damage to the fins.



63G01C-108

Fuel Hose

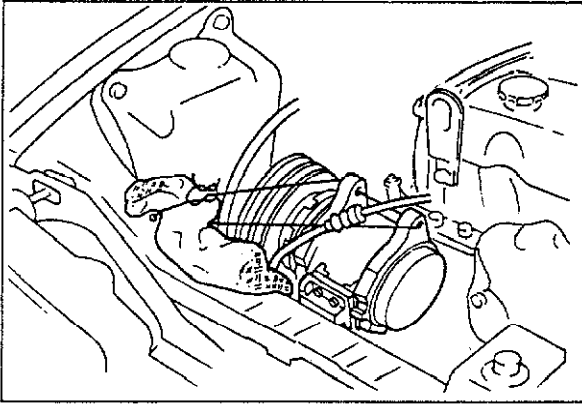
After disconnecting the fuel hoses (inlet and return), plug them to avoid fuel leakage.

Warning

Keep sparks and open flame away from the fuel area.

Caution

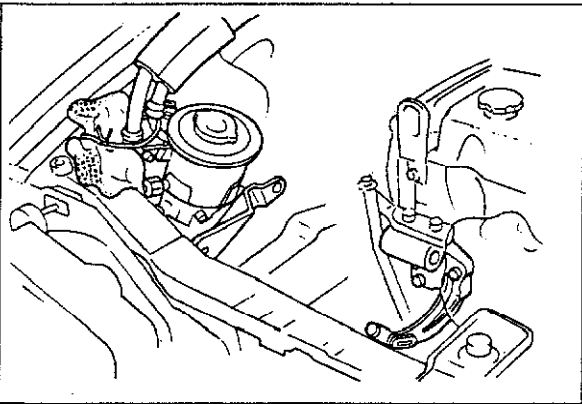
When disconnect the hoses, cover the hoses with a rag since fuel will splash out.



4BG01A-081

A/C Compressor

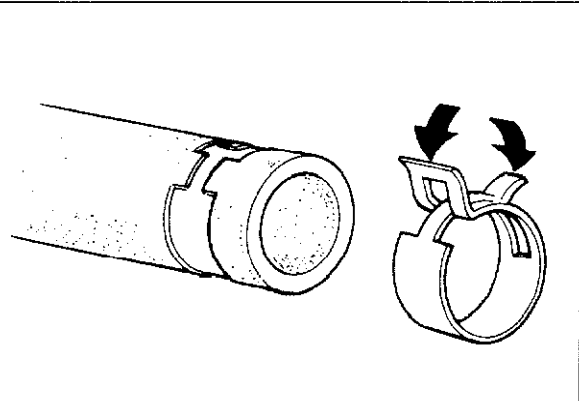
Remove the compressor, and then, with the high-pressure and low-pressure hoses still connected to it, secure the compressor as shown in the figure.



83U01A-045

P/S Pump

Secure the P/S pump as shown in the figure. Be careful not to damage the pipe when the engine is removed and installed.



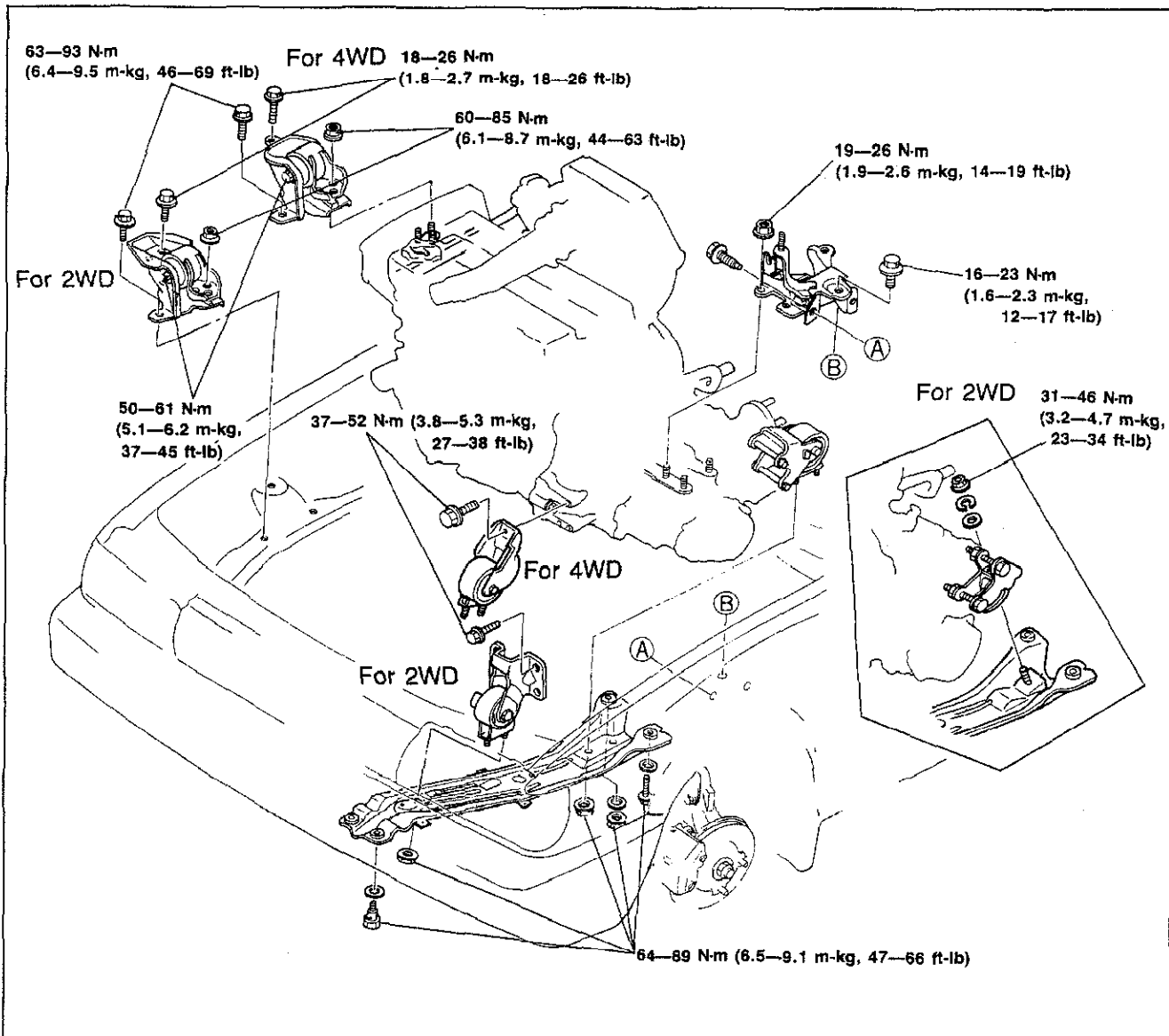
83U01A-046

Hose Clamp

1. Position the hose clamp in the original location on the hose.
2. Squeeze the clamp lightly with large pliers to ensure a good fit.

Engine Mount Torque Specification

After installing the engine into the engine room, tighten the engine mount bolts to the specified torque.



83U01A-046

Steps After Installation

1. Adjust the drive belt tension. (Refer to 1B—6)
2. Fill the radiator and sub tank with coolant.
3. Fill the engine with engine oil.
4. Fill the transaxle with transaxle oil.

Check Engine Condition

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

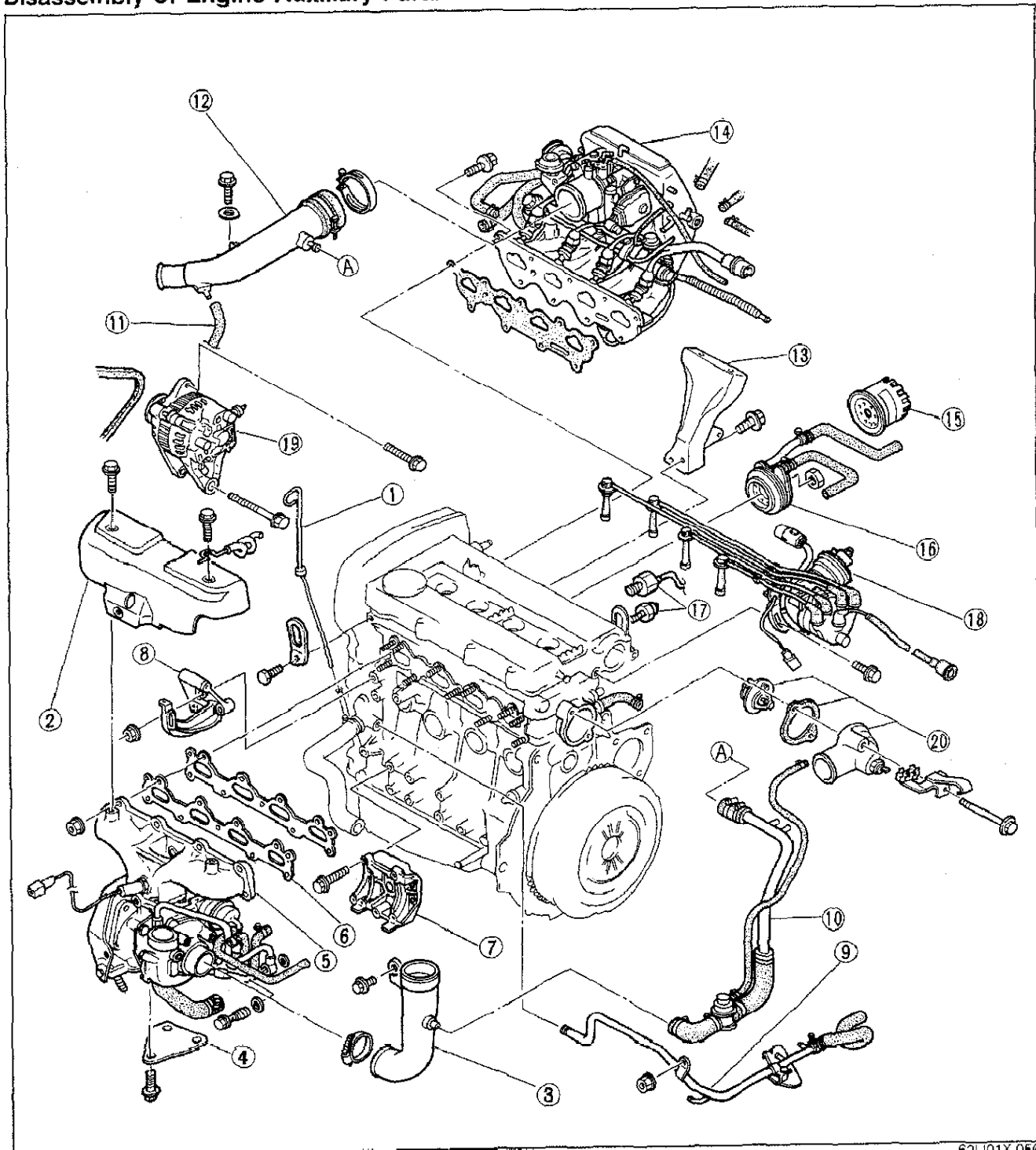
83U01B-038

DISASSEMBLY

Disassembly Note

1. Care should be taken during the disassembly of any part or system to study its order of assembly. Any deformation, wear, or damage also should be noted.
2. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the position from which they were removed.
3. After steam cleaning the parts, use compressed air to blow off any remaining water.
4. Remove the parts in the order shown in the figure.

Disassembly of Engine Auxiliary Parts

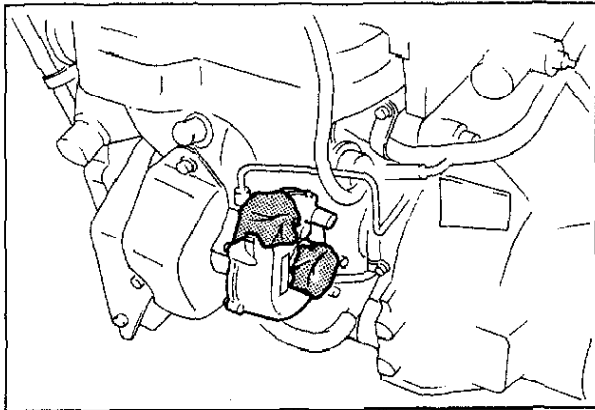


83U01X-056

1. Oil level gauge
2. Exhaust manifold insulator
3. Air hose
4. Turbocharger bracket
5. Exhaust manifold and turbocharger
6. Exhaust manifold gasket
7. A/C compressor bracket
8. P/S pump bracket
9. Coolant bypass pipe and hose
10. Air bypass valve and hoses

11. Hose
12. Air intake pipe
13. Surge tank bracket
14. Intake manifold assembly
15. Oil filter
16. Oil cooler
17. Oil pressure switch and knock sensor
18. Distributor and high-tension leads
19. Alternator and drive belt
20. Thermostat cover and thermostat

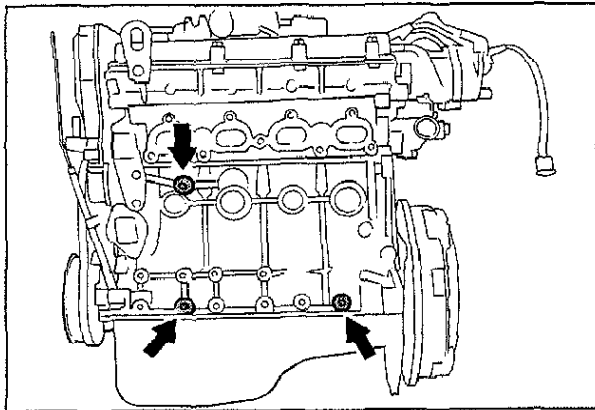
83U01B-039



77U01X-017

Turbocharger

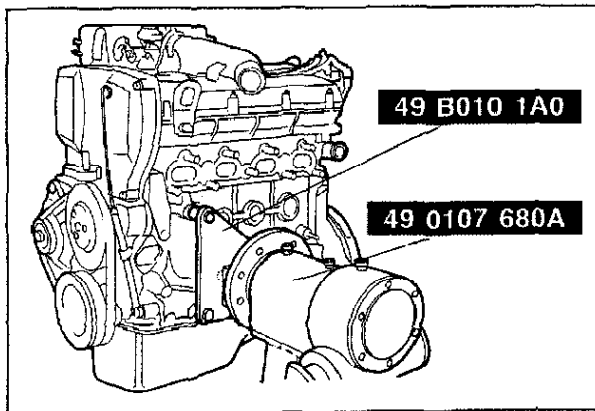
Cover the intake and exhaust ports and oil passage to prevent dirt or other contaminants from entering.



83U01X-123

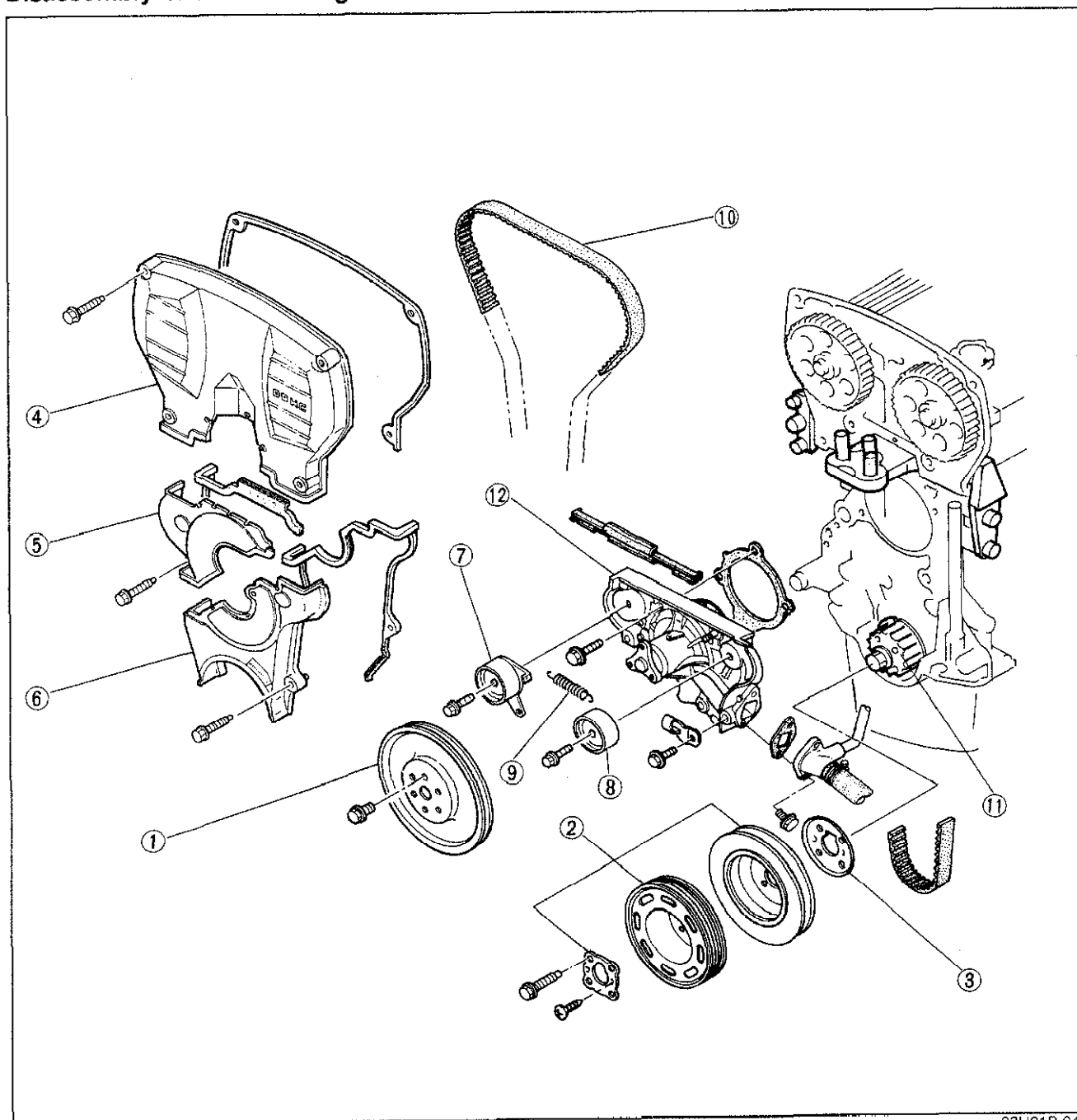
Engine hanger

After removing the exhaust manifold, install the engine on the **SST**.



83U01A-049

Disassembly of Front of Engine

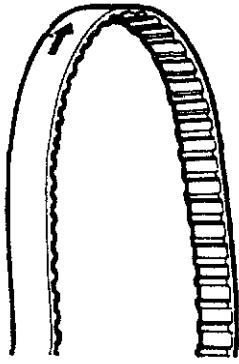


83U01B-040

1. Water pump pulley
2. Drive pulley
3. Baffle plate
4. Upper timing belt cover
5. Middle timing belt cover
6. Lower timing belt cover

7. Timing belt tensioner
8. Idler pulley
9. Tensioner spring
10. Timing belt
11. Timing belt drive pulley
12. Water pump

Mark the
direction of
rotation



83U01A-112

Timing belt

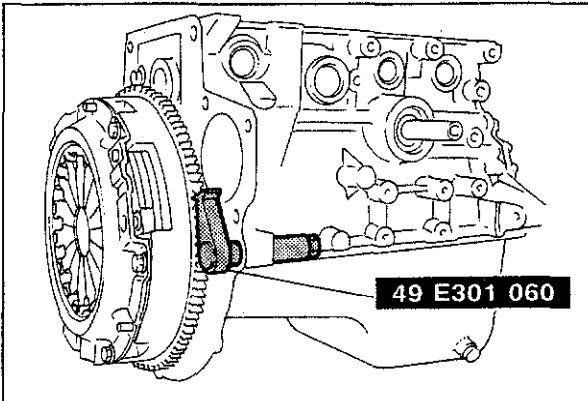
1. Remove the tensioner spring after loosening the tensioner lock bolt.
2. Mark the direction of rotation on the timing belt.
3. Remove the timing belt.

Caution

Do not allow any oil or grease on the timing belt.

Crankshaft pulley and timing belt pulley

Set the **SST** to the flywheel. Remove the crankshaft pulley and the timing belt pulley.



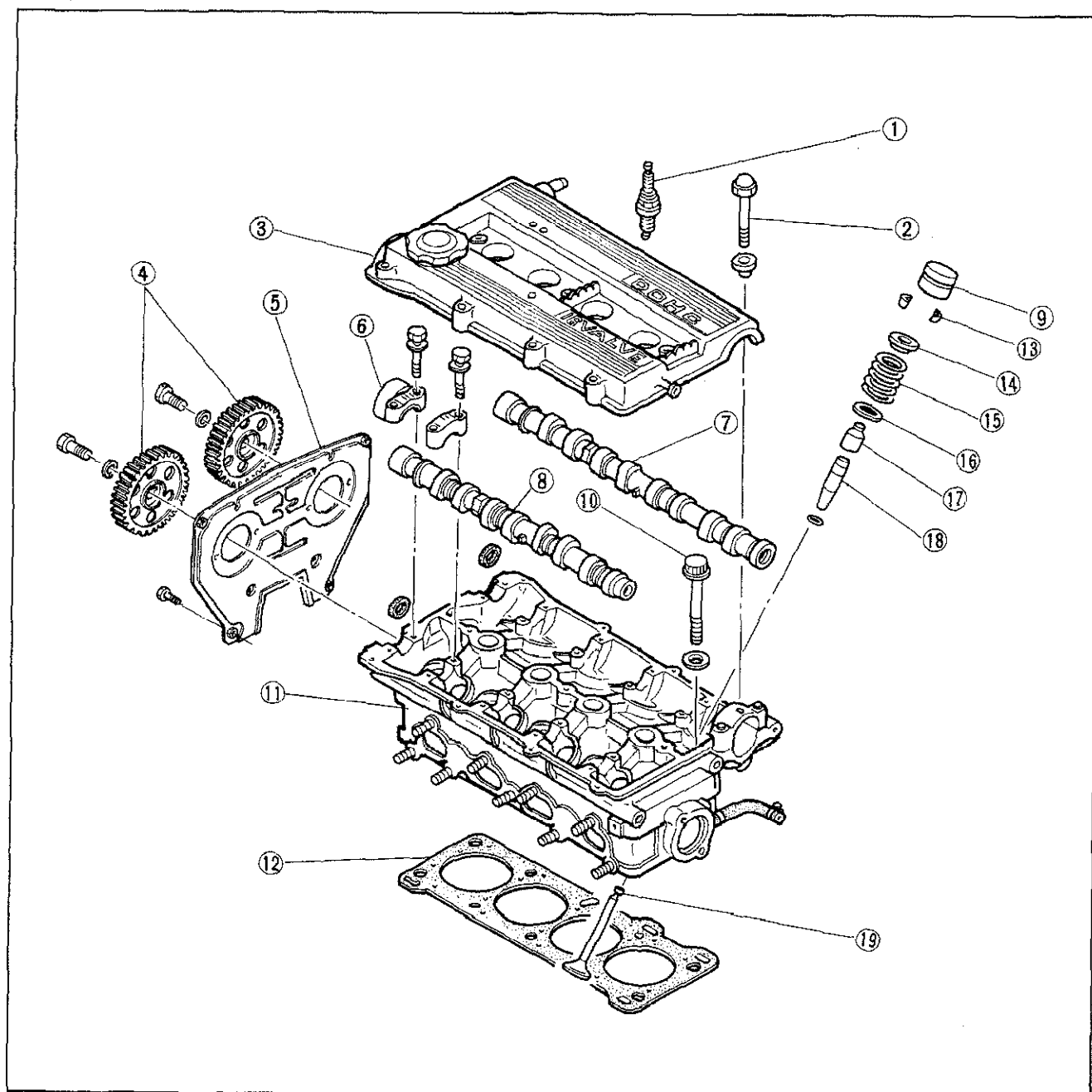
83U01X-124

1B DISASSEMBLY

Disassembly Related to Cylinder Head

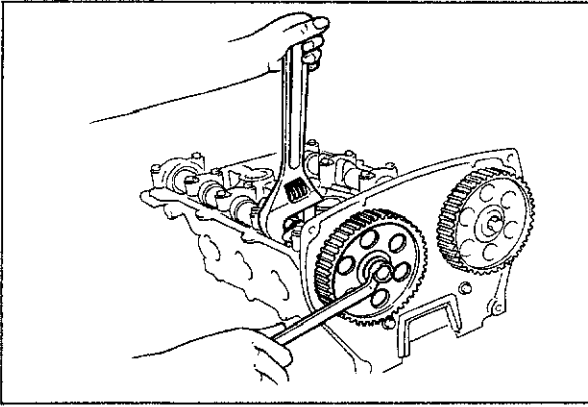
Note

During disassembly, inspect the camshaft end play, camshaft bearing oil clearance referring to INSPECTION AND REPAIR section.



83U01B-041

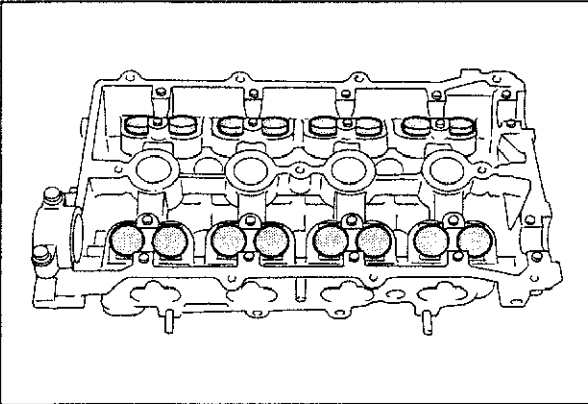
- | | |
|-----------------------------|-------------------------------|
| 1. Spark plug | 11. Cylinder head |
| 2. Cylinder head cover bolt | 12. Cylinder head gasket |
| 3. Cylinder head cover | 13. Spring retainers |
| 4. Camshaft pulley | 14. Valve spring seat (upper) |
| 5. Seal plate | 15. Valve spring |
| 6. Camshaft cap | 16. Valve spring seat (lower) |
| 7. Camshaft (IN) | 17. Valve seal |
| 8. Camshaft (EX) | 18. Valve guide |
| 9. Hydraulic lash adjuster | 19. Valve |
| 10. Cylinder head bolts | |



63G01C-039

Camshaft pulley

Remove the pulley using a wrench to prevent it from turning.



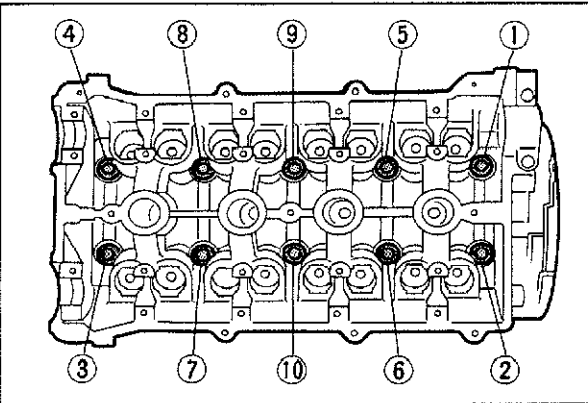
63G01C-041

HLA (Hydraulic Lash Adjuster)

Remove the HLA from the cylinder head.

Note

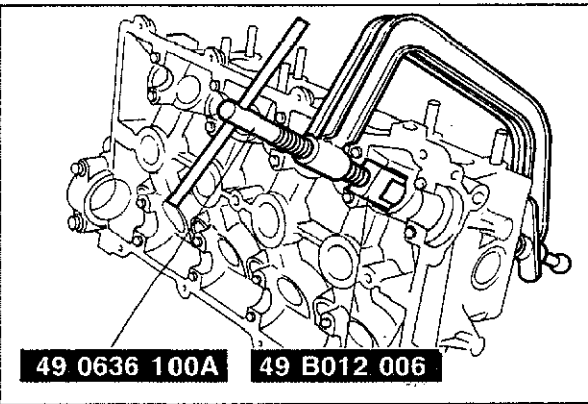
Mark all HLA so that they can be reinstalled in the position from which they were removed.



4BG01A-096

Cylinder head bolt

Remove the cylinder head bolts in the numbered order shown in the figure. Loosen them gradually, in order.



49 0636 100A

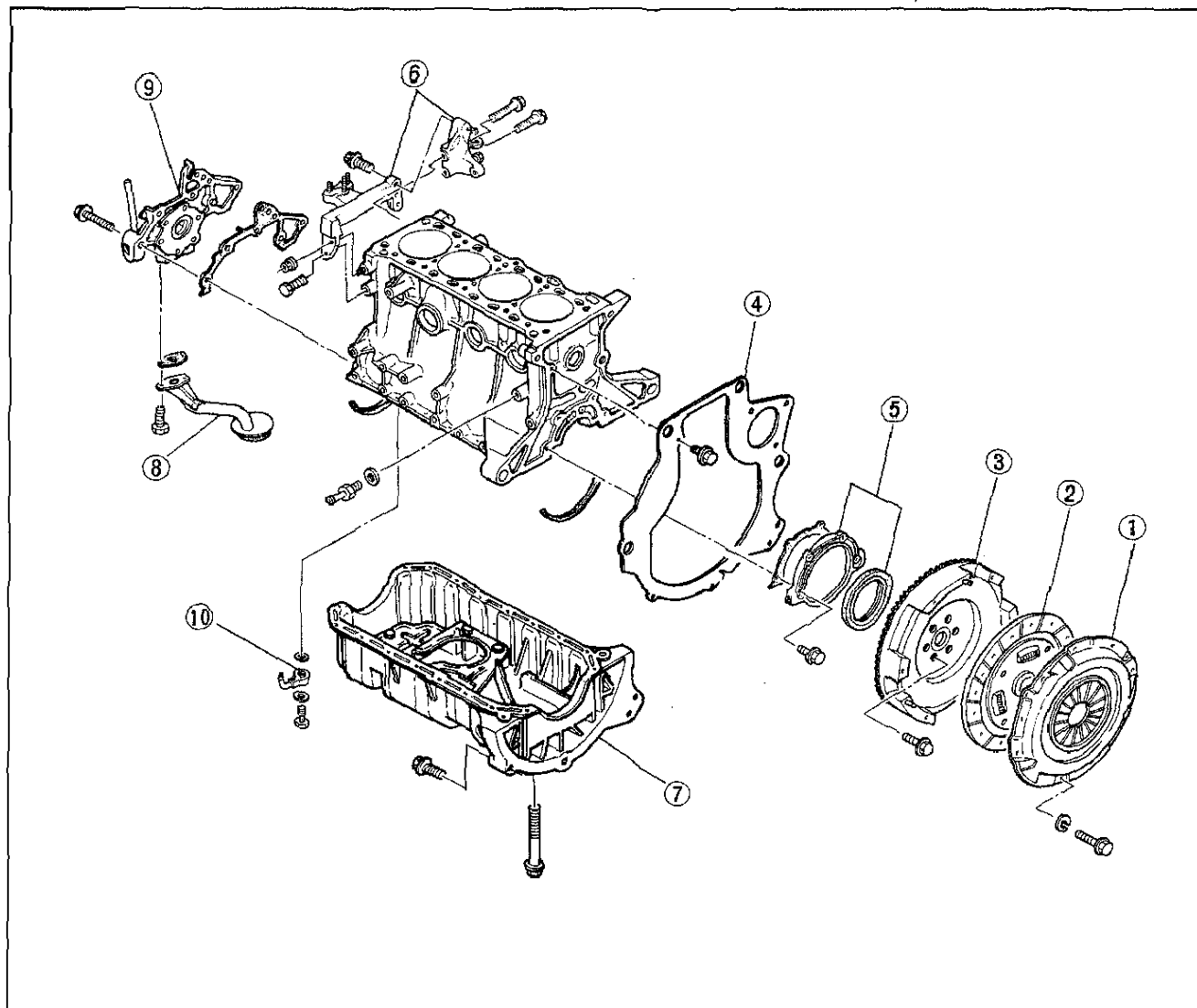
49 B012 006

83U01B-042

Valve

Remove the valves from the cylinder head with the SST.

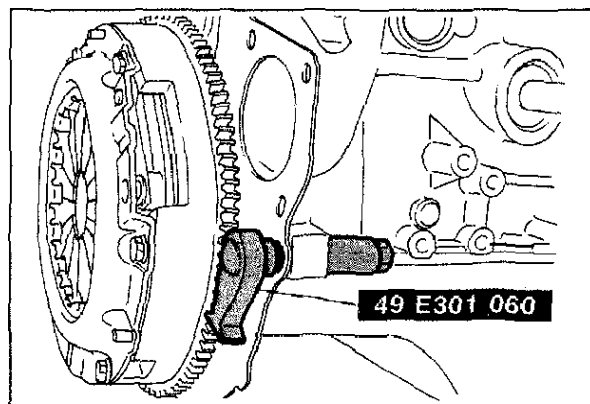
Disassembly Related to Lubrication System and Flywheel



83U01B-043

1. Clutch cover
2. Clutch disc
3. Flywheel
4. End plate
5. Rear cover

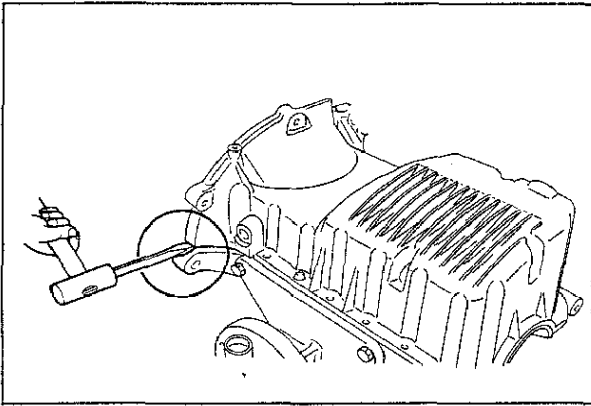
6. Engine bracket and mount arm
7. Oil pan
8. Oil strainer
9. Oil pump
10. Oil jet



83U01X-125

Clutch cover and flywheel

Remove the clutch cover and flywheel with the **SST** as shown in the figure.



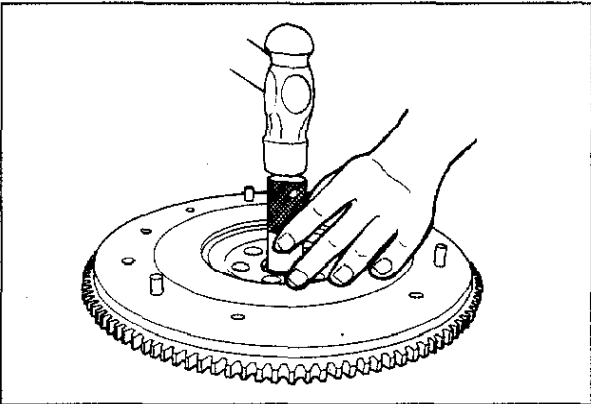
83U01B-044

Oil pan

Remove the oil pan by prying only at the points shown in the figure.

Caution

- a) Do not force a pry tool between the block and pan to prevent damaging the contact surfaces.
- b) Do not damage or scratch the contact surface when removing the oil sealant.



63U01X-065

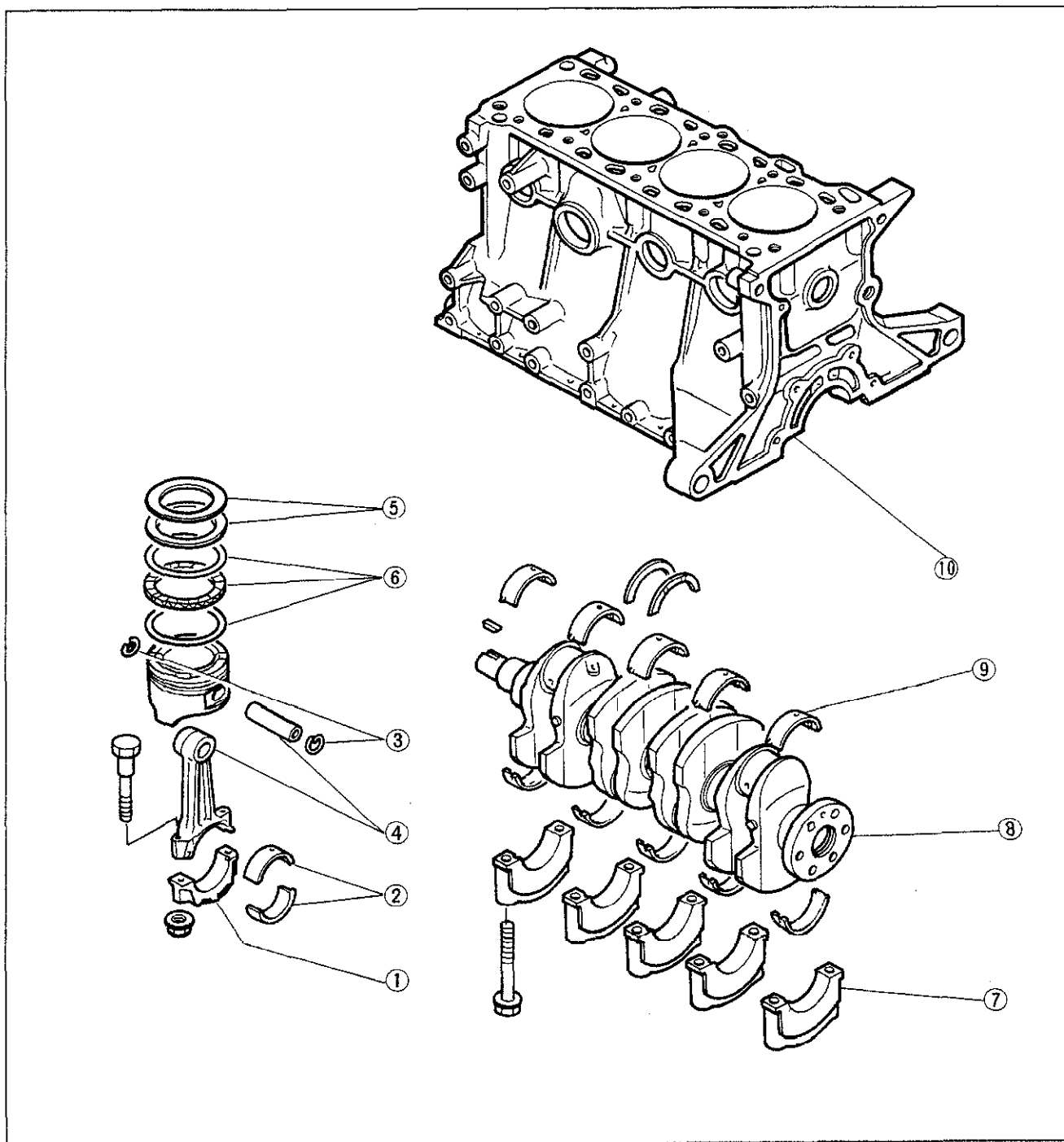
Flywheel pilot bearing

Use suitable pipe and punch out to the crankshaft side of the flywheel, as shown in the figure.

Disassembly Related to Crankshaft and Piston

Note

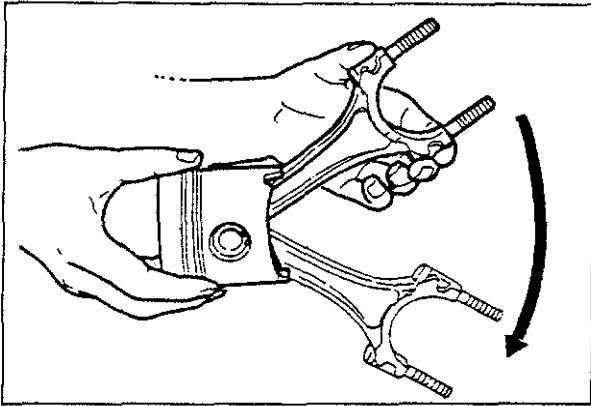
During disassembly, inspect the crankshaft end play, main journal bearing oil clearance, connecting rod bearing oil clearance, connecting rod side clearance referring to ASSEMBLY section.



83U01B-045

1. Connecting rod caps
2. Connecting rod bearings
3. Clips
4. Connecting rod and piston pin
5. Piston rings

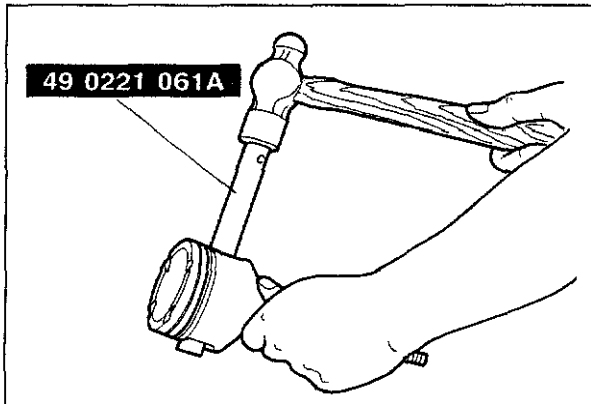
6. Oil rings
7. Main bearing caps
8. Crankshaft
9. Main bearings
10. Cylinder block



83U01B-046

Piston and connecting rod

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



83U01A-054

2. Use the **SST** to remove the piston pin.

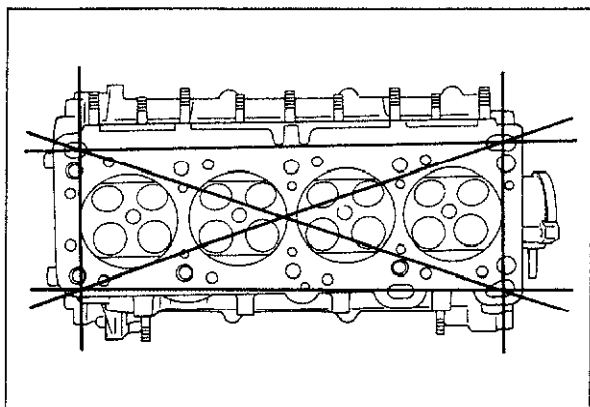
INSPECTION AND REPAIR

1. Clean all parts, taking care to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign material.
2. Inspect and repair 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.

83U01A-058

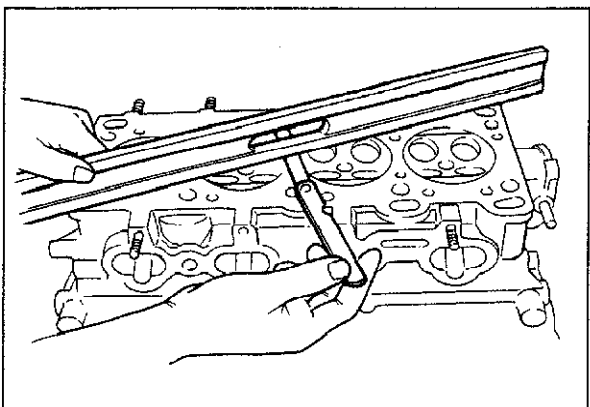


83U01A-059

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.



83U01B-047

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:

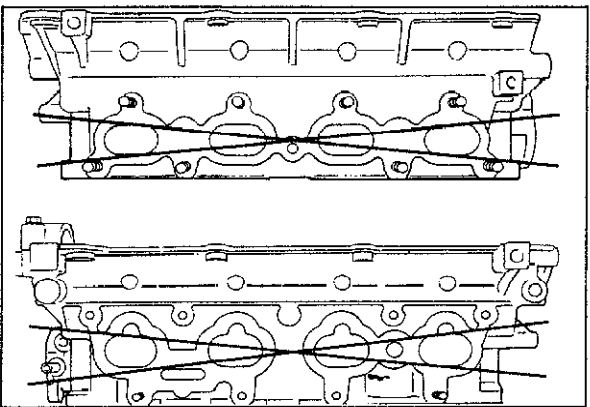
133.8—134.0 mm (5.268—5.276 in)

Grinding: 0.20 mm (0.008 in) max.

Note

Before grinding the cylinder head, first check the following and replace the head if necessary.

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

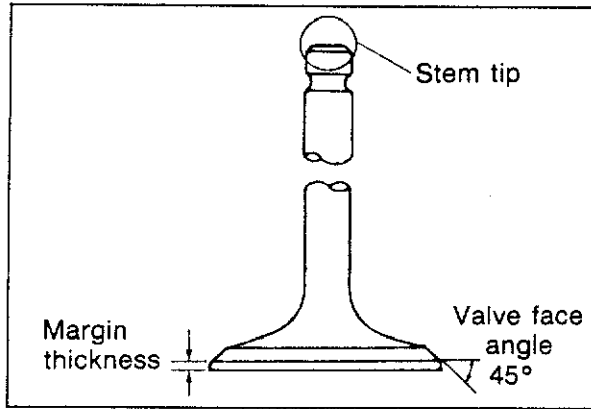


83U01A-061

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.



83U01B-48

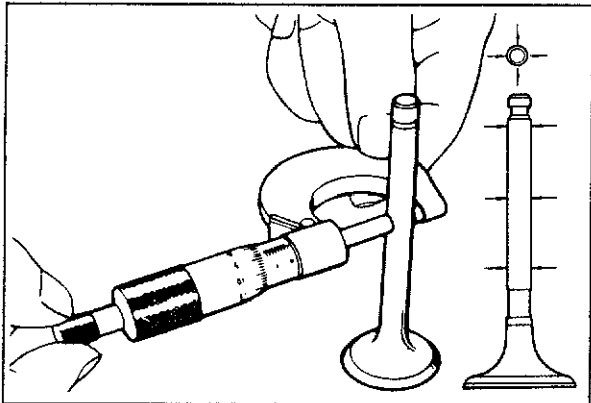
Valve and Valve Guide

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

Margin thickness

IN : 0.5 mm (0.020 in) min.

EX: 0.5 mm (0.020 in) min.



83U01B-049

3. Measure the valve length.

Length

IN : 105.29 mm (4.1452 in)

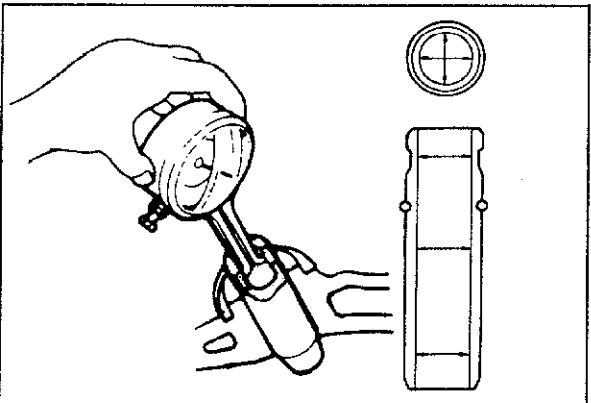
EX: 105.39 mm (4.1492 in)

4. Measure the valve stem diameter.

Diameter

IN : 5.970—5.985 mm (0.2350—0.2356 in)

EX: 5.965—5.980 mm (0.2348—0.2354 in)



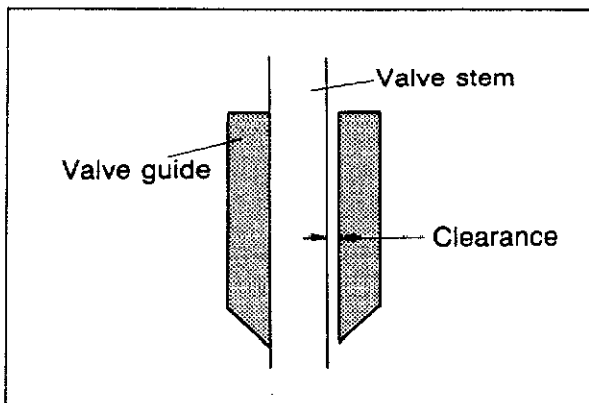
83U01B-050

5. Measure the valve guide inner diameter.

Inner diameter

IN : 6.01—6.03 mm (0.2366—0.2374 in)

EX: 6.01—6.03 mm (0.2366—0.2374 in)

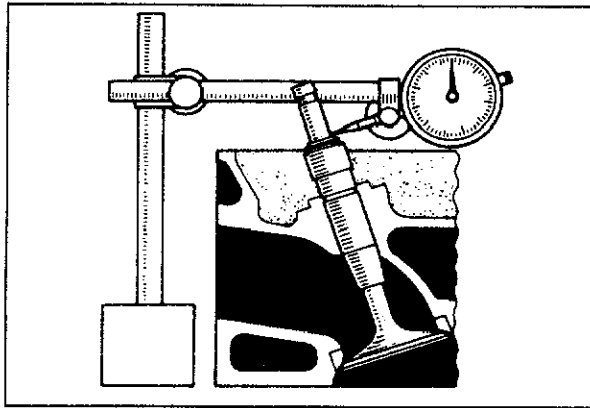


83U01A-064

6. Measure the valve stem to guide clearance.

(1) Method No. 1

Subtract the valve stem measurement from the corresponding valve guide inner diameter measurement.



83U01B-051

(2) Method No. 2

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

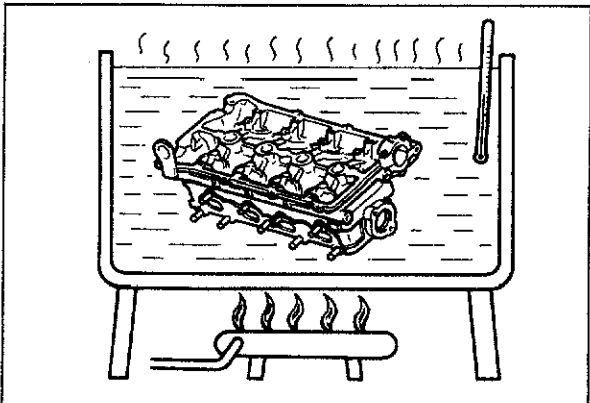
Clearance

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 the maximum, replace the valve and/or valve guide.

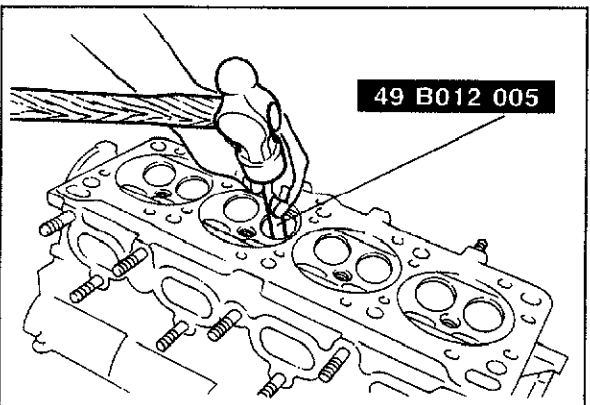


69G01B-093

Replacement of valve guide

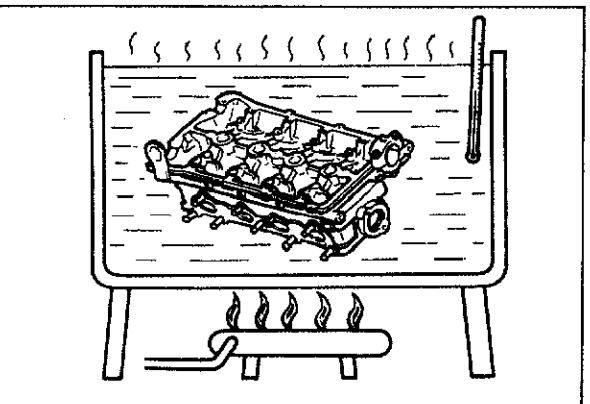
Removal

1. Gradually heat the cylinder head in water to approx. **90°C (190°F)**.



83U01B-052

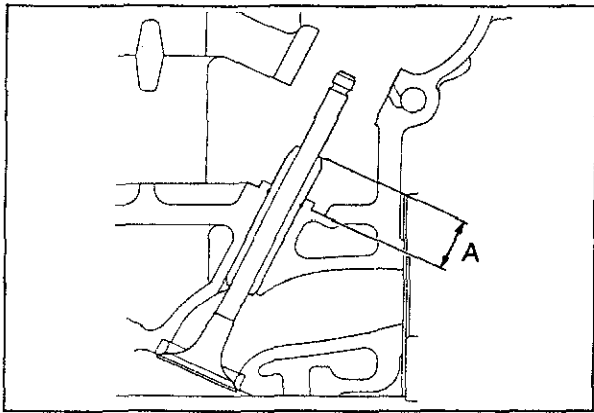
2. Remove the valve guide from the side opposite the combustion chamber with the **SST**.
3. Remove the valve guide clip.



83U01A-113

Installation

1. Fit the clip onto the valve guide.
2. Gradually heat the cylinder head in water to approx. **90°C (190°F)**.
3. Tap the valve guide in from the side opposite the combustion chamber until the clip contacts the cylinder head with the **SST**.



83U01B-053

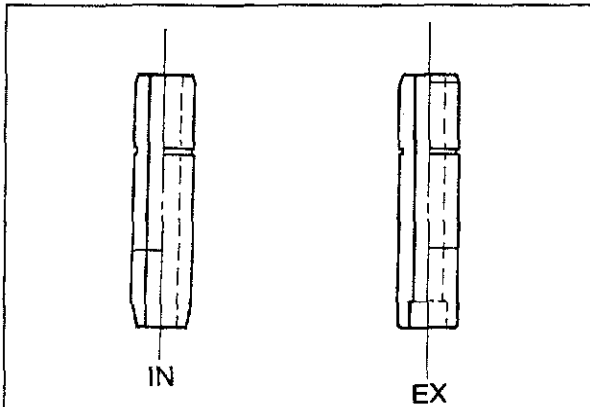
4. Check that the protrusion height (dimension A in the figure) is within specification.

Height:

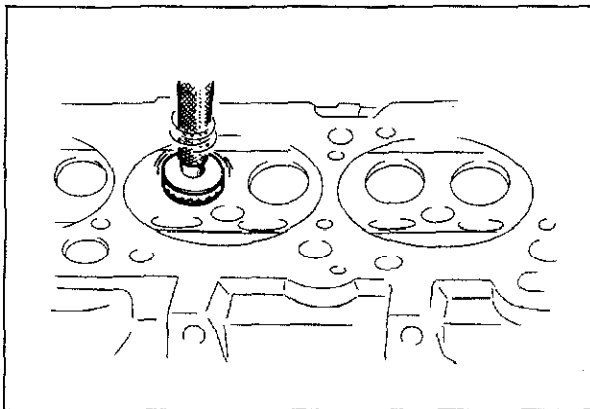
16.8—17.4 mm (0.661—0.685 in)

Note

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



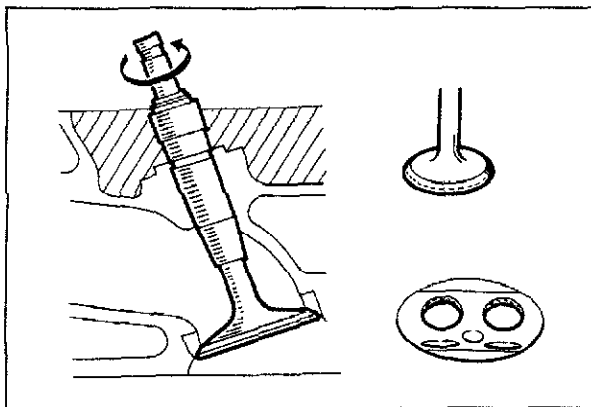
69G01B-098



83U01B-066

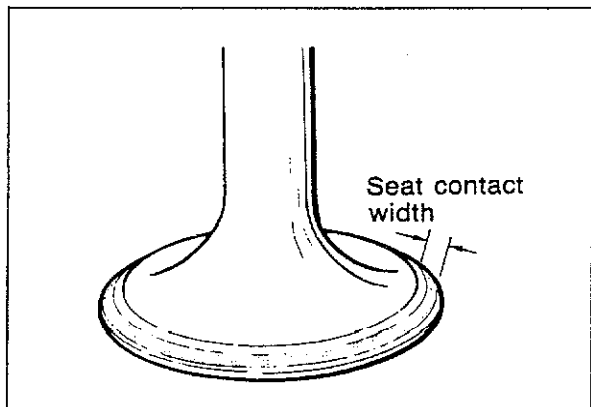
Valve Seat

1. Inspect the contact surface of the valve seat and valve face.
 - (1) Roughness
 - (2) Damage
2. If necessary, resurface the valve seat using a 45° valve seat cutter and/or resurface the valve face.



83U01B-114

3. Apply a thin coat of prussian blue to the valve face.
4. Check the valve seating by pressing 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.



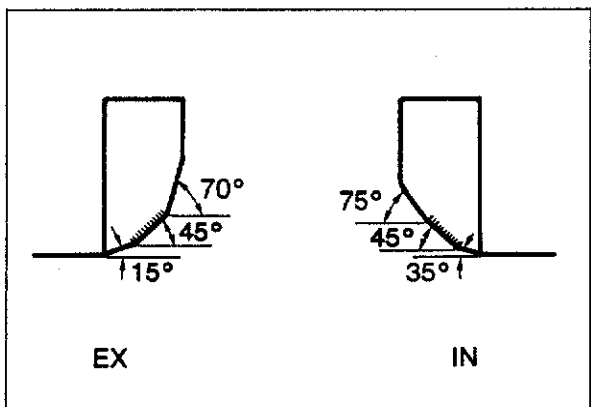
83U01B-054

5. Check the seat contact width and valve seating position on the valve face.

Width:

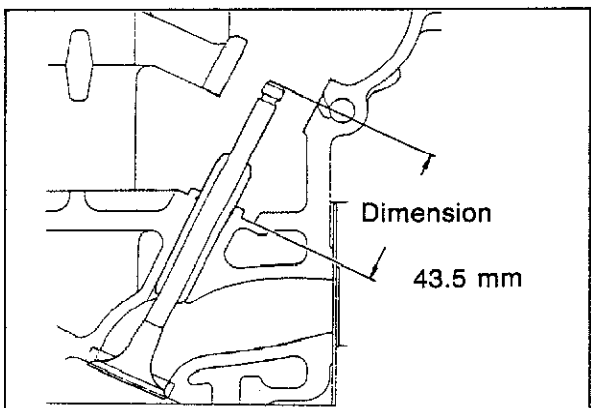
0.8—1.4 mm (0.031—0.055 in)

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



83U01A-068

- (1) If the seating position is too high, correct the valve seat using a **75°** cutter, and a **45°** cutter.
- (2) If the seating position is too low, correct the valve seat using a **35° (IN)** or **15° (EX)**, and a **45°** cutter.
7. Seat the valve to the valve seat using a lapping compound.



83U01B-055

8. Check the sinking of the valve seat. Measure protruding length (dimension "L") of the valve stem.

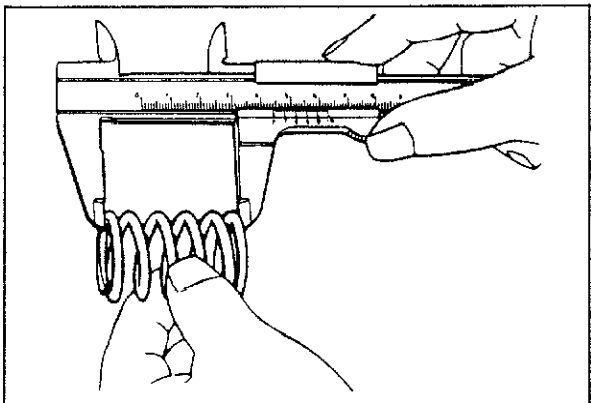
Dimension "L": 43.5 mm (1.713 in)

- (1) If "L" is as below, it can be used as it is.
- (2) If "L" is as below, insert a spacer between the spring seat and cylinder head so that "L" will be as specified.
- (3) If "L" is more than as below, replace the cylinder head.

43.5—44.0 mm (1.713—1.732 in)

44.0—45.0 mm (1.732—1.772 in)

45.0 mm (1.772 in) or more



83U01B-056

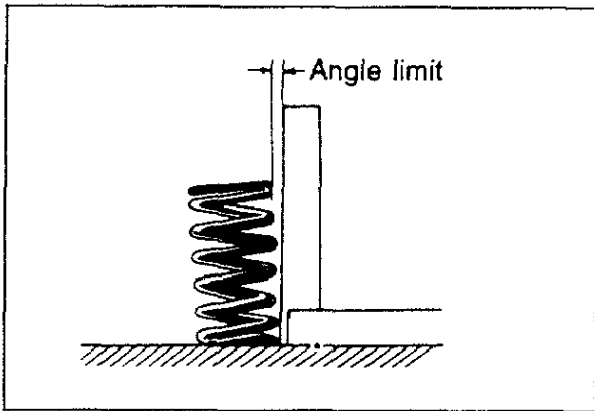
Valve Spring

1. Inspect each valve spring for cracks or damage.
2. Check the free length and angle, replace if necessary.

Free length

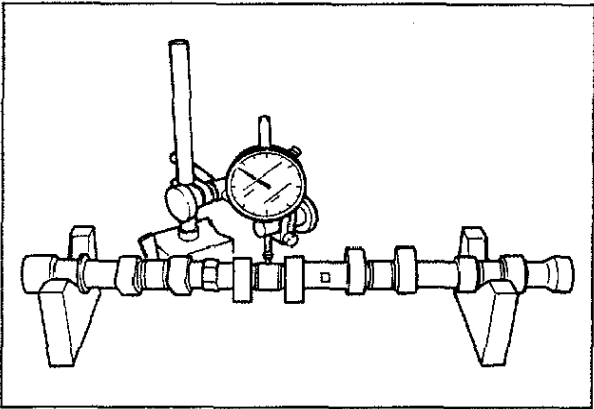
Standard: 47.2 mm (1.858 in)

Minimum: 45.8 mm (1.803 in)



83U01B-057

Angle: 1.6 mm (0.063 in) max.

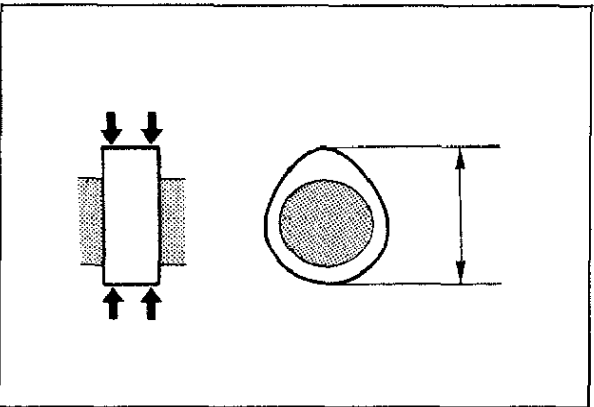


83U01A-074

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.



83U01B-058

2. Check the cam for wear or damage, replace if necessary.
3. Check the cam lobe height at the two places as shown.

Height

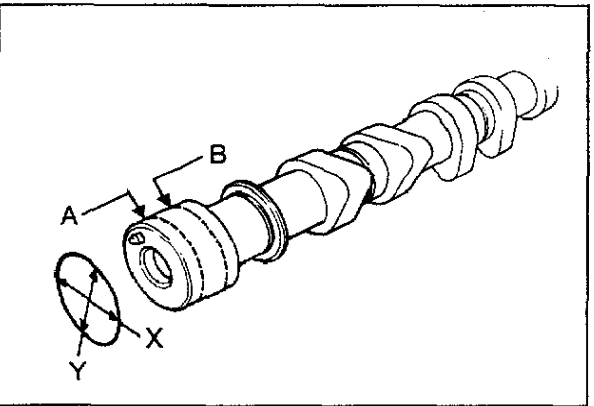
IN : 40.888 mm (1.6098 in)

EX: 40.688 mm (1.6019 in)

Minimum

IN : 40.889 mm (1.6098 in)

EX: 40.689 mm (1.6019 in)



83U01B-059

4. Measure wear of the journals in X and Y directions at the two places shown.

Diameter

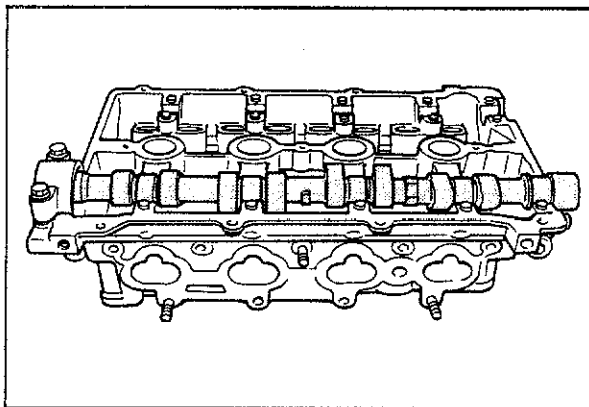
No.1—No.5:

25.940—25.965 mm (1.0213—1.0222 in)

No.6:

33.961—34.000 mm (1.3370—1.3386 in)

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



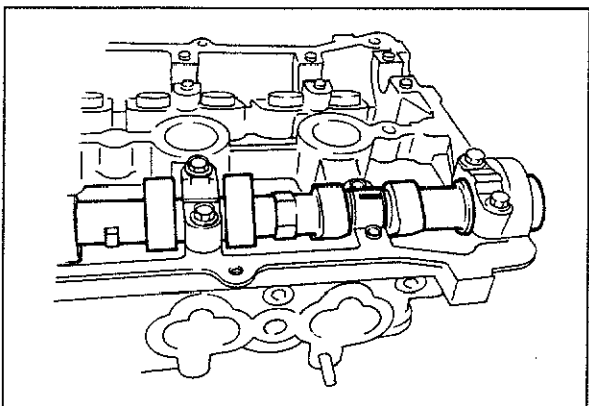
83U01B-060

5. Measure the oil clearances of the camshaft and cylinder head.

- (1) Remove any oil, or dirt from the journals and bearing surface.
- (2) Set the camshaft on the cylinder head.

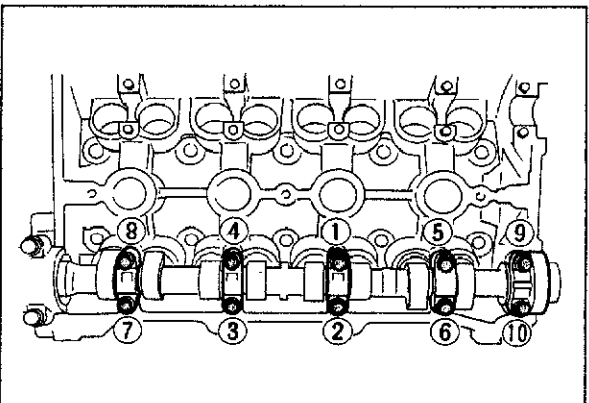
Note

Do not install the HLA, when measuring the oil clearance.



83U01B-061

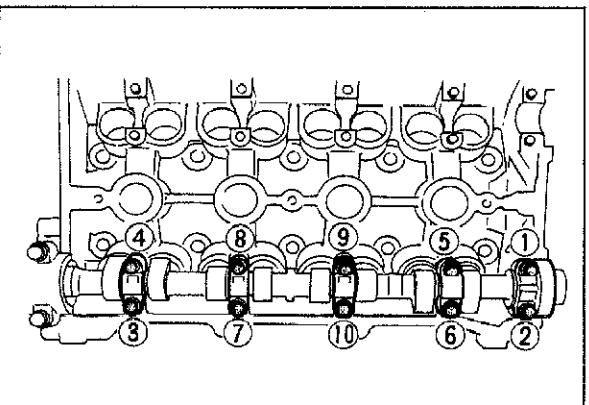
- (3) Position the plastic-gauge on top of the journal in the journal axial direction.



83U01B-062

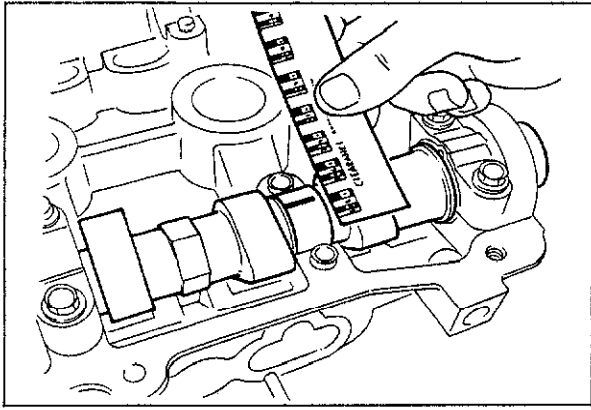
- (4) Install the camshaft caps according to the cap number and arrow, tighten them in the order shown in the figure.

**Tightening torque: 11—14 N·m
(1.15—1.45 m·kg, 100—126 in·lb)**



83U01B-063

- (5) Loosen the camshaft cap bolts in the order shown in the figure.



83U01B-064

(6) Measure the oil clearance.

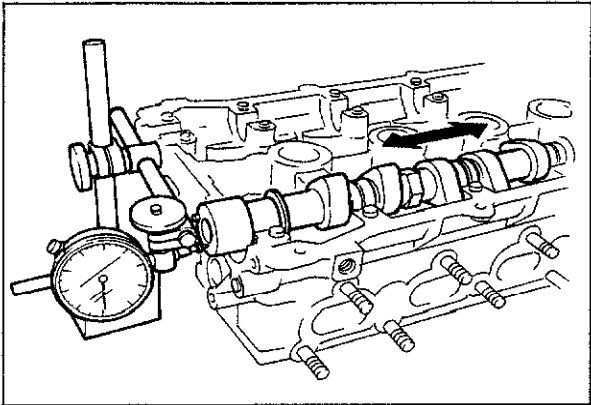
Oil clearance

No. 1—No. 5:

0.035—0.081 mm (0.0014—0.0032 in)

Maximum: 0.15 mm (0.0059 in)

(7) If the oil clearance exceeds the maximum, replace the camshaft or the cylinder head.



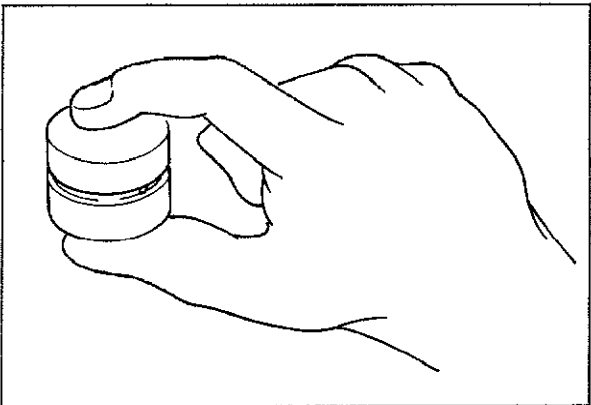
83U01B-065

6. Measure the camshaft end play. If it exceeds the maximum, replace the camshaft or the cylinder head.

End play:

0.07—0.19 mm (0.0028—0.0075 in)

Maximum: 0.20 mm (0.008 in)



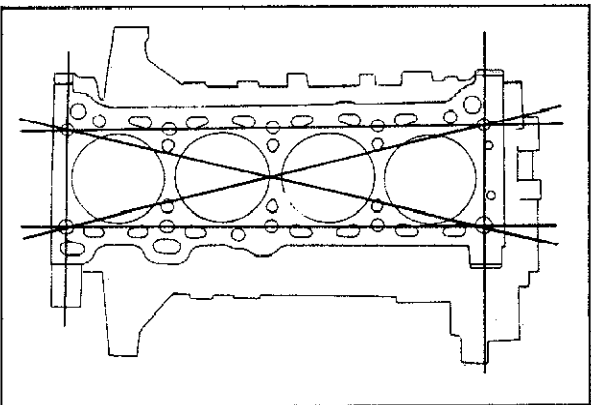
63G01C-061

HLA

1. Check the HLA for wear or damage.
2. Hold the HLA between your fingers and press it. If the HLA moves, replace it.

Note

Do not disassemble the HLA

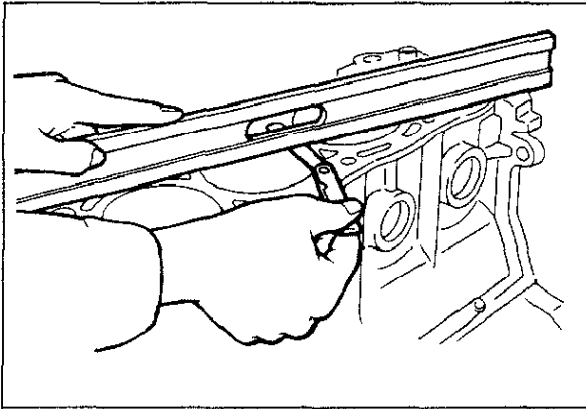


69G01A-117

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 shown in figure.

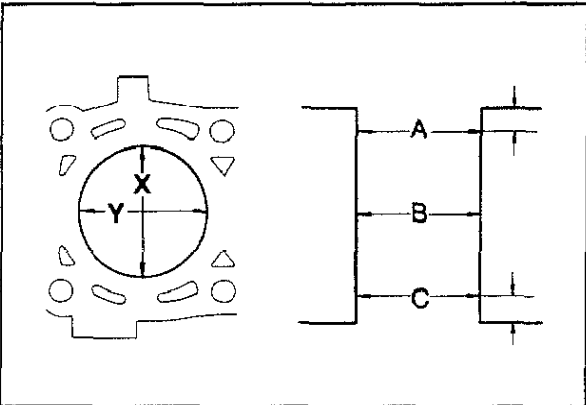
Distortion: 0.15 mm (0.006 in) max.



69G01A-118

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

Grinding: 0.20 mm (0.008 in) max.

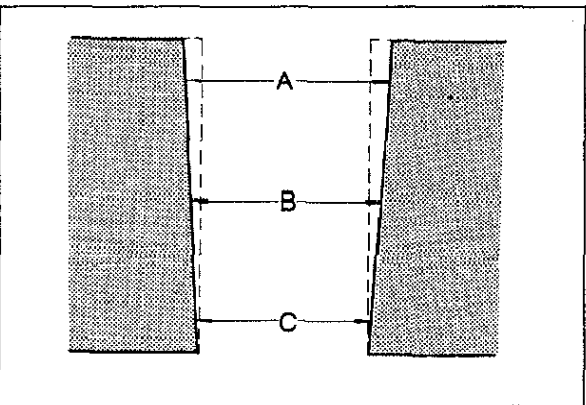


83U01B-066

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

Cylinder bore mm (in)

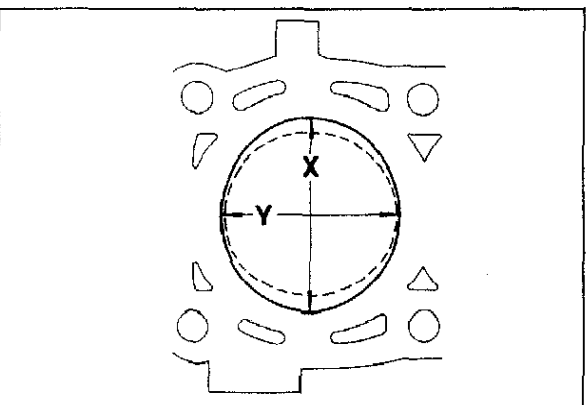
| Size | Bore |
|--------------------------|----------------------------------|
| Standard | 78.000—78.019 (3.0709—3.0717) |
| 0.25 (0.010) oversize | 78.250—78.269 (3.0807—3.0815) |
| 0.50 (0.020) oversize | 78.500—78.519 (3.0905—3.0913) |



83U01A-083

- (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.



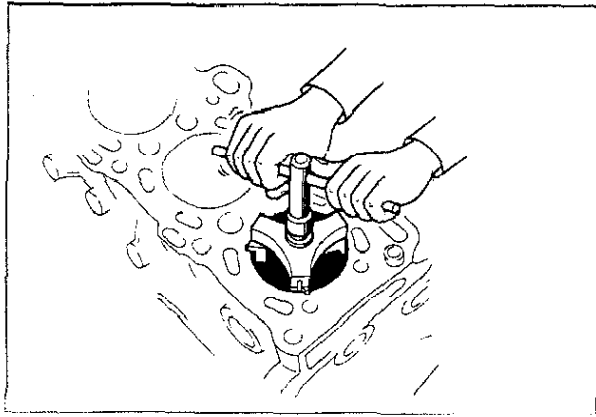
83U01A-084

- (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.

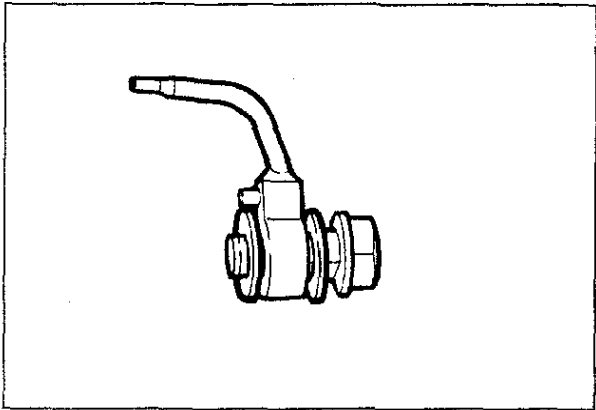
Caution

The boring size should be the same for all cylinders.



69G01A-122

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



63G01C-063

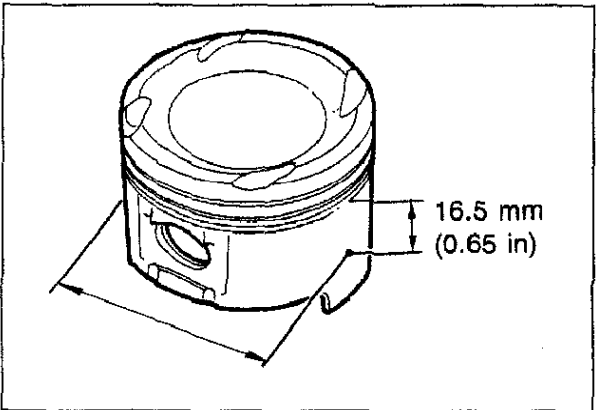
Oil Jet

- Check the oil jet for clogging.

Note

Make sure that the oil passages are not clogged.

- Check the check ball move smoothly.



83U01A-085

Piston

- Inspect the outer circumferences of all pistons for seizure or scoring, replace if necessary.
- Measure the outer diameter of each piston at a right angle (90°) to the piston pin, **16.5 mm (0.650 in) below** the oil ring land lower edge.

Piston diameter

mm (in)

| Size | Diameter |
|--------------------------|----------------------------------|
| Standard | 77.954—77.974 (3.0690—3.0698) |
| 0.25 (0.010) oversize | 78.204—78.224 (3.0789—3.0797) |
| 0.50 (0.020) oversize | 78.454—78.474 (3.0887—3.0895) |

- Check the piston to cylinder clearance.

Clearance:

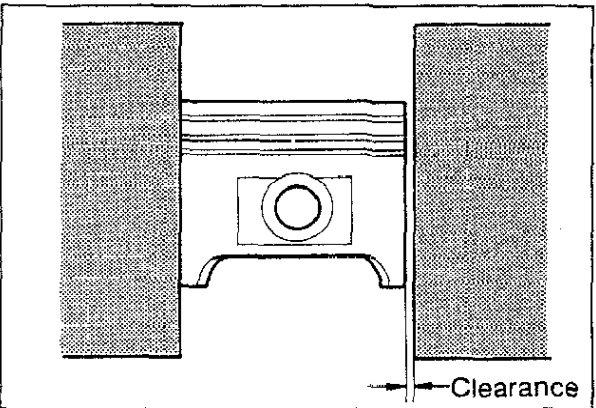
0.026—0.065 mm (0.0010—0.0026 in)

Maximum: 0.15 mm (0.0059 in)

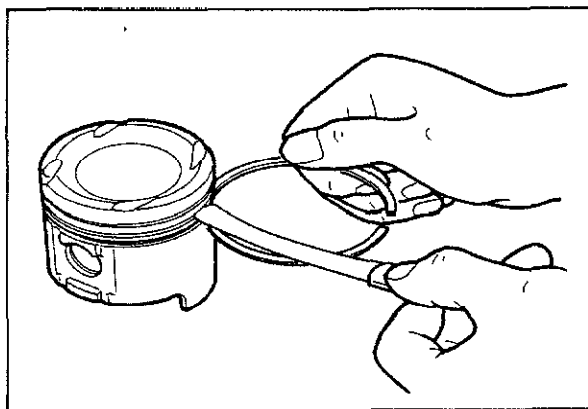
- If the clearance exceeds the maximum, replace the piston or rebore the cylinder to oversize.

Note

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



83U01A-086



83U01A-087

Piston and Piston Ring

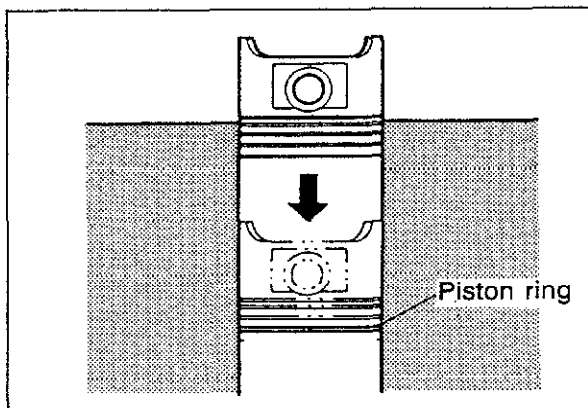
1. Measure the piston ring to ring land clearance around the entire circumference using a new piston ring.

Clearance (Top and Second):

0.030—0.065 mm (0.0012—0.0026 in)

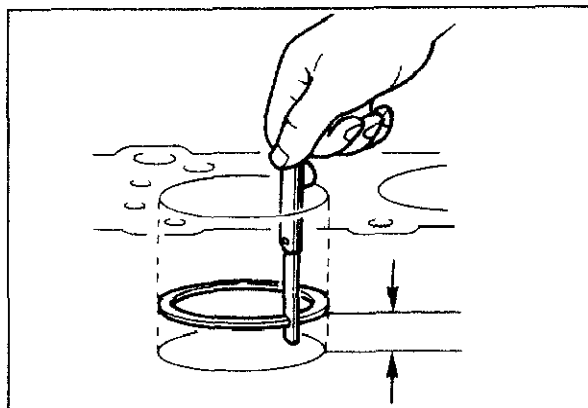
Maximum: 0.15 mm (0.006 in)

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



83U01A-088

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.



83U01A-089

5. Measure each piston ring end gap using a feeler gauge, replace if necessary.

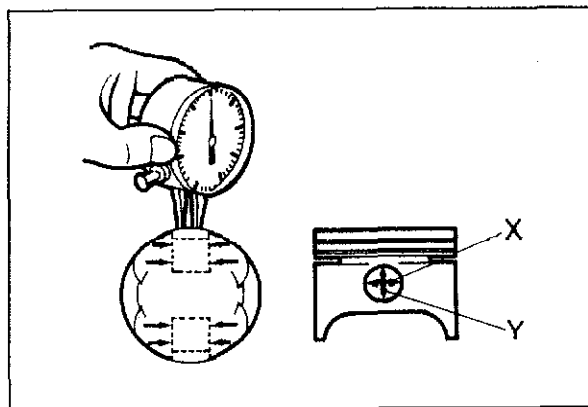
End gap

Top : 0.20—0.40 mm (0.008—0.016 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)



83U01A-090

Piston and Piston Pin

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

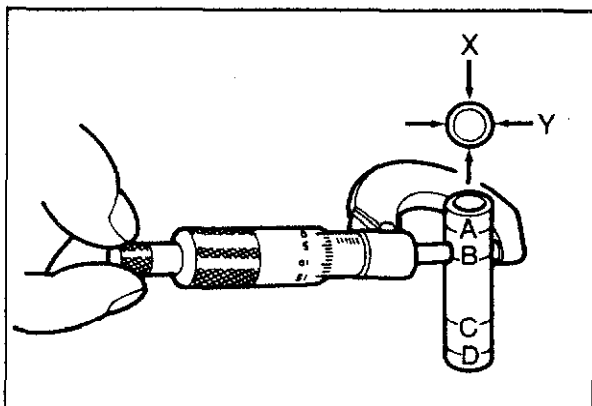
Diameter:

19.988—20.000 mm (0.7869—0.7874 in)

2. Measure the piston pin diameter in the same manner.

Diameter:

19.987—19.993 mm (0.7869—0.7871 in)



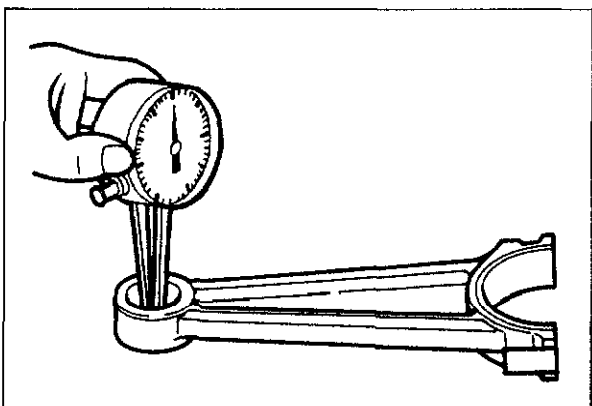
83U01B-068

3. Check the piston pin to piston clearance.

Clearance:

-0.005—0.013 mm (-0.0002—0.0005 in)

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



83U01B-069

Connecting Rod

1. Measure the connecting rod small end bore.

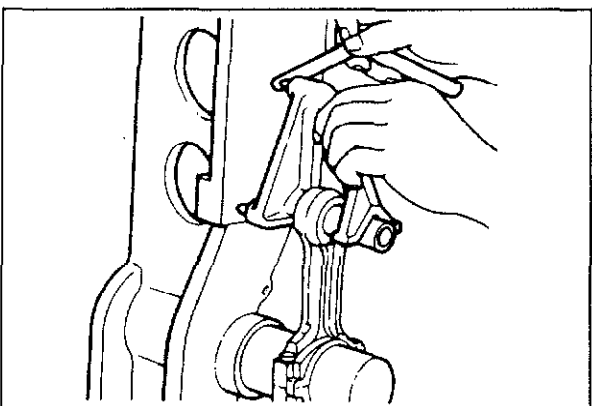
Diameter:

20.003—20.014 mm (0.7875—0.7880 in)

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

Clearance:

0.010—0.027 mm (0.0004—0.0012 in)

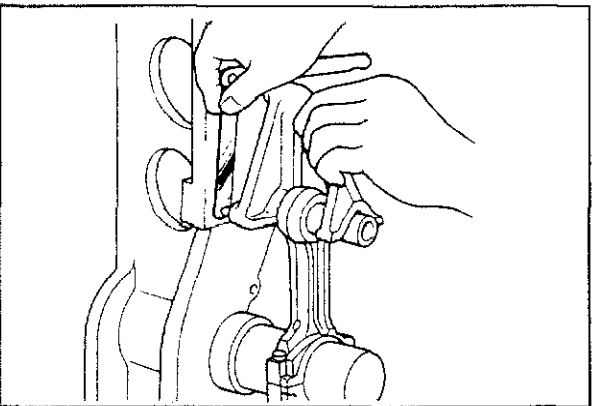


69G01B-115

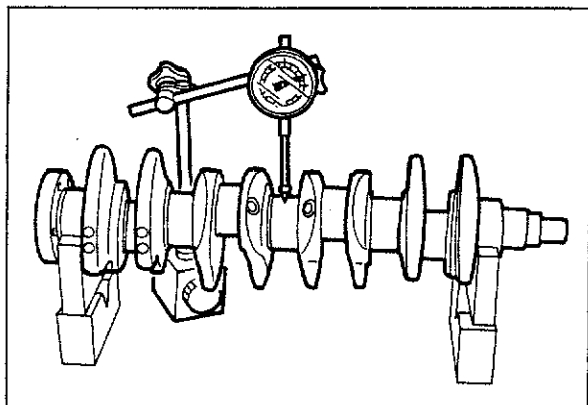
3. Check each connecting rod for bending or twisting, if necessary replace or repair.

Bend: 0.04 mm (0.0016 in) max.

Twist: 0.04 mm (0.0016 in) max.



69G01B-116

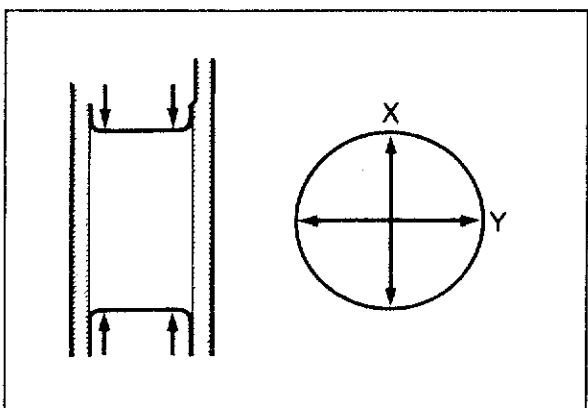


83U01A-093

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: 0.04 mm (0.0016 in) max.



83U01A-094

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

Main journal

Diameter:

49.938—49.956 mm (1.9661—1.9668 in)

Minimum: 49.89 mm (1.964 in)

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

Crankpin journal

Diameter:

44.940—44.956 mm (1.7693—1.7699 in)

Minimum: 44.89 mm (1.7673 in)

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

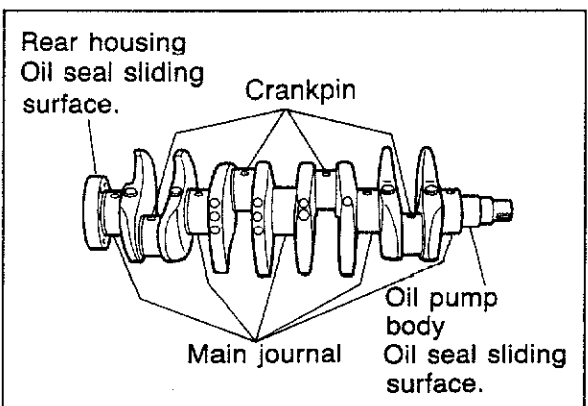
5. If the diameter is below the minimum, grind the journals to match undersize bearings.

Undersize bearing:

0.25 mm (0.010 in), 0.50 mm (0.020 in)

Main journal diameter undersize mm (in)

| Bearing size | Journal diameter |
|----------------|-------------------------------|
| 0.25 undersize | 49.688—49.706 (1.9562—1.9569) |
| 0.50 undersize | 49.438—49.456 (1.9464—1.9471) |



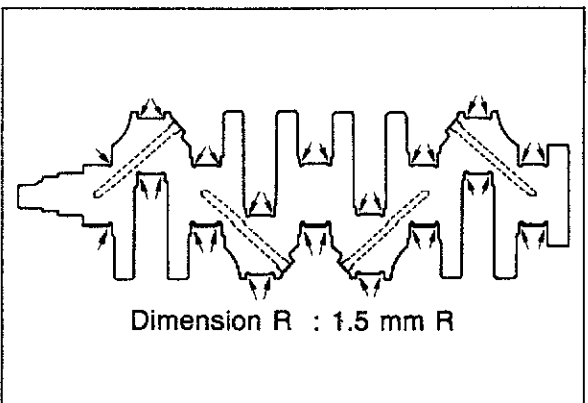
83U01A-095

Crankpin journal diameter undersize mm (in)

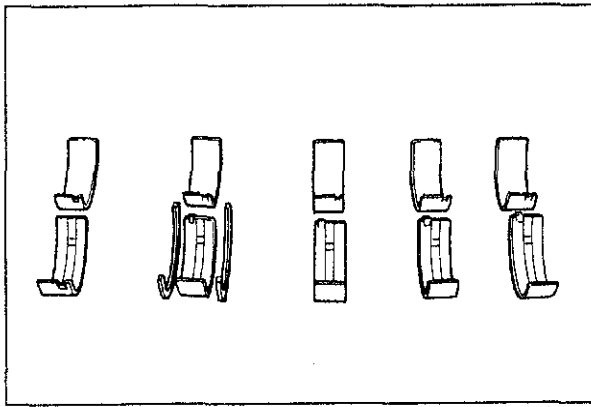
| Bearing size | Journal diameter |
|----------------|-------------------------------|
| 0.25 undersize | 44.690—44.706 (1.7594—1.7601) |
| 0.50 undersize | 44.440—44.456 (1.7496—1.7502) |

Caution

Do not grind the fillet roll.



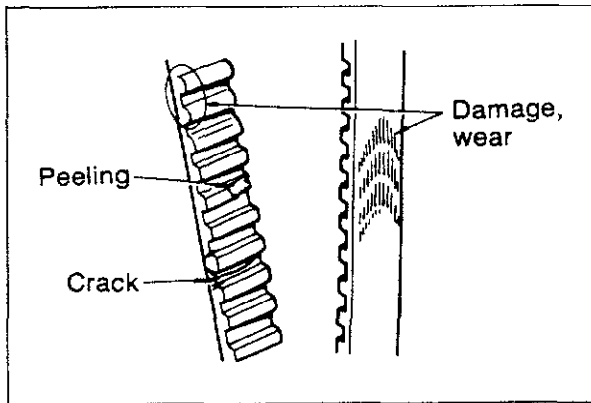
83U01A-096



83U01A-097

Main Bearing and Connecting Rod Bearing

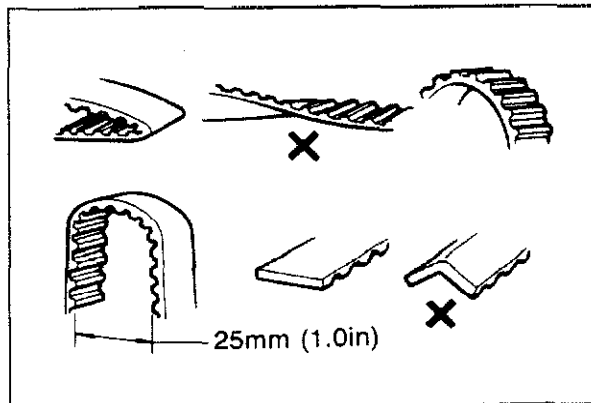
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.



69G01B-121

Timing Belt

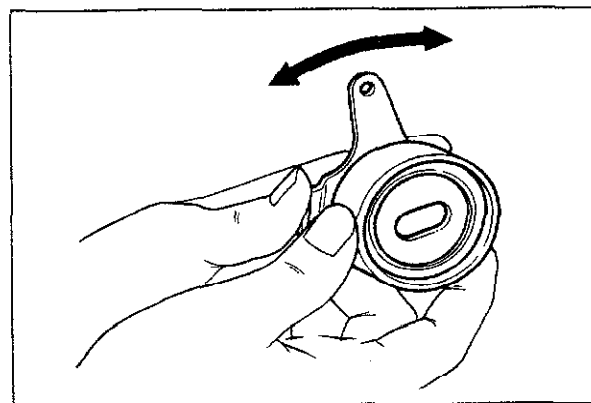
1. Replace the timing belt if there is any oil or grease on it.
2. Check the timing belt for damage, wear, peeling, cracks, or hardening, replace if necessary.



69G01B-122

Caution

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



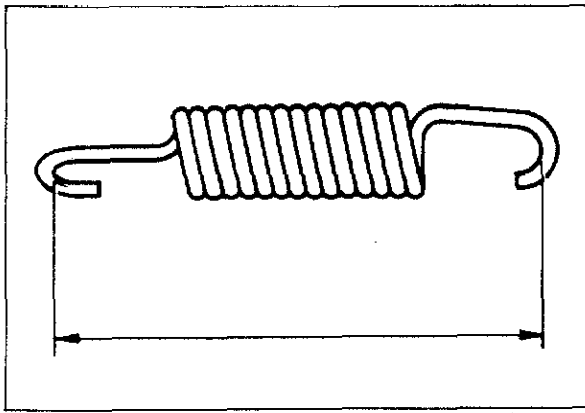
83U01A-098

Timing Belt Tensioner and Idler Pulley

Check the timing belt tensioner and idler pulley for smooth rotation or 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.

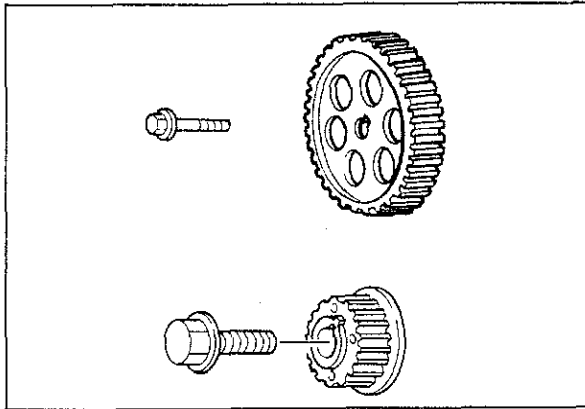


83U01B-070

Timing Belt Tensioner Spring

Check the free length of the tensioner spring, replace if necessary.

Free length:
58.8 mm (2.315 in)



83U01B-071

Timing Belt Pulley and Camshaft Pulley

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

Caution

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

Timing Belt Cover (lower, middle and upper)

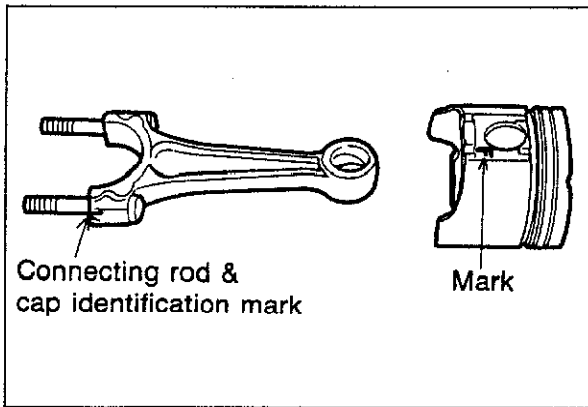
Inspect the timing belt covers for deformation or cracks, replace if necessary.

ASSEMBLY

Assembly Note

1. Be sure all parts are clean before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Do not reuse gaskets or oil seals.
4. During assembly, inspect all critical clearances, end plays and oil clearances.
5. Tighten bolts to the specified torques.
6. Replace bearings if they are peeling, burned, or otherwise damaged.

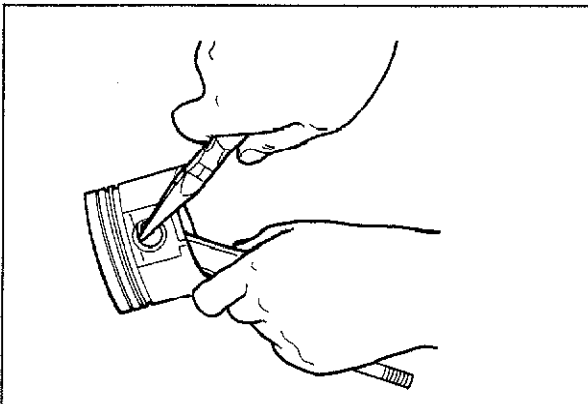
4BG01A-136



63G01C-112

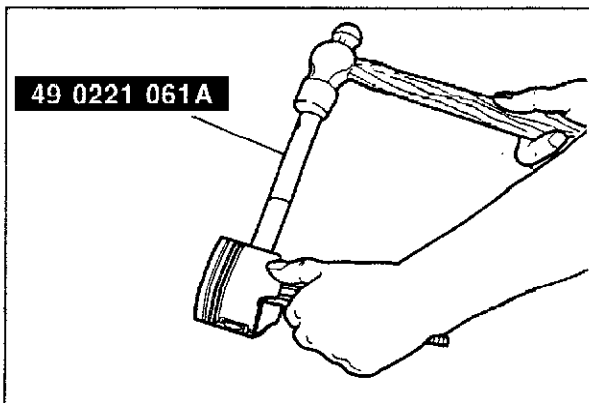
Connecting Rod

1. Align the identification mark to the cap of large end of connecting rod and "F" mark on the piston as shown in the figure.
2. Apply a coat of engine oil to the circumference of each piston pin and to the small end of each connecting rod.



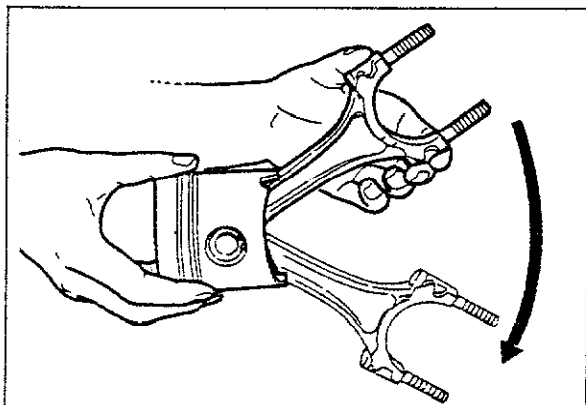
63G01C-073

3. Set a clip into the clip groove in one side of the piston.
4. Assemble the piston and connecting rod.



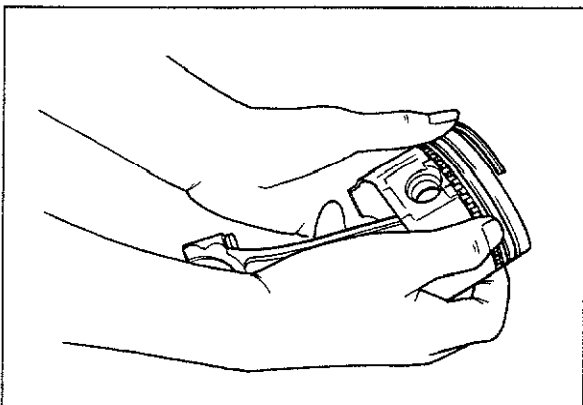
83U01X-126

5. Using the **SST**, insert the piston pin from the opposite side of the piston.
6. Tap the piston pin into touch the clip. Install the other clip into the groove in the piston.



63G01C-075

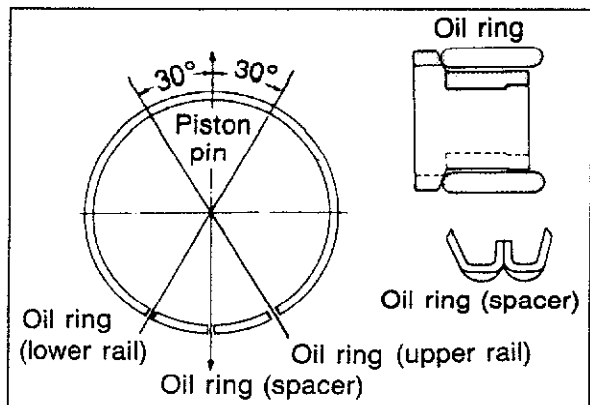
7. If the piston pin cannot be tapped in easily, replace the piston pin or the connecting rod.
8. Check the oscillation torque of the connecting rod as shown in the figure. If the large end does not drop by its own weight, replace the piston and piston pin.



4BG01A-143

Piston Ring

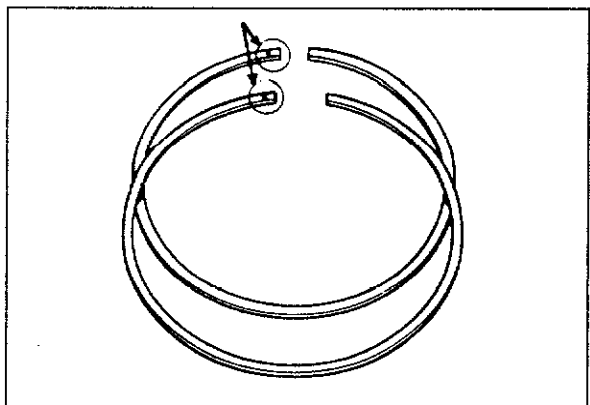
1. Install the three-piece oil rings on the pistons.
 - (1) Apply engine oil to the oil ring spacer and rails.
 - (2) Install the oil ring spacer.
 - (3) Install the upper rail and lower rail.



4BG01A-144

Caution

- a) After installation of the upper and lower side rails, make certain they turn smoothly in both directions.
- b) Do not align the end gaps, stagger them.

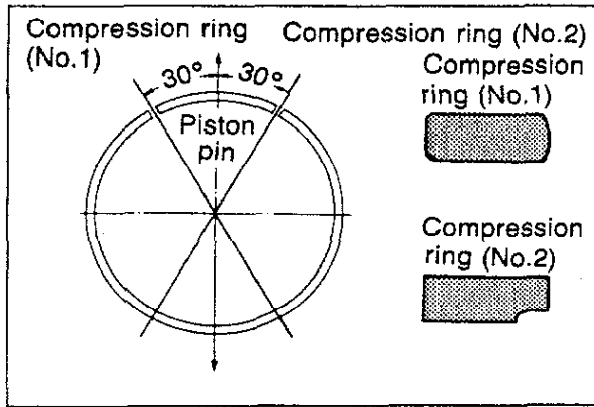


4BG01A-145

2. Install the second and top ring.
 - (1) Apply a liberal coat of engine oil to the piston rings.
 - (2) Install the second ring to the piston first, then the top one, using a piston ring insertion tool, (commercially available).

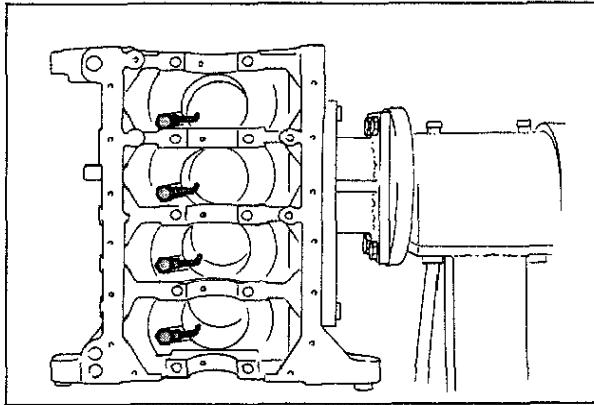
Caution

The rings must be installed so the "R" marks face upward.



5BU01X-208

- (3) Position the opening of each ring as shown in the figure.



63G01C-076

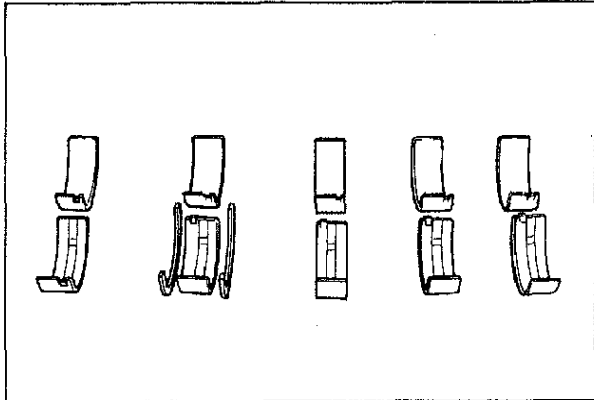
Oil Jet

Install the oil jet as shown in the figure.

**Tightening torque: 12—18 N·m
(1.2—1.8 m·kg, 104—156 in·lb)**

Note

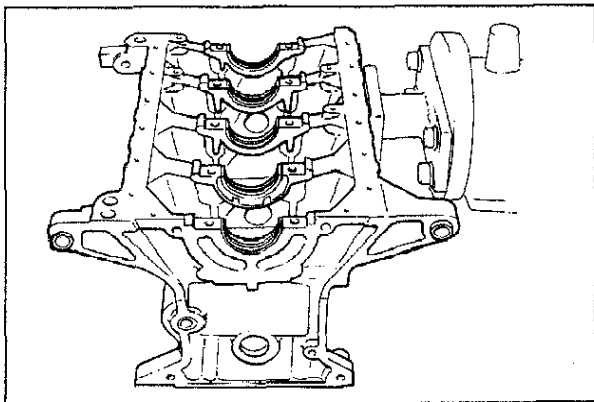
Before installation make sure that the oil passage is not clogged.



63U01X-095

Crankshaft

1. Inspect the oil clearances of the crankshaft and main bearings.



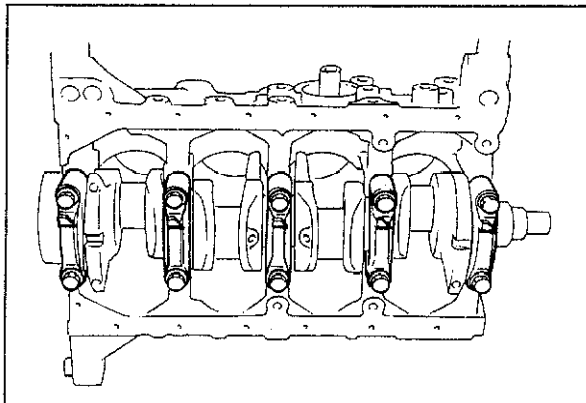
4BG01A-147

- (1) Remove any foreign material and oil from the journal and bearing.
- (2) Install the main bearings and the crankshaft.


Caution

The main bearing with the oil grooves must be install in the cylinder block.

- (3) Position the plasti-gauge on top of each journal (in the journal axial direction), away from the oil hole.



63U01X-096

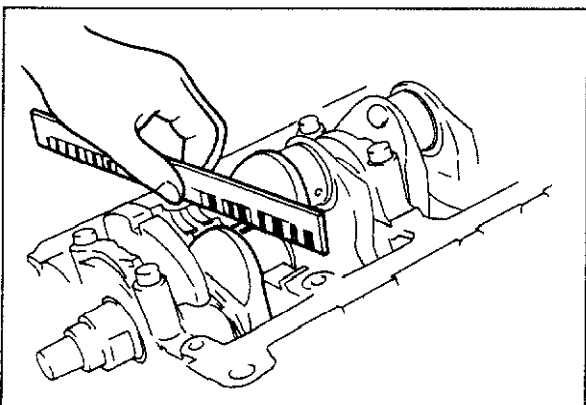
- (4) Set the main bearing caps according to the cap number and  mark, and tighten them.

Note

Do not rotate the crankshaft when measuring the oil clearances.

Tightening torque:

54—59 N·m (5.5—6.0 m·kg, 40—43 ft·lb)



83U01B-072

- (5) Remove the main bearing cap, 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.

Oil clearance:

0.024—0.042 mm (0.0010—0.0017 in)

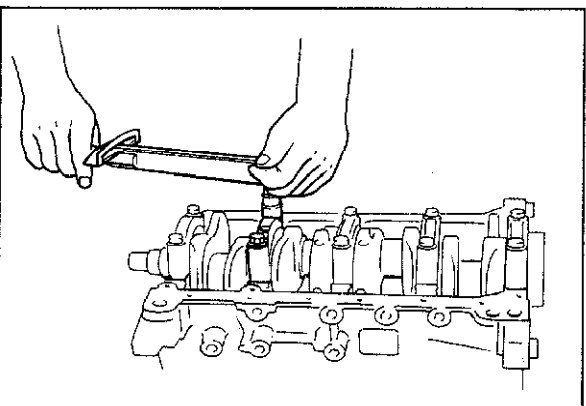
Maximum:

0.08 mm (0.0031 in)


- (6) If the oil clearance exceeds the limit, grind the crankshaft and use undersize main bearings.

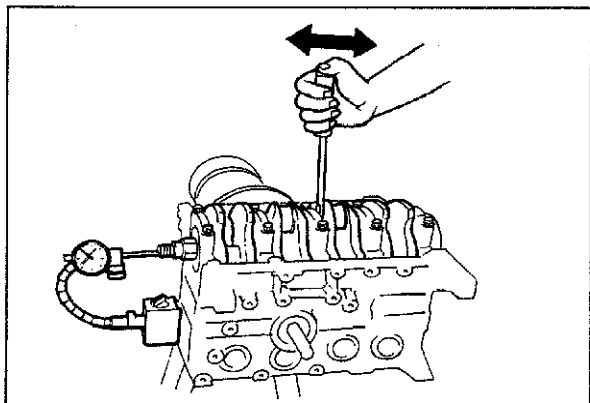
Undersize main bearings:

0.25 mm (0.010 in), 0.50 mm (0.020 in)



63G01C-078

2. Apply engine oil to the main bearings and main journals.
3. Install the thrust bearings to the cylinder block side.
4. Install the crankshaft, and install the main bearing caps according to the cap number and  mark.



