

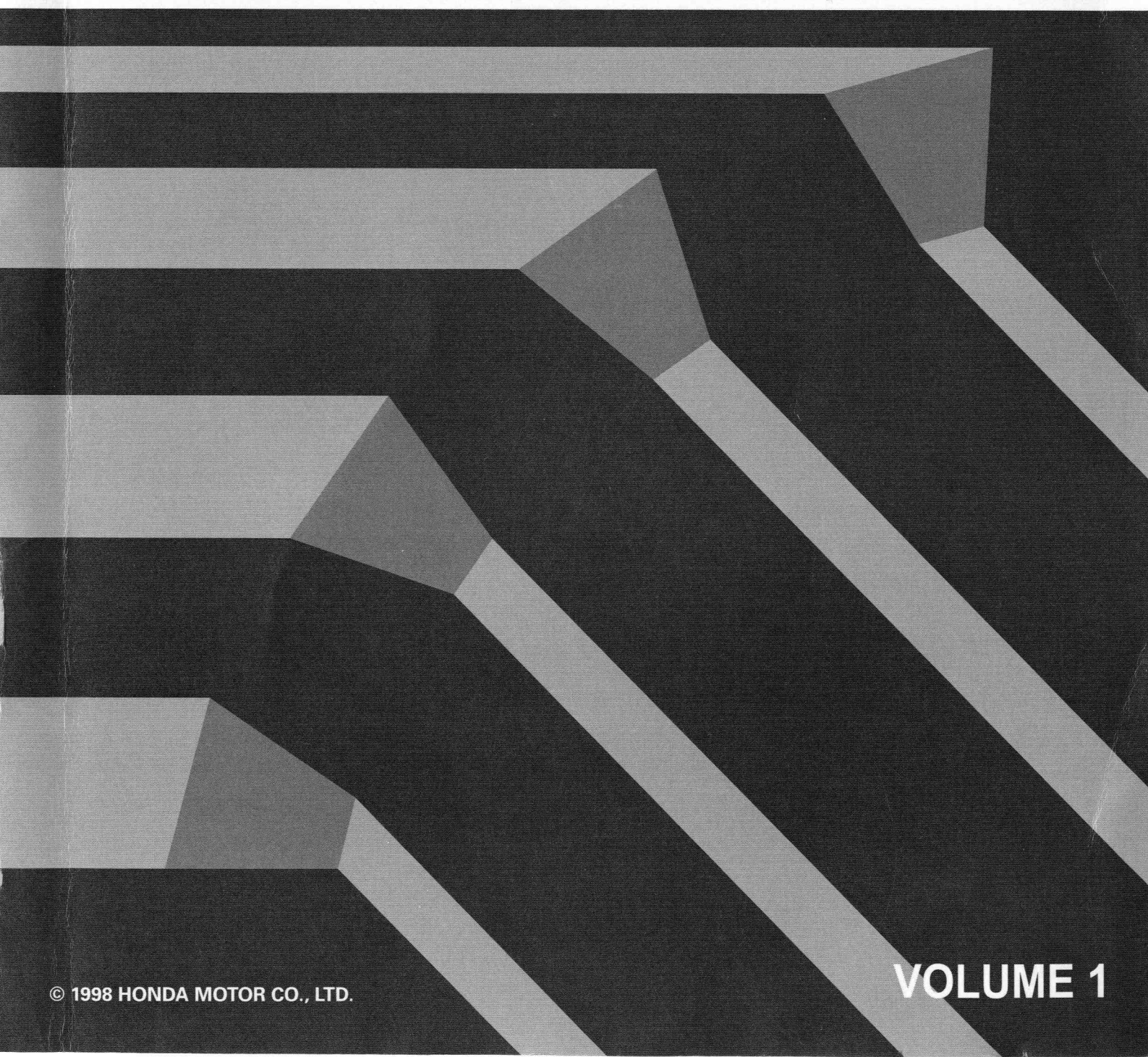
SHOP MANUAL

HONDA

Accord

MAINTENANCE, REPAIR and CONSTRUCTION

99



SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

This Accord Sedan SRS includes a driver's airbag located in the steering wheel hub, and a passenger's airbag located in the dashboard above the glove box, and some types include seat belt tensioners located in the front seat belt retractors, and some types include side airbags located in the front seat-backs.

Information necessary to safely service the SRS is included in this Shop Manual.

Items marked with an asterisk (*) on the contents page include, or are located near, SRS components. Servicing, disassembling or replacing these items will require special precautions and tools, and should therefore be done by an authorized Honda dealer.

⚠ WARNING

- To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all SRS service work must be performed by an authorized Honda dealer.
- Improper service procedures, including incorrect removal and installation of the SRS, could lead to personal injury caused by unintentional deployment of the airbags, side airbags and seat belt tensioners.
- SRS electrical wiring harnesses are indicated with yellow color. Related components are located in the steering column, front console, dashboard, dashboard lower panel, in the dashboard above the glove box, front seats and around the floor. Do not use electrical test equipment on these circuits.

INTRODUCTION

How to Use This Manual

This Manual is divided into 24 sections. The first page of each section is marked with a black tab that lines up with its corresponding thumb index tab on this page. You can quickly find the first page of each section without looking through a full table of contents. The symbols printed at the top corner of each page can also be used as a quick reference system.

Each section includes:

1. A table of contents, or an exploded view index showing:
 - Parts disassembly sequence.
 - Bolt torques and thread sizes.
 - Page references to descriptions in text.
2. Disassembly/assembly procedures and tools.
3. Inspection.
4. Testing/troubleshooting.
5. Repair.
6. Adjustments.

Special Information

⚠ WARNING : Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

⚠ CAUTION : Indicates a possibility of personal injury or equipment damage if instructions are not followed.

NOTICE : The purpose of these messages it is intended to help prevent damage to the vehicle, other properly, or the environment.

NOTE: Gives helpful information.

⚠ CAUTION

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual contains warnings and cautions against some specific service methods which could cause PERSONAL INJURY, damage a vehicle or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by HONDA, might be done, or of the possible hazardous consequences of every conceivable way, nor could HONDA investigate all such ways. Anyone using service procedures or tools, whether or not recommended by HONDA, must satisfy himself thoroughly that neither personal safety nor vehicle safety will be jeopardized.

All information contained in this manual is based on the latest product information available at the time of printing. We reserve the right to make changes at any time without notice. No part of this publication may be reproduced, stored in retrieval system, or transmitted, in any form by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher. This includes text, figures and tables.

General Info



Specifications

specs

Maintenance



Engine Electrical



Engine



Cooling



Fuel and Emissions



*Transaxle



*Steering



Suspension



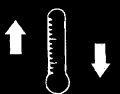
*Brakes Including
ABS



*Body



*Heater and
Air Conditioning



*Body Electrical



*Restraints





General Information

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Chassis and Engine Numbers

Vehicle Identification Number (VIN)

SHHCG7520 Y U 000101

Manufacturer, Make and

Type of Vehicle

SHH: HONDA OF THE U.K.
MFG., LTD. U.K.
HONDA Passenger car

Line, Body and Engine Type

CG7: ACCORD SEDAN/D16B6,
D16B7
CG8: ACCORD SEDAN/F18B2,
F18B3, F18B4
CG9: ACCORD SEDAN/F20B6
CH1: ACCORD SEDAN/H22A7
CH2: ACCORD SEDAN/20T2N

Body and Transmission Type

5: 4-door Sedan/5-speed Manual
6: 4-door Sedan/4-speed Automatic

Vehicle Grade (Series)

1: 2.0i ES
2: 1.6i S, 1.8i S, 2.0 TDi
3: 1.6i LS, 1.8i LS
4: 1.6i LS, 1.8i LS, 2.0i LS, 2.0 SDi
5: 1.6i LS, 1.8i LS, 2.0i LS, 1.8i S
6: 1.8i ES, 1.8i S
7: 1.8i ES, 2.0i ES, 2.0 TDi
8: 1.8i ES, 2.0i ES, 2.2 R, 2.0 SDi
9: 2.2 R, 2.0i ES

Fixed Code

Supplemental Number

Factory Code

U: Honda of the U.K. Manufacturing in U.K.

Model Year

0: 1999

Serial Number

Engine Number

D16B6 - E100001

Engine Type

D16B6, D16B7: 1.6 l SOHC 16-valves
Sequential Multiport
Fuel-injected Unleaded
gasoline with CATA
F18B2, F18B4: 1.8 l SOHC 16-valves VTEC
Sequential Multiport
Fuel-injected Unleaded
gasoline with CATA
F18B3: 1.8 l SOHC 16-valves VTEC Sequential
Multiport Fuel-injected Leaded
gasoline without CATA
F20B6: 2.0 l SOHC 16-valves VTEC Sequential
Multiport Fuel-injected Unleaded
gasoline with CATA
H22A7: 2.2 l DOHC 16-valves VTEC Sequential
Multiport Fuel-injected Unleaded
gasoline with CATA
20T2N: 2.0 l SOHC 8-valves Fuel-injected
diesel engine with turbo charger,
inter cooler and CATA

Serial Number

H22A7: 1000001~

20T2N: 0000001~

Except H22A7, 20T2N : E100001~

Transmission Number

U2J4 - 1000001

Transmission Type

DH: Manual for D16B6, D16B7 engines
U2J4: Manual for F18B2, F18B3,
F20B6 engines
U2G5: Manual for F18B4 engine
U2Q7: Manual for H22A7 engine
9A: Manual for 20T2N engine
MDJA: Automatic

Serial Number



Applicable Area Code/VIN/Engine Number/Transmission Number

MODEL	APPLICABLE AREA CODE	GRADE NAME	TRANSMISSION TYPE	VEHICLE IDENTIFICATION NUMBER	ENGINE NUMBER	TRANSMISSION NUMBER
Accord SEDAN	KE	1.6i S	5MT	SHHCG7520YU000101~	D16B6-E100001~	DH-1000001~
		1.6i LS	5MT	SHHCG7540YU000101~	D16B6-E100001~	DH-1000001~
		1.8i S	5MT	SHHCG8520YU000101~	F18B2-E100001~	U2J4-1000001~
			4AT	SHHCG8620YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i LS	5MT	SHHCG8540YU000101~	F18B2-E100001~	U2J4-1000001~
			4AT	SHHCG8640YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i ES	5MT	SHHCG8570YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i ES	5MT*1	SHHCG8580YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i ES	4AT	SHHCG8670YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i ES	4AT*1	SHHCG8680YU000101~	F18B2-E100001~	MDJA-1000001~
		2.0i LS	5MT	SHHCG9540YU000101~	F20B6-E100001~	U2J4-1000001~
			4AT	SHHCG9640YU000101~	F20B6-E100001~	MDJA-1000001~
		2.0i ES	5MT	SHHCG9570YU000101~	F20B6-E100001~	U2J4-1000001~
		2.0i ES	5MT*1	SHHCG9580YU000101~	F20B6-E100001~	U2J4-1000001~
		2.0i ES	4AT	SHHCG9670YU000101~	F20B6-E100001~	MDJA-1000001~
		2.0i ES	4AT*1	SHHCG9680YU000101~	F20B6-E100001~	MDJA-1000001~
		2.2 R	5MT	SHHCH1590YU000101~	H22A7-1000001~	U2Q7-1000001~
		2.2 R	5MT*5	SHHCH1580YU000101~	H22A7-1000001~	U2Q7-1000001~
		2.0 TDi	5MT	SHHCH2520YU000101~	20T2N-0000001~	9A-1000001~
			5MT	SHHCH2570YU000101~	20T2N-0000001~	9A-1000001~
		2.0 SDi	5MT	SHHCH2580YU000101~	20T2N-0000001~	9A-1000001~
	KG	1.6i S	5MT	SHHCG7520YU000101~	D16B6-E100001~	DH-1000001~
		1.6i LS	5MT	SHHCG7530YU000101~	D16B6-E100001~	DH-1000001~
		1.6i LS	5MT*2	SHHCG7540YU000101~	D16B6-E100001~	DH-1000001~
		1.6i LS	5MT*4	SHHCG7550YU000101~	D16B7-E100001~	DH-1000001~
		1.8i S	5MT	SHHCG8520YU000101~	F18B2-E100001~	U2J4-1000001~
			4AT	SHHCG8620YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i LS	5MT	SHHCG8530YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i LS	5MT*3	SHHCG8540YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i LS	5MT*4	SHHCG8550YU000101~	F18B4-E100001~	U2G5-1000001~
		1.8i LS	4AT	SHHCG8640YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i ES	5MT	SHHCG8570YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i ES	5MT*1	SHHCG8580YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i ES	5MT*4	SHHCG8560YU000101~	F18B4-E100001~	U2G5-1000001~
		1.8i ES	4AT	SHHCG8670YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i ES	4AT*1	SHHCG8680YU000101~	F18B2-E100001~	MDJA-1000001~

*1: with NAVI.

*2: with Auto Aircon

*3: with NAVI and Leather seat

*4: 7PA

*5: with Trunk Spoiler

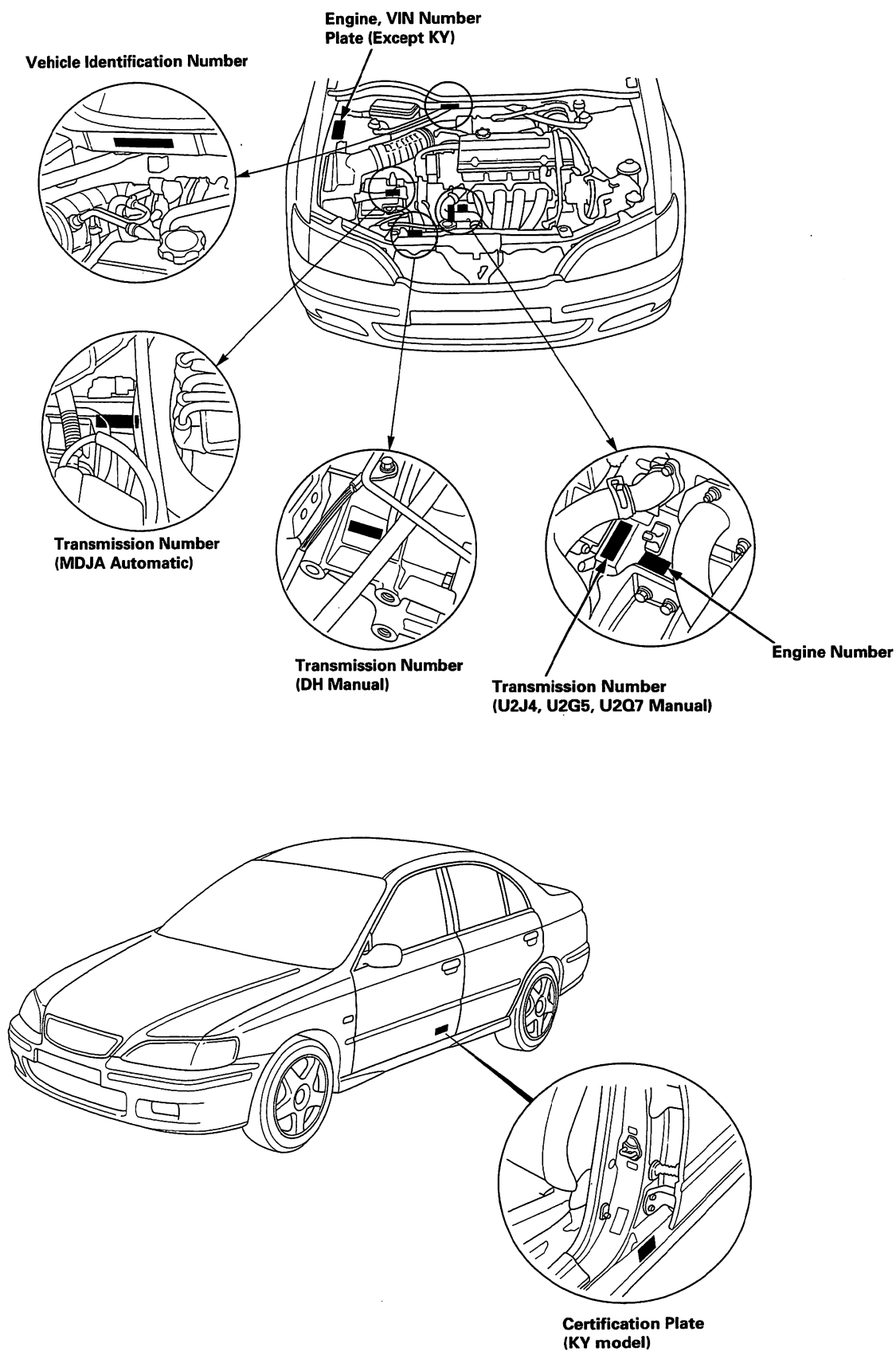
Chassis and Engine Numbers

Applicable Area Code/VIN/Engine Number/Transmission Number

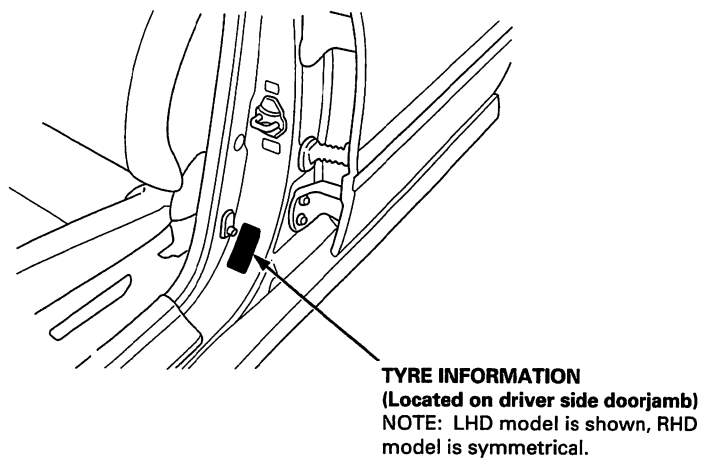
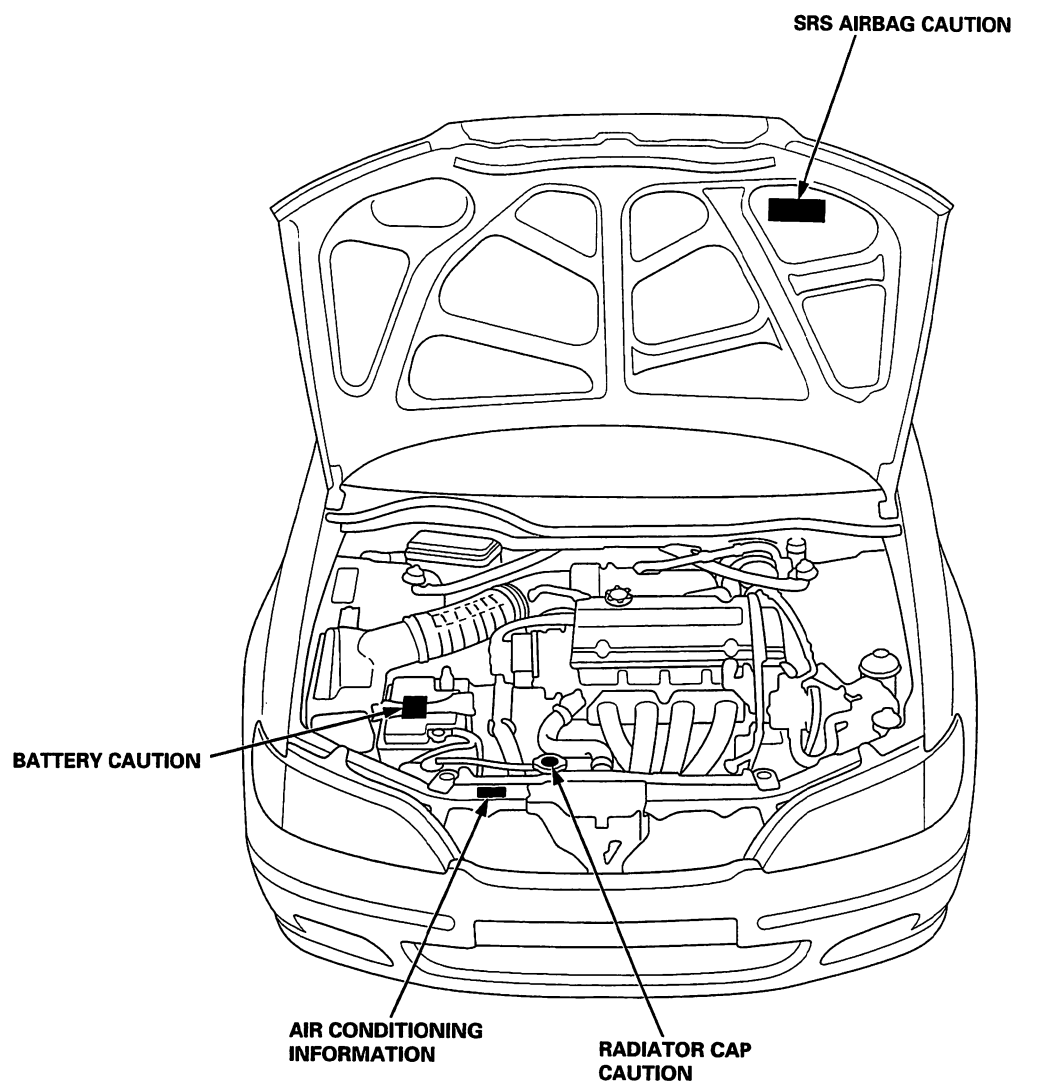
MODEL	APPLICABLE AREA CODE	GRADE NAME	TRANSMISSION TYPE	VEHICLE IDENTIFICATION NUMBER	ENGINE NUMBER	TRANSMISSION NUMBER
Accord SEDAN	KG	2.0i LS	5MT	SHHCG9540YU000101~	F20B6-E100001~	U2J4-1000001~
			5MT	SHHCG9550YU000101~	F20B6-E100001~	U2J4-1000001~
			4AT	SHHCG9640YU000101~	F20B6-E100001~	MDJA-1000001~
			4AT	SHHCG9650YU000101~	F20B6-E100001~	MDJA-1000001~
		2.0i ES	5MT	SHHCG9570YU000101~	F20B6-E100001~	U2J4-1000001~
			5MT	SHHCG9590YU000101~	F20B6-E100001~	U2J4-1000001~
			5MT	SHHCG9510YU000101~	F20B6-E100001~	U2J4-1000001~
		2.0i ES	5MT*1	SHHCG9580YU000101~	F20B6-E100001~	U2J4-1000001~
		2.0i ES	4AT	SHHCG9670YU000101~	F20B6-E100001~	MDJA-1000001~
			4AT	SHHCG9690YU000101~	F20B6-E100001~	MDJA-1000001~
			4AT	SHHCG9610YU000101~	F20B6-E100001~	MDJA-1000001~
		2.0i ES	4AT*1	SHHCG9680YU000101~	F20B6-E100001~	MDJA-1000001~
		2.2 R	5MT	SHHCH1590YU000101~	H22A7-1000001~	U2Q7-1000001~
		2.0 TDi	5MT	SHHCH2520YU000101~	20T2N-0000001~	9A-1000001~
				SHHCH2570YU000101~	20T2N-0000001~	9A-1000001~
				SHHCH2540YU000101~	20T2N-0000001~	9A-1000001~
				SHHCH2580YU000101~	20T2N-0000001~	9A-1000001~
		2.0 SDi				
	KS	1.6i S	5MT	SHHCG7520YU000101~	D16B6-E100001~	DH-1000001~
		1.6i LS	5MT	SHHCG7540YU000101~	D16B6-E100001~	DH-1000001~
		1.8i S	5MT	SHHCG8520YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i LS	5MT	SHHCG8540YU000101~	F18B2-E100001~	U2J4-1000001~
			4AT	SHHCG8640YU000101~	F18B2-E100001~	MDJA-1000001~
		2.0i LS	5MT	SHHCG9540YU000101~	F20B6-E100001~	U2J4-1000001~
		2.0i ES	5MT	SHHCG9570YU000101~	F20B6-E100001~	U2J4-1000001~
	KR	1.6i S	5MT	SHHCG7520YU000101~	D16B6-E100001~	DH-1000001~
		1.6i LS	5MT	SHHCG7540YU000101~	D16B6-E100001~	DH-1000001~
		1.8i S	5MT	SHHCG8520YU000101~	F18B2-E100001~	U2J4-1000001~
		1.8i LS	5MT	SHHCG8540YU000101~	F18B2-E100001~	U2J4-1000001~
			4AT	SHHCG8640YU000101~	F18B2-E100001~	MDJA-1000001~
		1.8i ES	5MT	SHHCG8570YU000101~	F18B2-E100001~	U2J4-1000001~
		2.0i LS	5MT	SHHCG9540YU000101~	F20B6-E100001~	U2J4-1000001~
			5MT	SHHCG9570YU000101~	F20B6-E100001~	U2J4-1000001~
		2.0i ES	5MT*1	SHHCG9580YU000101~	F20B6-E100001~	U2J4-1000001~
			4AT	SHHCG9670YU000101~	F20B6-E100001~	MDJA-1000001~
			4AT*1	SHHCG9680YU000101~	F20B6-E100001~	MDJA-1000001~
		2.2 R	5MT	SHHCH1590YU000101~	H22A7-1000001~	U2Q7-1000001~
		2.0 TDi	5MT	SHHCH2520YU000101~	20T2N-0000001~	9A-1000001~
		2.0 SDi	5MT	SHHCH2540YU000101~	20T2N-0000001~	9A-1000001~
	KY	1.8i S	5MT	SHHCG8527YU000101~	F18B3-E100001~	U2J4-1000001~
			4AT	SHHCG8627YU000101~	F18B3-E100001~	MDJA-1000001~

*1: with NAVI.

Identification Number Locations

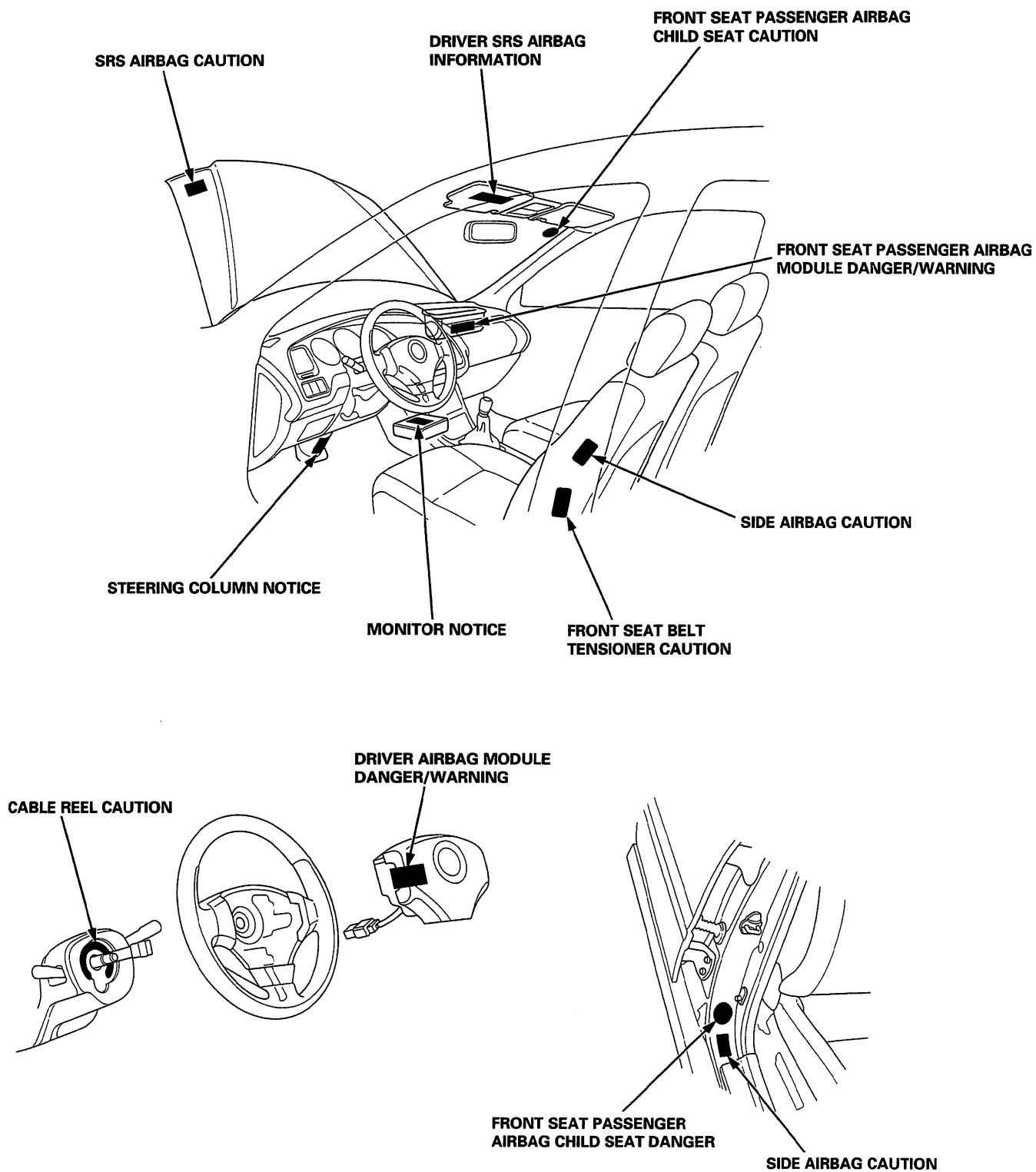


Warning/Caution Label Locations





NOTE: LHD model is shown, RHD model is similar.

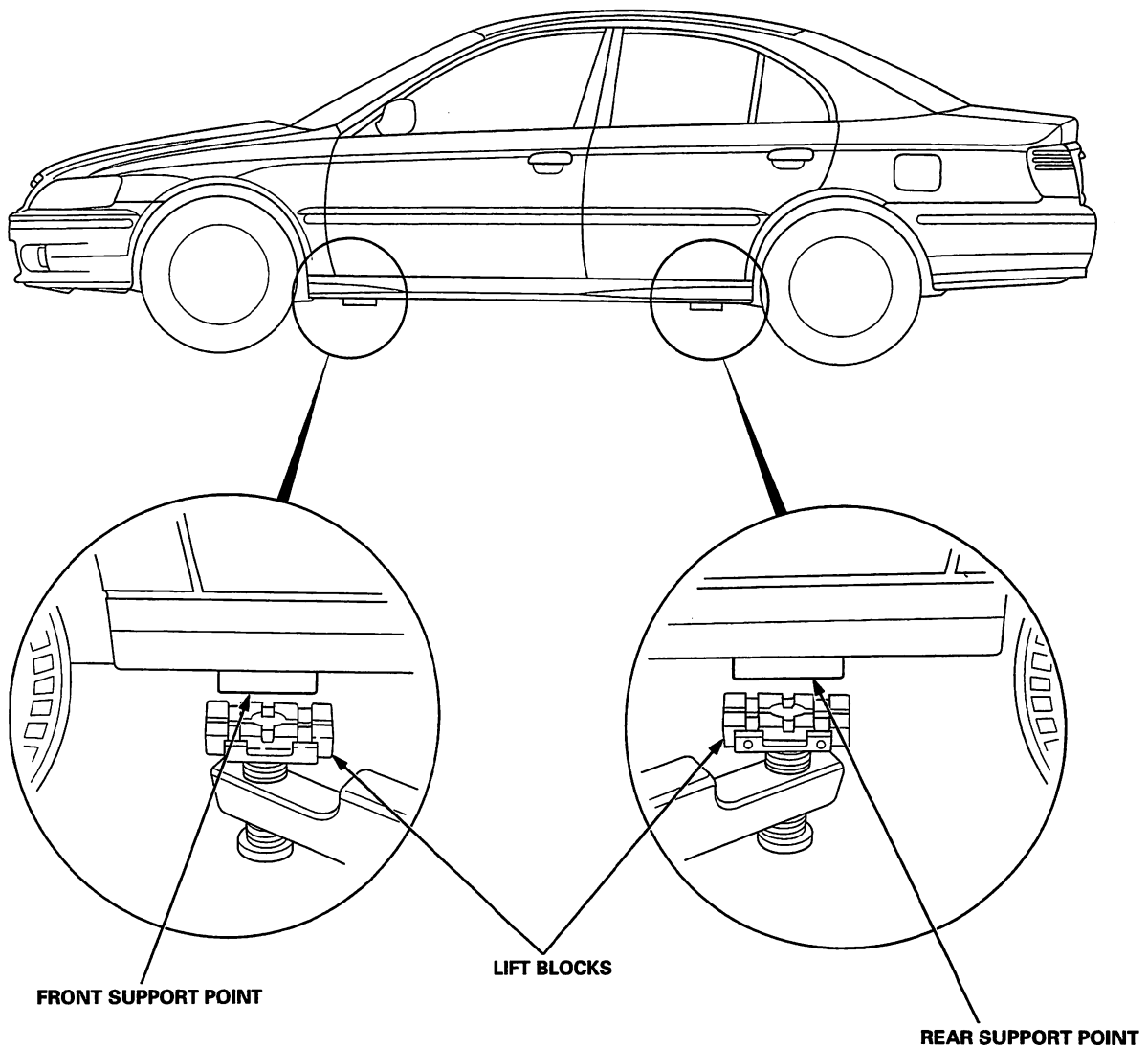


Lift and Support Points

Lift and Safety Stands

1. Place the lift blocks as shown.
2. Raise the hoist a few inches (centimeters), and rock the vehicle to be sure it is firmly supported.
3. Raise the hoist to full height, and inspect the lift points for solid support.

NOTE: Use the same support points to support the vehicle on safety stands.





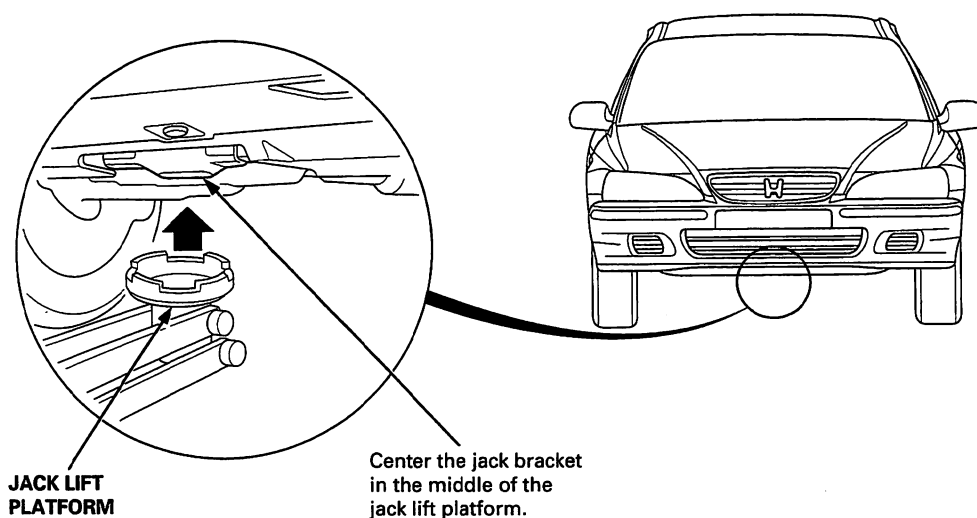
Floor Jack

1. Set the parking brake, and block the wheels that are not being lifted.
2. When lifting the rear of the vehicle, put the gearshift lever in reverse (Automatic in **P** position).
3. Raise the vehicle high enough to insert the safety stands.
4. Adjust and place the safety stands so the vehicle will be approximately level, then lower the vehicle onto them.

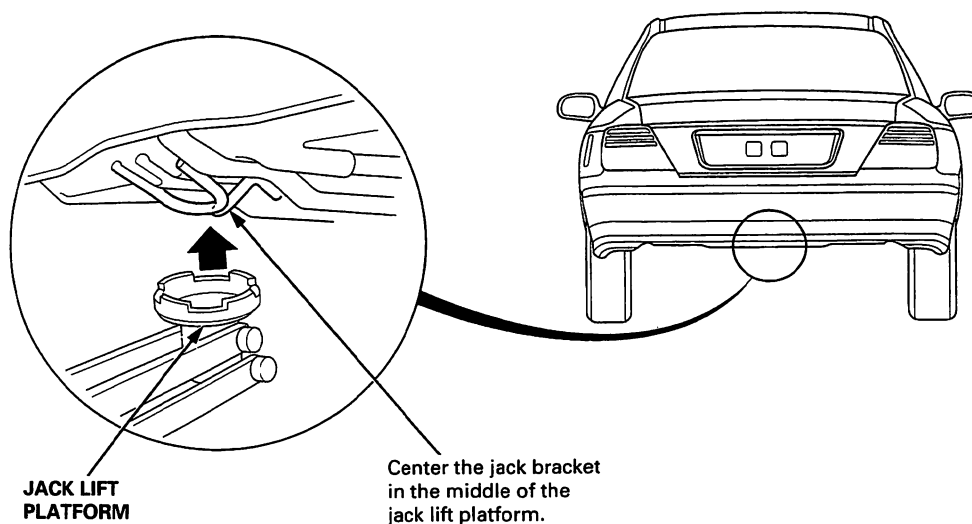
⚠ WARNING

- Always use safety stands when working on or under any vehicle that is supported by only a jack.
- Never attempt to use a bumper jack for lifting or supporting the vehicle.

Front:



Rear:



Towing

If the vehicle needs to be towed, call a professional towing service. Never tow the vehicle behind another vehicle with just a rope or chain. It is very dangerous.

Emergency Towing

There are three popular methods of towing a vehicle.

Flat-bed Equipment — The operator loads the vehicle on the back of a truck. This is the best way of transporting the vehicle.

Wheel Lift Equipment — The tow truck uses two pivoting arms that go under the tyres (front or rear) and lifts them off the ground. The other two wheels remain on the ground.

Sling-type Equipment — The tow truck uses metal cables with hooks on the ends. These hooks go around parts of the frame or suspension and the cables lift that end of the vehicle off the ground. The vehicle's suspension and body can be seriously damaged if this method of towing is attempted.

If the vehicle cannot be transported by flat-bed, it should be towed with the front wheels off the ground. If due to damage, the vehicle must be towed with the front wheels on the ground, do the following:

Manual Transmission

- Release the parking brake.
- Shift the transmission in Neutral.

Automatic Transmission

- Release the parking brake.
- Start the engine.
- Shift to **D** position, then **N** position.
- Turn off the engine.

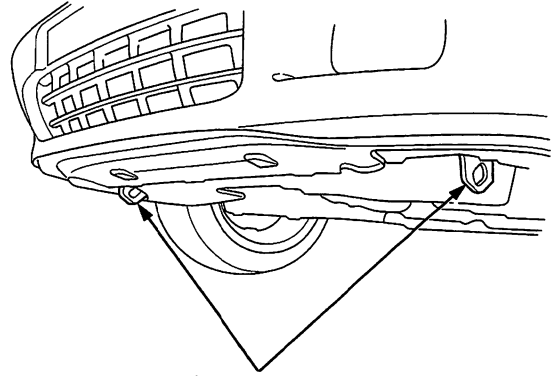
Ri:

Remove the front air spoiler before towing so it does not get damaged.

⚠ CAUTION

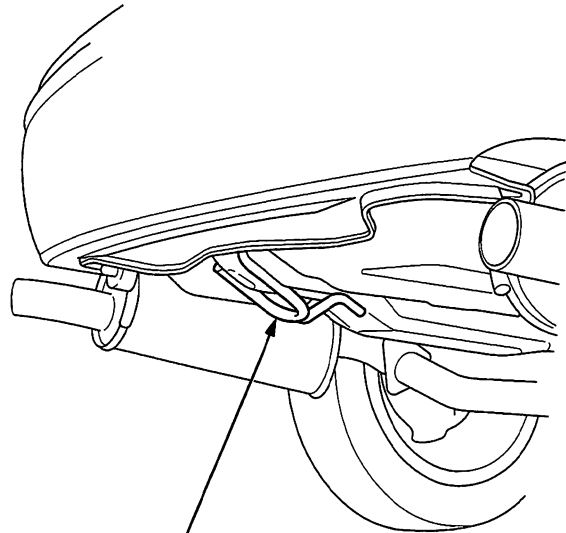
- Improper towing preparation will damage the transmission. Follow the above procedure exactly. If you cannot shift the transmission or start the engine (automatic transmission), the vehicle must be transported on a flat-bed.
- It is best to tow the vehicle no farther than 50 miles (80 km), and keep the speed below 35 mph (55 km/h).
- Trying to lift or tow the vehicle by the bumpers will cause serious damage. The bumpers are not designed to support the vehicle's weight.

Front:



TOWING HOOKS and
TIE DOWN BRACKETS

Rear:



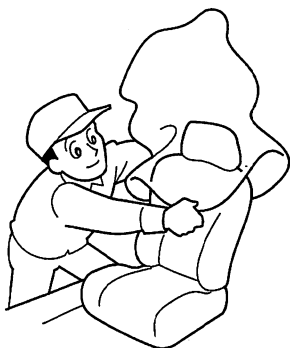
TIE DOWN BRACKET



⚠ CAUTION

Observe all safety precautions and notes while working.

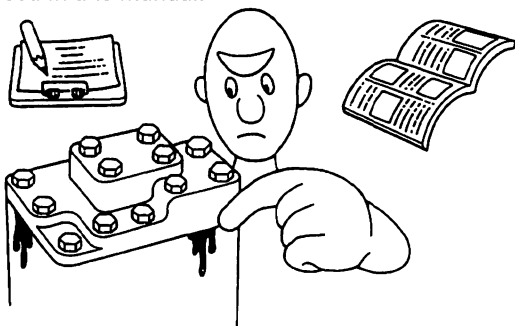
- Protect all painted surfaces and seats against dirt and scratches with a clean cloth or vinyl cover.



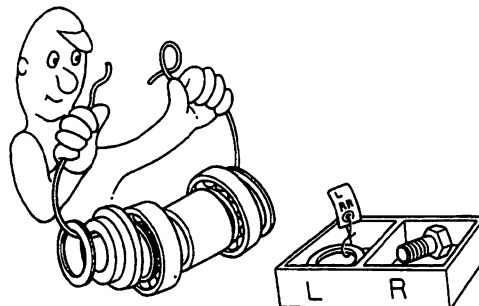
- Work safely and give your work your undivided attention. When either the front or rear wheels are to be raised, block the remaining wheels securely. Communicate as frequently as possible when work involves two or more workers. Do not run the engine unless the shop or working area is well ventilated.



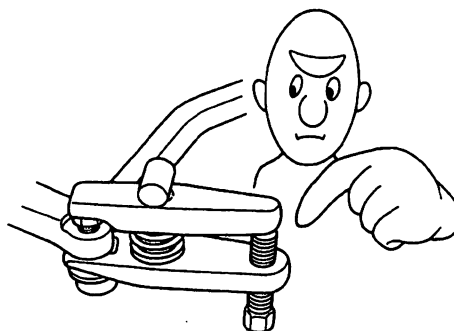
- Before removing or disassembling parts, they must be inspected carefully to isolate the cause for which service is necessary. Observe all safety notes and precautions and follow the proper procedures as described in this manual.



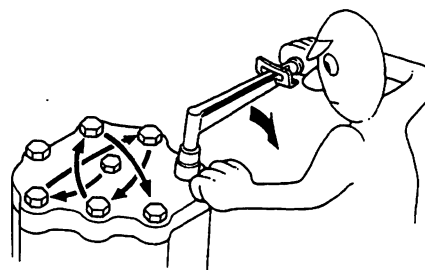
- Mark or place all removed parts in order in a parts rack so they can be reassembled in their original places.



- Use the special tool when use of such a tool is specified.



- Parts must be assembled with the proper torque according to the maintenance standards established.
- When tightening a series of bolts or nuts, begin with the center or large diameter bolts and tighten them in crisscross pattern in two or more steps.

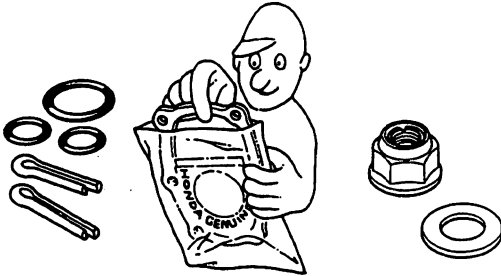


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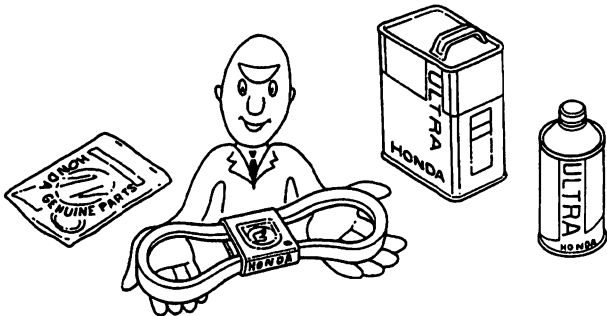
Preparation of Work

(cont'd)

- Use new packings, gaskets, O-rings and cotter pins whenever reassembling.
- Do not reuse parts that must be required to replace. Always replace them.



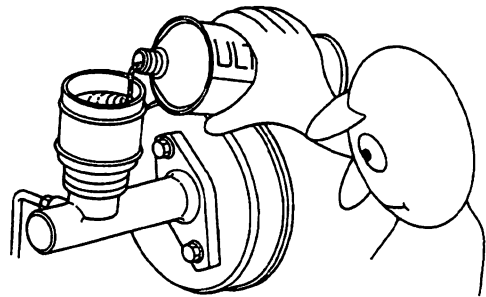
- Use genuine HONDA parts and lubricants or those equivalent. When parts are to be reused, they must be inspected carefully to make sure they are not damaged or deteriorated and are in good usable condition.



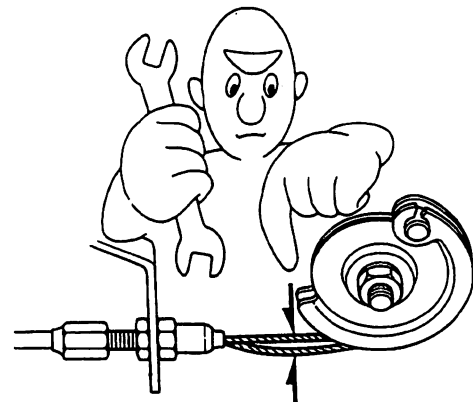
- Coat or fill parts with specified grease as specified (page 4-2). Clean all removed parts with solvent upon disassembly.



- Brake fluid and hydraulic components
 - When replenishing the system, use extreme care to prevent dust and dirt from entering the system.
 - Do not mix different brands of fluid as they may not be compatible.
 - Do not reuse drained brake fluid.
 - Because brake fluid can cause damage to painted and resin surfaces, care should be taken not to spill it on such materials. If spilled accidentally, quickly rinse it with water or warm water from painted or resin surfaces.
 - After disconnecting brake hoses or pipes, be sure to plug the openings to prevent loss of brake fluid.
 - Clean all disassembled parts only in clean BRAKE FLUID. Blow open all holes and passages with compressed air.



- Keep disassembled parts from air-borne dust and abrasives.
- Check that parts are clean before assembly.
- Avoid oil or grease getting on rubber parts and tubes, unless specified.
- Upon assembling, check every part for proper installation and operation.





Electrical Troubleshooting

Before Troubleshooting

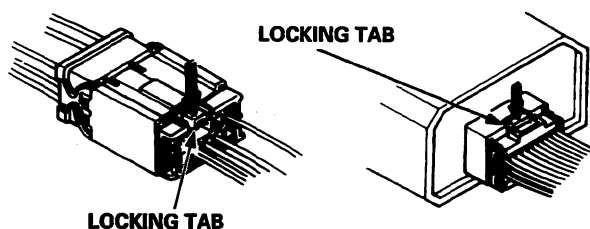
- Check applicable fuses in the appropriate fuse/relay box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Check the alternator belt tension.

⚠ CAUTION

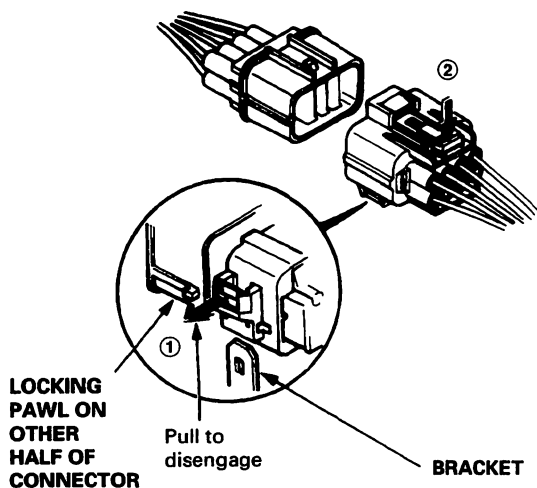
- Do not quick-charge a battery unless the battery ground cable has been disconnected, otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the battery ground cable loosely connected or you will severely damage the wiring.

Handling Connectors

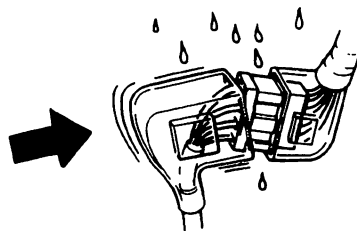
- Make sure the connectors are clean and have no loose wire terminals.
- Make sure multiple cavity connectors are packed with grease (except waterproof connectors).
- All connectors have push-down release type locks.



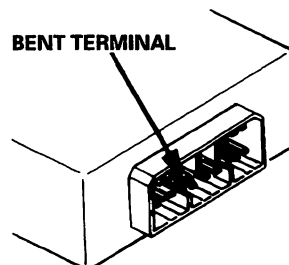
- Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
- Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket.



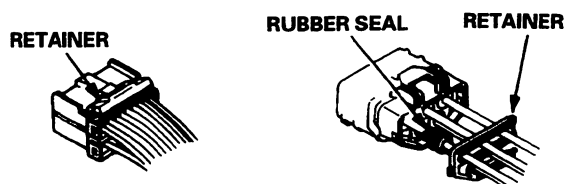
- Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
- Always reinstall plastic covers.



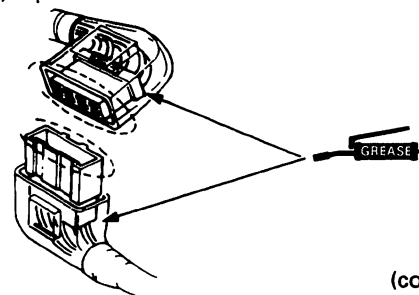
- Before connecting connectors, make sure the terminals are in place and not bent.



- Check for loose retainer and rubber seals.



- The backs of some connectors are packed with grease. Add grease if necessary. If the grease is contaminated, replace it.

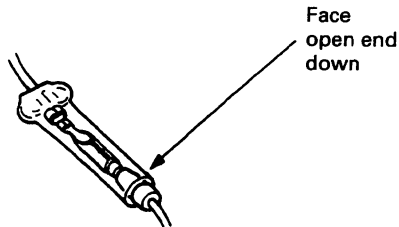


(cont'd)

Preparation of Work

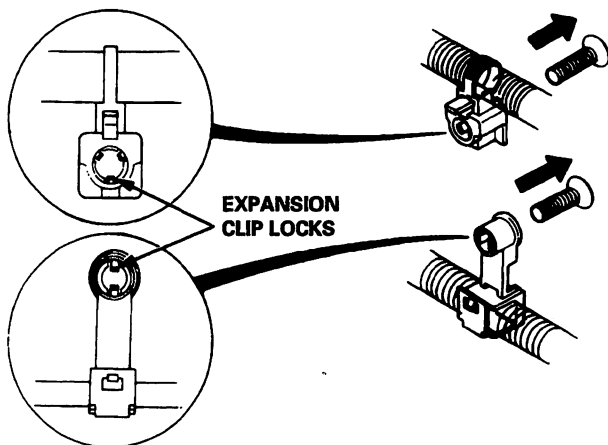
Electrical Troubleshooting (cont'd)

- Insert the connector all the way and make sure it is securely locked.
- Position wires so that the open end of the cover faces down.

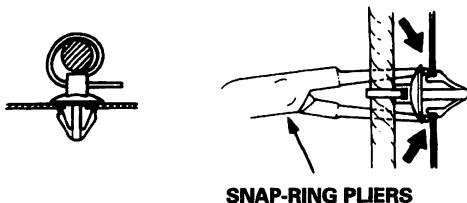


Handling Wires and Harnesses

- Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
- Remove clips carefully; don't damage their locks.

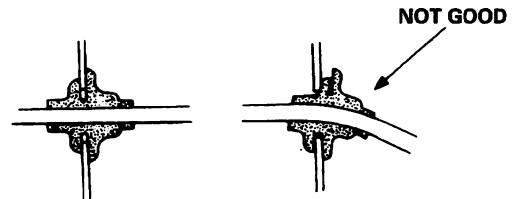


Slip pliers under the clip base and through the hole at an angle, then squeeze the expansion tabs to release the clip.