83U01B-073

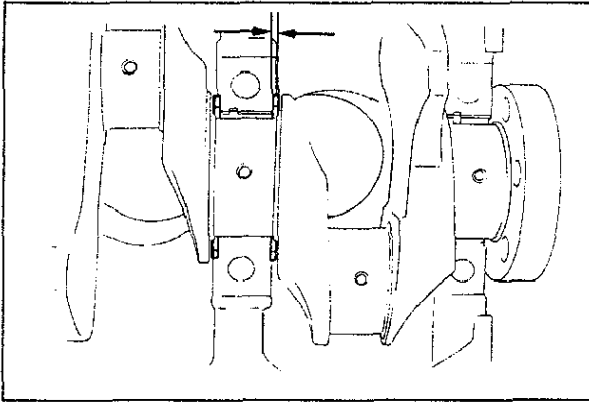
5. Inspect crankshaft end play.

End play:

0.08—0.242 mm (0.0031—0.0111 in)

Maximum:

0.30 mm (0.012 in)



83U01B-074

If end play exceeds the limit, adjust the end play with thrust bearings.

Standard thickness:

2.50—2.55 mm (0.0984—0.1004 in)

Undersize width:

0.25 mm (0.010 in):

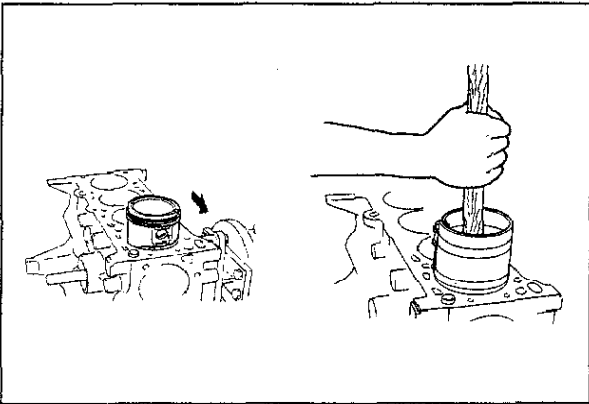
2.625—2.675 mm (0.1033—0.1053 in)

0.50 mm (0.020 in):

2.750—2.800 mm (0.1083—0.1102 in)

Note

Oil groove of the thrust bearing must face the crankshaft.



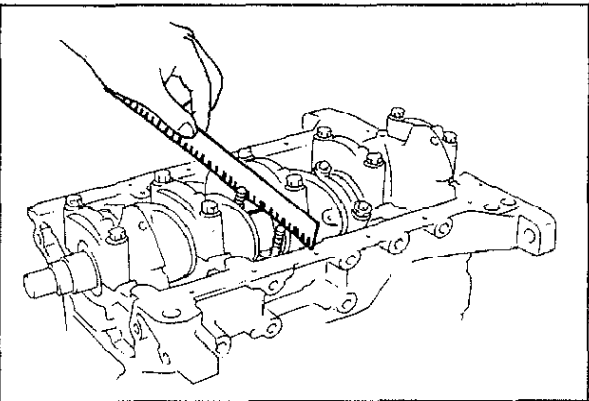
4BG01A-154

Piston and Connecting Rod Assembly

1. Apply engine oil to the cylinder walls, piston circumference, and rings.
2. Insert each piston and connecting rod into the cylinder block by using a piston insertion tool, (commercially available).

Caution

The pistons must be inserted so that the "F" marks face the front of the cylinder block.



83U01B-075

Connecting Rod Cap

1. Inspect and adjust the connecting rod bearing and crankshaft pin journal oil clearance by the same procedure used for the crankshaft and 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:

0.028—0.068 mm (0.0011—0.0027 in)

Maximum:

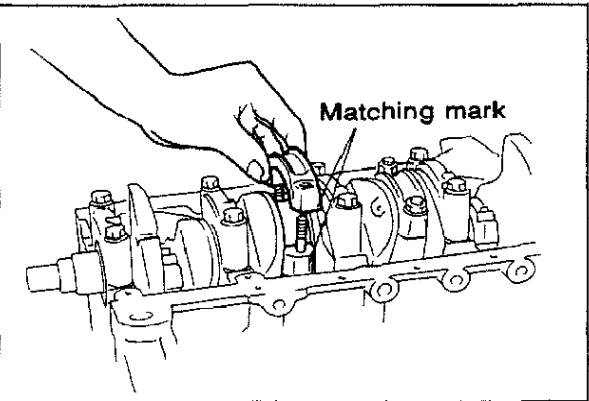
0.10 mm (0.0039 in)

Undersize connecting rod bearing:

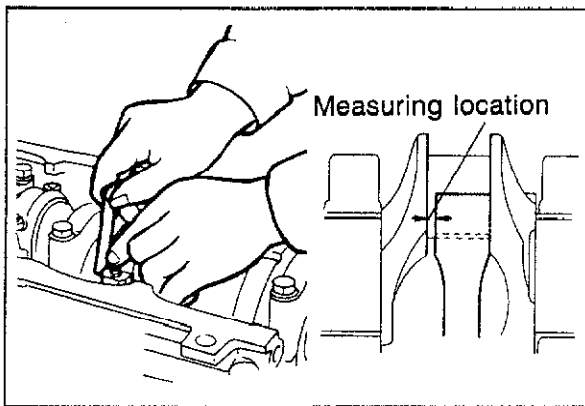
0.25 mm (0.010 in), 0.50 mm (0.020 in)

Caution

Be sure to align the connecting rod caps and on the connecting rod when installing the connecting rod cap.



63G01C-081



83U01B-115

2. Check the side clearance of the connecting rods.

Clearance: 0.30 mm (0.0118 in) max.

Caution

The connecting rod side clearance must be measured before installation.

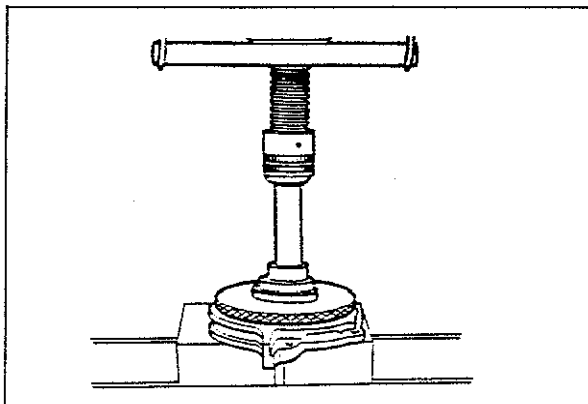
3. Apply engine oil to the crankpin journal and connecting rod bearing.
4. Install the connecting rod cap to align the matching mark and tighten it.

Tightening torque:

65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)

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.

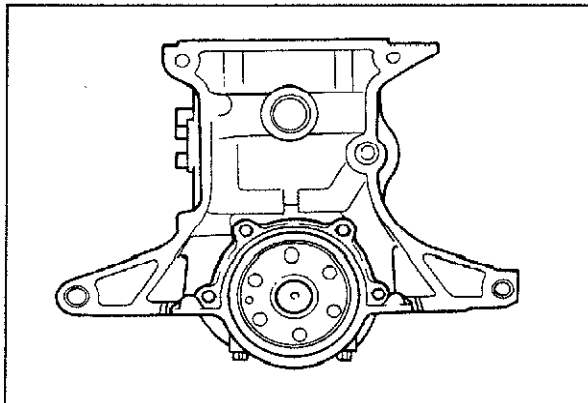


63U01X-102

3. Install the rear cover along with a new gasket.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

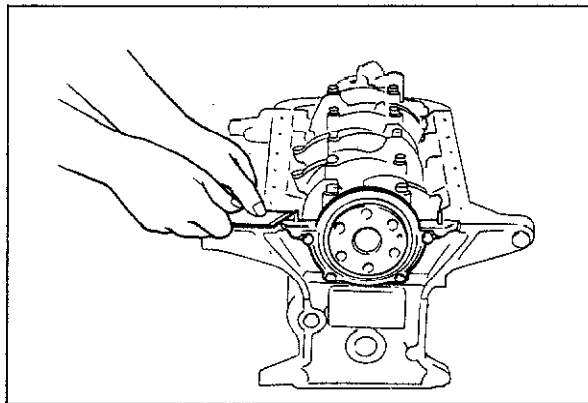


63U01X-103

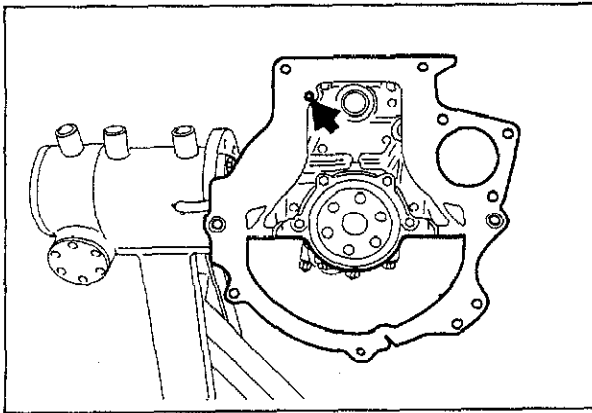
4. Cut away the exposed part of the gasket that projects out from the rear cover assembly.

Caution

Do not scratch the rear cover assembly.



63G01C-083



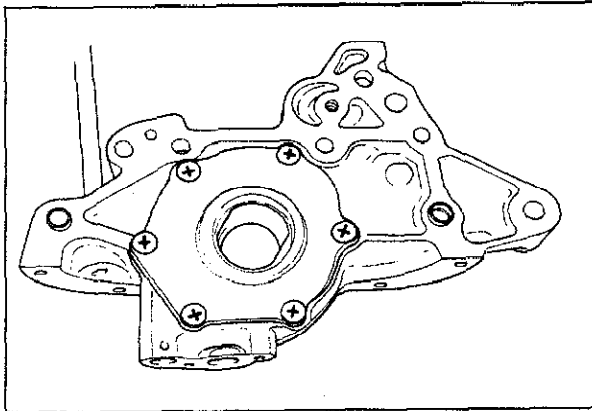
63U01X-104

End Plate

Install the end plate.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



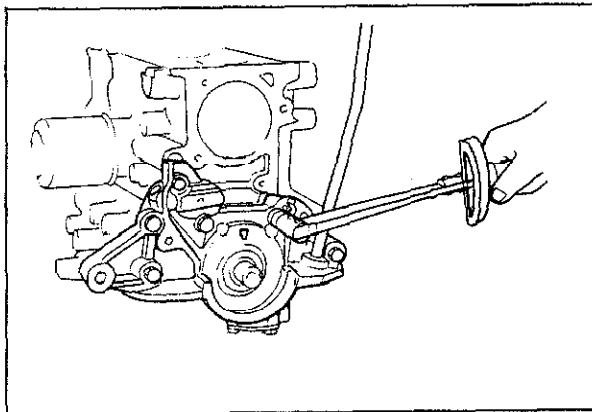
63U01X-105

Oil Pump

1. Remove any dirt or grease from the contact surfaces of the cylinder block and oil pump with a rag.
2. Apply engine oil to the oil seal lip.
3. Install new gasket.

Caution

Do not allow any sealant in the oil hole.



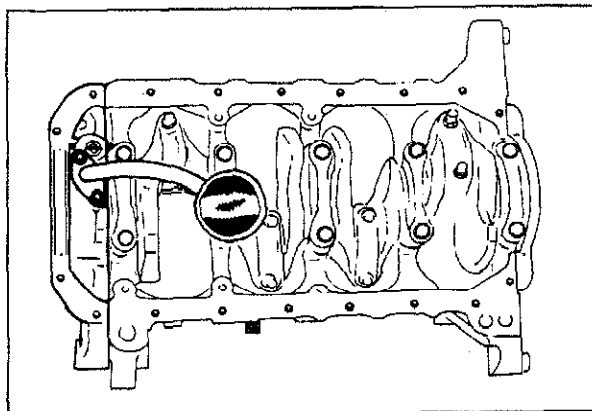
63U01X-106p

4. Install the oil pump.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

5. Remove any sealant which is squeezed out.



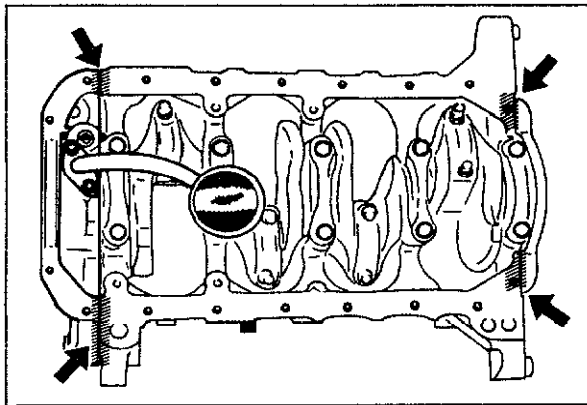
63U01X-107

Oil Strainer

Install the oil strainer along with a new gasket.

Tightening torque:

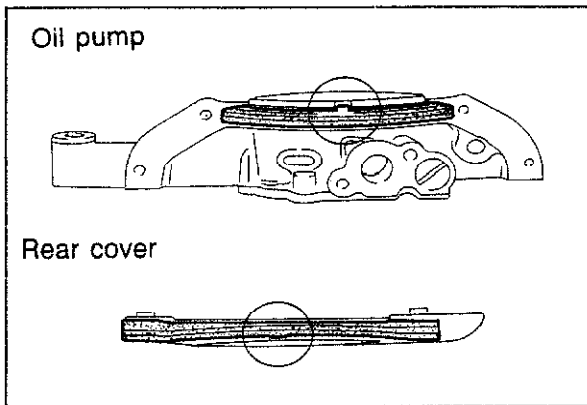
8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



83U01B-076

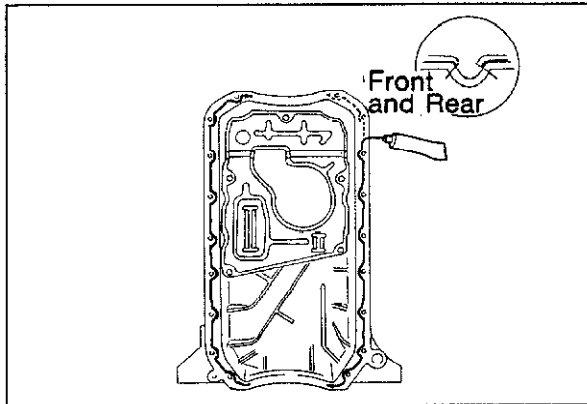
Oil Pan

1. Apply sealant to the places indicated by the arrows in the figure after cleaning the cylinder block surface.



83U01B-077

2. Install the gaskets onto the oil pump body and rear cover with the projections in the notches as shown.



83U01B-078

3. Clean the oil pan contact surface.

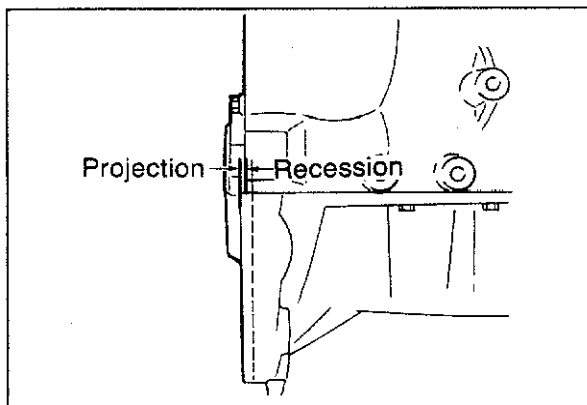
Caution

Do not leave any dirt or oil on it.

4. Apply silicone sealant to the oil pan continuously with the bead of **2.5—3.5 mm (0.0984—0.1378 in)**, rimming the surface inside the bolt holes as shown.

Caution

After the sealant is applied, the pan must be secured within 30 minutes.



83U01B-079

5. Install the oil pan.

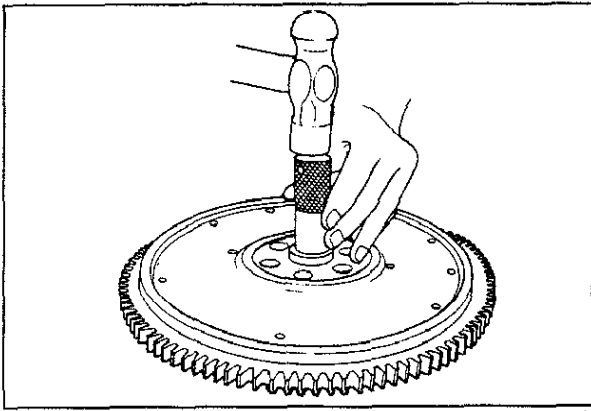
Caution

Oil pan projection and recession from the end of the cylinder block must not be more than 1.5 mm (0.06 in)

6. Tighten the bolts gradually in three steps.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



83U01A-107

Flywheel (MTX)

1. Tap the pilot bearing in with a suitable pipe and hammer.
2. Apply **sealant** to the flywheel bolts.

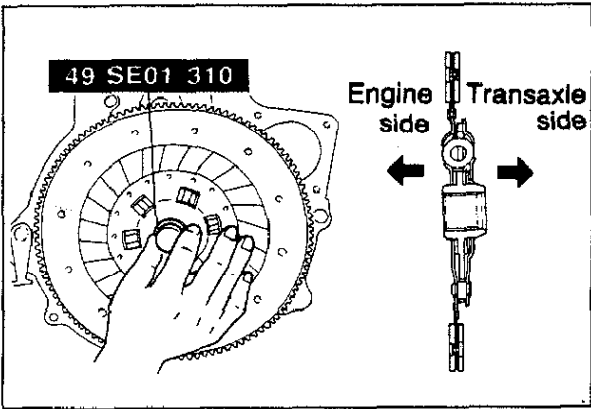
Caution

If reinstalling flywheel bolts, clean threads to remove old sealant, apply new sealant and tighten to specification.
If old sealant can not be removed, replace bolts.

3. Install the flywheel, with the **SST** while tightening.

Tightening torque:

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



83U01B-109

Clutch Disc and Clutch Cover

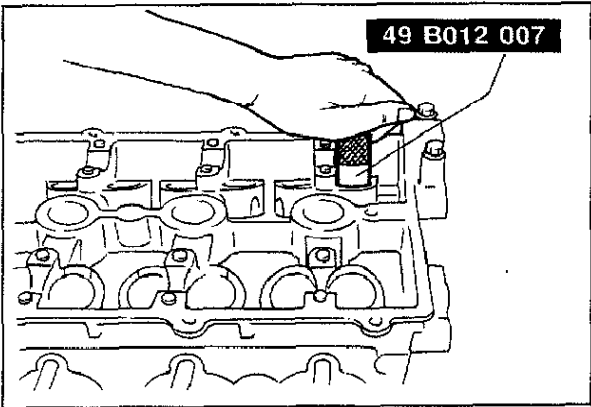
Install the clutch disc and clutch cover with the **SST**, and tighten the clutch cover.

Tightening torque:

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

Note

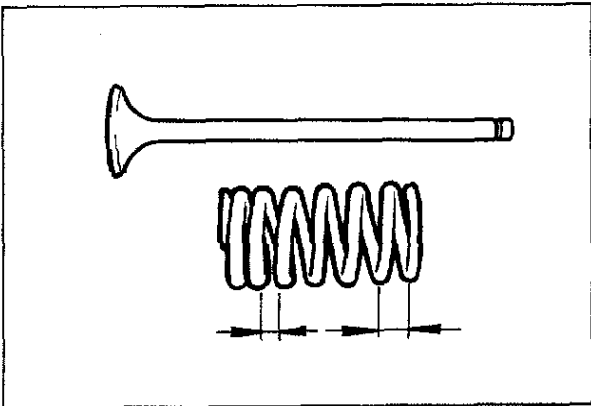
Follow the clutch disc installation directions exactly (See Section 6).



83U01X-127

Valve Seal

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



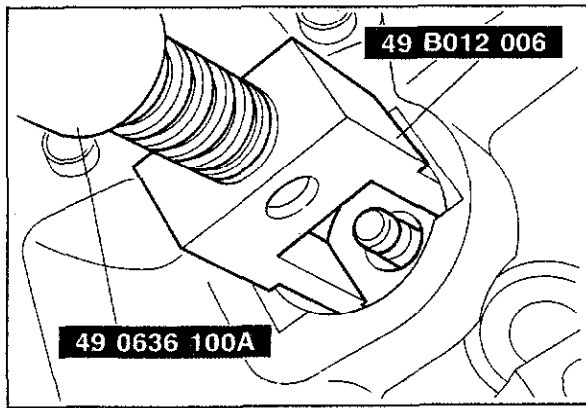
63U01X-091

Valve and Valve Spring

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

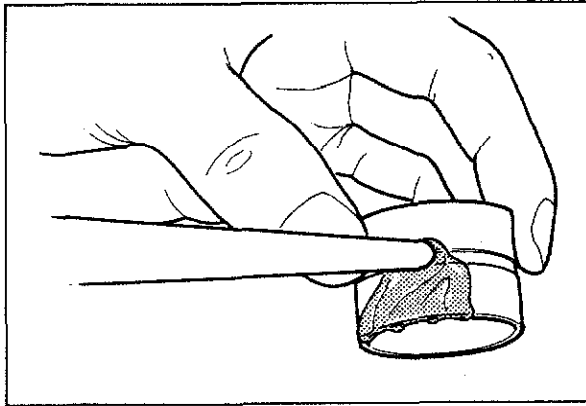
Note

Install the spring with its narrow pitch end toward the cylinder head.



83U01X-128

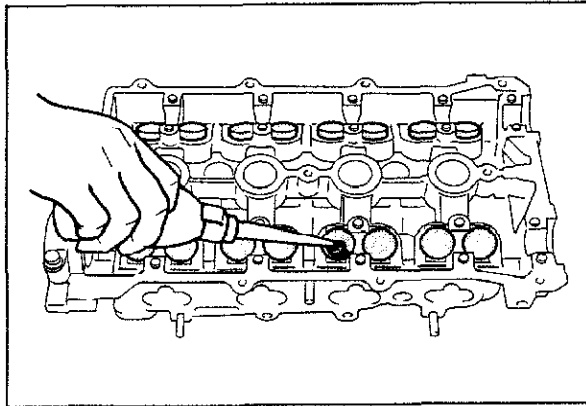
4. Install the spring retainer after compressing the valve spring with the **SST**.



83U01B-080

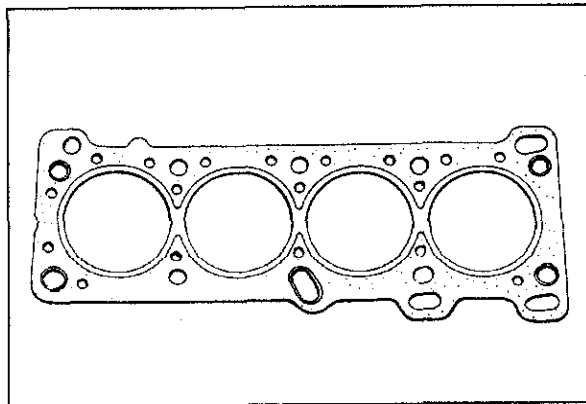
HLA

1. Apply engine oil to the sliding surface.



83U01B-081

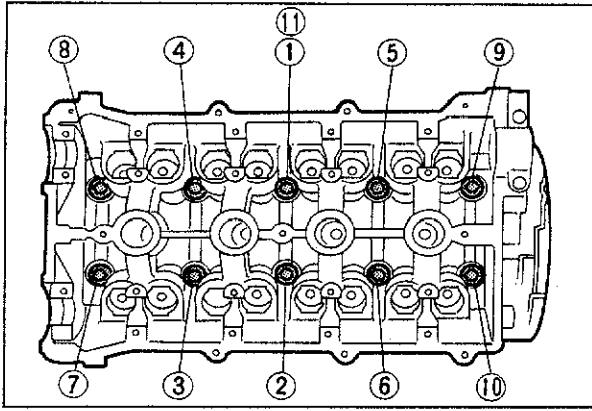
2. Install the HLA in the position from which they were removed.
3. Check for free movement.



63G01C-085

Cylinder Head

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



63U01X-112p

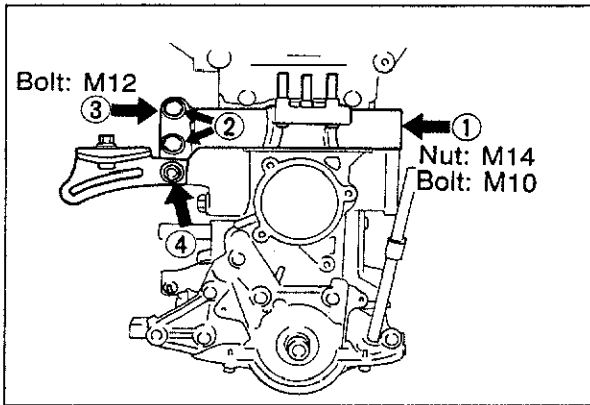
3. Install the cylinder head.

Tightening torque:

76—81 N·m (7.7—8.3 m·kg, 56—60 ft·lb)

Caution

Tightening the bolts must be done gradually and in the order shown in the figure.



83U01B-082

Engine Bracket and Mount Arm

Install the engine bracket and mount arm.

Tightening torque:

Bolt ①: 47—66 N·m

(4.8—6.7 m·kg, 35—48 ft·lb)

Bolt ②: 60—85 N·m

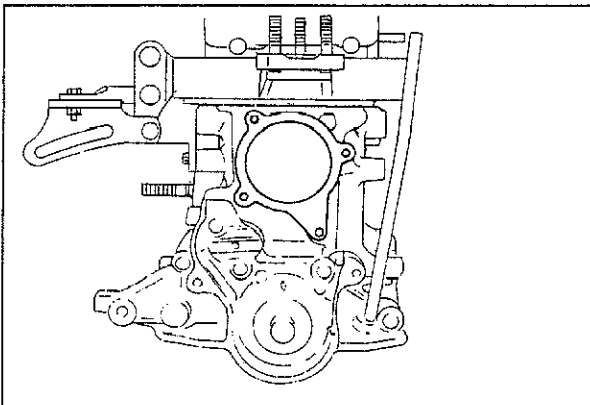
(6.1—8.7 m·kg, 44—63 ft·lb)

Bolt ③: 93—117 N·m

(9.5—11.9 m·kg, 69—86 ft·lb)

Bolt ④: 37—52 N·m

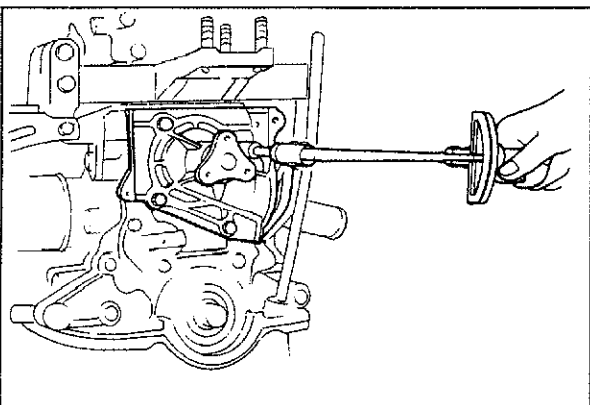
(3.8—5.3 m·kg, 27—38 ft·lb)



63G01C-084

Water Pump

1. Remove any dirt or old gasket from the water pump mounting surface.
2. Use a new water pump gasket in position.

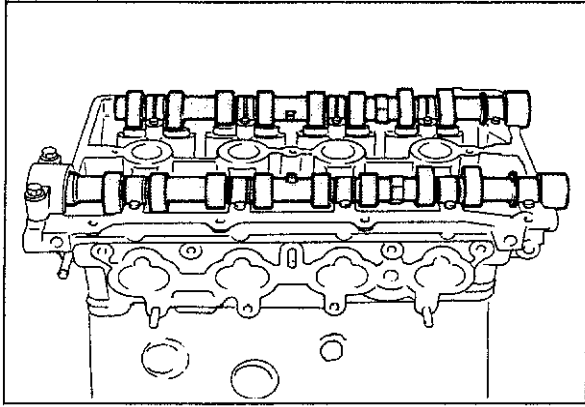


4BG01A-169p

3. Install the water pump.

Tightening torque:

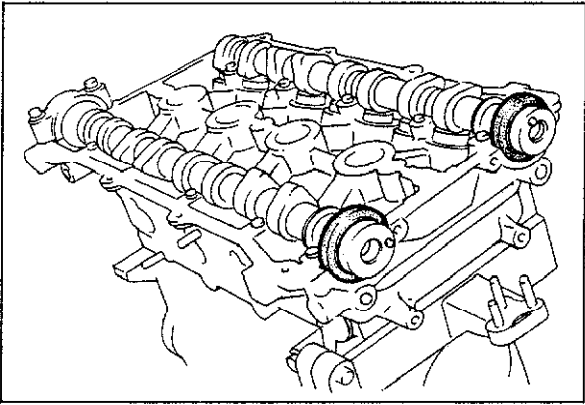
19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



63G01C-087

Camshaft

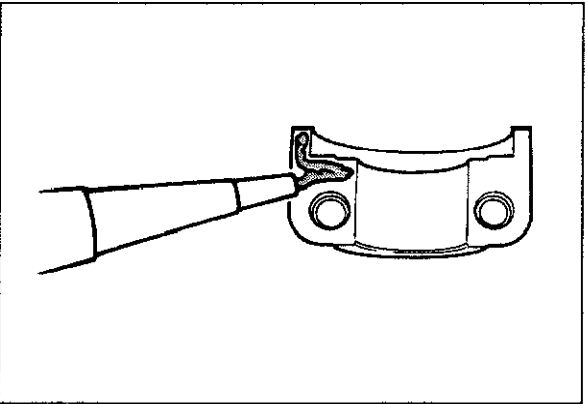
Apply engine oil to the journals, set the camshaft in position.



63G01C-088

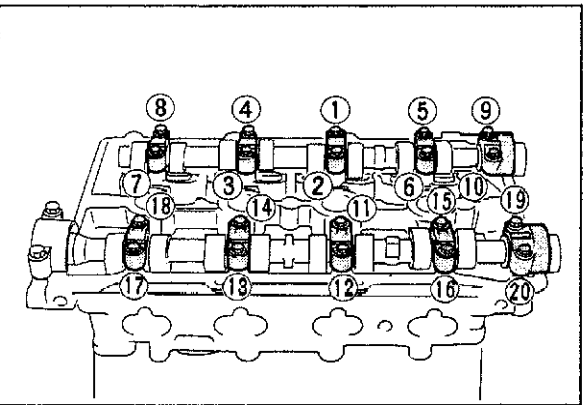
Camshaft Oil Seal

1. Apply a thin coat of engine oil to the camshaft oil seal and cylinder head.
2. Install the camshaft oil seal.



83U01B-083

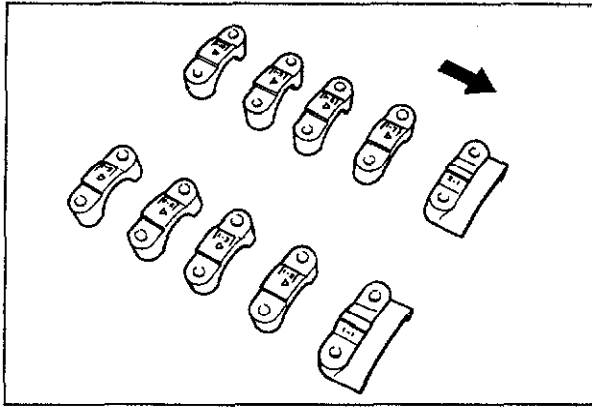
3. Apply a thin coat of sealant to the front camshaft cap surface.



63G01C-090

4. Install the camshaft caps, tighten the camshaft cap bolts gradually in the order shown in the figure.

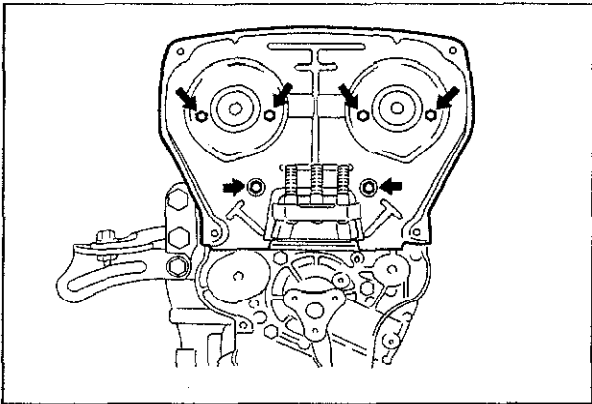
**Tightening torque: 11—14 N·m
(1.15—1.45 m·kg, 100—126 in·lb)**



63G01C-091

Note

Install the camshaft cap according to the cap number and arrow mark.



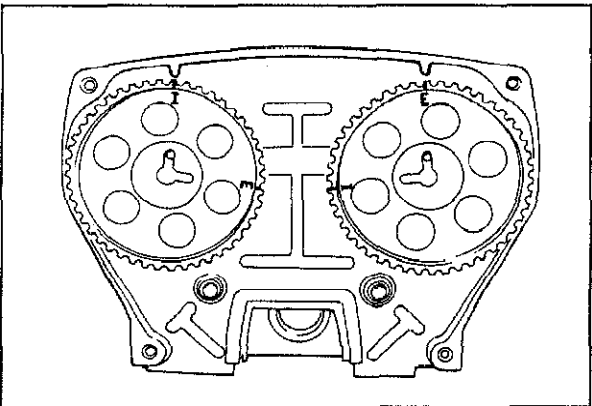
83U01B-084

Seal Plate

Install the seal plate.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



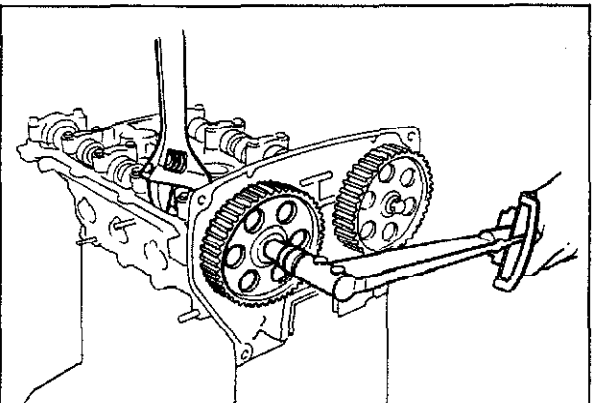
83U01B-085

Camshaft Pulley

1. Install the camshaft pulley.

Caution

For the exhaust side camshaft pulley, install the pulley with the "E" mark straight up.
For the intake side camshaft pulley, install the pulley with the "I" mark straight up.



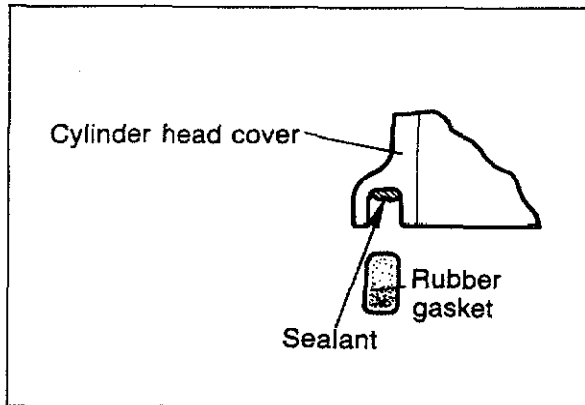
83U01B-086

2. Tighten the camshaft pulley bolt.

Hold the camshaft using a suitable wrench on the journal, as shown.

Tightening torque:

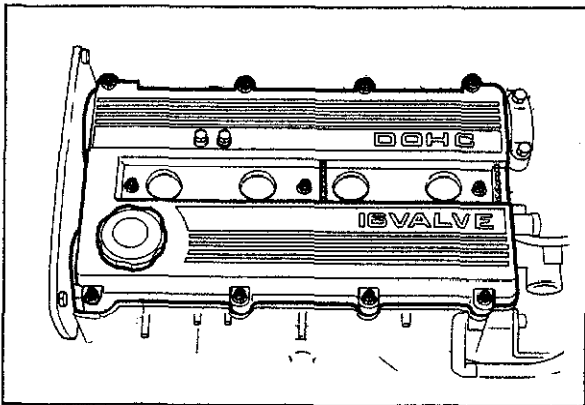
49—61 N·m (5.0—6.2 m·kg, 36—45 ft·lb)



63U01X-131

Cylinder Head Cover

1. Apply a coat of sealant in the groove as shown.
2. Place the gasket in position.



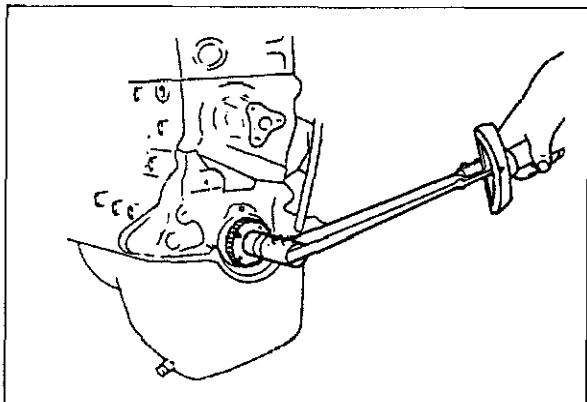
83U01B-087

3. Install the cylinder head cover with new seal washers.

Tightening torque:

3—4 N·m (0.3—0.4 m·kg, 26—35 in·lb)

4. Install the filler cap and the ventilation hose.

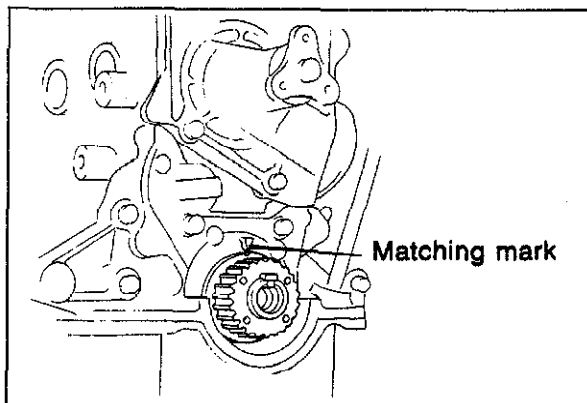


83U01A-113

Timing Belt Pulley

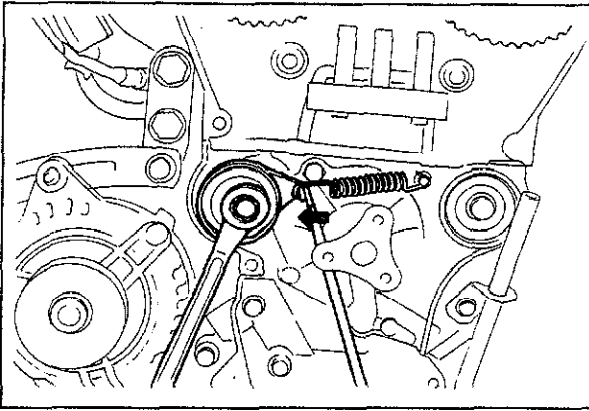
1. Reverse the direction of the **SST** (49 E301 060).
2. Install the timing belt pulley and key.
3. Apply sealant to the timing belt pulley bolt then tighten it.

**Tightening torque: 108—128 N·m
(11.0—13.0 m·kg, 80—94 ft·lb)**



83U01X-129

4. Release the **SST** (49 E301 060).
5. Turn the crankshaft so that the timing mark on the oil pump body is aligned with the groove.



83U01B-088

Idler Puller

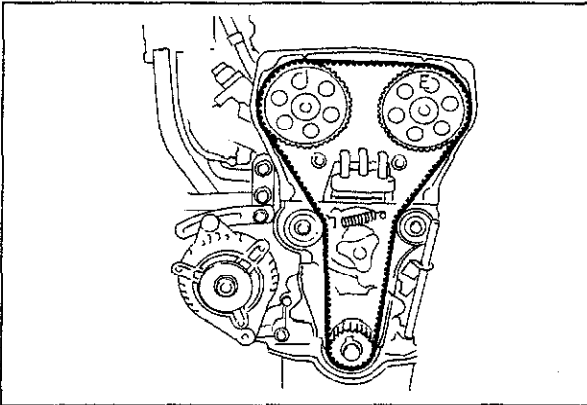
Install the idler puller.

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.
2. Install the tensioner spring.
3. Temporarily secure the tensioner so the spring is fully extended.



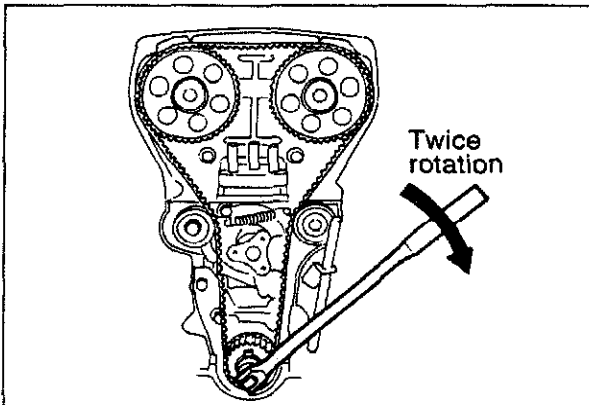
63U01X-124

Timing Belt

1. Align crankshaft and camshaft timing marks. (inlet "I" marks, exhaust "E" mark)
2. Install the timing belt. (Keep the right side of belt as tight as possible)

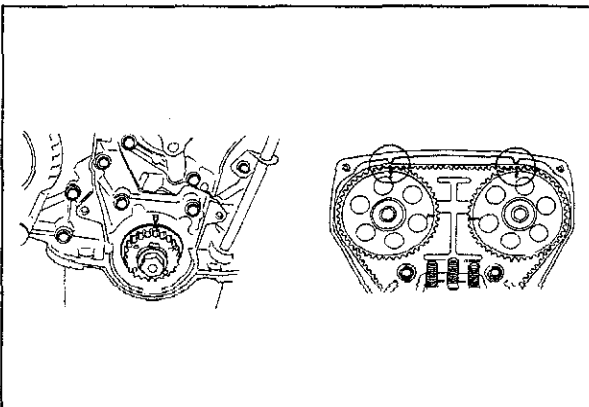
Caution

- a) The timing belt must be reinstalled in the direction of previous rotation if it is reused.
- b) Be sure that there is no oil, grease, or dirt on the timing belt.



83U01B-089

3. Turn the crankshaft twice in the direction of rotation. (Clockwise)
4. Check that the timing marks are correctly aligned. If not, repeat steps 1—3.
5. Loosen the tensioner lock bolt and apply tension to the belt.



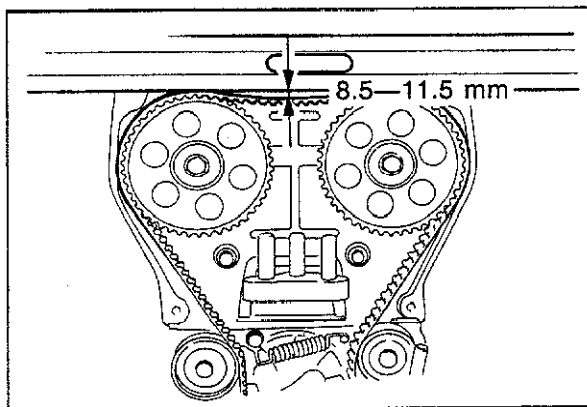
63U01X-126p

6. Tighten the timing belt tensioner to specification.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

7. Turn the crankshaft twice in the direction of rotation and check the matching marks for alignment.

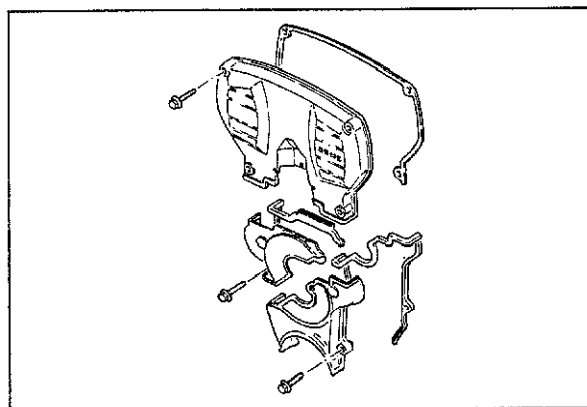


83U01B-090

8. Measure the tension between the intake side camshaft pulley and the exhaust side camshaft pulley. If the timing belt tension is not correct, temporarily secure the tensioner lock bolt so the spring is fully extended and repeat steps 1–7 above or replace the tensioner spring.

Deflection:

8.5–11.5 mm (0.33–0.45 in)
/ 95 N (10 kg, 22 lb)



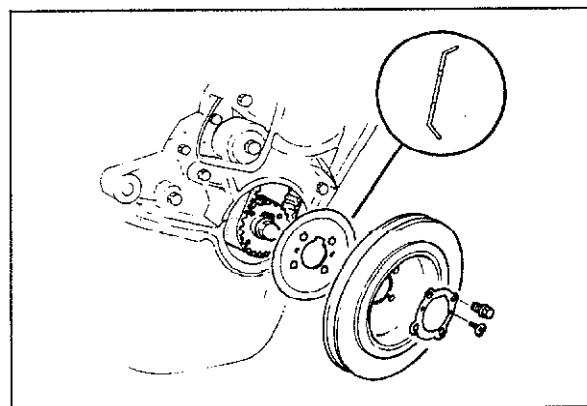
63G01C-095

Timing Belt Cover

Install the lower, middle and upper timing belt cover and a new gasket.

Tightening torque:

8–11 N·m (0.8–1.1 m·kg, 69–95 in·lb)



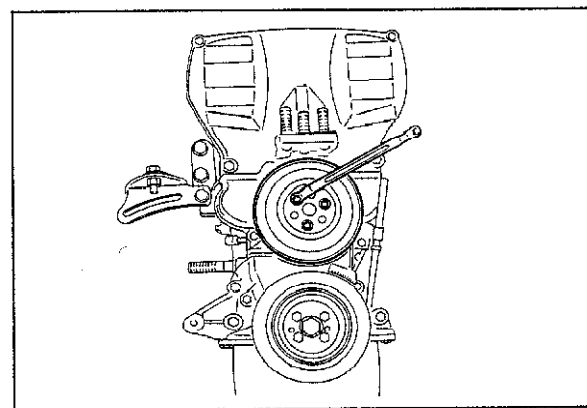
83U01B-091

Crankshaft Pulley

Install the crankshaft pulley and baffle plate.

Tightening torque: 12–17 N·m

(1.25–1.75 m·kg, 109–152 in·lb)



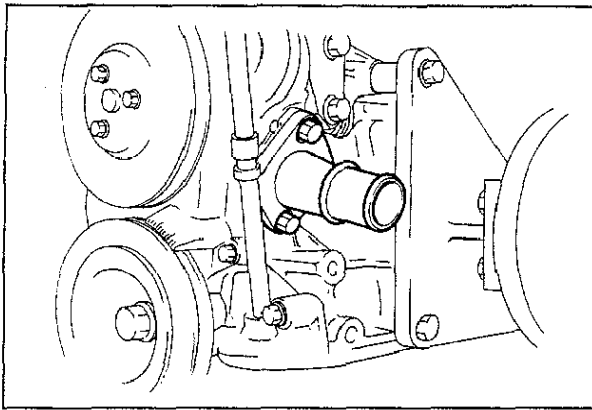
83U01B-092

Water Pump Pulley

Install the Water pump pulley.

Tightening torque:

8–11 N·m (0.8–1.1 m·kg, 69–95 in·lb)



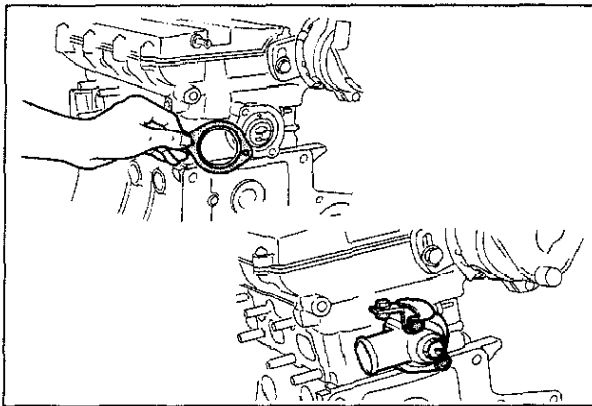
4BG01A-203

Coolant Inlet Pipe

Install the coolant inlet pipe and a new gasket.

Tightening torques:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



4BG01A-198p

Thermostat and Thermostat Cover

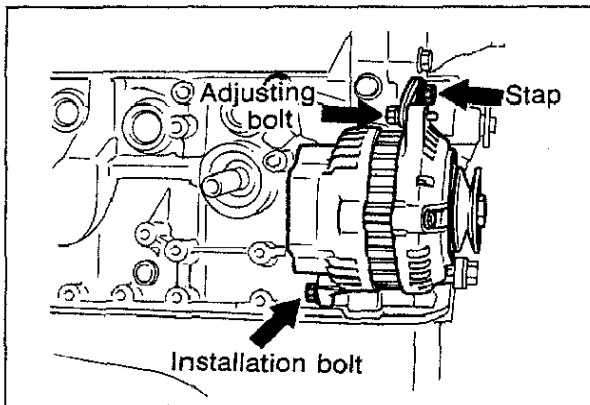
1. Install the thermostat with the jiggle pin facing upward.
2. Install the thermostat cover and gasket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Caution

The printed side of the gasket must face the thermostat.



83U01B-108

Alternator

1. Install the alternator strap.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

2. Install the alternator and alternator drive belt. Loosely tighten the alternator installation bolt.
3. Adjust the drive belt deflection by referring to page 1B—6.

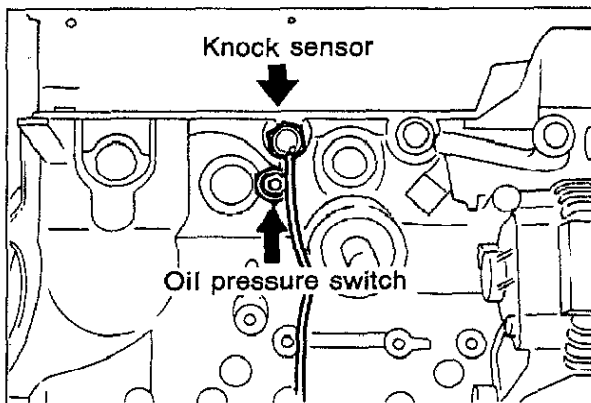
Tightening torque:

Alternator installation bolt:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

Belt adjusting bolt:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



83U01B-093

Oil Pressure Switch

Install the oil pressure switch.

Tightening torque: 12—18 N·m

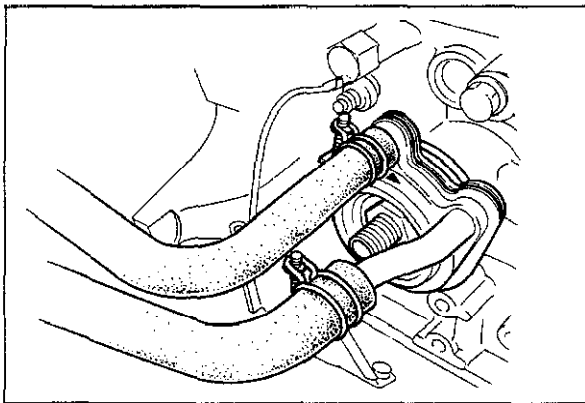
(1.2—1.8 m·kg, 104—156 in·lb)

Knock Sensor

Install the knock sensor.

Tightening torque:

20—34 N·m (2.0—3.5 m·kg, 14—25 ft·lb)



83U01B-094

Oil Cooler

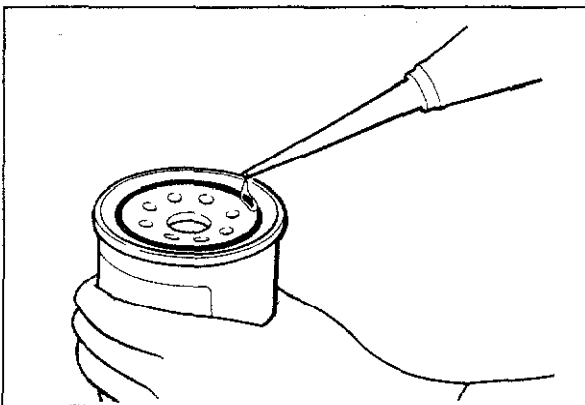
Apply engine oil to the oil cooler "O" ring and install the oil cooler to cylinder block.

Tightening torque:

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)

Note

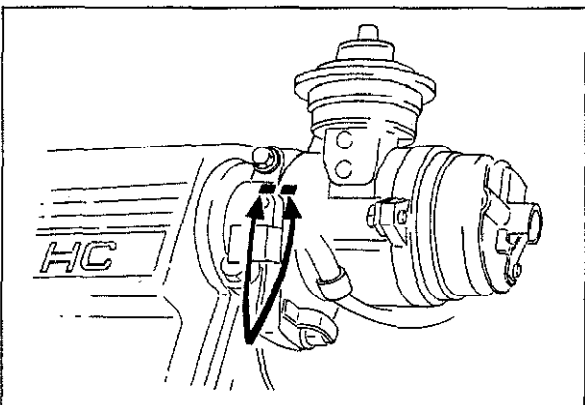
The oil cooler must be installed so the ▲ mark faces upward.



63G01C-099

Oil Filter

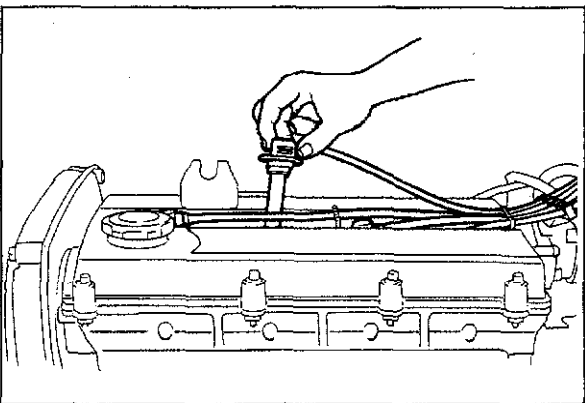
Apply engine oil to the oil filter "O" ring and install the filter, tighten thoroughly by hand.



83U01A-119

Distributor

1. Apply engine oil to the "O" ring, and position it on the distributor.
2. Apply engine oil to the drive gear.
3. Install the distributor with the blade into the camshaft groove.
4. Temporarily, loosely tighten the distributor installing bolt.



4BG01A-200

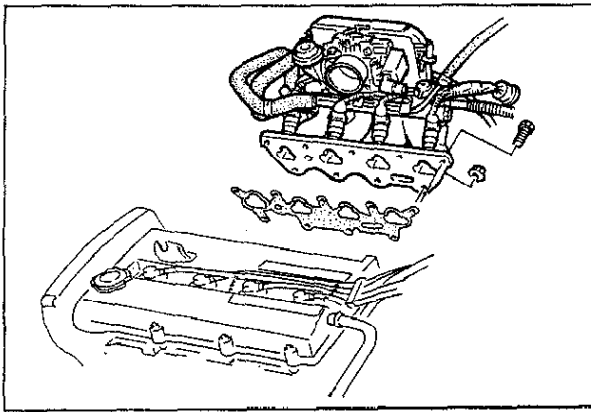
Spark Plug and High Tension Lead

1. Install the spark plugs.

Tightening torque:

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)

2. Connect the high tension leads.



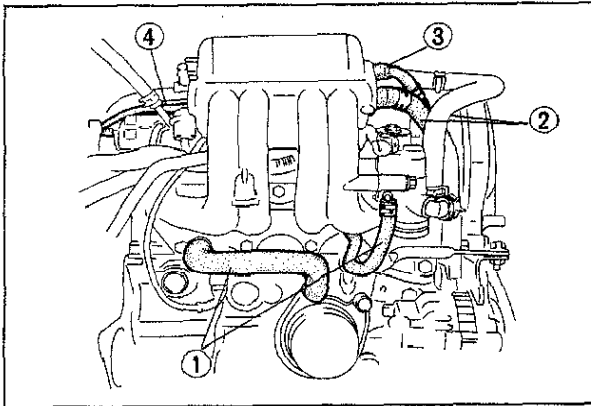
63U01X-136

Intake Manifold Assembly

1. Install the intake manifold assembly and new gasket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



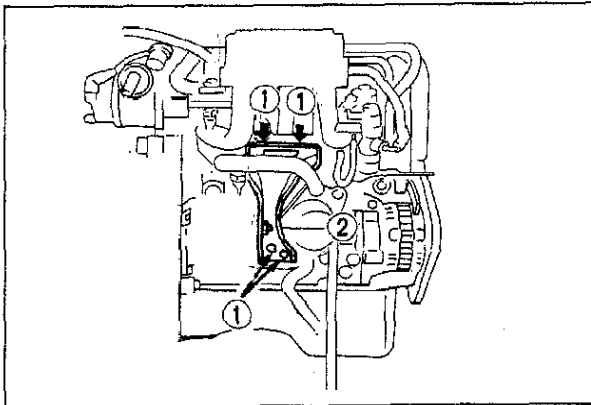
83U01B-095

2. Connect the following hoses.

- (1) Water hoses
- (2) Air hose
- (3) Ventilation hose
- (4) Vacuum hose

Caution

Hose clamp must be reinstalled in the original position on the hose.



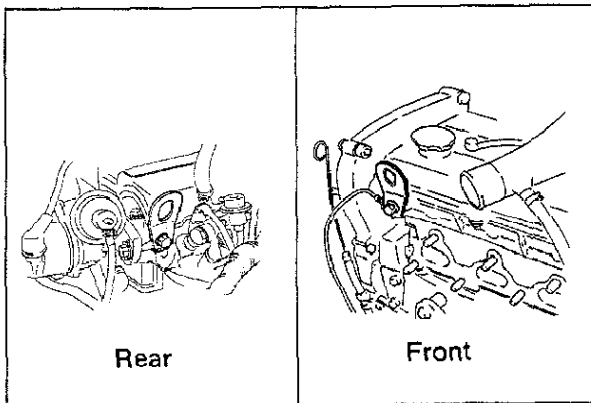
83U01B-096

Surge Tank Bracket

Install the surge tank bracket.

Tightening torque:

31—46 N·m (3.2—4.7 m·kg, 22—34 ft·lb)



63U01X-134

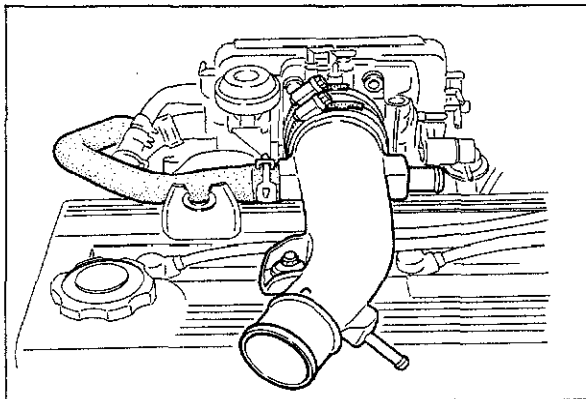
Engine Hanger

Install the front and rear engine hangers.

Tightening torque:

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

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



83U01B-097

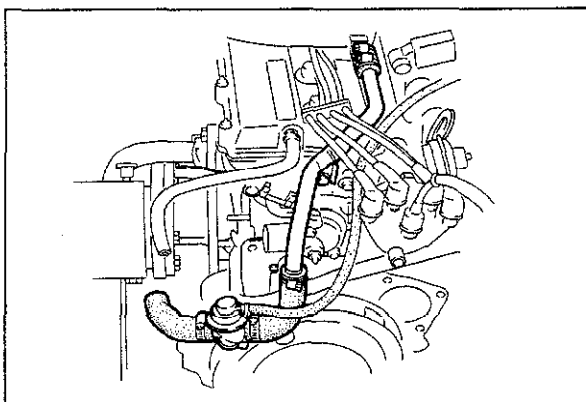
Air Intake Pipe

1. Install the air intake pipe.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

2. Connect the air hose.



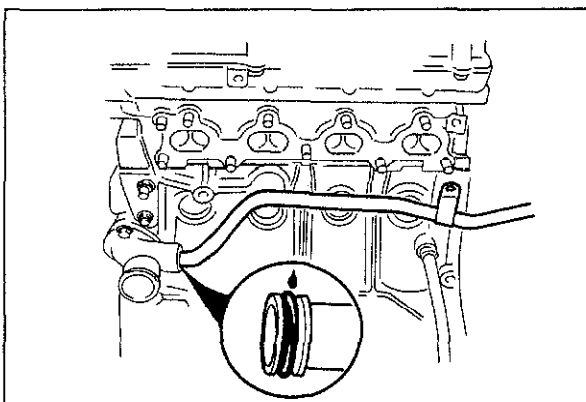
83U01B-098

Air Bypass Valve and Hoses

Install the air bypass valve and hoses.

Tightening torque:

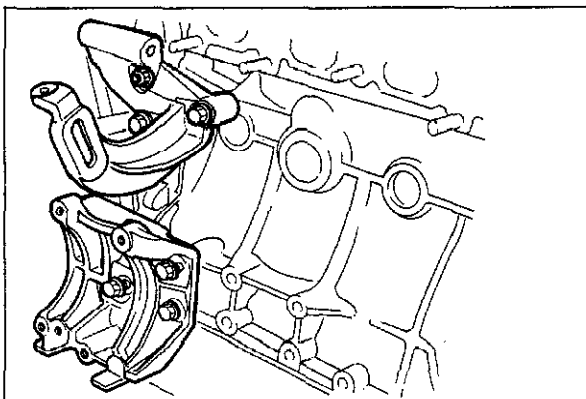
19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



83U01B-099

Coolant Bypass Hose

1. Apply a coat of long life coolant to the "O" ring.
2. Install the coolant bypass hose.



83U01A-127

Power Steering Pump Bracket

Install the power steering pump bracket.

Tightening torque:

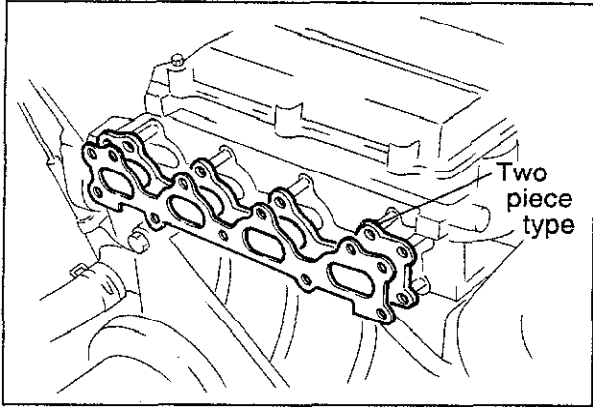
47—66 N·m (4.8—6.7 m·kg, 35—48 ft·lb)

Air Conditioner Compressor Bracket

Install the air conditioner compressor bracket.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)



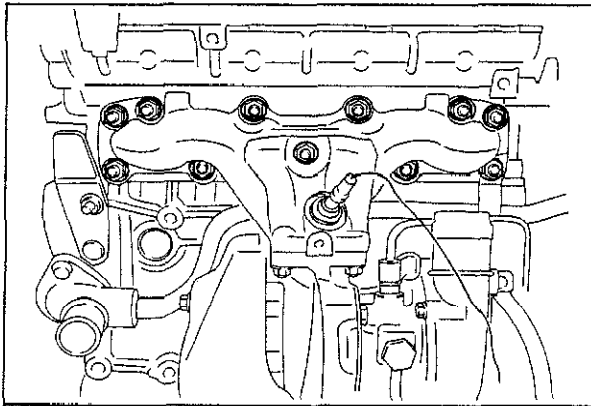
83U01B-100

Exhaust Manifold and Turbocharger Assembly

1. Remove the engine from the engine hanger and engine stand.
2. Install the exhaust manifold gasket.

Note

Two piece type gasket must be installed onto cylinder head side.

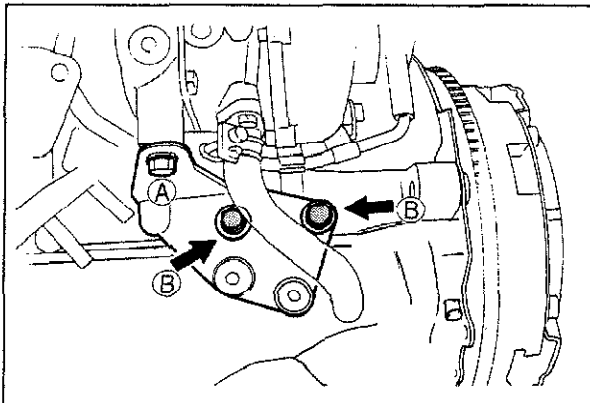


83U01B-101

3. Install the exhaust manifold and turbo charger assembly.

Tightening torque:

39—57 N·m (4.0—5.8 m·kg, 29—42 ft·lb)



83U01B-102

4. Install the turbocharger bracket.

Tightening torque:

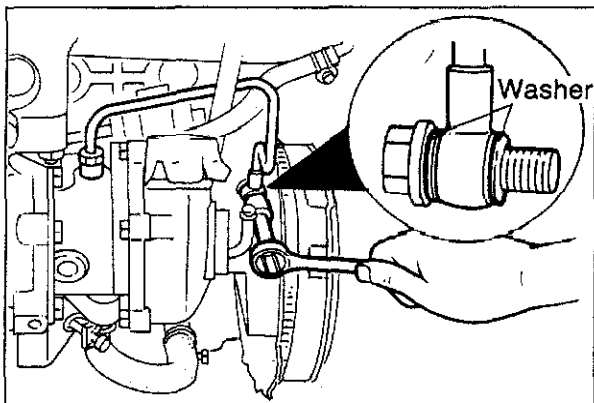
Bolt A: 25—32 N·m

(2.5—3.3 m·kg, 18—24 ft·lb)

Bolt B: 43—61 N·m

(4.4—6.2 m·kg, 32—45 ft·lb)

5. Connect the oil return hose.



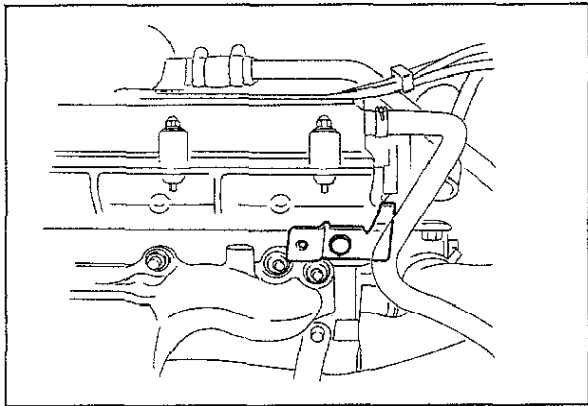
83U01B-103

6. Connect the oil pipe.

Tightening torque: 12—18 N·m

(1.2—1.8 m·kg, 104—156 in·lb)

7. Connect the water hose.



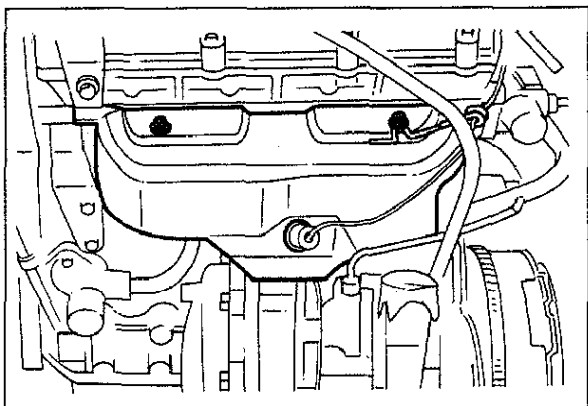
83U01B-104

Intake Air Hose Bracket

Install the intake air hose bracket.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



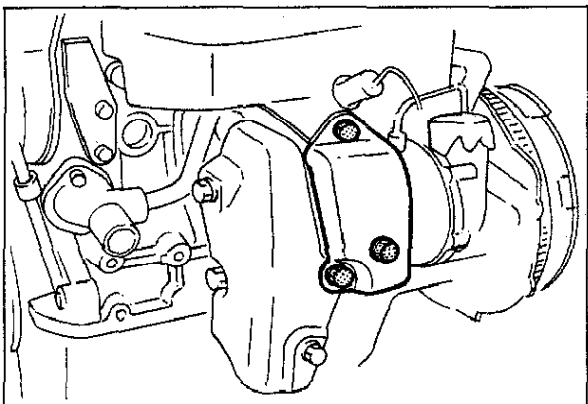
83U01B-105

Exhaust Manifold Insulator

Install the exhaust manifold insulator and wire clip.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



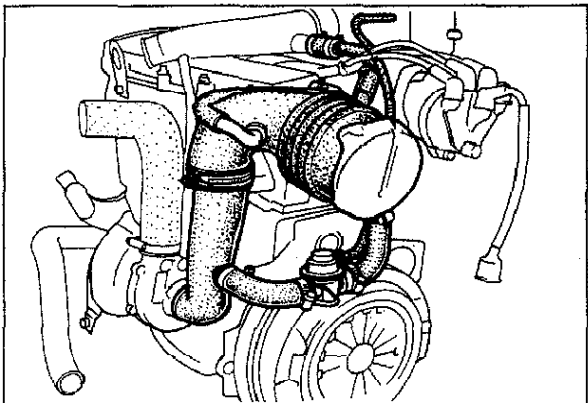
83U01B-106

Turbocharger Insulator

Install the turbocharger insulator.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg 14—19 ft·lb)



83U01B-107

Air Hose

Install the air hose.

Oil Level Gauge

Install the oil level gauge.

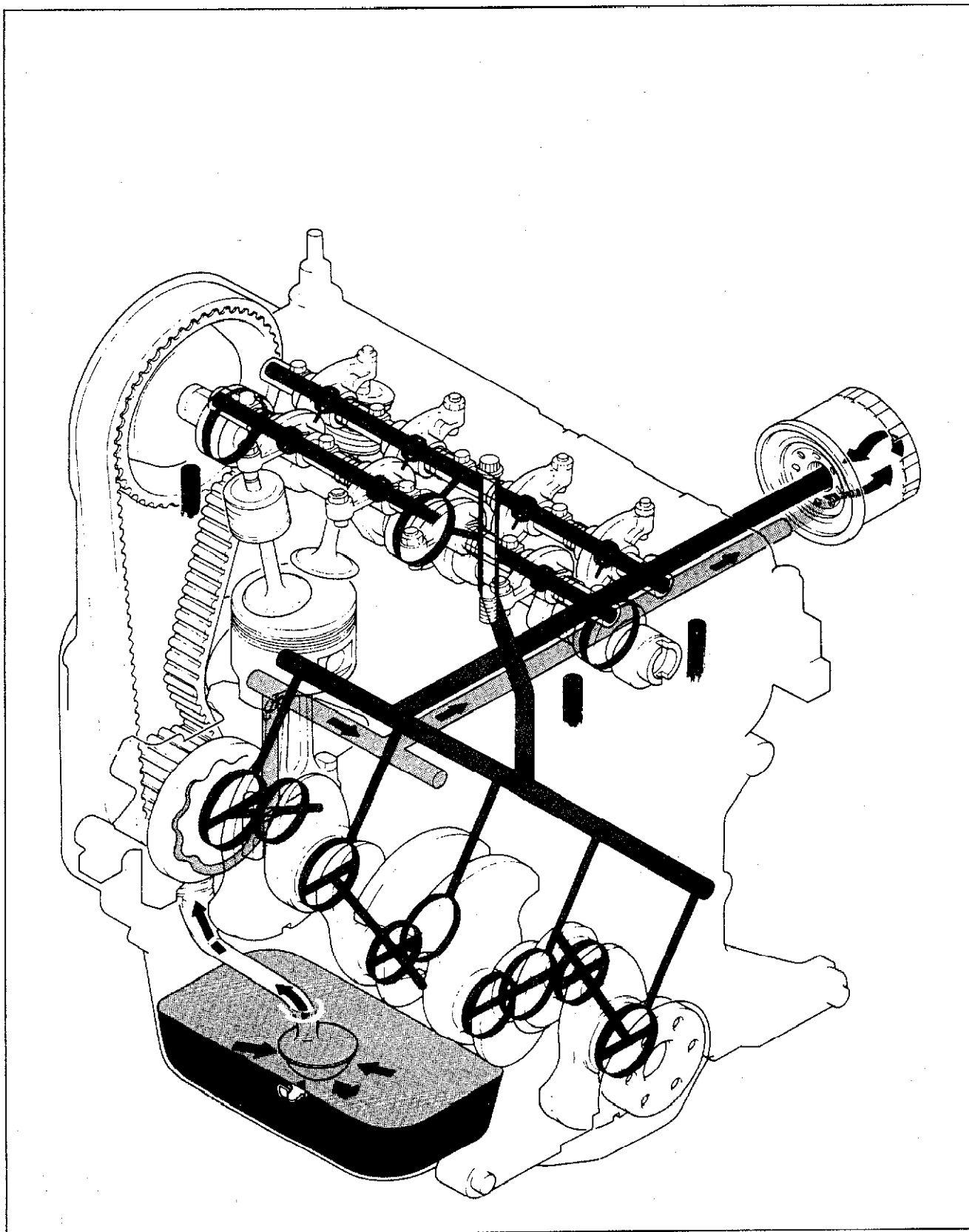
LUBRICATION SYSTEM (B6 EGI)

| | |
|------------------------------------|-------|
| OUTLINE | 2A— 2 |
| STRUCTURAL VIEW..... | 2A— 2 |
| SPECIFICATIONS..... | 2A— 3 |
| TROUBLESHOOTING GUIDE | 2A— 3 |
| OIL FILTER | 2A— 4 |
| REPLACEMENT | 2A— 4 |
| OIL PAN | 2A— 5 |
| REMOVAL AND INSTALLATION..... | 2A— 5 |
| INSPECTION..... | 2A— 6 |
| OIL PUMP | 2A— 7 |
| REMOVAL AND INSTALLATION..... | 2A— 7 |
| DISASSEMBLY AND ASSEMBLY..... | 2A— 8 |
| INSPECTION..... | 2A— 9 |
| OIL PRESSURE | 2A— 9 |
| INSPECTION..... | 2A— 9 |

83U02A-001

OUTLINE

STRUCTURAL VIEW



63U02X-002

SPECIFICATIONS

| | | |
|---|--|-------------------------------|
| Lubricating system | | Force-fed type |
| Oil pump | Type | Trochoid gear type |
| | Oil pressure kPa (kg/cm ² , psi) | 343—441 (3.5—4.5, 50—64) |
| Oil filter | Type | Full-flow type, paper element |
| | Relief-valve opening pressure kPa (kg/cm ² , psi) | 98 (1.0, 14) |
| Oil warning pressure kPa (kg/cm ² , psi) | | 29 (0.3, 4.3) |
| Oil capacity | Total liters (US qt, Imp qt) | 3.4 (3.6, 3.0) |
| | Oil pan liters (US qt, Imp qt) | 3.0 (3.2, 2.6) |
| | Oil filter liters (US qt, Imp qt) | 0.3 (0.32, 0.26) |
| Engine oil | | API service SD, SE, SF |

83U02A-002

Recommended SAE viscosity numbers

| Temperature | (°C) | −30 | −20 | −10 | 0 | 10 | 20 | 30 | 40 | 50 |
|-------------|------|--------|--------|-----|----|--------|----|-----|-----|----|
| | (°F) | −20 | 0 | 20 | 40 | 60 | 80 | 100 | 120 | |
| Engine oil | | 5W-30 | | | | 30 | | | | |
| | | 5W-20 | 20W-20 | | | | 40 | | | |
| | | 10W-30 | | | | | | | | |
| | | 10W-40 | | | | 10W-50 | | | | |
| | | 20W-40 | | | | 20W-50 | | | | |
| | | | | | | | | | | |

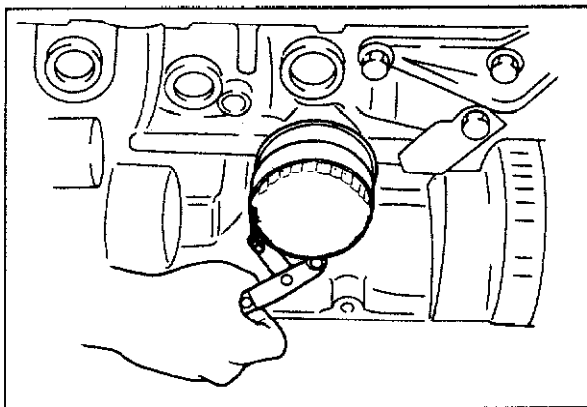
76U02X-003

Temperature range anticipated before next oil change, °C(°F)

TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|---|--|---------------------|-------|
| Oil leakage | Loose drain plug | Tighten or replace | 2A— 6 |
| | Faulty seal at oil pan and cylinder block | Repair | 2A— 6 |
| | Damaged cylinder head cover | Refer to Section 1A | — |
| | Loose oil pump body bolt, cylinder head cover bolt, or oil pan bolt | Tighten | 2A— 5 |
| | Damaged front housing gasket, or cylinder head gasket | Refer to Section 1A | — |
| | Faulty oil seal(s) | Replace | — |
| | Loose oil filter | Tighten | 2A— 4 |
| | Loose or damaged oil pressure switch | Tighten or replace | — |
| Oil pressure drop | Oil leak | As described above | — |
| | Insufficient oil | Add oil | — |
| | Worn and/or damaged oil pump gear | Replace | 2A— 8 |
| | Worn plunger (inside oil pump) or weak spring | Replace | 2A— 8 |
| | Clogged oil strainer | Clean | 2A— 7 |
| | Excessive lubrication clearance between main bearing or connecting rod bearing | Refer to Section 1A | — |
| Warning lamp illuminates while engine is running | Oil pressure drop | As described above | — |
| | Malfunction of oil pressure switch | Refer to Section 15 | — |
| | Problem in electrical system | Refer to Section 15 | — |

83U02A-003

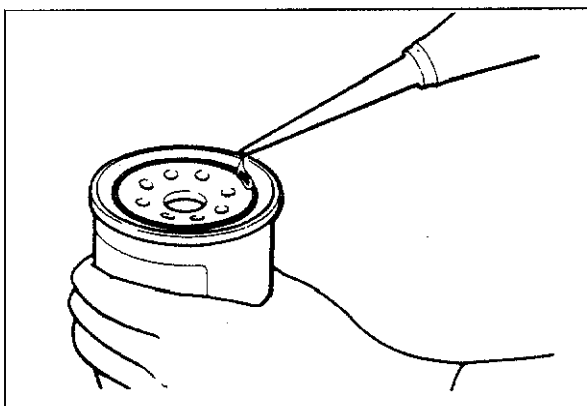


63U02X-006

OIL FILTER

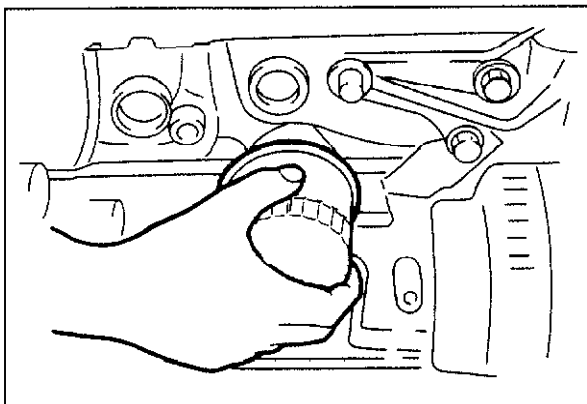
REPLACEMENT

1. Remove the oil filter with an oil filter wrench.



63U02X-007

2. Apply a small amount of engine oil to the O-ring of the new oil filter.



63U02X-008

3. Fully tighten the oil filter by hand.

4. Add engine oil to the correct level.

5. After installing the filter, check to be sure that there is no oil leakage while the engine is running.

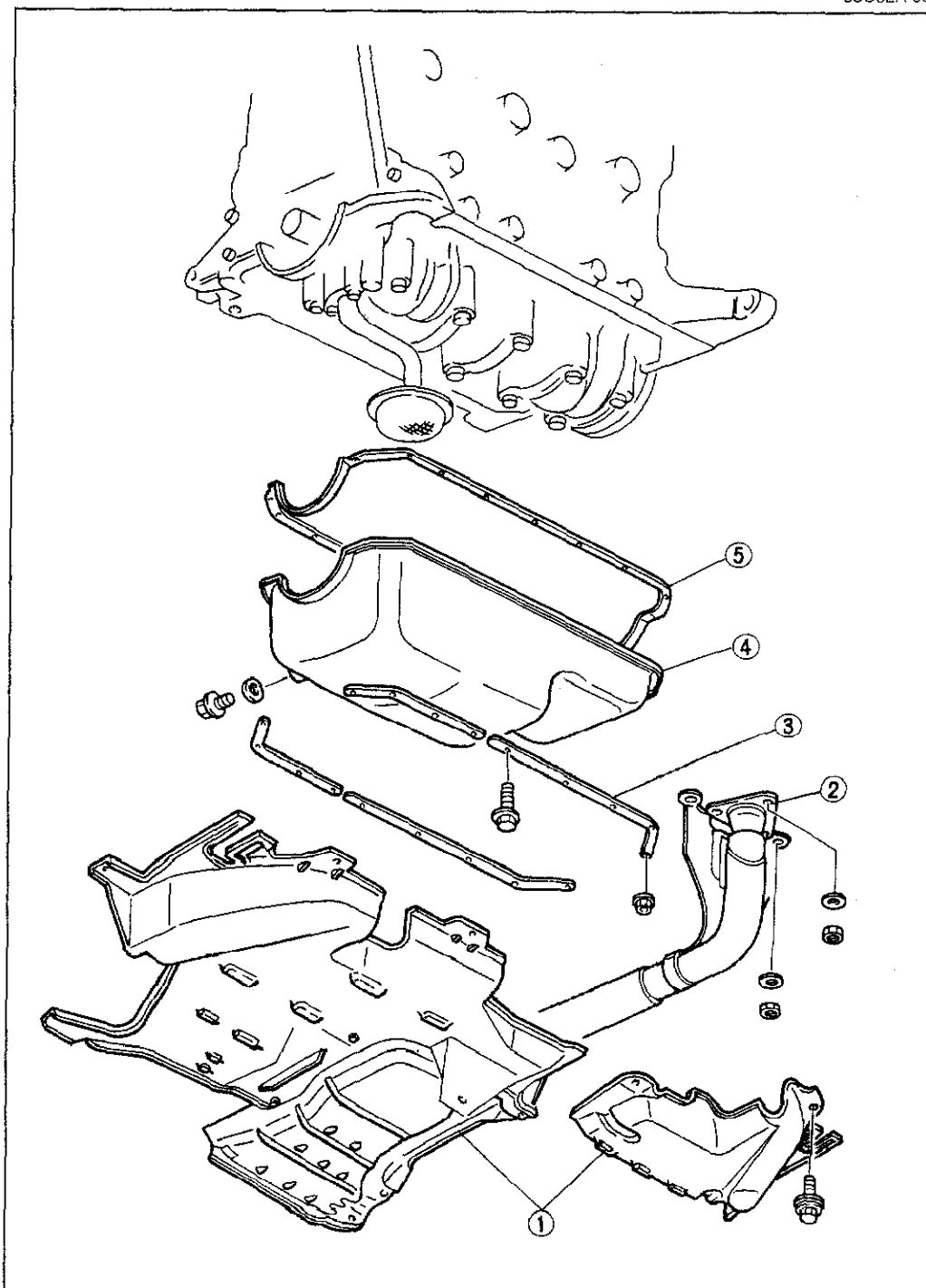
6. Re-check the oil level using the dipstick.

OIL PAN

REMOVAL AND INSTALLATION

1. Disconnect the battery negative cable.
2. Drain the engine oil.
3. Remove the parts in the numbered sequence shown in the figure.
4. Install in the reverse order of removal.

83U02A-004

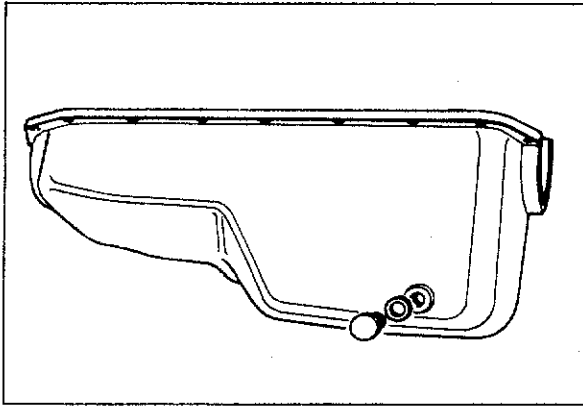


1. Engine under covers
2. Exhaust pipe
3. Stiffener
4. Oil pan
5. Gasket

83U02A-005

Steps after installation

1. Add the prescribed amount of oil.
2. Check for oil leakage after starting the engine.

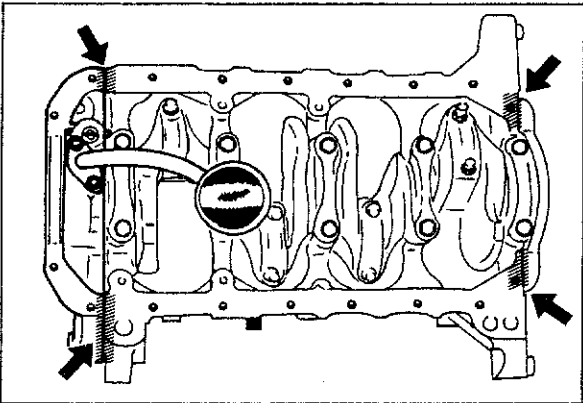


63U02X-013

INSPECTION

Check the following points. Repair or replace if necessary:

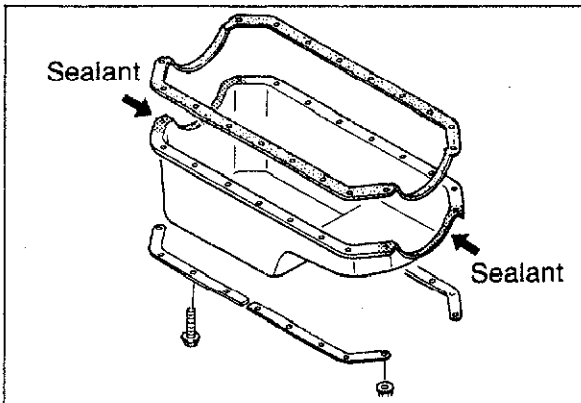
1. Cracks, deformation, damage (at bolt locations)
2. Damaged drain plug threads.



83U02A-006

Installation Note

1. Apply sealant to the places indicated by the arrows in the figure after cleaning the surface.



83U02A-007

2. Apply sealant to the shaded area as shown in the figure after cleaning the surface.
3. Install the oil pan along with new gasket and stiffener.

Tightening torque:

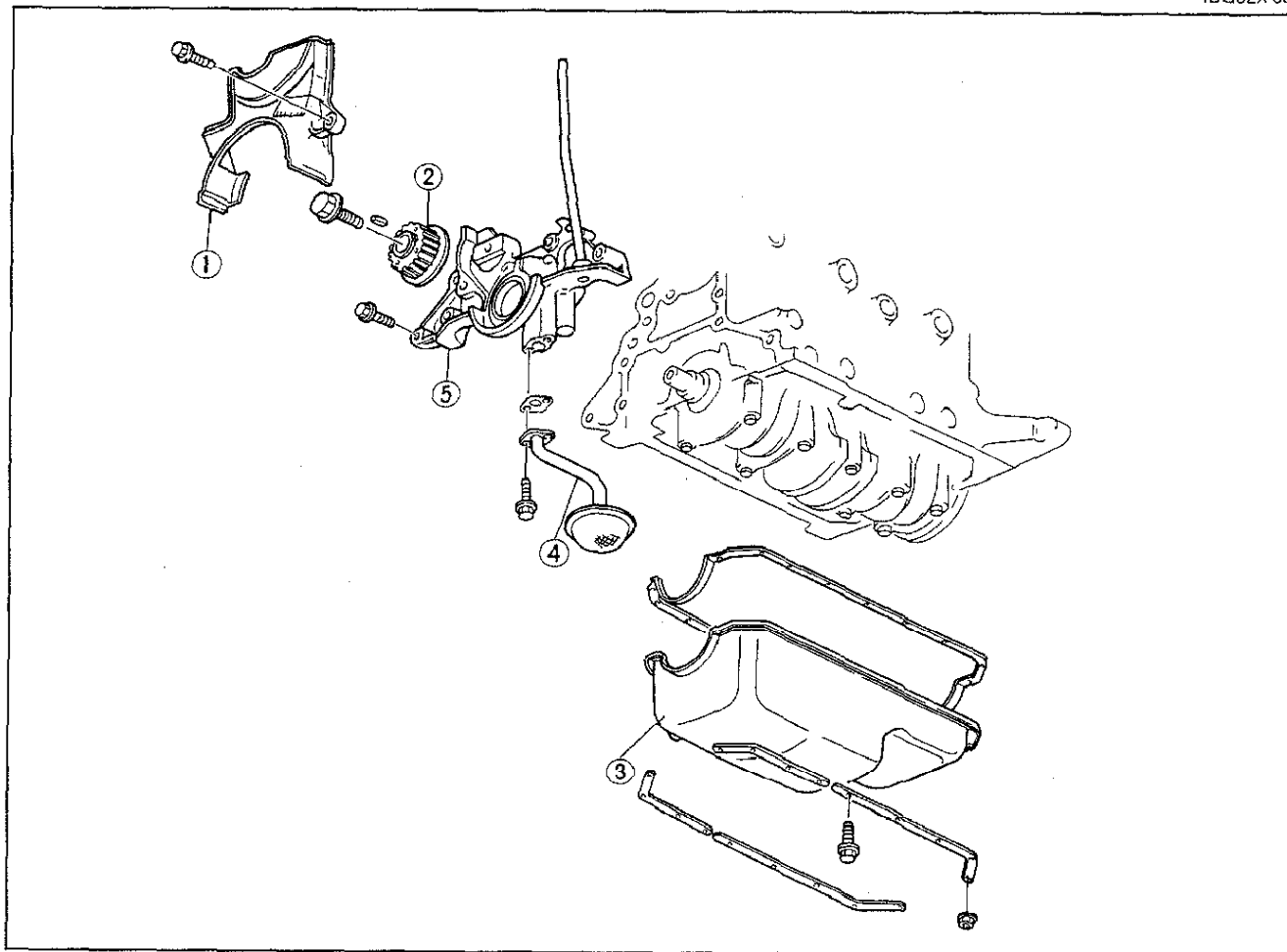
6—9 N·m (0.6—0.9 m·kg, 52—78 in·lb)

OIL PUMP

REMOVAL AND INSTALLATION

1. Disconnect the battery negative cable.
2. Drain the engine oil.
3. Remove each part in the numbered sequence shown in the figure.
4. Install in the reverse order of removal.

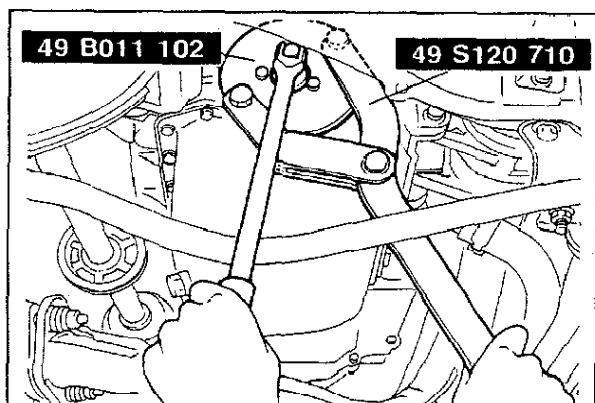
4BG02X-036



83U02A-008

1. Timing belt cover
2. Timing belt pulley
3. Oil pan (Refer to 2A—6)

4. Oil strainer
5. Oil pump



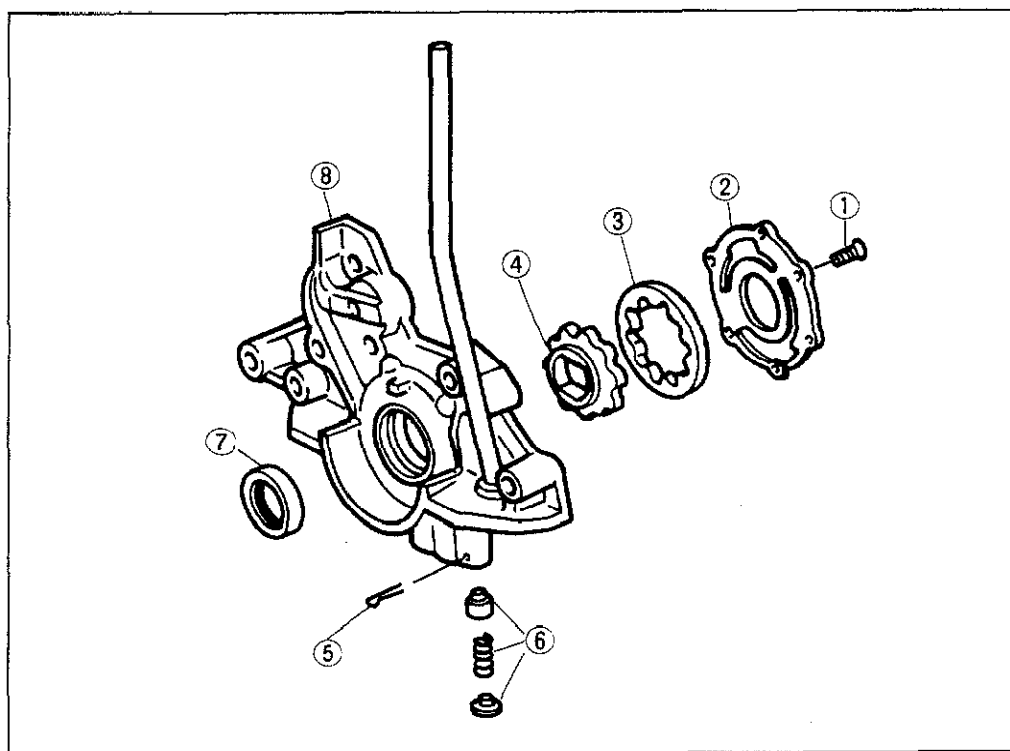
83U02X-010

Timing Belt Pulley

1. Install the **SST** to the timing belt pulley.
2. Remove the lock bolt.
3. Remove the timing belt pulley.

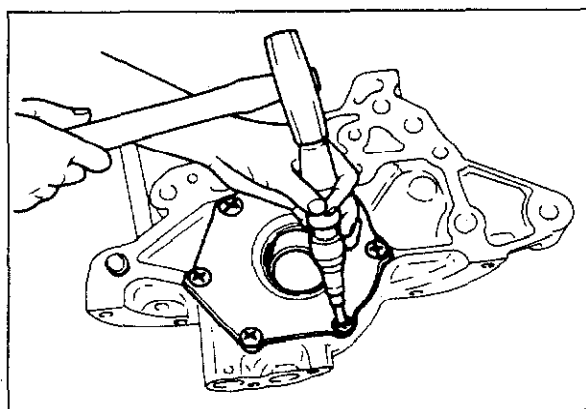
DISASSEMBLY AND ASSEMBLY

1. Disassemble the parts in the numbered sequence, shown in the figure.
2. Assemble in the reverse order of disassembly.



1. Bolt
2. Pump cover
3. Outer gear
4. Inner gear
5. Split pin
6. Plunger assembly
7. Oil seal
8. Pump body

83U02A-009



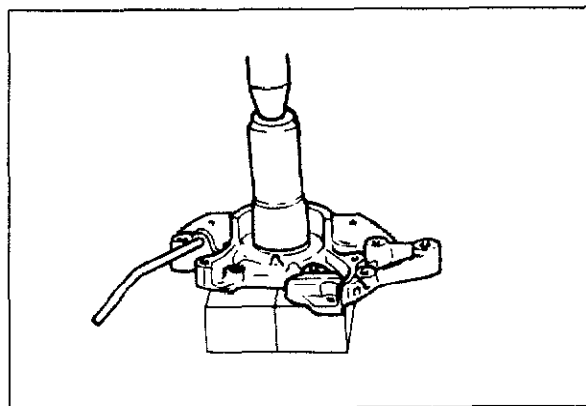
63U02X-016

Oil Pump Cover Removal

Loosen the screws by an impact driver so that the oil pump body is not damaged.

Installation

1. Coat locking agent on the screw threads.
2. Install the pump cover to the body.



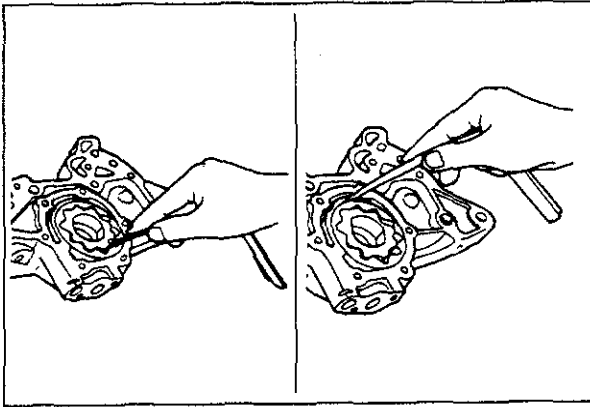
63U02X-017

Oil Seal Removal

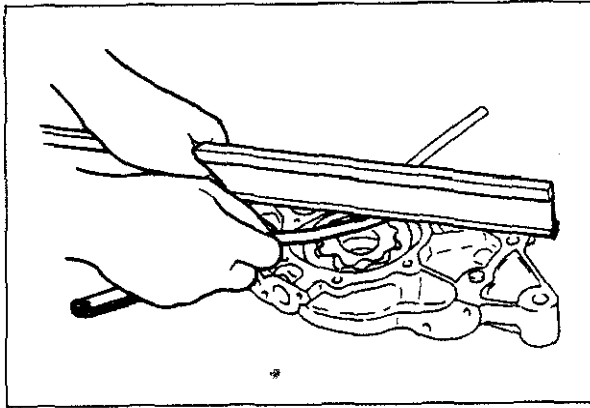
Remove the oil seal by using a screwdriver or similar tool to pry it out.

Installation

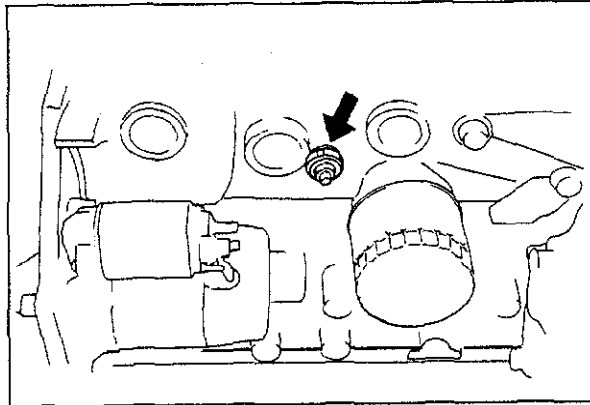
1. Apply engine oil to the pump body and the new oil seal.
2. Press the oil seal in until it is flush with the front of the pump body.



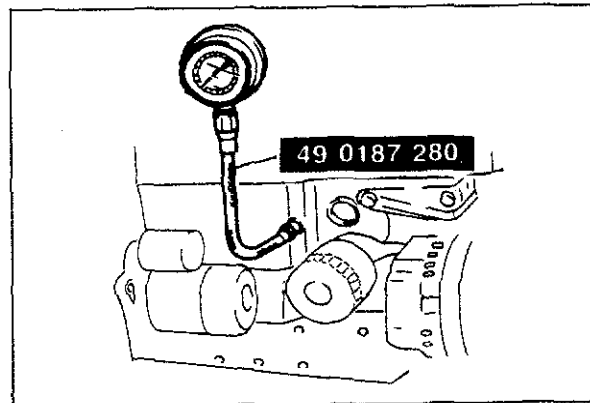
83U02X-011



63U02X-019



83U02X-012



63U02X-021P

INSPECTION

1. Inspect for distortion or damage to the pump body or cover.
2. Inspect for weak or damaged plunger.
3. Inspect for weak or broken plunger spring.
4. Measure the following clearances:

Inner gear tooth tip and outer gear clearance:
0.2 mm (0.0079 in) max.

Outer gear and pump body clearance:
0.22 mm (0.0087 in) max.

Side clearance:
0.14 mm (0.0055 in) max.

5. Replace the gear assembly or oil pump body if the clearances are not within the limits.

OIL PRESSURE

INSPECTION

1. Remove the oil pressure switch.
2. Connect the **SST** to the pressure switch installation hole in the cylinder block.

3. Start the engine and let it warm up.
4. Maintain engine rpm at 3,000, and note the gauge reading.

Standard oil pressure:
343—441kPa (3.5—4.5 kg/cm², 50—64psi)

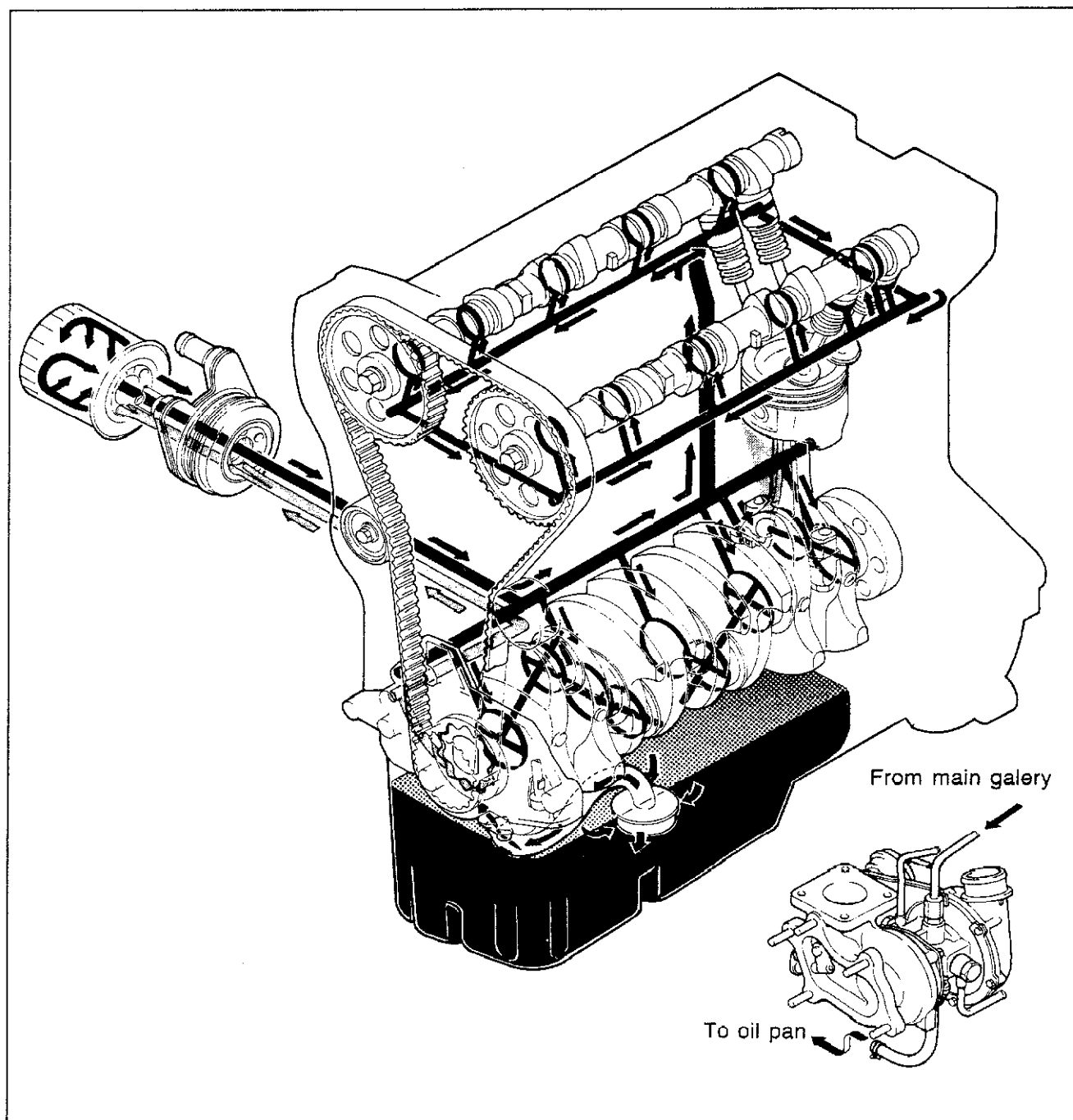
5. If the pressure is lower than specified, check and repair if necessary.
(Refer to Troubleshooting Guide.)

LUBRICATION SYSTEM (B6 DOHC)

| | |
|---|--------------|
| OUTLINE | 2B— 2 |
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| OIL PRESSURE..... | 2B—11 |
| INSPECTION..... | 2B—11 |
| INSPECTION OF CYLINDER HEAD OIL PRESSURE | 2B—12 |

OUTLINE

STRUCTURAL VIEW



63G02C-302

SPECIFICATIONS

| | | |
|---|--|-------------------------------|
| Lubricating system | | Force-fed type |
| Oil pump | Type | Trochoid gear type |
| | Oil pressure kPa (kg/cm ² , psi) | 343—441 (3.5—4.5, 50—64) |
| Oil filter | Type | Full-flow type, paper element |
| | Relief-valve opening pressure kPa (kg/cm ² , psi) | 98 (1.0, 14) |
| Oil warning pressure kPa (kg/cm ² , psi) | | 29 (0.3, 4.3) |
| Oil capacity | Total liters (US qt, Imp qt) | 3.6 (3.8, 3.2) |
| | Oil pan liters (US qt, Imp qt) | 3.2 (3.4, 2.8) |
| | Oil filter liters (US qt, Imp qt) | 0.3 (0.32, 0.26) |
| Engine oil | | API service, SF |

83U02B-002

Recommended SAE viscosity numbers

| Temperature | (°C) | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 |
|-------------|------|--------|-----|--------|----|--------|--------|-----|-----|----|
| | (°F) | -20 | 0 | 20 | 40 | 60 | 80 | 100 | 120 | |
| Engine oil | | 5W-30 | | | | 30 | | | | |
| | | 5W-20 | | 20W-20 | | | | 40 | | |
| | | 10W-30 | | | | | | | | |
| | | 10W-40 | | | | 10W-50 | | | | |
| | | 20W-40 | | | | | 20W-50 | | | |
| | | | | | | | | | | |

76U02X-003

Temperature range anticipated before next oil change, °C(°F)

TROUBLESHOOTING GUIDE

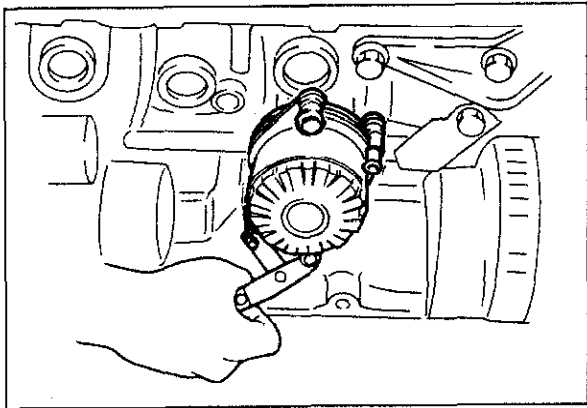
| Problem | Possible Cause | Remedy | Page |
|---|--|---------------------|-------|
| Oil leakage | Loose drain plug | Tighten or replace | 2B— 7 |
| | Faulty seal at oil pan and cylinder block | Repair | 2B— 7 |
| | Damaged cylinder head cover | Refer to Section 1B | — |
| | Loose oil pump body bolt, cylinder head cover bolt, or oil pan bolt | Tighten | 2B— 6 |
| | Damaged front housing gasket, or cylinder head gasket | Refer to Section 1B | — |
| | Faulty oil seal(s) | Replace | — |
| | Loose oil filter | Tighten | 2B— 4 |
| | Loose or damaged oil pressure switch | Tighten or replace | — |
| Oil pressure drop | Oil leak | As described above | — |
| | Insufficient oil | Add oil | — |
| | Worn and/or damaged oil pump gear | Replace | 2B—10 |
| | Worn plunger (inside oil pump) or weak spring | Replace | 2B—10 |
| | Clogged oil strainer | Clean | 2B— 9 |
| | Excessive lubrication clearance between main bearing or connecting rod bearing | Refer to Section 1B | — |
| Warning lamp illuminates while engine is running | Oil pressure drop | As described above | — |
| | Malfunction of oil pressure switch | Refer to Section 15 | — |
| | Problem in electrical system | Refer to Section 15 | — |

83U02B-003

OIL FILTER

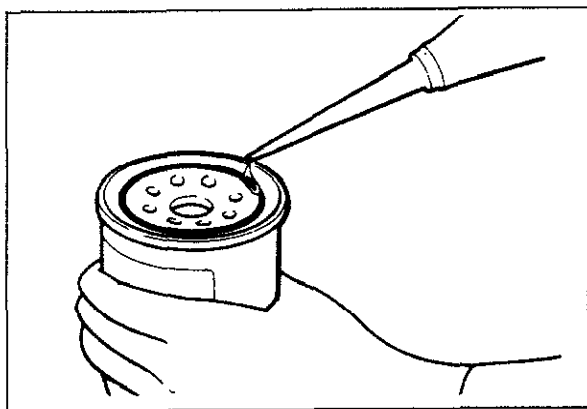
REPLACEMENT

1. Remove the oil filter with an oil filter wrench.



63U02X-006

2. Apply a small amount of engine oil to the O-ring of the new oil filter.



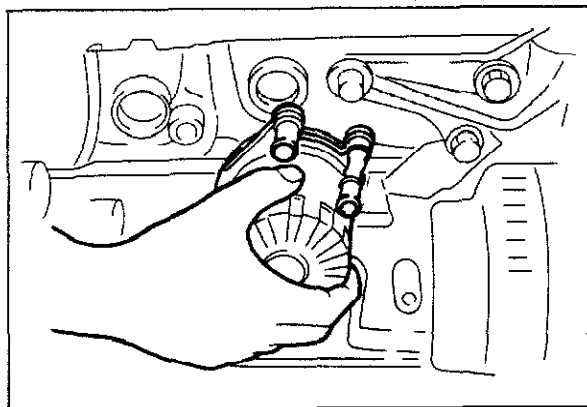
63U02X-007

3. Fully tighten the oil filter by hand.

4. Add engine oil to the correct level.

5. After installing the filter, check to be sure that there is no oil leakage while the engine is running.

6. Re-check the oil level using the dipstick.



63U02X-008

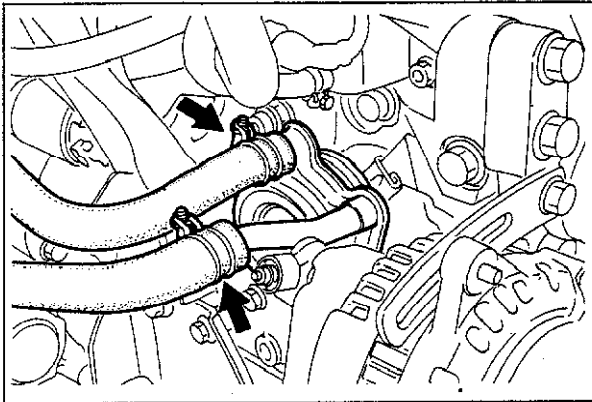


83U02B-004

OIL COOLER

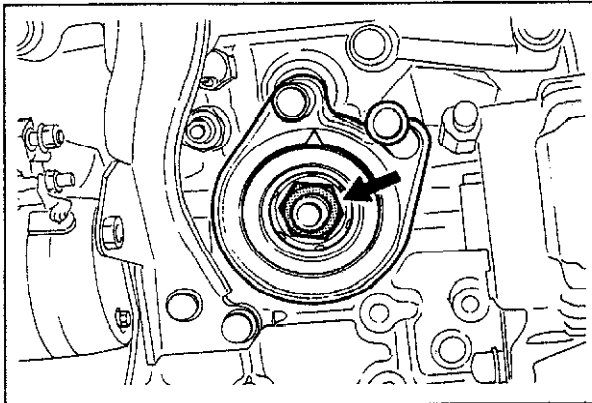
REMOVAL

1. Drain the engine oil.
2. Remove the under cover.
3. Remove the oil filter with an oil filter wrench.



83U02B-005

4. Disconnect the water hoses.
5. Remove the oil cooler.



83U02B-006

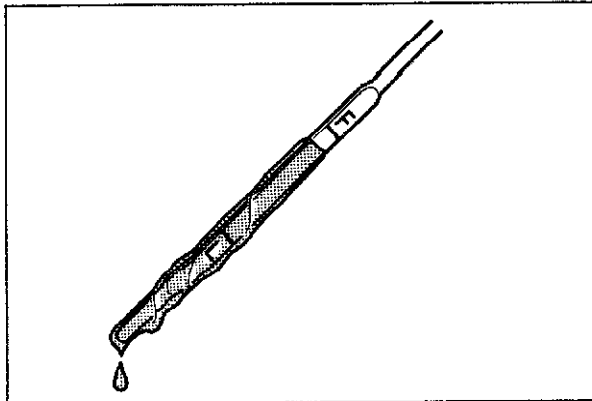
INSTALLATION

1. Install the oil cooler.

Tightening torque:

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)

2. Install the oil filter (Refer to page 2B—4).
3. Install the under cover.
4. Add engine oil to the correct level.



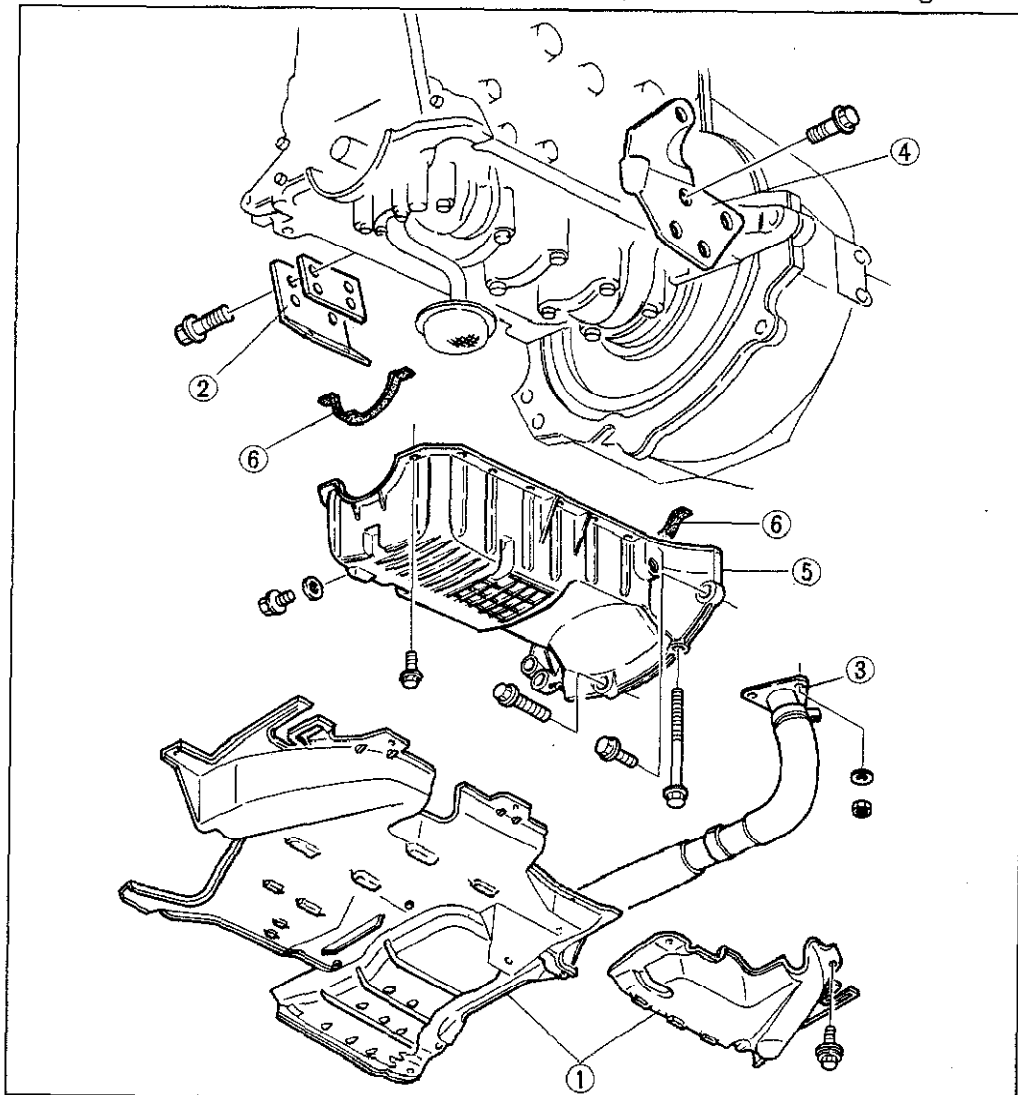
83U02B-007

5. After installing the filter, check that there is no oil leakage while the engine is running.
6. Re-check the oil level using the dipstick.

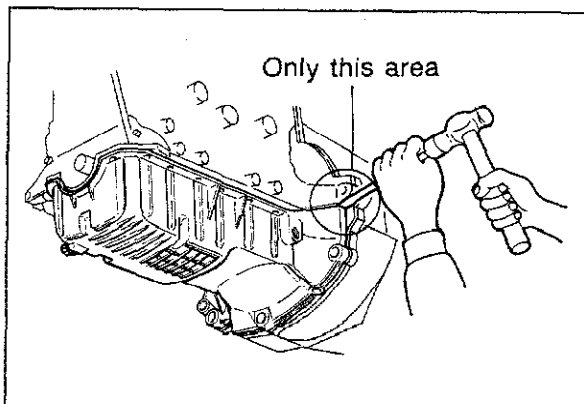
OIL PAN

REMOVAL

1. Disconnect the battery negative cable.
2. Drain the engine oil.
3. Mount the engine support (49 B017 5A0) and suspend the engine.
4. Remove the the parts in the numbered sequence shown in the figure.



83U02B-008



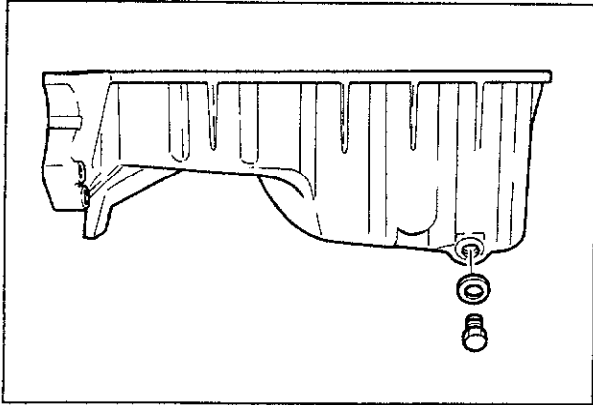
73G01C-008

Removal Note

1. Remove the oil pan by prying only at the points shown in the figure.
2. Loosen the mounting member bolts until the oil pan can be removed.

Caution

- a) Do not force a pry tool between the block and pan to prevent damaging the contact surfaces.
- b) Do not damage or scratch the contact surface when removing the old sealant.

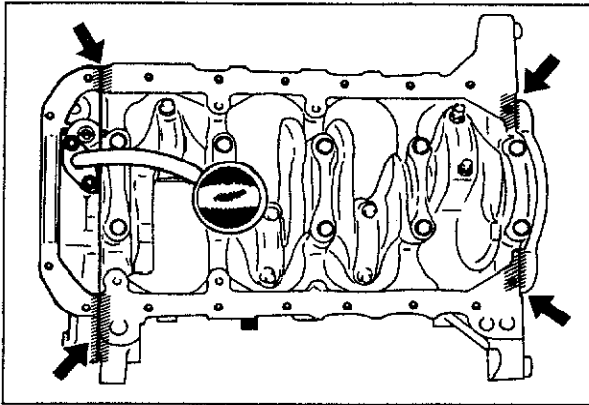


63U02X-013

INSPECTION

Check the following points. Repair or replace, if necessary.

1. Cracks, deformation, damage (at bolt locations).
2. Damaged drain plug threads.



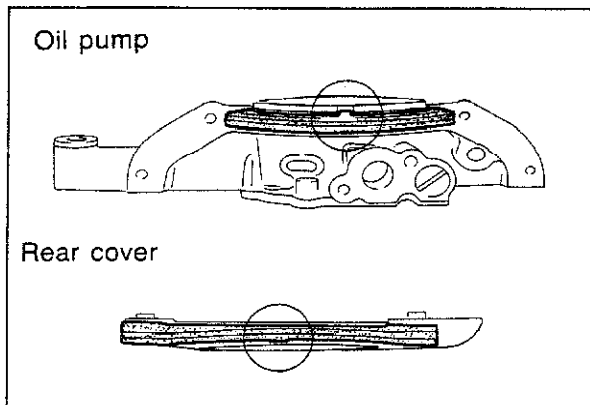
83U02B-009

INSTALLATION

Install in the reverse order of removal.

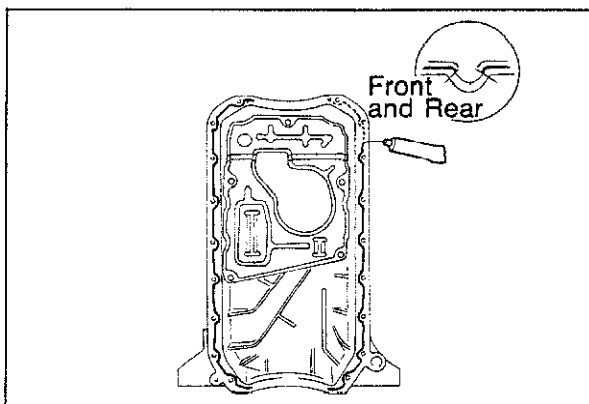
Installation Note

1. Apply sealant to the places indicated by the arrows in the figure after cleaning the cylinder block surface.



73G01C-011

2. Install the gaskets onto the oil pump body and rear cover with the projections in the notches as shown.



73G01C-012

3. Clean the oil pan contact surface.

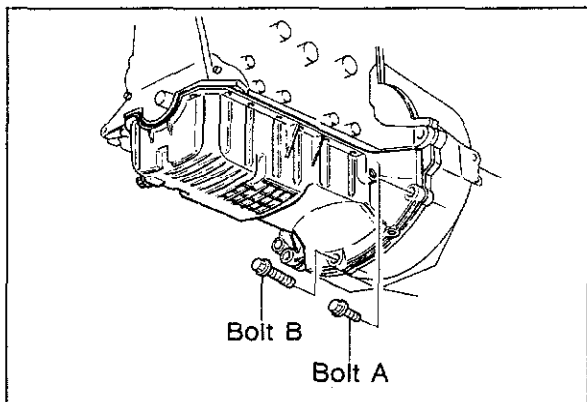
Caution

Do not leave any dirt or oil on it.

4. Apply silicone sealant to the oil pan continuously with the bead of **2.5—3.5 mm (0.0984—0.1378 in)**, rimming the surface inside the bolt holes as shown.

Caution

After the sealant is applied, the pan must be secured within 30 minutes.



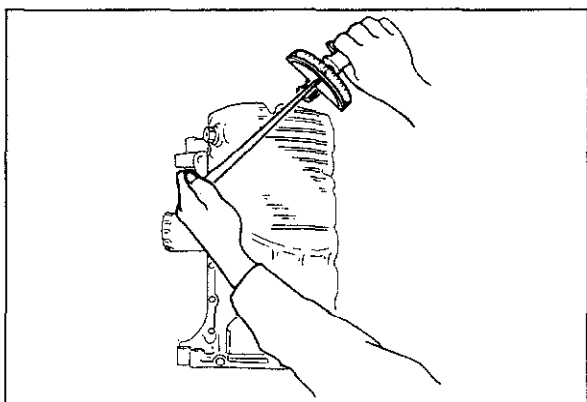
83U02B-010

5. Install the oil pan and tighten the transaxle connecting bolts.

Tightening torque:

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

Bolt B: 19—26 N·m
(1.9—2.6 m·kg, 14—19 ft·lb)



83U02B-011

6. Tighten the bolts gradually in three steps.

Tightening torque:

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

Steps After Installation

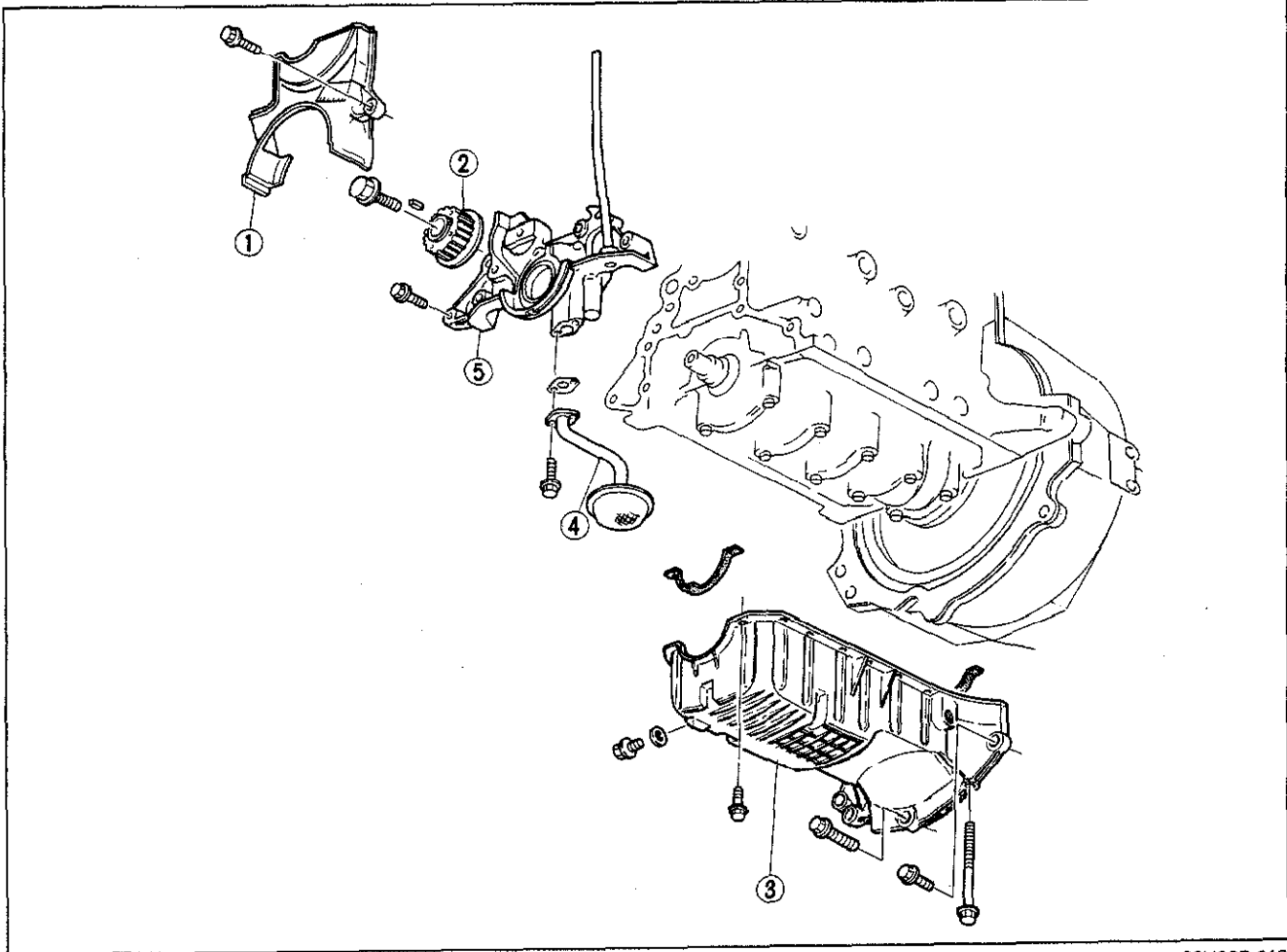
1. Add the prescribed amount of oil.
2. Check for oil leakage after starting the engine.

83U02B-012

OIL PUMP**REMOVAL AND INSTALLATION**

1. Disconnect the battery negative cable.
2. Drain the engine oil.
3. Remove each part in the numbered sequence shown in the figure.
4. Install in the reverse order of removal.

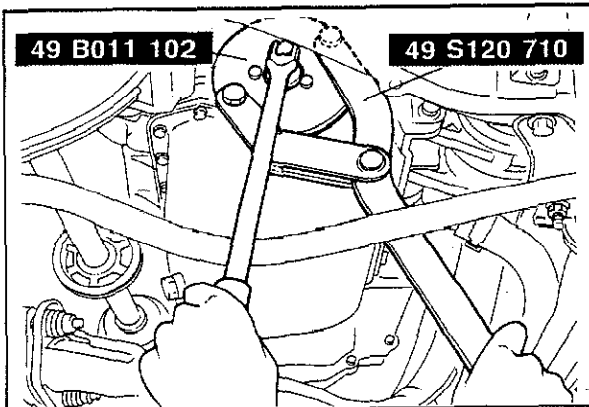
4BG02X-038



83U02B-013

1. Timing belt cover
2. Timing belt pulley
3. Oil pan (Refer to page 2B—6)

4. Oil strainer
5. Oil pump



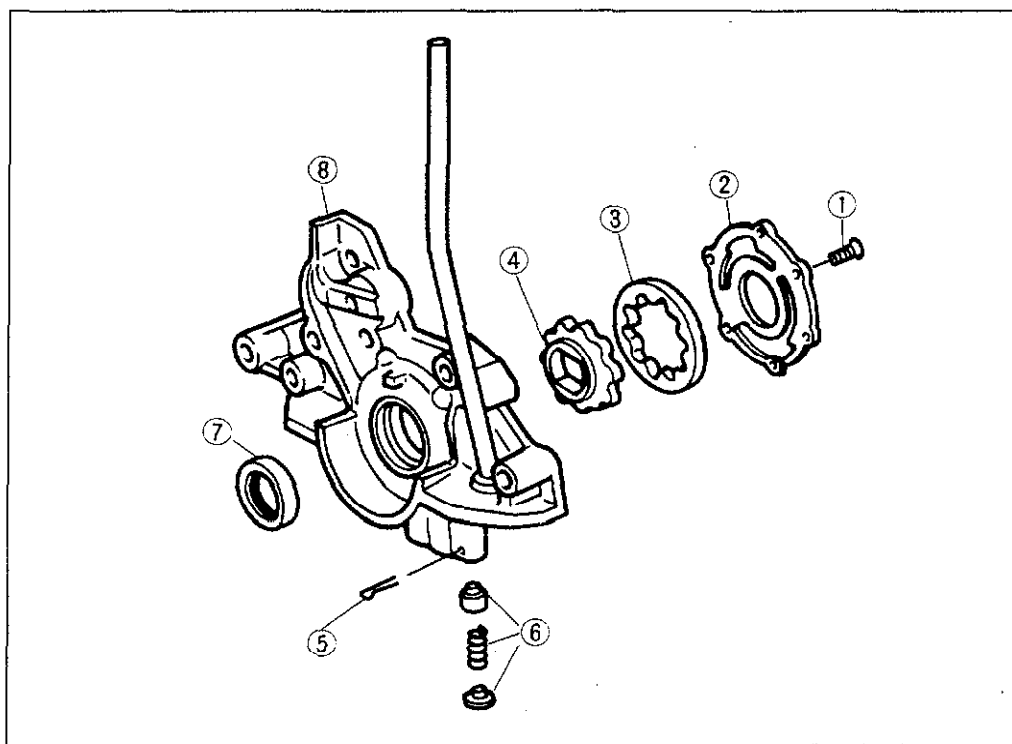
83U02A-010

Timing Belt Pulley

1. Install the **SST** to the timing belt pulley.
2. Remove the lock bolt.
3. Remove the timing belt pulley.

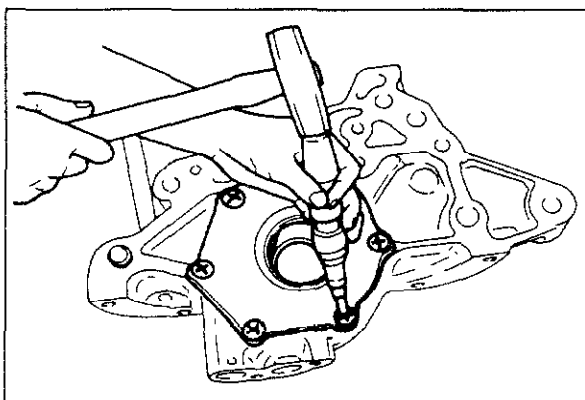
DISASSEMBLY AND ASSEMBLY

1. Disassemble the parts in the numbered sequence, shown in the figure.
2. Assemble in the reverse order of disassembly.



1. Bolt
2. Pump cover
3. Outer gear
4. Inner gear
5. Split pin
6. Plunger assembly
7. Oil seal
8. Pump body

83U02A-009



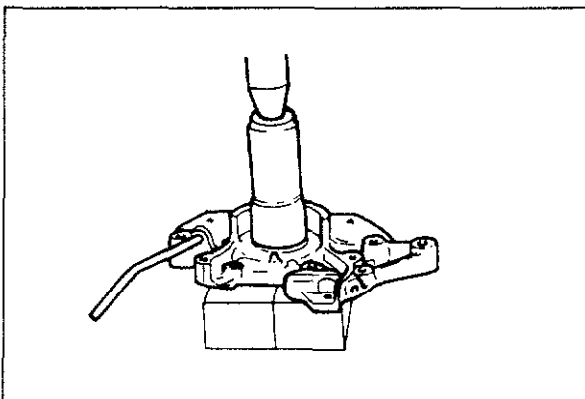
63U02X-016

Oil Pump Cover Removal

Loosen the screws by an impact driver so that the oil pump body is not damaged.

Installation

1. Coat locking agent on the screw threads.
2. Install the pump cover to the body.



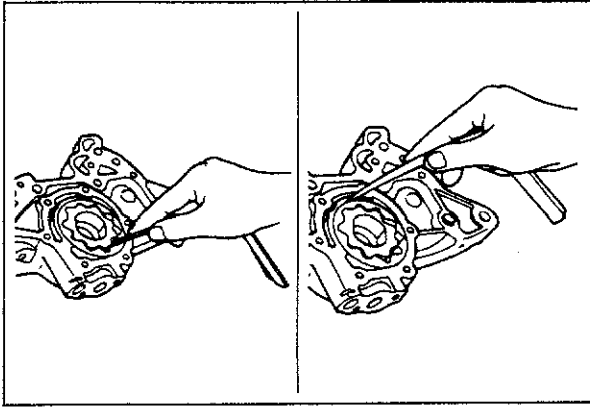
63U02X-017

Oil Seal Removal

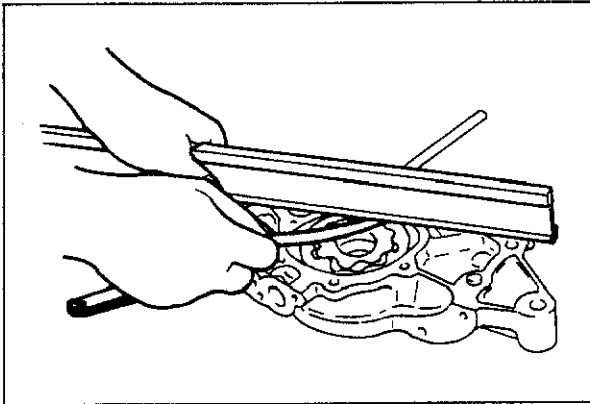
Remove the oil seal by using a screwdriver or similar tool to pry it out.

Installation

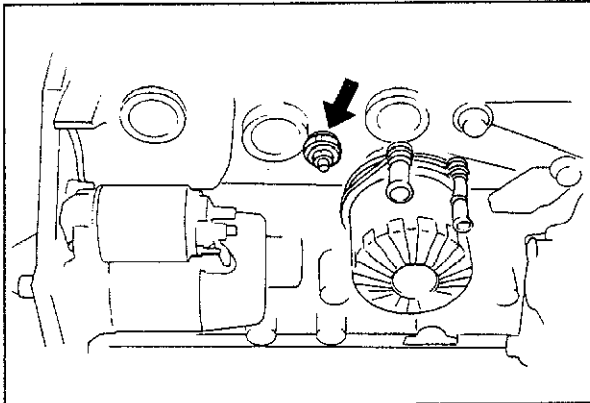
1. Apply engine oil to the pump body and the new oil seal.
2. Press the oil seal in until it is flush with the front of the pump body.



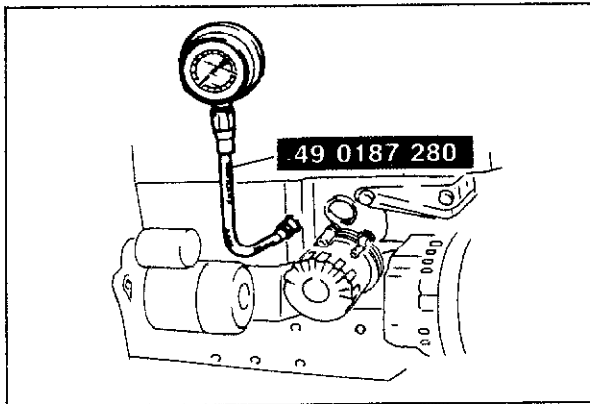
83U02A-011



63U02X-019



83U02A-012



63U02X-021P

INSPECTION

1. Inspect for distortion or damage to the pump body or cover.
2. Inspect for weak or damaged plunger.
3. Inspect for weak or broken plunger spring.
4. Measure the following clearances:

Inner gear tooth tip and outer gear clearance:
0.2 mm (0.0079 in) max.

Outer gear and pump body clearance:
0.22 mm (0.0087 in) max.

Side clearance
0.14 mm (0.0055 in) max.

5. Replace the gear assembly or oil pump body if the clearances are not within the limits.

OIL PRESSURE

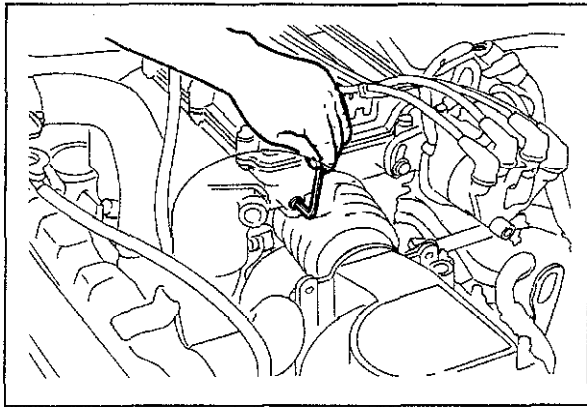
INSPECTION

1. Remove the oil pressure switch.
2. Connect the **SST** to the pressure switch installation hole in the cylinder block.

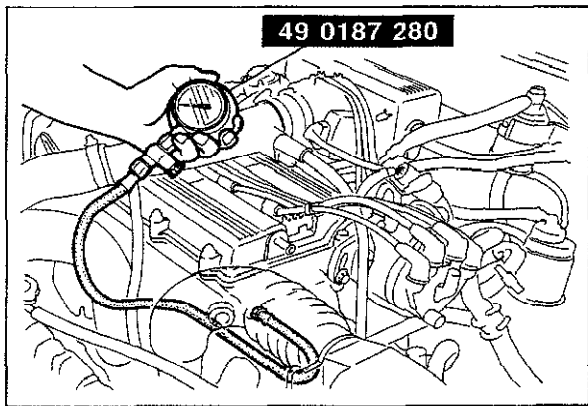
3. Start the engine and let it warm up.
4. Maintain engine rpm at 3,000, and note the gauge reading.

Standard oil pressure:
343—441kPa (3.5—4.5 kg/cm², 50—64psi)

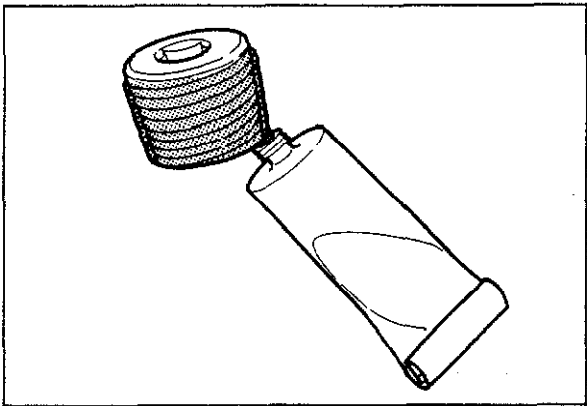
5. If the pressure is lower than specified, check and repair if necessary.
(Refer to Troubleshooting Guide.)



83U02B-014



63G02C-304



83U02B-015

INSPECTION OF CYLINDER HEAD OIL PRESSURE

1. Remove the blind plug on the cylinder head oil gallery using a hexagon wrench.
2. Connect the **SST** to the oil gallery.

3. Start the engine and let it warm up to normal operating temperature.
4. Maintain the engine speed at 3,000 rpm and note the gauge reading.

Standard oil pressure

98—196 kPa

(1.0—2.0 kg/cm², 14—28 psi) —3,000 rpm

5. If oil pressure is lower than specifications, check and repair as necessary.

6. After checking the oil pressure, apply sealant to the blind plug.

Caution

If reinstalling the blind plug, clean the threads to remove old sealant, apply new sealant and tighten to specification.

If old sealant cannot be removed, replace the blind plug.

Tightening torque

12—18 N·m

(1.2—1.8 m·kg, 108—154 in·lb)

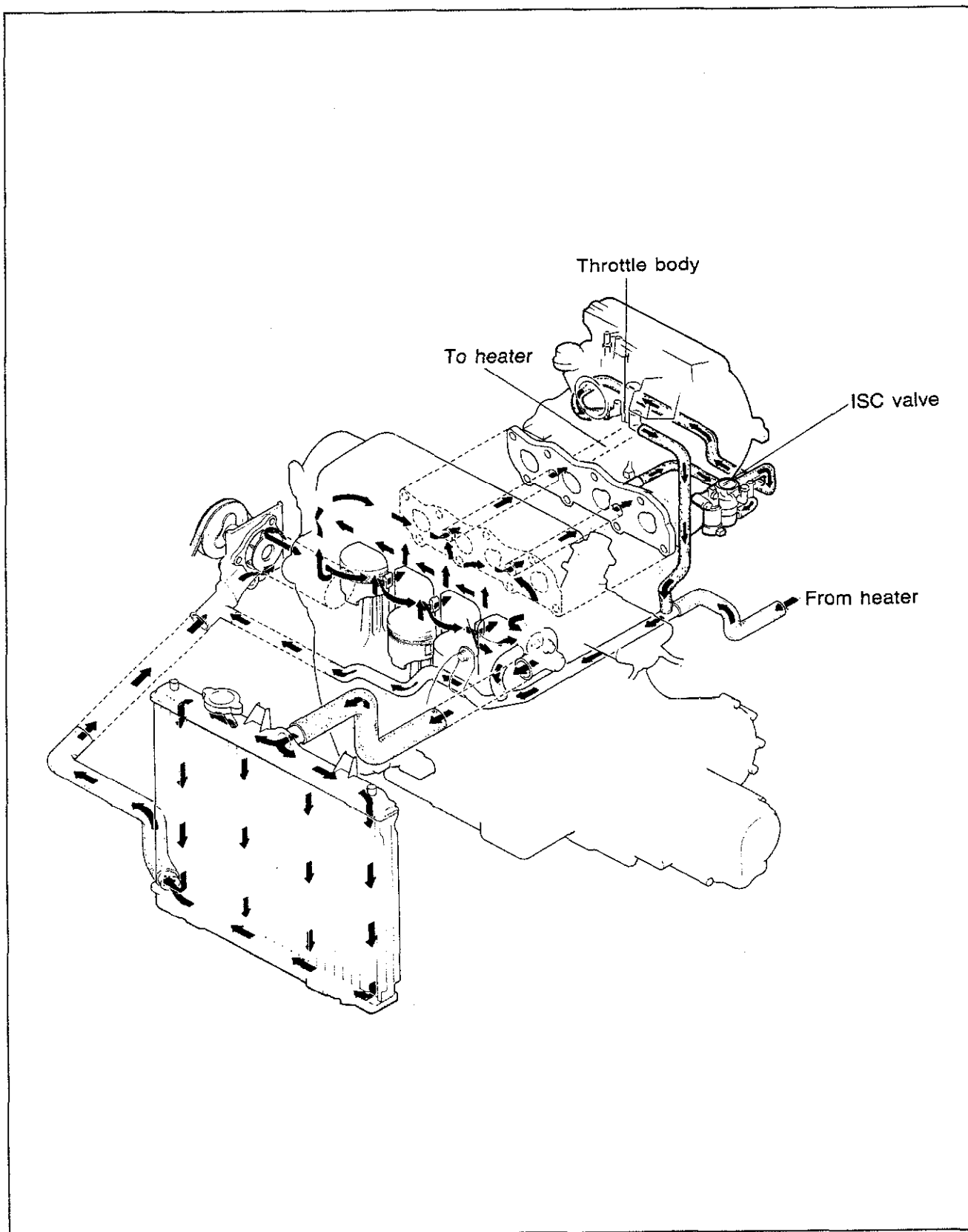
COOLING SYSTEM

(B6 EGI)

| | |
|------------------------------------|-------|
| OUTLINE | 3A— 2 |
| STRUCTURAL VIEW..... | 3A— 2 |
| SPECIFICATIONS..... | 3A— 3 |
| TROUBLESHOOTING GUIDE | 3A— 3 |
| COOLANT | 3A— 4 |
| INSPECTION..... | 3A— 4 |
| REPLACEMENT | 3A— 4 |
| RADIATOR CAP | 3A— 5 |
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OUTLINE

STRUCTURAL VIEW



63U03X-002

SPECIFICATIONS

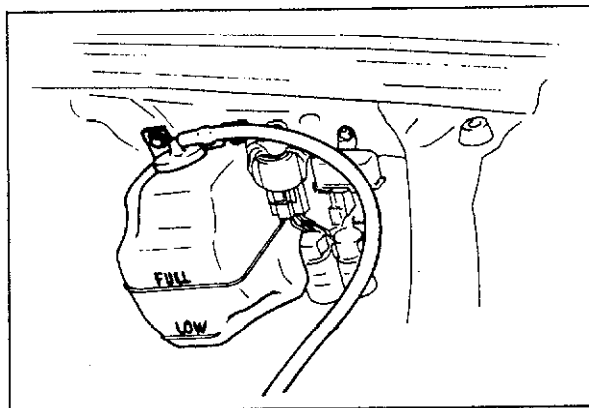
| | | | |
|------------------|--|----------------------------------|------------------------|
| Cooling system | | Water-cooled, forced circulation | |
| Coolant capacity | With heater liters (US qt, Imp qt.) | MTX 5.0 (5.3, 4.4) | ATX 6.0 (6.3, 5.3) |
| Thermostat | Type | 2 stage | |
| | Opening temperature °C (°F) | SUB. 85 (185) | MAIN. 88 (190) |
| | Full-open temperature °C (°F) | 100 (212) | |
| | Full-open lift mm (in) | SUB. 1.5 (0.06) or more | MAIN. 8 (0.31) or more |
| Water pump | Type | Centrifugal | |
| Radiator | Type | Corrugated fin type | |
| | Cap valve pressure kPa (kg/cm ² , psi) | 74—103 (0.75—1.05, 11—15) | |
| Cooling fan | Outer diameter mm (in) | MTX: 300 (11.8), ATX: 320 (12.6) | |
| | No. of blades | 4 | |

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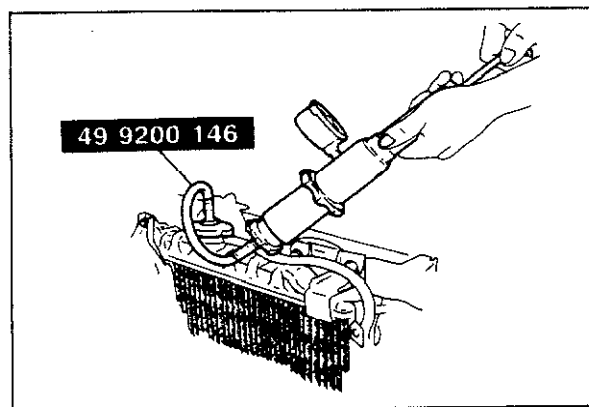
TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|------------------------|---|---------------------|-------|
| Coolant leakage | Damaged radiator core seam | Replace | 3A— 8 |
| | Leakage from radiator hose or heater hose | Repair or replace | 3A— 8 |
| | Leakage from water thermo switch | Repair or replace | 3A— 6 |
| | Malfunction of water pump seal | Replace | 3A— 9 |
| | Damaged or loose thermostat cover or gasket | Repair or replace | 3A— 7 |
| | Loose cylinder head bolt | Refer to Section 1A | — |
| | Damaged cylinder head gasket | Refer to Section 1A | — |
| | Cracked cylinder block | Refer to Section 1A | — |
| | Cracked cylinder head | Refer to Section 1A | — |
| Corrosion | Impurities in coolant | Clean and flush | 3A— 4 |
| Overheating | Water passage clogged | Clean | 3A— 8 |
| | Thermostat malfunction | Replace | 3A— 7 |
| | Radiator fins clogged | Clean | 3A— 8 |
| | Water pump malfunction | Repair or replace | 3A— 9 |
| | Insufficient coolant | Add | 3A— 4 |
| | Electric fan motor malfunction | Replace | 3A— 5 |
| | Electric fan relay malfunction | Replace | 3A— 6 |
| | Radiator cap malfunction | Replace | 3A— 5 |

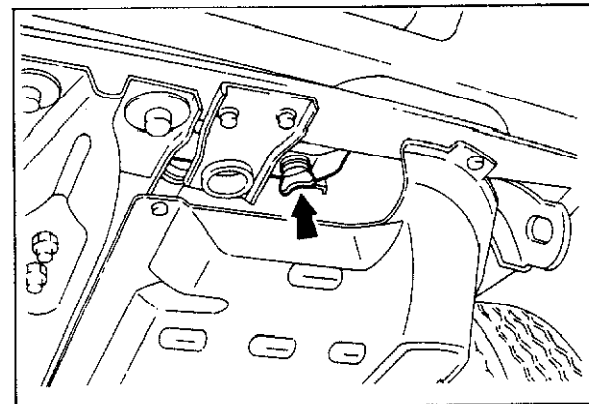
83U03A-003



63U03X-005



83U03X-014



63U03X-007

COOLANT

INSPECTION

Coolant level

While the coolant is cold, the coolant level should be near the radiator inlet port, and the level in the reserve tank should be between the FULL and LOW marks. Add coolant if the level is low.

Coolant leakage

1. Connect the tester with **SST** to the radiator inlet port.
2. Apply a pressure of **103 kPa (1.05 kg/cm², 15 psi)** to the tester.
3. Note if the tester indicator shows a reduction of pressure. If it does, there may be a coolant leak. Check for leaks.

Warning

When removing either the radiator cap or the tester with adapter, loosen it slowly until the pressure in the radiator is released, and then remove it.

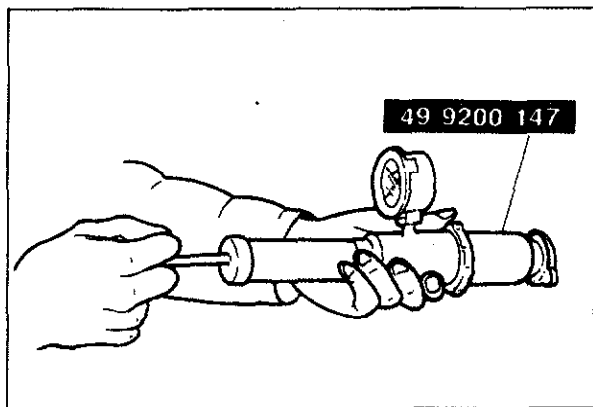
REPLACEMENT

1. Drain the coolant by opening the radiator drain plug.
2. Close the plug tightly.
3. After pouring anti-freeze into the radiator in accordance with the table below, add soft water.
4. Start engine, bleed the air from the coolant passages, and then add coolant as necessary.

Anti-freeze solution mixture percentage

| Protection | Mixture percentage (by volume) | |
|---------------------|--------------------------------|-------|
| | Anti-freeze solution | Water |
| Above -16°C (3°F) | 35 | 65 |
| Above -26°C (-15°F) | 45 | 55 |
| Above -40°C (-40°F) | 55 | 45 |

83U03A-004



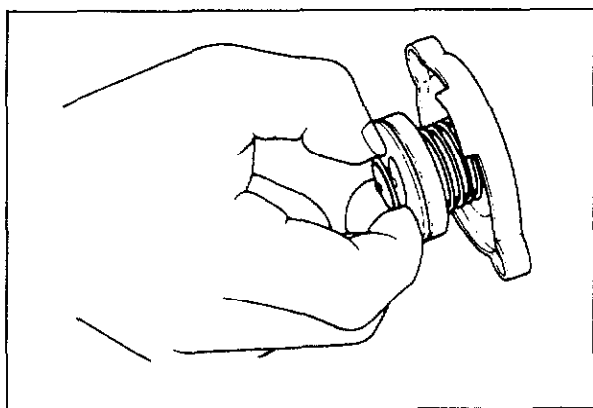
83U03X-015

RADIATOR CAP

INSPECTION

Radiator Cap Valve

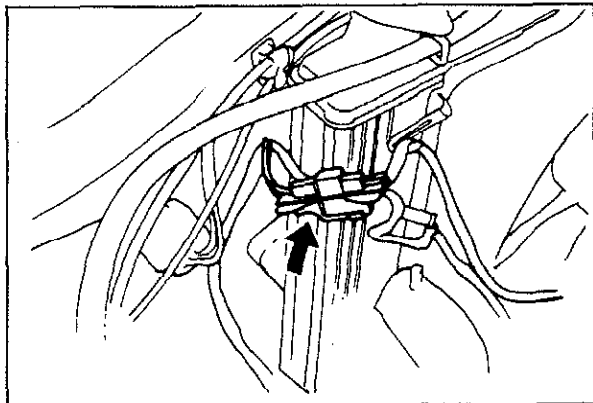
1. Remove foreign material (water residue, etc.) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap with **SST** to a tester. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm², 11—15 psi)**.
3. Wait about 10 seconds, and check whether the pressure has decreased.
The cap is normal if the pressure is maintained for about 10 seconds.



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Negative-Pressure Valve

1. Pull the negative-pressure valve to open it. Check that it closes completely when released.
2. Check for damage on the contact surfaces, cracked or deformed seal packing. Replace the radiator cap if necessary.

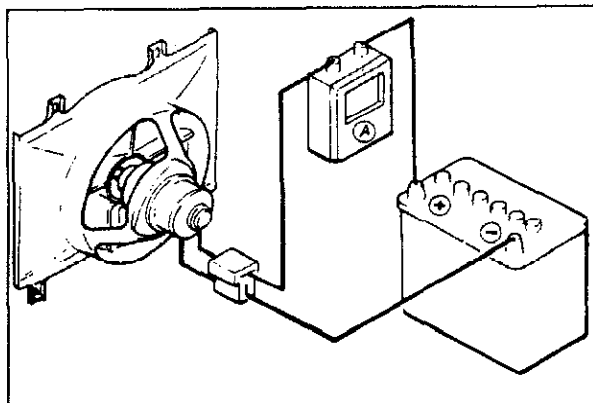


63U03X-010

ELECTRIC FAN MOTOR

INSPECTION

1. Disconnect the fan motor connectors.

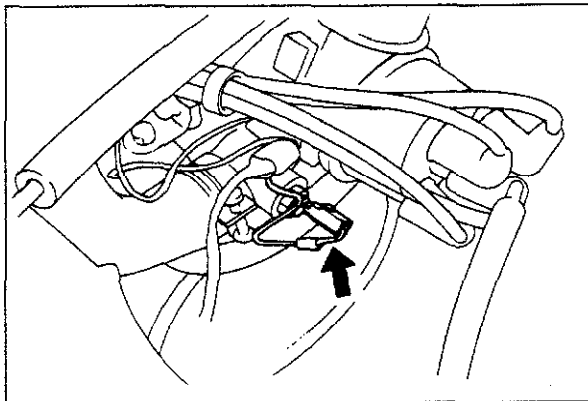


83U03A-006

2. Connect an ammeter and battery to the fan motor connectors.
3. Check to be sure that the fan motor operates smoothly at the standard current or less.

**Standard current: 5.6—7.6 Amperes (MTX)
10.0—11.0 Amperes (ATX)**

4. If the fan motor is faulty, replace it.



63U03X-012

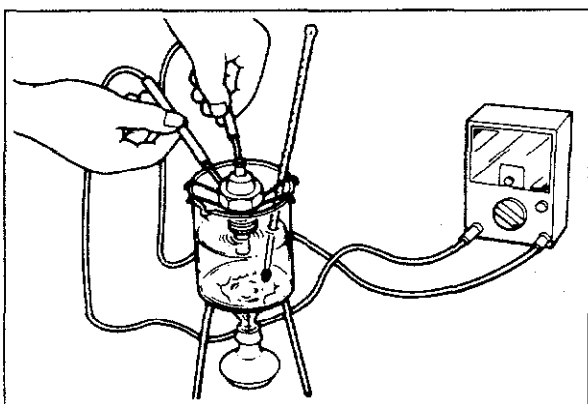
WATER THERMO SWITCH

INSPECTION

1. Remove the electric fan water thermo switch.

Caution

Do not disconnect the water thermo switch connector while the ignition switch is ON because the fan will turn.



83U03A-007

2. Place the water thermo switch in a container of water.
3. Connect a circuit tester to the water thermo switch.
4. Check that continuity is not indicated when the water temperature is **97°C (207°F)** or higher, and that continuity is indicated when the temperature is **90°C (194°F)** or less.
5. If the water thermo switch is faulty, replace it.

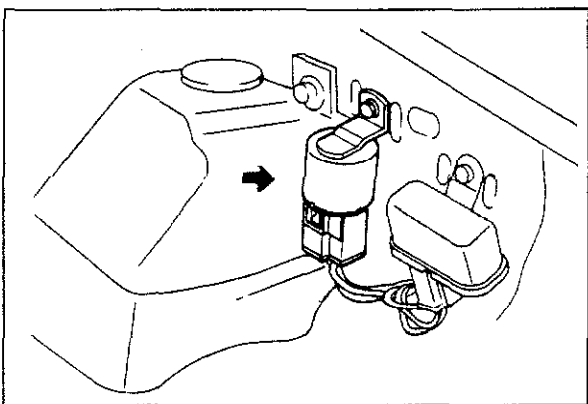
Notes

- a) Use a new O-ring when installing the water thermo-switch. Do not use seal tape on the threads of the thermo switch.
- b) Check for water leakage after installation.

ELECTRIC FAN RELAY

INSPECTION

1. Disconnect the water thermo switch connector, and then check whether the fan turns when the ignition switch is turned ON. If it does, the relay is functioning properly.
2. If the fan doesn't turn on, check for a malfunction of the fan relay, check the fuse and wiring harness, and check for poor contact or a loose coupler.



63U003X-014

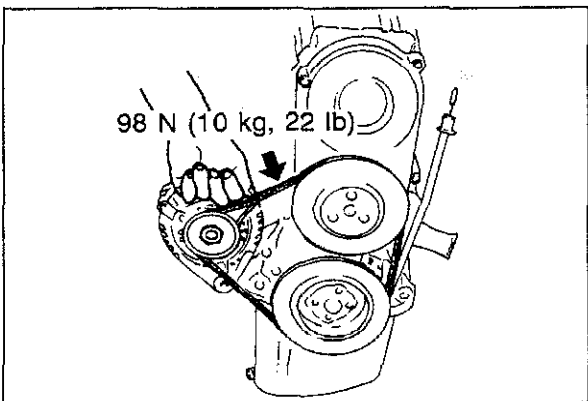
WATER PUMP DRIVE BELT

INSPECTION AND ADJUSTMENT

1. Check all surfaces of the V-belt. Replace it if it is cracked or damaged.
2. Check the amount of deflection (at point half-way between the water pump pulley and the alternator pulley) by applying a pressure of about **98N (10 kg, 22 lb)**.

Deflection

- New: 8—9 mm (0.31—0.35 in)**
Used: 9—10 mm (0.35—0.39 in)

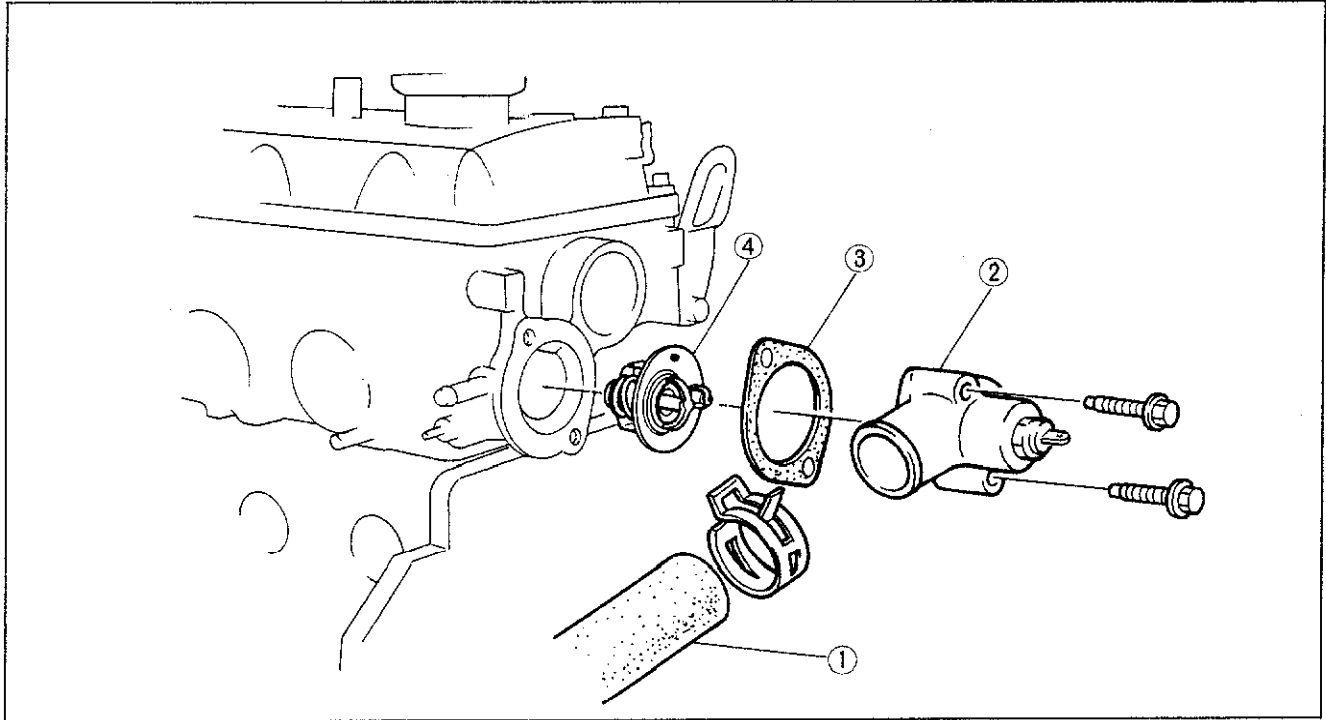


63U03X-015

THERMOSTAT**REMOVAL AND INSTALLATION**

1. Drain the coolant.
2. Remove the parts in the numbered sequence shown in the figure.
3. Install in the reverse order of removal.

83U03A-008



83U03A-009

1. Water hose
2. Thermostat cover
3. Gasket
4. 2 stage thermostat

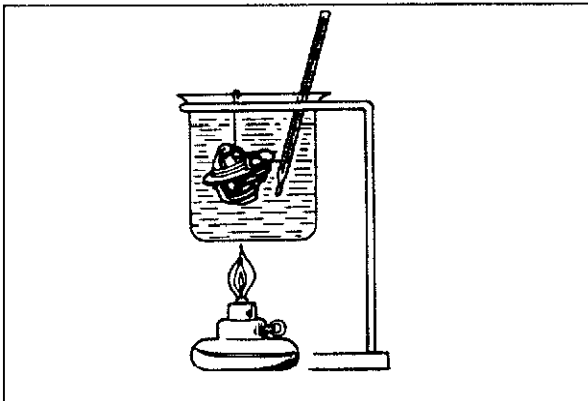
Note

- a) The jiggle pin should be on the upper side.
- b) Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.

INSPECTION

Check the operation. Replace if necessary.

1. Visually check the valve to be sure it is air tight.
2. Place the thermostat and a thermometer in water, gradually increase the water temperature, and then check the following:
 - (1) Valve opening temperature
 - Sub-valve **83.5—86.5°C (182—188°F)**
 - Main valve **86.5—89.5°C (188—193°F)**
 - (2) Full open lift
 - Sub-valve **1.5 mm (0.06 in)** or more at **100°C (212°F)**
 - Main valve **8 mm (0.31 in)** or more at **100°C (212°F)**
 - (3) Valve closing temperature
 - Sub-valve **80°C (176°F)**
 - Main valve **83°C (181°F)**



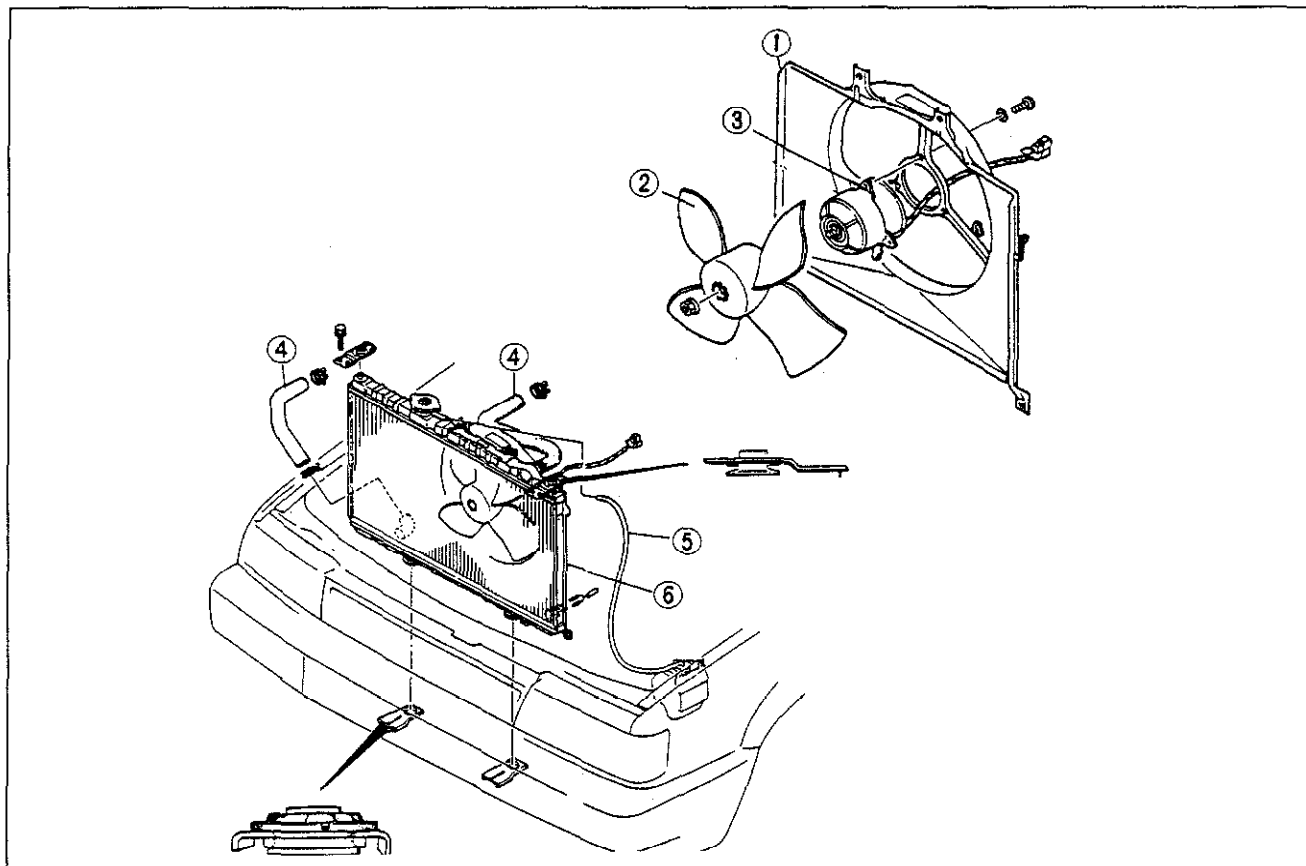
63U03X-017

RADIATOR

REMOVAL AND INSTALLATION

1. Drain the coolant.
2. Remove the parts in the numbered sequence shown in the figure.
3. Install in the reverse order of removal.

83U03A-010

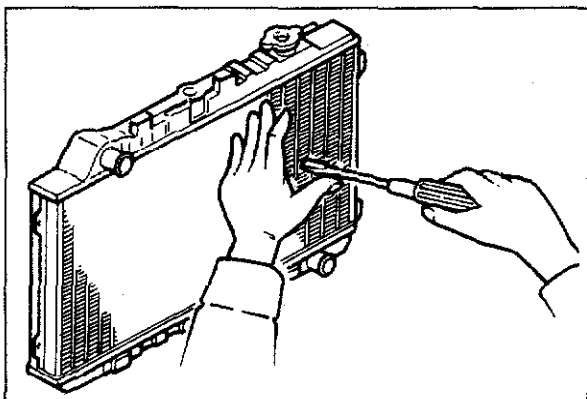


83U03A-011

- | | |
|----------------------|----------------------|
| 1. Radiator cowl | 4. Radiator hose |
| 2. Cooling fan | 5. Reserve tank hose |
| 3. Cooling fan motor | 6. Radiator |

Note

Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.



63U03X-019

INSPECTION

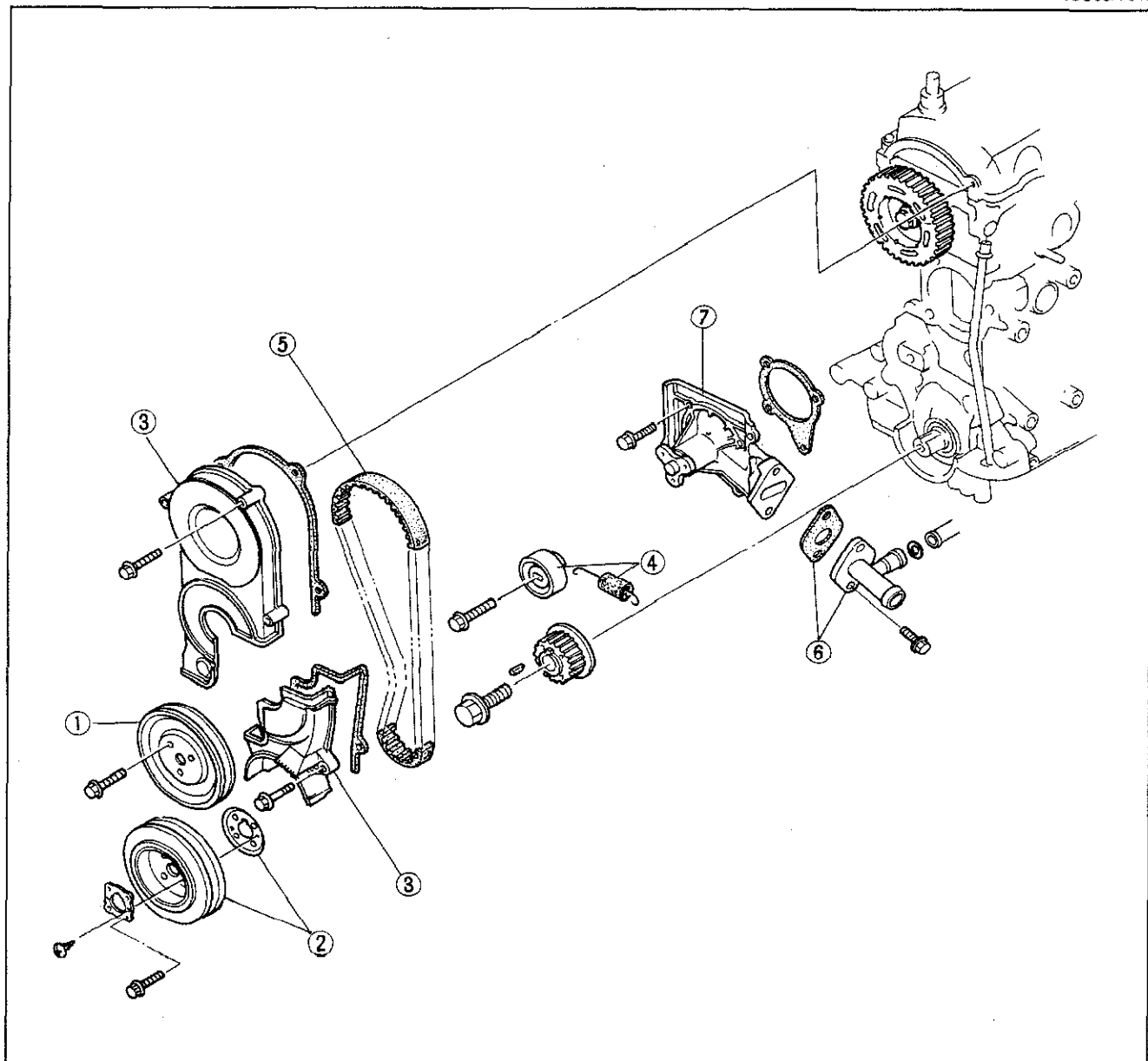
Check the following points; repair or replace if necessary:

1. Cracks, damage, or water leakage
2. Bent fins (repair by using a screwdriver)
3. Distorted or damaged radiator inlet.

WATER PUMP**REMOVAL AND INSTALLATION**

1. Turn the crankshaft so that the No. 1 cylinder is at top dead center of compression.
2. Drain the coolant.
3. Remove the parts in the numbered sequence shown in the figure.
4. Install in the reverse order of removal.

83U03A-012



83U03A-013

- | | |
|-------------------------------------|----------------------------------|
| 1. Water pump pulley | 5. Timing belt |
| 2. Crankshaft pulley | 6. Coolant inlet pipe and gasket |
| 3. Timing belt cover | 7. Water pump |
| 4. Timing belt tensioner and spring | |

Note

- a) Do not disassemble the water pump, if a problem is found replace it as a unit.
- b) Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.

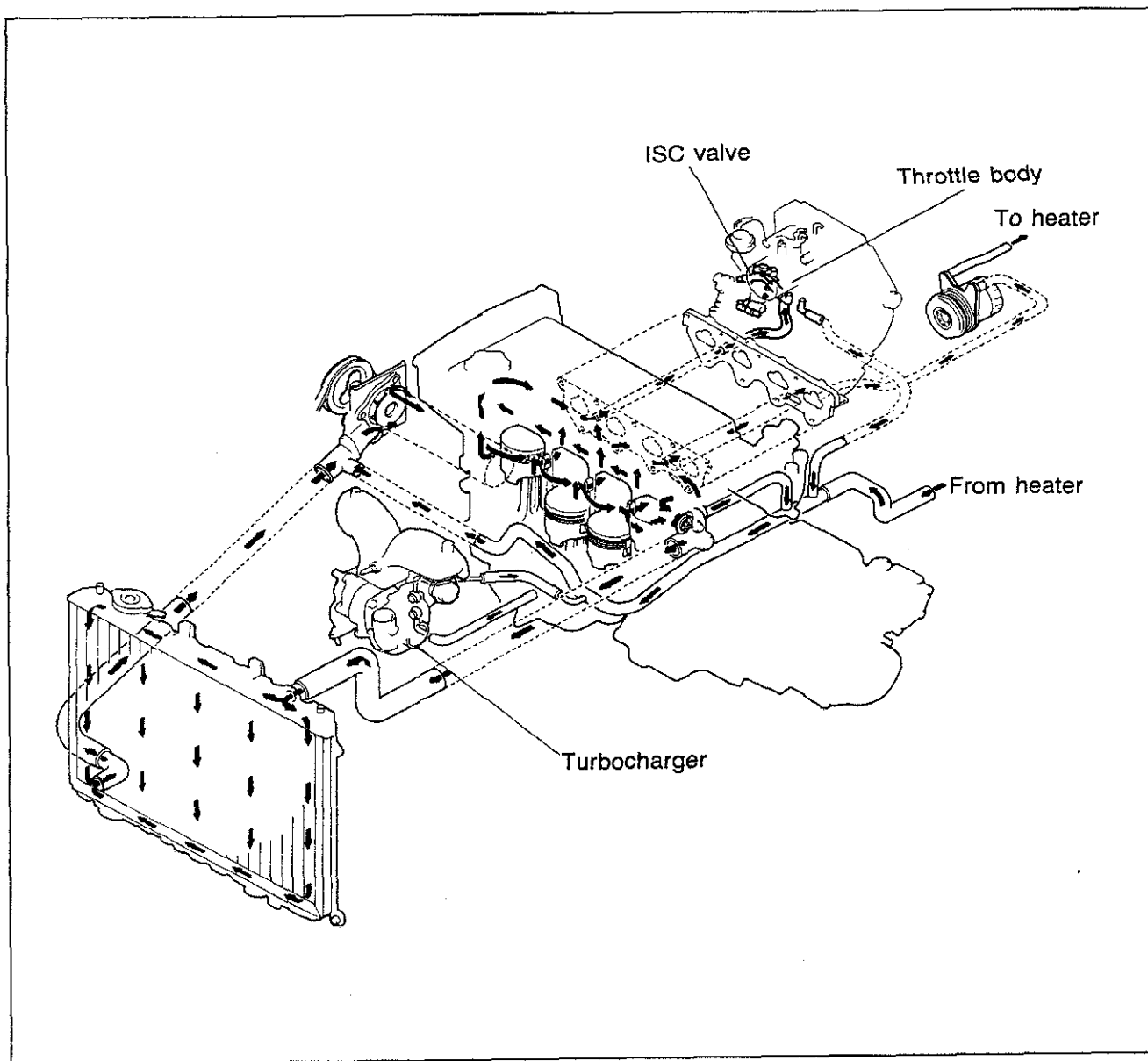
COOLING SYSTEM

(B6 DOHC)

| | |
|------------------------------------|-------|
| OUTLINE | 3B— 2 |
| STRUCTURAL VIEW..... | 3B— 2 |
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| COOLANT | 3B— 4 |
| INSPECTION..... | 3B— 4 |
| REPLACEMENT | 3B— 4 |
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| ELECTRIC FAN MOTOR | 3B— 5 |
| INSPECTION (FOR 2WD) | 3B— 5 |
| INSPECTION (FOR 4WD) | 3B— 6 |
| WATER THERMO SWITCH | 3B— 6 |
| INSPECTION..... | 3B— 6 |
| RADIATOR SWITCH | 3B— 7 |
| INSPECTION..... | 3B— 7 |
| ELECTRIC FAN RELAY | 3B— 7 |
| INSPECTION..... | 3B— 7 |
| WATER PUMP DRIVE BELT | 3B— 8 |
| INSPECTION AND ADJUSTMENT | 3B— 8 |
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| INSPECTION..... | 3B— 9 |
| RADIATOR | 3B—10 |
| REMOVAL AND INSTALLATION..... | 3B—10 |
| INSPECTION..... | 3B—10 |
| WATER PUMP | 3B—11 |
| REMOVAL AND INSTALLATION..... | 3B—11 |

OUTLINE

STRUCTURAL VIEW



83U03B-002

SPECIFICATIONS

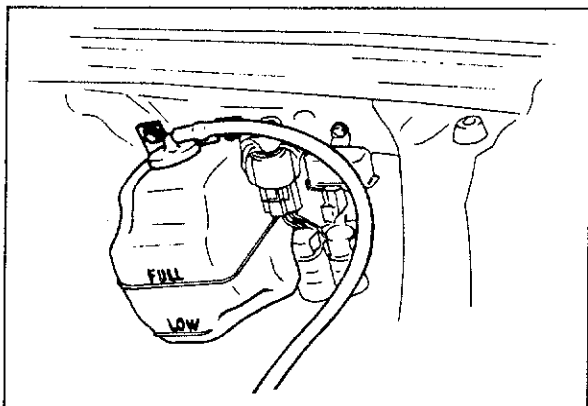
| | | | |
|------------------|--|----------------------------------|------------------------|
| Cooling system | | Water-cooled, forced circulation | |
| Coolant capacity | With heater liters (US qt, Imp qt.) | 6.0 (6.3, 5.3) | |
| Thermostat | Type | 2 stage | |
| | Opening temperature °C (°F) | SUB. 85 (185) | MAIN. 88 (190) |
| | Full-open temperature °C (°F) | 100 (212) | |
| | Full-open lift mm (in) | SUB. 1.5 (0.06) or more | MAIN. 8 (0.31) or more |
| Water pump | Type | Centrifugal | |
| Radiator | Type | Corrugated fin type | |
| | Cap valve pressure kPa (kg/cm ² , psi) | 74—103 (0.75—1.05, 11—15) | |
| Cooling fan | Outer diameter mm (in) | 320 (12.6) | |
| | No. of blades | 4 | |

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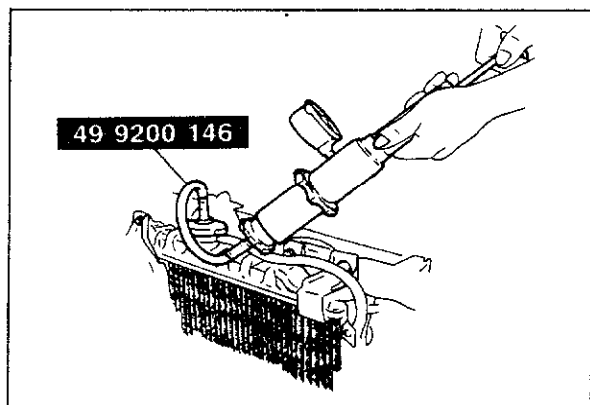
TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|------------------------|---|---------------------|---------|
| Coolant leakage | Damaged radiator core seam | Replace | 3B—10 |
| | Leakage from radiator hose or heater hose | Repair or replace | 3B—10 |
| | Leakage from water thermo switch or radiator switch | Repair or replace | 3B— 6,7 |
| | Malfunction of water pump seal | Replace | 3B—11 |
| | Damaged or loose thermostat cover or gasket | Repair or replace | 3B— 9 |
| | Loose cylinder head bolt | Refer to Section 1B | — |
| | Damaged cylinder head gasket | Refer to Section 1B | — |
| | Cracked cylinder block | Refer to Section 1B | — |
| | Cracked cylinder head | Refer to Section 1B | — |
| Corrosion | Impurities in coolant | Clean and flush | 3B— 4 |
| Overheating | Water passage clogged | Clean | 3B—10 |
| | Thermostat malfunction | Replace | 3B— 9 |
| | Radiator fins clogged | Clean | 3B—10 |
| | Water pump malfunction | Repair or replace | 3B—11 |
| | Insufficient coolant | Add | 3B— 4 |
| | Electric fan motor malfunction | Replace | 3B— 5 |
| | Electric fan relay malfunction | Replace | 3B— 7 |
| | Radiator cap malfunction | Replace | 3B— 5 |

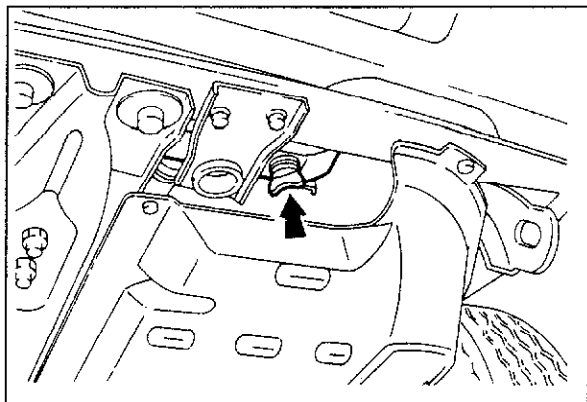
83U03B-004



63U03X-005



83U03A-014



63U03X-007

COOLANT

INSPECTION

Coolant level

While the coolant is cold, the coolant level should be near the radiator inlet port, and the level in the reserve tank should be between the FULL and LOW marks. Add coolant if the level is low.

Coolant leakage

1. Connect the tester with **SST** to the radiator inlet port.
2. Apply a pressure of **103 kPa (1.05 kg/cm², 15 psi)** to the tester.
3. Note if the tester indicator shows a reduction of pressure. If it does, there may be a coolant leak. Check for leaks.

Warning

When removing either the radiator cap or the tester with adapter, loosen it slowly until the pressure in the radiator is released, and then remove it.

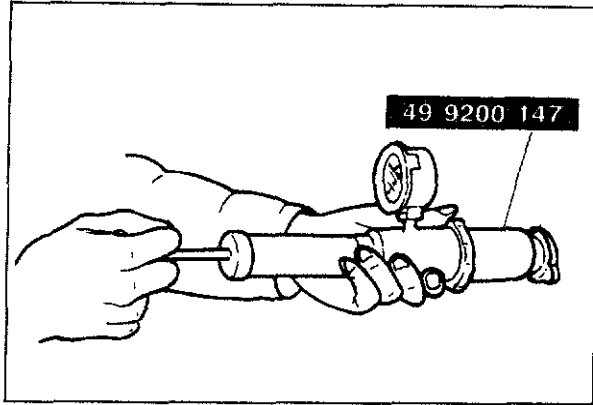
REPLACEMENT

1. Drain the coolant by opening the radiator drain plug.
2. Close the plug tightly.
3. After pouring anti-freeze into the radiator in accordance with the table below, add soft water.
4. Start engine, bleed the air from the coolant passages, and then add coolant as necessary.

Anti-freeze solution mixture percentage

| Protection | Mixture percentage (by volume) | |
|---------------------|--------------------------------|-------|
| | Anti-freeze solution | Water |
| Above -16°C (3°F) | 35 | 65 |
| Above -26°C (-15°F) | 45 | 55 |
| Above -40°C (-40°F) | 55 | 45 |

83U03A-004



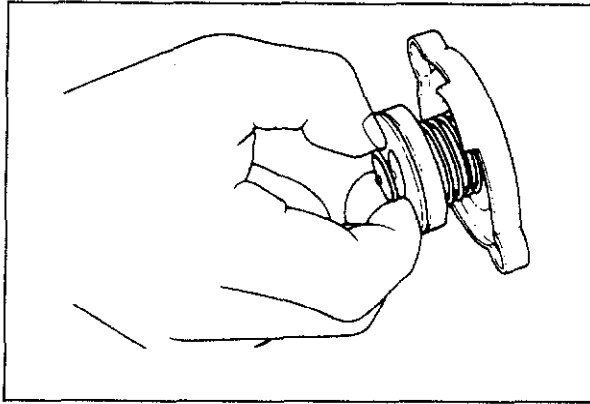
83U03A-015

RADIATOR CAP

INSPECTION

Radiator Cap Valve

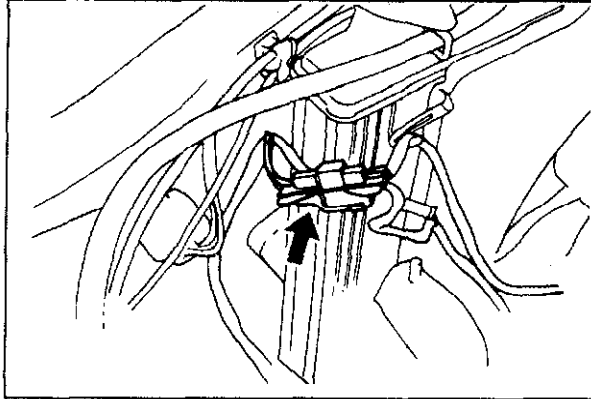
1. Remove foreign material (water residue, etc.) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap with **SST** to a tester. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm², 11—15 psi)**.
3. Wait about 10 seconds, and check whether the pressure has decreased.
The cap is normal if the pressure is maintained for about 10 seconds.



63U03X-009

Negative-Pressure Valve

1. Pull the negative-pressure valve to open it. Check that it closes completely when released.
2. Check for damage on the contact surfaces, cracked or deformed seal packing. Replace the radiator cap if necessary.

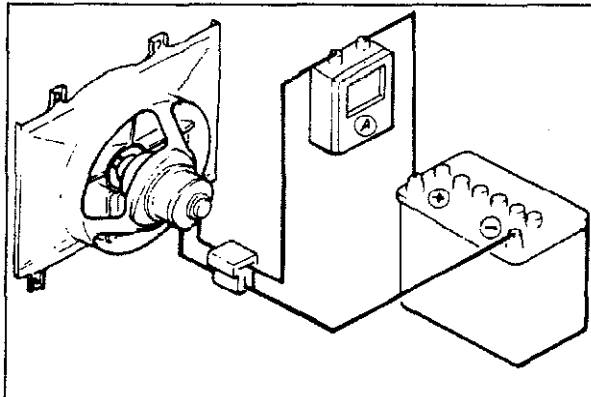


83U03B-005

ELECTRIC FAN MOTOR

INSPECTION (FOR 2WD)

1. Disconnect the fan motor connectors.
2. Confirm that the battery voltage is approx. 12V.

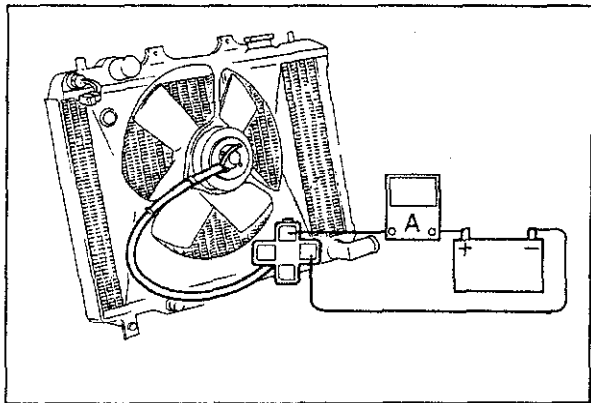


83U03B-006

3. Connect an ammeter and battery to the fan motor connectors.
4. Check that the fan motor operates smoothly at the standard current or less.

Standard current: 10.0—11.0 Amperes

5. If the fan motor is faulty, replace it.

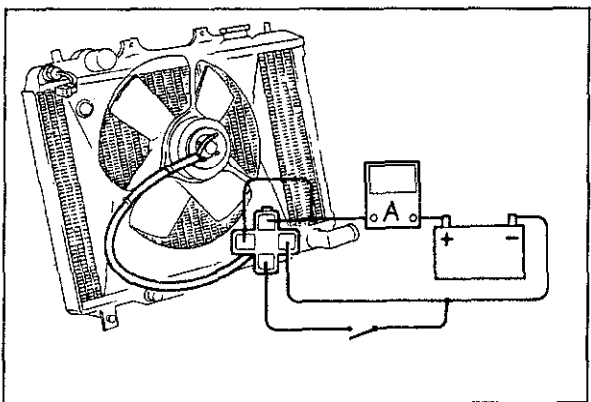


83U03B-007

INSPECTION (FOR 4WD)

1. Disconnect the fan motor connectors.
2. Confirm that the battery voltage is approx. 12V.
3. Connect an ammeter and battery to the fan motor connectors for low speed inspection.
4. Check that the fan motor operates smoothly at the standard current or less.

Standard current: 8.8—9.7 Amperes

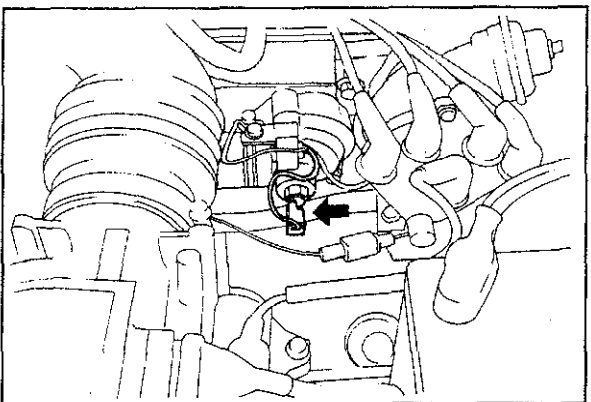


83U03B-008

5. Connect an ammeter, battery and switch to the fan motor connectors for high speed inspection.
6. Check that the fan motor operates smoothly at the standard current or less with the switch ON.

Standard current: 13.3—14.6 Amperes

7. If the fan motor is faulty, replace it.



83U03B-015

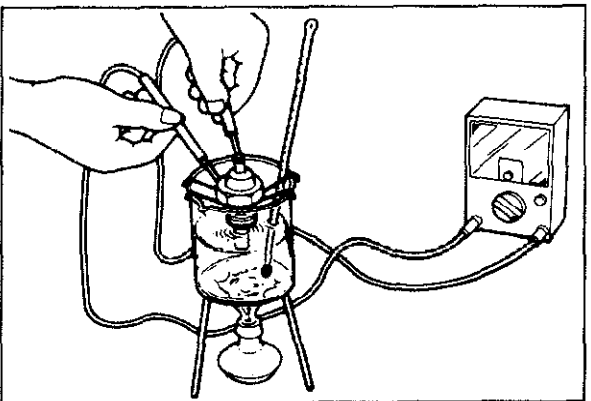
WATER THERMO SWITCH

INSPECTION

1. Remove the electric fan water thermo switch.

Warning

Do not disconnect the water thermo switch connector while the ignition switch is ON because the fan will turn.



83U03B-007

2. Place the water thermo switch in a container of water.
3. Connect a circuit tester to the water thermo switch.
4. Check that continuity is not indicated when the water temperature is **97°C (207°F)** or higher, and that continuity is indicated when the temperature is **90°C (194°F)** or less.
5. If the water thermo switch is faulty, replace it.

Note

- a) Use a new O-ring when installing the water thermo-switch. Do not use seal tape on the threads of the thermo switch.
- b) Check for water leakage after installation.

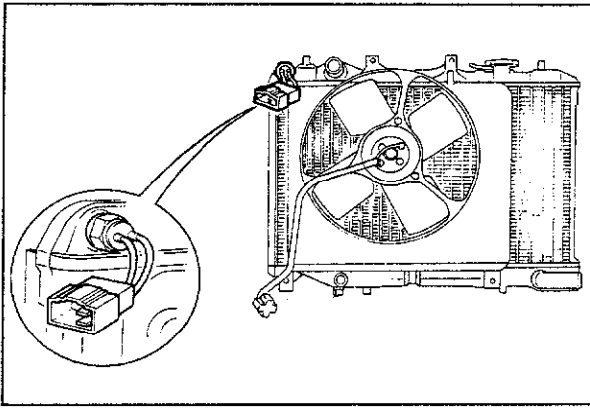
RADIATOR SWITCH (FOR 4WD)

INSPECTION

1. Remove the radiator switch.

Warning

Do not disconnect the radiator switch connector while the ignition switch is ON because the fan will turn.

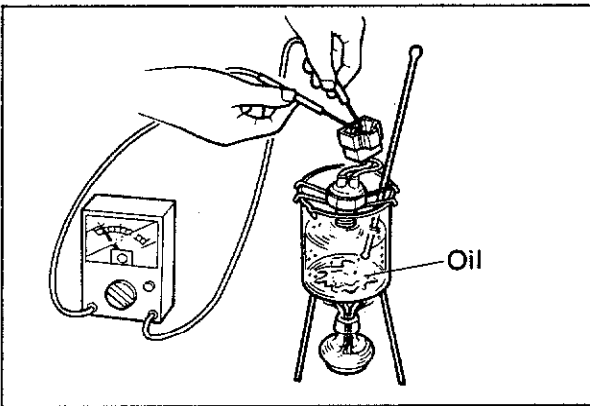


83U03B-009

2. Place the radiator switch in a container of engine oil.
3. Connect a circuit tester to the radiator.
4. Check that continuity is not indicated when the oil temperature is **105°C (221°F)**, and that continuity is indicated when the temperature is **96°C (205°F)**.

Warning

Do not heat the engine oil above 120°C (248°F).



83U03B-010

5. If the radiator switch is faulty, replace it.

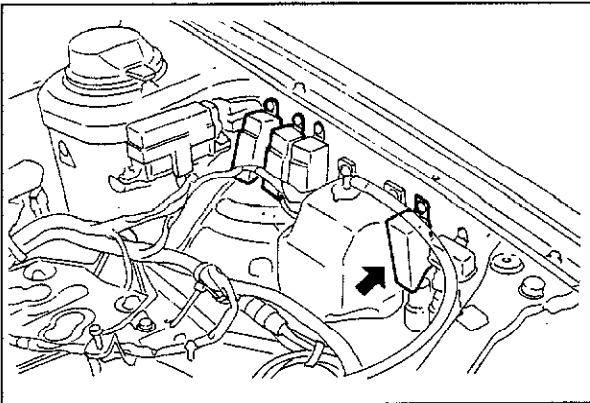
Note

Clean the engine oil on the switch when the switch is reused.

ELECTRIC FAN RELAY

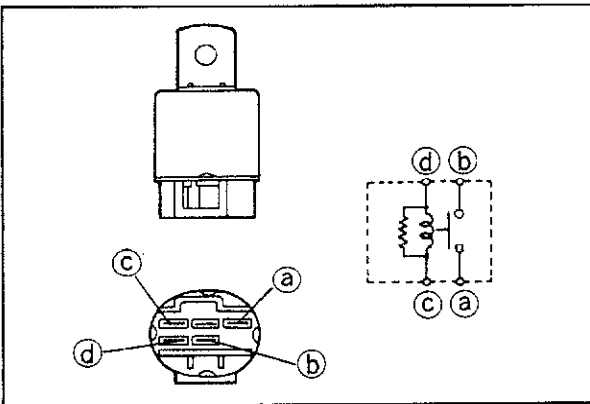
INSPECTION

1. Disconnect the water thermo switch connector, and then check whether the fan turns when the ignition switch is turned ON. If it does, the relay is functioning properly.



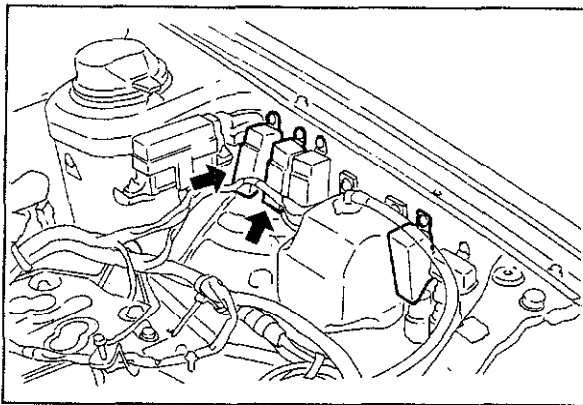
83U03B-011

2. If the fan doesn't turn on, check the continuity of the fan relay.
 - (1) Check for continuity between (a) and (b) terminals, (c) and (d) terminals.
 - (2) Check that there is no continuity between (a) and (b) terminals when 12V battery is applied across (c) and (d) terminals.
3. If the relay is faulty replace, if not, check the fuse and wiring harness, and for poor contact or a loose coupler.



83U03B-012

3B ELECTRIC FAN RELAY, WATER PUMP DRIVE BELT

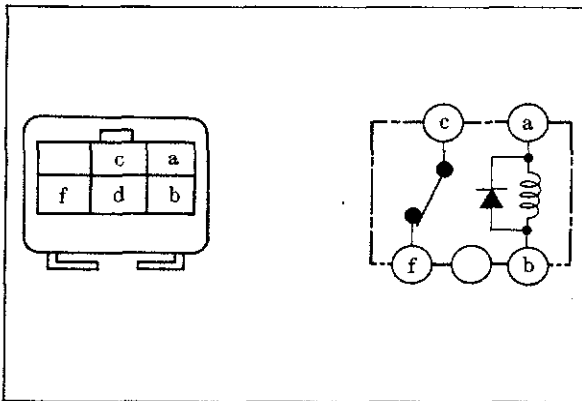


83U03B-013

(For 4WD)

After inspection of electric fan relay, inspect the No. 1 and No. 2 relay for high speed operation.

1. Disconnect the radiator switch connector, and check for fan rotation with the ignition switch ON. If the fan rotates, the relay is functioning properly.



83U03B-014

2. If the fan does not turn on, check the continuity of the No. 1 and No. 2 relay.

(1) Check for continuity between (a) and (b) terminals, (c) and (f) terminals.

(2) Check that there is no continuity between (c) and (f) terminals when 12V battery is applied across (a) and (b) terminals.

3. If the relay is faulty replace, if not, check the fuse and wiring harness, and for poor contact or a loose coupler.

Note

No. 1 and No. 2 relay are same.

WATER PUMP DRIVE BELT

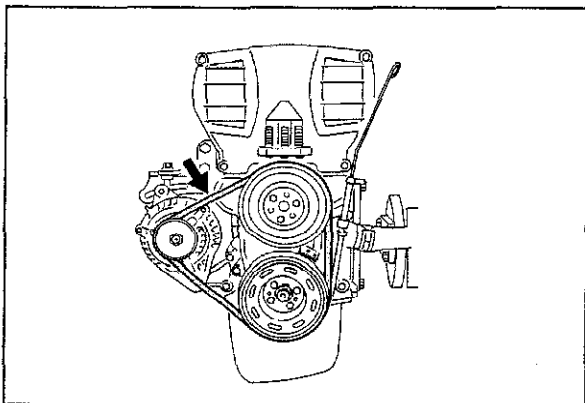
INSPECTION AND ADJUSTMENT

1. Check all surfaces of the V-belt. Replace it if it is cracked or damaged.
2. Check the amount of deflection (at point half-way between the water pump pulley and the alternator pulley) by applying a pressure of about **98N (10 kg, 22 lb)**.

Deflection

New: 8—9 mm (0.31—0.35 in)

Used: 9—10 mm (0.35—0.39 in)

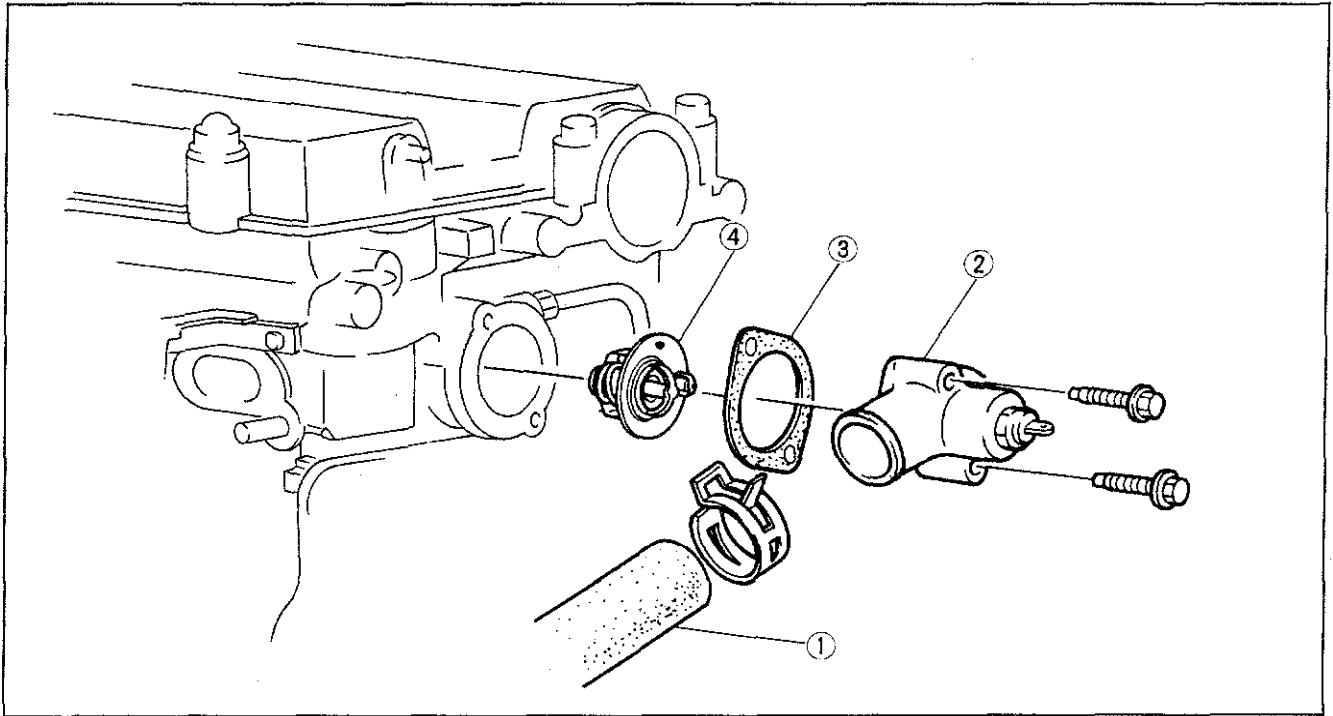


63U03X-015

THERMOSTAT**REMOVAL AND INSTALLATION**

1. Drain the coolant.
2. Remove the parts in the numbered sequence shown in the figure.
3. Install in the reverse order of removal.

83U03A-008



83U03A-009

1. Water hose
2. Thermostat cover
3. Gasket
4. 2 stage thermostat

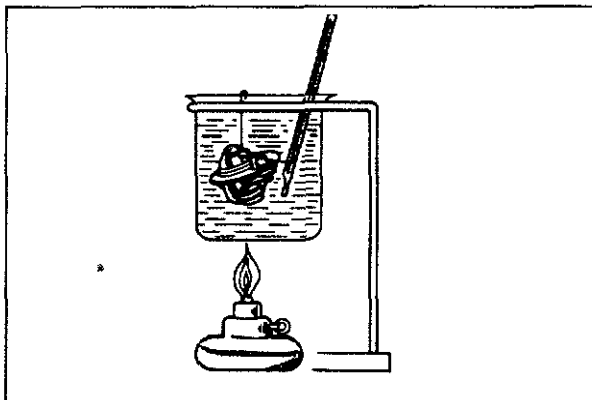
Note

- a) The jiggle pin should be on the upper side.
- b) Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.

INSPECTION

Check the operation. Replace if necessary.

1. Visually check the valve to be sure it is air tight.
2. Place the thermostat and a thermometer in water, gradually increase the water temperature, and then check the following:
 - (1) Valve opening temperature
 - Sub-valve **83.5—86.5°C (182—188°F)**
 - Main valve **86.5—89.5°C (188—193°F)**
 - (2) Full open lift
 - Sub-valve **1.5 mm (0.06 in)** or more at **100°C (212°F)**
 - Main valve **8 mm (0.31 in)** or more at **100°C (212°F)**
 - (3) Valve closing temperature
 - Sub-valve **80°C (176°F)**
 - Main valve **83°C (181°F)**



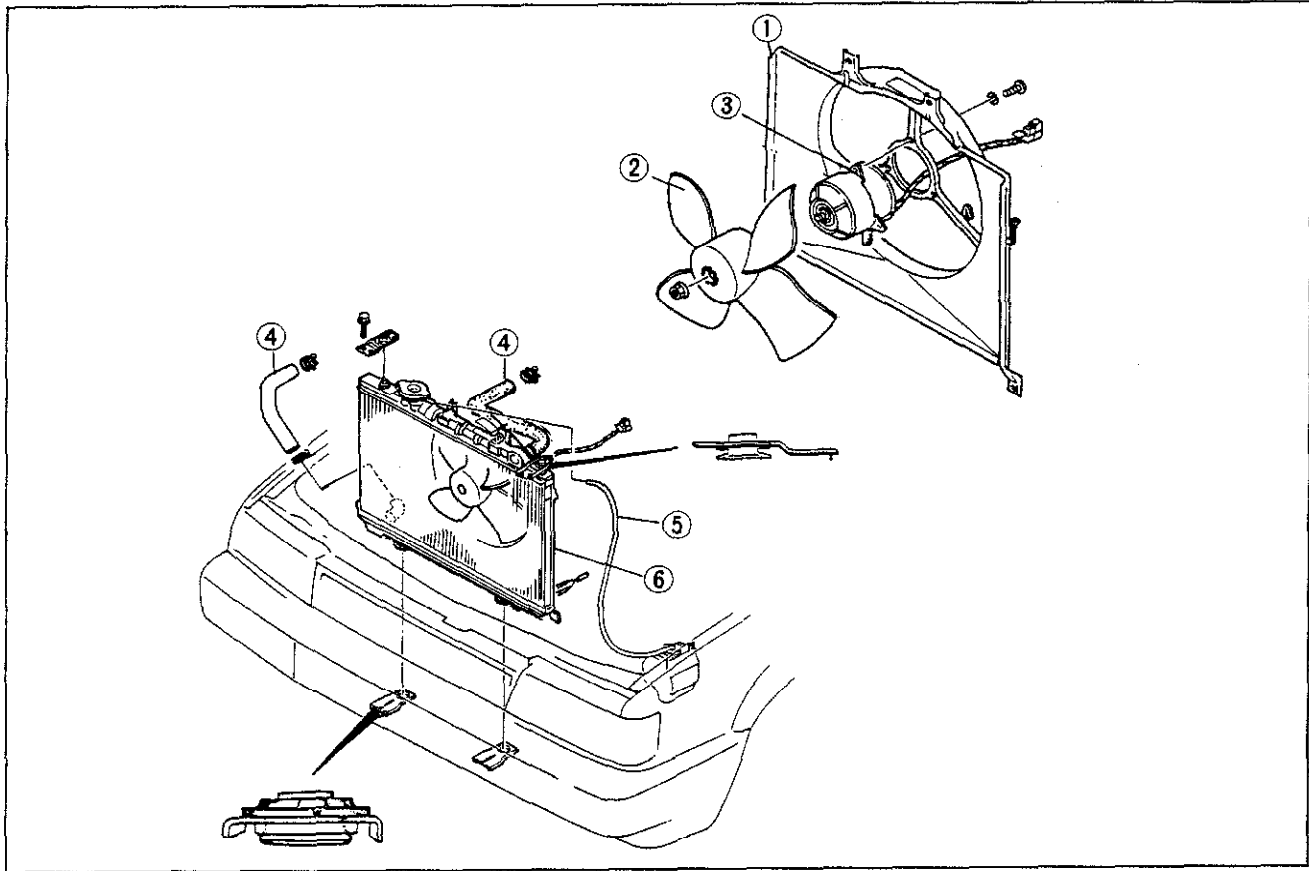
63U03X-017

RADIATOR

REMOVAL AND INSTALLATION

1. Drain the coolant.
2. Remove the parts in the numbered sequence shown in the figure.
3. Install in the reverse order of removal.

83U03A-010

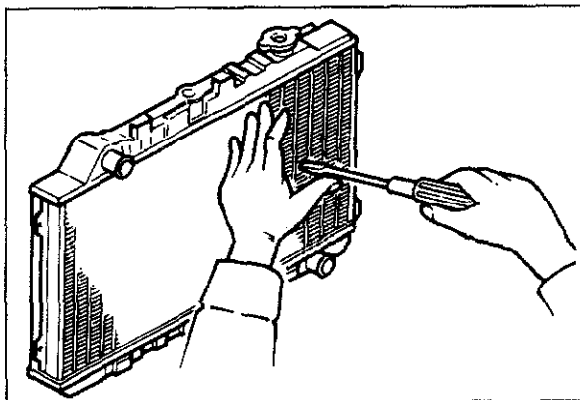


83U03A-011

- | | |
|----------------------|----------------------|
| 1. Radiator cowl | 4. Radiator hose |
| 2. Cooling fan | 5. Reserve tank hose |
| 3. Cooling fan motor | 6. Radiator |

Note

Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.



63U03X-019

INSPECTION

Check the following points; repair or replace if necessary:

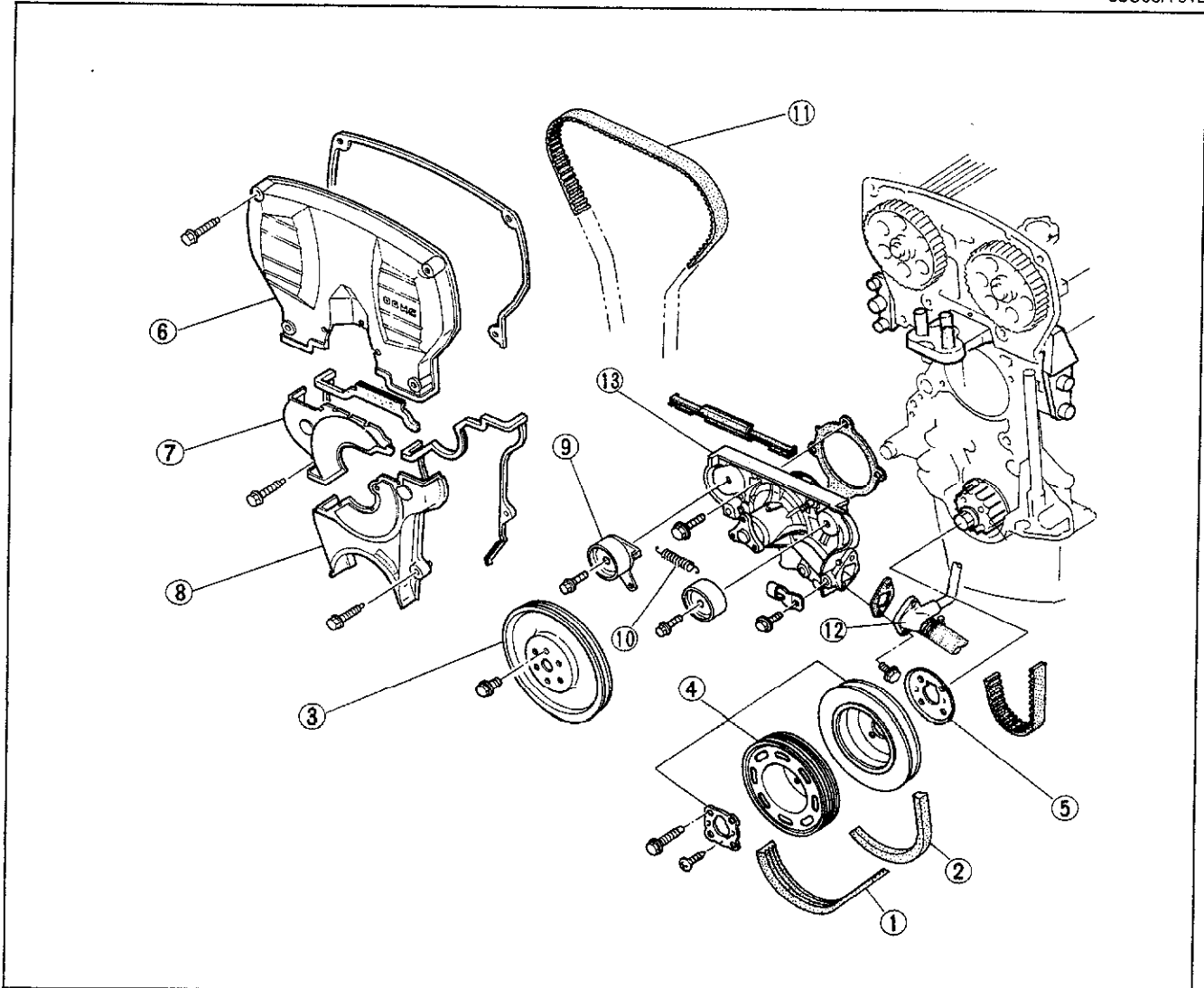
1. Cracks, damage, or water leakage
2. Bent fins (repair by using a screwdriver)
3. Distorted or damaged radiator inlet.

WATER PUMP

REMOVAL AND INSTALLATION

1. Turn the crankshaft so that the No. 1 cylinder is at top dead center of compression.
2. Drain the engine coolant.
3. Remove the parts in the numbered sequence shown in the figure.
4. Install in the reverse order of removal.

83U03A-012



83U03B-015

- | | |
|-------------------------------------|-------------------------------|
| 1. Drive belt (with P/S and or A/C) | 7. Timing belt cover (middle) |
| 2. Drive belt | 8. Timing belt cover (lower) |
| 3. Water pump pulley | 9. Timing belt tensioner |
| 4. Crankshaft pulley | 10. Tensioner spring |
| 5. Baffle plate | 11. Timing belt |
| 6. Timing belt cover (upper) | 12. Coolant inlet pipe |
| | 13. Water pump assembly |

Note

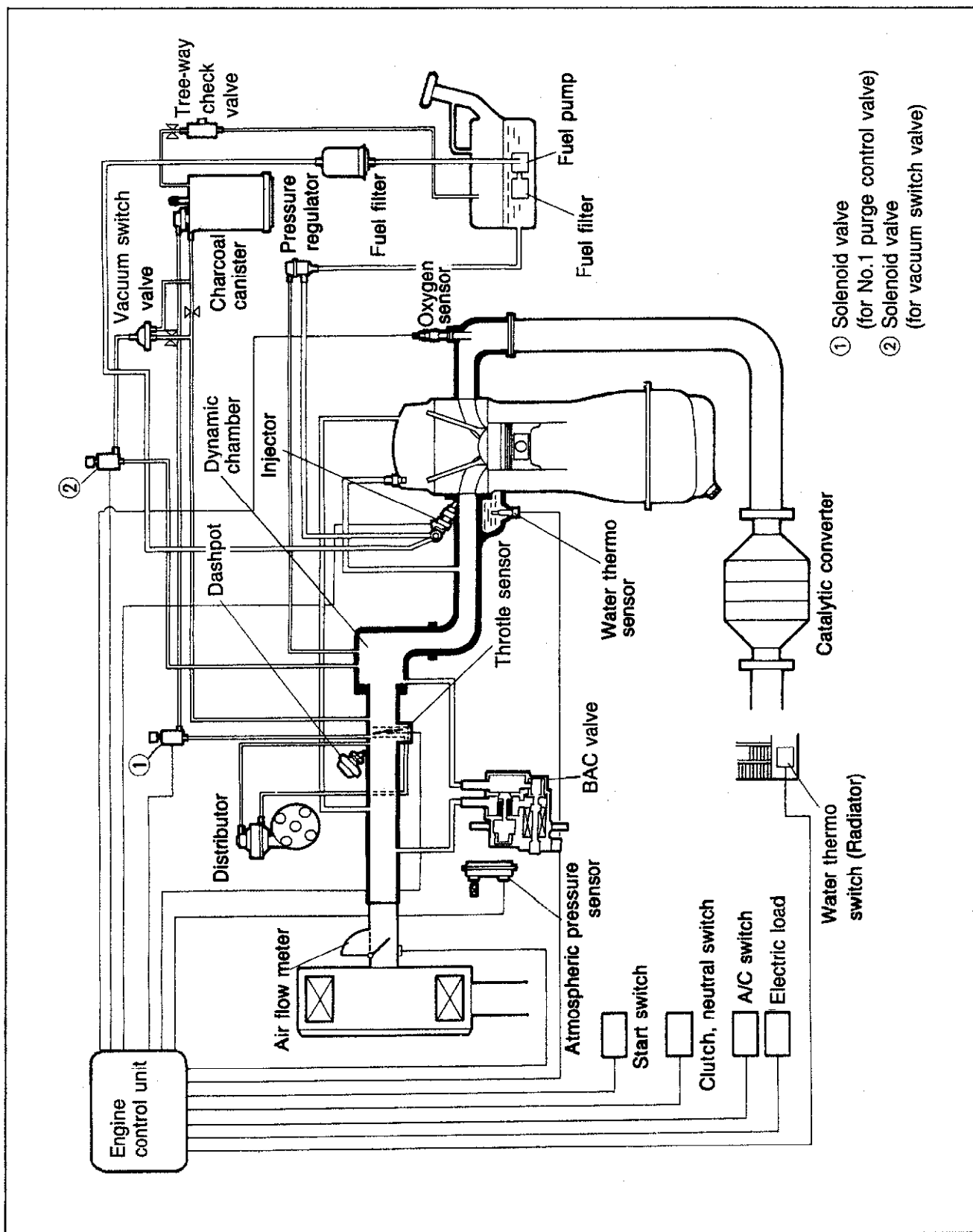
- a) Do not disassemble the water pump, if a problem is found replace it as a unit.
- b) Position the hose clamp in the original location on the hose and squeeze it lightly with large pliers to ensure a good fit.