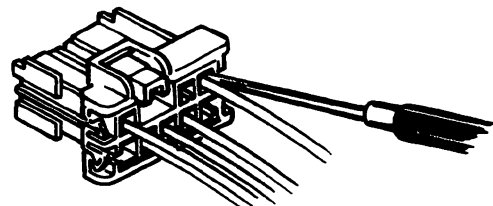
- After installing harness clips, make sure the harness doesn't interfere with any moving parts.
- Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.

- Seat grommets in their grooves properly.

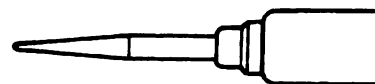


Testing and Repairs

- Do not use wires or harnesses with broken insulation. Replace them or repair them by wrapping the break with electrical tape.
- After installing parts, make sure that no wires are pinched under them.
- When using electrical test equipment, follow the manufacturer's instructions and those described in this manual.
- If possible, insert the probe of the tester from the wire side (except waterproof connector).



- Use a probe with a sharp tester probe.





How to Read Flowcharts

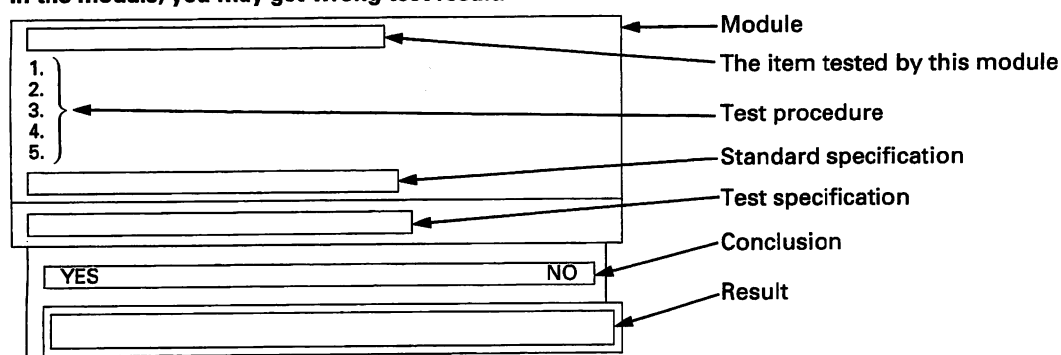
Except SRS:

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. But beware: if you go off the "map" anywhere but a "stop" symbol, you can easily get lost.

START (bold type)	Describes the conditions or situation to start a troubleshooting flowchart.
ACTION	Asks you to do something; perform a test, set up a condition etc.
DECISION	Asks you about the result of an action, then sends you in the appropriate troubleshooting direction.
STOP (bold type)	The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flowchart to confirm your repair.

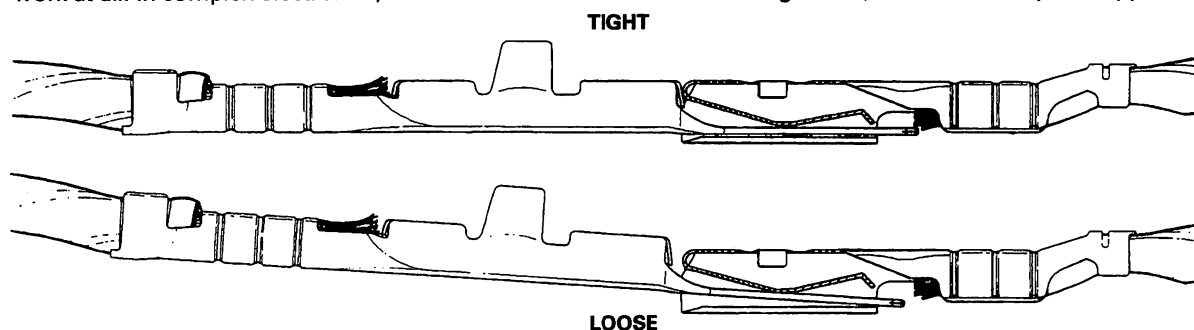
SRS:

SRS troubleshooting flowcharts are comprised of modules each of which contains all actions necessary to reach one decision. Except of the steps you must perform, the modules also include standard specifications of a correctly working system and test specifications. If the result of a test meets the specification shown in the module, the conclusion from this test is YES. If the specification is not met, the conclusion is NO. If you do not exactly follow the procedure described in the module, you may get wrong test result.



NOTE:

- The term "Intermittent Failure" is used in these charts. It simply means a system may have had a failure, but it checks out OK at this time. If any indicator light on the dash does not come on, check for poor connections or loose wires at all connectors related to the circuit that you are troubleshooting (see illustration below).
- Most of the troubleshooting flowcharts have you reset any control module(s) or unit(s) and try to duplicate the Diagnostic Trouble Code (DTC). If the problem is intermittent and you can't duplicate the code, do not continue through the flowchart. To do so will only result in confusion and, possibly, (a) needlessly replaced control module(s) or unit(s).
- "Open" and "Short" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something won't work at all. In complex electronics, this can sometimes mean something works, but not the way it's supposed to.



Preparation of Work

Electrical Troubleshooting (cont'd)

Five-step Troubleshooting

1. **Verify The Complaint**
Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.
2. **Analyze The Schematic**
Look up the schematic for the problem circuit. Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.

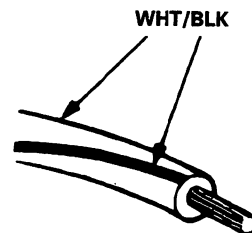
Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.
3. **Isolate The Problem By Testing The Circuit**
Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting. Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.
4. **Fix The Problem**
Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.
5. **Make Sure The Circuit Works**
Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on the fuse. Make sure no new problems turn up and the original problem does not recur.

Wire Color Codes

The following abbreviations are used to identify wire colors in the circuit schematics:

WHT	White
YEL	Yellow
BLK	Black
BLU	Blue
GRN	Green
RED	Red
ORN	Orange
PNK	Pink
BRN	Brown
GRY	Gray
PUR	Purple
LT BLU	Light Blue
LT GRN	Light Green

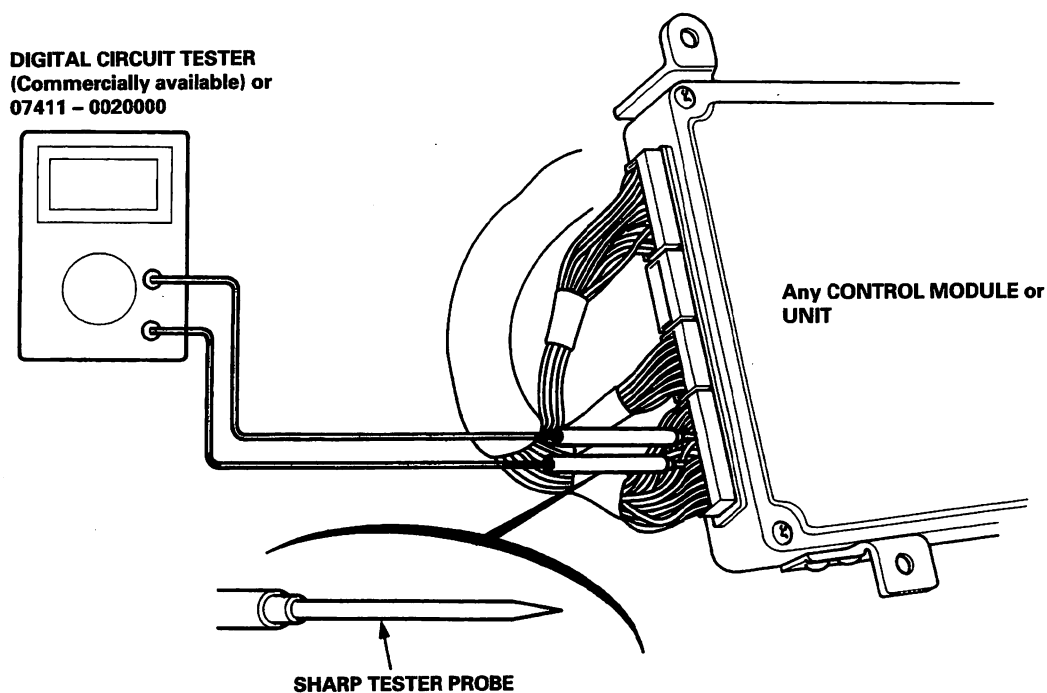
The wire insulation has one color or one color with another color stripe. The second color is the stripe.



NOTE: Different wires with the same color in the same system have been given number suffixes to distinguish them (for example, YEL¹ and YEL² are not the same).

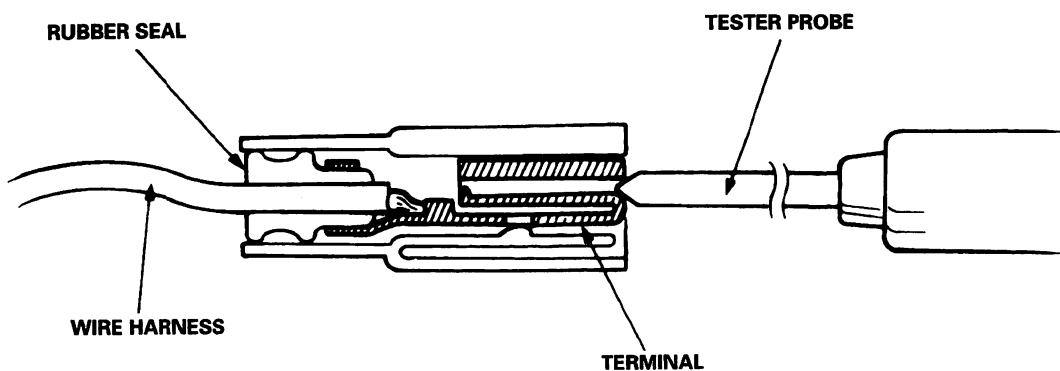


When checking any control module(s) or unit(s) connector terminals, gently slide the sharp tester probe from the wire side into the connector until it comes in contact with the terminal end of the wire.



⚠ CAUTION

- Puncturing the insulation on a wire can cause poor or intermittent electrical connections.
- For testing at connectors, bring the tester probe into contact with the terminal from the connector side of wire harness connectors in the engine compartment. For female connectors, just touch lightly with the tester probe and do not insert the probe.



Abbreviations

List of automotive abbreviations which may be used in shop manual.

ABS	Anti-lock Brake System	F	Front
A/C	Air Conditioning, Air Conditioner	FIA	Fuel Injection Air
ACL	Air Cleaner	FL	Front Left
A/F	Air Fuel Ratio	FP	Fuel Pump
ALT	Alternator	FR	Front Right
AMP	Ampere (s)	FSR	Fail Safe Relay
ANT	Antenna	FWD	Front Wheel Drive
API	American Petroleum Institute		
APPROX.	Approximately	GAL	Gallon
ASSY	Assembly	GND	Ground
A/T	Automatic Transmission	GPS	Global Positioning System
ATDC	After Top Dead Center		
ATF	Automatic Transmission Fluid	H/B	Hatchback
ATT	Attachment	HC	Hydrocarbons
ATTS	Active Torque Transfer System	HID	High Intensity Discharge
AUTO	Automatic	HO2S	Heated Oxygen Sensor
AUX	Auxiliary		
		IAB	Intake Air Bypass
BARO	Barometric	IAC	Idle Air Control
BAT	Battery	IAR	Intake Air Resonator
BDC	Bottom Dead Center	IAT	Intake Air Temperature
BTDC	Before Top Dead Center	ICM	Ignition Control Module
		ID	Identification
CARB	Carburetor	ID or I.D.	Inside Diameter
CAT	Catalytic Converter	IG or IGN	Ignition
or CATA		IMA	Idle Mixture Adjustment
CHG	Charge	IMMOBI.	Immobilizer (Immobiliser)
CKF	Crankshaft Speed Fluctuation	IN	Intake
CKP	Crankshaft Position	INJ	Injection
CO	Carbon Monoxide	INT	Intermittent
COMP	Complete		
CPB	Clutch Pressure Back up	KS	Knock Sensor
CPC	Clutch Pressure Control		
CPU	Central Processing Unit	L	Left
CVT	Continuously Variable Transmission	L/C	Lock-up Clutch
CYL	Cylinder	LCD	Liquid Crystal Display
CYP	Cylinder Position	LED	Light Emitting Diode
		LF	Left Front
DI	Distributor Ignition	LH	Left Handle
DIFF	Differential	LHD	Left Handle Drive
DLC	Data Link Connector	LR	Left Rear
DOHC	Double Overhead Camshaft	LSD	Limited Slip Differential
DPI	Dual Point Injection	L-4	In-line Four Cylinder (engine)
DTC	Diagnostic Trouble Code		
ECM	Engine Control Module		
ECT	Engine Coolant Temperature		
EGR	Exhaust Gas Recirculation		
ELD	Electrical Load Detector		
EPR	Evaporator Pressure Regulator		
EPS	Electrical Power Steering		
EVAP	Evaporative		
EX	Exhaust		



MAP	Manifold Absolute Pressure	T	Torque
MAX.	Maximum	TB	Throttle Body
MBS	Mainshaft Brake System	T/B	Timing Belt
MCK	Motor Check	TC	Torque Converter
MCU	Moment Control Unit	TCM	Transmission Control Module
MIL	Malfunction Indicator Light	TCS	Traction Control System
MIN.	Minimum	TDC	Top Dead Center
MPI	Multi Point Injection	TFT	Thin Film Transistor
M/S	Manual Steering	T/N	Tool Number
M/T	Manual Transmission	TP	Throttle Position
		TWC	Three Way Catalytic Converter
N	Neutral		
NOx	Oxides of Nitrogen	VC	Viscous Coupling
		VIN	Vehicle Identification Number
OBD	On-board Diagnostic	VSS	Vehicle Speed Sensor
O2S	Oxygen Sensor	VTEC	Variable Valve Timing & Valve Lift Electronic Control
OD or O.D.	Outside Diameter	VVIS	Variable Volume Intake System
P	Park		
PAIR	Pulsed Secondary Air Injection	W	With
PCM	Powertrain Control Module	W/O	Without
PCV	Positive Crankcase Ventilation	WOT	Wide Open Throttle
	Proportioning Control Valve		
PGM-FI	Programmed-fuel Injection	2WD	Two Wheel Drive
PGM-IG	Programmed Ignition	4WD	Four Wheel Drive
PH	Pressure High	2WS	Two Wheel Steering
PL	Pilot Light or Pressure Low	4WS	Four Wheel Steering
PMR	Pump Motor Relay	4AT	4-speed Automatic Transmission
P/N	Part Number	5MT	5-speed Manual Transmission
PRI	Primary	P	Park
P/S	Power Steering	R	Reverse
PSF	Power Steering Fluid	N	Neutral
PSP	Power Steering Pressure	D₄	Drive (1st through 4th gear)
PSW	Pressure Switch	D₃	Drive (1st through 3rd gear)
		2	Second
Qty	Quantity	1	First
		D	Drive
R	Right	S	Second
REF	Reference	L	Low
RGB	Red, Green, Black	1ST	Low (gear)
RHD	Right Hand Drive	2ND	Second (gear)
RL	Rear Left	3RD	Third (gear)
RON	Research Octane Number	4TH	Fourth (gear)
RR	Rear Right	5TH	Fifth (gear)
SAE	Society of Automotive Engineers		
SCS	Service Check Signal		
SEC	Second		
	Secondary		
SOHC	Single Overhead Camshaft		
SOL	Solenoid		
SPEC	Specification		
S/R	Sun Roof		
SRS	Supplemental Restraint System		
STD	Standard		
SW	Switch		

Specifications

Standards and Service Limits	2-2
Design Specifications	2-19
Body Specifications	2-25

Standards and Service Limits

Engine Electrical — Section 4

	MEASUREMENT	STANDARD (NEW)	
Ignition coil	Rated voltage V	12	
	Primary winding resistance at 20°C (68°F) Ω Except H22A7 engine H22A7 engine	0.45 – 0.55 0.63 – 0.77	
	Secondary winding resistance at 20°C (68°F) kΩ D16B6 engine F18B2, F18B3, F20B6 engines H22A7 engine	12.0 – 14.6 22.4 – 33.6 12.8 – 19.2	
Ignition wire	Resistance at 20°C (68°F) kΩ	25 max.	
	Firing order D16B6 engine Except D16B6 engine	1 – 4 – 2 – 3 1 – 3 – 4 – 2	
Spark plug	Type	STANDARD (NEW)	SERVICE LIMIT
	Gap Except H22A7 engine H22A7 engine	See section 4 1.0 – 1.1 (0.039 – 0.043) 1.0 – 1.1 (0.039 – 0.043)	1.3 (0.051)
Ignition timing	At idle BTDC (Red)	Except H22A7 engine H22A7 engine	M/T A/T
			12 ± 2 (Neutral) 12 ± 2 (N or P position) 15 ± 2 (Neutral)
Alternator Belt*1 (D16B6 engine)	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	7.0 – 10.5 (0.28 – 0.41) with used belt 5.0 – 7.0 (0.20 – 0.28) with new belt	
	Belt tension N (kgf, lbf) Measured with belt tension gauge	340 – 490 (35 – 50, 77 – 110) with used belt 640 – 780 (65 – 80, 140 – 180) with new belt	
Alternator Belt*1 (Except D16B6 engine with A/C)	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	10.0 – 12.0 (0.39 – 0.47) with used belt 5.5 – 7.5 (0.22 – 0.30) with new belt	
	Belt tension N (kgf, lbf) Measured with belt tension gauge	390 – 540 (40 – 55, 88 – 120) with used belt 880 – 1,030 (90 – 105, 200 – 230) with new belt	
Alternator Belt*1 (Except D16B6 engine without A/C)	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	10.0 – 13.0 (0.39 – 0.51) with used belt 7.5 – 10.0 (0.30 – 0.39) with new belt	
	Belt tension N (kgf, lbf) Measured with belt tension gauge	290 – 440 (30 – 45, 66 – 99) with used belt 540 – 740 (55 – 75, 120 – 170) with new belt	
Alternator (Except H22A7 engine)	Output 13.5 V at hot	STANDARD (NEW)	SERVICE LIMIT
	Coil resistance (rotor) at 20°C (68°F) Ω Slip ring O.D. Brush length Brush spring tension N (kgf, lbf)	D16B6 engine Except D16B6 engine D16B6 engine Except D16B6 engine 85 A 90 A 2.6 2.4 15.4 (0.61) 13.2 (0.52) 1.9 (0.19, 0.42)	14.15 (0.557) 3.2 (0.13)
Alternator (H22A7 engine)	Output 13.5 V at hot	95 A	
	Coil resistance (rotor) at 20°C (68°F) Ω Slip ring O.D. Brush length Brush spring tension N (kgf, lbf)	2.2 – 3.0 14.4 (0.57) 10.5 (0.41) 2.9 – 3.5 (0.30 – 0.36, 0.66 – 0.79)	14.0 (0.55) 1.5 (0.06)
Starter (Except H22A7 engine)	Manufacturer	VALEO	
	Output Commutator mica depth Commutator runout Brush length Brush spring tension N (kgf, lbf)	1.0 kW 0.5 – 0.9 (0.020 – 0.035) 0.01 (0.0004) max. 18 (0.7) 15.3 – 19.2 (1.56 – 1.96, 3.44 – 4.32)	0.2 (0.08) 0.015 (0.0006) 5 (0.2)
Starter (H22A7 engine)	Manufacturer	DENSO	
	Output Commutator mica depth Commutator runout Commutator O.D. Brush length Brush spring tension N (kgf, lbf)	1.0 kW 0.5 – 0.8 (0.020 – 0.031) 0.02 (0.0008) max. 27.9 – 28.0 (1.098, 1.102) 14.0 – 14.5 (0.55 – 0.57) 13.7 – 17.7 (1.4 – 1.8, 3.09 – 3.97)	0.2 (0.008) 0.05 (0.002) 27.0 (1.06) 9.0 (0.35)

*1: When using a new belt, adjust deflection or tension to new belt values. Run the engine for 5 minutes then turn it off.
Readjust deflection or tension to used belt values.

Cylinder Head/Valve Train (D16B6 engine) — Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm (min ⁻¹) and wide open throttle kPa (kgf/cm ² , psi)	Nominal Minimum Maximum variation	1,270 (13.0, 185) 930 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height		92.95 – 93.05 (3.659 – 3.663)	0.05 (0.002)
Camshaft	End play Camshaft-to-holder oil clearance Total runout Cam lobe height	IN EX	0.05 – 0.15 (0.002 – 0.006) 0.050 – 0.089 (0.0020 – 0.0035) 0.03 (0.001) max. 35.019 (1.3787)* ¹ , 34.734 (1.3675)* ² 37.904 (1.4923)	0.5 (0.02) 0.15 (0.006) 0.04 (0.002)
Valve	Valve clearance (Cold) Valve stem O.D. Stem-to-guide clearance	IN EX IN EX IN EX	0.18 – 0.22 (0.007 – 0.009) 0.23 – 0.27 (0.009 – 0.011) 5.48 – 5.49 (0.2157 – 0.2161) 5.45 – 5.46 (0.2146 – 0.2150) 0.02 – 0.05 (0.001 – 0.002) 0.05 – 0.08 (0.002 – 0.003)	5.45 (0.2146) 5.42 (0.2134) 0.08 (0.003) 0.11 (0.004)
Valve seat	Width Stem installed height	IN EX IN EX	0.85 – 1.15 (0.033 – 0.045) 1.25 – 1.55 (0.049 – 0.061) 53.17 – 53.64 (2.093 – 2.112) 53.17 – 53.64 (2.093 – 2.112)	1.6 (0.063) 2.0 (0.079) 53.89 (2.122) 53.89 (2.122)
Valve spring	Free length	IN and EX	58.7 (2.31)	
Valve guide	I.D. Installed height	IN EX IN EX	5.51 – 5.53 (0.217 – 0.218) 5.51 – 5.53 (0.217 – 0.218) 17.85 – 18.35 (0.703 – 0.722) 18.65 – 19.15 (0.734 – 0.754)	5.55 (0.219) 5.55 (0.219)
Rocker arm	Arm-to-shaft clearance	IN EX	0.017 – 0.050 (0.0007 – 0.0020) 0.018 – 0.054 (0.0007 – 0.0021)	0.08 (0.003) 0.08 (0.003)

*1: Timing belt side, *2: Distributor side

Standards and Service Limits

Cylinder Head/Valve Train (F18B2, F18B3, F20B6 engines) — Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm (min ⁻¹) and wide open throttle kPa (kgf/cm ² , psi)	Nominal Minimum Maximum variation	1,420 (14.5, 206) 930 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height		99.95 – 100.05 (3.935 – 3.939)	0.05 (0.002)
Camshaft	End play		0.05 – 0.15 (0.002 – 0.006)	0.5 (0.02)
	Camshaft-to-holder oil clearance		0.050 – 0.089 (0.0020 – 0.0035)	0.15 (0.006)
	Total runout		0.03 (0.001) max.	0.04 (0.002)
	Cam lobe height	F18B2, F18B3 engines		
		IN Primary	38.539 (1.5173)	—
		Mid	39.223 (1.5442)	—
		Secondary	33.913 (1.3352)	—
		EX	38.645 (1.5215)	—
		F20B6 engine IN Primary	38.539 (1.5173)	—
		Mid	39.725 (1.5640)	—
		Secondary	33.913 (1.3352)	—
		EX	38.645 (1.5215)	—
Valve	Valve clearance (Cold)	IN	0.24 – 0.28 (0.009 – 0.011)	—
		EX	0.28 – 0.32 (0.011 – 0.013)	—
	Valve stem O.D.	IN	5.485 – 5.495 (0.2159 – 0.2163)	5.455 (0.2148)
		EX	5.450 – 5.460 (0.2146 – 0.2150)	5.420 (0.2134)
	Stem-to-guide clearance	IN	0.020 – 0.045 (0.0008 – 0.0018)	0.08 (0.003)
		EX	0.055 – 0.080 (0.0022 – 0.0031)	0.12 (0.005)
Valve seat	Width	IN	1.25 – 1.55 (0.049 – 0.061)	2.00 (0.079)
		EX	1.25 – 1.55 (0.049 – 0.061)	2.00 (0.079)
	Stem installed height	IN	46.75 – 47.55 (1.841 – 1.872)	47.80 (1.882)
		EX	46.68 – 47.48 (1.838 – 1.869)	47.73 (1.879)
Valve spring	Free length	IN	51.08 (2.011)	—
		EX	55.58 (2.188)	—
Valve guide	I.D.	IN	5.515 – 5.530 (0.2171 – 0.2177)	5.55 (0.219)
		EX	5.515 – 5.530 (0.2171 – 0.2177)	5.55 (0.219)
	Installed height	IN	21.20 – 22.20 (0.835 – 0.874)	—
		EX	20.63 – 21.63 (0.812 – 0.852)	—
Rocker arm	Arm-to-shaft clearance	IN	0.026 – 0.067 (0.0010 – 0.0026)	0.08 (0.003)
		EX	0.018 – 0.054 (0.0007 – 0.0021)	0.08 (0.003)

Cylinder Head/Valve Train (H22A7 engine) — Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm (min ⁻¹) and wide open throttle kPa (kgf/cm ² , psi)	Nominal Minimum Maximum variation	1,270 (13.0, 185) 930 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height		146.95 – 147.05 (5.785 – 5.789)	0.05 (0.002)
Camshaft	End play		0.05 – 0.15 (0.002 – 0.006)	0.5 (0.02)
	Camshaft-to-holder oil clearance		0.050 – 0.089 (0.0020 – 0.0035)	0.15 (0.006)
	Total runout		0.03 (0.001) max.	0.04 (0.002)
	Cam lobe height	IN Primary	34.041 (1.3402)	
		Mid	37.229 (1.4657)	
		Secondary	34.071 (1.3414)	
		EX Primary	33.745 (1.3285)	
		Mid	36.704 (1.4450)	
		Secondary	34.683 (1.3655)	
Valve	Valve clearance (Cold)	IN	0.15 – 0.19 (0.006 – 0.007)* ¹	
		EX	0.17 – 0.21 (0.007 – 0.008)* ¹	
	Valve stem O.D.	IN	5.475 – 5.485 (0.2156 – 0.2159)	5.445 (0.2144)
		EX	5.475 – 5.485 (0.2156 – 0.2159)	5.445 (0.2144)
	Stem-to-guide clearance	IN	0.025 – 0.055 (0.0010 – 0.0022)	0.08 (0.003)
		EX	0.050 – 0.080 (0.0020 – 0.0031)	0.11 (0.004)
Valve seat	Width	IN	1.30 – 1.50 (0.051 – 0.059)	2.00 (0.079)
		EX	1.25 – 1.55 (0.049 – 0.061)	2.00 (0.079)
	Stem installed height	IN	42.5 – 42.7 (1.673 – 1.681)	42.95 (1.691)
		EX	43.9 – 44.1 (1.728 – 1.736)	44.35 (1.746)
Valve spring	Free length	IN Outer	44.10 (1.736)	
		Inner	41.32 (1.627)	
		EX Outer	44.92 (1.769)	
		Inner	40.01 (1.575)	
Valve guide	I.D.	IN	5.510 – 5.530 (0.2169 – 0.2177)	5.55 (0.219)
		EX	5.535 – 5.555 (0.2179 – 0.2187)	5.60 (0.220)
	Installed height	IN	14.55 – 15.05 (0.573 – 0.593)	
		EX	14.95 – 15.45 (0.589 – 0.608)	
Rocker arm	Arm-to-shaft clearance	IN	0.025 – 0.052 (0.0010 – 0.0020)	0.08 (0.003)
		EX	0.025 – 0.052 (0.0010 – 0.0020)	0.08 (0.003)

*1: Measuring point between camshaft and rocker arm.

Standards and Service Limits

Engine Block (D16B6 engine) — Section 7

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface Bore diameter Bore taper Reboring limit	0.07 (0.003) max. 75.00 – 75.02 (2.953 – 2.954) _____ _____	0.10 (0.004) 75.07 (2.956) 0.05 (0.002) 0.5 (0.02)
Piston	Skirt O.D. At 5 mm (0.2 in) from bottom of skirt Clearance in cylinder Groove width (for ring) Top Second Oil	74.980 – 74.990 (2.9520 – 2.9524) 0.010 – 0.040 (0.0004 – 0.0016) 1.020 – 1.030 (0.0402 – 0.0406) 1.220 – 1.230 (0.0480 – 0.0484) 2.805 – 2.820 (0.1104 – 0.1110)	74.970 (2.9516) 0.05 (0.002) 1.05 (0.041) 1.25 (0.049) 2.85 (0.112)
Piston ring	Ring-to-groove clearance Ring end gap Top Second Top Second Oil	0.030 – 0.060 (0.0012 – 0.0024) 0.030 – 0.055 (0.0012 – 0.0022) 0.15 – 0.30 (0.006 – 0.012) 0.20 – 0.70 (0.008 – 0.028) 0.20 – 0.80 (0.008 – 0.031)	0.13 (0.005) 0.13 (0.005) 0.70 (0.028) 0.80 (0.031) 0.90 (0.035)
Piston pin	O.D. Pin-to-piston clearance	18.994 – 19.000 (0.7478 – 0.7480) 0.010 – 0.022 (0.0004 – 0.0009)	_____ _____
Connecting rod	Pin-to-rod interference Small end bore diameter Large end bore diameter End play installed on crankshaft Nominal	0.014 – 0.040 (0.0006 – 0.0016) 18.96 – 18.98 (0.746 – 0.747) 48.0 (1.89) 0.15 – 0.30 (0.006 – 0.012)	_____ _____ _____ 0.40 (0.016)
Crankshaft	Main journal diameter Rod journal diameter Taper Out of round End play Total runout	54.976 – 55.000 (2.1644 – 2.1654) 44.976 – 45.000 (1.7707 – 1.7717) 0.0025 (0.0001) max. 0.0025 (0.0001) max. 0.10 – 0.35 (0.004 – 0.014) 0.03 (0.001) max.	_____ _____ 0.005 (0.0002) 0.005 (0.0002) 0.45 (0.018) 0.04 (0.002)
Bearing	Main bearing-to-journal oil clearance No. 1 and 5 journals No. 2, 3 and 4 journals Rod bearing-to-journal oil clearance	0.018 – 0.036 (0.0007 – 0.0014) 0.024 – 0.042 (0.0009 – 0.0017) 0.020 – 0.038 (0.0008 – 0.0015)	0.05 (0.002) 0.05 (0.002) 0.05 (0.002)

Engine Block (F18B2, F18B3, F20B6 engines) — Section 7

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface		0.07 (0.003) max.	0.10 (0.004)
	Bore diameter	A or I B or II	85.010 – 85.020 (3.3468 – 3.3472) 85.000 – 85.010 (3.3465 – 3.3468)	85.070 (3.3492) 85.070 (3.3492)
	Bore taper		—	0.05 (0.002)
	Reboring limit		—	0.25 (0.01)
Piston	Skirt O.D.	[at 16 mm (0.6 in) from bottom of skirt]	84.980 – 84.990 (3.3457 – 3.3461)	84.970 (3.3453)
			84.970 – 84.980 (3.3453 – 3.3457)	84.960 (3.3449)
	Clearance in cylinder		0.020 – 0.040 (0.0008 – 0.0016)	0.05 (0.002)
	Groove width (For ring)	Top Second Oil	1.220 – 1.230 (0.0480 – 0.0484) 1.220 – 1.230 (0.0480 – 0.0484) 2.805 – 2.825 (0.1104 – 0.1112)	1.25 (0.049) 1.25 (0.049) 2.85 (0.112)
Piston ring	Ring-to-groove clearance	Top	0.035 – 0.060 (0.0014 – 0.0024)	0.13 (0.005)
		Second	0.030 – 0.055 (0.0012 – 0.0022)	0.13 (0.005)
	Ring end gap	Top	0.20 – 0.35 (0.008 – 0.014)	0.60 (0.024)
		Second Oil	0.40 – 0.55 (0.016 – 0.022) 0.20 – 0.70 (0.008 – 0.028)	0.70 (0.028) 0.80 (0.031)
Piston Pin	O.D.		21.961 – 21.965 (0.8646 – 0.8648)	21.953 (0.8643)
	Pin-to-piston clearance		–0.0050 – + 0.0020 (–0.00020 – + 0.00008)	0.004 (0.0002)
Connecting rod	Pin-to-rod clearance		0.005 – 0.015 (0.0002 – 0.0006)	0.020 (0.0008)
	Small end bore diameter		21.970 – 21.976 (0.8650 – 0.8652)	—
	Large end bore diameter	Nominal	48.0 (1.89)	—
	End play installed on crankshaft		0.15 – 0.30 (0.006 – 0.012)	0.40 (0.016)
Crankshaft	Main journal diameter	No. 1, 2 and 4 journals No. 3 journal No. 5 journal	54.980 – 55.004 (2.1646 – 2.1655) 54.976 – 55.000 (2.1644 – 2.1654) 54.992 – 55.016 (2.1650 – 2.1660)	— — —
	Rod journal diameter		44.976 – 45.000 (1.7707 – 1.7717)	—
	Taper		0.005 (0.0002) max.	0.010 (0.0004)
	Out-of-round		0.005 (0.0002) max.	0.010 (0.0004)
	End play		0.10 – 0.35 (0.004 – 0.014)	0.45 (0.018)
	Runout		0.02 (0.001) max.	0.04 (0.002)
Bearings	Main bearing-to-journal oil clearance	No. 1 and No. 4 journals	0.013 – 0.037 (0.0005 – 0.0015)	0.050 (0.0020)
		No. 2 journal	0.021 – 0.045 (0.0008 – 0.0018)	0.050 (0.0020)
		No. 3 journal	0.025 – 0.049 (0.0010 – 0.0019)	0.055 (0.0022)
		No. 5 journal	0.009 – 0.033 (0.0004 – 0.0013)	0.040 (0.0016)
	Rod bearing-to-journal oil clearance		0.015 – 0.043 (0.0006 – 0.0017)	0.050 (0.0020)
Balancer shaft	Journal diameter	No. 1 front journal	42.722 – 42.734 (1.6820 – 1.6824)	42.71 (1.681)
		No. 1 rear journal	20.938 – 20.950 (0.8243 – 0.8248)	20.92 (0.824)
		No. 2 front and rear journals	38.712 – 38.724 (1.5241 – 1.5246)	38.70 (1.524)
		No. 3 front and rear journals	34.722 – 34.734 (1.3670 – 1.3675)	34.71 (1.367)
	Journal taper		0.005 (0.0002) max.	—
	End play	Front	0.10 – 0.40 (0.004 – 0.016)	—
		Rear	0.04 – 0.15 (0.002 – 0.006)	—
	Total runout		0.02 (0.001) max.	0.03 (0.001)
	Shaft-to-bearing oil clearance	No. 1 front, No. 3 front and rear journals	0.066 – 0.098 (0.0026 – 0.0039)	0.12 (0.005)
		No. 1 rear journal	0.050 – 0.075 (0.0020 – 0.0030)	0.09 (0.004)
		No. 2 front and rear journals	0.076 – 0.108 (0.0030 – 0.0043)	0.13 (0.005)
Balancer shaft bearing	I.D.	No. 1 front journal	42.800 – 42.820 (1.6850 – 1.6858)	42.83 (1.686)
		No. 1 rear journal	21.000 – 21.013 (0.8268 – 0.8273)	21.02 (0.828)
		No. 2 front and rear journals	38.800 – 38.820 (1.5276 – 1.5283)	38.83 (1.529)
		No. 3 front and rear journals	34.800 – 34.820 (1.3701 – 1.3709)	34.83 (1.371)

Standards and Service Limits

Engine Block (H22A7 engine) — Section 7

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface		0.07 (0.003) max.	0.10 (0.004)
	Bore diameter	A or I B or II	87.010 – 87.020 (3.4256 – 3.4260) 87.000 – 87.010 (3.4252 – 3.4256)	87.070 (3.4279) 87.070 (3.4279)
	Bore taper		—	0.05 (0.002)
	Reboring limit		—	0.25 (0.010)
Piston	Skirt O.D.	[at 15 mm (0.6 in) from bottom of skirt]	86.993 – 87.006 (3.4249 – 3.4254) 86.983 – 86.996 (3.4245 – 3.4250)	86.980 (3.4244) 86.970 (3.4240)
	Clearance in cylinder	No letter Letter B	0.004 – 0.027 (0.0002 – 0.0011)	0.04 (0.002)
	Groove width (For ring)	Top Second Oil	1.240 – 1.255 (0.0488 – 0.0494) 1.230 – 1.245 (0.0484 – 0.0490) 2.805 – 2.825 (0.1104 – 0.1112)	1.275 (0.0502) 1.265 (0.0498) 2.85 (0.112)
Piston ring	Ring-to-groove clearance	Top Second	0.055 – 0.085 (0.0022 – 0.0033) 0.040 – 0.070 (0.0016 – 0.0028)	0.13 (0.005) 0.13 (0.005)
	Ring end gap	Top Second Oil	0.25 – 0.35 (0.010 – 0.014) 0.60 – 0.70 (0.024 – 0.028) 0.20 – 0.70 (0.008 – 0.028)*1 0.20 – 0.50 (0.008 – 0.020)*2	0.60 (0.024) 0.90 (0.035) 0.80 (0.031)*1 0.60 (0.024)*2
Piston pin	O.D. Pin-to-piston clearance		21.961 – 21.965 (0.8646 – 0.8648) –0.0030 – + 0.0060 (–0.00012 – + 0.00024)	21.953 (0.8643) 0.009 (0.0004)
Connecting rod	Pin-to-rod clearance		0.005 – 0.015 (0.0002 – 0.0006)	0.002 (0.0008)
	Small end bore diameter		21.970 – 21.976 (0.8650 – 0.8652)	—
	Large end bore diameter	Nominal	51.0 (2.01)	—
	End play installed on crankshaft		0.15 – 0.30 (0.006 – 0.012)	0.40 (0.016)
Crankshaft	Main journal diameter	No. 1, 2 and 4 journals No. 3 journal No. 5 journal	54.980 – 55.004 (2.1646 – 2.1655) 54.976 – 55.000 (2.1644 – 2.1654) 54.992 – 55.016 (2.1650 – 2.1660) 47.976 – 48.000 (1.8888 – 1.8898)	— — — —
	Rod journal diameter		0.005 (0.0002) max.	0.006 (0.0002)
	Taper		0.004 (0.0002) max.	0.006 (0.0002)
	Out-of-round		0.10 – 0.35 (0.004 – 0.014)	0.45 (0.018)
Bearings	End play		0.03 (0.001) max.	0.04 (0.002)
	Runout			
Bearings	Main bearing-to-journal oil clearance	No. 1 and No. 4 journals No. 2 journal No. 3 journal No. 5 journal	0.013 – 0.037 (0.0005 – 0.0015) 0.021 – 0.045 (0.0008 – 0.0018) 0.025 – 0.049 (0.0010 – 0.0019) 0.009 – 0.033 (0.0004 – 0.0013)	0.050 (0.0020) 0.050 (0.0020) 0.055 (0.0022) 0.040 (0.0016)
	Rod bearing-to-journal oil clearance		0.027 – 0.055 (0.0011 – 0.0022)	0.060 (0.0024)
Balancer shaft	Journal diameter	No. 1 front journal No. 1 rear journal No. 2 front and rear journals No. 3 front and rear journals	42.722 – 42.734 (1.6820 – 1.6824) 20.938 – 20.950 (0.8243 – 0.8248) 38.712 – 38.724 (1.5241 – 1.5246) 34.722 – 34.734 (1.3670 – 1.3675)	42.71 (1.681) 20.92 (0.824) 38.70 (1.524) 34.71 (1.367)
	Journal taper		0.005 (0.0002) max.	—
	End play	Front Rear	0.10 – 0.40 (0.004 – 0.016) 0.04 – 0.15 (0.002 – 0.006) 0.02 (0.001) max.	— — 0.03 (0.001)
	Total runout			
Balancer shaft	Shaft-to-bearing oil clearance	No. 1 front, No. 3 front and rear journals No. 1 rear journal No. 2 front and rear journals	0.066 – 0.098 (0.0026 – 0.0039) 0.050 – 0.075 (0.0020 – 0.0030) 0.076 – 0.108 (0.0030 – 0.0043)	0.12 (0.005) 0.09 (0.004) 0.13 (0.005)
Balancer shaft bearing	I.D.	No. 1 front journal No. 1 rear journal No. 2 front and rear journals No. 3 front and rear journals	42.800 – 42.820 (1.6850 – 1.6858) 21.000 – 21.013 (0.8268 – 0.8273) 38.800 – 38.820 (1.5276 – 1.5283) 34.800 – 34.820 (1.3701 – 1.3709)	42.83 (1.686) 21.02 (0.828) 38.83 (1.529) 34.83 (1.371)

*1: RIKEN manufactured piston ring.

*2: TEIKOKU PISTON RING manufactured piston ring.

Engine Lubrication — Section 8

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US qt, Imp qt)	D16B6 engine: 4.0 (4.2, 3.5) for engine overhaul 3.6 (3.8, 3.2) for oil change, including filter 3.3 (3.5, 2.9) for oil change, without filter F18B2, F18B3, F20B6 engines: 5.7 (6.0, 5.0) for engine overhaul 4.4 (4.6, 3.9) for oil change, including filter 4.1 (4.3, 3.6) for oil change, without filter H22A7 engine: 5.9 (6.2, 5.2) for engine overhaul 4.8 (5.1, 4.2) for oil change, including filter 4.5 (4.8, 4.0) for oil change, without filter	
Oil pump	Inner-to-outer rotor clearance		
	D16B6 engine	0.02 – 0.14 (0.001 – 0.006)	0.20 (0.008)
	Except D16B6 engine	0.02 – 0.16 (0.001 – 0.006)	0.20 (0.008)
	Pump housing-to-outer rotor clearance		
	D16B6 engine	0.10 – 0.18 (0.004 – 0.007)	0.20 (0.008)
	Except D16B6 engine	0.10 – 0.19 (0.004 – 0.007)	0.21 (0.008)
	Pump housing-to-rotor axial clearance		
	D16B6 engine	0.03 – 0.08 (0.001 – 0.003)	0.15 (0.006)
	Except D16B6 engine	0.02 – 0.07 (0.001 – 0.003)	0.12 (0.005)
Relief valve	Pressure setting at engine oil temp. 80°C (176°F) kPa (kgf/cm ² , psi) at idle at 3,000 rpm (min ⁻¹)	70 (0.7, 10) min. 340 (3.5, 50) min.	

Cooling — Section 10

	MEASUREMENT	STANDARD (NEW)
Radiator	Coolant capacity ℓ (US qt, Imp qt) [Including engine, heater, cooling line and reservoir] Reservoir capacity: 0.55 ℓ (0.58 US qt, 0.48 Imp qt)	D16B6 engine: 4.6 (4.9, 4.1) for overhaul 3.9 (4.1, 3.4) for coolant change F18B2, F18B3, F20B6 engines: M/T: 5.8 (6.1, 5.1) for overhaul 4.2 (4.4, 3.7) for coolant change A/T: 5.7 (6.0, 5.0) for overhaul 4.1 (4.3, 3.6) for coolant change H22A7 engine: 6.9 (7.3, 6.1) for overhaul 3.3 (3.5, 2.9) for coolant change
Radiator cap	Opening pressure kPa (kgf/cm ² , psi)	93 – 123 (0.95 – 1.25, 14 – 18)
Thermostat	Start to open °C (°F)	70 – 80 (169 – 176)
	Fully open °C (°F)	90 (194)
	Valve lift at fully open	8.0 (0.31) min.
	Except H22A7 engine H22A7 engine	10.0 (0.39) min.
Cooling fan	Thermoswitch "ON" temperature °C (°F)	
	Except H22A7 engine	91 – 95 (196 – 203)
	H22A7 engine	92 – 98 (198 – 208)
	Thermoswitch "OFF" temperature °C (°F)	
	Except H22A7 engine	Subtract 3 – 8 (5 – 15) from actual "ON" temperature
	H22A7 engine	Subtract 2 – 7 (4 – 12) from actual "ON" temperature
	Fan timer "ON" temperature °C (°F)	103 – 109 (217 – 228)
	Fan timer "OFF" temperature °C (°F)	Subtract 4 – 9 (7 – 16) from actual "ON" temperature

Standards and Service Limits

Fuel and Emissions — Section 11

	MEASUREMENT	STANDARD (NEW)
Pressure regulator	Pressure with regulator vacuum hose disconnected kPa (kgf/cm ² , psi)	D16B6 engine 290 – 300 (3.0 – 3.1, 43 – 44) F18B2, F18B3, F20B6 engines 270 – 320 (2.8 – 3.3, 40 – 47) H22A7 engine 270 – 370 (2.8 – 3.8, 40 – 54)
Fuel tank	Capacity ℓ (US gal, Imp gal)	65.0 (17.2, 14.3)
Engine	Idle speed with headlight and cooling fan off rpm (min ⁻¹)	D16B6, F18B3 engines 750 ± 50 (M/T: neutral) F18B2, F20B6 engines 750 ± 50 (M/T: neutral) 730 ± 50 (A/T: N or P position) H22A7 engine 790 ± 50 (M/T: neutral)
	Idle CO %	With TWC model: 0.1 max. Without TWC model: 1.0 ± 1.0

Clutch — Section 12

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height	to floor LHD RHD	_____
	Stroke	177 – 187 (7.0 – 7.4) 201 – 211 (7.9 – 8.3)	_____
	Free play	141 – 151 (5.55 – 5.94)	_____
	Pedal play	9 – 15 (0.4 – 0.6)	_____
	Disengagement height	1.0 – 7.0 (0.04 – 0.28)	_____
Flywheel	Clutch surface runout	to floor LHD RHD	_____
Clutch disc	Rivet head depth	0.05 (0.002) max.	0.15 (0.006)
	U2J4, U2G5	1.4 (0.06) min	0.2 (0.008)
	DH	1.3 (0.05) min	0.2 (0.008)
	U2Q7	1.2 – 1.7 (0.05 – 0.07)	0.2 (0.008)
	Surface runout	0.6 (0.02) max.	1.0 (0.04)
	Thickness	7.9 – 8.4 (0.31 – 0.33)	6.0 (0.24)
Pressure plate	U2J4, U2G5	7.7 – 8.2 (0.30 – 0.32)	6.0 (0.24)
	DH	8.3 – 9.0 (0.33 – 0.35)	6.0 (0.24)
	U2Q7		
Warpage	Diaphragm spring finger alignment	0.03 (0.001) max.	0.15 (0.006)
		0.6 (0.02) max.	0.8 (0.03)

Manual Transmission (DH) — Section 13

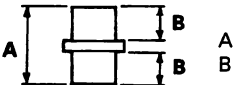
	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)	1.8 (1.9, 1.6) at fluid change 1.9 (2.0, 1.7) at overhaul	
Mainshaft	End play	0.11 – 0.18 (0.004 – 0.007)	Adjust
	Diameter of ball bearing contact area A (Transmission housing side)	21.987 – 22.000 (0.8656 – 0.8661)	21.930 (0.8634)
	Diameter of 4th, 5th gear contact area B	26.980 – 26.993 (1.0622 – 1.0627)	26.930 (1.0602)
	Diameter of 3rd gear contact area C	33.984 – 34.000 (1.3380 – 1.3386)	33.930 (1.3358)
	Diameter of ball bearing contact area D (Clutch housing side)	25.977 – 25.990 (1.0227 – 1.0232)	25.920 (1.0205)
Mainshaft 3rd and 4th gears	Runout	0.02 (0.001) max.	0.05 (0.002)
	I.D.	39.009 – 39.025 (1.5358 – 1.5364)	39.07 (1.5382)
	End play	3rd 0.06 – 0.21 (0.002 – 0.008)	0.33 (0.013)
	4th	0.06 – 0.19 (0.002 – 0.007)	0.31 (0.012)
	Thickness	3rd 30.22 – 30.27 (1.190 – 1.192)	30.15 (1.187)
Mainshaft 5th gear	4th	30.12 – 30.17 (1.186 – 1.188)	30.05 (1.183)
	I.D.	37.009 – 37.025 (1.4570 – 1.4577)	37.07 (1.459)
	End play	0.06 – 0.19 (0.002 – 0.007)	0.31 (0.012)
Countershaft	Thickness	28.42 – 28.47 (1.119 – 1.121)	28.35 (1.116)
	Diameter of needle bearing contact area A	30.000 – 30.015 (1.1811 – 1.1817)	29.95 (1.179)
	Diameter of 1st gear contact area B	35.984 – 36.000 (1.4167 – 1.4173)	35.93 (1.415)
	Diameter of ball bearing contact area C	24.980 – 24.993 (0.9835 – 0.9840)	24.93 (0.982)
	Runout	0.02 (0.001) max.	0.05 (0.002)

Manual Transmission (DH) — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Countershaft 1st gear	I.D. End play (When tightened by the specified torque) Thickness	41.009 – 41.025 (1.6145 – 1.6152) 0.03 – 0.10 (0.001 – 0.004) 30.41 – 30.44 (1.197 – 1.198)	41.07 (1.617) 0.22 (0.009) 30.36 (1.195)
Countershaft 2nd gear	I.D. End play (When tightened by the specified torque) Thickness	44.009 – 44.025 (1.7326 – 1.7333) 0.04 – 0.12 (0.002 – 0.005) 31.91 – 31.96 (1.256 – 1.258)	44.07 (1.735) 0.24 (0.009) 31.85 (1.254)
Spacer collar (Countershaft 2nd gear)	I.D. O.D. Length	33.000 – 33.010 (1.2992 – 1.2996) 38.989 – 39.000 (1.5350 – 1.5354) 32.03 – 32.06 (1.261 – 1.262)	33.04 (1.301) 38.93 (1.533) 32.01 (1.260)
Spacer collar (Mainshaft 4th and 5th gears)	I.D. O.D. Length	27.002 – 27.012 (1.0631 – 1.0635) 33.989 – 34.000 (1.3381 – 1.3386) 31.989 – 32.000 (1.2594 – 1.2598) 22.83 – 22.86 (0.899 – 0.900) 23.53 – 23.56 (0.926 – 0.928)	27.06 (1.065) 33.93 (1.336) 31.93 (1.257) 22.81 (0.898) 23.51 (0.926)
Reverse idler gear	I.D. Gear-to-reverse gear shaft clearance	15.016 – 15.043 (0.5912 – 0.5922) 0.032 – 0.077 (0.0013 – 0.0030)	15.08 (0.594) 0.14 (0.006)
Synchro ring	Ring-to-gear clearance (ring pushed against gear)	0.73 – 1.18 (0.029 – 0.046)	0.4 (0.016)
Shift fork	Finger thickness Fork-to-synchro sleeve clearance	6.2 – 6.4 (0.24 – 0.25) 7.4 – 7.6 (0.29 – 0.30) 0.35 – 0.65 (0.014 – 0.026)	— — —
Reverse shift fork	Fork pawl groove width Fork-to-reverse idler gear clearance L-groove width Fork-to-6th/reverse shift shaft piece pin clearance	12.7 – 13.0 (0.50 – 0.51) 0.5 – 1.1 (0.02 – 0.04) 7.05 – 7.25 (0.278 – 0.285) 0.05 – 0.35 (0.002 – 0.014)	— 1.8 (0.07) — 0.5 (0.02)
Shift arm A	Inner diameter of shift arm A contact point Shift arm A-to-shift arm C clearance	13.05 – 13.13 (0.514 – 0.517) 0.05 – 0.23 (0.002 – 0.009)	— 0.35 (0.014)
Shift arm B	Inner diameter of shift arm B shaft contact point Shift arm B-to-shaft clearance Shift arm B-to-shift piece clearance Diameter of shift fork contact point Shift fork 1st – 2nd/shift piece groove width	13.973 – 14.000 (0.5501 – 0.5512) 0.013 – 0.070 (0.0005 – 0.0028) 0.2 – 0.5 (0.01 – 0.02) 12.900 – 13.000 (0.5079 – 0.5118) 13.2 – 13.4 (0.52 – 0.53)	— 0.16 (0.006) 0.6 (0.02) 12.78 (0.503) —
MBS shift piece	Diameter of pin	6.9 – 7.1 (0.27 – 0.28)	6.8 (0.27)
Differential carrier	Pinion shaft bore diameter Carrier-to-pinion shaft clearance Driveshaft bore diameter Carrier-to-driveshaft clearance	18.010 – 18.028 (0.7091 – 0.7098) 0.023 – 0.057 (0.0009 – 0.0022) 26.025 – 26.045 (1.0246 – 1.0254) 0.045 – 0.086 (0.0018 – 0.0034)	— 0.095 (0.004) — 0.14 (0.006)
Differential pinion gear	Backlash Pinion gear bore diameter Pinion gear-to-pinion shaft clearance	0.05 – 0.15 (0.002 – 0.006) 18.042 – 18.066 (0.7103 – 0.7113) 0.055 – 0.095 (0.0022 – 0.0037)	— — 0.15 (0.006)
Set ring-to-bearing outer race		0 – 0.1 (0 – 0.004)	Adjust

Standards and Service Limits

Manual Transmission (U2J4/U2G5/U2Q7) — Section 13

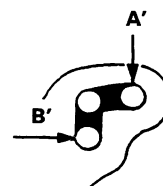
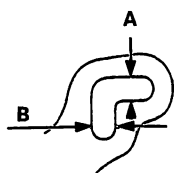
	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)	1.9 (2.0, 1.7) at fluid change 2.0 (2.1, 1.8) at overhaul	
Mainshaft	End play Diameter of ball bearing contact area C Diameter of needle bearing contact area B Diameter of ball bearing contact area A Diameter of 4th/5th contact area Runout	0.10 – 0.16 (0.004 – 0.006) 27.977 – 27.990 (1.1015 – 1.1020) 37.984 – 38.000 (1.4954 – 1.4961) 27.987 – 28.000 (1.1018 – 1.1024) 30.987 – 31.000 (1.2200 – 1.2205) 0.02 (0.001) max.	Adjust 27.93 (1.100) 37.93 (1.493) 27.94 (1.100) 30.93 (1.218) 0.05 (0.002)
Mainshaft 3rd and 4th gears	I.D. End play Thickness 3rd gear Except U2Q7 4th gear Except U2Q7	43.009 – 43.025 (1.6933 – 1.6939) 0.06 – 0.21 (0.002 – 0.008) 32.42 – 32.47 (1.276 – 1.278) 34.92 – 34.97 (1.375 – 1.377) 30.92 – 30.97 (1.217 – 1.219) 31.42 – 31.47 (1.237 – 1.239)	43.080 (1.6961) 0.30 (0.012) 32.3 (1.27) 34.8 (1.37) 30.8 (1.21) 31.3 (1.23)
Mainshaft 5th gear	I.D. End play Thickness	43.009 – 43.025 (1.6933 – 1.6939) 0.06 – 0.21 (0.002 – 0.008) 30.92 – 30.97 (1.217 – 1.219)	43.080 (1.6961) 0.30 (0.012) 30.8 (1.21)
Countershaft	Diameter of needle bearing contact area A Diameter of ball bearing and needle bearing contact area C Diameter of 1st gear contact area B Runout	38.000 – 38.015 (1.4961 – 1.4967) 24.987 – 25.000 (0.9837 – 0.9843) 39.984 – 40.000 (1.5742 – 1.5748) 0.02 (0.001) max.	37.95 (1.494) 24.94 (0.982) 39.93 (1.572) 0.05 (0.002)
Countershaft 1st gear	I.D. End play Thickness Except U2Q7 Except U2Q7	46.009 – 46.025 (1.8114 – 1.8120) 0.06 – 0.23 (0.002 – 0.009) 0.06 – 0.18 (0.002 – 0.007) 32.95 – 33.00 (1.297 – 1.299) 26.95 – 27.000 (1.061 – 1.063)	46.08 (1.814) 0.23 (0.009) 0.23 (0.009) — —
Countershaft 2nd gear	I.D. End play Thickness	47.009 – 47.025 (1.8507 – 1.8514) 0.10 – 0.15 (0.004 – 0.006) 28.94 – 28.97 (1.139 – 1.141)	47.08 (1.854) 0.18 (0.007) —
Thrust washer (Countershaft 1st gear)	Thickness	1.95 – 1.97 (0.077 – 0.078)	—
Spacer collar (Countershaft 2nd gear)	I.D. O.D. Length	36.48 – 36.49 (1.436 – 1.437) 41.989 – 42.000 (1.6531 – 1.6535) 29.07 – 29.09 (1.144 – 1.145)	36.50 (1.437) 41.94 (1.651) —
Spacer collar (Mainshaft 4th and 5th gears)	I.D. O.D. Length	31.002 – 31.012 (1.2205 – 1.2209) 37.989 – 38.000 (1.4956 – 1.4961) 56.45 – 56.55 (2.222 – 2.226) 26.03 – 26.08 (1.025 – 1.027)	31.06 (1.223) 37.94 (1.494) — 26.01 (1.024)
			
Reverse idler gear	I.D. Gear-to-reverse gear shaft clearance	20.016 – 20.043 (0.7880 – 0.7891) 0.036 – 0.084 (0.0014 – 0.0033)	20.09 (0.7909) 0.160 (0.0063)
Synchro ring	Ring-to-gear clearance (ring pushed against gear)	0.85 – 1.10 (0.033 – 0.043)	0.40 (0.016)
Double cone synchro	Clearance (ring pushed against gear) Outer synchro ring-to-synchro cone Inner synchro ring-to-gear Outer synchro ring-to-gear	0.5 – 1.0 (0.02 – 0.04) min 0.5 – 1.0 (0.02 – 0.04) min 0.95 – 1.68 (0.037 – 0.066)	0.3 (0.01) 0.3 (0.01) 0.6 (0.02)

Manual Transmission (U2J4/U2G5/U2Q7) — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Shift fork	Finger thickness 1st/2nd/5th 3rd/4th	6.2 – 6.4 (0.24 – 0.25) 7.4 – 7.6 (0.29 – 0.30)	— —
	Fork-to-synchro sleeve clearance	0.35 – 0.65 (0.014 – 0.026)	1.0 (0.04)
Reverse shift fork	Pawl groove width	13.0 – 13.3 (0.51 – 0.52)	—
	Fork-to-reverse idler gear clearance	0.5 – 1.1 (0.02 – 0.04)	1.8 (0.07)
	Groove width*1 at A	7.05 – 7.25 (0.278 – 0.285)	—
	Fork-to-5th/reverse shift shaft Clearance*2 at A' at B'	7.4 – 7.7 (0.29 – 0.30) 0.05 – 0.35 (0.002 – 0.014) 0.4 – 0.8 (0.02 – 0.03)	0.5 (0.02) 1.0 (0.04)
Shift arm	I.D.	15.973 – 16.000 (0.6289 – 0.6299)	—
	Shift arm-to-shaft clearance	0.005 – 0.059 (0.0002 – 0.0023)	—
	Shift fork diameter contact area	12.9 – 13.0 (0.508 – 0.512)	—
	Shift arm-to-shift fork shaft clearance	0.2 – 0.5 (0.01 – 0.02)	0.6 (0.02)
Select lever	Shaft outer diameter	15.941 – 15.968 (0.6276 – 0.6287)	—
	Shift arm cover clearance	0.032 – 0.102 (0.0013 – 0.0040)	—
Shift lever	O.D.	15.941 – 15.968 (0.6276 – 0.6287)	—
	Transmission housing clearance	0.021 – 0.141 (0.0008 – 0.0056)	—
Interlock	Bore diameter	16.00 – 16.05 (0.630 – 0.632)	—
	Shift arm clearance	0.032 – 0.109 (0.0013 – 0.0043)	—
Differential carrier	Pinion shaft contact area I.D. Except U2Q7	18.000 – 18.018 (0.7087 – 0.7094)	—
	Carrier-to-pinion shaft clearance Except U2Q7	0.017 – 0.047 (0.0007 – 0.0019)	0.10 (0.004)
	Driveshaft contact area I.D.	28.005 – 28.025 (1.1026 – 1.1033)	—
	Carrier-to-driveshaft clearance R L	0.025 – 0.066 (0.0010 – 0.0026) 0.055 – 0.091 (0.0022 – 0.0036)	0.12 (0.005) 0.15 (0.006)
Differential pinion gear Except U2Q7	Backlash	0.05 – 0.15 (0.002 – 0.006)	—
	I.D.	18.042 – 18.066 (0.7103 – 0.7113)	—
	Pinion gear-to-pinion shaft clearance	0.055 – 0.095 (0.0022 – 0.0037)	0.15 (0.006)
Tapered roller bearing preload	Starting torque N·m (kgf·cm, lbf·in)	1.4 – 2.5 (14 – 26, 12 – 23)	Adjust

*1: Measuring points

*2: Measuring points



Standards and Service Limits

Automatic Transmission — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)	6.1 (6.4, 5.4) at overhaul 2.5 (2.6, 2.2) at fluid change	
Hydraulic pressure kPa (kgf/cm ² , psi)	Line pressure at 2,000 rpm (min ⁻¹) in N or P position	850 – 910 (8.7 – 9.3, 120 – 130)	800 (8.2, 120)
	4th clutch pressure at 2,000 rpm (min ⁻¹) in D₄ position	840 – 920 (8.6 – 9.4, 120 – 130)	790 (8.1, 120)
	3rd clutch pressure at 2,000 rpm (min ⁻¹) in D₃ position		
	2nd clutch pressure at 2,000 rpm (min ⁻¹) in 2 position 1st clutch pressure at 2,000 rpm (min ⁻¹) in 1 position		
Stall speed rpm (min ⁻¹) (Check with vehicle on level ground)			
F20B6 engine		2,250	1,950 – 2,550
F18B2, F18B3 engines		2,450	2,150 – 2,750
Clutch	Clutch initial clearance	1st 2nd 3rd 4th	1.15 – 1.35 (0.045 – 0.053) 0.7 – 0.9 (0.028 – 0.035) 0.6 – 0.8 (0.024 – 0.031) 0.4 – 0.6 (0.016 – 0.024)
	Clutch return spring free length	1st, 2nd 3rd, 4th	45.7 (1.80) 33.5 (1.32)
	Clutch disc thickness		1.88 – 2.00 (0.074 – 0.079)
	Clutch plate thickness	1st 2nd 3rd 4th	1.95 – 2.05 (0.077 – 0.081) 2.25 – 2.35 (0.089 – 0.093) 2.55 – 2.65 (0.100 – 0.104) 2.25 – 2.35 (0.089 – 0.093)
	Clutch end plate thickness	Mark 6 Mark 7 Mark 8 Mark 9 Mark 0 Mark 1 Mark 2 Mark 3 Mark 4	2.55 – 2.60 (0.100 – 0.102) 2.65 – 2.70 (0.104 – 0.106) 2.75 – 2.80 (0.108 – 0.110) 2.85 – 2.90 (0.112 – 0.114) 2.95 – 3.00 (0.116 – 0.118) 3.05 – 3.10 (0.120 – 0.122) 3.15 – 3.20 (0.124 – 0.126) 3.25 – 3.30 (0.128 – 0.130) 3.35 – 3.40 (0.132 – 0.134)
	Clutch end plate thickness	Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 Mark 6 Mark 7 Mark 8 Mark 9	2.05 – 2.10 (0.081 – 0.083) 2.15 – 2.20 (0.085 – 0.087) 2.25 – 2.30 (0.089 – 0.091) 2.35 – 2.40 (0.093 – 0.094) 2.45 – 2.50 (0.096 – 0.098) 2.55 – 2.60 (0.100 – 0.102) 2.65 – 2.70 (0.104 – 0.106) 2.75 – 2.80 (0.108 – 0.110) 2.85 – 2.90 (0.112 – 0.114)
	3rd, 4th clutches		
			43.7 (1.72) 31.5 (1.24) Until grooves worn out Discoloration ↑ Discoloration
Valve body	Stator shaft needle bearing contact I.D.		
	Torque converter side	27.000 – 27.021 (1.0630 – 1.0638)	Wear or damage
	ATF pump side	29.000 – 29.021 (1.1417 – 1.1426)	
	ATF pump gear thrust clearance	0.03 – 0.05 (0.001 – 0.002)	0.07 (0.003)
	ATF pump gear-to-body clearance	Drive Driven	
		0.210 – 0.265 (0.0083 – 0.0104)	
		0.070 – 0.125 (0.0028 – 0.0049)	
	ATF pump driven gear I.D.	14.016 – 14.034 (0.5518 – 0.5525)	Wear or damage
	ATF pump driven gear shaft O.D.	13.980 – 13.990 (0.5504 – 0.5508)	Wear or damage
Shifting device and parking brake	Reverse shift fork finger thickness	5.90 – 6.00 (0.232 – 0.236)	5.40 (0.213)
	Parking brake pawl		Wear or other defect
	Parking gear		
Servo body	Shift fork shaft bore I.D.	14.000 – 14.010 (0.5512 – 0.5516)	
	Shift fork shaft valve bore I.D.	37.000 – 37.039 (1.4567 – 1.4582)	37.045 (1.4585)
Regulator valve body	Sealing ring contact I.D.	32.000 – 32.025 (1.2598 – 1.2608)	32.050 (1.2618)
Accumulator body	Sealing ring contact I.D.	35.000 – 35.025 (1.3780 – 1.3789)	35.05 (1.3799)
Stator shaft	Sealing ring contact I.D.	29.000 – 29.021 (1.1417 – 1.1426)	29.050 (1.1437)

Unit of length: mm (in)

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission	Mainshaft 3rd gear thrust shim, 41 x 72 mm thickness	6.32 – 6.35 (0.2488 – 0.2500) 6.37 – 6.40 (0.2508 – 0.2520) 6.42 – 6.45 (0.2528 – 0.2539) 6.47 – 6.50 (0.2547 – 0.2559) 6.52 – 6.55 (0.2567 – 0.2579) 6.57 – 6.60 (0.2587 – 0.2598)	Wear or damage
	Mainshaft 4th gear thrust washer, 27 x 47 mm thickness	4.95 – 5.00 (0.1949 – 0.1969)	
	Secondary shaft splined washer, 38 x 56.5 mm thickness	6.82 – 6.85 (0.269 – 0.270) 6.87 – 6.90 (0.270 – 0.272) 6.92 – 6.95 (0.272 – 0.274) 6.97 – 7.00 (0.274 – 0.276) 7.02 – 7.05 (0.276 – 0.278) 7.07 – 7.10 (0.278 – 0.280)	
	Secondary shaft thrust shim, 37 x 55 mm thickness	4.87 – 4.90 (0.192 – 0.193) 4.92 – 4.95 (0.194 – 0.195) 4.97 – 5.00 (0.196 – 0.197) 5.02 – 5.05 (0.198 – 0.199) 5.07 – 5.10 (0.200 – 0.201) 5.12 – 5.15 (0.202 – 0.203) 5.17 – 5.20 (0.204 – 0.205)	
	Mainshaft 4th gear collar length	49.40 – 49.50 (1.945 – 1.949)	 Wear or damage
	Mainshaft 4th gear collar flange thickness	4.35 – 4.50 (0.171 – 0.177)	
	Countershaft distance collar length	50.42 – 50.46 (1.985 – 1.987)	
	Cotter thickness	1.99 – 2.02 (0.078 – 0.080)	 1.800 (0.071)
	Secondary shaft sealing ring, 35 mm thickness	1.890 – 1.950 (0.074 – 0.077)	
	Mainshaft sealling ring, 32 mm thickness	1.850 – 1.950 (0.073 – 0.077)	1.800 (0.071)
	Mainshaft sealling ring, 29 mm thickness	1.850 – 1.950 (0.073 – 0.077)	
	Mainshaft sealling ring groove width	2.025 – 2.060 (0.080 – 0.081)	2.080 (0.082)
	Secondary shaft sealing ring groove width	2.025 – 2.060 (0.080 – 0.081)	
	Mainshaft 4th clutch feed pipe O.D.	11.47 – 11.48 (0.4516 – 0.4520)	11.45 (0.4508)
	Mainshaft 3rd clutch feed pipe O.D.	5.97 – 5.98 (0.2350 – 0.2354)	
	Secondary shaft feed pipe O.D.	7.97 – 7.98 (0.3138 – 0.3142)	7.95 (0.3130)
	Mainshaft 4th clutch feed pipe bushing I.D.	11.500 – 11.518 (0.4528 – 0.4535)	
	Mainshaft 3rd clutch feed pipe bushing I.D.	6.018 – 6.030 (0.2369 – 0.2374)	6.045 (0.2380)
	Secondary shaft bushing I.D.	8.000 – 8.015 (0.3150 – 0.3156)	
	Diameter of needle bearing contact area		8.030 (0.3161)
	On mainshaft of stator shaft	22.984 – 23.000 (0.9049 – 0.9055)	
	On mainshaft of 3rd gear	55.975 – 55.991 (2.2037 – 2.2044)	Wear or damage
	On mainshaft of 4th gear collar	33.975 – 33.991 (1.3376 – 1.3382)	
	On countershaft of 4th gear	33.975 – 33.991 (1.3376 – 1.3382)	Wear or damage
	On countershaft 2nd gear	39.979 – 40.000 (1.5740 – 1.5748)	
	On countershaft of L. side	36.005 – 36.015 (1.4175 – 1.4179)	Wear or damage
	On parking gear	41.964 – 41.980 (1.6521 – 1.6528)	
	On secondary shaft of 1st gear	37.978 – 37.993 (1.4952 – 1.4958)	Wear or damage
	On secondary shaft of 2nd gear	33.986 – 33.999 (1.3380 – 1.3385)	
	On secondary shaft of L. side	34.000 – 34.013 (1.3386 – 1.3391)	Wear or damage
	On reverse idler gear shaft	14.985 – 15.000 (0.5900 – 0.5906)	
	Transmission housing of reverse idler gear shaft contact area I.D.	14.800 – 14.818 (0.5827 – 0.5834)	Wear or damage
	Reverse idler gear shaft holder I.D.	14.800 – 14.824 (0.5827 – 0.5836)	
	Reverse selector hub O.D.	55.87 – 55.90 (2.1996 – 2.2008)	Wear or damage
	Inside Diameter		
	Mainshaft 3rd gear	61.000 – 61.019 (2.4016 – 2.4023)	Wear or damage
	Mainshaft 4th gear	40.000 – 40.016 (1.5748 – 1.5754)	
	Countershaft 4th gear	40.000 – 40.016 (1.5748 – 1.5754)	Wear or damage
	Countershaft idler gear	50.000 – 50.016 (1.9685 – 1.9691)	
	Countershaft reverse gear	46.000 – 46.016 (1.8110 – 1.8116)	Wear or damage
	Reverse idler gear	20.007 – 20.020 (0.7877 – 0.7882)	
	Secondary shaft 1st gear	44.000 – 44.016 (1.7323 – 1.7329)	Wear or damage
	Secondary shaft 2nd gear	40.000 – 40.016 (1.5748 – 1.5754)	

(cont'd)

Standards and Service Limits

Automatic Transmission (cont'd) — Section 14

Automatic Transmission (cont'd) — Section 14					
	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT		
Transmission (cont'd)	End play				
	Mainshaft 3rd gear	0.03 – 0.11 (0.001 – 0.004)	_____		
	Mainshaft 4th gear	0.10 – 0.22 (0.004 – 0.009)	_____		
	Countershaft 1st gear	0.00 – 0.33 (0.000 – 0.013)	_____		
	Countershaft 4th gear	0.04 – 0.28 (0.002 – 0.011)	_____		
	Countershaft idler gear	0.015 – 0.045 (0.0006 – 0.0018)	_____		
	Countershaft reverse gear	0.10 – 0.25 (0.004 – 0.010)	_____		
	Reverse idler gear	0.20 – 0.55 (0.008 – 0.022)	_____		
	Secondary shaft 1st gear	0.07 – 0.15 (0.003 – 0.006)	_____		
Secondary shaft 2nd gear	0.04 – 0.12 (0.002 – 0.005)	_____			
Differential carrier	Pinion shaft contact area I.D.	18.010 – 18.028 (0.709 – 0.710)	_____		
	Carrier-to-pinion shaft clearance	0.023 – 0.057 (0.001 – 0.002)	0.1 (0.004)		
	Driveshaft contact area I.D.	28.025 – 28.045 (1.103 – 1.104)	_____		
	Carrier-to-driveshaft clearance	0.045 – 0.086 (0.002 – 0.003)	0.12 (0.005)		
Differential pinion gear	Backlash	0.050 – 0.150 (0.002 – 0.006)	_____		
	I.D.	18.042 – 18.066 (0.710 – 0.711)	_____		
	Pinion gear-to-pinion shaft clearance	0.055 – 0.095 (0.002 – 0.004)	0.12 (0.005)		
Differential tapered roller bearing preload		For new bearing	2.7 – 3.9 (28 – 40, 24 – 35)		
Starting torque N·m (kgf·cm, lbf·in)		For used bearing	2.5 – 3.6 (25 – 37, 22 – 32)		
			Adjust Adjust		
	MEASUREMENT	STANDARD (NEW)			
		Wire Dia.	O.D.	Free Length	No. of Coils
Spring	Regulator valve spring A	1.9 (0.075)	14.7 (0.579)	77.4 (3.047)	15.2
	Regulator valve spring B	1.6 (0.063)	9.2 (0.362)	44.0 (1.732)	12.5
	Stator reaction spring	4.5 (0.177)	35.4 (1.394)	30.3 (1.193)	1.92
	Modulator valve spring	1.6 (0.063)	10.4 (0.409)	33.5 (1.319)	9.8
	Torque converter check valve spring	1.1 (0.043)	8.4 (0.331)	38.2 (1.504)	14.0
	Relief valve spring	0.9 (0.035)	6.6 (0.260)	39.8 (1.567)	20.4
	Cooler check valve spring	0.6 (0.024)	5.8 (0.228)	14.5 (0.571)	6.8
	Shift valve A spring	0.8 (0.031)	7.1 (0.280)	40.4 (1.591)	16.9
	Shift valve B spring	0.8 (0.031)	7.1 (0.280)	40.4 (1.591)	16.9
	Shift valve C spring	0.8 (0.031)	6.6 (0.260)	49.1 (1.933)	21.7
	Shift valve E spring	0.7 (0.028)	6.6 (0.260)	32.2 (1.268)	13.4
	Lock-up shift valve spring	0.9 (0.035)	7.6 (0.299)	63.0 (2.480)	22.4
	Lock-up timing valve spring	0.65 (0.026)	6.6 (0.260)	34.8 (1.370)	15.6
	Lock-up control valve spring	0.7 (0.028)	6.6 (0.260)	42.9 (1.689)	14.2
	Shift valve D spring	0.7 (0.028)	6.6 (0.260)	35.7 (1.406)	17.2
	Servo control valve spring	0.7 (0.028)	6.6 (0.260)	35.7 (1.406)	17.2
	Reverse CPC valve spring	0.7 (0.028)	6.1 (0.240)	17.8 (0.701)	7.9
	CPC valve A spring	0.7 (0.028)	6.1 (0.240)	17.8 (0.701)	7.9
	CPC valve B spring	0.7 (0.028)	6.1 (0.240)	17.8 (0.701)	7.9
	1st accumulator spring A	2.6 (0.102)	19.6 (0.772)	69.7 (2.744)	10.8
	1st accumulator spring B	2.5 (0.098)	12.8 (0.504)	49.5 (1.949)	8.5
	3rd accumulator spring	3.8 (0.150)	19.6 (0.772)	59.8 (2.354)	7.8
	4th accumulator spring	3.8 (0.150)	19.6 (0.772)	59.8 (2.354)	7.8
	2nd accumulator spring A	2.6 (0.102)	21.6 (0.850)	73.2 (2.882)	10.0
	2nd accumulator spring B	2.7 (0.106)	14.8 (0.583)	51.0 (2.008)	9.6

Steering — Section 17

Steering — Section 17		
	MEASUREMENT	STANDARD (NEW)
Steering wheel	Rotational play at steering wheel circumference Starting load at steering wheel circumference N (kgf, lbf) Engine running	0 – 10 (0 – 0.39) 30 (3.1, 6.8)
Gearbox	Angle of rack-guide-screw loosened from locked position	5° – 10°
Pump	Pump pressure with shut-off valve closed kPa (kgf/cm ² , psi) D16B6 engine model F18B2, F18B3, F20B6 engine models H22A7 engine model	5,700 – 6,400 (58 – 65, 820 – 920) 6,700 – 7,400 (68 – 75, 970 – 1,070) 6,900 – 7,600 (70 – 77, 1,000 – 1,090)
Power steering fluid	Recommended fluid Fluid capacity ℓ (US qt, Imp qt) For overhaul D16B6 engine model RHD (Except D16B6 engine) LHD (Except D16B6 engine) For fluid change	Honda power steering fluid S 1.0 (1.1, 0.9) 1.1 (1.2, 1.0) 1.0 (1.1, 0.9) 0.4 (0.42, 0.35)
Power steering belt*	Deflection with 98 N (10 kgf, 22 lbf) between pulleys D16B6 engine model Except D16B6 engine model	10.5 – 14.0 (0.41 – 0.55) with used belt 7.5 – 10.0 (0.30 – 0.39) with new belt 13.0 – 16.5 (0.51 – 0.65) with used belt 8.5 – 11.0 (0.33 – 0.43) with new belt
	Belt tension N (kgf, lbf) Measured with belt tension gauge D16B6 engine model Except D16B6 engine model	340 – 490 (35 – 50, 77 – 110) with used belt 640 – 780 (65 – 80, 143 – 176) with new belt 390 – 540 (40 – 55, 88 – 121) with used belt 740 – 880 (75 – 90, 165 – 198) with new belt

*: When using a new belt, adjust deflection or tension to new values. Run the engine for 5 minutes then turn it off.
Readjust deflection or tension to used belt values.

Suspension — Section 18

Suspension — Section 18								
	MEASUREMENT			STANDARD (NEW)				
Wheel alignment	Camber	Front	H22A7 engine model	−0°15′ ± 1°				
			Except H22A7 engine model	0° ± 1°, 0°10′ ± 1°**				
		Rear	H22A7 engine model	−1°15′ ± 30′				
			Except H22A7 engine model	−1°00′ ± 30′, −0°50′ ± 30°**				
	Caster	Front	H22A7 engine model	3°00′ ± 1°				
			Except H22A7 engine model	2°50′ ± 1°, 2°45′ ± 1°**				
	Total toe	Front		0 ± 2 (0 ± 0.08)				
		Rear		IN 2 ± 2 (0.08 ± 0.08)				
	Front wheel turning angle	Inward wheel						
			H22A7 engine model		36°06′ ± 2°			
		Except H22A7 engine model		39°10′ ± 2°, 39°27′ ± 2°				
Outward wheel								
		H22A7 engine model		29°12′ (Reference)				
		Except H22A7 engine model		30°58′ (Reference), 31°14′ (Reference)**				
Wheel bearing	End play	Front		0 – 0.05 (0 – 0.002)				
		Rear		0 – 0.05 (0 – 0.002)				
Wheel	Rim runout	Aluminum wheel	Axial	0 – 0.7 (0 – 0.03)				
			Radial	0 – 0.7 (0 – 0.03)				
		Steel wheel	Axial	0 – 1.0 (0 – 0.04)				
			Radial	0 – 1.0 (0 – 0.04)				
					STANDARD (NEW)		SERVICE LIMIT	

*1: KY model

Standards and Service Limits

Brakes — Section 19

	MEASUREMENT	STANDARD (NEW)
Parking brake lever	Play in stroke at 200 N (20 kgf, 44 lbf) lever force	To be locked when pulled 6 – 9 notches
Foot brake pedal	Pedal height (With floor mat removed) M/T A/T Free play	168.5 (6.63) 173.5 (6.83) 1 – 5 (0.04 – 0.20)
Master cylinder	Piston-to-pushrod clearance	0 – 0.4 (0 – 0.02)
Disc brake	Disc thickness H22A7 engine model Except D16B6, H22A7 engine model D16B6 engine model Disc runout Rear Front Disc parallelism Rear Pad thickness Front and rear Front Rear	STANDARD (NEW) 27.9 – 28.1 (1.10 – 1.11) 24.9 – 25.1 (0.98 – 0.99) 22.9 – 23.1 (0.90 – 0.91) 9.9 – 10.1 (0.390 – 0.398) SERVICE LIMIT 26.0 (1.02) 23.0 (0.91) 21.0 (0.83) 8.0 (0.31) 0.10 (0.004) 0.10 (0.004) 0.015 (0.0006) 1.6 (0.06) 1.6 (0.06)
Drum brake	Drum I.D. Lining thickness	228.6 – 228.7 (9.000 – 9.004) 5.0 (0.20) 229.6 (9.039) 2.0 (0.08)
Brake booster	Characteristics at 98 N (10 kgf, 22 lbf) and 294 N (30 kgf, 66 lbf) pedal force	Minimum line pressure D16B6 engine model Except D16B6 engine model N (kgf, lbf) kPa (kgf/cm ² , psi) N (kgf, lbf) kPa (kgf/cm ² , psi) 0 (0, 0) 98 (10, 22) 0 (0, 0) 98 (10, 22) 0 (0, 0) 294 (30, 66) 1,470 (15, 213) 294 (30, 66) 1,275 (13, 185) 66.7 (500, 19.7) 98 (10, 22) 3,040 (31, 441) 98 (10, 22) 3,825 (39, 555) 294 (30, 66) 6,860 (70, 995) 294 (30, 66) 8,238 (84, 1,194)

Air Conditioning — Section 22

	MEASUREMENT	STANDARD (NEW)
Air conditioning system SANDEN	Lubricant type: SP – 10 (P/N 38897 – P13 – 003, 38898 – P13 – 003 or 38899 – P13 – A01) (For Refrigerant: HFC-134a (R-134a)) Lubricant capacity mℓ (fl oz, Imp oz) Condenser Evaporator Line or hose Receiver	25 (5/6, 0.9) 40 (1 1/3, 1.4) 10 (1/3, 0.4) 10 (1/3, 0.4)
DENSO	Lubricant type: ND – OIL8 (P/N 38897 – PR7 – 003, 38898 – PR7 – 003 or 38899 – PR7 – A01) (For Refrigerant: HFC-134a (R-134a)) Lubricant capacity mℓ (fl oz, Imp oz) Condenser Evaporator Line or hose Receiver	25 (5/6, 0.9) 40 (1 1/3, 1.4) 10 (1/3, 0.4) 10 (1/3, 0.4)
Compressor SANDEN	Lubricant type: SP – 10 Lubricant capacity mℓ (fl oz, Imp oz) Field coil resistance at 20°C (68°F) Ω Pulley-to-pressure plate clearance	130 (4 1/3, 4.6) 3.05 – 3.35 0.5 ± 0.15 (0.02 ± 0.006)
DENSO	Lubricant type: ND – OIL8 Lubricant capacity mℓ (fl oz, Imp oz) Stator coil resistance at 20°C (68°F) Ω Pulley-to-pressure plate clearance	160 (5 1/3, 5.6) 3.9 – 4.3 0.5 ± 0.15 (0.02 ± 0.006)
Compressor belt*	Deflection with 98 N (10 kgf, 22 lbf) between pulleys D16B6 engine All except D16B6 engine Belt tension N (kgf, lbf) Measured with belt tension gauge D16B6 engine All except D16B6 engine	7.5 – 9.5 (0.30 – 0.37) with used belt 5.0 – 6.5 (0.20 – 0.26) with new belt 10.0 – 12.0 (0.39 – 0.47) with used belt 5.5 – 7.5 (0.22 – 0.30) with new belt 340 – 490 (35 – 50, 77 – 110) with used belt 690 – 830 (70 – 85, 150 – 190) with new belt 390 – 540 (40 – 55, 88 – 120) with used belt 880 – 1,030 (90 – 105, 200 – 231) with new belt

*: When using a new belt, adjust deflection or tension to new values. Run the engine for 5 minutes then turn it off.
Readjust deflection or tension to used belt values.

Design Specifications

	ITEM		METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length		4,595 mm	180.9 in	
	Overall Width		1,750 mm	68.9 in	
	Overall Height	Except KY model	1,430 mm	56.3 in	
		KY model	1,445 mm	56.9 in	
	Wheelbase	Except TYPE R	2,668 mm	105.0 in	
		TYPE R	2,670 mm	105.1 in	
	Track Front/Rear	Except TYPE R	1,495/1,504 mm	58.9/59.2 in	
		TYPE R	1,507/1,515 mm	59.3/59.6 in	
	Wheel Arch Front/Rear		666/669 mm	26.2/26.3 in	EU
	Seating Capacity		Five		
WEIGHT	Curb Weight				
	KE	1.6iS	M/T	1,270 kg	2,800 lbs
			M/T with A/C, S/R	1,301 kg	2,868 lbs
		1.6iLS	M/T with A/C, S/R	1,301 kg	2,868 lbs
		1.8iS	M/T	1,345 kg	2,965 lbs
			A/T	1,370 kg	3,020 lbs
			M/T with A/C	1,360 kg	2,998 lbs
			A/T with A/C	1,385 kg	3,053 lbs
			M/T with S/R	1,361 kg	3,000 lbs
			A/T with S/R	1,386 kg	3,056 lbs
		1.8iLS	M/T with S/R	1,361 kg	3,000 lbs
			A/T with S/R	1,386 kg	3,056 lbs
			M/T with A/C, S/R	1,376 kg	3,034 lbs
			A/T with A/C, S/R	1,401 kg	3,089 lbs
		1.8iES	M/T	1,406 kg	3,100 lbs
			A/T	1,431 kg	3,155 lbs
		2.0iLS	M/T with S/R	1,361 kg	3,000 lbs
			A/T with S/R	1,386 kg	3,056 lbs
			M/T with A/C, S/R	1,376 kg	3,034 lbs
			A/T with A/C, S/R	1,401 kg	3,089 lbs
		2.0iES	M/T	1,406 kg	3,100 lbs
			A/T	1,431 kg	3,155 lbs
		TYPE R	M/T	1,345 kg	2,965 lbs
	KG	1.6iS	M/T with A/C	1,285 kg	2,833 lbs
			M/T with S/R	1,286 kg	2,835 lbs
		1.6iLS	M/T with A/C	1,285 kg	2,833 lbs
			M/T with S/R	1,286 kg	2,835 lbs
			M/T with A/C, S/R	1,301 kg	2,868 lbs
		1.8iS	M/T with A/C	1,360 kg	2,998 lbs
			A/T with A/C	1,385 kg	3,053 lbs
			M/T with S/R	1,361 kg	3,000 lbs
		1.8iLS	M/T	1,345 kg	2,965 lbs
			A/T	1,370 kg	3,020 lbs
			M/T with A/C	1,360 kg	2,998 lbs
			A/T with A/C	1,385 kg	3,053 lbs
			M/T with S/R	1,361 kg	3,000 lbs
			A/T with S/R	1,386 kg	3,056 lbs
			M/T with A/C, S/R	1,376 kg	3,034 lbs
			A/T with A/C, S/R	1,401 kg	3,089 lbs
		1.8iES	M/T	1,406 kg	3,100 lbs
			A/T	1,431 kg	3,155 lbs
		2.0iLS	M/T	1,345 kg	2,965 lbs
			A/T	1,370 kg	3,020 lbs
			M/T with A/C	1,360 kg	2,998 lbs
			A/T with A/C	1,365 kg	3,053 lbs
			M/T with S/R	1,361 kg	3,000 lbs
			A/T with S/R	1,386 kg	3,056 lbs
			M/T with A/C, S/R	1,376 kg	3,034 lbs
			A/T with A/C, S/R	1,401 kg	3,089 lbs
		2.0iES	M/T	1,406 kg	3,100 lbs
			A/T	1,431 kg	3,155 lbs
		TYPE R	M/T	1,345 kg	2,965 lbs
	KS	1.6iS	M/T	1,270 kg	2,800 lbs
			M/T with A/C	1,285 kg	2,833 lbs
		1.6iLS	M/T with A/C	1,285 kg	2,833 lbs
		1.8iS	M/T with A/C	1,360 kg	2,998 lbs
		1.8iLS	A/T	1,375 kg	3,031 lbs
			M/T with A/C	1,360 kg	2,998 lbs

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Design Specifications

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	ITEM			METRIC	ENGLISH	NOTES
WEIGHT	KS	2.0iLS	M/T	1,345 kg	2,965 lbs	
		2.0iES	M/T with A/C	1,390 kg	3,064 lbs	
	KR	1.6iS	M/T	1,265 kg	2,789 lbs	
			M/T with ABS	1,270 kg	2,800 lbs	
			M/T with ABS, A/C	1,285 kg	2,833 lbs	
		1.6iLS	M/T with A/C	1,285 kg	2,833 lbs	
			M/T with A/C, S/R	1,301 kg	2,868 lbs	
		1.8iS	M/T with A/C	1,360 kg	2,998 lbs	
		1.8iLS	M/T	1,345 kg	2,965 lbs	
			A/T	1,370 kg	3,020 lbs	
			M/T with A/C	1,360 kg	2,998 lbs	
			A/T with A/C	1,385 kg	3,053 lbs	
			M/T with A/C, S/R	1,376 kg	3,034 lbs	
		1.8iES	M/T	1,375 kg	3,031 lbs	
		2.0LS	M/T	1,360 kg	2,998 lbs	
		2.0ES	M/T	1,406 kg	3,100 lbs	
			A/T	1,431 kg	3,155 lbs	
		TYPE R	M/T	1,345 kg	2,965 lbs	
	KY	1.8iS	M/T	1,340 kg	2,954 lbs	
			A/T	1,365 kg	3,009 lbs	
Weight Distributions (Front/Rear)						
	KE	1.6iS	M/T	730/540 kg	1,610/1,190 lbs	
			M/T with A/C, S/R	753/548 kg	1,660/1,208 lbs	
		1.6iLS	M/T with A/C, S/R	753/548 kg	1,660/1,208 lbs	
		1.8iS	M/T	805/540 kg	1,775/1,190 lbs	
			A/T	830/540 kg	1,830/1,190 lbs	
			M/T with A/C	820/540 kg	1,808/1,190 lbs	
			A/T with A/C	845/540 kg	1,863/1,190 lbs	
			M/T with S/R	813/548 kg	1,792/1,208 lbs	
			A/T with S/R	838/548 kg	1,848/1,208 lbs	
		1.8iLS	M/T with S/R	813/548 kg	1,792/1,208 lbs	
			A/T with S/R	838/548 kg	1,848/1,208 lbs	
			M/T with A/C, S/R	828/548 kg	1,826/1,208 lbs	
			A/T with A/C, S/R	853/548 kg	1,881/1,208 lbs	
		1.8iES	M/T	838/568 kg	1,848/1,252 lbs	
			A/T	863/568 kg	1,903/1,252 lbs	
		2.0iLS	M/T with S/R	823/538 kg	1,814/1,186 lbs	
			A/T with S/R	848/538 kg	1,870/1,186 lbs	
			M/T with A/C, S/R	838/538 kg	1,848/1,186 lbs	
			A/T with A/C, S/R	863/538 kg	1,903/1,186 lbs	
		2.0iES	M/T	848/558 kg	1,870/1,230 lbs	
			A/T	873/558 kg	1,925/1,230 lbs	
		TYPE R	M/T	820/525 kg	1,808/1,157 lbs	
	KG	1.6iS	M/T with A/C	745/540 kg	1,643/1,190 lbs	
			M/T with S/R	738/548 kg	1,627/1,208 lbs	
		1.6iLS	M/T with A/C	745/540 kg	1,643/1,190 lbs	
			M/T with S/R	738/548 kg	1,627/1,208 lbs	
			M/T with A/C, S/R	753/548 kg	1,660/1,208 lbs	
		1.8iS	M/T with A/C	820/540 kg	1,808/1,190 lbs	
			A/T with A/C	845/540 kg	1,863/1,190 lbs	
			M/T with S/R	813/548 kg	1,792/1,208 lbs	
		1.8iLS	M/T	805/540 kg	1,775/1,190 lbs	
			A/T	830/540 kg	1,830/1,190 lbs	
			M/T with A/C	820/540 kg	1,808/1,190 lbs	
			A/T with A/C	845/540 kg	1,863/1,190 lbs	
			M/T with S/R	813/548 kg	1,792/1,208 lbs	
			A/T with S/R	838/548 kg	1,848/1,208 lbs	
			M/T with A/C, S/R	828/548 kg	1,826/1,208 lbs	
			A/T with A/C, S/R	853/548 kg	1,881/1,208 lbs	
		1.8iES	M/T	838/568 kg	1,848/1,252 lbs	
			A/T	863/568 kg	1,903/1,252 lbs	
		2.0iLS	M/T	815/530 kg	1,797/1,168 lbs	
			A/T	840/530 kg	1,852/1,168 lbs	
			M/T with A/C	830/530 kg	1,830/1,168 lbs	
			A/T with A/C	855/530 kg	1,885/1,168 lbs	
			M/T with S/R	823/538 kg	1,814/1,186 lbs	
			A/T with S/R	848/538 kg	1,870/1,186 lbs	
			M/T with A/C, S/R	838/538 kg	1,848/1,186 lbs	
			A/T with A/C, S/R	863/538 kg	1,903/1,186 lbs	

	ITEM			METRIC	ENGLISH	NOTES		
WEIGHT	KG	2.0iES	M/T	848/558 kg	1,870/1,230 lbs			
			A/T	873/558 kg	1,925/1,230 lbs			
	KS	TYPE R	M/T	820/525 kg	1,808/1,157 lbs			
			1.6iS	M/T	730/540 kg		1,610/1,190 lbs	
	KR	1.6iLS	M/T with A/C	745/540 kg	1,643/1,190 lbs			
			M/T with A/C	745/540 kg	1,643/1,190 lbs			
			M/T with A/C	830/530 kg	1,830/1,168 lbs			
			A/T	815/560 kg	1,797/1,234 lbs			
			M/T with A/C	820/540 kg	1,808/1,190 lbs			
			M/T	815/530 kg	1,797/1,168 lbs			
			M/T with A/C	840/550 kg	1,852/1,212 lbs			
			M/T	725/540 kg	1,598/1,191 lbs			
			M/T with ABS	730/540 kg	1,610/1,190 lbs			
			M/T with ABS, A/C	745/540 kg	1,643/1,190 lbs			
			M/T with A/C	745/540 kg	1,643/1,190 lbs			
			M/T with A/C, S/R	753/548 kg	1,660/1,208 lbs			
			M/T with A/C	820/540 kg	1,808/1,190 lbs			
			M/T	805/540 kg	1,775/1,190 lbs			
			A/T	830/540 kg	1,830/1,190 lbs			
			M/T with A/C	820/540 kg	1,808/1,190 lbs			
	A/T with A/C	845/540 kg	1,863/1,190 lbs					
	M/T with A/C, S/R	828/548 kg	1,826/1,208 lbs					
	1.8iES	M/T	815/560 kg	1,797/1,234 lbs				
	2.0LS	M/T	830/530 kg	1,830/1,168 lbs				
	2.0ES	M/T	848/558 kg	1,870/1,230 lbs				
	KY	TYPE R	A/T	873/558 kg	1,925/1,230 lbs			
			M/T	820/525 kg	1,808/1,157 lbs			
			M/T	805/535 kg	1,775/1,179 lbs			
			A/T	830/535 kg	1,830/1,179 lbs			
	Max. Permissible Weight (EU)							
	D16B6 engine model				1,740 kg		3,836 lbs	
	F18B2, F18B3, F20B6 engine models				1,890 kg		4,167 lbs	
	H22A7 engine model				1,820 kg		4,012 lbs	

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Design Specifications

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	ITEM	METRIC	ENGLISH	NOTES
ENGINE	Type			
	D16B6 engine	Water-cooled, 4-stroke SOHC gasoline engine		
	F18B2, F18B3, F20B6 engines	Water-cooled, 4-stroke SOHC VTEC gasoline engine		
	H22A7 engine	Water-cooled, 4-stroke DOHC VTEC gasoline engine		
	Cylinder Arrangement	Inline 4-cylinder, transverse		
	Bore and Stroke			
	D16B6 engine	75.0 x 90.0 mm	2.95 x 3.54 in	
	F18B2, F18B3 engines	85.0 x 81.5 mm	3.35 x 3.21 in	
	F20B6 engine	85.0 x 88.0 mm	3.35 x 3.46 in	
	H22A7 engine	87.0 x 90.7 mm	3.43 x 3.57 in	
	Displacement			
	D16B6 engine	1,590 cm ³ (ml)	97.0 cu-in	
	F18B2, F18B3 engines	1,850 cm ³ (ml)	112.9 cu-in	
	F20B6 engine	1,997 cm ³ (ml)	121.9 cu-in	
	H22A7 engine	2,157 cm ³ (ml)	131.6 cu-in	
	Compression Ratio			
	D16B6 engine	9.6		
	F18B2, F18B3, F20B6 engines	10.0		
	H22A7 engine	11.0		
	Valve Train			
	D16B6 engine	Belt Driven, SOHC 4 valve per cylinder		
	F18B2, F18B3, F20B6 engines	Belt Driven, SOHC VTEC 4 valve per cylinder		
	H22A7 engine	Belt Driven, DOHC VTEC 4 valve per cylinder		
	Lubrication System	Forced and wet sump, trochoid pump		
	Oil Pump Displacement			
	D16B6 engine	35.4 ℓ (37.4 US qt, 31.1 Imp qt)		at 6,000 engine rpm (min ⁻¹)
	Except D16B6 engine	73.5 ℓ (77.7 US qt, 64.7 Imp qt)		
	Water Pump Displacement			
	D16B6 engine	125 ℓ (132 US qt, 110 Imp qt)		at 6,000 engine rpm (min ⁻¹)
	Except D16B6 engine	160 ℓ (169 US qt, 141 Imp qt)		
	Fuel Required			
	D16B6, F18B2, F20B6 engines	Premium UNLEADED gasoline with a Research Octane Number (RON) of 95 or higher		
	F18B3 engine	LEADED gasoline with a Research Octane Number (RON) of 91 or higher* ¹		
	H22A7 engine	Super plus UNLEADED gasoline with a Research Octane Number (RON) of 98 or higher		
STARTER	Type	Gear reduction		
	Normal Output	1.0 kW		
	Normal Voltage	12 V		
	Hour Rating	30 seconds		
	Direction of Rotation	Clockwise as viewed from gear end		

	ITEM		METRIC		ENGLISH		NOTES	
CLUTCH	Type	M/T	Single plate dry, diaphragm spring Torque converter					
	Facing Area	A/T M/T						
TRANSMISSION	Type	M/T A/T	Synchronized 5-speed forward, 1 reverse Electronically controlled 4-speed automatic, 1 reverse Direct/1:1					
	Primary Reduction	Type/Ratio						
	Manual Transmission Gear Ratio		DH	U2J4	U2G5	U2Q7		
			D16B6 engine	F18B2 F18B3 F20B6 engines	F18B2 (7cv) engine	H22A7 engine		
		1st	3.250	3.285	3.285	3.285		
		2nd	1.782	1.807	1.807	2.090		
		3rd	1.250	1.266	1.193	1.481		
		4th	0.937	0.966	0.843	1.071		
		5th	0.750	0.787	0.685	0.870		
	Final Reduction Gear	Reverse	3.153	3.000	3.000	3.000		
		Ratio	4.437	4.266	4.062	4.266		
		Type	Single helical gear					
	Automatic Transmission Gear Ratio	1st	2.528					
2nd		1.427						
3rd		0.976						
4th		0.653						
Reverse		1.863						
Final Reduction Gear	Ratio	4.466						
	Type	Single helical gear						
AIR CONDITIONING	Cooling Capacity		4,780 Kcal/h 3,910 Kcal/h 3,740 Kcal/h		19,000 BTU/h 15,500 BTU/h 14,800 BTU/h		KY model KR model KG, KE models	
	Compressor: SANDEN	Type	Scroll					
		Capacity	85.7 cm ³ /rev	5.22 cu-in/rev				
	Max. Speed	10,000 rpm (min ⁻¹)						
	Lubricant Type	SP - 10						
	DENSO	Lubricant Capacity	130 cm ³	4 1/3 fl oz, 4.6 imp oz				
		Type	Swash-plate					
	No. of Cylinder	10						
	Capacity	188.0 cm ³ /rev	11.47 cu-in/rev					
	Max. Speed	7,600 rpm (min ⁻¹)						
	Lubricant Type	ND - OIL8						
	Lubricant Capacity	160 cm ³	5 1/3 fl oz, 5.6 imp oz					
	Condenser	Type	Corrugated fin					
Evaporator	Type	Corrugated fin						
Blower	Type	Sirocco fan				*1: Manual A/C *2: AUTO A/C		
	Motor Input	220 W/12 V max.						
Speed Control	4-speed*/Infinite variable*2							
Max. Capacity	470 m ³ /h	16,600 cu-ft/h						
	Temp. Control	Type	Air Mix					
Compressor Clutch	Type	Dry, single plate, poly-V belt drive						
	Power Consumption	40 W max/12 V 40 W max/12 V						
Refrigerant	SANDEN	HFC - 134a (R - 134a)						
	DENSO	500 - 550 g	18 - 19 oz					
STEERING SYSTEM	Type	Power assisted, rack and pinion						
	Overall Ratio	15.50 15.74						
	Turns, Lock-to-Lock	Except H22A7 engine model	3.02					
		H22A7 engine model	2.88					
	Steering Wheel Dia.	380 mm	15.0 in					

(cont'd)

Design Specifications

(cont'd)

(cont d)	ITEM		METRIC	ENGLISH	NOTES
SUSPENSION	Type	Front	Independent double wishbone, coil spring with stabilizer		
		Rear	Independent double wishbone, coil spring with stabilizer		
	Shock Absorber	Front and Rear	Telescopic, hydraulic nitrogen gas-filled		
WHEEL ALIGNMENT	Camber				
	Front	H22A7 engine model Except H22A7 engine model	-0°15' 0°00', 0°10'' ^{*1}		
	Rear	H22A7 engine model Except H22A7 engine model	-1°15' -1°00', -0°50'' ^{*1}		
	Caster				
	Front	H22A7 engine model Except H22A7 engine model	3°00' 2°50', 2°45'' ^{*1}		
	Total Toe	Front Rear	0 mm In 2 mm	0 in In 0.08 in	
BRAKE SYSTEM	Type	Front	Power-assisted self-adjusting ventilated disc		H22A7 engine model Except H22A7, D16B6 engine model D16B6 engine model Disk brake Drum brake
		Rear	Power-assisted self-adjusting solid disc* ² Power-assisted self-adjusting drum* ³		
	Pad Surface Area	Front	53.2 cm ² x 2 47.6 cm ² x 2	8.25 sq-in x 2 7.38 sq-in x 2	
		Rear	40.0 cm ² x 2 25.4 cm ² x 2	6.20 sq-in x 2 3.94 sq-in x 2	
	Lining Surface Area	Rear	86.8 cm ² x 2	13.45 sq-in x 2	
	Parking Brake	Type	Mechanical actuating, rear two wheel brakes		
TIRE	Size and Pressure		See tire label (see page 1-12)		
WASHER RESERVOIR	Capacity ℓ (US qt, Imp qt)		4.5* ⁸ (4.8, 4.0) 6.9* ⁹ (7.3, 6.1)		
ELECTRICAL	Battery		* ⁴ 12 V - 47 AH - 20 HR * ⁵ 12 V - 57 AH - 20 HR		
	Under-hood fuse/relay box		100 A, 50 A, 40 A, 30 A, 20 A, 15 A, 10 A, 7.5 A		
	Driver's under-dash fuse/relay box		30 A, 15 A, 10 A, 7.5 A		
	Passenger's under-dash fuse/relay box		30 A, 20 A, 7.5 A		
	Headlight high beam		12 V - 55 W		
	Headlight low beam		* ⁶ 12 V - 35 W * ⁷ 12 V - 55 W		
	Front turn signal lights		12 V - 21 W		
	Front parking lights		12 V - 5 W		
	Front fog lights		12 V - 55 W		
	Side turn signal lights		12 V - 5 W		
	Rear turn signal lights		12 V - 21 W		
	Brake lights		12 V - 21 W		
	Tail lights		12 V - 5 W		
	High mount brake light		12 V - 5 W		
	Back-up lights		12 V - 21 W		
	Rear fog light		12 V - 21 W		
	License plate lights		12 V - 5 W		
	Front ceiling light		12 V - 5 W		
	Rear ceiling light		12 V - 5 W		
	Trunk light		12 V - 5 W		
	Glove box light		12 V - 3.4 W		
	Spotlights		12 V - 5 W		
	Gauge lights		14 V - 1.12 W, 1.4 W, 3.0 W, 9.5 V - 1.1 W		
	Indicator lights		12 V - LED, 14 V - 0.84 W, 1.4 W		
	Panel and pilot lights		14 V - 0.84 W, 1.2 W		

*1: KY model

*2: Except B16B6 engine model

*3: B16B6 engine model

*4: CG7 (Vehicle type)

*5: Except CG7 (Vehicle type)

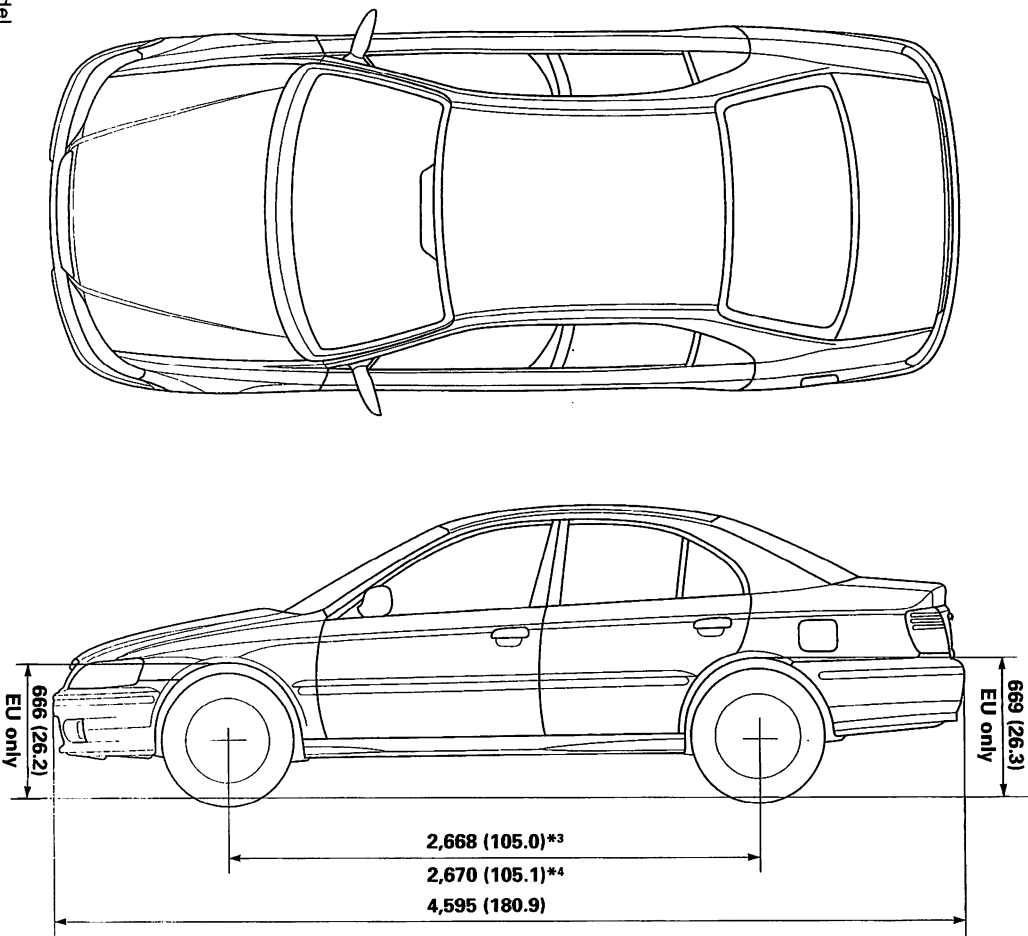
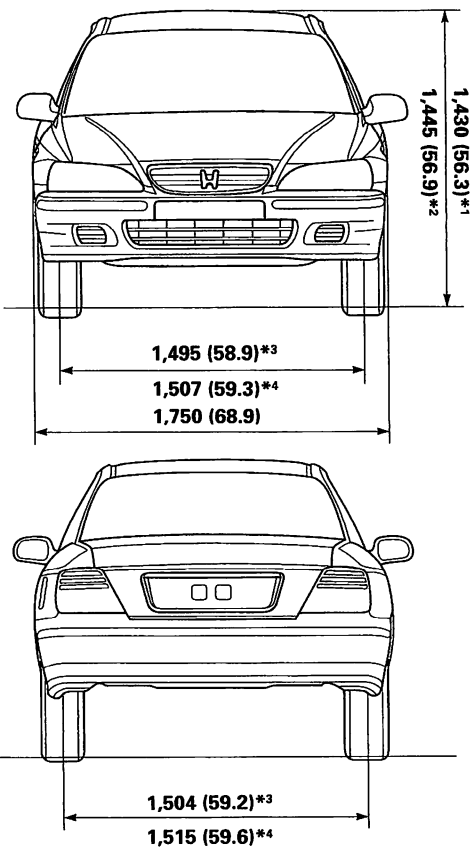
*6: With HID lamp

*7: Without HID lamp

*8: Without Headlight Washer

*9: With Headlight Washer

Unit: mm (in)



*1: Except KY model
*2: KY model
*3: Except TYPE R
*4: TYPE R



Maintenance

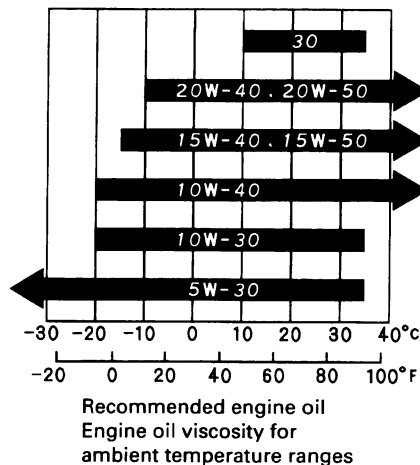
Lubrication Points 3-2

Maintenance Schedule 3-4

Lubrication Points

For the details of lubrication points and type of lubricants to be applied, refer to the illustrated index and various work procedure (such as Assembly/Reassembly, Replacement, Overhaul, Installation, etc.) contained in each section.