FUEL AND EMISSION CONTROL SYSTEMS (NON-TURBO)

| | | | |
|--------------------------------------|-------|---|-------|
| OUTLINE | 4A— 2 | DECELERATION CONTROL | |
| SYSTEM DIAGRAM | 4A— 2 | SYSTEM | 4A—47 |
| EMISSION COMPONENT LOCATION | 4A— 3 | HIGH ALTITUDE COMPENSATION | |
| VACUUM HOSE ROUTING | | SYSTEM | 4A—50 |
| DIAGRAM | 4A— 4 | EVAPORATIVE EMISSION | |
| COMPONENT DESCRIPTIONS | 4A— 5 | CONTROL SYSTEM | 4A—52 |
| SPECIFICATIONS | 4A— 7 | SYSTEM INSPECTION | 4A—53 |
| TROUBLESHOOTING GUIDE | 4A— 8 | NO.1 PURGE CONTROL VALVE ... | 4A—54 |
| RELATIONSHIP CHART | 4A— 8 | NO.2 PURGE CONTROL VALVE ... | 4A—54 |
| TROUBLESHOOTING CHART | 4A—10 | THREE-WAY SOLENOID VALVE.... | 4A—54 |
| TROUBLESHOOTING WITH SST | 4A—12 | VACUUM SWITCH VALVE | 4A—55 |
| SELF-DIAGNOSIS CHECKER | | THREE-WAY CHECK VALVE | 4A—55 |
| (49 H018 9A1) | 4A—12 | POSITIVE CRANKCASE VENTILATION | |
| INSPECTION PROCEDURE | 4A—13 | (PCV) SYSTEM | 4A—56 |
| MONITOR SWITCH FUNCTION | 4A—20 | CONTROL SYSTEM | 4A—57 |
| INSPECTION PROCEDURE | 4A—21 | MAIN FUSE | 4A—58 |
| IDLE ADJUSTMENT | 4A—24 | MAIN RELAY | 4A—58 |
| INTAKE AIR SYSTEM | 4A—25 | CIRCUIT OPENING RELAY | 4A—58 |
| REMOVAL AND INSTALLATION | 4A—26 | ENGINE CONTROL UNIT | 4A—60 |
| PARTS INSPECTION | 4A—28 | NEUTRAL SWITCH (MTX) | 4A—63 |
| IDLE SPEED CONTROL (ISC) | | CLUTCH SWITCH (MTX) | 4A—63 |
| SYSTEM | 4A—29 | INHIBITOR SWITCH | 4A—63 |
| OUTLINE | 4A—29 | BRAKE SWITCH | 4A—63 |
| TROUBLESHOOTING CHART | 4A—30 | E/L CONTROL UNIT | 4A—64 |
| FUEL SYSTEM | 4A—33 | AIR FLOW METER | 4A—65 |
| FUEL PRESSURE RELEASE AND | | THROTTLE SENSOR | 4A—66 |
| SERVICING FUEL SYSTEM | 4A—34 | INTAKE AIR THERMO SENSOR | 4A—68 |
| MULTI-PRESSURE TESTER | | WATER THERMO SENSOR | 4A—68 |
| (49 9200 750A) | 4A—35 | WATER THERMO SWITCH | 4A—70 |
| TROUBLESHOOTING CHART | 4A—37 | OXYGEN SENSOR (O ₂ SENSOR) ... | 4A—69 |
| FUEL PRESSURE | 4A—38 | ATMOSPHERIC PRESSURE | |
| INSPECTION | 4A—40 | SENSOR | 4A—70 |
| REPLACEMENT | 4A—44 | EXHAUST SYSTEM | 4A—71 |
| FUEL TANK | 4A—46 | | |

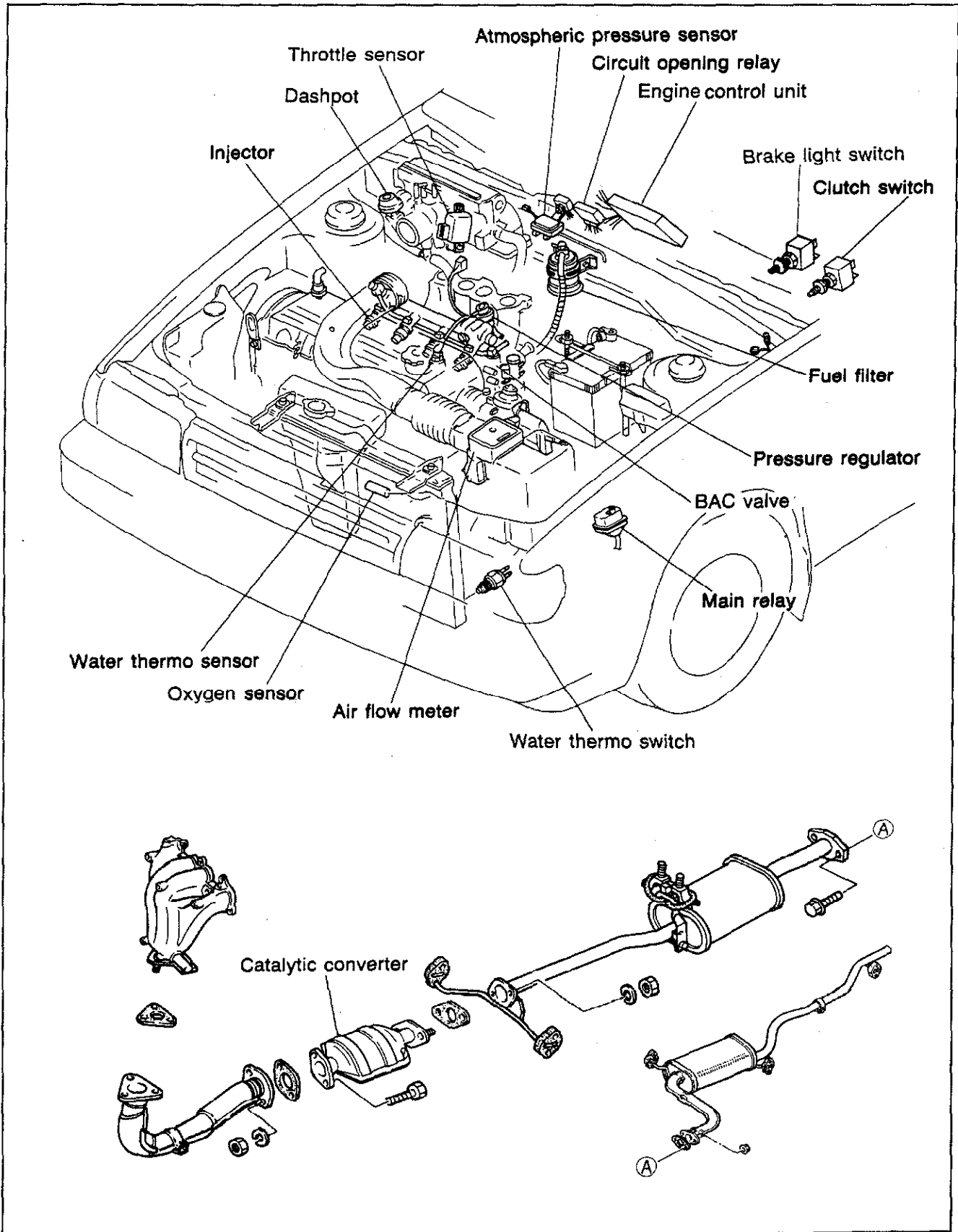
OUTLINE

SYSTEM DIAGRAM



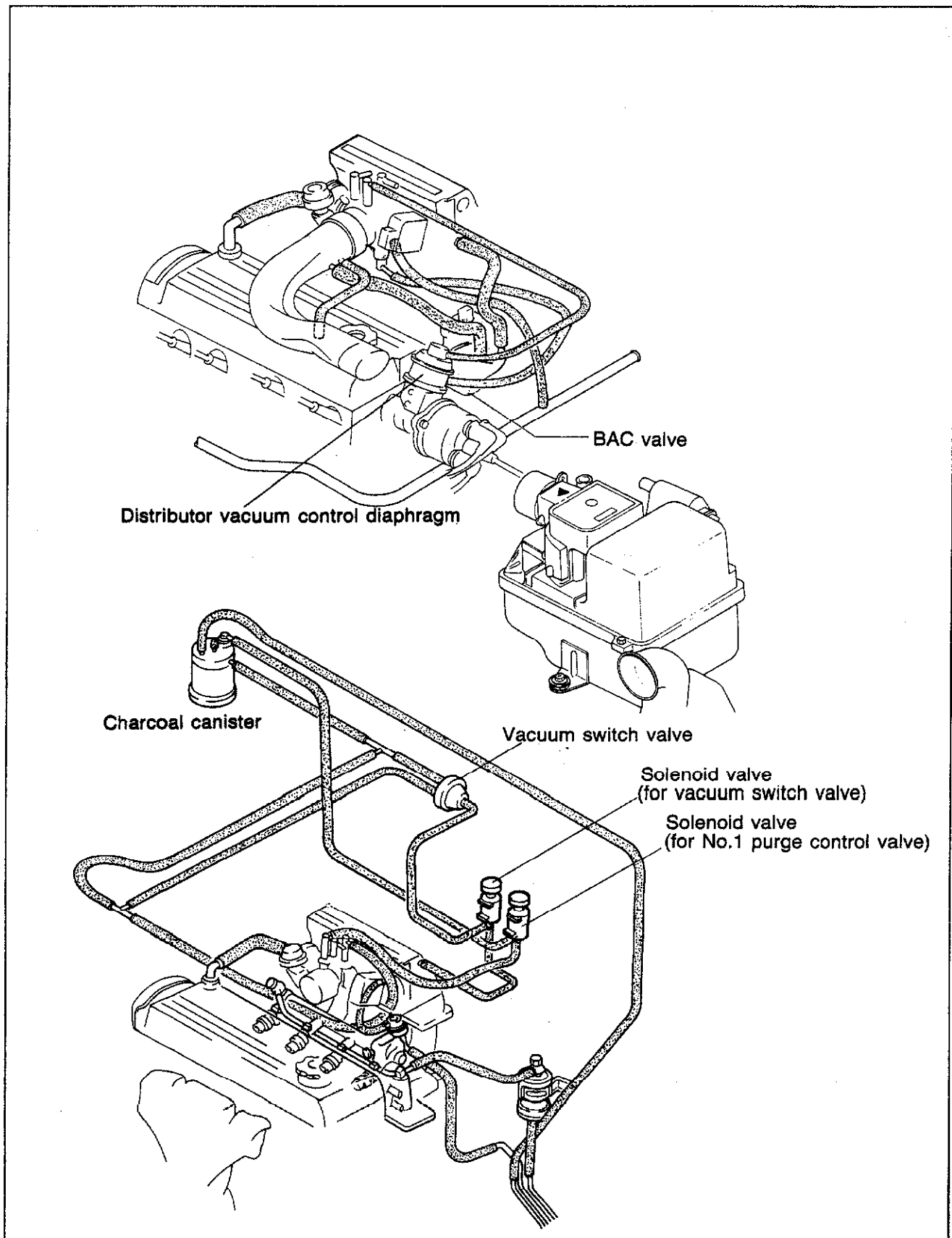
83U04A-002

EMISSION COMPONENT LOCATION



83U04A-003

VACUUM HOSE ROUTING DIAGRAM



83U04A-004

COMPONENT DESCRIPTIONS

| No. | COMPONENT | FUNCTION | REMARKS |
|-----|-----------------------------|---|---|
| 1 | Air cleaner | Filters air into the combustion chamber | |
| 2 | Air flow meter | Detects intake air amount; sends signal to the engine control unit. (for determination of fuel injection amount) | Intake air thermo sensor and fuel pump switch are integrated. |
| 3 | Atmospheric pressure sensor | Detects atmospheric pressure to prevent over rich mixture; sends signal to engine control unit. | |
| 4 | Air valve | When engine is cold, supplies bypass air into dynamic chamber for quick warm-up and smooth idle. | <ul style="list-style-type: none"> • Engine speed is increased to shorten warm-up period. • Thermo wax type • Installed into BAC valve |
| 5 | Brake light switch | Detects brake operation (deceleration); sends signal to engine control unit. | |
| 6 | Catalytic converter | Reduce HC and CO by oxidation. Reduce NOx. | Honeycomb construction |
| 7 | Charcoal canister | Stores fuel tank fumes while engine is stopped. | |
| 8 | Check connector | For Self-diagnosis checker | 6 pin connector (Green) |
| 9 | Circuit opening relay | Supplies voltage for fuel pump while engine running. | |
| 10 | Clutch switch | Detects in-gear condition; sends signal to engine control unit. | Switch is closed when clutch pedal is released. |
| 11 | Engine control unit | Detects the following; <ol style="list-style-type: none"> 1. Engine speed 2. Intake air amount 3. Engine coolant temperature 4. Engine load condition 5. Oxygen concentration in exhaust gas 6. In-gear condition 7. Intake air temperature 8. Atmospheric pressure 9. A/C operation 10. P/S operation 11. E/L (Electrical load) operation 12. Starting signal 13. Initial set signal Controls operation of the following; <ol style="list-style-type: none"> 1. Fuel injection amount 2. Idle speed control system 3. Fail-safe system 4. Monitor switch function | <ol style="list-style-type: none"> 1. Ignition coil (-) terminal 2. Air flow meter 3. Water thermo sensor 4. Throttle sensor (Point type) 5. Oxygen sensor 6. Clutch switch and neutral switch 7. Intake air thermo sensor (in air flow meter) 8. Atmospheric pressure sensor 9. A/C switch 10. P/S switch 11. E/L switch 12. Starter switch (Ignition switch) 13. Test terminal <ol style="list-style-type: none"> 1. Injector 2. BAC valve (ISC solenoid valve) 3. Self-diagnosis checker and MIL 4. Monitor lamp (Self-diagnosis checker) |
| 12 | Dashpot | Gradually allows throttle valve closing during deceleration. | Adjustment speed MTX....2800 ± 150 rpm ATX2800 ± 300 rpm (in neutral) |
| 13 | Fuel filter | Filters particles from fuel | |
| 14 | Fuel pump | Provides fuel to injectors | <ul style="list-style-type: none"> • Operates while engine is running • Installed in fuel tank |
| 15 | Intake air thermo sensor | Detects intake air temperature; compensates fuel injection amount through engine control unit. | Thermistor |
| 16 | Injector | Injects fuel to intake port | Controlled by signals from engine control unit. |
| 17 | Intank Filter | Filters particles from fuel | Installed in low-pressure side |

| No. | COMPONENT | FUNCTION | REMARKS |
|-----|---|---|---|
| 18 | ISC valve | Supplies bypass air to dynamic chamber for smooth idle | Insalled into BAC valve |
| 19 | Neutral switch | Detects transaxle condition; sends signal to control unit | |
| 20 | Oxygen Sensor | Detects oxygen concentration in exhaust gas; sends signal to control unit; compensates fuel injection amount. | Zilconia ceramic with platinum coating |
| 21 | Pressure Regulator | Regulates fuel pressure to injectors | |
| 22 | No.1 Purge Control Valve | Opens and closes evaporative vapor passage from canister to intake manifold | During open throttle |
| 23 | No.2 Purge Control Valve | Positive pressure and negative pressure valves operate in accordance with fuel tank pressure. | Prevents canister from flooding. |
| 24 | Throttle Sensor (Point type) | Detects throttle opening angle; sends signal to engine control unit; compensates fuel injection amount. | |
| 25 | Solenoid Valve (for No.1 purge control valve) | Opens and closes vacuum passage to No.1 purge control valve. | Controlled by signal from engine control unit |
| | Solenoid Valve (for vacuum switch valve) | Opens and closes vacuum passage to vacuum switch valve. | Controlled by signal from engine control unit |
| 26 | Vacuum Switch Valve | Opens passage of vacuum line when vacuum applied. | Vacuum from three-way solenoid valve |
| 27 | Water Thermo Sensor | Detects coolant temperature; sends signal to engine control unit; compensates fuel injection amount. | Thermistor |
| 28 | Water Thermo Switch | Detects radiator coolant temperature; sends signal to control unit; increases fuel injection amount. | Above 17°C (63°F): ON |

83U04A-005

SPECIFICATIONS

| Item | | Transaxle type | Manual transaxle | Automatic transaxle |
|--------------------------|--------------------|--------------------------------|--|---------------------|
| Idle speed | | rpm | 850 ± 50 in Neutral | 850 ± 50 in P range |
| Throttle body | | | | |
| Type | | Horizontal draft (1-barrel) | | |
| Throat diameter | | mm (in) | 45 (1.77) | |
| Air flow meter | | | | |
| Resistor | Ω | E2—Vs | Fully closed: 20—400 Fully open: 20—1,000 | |
| | | E2—Vc | 100—300 | |
| | | E2—Vb | 200—400 | |
| | | E2—THA | -20°C (-4°F) 10,000—20,000 20°C (68°F) 2,000—3,000 60°C (140°F) 400—700 | |
| Fuel pump | | | | |
| Type | | Impeller (in tank) | | |
| Output pressure | | kPa (kg/cm ² , psi) | 441—588 (4.5—6.0, 64.0—85.3) | |
| Feeding capacity | | cc (cu-in)/10 sec | 220—380 (13.4—23.2) when fuel pressure at 250 kPa (2.55 kg/cm ² , 36.3 psi) | |
| Fuel filter | | | | |
| Type | Low pressure side | | Nylon 6 (250 mesh) element | |
| | High pressure side | | Paper element | |
| Pressure regulator | | | | |
| Type | | Diaphragm | | |
| Regulating pressure | | kPa (kg/cm ² , psi) | 240—279 (2.45—2.85, 34.8—40.5) (Vacuum hose disconnected) | |
| Injector | | | | |
| Type | | High-ohmic | | |
| Type of drive | | Voltage | | |
| Resistance | | Ω | 11—15 | |
| Injection amount | | cc (cu in)/15 sec | 32—41 (1.95—2.50) | |
| Idle speed control valve | | | | |
| Solenoid resistance | | Ω | 5—20 | |
| Fuel tank | | | | |
| Capacity | | liters (US gal, Imp gal) | 48 (12.7, 10.6) | |
| Air cleaner | | | | |
| Element type | | Wet | | |
| Accelerator cable | | | | |
| Free play | | mm (in) | 1—3 (0.039—0.118) | |
| Fuel | | | | |
| Specification | | Unleaded gasoline | | |

83U04A-006

TROUBLESHOOTING GUIDE

RELATIONSHIP CHART

Output Devices and Input Devices

| OUTPUT DEVICE INPUT DEVICE | INJECTOR | | SOLENOID (PRES- SURE RE- GULATOR) | BAC VALVE | | PURGE SOLENOID | |
|---|-------------------------------|-------------------------------|--|--------------|--------------|----------------|------|
| | FUEL IN- JECTION AMOUNT | FUEL IN- JECTION TIMING | | AIR VALVE | ISC VALVE | No.1 | No.2 |
| IGNITION COIL | ○ | ○ | X | X | ○ | X | ○ |
| AIRFLOW METER | ○ | X | X | X | X | X | ○ |
| IDLE SWITCH | ○ | X | ○ | X | ○ | X | X |
| PSW SWITCH | ○ | X | X | X | X | X | X |
| WATER THERMO SENSOR | ○ | X | ○ | X | ○ | ○ | X |
| INTAKE AIR THERMO SENSOR | ○ | X | ○ | X | ○ | ○ | X |
| ATMOSPHER- IC PRESSURE SENSOR | ○ | X | X | X | ○ | X | X |
| OXYGEN SENSOR | ○ | X | X | X | ○ | ○ | X |
| BRAKE LIGHT SWITCH | ○ | X | X | X | X | X | X |
| WATER THERMO SWITCH | ○ | X | X | X | ○ | ○ | X |
| NEUTRAL AND CLUTCH SWITCH | ○ | X | ○ | X | ○ | ○ | X |
| STARTER SWITCH | ○ | X | ○ | X | X | X | X |
| E/L SWITCH | X | X | X | X | ○ | X | X |
| A/C SWITCH | X | X | X | X | ○ | X | X |
| P/S SWITCH | X | X | X | X | ○ | X | X |
| TEST CONNECTOR | X | X | X | X | ○ | X | X |

○: Related
X : Not related
83U04A-007

Output Devices and Engine Condition

| ENGINE CONDITION OUTPUT DEVICES | | CRANKING (COLD ENGINE) | WARMING UP (DURING IDLE) | MEDIUM LOAD | | ACCELERATION | HEAVY LOAD | DECELERATION | IDLE (THROTTLE VALVE FULLY CLOSED) | IGN: ON (ENGINE NOT RUNNING) | REMARKS |
|--|------------------------------------|-------------------------------|-----------------------------|---|--|--------------|-------------------------|--|---|--|---------------------------------------|
| | | | | COLD | WARM | | | | | | |
| INJECTOR | INJECTION (Air Fuel Mixture) | Rich | | | Rich and Lean | Rich | | Fuel cut off | Rich | Does not inject | |
| | INJEC- TION TIMING | 1 Group | | | | | | | 1 Group | | Above 6,400 rpm fuel cut off |
| BAC VALVE | AIR VALVE | * Open | | | Closed | | | | | | * Coolant temp: below 60°C (140°F) |
| | ISC VALVE | Large amount of bypass air | | Small amount of bypass air | | | | * Large and small amount of bypass air | Does not operate | * Test connector grounded: small amount of air | |
| PURGE CONTROL SOLEN- OID | No.1 | OFF (Vacuum cut off) | | | * ON (Vacuum to No.1 purge control valve) | | | OFF (Vacuum cut off) | | | * Engine speed: Above 1,500 rpm |
| | No.2 | OFF (Vacuum cut off) | | * ON (Vacuum to vacuum switch valve) | | | OFF (Vacuum cut off) | | | | |

TROUBLESHOOTING CHART

| POSSIBLE CAUSE | | INPUT DEVICES | | | | | | | OUTPUT DEVICES | | |
|----------------|---|--|----------------|---------------------|--|-----------------------------|---------------|-----------------|---|--------------------------------------|--------------------------------|
| | | Ignition coil | Air flow meter | Water thermo sensor | Intake air thermo sensor (In Air flow meter) | Atmospheric pressure sensor | Oxygen sensor | Feedback system | Solenoid valve (No.1 purge control valve) | Solenoid valve (Vacuum switch valve) | BAC Valve (idle speed control) |
| SYMPTOM | | 4A—14 | 4A—14 | 4A—15 | 4A—16 | 4A—17 | 4A—18 | 4A—18 | 4A—19 | 4A—19 | 4A—19 |
| 1 | Fault Indicated by SST Code No. | 01 | 08 | 09 | 10 | 14 | 15 | 17 | 26 | 27 | 34 |
| 2 | Hard start or won't start (Crank OK) | TROUBLESHOOTING PROCEDURE: Note Step 1 under symptom is to quickly determine what system or parts may be at fault by use of the SST. (Self-Diagnosis checker 49 H018 9A1) 1st Check input sensors and output solenoid valves with SST (Refer to page 4A—12). 2nd Check other switches with SST (Refer to page 4A—20). 3rd Check the following items: <div style="display: flex; justify-content: space-between;"> <div> Electrical system 1) Battery condition 2) Fuses Fuel system 1) Fuel level 2) Fuel leakage 3) Fuel filter 4) Idle speed (with test connector grounded) Engine 1) Compression 2) Overheating </div> <div> Ignition system 1) Spark plugs 2) Ignition timing Intake air system 1) Air cleaner element 2) Vacuum or air leakage 3) Vacuum hose routing 4) Accelerator cable Others 1) Clutch slippage 2) Brake dragging </div> </div> 4th Check the Fuel and Emission Control Systems | | | | | | | | | |
| 3 | Engine stall | | | | | | | | | | |
| | While warming up | | | | | | | | | | |
| | After warming up | | | | | | | | | | |
| 4 | Rough Idle | | | | | | | | | | |
| | While warming up | | | | | | | | | | |
| | After warming up | | | | | | | | | | |
| 5 | High Idle speed after warming up | | | | | | | | | | |
| 6 | Poor acceleration, hesitation, or lack of power | | | | | | | | | | |
| 7 | Runs rough on deceleration | | | | | | | | | | |
| 8 | Afterburn in exhaust system | | | | | | | | | | |
| 9 | Poor fuel consumption | | | | | | | | | | |
| 10 | Fail emission test | | | | | | | | | | |

83U04A-009

| POSSIBLE CAUSE | | Intake air system (Poor connection of components, throttle body) | Fuel system (Fuel injection, Fuel pressure) | ISC (Idle speed control) system (Air valve or Idle speed control malfunction) | PCV (Positive crank case ventilation) system (System clogged) | Deceleration control system (Fuel cut operation malfunction) | Evaporative emission control system | Exhaust system (System clogged) |
|----------------|----|---|---|--|--|---|-------------------------------------|---------------------------------|
| PAGE | | 4A—25 | 4A—33 | 4A—29 | 4A—56 | 4A—47 | 4A—52 | 4A—71 |
| SYMPTOM | 2 | 2 | 1 | | | | | |
| | 3 | 3 | 2 | 1 | | | | |
| | | 4 | 3 | 2 | 1 | | | |
| | 4 | 4 | 3 | 1 | 2 | | | |
| | | 5 | 4 | 2 | 1 | | 3 | |
| | 5 | 2 | | 1 | | | | |
| | 6 | 2 | 3 | | | | 1 | 4 |
| | 7 | | 3 | 2 | | 1 | | |
| | 8 | 3 | 4 | 1 | | 2 | | |
| | 9 | | 2 | | | 1 | | 3 |
| | 10 | 5 | 6 | 3 | | 2 | 4 | 1 |

83U04A-010

Note

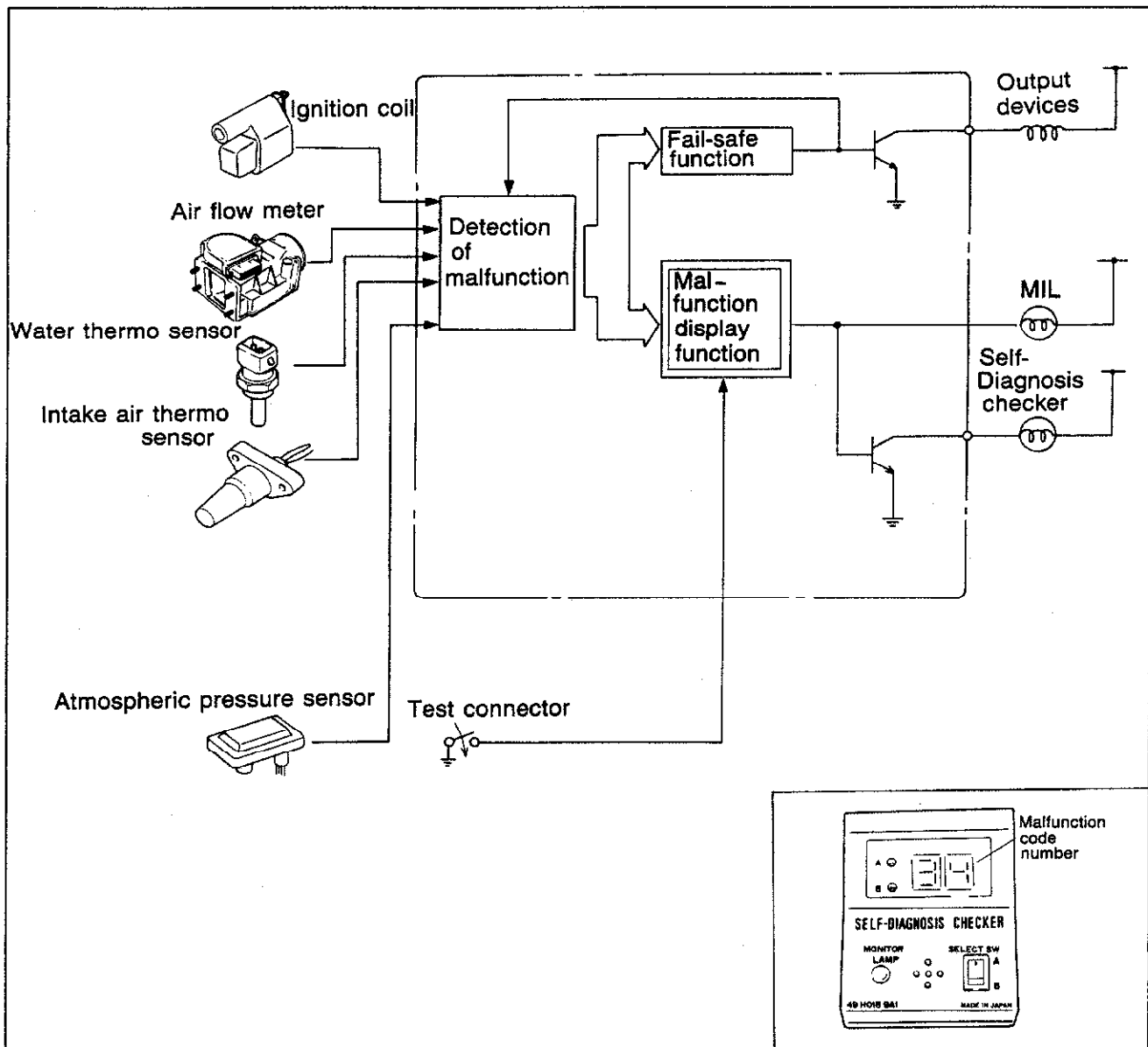
The number of the list such shown a priorities of inspection from the most possible to that with the lowest possibility.

These were determined on following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

TROUBLESHOOTING WITH SST

SELF-DIAGNOSIS CHECKER (49 H018 9A1)

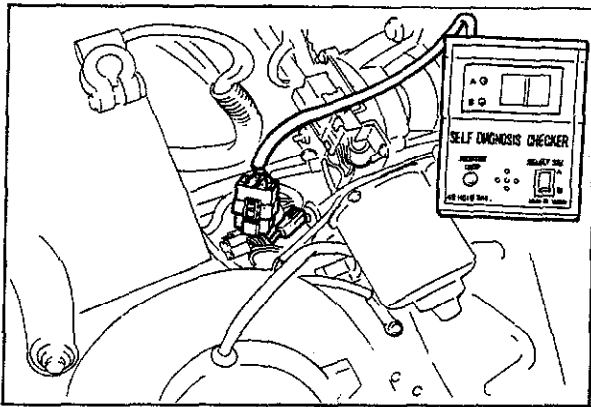


69G04A-020

When troubles occur in the main input devices or output devices, check for the cause using **SST**. Using the **SST**, failures of each input and output device are indicated and retrieved from the control unit as warning code numbers.

Note

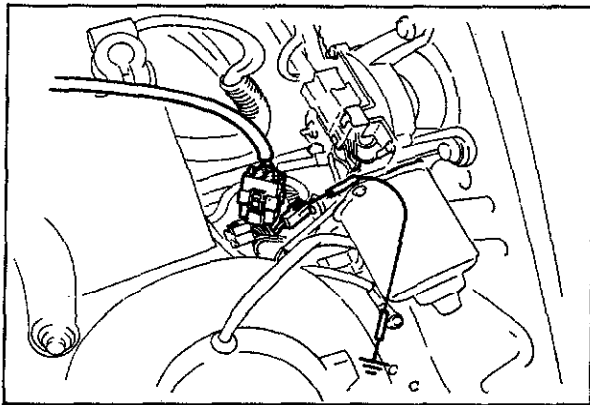
The control unit constantly checks for malfunction of the input devices. But, the control unit checks for malfunction of output devices only in a 3 second period after the ignition switch is turned ON and the test connector is grounded.



83U04A-200

INSPECTION PROCEDURE

1. Warm-up the engine to normal operating temperature and stop it.
2. Connect **SST** to the check connector (Green: 6pin) and the battery negative terminal.

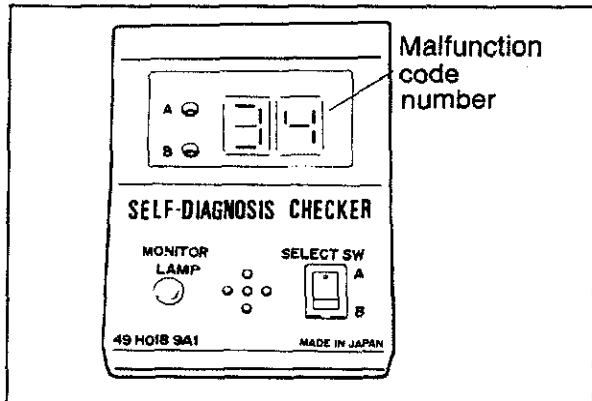


69G04C-123

3. Connect a jumper wire between the test connector (Green: 1pin) and a ground.
4. Turn the ignition switch ON, then check for any code number.

Note

The SST buzzer should sound for 3 sec. after the ignition switch is turned ON.



69G04A-023

5. Start the engine, and check for further code numbers.
6. If a code number illuminates, check for the cause of the problem.

TROUBLESHOOTING WITH MIL (MALFUNCTION INDICATOR LIGHT)

Refer to page 4A—73

Note

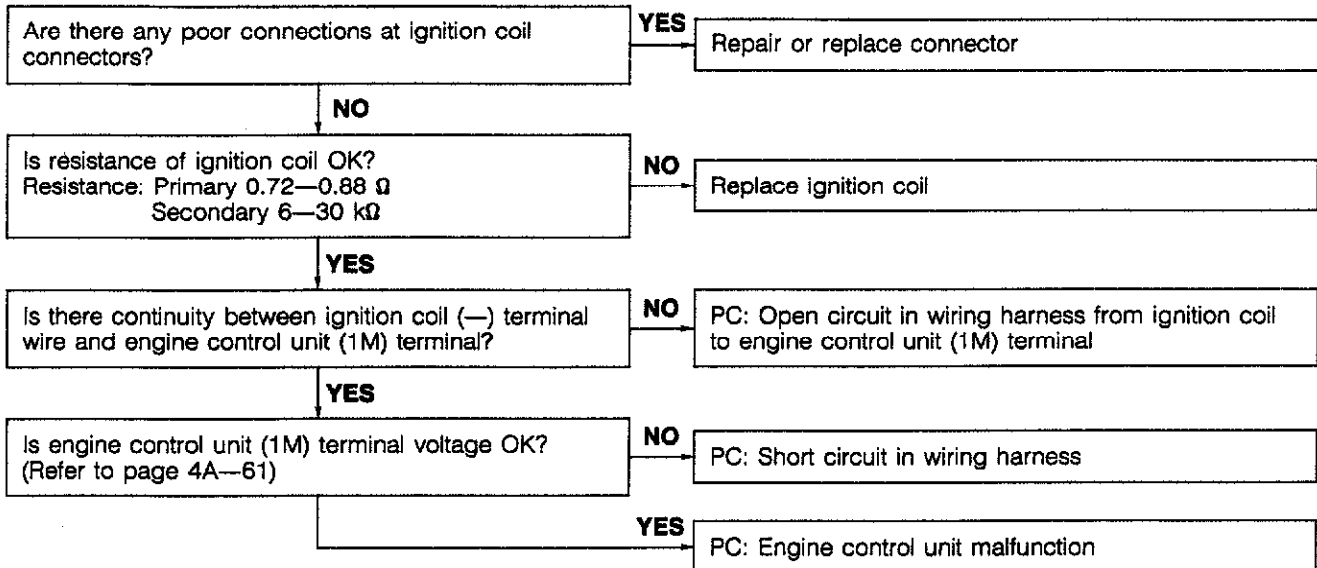
The test connector (Green: 1 pin) must be grounded

4A TROUBLESHOOTING WITH SST

If a malfunction code number is illuminated on **SST**, check the following chart along with the wiring diagram.

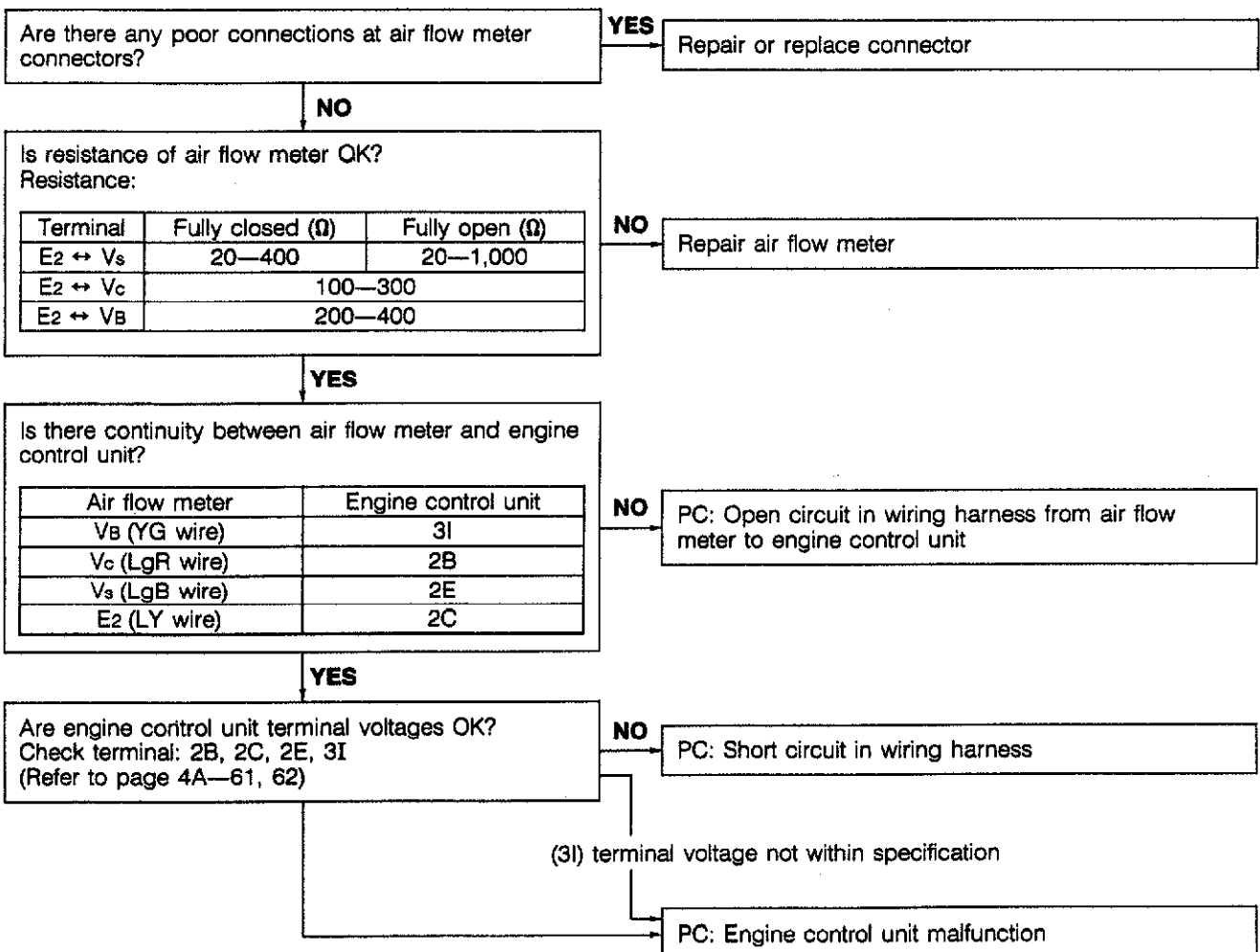
No. 01 Code illumination (Ignition Pulse)

PC: Possible Cause

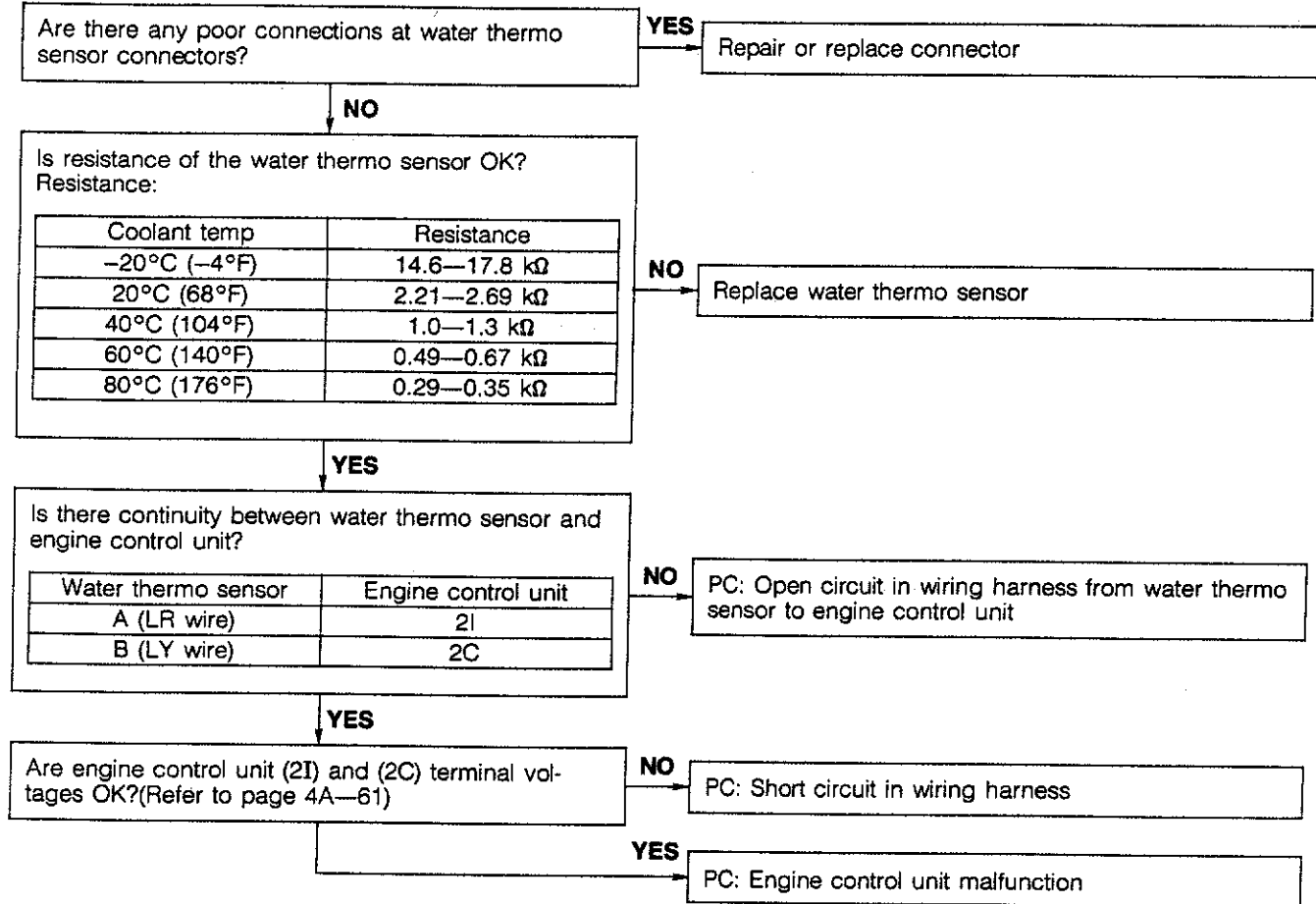


No. 08 Code illumination (Airflow Meter)

83U04A-120

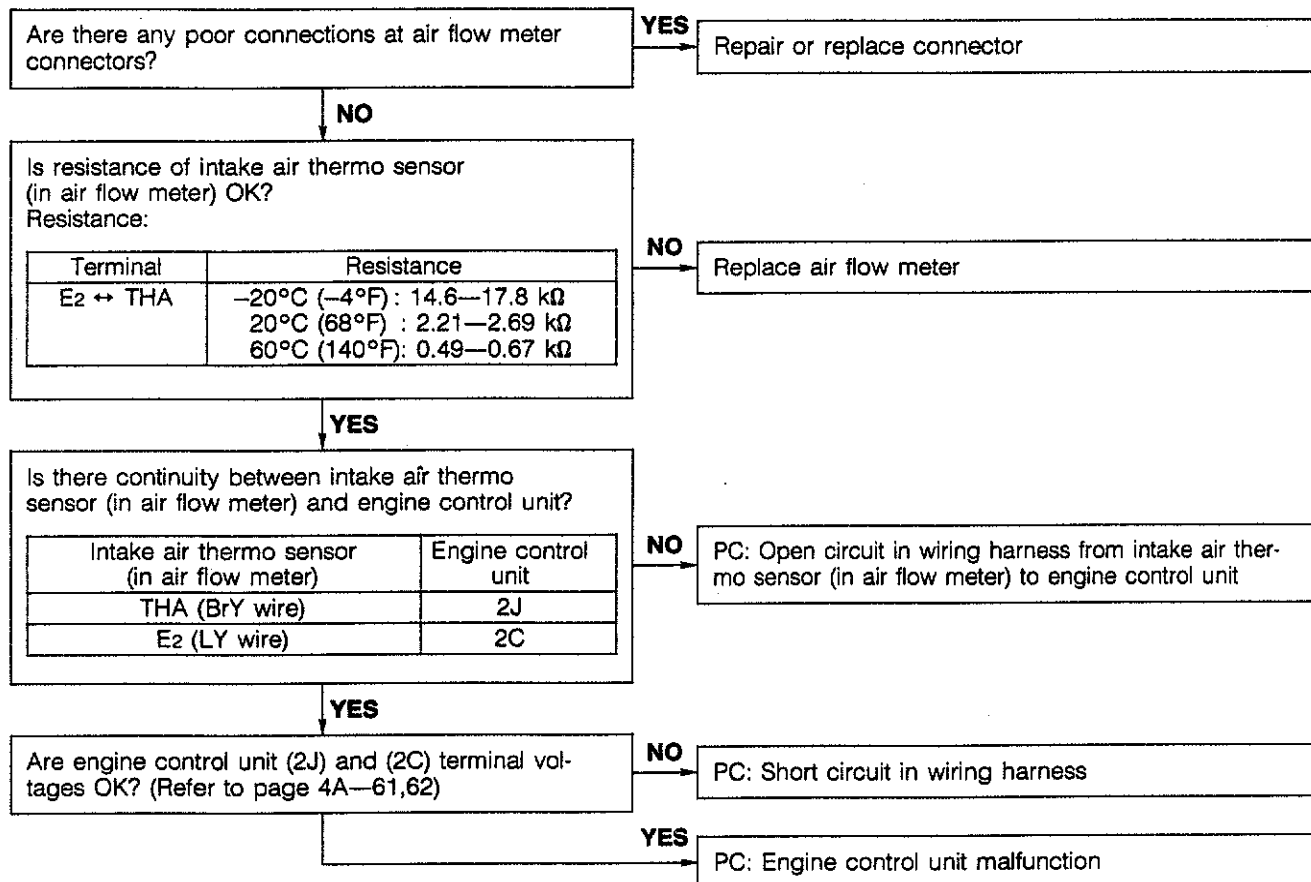


83U04A-011

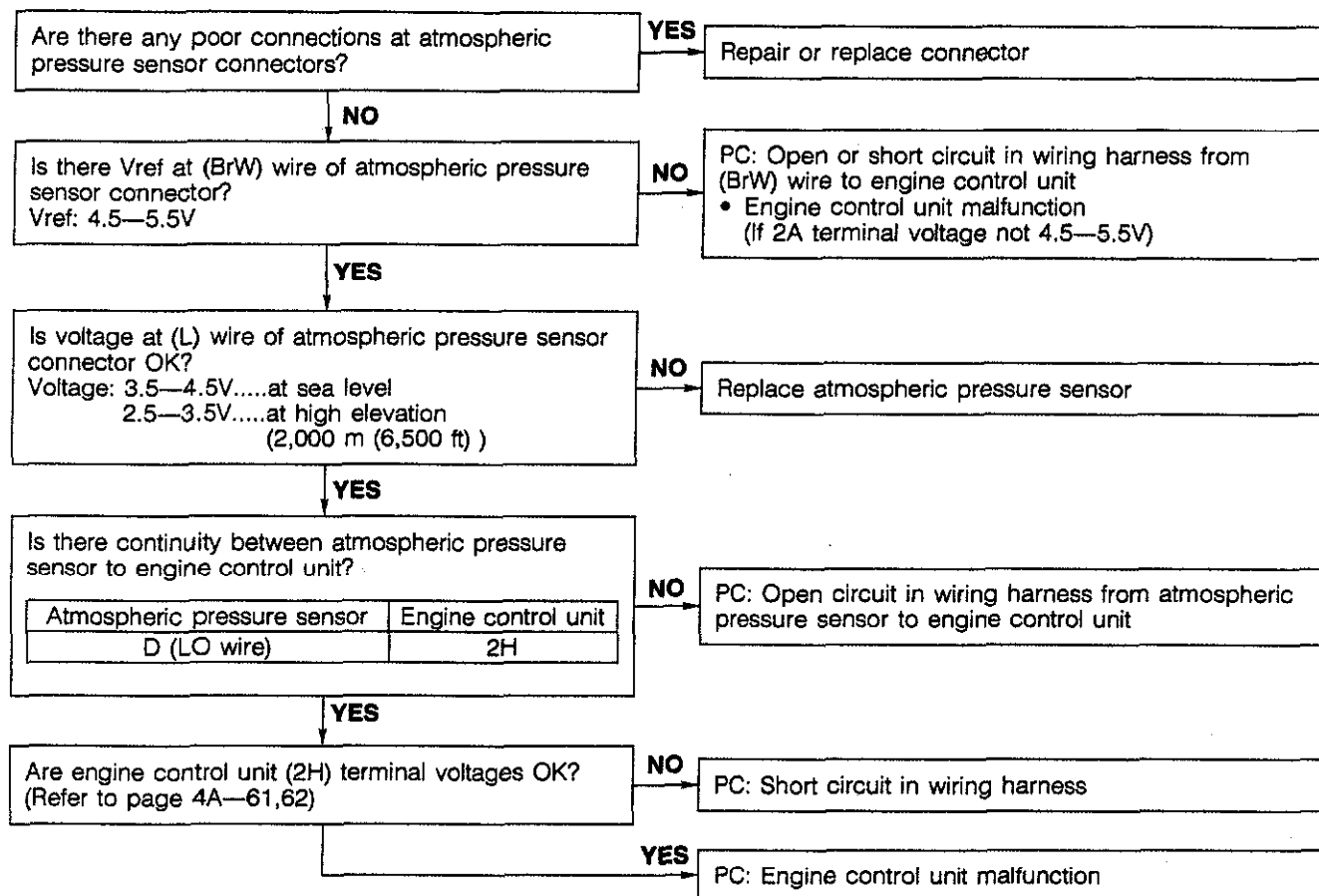
No. 09 Code illumination (Water Thermo Sensor)

83U04A-012

No. 10 Code illumination (Intake Air Thermo Sensor)

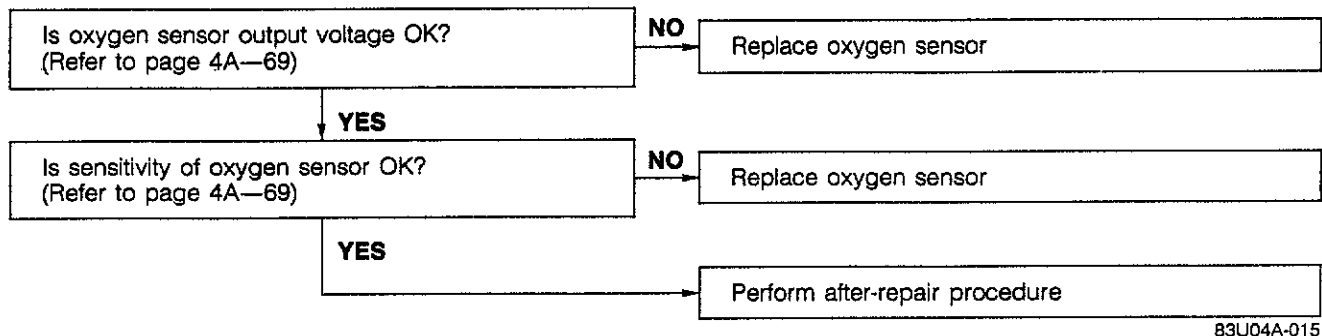


83U04A-013

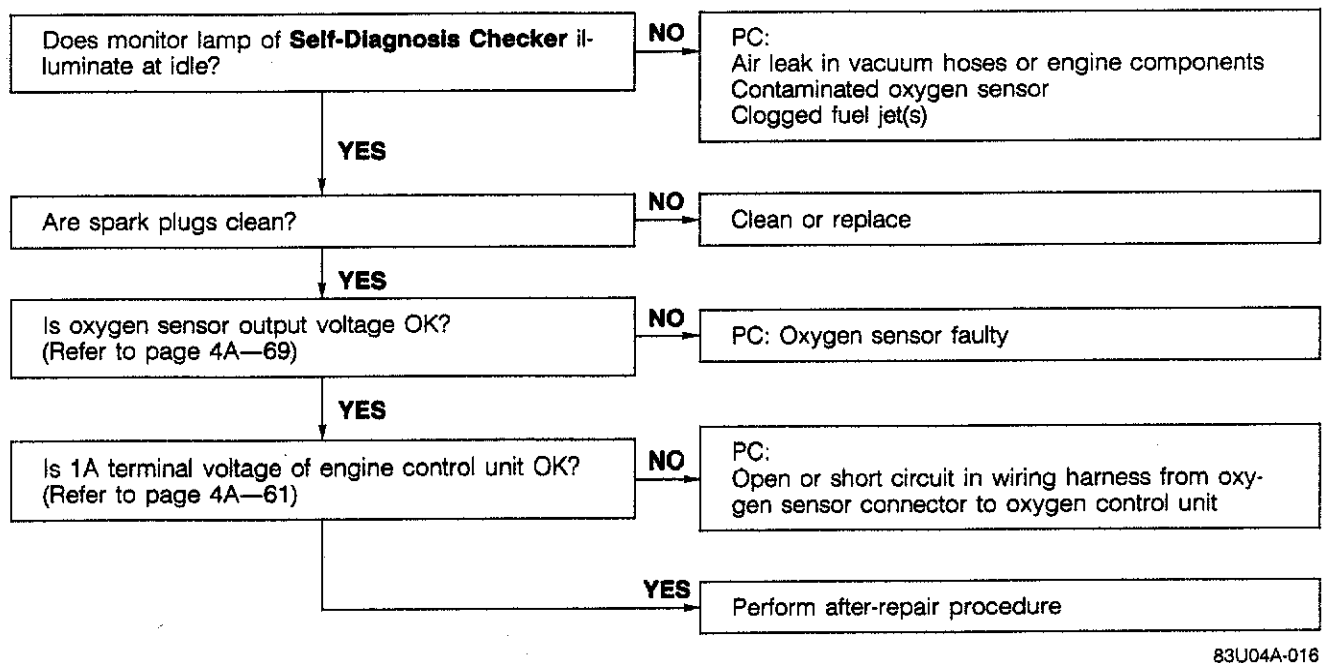
No. 14 Code illumination (Atmospheric Pressure Sensor)

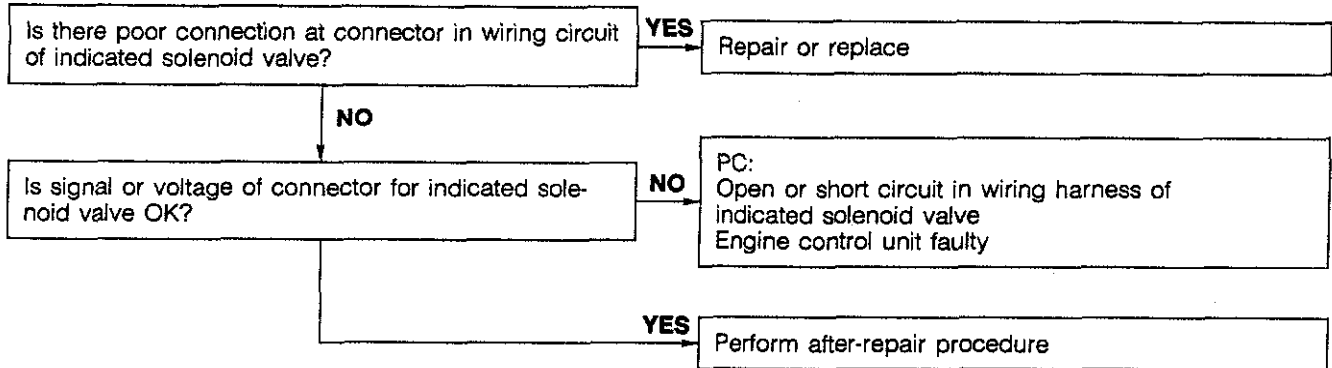
83U04A-014

No. 15 Code Illumination (Oxygen Sensor)

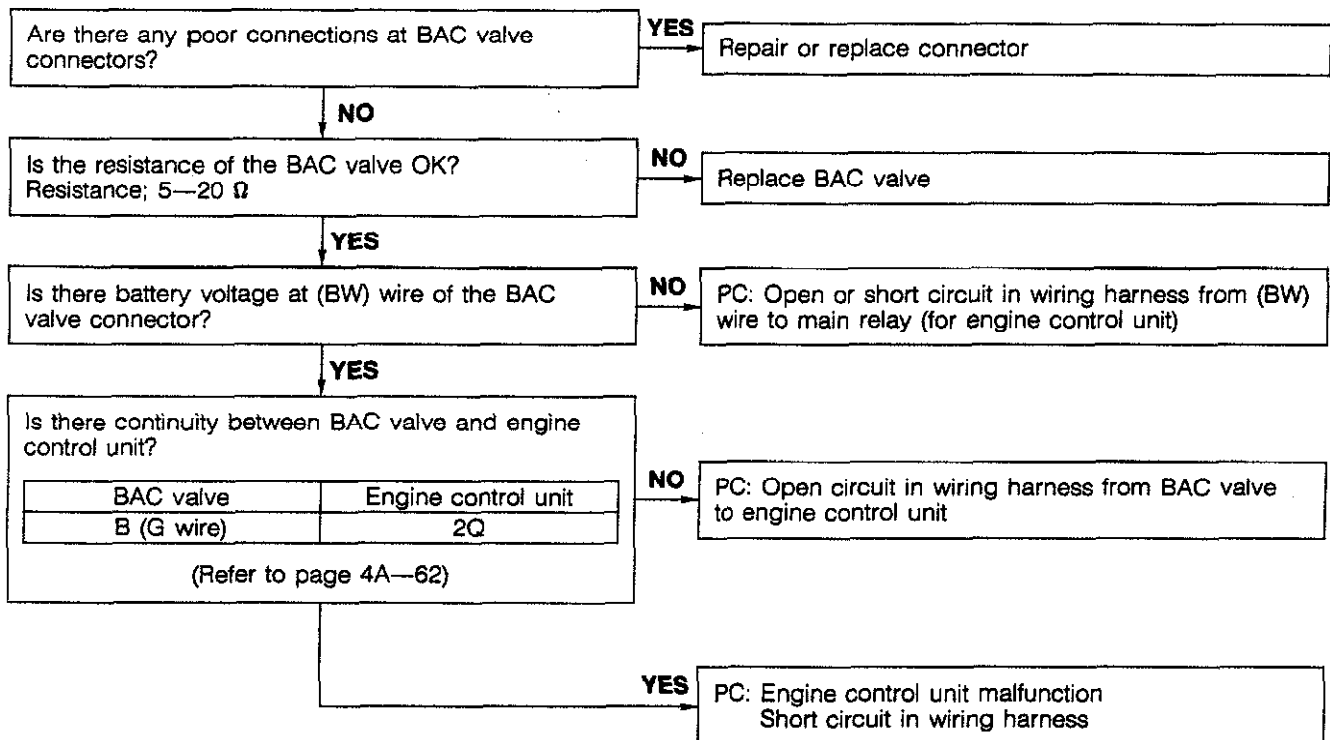


No. 17 Code Illumination (Feedback System)



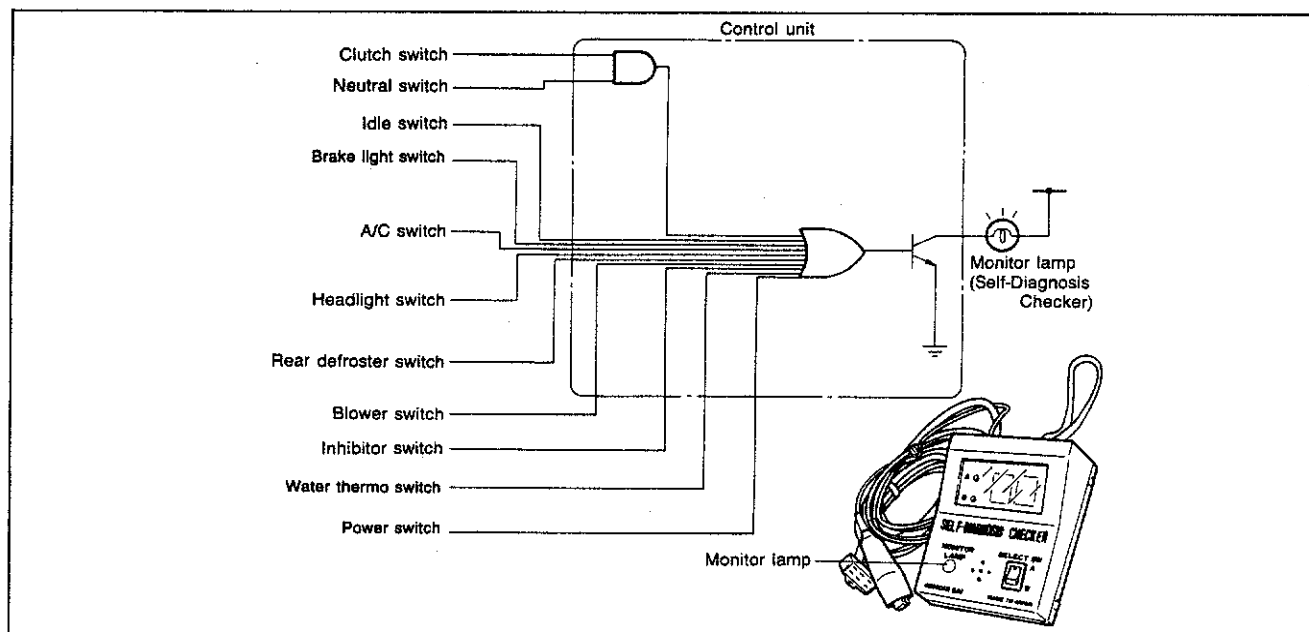
No. 26, 27 Code Illumination (Solenoid Valve)

83U04A-017

No. 34 Code Illumination (BAC valve)

83U04A-018

MONITOR SWITCH FUNCTION



83U04A-019

The operation of individual switches can be determined by the monitor lamp **SST**.

Note

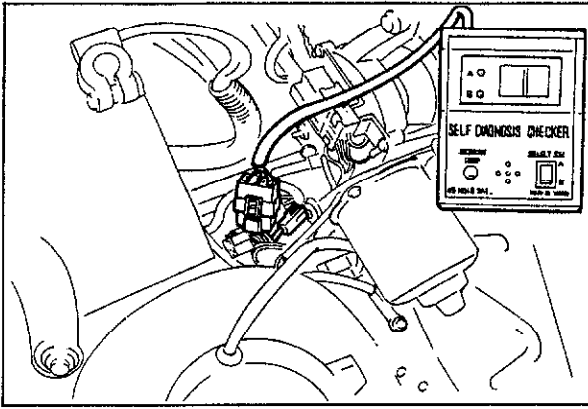
The test connector must be grounded and the ignition switch ON (engine stopped) to check the switches.

| Switch | Self-Diagnosis Checker | | Remarks |
|------------------------------------|------------------------|-----------------------|-------------------------------------|
| | Light ON | Light OFF | |
| Clutch switch | Pedal released | Pedal depressed | Gear: IN |
| Neutral switch (Throttle sensor) | In gear | Neutral | Clutch pedal released |
| Idle switch | Pedal depressed | Pedal released | |
| Brake light switch | Pedal depressed | Pedal released | |
| A/C switch | ON | OFF | Blower motor position: "1" position |
| Headlight switch | ON | OFF | |
| Rear defroster switch | ON | OFF | |
| Blower switch | ON | OFF | Blower motor position: "3" position |
| Inhibitor switch | D, 1, 2 and R range | P and N range | |
| Water thermo switch (Electric fan) | Disconnected terminal | Connected terminal | |
| Power switch | Pedal depressed | Pedal fully depressed | |

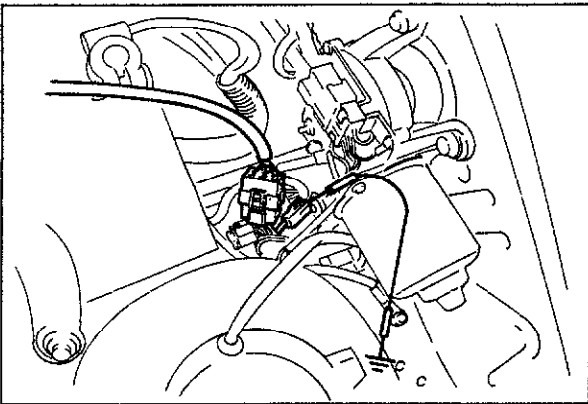
OXYGEN SENSOR MONITOR FUNCTION

The oxygen sensor and feedback mode are monitored as follows.

| Condition | | Item monitored | Function |
|-----------|----------------|-----------------------------|--|
| Engine | Test connector | | |
| Running | Not grounded | Oxygen sensor output signal | Oxygen sensor output more than 0.55V: Monitor lamp ON |
| | | Oxygen sensor output signal | Oxygen sensor output less than 0.55V: Monitor lamp OFF |



69G04A-037



69G04C-030

INSPECTION PROCEDURE

1. Warm up the engine to normal operating temperature and stop it.
2. Connect **SST** to the check connector (Green: 6pin) and the negative battery terminal.

3. Connect a jumper wire between the test connector (Green: 1 pin) and a ground.
4. Turn the ignition switch ON, then check that the monitor lamp illuminates when each switch is made to function according to below procedure.

Caution

- a) If even one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

Procedure

Set the conditions to deactivate each switch.

- All accessories are OFF.
- Transmission is neutral.
- All pedals are released.

Check that the monitor lamp does not illuminate.

Yes

Check each switch in accordance with following procedures.

NO

Check each switch and related wiring harness.

- Clutch and Neutral switch: Refer to page 4A—63.
- Idle switch (throttle sensor): Refer to page 4A—66.
- Brake light switch: Refer to page 4A—63.
- A/C switch: Section 16
- Headlight switch: Section 15
- Rear defroster switch: Section 15
- Blower switch: Section 15
- Inhibitor switch: Refer to page 4A—63.
- Water thermo switch: Refer to page 3A—6.

83U04A-020

Neutral and clutch switch (MTX)

Shift transmission into gear.
Check that monitor lamp illuminates with clutch pedal released.

YES

Depresses clutch pedal
Check that monitor lamp does not illuminate.

NO

- PC:
- Neutral or clutch switch malfunction (Refer to page 4A—63)
 - Open or short circuit in related wiring harness
 - Engine control unit (1G) terminal malfunction (Refer to page 4A—61)

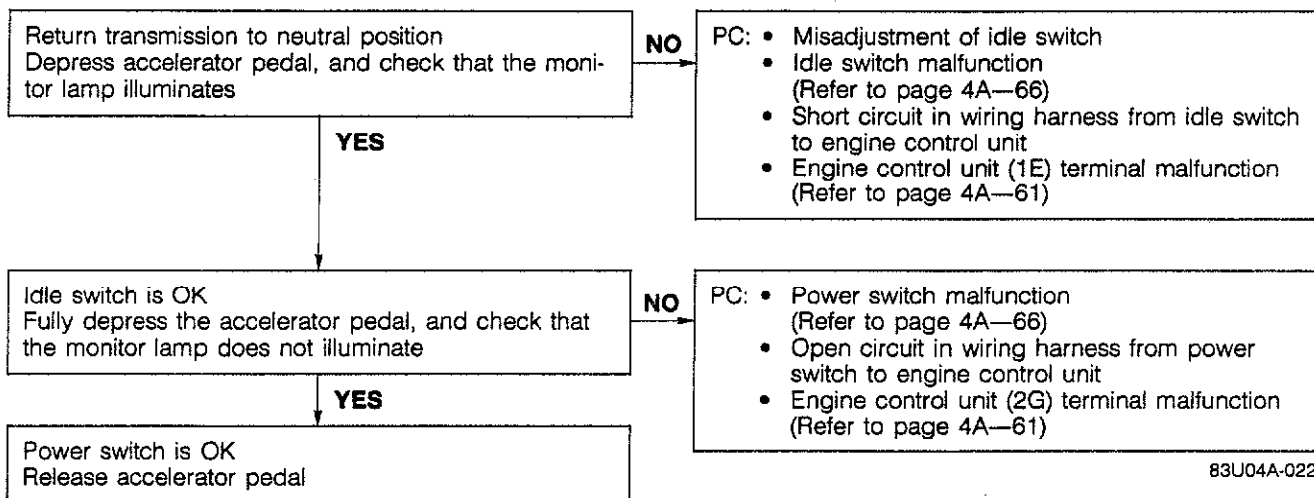
NO

- PC:
- Clutch switch malfunction (Refer to page 4A—63)
 - Short circuit in wiring harness from clutch switch to engine control unit

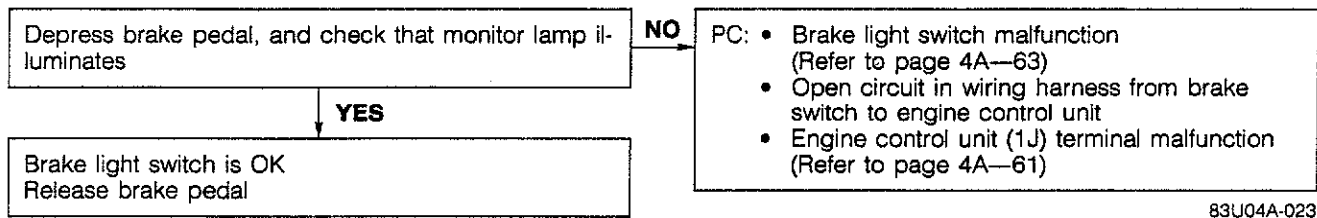
83U04A-021

4A MONITOR SWITCH FUNCTION

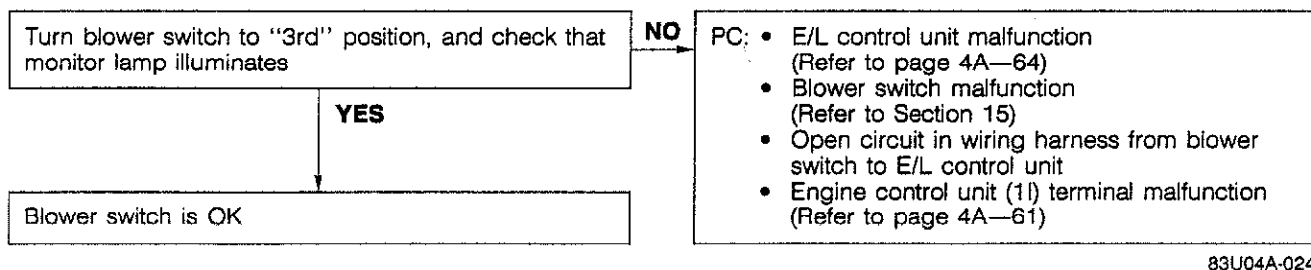
Idle switch and power switch (Throttle sensor)



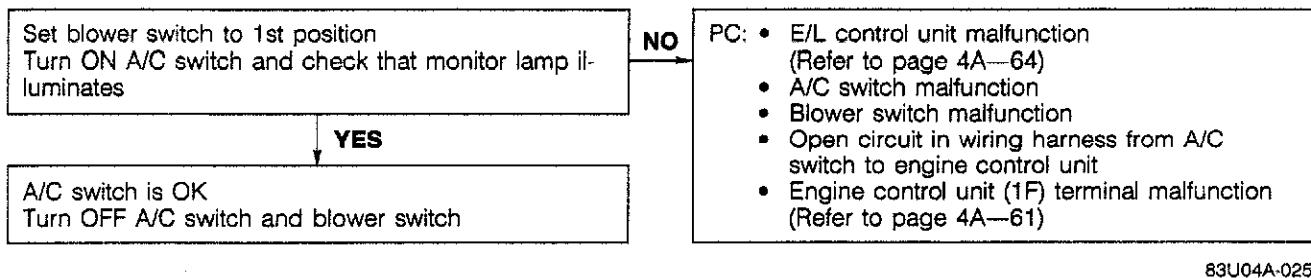
Brake light switch



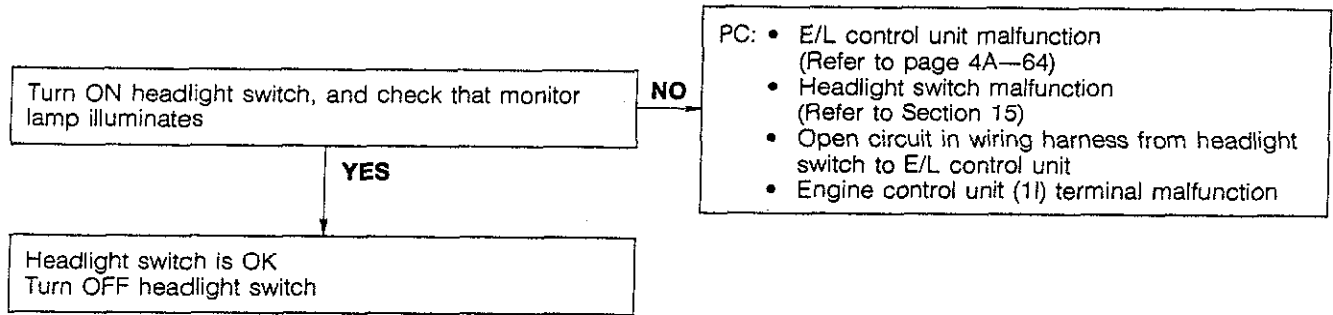
Blower switch



A/C switch

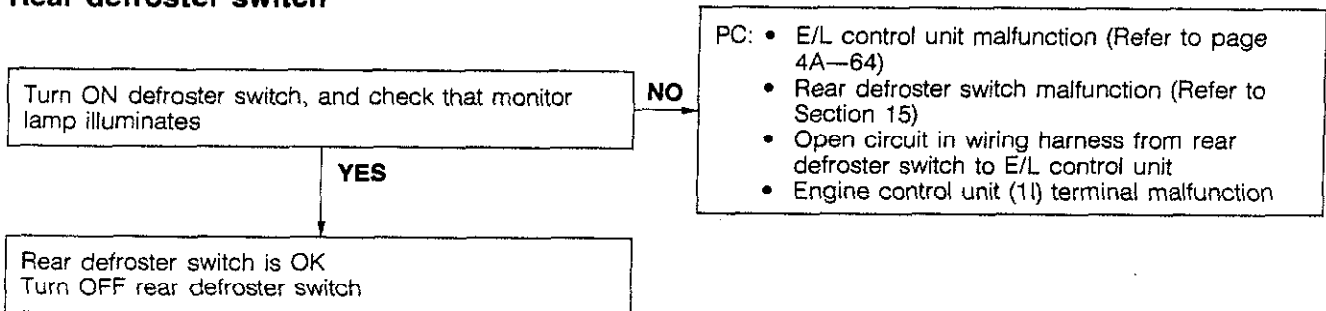


Headlight switch



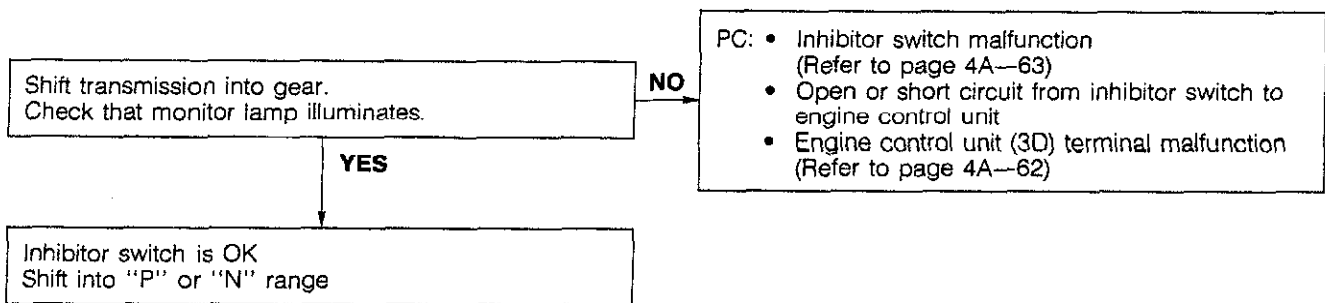
83U04A-026

Rear defroster switch



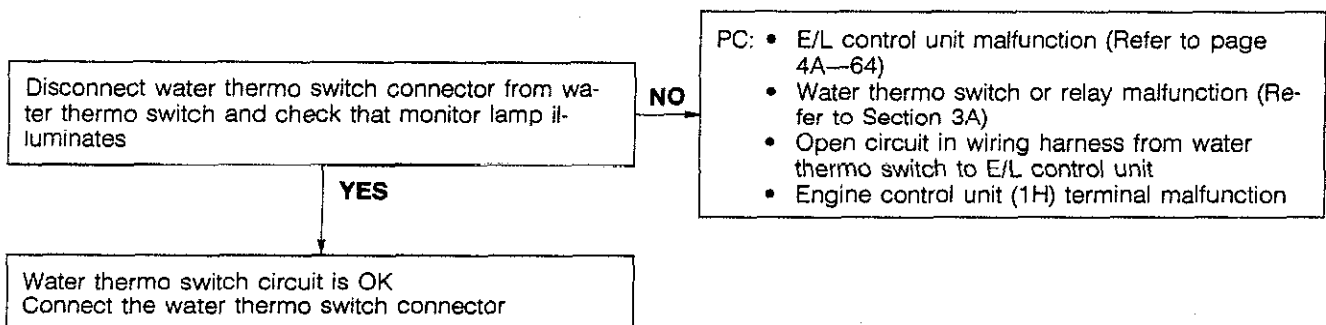
83U04A-027

Inhibitor switch

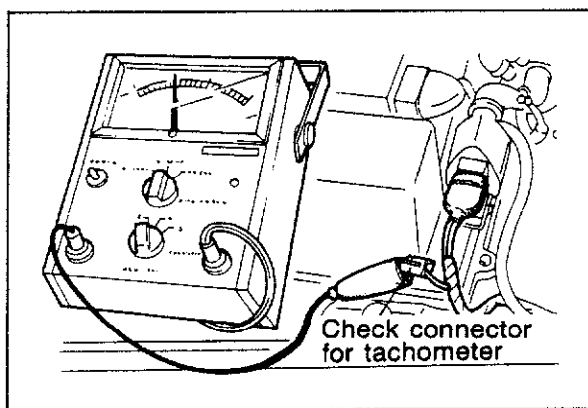


83U04A-028

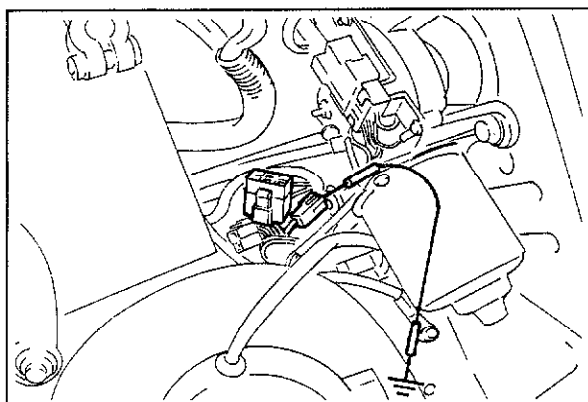
Water thermo switch circuit (not include switch inspection)



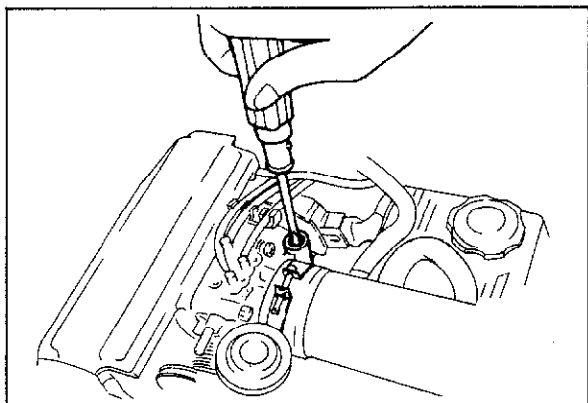
83U04A-029



83U04A-030



83U04A-031



83U04A-032

IDLE ADJUSTMENT

Preparation

Before checking or adjusting the idle speed, perform the followings:

- Switch off all accessories.
- Connect a tachometer to check connector. (White 1 pin)
- Warm up the engine to normal operating temperature.
- Check and adjust the ignition timing.

- Connect a jump wire between the test connector (Green: 1 pin) and ground.

Idle speed

1. Check the idle speed.

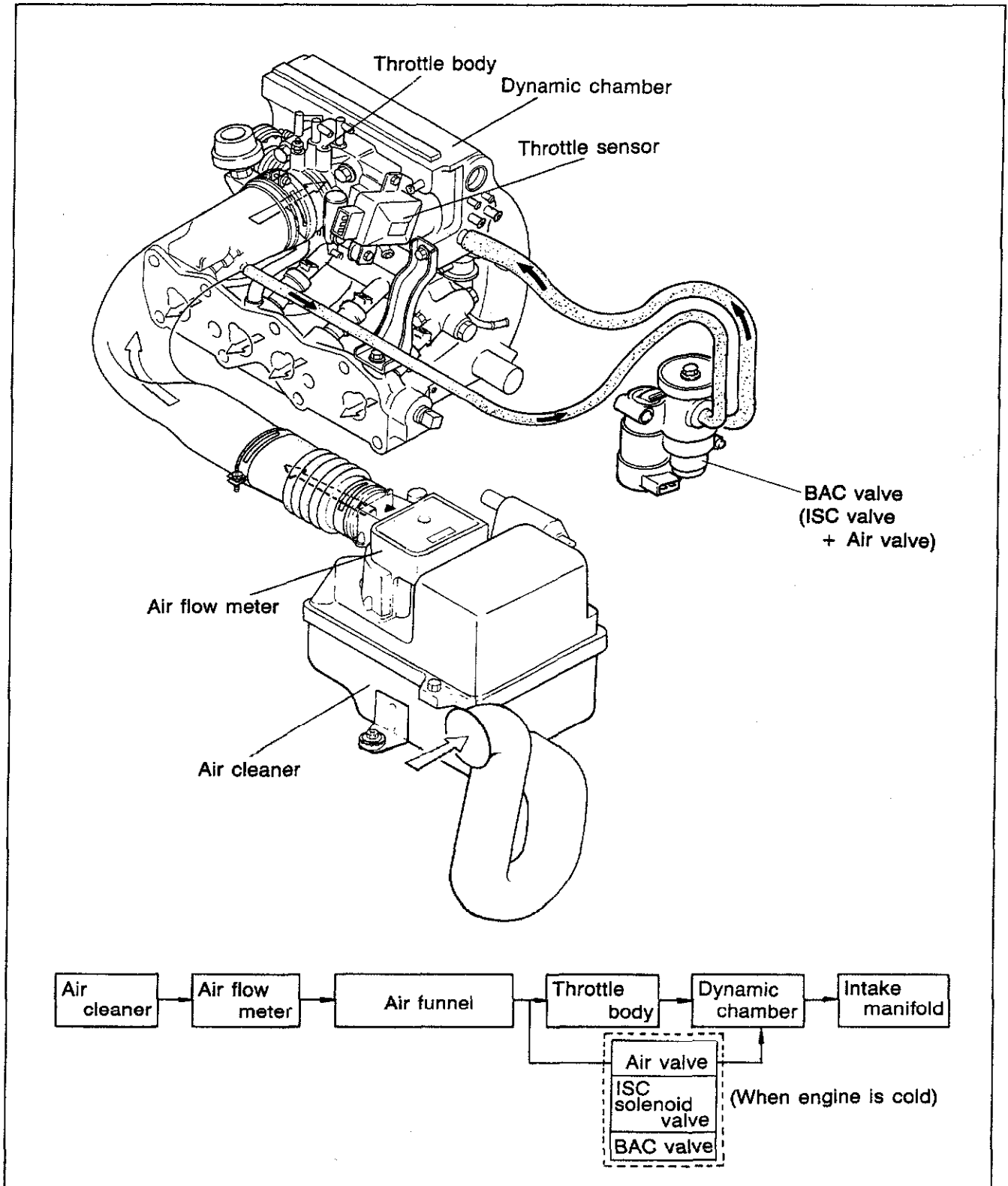
**Idle speed: 850 \pm 50 rpm (MTX: Neutral)
(ATX: in "P" range)**

2. If the idle speed is not within specification, remove the blind cap from air adjust screw and adjust it by turning the air adjust screw.
3. After adjusting the idle speed, install the blind cap and disconnect a jumper wire from test connector.

Note

Check and adjust the dashpot operation after adjusting the idle speed.

INTAKE AIR SYSTEM

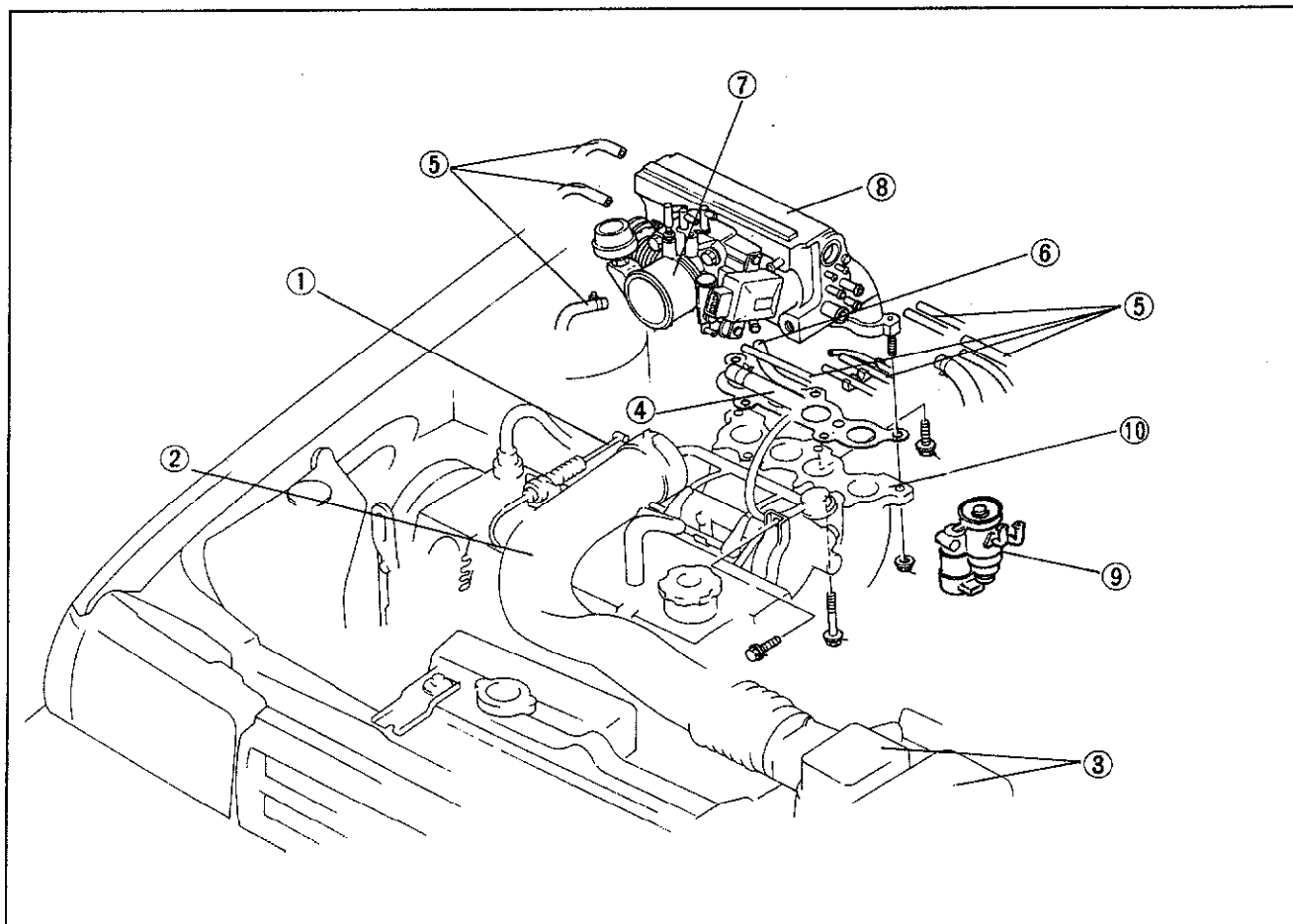


The intake air system supplies air required by the engine for the formation of the air-fuel mixture and measures the air flow and air temperature. It consists of the air cleaner, air flow meter, throttle body, dynamic chamber and BAC valve.

4A INTAKE AIR SYSTEM

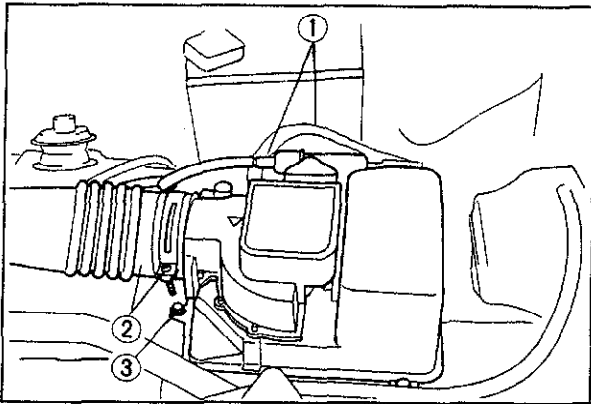
REMOVAL AND INSTALLATION

1. Disconnect the battery negative cable.
2. Disassemble the intake air system in the sequence shown in the figure.
3. Install in the reverse order of removal.



83U04A-033

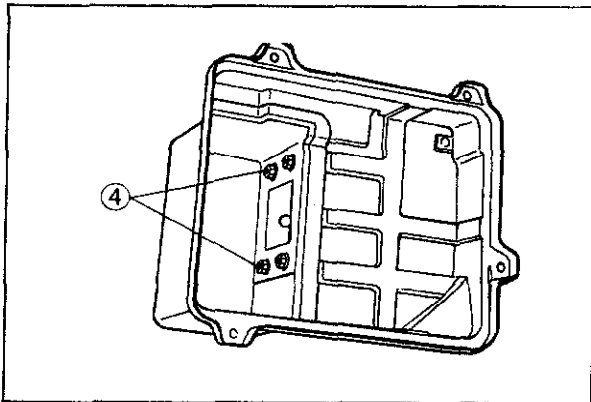
- | | |
|--------------------------------------|---------------------|
| 1. Accelerator cable | 6. Water hoses |
| 2. Air funnel | 7. Throttle body |
| 3. Air cleaner (with Air flow meter) | 8. Dynamic chamber |
| 4. Air hoses | 9. BAC valve |
| 5. Vacuum hoses | 10. Intake manifold |



83U04A-034

Air Flow Meter Removal and Installation

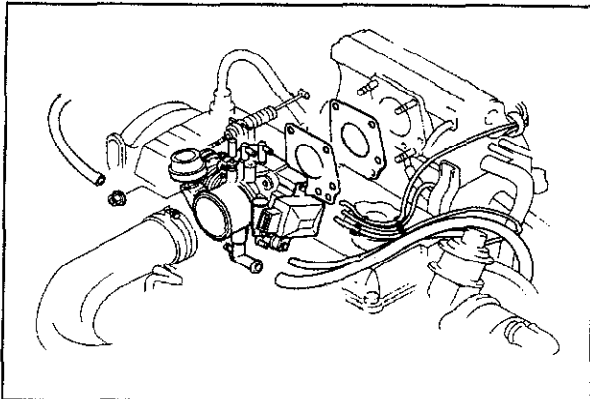
1. Remove the high tension lead and ignition coil connectors.
2. Loosen the hose band and remove the intake air hose.
3. Remove the attaching bolts.



73U04B-041

4. Turn the air cleaner cover upside down and remove the attaching nuts.
5. Remove the air flow meter.

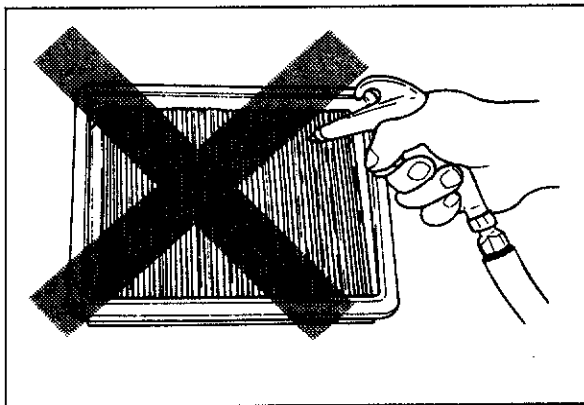
Install in the reverse order of removal.



83U04A-035

Throttle Body Removal and Installation

1. Drain the water from radiator
2. Disconnect the accelerator cable from the throttle linkage
3. Disconnect the air funnel
4. Disconnect the hoses and tubes
5. Disconnect the throttle sensor connector
6. Remove the attaching nuts and bolts of throttle body
7. Remove the throttle body
8. Install in the reverse order of removal



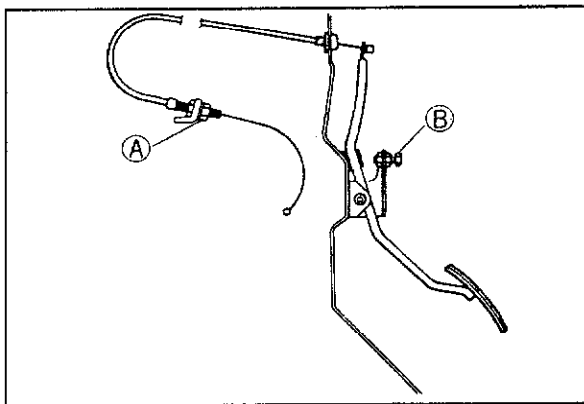
69G04A-059

PARTS INSPECTION Air Cleaner Element

Caution

Do not use the compressed air to clean the air cleaner element.

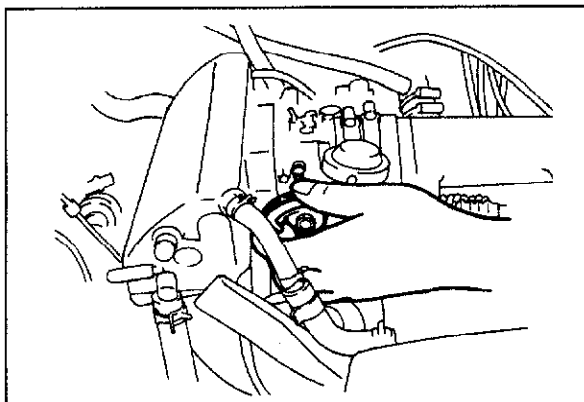
1. Check the condition of the air cleaner element.
2. Replace, if necessary.



69G04A-060

Accelerator Cable

1. Inspect the deflection of the cable. If the deflection is not within **1 ~ 3 mm (0.04 ~ 0.12 in.)**, adjust by using nuts (A).
2. Depress the accelerator pedal to the floor and confirm that the throttle valve is fully opened. Adjust by using bolt (B) if necessary.



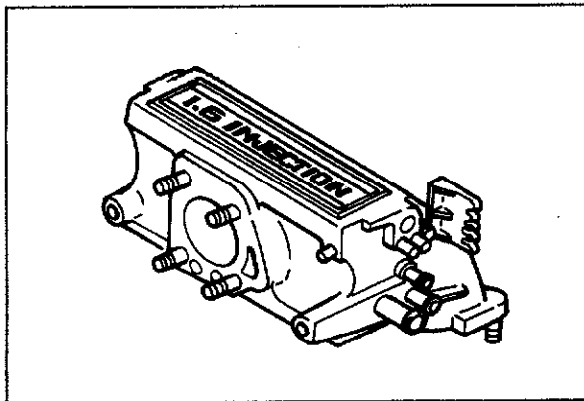
83U04A-036

Throttle Body

1. Check that the throttle valve move smoothly when throttle lever is moved from fully closed to fully open.
2. Replace, if necessary.

Note

For inspection and adjustment of throttle sensor, refer to Control System (Page 4A—66).

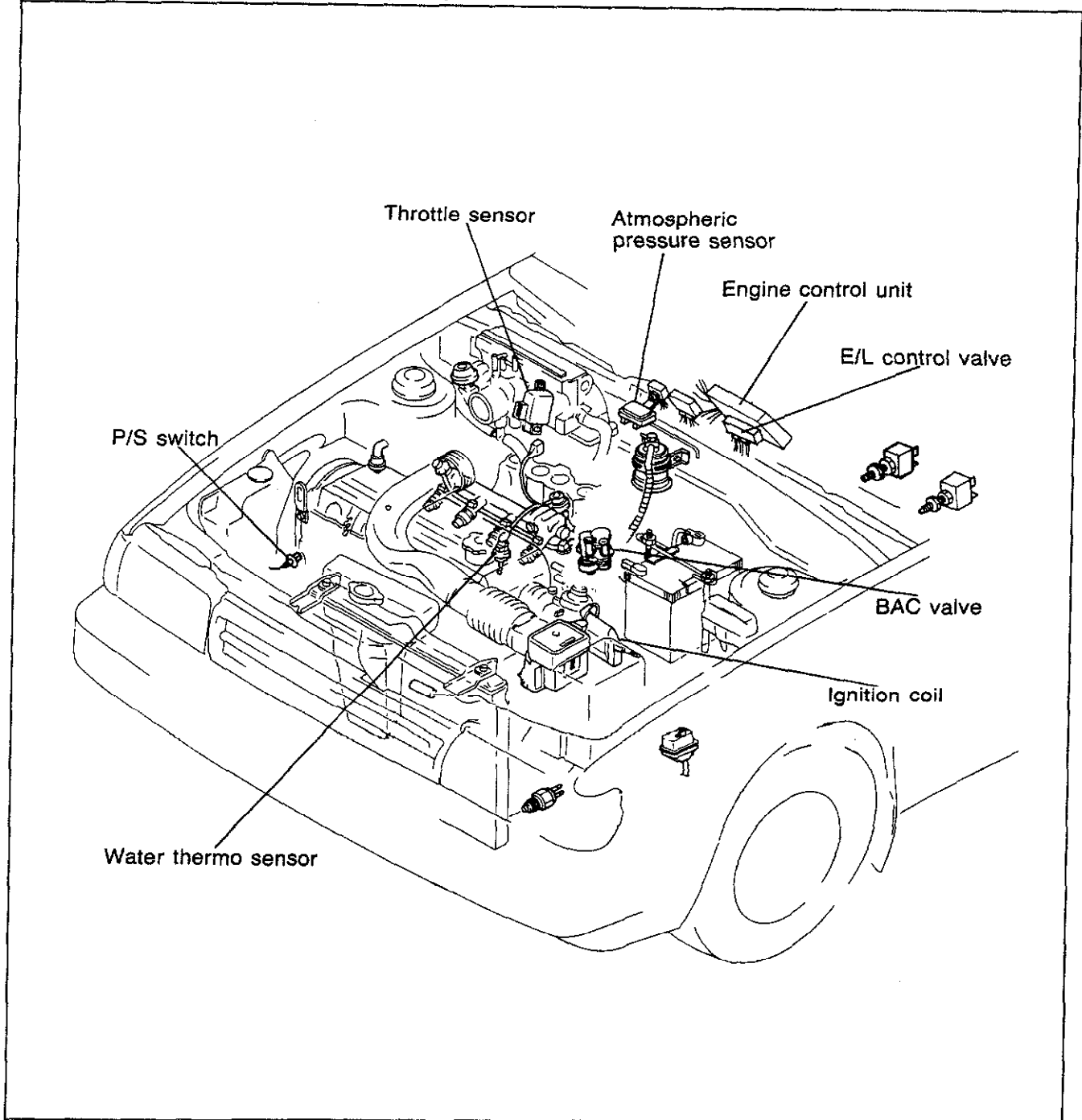


83U04A-037

Dynamic Chamber

1. Visually check the dynamic chamber for damage.
2. Replace, if necessary.

IDLE SPEED CONTROL (ISC) SYSTEM



83U04A-038

OUTLINE

To improve idle smoothness, the ISC system controls the intake air amount detected by the air flow meter by regulating the bypass air amount that passes through the throttle body, and thereby helps the engine to maintain a steady idle speed.

This system consists of the BAC valve and the control system.

The BAC valve consists of the air valve which functions only during cold engine conditions and the ISC valve which works throughout the entire engine speed range.

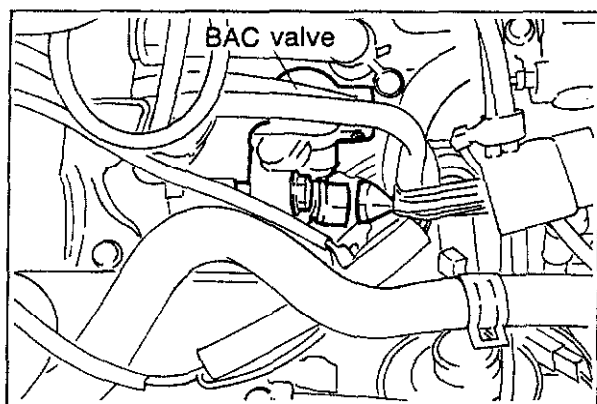
4A IDLE SPEED CONTROL (ISC) SYSTEM

TROUBLESHOOTING CHART

Before performing the following troubleshooting, check the condition of the wiring harness and connector.

| POSSIBLE CAUSE | | Water thermo sensor | Intake air thermo sensor | Throttle sensor (Variable resistor type) | ISC system (System inspection) | BAC valve | Engine control unit terminal voltage |
|---|------------------|---------------------|--------------------------|--|--------------------------------|-----------|--------------------------------------|
| | | | | | | | 2Q |
| SYMPTOM | | 4A—68 | 4A—68 | 4A—66 | 4A—31 | 4A—32 | 4A—62 |
| Engine stall | While warming up | 3 | 4 | | 1 | 2 | 5 |
| | After warming up | 3 | 4 | | 1 | 2 | 5 |
| Rough Idle | While warming up | 3 | 4 | | 1 | 2 | 5 |
| | After warming up | 3 | 4 | | 1 | 2 | 5 |
| High idle speed after warming up | | 3 | 4 | | 1 | 2 | 5 |
| Runs rough on deceleration | | 4 | 5 | 3 | 1 | 2 | 6 |
| Afterburn in exhaust system | | 4 | 5 | 3 | 1 | 2 | 6 |
| Poor acceleration, hesitation, or lack of power | | 4 | | 3 | 1 | 2 | 5 |
| Fail emission test | | 4 | 5 | 3 | 1 | 2 | 6 |

83U04A-039



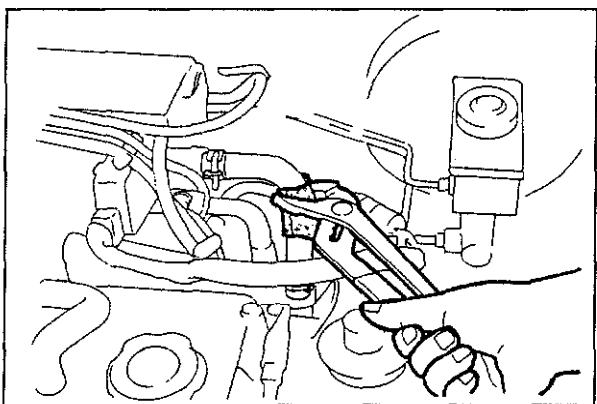
83U04A-040

System Inspection

1. Connect the jumper wire between the test connector (Green: 1 pin) and ground. (Refer to page 4A—13).
2. Disconnect the BAC valve connector.

Note

When the BAC valve is disconnected, the engine speed will be reduced, which is normal.

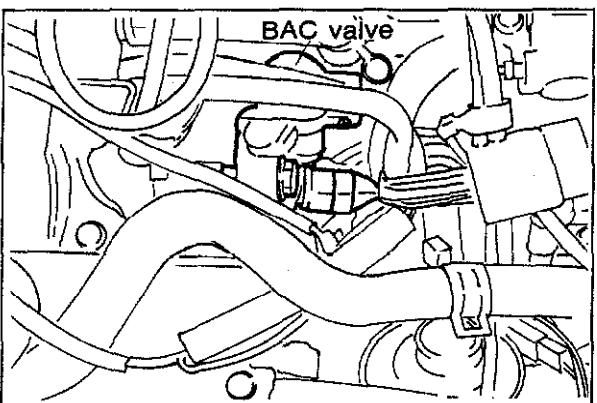


83U04A-041

3. Start the engine and run it at idle.
4. Pinch the air hose and note the engine speed.

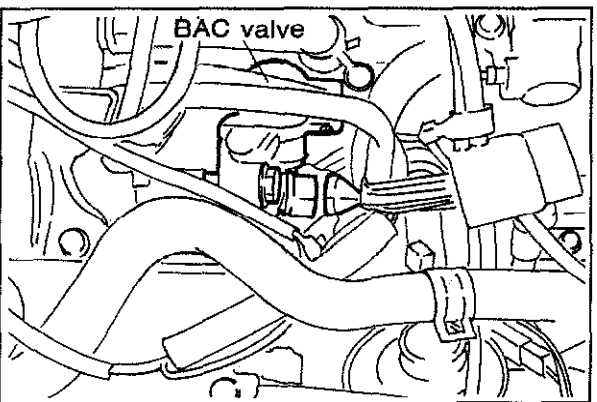
Cold engine: Engine speed drops

Warm engine: Engine speed unchanged



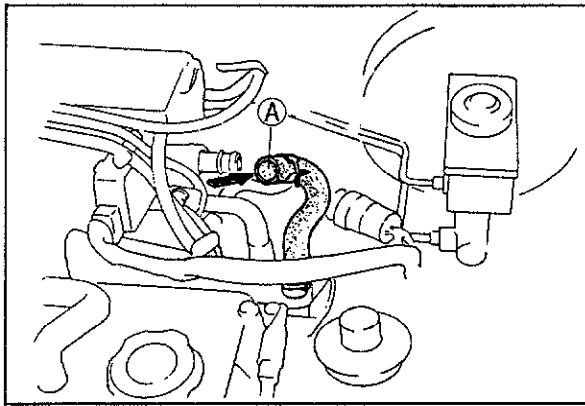
83U04A-042

5. Connect the BAC valve connector.
6. Disconnect the test connector.
7. Warm up the engine to normal operating temperature and run it at idle.
8. Check that the idle speed is correct.



83U04A-043

9. Connect the jumper wire between the test connector and ground.
10. Disconnect the BAC valve connector.
11. Check that the engine speed decreases.
12. Reconnect the BAC valve connector.
13. Disconnect the jumper wire.



83U04A-044

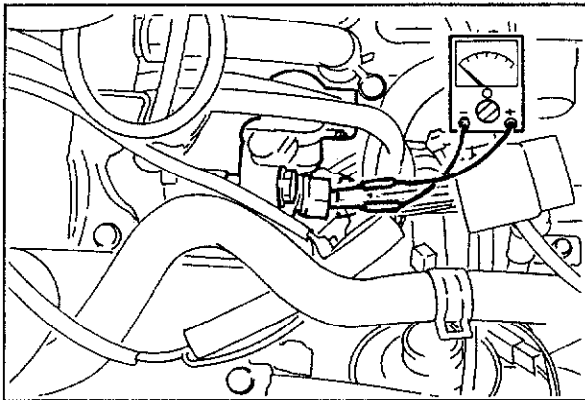
BAC Valve

Air valve

1. Disconnect the air hoses from the air funnel.
2. Blow through the BAC valve from port (A). Check the air flow.

Cold engine: Air flows

Warm engine: Air does not flow

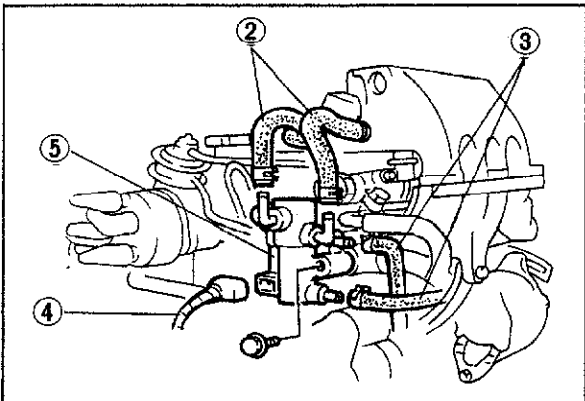


83U04A-045

ISC valve

1. Disconnect the BAC valve connector.
2. Connect an ohmmeter to the terminals of the BAC valve.
3. Check the resistance.

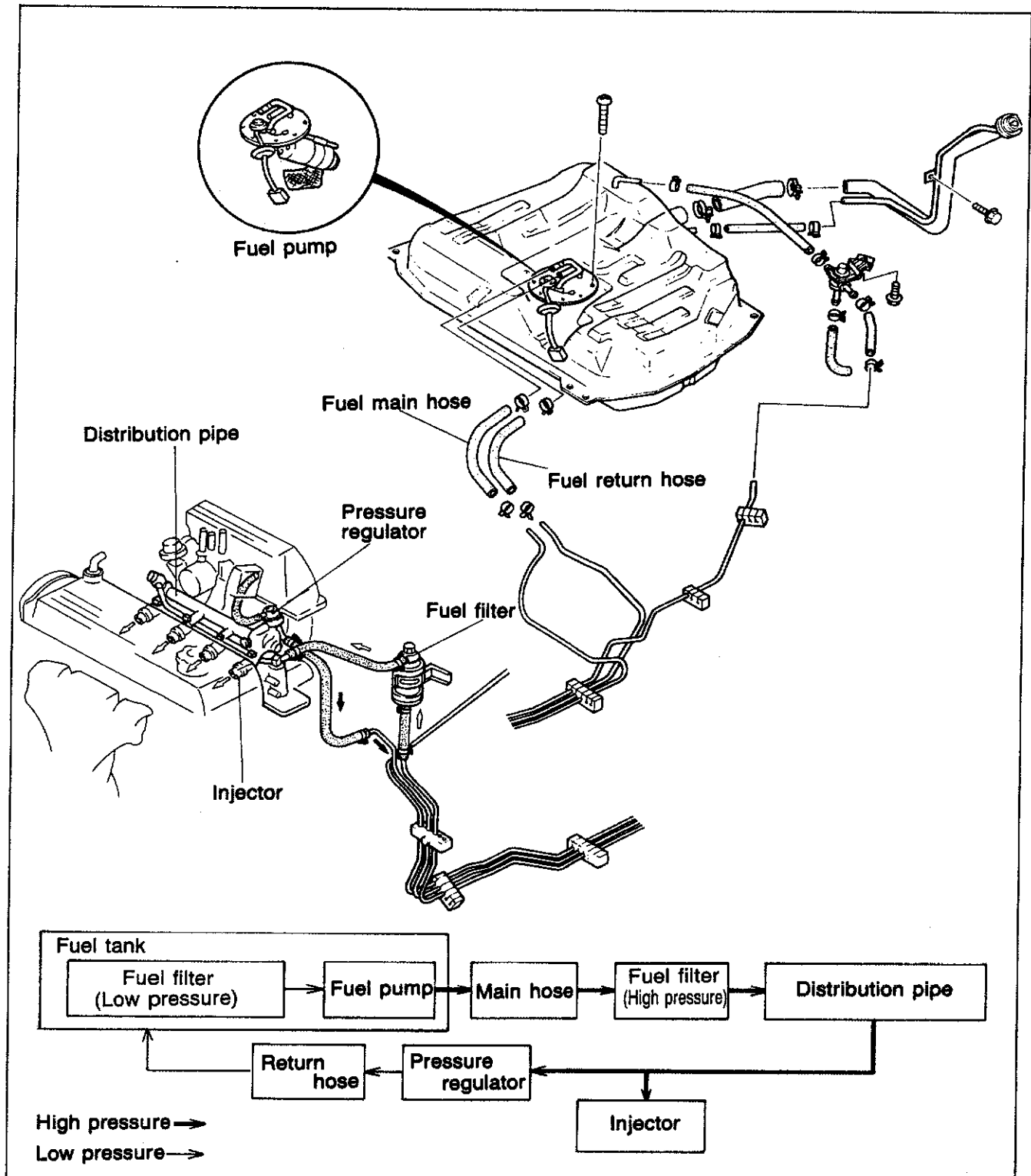
Resistance: 5—20 Ω



83U04A-046

Removal and Installation

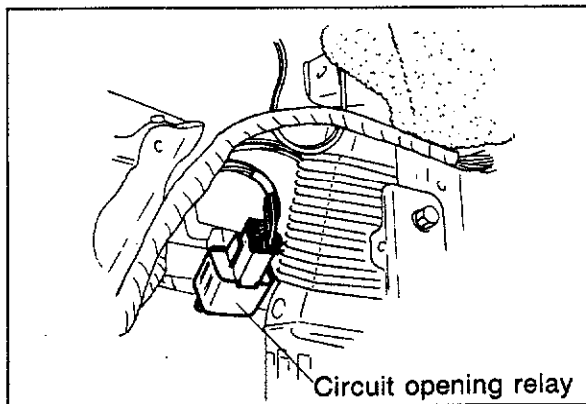
1. Drain the water from radiator.
2. Disconnect the by-pass air hoses.
3. Disconnect water hoses.
4. Disconnect the BAC connector.
5. Remove the BAC valve.
6. Install in the reverse order of removal.