NO.	LUBRICATION POINTS		LUBRICANT
1	Engine		Always use a fuel-efficient oil is that says "API Service SG, SH or SJ." SAE Viscosity: See chart below.
2	Transmission	Manual	Genuine Honda MTF*1
		Automatic	Genuine Honda ATF PREMIUM (Automatic Transmission Fluid-PREMIUM) or DEXRON® II or III ATF
3	Brake line (includes Anti-lock brake line)		Brake fluid DOT3 or DOT4*2
4	Clutch line		Brake fluid DOT3 or DOT4*2
5	Power steering gearbox		Steering grease P/N 08733 – B070E
6	Release fork (Manual transmission)		Urea Grease UM264 (P/N 41211 – PY5 – 305)
7	Shift and select cable ends (Manual transmission)		
8	Throttle cable end (Dashboard lower panel hole)		Silicone grease
9	Throttle cable end (Throttle link)		Multi-purpose grease
10	Brake master cylinder pushrod		
11	Clutch master cylinder pushrod		
12	Hood hinges and hood latch		
13	Battery terminals		
14	Fuel fill lid		
15	Trunk hinges and latch		
16	Door hinges, upper and lower		
17	Door open detent		
18	Rear brake shoe linkages		
19	Brake calipers		Silicone grease
20	Power steering system		Genuine Honda Power Steering Fluid (V, II or S)
21	Air conditioning compressor		Compressor oil: SANDEN: SP-10 (P/N 38897 – P13 – 003, 38898 – P13 – 003 or 38899 – P13 – A01) DENSO: ND OIL 8 (38897 – PR7 – 003, 38898 – PR7 – 003 or 38899 – PR7 – A01) (For Refrigerant: HFC-134a (R-134a))

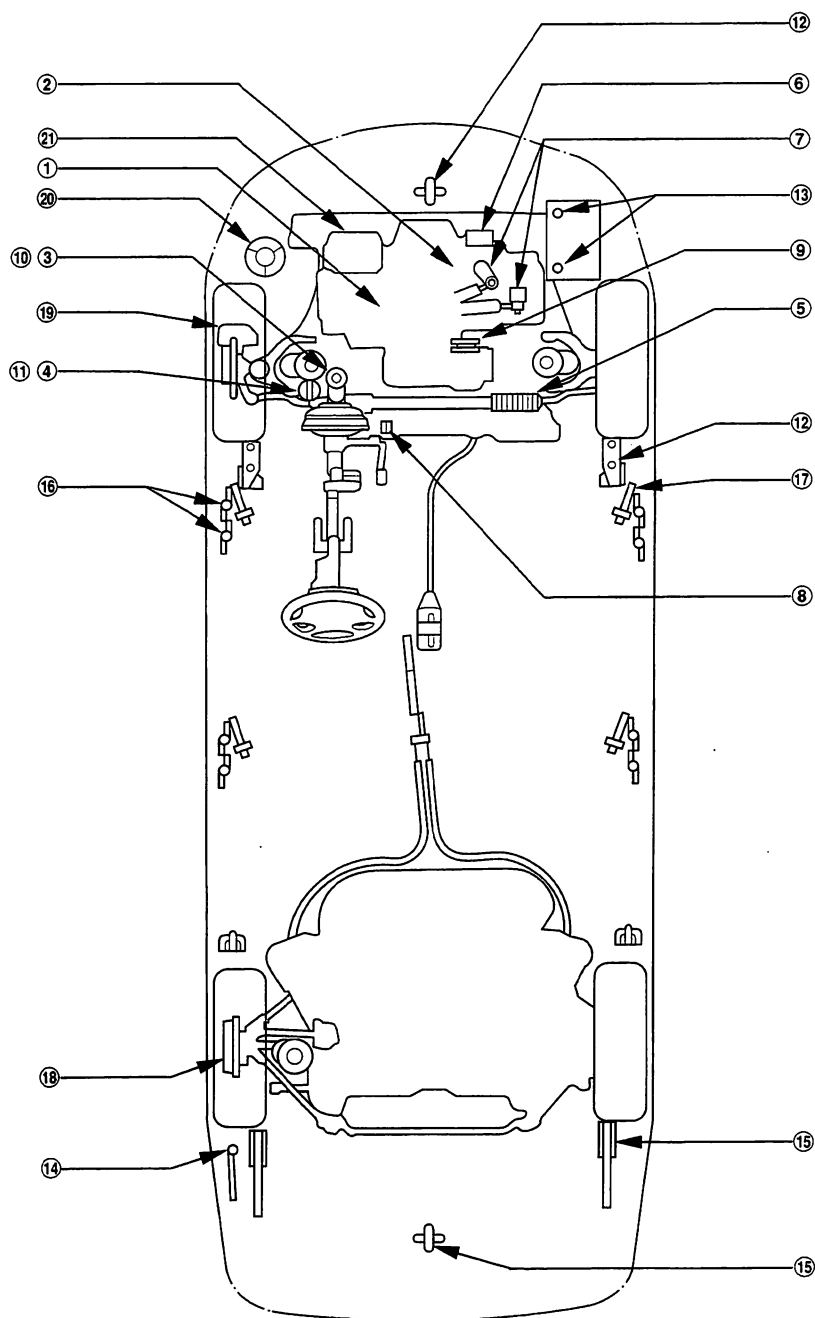


CAUTION: Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

*1: If Honda MTF is not available, you may use an API service SG, SH or SJ-rated motor oil with a viscosity of SAE 10 W – 30 or 10 W – 40 temporarily.

Motor oil can cause increased transmission wear and higher shifting effort.

*2: We recommend Genuine Honda Brake Fluid.



Follow the Normal Maintenance Schedule if the severe driving conditions specified in the Severe Conditions Maintenance Schedule on pages 3-6 and 3-7 do not apply.

Service at the indicated distance or time whichever comes first.	km x 1,000	15	30	45	60	75	90	105	120	135	150	165	NOTES	SECTION and PAGE
	miles x 1,000	9	18	27	36	45	54	63	72	81	90	99		
	months	12	24	36	48	60	72	84	96	108	120	132		
Replace engine oil and oil filter		●	●	●	●	●	●	●	●	●	●	●		8-7 to 8-10
Replace air cleaner element				●			●			●				11-A-119
Inspect valve clearance				●			●			●			Check the valve clearance.	6-A-3 6-B-12 6-C-9
Replace fuel filter				●			●			●				11-A-105
Replace spark plugs	Except Type R			●			●			●				4-31
	Type R								●					4-32
Replace timing belt, timing balancer belt and inspect water pump									●				Check water pump for signs of seal leakage.	6-A-8, 6-B-18, 6-C-14, 10-17
Inspect and adjust drive belts				●			●			●			<ul style="list-style-type: none"> • Check for cracks and damage. • Check deflection and tension. 	4-46, 47, 48 17-14 22-53, 54
Inspect idle speed								●						11-A-94 11-B-65 11-C-57
Replace engine coolant						●			●			●	Check specific gravity for freezing point.	10-7 to 10-10
Replace transmission fluid (○: Inspect)	MT				○				●				Manual transmission: Genuine Honda MTF Automatic transmission: Genuine Honda ATF PREMIUM (Automatic Transmission Fluid-PREMIUM) or DEXRON II or III ATF.	13-3, 57
	AT			○*1		●			○		●			14-132
Inspect front and rear brakes		●	●	●	●	●	●	●	●	●	●	●	<ul style="list-style-type: none"> • Check the brake pad and disc thickness. Check for damage or cracks. • Check the calipers for damage, leaks, and tightness. 	19-A-4, 10, 12, 14, 15, 17, 26, 28, 30, 31
Replace brake fluid		Every 3 years											Use only DOT3 or DOT4*2 fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-A-7
Check parking brake adjustment		●	●		●		●		●		●		Check the parking brake operation.	19-A-6
Replace pollen filter		Every 30,000 km (18,000 miles) or 12 months												22-39
Check lights alignment		●	●	●	●	●	●	●	●	●	●	●	Check the position of the headlights.	23-D-9
Test drive (noise, stability, dashboard operation)		●	●	●	●	●	●	●	●	●	●	●	Check for road stability, noise, vibrations and dashboard operation.	—

*1: Inspect at 45,000 km (27,000 miles)/36 months, and every 45,000 km (27,000 miles)/36 months after replacement.

*2: We recommend Genuine Honda Brake Fluid.

Service at the indicated distance or time whichever comes first.	km x 1,000	15	30	45	60	75	90	105	120	135	150	165	NOTES	SECTION and PAGE
	miles x 1,000	9	18	27	36	45	54	63	72	81	90	99		
	months	12	24	36	48	60	72	84	96	108	120	132		
Visually inspect the following items:													<ul style="list-style-type: none"> • Check for correct installation and position, check for cracks, deterioration, rust, and leaks. • Check tightness of screws, nuts, and joints. If necessary, retighten. 	_____
Tie rod ends, steering gearbox, and boots													<ul style="list-style-type: none"> • Check rack grease and steering linkage. • Check the boot for damage and leaking grease. • Check the fluid line for damage and leaks. 	17-13, 26
Suspension components													<ul style="list-style-type: none"> • Check the bolts for tightness. • Check the all dust cover for deterioration and damage. 	18-9, 10, 11, 20, 21, 22
Driveshaft boots													<ul style="list-style-type: none"> • Check boots and boot band for cracks. • Check rack grease. 	16-3
Brake hoses and lines (including ABS)	●	●	●	●	●	●	●	●	●	●	●	●	Check the master cylinder, proportioning control valve and ABS modulator for damage and leakage.	19-A-3, 36
Exhaust system													Check the catalytic converter heat shield, exhaust pipe and muffler for damage, leaks and tightness.	9-9 to 9-12
Fuel lines and connections													Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged parts.	11-A-95 11-C-59
Tyre condition													Check for pressure, puncture or cuts and irregular thread wear.	_____



Maintenance Schedule

European Model — Severe Conditions

Service at the indicated distance or time whichever comes first.	km x 1,000	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	NOTES	SECTION and PAGE
	miles x 1,000	4.5	9	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72		
	months	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96		
Replace engine oil and oil filter		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		8-7 to 8-10
Clean (○) or replace (●) air cleaner element — Use normal schedule except in dusty conditions				○			●			○			●			○			11-A-119
Inspect valve clearance							●						●					Check the valve clearance.	6-A-3, 6-B-12, 6-C-9
Replace fuel filter							●						●						11-A-105
Replace spark plugs	Except TYPE R						●						●						4-31
	TYPE R																●		4-32
Replace timing belt, timing balancer belt and inspect water pump																	*1 ●	Check water pump for signs of seal leakage.	6-A-8, 6-B-18, 6-C-14, 10-17
Inspect and adjust drive belts							●						●					• Check for cracks and damage. • Check deflection and tension.	4-46, 47, 48 17-14 22-53, 54
Inspect idle speed															●				11-A-94 11-B-65 11-C-57
Replace engine coolant											●						●	Check specific gravity for freezing point.	10-7 to 10-10
Replace transmission fluid	MT								●								●	Manual transmission: Genuine Honda MTF Automatic transmission: Genuine Honda ATF PREMIUM (Automatic Transmission Fluid-PREMIUM) or DEXRON II or III ATF.	13-3, 57
	AT						●						●						14-132
Inspect front and rear brakes		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	• Check the brake pad and disc thickness. Check for damage or cracks. • Check the calipers for damage, leaks, and tightness.	19-A-4, 10, 12, 14, 15, 17, 26, 28, 30, 31
Replace brake fluid		Every 3 years																Use only DOT3 or DOT4*2 fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-A-7
Check parking brake adjustment			●		●				●				●				●	Check the parking brake operation.	19-A-6
Replace pollen filter		Every 30,000 km (18,000 miles) or 12 months																	22-39
Check lights alignment			●		●		●		●		●		●		●		●	Check the position of the headlights.	23-D-9
Test drive (noise, stability, dashboard operations)			●		●		●		●		●		●		●		●	Check for road stability, noise, vibrations and dashboard operation.	—

*1: These belts should normally be replaced at the intervals shown in the maintenance schedule. (Normal Conditions)

Replace these belts at 75,000 km or 45,000 miles if you regularly drive your vehicle in one or more of these conditions.

• In very high temperatures [43°C (110°F) above]

• In very low temperatures [–29°C (–20°F) under]

*2: We recommend Genuine Honda Brake Fluid.

Service at the indicated distance or time whichever comes first.	km x 1,000	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	NOTES	SECTION and PAGE
	miles x 1,000	4.5	9	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72		
	months	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96		
Visually inspect the following items:																		<ul style="list-style-type: none">• Check for correct installation and position, check for cracks, deterioration, rust, and leaks.• Check tightness of screws, nuts, and joints. If necessary, retighten.	_____
Tie rod ends, steering gearbox, and boots																		<ul style="list-style-type: none">• Check rack grease and steering linkage.• Check the boot for damage and leaking grease.• Check the fluid line for damage and leaks.	17-13, 26
Suspension components	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	<ul style="list-style-type: none">• Check the bolts for tightness.• Check the all dust cover for deterioration and damage.	18-9, 10, 11, 20, 21, 22
Driveshaft boots																		<ul style="list-style-type: none">• Check boots and boot band for cracks.• Check rack grease.	16-3
Brake hoses and lines (including ABS)																		Check the master cylinder, proportioning control valve and ABS modulator for damage and leakage.	19-A-3, 36
Exhaust system																		Check the catalytic converter heat shield, exhaust pipe and muffler for damage, leaks and tightness.	9-9 to 9-12
Fuel lines and connections		●		●		●		●		●		●		●		●		Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged parts.	11-A-95 11-C-59
Tyre condition																		Check for pressure, puncture or cuts and irregular thread wear.	_____

Follow the Severe Maintenance Schedule if the customer's vehicle is driven MAINLY under one or more of the following conditions:

- Driving less than 8 km (5 miles) per trip or, in freezing temperatures, driving less than 16 km (10 miles) per trip.
- Driving in extremely hot [over 32°C, (90°F)] conditions.
- Extensive idling or long periods of stop-and-go driving.
- Trailer towing, driving with a car-top carrier, or driving in mountainous conditions.
- Driving on muddy, dusty, or de-iced roads.

NOTE: If the customer's vehicle is driven OCCASIONALLY under severe condition, you should follow the Normal Conditions Maintenance Schedule on pages 3-4 and 3-5.



This Maintenance Schedule outlines the minimum required maintenance that you should perform to ensure the trouble-free operation of the customer's vehicle. Due to regional and climatic differences, some additional servicing may be required. Please consult the warranty handbook for a more detailed description.

Service at the indicated distance or time whichever comes first.	km x 1,000	20	40	60	80	100	120	140	160	180	200	NOTES	SECTION and PAGE
	miles x 1,000	12	24	36	48	60	72	84	96	108	120		
	months	12	24	36	48	60	72	84	96	108	120		
Replace engine oil		Every 5,000 km (3,000 miles) or 6 months											8-7
Replace engine oil filter		Every 5,000 km (3,000 miles) or 6 months											8-8 to 8-10
Clean or replace air cleaner element		Clean every 10,000 km (6,000 miles) or 6 months and replace every 20,000 km (12,000 miles) or 12 months.											11-A-119
Inspect valve clearance		●	●	●	●	●	●	●	●	●	●	Check the valve clearance.	6-B-12
Replace fuel filter			●		●		●		●		●		11-A-105
Replace spark plugs		●	●	●	●	●	●	●	●	●	●		4-31
Inspect distributor cap, rotor and ignition wiring			●		●		●		●		●		4-26, 27, 29
Replace timing belt, timing balancer belt and inspect water pump						●					●	Check water pump for signs of seal leakage.	6-B-18 10-17
Inspect and adjust drive belts			●		●		●		●		●	<ul style="list-style-type: none"> • Check for cracks and damage. • Check deflection and tension. 	4-46, 47, 48 17-14 22-53, 54
Inspect idle speed and idle CO		●	●	●	●	●	●	●	●	●	●		11-A-94 11-B-65 11-C-57
Replace engine coolant					●		●		●		●	Check specific gravity for freezing point.	10-7 to 10-10
Inspect PCV valve			●		●		●		●		●	Check the clicking sound of motion from the PCV valve of idling.	11-A-143, 11-C-79
Inspect ignition timing			●		●		●		●		●		4-21
Inspect evaporative emission control system						●					●	<ul style="list-style-type: none"> • Check the EVAPO control canister operation. • Check the hose for blockage, cracks or disconnected. 	11-A-144, 11-B-81, 11-C-80
Replace transmission fluid			●		●		●		●		●	Manual transmission: Genuine Honda MTF Automatic Transmission: Genuine Honda ATF PREMIUM (Automatic Transmission Fluid- PREMIUM) or DEXRON II or III ATF.	13-3, 57 14-132
Inspect front and rear brakes		Every 10,000 km (6,000 miles) or 6 months										<ul style="list-style-type: none"> • Check the brake pad and disc thickness. • Check for damage or cracks. • Check the calipers for damage, leaks, and tightness. 	19-A-4, 10, 12, 14, 15, 17, 26, 28, 30, 31

KY Model

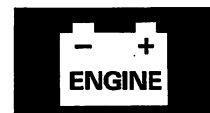
Maintenance Schedule

Service at the indicated distance or time whichever comes first.	km x 1,000	20	40	60	80	100	120	140	160	180	200	NOTES	SECTION and PAGE
	miles x 1,000	12	24	36	48	60	72	84	96	108	120		
	months	12	24	36	48	60	72	84	96	108	120		
Replace brake fluid			●		●		●		●		●	Use only DOT3 or DOT4** fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-A-7
Check parking brake adjustment		●	●		●		●		●		●	Check the parking brake operation.	19-A-6
Rotate tyres (Check tyre inflation and condition at least once per month)	Rotate tyres every 10,000 km (6,000 miles)											The suggested rotation method is shown in the diagram of the Owner's Manual.	_____
Visually inspect the following items:												<ul style="list-style-type: none">• Check for correct installation and position, check for cracks, deterioration, rust, and leaks.• Check tightness of screws, nuts, and joints. If necessary, retighten.	_____
Tie rod ends, steering gearbox, and boots	Every 10,000 km (6,000 miles) or 6 months											<ul style="list-style-type: none">• Check rack grease and steering linkage.• Check the boot for damage and leaking grease.• Check the fluid line for damage and leaks.	17-13, 26
Suspension components												<ul style="list-style-type: none">• Check the bolts for tightness.• Check the all dust cover for deterioration and damage.	18-9, 10, 11, 20, 21, 22
Driveshaft boots												<ul style="list-style-type: none">• Check boots and boot band for cracks.• Check rack grease.	16-3
Brake hoses and lines (including ABS)	●	●	●	●	●	●	●	●	●	●	Check the master cylinder, proportioning control valve and ABS modulator for damage and leakage.	19-A-3, 36	
Cooling system hoses and connection											<ul style="list-style-type: none">• Check all hoses for damage, leaks or deterioration.• Check all hose clamps. Retighten if necessary.	10-2, 4	
Exhaust system											Check the catalytic converter heat shield, exhaust pipe and muffler for damage, leaks and tightness.	9-10	
Fuel lines and connections											Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged parts.	11-A-95 11-C-59	

*1: We recommend Genuine Honda Brake Fluid.



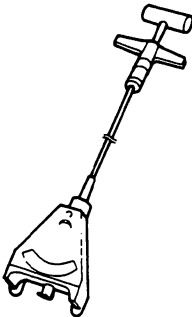
Engine Electrical



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(Except D16B6 engine)	4-26	Actuator Cable Adjustment	4-57
Ignition Control Module (ICM) Input		Clutch Switch Test	4-58
Test (Except D16B6 engine)	4-28	Brake Switch Test	4-58
Ignition Wire Inspection and			
Test	4-29		

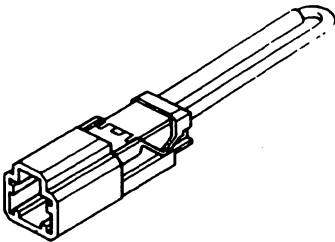
Special Tools

Ref. No.	Tool Number	Description	Qty	Remark
①	07JGG – 0010100	Belt Tension Gauge	1	
②	07PAZ – 0010100	SCS Short Connector	1	



A line drawing of a belt tension gauge. It features a long, thin metal rod with a T-shaped handle at one end and a specialized measurement head at the other. The head has a curved, hook-like shape with a small circular dial or scale on its side.

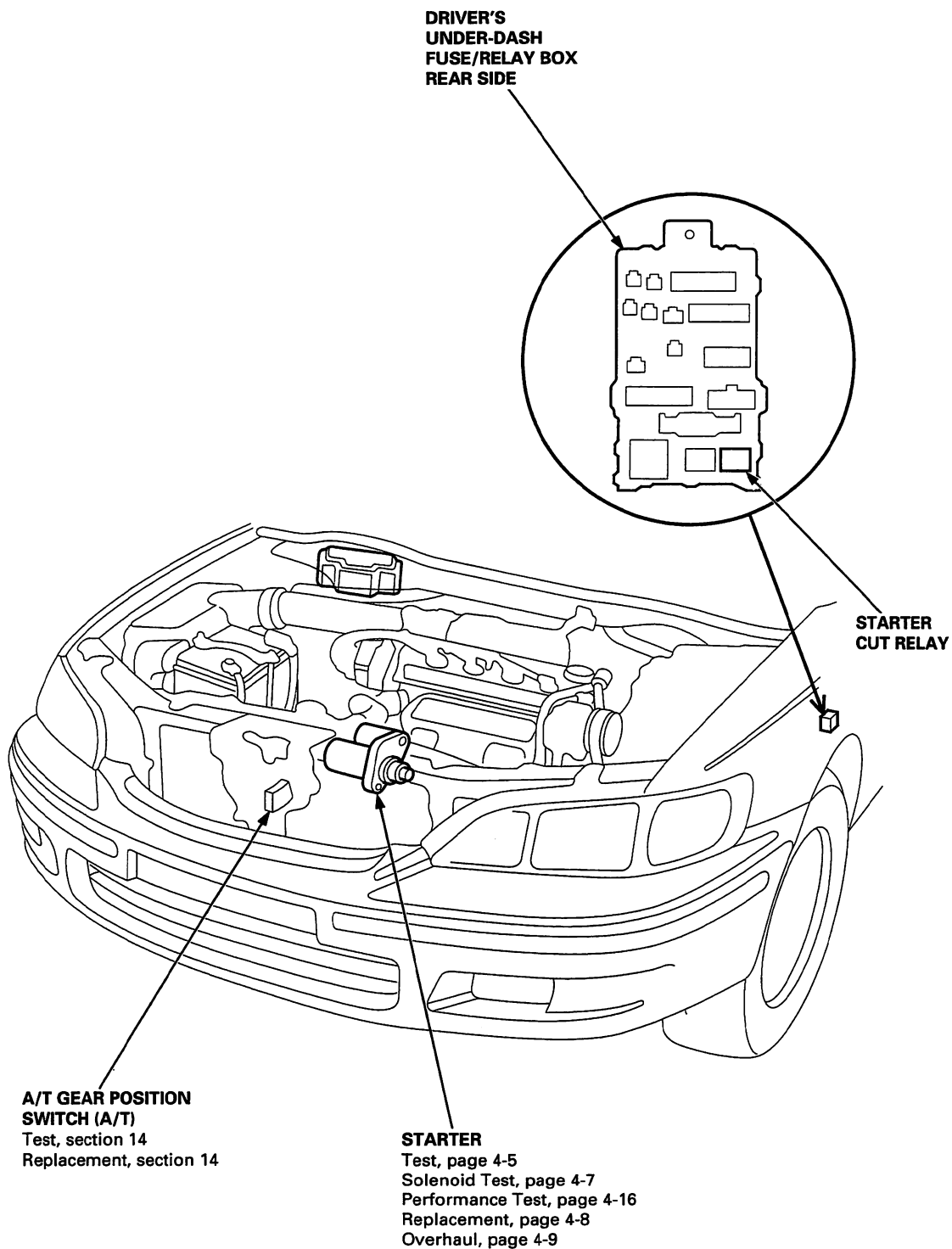
①



A line drawing of an SCS short connector. It is a rectangular plastic component with a long, thin metal rod inserted through its center. The rod has a small, curved hook-like end. The connector has a locking mechanism on its side.

②

Component Location Index



Circuit Diagram

BATTERY

UNDER-HOOD FUSE/RELAY BOX

No. 41 (100A) No. 42 (50A)

IGNITION SWITCH

BAT ST

BLK

WHT

BLK/WHT

STARTER CUT RELAY

No. 13 (7.5A)

BLU/ORN

ECM/PCM
PGM-FI
MAIN RELAY

DRIVER'S UNDER-DASH FUSE/RELAY BOX

BLK

BLK/WHT

(Except H22A7 engine)

B S

M SOLENOID

STARTER (Permanent magnet type)

(H22A7 engine)

B S

M SOLENOID

STARTER (Field winding type)

(A/T)

BLU/WHT

BLK

A/T GEAR POSITION SWITCH
(ON : P and N position)

G101

(M/T)

BLK

G401

Starter Test

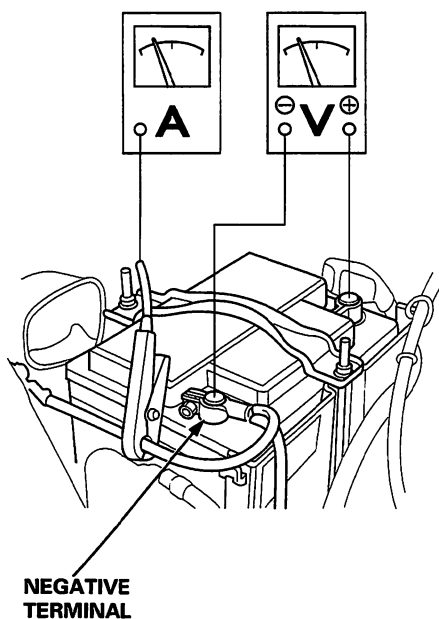
NOTE: The air temperature must be between 15 and 38°C (59 and 100°F) before testing.

Recommended Procedure:

- Use a starter system tester.
- Connect and operate the equipment in accordance with the manufacturer's instructions.
- Test and troubleshoot as described.

Alternate Procedure:

- Use following equipment:
 - Ammeter, 0 – 400 A
 - Voltmeter, 0 – 20 V (accurate within 0.1 volt)
 - Tachometer, 0 – 1,200 rpm (min⁻¹)
- Hook up a voltmeter and ammeter as shown.



NOTE: After this test, or any subsequent repair, reset the ECM to clear any codes (see section 11).

Check the Starter Engagement:

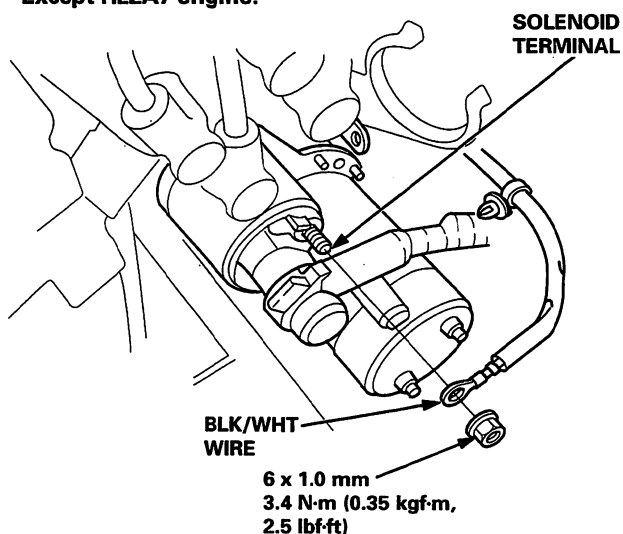
1. Remove the No. 31 (15 A) fuse from the under-hood fuse/relay box.
2. Turn the ignition switch to START (III) with the shift lever in **N** or **P** position (A/T) or neutral position (M/T). The starter should crank the engine.
 - If the starter does not crank the engine, go to step 3.
 - If it cranks the engine erratically or too slowly, go to "Check for Wear and Damage" on the next page.

3. Check the battery, battery positive cable, ground, starter cut relay, and the wire connections for looseness and corrosion. Test again.
If the starter still does not crank the engine, go to step 4.

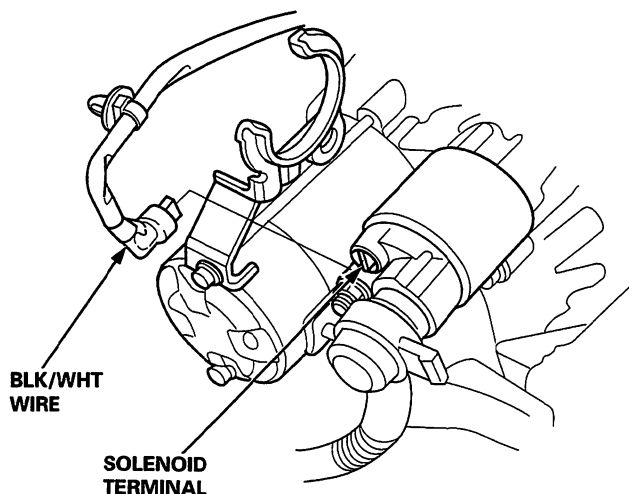
4. Unplug the connector (BLK/WHT wire and solenoid terminal) from the starter.

5. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal.
The starter should crank the engine.

Except H22A7 engine:



H22A7 engine:



- If the starter still does not crank the engine, remove it, and diagnose its internal problem.
- If the starter cranks the engine, go to step 6.

(cont'd)

Starting System

Starter Test (cont'd)

6. Check the ignition switch (see section 23).
7. Check the starter cut relay (see section 23).
8. Check the A/T gear position switch (see section 14).
9. Check for an open in the wire between the ignition switch and starter.
10. Check the immobilizer system (see section 23).

Check for Wear and Damage

The starter should crank the engine smoothly and steadily. If the starter engages, but cranks the engine erratically, remove it, and inspect the starter drive gear and torque converter or flywheel ring gear for damage.

- Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held.
 - If damaged, replace the gears.

Check Cranking Voltage and Current Draw

Cranking voltage should be no less than 8.0 volts.
Current draw should be no more than *1 amperes.

*1 Valeo:	300
DENSO:	200

If cranking voltage is too low, or current draw too high, check for:

- dead or low battery.
- open circuit in starter armature commutator segments.
- starter armature dragging.
- shorted armature winding.
- excessive drag in engine.

Check Cranking rpm

Engine speed during cranking should be above 100 rpm (min^{-1}).

If speed is too low, check for:

- loose battery or starter terminals.
- excessively worn starter brushes.
- open circuit in commutator segments.
- dirty or damaged helical spline or drive gear.
- defective drive gear overrunning clutch.

Check Starter Disengagement

With the shift lever in **N** or **P** position (A/T) or neutral position (M/T), turn the ignition switch to START (III), and release to ON (II).

The starter drive gear should disengage from the torque converter or flywheel ring gear when you release the key.

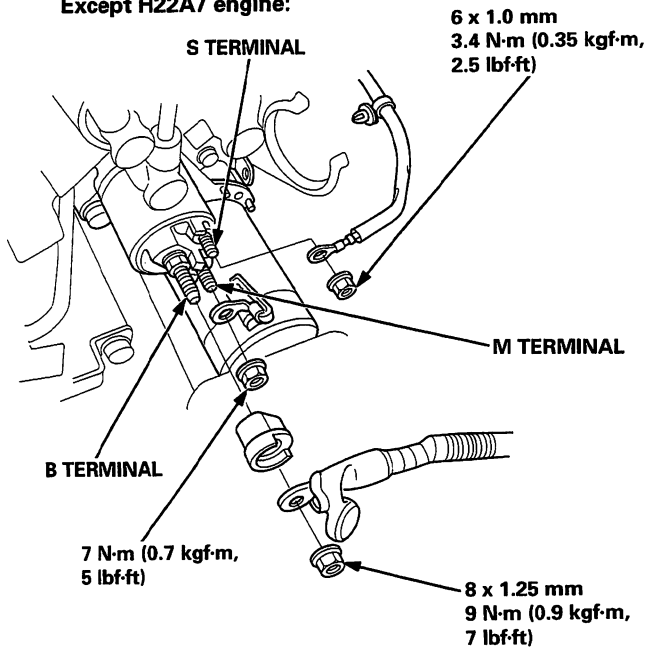
If the drive gear hangs up on the torque converter or flywheel ring gear, check for:

- solenoid plunger and switch malfunction.
- dirty drive gear assembly or damaged overrunning clutch.

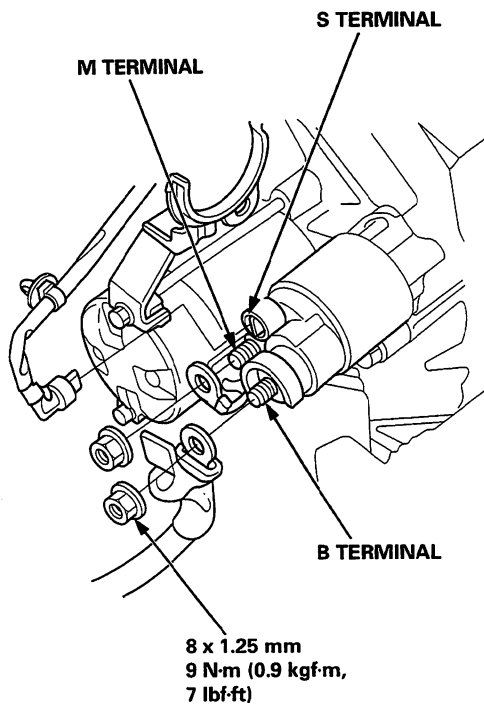
Starter Solenoid Test

1. Check the hold-in coil for continuity between the S terminal and the armature housing (ground). The coil is OK if there is continuity.

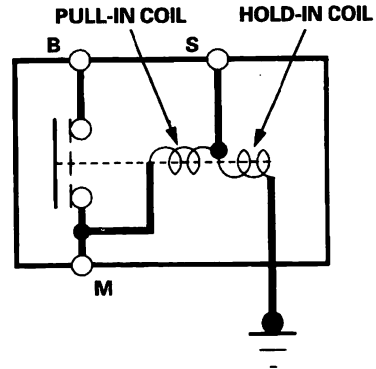
Except H22A7 engine:



H22A7 engine:



2. Check the pull-in coil for continuity between the S and M terminals. The coil is OK if there is continuity.

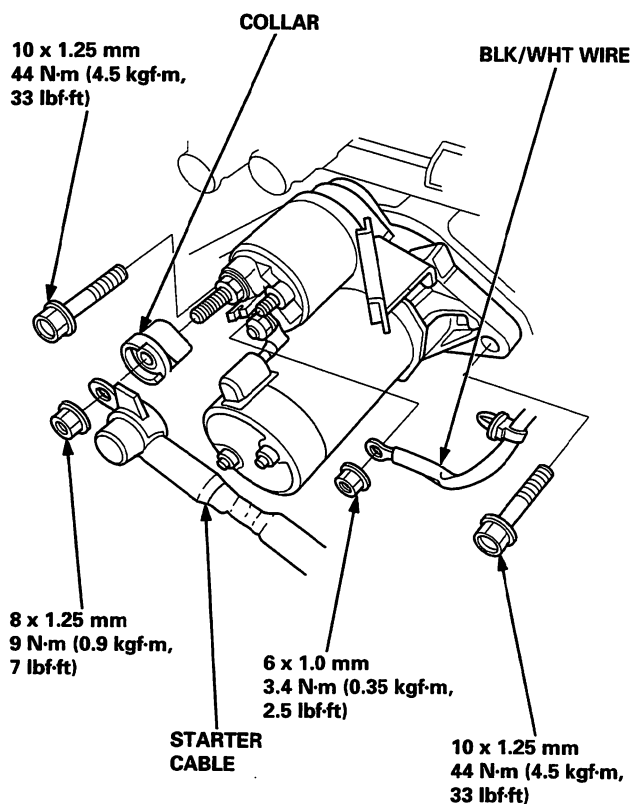


Starting System

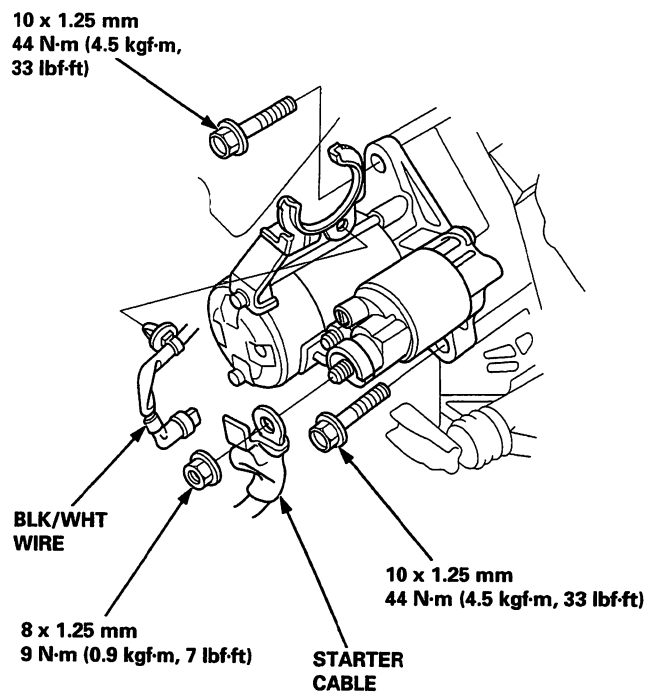
Starter Replacement

1. Disconnect the battery negative cable, then disconnect the positive cable, and wait at least three minutes.
2. Remove the engine wire harness and radiator lower hose from the bracket on the starter motor.
3. Disconnect the starter cable from the B terminal on the solenoid, then disconnect the BLK/WHT wire from the S terminal wire.

Except H22A7 engine:

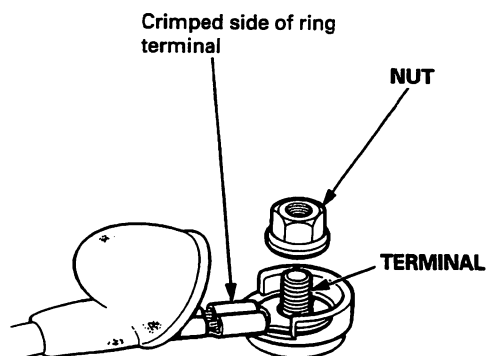


H22A7 engine:



4. Remove the two bolts holding the starter, then remove the starter.
5. Install in the reverse order of removal.

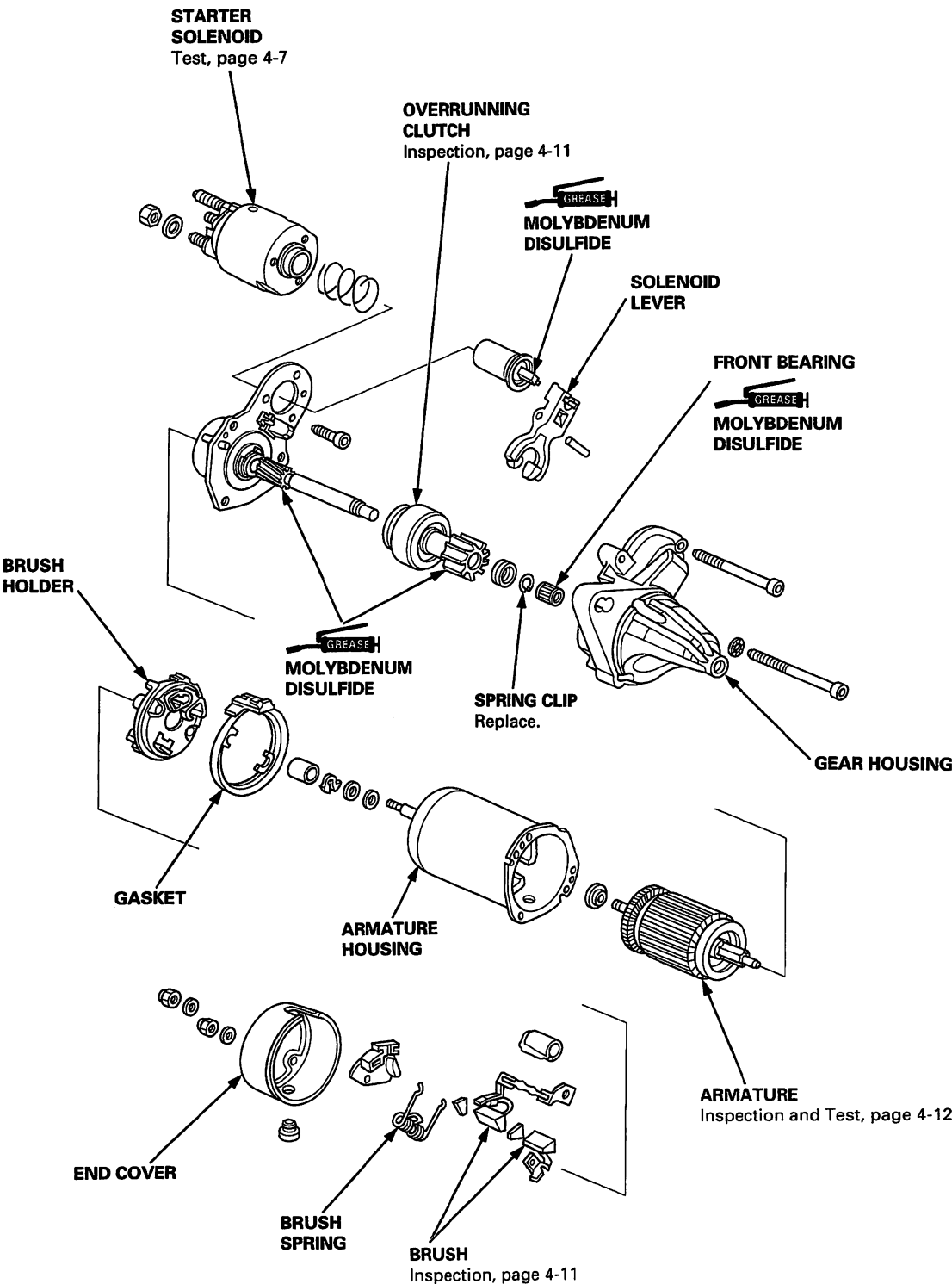
NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out.



6. Connect the battery positive cable and negative cable to the battery.

Starter Overhaul (VALEO)

Except H22A7 engine:

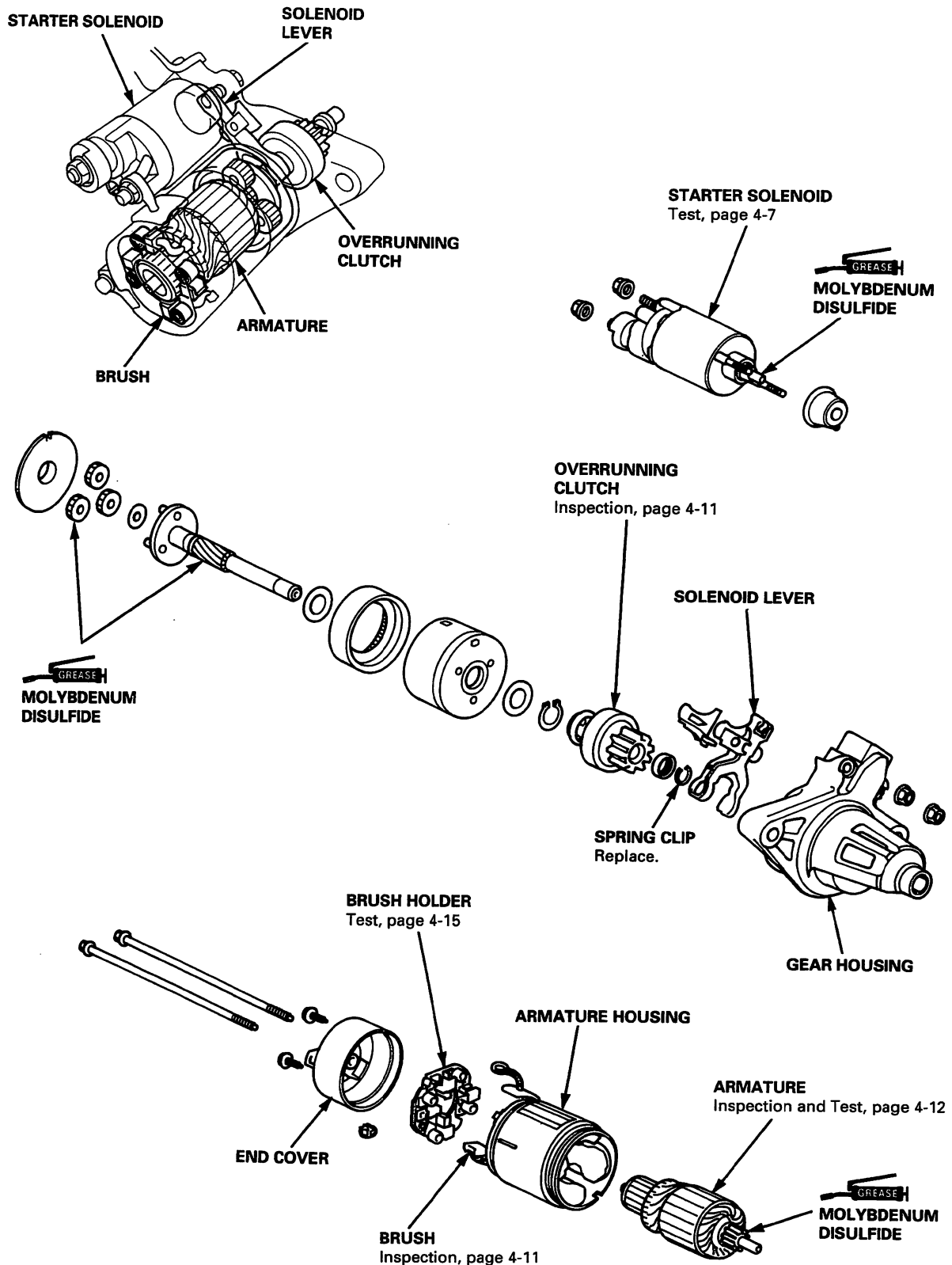


(cont'd)

Starting System

Starter Overhaul (cont'd) (DENSO)

H22A7 engine:

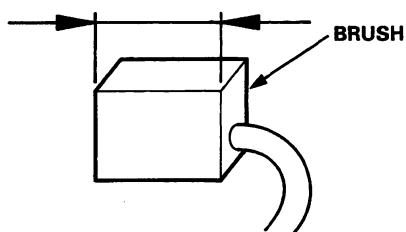


Brush Inspection

Measure the brush length. If not within the service limit, replace the brush (or brush holder assembly).

Brush Length

	Standard (NEW)	Service Limit
Valeo	18 mm (0.7 in)	5 mm (0.2 in)
DENSO	14.0 – 14.5 mm (0.55 – 0.57 in)	9.0 mm (0.35 in)

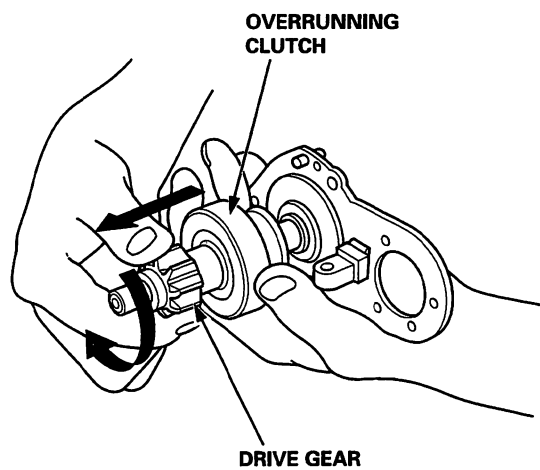


NOTE: To seat new brushes after installing them in their holders, slip a strip of #500 or #600 sandpaper, with the grit side up, over the commutator and smoothly rotate the armature. The contact surface of the brushes will be sanded to the same contour as the commutator.

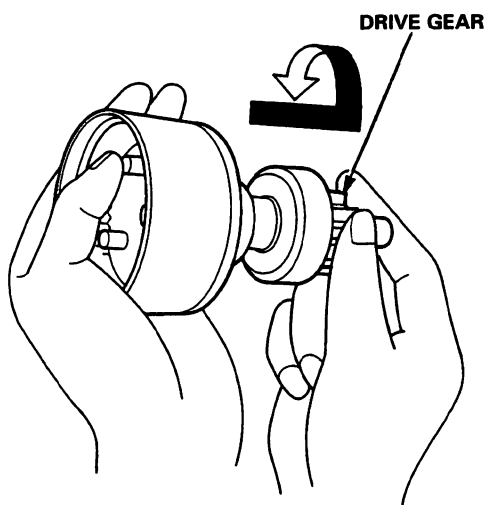
Overrunning Clutch Inspection

1. Slide the overrunning clutch along the shaft. Does it move freely? If not, replace it.
2. Rotate the overrunning clutch both ways. Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or it locks in both directions, replace it.

Valeo:



DENSO:

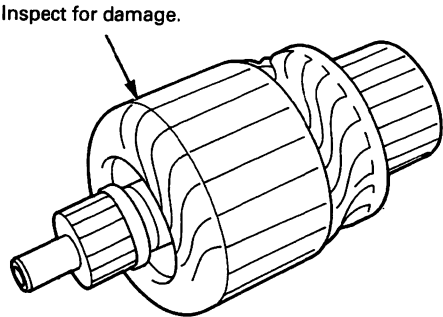


3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.
4. Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

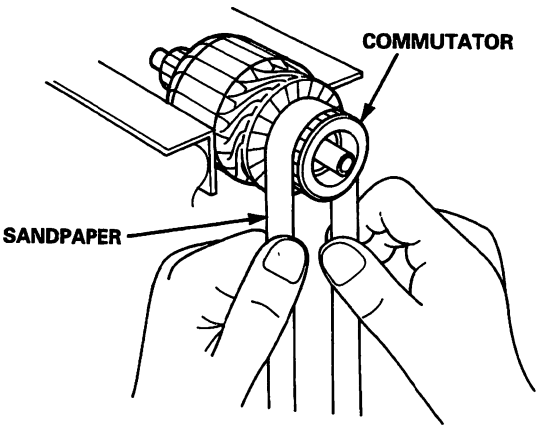
Starting System

Armature Inspection and Test

- 1. Inspect the armature for wear or damage due to contact with the permanent magnet or field winding. If there is wear or damage, replace the armature.



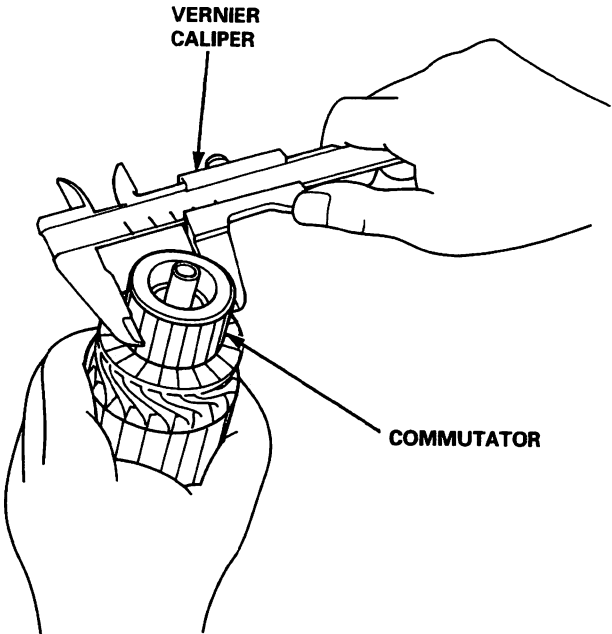
- 2. Check commutator surface and diameter.
 - If the surface is dirty or burnt, resurface with emery cloth or a lathe within the following specifications, or recondition with #500 or #600 sandpaper.



- If commutator diameter is below the service limit, replace the armature.

Commutator Diameter

	Standard (NEW)	Service Limit
DENSO	27.9 – 28.0 mm (1.09 – 1.10 in)	27.0 mm (1.06 in)

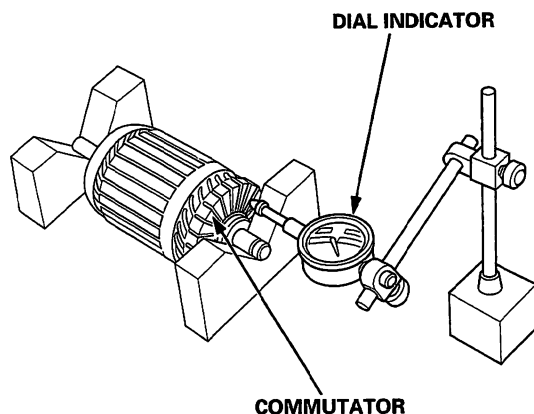


3. Measure the commutator runout.
 - If the commutator runout is within the service limit, check the commutator for carbon dust or brass chips between the segments.
 - If the commutator runout is not within the service limit, replace the armature.

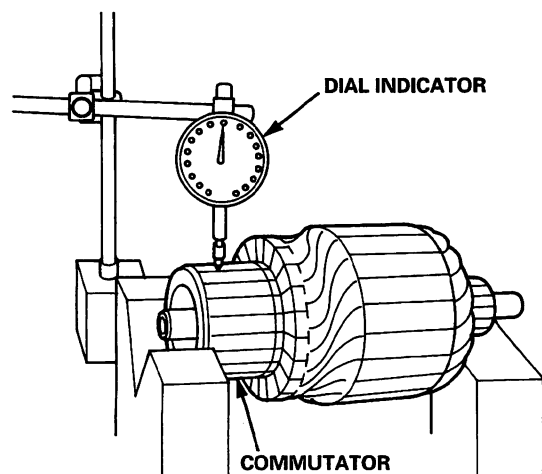
Commutator Runout

	Standard (NEW)	Service Limit
Valeo	0 – 0.01 mm (0 – 0.0004 in)	0.015 mm (0.0006 in)
DENSO	0 – 0.02 mm (0 – 0.0008 in)	0.05 mm (0.002 in)

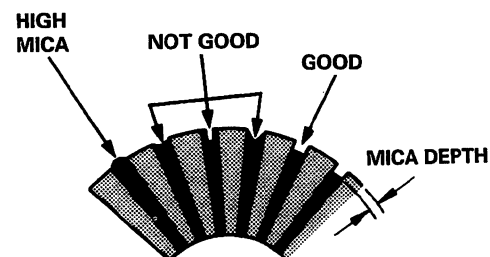
VALEO:



DENSO:



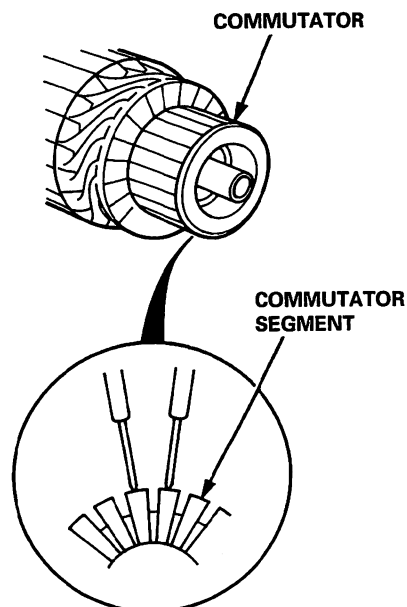
4. Check the mica depth. If necessary, undercut the mica with a hacksaw blade to achieve proper depth. If the service limit cannot be maintained, replace the armature.



Commutator Mica Depth

	Standard (NEW)	Service Limit
Valeo	0.5 – 0.9 mm (0.020 – 0.035 in)	0.2 mm (0.008 in)
DENSO	0.5 – 0.8 mm (0.020 – 0.031 in)	0.2 mm (0.008 in)

5. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.

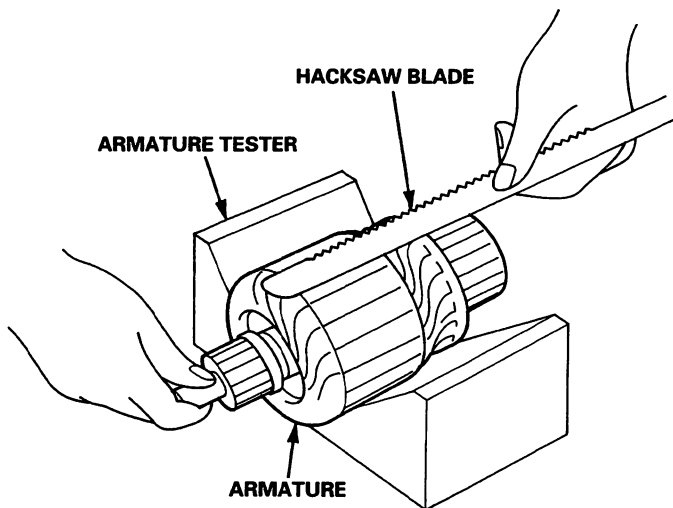


(cont'd)

Starting System

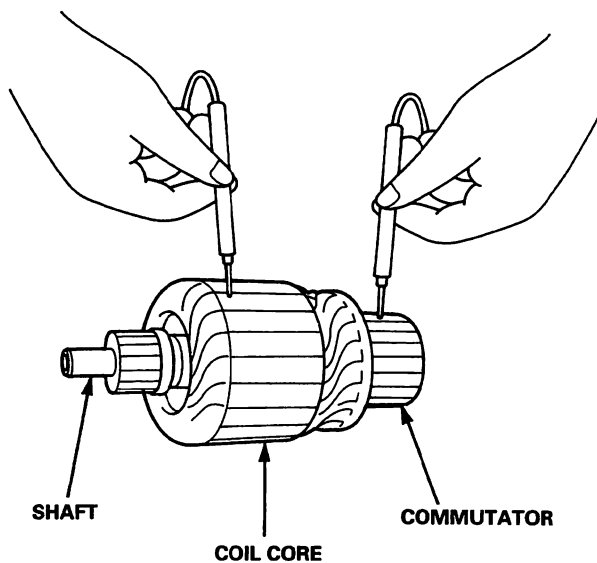
Armature Inspection and Test (cont'd)

6. Place the armature on an armature tester. Hold a hacksaw blade on the armature core.



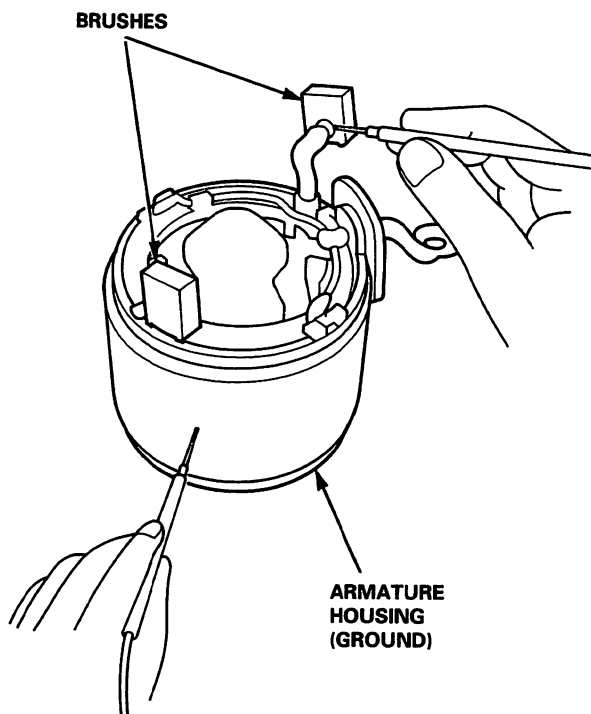
If the blade is attracted to the core or vibrates while the core is turned, the armature is shorted. Replace the armature.

7. Check with an ohmmeter that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If continuity exists, replace the armature.



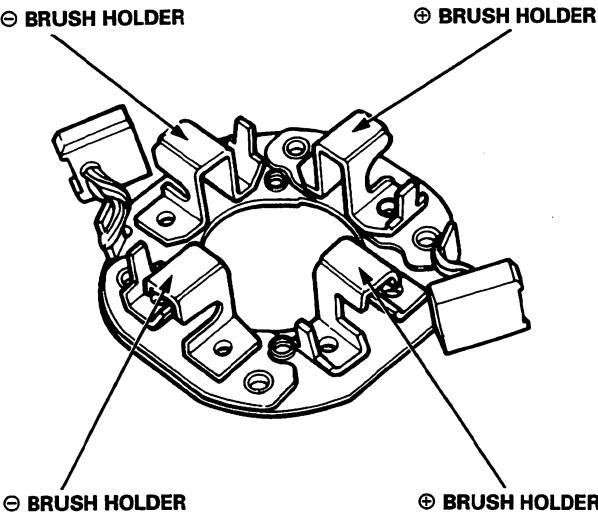
Field Winding Test (DENSO)

1. Check for continuity between the brushes. If there's no continuity, replace the armature housing.
2. Check for continuity between each brush and the armature housing (ground). If there is continuity, replace the armature housing.



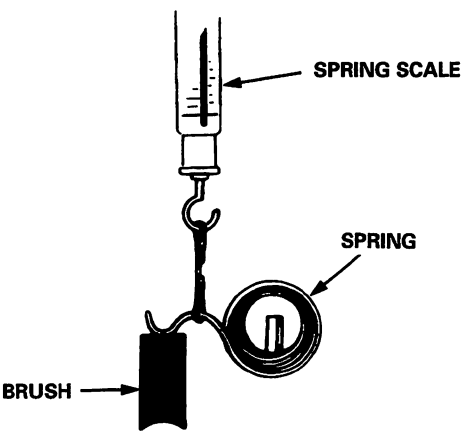
Starter Brush Holder Test (DENSO)

1. Check that there is no continuity between the ⊕ brush holder and ⊖ brush holder. If there is continuity, replace the brush holder assembly.



Brush Spring Test

1. Insert the brush into the brush holder, and bring the brush into contact with the commutator, then attach a spring scale to the spring. Measure the spring tension at the moment the spring lifts off the brush.



Spring Tension:

Valeo	15.25 – 19.25 N (1.56 – 1.96 kgf, 3.44 – 4.32 lbf)
DENSO	13.7 – 17.7 N (1.4 – 1.8 kgf, 3.09 – 3.97 lbf)

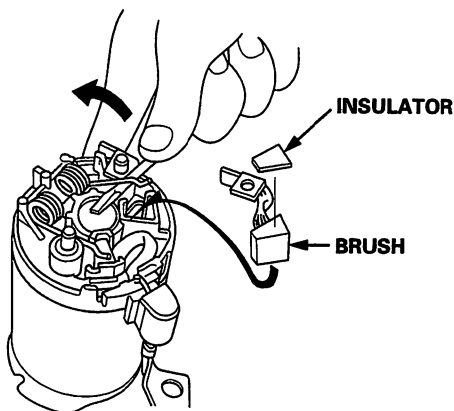
Starting System

Starter Reassembly

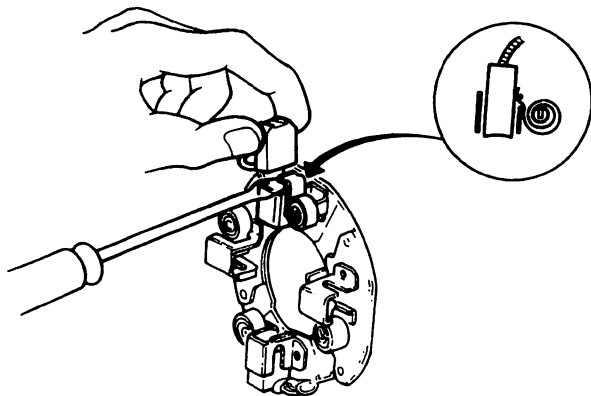
NOTE: Use the illustration on pages 4-9, 10 as reference for reassembly.

1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder and release the spring to hold it there.

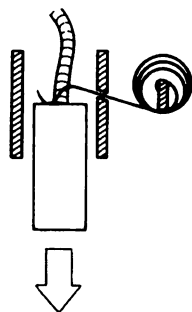
Valeo:



DENSO:



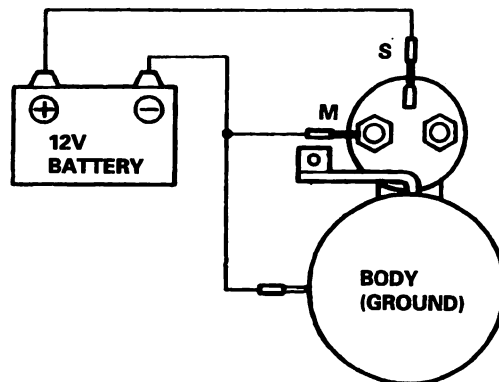
2. Install the armature in the housing. Next, pry back each brush spring again, and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



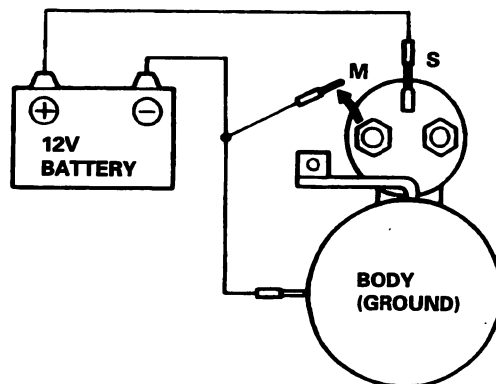
3. Install the end cover on the brush holder.

Performance Test

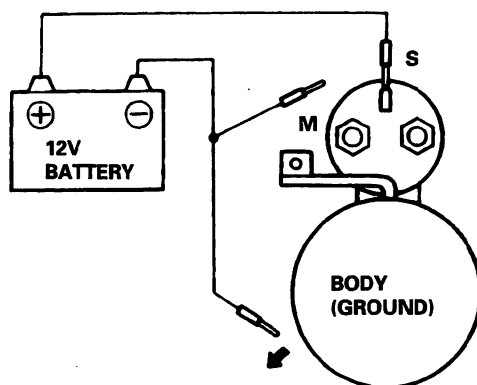
1. Disconnect the wires from S terminal and M terminal.
2. Make a connection as described below using as heavy a wire as possible (preferably equivalent to the wire used for the vehicle).
3. Connect the battery as shown. If the starter pinion pops out, it is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



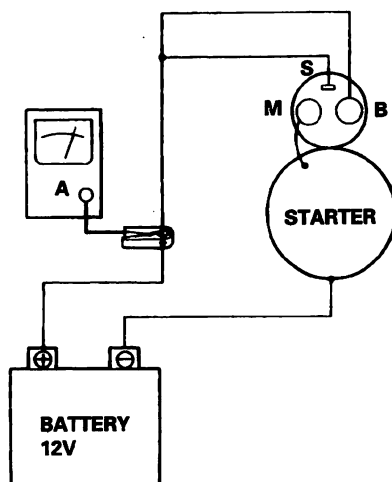
4. Disconnect the battery from the M terminal. If the pinion does not retract, the hold-in coil is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



5. Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



6. Clamp the starter firmly in a vise.
7. Connect the starter to the battery as described in the diagram below, and confirm that the motor starts and keeps rotating.



8. If the electric current and motor speed meet the specifications when the battery voltage is at 11.5 V, the starter is working properly.

Specifications:

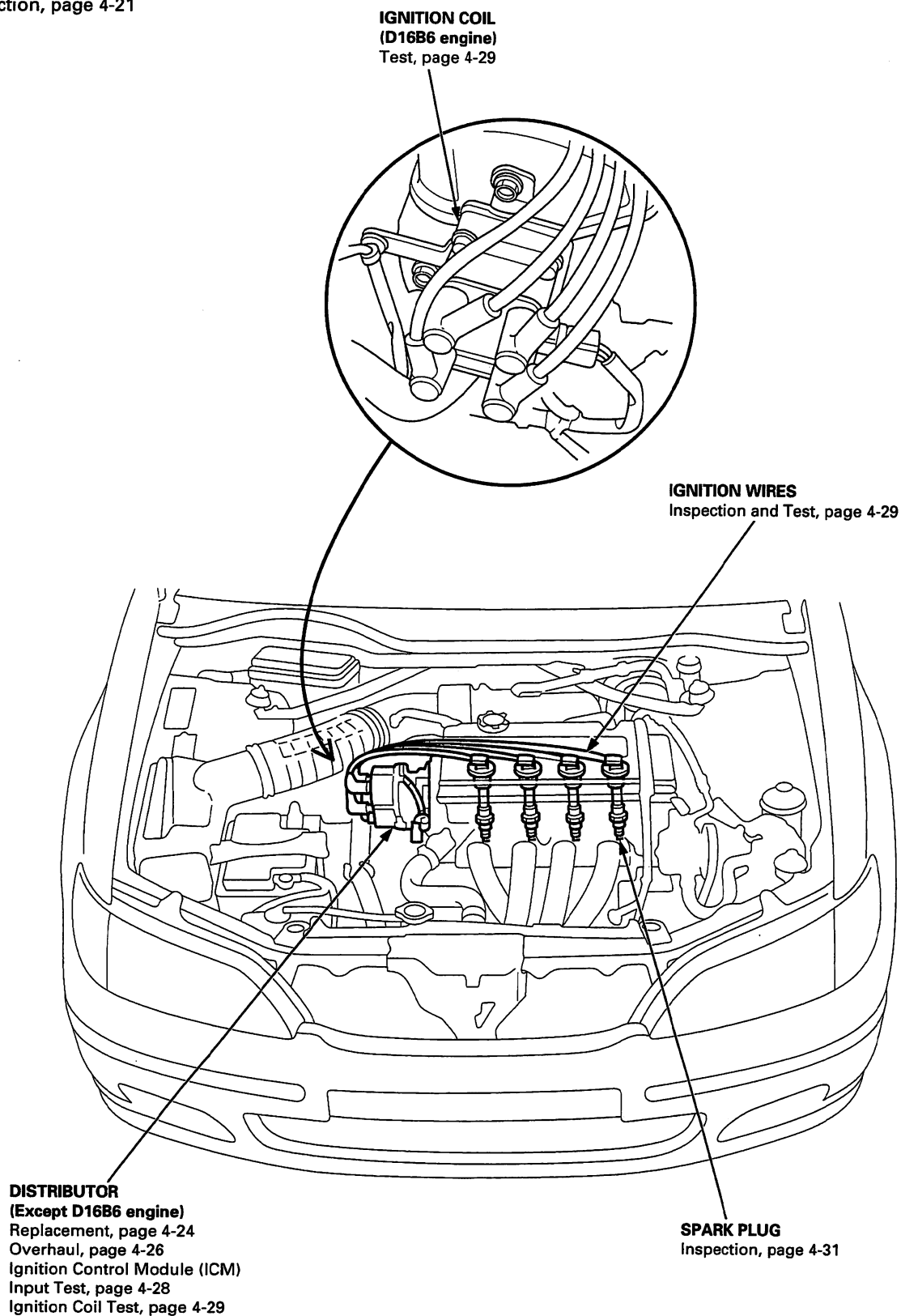
Maker	Electric current	Motor speed
Valeo	70 A or less	2,700 rpm (min ⁻¹) or more
DENSO	90 A or less	3,000 rpm (min ⁻¹) or more

Ignition System

Component Location Index

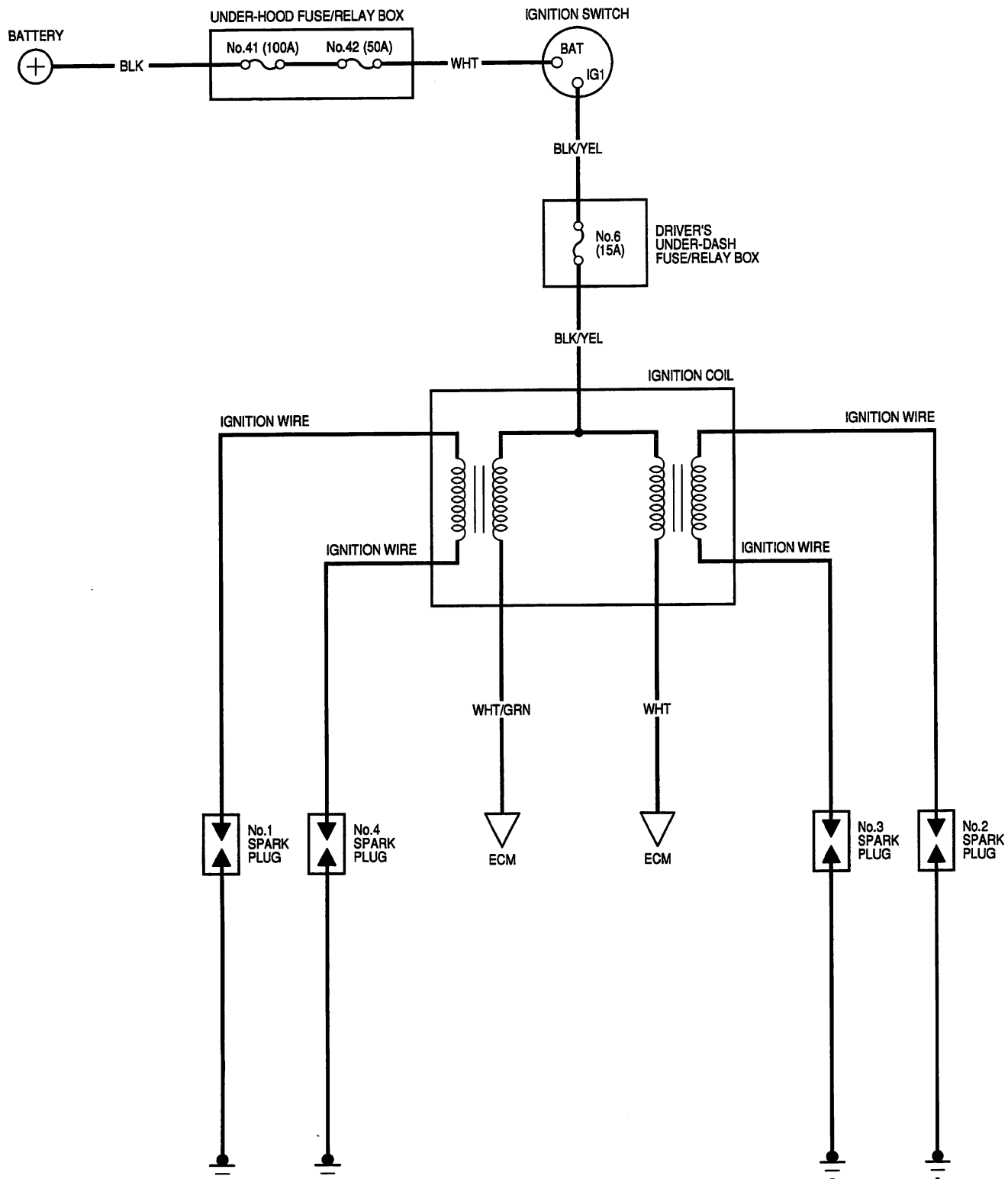
IGNITION TIMING CONTROL SYSTEM

Inspection, page 4-21



Circuit Diagram

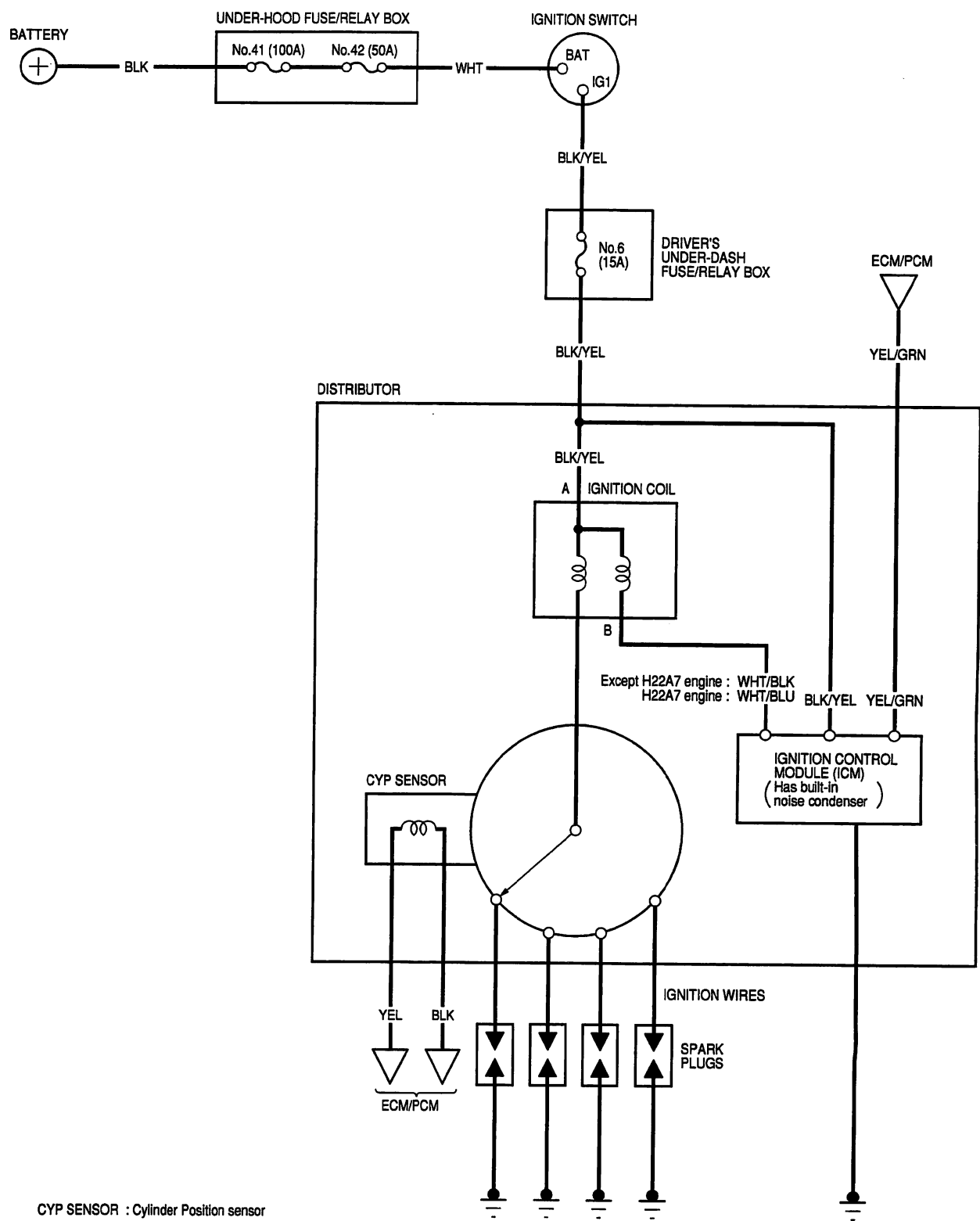
D16B6 engine :



Ignition System

Circuit Diagram

Except D16B6 engine :



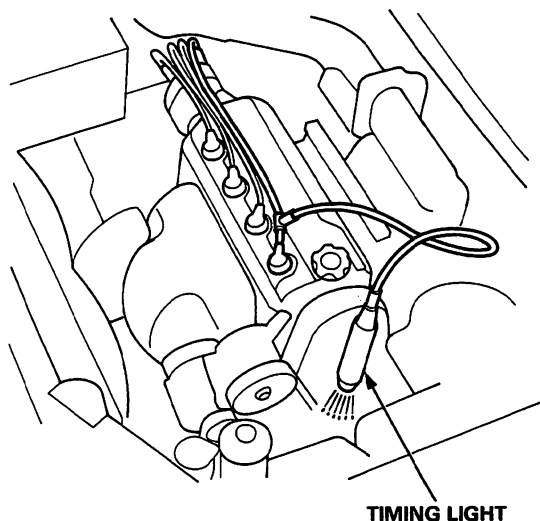
CYP SENSOR : Cylinder Position sensor

Ignition Timing Inspection

1. Check the idle speed, and adjust it if necessary (see section 11).
2. Pull out the service check connector 2P (GRN/BLK and BRN wires) from the connector holder located under the dash on the front passenger side, then connect the SCS short connector (T/N 07PAZ – 0010100) to it.
3. Start the engine. Hold the engine at 3,000 rpm (min⁻¹) with no load (A/T in **N** or **P** position, M/T in neutral) until the radiator fan comes on, then let it idle.
4. Connect a timing light to the No. 1 ignition wire.

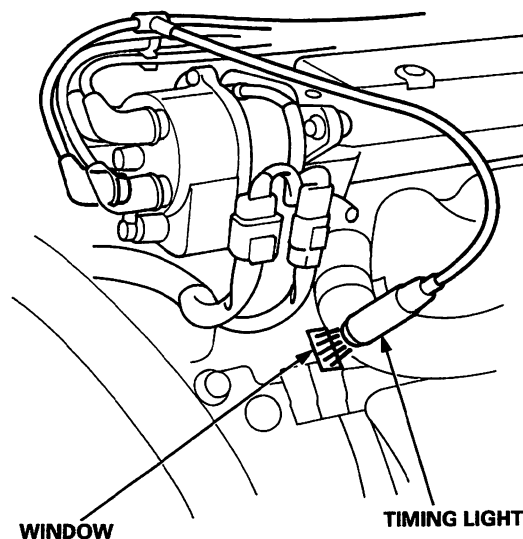
Except H22A7 engine:

- Point the timing light toward the pointer on the timing belt cover.



H22A7 engine:

- Remove the rubber plug from the “window” in the flywheel housing. While the engine idles, point the timing light toward the pointer on the flywheel.



(cont'd)

Ignition System

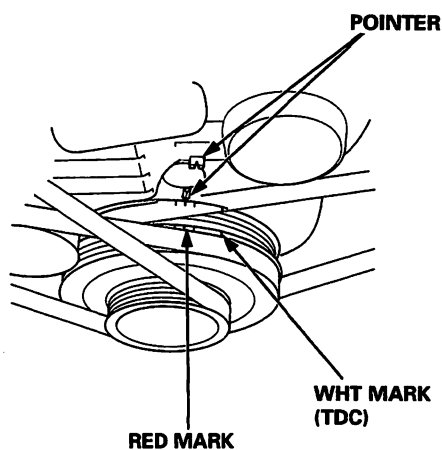
Ignition Timing Inspection (cont'd)

5. Check the ignition timing in no load conditions: headlights, blower fan, rear window defogger, and air conditioner are not operating.

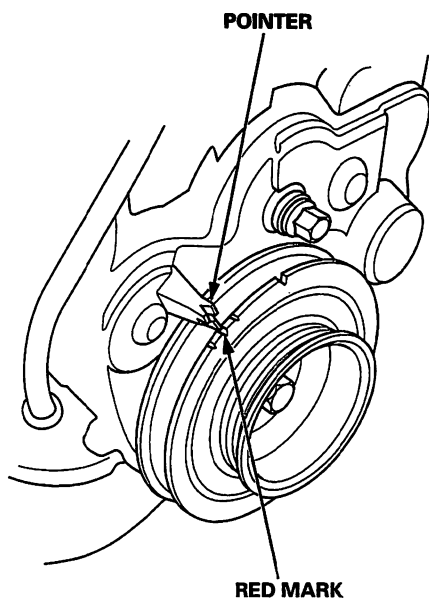
Ignition Timing:

Except H22A7 engine	M/T	$12^{\circ} \pm 2^{\circ}$ BTDC (RED) during idling in neutral
	A/T	$12^{\circ} \pm 2^{\circ}$ BTDC (RED) during idling in N or P position
H22A7 engine		$15^{\circ} \pm 2^{\circ}$ BTDC (RED) during idling in neutral

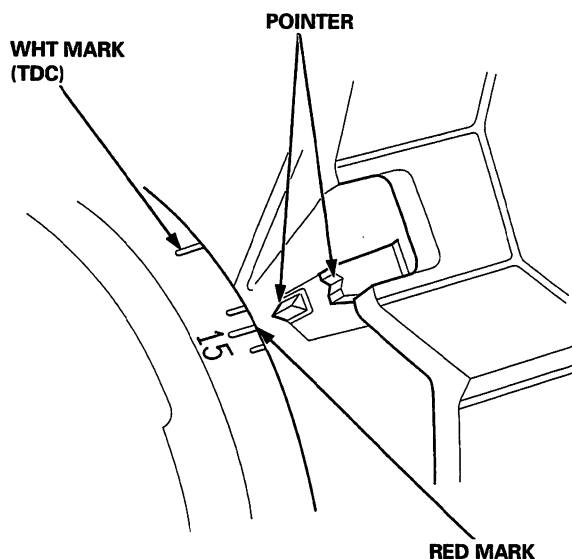
D16B6 engine:



F18B2, F18B3, F20B6 engines:



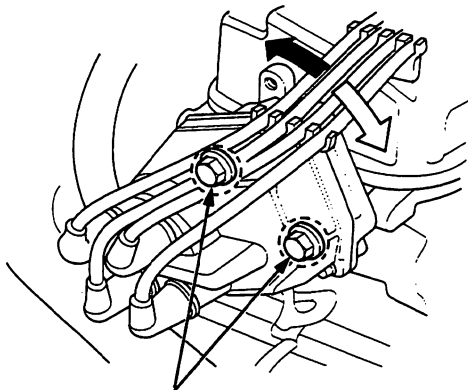
H22A7 engine:



6. If the ignition timing is incorrect;
— the PCM in the D16B6 engine should be replaced.
— for engines except D16B6 engine, ignition timing should be set (see page 4-23).
7. Disconnect the SCS short connector.

Ignition Timing Setting (Except D16B6 engine)

1. Inspect the ignition timing (see page 4-21).
2. If necessary, adjust the ignition timing, as follows.
Loosen the distributor mounting bolts, and turn the distributor ignition (DI) housing counterclockwise to advance the timing, or clockwise to retard the timing.



MOUNTING BOLTS
22 N·m (2.2 kgf·m, 16 lbf·ft)

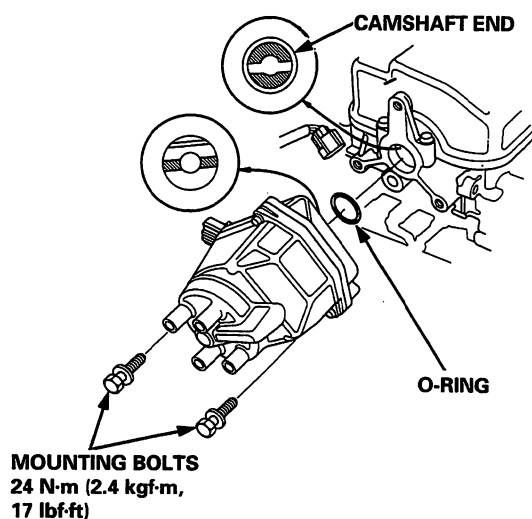
3. Tighten the distributor mounting bolts, and recheck the ignition timing (see page 4-21).

Ignition System

Distributor Replacement (Except D16B6 engine)

Removal:

1. Disconnect the connector from the distributor.
2. Disconnect the ignition wires from the distributor ignition (DI) cap.
3. Remove the mounting bolts from the distributor, then remove the distributor from the cylinder head.



Installation:

NOTE: Before you install the distributor, bring the No. 1 piston to compression stroke TDC.

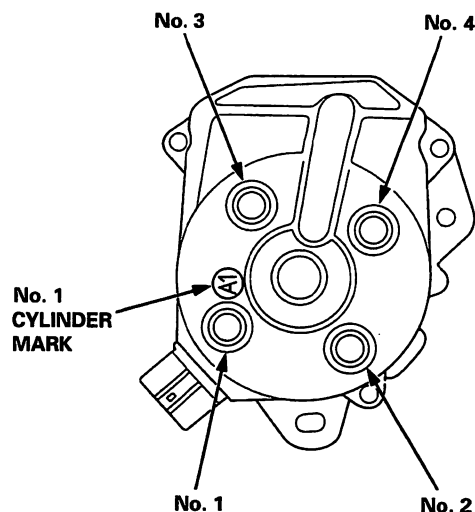
1. Coat a new O-ring with engine oil, then install it.
2. Slip the distributor into position.

NOTE: The lug on the end of the distributor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor 180° out of time.

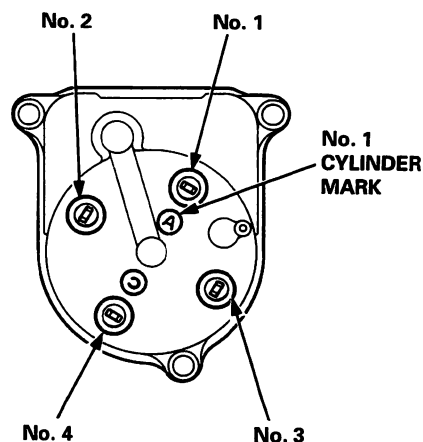
3. Install the mounting bolts, and tighten them lightly.

4. Connect the ignition wires to the distributor ignition (DI) cap as shown.

F18B2, F18B3, F20B6 engines:

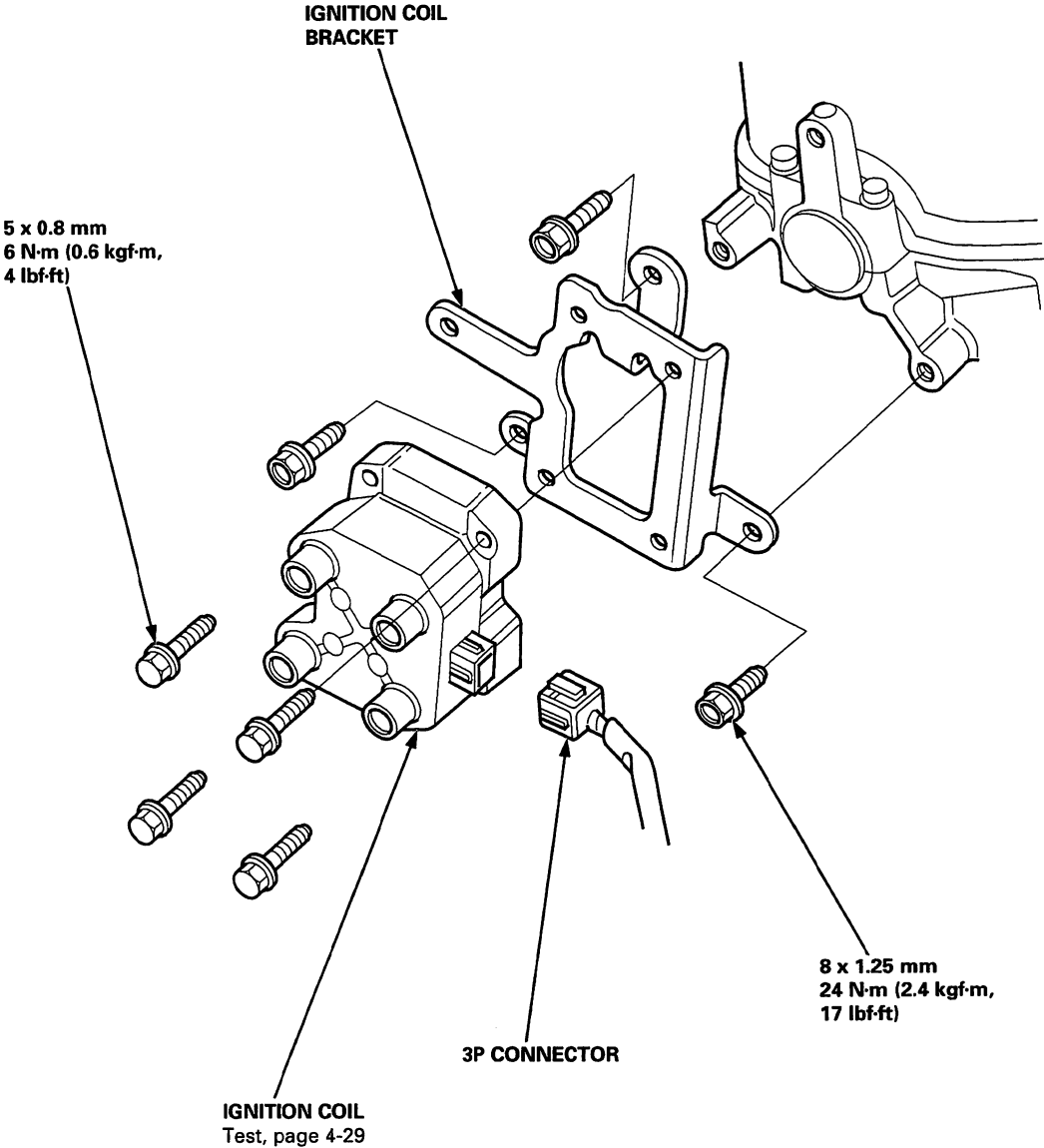


H22A7 engine:



5. Connect the connector to the distributor.
6. Set the ignition timing (see page 4-23).
7. After setting the ignition timing, tighten the mounting bolts.

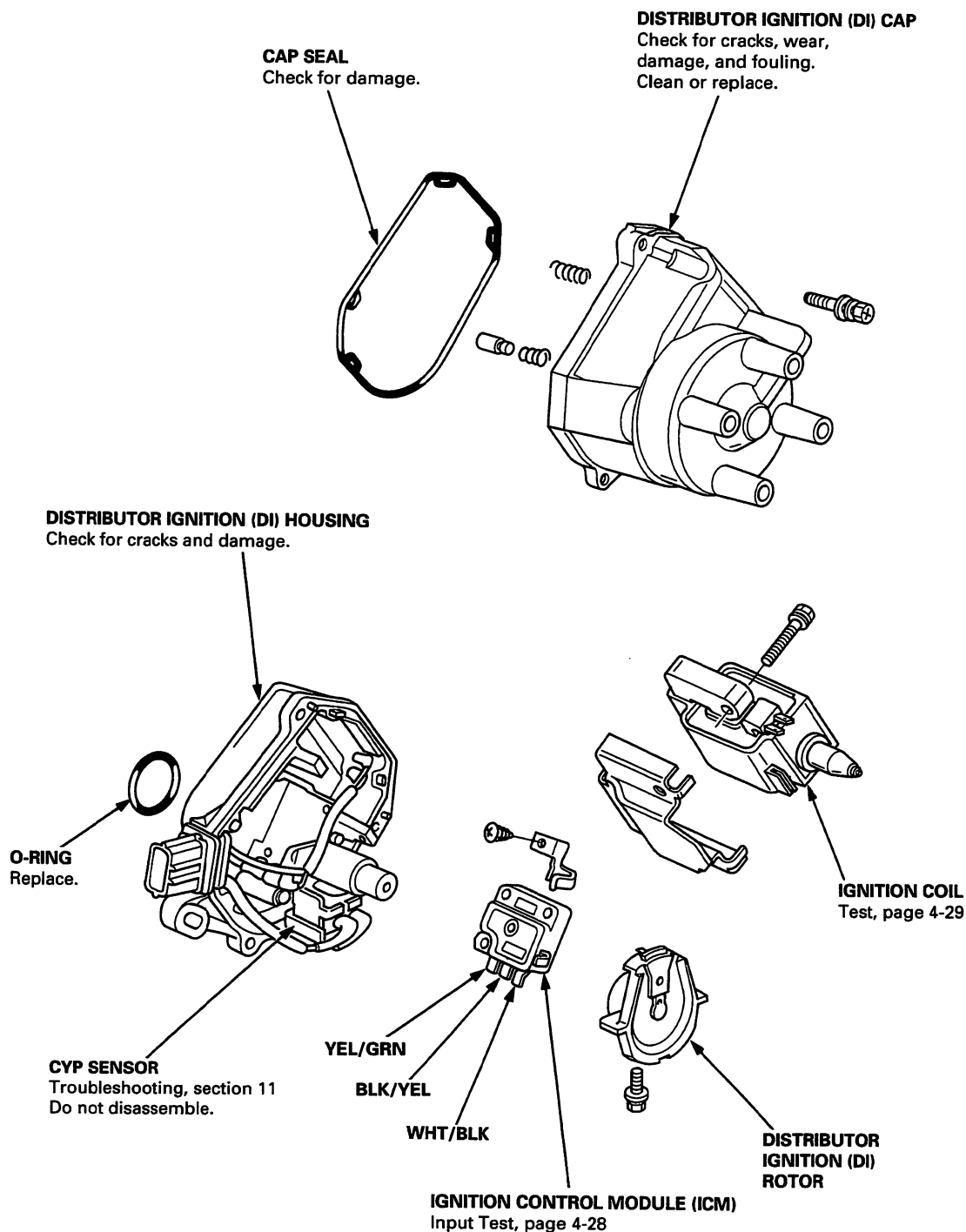
Ignition Coil Replacement (D16B6 engine)



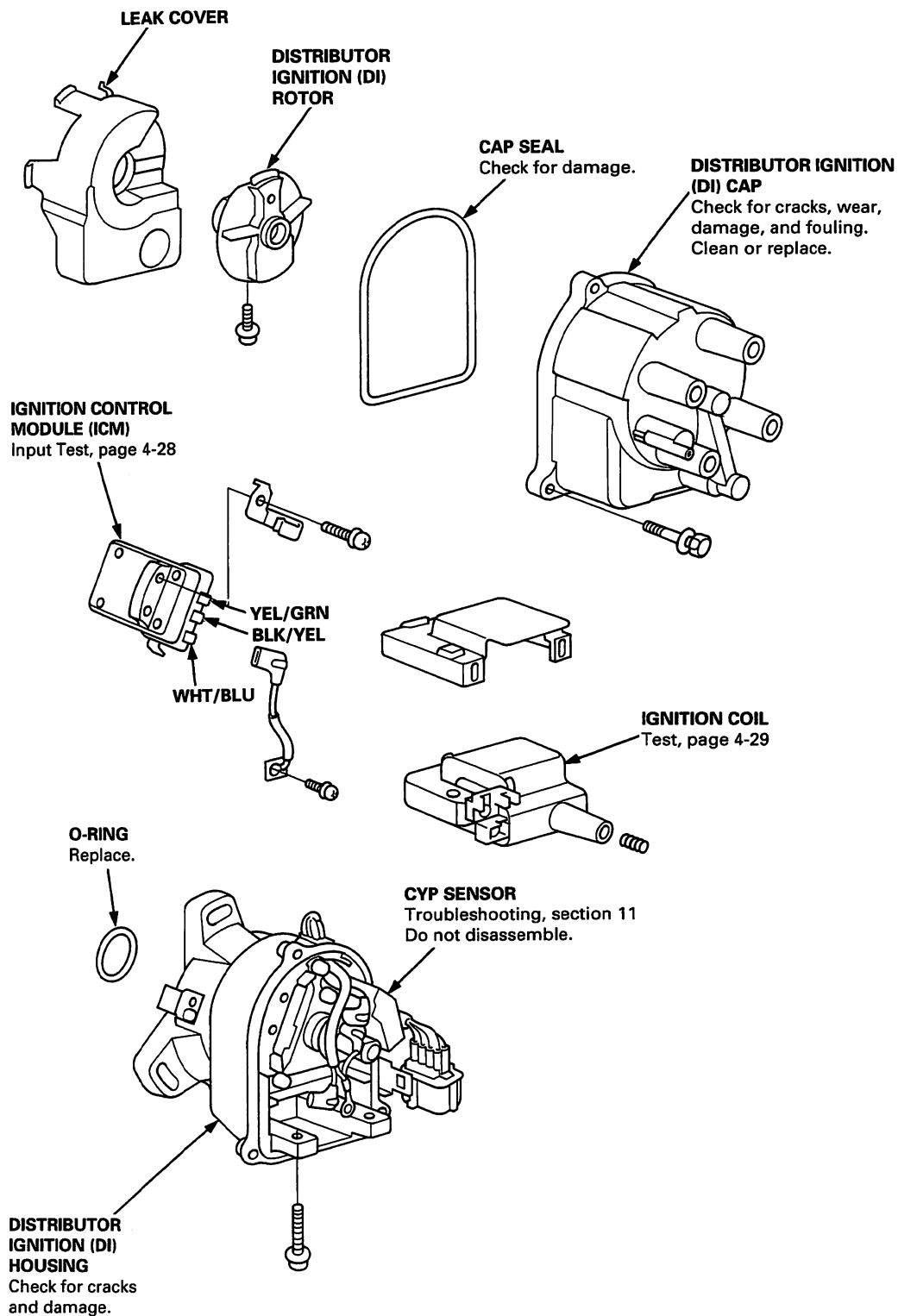
Ignition System

Distributor Overhaul (Except D16B6 engine)

F18B2, F18B3, F20B6 engines:



H22A7 engine:



Ignition System

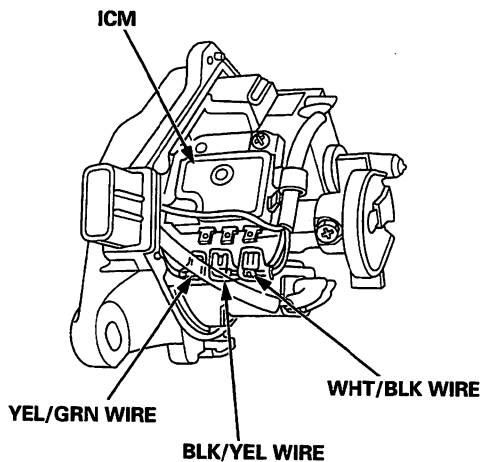
Ignition Control Module (ICM) Input Test (Except D16B6 engine)

NOTE:

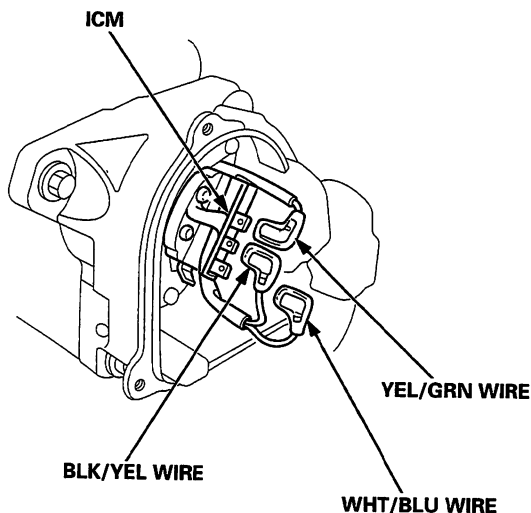
- See section 11 when the malfunction indicator lamp (MIL) comes on.
- Perform an input test for the ignition control module (ICM) after finishing the fundamental tests for the ignition system and the fuel and emissions systems.
- The tachometer should operate normally if the ICM is OK.