FUEL SYSTEM

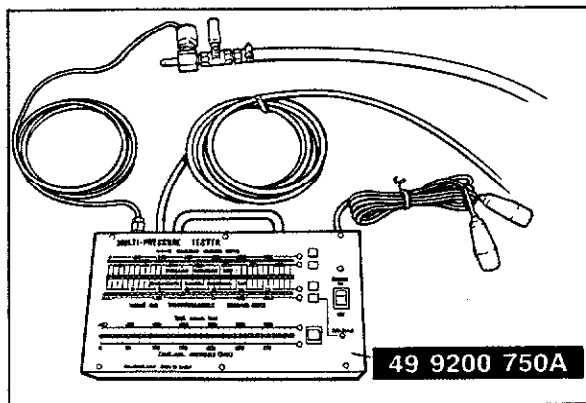
63U04B-514

The fuel system supplies the injectors with fuel necessary for combustion at a constant pressure. Fuel is metered and injected into the intake manifold and intake ports according to the injection signals from the engine control unit.

The system consists of the fuel pump, fuel filter, distribution pipe, pressure regulator and the injectors.



83U04A-047

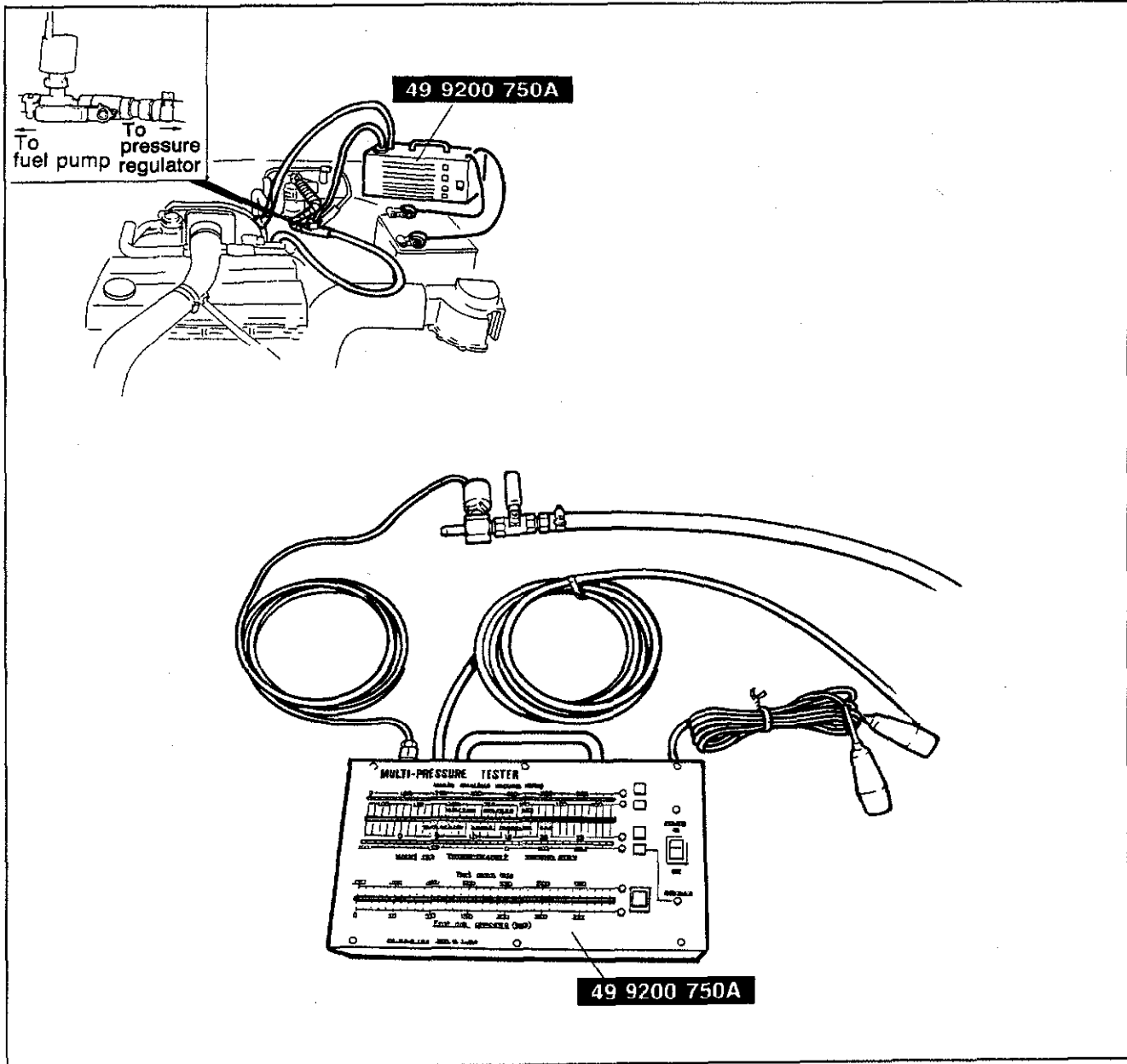


69G04A-098

FUEL PRESSURE RELEASE AND SERVICING FUEL SYSTEM

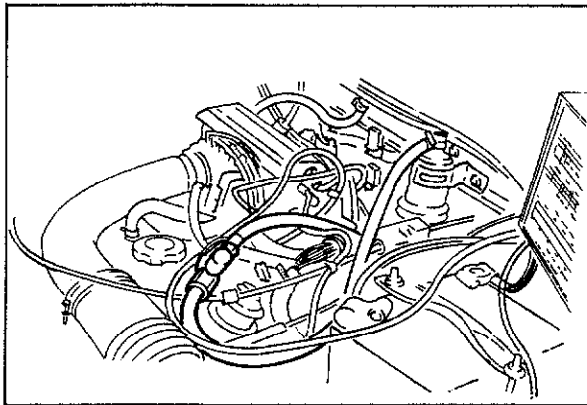
Fuel in the fuel lines remains under high pressure even when the engine is not running.

- a) Before disconnecting any fuel line, release the fuel pressure from the fuel line to reduce the possibility of injury or fire.
 1. Start the engine.
 2. Disconnect the circuit opening relay connector.
 3. After the engine stalls, turn OFF the ignition switch.
 4. Connect the circuit opening relay connector.
- b) Use a rag as protection from fuel spray when disconnecting the hoses.
Plug the hoses after removal.
- c) When inspecting the fuel system, use **SST**.

MULTI-PRESSURE TESTER (49 9200 750A)

69G04A-099

The **MULTI-PRESSURE TESTER** (49 9200 750A) has been developed to check the fuel pressure and intake manifold vacuum. These can easily be inspected by setting the buttons on the tester.



How to Connect Multi-Pressure Tester

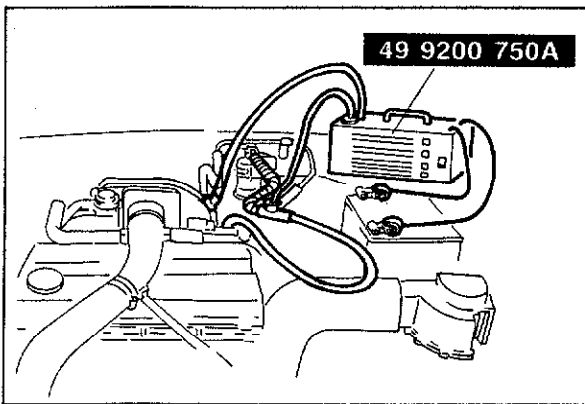
Warning

Before connecting SST, release the fuel pressure from the fuel line to reduce the possibility of injury or fire. (Refer to page 4A—34)

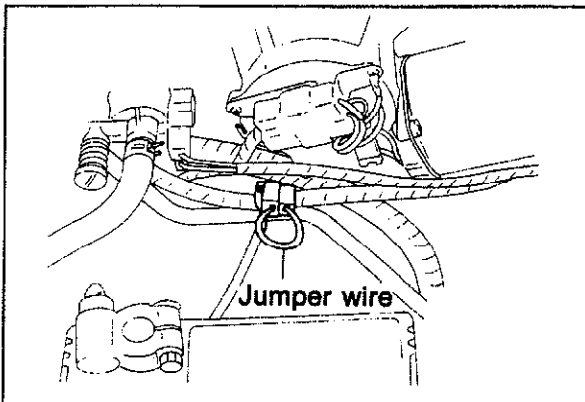
1. Disconnect the battery negative terminal.
2. Disconnect the fuel main hose from the fuel filter (high pressure side)
3. Connect **SST** between fuel main hose and pressure regulator using the adapter.

Caution

Do not reverse the adapter connection.



4. Disconnect the vacuum hose from the pressure regulator control solenoid valve, and connect **SST** vacuum hose using a three-way joint.
5. Connect the battery negative terminal.
6. Connect **SST** to the battery.



7. Connect the terminals of the test connector (yellow connector) with a jumper wire. Turn the ignition switch ON to operate the fuel pump.
8. Check for fuel leaks.

Caution

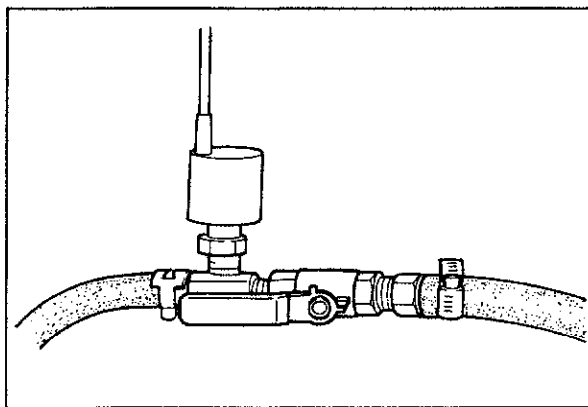
After checking fuel leakage, turn the ignition switch OFF and disconnect the jumper wire from the test connector.

TROUBLESHOOTING CHART

Before performing the following troubleshooting, check the condition of the wiring harness and connector.

| POSSIBLE CAUSE | | Water thermo sensor | Air flow meter | Intake air thermo sensor | Throttle sensor | Atmospheric pressure sensor | Oxygen sensor | Fuel pressure (Fuel pump pressure, line pressure) | Injector | Engine control unit terminal voltage | | |
|--|------------------|---------------------|----------------|--------------------------|-----------------|-----------------------------|---------------|---|----------|--------------------------------------|----|----|
| | | | | | | | | | | 3C | 3E | 3B |
| SYMPTOM | | 4A-68 | 4A-65 | 4A-68 | 4A-66 | 4A-70 | 4A-69 | 4A-38 | 4A-41 | 4A-61,62 | | |
| Hard start or won't start (Crank OK) | | 3 | | | | | | 1 | 2 | 5 | 6 | 4 |
| Engine stall | While warming up | 3 | 4 | 5 | | 6 | | 1 | 2 | 7 | 8 | |
| | After warming up | 3 | 4 | 5 | | 6 | 7 | 1 | 2 | 8 | 9 | |
| Rough idle | While warming up | 3 | 4 | 5 | | 6 | | 1 | 2 | 7 | 8 | |
| | After warming up | 3 | 4 | 5 | | 6 | 7 | 1 | 2 | 8 | 9 | |
| Poor acceleration, hesitation or lack of power | | 4 | 5 | | 1 | | | 2 | 3 | 6 | 7 | |
| Runs rough on deceleration | | 2 | | | | | | | 1 | 3 | 4 | |
| Afterburn in exhaust system | | 3 | 4 | 5 | | | | 1 | 2 | 6 | 7 | |
| Poor fuel consumption | | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 9 | 10 | |
| Fails emission test | | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 9 | 10 | |

83U04A-049



83U04A-050

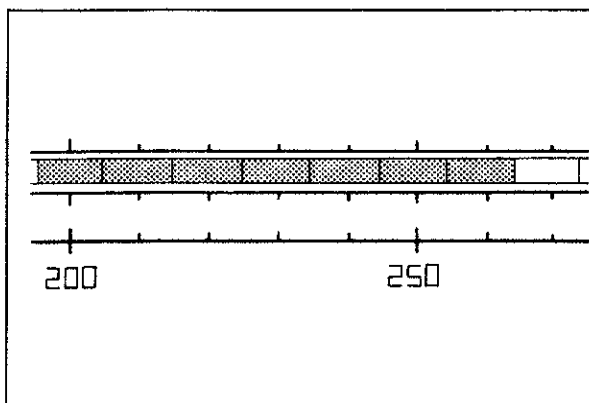
FUEL PRESSURE

Note

- When inspecting fuel pressure, use SST. (Refer to page 4A—36)
- Warm up the engine to normal operating temperature.

Injection Pressure

- Set the lever on the adapter as shown in the figure.

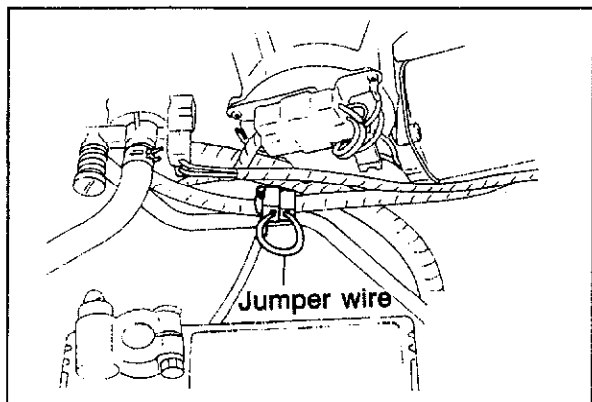


83U04A-051

- Run the engine and measure the injection pressure at various speeds.

**Injection pressure: Approx. 240—279 kPa
(2.45—2.85 kg/cm², 34.8—40.5 psi)**

- If not within specification, check the fuel pump pressure, fuel line pressure, and injector (Refer to page 4A—41)



83U04A-052

Fuel Pump Pressure

- Connect the terminals of the test connector (yellow connector) with a jumper wire.
- Turn the ignition switch ON to operate the fuel pump.

- Move the lever on the adapter as shown in the figure.
- Check the fuel pump pressure.

**Fuel pump pressure: 441—588 kPa
(4.5—6.0 kg/cm², 64.0—85.3 psi)**

- If the fuel pump pressure is not within specification, check the followings.

No pressure

Fuel pump operation (Refer to page 4A—40)

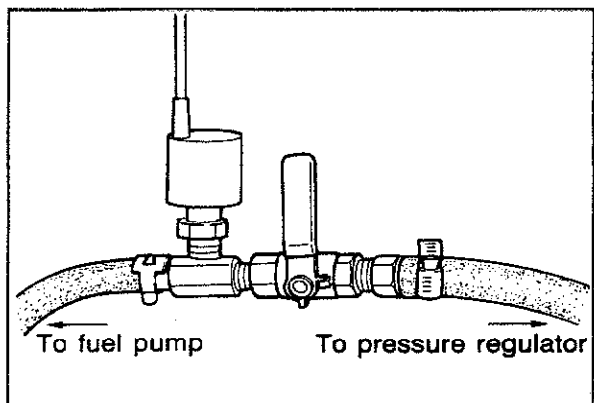
Low pressure

Fuel pump feeding capacity (Refer to page 4A—40)

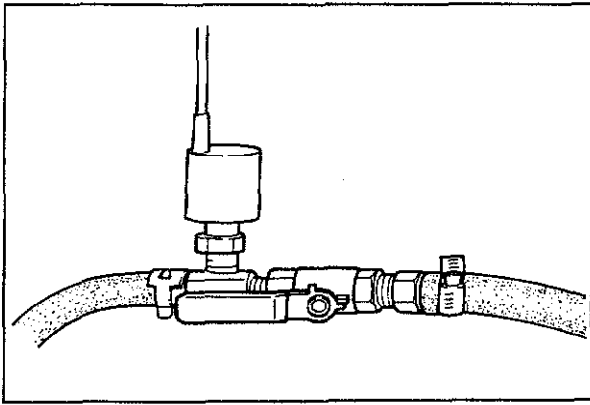
High pressure

Replace the fuel pump

- After checking the fuel pump pressure, disconnect the jumper wire from the test connector.



83U04A-053



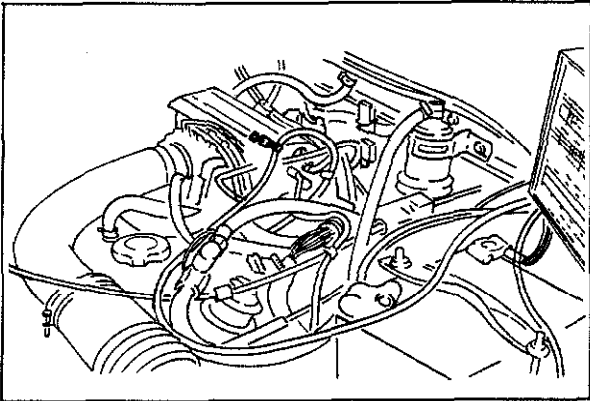
83U04A-054

Fuel line Pressure

1. Start the engine and run it idle.
2. Move the lever on the adapter as shown in the figure.
3. Check the fuel line pressure.

**Fuel line pressure: Approx. 177—216 kPa
(1.8—2.2 kg/cm², 24.6—31.3 psi)**

4. If not within specification, check the vacuum hose.

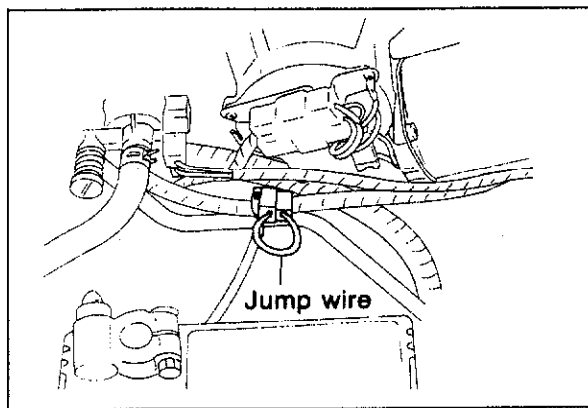


83U04A-055

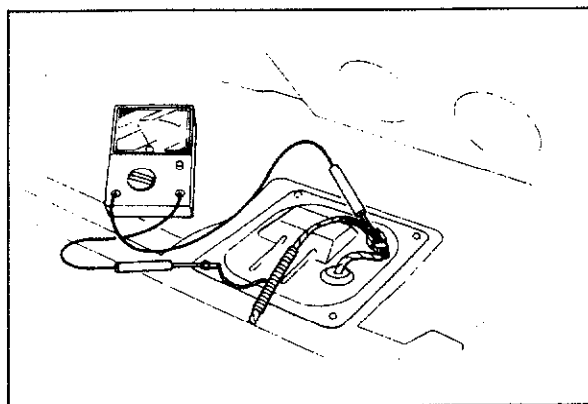
5. Pinch a vacuum hose of pressure regulator.
6. Check the fuel line pressure.

**Fuel line pressure: 240—279kPa
(2.45—2.85 kg/cm², 34.8—40.5 psi)**

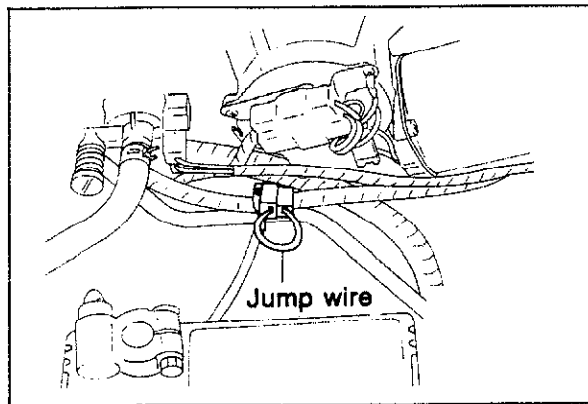
7. If not within specifications, replace the pressure regulator.
8. Connect the vacuum hose to pressure regulator.



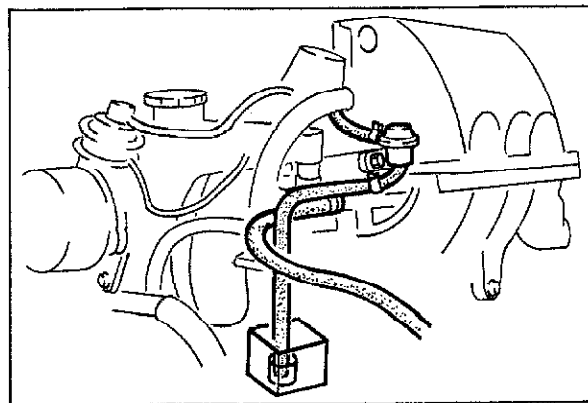
83U04A-056



83U04A-057



83U04A-058



83U04A-059

INSPECTION

Fuel Pump (Operation Test)

1. Connect a jumper wire to the check connector (Yellow connector).
2. Open the fuel tank lid, and fuel filler cap.
3. Turn the ignition switch ON.
4. Check that the fuel pump operation sound.
5. Shut the fuel filler cap, and fuel tank lid.

6. If operation sound is not produced, check the voltage at the fuel pump connector.

Voltage: 12V

(IG: ON, Voltmeter [GR and B] connected)

7. If the voltage normal, replace the fuel pump.

Fuel pump (Volume test)

Warning

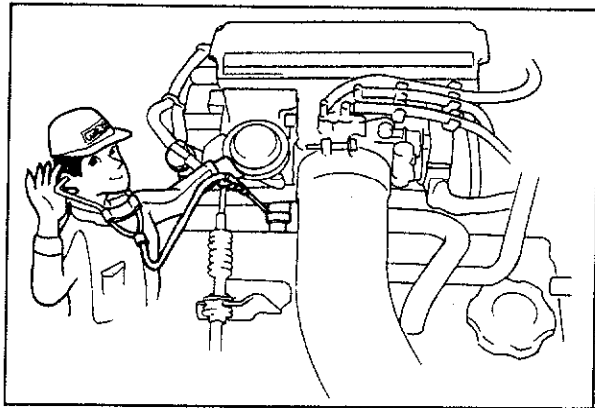
Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4A—34)

1. Connect a jumper wire to check connector (Yellow connector).
2. Disconnect the fuel return hose from fuel return pipe.

3. Turn the ignition switch ON for 10 seconds, and check the feeding capacity with graduated cylinder.

Feeding capacity: 220—380 cc (13.4—23.2 cu-in) when fuel pressure at 250 kPa (2.55 kg/cm², 36.3 psi)

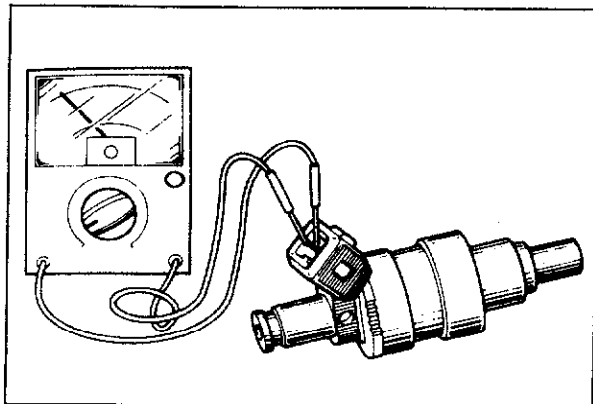
4. If not within specification, check the fuel filter, and fuel line.



83U04A-060

Injector (On-vehicle inspection)

1. Warm up the engine and run at idle.
2. Check the operating sound of the injector, using a sound scope. Check that operating sounds are produced from each injector at idle and at acceleration.
3. If operating sound is not produced, check the followings.
 - Wiring harness
 - Injector resistance
 - Engine control unit terminal voltage of 3C, 3E, 3B, and 3D (refer to page 4A—62).



83U04A-061

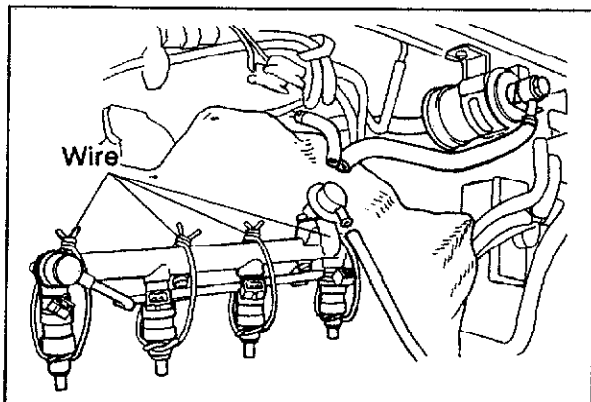
Injector (Resistance)

Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4A—34)

1. Remove the injector from the engine. (Refer to page 4A—44)
2. Check that the resistance of the injector.

Resistance: 11—15 Ω



83U04A-062

Injector (Leak test)

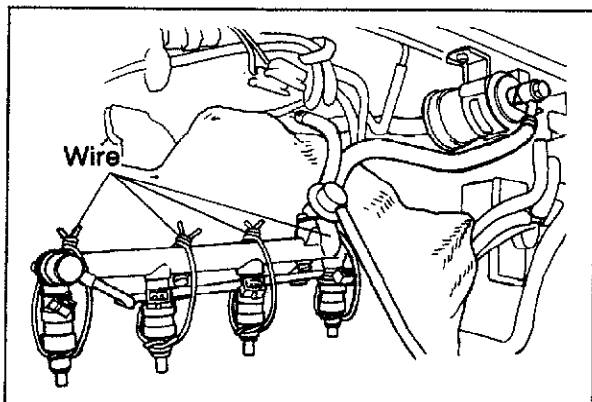
Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4A—34)

1. Remove the delivery pipe, injector, and pressure regulator. (Refer to page 4A—44)
2. Affix the injectors to the distribution pipe with wire.

Caution

Affix the injectors firmly to the distribution pipe so no movement of the injectors is possible.

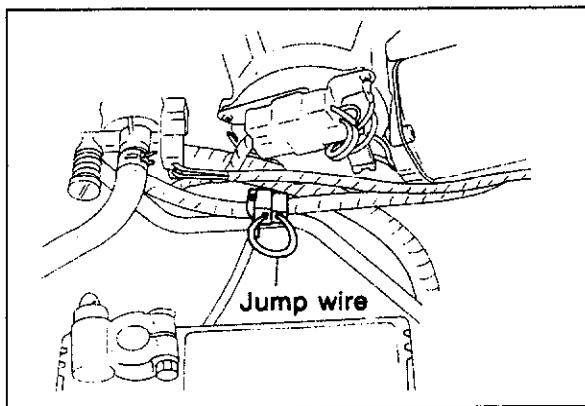


83U04A-063

3. Connect the distribution pipe assembly between the fuel filter and the return pipe.
4. Connect the return hose to the pressure regulator.
5. Connect the negative terminal of the battery.

Warning

Be extremely careful when working with fuel; always work away from sparks or open flames.



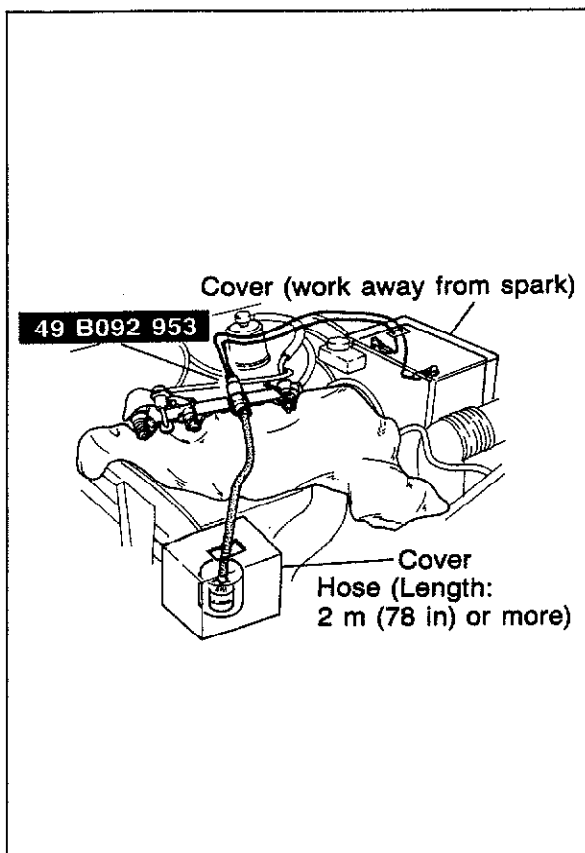
83U04A-064

6. Connect a jumper wire to the check connector (Yellow terminal).
7. Turn the ignition switch ON.
8. Check that fuel does not leak from injector.

Note

After 5 minutes a very slight amount of fuel leakage from the injector is acceptable.

9. If fuel leaks, replace the injector.



83U04A-065

Injector (Volume test)

1. Connect a suitable vinyl hose to the injector and place the hose in the container, or graduated glass etc.

Note

The hose should be 2 m (78 in) or more

2. Connect the terminals of the fuel pump check connector with a jumper wire.

Warning

Be extremely careful when working with fuel; always work away from sparks or open flames.

3. Apply battery voltage to each injector, using the SST.
4. Turn the ignition switch ON.
5. Check the injection volume.

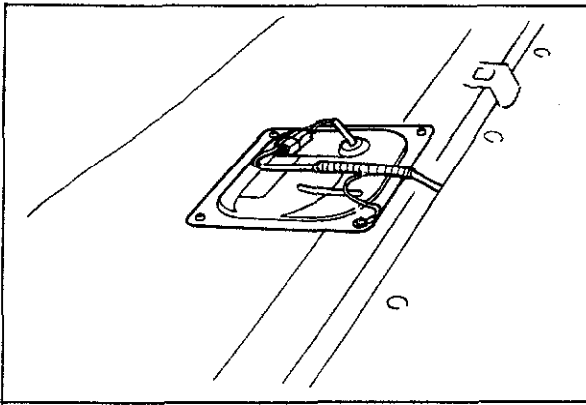
**Specification: 32—41 cc
(1.95—2.50 cu in)/15 sec.**

6. If not correct, replace the injector.

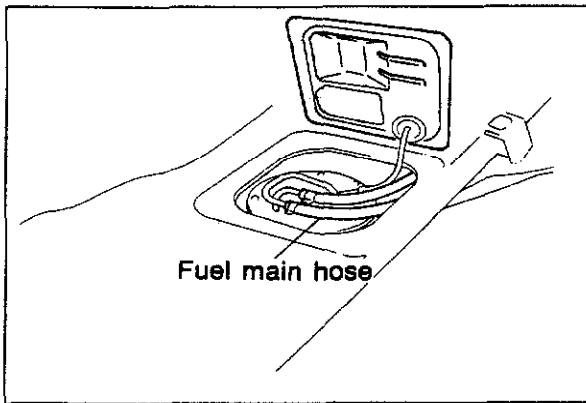
REMOVAL AND INSTALLATION

Caution

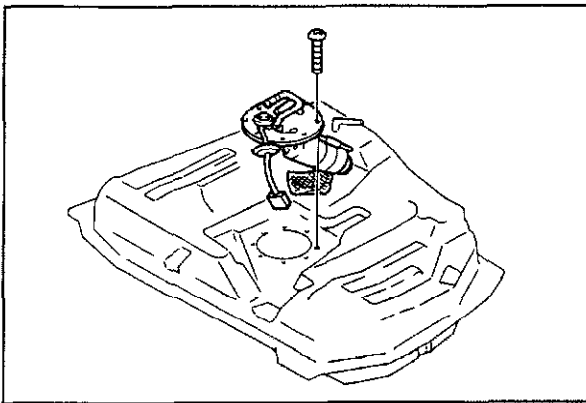
- a) Before performing the following procedure, release the fuel pressure from the fuel line to reduce the possibility of injury or fire (Refer to page 4A—34).
- b) When servicing the fuel system, keep sparks, cigarettes and open flames away from the fuel.



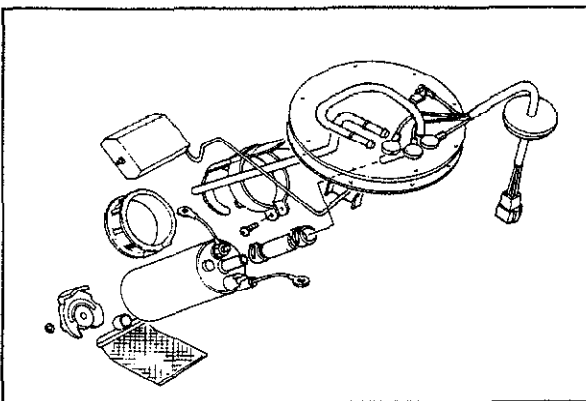
83U04A-066



83U04A-067



83U04A-068



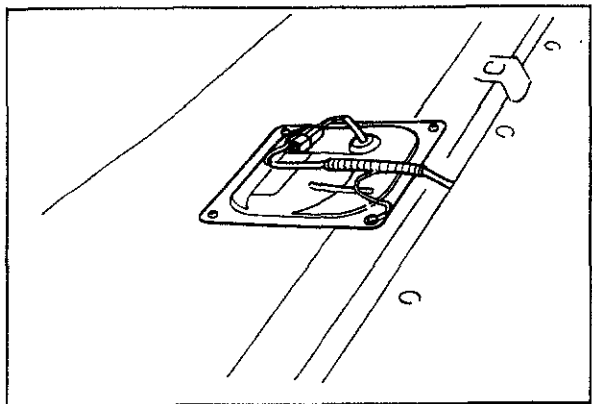
83U04A-069

Fuel Pump

1. Remove the rear seat.
2. Remove the filler cap.
3. Disconnect the fuel pump connector.
4. Remove the fuel pump cover.
5. Disconnect the fuel main and return hoses, then plug them to prevent fuel leakage.
6. Remove the fuel pump and fuel tank gauge unit assembly.

Warning

Use of fire or smoking is strictly prohibited while working on the fuel system.



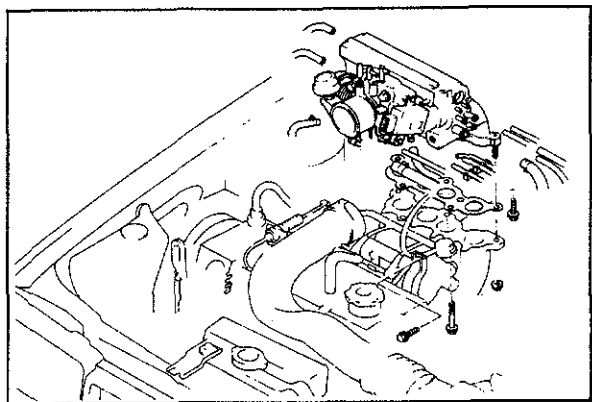
83U04A-070

7. Replace the fuel pump.

Caution

Secure the fuel pump terminals and fuel hose.

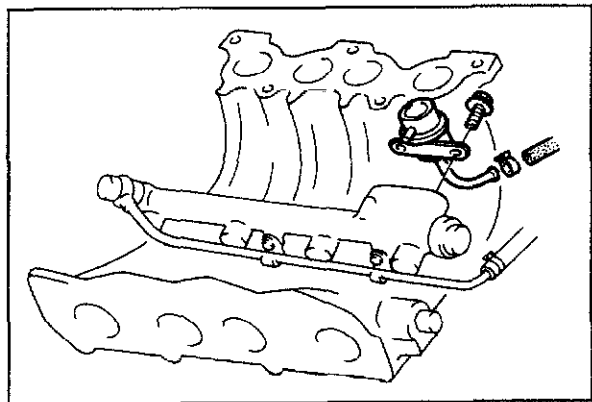
8. Install the fuel pump and fuel tank gauge unit assembly in the reverse order of removal.



83U04A-071

Pressure Regulator

1. Remove the dynamic chamber. (Refer to page 4A—26)



83U04A-072

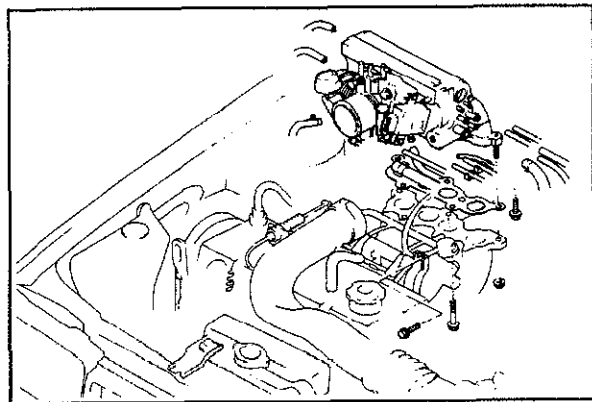
2. Disconnect the fuel return hose.

3. Remove the pressure regulator.

4. Install the pressure regulator and dynamic chamber in the reverse order of replacement.

Tightening torque:

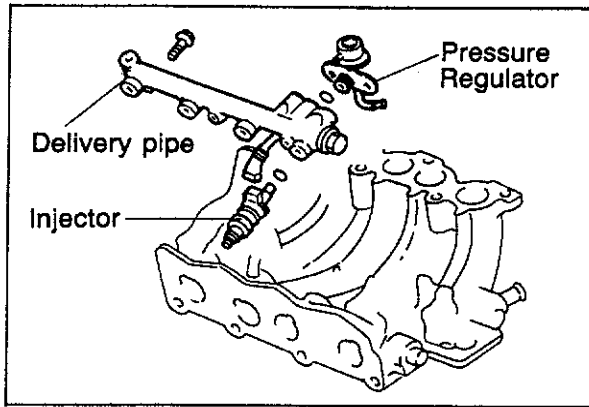
7.8—8.7 N·m (0.8—1.1 m·kg, 5.8—8.0 ft·lb)



83U04A-073

Injector

1. Remove the dynamic chamber. (Refer to page 4A—26)



83U04A-074

2. Disconnect the connectors from injector.
3. Remove the delivery pipe with pressure regulator.
4. Remove the injector.
5. Install the injector, delivery pipe, and pressure regulator in the reverse order of replacement.

Delivery pipe tightening torque

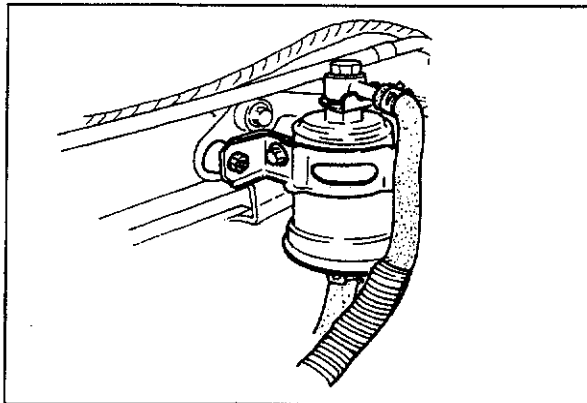
18.6—25.5 N·m

(1.9—2.6 m·kg, 13.7—18.8 ft·lb)

Note

a) O-ring of injector is not reuseable.

b) When install the injector, apply the gasoline on O-ring.



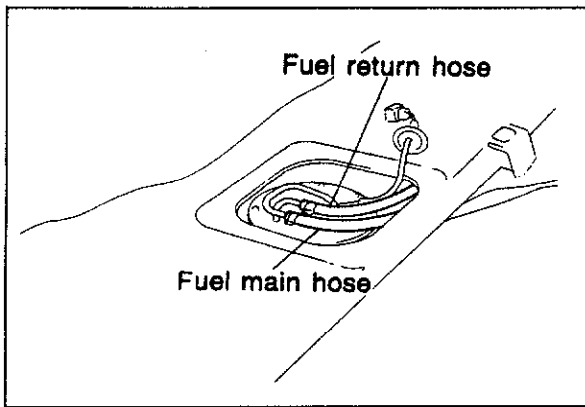
83U04A-075

Fuel Filter (High Pressure)

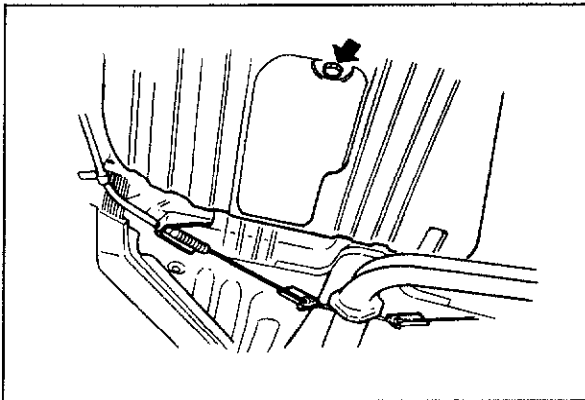
The fuel filter should be replaced at intervals, following the maintenance schedule.

To replace the fuel filter, proceed as follows:

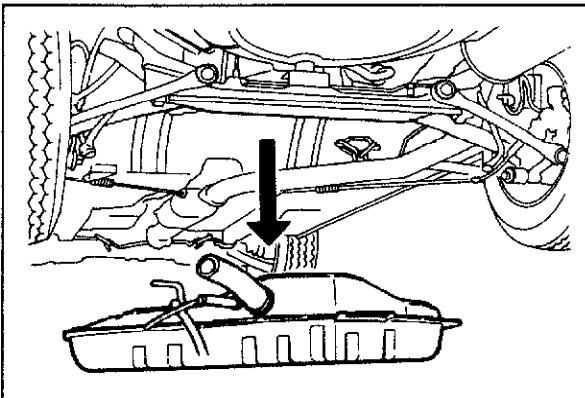
1. Disconnect the fuel hoses.
2. Remove the fuel filter with the bracket.
3. Install a new filter and connect the fuel hoses.



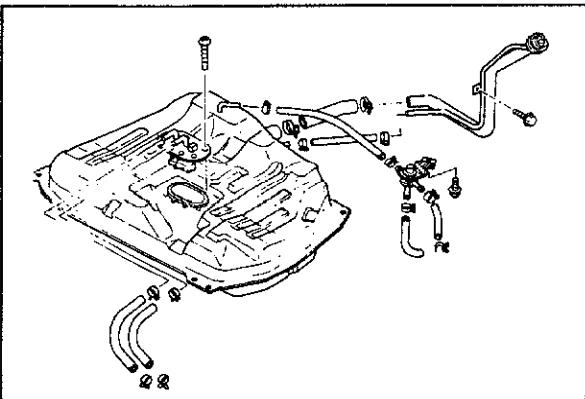
83U04A-076



63U04B-067



63U04B-068



63U04B-069

FUEL TANK Removal

Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4A—34)

1. Remove the rear seat cushion.
2. Disconnect the fuel tank gauge unit and remove the cover.
3. Disconnect the fuel main and return hoses.

4. Raise the vehicle on a jack and support it with safety stands.
5. Remove the drain plug and drain the fuel.

Warning

a) When repairing the fuel tank, clean the fuel tank thoroughly with steam to remove all explosive gas.

b) Use of fire is strictly prohibited while working on fuel tank.

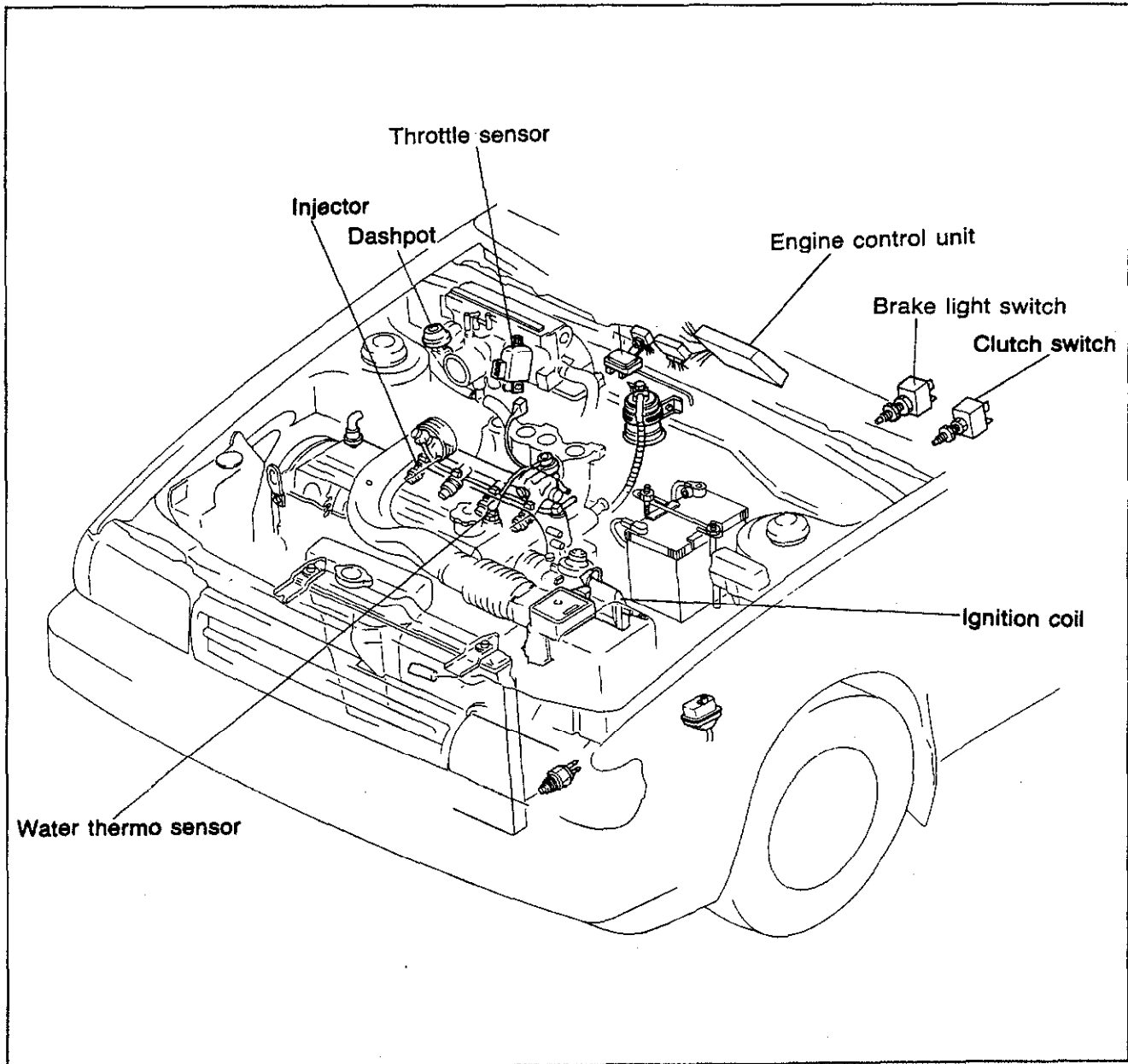
6. Disconnect the other hoses.
7. Remove the fuel tank.

Installation

Install in reverse order of removal and be careful of the following;

1. Make sure to connect the hoses in the correct positions.
2. Check for leaks.

DECELERATION CONTROL SYSTEM



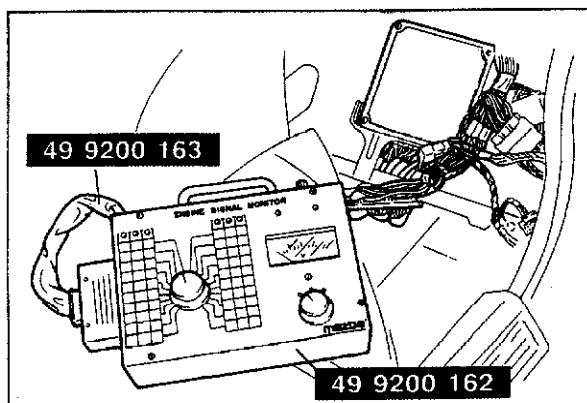
83U04A-077

The fuel cut function is provided in the deceleration control system.
This function is to improve fuel consumption.

TROUBLESHOOTING CHART

| POSSIBLE CAUSE Page | Water thermo sensor | Injector | Engine control unit terminal voltage | | Dashpot | | | | | |
|-----------------------------|---------------------|----------|--------------------------------------|----|---------|--|--|--|--|--|
| | | | 3C | 3E | | | | | | |
| SYMPTOM | 4A—68 | 4A—41 | 4A—62 | | 4A—49 | | | | | |
| Runs rough on deceleration | ③ | ② | ① | | ④ | | | | | |
| Afterburn in exhaust system | ② | ① | ③ | | ④ | | | | | |
| Poor fuel consumption | ② | ① | ③ | | ④ | | | | | |
| Fail emission test | ③ | ② | ① | | ④ | | | | | |

83U04A-078



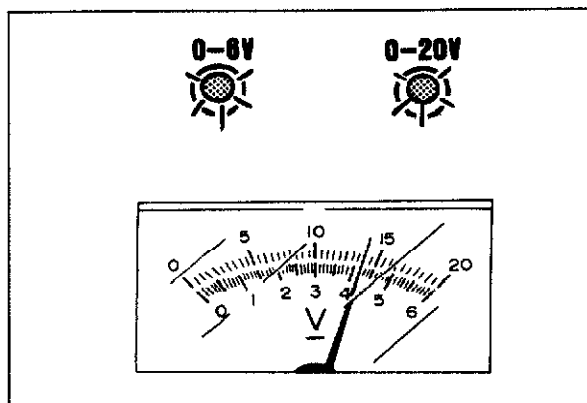
83U04A-079

System Inspection (Electrical Signal)

1. Connect **SST** between the wiring harness and engine control unit.
2. Warm up the engine, and run at idle.
3. Set "3C" and "3E" position on **SST**.

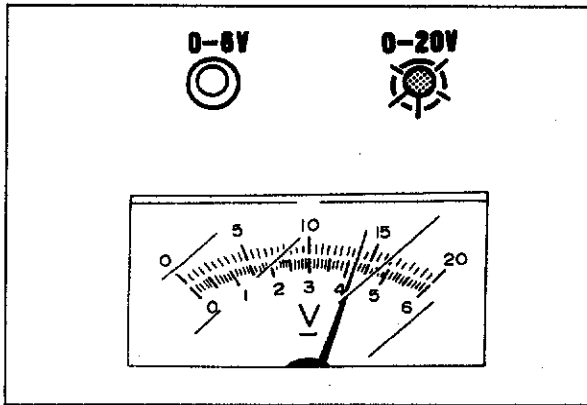
Note

- "3C" — For No. 2 and No.4 injectors
 "3E" — For No. 1 and No.3 injectors



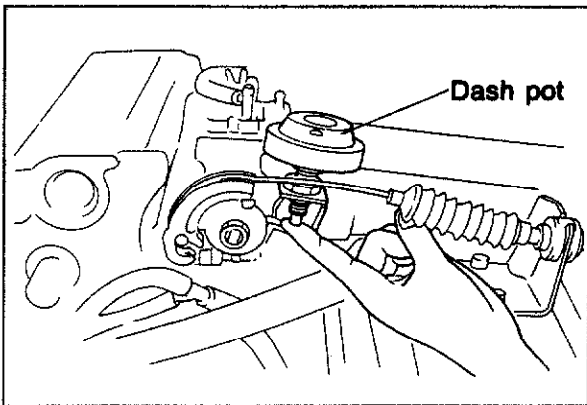
83U04A-080

4. Check that both indicator lamps flash at idle.



83U04A-081

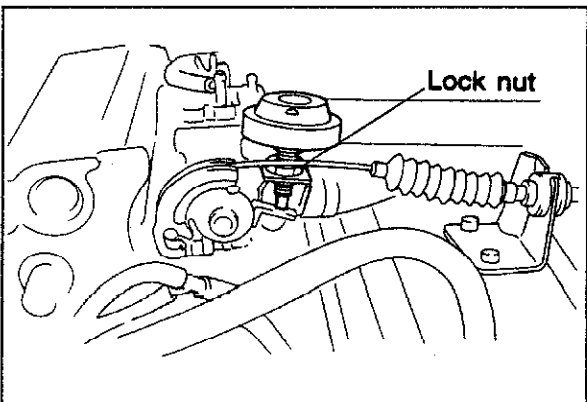
5. Increase the engine speed to **4,000 rpm**, then suddenly decrease the engine speed.
6. Check that only the red indicator lamp illuminates during deceleration.



83U04A-082

Dashpot Inspection

1. Push the dashpot rod with a finger and make sure the rod goes into the dashpot slowly.
2. Release the finger and make sure the rod comes out quickly.



83U04A-083

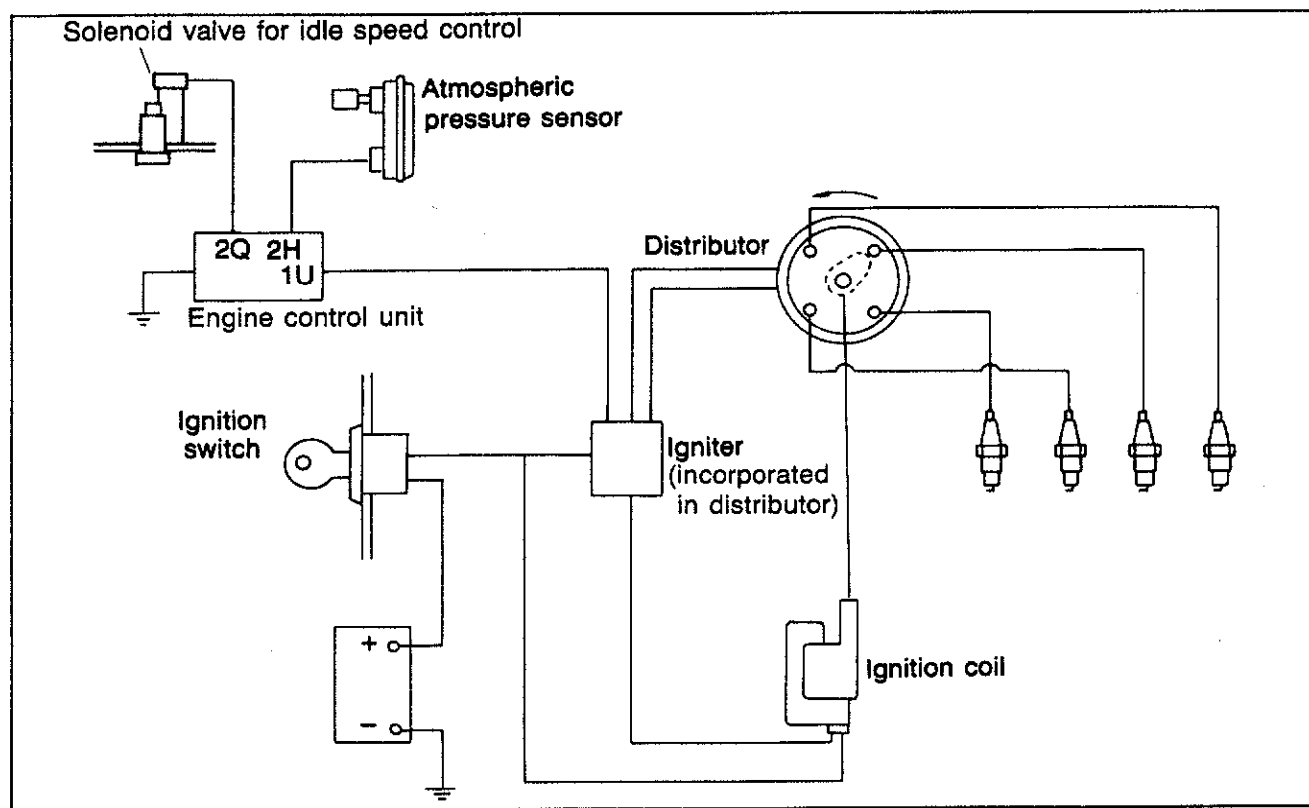
Adjustment

1. Warm up the engine to the normal operation temperature and run it at idle speed.
2. Attach a tachometer.
3. Increase the engine speed above **3,500 rpm**.
4. Slowly decrease the engine speed, check the dashpot rod touches the lever at specified speed.

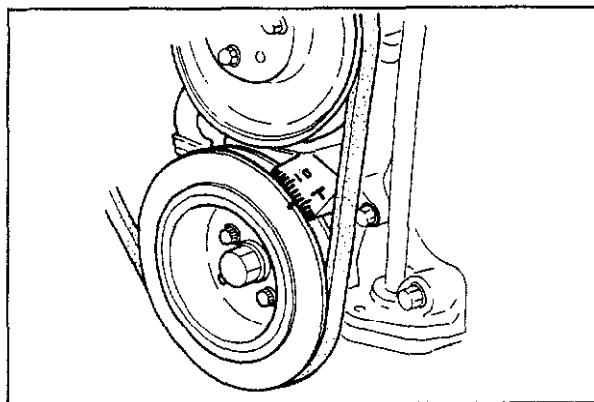
**Contact speed: 2,800 ± 150 rpm (MTX)
2,800 ± 300 rpm (ATX)**

5. To adjust, loosen the lock nut and adjust by turning the dashpot, tighten lock nut after adjusting.

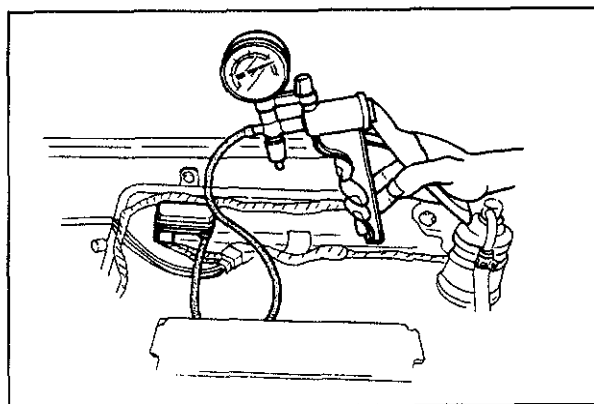
HIGH ALTITUDE COMPENSATION SYSTEM



63U04B-081



63U04B-082



83U04A-121

SYSTEM INSPECTION CHECKING

Note

This procedure described is for sea level areas only.

1. Warm up the engine and run it at idle.
2. Connect a timing light to the No.1 high-tension lead and check the ignition timing.

Ignition timing: approx. 7° BTDC (vacuum connected)

3. Connect a vacuum pump to the atmospheric pressure sensor.
4. Apply a vacuum of **120 mmHg (4.72 inHg)** by using the vacuum pump and check the ignition timing.

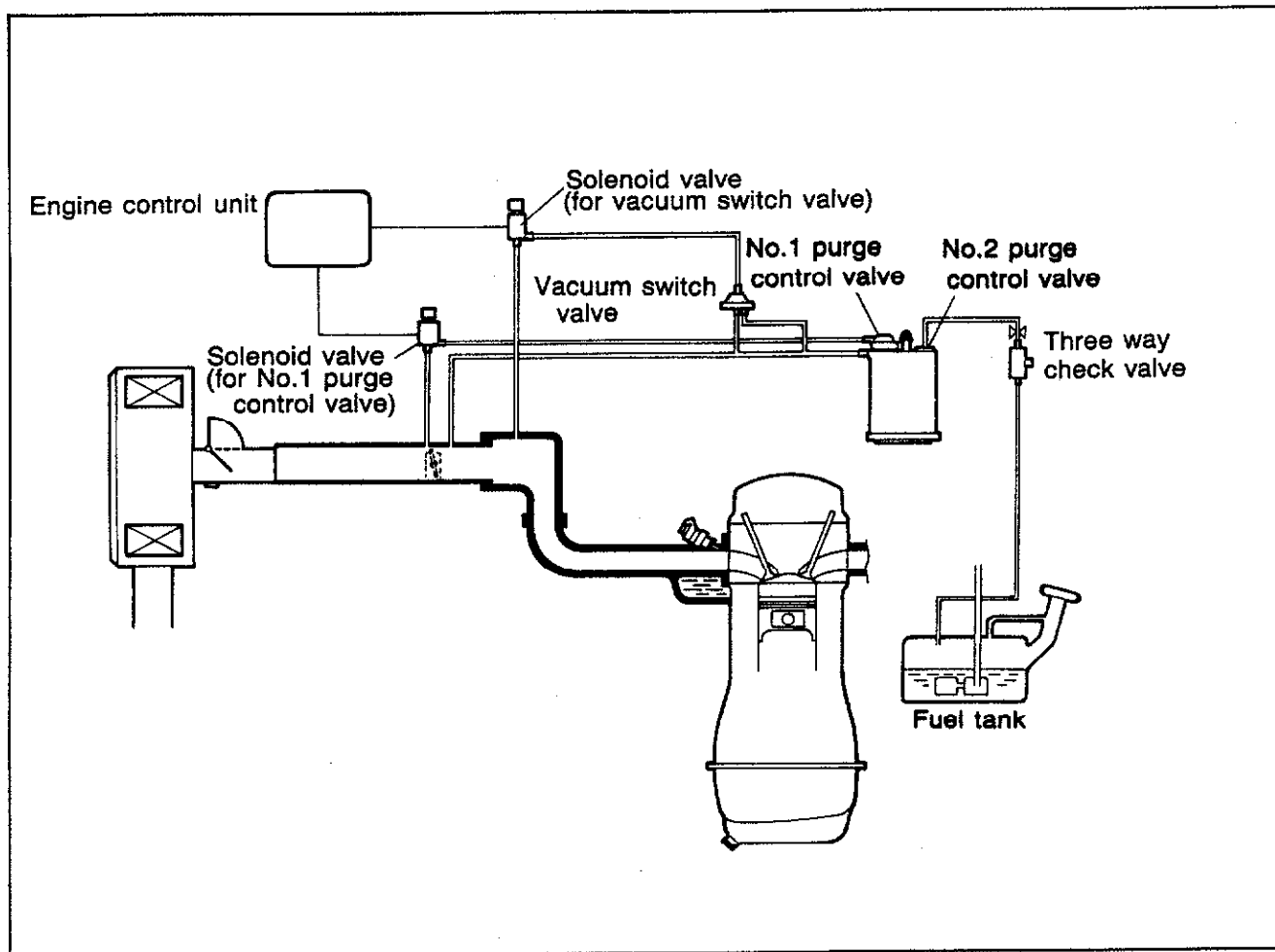
Ignition timing: approx. 13° BTDC

Note

At 1,000 m (3,280 ft) or higher altitude area, the ignition timing is the same as above.

5. If this system does not operate inspect the atmospheric pressure sensor (Refer to page 4A—70), and engine control unit (Refer to page 4A—61, 62)

EVAPORATIVE EMISSION CONTROL SYSTEM



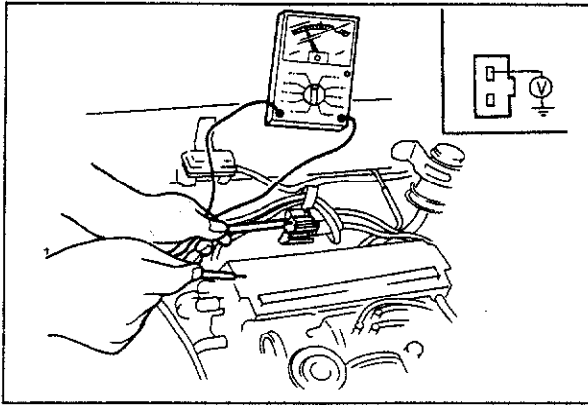
83U04A-084

The evaporative emission control system is controlled by signal from the water thermo sensor, intake air thermo sensor, air flow sensor, and engine speed sensor (ignition coil). The engine control unit determined the engine operating conditions from the signals, and control the evaporative emission control system by operating the solenoid valves for No. 1 purge control valve and vacuum switch valve when specified conditions exist.

TROUBLE SHOOTING CHART

| POSSIBLE CAUSE | Ignition coil | Water thermo sensor | Intake air thermo sensor | Engine control unit | | Solenoid valve (for No.1 vacuum switch valve) | Solenoid valve (for vacuum switch valve) | Vacuum switch valve | No.1 purge control valve | No.2 purge control valve | Three-way check valve |
|----------------|---------------|---------------------|--------------------------|---------------------|----|--|---|---------------------|--------------------------|--------------------------|-----------------------|
| | | | | 2O | 2P | | | | | | |
| | | | | 4A-62 | | | | | | | |
| SYMPTOM | 5-30 | 4A-68 | 4A-68 | 4A-62 | | 4A-54 | | 4A-55 | 4A-54 | 4A-54 | 4A-55 |
| Checking order | ⑪ | ⑩ | ⑨ | ③ | ④ | ① | ② | ⑦ | ⑤ | ⑥ | ⑧ |

83U04A-999

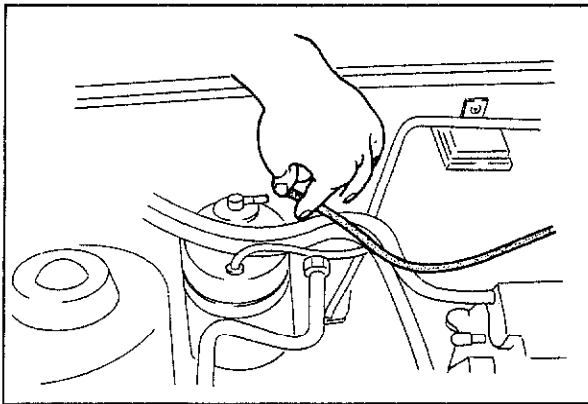


83U04A-203

SYSTEM INSPECTION

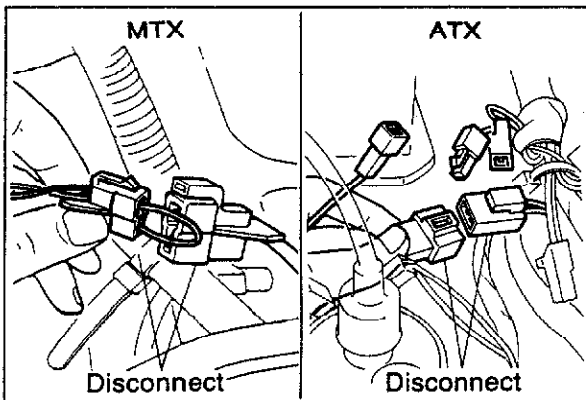
1. Warm up the engine and run it at idle.
2. Connect a voltmeter to the solenoid valve for No. 2 purge control valve (BY) terminal

Voltage: approx. 12V



63U04B-095

3. Disconnect the vacuum hose from the No. 1 purge control valve and place a finger over the hose opening.
4. Increase the engine speed to about **2,000 rpm** and make sure air is not sucked in.

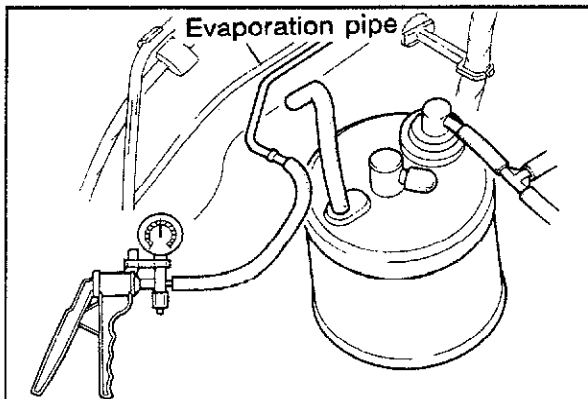


83U04A-085

5. Disconnect the neutral switch connector and connect a jump wire to the neutral switch connector (MTX).
(Disconnect the inhibitor switch connector....ATX)
6. Check the terminal voltage (BY)

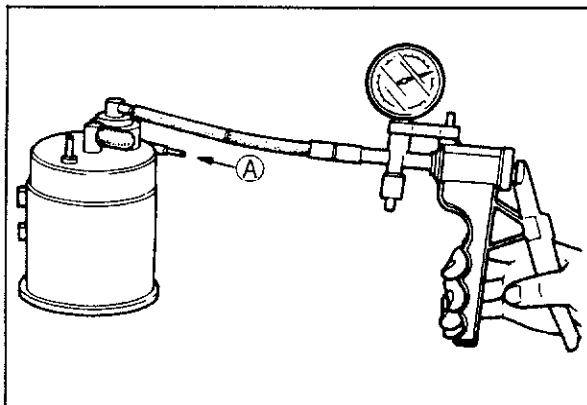
Voltage: below 1.5V

7. Place finger over the hose opening.
8. Increase the engine speed to about **2,000 rpm** and check that air is sucked in.
9. If not correct, check the solenoid valve, for No. 1 purge control valve engine control unit 2P terminal, and No. 1 purge control valve.
10. Connect the neutral switch connector.
11. Disconnect the evaporation hose from the evaporation pipe.
12. Connect the vacuum pump to the evaporation pipe.
13. Operate the vacuum pump and check that no vacuum is held.
14. If vacuum is held, check the three-way check valve or evaporation pipe for clog.



83U04A-087

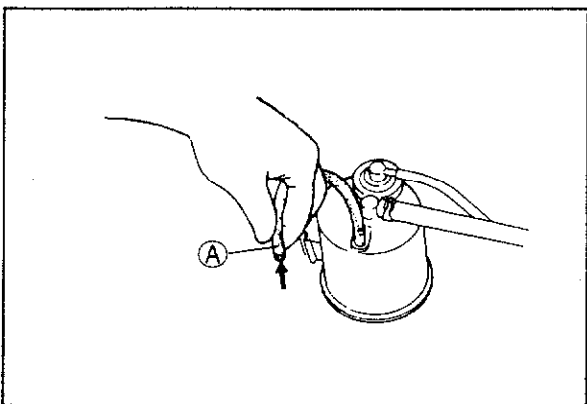
4A EVAPORATIVE EMISSION CONTROL SYSTEM



NO. 1 PURGE CONTROL VALVE

Inspection

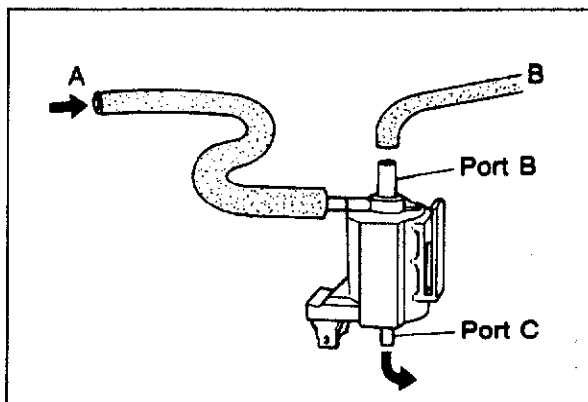
1. Blow through the purge control valve from port (A) and check that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.33 inHg)** vacuum, and blow through port (A) again; air should flow from port (A).



NO. 2 PURGE CONTROL VALVE

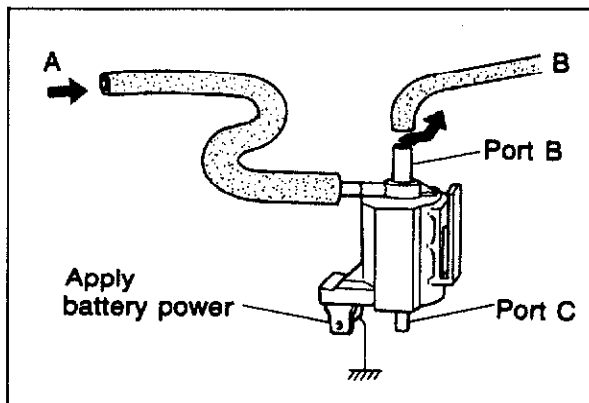
Inspection

1. Disconnect vacuum hose (A) from the evaporation pipe.
2. Blow into the hose and check that air flows freely.

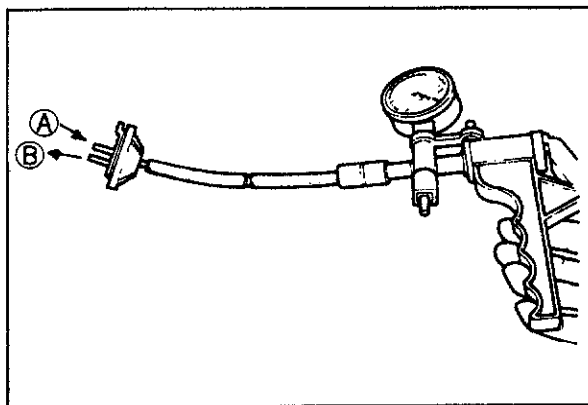


SOLENOID VALVE

1. Disconnect vacuum tube (A) from the servo diaphragm.
2. Disconnect vacuum tube (B) from the solenoid valve.
3. Disconnect the connector of the solenoid valve.
4. Blow air through the solenoid valve from tube (A) and make sure air comes out of port (C).



5. Apply battery power to the solenoid valve with a suitable jump wire.
6. Blow air through the solenoid valve from tube (A) and check that air comes out of port (B).
7. If the solenoid valve does not operate properly, replace it with a new one.



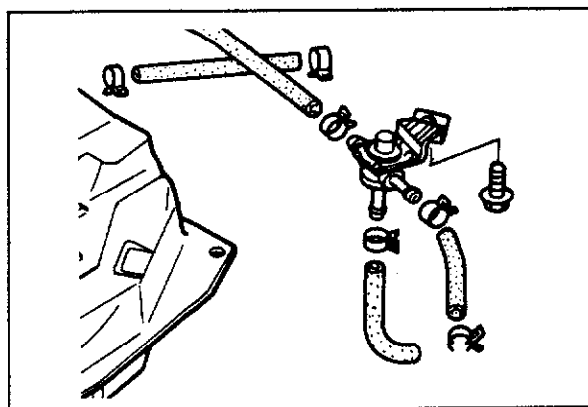
83U04A-090

VACUUM SWITCH VALVE

1. Remove the No. 3 purge control valve.
2. Connect a vacuum pump to the valve.
3. Blow through the valve from port (A) and confirm that air comes out of port (B) when applied vacuum is more than the specified vacuum amount.

Specified vacuum:

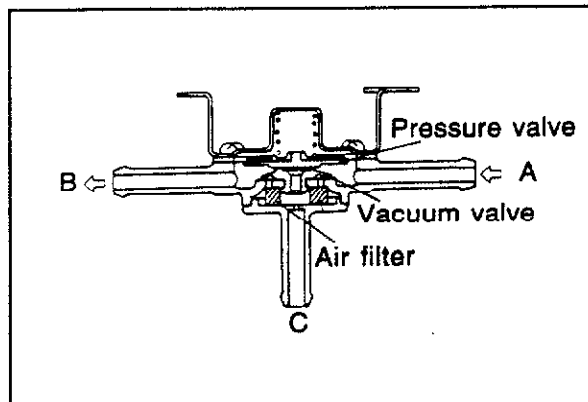
70—100 mmHg (2.76—3.94 inHg)



63U04B-102

THREE-WAY CHECK VALVE

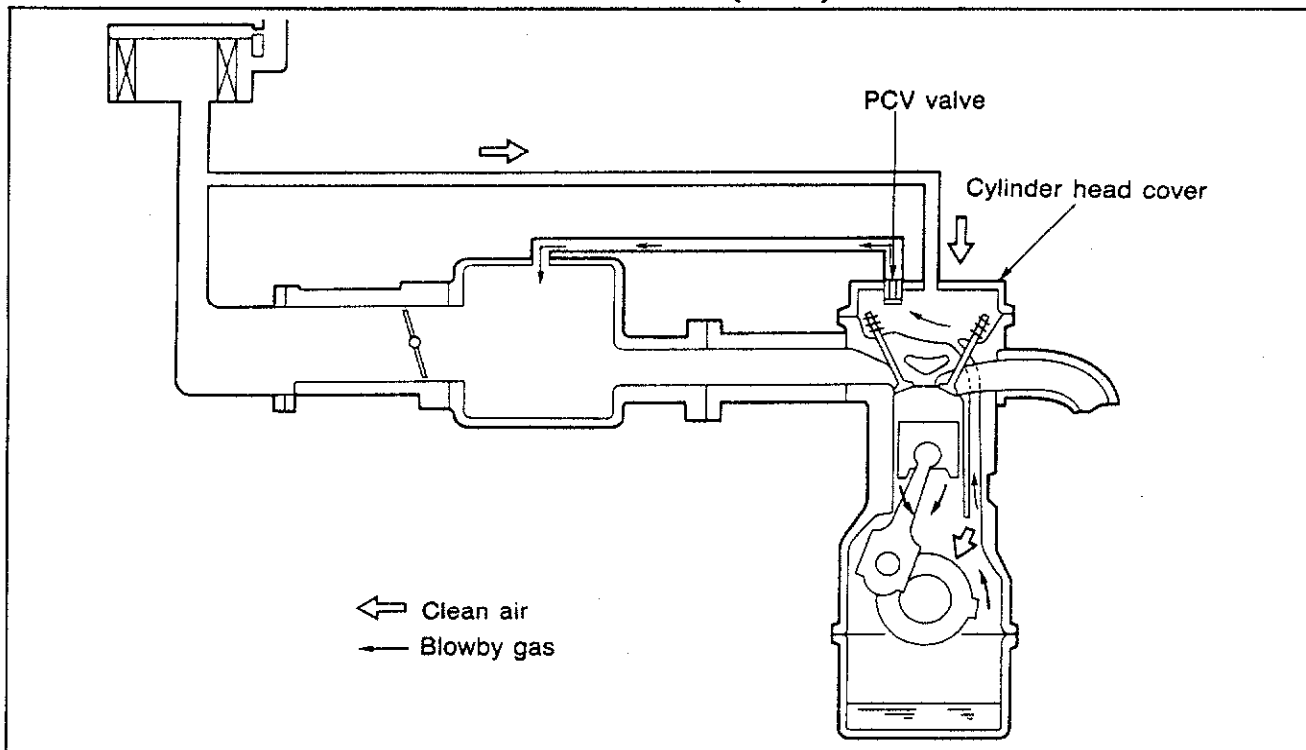
1. Remove the three-way check valve.



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2. Blow through the valve from port (A), and check that air flows out through port (B). Next, block port (B), and check that air flows out through port (C).
3. Block port (B), and suck through port (A). Check that air is pulled in through port (C).

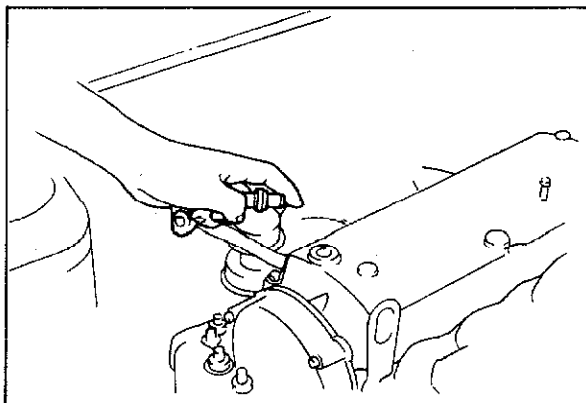
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



83U04A-091

The PCV valve is operated by intake manifold vacuum to prevent blow-by gas from escaping to the atmosphere. When the engine is running at idle, the PCV valve is slightly opened and small amount of blow-by gas is drawn into the dynamic chamber.

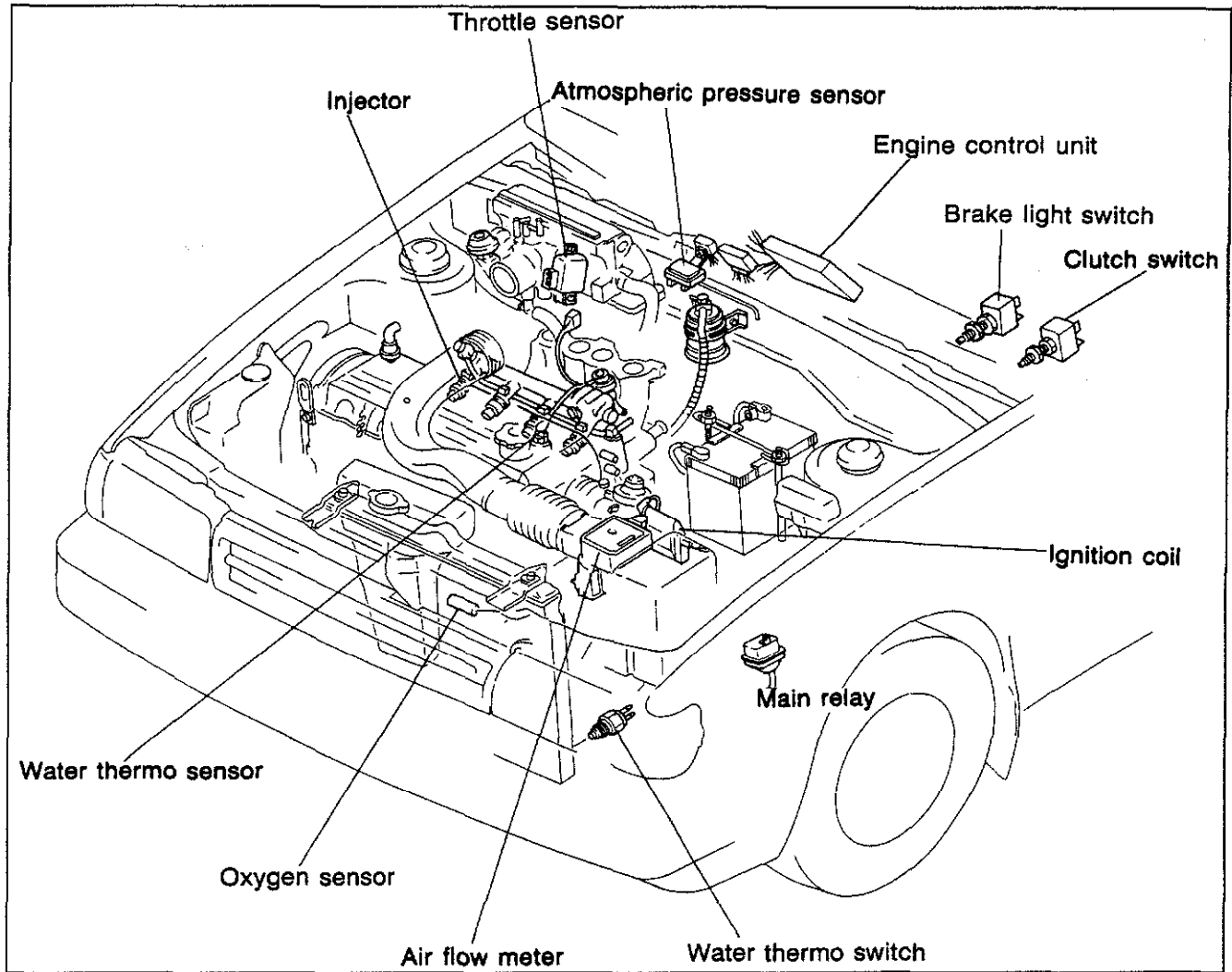
At high engine speed, the PCV valve is further opened and large amount of blow-by gas; drawn into the dynamic chamber.



83U04A-118

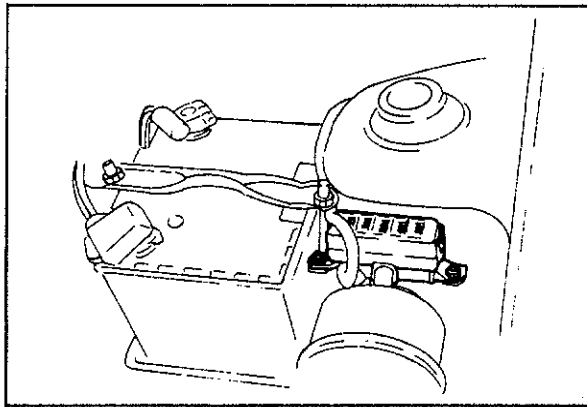
PCV VALVE Inspection

1. Warm up the engine to the normal operating temperature and run it at idle speed.
 2. Disconnect the PCV valve with the ventilation hose from the cylinder head cover.
 3. Block the PCV valve opening by finger.
- If the engine speed drops, the PCV valve is working properly.

CONTROL SYSTEM

83U04A-092

The control system consists of the input devices and control unit.
The control unit controls the injection amount, monitor switch function, and fail-safe function.

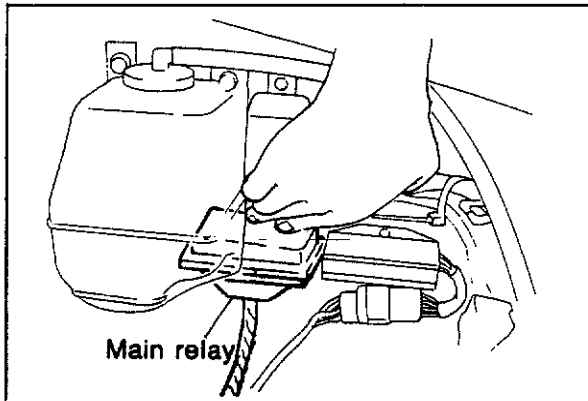


83U04A-093

MAIN FUSE

Inspection

Check the continuity of EGI main fuse.

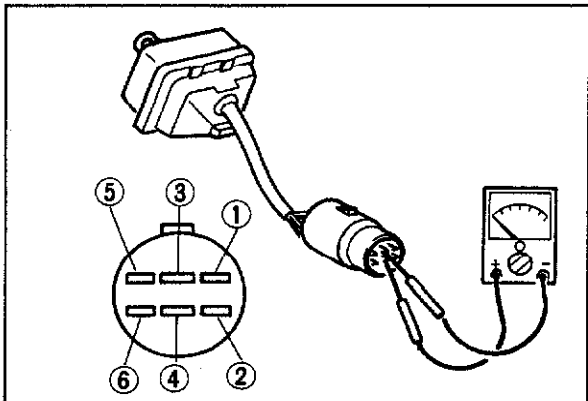


83U04A-094

MAIN RELAY

Inspection

1. Turn ignition switch ON and OFF, verify that the main relay "CLICKS".
2. If clicking is not heard at main relay correct, check the continuity at terminals using an ohmmeter, and wiring harness.



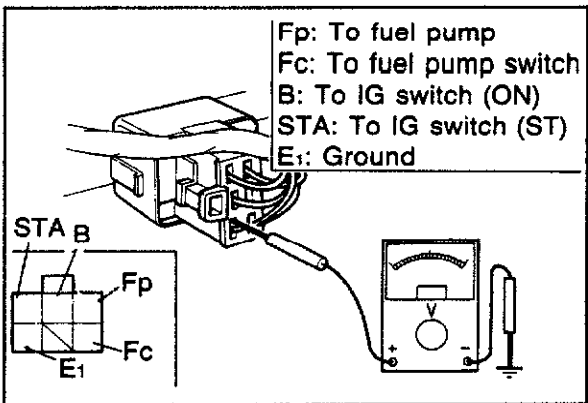
83U04A-095

Continuity

1. Apply 12V to ⑤ and a ground ⑥ terminals of the main relay.
2. Check continuity at terminals using an ohmmeter.

| Operation Terminals | 12V Not applied | 12V Applied |
|------------------------|-----------------|-------------|
| ①—② | No | Yes |
| ③—④ | No | Yes |

3. If not correct, replace it.



83U04A-096

CIRCUIT OPENING RELAY

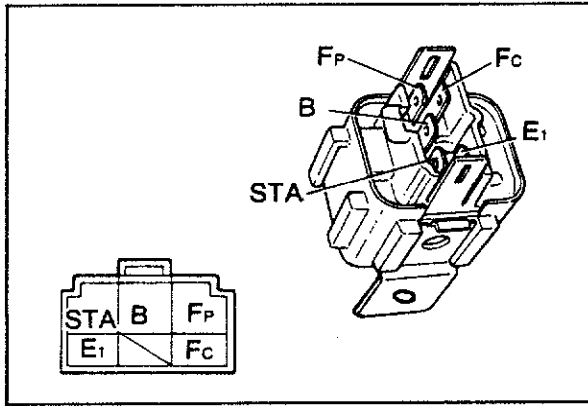
Inspection

Terminal voltage

1. Check voltage between each terminal and ground using a voltmeter.

| Condition | Terminal | Fp | Fc | B | STA | E1 |
|-----------------------|----------|-----|-----|-----|-----|----|
| IG SW: ON | | 0V | 12V | 12V | 0V | 0V |
| Measuring plate: open | | 12V | 0V | 12V | 0V | 0V |
| IG SW: ST | | 12V | 0V | 12V | 12V | 0V |

2. If not correct, check the resistance using the ohmmeter.



83U04A-097

Resistance

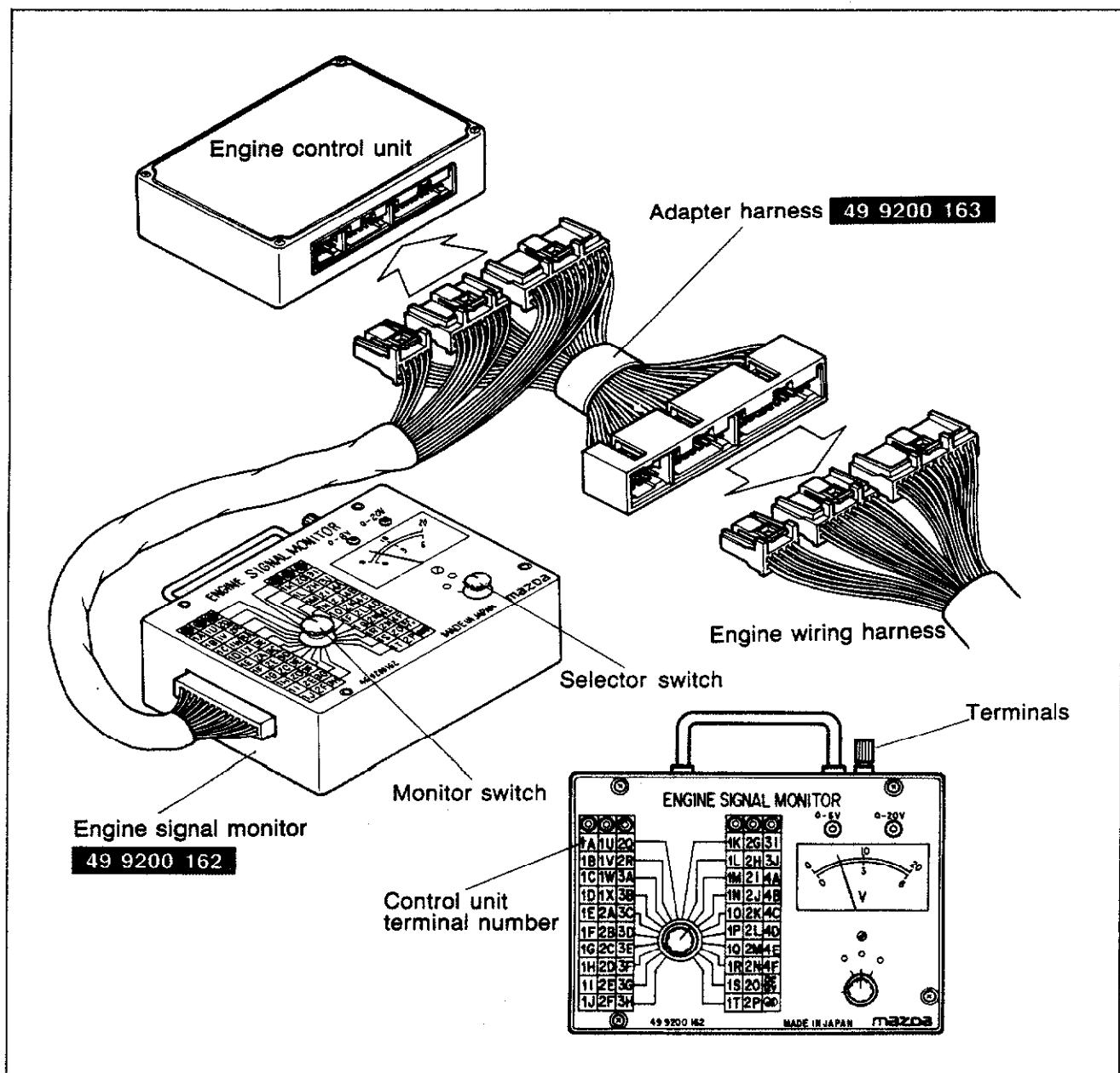
1. Check the resistance between the terminals using an ohmmeter.

| Between terminals | Resistance (Ω) |
|--------------------------|-------------------------|
| STA \leftrightarrow E1 | 15—30 |
| B \leftrightarrow Fc | 80—150 |
| B \leftrightarrow Fp | ∞ |

2. If not correct, replace it.

ENGINE CONTROL UNIT

Engine Signal Monitor (49 9200 162) and Adapter (49 9200 163)



83U04A-098

The Engine Signal Monitor (49 9200 162) was developed to check the engine control unit terminal voltages. This monitor easily inspects the terminal voltage by setting the monitor switch.

How to Use the Engine Signal Monitor

1. Connect the **Engine Signal Monitor** (49 9200 162) between the engine control unit and the engine harness using the **adapter harness** (49 9200 163).
2. Turn the selector switch and monitor switch to select the terminal number.
3. Check the terminal voltage.

Do not apply voltage to terminals.

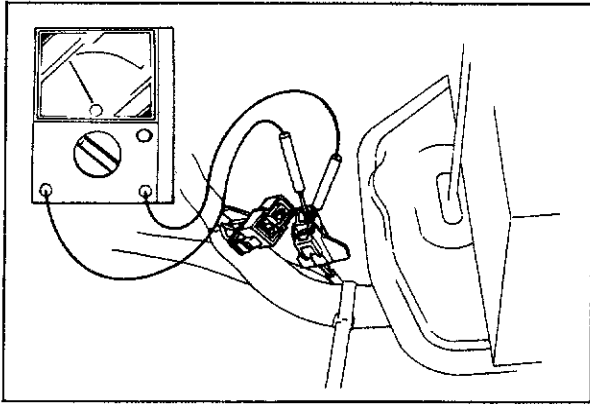
| Terminal | Connected to | Voltage | Condition | Remark |
|-------------|---|--|---|--|
| 1A (Output) | MIL | Below 2.5V Approx. 12V | Ignition switch OFF → ON for 3 sec. After 3 sec. | Test connector grounded |
| 1B (Output) | Self-Diagnosis Checker (for Code No.) | Below 2.5V Approx. 12V | Ignition switch OFF → ON for 3 sec. After 3 sec. | • Test connector grounded • Checker connected |
| 1C | — | — | — | — |
| 1D (Output) | Self-Diagnosis Checker (for Monitor lamp) | Approx. 5V Approx. 10V | Ignition switch OFF → ON for 3 sec. After 3 sec. | • Test connector grounded • Checker connected |
| 1E (Input) | Throttle sensor (IDL switch) | Approx. 12V Below 1.5V | Accelerator pedal depressed Accelerator pedal released | |
| 1F (Output) | A/C control relay | Approx. 12V Below 1.5V | Ignition switch ON A/C switch ON (at idle) | |
| 1G (Input) | Neutral/clutch switch | Approx. 12V Below 1.5V | Clutch pedal depressed Clutch pedal released | In-gear condition (Neutral: constant 12 V) |
| 1H (Input) | Water thermo switch (Radiator) | Approx. 12V Below 1.5V | Below 17°C (63°F) Above 17°C (63°F) | |
| 1I (Input) | Electrical load (E/L) switch | Approx. 2.5V Approx. 10V | E/L switch ON E/L switch OFF | |
| 1J (Input) | Brake light switch | Approx. 12V Below 1.5V | Brake pedal depressed Brake pedal released | |
| 1K (Input) | Power steering switch | Approx. 12V Below 1.5V | Power steering switch OFF Power steering switch ON | |
| 1L (Input) | A/C switch | Approx. 12V Below 2.5V | A/C switch OFF A/C switch ON | Blower motor ON |
| 1M (Input) | Ignition coil | Approx. 12V Approx. 12V | Ignition switch ON At idle | (When engine running) Engine Signal Monitor: Green and red light flash |
| 1N | — | — | — | — |
| 1O | — | — | — | — |
| 1P | — | — | — | — |
| 1Q | — | — | — | — |
| 1R | — | — | — | — |
| 1S | — | — | — | — |
| 1T | — | — | — | — |
| 1U (Output) | Igniter | Below 1.5V Approx. 12V | Ignition switch ON At idle | |
| 1V (Input) | MT switch (ground) | Below 1.5V | — | ATX; constant 12V |
| 1W (Input) | Test connector | Below 1.5V Approx. 12V | Test connector grounded Test connector not grounded | |
| 1X | — | — | — | — |
| 2A (Output) | Vref | 4.5—5.5V | — | — |
| 2B (Input) | Air flow meter (Vc) | 7—9V | — | — |
| 2C | Ground (E2) | Below 1.5V | — | — |
| 2D (Input) | Oxygen sensor | 0.3—0.7V More than 0.45V Less than 0.45V | At idle During acceleration During deceleration | |
| 2E (Input) | Air flow meter (Vs) | Approx. 2V 4—5V | Ignition switch ON At idle | |
| 2F | — | — | — | — |
| 2G (Input) | Throttle sensor (PSW switch) | Approx. 12V Below 1.5V | Accelerator pedal released Accelerator pedal depressed (fully open throttle) | |
| 2H (Input) | Atmospheric pressure sensor | Approx. 4V | — | At sea level |
| 2I (Input) | Water thermo sensor | Approx. 0.5V | Normal operating temperature | |
| 2J (Input) | Intake air thermo sensor (Air flow meter) | 2—3V | Intake air temperature: 20°C (68°F) | |

| Terminal | Connected to | Voltage | Condition | Remark |
|-------------|--|-------------|---|--|
| 2K (Output) | Pressure regulator control valve (PRCV) solenoid | Below 1.5V | Intake air temp. more than 58°C (136°F) Water temp. more than 90°C (194°F) | If PRCV solenoid is equipped. |
| | | Approx. 12V | Other | |
| 2L | — | — | — | — |
| 2M | — | — | — | — |
| 2N | — | — | — | — |
| 2O | No.2 purge control solenoid | Approx. 12V | Less than 1,500 rpm | |
| | | Below 1.5V | More than 1,500 rpm | |
| 2P | No.1 purge control valve solenoid | Below 1.5V | Intake air temp. more than 50°C (122°F) Water temp. more than 50°C (122°F) | In-gear condition. • Jumper wire connect to the Neutral switch (MTX) • Disconnect the inhibitor switch connector (ATX) |
| | | Approx. 12V | Other | |
| 2Q | Idle speed control (ISC) valve | 1.5—11.6V | At idle | Engine Signal Monitor: Green and red light flash |
| 2R | Ground | Below 1.5V | — | — |
| 3A | Ground | Below 1.5V | — | — |
| 3B | Starter switch | Below 2.5V | Ignition switch ON | |
| | | 7—9V | While cranking | |
| 3C | Injector No.2, No.4 | Approx. 12V | At idle | Engine Signal Monitor: Green and red light flash |
| 3D | Inhibitor switch | Below 1.5V | "N" or "P" range | MTX constant 0V |
| | | Approx. 12V | Other range | |
| 3E | Injector No.1 and No.3 | Approx. 12V | At idle | Engine Signal Monitor: Green and red light flash |
| 3F | — | — | — | — |
| 3G | Ground | Below 1.5V | — | — |
| 3H | — | — | — | — |
| 3I | Main relay | Approx. 12V | Ignition switch ON | |
| 3J | Battery | Approx. 12V | — | — |

Engine control unit connector

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 3I | 3G | 3E | 3C | 3A | 2Q | 2O | 2M | 2K | 2I | 2G | 2E | 2C | 2A | 1W | 1U | 1S | 1Q | 1O | 1M | 1K | 1I | 1G | 1E | 1C | 1A |
| 3J | 3H | 3F | 3D | 3B | 2R | 2P | 2N | 2L | 2J | 2H | 2F | 2D | 2B | 1X | 1V | 1T | 1R | 1P | 1N | 1L | 1J | 1H | 1F | 1D | 1B |

83U04A-099

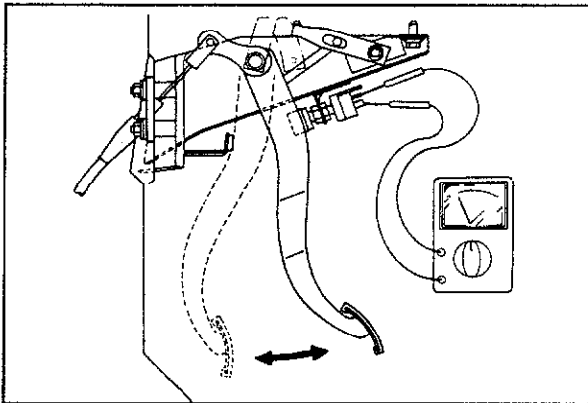


83U04A-114

NEUTRAL SWITCH (MTX)

1. Disconnect the neutral switch connector.
2. Connect a circuit tester to the neutral switch and check the continuity between the terminals.

| Condition | Continuity |
|-----------------|------------|
| In neutral | No |
| In other ranges | Yes |

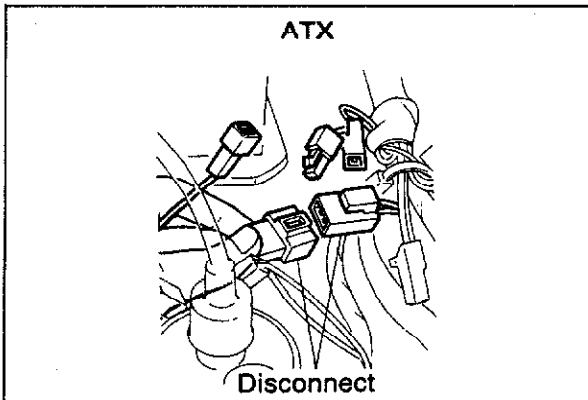


83U04A-115

CLUTCH SWITCH (MTX)

1. Disconnect the clutch switch connector.
2. Connect the circuit tester to the clutch switch and check the continuity between the switch terminals.

| Condition | Continuity |
|-----------------------------|------------|
| When the pedal is depressed | No |
| When the pedal is released | Yes |



83U04A-100

INHIBITOR SWITCH (ATX)

Inspection

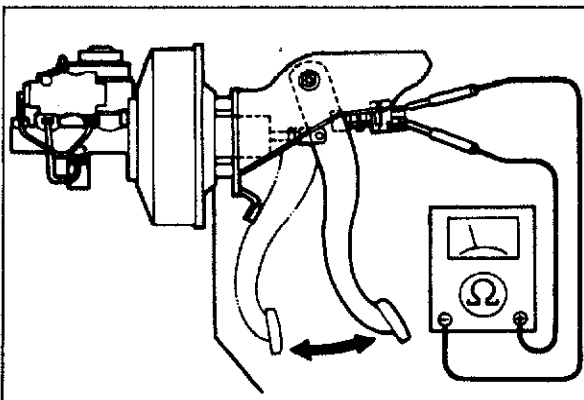
1. Disconnect the inhibitor switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the terminal.

| Position | Continuity |
|----------------|------------|
| P and N ranges | Yes |
| Other ranges | No |

4. After checking, connect the switch connector.

Note

Refer to Section 7B for replacement of the inhibitor switch.



83U04A-205

BRAKE LIGHT SWITCH

Inspection

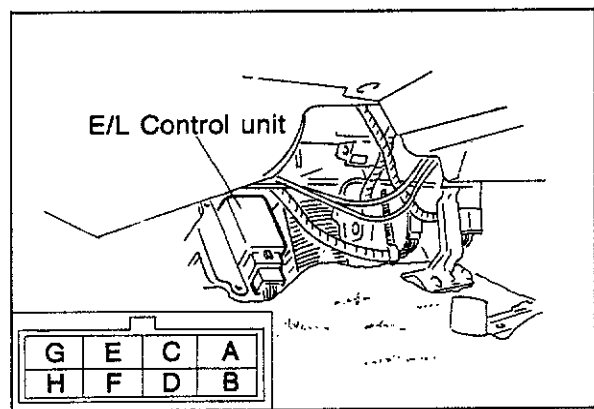
1. Disconnect the brake light switch connector.
2. Connect an ohmmeter to the switch.
3. Check the continuity of the switch.

| Pedal | Continuity |
|-----------|------------|
| Depressed | Yes |
| Released | No |

4. After checking, connect the switch connector.

Note

Refer to section 11 for replacement of the brake light switch.



69G04A-174

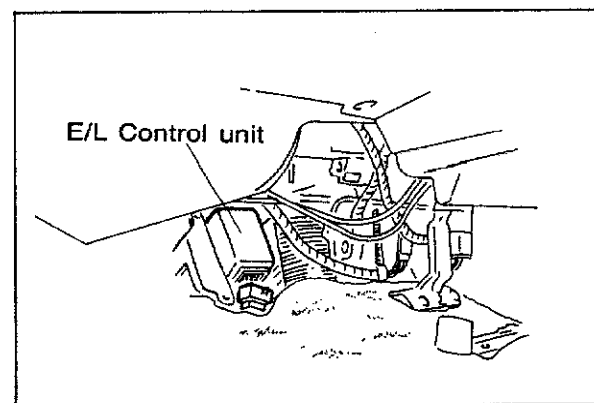
E/L CONTROL UNIT

Inspection

1. Connect a voltmeter between the E/L control unit and ground.
2. Start the engine and check the terminal voltages as described below.

| Terminal | Input | Output | Connection to | Voltage (after warm-up) | Condition |
|-----------|-------|--------|-----------------------|-------------------------|---|
| A (YG) | — | — | Main relay | Approx. 12V | |
| B (YG) | ○ | | Electrical fan relay | Approx. 12V | Coolant temp.: below 97°C (206.6°F) |
| | | | | Below 1.5V | Coolant temp.: above 97°C (206.6°F) |
| C (B) | — | — | Ground | 0V | |
| D | — | — | — | — | — |
| E (L) | | ○ | Control unit (1H) | Below 1.5V | E/L: ON |
| | | | | Approx. 12V | E/L: OFF |
| F (RB) | ○ | | Combination switch | Approx. 12V | Combination switch: ON |
| | | | | Below 1.5V | Combination switch: OFF |
| G (LG) | ○ | | Blower motor switch | Below 1.5V | Blower motor switch: ON (2nd, 3rd or 4th position) |
| | | | | Approx. 12V | Others |
| H (BY) | ○ | | Rear defroster switch | Below 1.5V | Rear defroster switch: ON |
| | | | | Approx. 12V | Rear defroster switch: OFF |

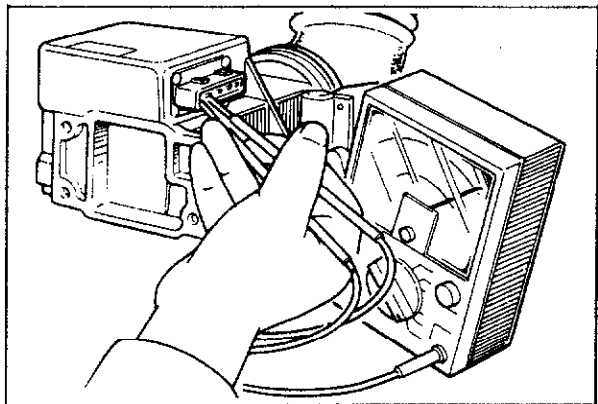
83U04A-122



69G04A-175

Replacement

1. Disconnect the connector from the E/L control unit.
2. Replace the E/L control unit.
3. Install in the reverse order of removal.

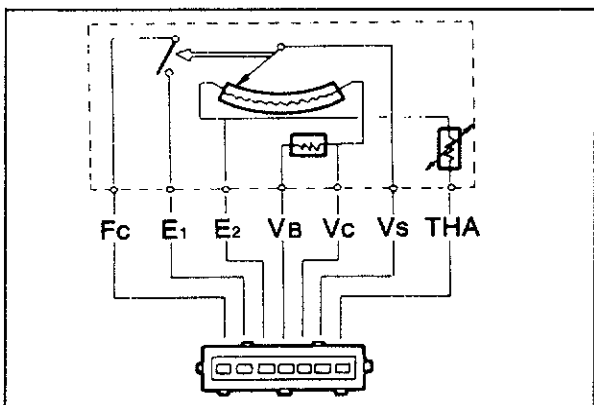


83U04A-101

AIR FLOW METER

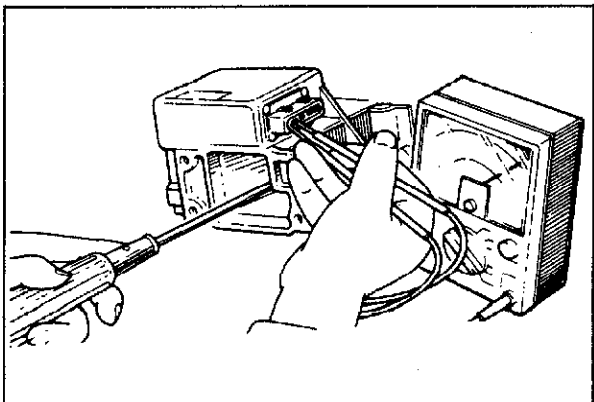
Inspection

1. Inspect the air flow meter body for cracks.
2. Check the resistance between terminals using an ohmmeter.



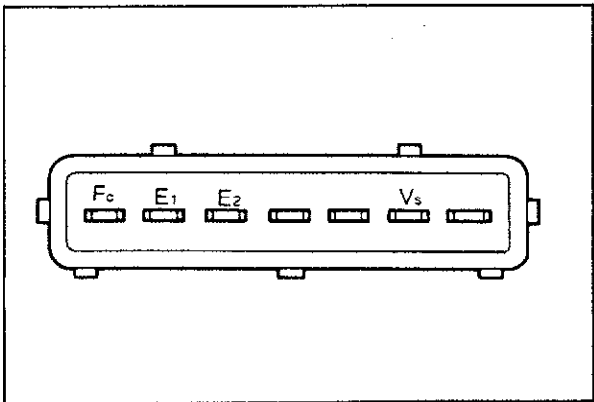
63U04B-018

| Terminal | Resistance (Ω) |
|---|--|
| E2 \leftrightarrow Vs | 20 to 400 |
| E2 \leftrightarrow Vc | 100 to 300 |
| E2 \leftrightarrow Vb | 200 to 400 |
| E2 \leftrightarrow THA (Air thermo sensor) | -20°C (-4°F) 10,000 to 20,000 0°C (32°F) 4,000 to 7,000 20°C (68°F) 2,000 to 3,000 40°C (104°F) 900 to 1,300 60°C (140°F) 400 to 700 |
| E1 \leftrightarrow Fc | ∞ |



73U04B-011

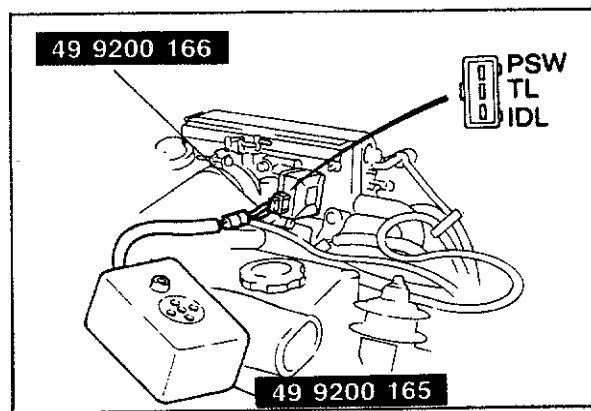
3. Press open the measuring plate with a screwdriver, measure the resistance between E1 and Fc (fuel pump switch) and between E2 and Vs.