1. Remove the distributor ignition (DI) cap, the distributor ignition (DI) rotor, and the leak cover.
2. Disconnect the wires from the ICM.

F18B2, F18B3, F20B6 engines:



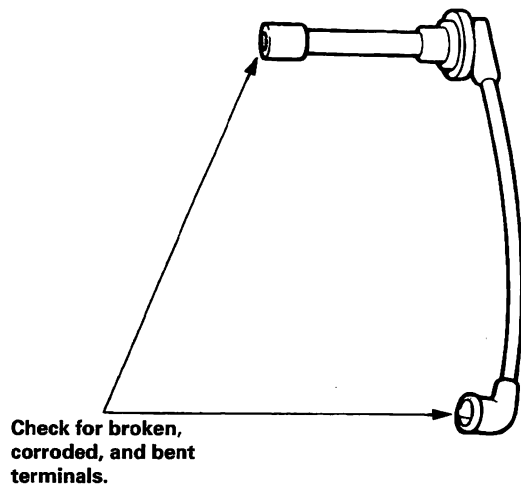
H22A7 engine:



3. Turn the ignition switch ON (II). Check for voltage between the BLK/YEL wire and body ground. There should be battery voltage.
 - If there is no battery voltage, check the BLK/YEL wire between the ignition switch and the ICM.
 - If there is battery voltage, go to step 4.
4. Turn the ignition switch ON (II). Check for voltage between the WHT/BLK [WHT/BLU] wire and body ground. There should be battery voltage.
 - []: H22A7 engine
 - If there is no battery voltage, check:
 - ignition coil.
 - WHT/BLK [WHT/BLU] wire between the ICM and ignition coil.
 - If there is battery voltage, go to step 5.
5. Disconnect the 25P connector from the ECM/PCM, and check for continuity on the YEL/GRN wire between the ICM and ECM/PCM. There should be continuity.
6. Check for continuity on the YEL/GRN wire to body ground. There should be no continuity.
7. If all the tests are normal, reconnect the ECM/PCM 25P connector, and replace the ICM.

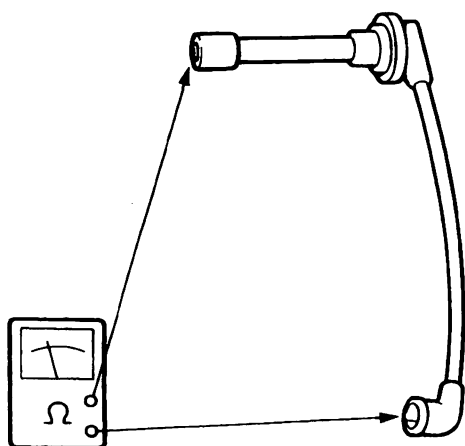
Ignition Wire Inspection and Test

1. Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wires; you might break them inside.
2. Check the condition of the ignition wire terminals. If any terminal is corroded, clean it, and if it is broken or distorted, replace the ignition wire.



3. Connect ohmmeter probes and measure resistance.

Ignition Wire Resistance:
25 k Ω max. at 20°C (68°F)

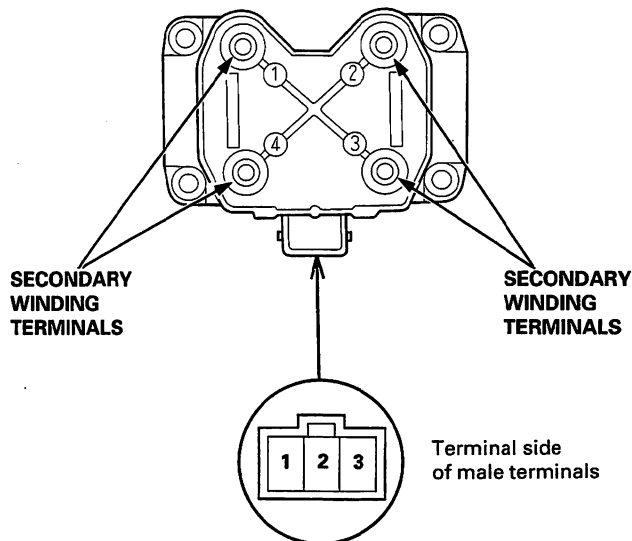


4. If resistance exceeds 25 k Ω , replace the ignition wire.

Ignition Coil Test

D16B6 engine:

1. Turn the ignition switch OFF.
2. Disconnect the 3P connector and ignition wire.



3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

NOTE: Resistance will vary with the coil temperature; specifications are at 20°C (68°F).

Primary Winding Resistance

(Between the No. 1 and No. 2 terminals, and the No. 3 and No. 2 terminals):

0.45 – 0.55 Ω

Secondary Winding Resistance

(Between the No. 2 terminal and secondary winding terminals):

12.0 – 14.6 k Ω

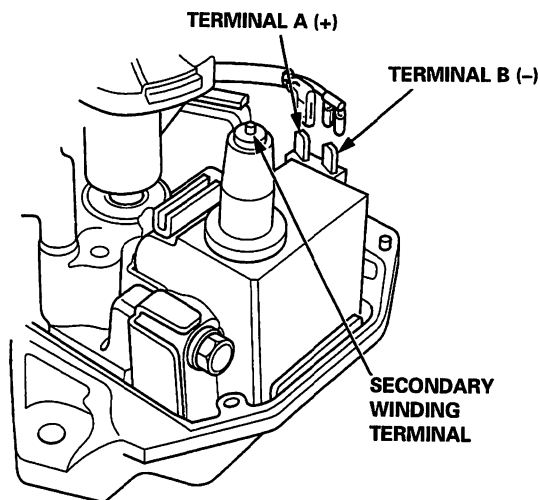
(cont'd)

Ignition System

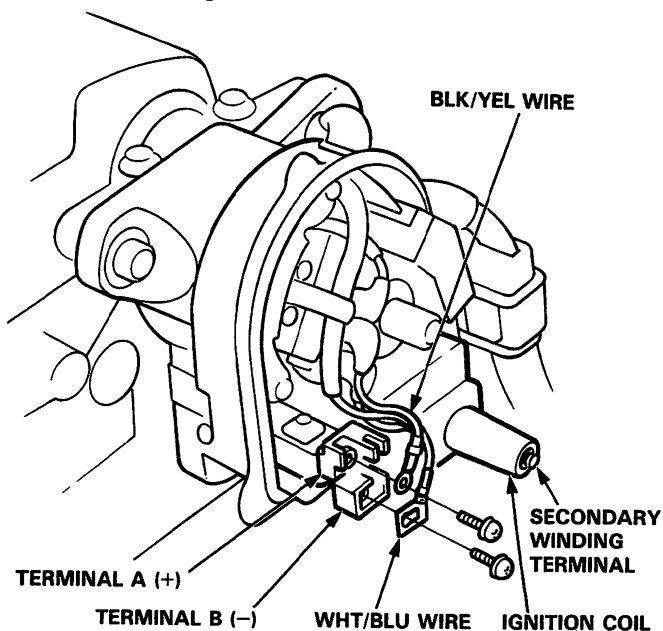
Ignition Coil Test (cont'd)

Except D16B6 engine:

1. Turn the ignition switch OFF, and remove the distributor ignition (DI) cap.
2. Disconnect the BLK/YEL and WHT/BLK (H22A7 engine: WHT/BLU) wires from terminals (+) and (-) respectively.



H22A7 engine:



3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

NOTE: Resistance will vary with the coil temperature: specifications are at 20°C (68°F).

F18B2, F18B3, F20B6 engines:

Primary Winding Resistance

(Between the A and B terminals):

0.45 – 0.55 Ω

Secondary Winding Resistance

(Between the A and secondary Winding terminals)

22.4 – 33.6 k Ω

H22A7 engine:

Primary Winding Resistance

(Between the A and B terminals):

0.63 – 0.77 Ω

Secondary Winding Resistance

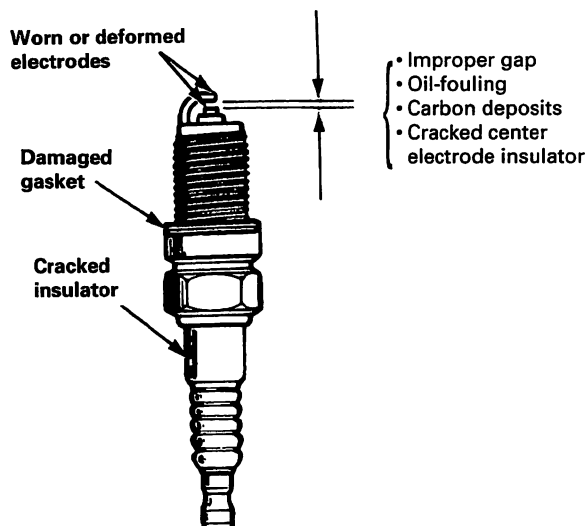
(Between the A and secondary Winding terminals):

12.8 – 19.2 k Ω

Spark Plug Inspection

Except H22A7 engine:

1. Inspect the electrodes and ceramic insulator for:



Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too hot
- Insufficient cooling

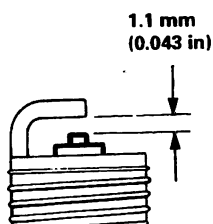
Fouled plug may be caused by:

- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too cold
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

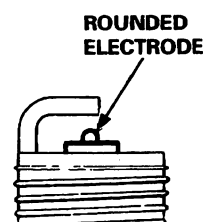
2. Check the electrode gap.
 - Adjust the gap with a suitable gapping tool.

Electrode Gap

Standard	1.1 \pm 0.1 mm (0.043 \pm 0.004 in)
----------	---



- Replace the plug if the center electrode is rounded as shown below:



Spark Plugs

Engine Type	Spark Plug Type
D16B6	ZFR5F-11 (NGK) ZFR5J-11 (NGK) KJ16CR-L11 (DENSO)
F18B3	ZFR5F-11 (NGK) ZFR5J-11 (NGK) KJ20CR-L11 (DENSO)
F18B2 F20B6	ZFR6F-11 (NGK) KJ20CR-L11 (DENSO)

3. Apply a small quantity of anti-seize compound to the plug threads, and screw the plugs into the cylinder head finger-tight. Then torque them to 18 N·m (1.8 kgf·m, 13 lbf·ft).

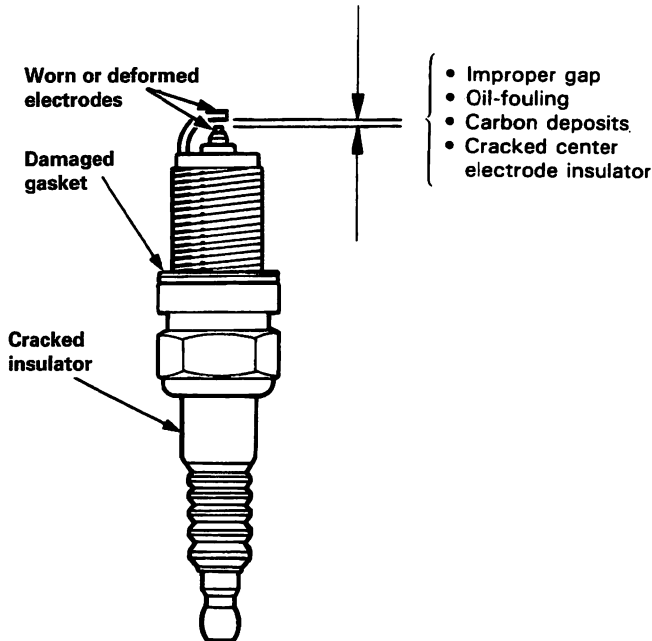
(cont'd)

Ignition System

Spark Plug Inspection (cont'd)

H22A7 engine:

1. Inspect the electrodes and ceramic insulator for:



Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too hot
- Insufficient cooling

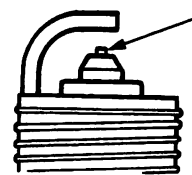
Fouled plug may be caused by:

- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too cold
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

2. Do not adjust the gap of platinum tip plugs; replace the spark plug if the gap is out of specification or if the center electrode is rounded.

Electrode Gap:

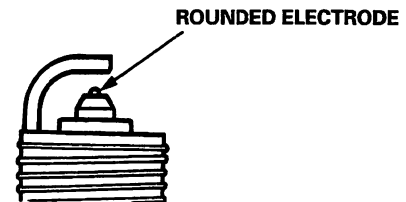
Standard	1.1 $^{+0}_{-0.1}$ mm (0.043 $^{+0}_{-0.004}$ in)
Service Limit	1.3 mm (0.051 in)



Platinum tip plug:

Do not adjust the gap; replace the spark plug if the gap is out of specification or if the center electrode is rounded.

3. Replace the plug at the specified interval, or if the center electrode is rounded as shown below:



NOTE: Use only the spark plugs listed below.

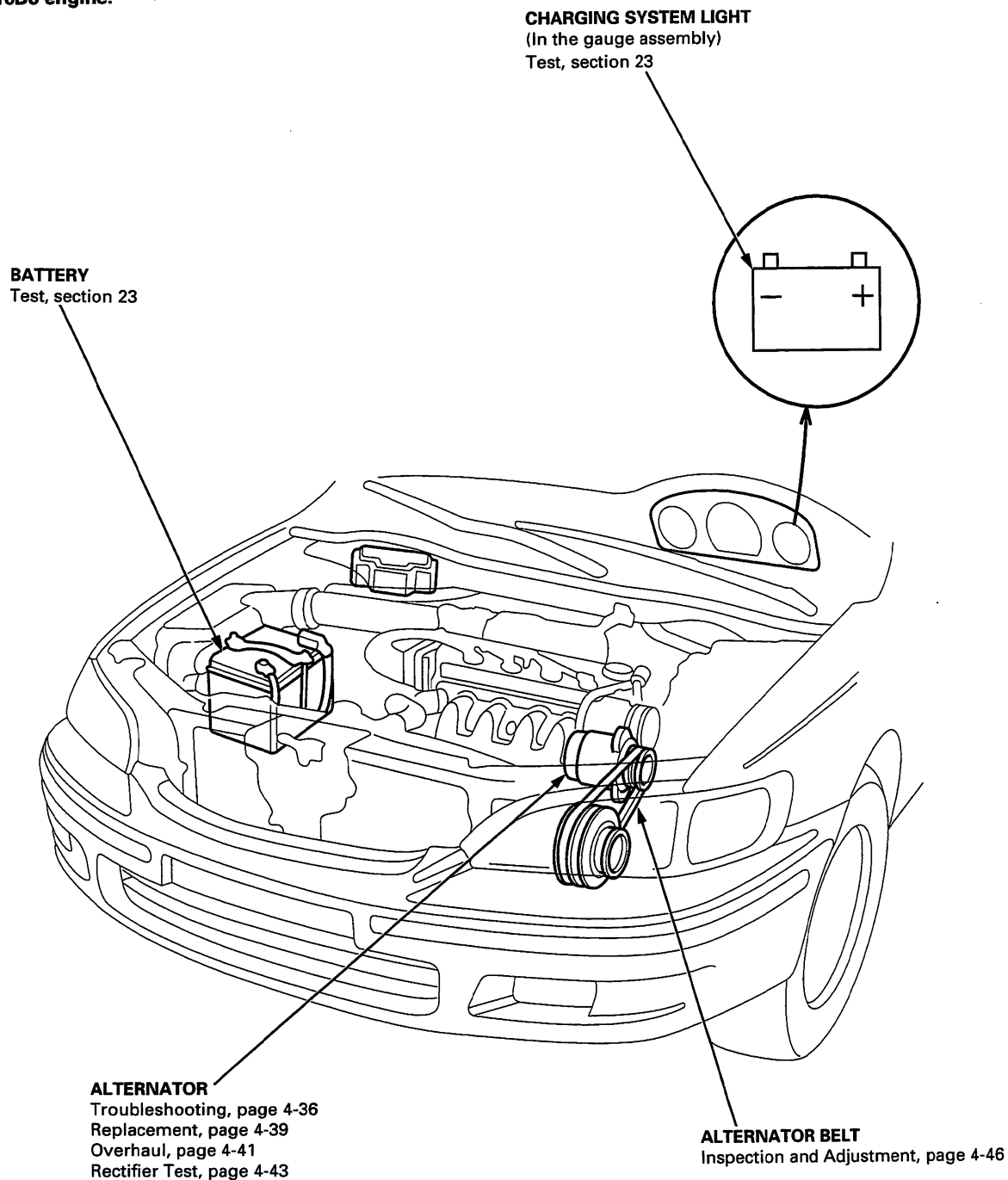
Spark Plug: PZFR6F-11 (NGK)

4. Apply a small quantity of anti-seize compound to the plug threads, and screw the plugs into the cylinder head finger-tight. Then torque them to 18 N·m (1.8 kgf·m, 13 lbf·ft).

Charging System

Component Location Index

D16B6 engine:

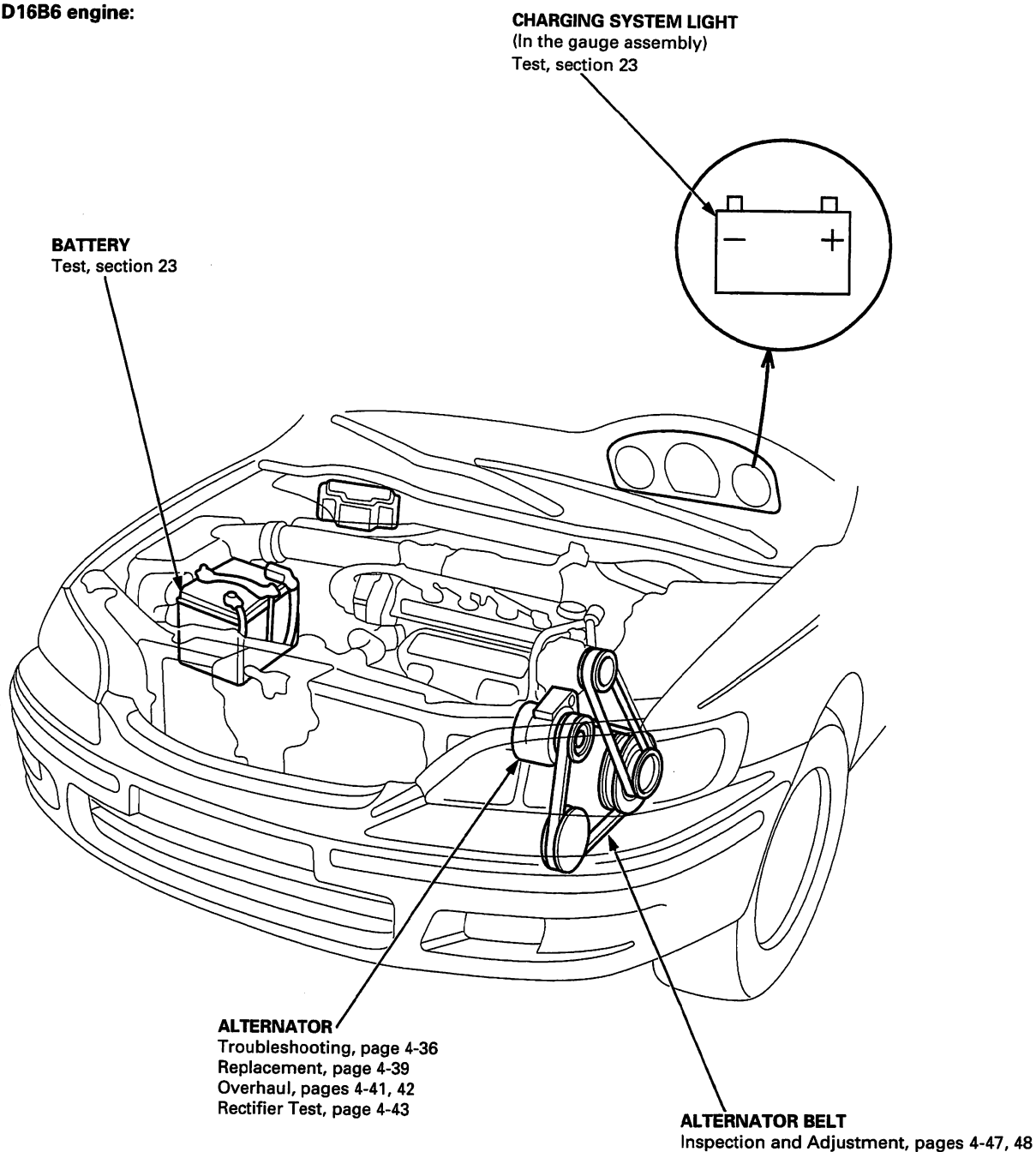


(cont'd)

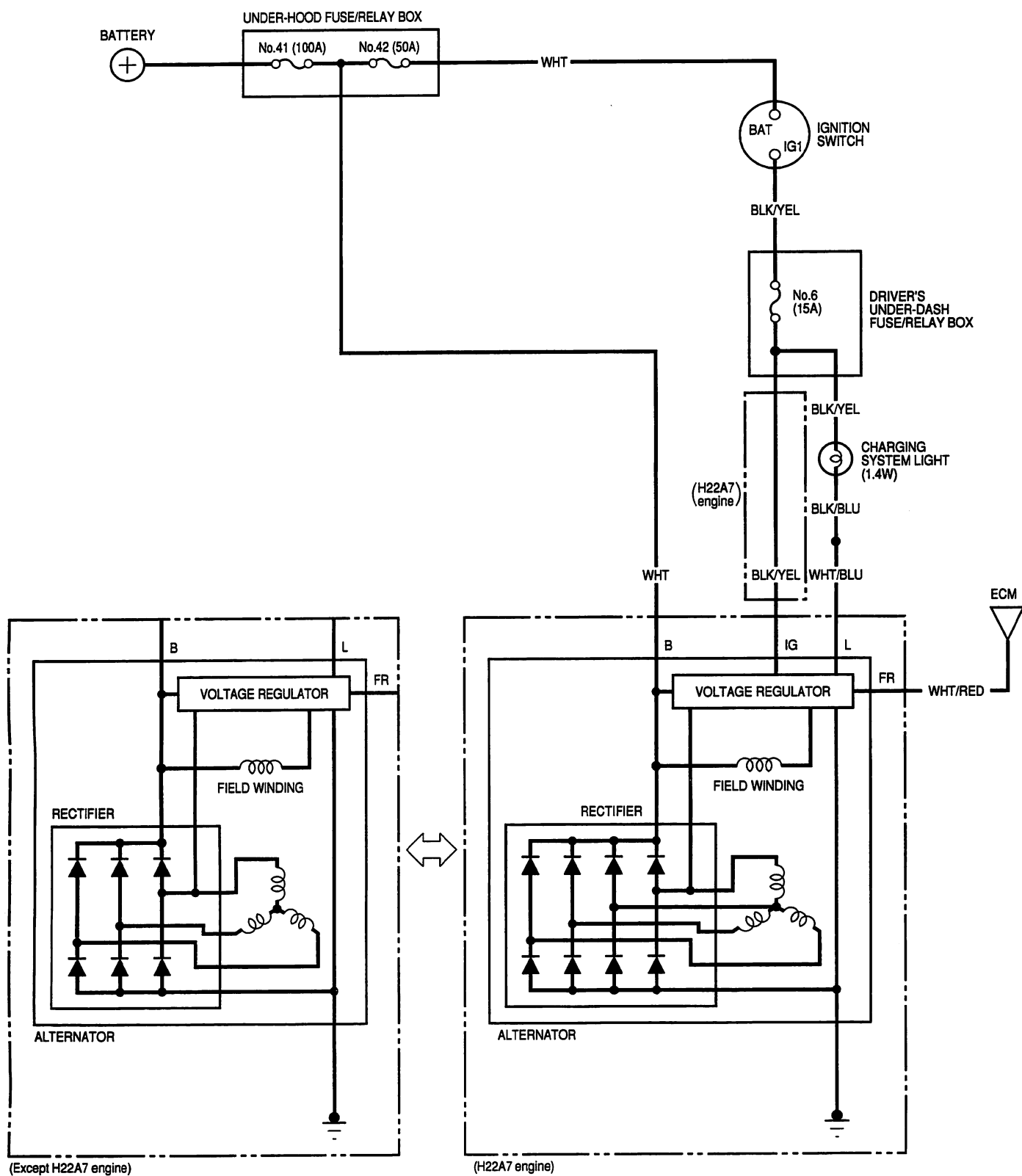
Charging System

Component Location Index (cont'd)

Except D16B6 engine:



Circuit Diagram



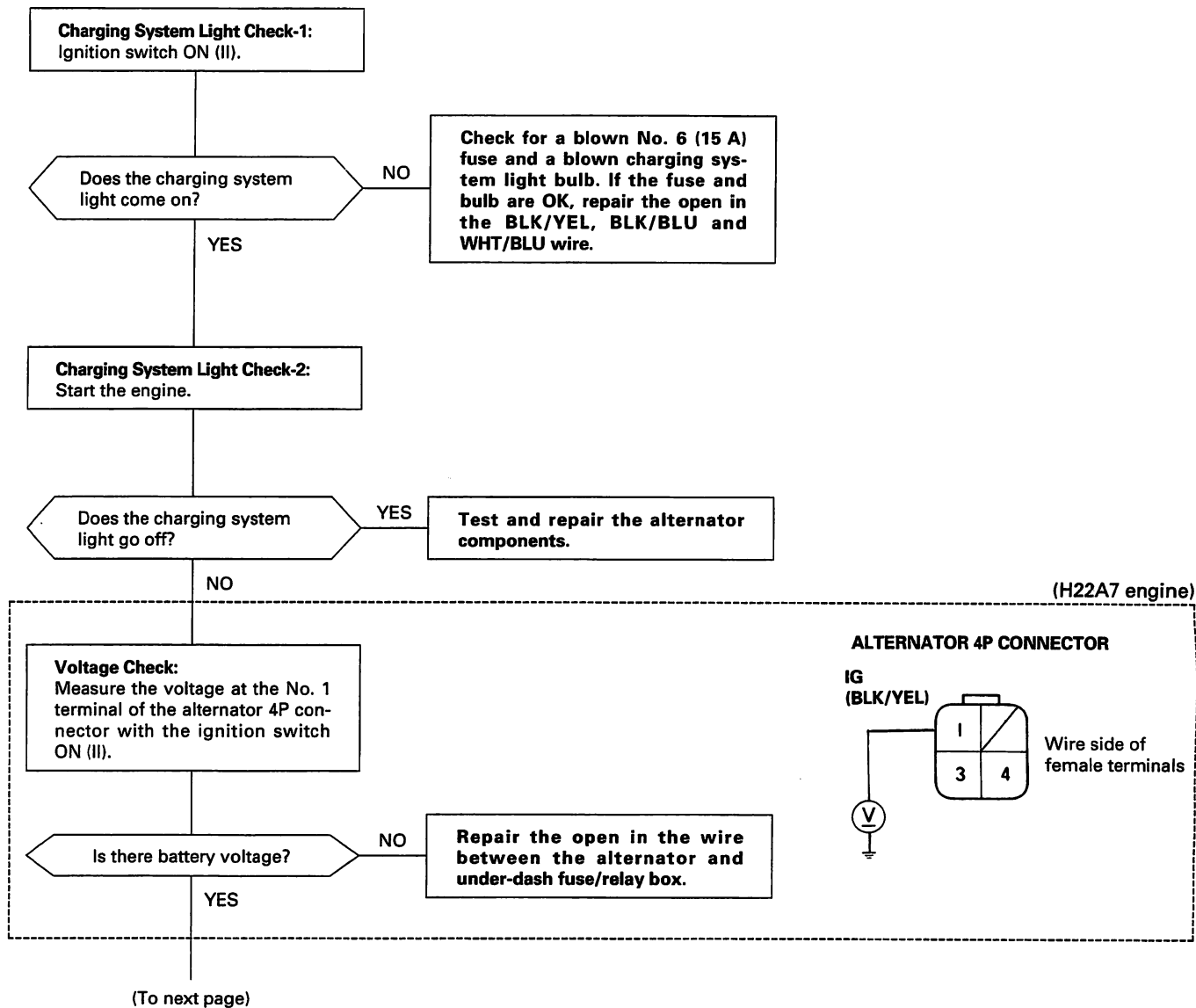
Charging System

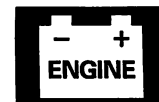
Troubleshooting

If the charging system light does not come on or does not go off, or the battery is dead or low, test the following items in the order listed below:

1. Battery (see section 23)
2. Charging system light
3. Voltage
4. Alternator/regulator

Charging System Light Test





(From previous page)

Check for an open in the L circuit-1:

1. Turn the ignition switch OFF.
2. Disconnect the 2P [4P] connector from the alternator.
3. Connect the alternator 2P [4P] connector terminal No. 1 [No. 3] to body ground with a jumper wire.
4. Turn the ignition switch ON (II).

Does the charging system light come on?

NO

Turn the ignition switch OFF, and repair the open in the BLK/YEL, BLK/BLU and WHT/BLU wire.

YES

Check for an open in the L circuit-2:

Disconnect the alternator 2P [4P] connector terminal No. 1 [No. 3] from body ground with a jumper wire.

Does the charging system light go off?

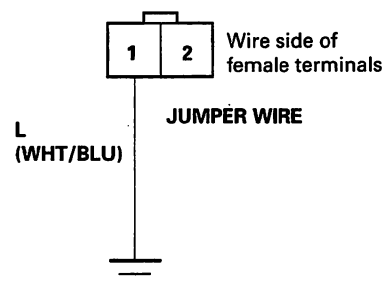
YES

Test and repair the alternator components.

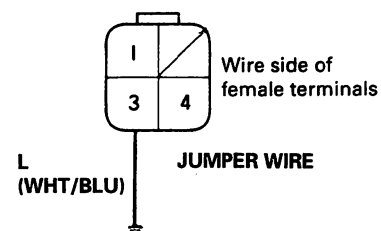
NO

Turn the ignition switch OFF, and repair the short to ground in the WHT/BLU wire.

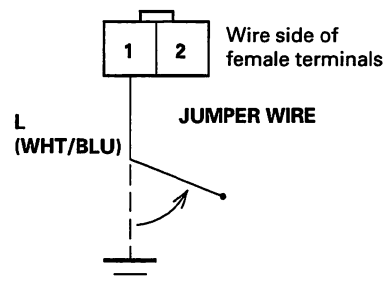
**ALTERNATOR 2P CONNECTOR
(Except H22A7 engine)**



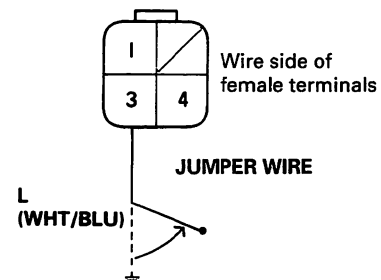
**ALTERNATOR 4P CONNECTOR
(H22A7 engine)**



**ALTERNATOR 2P CONNECTOR
(Except H22A7 engine)**



**ALTERNATOR 4P CONNECTOR
(H22A7 engine)**



[]: H22A7 engine

(cont'd)

Charging System

Troubleshooting (cont'd)

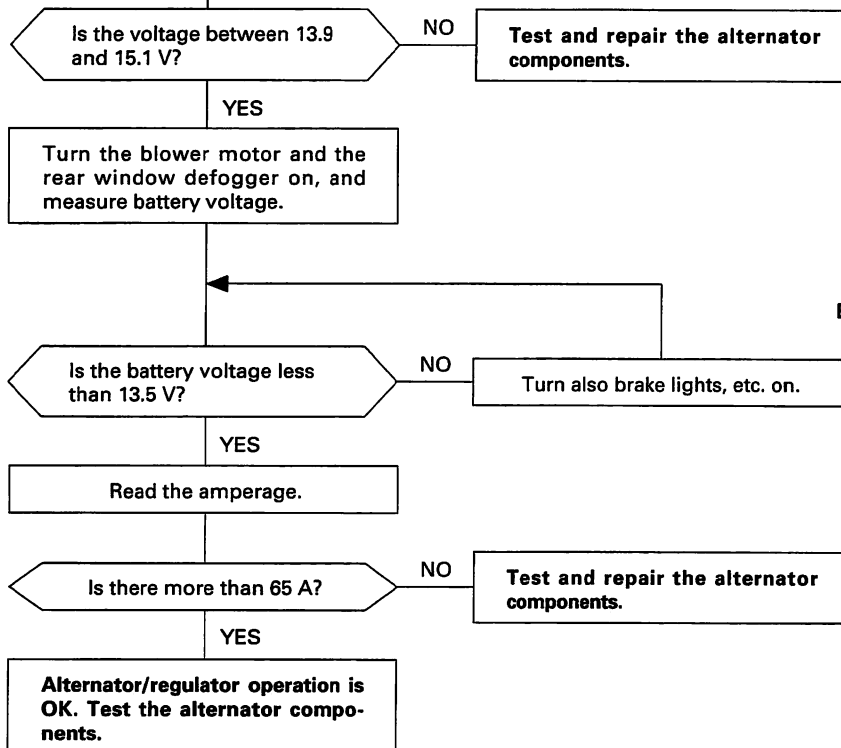
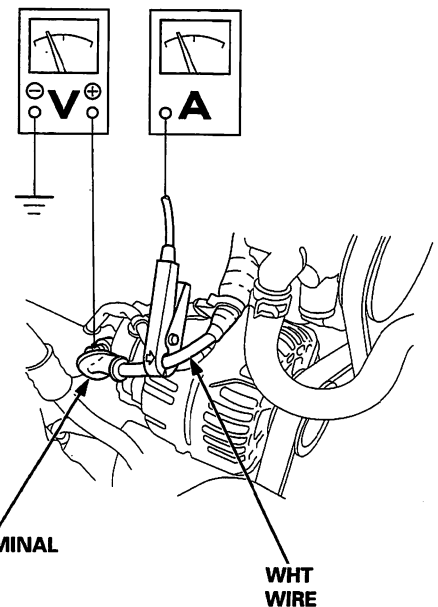
Alternator/Regulator Test

CAUTION: Be careful during testing as the radiator and condenser fans come on suddenly while the engine is running.

NOTE: Be sure to use an ammeter capable of measuring amperages higher than 120 A.

- Alternator/Regulator Test:**
1. Shift to **P** or **N** position (A/T) or neutral (M/T), and start the engine.
 2. Hold the engine at 3,000 rpm (min^{-1}) with no load until the radiator fan comes on, then let it idle.
 3. Raise the engine speed to 2,000 rpm (min^{-1}), and hold it there.
 4. Turn the headlights (high beam) on, and measure voltage at the battery terminals.

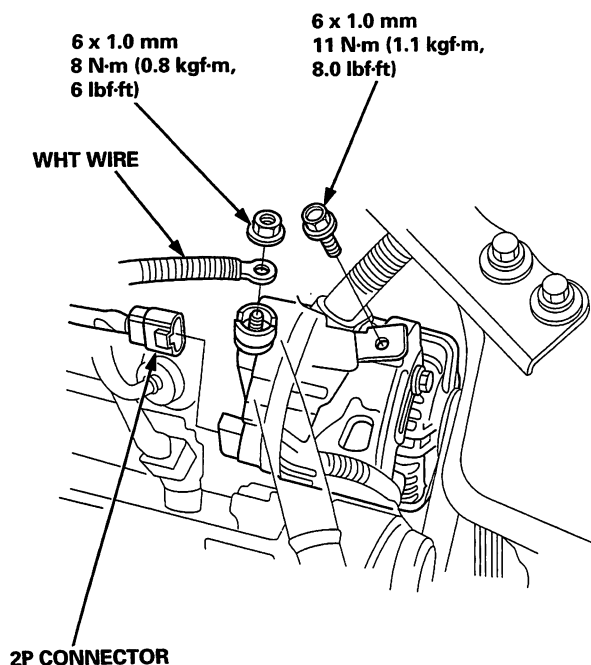
CAUTION: As the headlights warm up considerably, do not cover them.



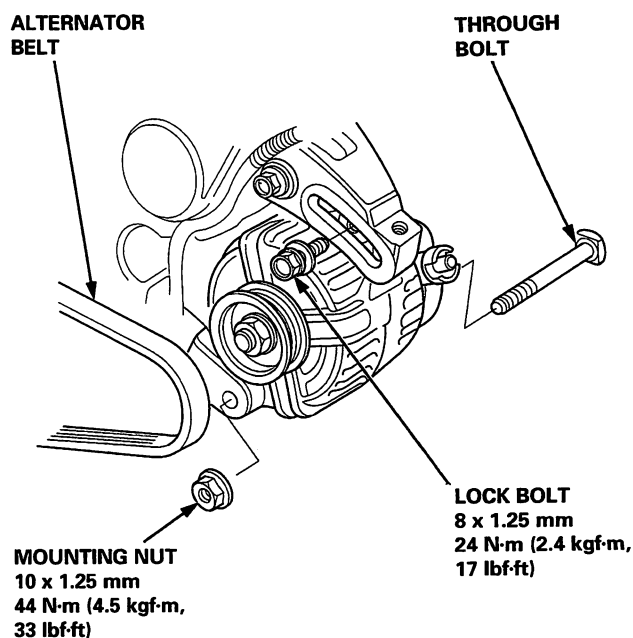
Alternator Replacement

D16B6 engine:

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the 2P connector, WHT wire and wire harness clamp.



4. Remove the lock bolt and mounting nut, then remove the alternator belt.
5. Pull out the through bolt, then remove the alternator from the transmission side.



6. Install the alternator in the reverse order of removal.
7. Adjust the alternator belt tension (see page 4-46).
8. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

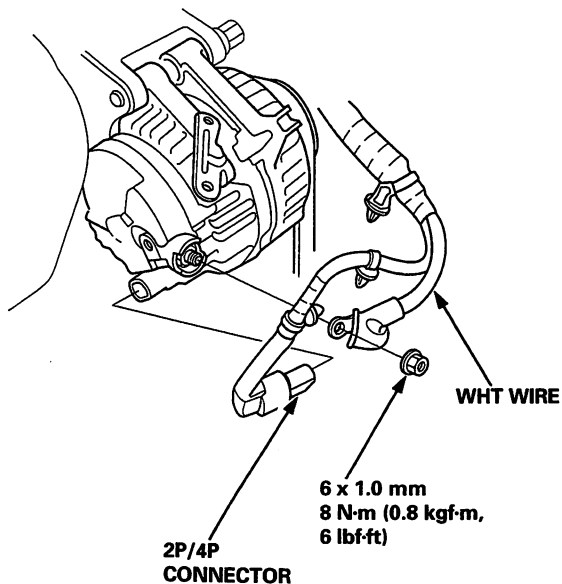
(cont'd)

Charging System

Alternator Replacement (cont'd)

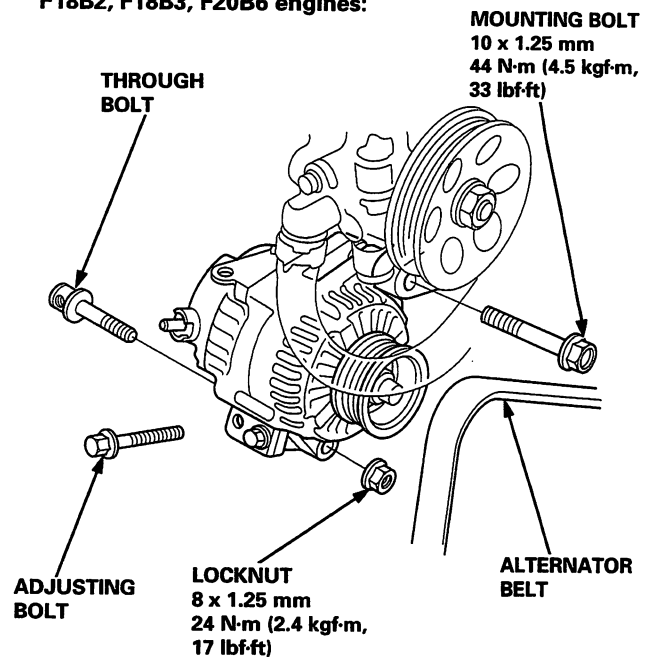
Except D16B6 engine:

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the 2P/4P connector and WHT wire.

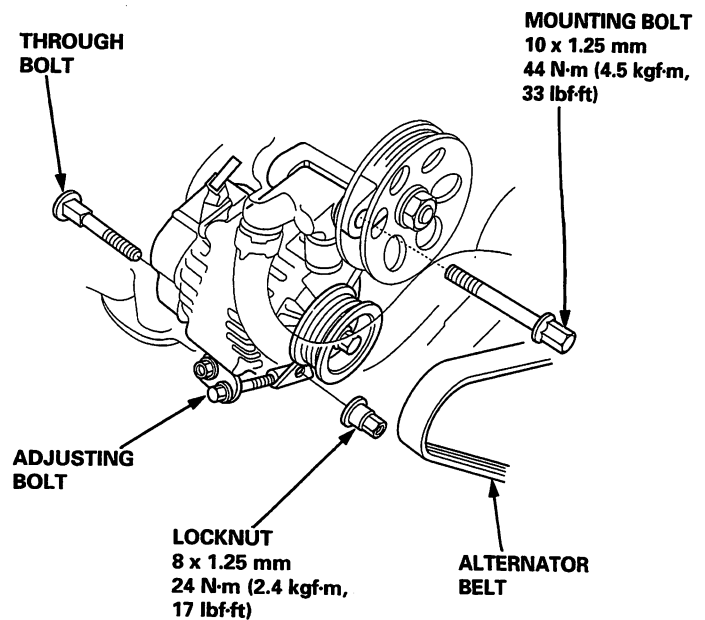


4. Remove the adjusting bolt, locknut and mounting bolt, then remove the alternator belt.
5. Pull out the through bolt, then remove the alternator.

F18B2, F18B3, F20B6 engines:



H22A7 engine:



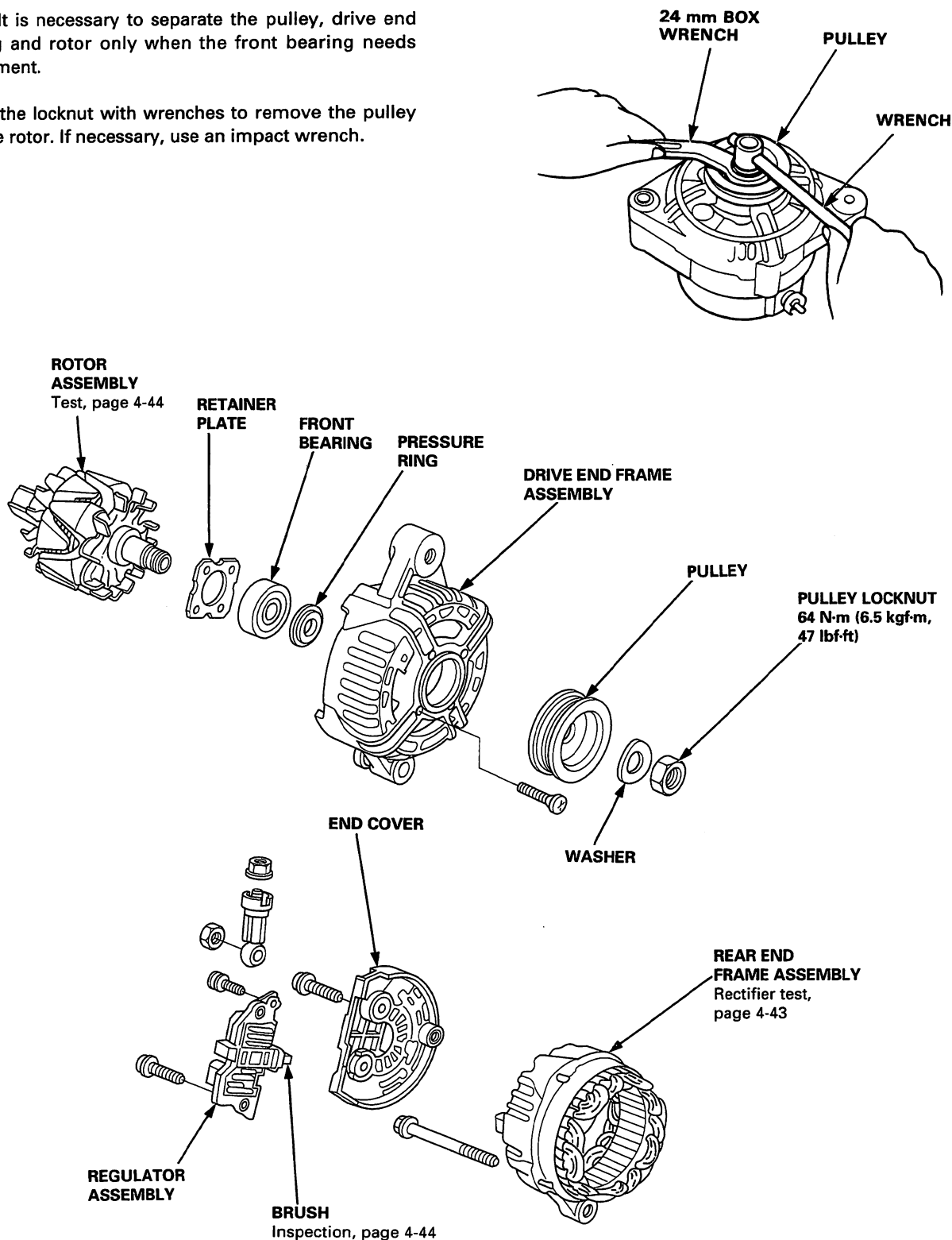
6. Install the alternator in the reverse order of removal.
7. Adjust the alternator belt tension (see pages 4-47, 48).
8. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Alternator Overhaul (BOSH)

Except H22A7 engine:

NOTE: It is necessary to separate the pulley, drive end housing and rotor only when the front bearing needs replacement.

Loosen the locknut with wrenches to remove the pulley from the rotor. If necessary, use an impact wrench.



(cont'd)

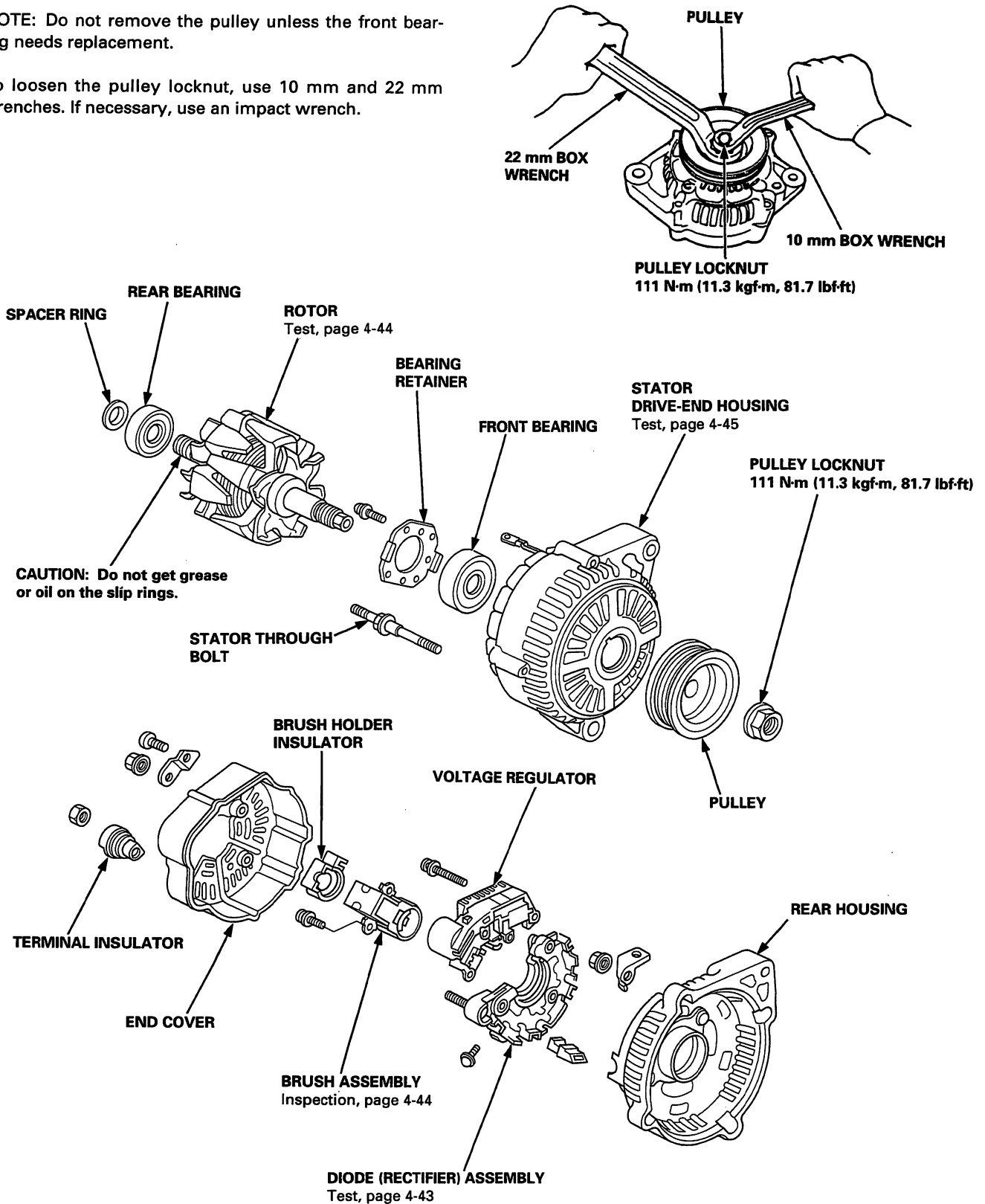
Charging System

Alternator Overhaul (cont'd) (DENSO)

H22A7 engine:

NOTE: Do not remove the pulley unless the front bearing needs replacement.

To loosen the pulley locknut, use 10 mm and 22 mm wrenches. If necessary, use an impact wrench.

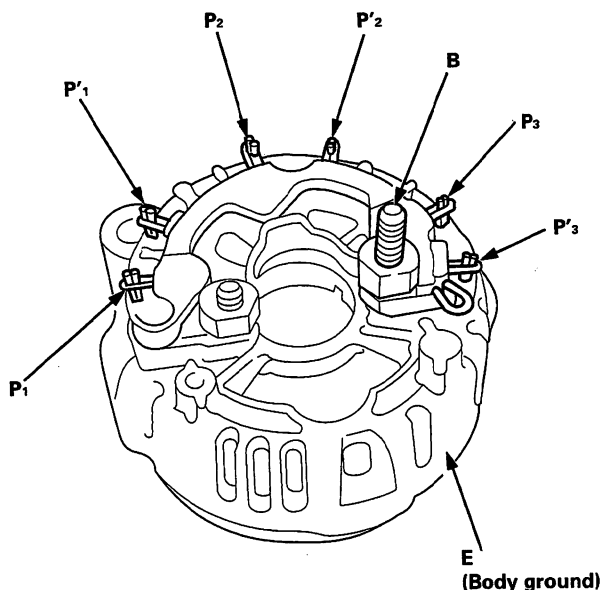


Rectifier Test

Except H22A7 engine:

NOTE: The diodes are designed to allow current to pass in one direction while blocking it in the opposite direction. Since the alternator rectifier is made up of six diodes, each diode must be tested for continuity in both directions with an ohmmeter that has diode checking capability; a total of 12 checks.

1. Check for continuity in each direction between
 - the B and P terminals.
 - E (ground) and the P terminals.
 All diodes should have continuity in only one direction.

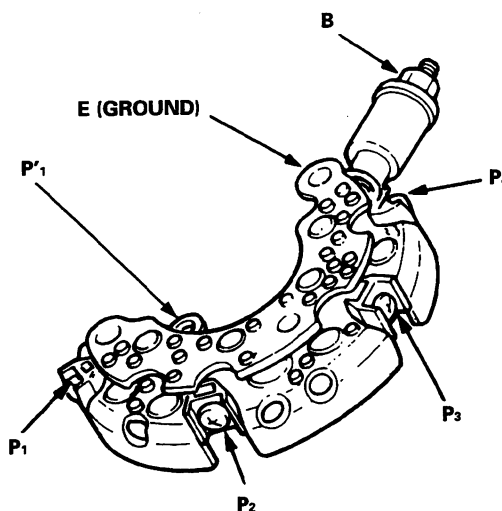


2. If any of the diodes fails, replace the rectifier assembly. (Diodes are not available separately.)

H22A7 engine:

NOTE: The diodes are designed to allow current to pass in one direction while blocking it in the opposite direction. Since the alternator rectifier is made up of eight diodes (four pairs), each diode must be tested for continuity in both directions with an ohmmeter that has diode checking capability; a total of 16 checks.

1. Check for continuity in each direction between
 - the B and P terminals.
 - E (ground) and P terminals.
 All diodes should have continuity in only one direction.



2. If any of the diodes fail, replace the rectifier assembly. (Diodes are not available separately.)

Charging System

Alternator Brush Inspection

1. Remove the end cover, then take out the brush holder by removing its two screws.
2. Measure the length of the brushes with a vernier caliper.