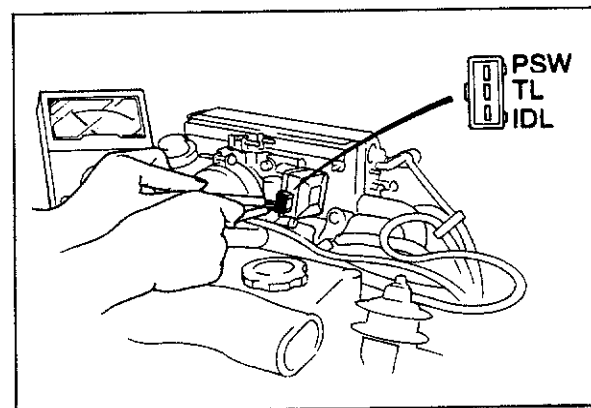
63U04B-020

| Terminals | Measuring Plate | |
|-------------------------|--------------------|----------------------|
| | Fully closed | Fully open |
| E1 \leftrightarrow Fc | ∞ | 0 |
| E2 \leftrightarrow Vs | 20 to 400 Ω | 20 to 1,000 Ω |

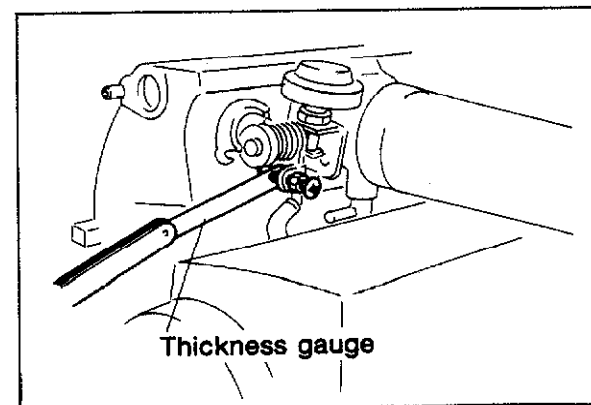
4. If not correct replace it.



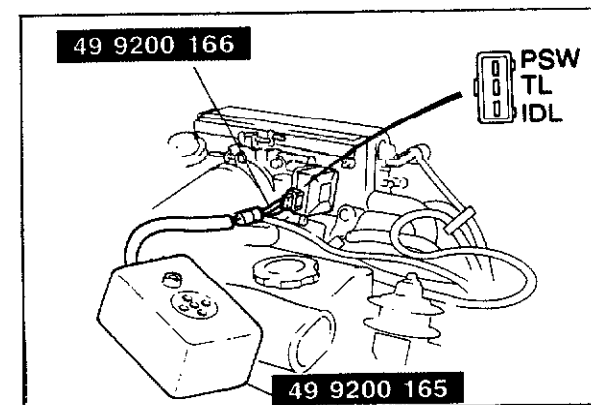
83U04A-104



73U04B-042



73U04B-013



83U04A-102

THROTTLE SENSOR

Inspection

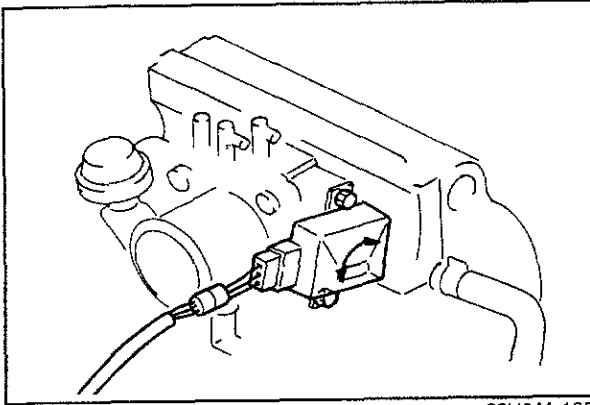
1. Disconnect the connector from the throttle sensor.
2. Connect the **SST** in the throttle sensor or connect an ohmmeter.

3. Insert a thickness gauge between the throttle stop screw and stop lever.
4. Note the operation of the buzzer or continuity between terminals.

| Thickness gauge | Buzzing of the tester | Continuity between terminals | |
|---------------------------|-----------------------|------------------------------|----------|
| | | IDL ↔ TL | PSW ↔ TL |
| 0.5 mm (0.02 in) | Yes | Yes | No |
| 0.7 mm (0.027 in) | No | No | No |
| Fully open throttle lever | Yes | No | Yes |

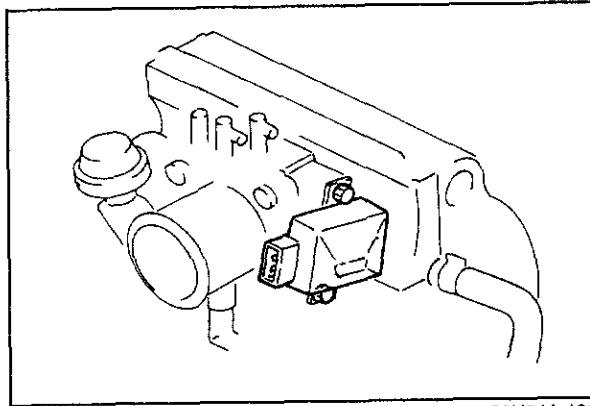
Adjustment

1. Disconnect the connector from the throttle sensor and connect the **SST**.
2. Insert a 0.5 mm (0.020 in) thickness gauge between the throttle stop screw and stop lever.



83U04A-105

3. Loosen the two attaching screws.
4. Rotate the throttle sensor clockwise about **30 degrees**, then rotate it back counterclockwise until the buzzer sounds.
5. Replace the thickness gauge with a 0.7 mm (0.027 in) gauge.
6. Check that the buzzer does not sound.
7. If it sounds, repeat steps 3 to 6.



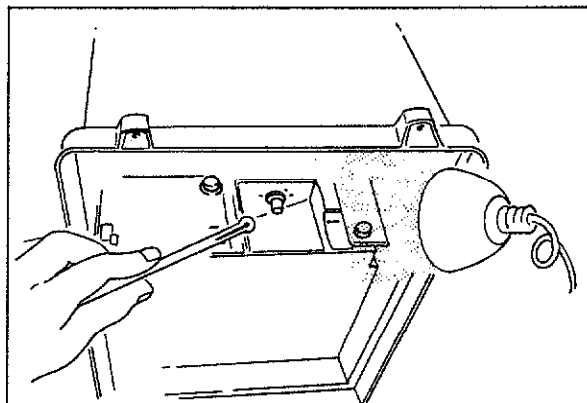
83U04A-106

8. Tighten the two attaching screws.

Note

Be careful not to move the throttle sensor from the set position when tightening the screw.

9. Open the throttle valve fully a few times, then recheck the adjustment of the throttle sensor (refer to inspection procedures).



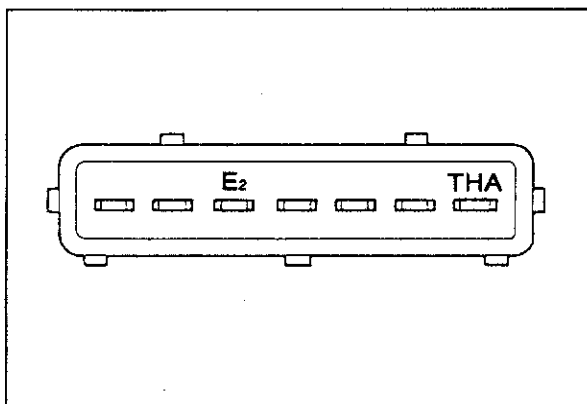
83U04A-107

INTAKE AIR THERMO SENSOR

Inspection of Resistance

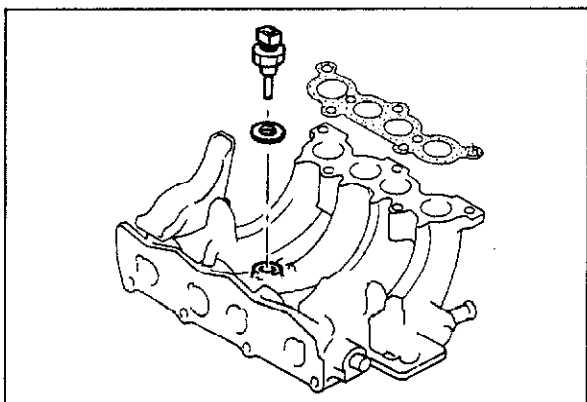
1. Remove the air cleaner upper cover assembly.
2. Heat the intake air thermo sensor and observe the temperature.
3. Check resistance between the THA and E₂ terminals using an ohmmeter.

| Intake Air Temperature | Resistance Ω |
|------------------------|----------------------------|
| -20°C (-4°F) | 10,000—20,000 10.0—20.0 |
| 20°C (68°F) | 2,000—3,000 |
| 60°C (140°F) | 400—700 |



56G04B-097

4. If the resistance is not within specification, replace the air flow meter assembly.
5. If the resistance is within specification, check the wiring harnesses.

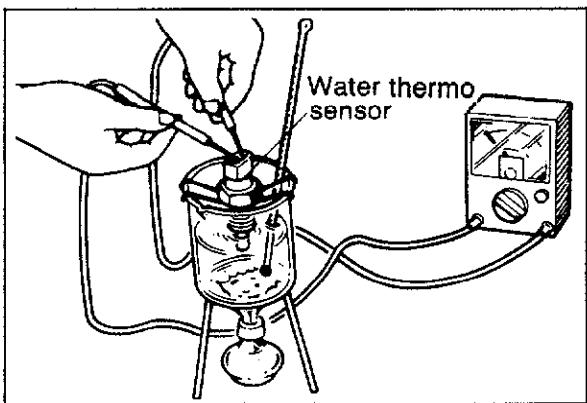


83U04A-108

WATER THERMO SENSOR

Inspection of Resistance

1. Remove the water thermo sensor.

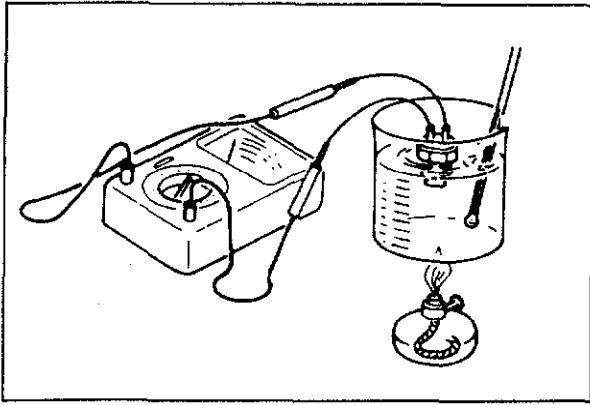


56G04B-100

2. Place the sensor in water with a thermometer and heat the water gradually.
3. Check that resistance of the sensor is within specification:

| Water temperature | Resistance |
|-------------------|------------------------|
| -20°C (-4°F) | 14.6—17.8 k Ω |
| 20°C (68°F) | 2.21—2.69 k Ω |
| 80°C (176°F) | 0.290—0.354 k Ω |

4. If not correct, replace the water thermo sensor.



83U04A-109

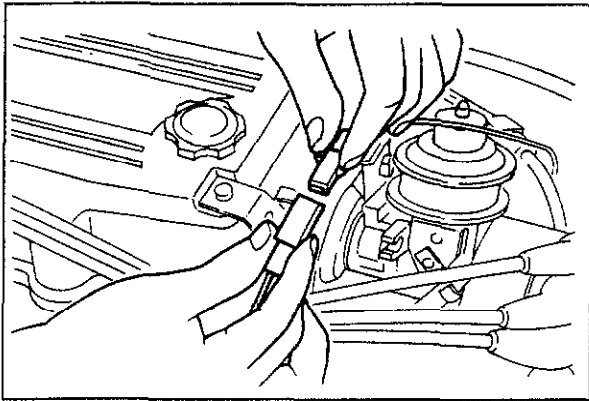
WATER THERMO SWITCH

Inspection

1. Remove the switch from the radiator.
2. Place the switch in water with a thermometer and heat the water gradually.
3. Check that the continuity between the terminals exists at more than specification.

Specification: 15—19°C (59—66°F)

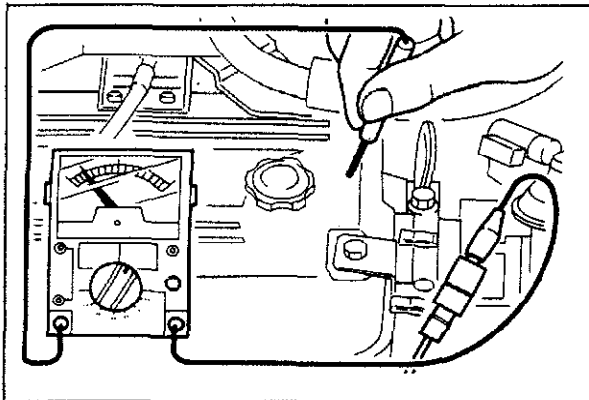
4. If not correct, replace the water thermo switch.



83U04A-110

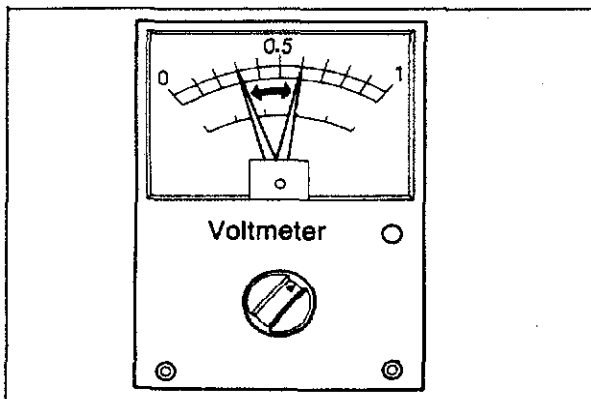
OXYGEN SENSOR

1. Warm up the engine and run it at idle speed.
2. Disconnect the oxygen sensor wiring harness connector.



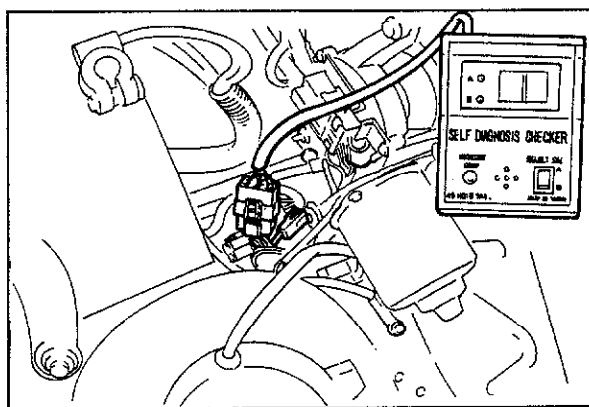
63U04B-078

3. Attach a voltmeter between the oxygen sensor connector (oxygen sensor side) and ground.
4. Run the engine at 4,000 rpm until the voltmeter indicates about **0.7V**.

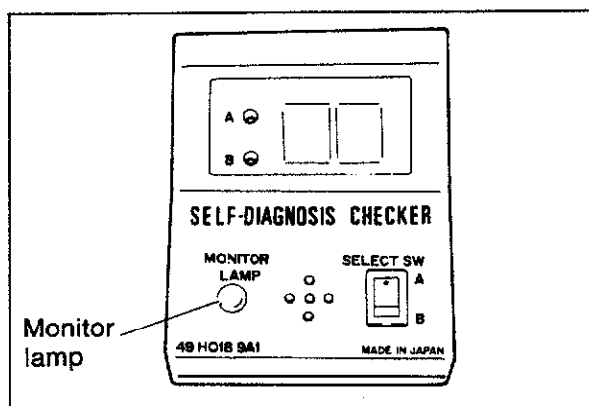


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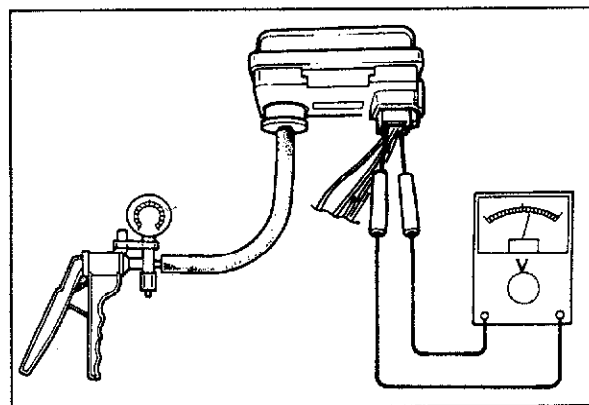
5. Increase and decrease the engine speed quickly several times. When the speed is increased the meter should read between **0.5V—1.0V**. When the speed is decreased it should read between **0V—0.3V**.
6. If the voltmeter doesn't indicate above mentioned values, replace the oxygen sensor.



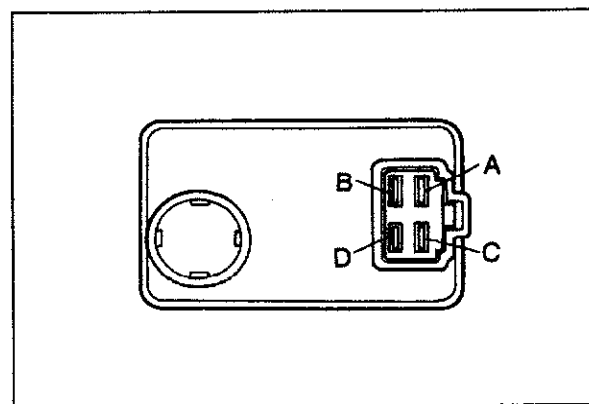
86U04A-207



86U04A-208



76U04A-052



76U04A-053

Inspection of Sensitivity

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect the **SST** to the check connector.

3. Increase the engine speed to between **2,000 and 3,000 rpm**, and check that the monitor lamp flashes for 10 seconds.

Monitor lamp: Flashes ON and OFF more than 8 times/10 sec

ATMOSPHERIC PRESSURE SENSOR

Inspection of Terminal Voltage

1. Remove the rubber cap and connect a vacuum pump to the port of the sensor.
2. Turn the ignition switch ON.
3. Check voltage between each terminal and ground while applying and releasing vacuum to the sensor.

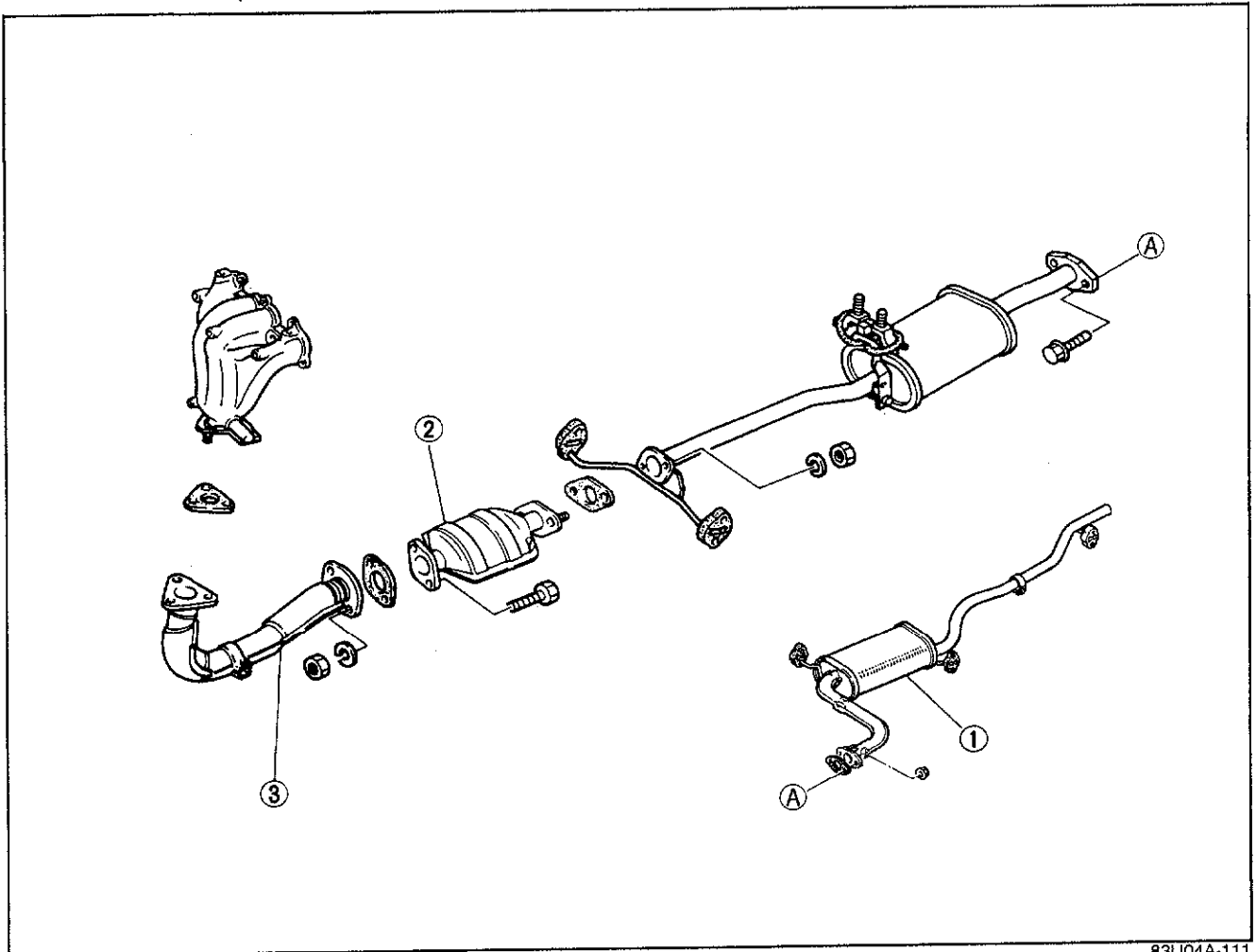
| Terminal (Color) | Voltage |
|------------------|------------|
| A | — |
| B (Lg) | 1.4—4.9V |
| C (LgR) | Below 1.5V |
| D (LgW) | 4.5—5.5V |

4. If the voltage at A, C or D terminal is not correct, check the wiring harness.
5. If the voltage of A, C and D terminal is OK but at B terminal is wrong, replace the atmospheric pressure switch.

EXHAUST SYSTEM

REMOVAL

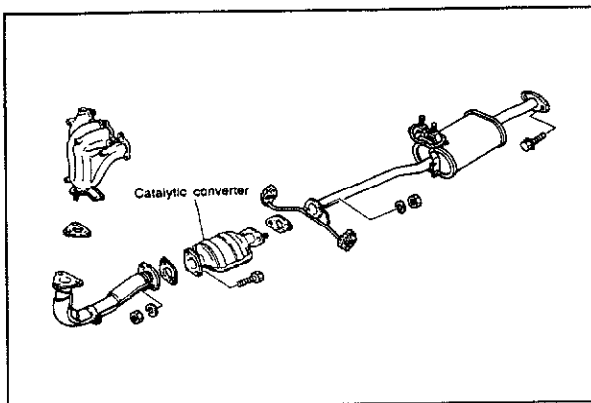
Remove in the sequence shown in the figure.



83U04A-111

- 1. Main silencer
- 2. Catalytic converter

- 3. Front exhaust pipe



83U04A-112

INSPECTION

Visually check the exhaust system parts for cracks, or damage.

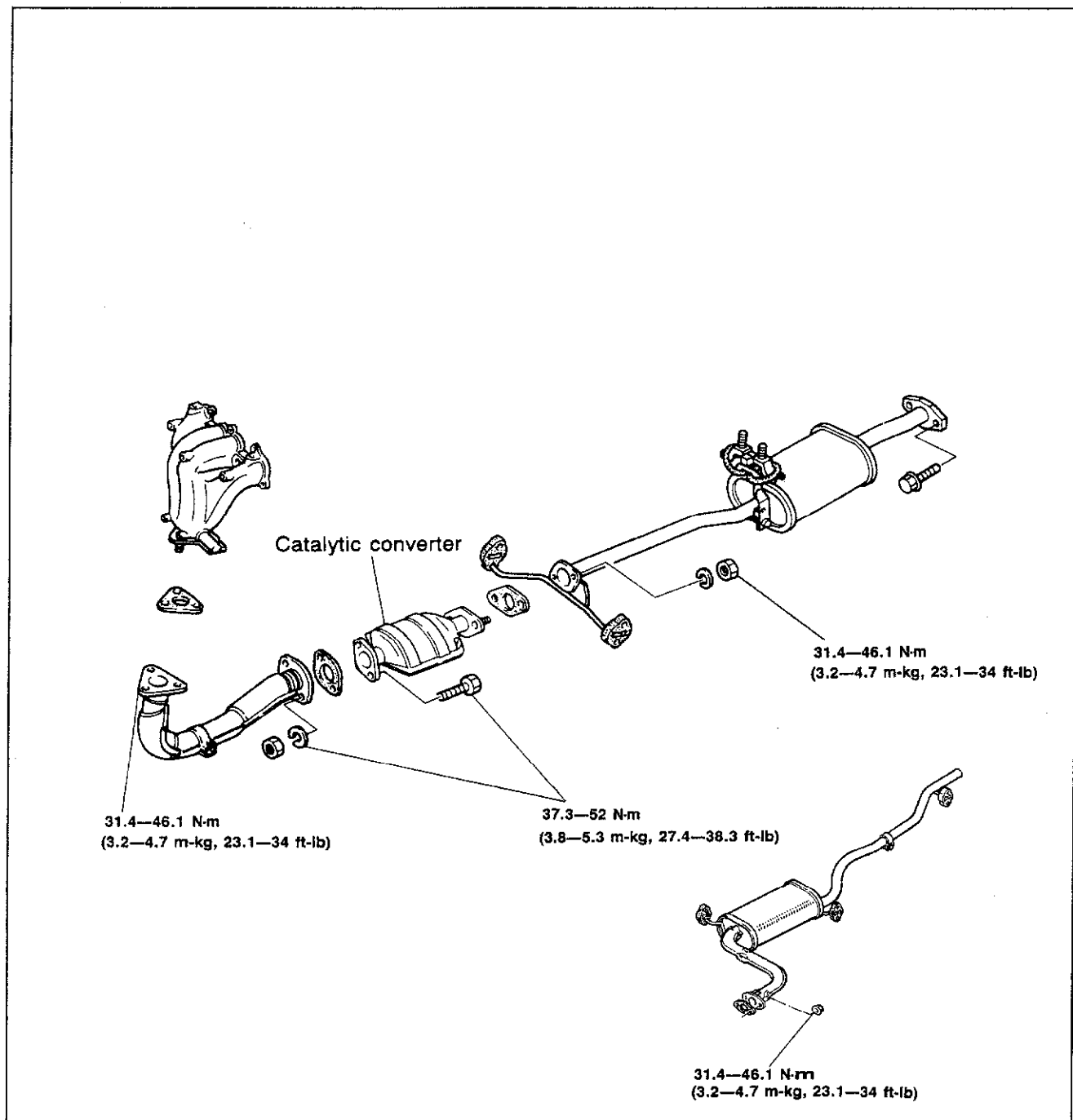
4A EXHAUST SYSTEM

INSTALLATION

Install in the reverse order of removal.

Note

When installing the exhaust system parts, tighten to the specified torque.



83U04A-113

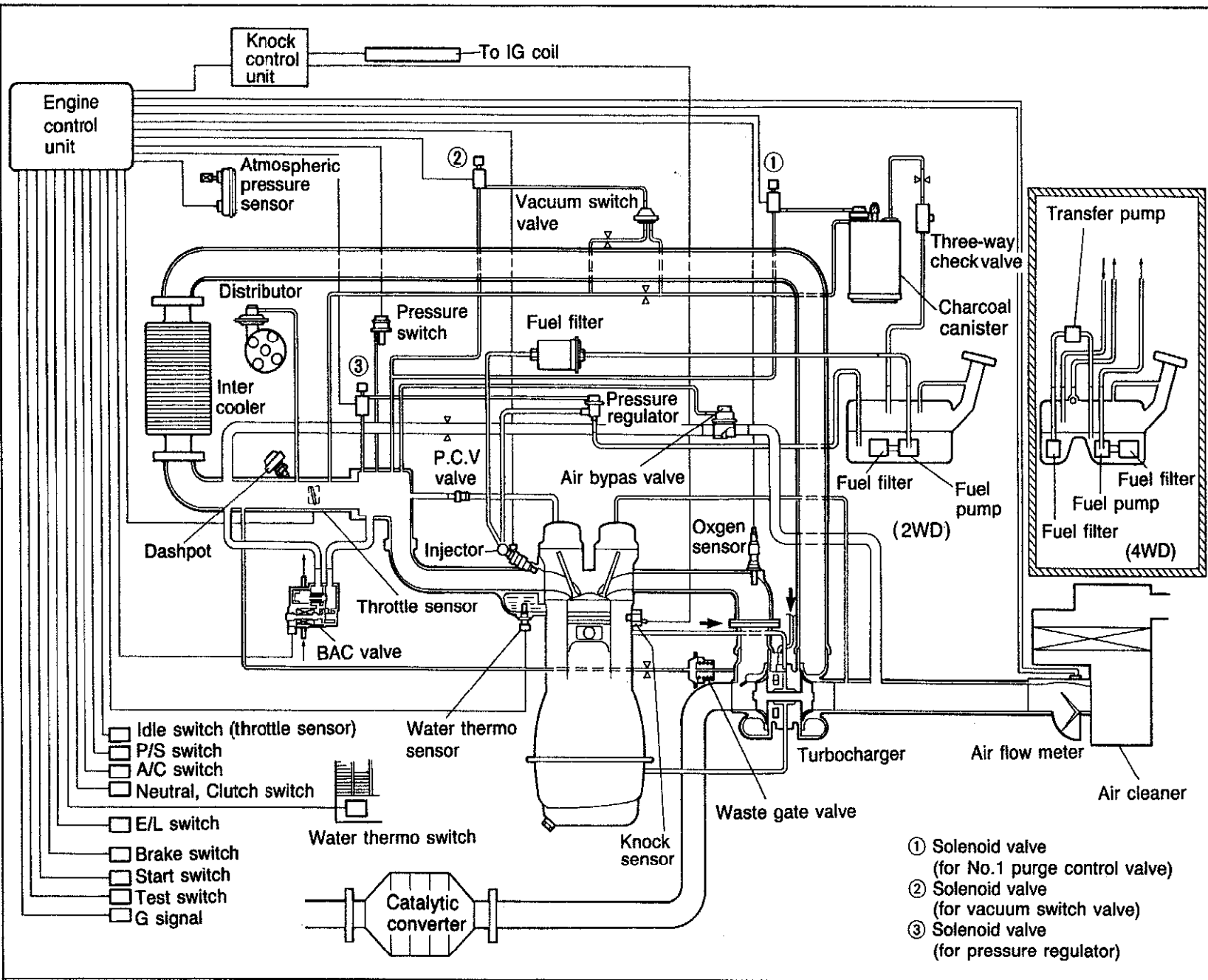
FUEL AND EMISSION CONTROL SYSTEMS (TURBO)

| | | | |
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| (PRC) SYSTEM | 4B—54 | TROUBLESHOOTING WITH MIL | |
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| | | LIGHT)..... | 4B—88 |

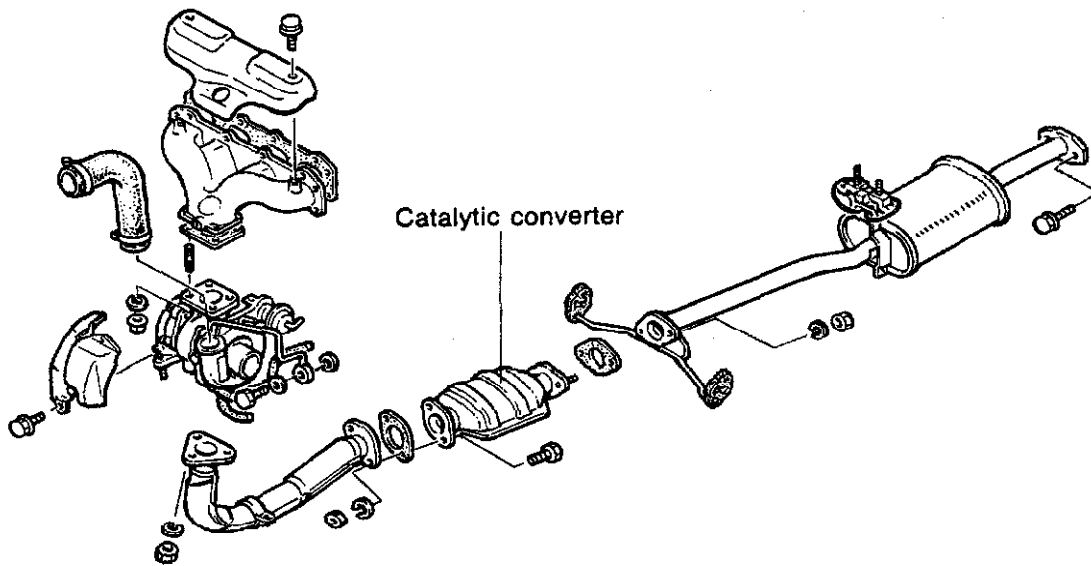
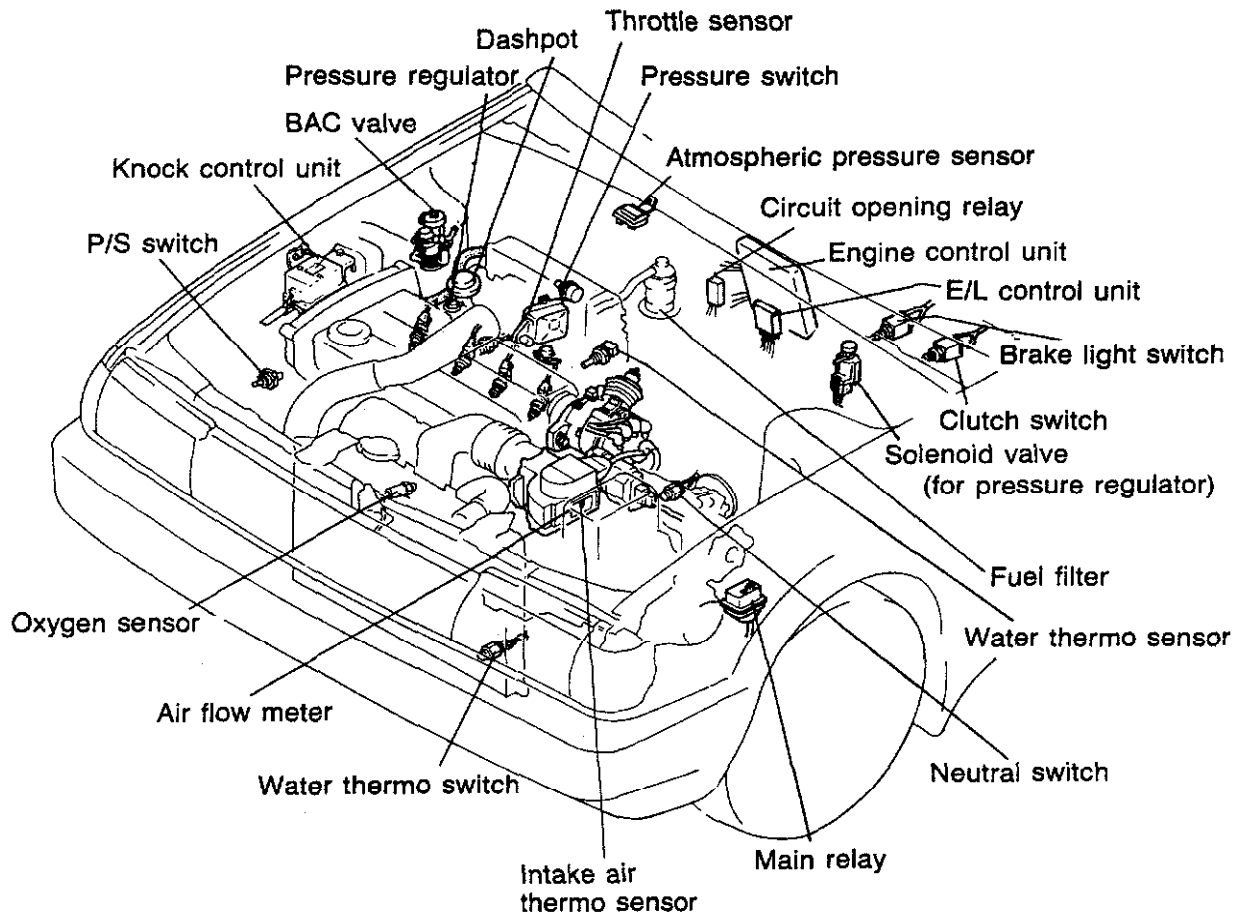
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OUTLINE

SYSTEM DIAGRAM



EMISSION COMPONENT LOCATION



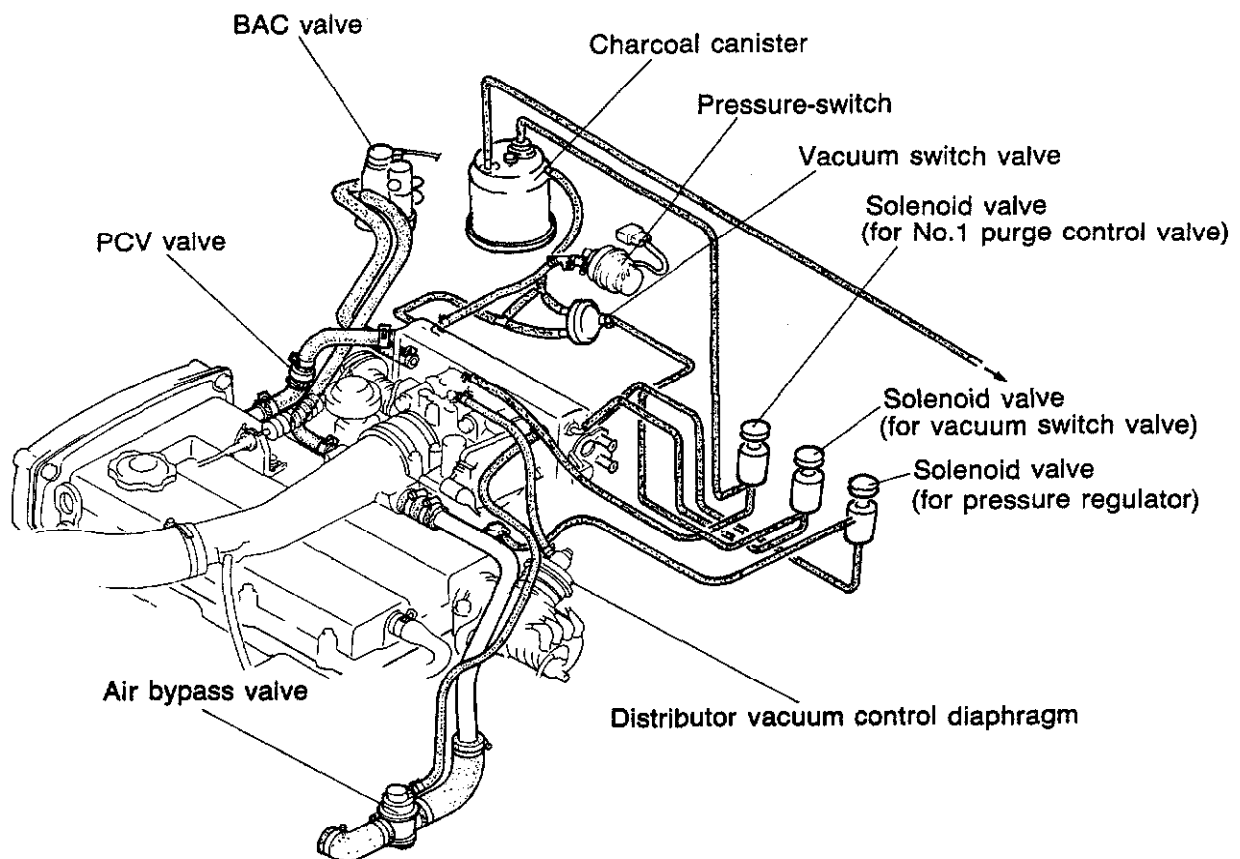
COMPONENT DESCRIPTIONS

| No. | COMPONENT | FUNCTION | REMARKS |
|-----|-----------------------------|---|--|
| 1 | Air cleaner | Filters air into the combustion chamber | |
| 2 | Air flow meter | Detects intake air amount; sends signal to the engine control unit. (for determination of fuel injection amount) | Intake air thermo sensor and fuel pump switch are integrated. |
| 3 | Atmospheric pressure sensor | Detects atmospheric pressure to prevent over rich mixture; sends signal to engine control unit. | |
| 4 | Air valve | When engine is cold, supplies bypass air into dynamic chamber for quick warm-up and smooth idle. | <ul style="list-style-type: none"> • Thermo wax type • Installed into BAC valve |
| 5 | Brake light switch | Detects brake operation (deceleration); sends signal to control unit. | |
| 6 | Catalytic converter | Reduce HC and CO by oxidation. Reduce NOx. | Honeycomb construction |
| 7 | Charcoal canister | Stores fuel tank fumes while engine is stopped for evaporative emission. | |
| 8 | Check connector | For Self-diagnosis checker | 6 pin connector (Green) |
| 9 | Circuit opening relay | Supplies voltage for fuel pump while engine running. | |
| 10 | Clutch switch | Detects in-gear condition; sends signal to control unit. | Switch closed when clutch pedal is released. |
| 11 | Engine control unit | <p>Detects the following;</p> <ol style="list-style-type: none"> 1. Engine speed 2. Intake air amount 3. Engine coolant temperature 4. Engine load condition 5. Oxygen concentration 6. In-gear condition 7. Intake air temperature <p>8. Atmospheric pressure 9. A/C operation 10. P/S operation 11. E/L operation 12. Starting signal 13. Initial set signal</p> <p>Controls operation of the following;</p> <ol style="list-style-type: none"> 1. Fuel injection amount 2. Idle speed control system 3. Pressure regulator control system 4. Fail-safe system 5. Monitor switch function | <ol style="list-style-type: none"> 1. Ignition coil (–) terminal 2. Air flow meter 3. Water thermo sensor 4. Throttle sensor (Point type) 5. Oxygen sensor 6. Clutch switch and neutral switch 7. Intake air thermo sensor (in air flow meter) 8. Atmospheric pressure sensor 9. A/C switch 10. P/S switch 11. E/L switch 12. Starter switch (Ignition switch) 13. Test terminal <ol style="list-style-type: none"> 1. Injector 2. BAC valve 3. Solenoid valve (for pressure regulator) 4. Self-diagnosis checker and MIL 5. Monitor lamp (Self-diagnosis checker) |
| 12 | Dashpot | Gradually allows throttle valve closing during deceleration. | Adjustment speed MTX....2,000±150 rpm |
| 13 | Fuel filter | Filters particles from fuel | |
| 14 | Fuel pump | Provides fuel to injectors | <ul style="list-style-type: none"> • Operates while engine is running • Installed in fuel tank |
| 15 | Injector | Injects fuel to intake port | Controlled by signals from engine control unit. |
| 16 | Intake Air Thermo Sensor | Detects intake air temperature; compensates fuel injection amount through engine control unit. | Thermistor |
| 17 | Intercooler | Cools intake air temperature after turbocharger | Air cooled |

| No. | COMPONENT | FUNCTION | REMARKS |
|-----|---|---|---|
| 18 | Intank Filter | Filters particles from fuel | Installed in low-pressure side |
| 19 | ISC valve | Supplies bypass air to intake manifold assembly for smooth idle | Installed into BAC valve |
| 20 | Neutral switch | Detects transaxle condition; sends signal to control unit | |
| 21 | Oxygen Sensor | Detects oxygen concentration in exhaust gas; sends signal to engine control unit; compensates fuel injection amount | Zirconia ceramic with platinum coating |
| 22 | Pressure Regulator | Regulates fuel pressure to injectors | |
| 23 | Pressure Switch (For Overboost Detection) | Detects overboost condition; sends signal to engine control unit | |
| 24 | No.1 Purge Control Valve | Open and closes evaporative vapor passage from canister to intake manifold | During open throttle |
| 25 | No.2 Purge Control Valve | Positive pressure and negative pressure valves operate in accordance with fuel tank pressure | Prevents canister from flooding |
| 26 | Throttle Sensor (Variable resistor type) | Detects throttle opening angle; sends signal to control unit; compensates fuel injection amount | |
| 27 | Solenoid Valve (for No.1 purge control valve) | Opens and closes vacuum passage to No.1 purge control valve | Controlled by signal from engine control unit |
| | Solenoid Valve (for vacuum switch valve) | Opens and closes vacuum passage to vacuum switch valve | Controlled by signal from engine control unit |
| | Solenoid valve (for pressure regulator) | Closes vacuum passage between dynamic chamber and pressure regulator | Only during hot condition |
| 28 | Transfer Pump | Pumps fuel from one side of tank to other to maintain balance | |
| 29 | Turbocharger | Pressurizes intake air utilizing exhaust gas flow | Water cooled |
| 30 | Vacuum Switch Valve | Opens passage of vacuum line when vacuum applied | Vacuum from three-way solenoid valve |
| 31 | Water Thermo Sensor | Detects coolant temperature; sends signal to control unit; compensates fuel injection amount | Thermistor |
| 32 | Water Thermo Switch | Detects radiator coolant temperature; sends signal to control unit; increases fuel injection amount | Above 17°C (63°F): ON |
| 33 | Waste Gate Valve | Allows bypassing of exhaust gas to control turbocharger boost pressure | |

83U04B-005

VACUUM ROUTING DIAGRAM



83U04B-005

SPECIFICATIONS

| Item | | Engine model | Turbo |
|--------------------------|--------------------|--------------------------------|--|
| Idle-speed rpm | | | 850 ± 50 in Neutral |
| Throttle body | | | |
| Type | | | Horizontal draft (1-barrel) |
| Throat diameter | | mm (in) | 50 (1.968) |
| Air flow meter | | | |
| Resistance | Ω | E2—Vs | Fully closed: 20—400 Fully open: 20—1,000 |
| | | E2—Vc | 100—300 |
| | | E2—VB | 200—400 |
| | | E2—THA | -20°C (-4°F) 10,000—20,000 20°C (68°F) 2,000—3,000 60°C (140°F) 400—700 |
| Fuel pump | | | |
| Type | | | Impeller (in tank) |
| Output pressure | | kPa (kg/cm ² , psi) | 441—588 (4.5—6.0, 64—85) |
| Feeding capacity | | cc (cu in)/10 sec. | 220—380 (13.4—23.2) when fuel pressure is at 250 kPa |
| Transfer pump | | | |
| Feeding capacity | | cc (cu in)/10 sec. | 278—388 (16.95—23.7) |
| Pressure regulator | | | |
| Type | | | Diaphragm |
| Regulating pressure | | kPa (kg/cm ² , psi) | 240—279 (2.45—2.85, 34.8—40.5) |
| Fuel filter | | | |
| Type | Low-pressure side | | Nylon 6 (250 mesh) element |
| | High-pressure side | | Paper element |
| Injector | | | |
| Type | | | High-ohmic |
| Type of drive | | | Voltage |
| Resistance | | Ω | 12—16 |
| Injection amount | | cc (cu in)/15 sec | 66—82 (4.0—5.0) |
| Turbocharger | | | |
| Type | | | Water cooled |
| Lubrication | | | Engine oil |
| Boost pressure (Max) | | kPa (kg/cm ² , psi) | 55—64 (0.56—0.65, 8.0—9.2) |
| Waste-gate valve | | | |
| Operating pressure | | kPa (kg/cm ² , psi) | 48.1—58.9 (0.49—0.60, 7.0—8.6) |
| Idle-speed control valve | | | |
| Solenoid resistance | | Ω | 5—20 |
| Fuel tank | | | |
| Capacity | | liters (US gal, Imp gal) | 50 (13, 11) |
| Air cleaner | | | |
| Element type | | | Wet |
| Accelerator cable | | | |
| Free play | | mm (in) | 1—3 (0.039—0.118) |
| Fuel | | | |
| Specification | | | Unleaded gasoline |

83U04B-006

TROUBLESHOOTING GUIDE

RELATIONSHIP CHART

Input Devices and Output Devices

| OUTPUT DEVICE INPUT DEVICE | INJECTOR | | PRCV SOLENOID | BAC VALVE | | PURGE SOLENOID | |
|---|-------------------------------|-------------------------------|------------------|--------------|--------------|----------------|------|
| | FUEL IN- JECTION AMOUNT | FUEL IN- JECTION TIMING | | AIR VALVE | ISC VALVE | No.1 | No.2 |
| IGNITION COIL | ○ | ○ | X | X | ○ | X | ○ |
| AIR FLOW METER | ○ | X | X | X | X | X | ○ |
| IDLE SWITCH | ○ | X | ○ | X | ○ | X | X |
| THROTTLE SENSOR | ○ | X | X | X | X | X | X |
| WATER THERMO SENSOR | ○ | X | ○ | X | ○ | ○ | X |
| INTAKE AIR THERMO SENSOR | ○ | X | ○ | X | ○ | ○ | X |
| ATMOSPHERIC PRESSURE SENSOR | ○ | X | X | X | ○ | X | X |
| OXYGEN SENSOR | ○ | X | X | X | ○ | ○ | X |
| PRESSURE SWITCH | ○ | X | X | X | X | X | X |
| BRAKE LIGHT SWITCH | ○ | X | X | X | X | X | X |
| WATER THERMO SWITCH | ○ | X | X | X | ○ | ○ | X |
| NEUTRAL AND CLUTCH SWITCH | ○ | X | ○ | X | ○ | ○ | X |
| START SWITCH | ○ | ○ | ○ | X | X | X | X |
| FF SWITCH | ○ | X | X | X | X | X | X |
| A/C SWITCH | X | X | X | X | ○ | X | X |
| P/S SWITCH | X | X | X | X | ○ | X | X |
| G SENSOR | X | ○ | X | X | X | X | X |
| TEST CONNECTOR | X | X | X | X | ○ | X | X |

83U04B-007

Output Devices and Engine Conditions (Turbocharged Engine)

| ENGINE CONDITION OUTPUT DEVICES | | CRANKING (COLD ENGINE) | WARMING UP (DURING IDLE) | MEDIUM LOAD | | ACCELERATION | HEAVY LOAD | DECELERATION | IDLE (THROTTLE VALVE FULLY CLOSED) | IGN: ON (ENGINE NOT RUNNING) | REMARKS |
|--|--------------------------|-------------------------------|---------------------------------------|--|---------------------|--------------|---------------|--|---|---|---------------------------------------|
| | | | | COLD | WARM | | | | | | |
| INJECTOR | INJECTION | Rich | | | Rich and Lean | Rich | | Fuel Cut | Rich | Does not inject | |
| | INJEC- TION TIMING | 1 Group | 2 Group | | | | 2 Group | | Above 6,800 rpm fuel cut | | |
| PRCV SOLENOID | | ON (Vacuum cut) | OFF (Vacuum to pressure regulator) | | | | | | * After start ON (Vacuum cut) | Does not operate | * During hot starting |
| BAC VALVE | AIR VALVE | * Open | | | Close | | | | | | * Coolant temp: below 60°C (140°F) |
| | ISC VALVE | Large amount of bypass air | | Small amount of bypass air | | | | * Large and small amount of bypass air | Does not operate | * Test connector grounded: small amount | |
| PURGE SOLEN- VID | No.1 | OFF (Vacuum cut) | | * ON (Vacuum to No.1 purge control valve) | | | | OFF (Vacuum cut) | | * Positive pressure: OFF | |
| | No.2 | OFF (Vacuum cut) | | * ON (Vacuum to vacuum switch valve) | | | | OFF (Vacuum cut) | | * Engine speed: above 1,500 rpm | |

TROUBLESHOOTING CHART

| POSSIBLE CAUSE | | INPUT DEVICES | | | | | | | | | | OUTPUT DEVICES | | | |
|----------------|---|---|----------------------------|----------------|---------------------|--|--|-----------------------------|---------------|-----------------|--|-------------------------------------|---|--------------------------------------|--------------------------------------|
| | | Ignition coil | Group sensor (Distributor) | Air flow meter | Water thermo sensor | Intake air thermo sensor (in Air flow meter) | Throttle sensor (Variable resistor type) | Atmospheric pressure sensor | Oxygen sensor | Feedback system | | Solenoid valve (Pressure regulator) | Solenoid valve (No.1 purge control valve) | Solenoid valve (Vacuum switch valve) | BAC Valve (Idle speed control valve) |
| SYMPTOM | | 4B—14 | 4B—14 | 4B—15 | 4B—16 | 4B—17 | 4B—18 | 4B—19 | 4B—20 | 4B—20 | | 4B—21 | 4B—21 | 4B—21 | 4B—21 |
| 1 | Front indicated by SST Code NO. | 01 | 03 | 08 | 09 | 10 | 12 | 14 | 15 | 17 | | 25 | 26 | 27 | 34 |
| 2 | Hard start or won't start (Crank: OK) | TROUBLESHOOTING PROCEDURE: Note Step 1 under symptom is to quickly determine what system or parts may be at fault using the self-Diagnosis Checker (49 H018 9A1) 1st Check input sensors and switches and output solenoid valves self-diagnosed with Self-Diagnosis checker (Refer to page 4B—12). 2nd Check other switches with Self-Diagnosis Chicker (Refer to page 4B—22). 3rd Check the following items: <div style="display: flex; justify-content: space-between;"> <div> Electrical system 1) Battery condition 2) Fuses Fuel system 1) Fuel amount 2) Fuel leakage 3) Fuel filter 4) Idle speed </div> <div> Ignition system 1) Spark plugs 2) Ignition timing Intake air system 1) Air cleaner element 2) Vacuum or air leakage 3) Vacuum hose routing 4) Accelerator cable </div> </div> 4th Check the Fuel and Emission Control Systems | | | | | | | | | | | | | |
| 3 | Engine stall | | | | | | | | | | | | | | |
| | Only while warming up | | | | | | | | | | | | | | |
| | Only after warming up | | | | | | | | | | | | | | |
| 4 | Rough idle | | | | | | | | | | | | | | |
| | Only while warming up | | | | | | | | | | | | | | |
| | Only after warming up | | | | | | | | | | | | | | |
| 5 | High idle speed after warming up | | | | | | | | | | | | | | |
| 6 | Poor acceleration, hesitation, or lack of power | | | | | | | | | | | | | | |
| 7 | Runs rough on deceleration | | | | | | | | | | | | | | |
| 8 | Knocking | | | | | | | | | | | | | | |
| 9 | Excessive fuel consumption | | | | | | | | | | | | | | |
| 10 | Abnormal noise | | | | | | | | | | | | | | |
| 11 | Vibration | | | | | | | | | | | | | | |
| 12 | White smoke | | | | | | | | | | | | | | |
| 13 | Excessive oil consumption | | | | | | | | | | | | | | |
| 14 | Afterburn in exhaust system | | | | | | | | | | | | | | |
| 15 | Engine stalls or rough after hot starting | | | | | | | | | | | | | | |
| 16 | Fail emission test | | | | | | | | | | | | | | |

83U04B-009

| POSSIBLE CAUSE | | | | | | | | | | | |
|---|----|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Intake air system (Poor connection of components, throttle body) | | | | | | | | | | | |
| Fuel system (Fuel injection, fuel pressure) | | | | | | | | | | | |
| ISC (Idle speed control) system (Air valve, ISC solenoid valve) | | | | | | | | | | | |
| PRC (Pressure regulator control) system | | | | | | | | | | | |
| Turbocharging system (Oil and water passage, turbine, and compressor wheels malfunction) | | | | | | | | | | | |
| PCV (Positive crank case ventilation) system | | | | | | | | | | | |
| Knock control system | | | | | | | | | | | |
| Evaporative emission control system (Vacuum switch valve, No.1, No.2 purge valve malfunction) | | | | | | | | | | | |
| Deceleration system (Fuel cut operation malfunction) | | | | | | | | | | | |
| Exhaust system (System clogged) | | | | | | | | | | | |
| PAGE | | 4B—27 | 4B—37 | 4B—32 | 4B—54 | 4B—58 | 4B—71 | 5—41 | 4B—67 | 4B—64 | 4B—86 |
| SYMPTOM | 2 | 2 | 1 | | | | | | | | |
| | 3 | 3 | 2 | 1 | | | | | | | |
| | | 4 | 3 | 2 | | | 1 | | | | |
| | 4 | 4 | 3 | 1 | | | 2 | | | | |
| | | 5 | 4 | 2 | | | 1 | | 3 | | |
| | 5 | 2 | | 1 | | | | | | | |
| | 6 | 2 | 3 | | | 5 | | | 1 | | 4 |
| | 7 | | 3 | 2 | | | | | | 1 | |
| | 8 | | | | | 2 | | 1 | | | |
| | 9 | | 2 | | | | | | | 1 | 3 |
| | 10 | | | | | 1 | | | | | |
| | 11 | | | | | 1 | | | | | |
| | 12 | | | | | 1 | | | | | |
| | 13 | | | | | 1 | | | | | |
| | 14 | 3 | 4 | 1 | | | | | | 2 | |
| | 15 | | 2 | | 1 | | | | | | |
| 16 | 5 | 6 | 3 | | | | | | 4 | 2 | 1 |

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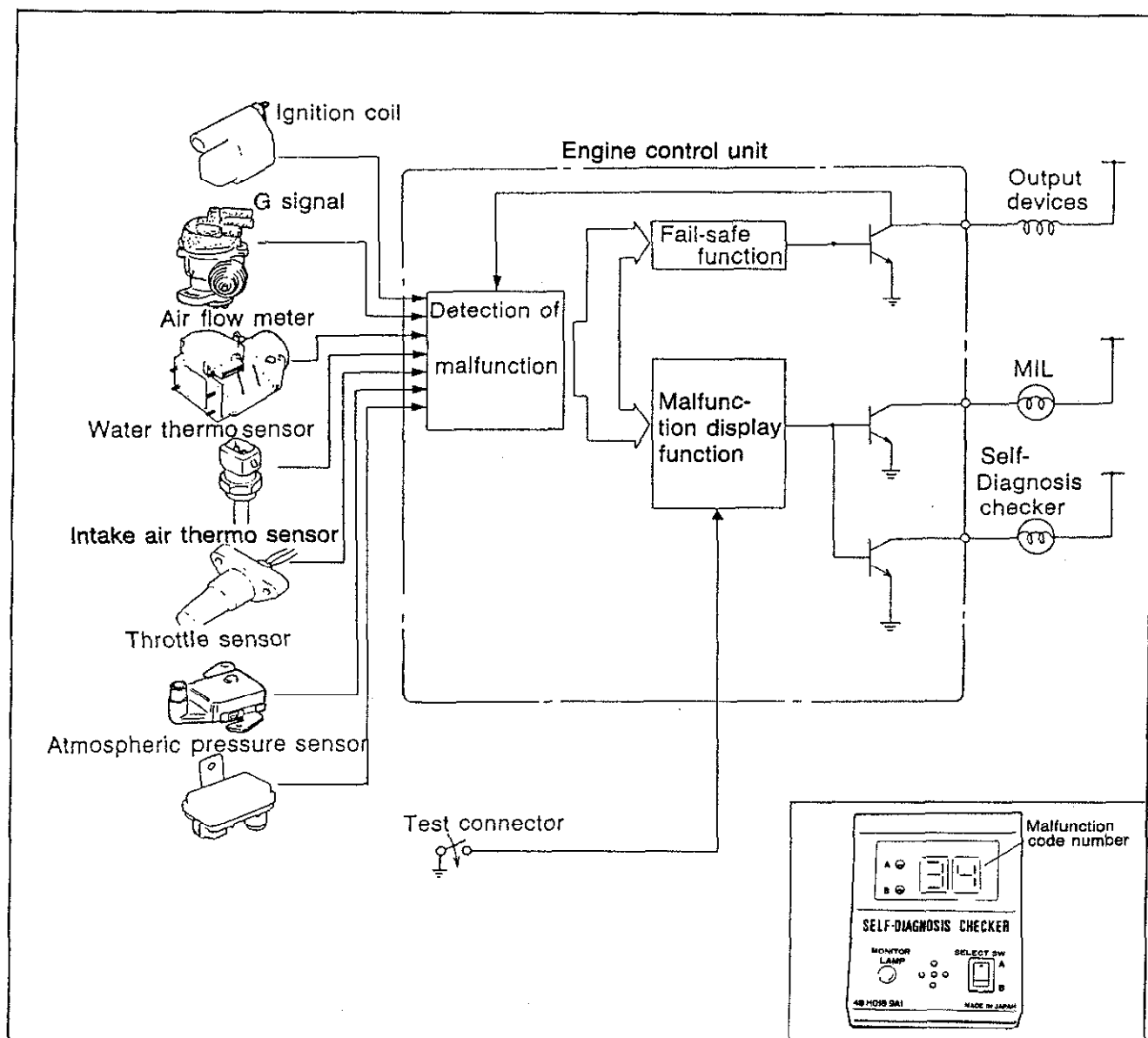
The number of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in the system

TROUBLESHOOTING WITH SST

SELF-DIAGNOSIS CHECKER (49 H018 9A1)

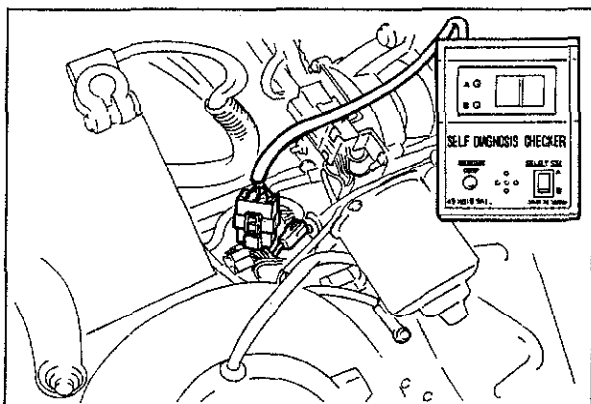


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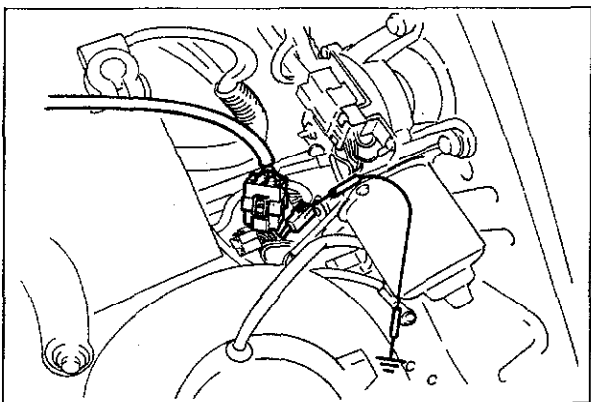
When troubles occur in the main input devices or output devices, check for the cause using **SST**. Using the **SST**, failures of each input and output device are indicated and retrieved from the control unit as malfunction code numbers.

Note

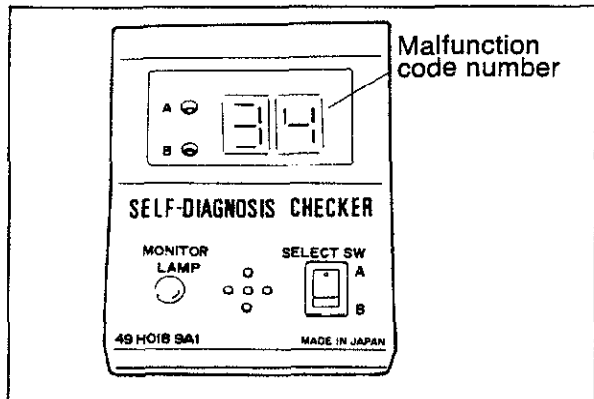
The control unit constantly checks for malfunction of the input devices. But, the control unit checks for malfunction of output devices only in a 3 second period after the ignition switch is turned ON and the test connector is grounded.



83U04B-011



69G04C-123



69G04A-023

INSPECTION PROCEDURE

1. Warm-up the engine to normal operating temperature and stop it.
2. Connect **SST** to the check connector (Green: 6pin) and the battery negative cable.

3. Connect a jumper wire between the test connector (Green: 1pin) and a ground.
4. Turn the ignition switch ON, then check for any code number.

Note

The SST buzzer should sound for 3 sec. after the ignition switch is turned ON.

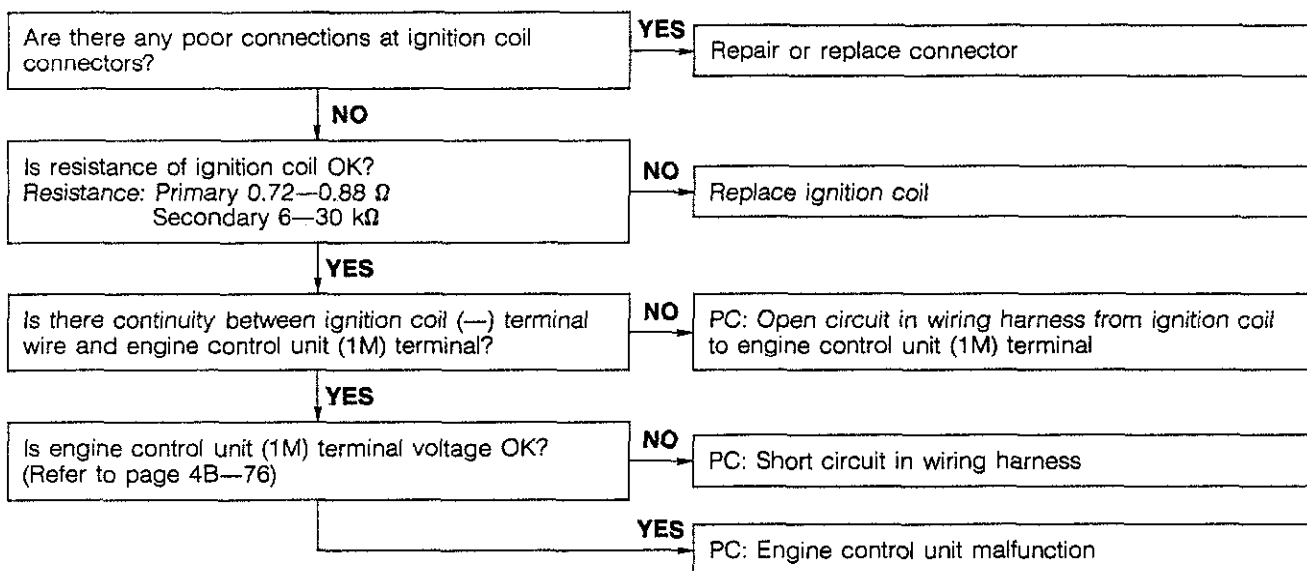
5. Start the engine, and check for further code numbers.
6. If a code number illuminates, check for the cause of the problem.

4B TROUBLESHOOTING WITH SST

If a warning code number is illuminated on **SST**, check the following chart along with the wiring diagram.

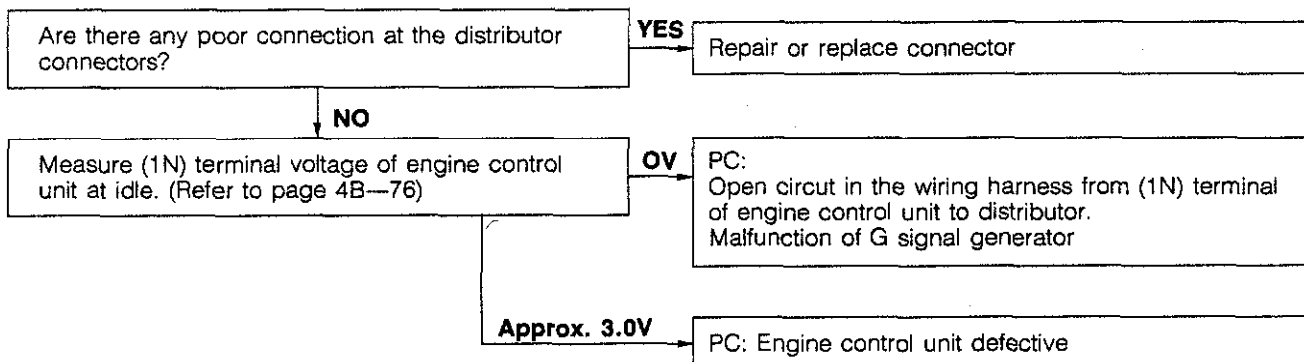
No. 01 code illumination (Ignition Pulse)

PC: Possible Cause

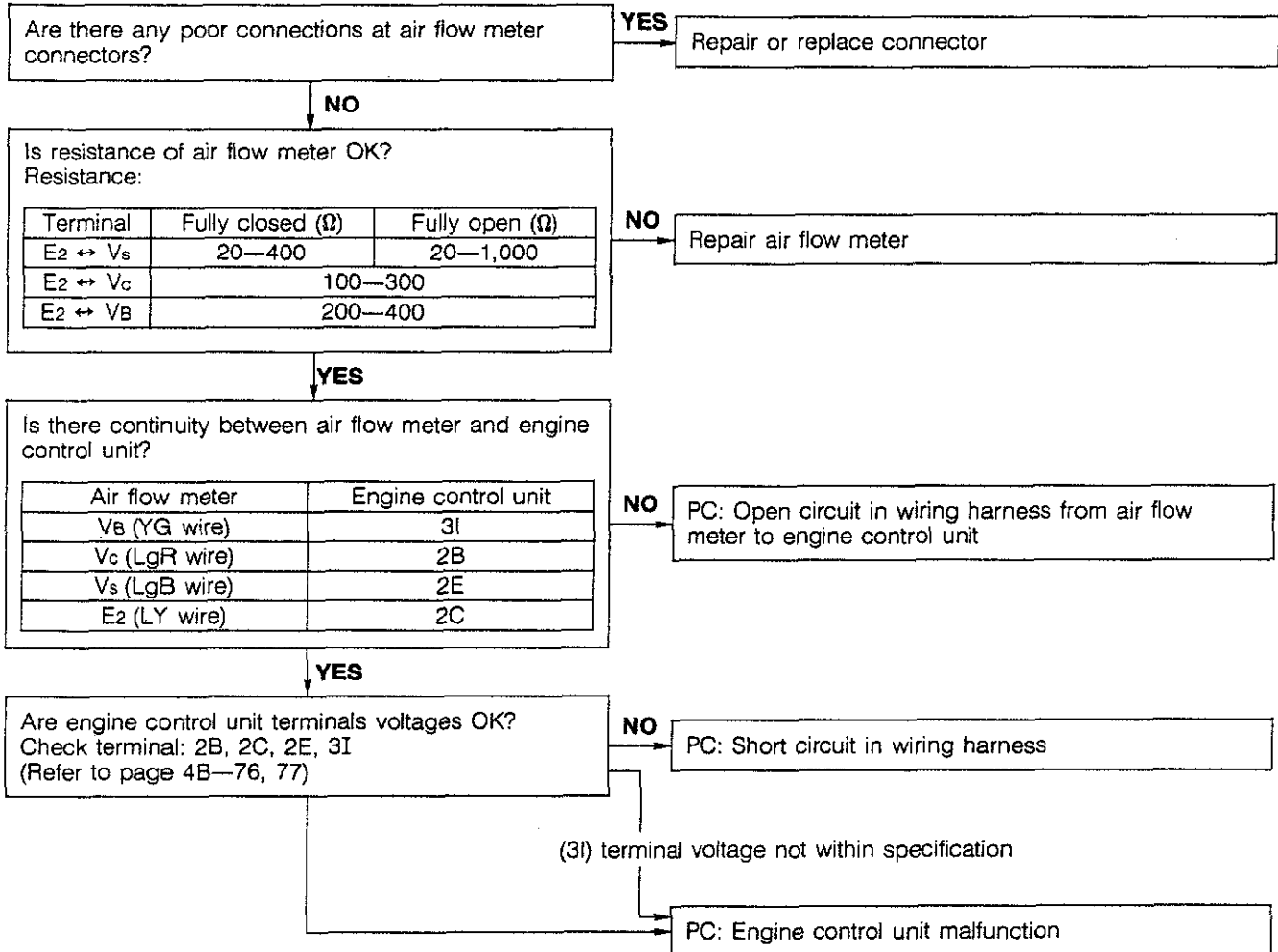


83U04B-012

No. 03 Code Illumination (G Signal)



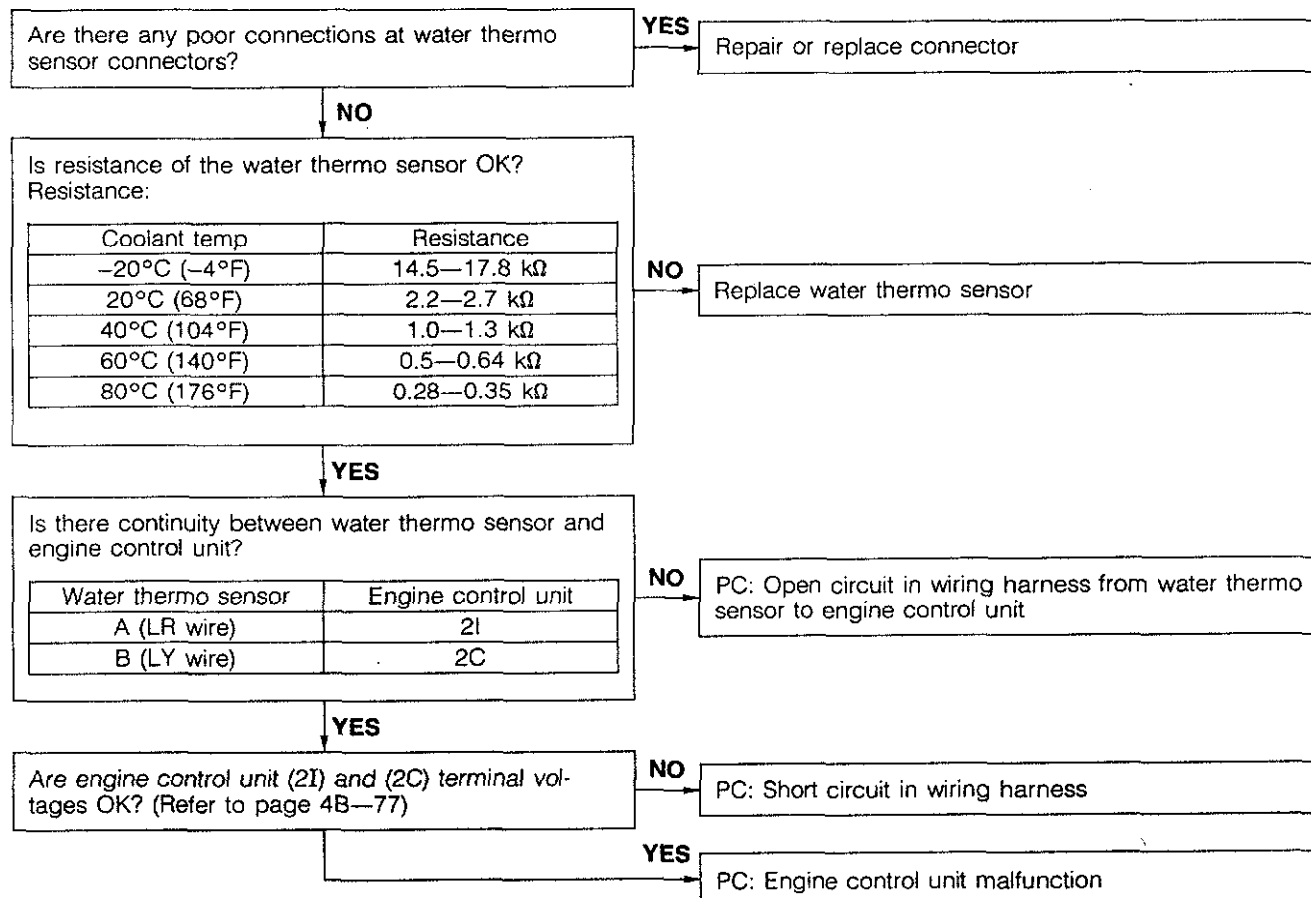
83U04B-013

No. 08 Code illumination (Air Flow Meter)

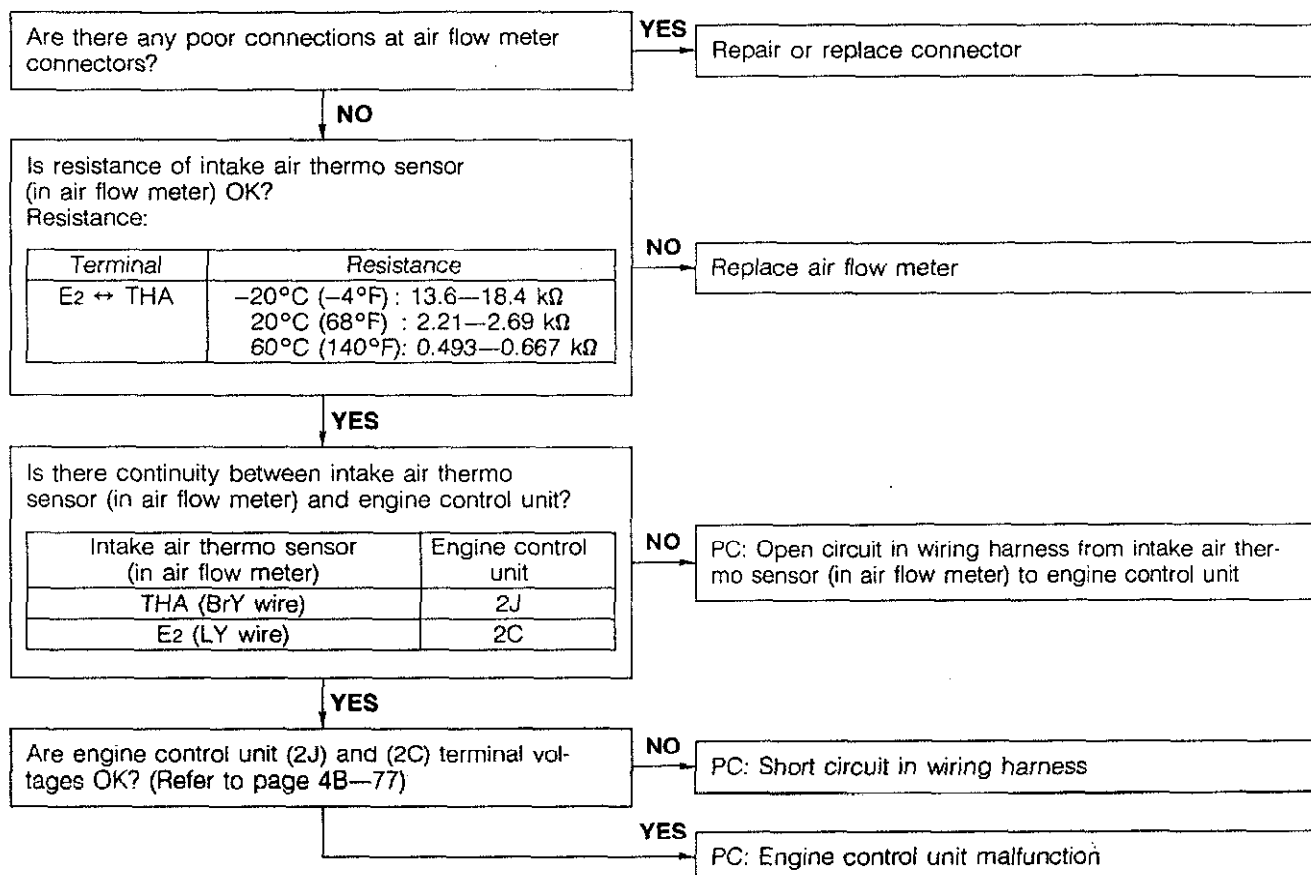
83U04B-014

4B TROUBLESHOOTING WITH SST

No. 09 Code illumination (Water Thermo Sensor)

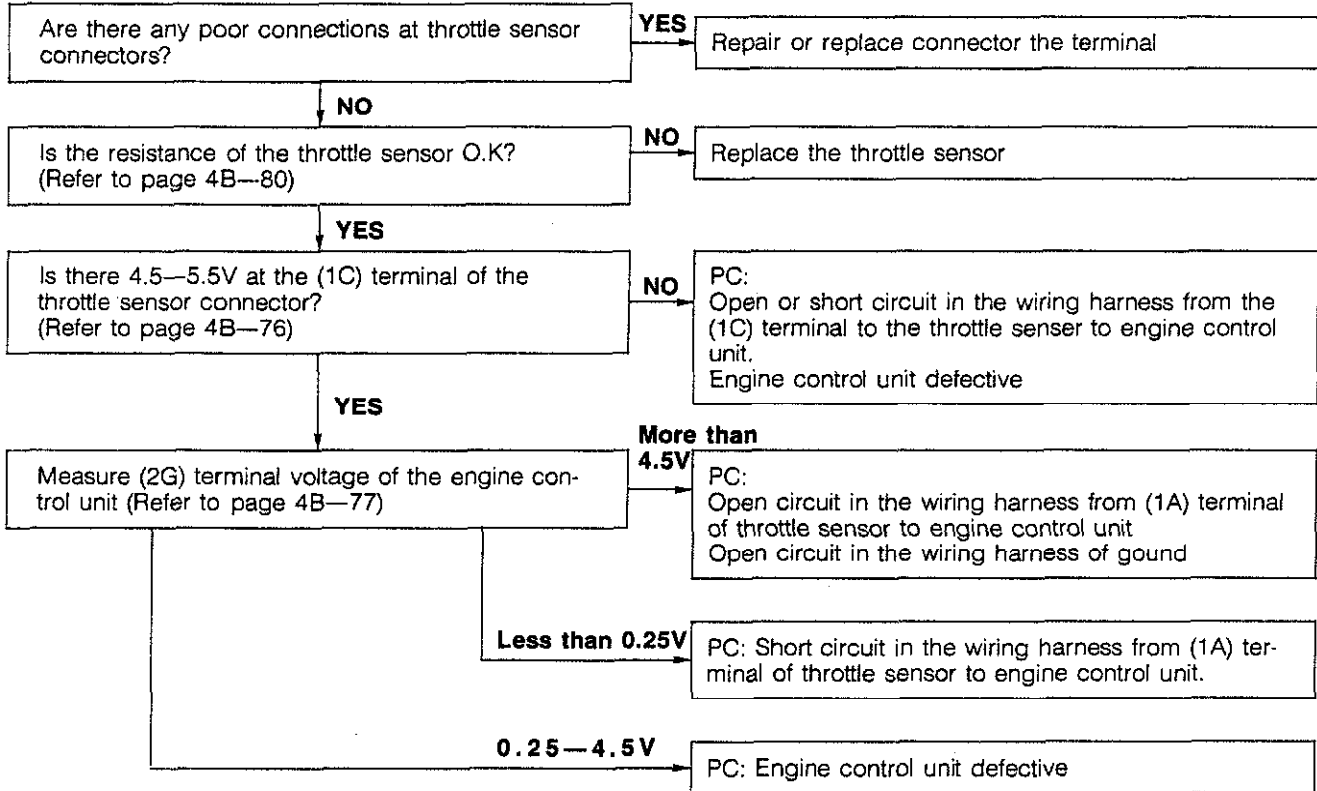


83U04B-015

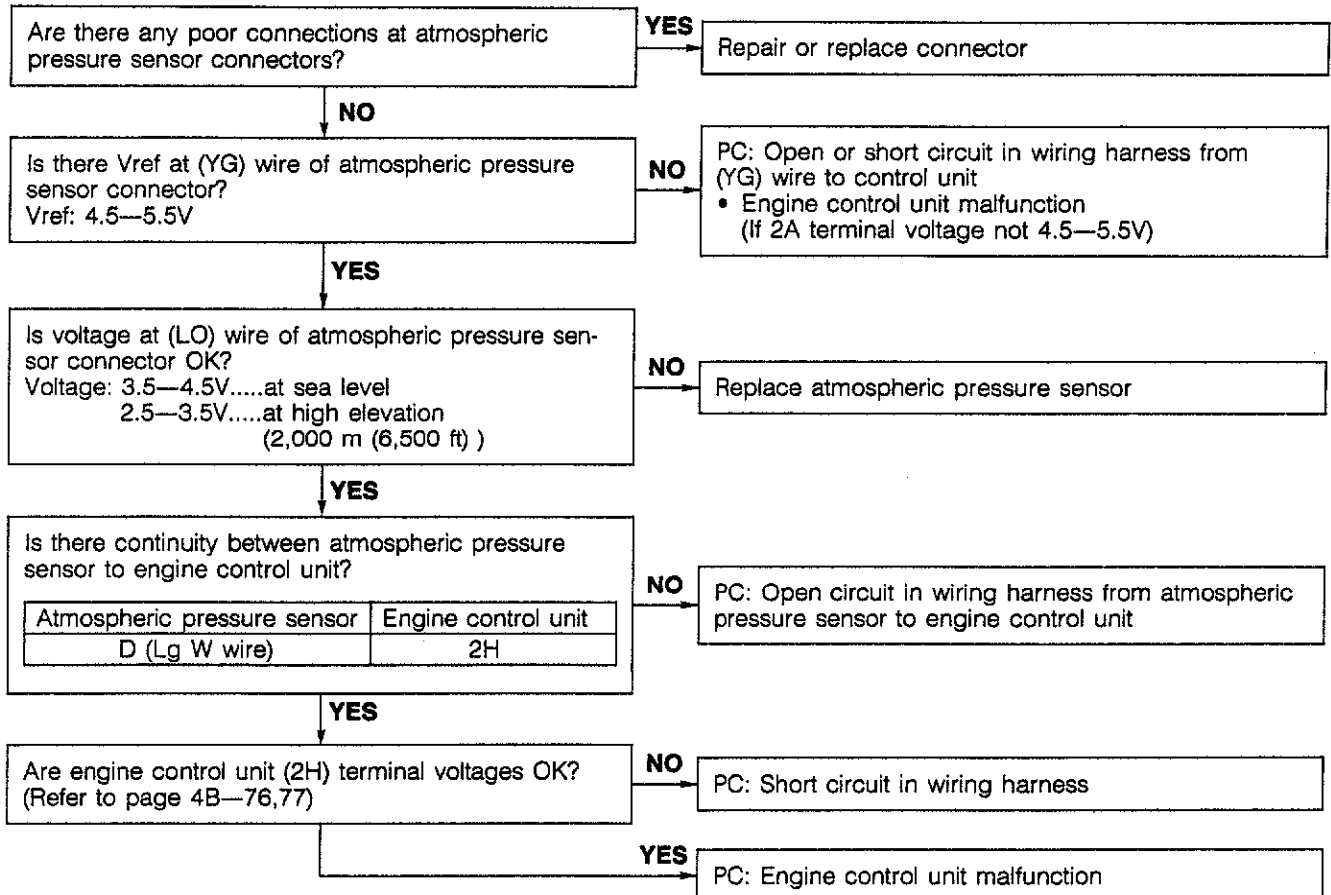
No. 10 Code illumination (Intake Air Thermo Sensor)

83U04B-016

No. 12 Code Illumination (Throttle Sensor)

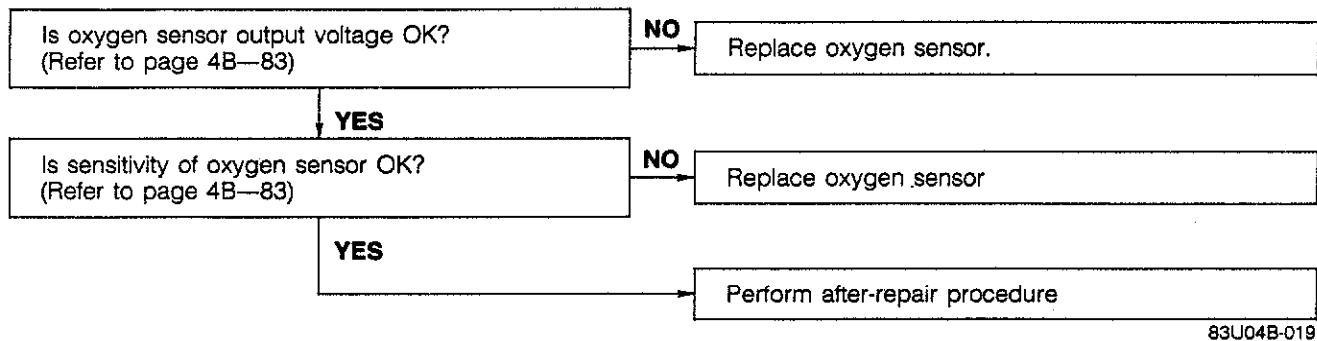


83U04B-017

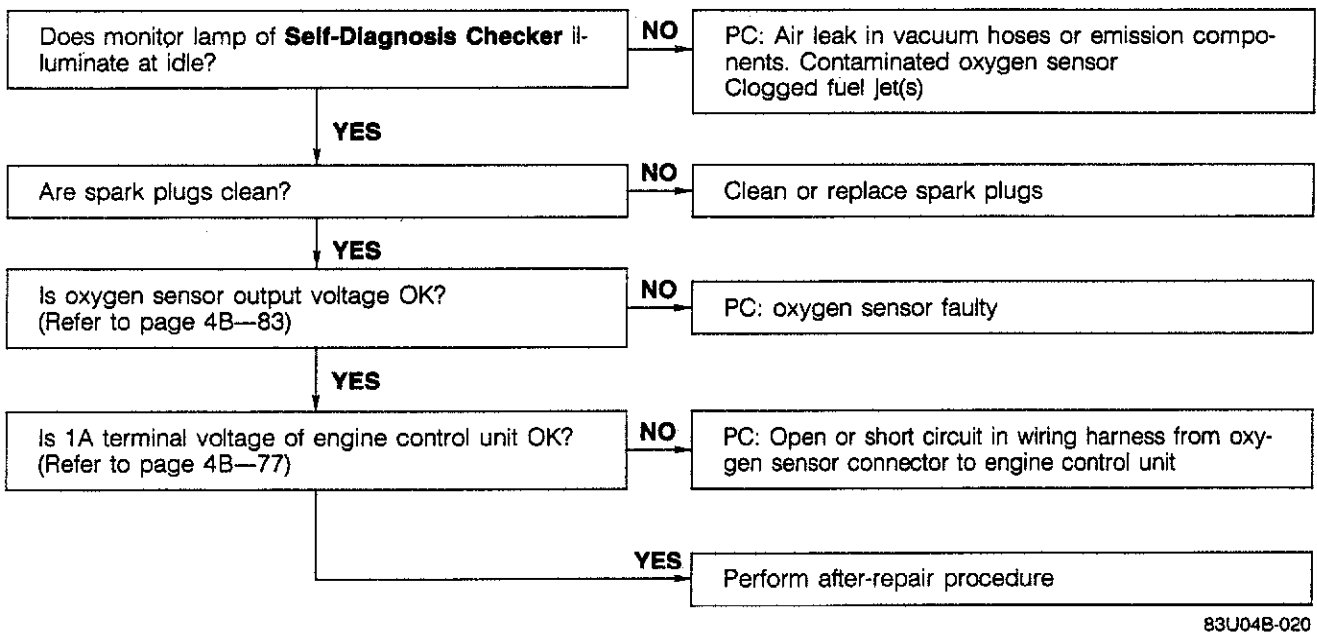
No. 14 Code illumination (Atmospheric Pressure Sensor)

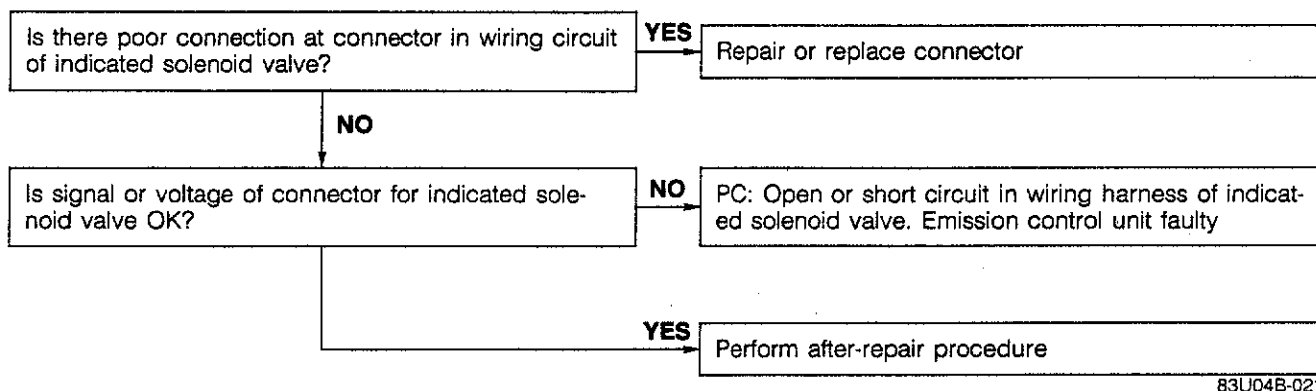
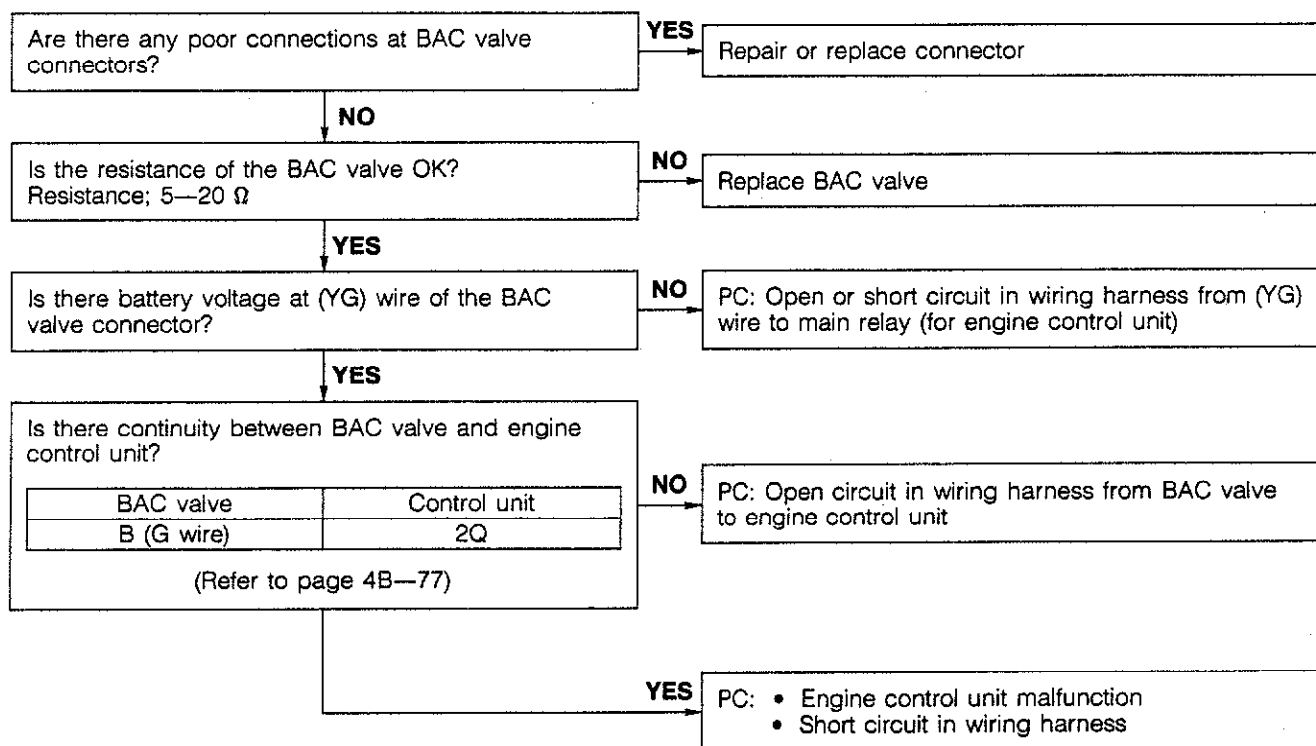
83U04B-018

No. 15 Code display illumination (Oxygen Sensor)

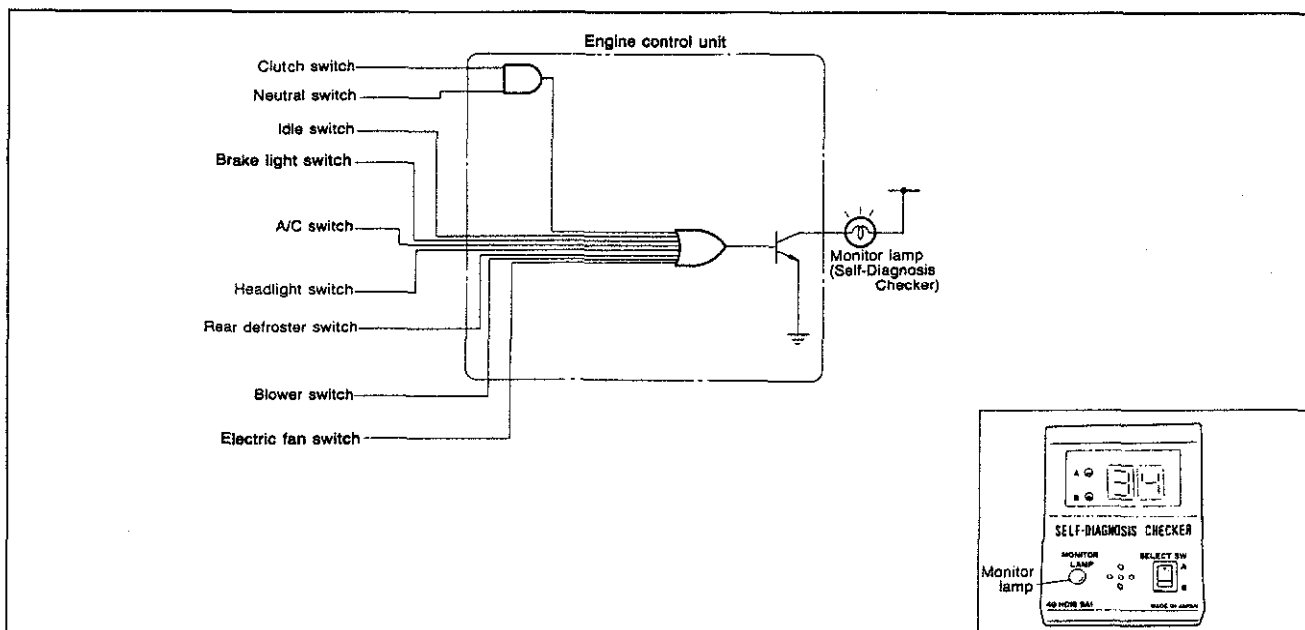


No. 17 Code display illumination (Feedback System)



No. 25, 26, 27 Code Illumination (Solenoid Valve)**No. 34 Code illumination (BAC Valve)**

MONITOR SWITCH FUNCTION



83U04B-023

The operation of individual switches can be determined by the monitor lamp SST.

Note

The test connector must be grounded and the ignition switch ON (engine stopped) to check the switches.

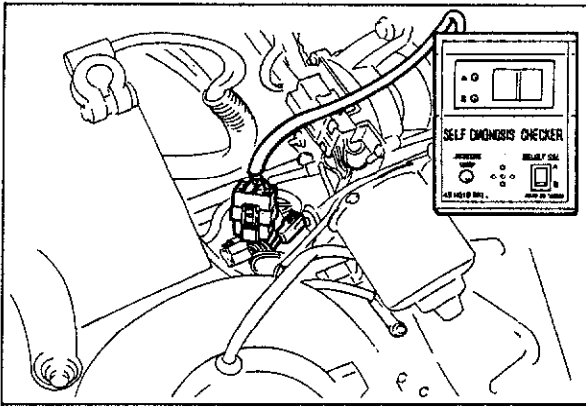
| Switch | Self-Diagnosis Checker | | Remarks |
|------------------------------------|------------------------|--------------------|-------------------------------------|
| | Monitor lamp ON | Monitor lamp OFF | |
| Clutch switch | Pedal released | Pedal depressed | Gear: IN |
| Neutral switch | In gear | Neutral | Clutch pedal released |
| Idle switch (Throttle sensor) | Pedal depressed | Pedal released | |
| Brake light switch | Pedal depressed | Pedal released | |
| A/C switch | ON | OFF | Blower motor position: "1" position |
| Headlight switch | ON | OFF | |
| Rear defroster switch | ON | OFF | |
| Blower switch | ON | OFF | Blower motor position: "3" position |
| Water thermo switch (Electric fan) | Disconnected terminal | Connected terminal | |

OXYGEN SENSOR MONITOR FUNCTION

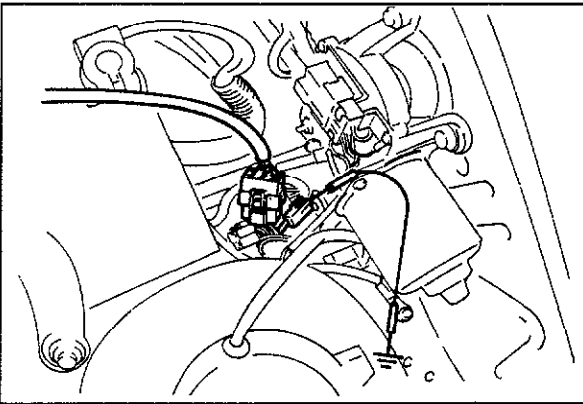
The oxygen sensor and feedback mode are monitored as follows.

| Condition | | Item monitored | Function |
|-----------|----------------|-----------------------------|--|
| Engine | Test connector | | |
| Running | Not grounded | Oxygen sensor output signal | Oxygen sensor output more than 0.55V: Monitor lamp ON |
| | | Oxygen sensor output signal | Oxygen sensor output less than 0.55V: Monitor lamp OFF |

86U04X-582



83U04B-024



83U04B-025

INSPECTION PROCEDURE

1. Warm up the engine to normal operating temperature and stop it.
2. Connect **SST** to the check connector (Green: 6 pin) and the battery negative terminal.

3. Connect a jumper wire between the test connector (Green: 1 pin) and a ground.
4. Turn the ignition switch ON, then check that the monitor lamp illuminates when each switch is made to function according to below procedure.

Caution

- a) When even one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

Procedure

Set the conditions to deactivate each switch.

- All accessories are OFF.
- Transmission is neutral.
- All pedals are released.

Check that the monitor lamp does not illuminate.

YES

Check each switch in accordance with following procedures

NO

Check each switch and related wiring harness.

- Clutch and Neutral switch: Refer to page 4A—78.
- Idle switch (Throttle sensor): Refer to page 4A—80.
- Brake light switch: Refer to page 4A—78.
- A/C switch
- Headlight switch: Section 15
- Rear defroster switch: Section 15
- Blower switch: Section 15
- Water thermo switch: Refer to page 3B—6.

Neutral and clutch switch (for MTX)

Shift transmission into gear.

Check that monitor lamp illuminates with clutch pedal released.

YES

Depresses clutch pedal
Check that monitor lamp does not illuminate

NO

- PC:
- Neutral or clutch switch malfunction (Refer to 4B—78)
 - Open or short circuit in related wiring harness
 - Engine control unit (1G) terminal malfunction (Refer to 4B—76)

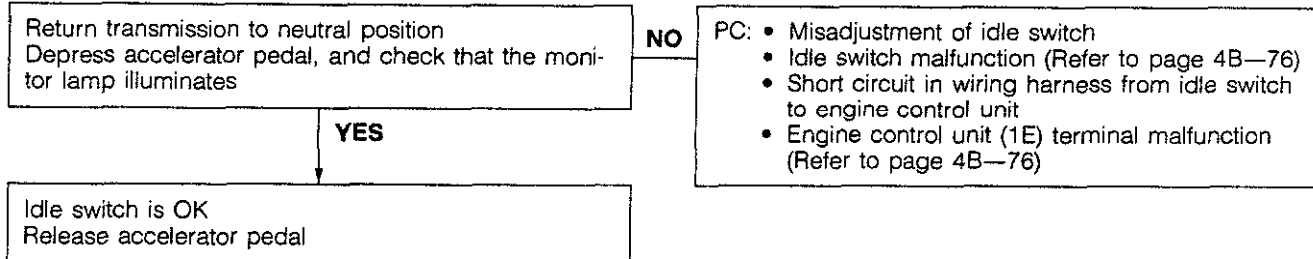
NO

- PC:
- Clutch switch malfunction (Refer to 4B—76)
 - Short circuit in wiring harness from clutch switch to engine control unit

83U04B-026

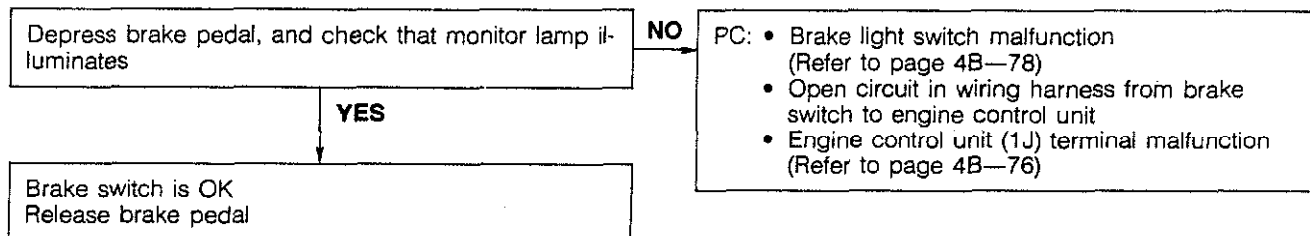
4B MONITOR SWITCH FUNCTION

Idle switch (Throttle sensor)



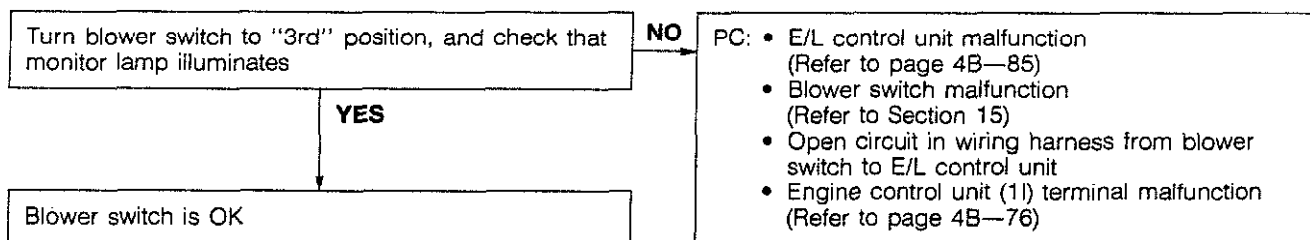
83U04B-027

Brake light switch



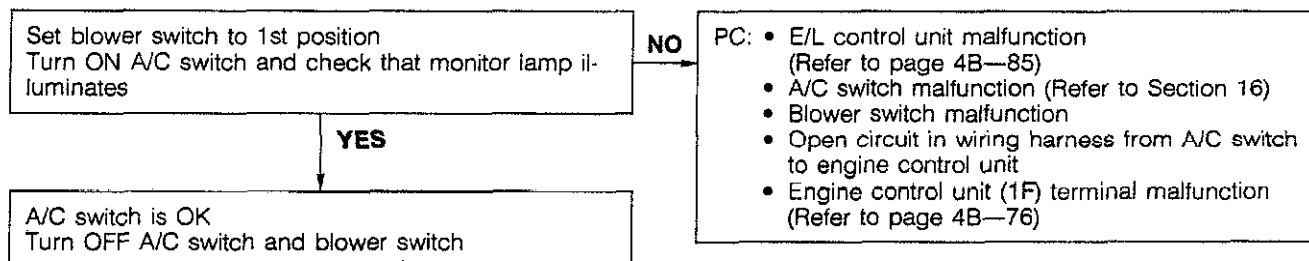
83U04B-028

Blower switch



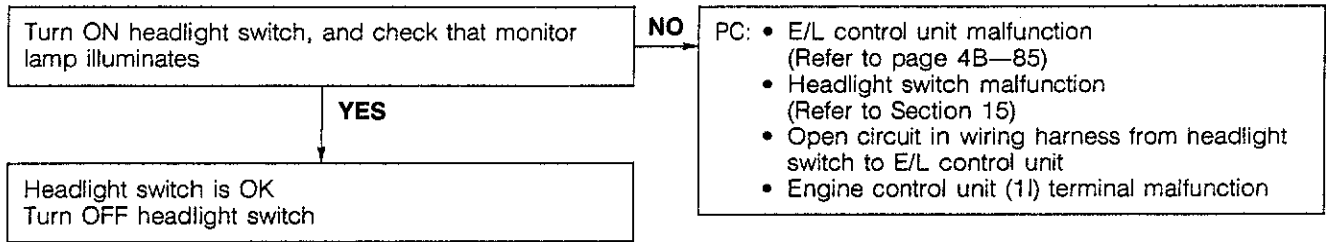
83U04B-029

A/C switch



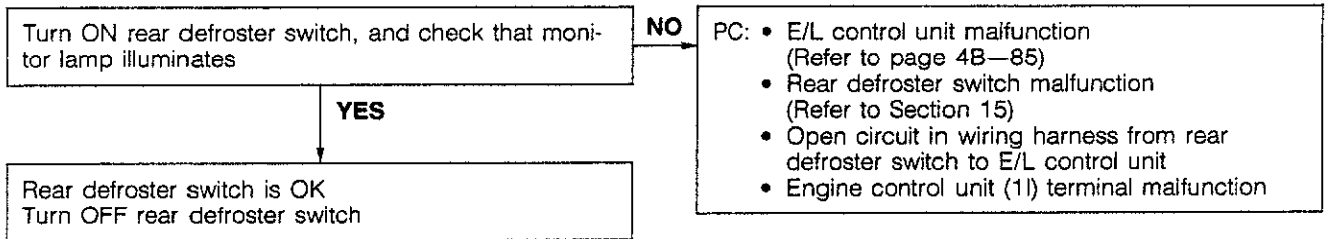
83U04B-030

Headlight switch



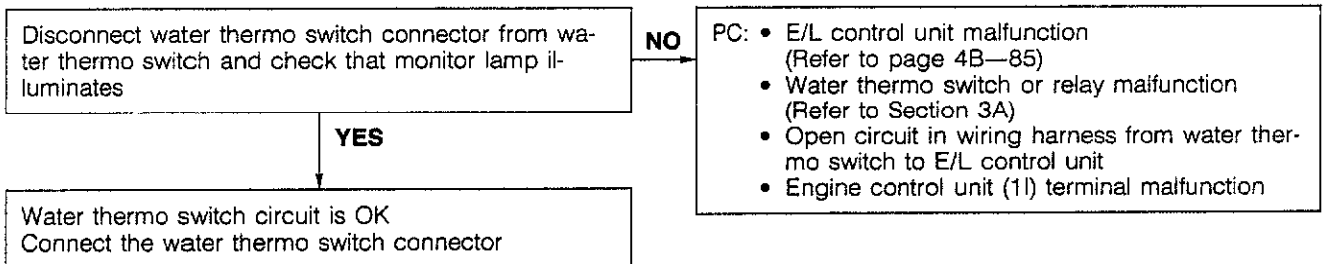
83U04B-031

Rear defroster switch

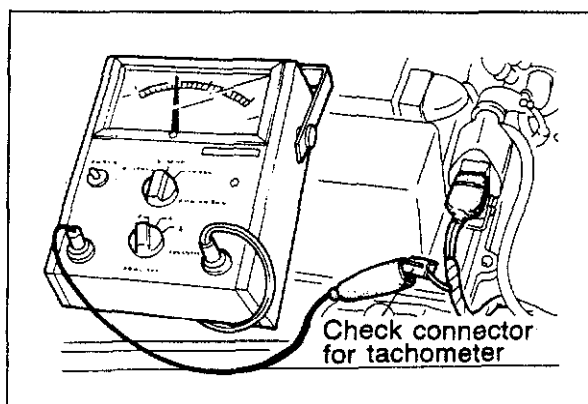


83U04B-032

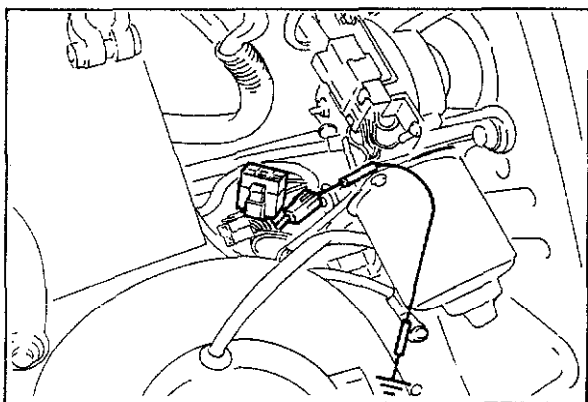
Water thermo switch circuit (not include switch inspection)



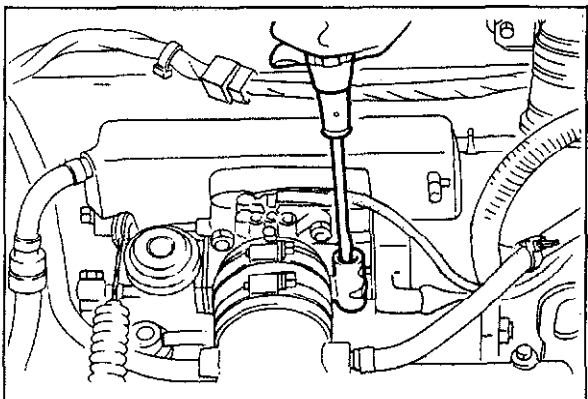
83U04B-033



83U04B-034



83U04B-035



83U04B-036

IDLE ADJUSTMENT

Preparation

Before checking or adjusting the idle speed, perform the followings:

- Switch off all accessories.
- Connect a tachometer to check connector (White).
- Warm up the engine to normal operating temperature.
- Check and adjust the ignition timing.