Alternator Brush Length:

Except H22A7 engine:

Standard (New): 13.2 mm (0.52 in)

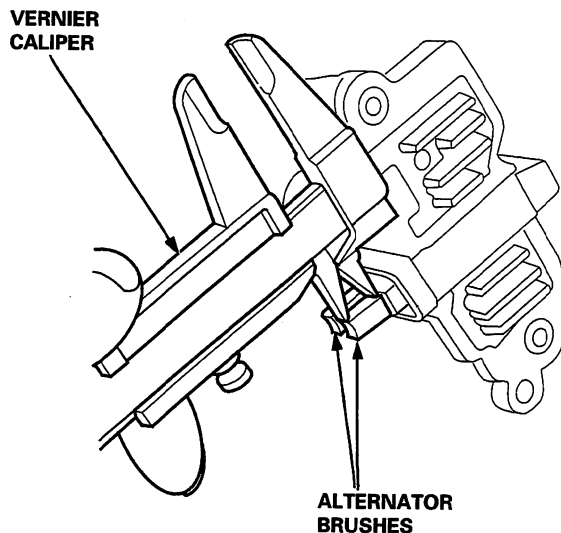
Service Limit: 3.2 mm (0.13 in)

H22A7 engine:

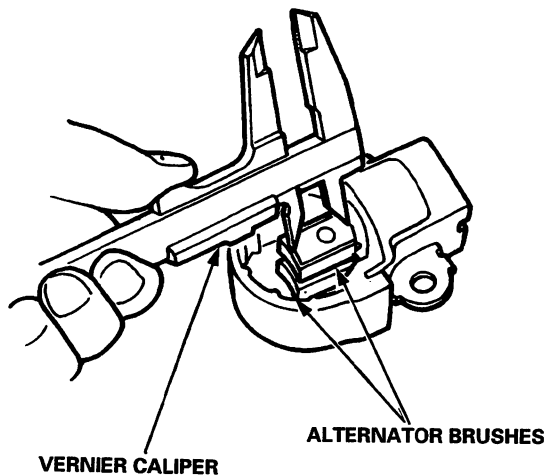
Standard (New): 10.5 mm (0.41 in)

Service Limit: 1.5 mm (0.06 in)

Except H22A7 engine:



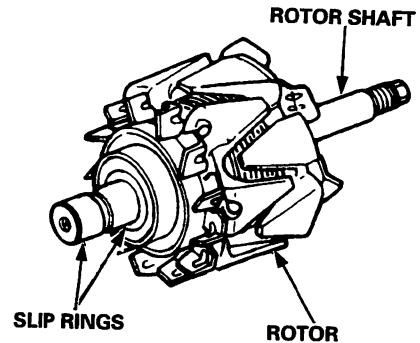
H22A7 engine:



3. If the brushes are less than the service limit, replace the alternator brush assembly.

Rotor Slip Ring Test

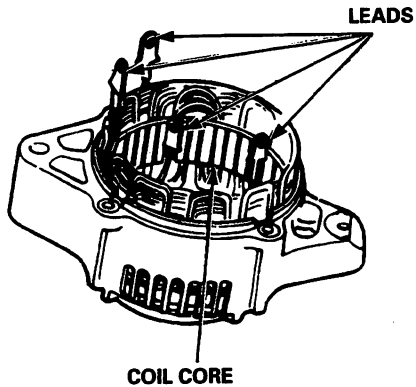
1. Check the resistance between the slip rings. There should be 1.8 – 3.0 ohms.
 - If resistance meets the specification, go to step 2.
 - If resistance does not meet the specification, replace the alternator.



2. Check that there is no continuity between the slip rings and the rotor or rotor shaft.
3. If the rotor fails either continuity check, replace the alternator.

Stator Test (H22A7 engine)

1. Check that there is continuity between each pair of leads.



2. Check that there is no continuity between each lead and the coil core.
3. If the coil fails either continuity check, replace the alternator.

Charging System

Alternator Belt Adjustment (D16B6 engine)

NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

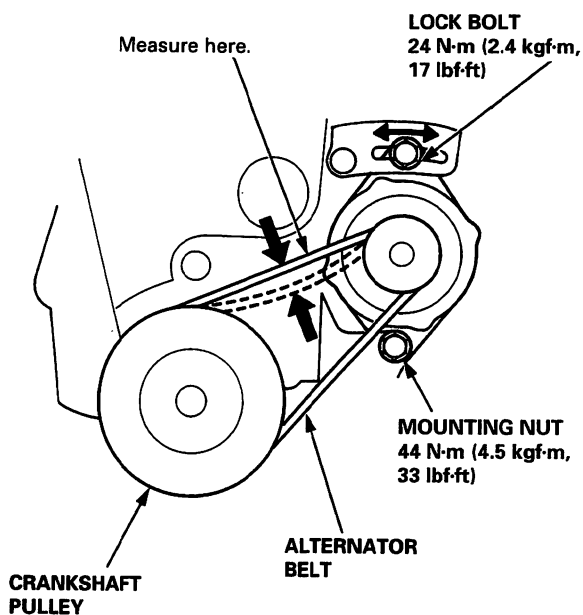
Inspection with Deflection Method

1. Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection at the mid point between the alternator and crankshaft pulley. If the belt is worn or damaged, replace it.

Deflection:

Used Belt: 7.0 – 10.5 mm (0.28 – 0.41 in)

New Belt: 5.0 – 7.0 mm (0.19 – 0.28 in)



Adjustment

1. Loosen the mounting nut and lock bolt.
2. Move the alternator to obtain the proper belt tension, then retighten the lock bolt and mounting nut.
3. Recheck the belt tension.

NOTE:

- For the power steering pump belt adjustment, refer to section 17.
- For the air conditioning compressor belt adjustment, refer to section 22.

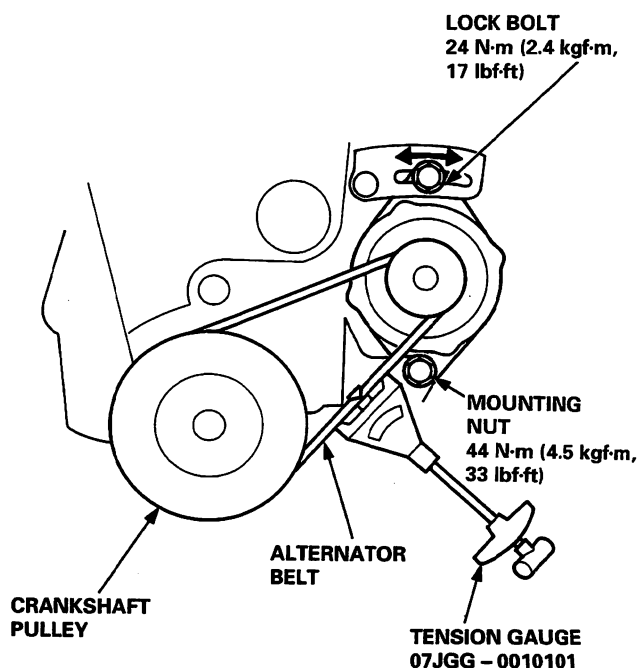
Inspection with Belt tension gauge method

1. Attach the belt tension gauge to the belt and measure the tension. Follow the gauge manufacturer's instructions. If the belt is worn or damaged, replace it.

Tension:

Used Belt: 340 – 490 N (35 – 50 kgf, 77 – 110 lbf)

New Belt: 640 – 780 N (65 – 80 kgf, 140 – 180 lbf)



Adjustment

1. Loosen the mounting nut and lock bolt.
2. Move the alternator to obtain the proper belt tension, then retighten the lock bolt and mounting nut.
3. Recheck the belt tension.

NOTE:

- For the power steering pump belt adjustment, refer to section 17.
- For the air conditioning compressor belt adjustment, refer to section 22.

Alternator Belt Adjustment (Except D16B6 engine with A/C)

NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

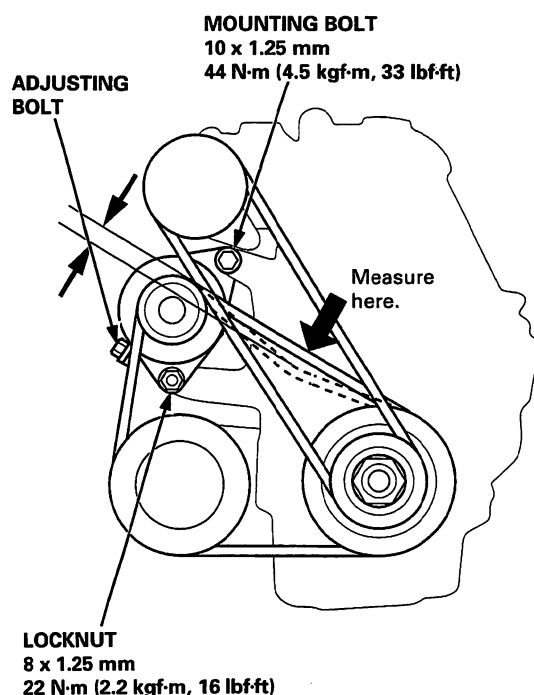
Inspection with Deflection Method

1. Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection at the mid point between the alternator and crankshaft pulley. If the belt is worn or damaged, replace it.

Deflection:

Used Belt: 10.0 – 12.0 mm (0.39 – 0.47 in)

New Belt: 5.5 – 7.5 mm (0.22 – 0.30 in)



Adjustment

1. Loosen the mounting bolt and locknut.
2. Turn the adjusting bolt to obtain the proper belt tension, then retighten the locknut and mounting bolt.
3. Recheck the belt tension.

NOTE: For the power steering pump belt adjustment, refer to section 17.

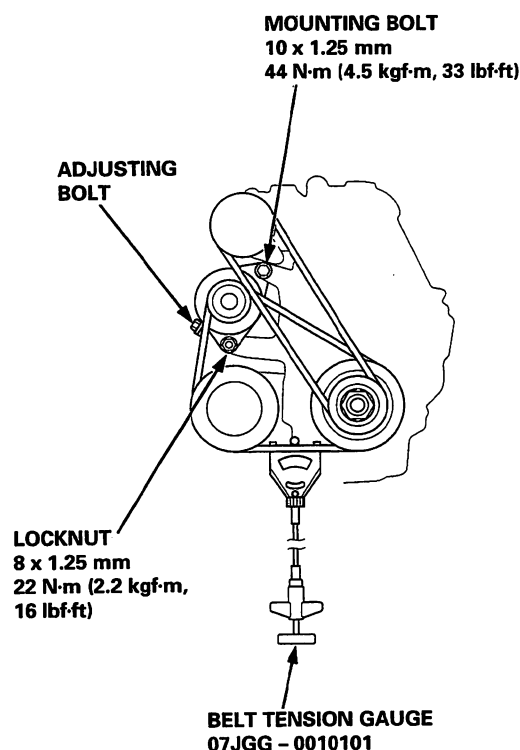
Inspection with Belt tension gauge method

1. Remove the three bolts from the left end of the splash shield, and pull it back as needed.
2. Attach the belt tension gauge to the belt and measure the tension. Follow the gauge manufacturer's instructions. If the belt is worn or damaged, replace it.

Tension:

Used Belt: 390 – 540 N (40 – 55 kgf, 88 – 120 lbf)

New Belt: 880 – 1,030 N (90 – 105 kgf, 200 – 231 lbf)



Adjustment

1. Loosen the mounting bolt and locknut.
2. Turn the adjusting bolt to obtain the proper belt tension, then retighten the locknut and mounting bolt.
3. Recheck the belt tension.

NOTE: For the power steering pump belt adjustment, refer to section 17.

Charging System

Alternator Belt Adjustment (Except D16B6 engine without A/C)

NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

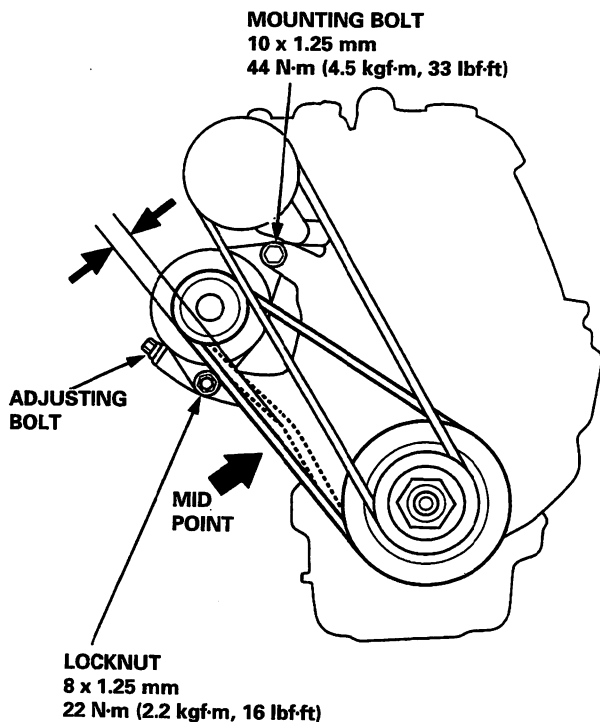
Inspection with Deflection method

1. Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection at the mid point between the alternator and crankshaft pulley. If the belt is worn or damaged, replace it.

Deflection:

Used Belt: 10.0 – 13.0 mm (0.39 – 0.51 in)

New Belt: 7.5 – 10.0 mm (0.30 – 0.39 in)



Adjustment

1. Loosen the mounting bolt and locknut.
2. Turn the adjusting bolt to obtain the proper belt tension, then retighten the locknut and mounting bolt.
3. Recheck the belt tension.

NOTE: For the power steering pump belt adjustment, refer to section 17.

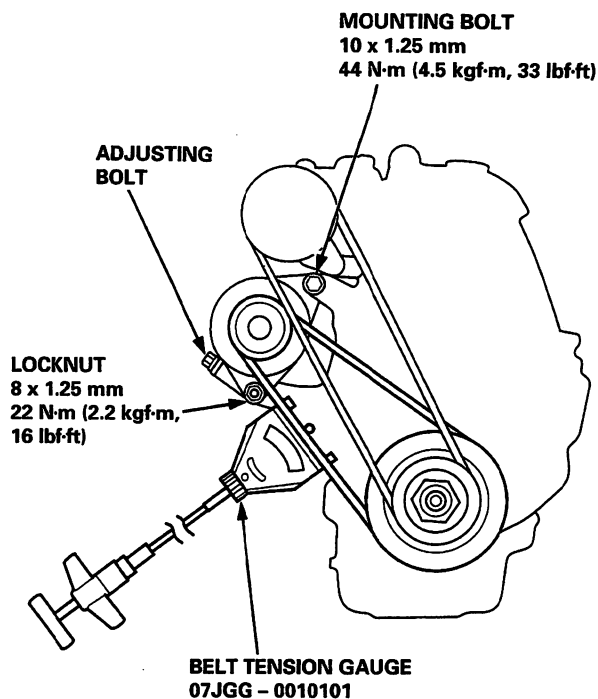
Inspection with Belt tension gauge method

1. Attach the belt tension gauge to the belt and measure the tension. Follow the gauge manufacturer's instructions. If the belt is worn or damaged, replace it.

Tension:

Used Belt: 290 – 440 N (30 – 45 kgf, 66 – 99 lbf)

New Belt: 540 – 740 N (55 – 75 kgf, 120 – 170 lbf)

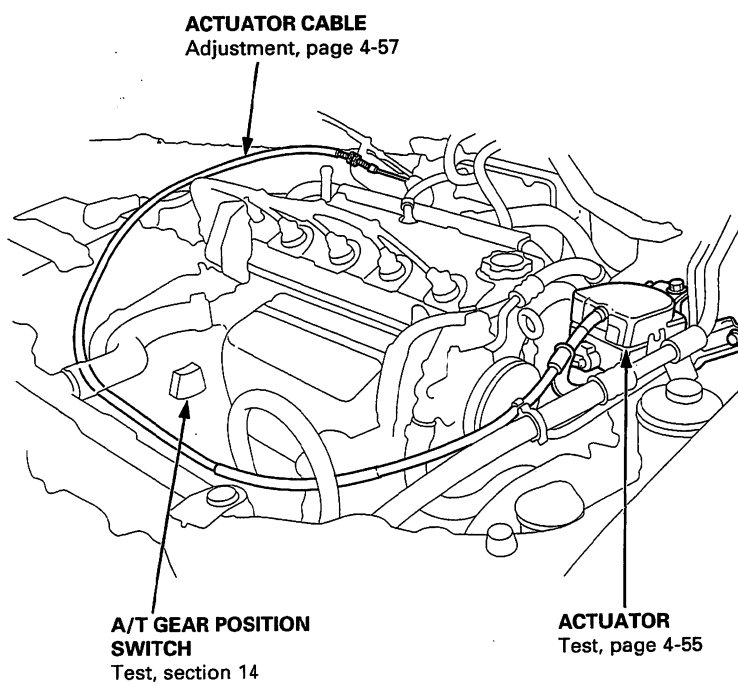
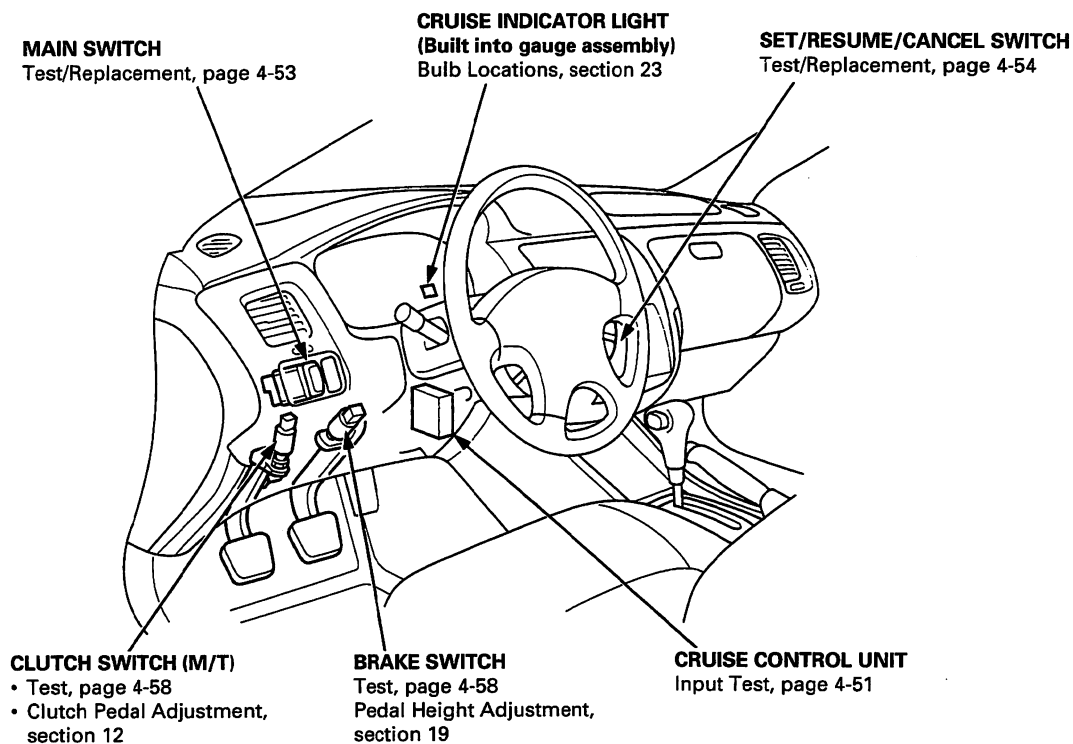


Adjustment

1. Loosen the mounting bolt and locknut.
2. Turn the adjusting bolt to obtain the proper belt tension, then retighten the locknut and mounting bolt.
3. Recheck the belt tension.

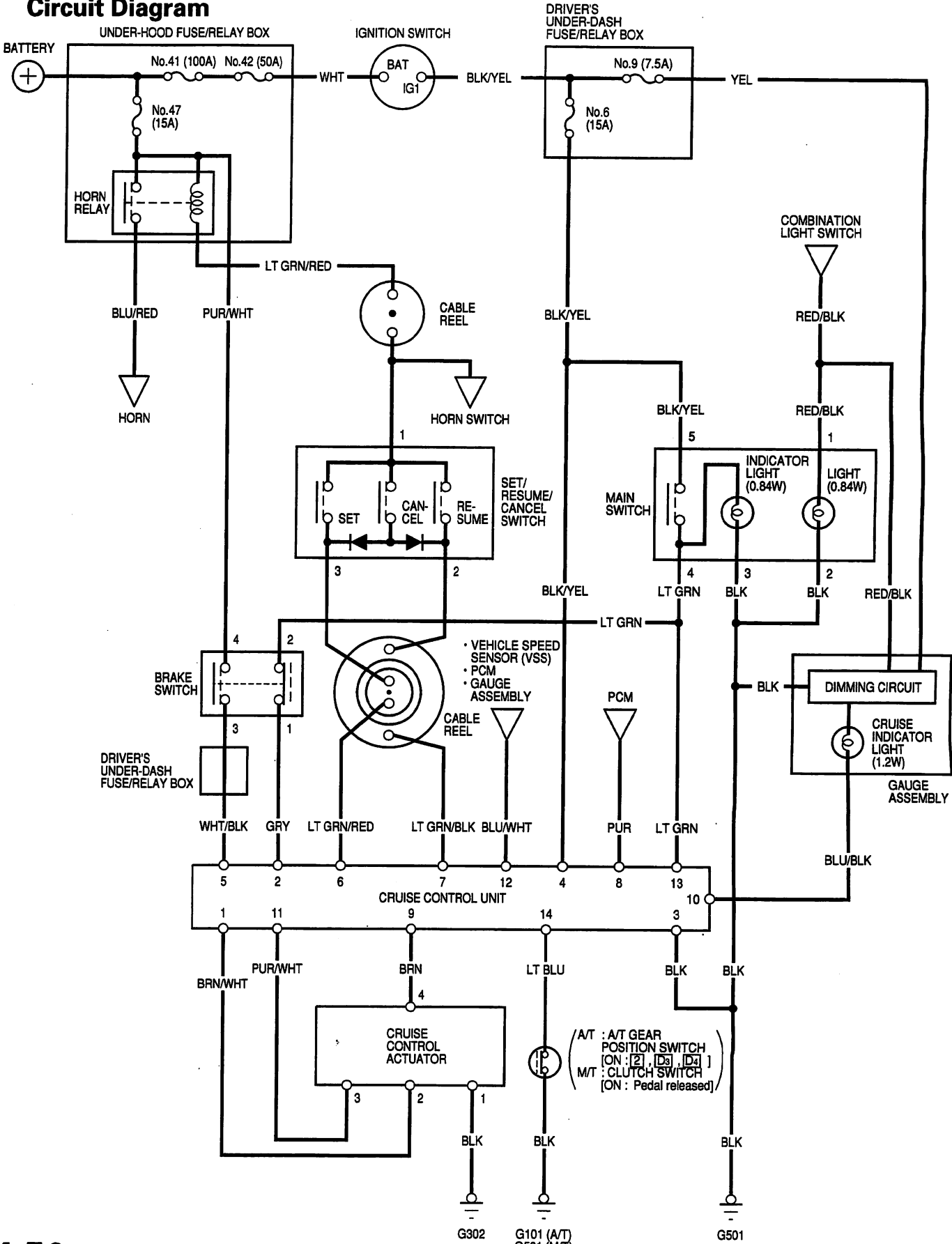
NOTE: For the power steering pump belt adjustment, refer to section 17.

Component Location Index



Cruise Control

Circuit Diagram



Control Unit Input Test

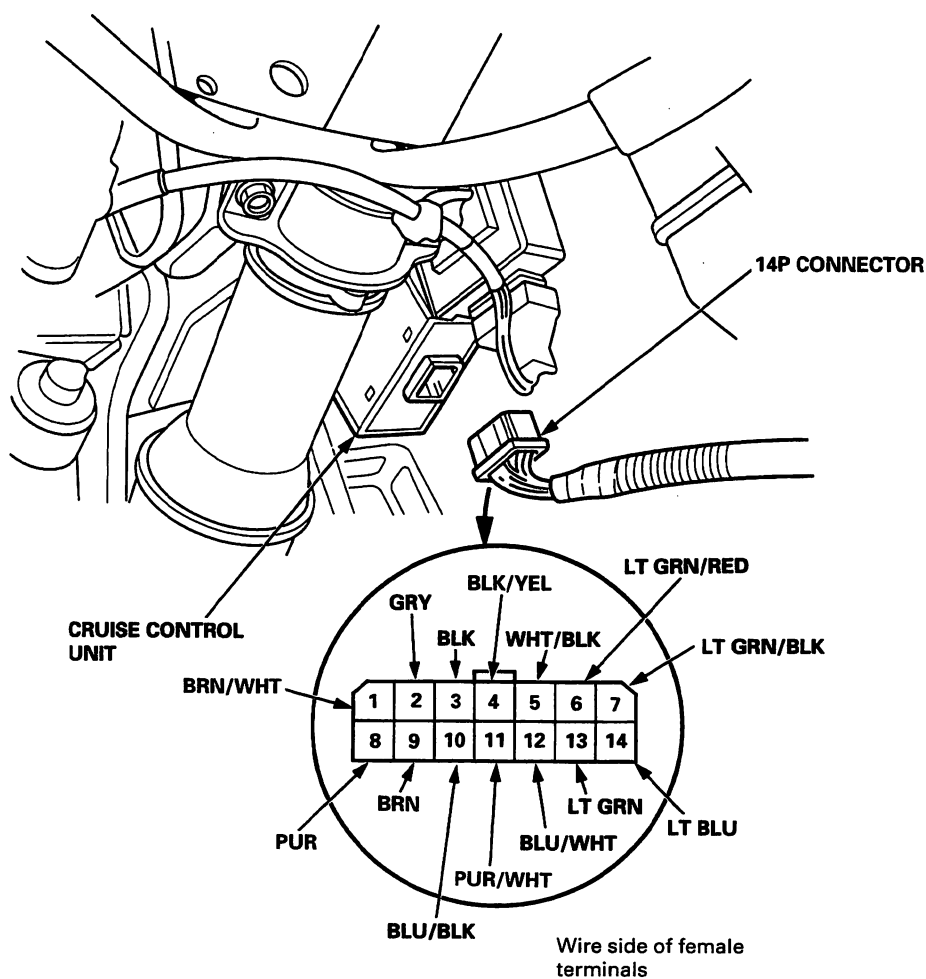
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the driver's dashboard lower cover (see section 20).
2. Disconnect the 14P connector from the control unit.
3. Inspect the connector and socket terminals to be sure they are all making good contact.

If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.

If the terminals look OK, make the following input tests at the connector.

- If any test indicates a problem, find and correct the cause, then recheck the system.
- If all the input tests prove OK, the control unit must be faulty; replace it.



(cont'd)

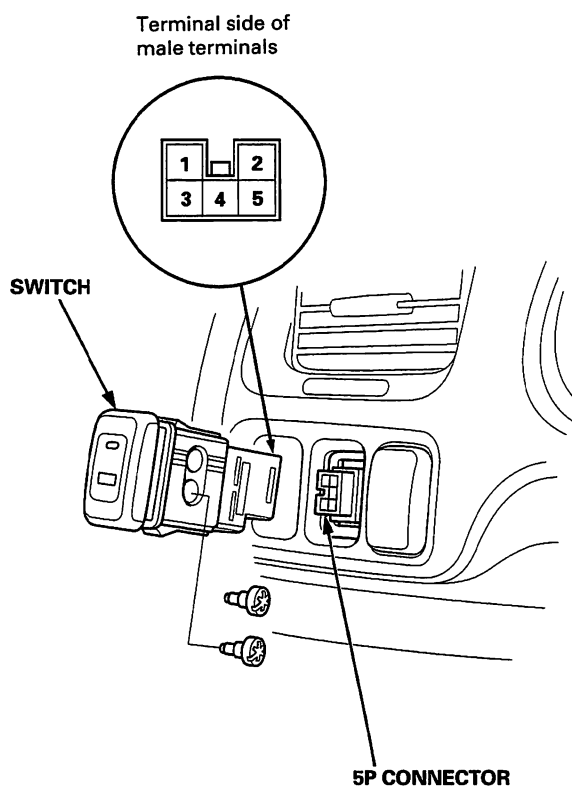
Cruise Control

Control Unit Input Test (cont'd)

Cavity	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BRN/WHT	Connect battery power	Check the operation of the magnetic clutch: Clutch should click and output link should be locked.	<ul style="list-style-type: none"> Faulty actuator Poor ground (G302) An open in the wire
2	GRY	Ignition switch ON (II), main switch ON and brake pedal depressed, then released	Check for voltage to ground: There should be 0 V with the pedal depressed and battery voltage with the pedal released.	<ul style="list-style-type: none"> Faulty brake switch An open in the wire
3	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> Poor ground (G501) An open in the wire
4	BLK/YEL	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage	<ul style="list-style-type: none"> Blown No. 6 (15 A) fuse in the driver's under-dash fuse/relay box An open in the wire
5	WHT/BLK	Brake pedal depressed, then released	Check for voltage to ground: There should be battery voltage with the pedal depressed, and 0 V with the pedal released.	<ul style="list-style-type: none"> Blown No. 47 (15 A) fuse in the under-hood fuse/relay box Faulty brake switch An open in the wire
6	LT GRN/RED	Set button pushed	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> Blown No. 47 (15 A) fuse in the under-hood fuse/relay box Faulty horn relay Faulty set/resume switch Faulty cable reel An open in the wire
7	LT GRN/BLK	Resume button pushed		
8	PUR	Start the engine, main switch ON and drive the vehicle to speed over 25 mph (40 km/h) with the cruise control	Check for voltage to ground: There should be approx. 5 V	<ul style="list-style-type: none"> Faulty cruise control unit
9	BRN	Connect battery power to the BRN terminal and ground to the PUR/WHT terminal	Check the operation of the actuator motor: You should be able to hear the motor.	<ul style="list-style-type: none"> Faulty actuator An open in the wire
11	PUR/WHT			
10	BLU/BLK	Ignition switch ON (II)	Attach to ground: Cruise indicator light in the gauge assembly should come on.	<ul style="list-style-type: none"> Blown bulb Blown No. 9 (7.5 A) fuse in the driver's under-dash fuse/relay box Faulty dimming circuit in the gauge assembly An open in the wire
12	BLU/WHT	Ignition switch ON (II) and main switch ON; raise the front of the vehicle, and rotate one wheel slowly while holding the other wheel	Check for voltage between the BLU/WHT ⊕ and BLK ⊖ terminals: There should be 0 – 5 V or more – 0 – 5 V or more repeatedly.	<ul style="list-style-type: none"> Faulty vehicle speed sensor (VSS) (M/T) Faulty PCM (A/T) An open in the wire
13	LT GRN	Ignition switch ON (II) and main switch ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> Blown No. 6 (15 A) fuse in the driver's under-dash fuse/relay box Faulty main switch An open in the wire
14	LT BLU	A/T: Shift lever in 2, D₃ or D₄ M/T: Clutch pedal released	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity when the clutch pedal is depressed or when the shift lever is in other positions.	<ul style="list-style-type: none"> Faulty A/T gear position switch (A/T) Faulty or misadjusted clutch switch (M/T) Poor ground (G101, G501) An open in the wire

Main Switch Test/Replacement

- Carefully pry the switch out of the instrument panel.



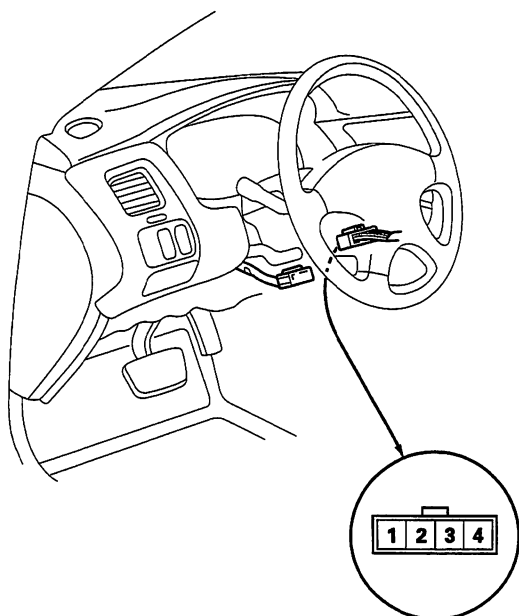
- Disconnect the 5P connector from the switch.
- Check for continuity between the terminals in each switch position according to the table. If there is no continuity, replace the switch.

Terminal Position	3		4	5	1		2
OFF	○	⊗	○		○	⊗	○
ON	○	⊗	○	○	○	⊗	○

Cruise Control

Set/Resume/Cancel Switch Test/Replacement

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative cable, then disconnect the positive cable, and wait at least three minutes.
3. Disconnect the driver's airbag and front passenger's airbag connectors (see section 24).
4. Remove the dashboard lower cover and knee bolster.
5. Disconnect the combination switch harness 4P connector from the cable reel.



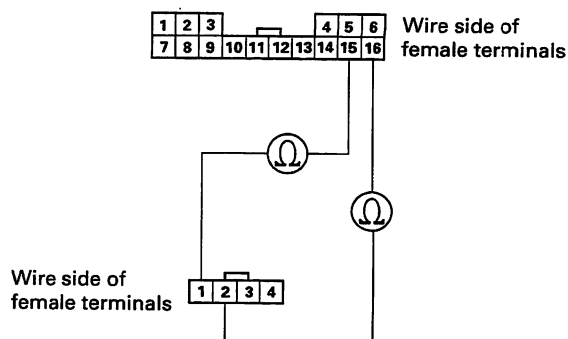
Terminal side of male terminals

6. Check for continuity between the terminals of the 4P connector in each switch position according to the table.

Terminal	3		1	2
Position				
SET (ON)	○	—	○	
RESUME (ON)	○	—		○
CANCEL (ON)	○	—	○	○

- If there is continuity, and it matches the table, go to step 7.
- If there is no continuity in one or both positions, go to step 12.

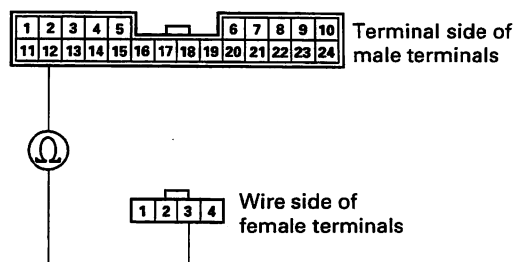
7. Remove the steering column covers.
8. Disconnect the 16P connector between the combination switch harness and main wire harness.
9. Check for continuity between the terminals as shown:



- If there is no continuity, replace the combination switch harness.

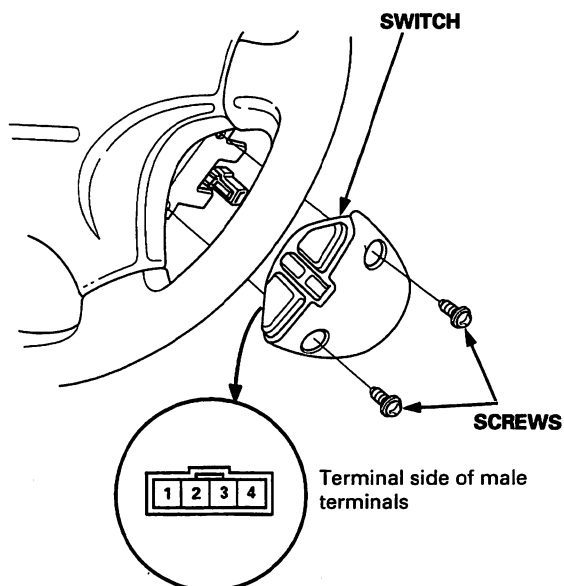
10. Disconnect the 24P connector between the combination switch harness and left engine compartment wire harness.

11. Check for continuity between the terminals as shown:



- If there is no continuity, replace the combination switch harness.

12. Remove the two screws, then remove the switch.



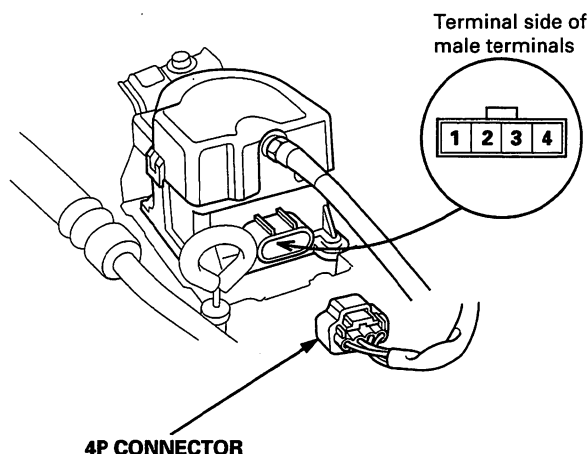
13. Check for continuity between the terminals in switch position according to the table.

Terminal Position	1	2	3
SET (ON)	○	○	○
RESUME (ON)	○	○	○
CANCEL (ON)	○	○	○

- If there is continuity, and it matches the table, replace the cable reel.
 - If there is no continuity in one or both positions, replace the switch.
14. If all tests prove OK, reconnect the cable reel and combination switch harness connectors, then reinstall the steering column covers.
15. Reconnect the driver's airbag and front passenger's airbag connectors, and reinstall the access panel on the steering wheel.
16. Reconnect the battery positive cable, then the negative cable.
17. After connecting the airbag connectors, confirm proper system operation: Turn the ignition switch ON (II); the SRS indicator light should come on for about six seconds and then go off.
18. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

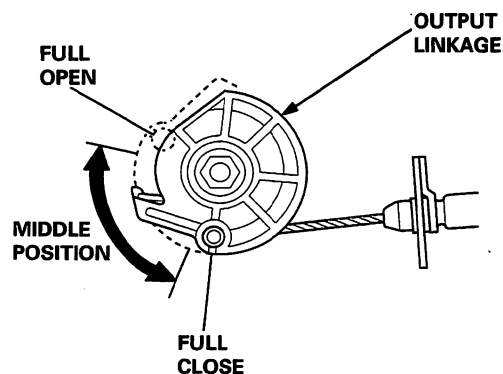
Actuator Test

1. Disconnect the 4P connector from the actuator.
2. Check the output linkage for smooth movement.
3. Connect battery power to the No. 2 terminal and ground to the No. 1 terminal.
4. Check for a clicking sound from the magnetic clutch. The output linkage should be locked.
5. If the output linkage is not locked, replace the actuator assembly.



6. Check the operation of the actuator motor in each output linkage position according to the table. You should be able to hear the motor.

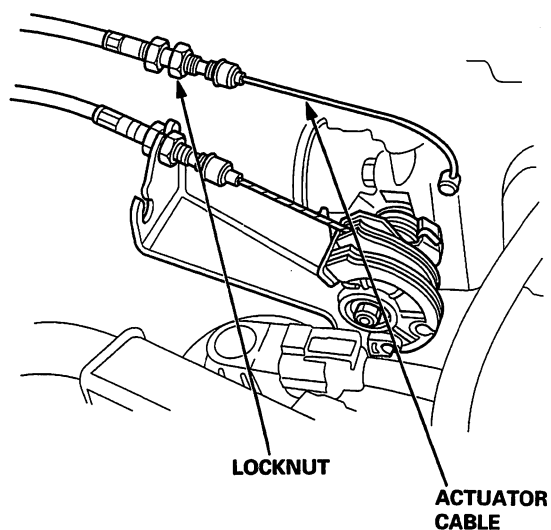
Battery power polarities		Output linkage position		
⊕	⊖	FULL CLOSE	MIDDLE POSITION	FULL OPEN
No. 4 Terminal	No. 3 Terminal	The motor runs.	The motor runs.	The motor stops.
No. 3 Terminal	No. 4 Terminal	The motor stops.	The motor runs.	The motor runs.



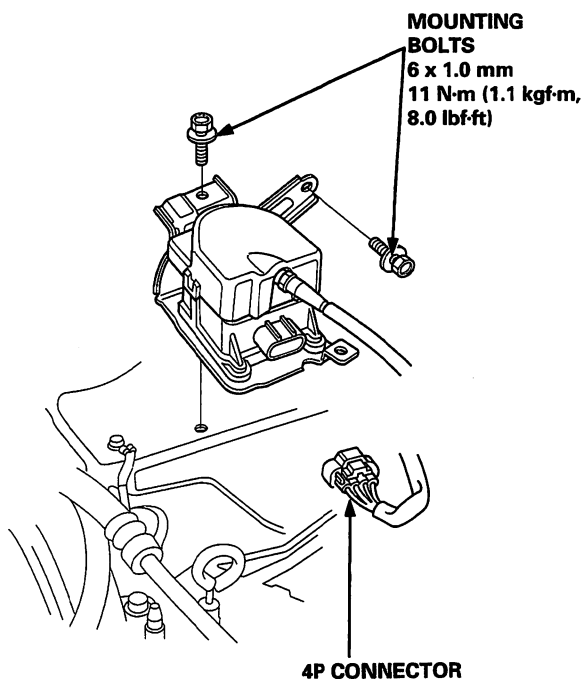
Cruise Control

Actuator and Cable Replacement

1. Loosen the locknut, then disconnect the actuator cable from the throttle linkage.

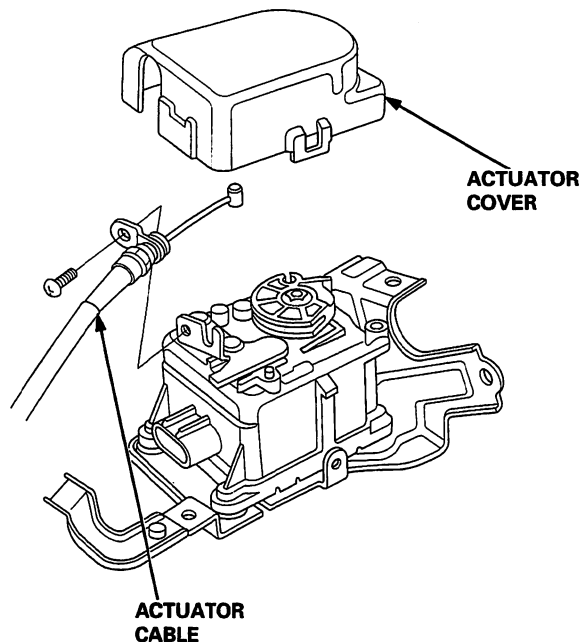


2. Disconnect the 4P connector from the actuator.

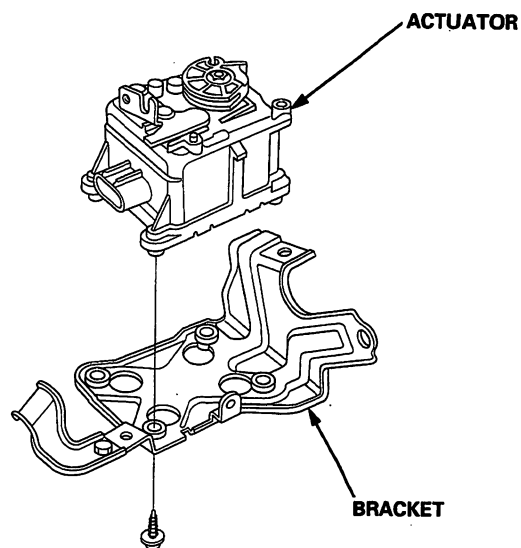


3. Remove the two mounting bolts, and remove the actuator with the bracket.

4. Remove the actuator cover, then remove the actuator cable from the actuator.



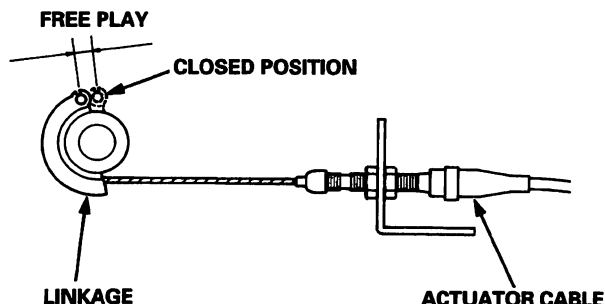
5. Remove the actuator from the bracket.



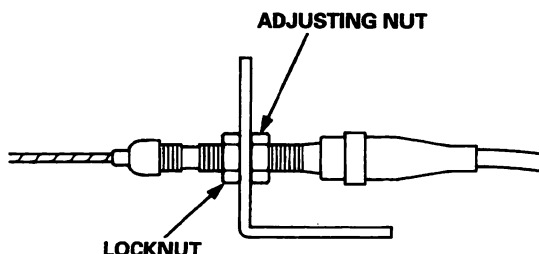
6. Install the reverse order of removal, and adjust the free play at the throttle linkage after connecting the actuator cable.

Actuator Cable Adjustment

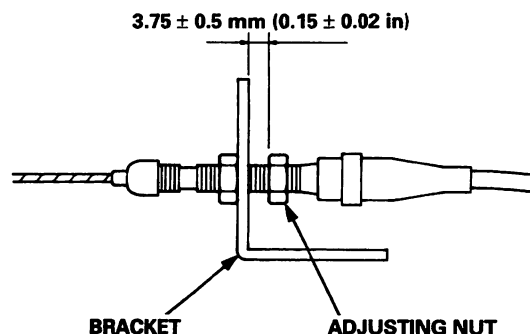
1. Check that the actuator cable moves smoothly with no binding or sticking.



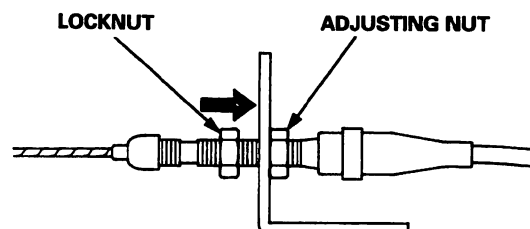
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) (rpm) with no load (A/T in **N** or **P** position, M/T in neutral) until the radiator fan comes on, then let it idle.
3. Measure the amount of movement of the output linkage until the engine speed starts to increase. At first, the output linkage should be located at the fully closed position. The free play should be $3.75 \pm 0.5 \text{ mm}$ ($0.15 \pm 0.02 \text{ in}$).
4. If the free play is not within specs, move the cable to the point where the engine speed starts to increase, and tighten the locknut and adjusting nut.



5. Turn the adjusting nut until it is $3.75 \pm 0.5 \text{ mm}$ ($0.15 \pm 0.02 \text{ in}$) away from the bracket.



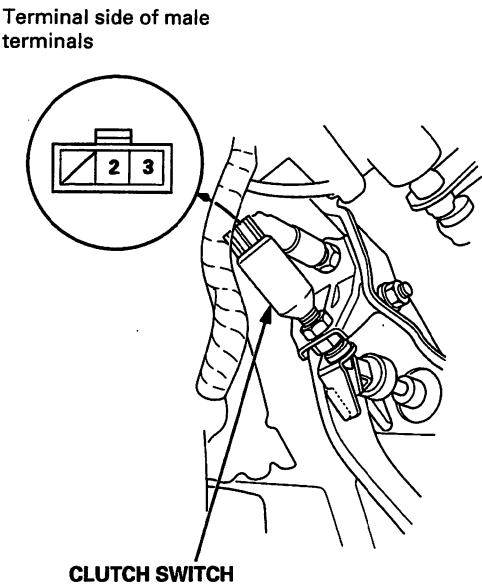
6. Pull the cable so that the adjusting nut touches the bracket, and tighten the locknut.



Cruise Control

Clutch Switch Test

1. Disconnect the 3P connector from the clutch switch.



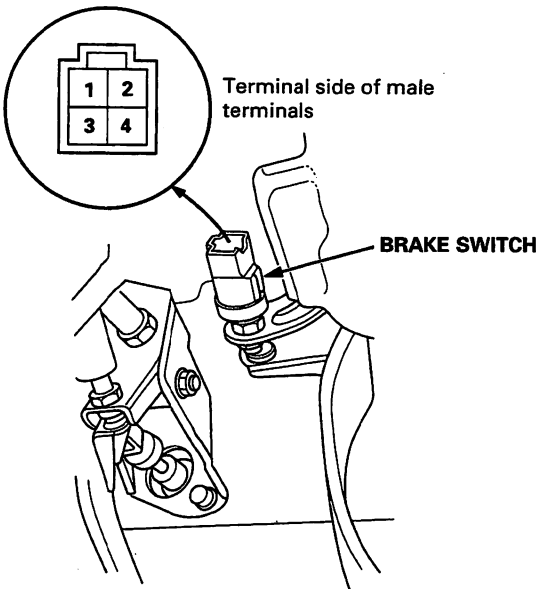
2. Remove the clutch switch.
3. Check for continuity between the terminals according to the table.

Terminal	2	3
Clutch Switch		
DEPRESSED		
RELEASED	○	○

4. If necessary, replace the switch or adjust the pedal height (see section 12).

Brake Switch Test

1. Disconnect the 4P connector from the switch.



2. Remove the brake switch.
3. Check for continuity between the terminals according to the table.

Terminal	1	2	3	4
Brake Switch				
DEPRESSED			○	○
RELEASED	○	○		

4. If necessary, replace the switch or adjust the pedal height (see section 19).

Engine

Engine Removal/Installation	5-1
Cylinder Head	
D16B6 engine	6-A-1
F18B2, F18B3, F20B6 engines	6-B-1
H22A7 engine	6-C-1
Engine Block	
D16B6 engine	7-A-1
F18B2, F18B3, F20B6, H22A7 engines	7-B-1
Engine Lubrication	8-1
Intake Manifold/Exhaust System	9-1
Cooling	10-1

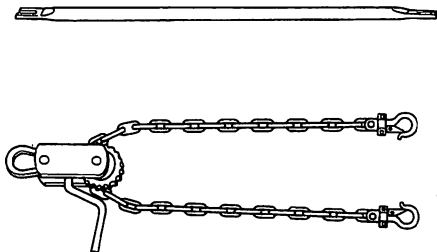


Engine Removal/Installation

Special Tools	5-2
Engine Removal/Installation	
Removal	5-3
Installation	5-15
Engine Mount Control System (A/T)	
Component Location Index	5-23
Circuit Diagram	5-24
Troubleshooting Flowchart	5-25



Special Tools

Ref. No.	Tool Number	Description	Qty	Remark
①	07KAK - SJ40101	Engine Tilt Hanger Set	1	Except EU
<div><p>①</p></div>				

Engine Removal/Installation

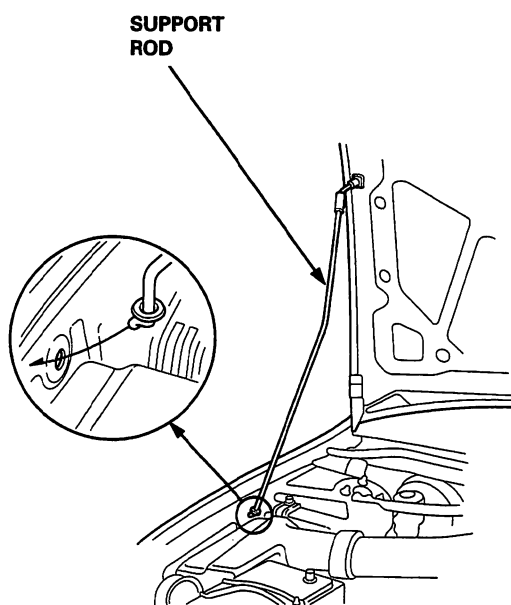


Removal

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other part.

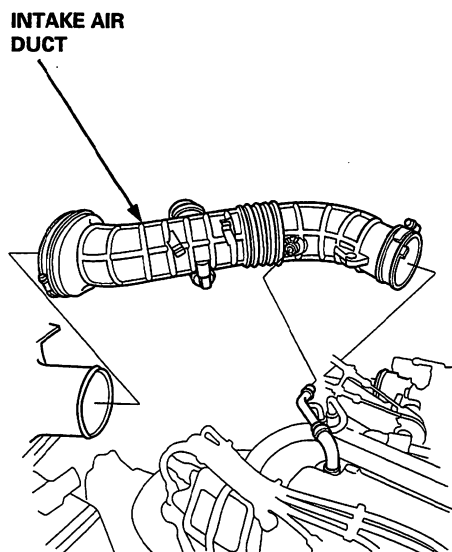
1. Fix the hood in the vertical position by using a support rod (P/N 74145 – S84 – A00) as shown below.



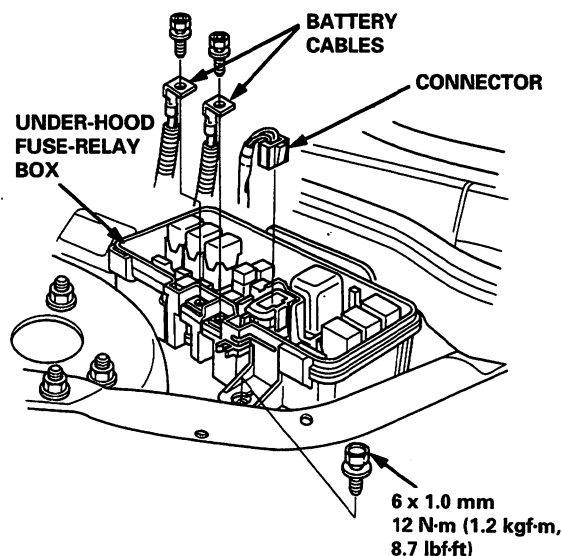
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
3. Disconnect the battery negative terminal first, then the positive terminal.