- Connect a jump wire between the test connector and ground.

Idle speed

1. Check the idle speed.

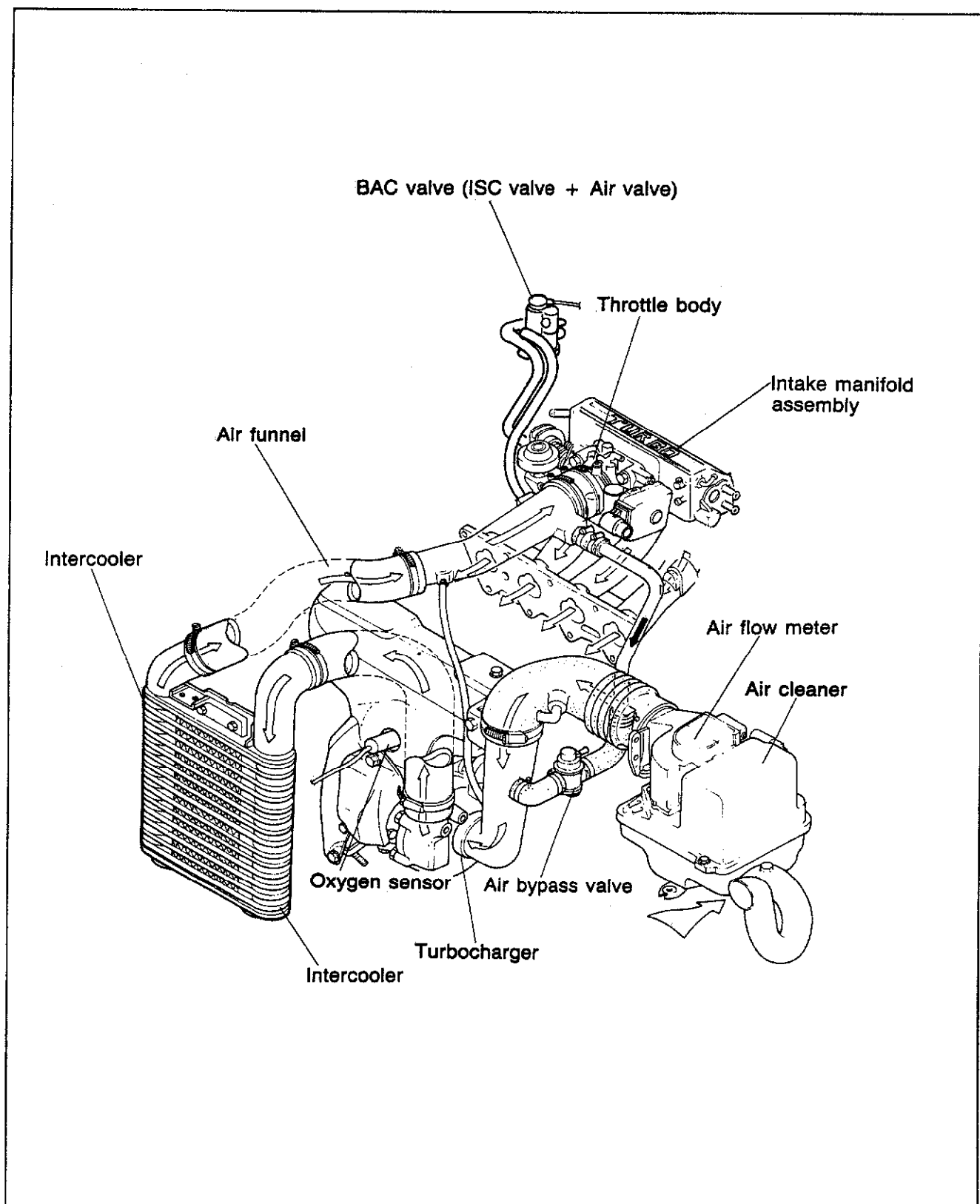
Idle speed: 850 ± 50 rpm

2. If the idle speed is not within specification, remove the blind cap from air adjust screw and adjust it by turning the air adjust screw.
3. After adjusting the idle speed, install the blind cap and disconnect a jumper wire from the test connector.

Note

Check and adjust the dashpot operation after adjusting the idle speed.

INTAKE AIR SYSTEM



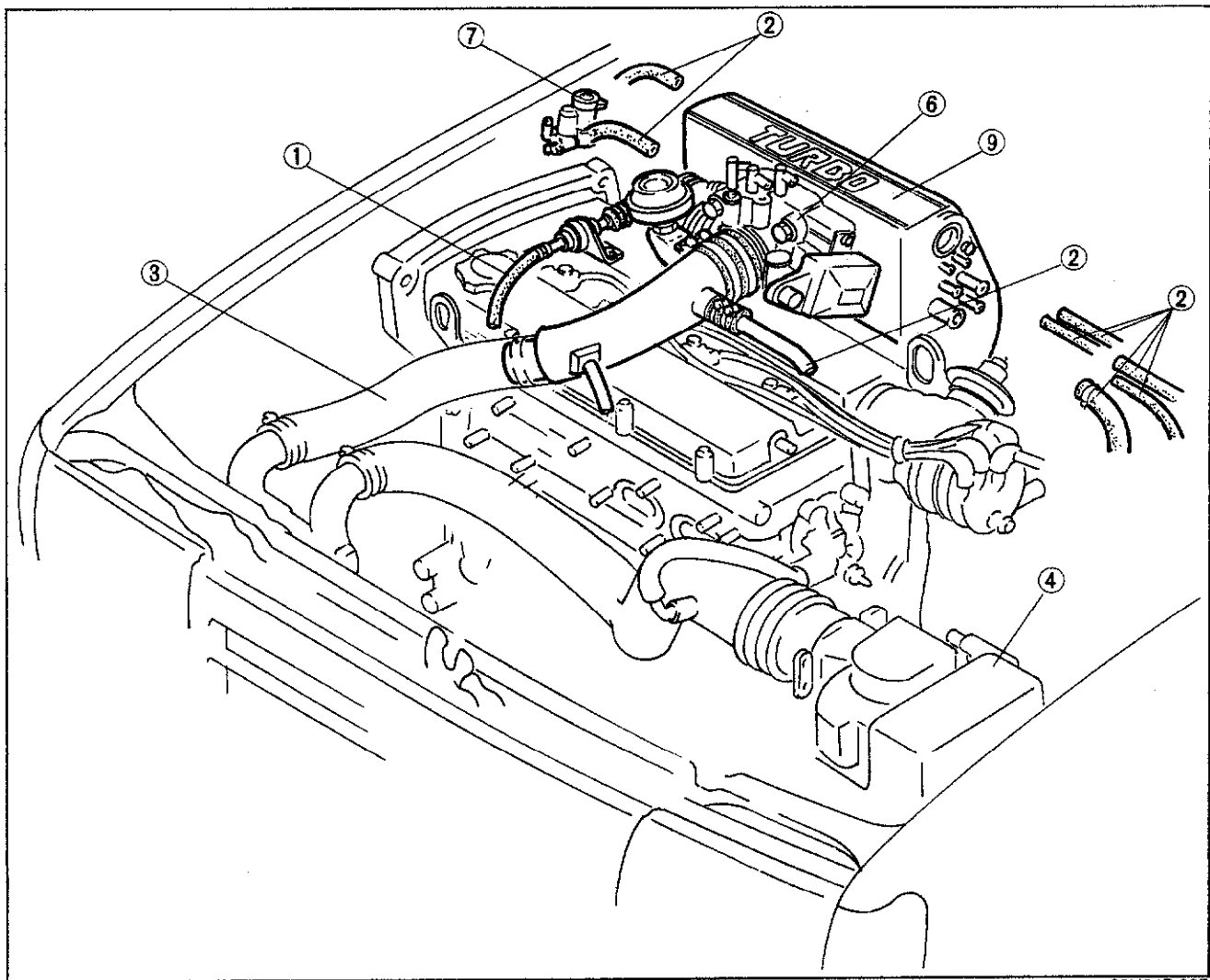
83U04B-160

This system is comprised of the air cleaner, air flow meter, turbocharger, intercooler, air bypass valve, air funnel, throttle body, intake manifold assembly, and BAC valve.

4B INTAKE AIR SYSTEM

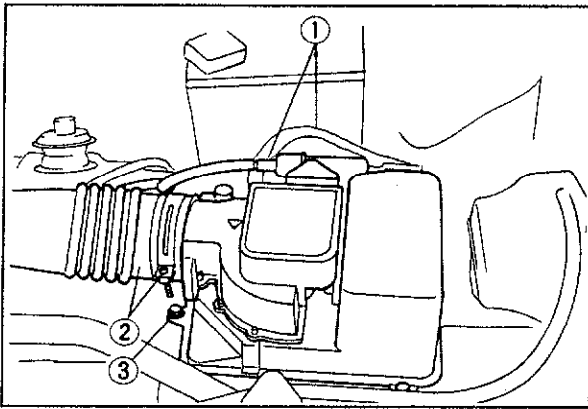
REMOVAL AND INSPECTION

1. Disconnect the negative battery cable.
2. Remove the intake air system in accordance with the following order.
3. Install in the reverse order of removal.



83U04B-037

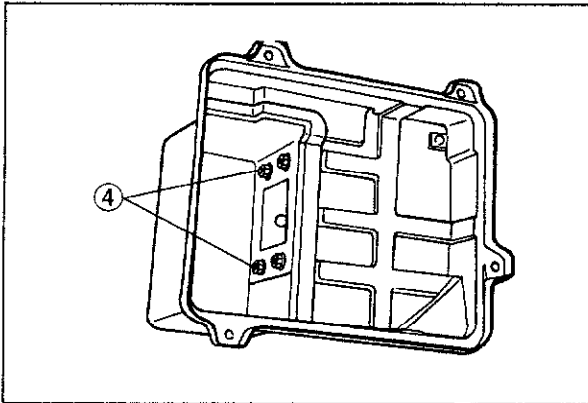
- | | |
|-------------------------------|--------------------------------|
| 1. Accelerator cable | 6. Throttle body |
| 2. Air hoses and vacuum hoses | 7. BAC valve |
| 3. Air funnel | 8. Water hose (for oil cooler) |
| 4. Air cleaner | 9. Intake manifold assembly |
| 5. Water hoses | |



83U04B-038

Air Flow Meter Removal and Installation

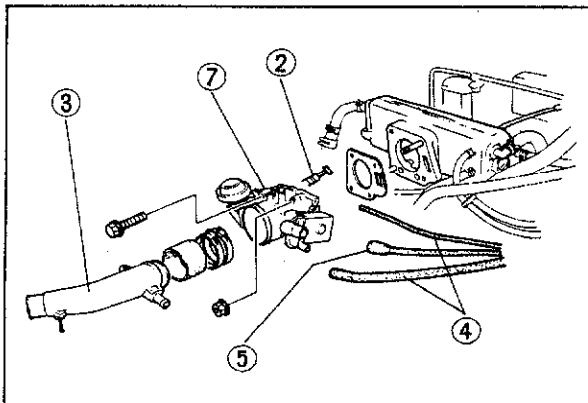
1. Remove the high tension leads and connectors.
2. Loosen the hose band and remove the intake air hose.
3. Remove the attaching bolts of air cleaner cover.



83U04B-039

4. Turn the air cleaner cover upside down and remove the attaching nuts of air flow meter.
5. Remove the air flow meter.

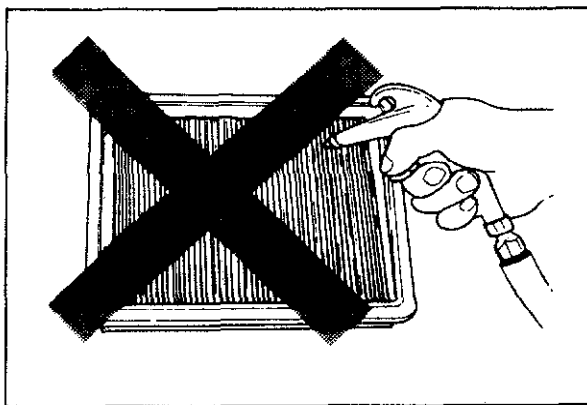
Install in the reverse order of removal.



83U04B-040

Throttle Body Removal and Installation

1. Drain the water from radiator
2. Disconnect the accelerator cable from the throttle linkage
3. Disconnect the air funnel
4. Disconnect the hoses and tubes
5. Disconnect the throttle sensor connector
6. Remove the attaching nuts and bolts of throttle body
7. Remove the throttle body
8. Install in the reverse order of removal



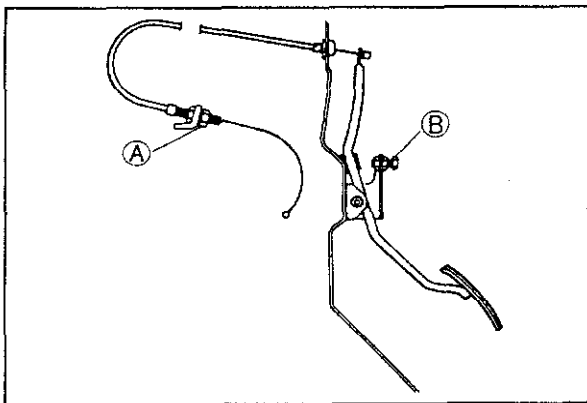
69G04A-059

PARTS INSPECTION Air Cleaner Element

Caution

Do not use the compressed air to clean the air cleaner element.

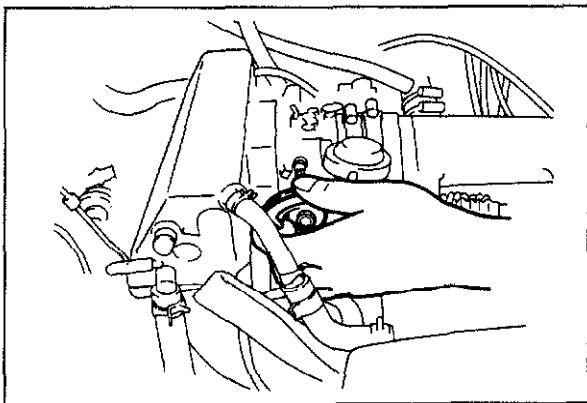
1. Check the condition of the air cleaner element.
2. Replace, if necessary.



69G04A-060

Accelerator Cable

1. Inspect the deflection of the cable. If the deflection is not within **1 ~ 3 mm (0.04 ~ 0.12 in.)**, adjust by using nuts (A).
2. Depress the accelerator pedal to the floor and confirm that the throttle valve is fully opened. Adjust by using bolt (B) if necessary.



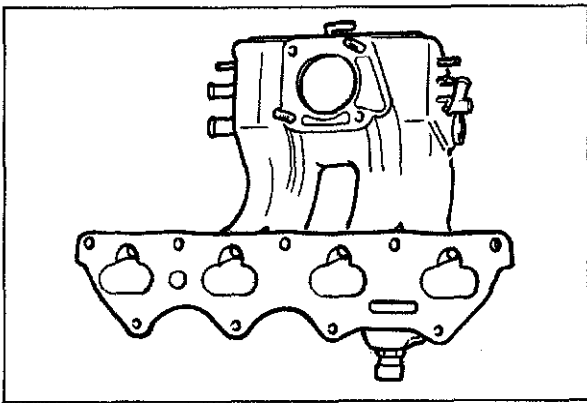
83U04B-042

Throttle Body

1. Check that the throttle valve move smoothly when the throttle lever is moved from fully closed and fully open.
2. Replace, if necessary.

Note

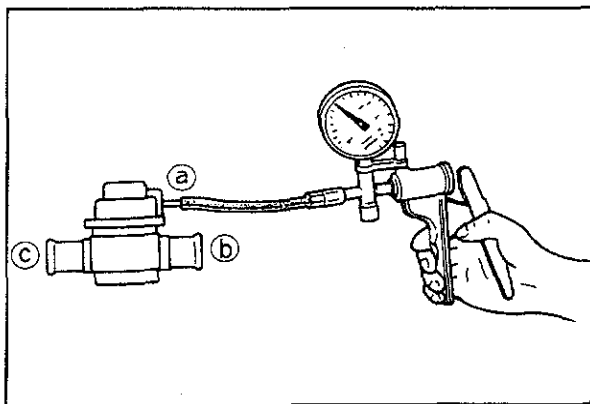
For inspection and adjustment of the throttle sensor, refer to Control System (Page 4B—80).



83U04B-043

Intake manifold assembly

1. Visually check the intake manifold assembly for damage.
2. Replace, if necessary.

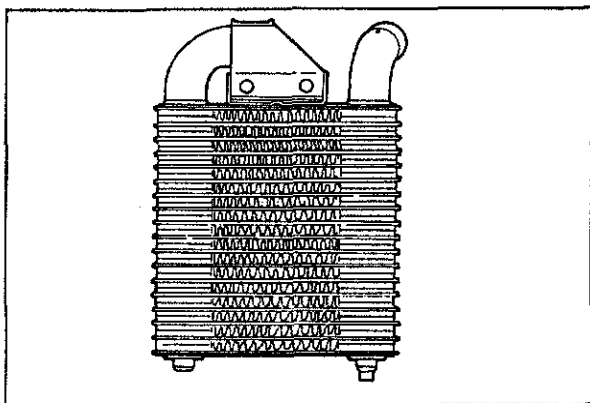


83U04B-044

AIR BYPASS VALVE

Inspection

1. Remove the air bypass valve.
2. Connect a vacuum pump tester to port (a) of the valve.
3. Apply vacuum and check that the air flow through the valve from port (b) to port (c) at **100—370 mmHg (3.94—14.58 inHg)** of the vacuum.
4. Replace the valve if necessary.



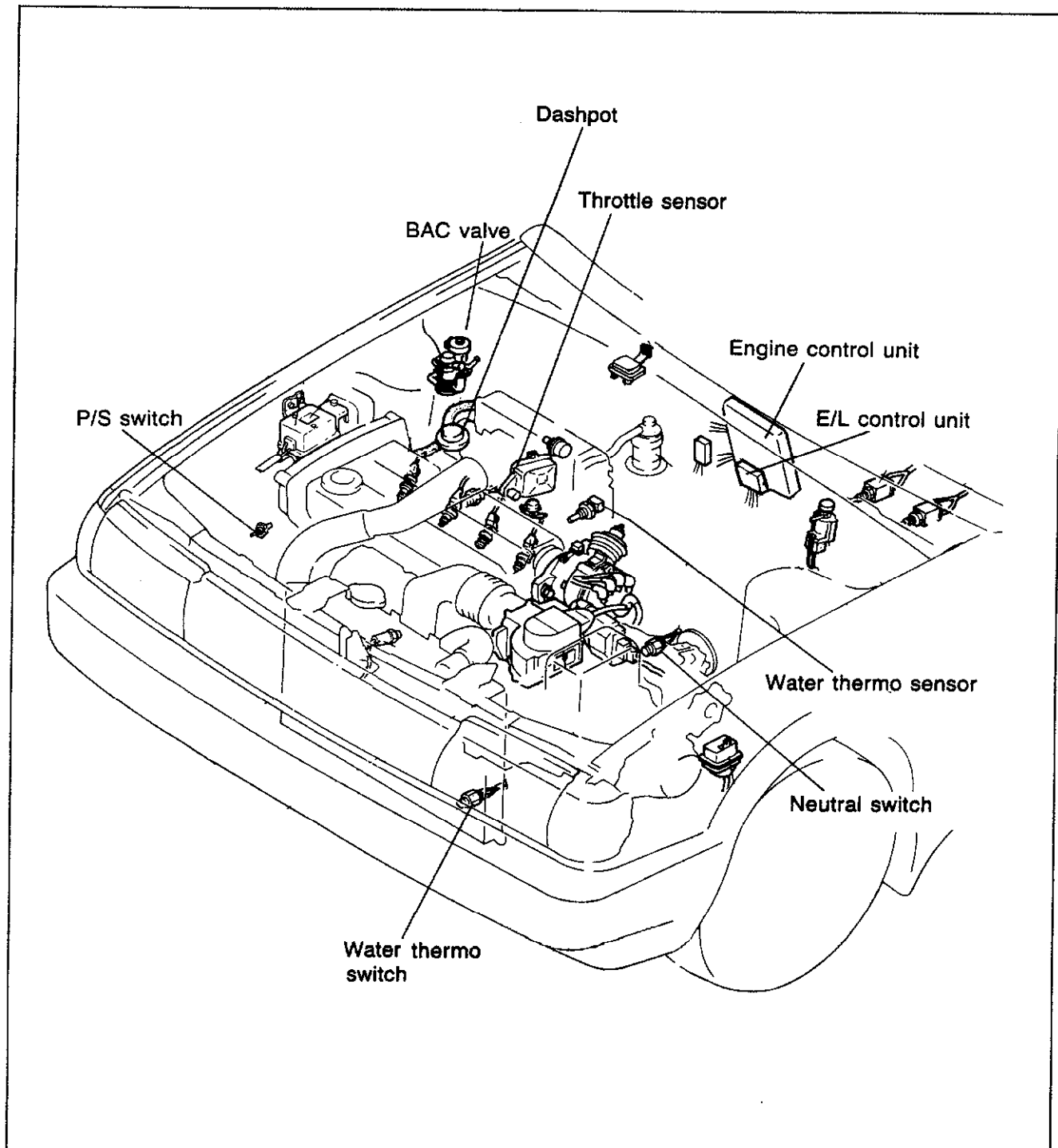
63G04C-327

INTERCOOLER

Inspection

1. Remove the intercooler.
2. Inspect the intercooler for cracks, restriction, or damage, replace if necessary.

IDLE SPEED CONTROL (ISC) SYSTEM



OUTLINE

To improve idle smoothness, the ISC system controls the intake air amount detected by the air flow meter by regulating the bypass air amount that passes through the throttle body, and thereby helps the engine to maintain a steady idle speed.

This system consists of the BAC valve and the control system.

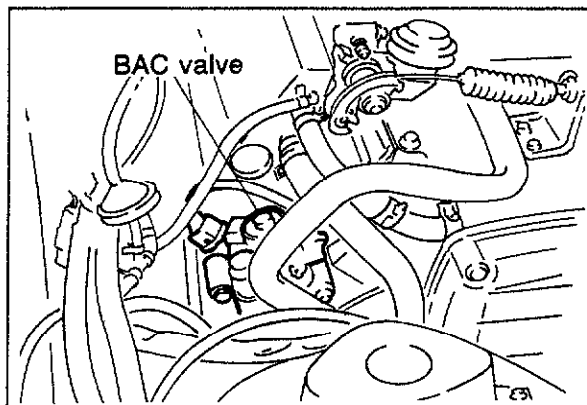
The BAC valve consists of the air valve which functions only during cold engine conditions and the ISC valve which works throughout the entire engine speed range.

TROUBLESHOOTING CHART

Before performing the following troubleshooting, check the condition of the wiring harness and connector.

| SYMPTOM | | POSSIBLE CAUSE | | | | | |
|----------------------------------|------------------|---------------------|--------------------------|--|--------------------------------|-----------|--------------------------------------|
| | | Water thermo sensor | Intake air thermo sensor | Throttle sensor (Variable resistor type) | ISC system (System inspection) | BAC valve | Engine control unit terminal voltage |
| | | | | | | | 2Q |
| | | 4B—82 | 4B—79 | 4B—80 | 4B—34 | 4B—35 | 4B—77 |
| Engine stall | While warming up | 3 | 4 | | 1 | 2 | 5 |
| | After warming up | 3 | 4 | | 1 | 2 | 5 |
| Rough Idle | While warming up | 3 | 4 | | 1 | 2 | 5 |
| | After warming up | 3 | 4 | | 1 | 2 | 5 |
| High Idle speed after warming up | | 3 | 4 | | 1 | 2 | 5 |
| Runs rough on deceleration | | 4 | 5 | 3 | 1 | 2 | 6 |
| Afterburn in exhaust system | | 4 | 5 | 3 | 1 | 2 | 6 |
| Fail emission test | | 4 | 5 | 3 | 1 | 2 | 6 |

83U04B-046



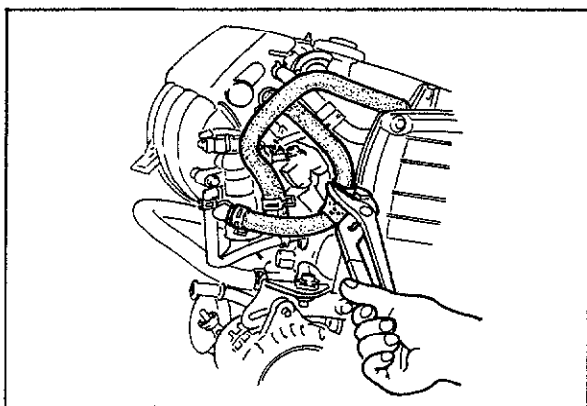
83U04B-047

System Inspection

1. Connect the jumper wire between the test connector (Green: 1 pin) and ground.
2. Disconnect the BAC valve connector.
3. Start the engine and run it at idle.

Note

When the BAC valve is disconnected, the engine speed will be reduced, which is normal.

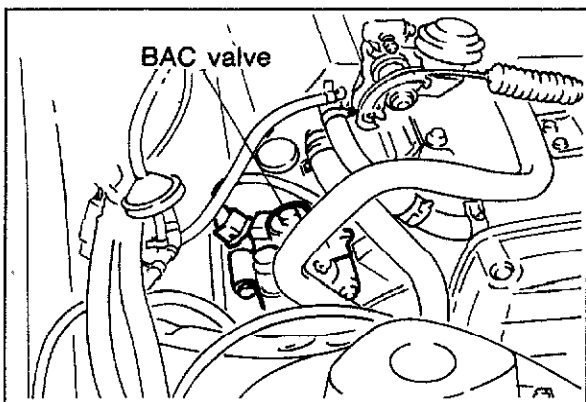


83U04B-048

4. Pinch the air hose and note the engine speed.

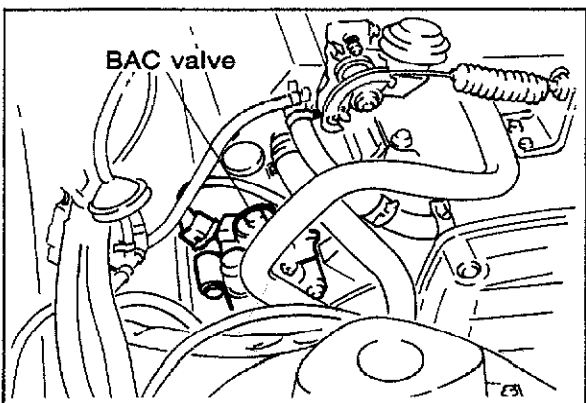
Cold engine: Engine speed drops

Warm engine: Engine speed unchanged



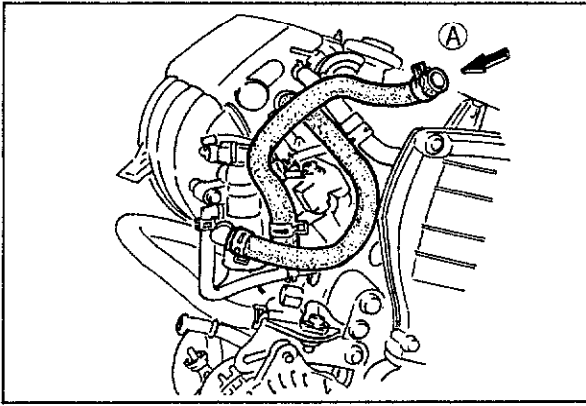
83U04B-049

5. Connect the BAC valve connector.
6. Disconnect the jumper wire.
7. Warm up the engine to normal operating temperature and run it at idle.
8. Check that the idle speed is correct.



83U04B-050

9. Connect the jumper wire between the test connector and ground.
10. Disconnect the BAC valve connector.
11. Check that the engine speed decreases.
12. Reconnect the BAC valve connector.



83U04B-051

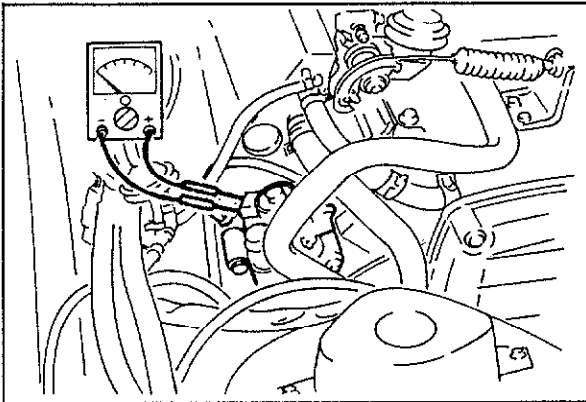
BAC Valve

Air valve

1. Disconnect the air hoses from the air funnel.
2. Blow through the BAC valve from port ①. Check the air flow.

Cold engine: Air flows

Warm engine: Air does not flow



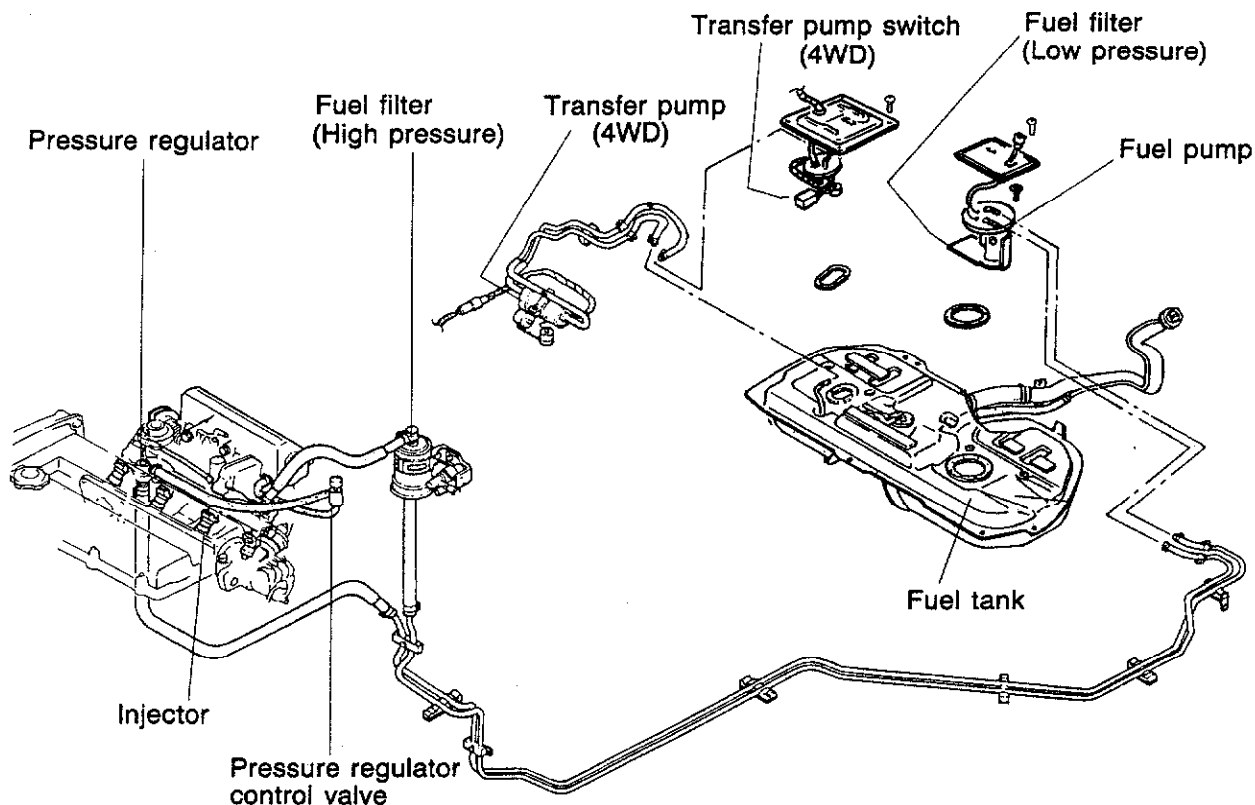
83U04B-052

ISC valve

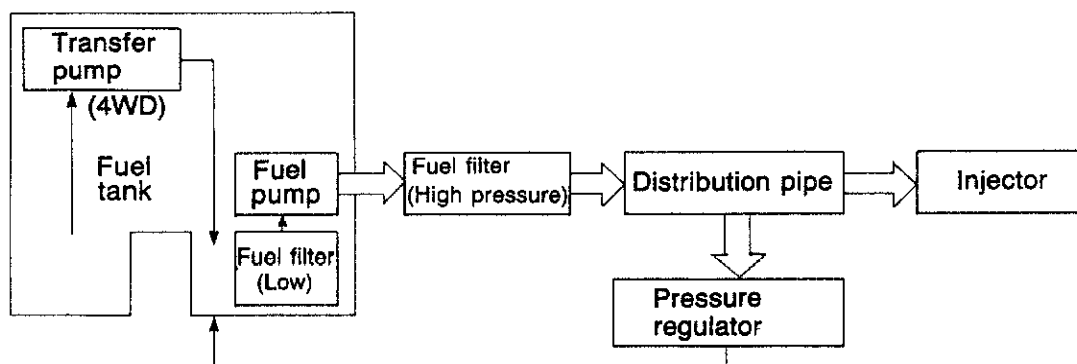
1. Disconnect the BAC valve connector.
2. Connect an ohmmeter to the terminals of the BAC valve.
3. Check the resistance.

Resistance: 5—20 Ω

FUEL SYSTEM



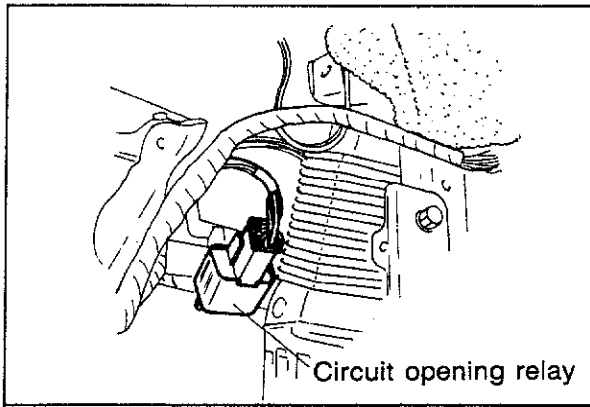
Fuel flow



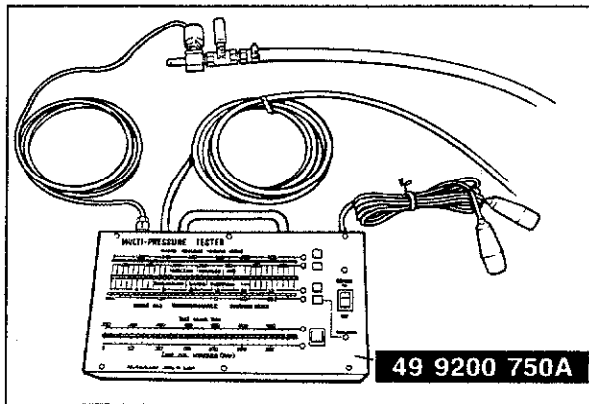
83U04B-053

This system supplies fuel for engine and controls the fuel pressure to maintain the required fuel injection amount to each injector.

This system consists of the fuel pump, transfer pump (only 4WD), pressure regulator, delivery pipe, fuel filters, and injectors.



83U04B-054



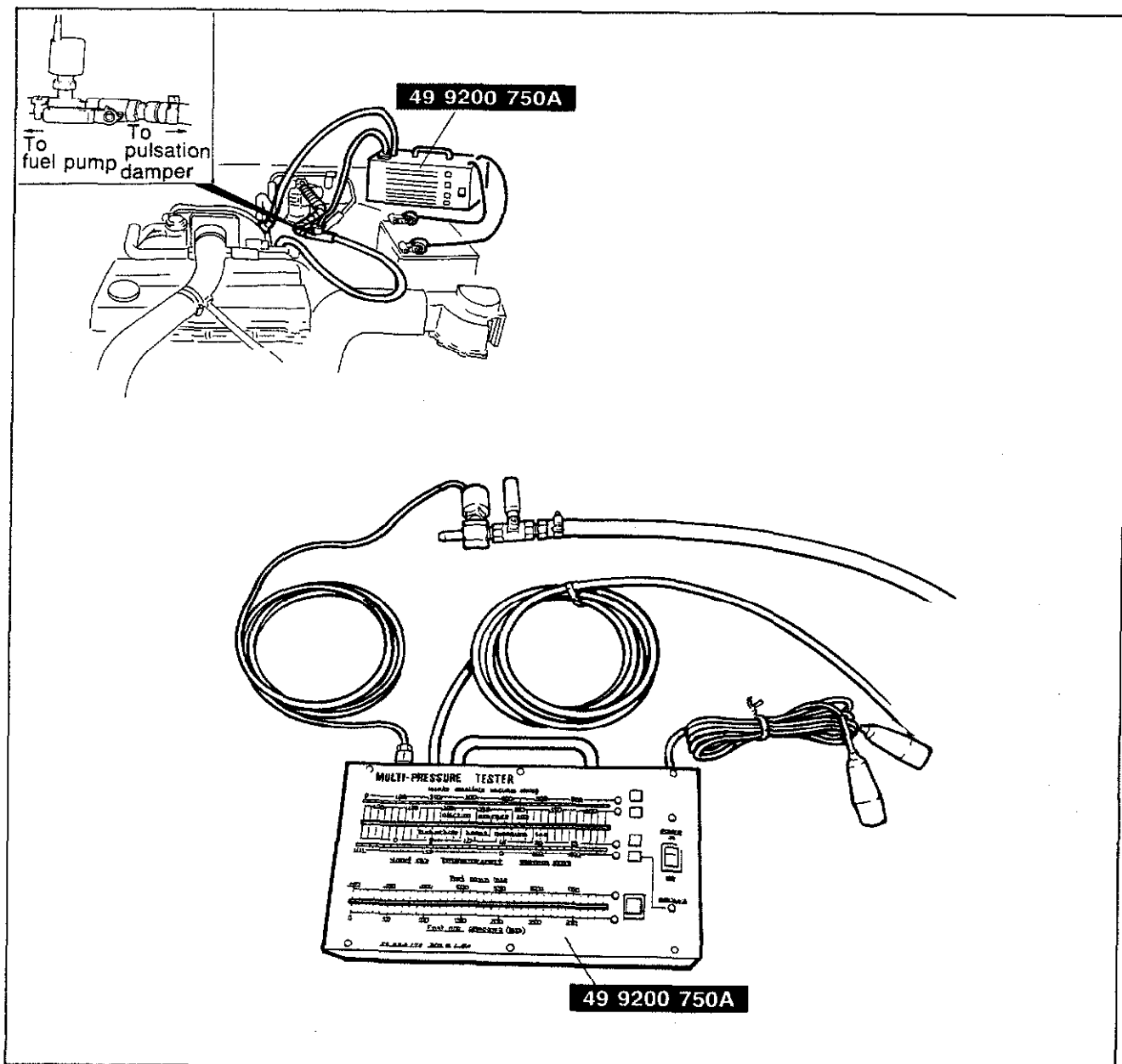
69G04A-098

FUEL PRESSURE RELEASE AND SERVICING FUEL SYSTEM

Fuel in the fuel lines remains under high pressure even when the engine is not running.

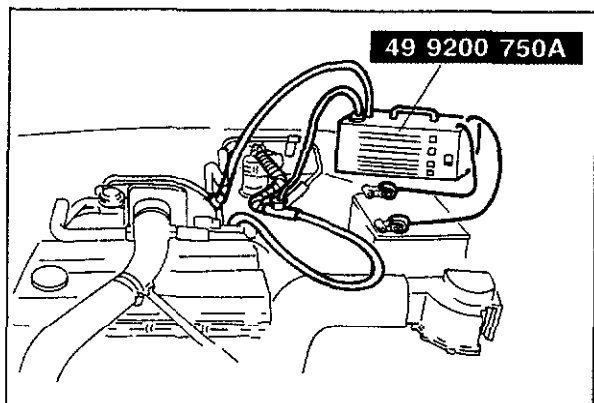
- a) Before disconnecting any fuel line, release the fuel pressure from the fuel line to reduce the possibility of injury or fire.
 1. Start the engine.
 2. Disconnect the circuit opening relay connector.
 3. After the engine stalls, turn OFF the ignition switch.
 4. Connect the circuit opening relay connector.
- b) Use a rag as protection from fuel spray when disconnecting the hoses.
Plug the hoses after removal.
- c) When inspecting the fuel system, use **SST**.

MULTI-PRESSURE TESTER (49 9200 750A)

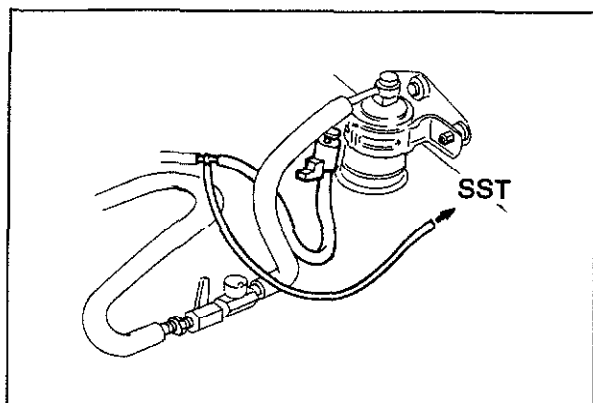


69G04A-099

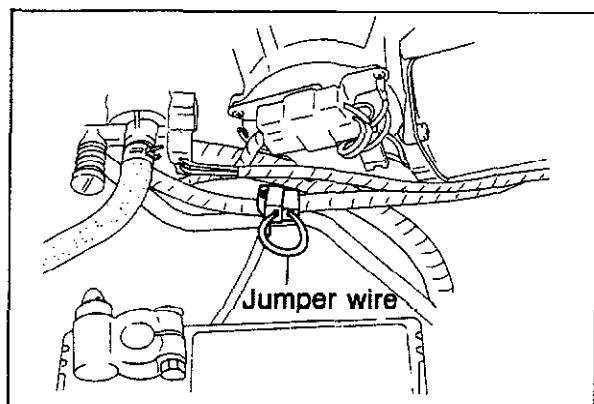
The **MULTI-PRESSURE TESTER** (49 9200 750A) has been developed to check the fuel pressure and intake manifold vacuum. These can easily be inspected by setting the buttons on the tester.



83U04B-055



83U04B-056



83U04B-057

How to Connect Multi-Pressure Tester

Warning

Before connecting SST, release the fuel pressure from the fuel line to reduce the possibility of injury or fire. (Refer to page 4B—37)

1. Disconnect the battery negative cable.
2. Disconnect the fuel main hose from the pressure regulator
3. Connect **SST** between fuel main hose and pressure regulator using adapter.

Caution

Do not reverse the adapter connection.

4. Disconnect the vacuum hose from the pressure regulator control solenoid valve, and connect **SST** vacuum hose using a three-way joint.
5. Connect the battery negative cable.
6. Connect **SST** to the battery.

7. Connect the terminals of the test connector (yellow connector) with a jumper wire. Turn the ignition switch ON to operate the fuel pump.
8. Check for fuel leaks.

Caution

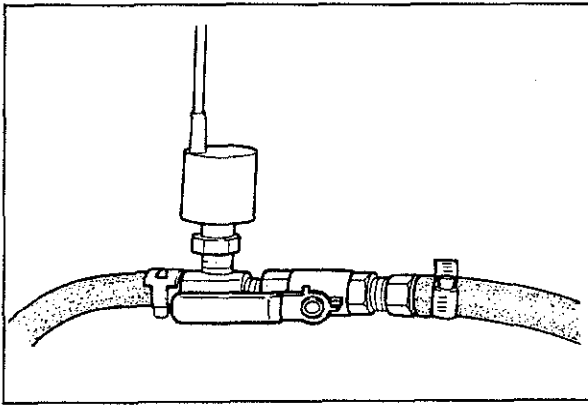
After checking fuel leakage, turn the Ignition switch OFF and disconnect the jumper wire from the service connector.

TROUBLESHOOTING CHART

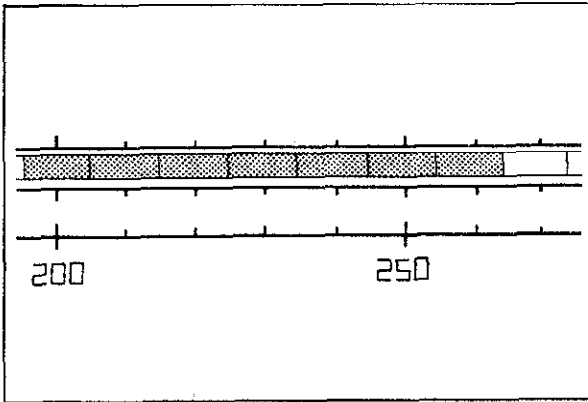
Before performing the following troubleshooting, check the condition of the wiring harness and connector.

| SYMPTOM | | POSSIBLE CAUSE | | | | | | | | Engine control unit terminal voltage | | |
|--|------------------|---------------------|----------------|--------------------------|--|-----------------------------|---------------|---------------|----------|--------------------------------------|----|----|
| | | Water thermo sensor | Air flow meter | Intake air thermo sensor | Throttle sensor (Variable resistor type) | Atmospheric pressure sensor | Oxygen sensor | Fuel pressure | Injector | 3C | 3E | 3B |
| | | 4B-82 | 4B-79 | 4B-79 | 4B-80 | 4B-84 | 4B-83 | 4B-41 | 4B-43 | 4B-76,77 | | |
| Hard start or won't start (Crank OK) | | 3 | | | | | | 1 | 2 | 5 | 6 | 4 |
| Engine stall | While warming up | 3 | 4 | 5 | | 6 | | 1 | 2 | 7 | 8 | |
| | After warming up | 3 | 4 | 5 | | 6 | 7 | 1 | 2 | 8 | 9 | |
| Rough idle | While warming up | 3 | 4 | 5 | | 6 | | 1 | 2 | 7 | 8 | |
| | After warming up | 3 | 4 | 5 | | 6 | 7 | 1 | 2 | 8 | 9 | |
| Poor acceleration, hesitation or lack of power | | 4 | 5 | | 1 | | | 2 | 3 | 6 | 7 | |
| Runs rough on deceleration | | 2 | | | | | | | 1 | 3 | 4 | |
| Excessive fuel consumption | | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 9 | 10 | |
| Afterburn in exhaust system | | 3 | 4 | 5 | | | | 1 | 2 | 6 | 7 | |
| Engine stalls or rough after hot starting | | 3 | | 4 | | | | 1 | 2 | 5 | 6 | |
| Falls emission test | | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 9 | 10 | |

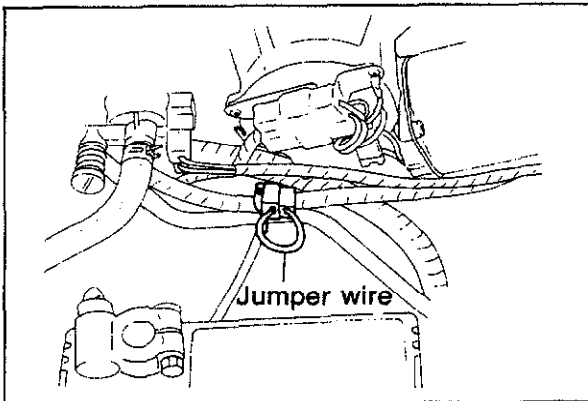
83U04B-058



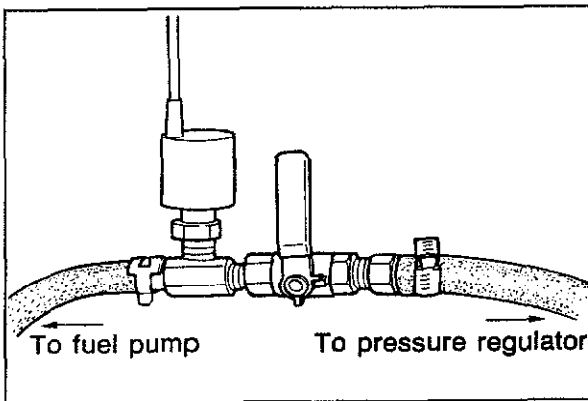
83U04B-059



83U04B-060



83U04B-061



83U04B-062

FUEL PRESSURE

Note

- When inspecting fuel pressure, use SST. (Refer to page 4B—39)
- Warm up the engine to normal operating temperature.

Injection Pressure

- Set the lever on the adapter as shown in the figure.

- Run the engine and measure the injection pressure at various speeds.

**Injection pressure: Approx. 240—279 kPa
(2.45—2.85 kg/cm², 34.8—40.5 psi)**

- If not within specification, check the fuel pump pressure, fuel line pressure, and injector (Refer to page 4B—47)

Fuel Pump Pressure

- Connect the terminals of the test connector (yellow connector) with a jumper wire.
- Turn the ignition switch ON to operate the fuel pump.

- Move the lever on the adapter as shown in the figure.
- Check the fuel pump pressure.

**Fuel pump pressure: 441—588 kPa
(4.5—6.0 kg/cm², 64.0—85.3 psi)**

- If the fuel pump pressure is not within specification, check the followings.

No pressure

Fuel pump operation (Refer to page 4B—43)

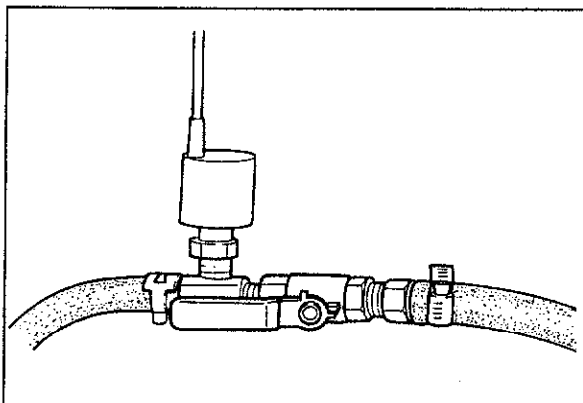
Low pressure

Fuel pump feeding capacity (Refer to page 4B—43)

High pressure

Replace the fuel pump

- After checking the fuel pump pressure, disconnect the jumper wire from the service connector.



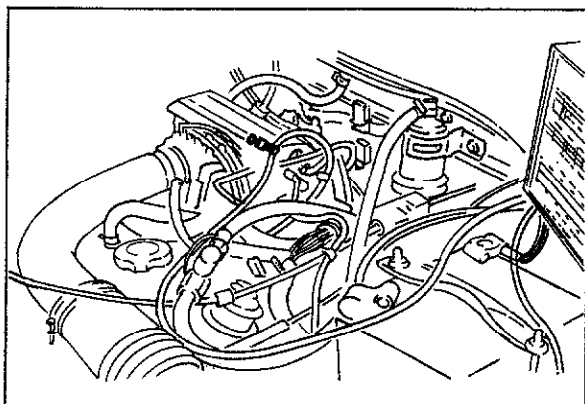
83U04B-063

Fuel line Pressure

1. Start the engine and run it idle.
2. Move the lever on the adapter as shown in the figure.
3. Check the fuel line pressure.

**Fuel line pressure: Approx. 167—216 kPa
(1.7—2.2 kg/cm², 24.1—31.3 psi)**

4. If not within specification, check the vacuum hose.

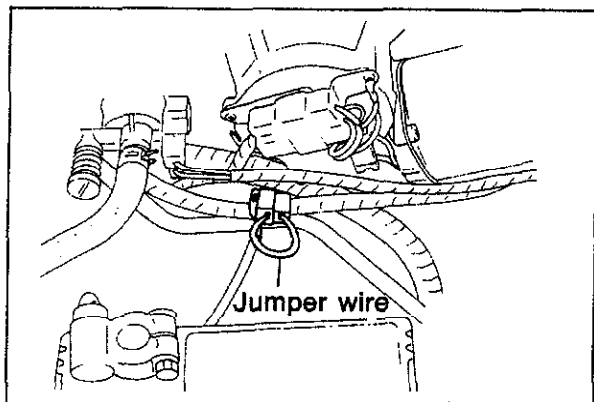


83U04B-064

5. Disconnect a vacuum hose of pressure regulator.
6. Check the fuel line pressure.

**Fuel line pressure: 240—279 kPa
(2.45—2.85 kg/cm², 34.8—40.5 psi)**

7. If not within specifications, replace the pressure regulator.
8. Connect the vacuum hose to pressure regulator.

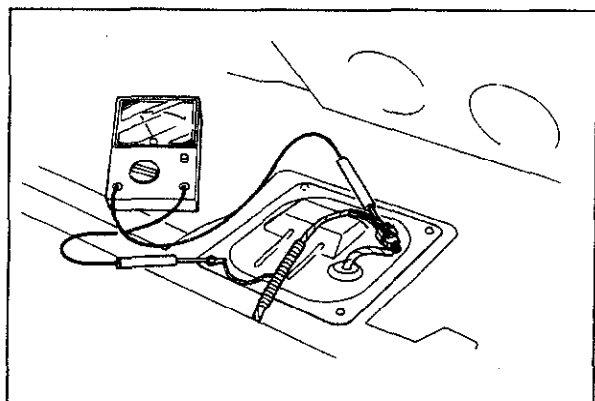


83U04B-065

INSPECTION

Fuel Pump (Operation Test)

1. Connect a jumper wire to the test connector (Yellow).
2. Open the fuel tank lid, and fuel filler cap.
3. Turn the ignition switch ON.
4. Check that the fuel pump operation sound.
5. Shut the fuel filler cap, and fuel tank lid.



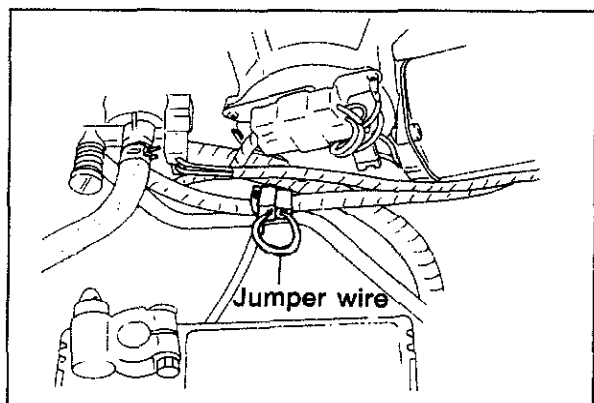
83U04B-066

6. If operation sound is not produced, check the voltage at the fuel pump connector.

Voltage: 12V

(IG: ON, Voltmeter [GR and B] connected)

7. If the voltage is normal, replace the fuel pump.



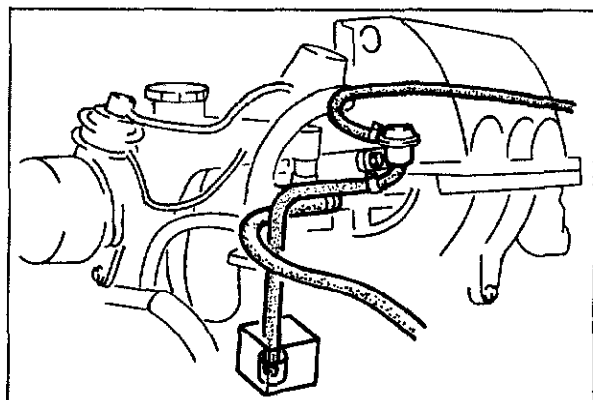
83U04B-067

Fuel pump (Volume test)

Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4B—37)

1. Connect a jumper wire to test connector (Yellow connector).
2. Disconnect the fuel return hose from fuel return pipe.



83U04B-068

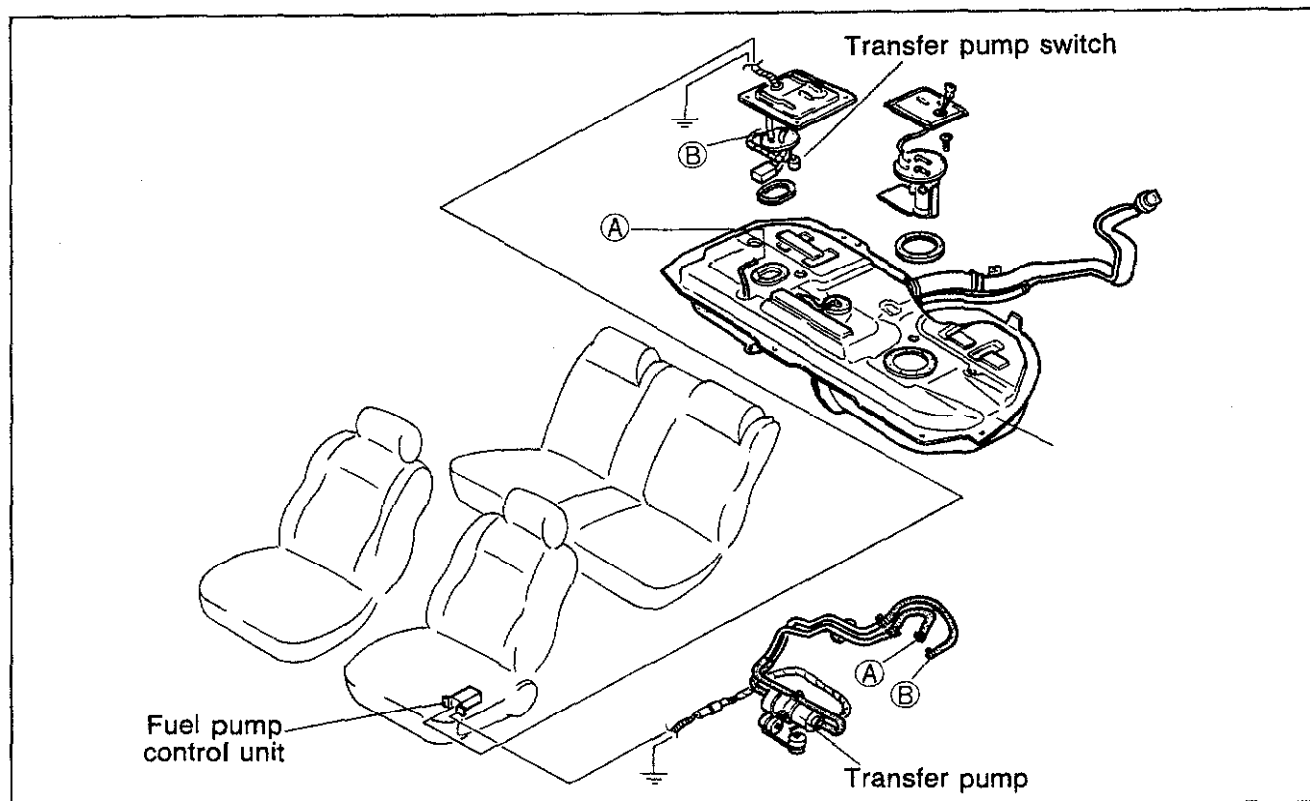
3. Turn the ignition switch ON for 10 seconds, and check the feeding capacity with graduated cylinder.

Feeding capacity:

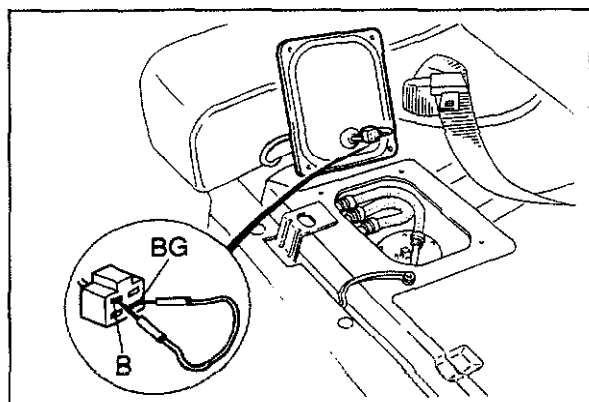
220—380 cc (13.4—23.2 cu-in)/10 sec when fuel pressure at 250 kPa (2.55 kg/cm², 36.3 psi)

4. If not within specification, check the fuel filter, and fuel line.

TRANSFER PUMP CONTROL SYSTEM



63G04C-351



83U04B-069

Inspection

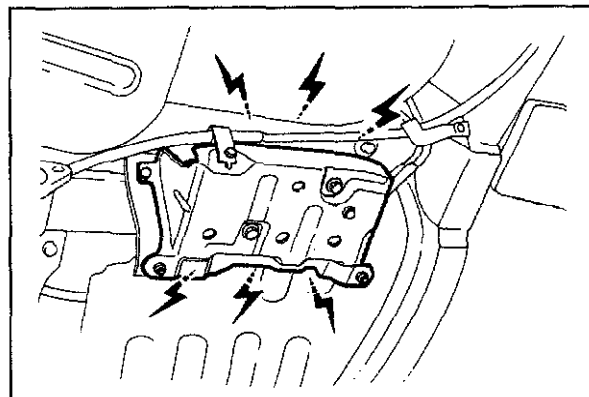
1. Remove the rear seat cushion.
2. Remove attaching screws and cover.
3. Turn the ignition switch ON.
4. Disconnect the fuel tank gauge unit connector, then short or open the (BG) and (B) terminals of the fuel tank gauge unit connector using a jumper wire, and check the transfer pump operation.

| Terminals | Transfer pump operation |
|-----------|-------------------------|
| Short | Stop |
| Open | Run |

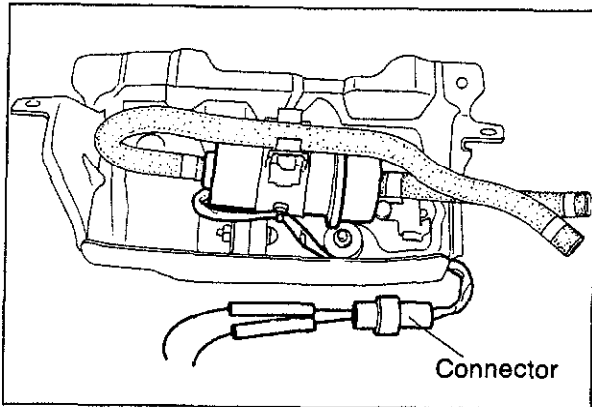
Note

The transfer pump will not operate until 10 seconds after opening the (BG) and (B) terminals.

5. If the operation is not correct, check the following parts.
Transfer pump
Fuel pump control unit
Transfer pump switch



83U04B-070

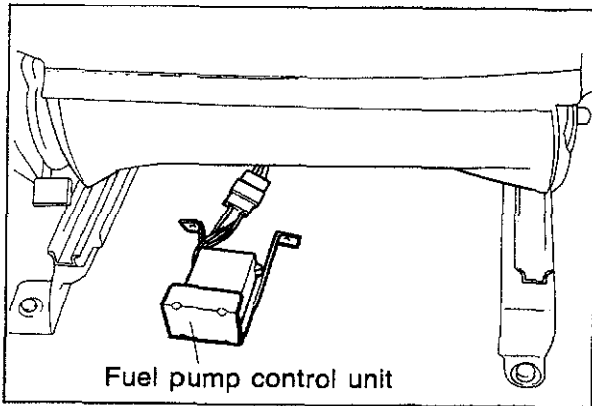


63G04C-354

Transfer Pump Inspection

Measure the resistance with the transfer pump connector disconnected.

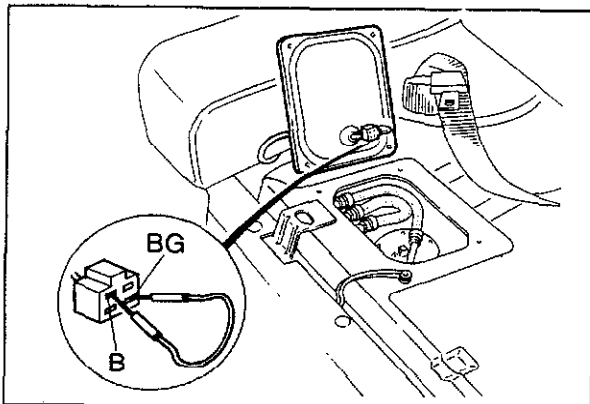
Resistance: 8 Ω



63G04C-356

Fuel Pump Control Unit Inspection

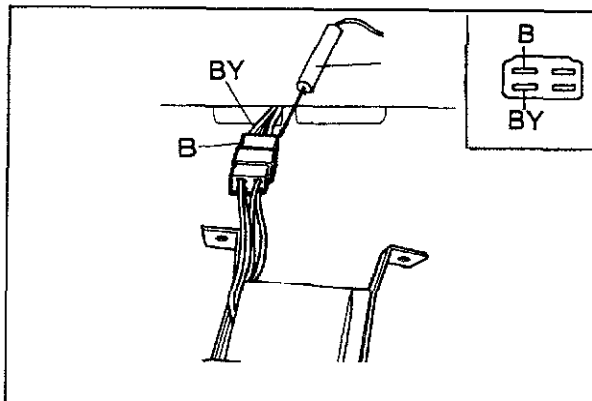
1. Remove the control unit under the driver's seat.



83U04B-071

2. Remove the rear seat cushion.
3. Disconnect the fuel tank gauge unit connector.
4. Remove attaching screws and cover.
5. Turn the ignition switch ON.
6. Short or open the (BG) and (B) terminals of the fuel tank gauge unit connector, and check the voltage (B) and (BY) terminals of the fuel pump control unit.

| Terminals | Voltage V | |
|-----------|-----------|----|
| | B | BY |
| Short | 0 | 0 |
| Open | 0 | 12 |

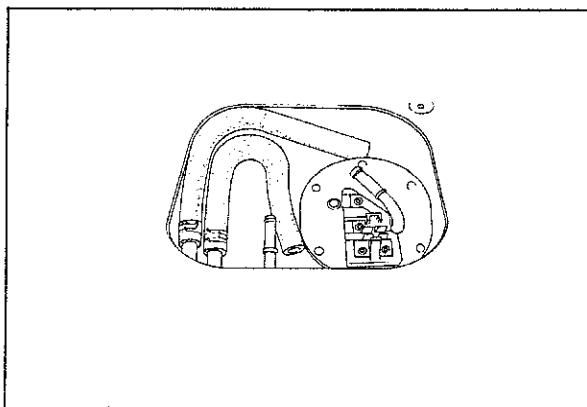


83U04B-072

7. If the voltage is not within specifications, replace the fuel pump control unit.

Note

12V will not be indicated at the (BY) terminal until 10 seconds after opening the terminals of the fuel tank gauge unit connector.



83U04B-073

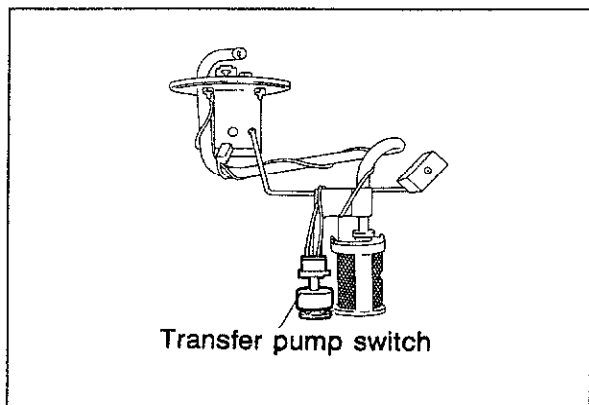
Transfer Pump Switch Removal

Warning

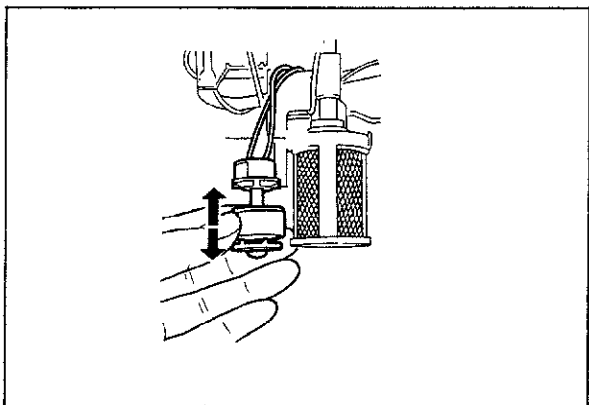
**Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire.
(Refer to page 4B—37)**

1. Remove the filler cap.
2. Remove the rear seat cushion.
3. Remove attaching screws and cover.
4. Disconnect the fuel hoses and plug them.

5. Remove the fuel tank gauge unit.



83U04B-074

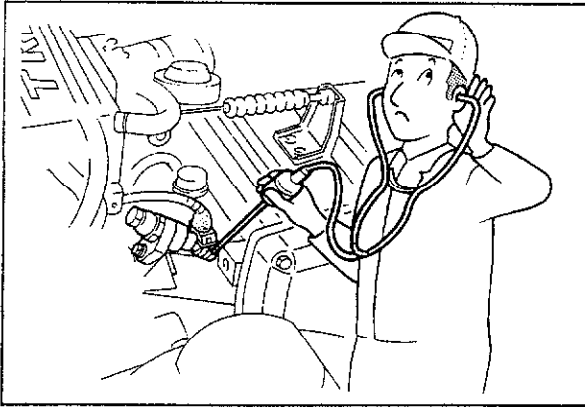


83U04B-075

Inspection

1. Check the continuity between the (B) and (BG) terminals with the float up and down.

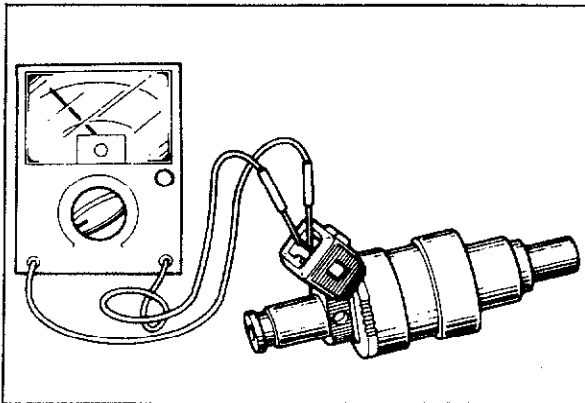
| Float | Continuity |
|-------|------------|
| Up | No |
| Down | Yes |



83U04B-076

Injector (On-vehicle inspection)

1. Warm up the engine and run at idle.
2. Check the operating sound of the injector, using a sound scope. Check that operating sounds are produced from each injector at idle and at acceleration.
3. If operating sound is not produced, check the followings.
 - Wiring harness
 - Injector resistance
 - Engine control unit terminal voltage of 3C, 3E. (Refer to page 4B—77)



83U04B-077

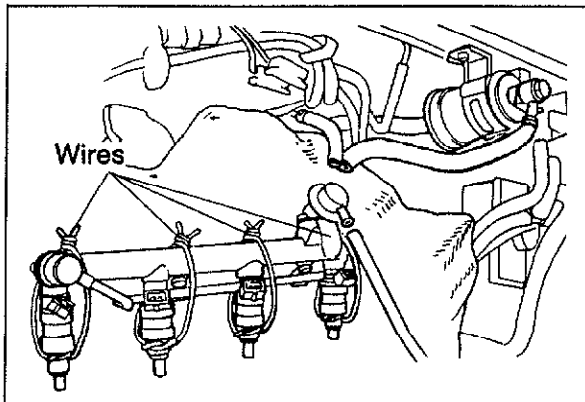
Injector (Resistance)

Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4B—37)

1. Remove the injector from the engine. (Refer to page 4B—50)
2. Check the resistance of the injector.

Resistance: 12—16 Ω



83U04B-078

Injector (Leak test)

Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4B—37)

1. Remove the delivery pipe, injector, and pressure regulator. (Refer to page 4B—50)
2. Affix the injectors to the distribution pipe with wire.

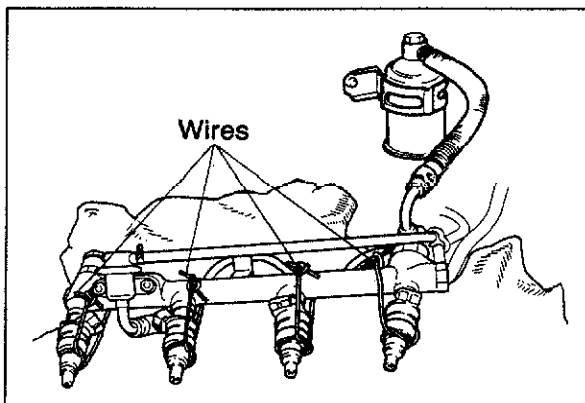
Caution

Affix the injectors firmly to the distribution pipe so no movement of the injectors is possible.

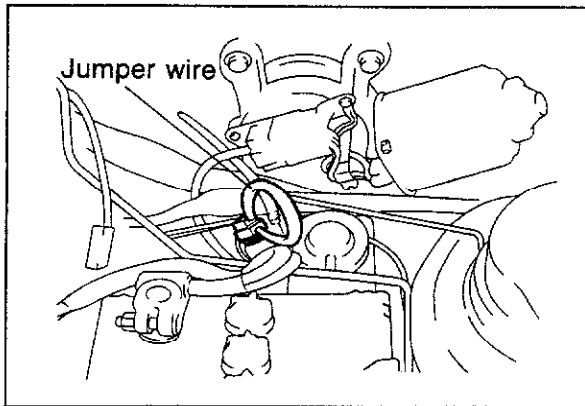
3. Connect the distribution pipe assembly between the fuel filter and the return pipe.
4. Connect the return hose to the pressure regulator.
5. Connect the negative terminal of the battery.

Warning

Be extremely careful when working with fuel; always work away from sparks or open flames.



83U04B-079



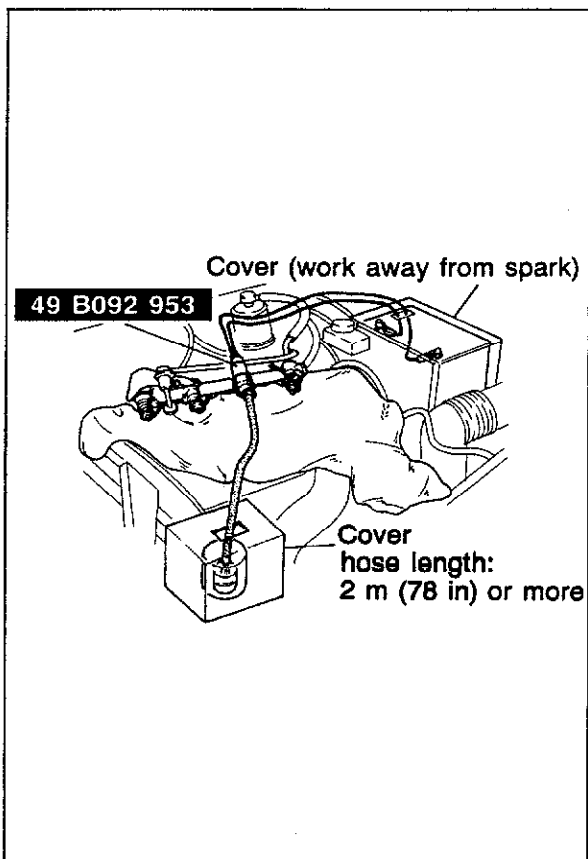
83U04B-080

6. Connect a jumper wire to the test connector (Yellow terminal).
7. Turn the ignition switch ON.
8. Check that fuel does not leak from injector.

Note

After 5 minutes a very slight amount of fuel leakage from the injector is acceptable.

9. If fuel leaks, replace the injector.



83U04B-081

Injector (Volume test)

1. Connect a suitable vinyl hose to the injector and place the hose in the container, or graduated glass etc.

Note

The hose should be 2 m (78 in) or more

2. Connect the terminals of the fuel pump service connector with a jumper wire.

Warning

Be extremely careful when working with fuel; always work away from sparks or open flames.

3. Apply battery voltage to each injector, using the SST.
4. Turn the ignition switch ON.
5. Check the injection volume.

**Specification: 66—82 cc
(4.0—5.0 cu in)/15 sec.**

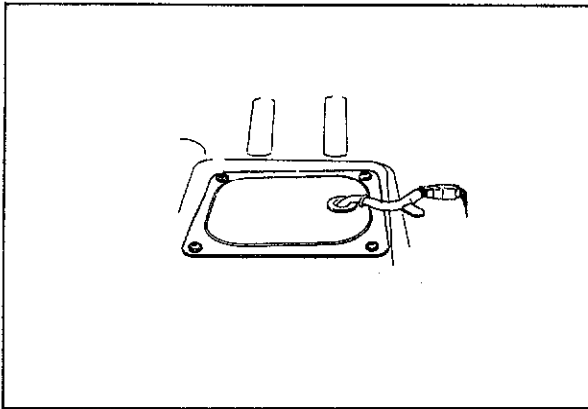
6. If not correct, replace the injector.

REPLACEMENT AND INSTALLATION Fuel Pump

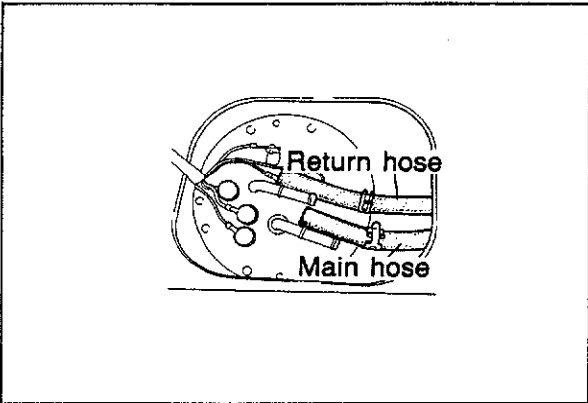
Warning

Before performing the following procedures, release the fuel pressure to reduce the possibility of injury or fire.
(Refer to page 4B—37)

1. Remove the filler cap.
2. Remove rear seat cushion.
3. Remove attaching screws and cover.
3. Disconnect the fuel main, and return hoses and plug them to prevent fuel leakage.



83U04B-082

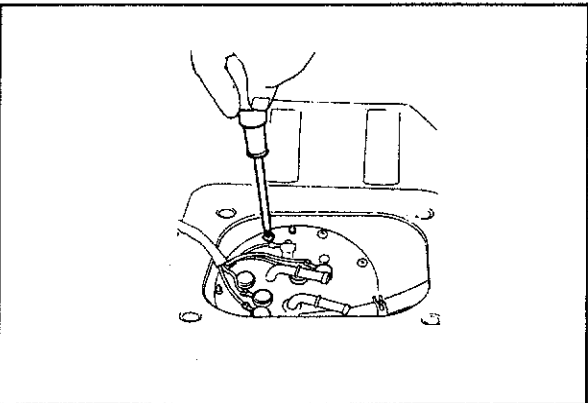


83U04B-083

4. Remove the fuel pump and fuel tank gauge unit assembly.

Warning

Use of fire or smoking is strictly prohibited while working on the fuel system.

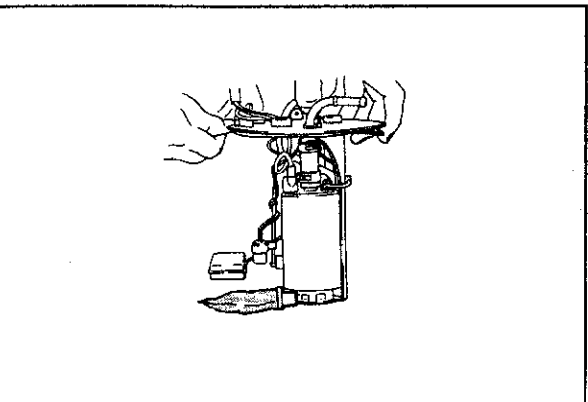


83U04B-084

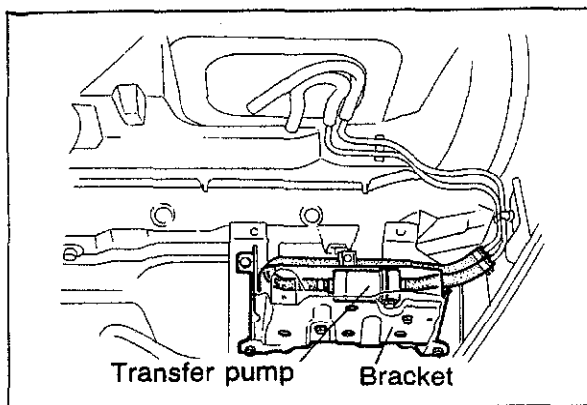
5. Replace the fuel pump.
6. Install the fuel pump and fuel tank gauge unit assembly in the reverse order of removal.

Caution

Secure the fuel pump terminals and fuel hose.



83U04B-085



83U04B-086

Transfer Pump

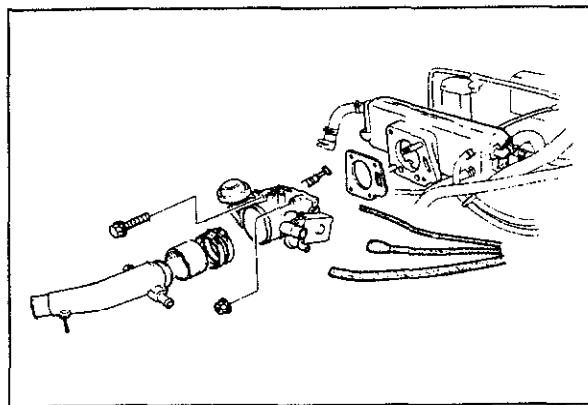
Warning

**Before performing the following procedures, release the fuel pressure to reduce the possibility of injury or fire.
(Refer to page 4B—37)**

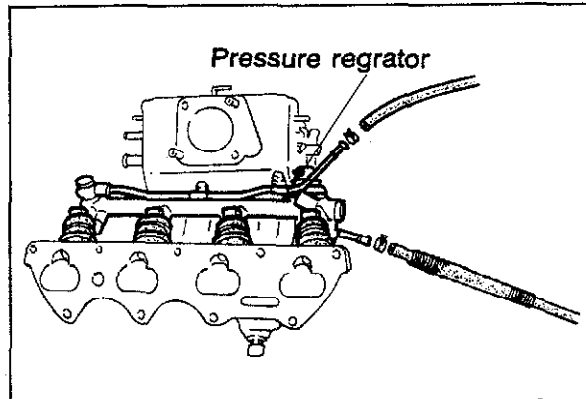
1. Remove the filler cap.
2. Remove the transfer pump bracket under the vehicle.
3. Disconnect the fuel hoses.
4. Disconnect the connector.
5. Install in the reverse order of removal.

Pressure Regulator

1. Remove the throttle body. (Refer to page 4B—29)



83U04B-087

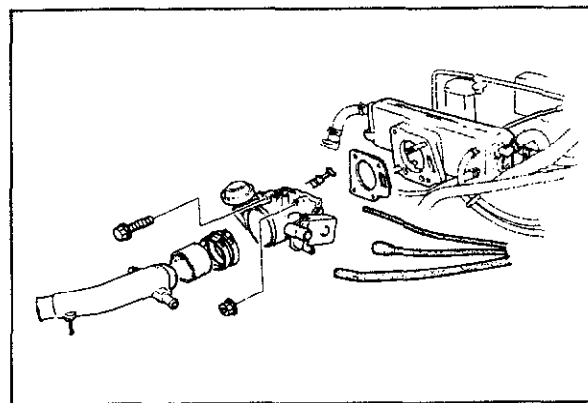


83U04B-088

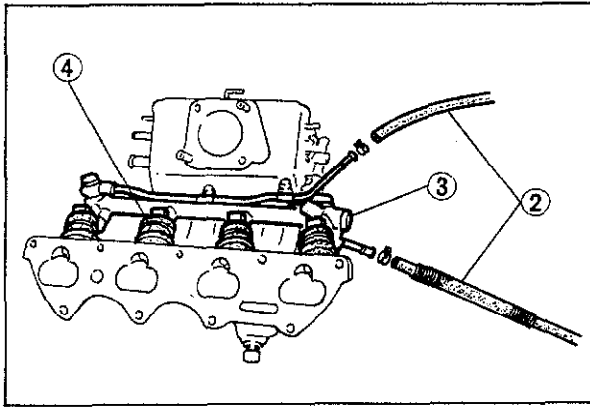
2. Disconnect the fuel main hose and return hose.
3. Remove the pressure regulator.
4. Install the pressure regulator, and throttle body in reverse order of removal.

Injector

1. Remove the throttle body. (Refer to page 4B—29)



83U04B-089



83U04B-090

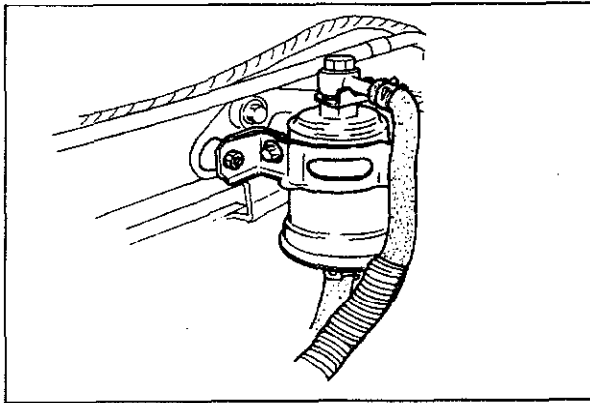
2. Disconnect the fuel main hose and return hose.
3. Remove the delivery pipe.
4. Remove the injector.
5. Install the injector, delivery pipe, throttle body in the reverse order of removal.

Tightening torque:

Delivery pipe: 18.6—25.5 N·m
(1.9—2.6 m·kg, 13.7—18.8 ft·lb)

Note

- a) O-ring of injector is not reuseable.
- b) When install the injector, apply the gasoline on the O-ring.



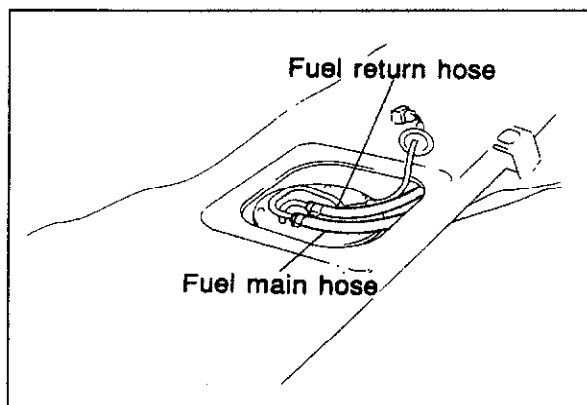
83U04B-091

Fuel Filter (High Pressure)

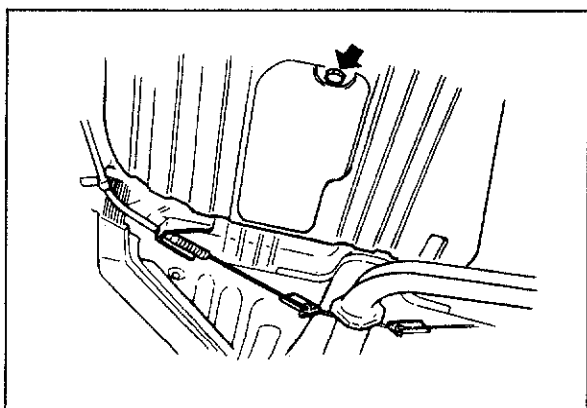
The fuel filter should be replaced at intervals, following the maintenance schedule.

To replace the fuel filter, proceed as follows:

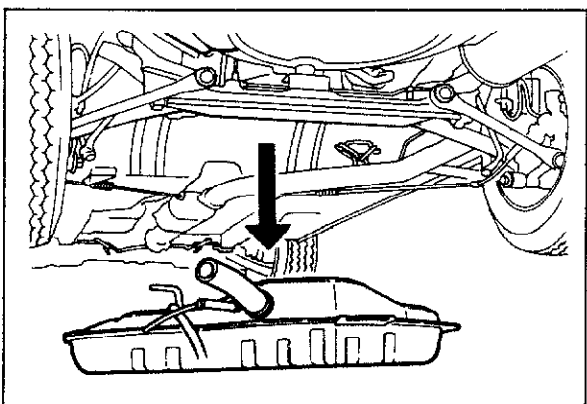
1. Disconnect the fuel hoses.
2. Remove the fuel filter with the bracket.
3. Install a new filter and connect the fuel hoses.



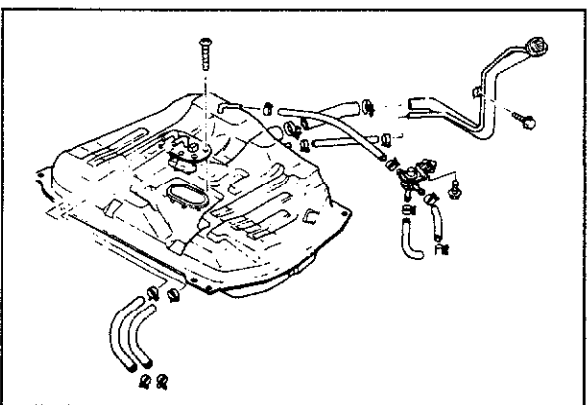
83U04B-092



83U04B-093



63U04B-068



83U04B-094

FUEL TANK (2WD)

Removal

Warning

Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4B—37)

1. Remove the rear seat cushion.
2. Remove the cover and disconnect the fuel tank gauge unit connector.
3. Disconnect the fuel main and return hoses.

4. Raise the vehicle and support it with safety stands.
5. Remove the drain plug and drain the fuel.

Warning

a) When repairing the fuel tank, clean the fuel tank thoroughly with steam to remove all explosive gas.

b) Use of fire is strictly prohibited while working on the fuel tank.

6. Disconnect the other hoses.
7. Remove the fuel tank.

Installation

Install in reverse order of removal and be careful of the following;

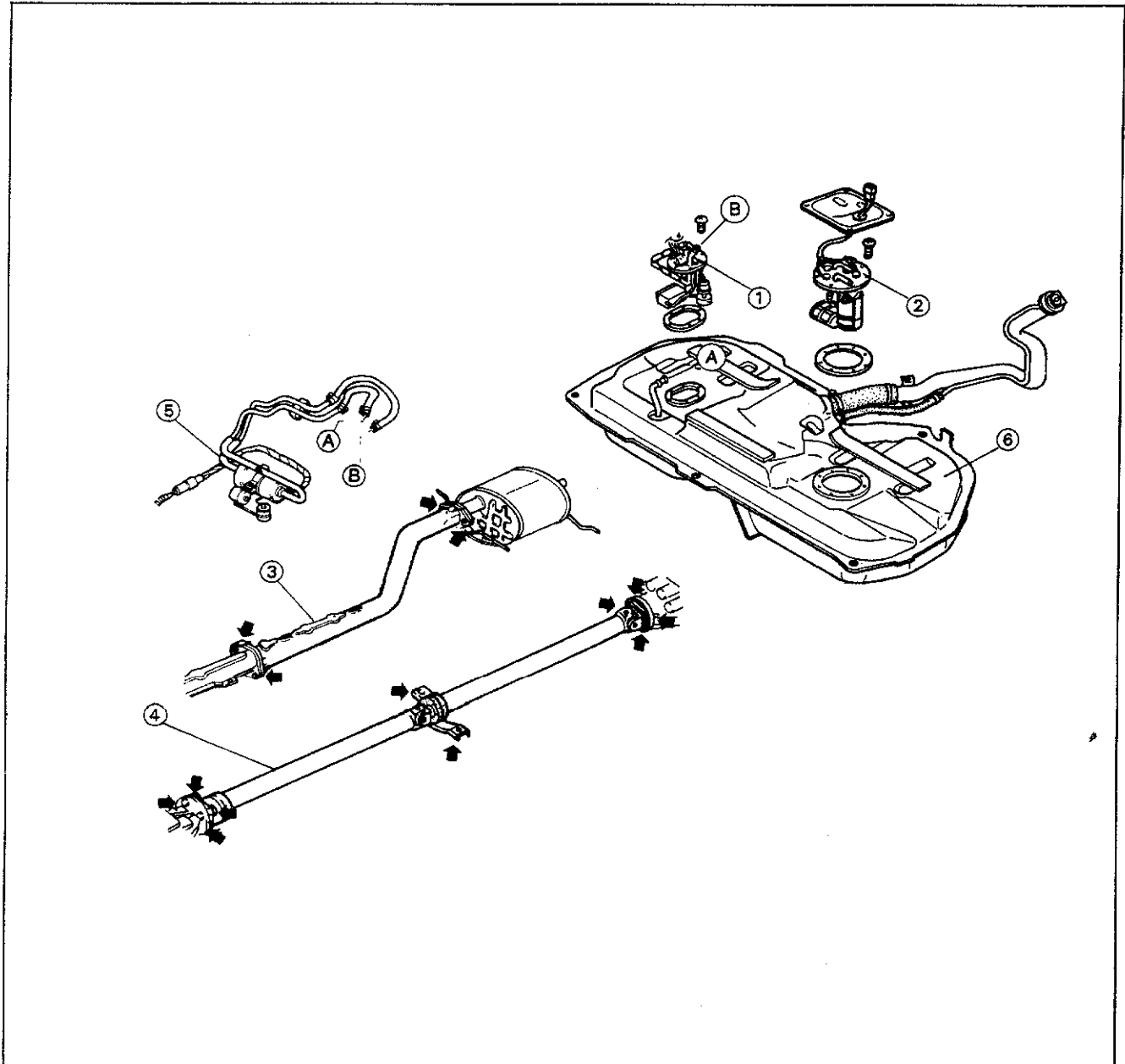
1. Make sure to connect the hoses in the correct positions.
2. Fill tank with fuel and Check for leaks.

FUEL TANK (4WD)**Warning**

- a) When repairing the fuel tank, clean the fuel tank thoroughly with steam to remove all explosive gas.
- b) Use of fire is strictly prohibited while working on the fuel tank.

Removal and Installation

- 1. Remove in the sequence shown in the figure.
- 2. Install in the reverse order of removal and be careful of the following:
 - a) Be sure to connect the hoses in the correct positions.
 - b) Check for leaks.



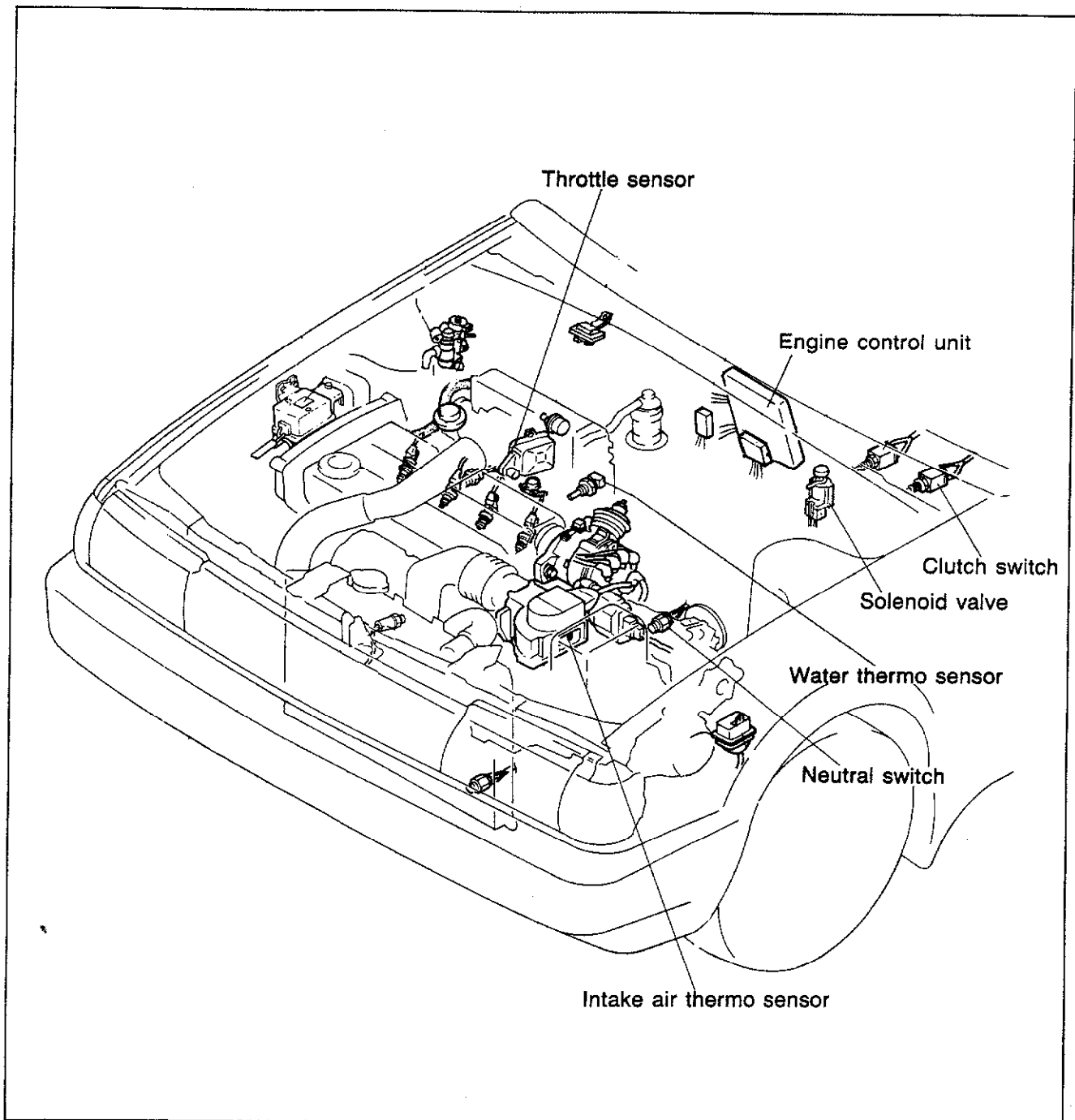
83U04B-095

1. Fuel tank gauge unit
2. Fuel tank gauge unit

3. Exhaust pipe
4. Propeller shaft

5. Transfer pump
6. Fuel tank

PRESSURE REGULATOR CONTROL (PRC) SYSTEM



83U04B-096

To prevent percolation of the fuel during idle for a specified period after the engine is re-started, vacuum is cut to pressure regulator and the fuel pressure is increased.

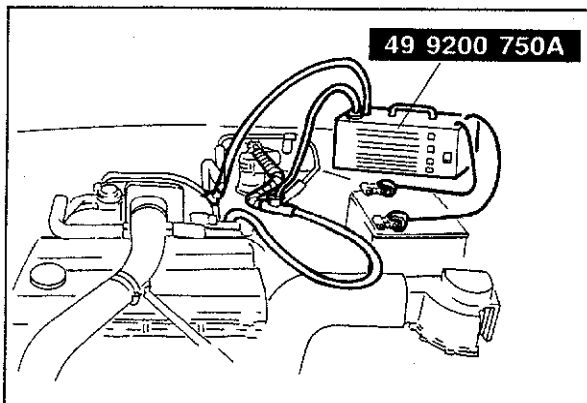
Specified time: Approx. 180 sec

Operating condition: Coolant temperature — above 90°C (158°F)

Intake air temperature — above 58°C (136°F)

| <div style="position: relative; height: 100px;"> <div style="position: absolute; top: 0; right: 0; text-align: right;">POSSIBLE CAUSE</div> <div style="position: absolute; bottom: 0; left: 0; text-align: left;">SYMPTOM</div> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%);">PAGE</div> </div> | Water thermo sensor | Intake air thermo sensor | System inspection | Vacuum signal | Electrical signal | Solenoid valve | Control unit terminal voltage | |
|--|---------------------|--------------------------|-------------------|---------------|-------------------|----------------|-------------------------------|--|
| | 4B—82 | 4B—79 | 4B—55 | 4B—56 | 4B—56 | 4B—57 | 2K 4B—77 | |
| Checking order | 5 | 6 | 1 | 2 | 3 | 4 | 7 | |

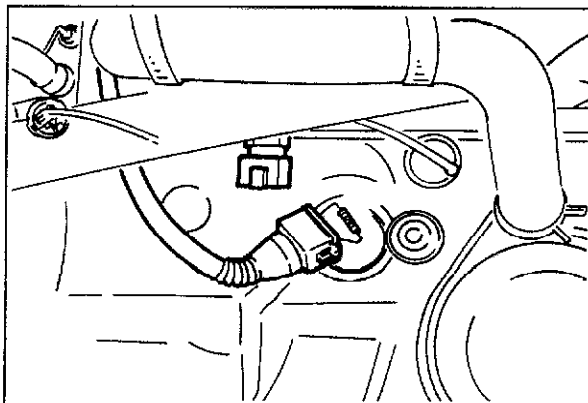
83U04B-097



83U04B-098

System Inspection

1. Connect **SST** to the engine. (Refer to page 4B—38)
2. Start the engine.



83U04B-099

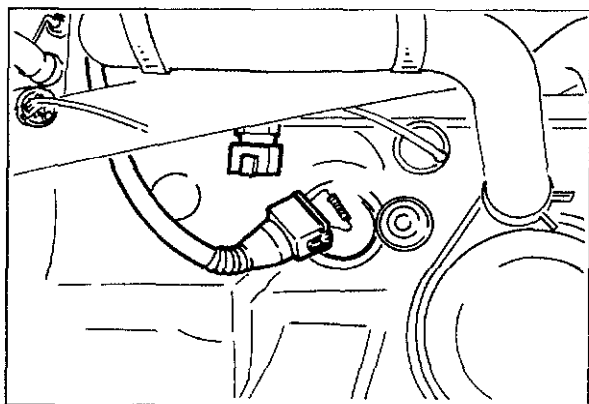
3. Warm up the engine to normal operating temperature and stop the engine.
4. Disconnect the water thermo sensor connector, then connect a resistor (**200 Ω**) to the sensor connector.
5. Remove the air cleaner upper cover assembly, and heat up the intake air thermo sensor above 60°C (140°F).

4B PRESSURE REGULATOR CONTROL (PRC) SYSTEM

| Operating time | Fuel line pressure kPa (kg/cm ² , psi) |
|----------------------------|--|
| After starting for 180 sec | 245—279 (2.45—2.85, 35.6—40.5) |
| After 180 sec | 167—216 (1.7—2.2, 24.2—31.3) |

83U04B-100

- Restart the engine.
- Check the fuel line pressure and operating times as shown in the chart.
- If not correct, check the water thermo sensor, intake air thermo sensor, solenoid valve, and control unit.



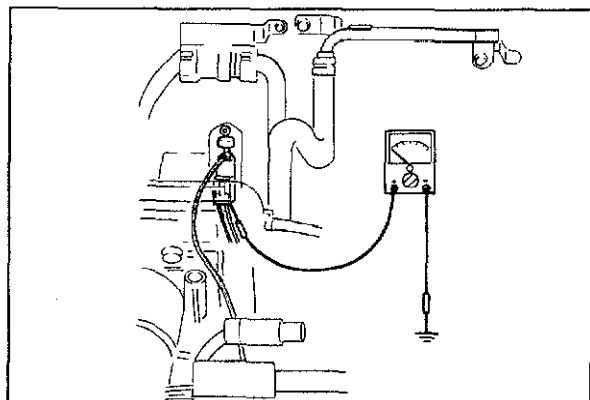
83U04B-101

| Operating time | Vacuum condition |
|----------------------------|------------------|
| After starting for 180 sec | No vacuum |
| After 180 sec | Vacuum |

83U04B-102

Vacuum Signal

- Disconnect the water thermo sensor connector, then connect a resistor (**200 Ω**) to the sensor connector.
- Remove the air cleaner upper cover assembly, and heat up the intake air thermo sensor above 60°C (140°F).
- Disconnect the vacuum hose from the pressure regulator, and place a finger over the port opening.
- Check for vacuum when starting the engine.
- If not correct, check the solenoid valve and electrical signal.
- Connect the vacuum hose to the pressure regulator.



83U04B-103

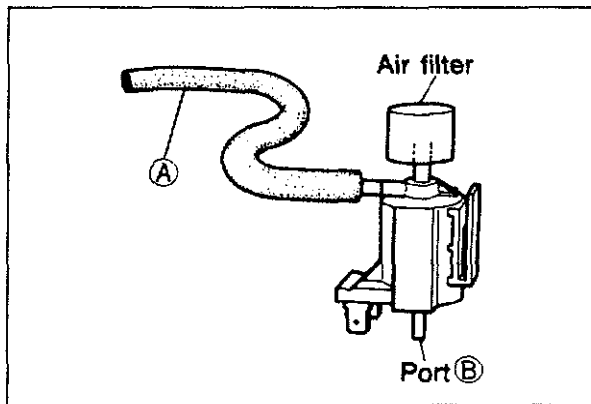
Electrical Signal

- Disconnect the water thermo sensor connector, then connect a resistor (**200 Ω**) to the sensor connector.
- Remove the air cleaner upper cover assembly, and heat up the intake air thermo sensor above 60°C (140°F).
- Connect a voltmeter to the PRC solenoid valve (LB).

| Operating time | Voltage |
|-----------------------------|-------------|
| After starting for: 180 sec | below 2.5 V |
| After 180 sec | approx 12V |

83U04B-104

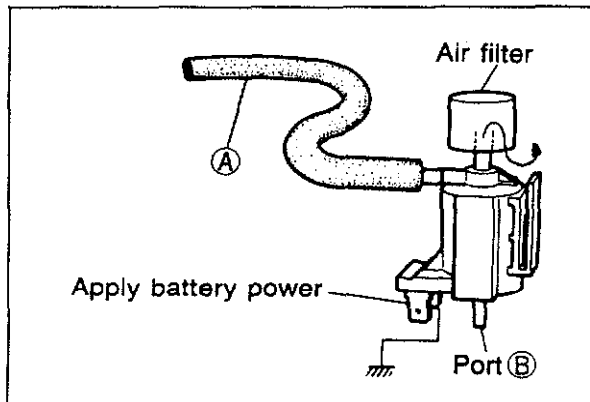
4. Check the voltage when starting the engine.
5. If not correct, check the engine control unit terminal voltage (Refer to page 4B—77)



69G04A-134

PRC Solenoid Valve Inspection

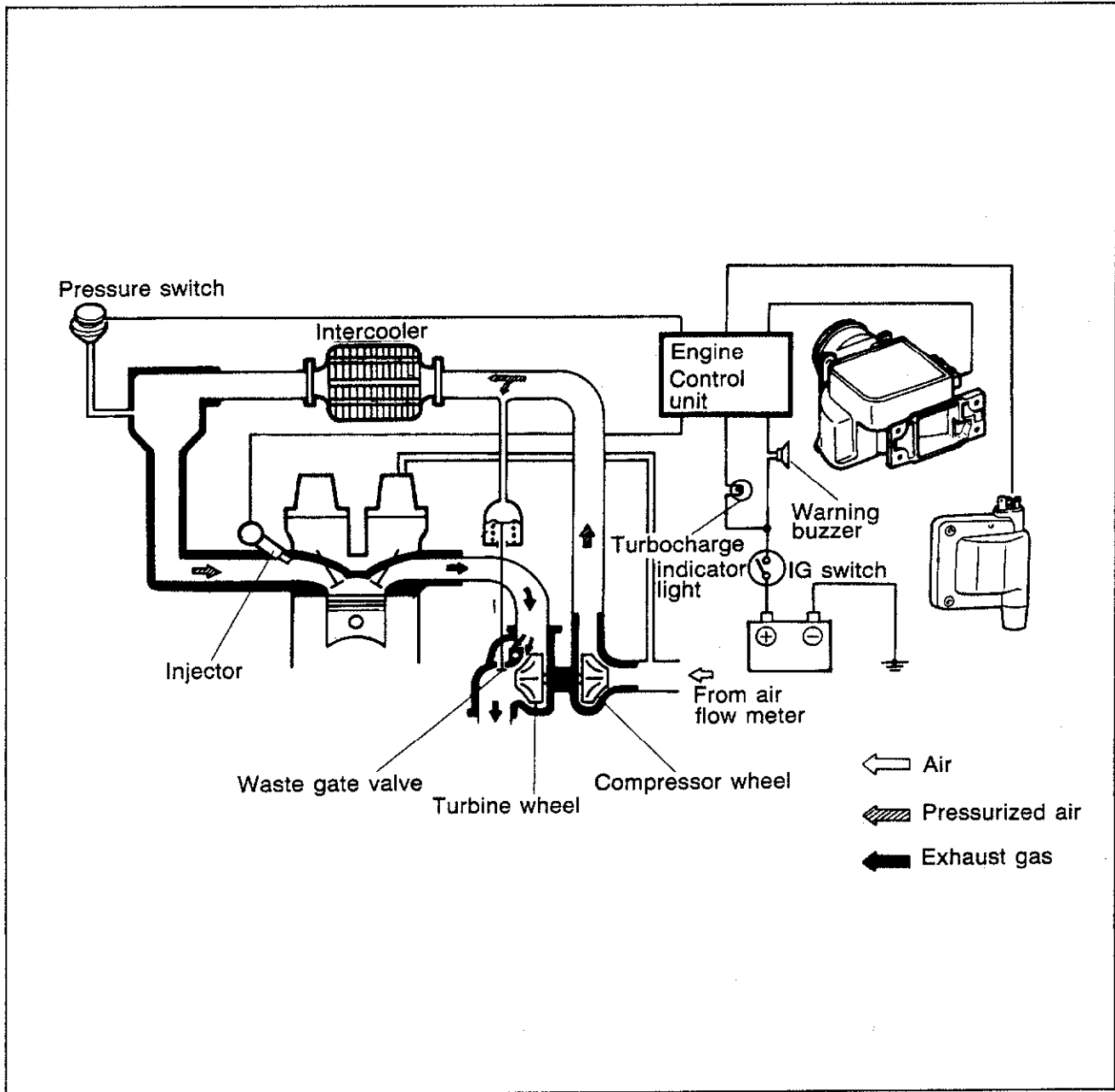
1. Disconnect the vacuum hose from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from vacuum hose (A).
3. Check that air passes through the solenoid valve and flows from port (B).



83U04B-104

4. Disconnect the solenoid valve connector.
5. Connect 12V and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from the vacuum hose (A).
7. Check that air passes through the solenoid valve and flows from the air filter.
8. If not correct, replace the solenoid valve.
9. Connect the vacuum hoses, and connector.

TURBOCHARGING SYSTEM



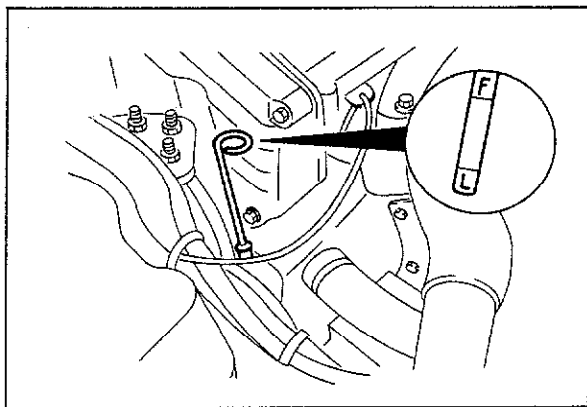
83U04B-106

The turbocharger is composed of the turbine wheel (driven by exhaust gases), compressor wheel (which pressurizes the intake air), full-floating bearings (which support the compressor and turbine wheels), seal rings (which prevent oil leakage), housing, actuator (which controls the waste-gate valve), and waste-gate valve (which opens and closes the exhaust gas bypass passage). By utilizing the flow of exhaust gases, the turbocharger, pressurizes the intake air to a maximum of 56 kPa (0.57 kg/cm², 8.1 psi), thus increasing the amount of the intake air.

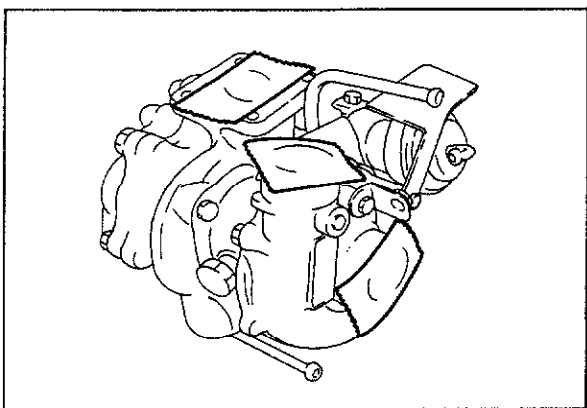
TROUBLESHOOTING CHART

| <div> <div>POSSIBLE CAUSE</div> <div>PAGE</div> <div>SYMPTOM</div> </div> | Pressure switch | Waste gate valve | Turbocharger | Knock sensor | Knock control unit | Engine control unit | |
|---|-----------------|------------------|--------------|--------------|--------------------|---------------------|-------|
| | | | | | | 1U | 2M |
| | 4B—63 | 4B—63 | 4B—62 | 5—43 | 5—44 | 4B—76 | 4B—77 |
| Poor acceleration, hesitation, and lack of power | | 1 | 2 | | | | |
| Knocking | 2 | 1 | | 3 | 4 | 5 | 6 |
| Abnormal noise | | | 1 | | | | |
| Vibration | | | 1 | 2 | 3 | 4 | 5 |
| White smoke | | | 1 | | | | |
| Excessive oil consumption | | | 1 | | | | |

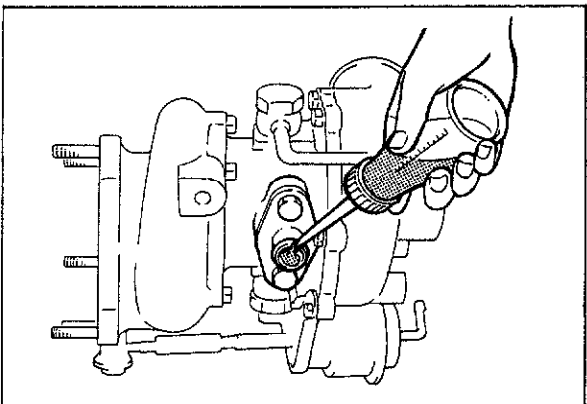
83U04B-107



83U04B-108



63G04C-333



63G04C-334

REMOVAL AND INSTALLATION

Precaution

1. When replacing the turbocharger, always check the engine oil level and quality, as well as the oil pipe leading to the turbocharger, and the oil return pipe.

If necessary, replace them.

2. Be careful of the following when removing, installing, and handling the turbocharger.

- a) Do not drop the turbocharger.
- b) Do not bend the actuator mounting or rod.
- c) Cover the intake, exhaust and oil passages to prevent dirt or other particles from entering.

3. When reinstalling the turbocharger, perform the following.

- a) Remove all the gaskets and sealant.
- b) Use new gaskets.
- c) Add **25 cc** of oil in the oil passage of the turbocharger.

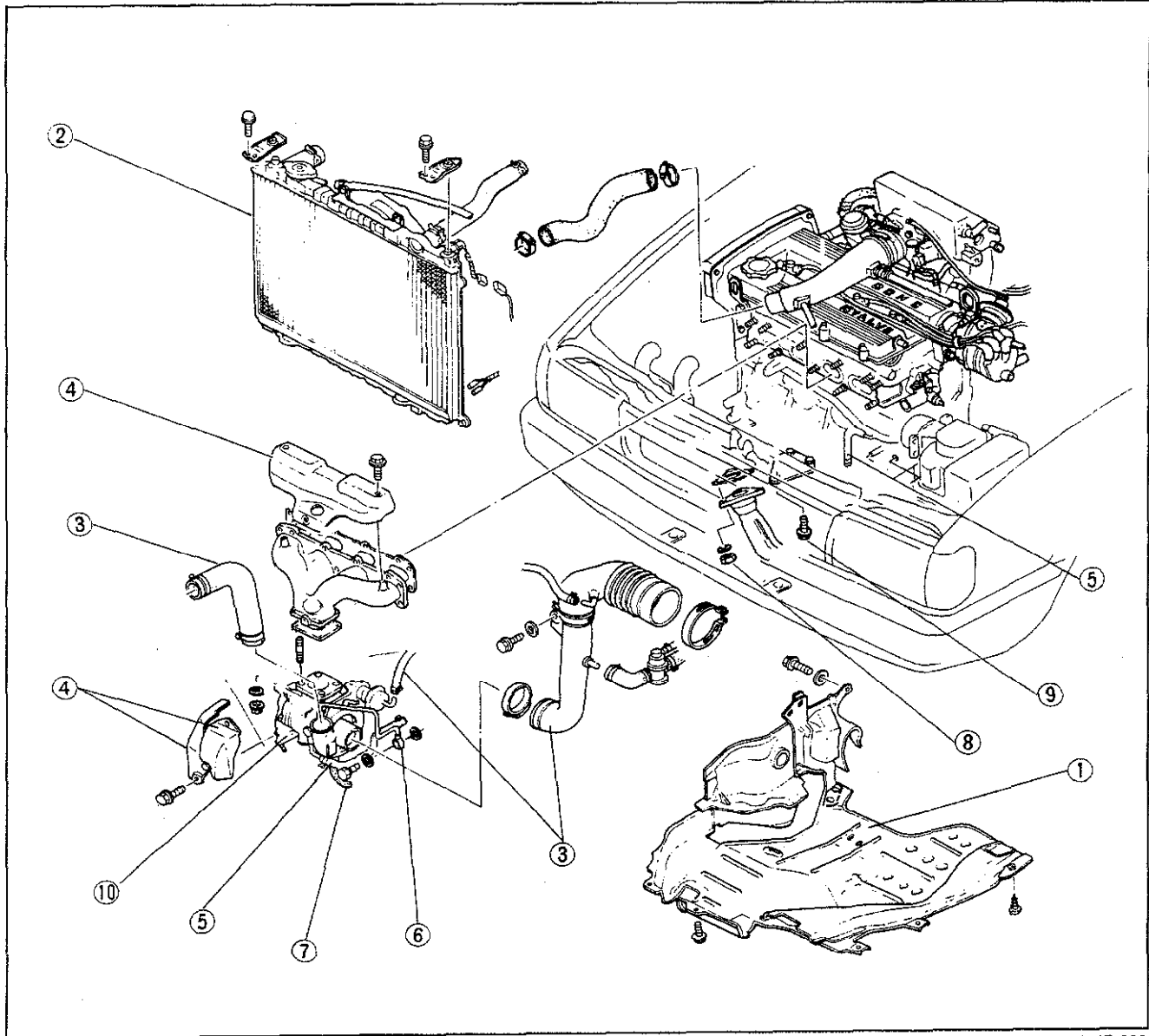
4. After replacing the turbocharger, perform the following.

- (1) Disconnect the connector from the negative terminal of the ignition coil.
- (2) Crank the engine for **20 seconds**.
- (3) Reconnect the negative terminal connector.
- (4) Start the engine and run at idle for **30 seconds**.

Removal and Installation of Turbocharger

1. Remove the turbocharger in the sequence shown in the figure.
2. Install in the reverse order of removal.

63G04C-336

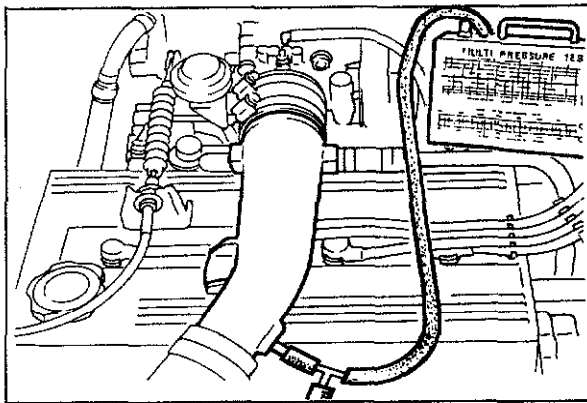


83U04B-200

- | | |
|--------------------------|--------------------|
| 1. Under cover | 6. Oil pipe |
| 2. Radiator | 7. Oil return pipe |
| 3. Air pipe and air hose | 8. Attaching nuts |
| 4. Insulator covers | 9. Attaching bolts |
| 5. Water hoses | 10. Turbocharger |

Caution

- a) Before removing the radiator, drain the engine coolant.
- b) Replace the mounting gasket if bent or cracked.
- c) Use the specified nut to mount the turbocharger.



83U04B-109

INSPECTION

Turbocharger Boost Pressure

1. Disconnect the air hose to the waste gate valve.
2. Connect a pressure gauge as shown.
3. Connect a tachometer to the engine.
4. Warm up the engine to operating temperature.
5. Increase the engine speed to **4,000 rpm** and check that the boost pressure is within the specification.

Specification

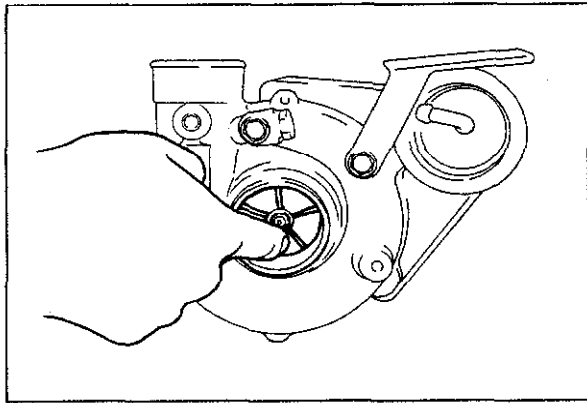
Min. 2.0 kPa (0.02 kg/cm², 0.28 psi)

6. If not within specification, check the turbocharger.

Turbocharger

Inspection of wheel assembly

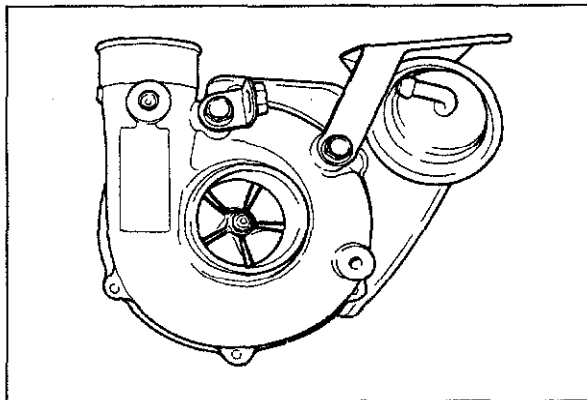
1. Cool the engine.
2. Remove the air hose.
3. Check that the rotor assembly turns smoothly.
4. If there is excessive load or noise, replace the turbocharger.



83U04B-110

Inspection of wheel deflection

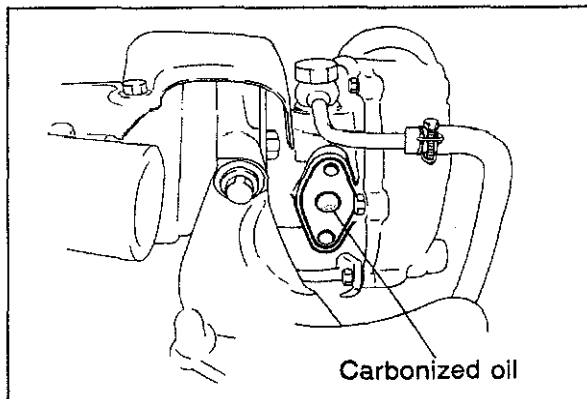
1. Cool the engine.
2. Remove the air hose.
3. Check if the wheel touches the compressor housing.
4. If the wheel touches the housing, replace the turbocharger.



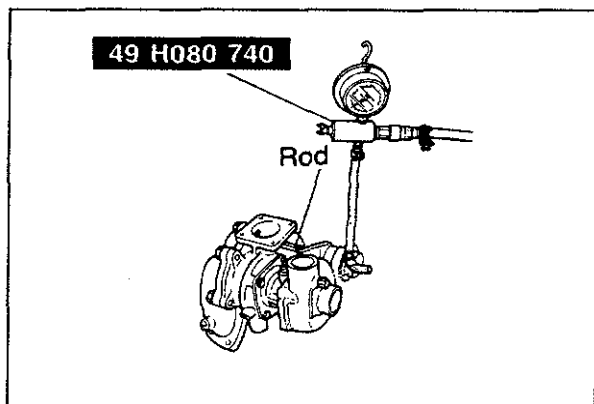
83U04B-111

Inspection of Oil Passage

1. Cool the engine.
2. Remove the oil return pipe.
3. Check that carbonized oil has not blocked the oil passage in the turbocharger or the oil return pipe.
4. If carbonized oil blocks the oil passage, replace the turbocharger, and return pipe if necessary.



66U04B-047



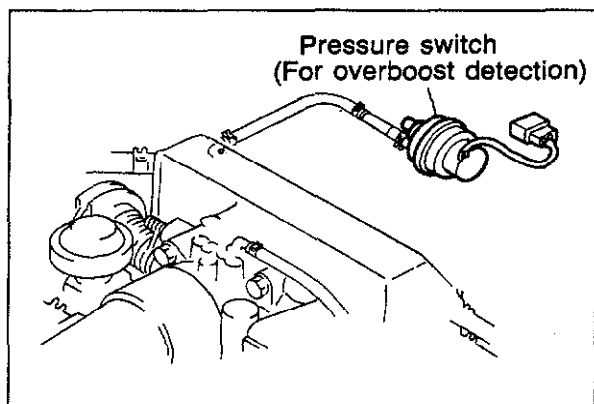
83U04B-112

Waste Gate Valve

1. Cool the engine.
2. Remove the waste gate actuator hose and attach **SST**.
3. Adjust the compressed air pressure to **48.1—58.9 kPa (0.49—0.60 kg/cm², 7.0—8.6 psi)**.
4. Check that the rod moves when disconnecting and reconnecting the hose applying the compressed air.

Caution

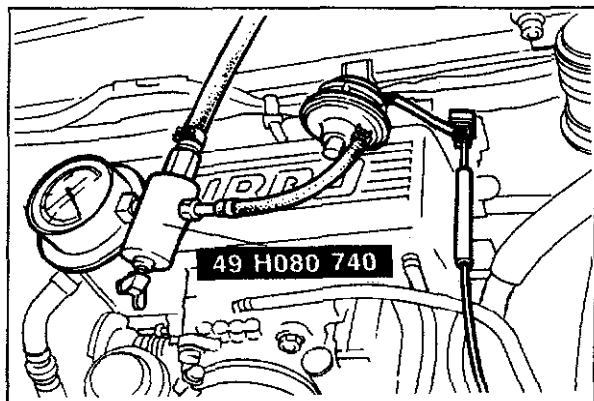
Do not apply compressed air higher than 98 kPa (1.0 kg/cm², 14 psi).



83U04B-113

Pressure Switch

1. Turn the ignition switch ON.
2. Disconnect the hose from the pressure switch and attach **SST**.
3. Adjust the compressed air pressure to **71.8—79.8 kPa (0.73—0.81 kg/cm², 10.4—11.6 psi)**.
4. Make sure that the warning buzzer sounds while applying the compressed air.
5. If the warning buzzer does not sound, inspect as described below.



83U04B-201

Inspection of voltage

1. Turn the ignition switch ON.
2. Apply air pressure of **71.8—79.8 kPa (0.73—0.81 kg/cm², 10.4—11.6 psi)** to the pressure switch, then check the voltage at the (Lg) and (B) terminals with the connector connected.

| Condition | Lg | B |
|----------------------------|------|-----|
| Compressed air applied | 12 V | 0 V |
| Compressed air not applied | 0 V | 0 V |

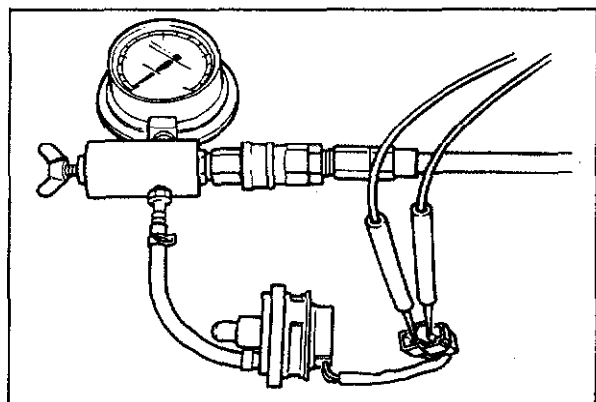
If the voltage is not correct, go to next step.

Inspection of the pressure switch

1. Turn the ignition switch OFF.
2. Disconnect the pressure switch connector.
3. Apply air pressure of **71.8—79.8 kPa (0.73—0.81 kg/cm², 10.4—11.6 psi)** to the pressure switch, then check the continuity between the terminals.

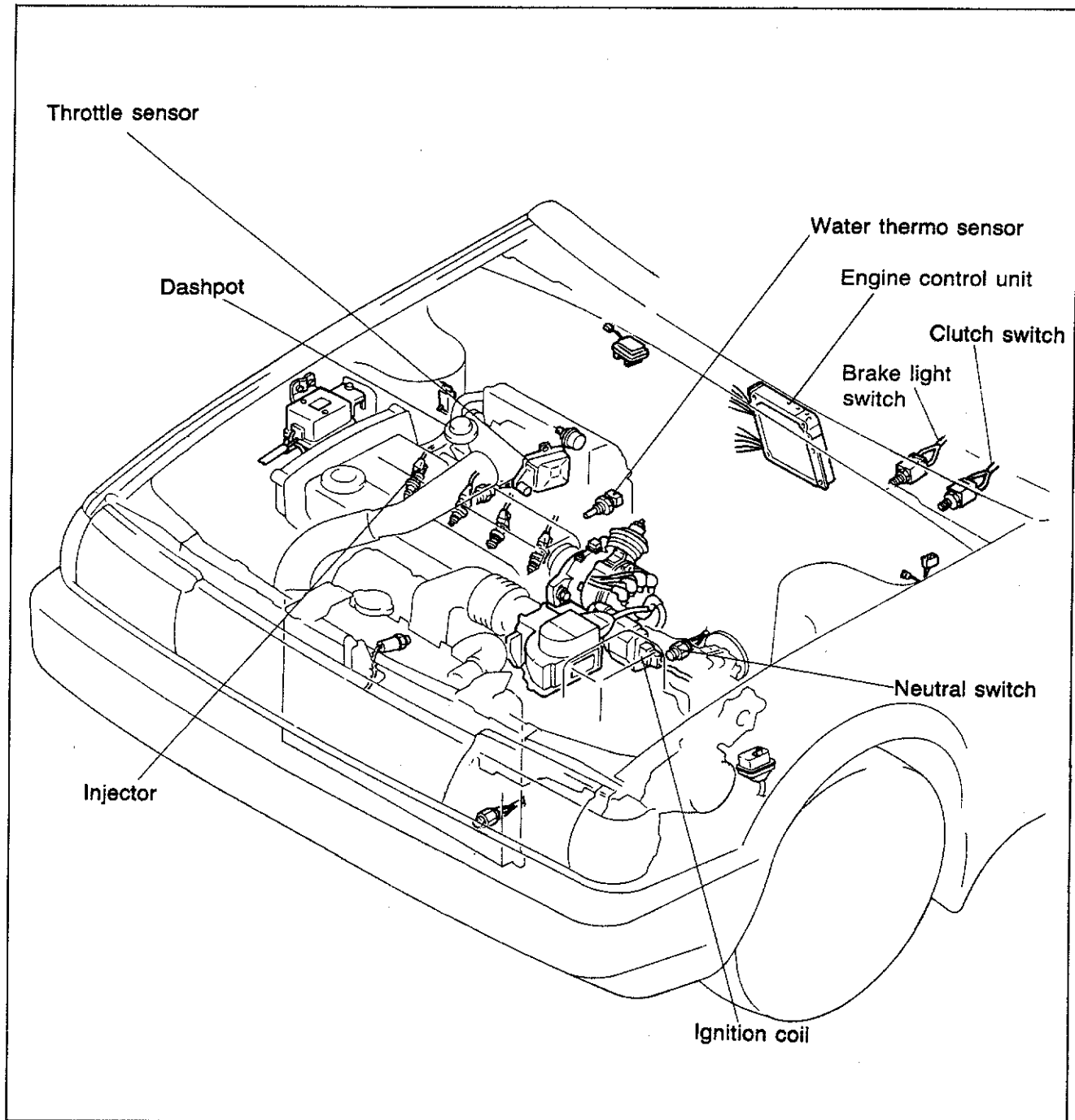
| Condition | Continuity |
|----------------------------|------------|
| Compressed air applied | Yes |
| Compressed air not applied | No |

If the continuity is not good, replace the pressure switch.



63G04C-340

DECELERATION CONTROL SYSTEM



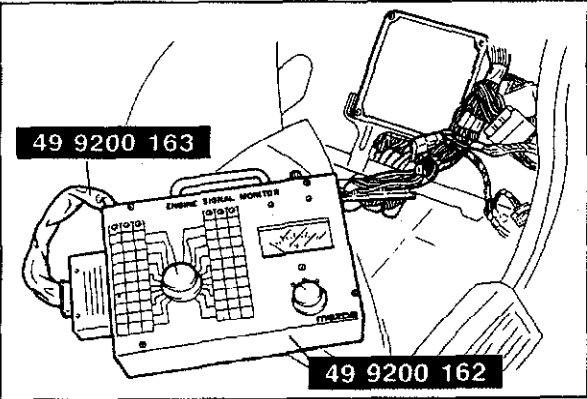
83U04B-114

The fuel cut function is provided in the deceleration control system.
This function is to improve fuel consumption.

TROUBLESHOOTING CHART

| SYMPTOM | POSSIBLE CAUSE | | | | | | |
|-----------------------------|---------------------|----------|-------------------|----|--------------------|--|--|
| | Water thermo sensor | Injector | Electrical signal | | Dashpot adjustment | | |
| | | | 3C | 3E | | | |
| | 4B-82 | 4B-47 | 4B-77 | | 4B-66 | | |
| Runs rough on deceleration | 3 | 2 | 1 | | 4 | | |
| Afterburn in exhaust system | 3 | 4 | 1 | | 2 | | |
| Fail emission test | 3 | 2 | 1 | | 4 | | |

83U04B-159



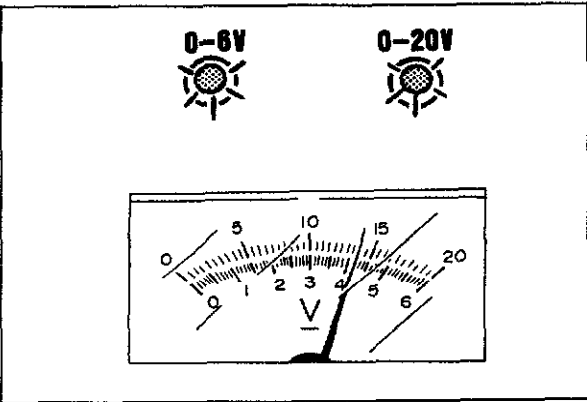
83U04B-115

System Inspection (Electrical Signal)

1. Connect **SST** between the wiring harness and engine control unit.
2. Warm up the engine and run at idle.
3. Set "3C" and "3E" position on **SST**.

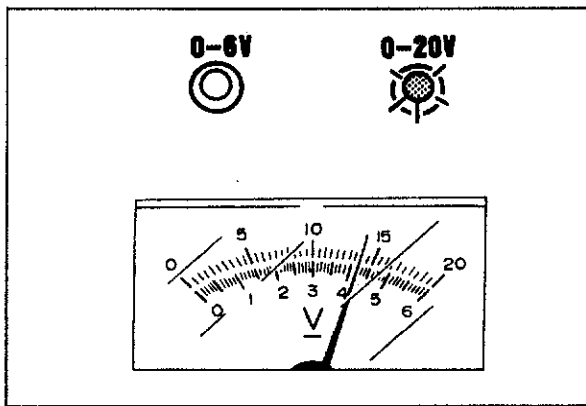
Note

- "3C" — For No. 2 and No. 4 injectors
"3E" — For No. 1 and No. 3 injectors

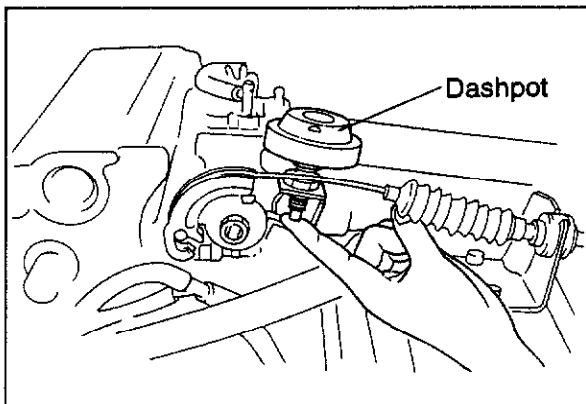


83U04B-116

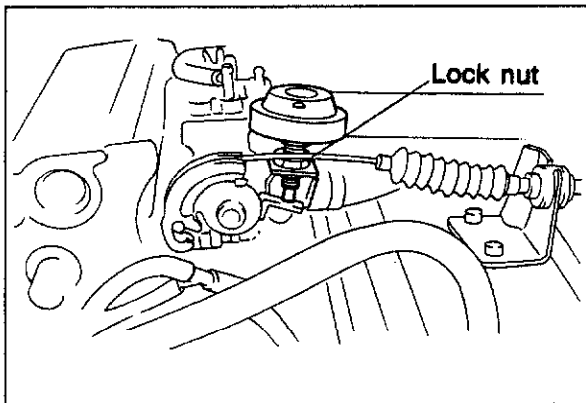
4. Check that both indicator lamps flash at idle.



83U04B-117



83U04B-118



83U04B-119

5. Increase the engine speed to **4,000 rpm**, then suddenly decrease the engine speed.
6. Check that only the red indicator lamp illuminates during deceleration.

Dashpot Inspection

1. Push the dashpot rod with a finger and make sure the rod goes into the dashpot slowly.
2. Release the finger and make sure the rod comes out quickly.

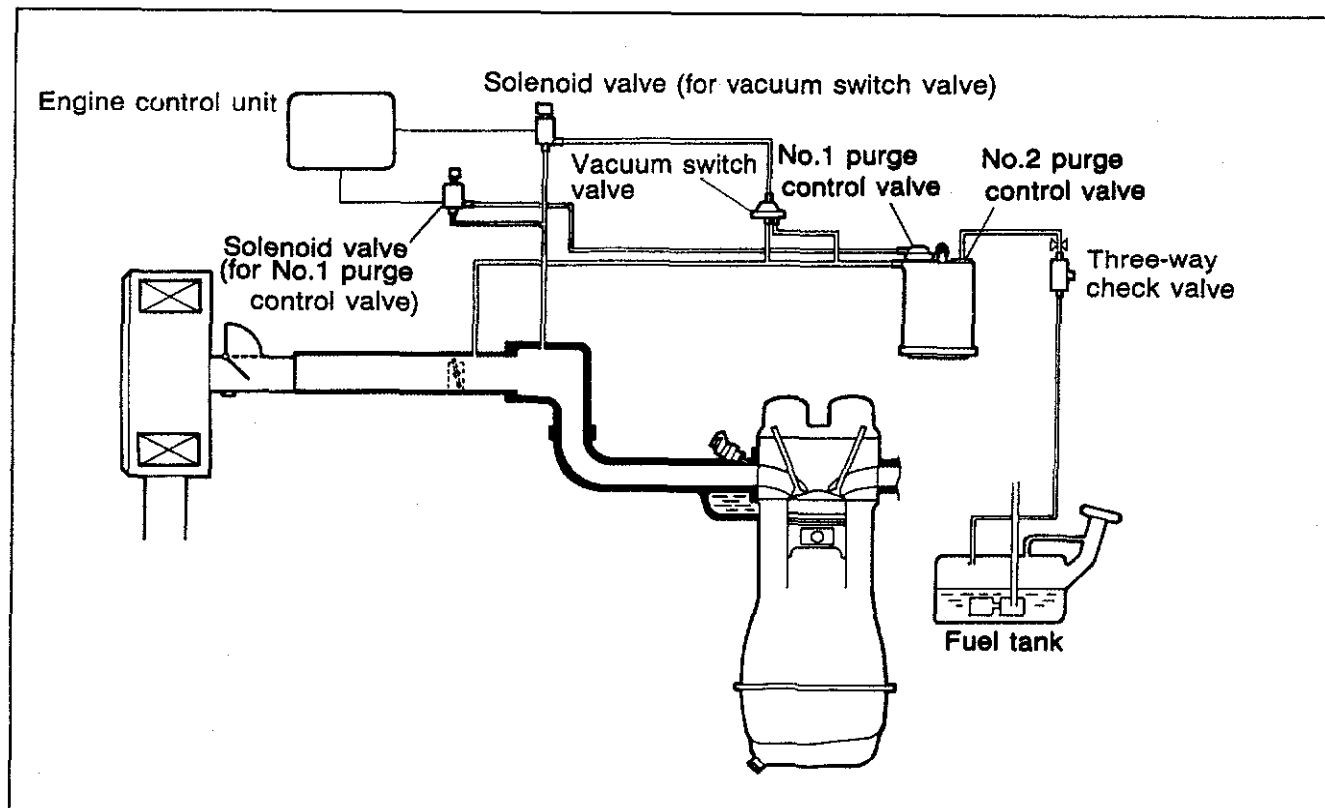
Adjustment

1. Warm up the engine to the normal operation temperature and run it at idle speed.
2. Connect tachometer.
3. Increase the engine speed above 3,500 rpm.
4. Gradually decrease the engine speed and check the dashpot rod contact speed.

Contact speed: $2,000 \pm 150$ rpm

5. To adjust, loosen the lock nut and adjust by turning the dashpot, tighten lock nut after adjusting.

EVAPORATIVE EMISSION CONTROL SYSTEM

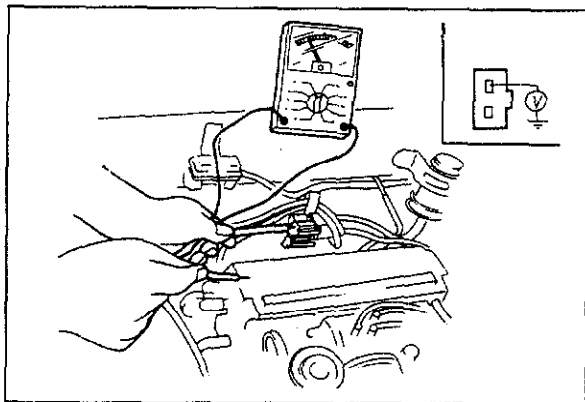


83U04B-120

The evaporative emission control system is controlled by signal from the water thermo sensor, the intake air thermo sensor, the air flow meter, and the engine speed sensor (ignition coil). The control unit determines the engine operating conditions from the signals, and control the evaporative emission control system by operating the solenoid valves for No. 1 purge control valve and vacuum switch valve when specified conditions exist.

TROUBLESHOOTING CHART

| SYMPTOM | POSSIBLE CAUSE | | | | | | | | | | |
|----------------|----------------|---------------------|--------------------------|---------------------|-------|--|---|---------------------|--------------------------|--------------------------|-----------------------|
| | Ignition coil | Water thermo sensor | Intake air thermo sensor | Engine control unit | | Solenoid valve (for No.1 purge control valve) | Solenoid valve (for vacuum switch valve) | Vacuum switch valve | No.1 purge control valve | No.2 purge control valve | Three-way check valve |
| | | | | 20 | 2P | | | | | | |
| | | | | 4B-76 | | | | | | | |
| 5-30 | 4B-82 | 4B-79 | 4B-76 | | 4B-69 | | 4B-70 | 4B-69 | 4B-69 | 4B-70 | |
| Checking order | 11 | 10 | 9 | 3 | 4 | 1 | 2 | 7 | 5 | 6 | 8 |

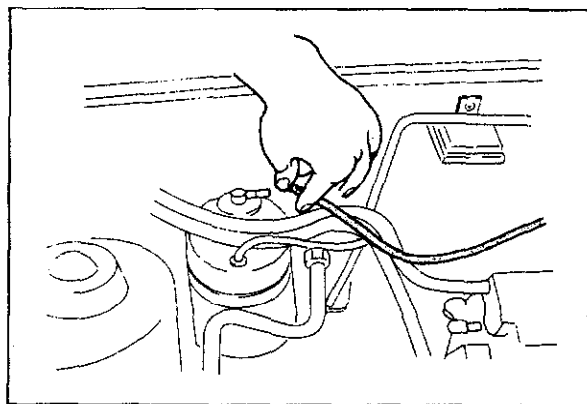


83U04B-121

SYSTEM INSPECTION

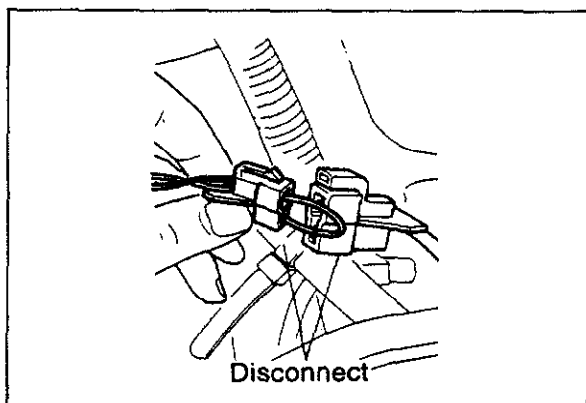
1. Warm up the engine and run it at idle.
2. Connect a voltmeter to the solenoid valve for No. 1 purge control valve (YG) terminal

Voltage: approx. 12V



63U04B-095

3. Disconnect the vacuum hose from the No. 1 purge control valve and place a finger over the hose opening.
4. Increase the engine speed to about **2,000 rpm** and make sure air is not sucked in.

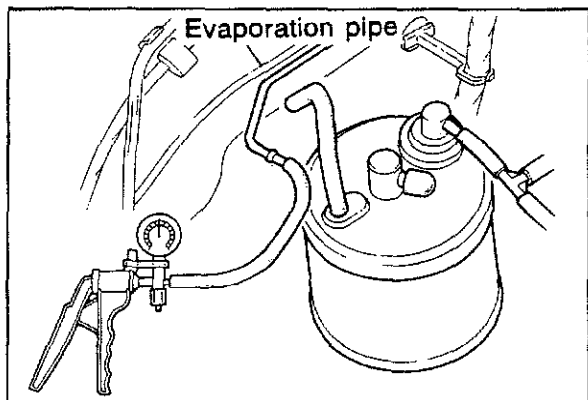


83U04B-122

5. Disconnect the neutral switch connector, and connect a jumper wire to the neutral switch connector.
6. Disconnect the throttle sensor connector (vacuum hose disconnected)
7. Check the terminal voltage (YG)

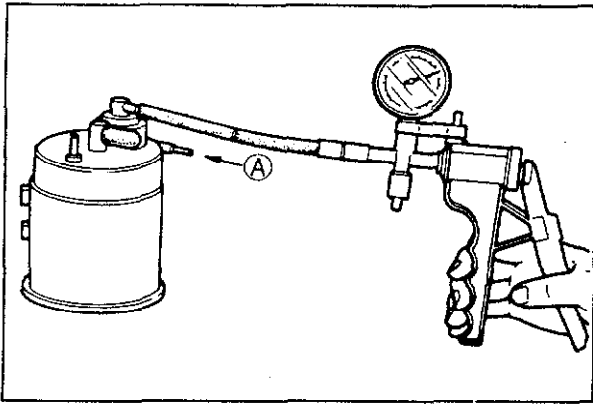
Voltage: below 1.5V

8. Place finger over the hose opening.
9. Increase the engine speed to about **2,000 rpm** and check that air is sucked in.
10. If not correct, check the solenoid valve for No.1 purge control valve, engine control unit 2P terminal, and No.1 purge control valve.



83U04B-124

11. Disconnect the evaporation hose from the evaporation pipe.
12. Connect the vacuum pump to the evaporation pipe.
13. Operate the vacuum pump and check that no vacuum is held.
14. If vacuum is held, check the three-way check valve or evaporation pipe for clog.

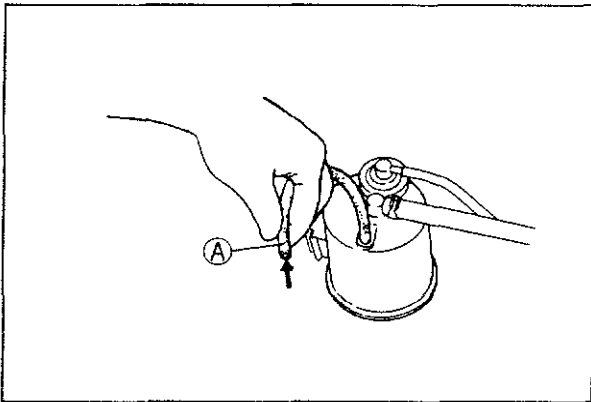


56G04A-449

NO. 1 PURGE CONTROL VALVE

Inspection

1. Blow through the purge control valve from port (A) and check that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.33 inHg)** vacuum, and blow through port (A) again; air should flow from port (A).

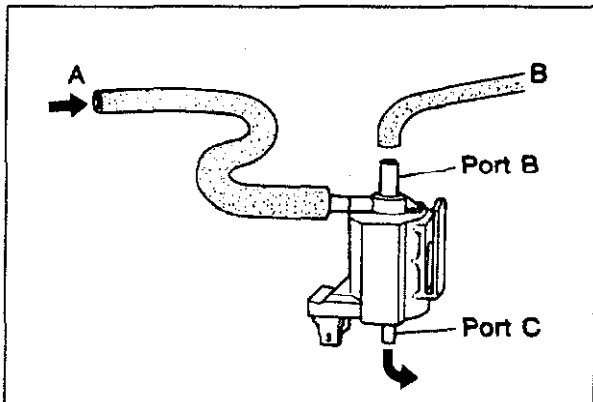


56G04A-450

NO. 2 PURGE CONTROL VALVE

Inspection

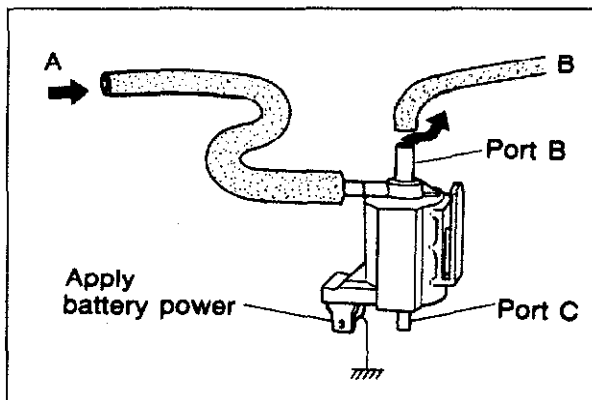
1. Disconnect vacuum hose (B) from the evaporation pipe.
2. Blow into the hose and check that air flows freely.



83U04B-126

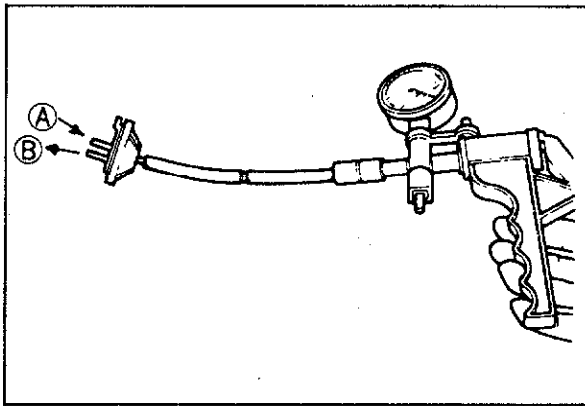
SOLENOID VALVE

1. Disconnect vacuum hose (A) from the servo diaphragm.
2. Disconnect vacuum hose (B) from the solenoid valve.
3. Disconnect the connector of the solenoid valve.
4. Blow air through the solenoid valve from hose (A) and make sure air comes out of port (C).



83U04B-127

5. Apply battery power to the solenoid valve with a suitable jumper wire.
6. Blow air through the solenoid valve from hose (A) and check that air comes out of port (B).
7. If the solenoid valve does not operate properly, replace it with a new one.



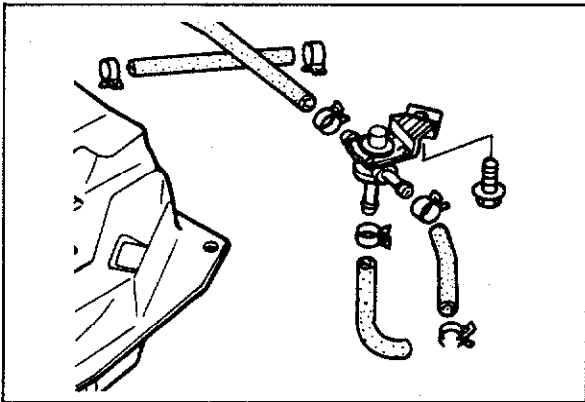
83U04B-128

VACUUM SWITCH VALVE

1. Remove the vacuum switch valve.
2. Connect a vacuum pump to the valve.
3. Blow through the valve from port (A) and confirm that air comes out of port (B) when applied vacuum is more than the specified vacuum amount.

Specified vacuum:

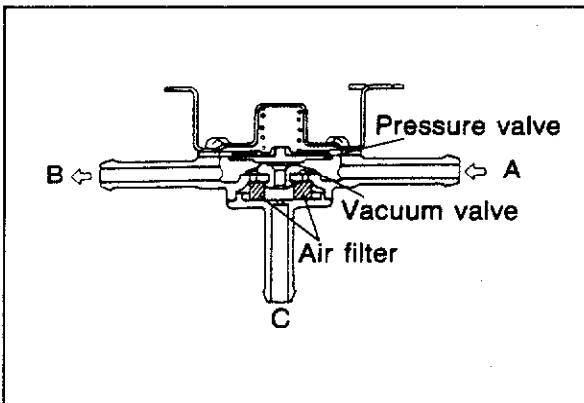
70—100 mmHg (2.76—3.94 inHg)



83U04B-202

THREE-WAY CHECK VALVE

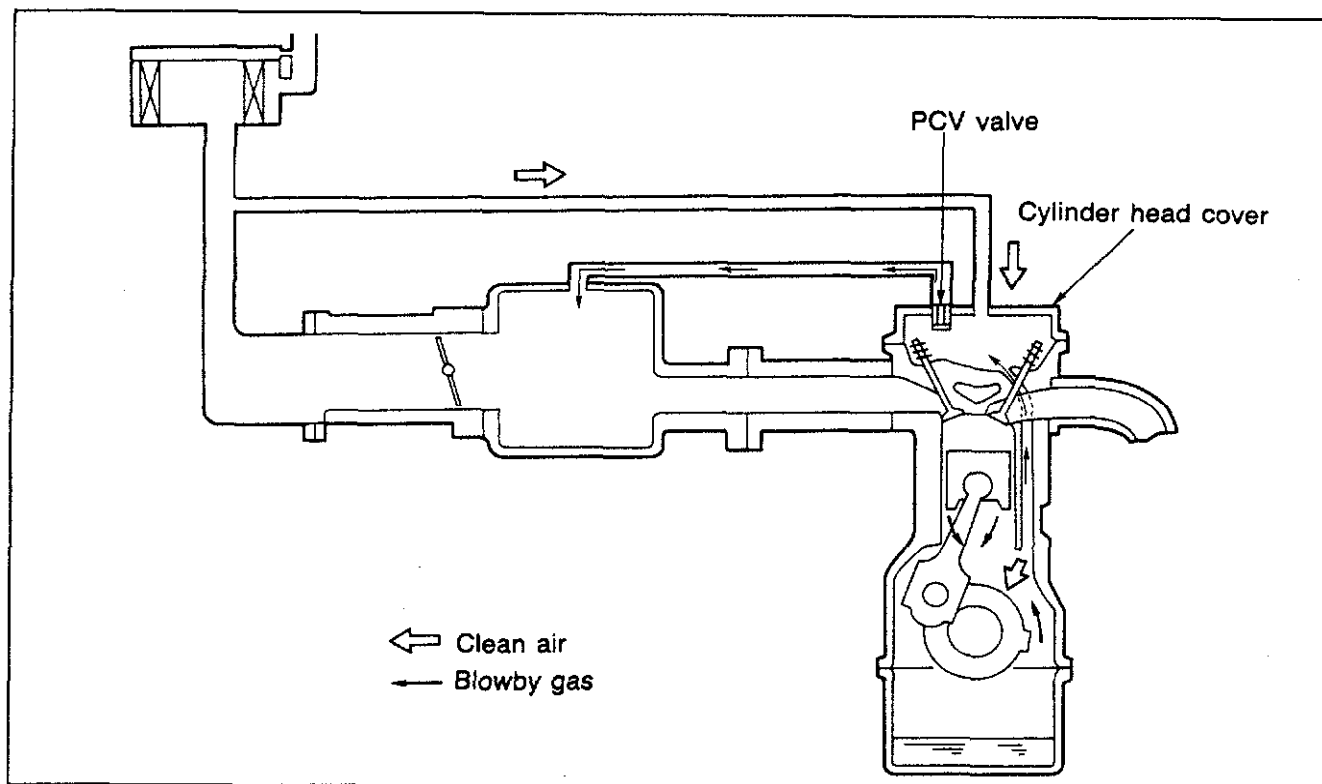
1. Remove the three-way check valve.



63U04B-103

2. Blow through the valve from port (A), and check that air flows out through port (B). Next, block port (B), and check that air flows out through port (C).
3. Block port (B), and suck through port (A). Check that air is pulled in through port (C).

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

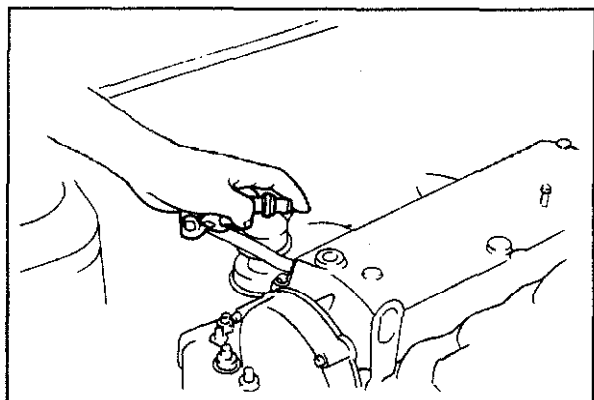


83U04B-129

The PCV valve is operated by intake manifold vacuum.

When the engine is running at idle, the PCV valve is slightly opened and small amount of blow-by gas is drawn into the dynamic chamber.

At high engine speed, the PCV valve is further opened and large amount of blow-by gas; drawn into the dynamic chamber.



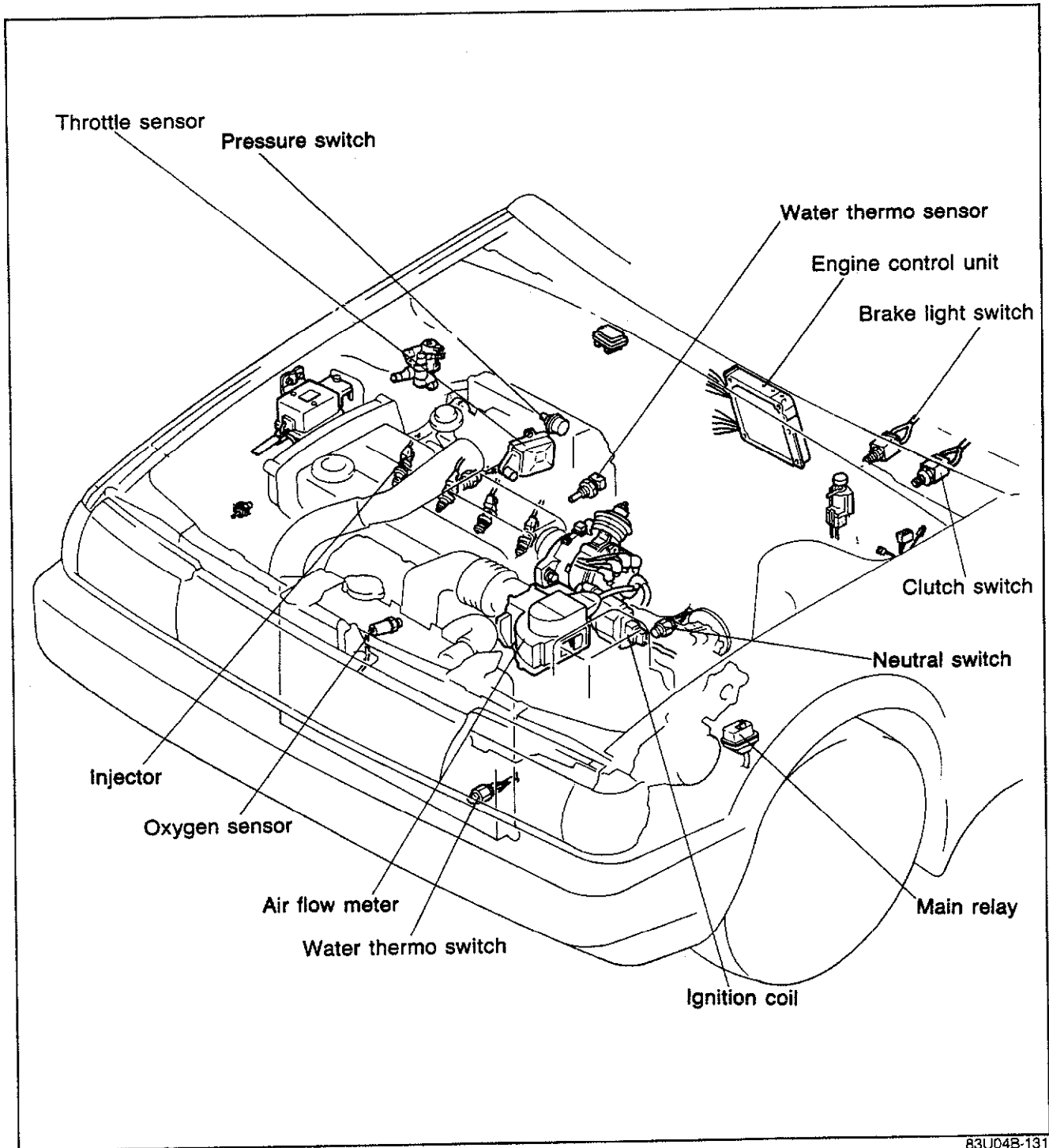
83U04B-130

PCV VALVE

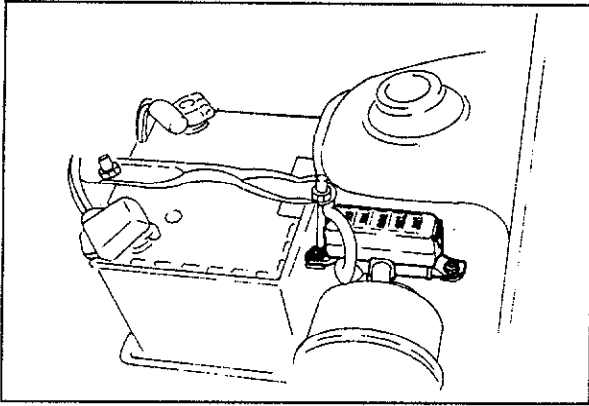
Inspection

1. Warm up the engine to the normal operating temperature and run it at idle speed.
2. Disconnect the PCV valve together with the ventilation hose from the cylinder head cover.
3. Close the PCV valve opening with finger. Make sure air is sucked into the PCV valve, if not replace the valve.

CONTROL SYSTEM



83U04B-131

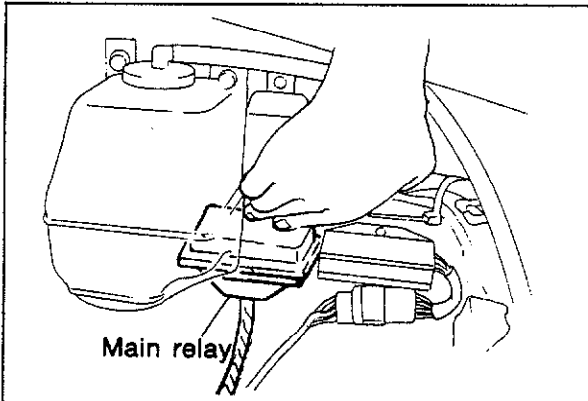


83U04B-132

MAIN FUSE

Inspection

Check the continuity of EGI main fuse.

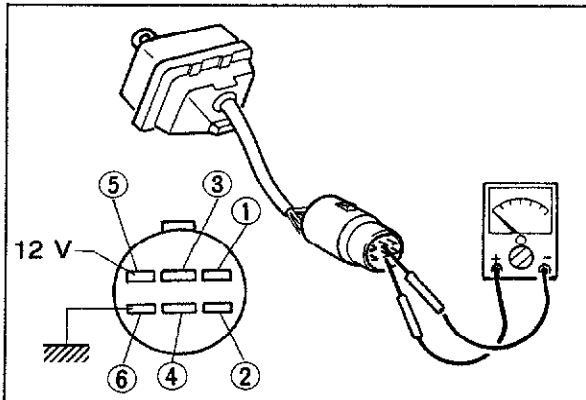


83U04B-133

MAIN RELAY

Inspection

1. Turn ignition switch ON and OFF, verify that the main relay "CLICKS"
2. If clicking is not heard at main relay, check the continuity at terminals using an ohmmeter, and wiring harness.



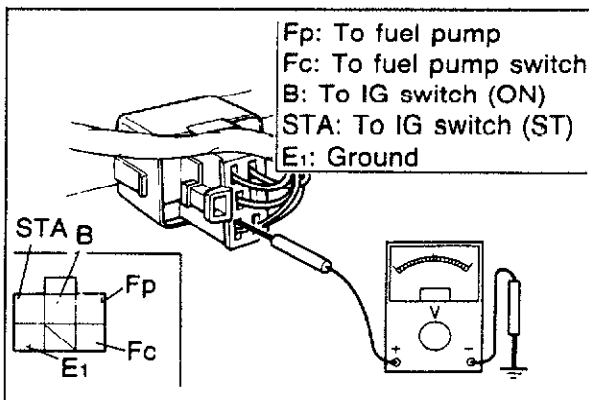
83U04B-134

Continuity

1. Apply 12V to ⑤ and a ground ⑥ terminals of the main relay.
2. Check continuity at terminals using an ohmmeter.

| Operation Terminals | 12V Not applied | 12V Applied |
|------------------------|-----------------|-------------|
| ①—② | No | Yes |
| ③—④ | No | Yes |

3. If not correct, replace it.



83U04B-135

Fp: To fuel pump
Fc: To fuel pump switch
B: To IG switch (ON)
STA: To IG switch (ST)
E1: Ground

CIRCUIT OPENING RELAY

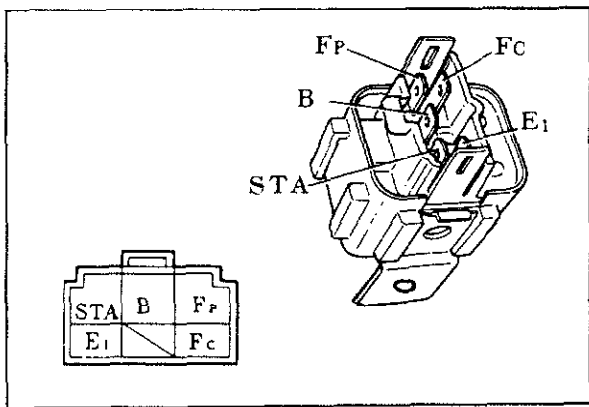
Inspection

Terminal voltage

1. Check voltage between each terminal and ground using a voltmeter.

| Condition | Terminal | Fp | Fc | B | STA | E1 |
|-----------------------|----------|-----|-----|-----|-----|----|
| IG SW: ON | | 0V | 12V | 12V | 0V | 0V |
| Measuring plate: open | | 12V | 0V | 12V | 0V | 0V |
| IG SW: ST | | 12V | 0V | 12V | 12V | 0V |

2. If not correct, check the resistance using the ohmmeter.



83U04B-136

Resistance

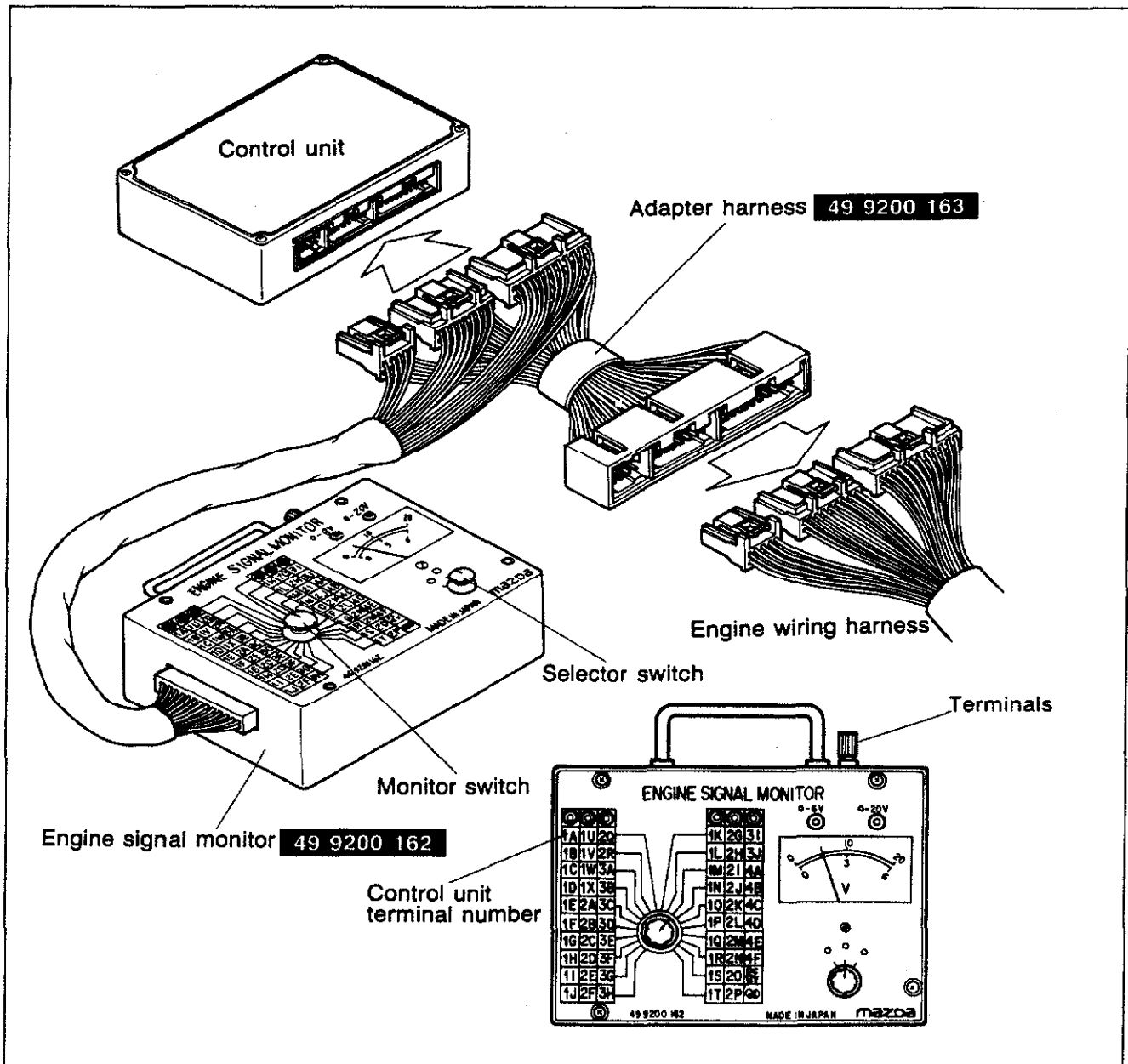
1. Check the resistance between the terminals using an ohmmeter.

| Between terminals | Resistance (Ω) |
|--------------------------|-------------------------|
| STA \leftrightarrow E1 | 15—30 |
| B \leftrightarrow Fc | 80—150 |
| B \leftrightarrow Fp | ∞ |

2. If not correct, replace the relay.

ENGINE CONTROL UNIT

Engine Signal Monitor (49 9200 162) and Adapter (49 9200 163)



83U04B-137

The Engine Signal Monitor (49 9200 162) was developed to check the engine control unit terminal voltages. This monitor easily inspects the terminal voltage by setting the monitor switch.

How to Use the Engine Signal Monitor

1. Connect the **Engine Signal Monitor** (49 9200 162) between the engine control unit and the engine harness using the **adapter** (49 9200 163).
2. Turn the selector switch and monitor switch to select the terminal number.
3. Check the terminal voltage.

Do not apply voltage to terminals.

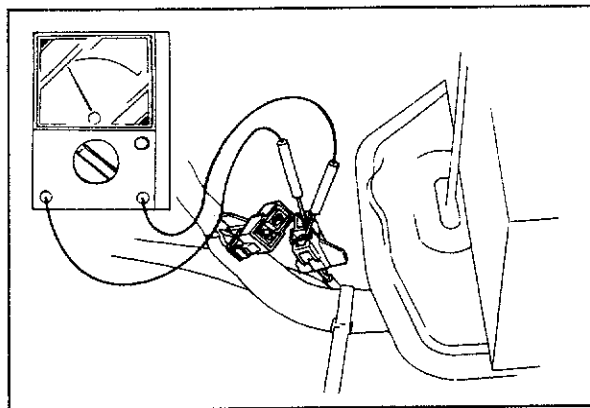
4B CONTROL SYSTEM

| Terminal | Connected to | Voltage | Condition | Remark |
|-------------|---|-----------------|-------------------------------------|--|
| 1A (Output) | MIL | Below 2.5V | Ignition switch OFF → ON for 3 sec. | Test connector grounded |
| | | Approx. 12V | After 3 sec. | |
| 1B (Output) | Self-Diagnosis Checker (for Code No.) | Below 2.5V | Ignition switch OFF → ON for 3 sec. | Test connector grounded Checker connected |
| | | Approx. 12V | After 3 sec. | |
| 1C | — | — | — | — |
| 1D (Output) | Self-Diagnosis Checker (for Monitor lamp) | Approx. 5V | Ignition switch OFF → ON for 3 sec. | Test connector grounded Checker connected |
| | | Approx. 12V | After 3 sec. | |
| 1E (Input) | Throttle sensor (IDL switch) | Approx. 12V | Accelerator pedal depressed | |
| | | Below 1.5V | Accelerator pedal released | |
| 1F (Output) | A/C control relay | Approx. 12V | Ignition switch ON | |
| | | Below 1.5V | A/C switch ON (at idle) | |
| 1G (Input) | Neutral/clutch switch | Approx. 12V | Clutch pedal depressed | In-gear condition (Neutral: Constant 12V) |
| | | Below 1.5V | Clutch pedal released | |
| 1H (Input) | Water thermo switch (Radiator) | Approx. 12V | Below 17°C (63°F) | |
| | | Below 1.5V | Above 17°C (63°F) | |
| 1I (Input) | Electrical load (E/L) switch | Approx. 2.5V | E/L switch ON | |
| | | Approx. 12V | E/L switch OFF | |
| 1J (Input) | Brake light switch | Approx. 12V | Brake pedal depressed | |
| | | Below 1.5V | Brake pedal released | |
| 1K (Input) | Power steering switch | Approx. 12V | Power steering switch OFF | |
| | | Below 1.5V | Power steering switch ON | |
| 1L (Input) | A/C switch | Approx. 12V | A/C switch OFF | Blower motor ON |
| | | Below 2.5V | A/C switch ON | |
| 1M (Input) | Ignition coil | Approx. 12V | Ignition switch ON | (When engine running) Engine Signal Monitor: Green and red light flash |
| | | Approx. 12V | At idle | |
| 1N | G sensor (Distributor) | Below 1.5V | Ignition switch ON | |
| | | Approx. 3V | At idle | |
| 1O | — | — | — | — |
| 1P | — | — | — | — |
| 1Q | — | — | — | — |
| 1R | — | — | — | — |
| 1S | — | — | — | — |
| 1T | — | — | — | — |
| 1U (Output) | Knock control unit (1 terminal) | Below 1.5V | Ignition switch ON | |
| | | Approx. 12V | At idle | |
| 1V (Input) | FF switch | Below 1.5V | 4x4 | |
| | | Approx. 12V | FF | |
| 1W (Input) | Test connector | Below 1.5V | Test connector grounded | |
| | | Approx. 12V | Test connector not grounded | |
| 1X | — | — | — | — |
| 2A (Output) | Vref | 4.5—5.5V | — | — |
| 2B (Input) | Air flow meter (Vc) | 7—9V | — | — |
| 2C | Ground (E2) | Below 1.5V | — | — |
| 2D (Input) | Oxygen sensor | 0.3—0.7V | At idle | |
| | | More than 0.45V | During acceleration | |
| | | Less than 0.45V | During deceleration | |

| Terminal | Connected to | Voltage | Condition | Remark |
|-------------|--|--------------|---|---|
| 2E (Input) | Air flow meter (Vs) | Approx. 2V | Ignition switch ON | |
| | | 4—5V | At idle | |
| 2F | — | — | — | — |
| 2G (Input) | Throttle sensor | Approx. 0.5V | Accelerator pedal released | |
| | | Approx. 4V | Accelerator pedal depressed | |
| 2H (Input) | Atmospheric pressure sensor | Approx. 4V | — | At sea level |
| 2I (Input) | Water thermo sensor | Approx. 0.5V | Normal operating temperature | |
| 2J (Input) | Intake air thermo sensor (Air flow meter) | 2—3V | Intake air temperature: 20°C (68°F) | |
| 2K (Output) | Pressure regulator control valve (PRCV) solenoid | Below 2.5V | Intake air temp. more than 58°C (136°F) Water temp. more than 90°C (194°F) | |
| | | Approx. 12V | Other | |
| 2L (Output) | Pressure switch | Approx. 12V | At idle | Air pressure 71.8—79.8 kPa (0.73—0.81 kg/cm ² , 10.4—11.6 psi) |
| | | Below 1.5V | At overboost | |
| 2M (Output) | Knock control unit (f terminal) | Below 1.5V | At idle | Coolant temp: More than 80°C (176°F) Intake air temp: More than 0°C (32°F) |
| | | Approx. 12V | Engine speed 1,000 rpm (Positive pressure) | |
| 2N (Output) | Indicator light | Approx. 12V | At idle | 71.8—79.8 kPa (0.73—0.81 kg/cm ² , 10.4—11.6 psi) |
| | | Below 1.5V | At overboost | |
| 2O | No.2 purge control solenoid | Approx. 12V | Less than 1,500 rpm | |
| | | Below 1.5V | More than 1,500 rpm | |
| 2P | No.1 purge control valve solenoid | Below 1.5V | Intake air temp. more than 50°C (122°F) Water temp. more than 50°C (122°F) | In-gear condition. Jumper wire connect to the Neutral switch |
| | | Approx. 12V | Other | |
| 2Q | Idle speed control (ISC) valve | 1.5—11.6V | At idle | Engine Signal Monitor: Green and red light flash |
| 2R | Ground | Below 1.5V | — | — |
| 3A | Ground | Below 1.5V | — | — |
| 3B | Starter switch | Below 2.5V | Ignition switch ON | |
| | | 7—9V | While cranking | |
| 3C | Injector No.2, No.4 | Approx. 12V | At idle | Engine Signal Monitor: Green and red light flash |
| 3D | — | — | — | — |
| 3E | Injector No.1, No.3 | Approx. 12V | At idle | Engine signal Monitor: Green and red light flash |
| 3F | — | — | — | — |
| 3G | Ground | Below 1.5V | — | — |
| 3H | — | — | — | — |
| 3I | Main relay | Approx. 12V | Ignition switch ON | |
| 3J | Battery | Approx. 12V | — | — |

Engine control unit connector

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 3I | 3G | 3E | 3C | 3A | 2Q | 2O | 2M | 2K | 2I | 2G | 2E | 2C | 2A | 1W | 1U | 1S | 1Q | 1O | 1M | 1K | 1I | 1G | 1E | 1C | 1A |
| 3J | 3H | 3F | 3D | 3B | 2R | 2P | 2N | 2L | 2J | 2H | 2F | 2D | 2B | 1X | 1V | 1T | 1R | 1P | 1N | 1L | 1J | 1H | 1F | 1D | 1B |



83U04B-139

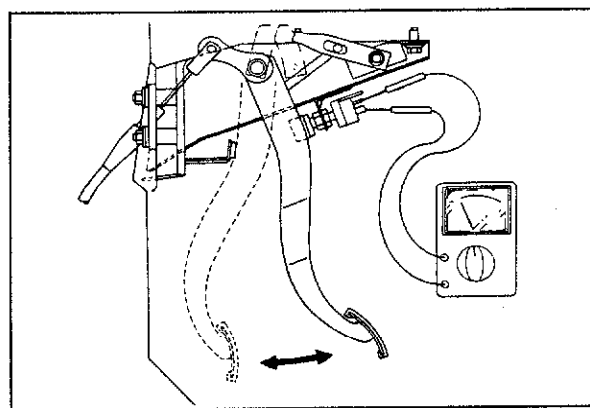
NEUTRAL SWITCH

Inspection

1. Disconnect the neutral switch connector.
2. Connect a to the neutral switch and check the continuity through the switch.

| Condition | Continuity |
|-----------------|------------|
| In neutral | No |
| In other ranges | Yes |

3. After checking, connect the switch connector.



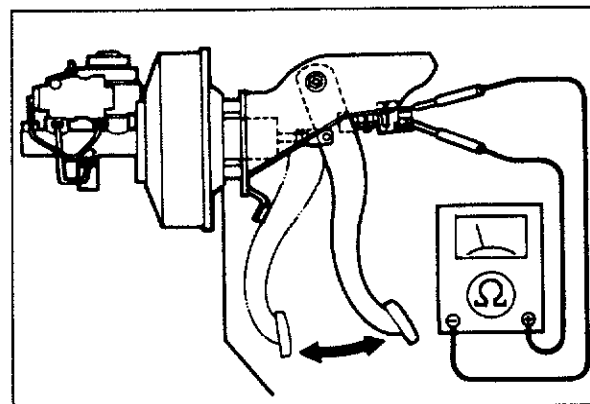
83U04B-140

CLUTCH SWITCH

Inspection

1. Disconnect the clutch switch connector.
2. Connect the circuit tester to the clutch switch and check the continuity between the switch terminals.

| Condition | Continuity |
|-----------------------------|------------|
| When the pedal is depressed | No |
| When the pedal is released | Yes |



83U04B-203

BRAKE LIGHT SWITCH

Inspection

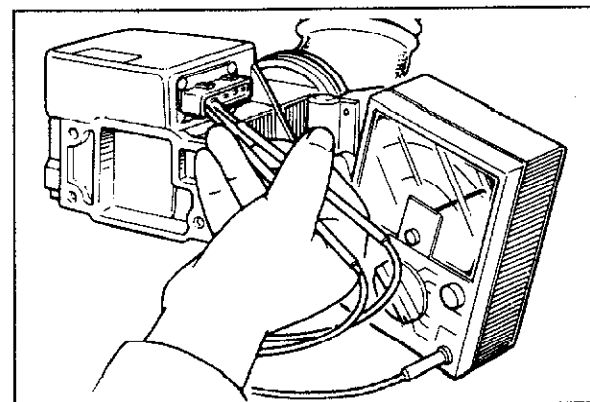
1. Disconnect the brake switch connector.
2. Connect an ohmmeter to the switch.
3. Check the continuity of the switch.

| Pedal | Continuity |
|-----------|------------|
| Depressed | Yes |
| Released | No |

4. After checking, connect the switch connector.

Note

Refer to section 11 for replacement of the brake switch.

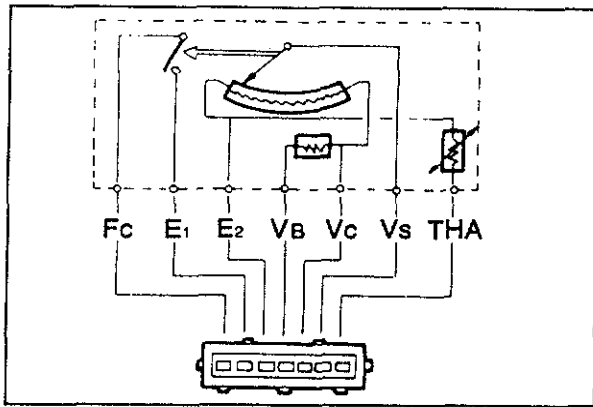


83U04B-141

AIR FLOW METER

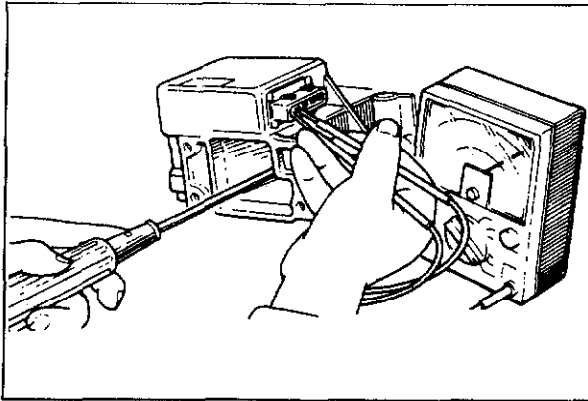
Inspection

1. Inspect the air flow meter body for cracks.
2. Check the resistance between terminals using an ohmmeter.



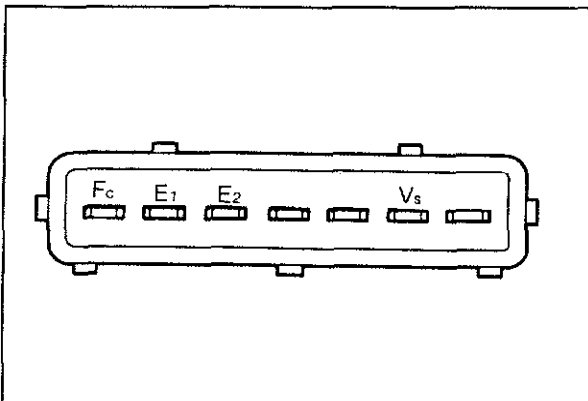
83U04B-142

| Terminal | Resistance (Ω) |
|--|--|
| $E_2 \leftrightarrow V_s$ | 20 to 400 |
| $E_2 \leftrightarrow V_c$ | 100 to 300 |
| $E_2 \leftrightarrow V_b$ | 200 to 400 |
| $E_2 \leftrightarrow THA$ (Air thermo sensor) | -20°C (-4°F) 10,000 to 20,000 0°C (32°F) 4,000 to 7,000 20°C (68°F) 2,000 to 3,000 40°C (104°F) 900 to 1,300 60°C (140°F) 400 to 700 |
| $E_1 \leftrightarrow F_c$ | ∞ |



73U04B-011

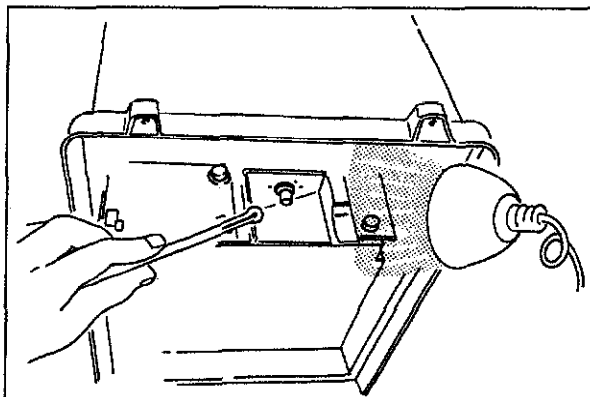
- Press open the measuring plate with a screwdriver, measure the resistance between E1 and FC (fuel pump switch) and between E2 and VS.



83U04B-143

| Conditions Terminals | Measuring Plate | |
|---------------------------|--------------------|----------------------|
| | Fully closed | Fully open |
| $E_1 \leftrightarrow F_c$ | ∞ | 0 |
| $E_2 \leftrightarrow V_s$ | 20 to 400 Ω | 20 to 1,000 Ω |

- If not correct replace it.

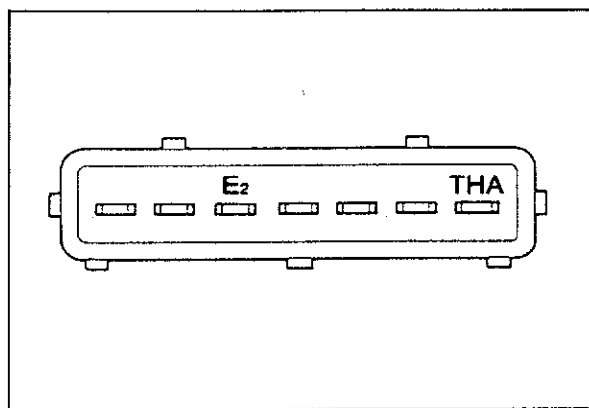


83U04B-144

INTAKE AIR THERMO SENSOR

Inspection of Resistance

- Remove the air cleaner upper cover assembly.
- Heat the intake air thermo sensor and observe the temperature.

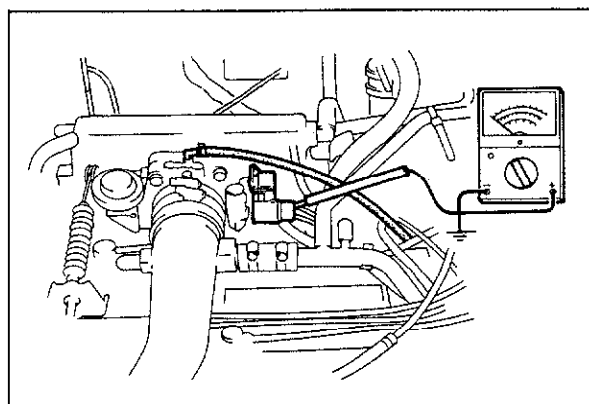


83U04B-160

3. Check resistance between the THA and E2 terminals using an ohmmeter.

| Intake Air Temperature | Resistance (Ω) |
|------------------------|-------------------------|
| -20°C (-4°F) | 10,000—20,000 |
| 20°C (68°F) | 2,000—3,000 |
| 60°C (140°F) | 400—700 |

4. If the resistance is not within specification, replace the air flow meter assembly.
5. If the resistance is within specification, check the wiring harnesses.



83U04B-145

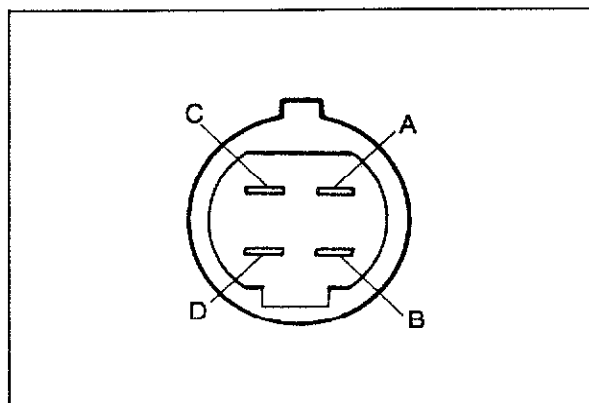
THROTTLE SENSOR

Inspection of Terminal Voltage

1. Remove the rubber boot from the connector.
2. Turn the ignition switch ON.
3. Check the voltage between each terminal and ground.
4. Open the throttle valve and check the voltage between each terminal and ground.

| Terminal \ Condition | Closed | Fully opened |
|----------------------|------------|--------------|
| A (OUTPUT) | 0.3—0.7V | Approx. 4.0V |
| B (GND) | below 1.5V | |
| C (Vref) | 4.5—5.5V | |
| D (IDL) | below 1.5V | Approx. 12V |

5. If not correct on (D) terminal only, check the throttle sensor setting.
6. If not correct at others, check resistances of the throttle sensor and voltage of the (2A), (2C), (2E) and (1G) terminals at the Engine control unit (refer to page 4B—76).
7. Install the rubber boot to the connector.



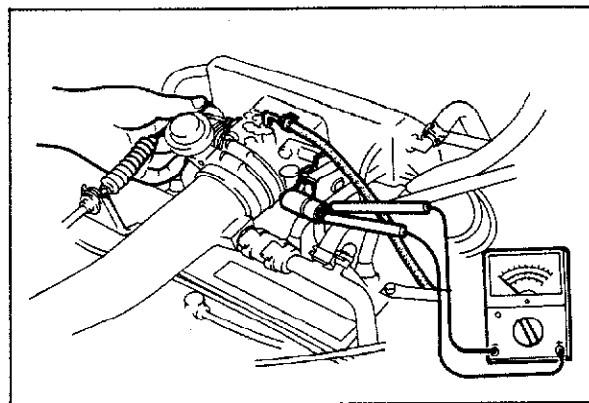
83U04B-146

Inspection of Resistance

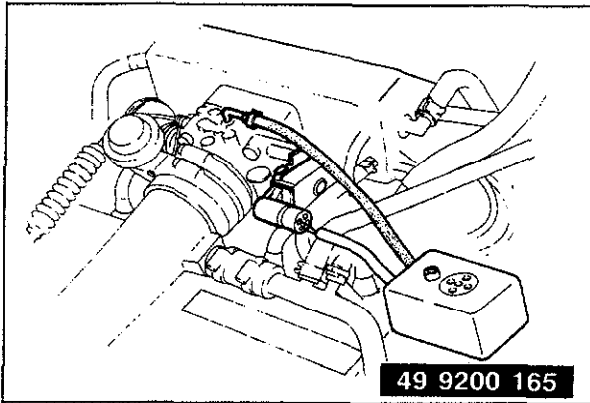
1. Disconnect the connector from the throttle sensor.
2. Check resistance between the terminals as shown in the table.
3. Open the throttle valve fully and check resistances between the terminals

| Terminal \ Condition | Closed | Fully opened |
|----------------------|----------------------|-----------------------|
| A — B | Approx. 500 Ω | Approx. 4.5k Ω |
| B — C | 3—7 k Ω | |

4. If not correct, replace the throttle sensor.



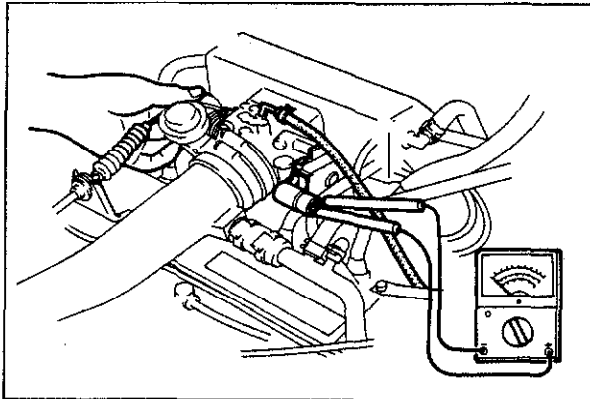
83U04B-147



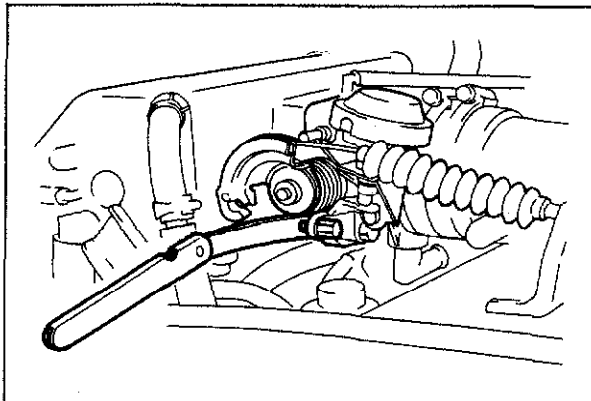
83U04B-148

Inspection of Throttle Sensor Setting

1. Disconnect the connector from the throttle sensor.
2. Connect the **SST** or ohmmeter to the throttle sensor.



63G04C-411

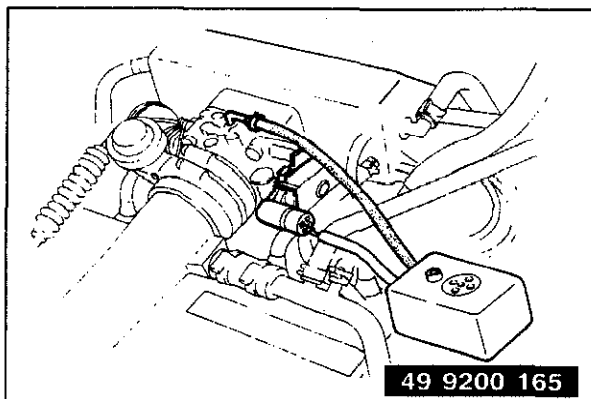


63G04C-412

3. Insert a thickness gauge between the throttle stop screw and stop lever.
4. Note the operation of the buzzer or continuity between terminals.

| Thickness gauge | Buzzing of the tester | Continuity between terminals |
|------------------|-----------------------|------------------------------|
| | | B — D |
| 0.5mm (0.020 in) | Yes | Yes |
| 0.7mm (0.027 in) | No | No |

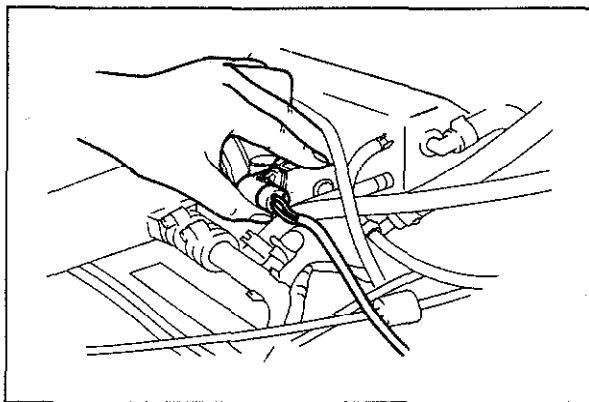
If necessary, adjust the throttle sensor



83U04B-149

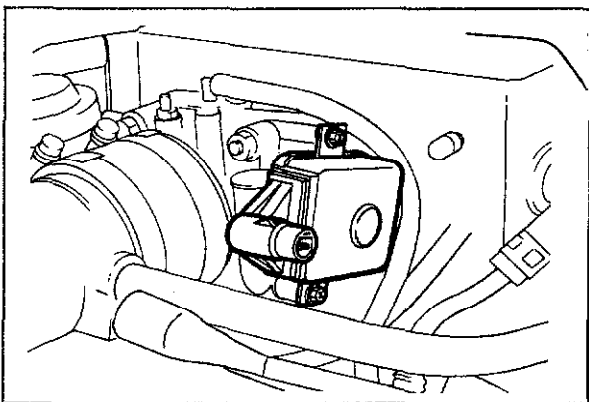
Adjustment of Throttle Sensor Setting

1. Disconnect the connector from the throttle sensor.
2. Connect the **SST** to the throttle sensor.
3. Insert a **0.5mm (0.020 in)** thickness gauge between the throttle stop screw and stop lever.



83U04B-150

4. Loosen the two attaching screws.
5. Rotate the throttle sensor clockwise about **30 degrees**, then rotate it back counterclockwise until the buzzer sounds.
6. Replace the thickness gauge with a **0.7mm (0.027 in)** gauge.
7. Check that the buzzer does not sound, or exist continuity.
8. If it sounds or continuity, repeat step 4 to 8.



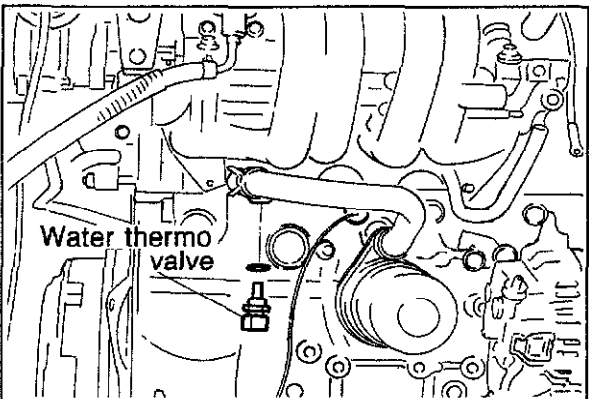
63G04C-418

9. Tighten the two attaching screws.

Note:

Be careful not to move the throttle sensor from the set position when tightening the screws.

10. Open the throttle valve fully a few times, then check the adjustment of the throttle sensor again (Refer to inspection procedures).

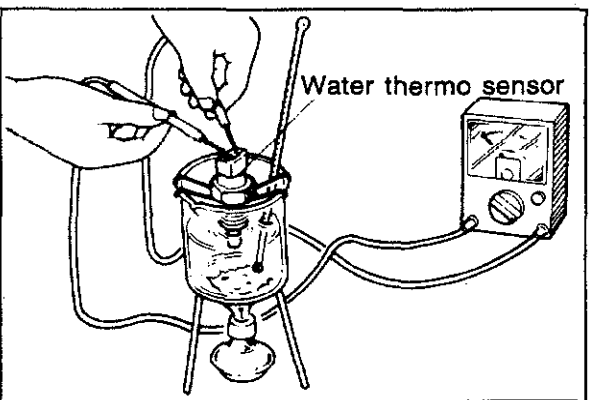


83U04B-151

WATER THERMO SENSOR

Inspection of Resistance

1. Remove the water thermo sensor.

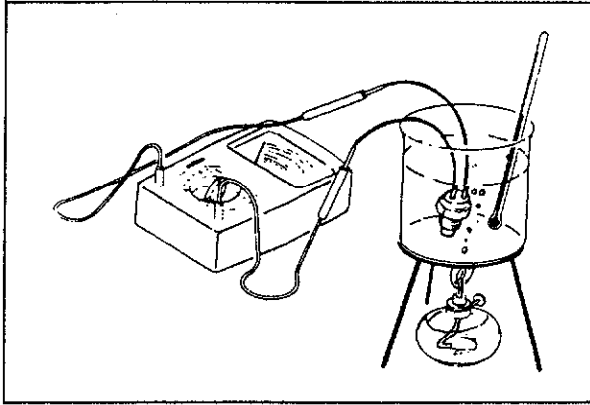


56G04B-100

2. Place the sensor in water with a thermometer and heat the water gradually.
3. Check that resistance of the sensor is within specification:

| Water temperature | Resistance |
|-------------------|----------------|
| -20°C (-4°F) | 14.6—17.8 kΩ |
| 20°C (68°F) | 2.21—2.69 kΩ |
| 80°C (176°F) | 0.290—0.354 kΩ |

4. If not correct, replace the water thermo sensor.



83U04B-152

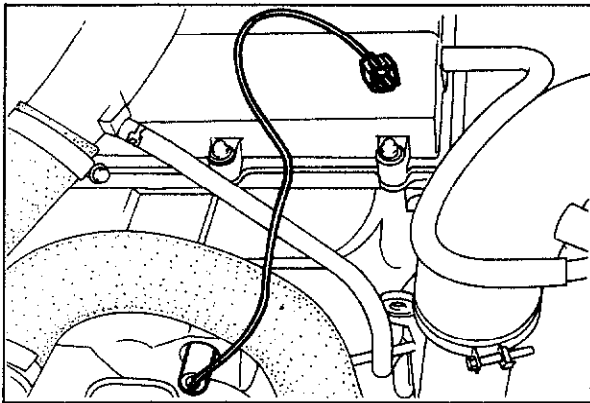
WATER THERMO SWITCH

Inspection

1. Remove the switch from the radiator.
2. Place the switch in water with a thermometer and heat the water gradually.
3. Check that the continuity between the terminals exists at more than specification.

Specification: 15—19°C (59—66°F)

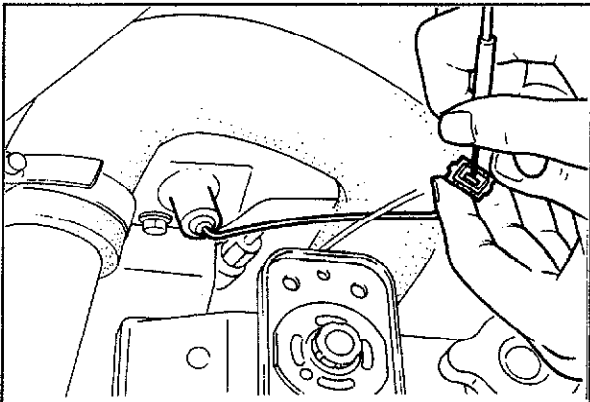
4. If not correct, replace the water thermo switch.



83U04B-153

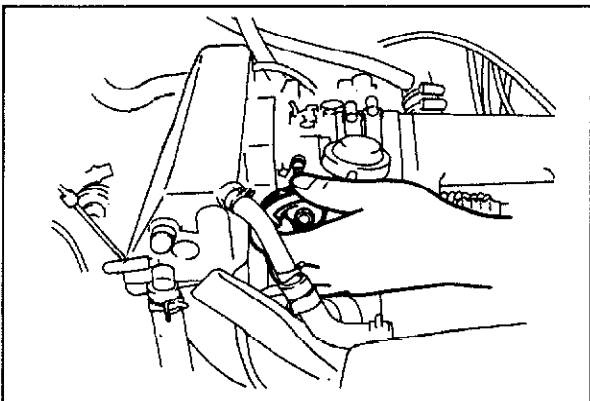
OXYGEN SENSOR

1. Warm up the engine and run it at idle.
2. Disconnect the oxygen sensor wiring harness connector.



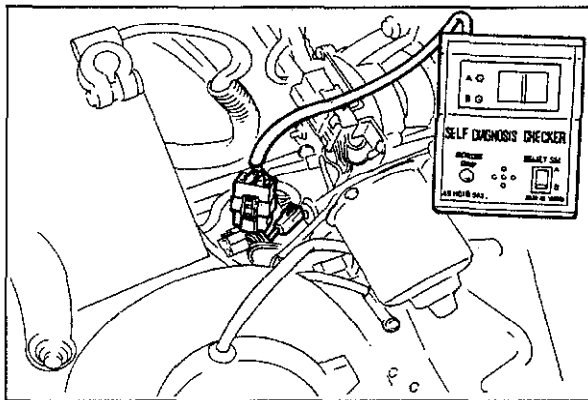
83U04B-161

3. Attach a voltmeter between the oxygen sensor connector (oxygen sensor side) and ground.
4. Run the engine speed at 4,000 rpm until the voltmeter indicates about **0.7 V**.



83U04B-162

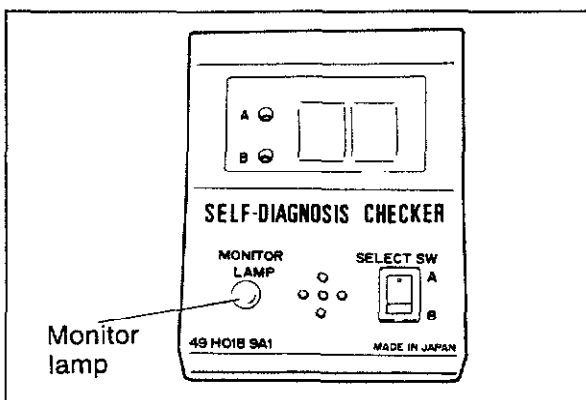
5. Increase and decrease the engine speed quickly several times. When the speed is increased the meter should read between **0.5V—1.0V**. When the speed is decreased it should read between **0V—0.3V**.
6. If the voltmeter doesn't indicate above mentioned values, replace the O₂ sensor.



86U04A-207

Inspection of Sensitivity

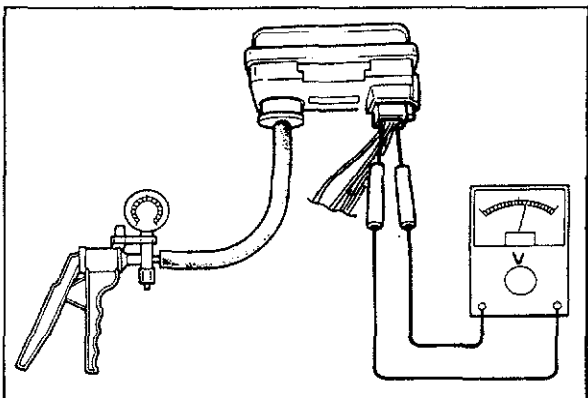
1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect the **SST** to the check connector.



86U04A-208

3. Increase the engine speed to between **2,000 and 3,000 rpm**, and check that the monitor lamp flashes for 10 seconds.

Monitor lamp: Flashes ON and OFF more than 8 times/10 sec

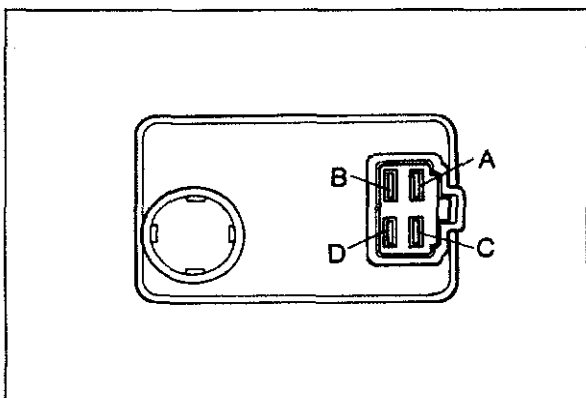


76U04A-052

ATMOSPHERIC PRESSURE SENSOR

Inspection of Terminal Voltage

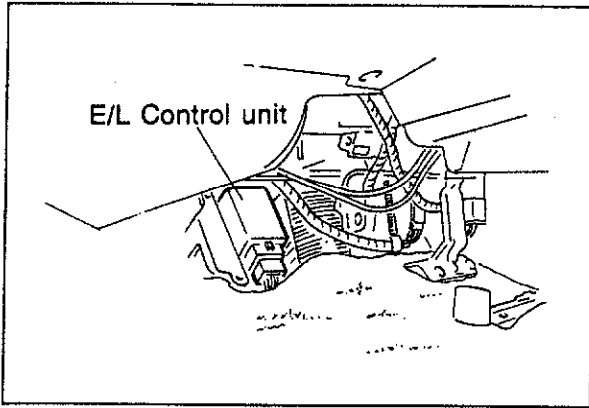
1. Remove the rubber cap and connect a vacuum pump to the port of the sensor.
2. Turn the ignition switch ON.
3. Check voltage between each terminal and ground while applying and releasing vacuum to the sensor.



83U04B-154

| Terminal (Color) | Voltage |
|------------------|------------|
| A | — |
| B (Lg) | 1.4—4.9V |
| C (LgR) | Below 1.5V |
| D (LgW) | 4.5—5.5V |

4. If the voltage at C or D terminal is not correct, check the wiring harness.
5. If the voltage of C and D terminal is OK but at B terminal is wrong, replace the atmospheric pressure sensor.



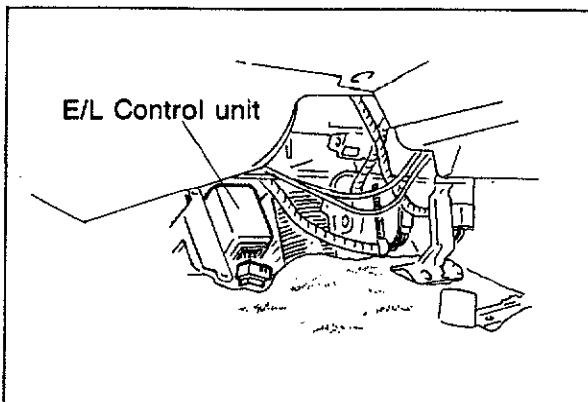
83U04B-155

ELECTRICAL LOAD (E/L) CONTROL UNIT Inspection

1. Connect a voltmeter between the E/L control unit and ground.
2. Start the engine and check the terminal voltages as described below.

| Terminal | Input | Output | Connection to | Voltage (after warm-up) | | Remarks |
|-----------|-------|--------|-----------------------|-------------------------|------|---|
| | | | | Ignition switch: ON | Idle | |
| A (YG) | — | — | Ignition switch | Approx. 12V | | |
| B (YG) | ○ | | Electrical fan relay | Approx. 12V | | Coolant temp.: below 97°C (206.6°F) |
| | | | | Below 1.5V | | Coolant temp.: above 97°C (206.6°F) |
| C (B) | — | — | Ground | 0V | | |
| D | — | — | — | — | — | — |
| E (L) | | ○ | Control unit (1H) | Below 1.5V | | E/L: ON |
| | | | | Approx. 12V | | E/L: OFF |
| F (RB) | ○ | | Combination switch | Approx. 12V | | Combination switch: ON |
| | | | | Below 1.5V | | Combination switch: OFF |
| G (LG) | ○ | | Blower motor switch | Below 1.5V | | Blower motor switch: ON (2nd, 3rd or 4th position) |
| | | | | Approx. 12V | | Others |
| H (BY) | ○ | | Rear defroster switch | Below 1.5V | | Rear defroster switch: ON |
| | | | | Approx. 12V | | Rear defroster switch: OFF |

83U04B-163



69G04A-175

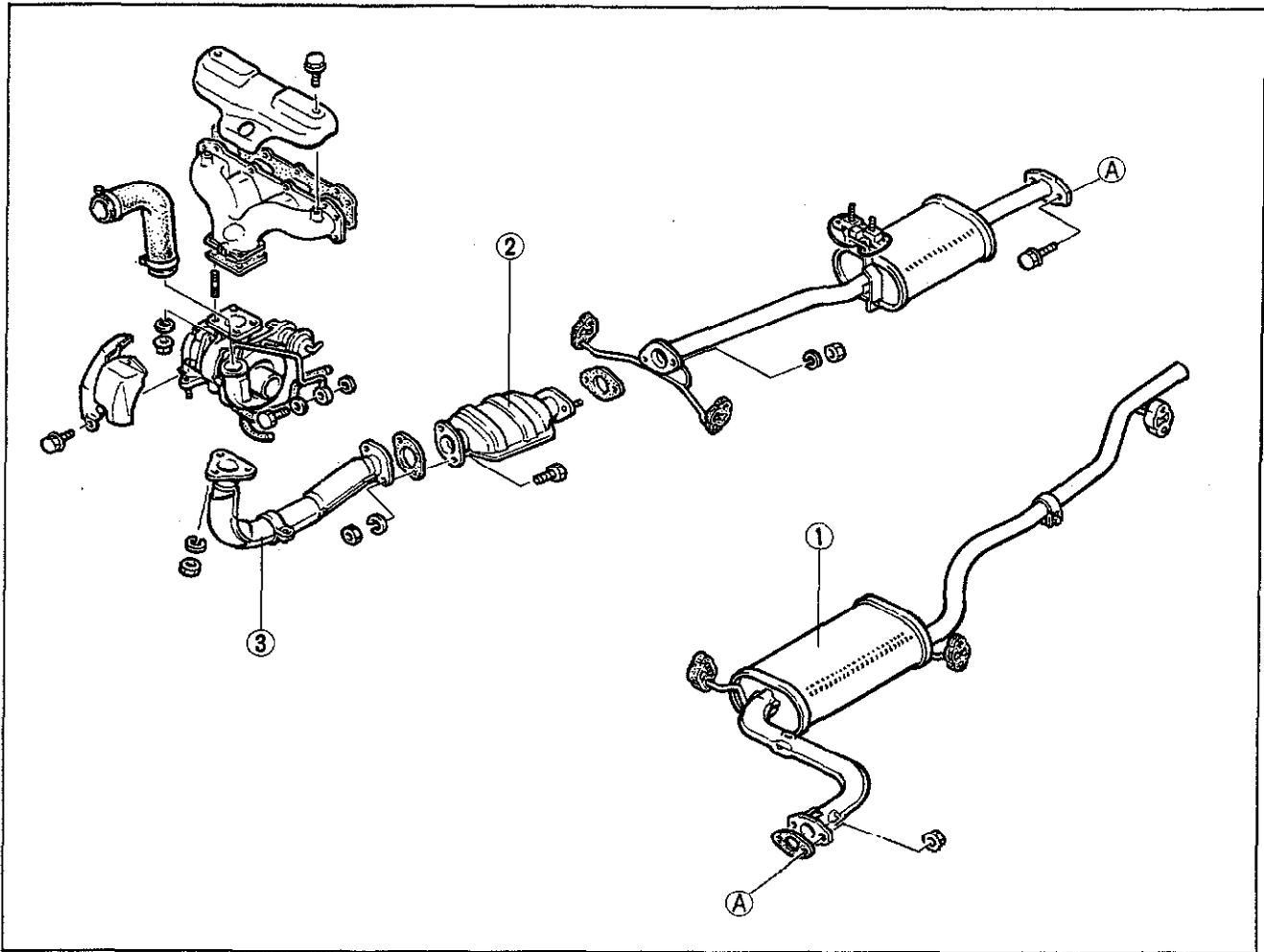
Replacement

1. Disconnect the connector from the E/L control unit.
2. Replace the E/L control unit.
3. Install in the reverse order of removal.

EXHAUST SYSTEM

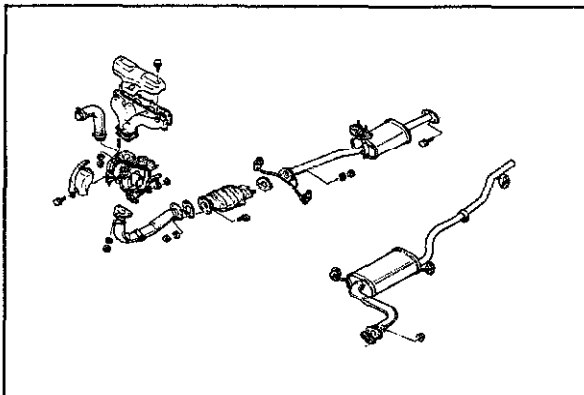
REMOVAL

Remove in the sequence shown in the figure.



- 1. Main silencer
- 2. Catalytic converter

- 3. Front exhaust pipe



INSPECTION

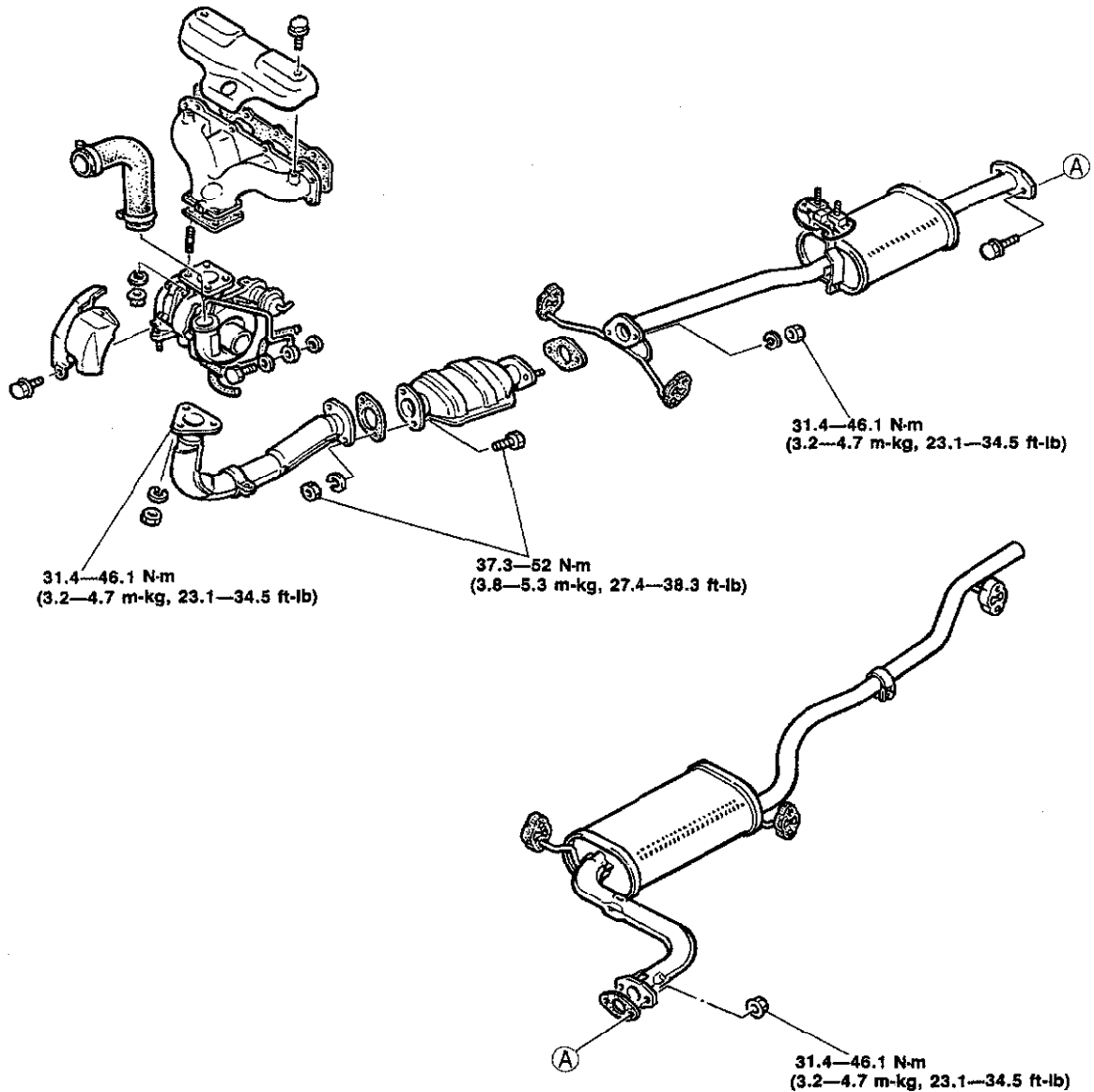
Visually check the exhaust system parts for cracks, or damage.

INSTALLATION

Install in the reverse order of removal.

Note

When installing the exhaust system parts, tighten to the specified torque.



83U04B-158