4. Disconnect the intake air temperature (IAT) sensor connector from intake air duct (D16B6 engine).

5. Remove the intake air duct.



6. Disconnect the battery cables and connector from the under-hood fuse/relay box, then remove the under-hood fuse/relay box.



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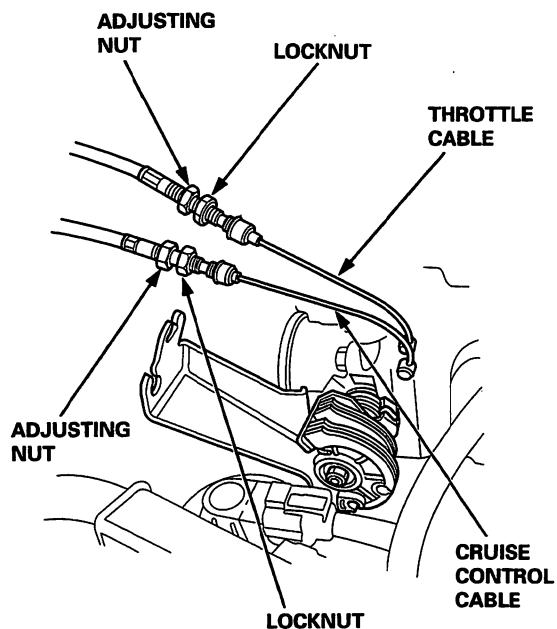
Engine Removal/Installation

Removal (cont'd)

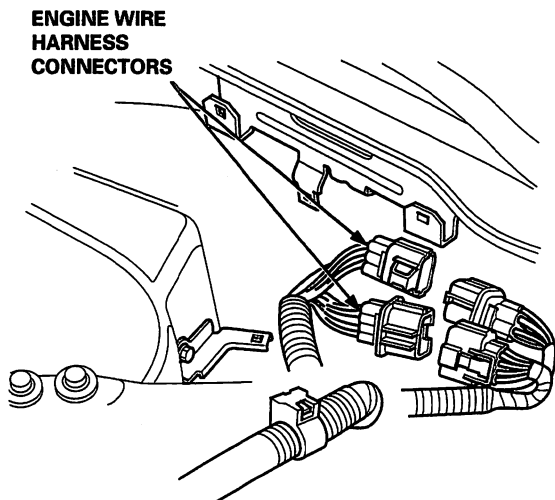
7. Remove the throttle cable and cruise control cable by loosening the locknuts, then slip the cable ends out of the accelerator linkage.

NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (see section 11).
- Adjust the cruise control cable when installing (see section 4).



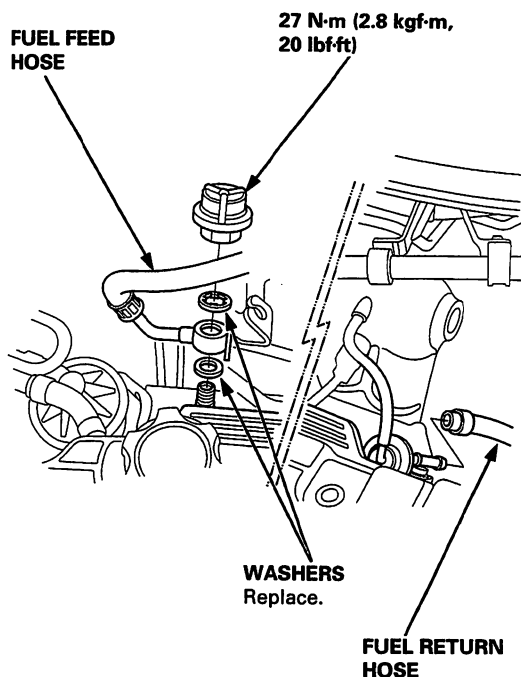
8. Disconnect the engine wire harness connectors from under the under-hood fuse/relay box.



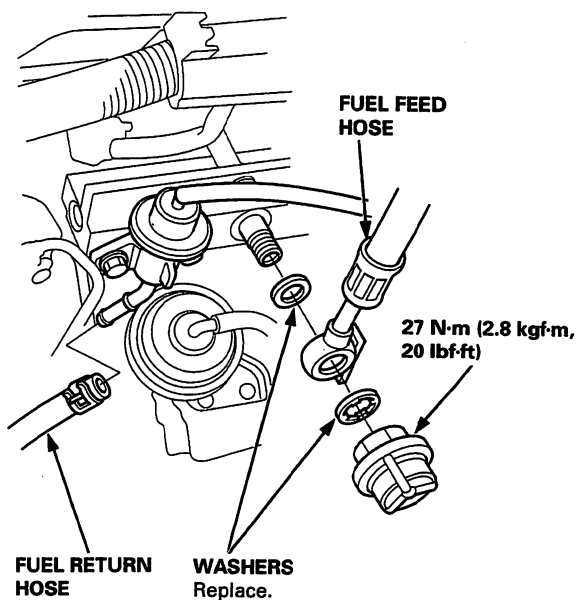
9. Relieve fuel pressure (see section 11).

10. Remove the fuel feed hose and fuel return hose.

H22A7 engine:

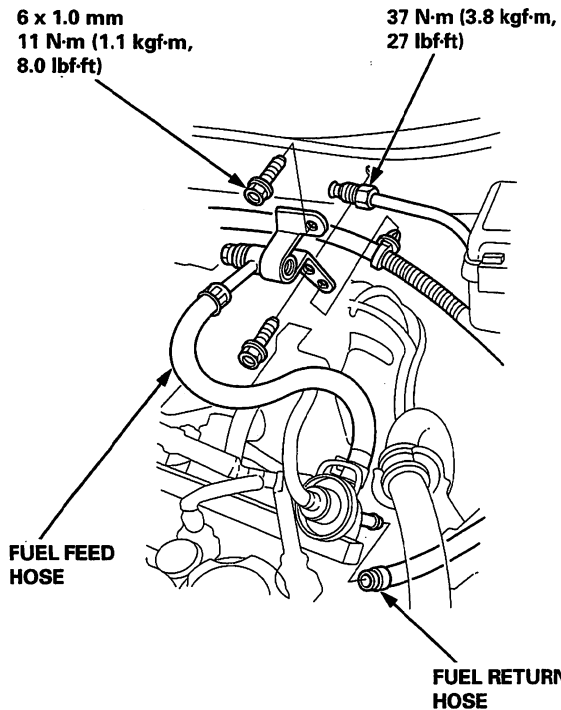


F18B2, F18B3, F20B6 engines:



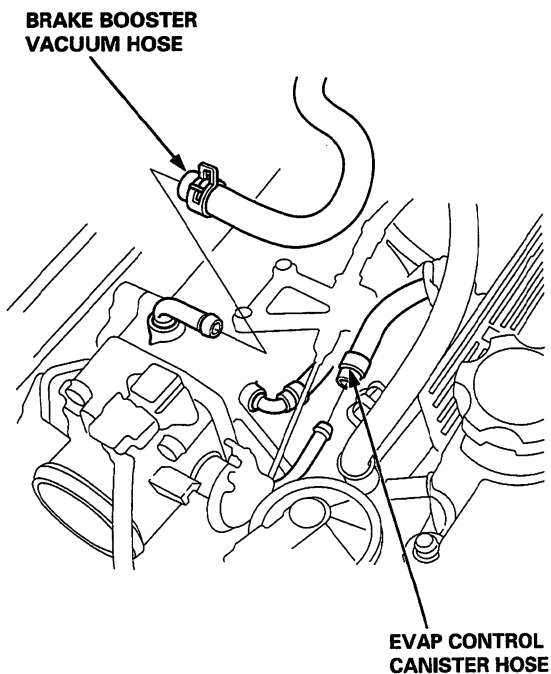


D16B6 engine:

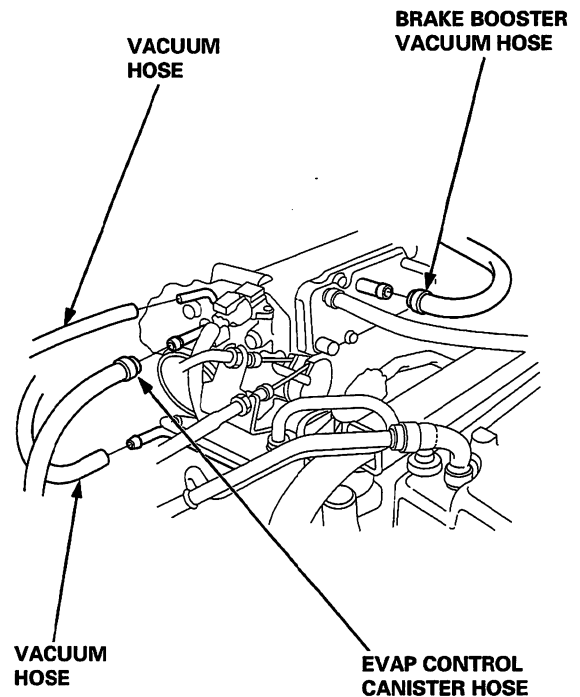


11. Remove the brake booster vacuum hose, evaporative emission (EVAP) control canister hose.

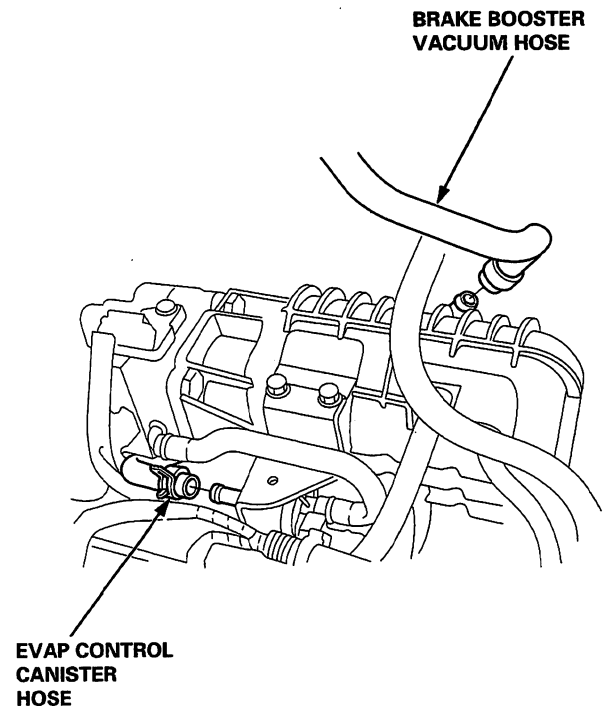
H22A7 engine:



F18B2, F18B3, F20B6 engines:



D16B6 engine:



(cont'd)

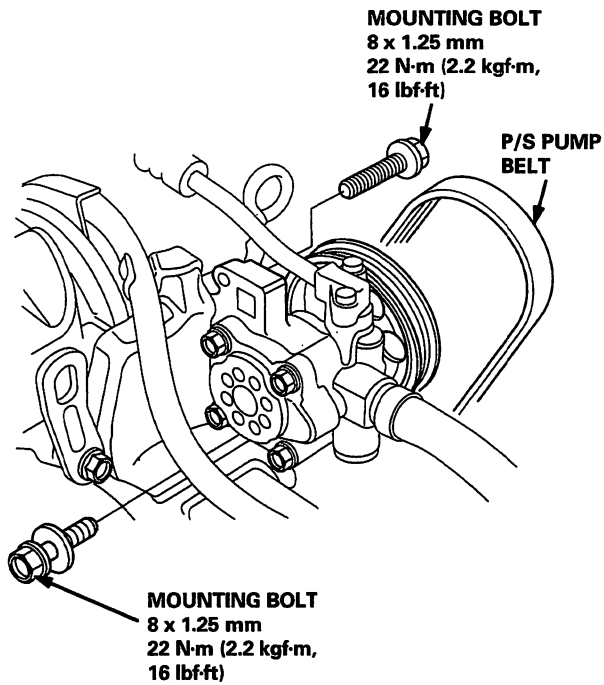
Engine Removal/Installation

Removal (cont'd)

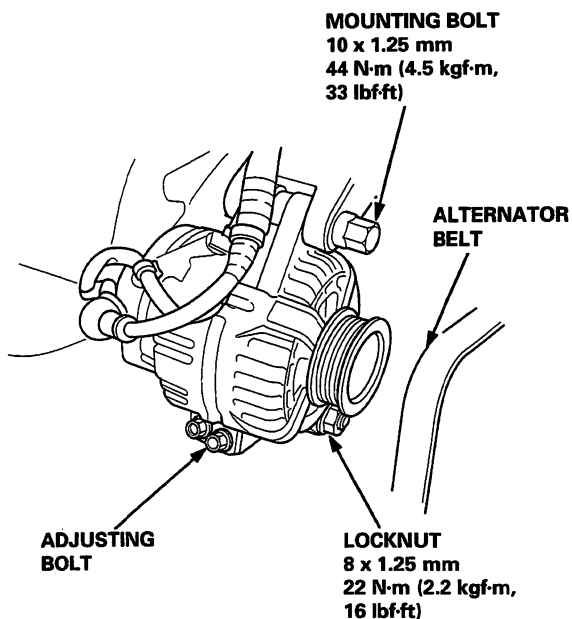
12. Remove the power steering (P/S) pump and air conditioning (A/C) compressor.

Except D16B6 engine:

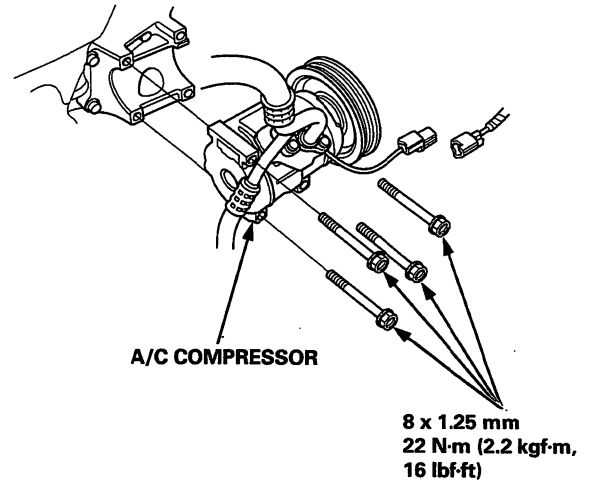
- 1. Remove the mounting bolts, then remove the P/S pump belt and pump without disconnecting the P/S hoses.



- 2. Loosen the alternator mounting bolt, locknut and adjusting bolt, then remove the alternator belt.



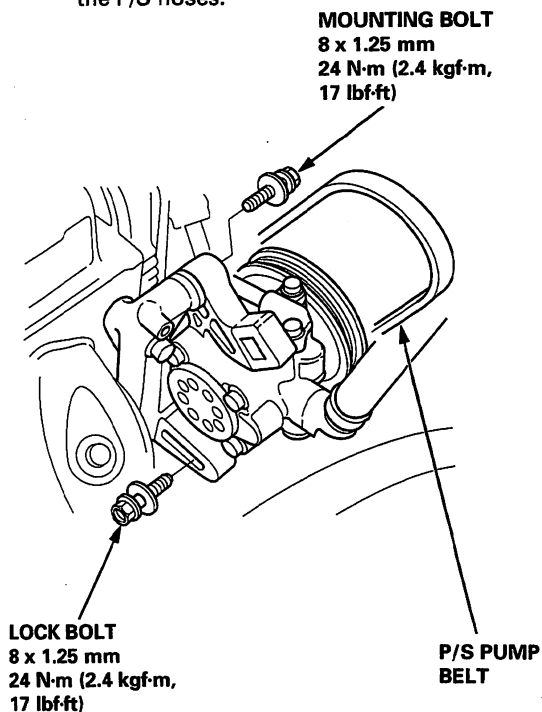
- 3. Remove the A/C compressor without disconnecting the A/C hoses.



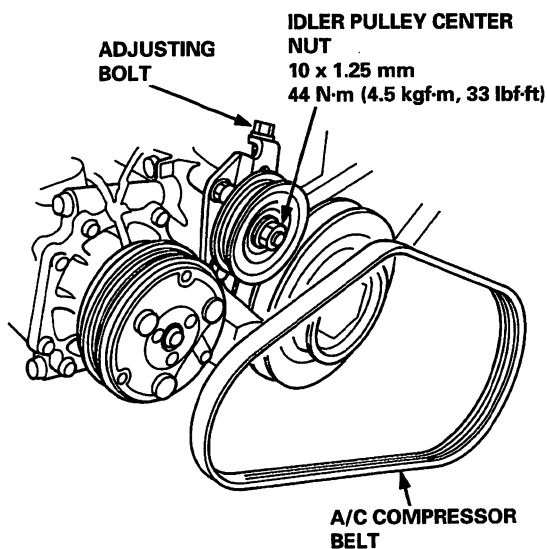


D16B6 engine:

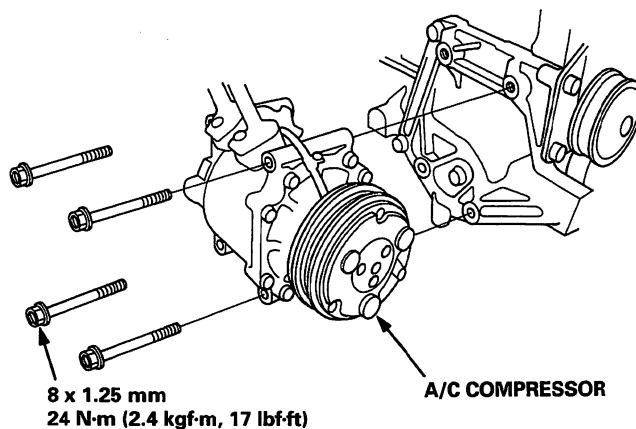
- 1. Remove the mounting bolts, then remove the P/S pump belt and pump without disconnecting the P/S hoses.



- 2. Loosen the idler pulley center nut and adjusting bolt, then remove the A/C compressor belt.



- 3. Remove the A/C compressor without disconnecting the A/C hoses.

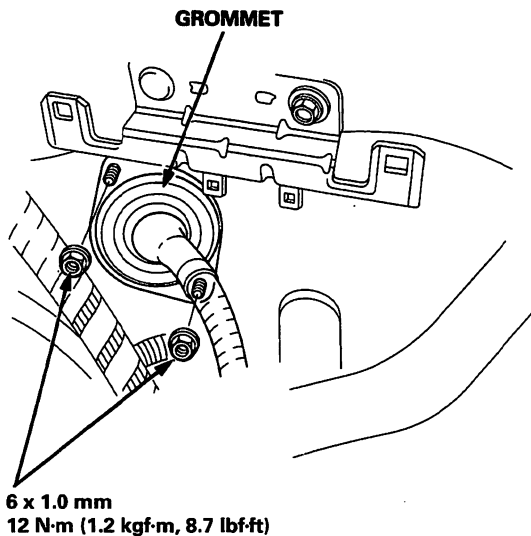


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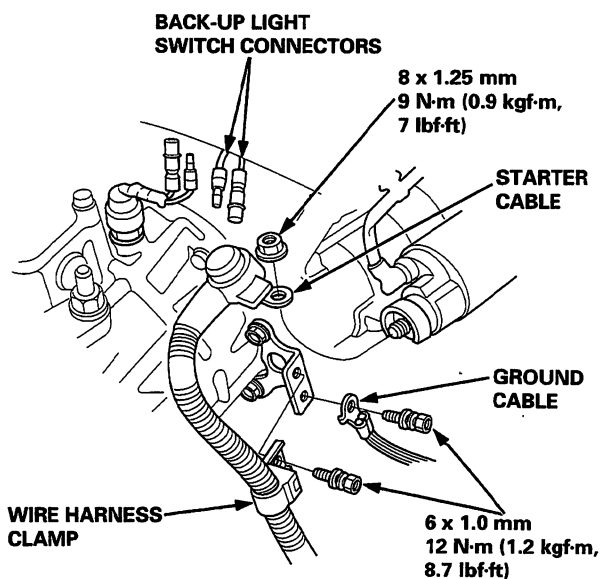
Engine Removal/Installation

Removal (cont'd)

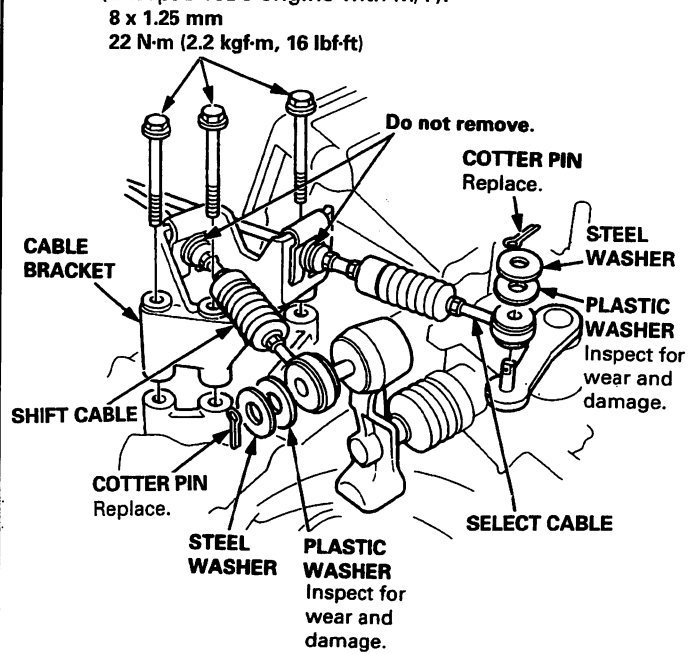
13. Disconnect the engine control module (ECM)/power-train control module (PCM) connectors from the ECM/PCM (see section 11).
14. Remove the grommet mounting nuts from under the under-hood fuse/relay box, then pull out the ECM/PCM connectors



15. Remove the starter cable, wire harness clamp and ground cable.
16. Disconnect the back up light switch connectors (M/T).



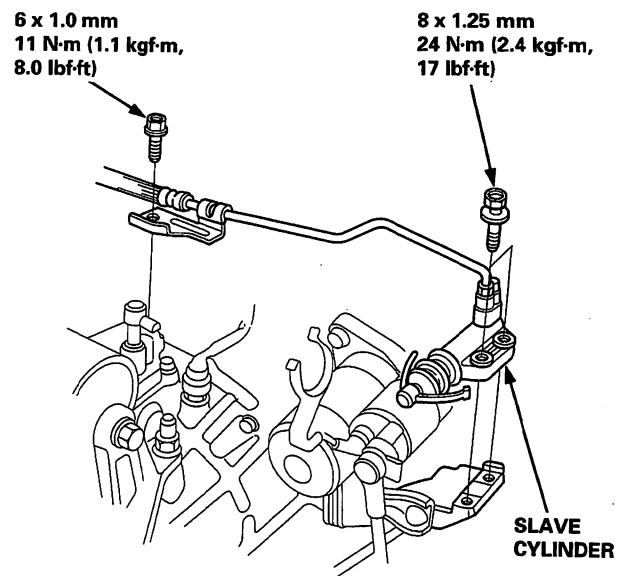
17. Remove the shift cable and select cable. Take care not to bend the cables when removing them. Always replace any kinked cable with a new one (Except D16B6 engine with M/T).



18. Remove the clutch slave cylinder and line/hose assembly (M/T).

NOTE:

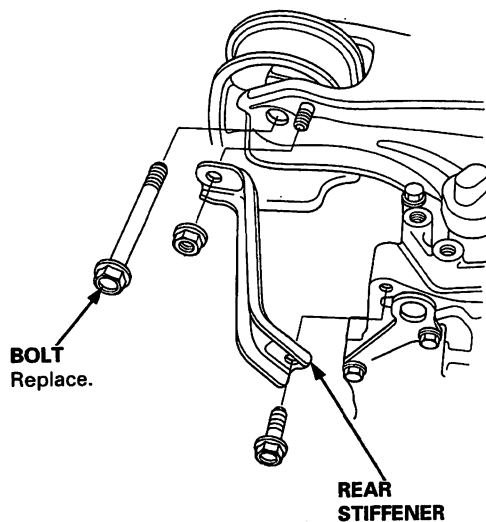
- Do not disconnect the line/hose assembly.
- Do not operate the clutch pedal once the slave cylinder has been removed.
- Take care not to bend the line.



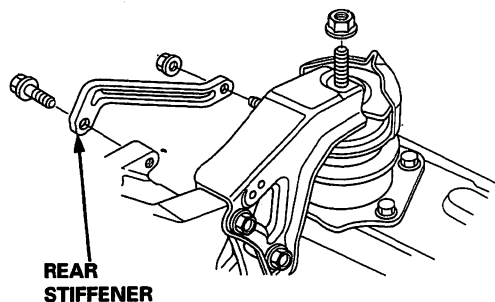


19. Remove the rear engine mount bracket mounting bolt/nut and rear stiffener.

Except D16B6 engine with M/T:

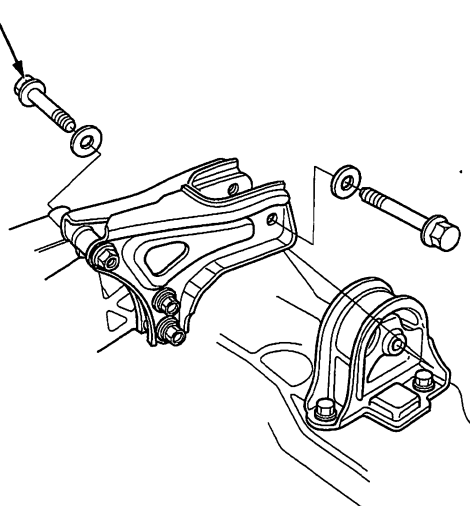


A/T:

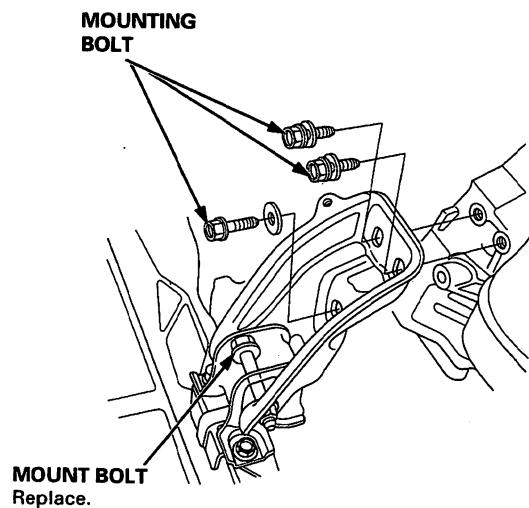


D16B6 engine:

BOLT
Replace.



20. Remove the front engine mount bracket mounting bolts, and loosen the mount bolt.

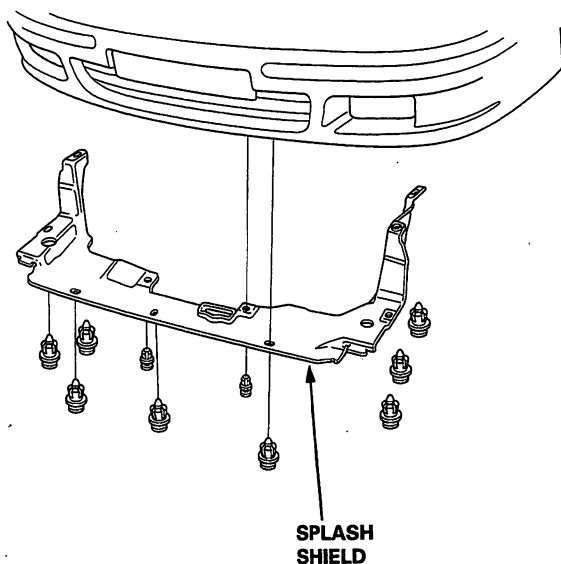


(cont'd)

Engine Removal/Installation

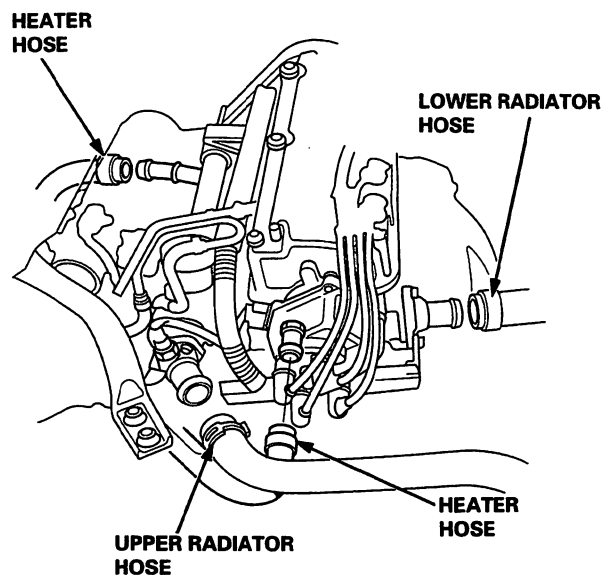
Removal (cont'd)

21. Remove the radiator cap.
22. Raise the hoist to full height.
23. Remove the front tires/wheels.
24. Remove the splash shield.

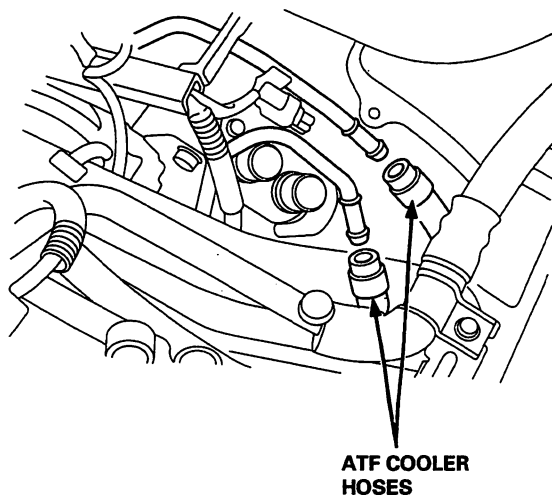


25. Loosen the drain plug in the radiator, drain the engine coolant (see page 10-7).
26. Drain the transmission oil or fluid. Reinstall the drain plug using a new washer (see section 13 (M/T) or section 14 (A/T)).
27. Drain the engine oil. Reinstall the drain bolt using a new washer (see page 8-7).

28. Lower the hoist, then remove the upper radiator hose, lower radiator hose and the heater hoses.



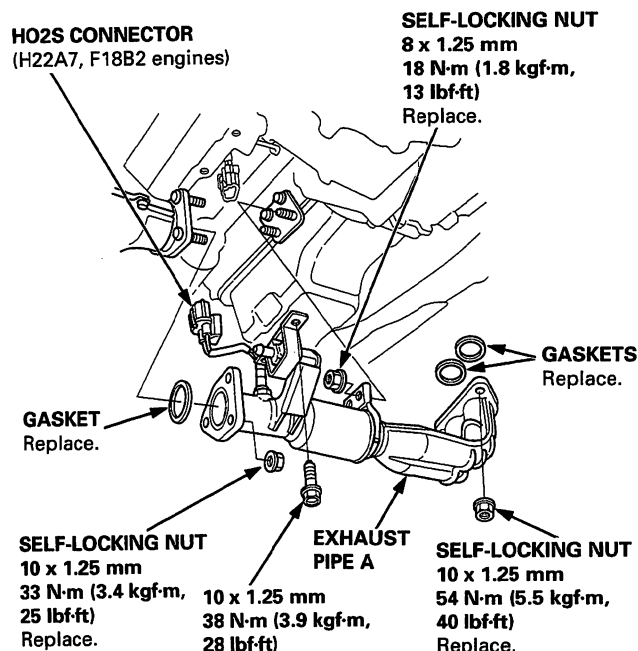
29. Remove the ATF cooler hoses, then plug the ATF cooler hoses and lines.



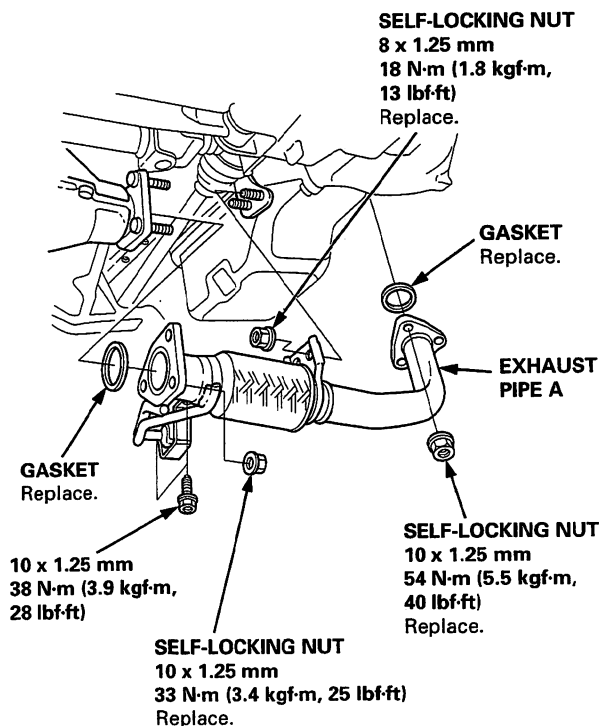


30. Raise the hoist to full height.
31. Disconnect the heated oxygen sensor (HO2S) connector. (H22A7, F18B2 engines)
32. Remove exhaust pipe A.

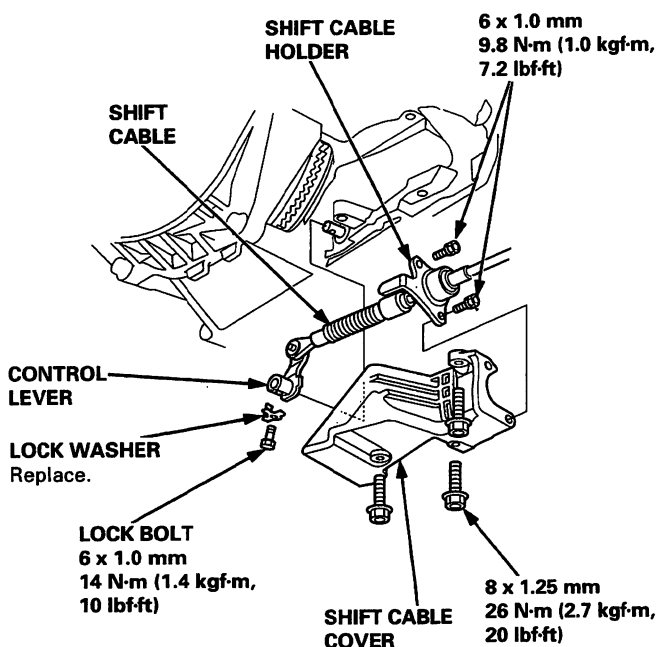
H22A7, F18B2, F18B3 engines:



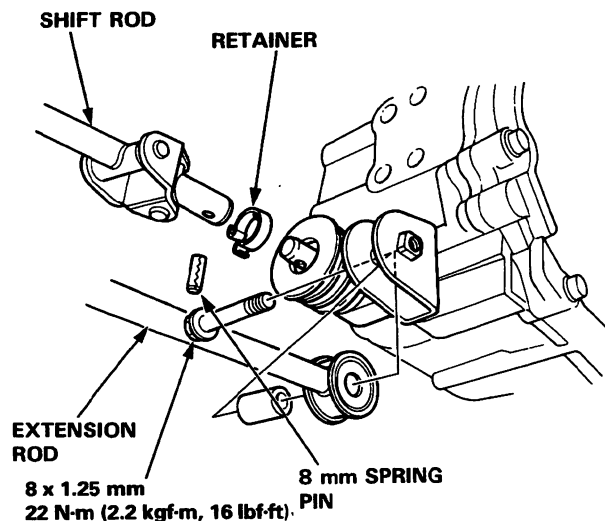
F20B6, D16B6 engines:



33. Remove the bolts securing the shift cable holder, then remove the shift cable cover. To prevent damage to the control lever joint, be sure to remove the bolts securing the shift cable holder before removing the bolts securing the shift cable cover (A/T).
34. Remove the lock bolt securing the control lever, then remove the shift cable with control lever. Take care not to bend the shift cable while removing it (A/T).



35. Remove the shift rod and extension rod (D16B6 engine with M/T).



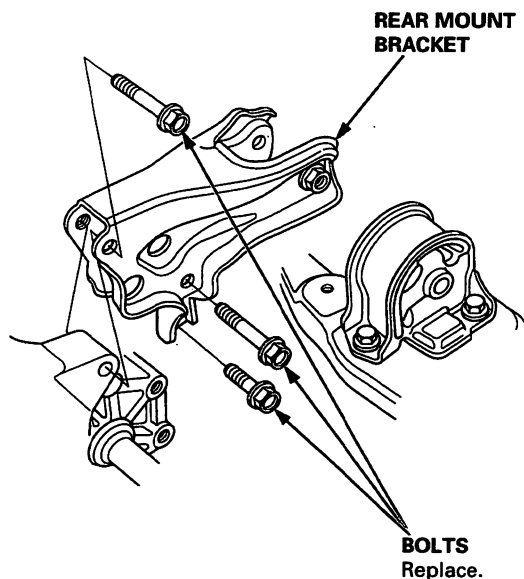
(cont'd)

Engine Removal/Installation

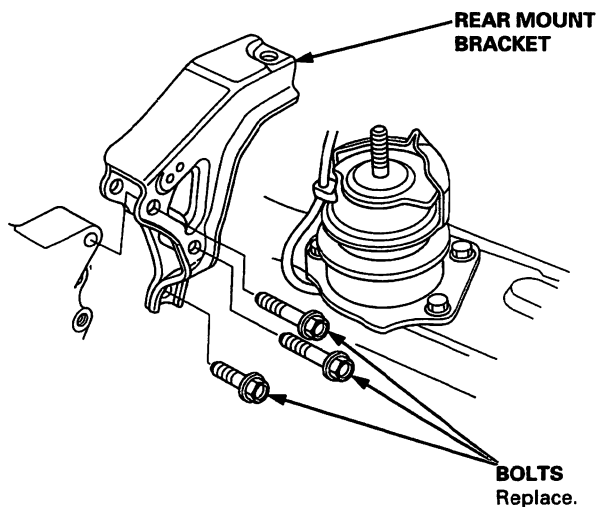
Removal (cont'd)

36. Remove the damper fork (see section 18).
37. Disconnect the suspension lower arm ball joints (see section 18).
38. Remove the driveshafts (see section 16). Coat all precision-finished with clean engine oil. Tie plastic bags over the driveshaft ends.
39. Remove the rear mount bracket.

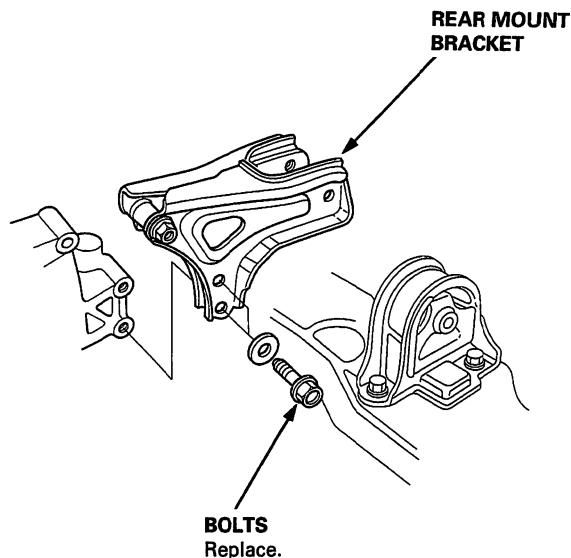
Except D16B6 engine with M/T:



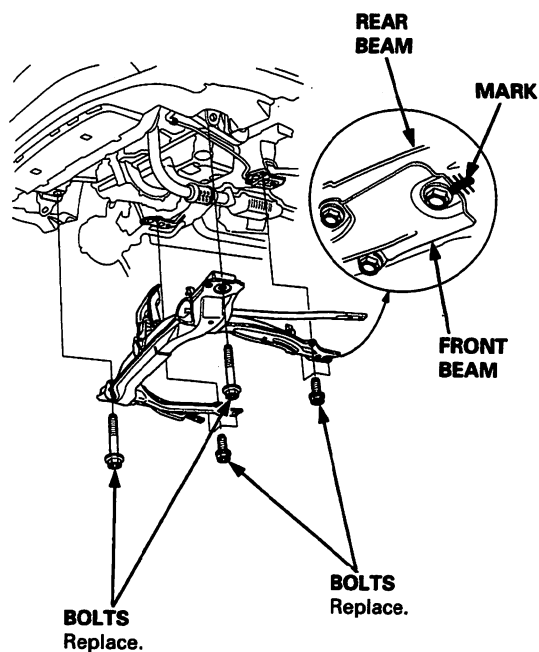
A/T:



D16B6 engine:



40. Remove flange bolts securing the radius rods (see section 18).
41. Mark on the front beam and rear beam, then remove the front beam.

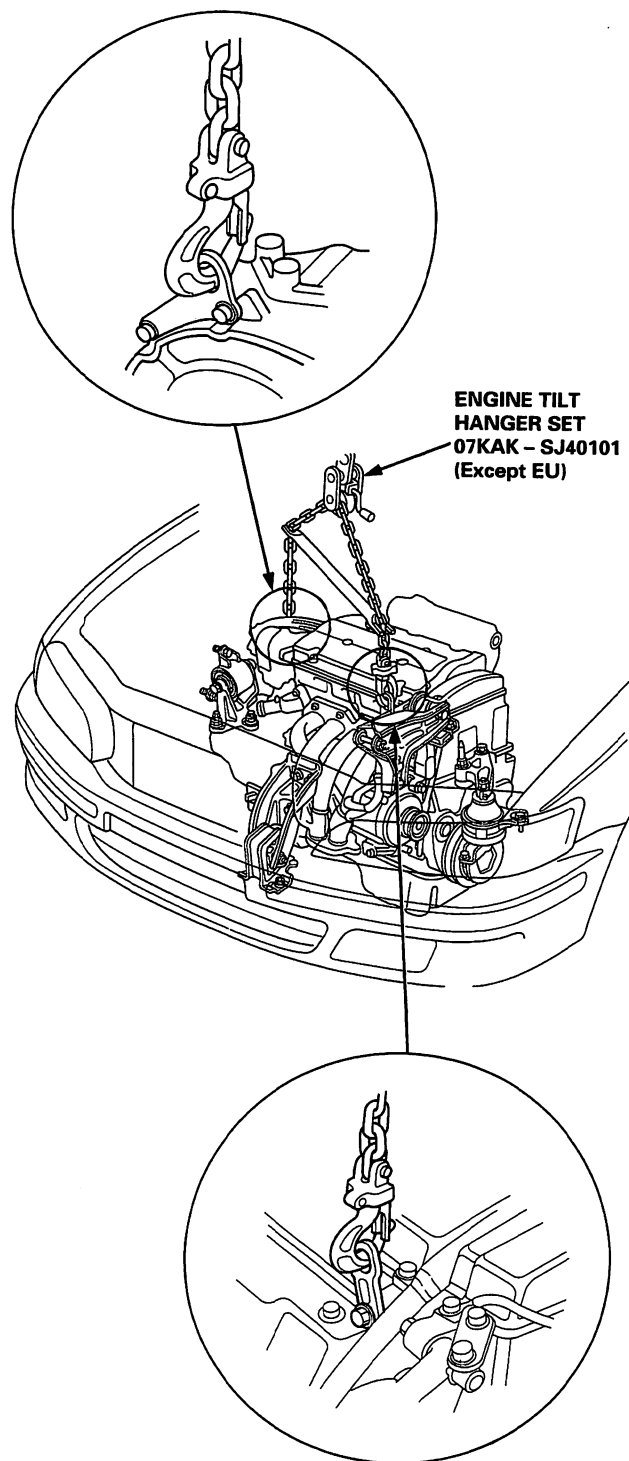




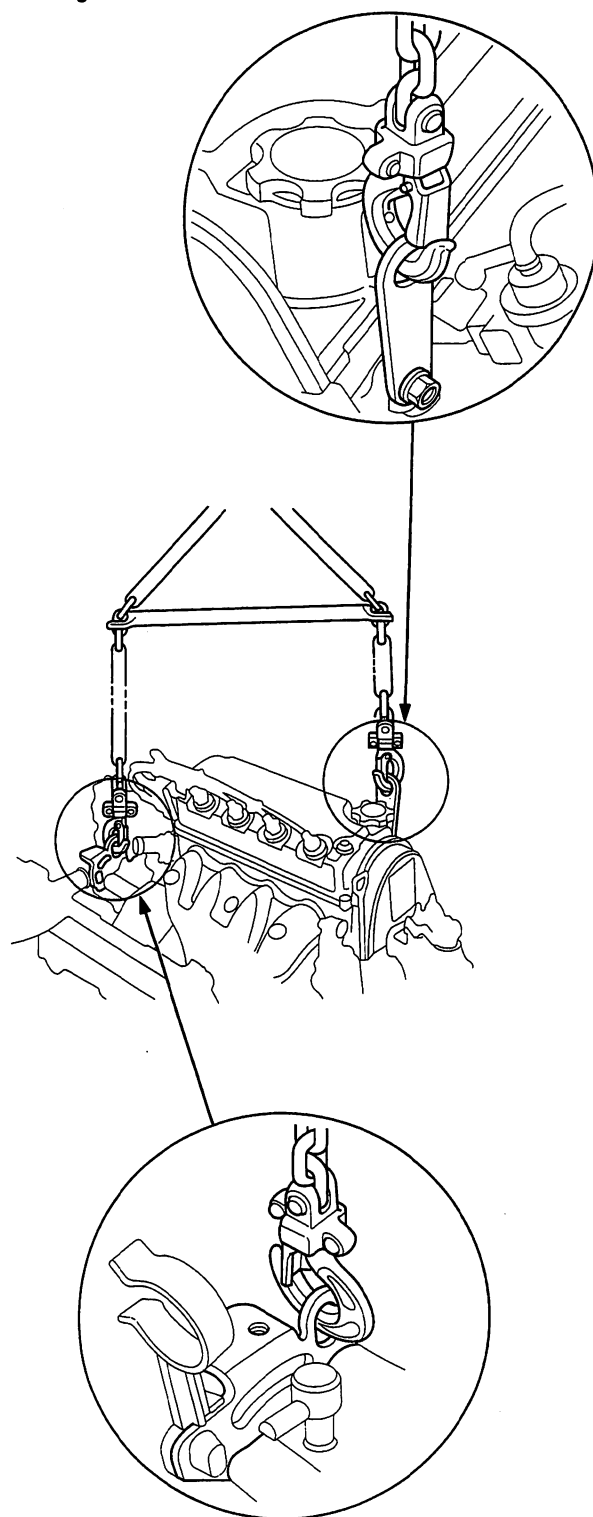
42. Lower the hoist.

43. Attach the chain hoist to the engine as shown.

Except D16B6 engine:



D16B6 engine:

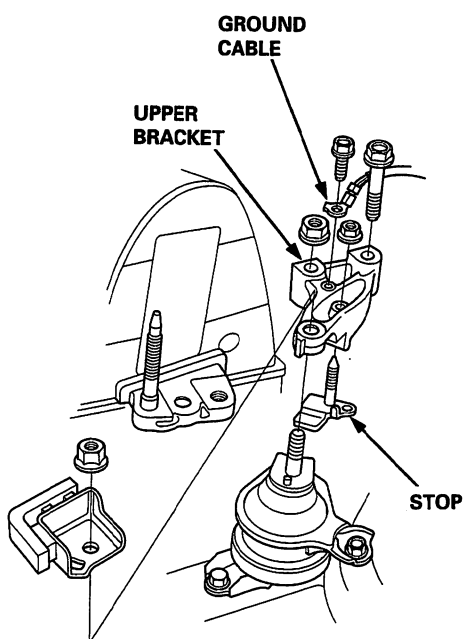


(cont'd)

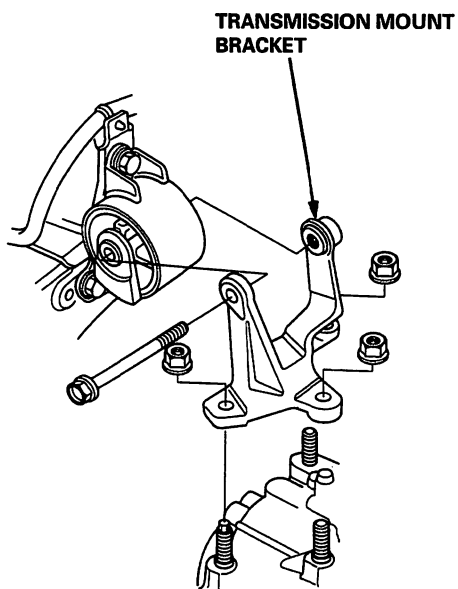
Engine Removal/Installation

Removal (cont'd)

44. Remove the stop and ground cable, then remove the upper bracket.



45. Remove the transmission mount bracket.



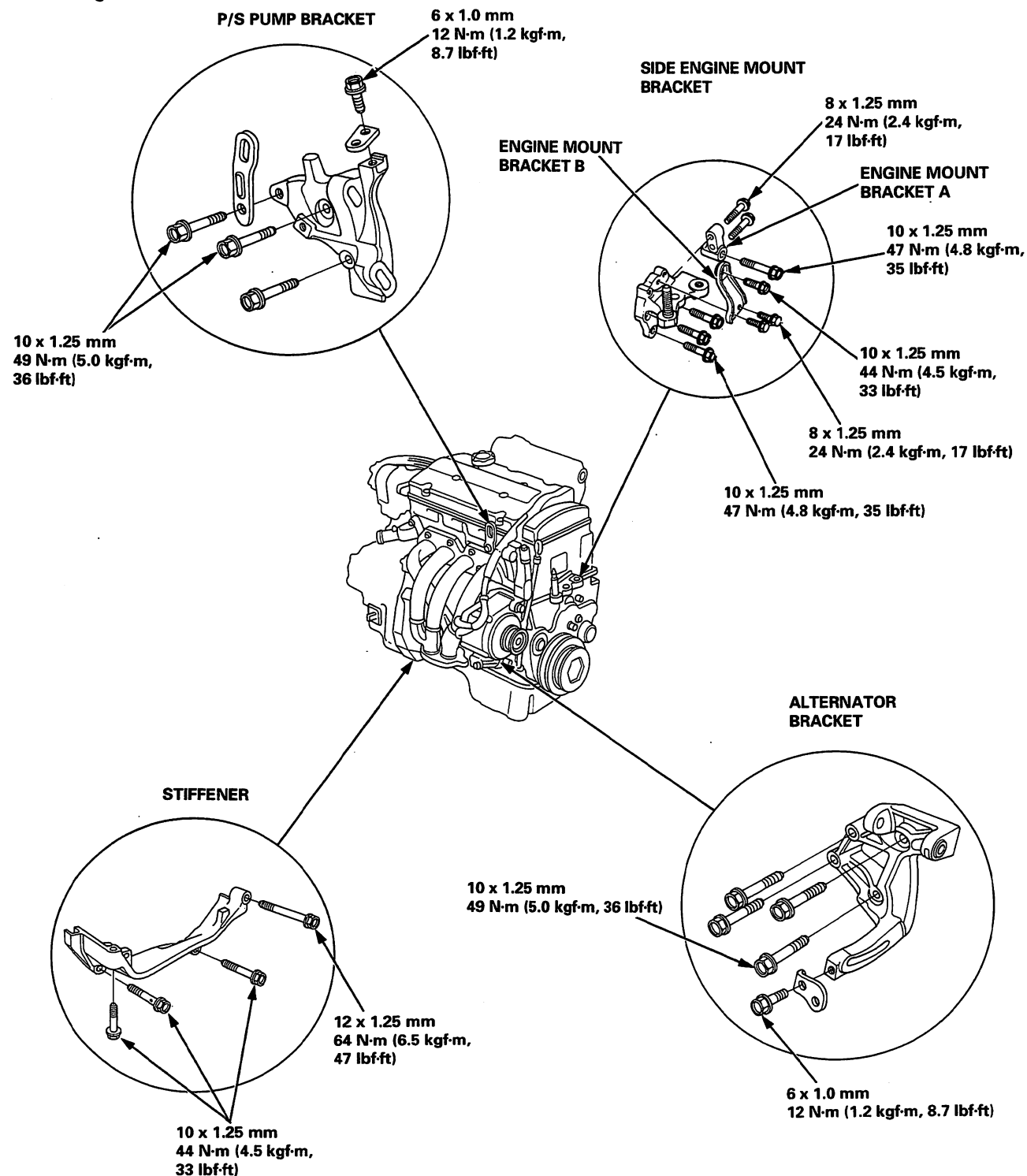
46. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.
47. Slowly lower the engine approximately 150 mm (6 in). Check once again that all hoses and wires are disconnected from the engine/transmission.
48. Lower the engine all the way. Remove the chain hoist from the engine.
49. Remove the engine from under the vehicle.



Installation

Bracket Bolts/Nuts Torque Specification:

H22A7 engine:



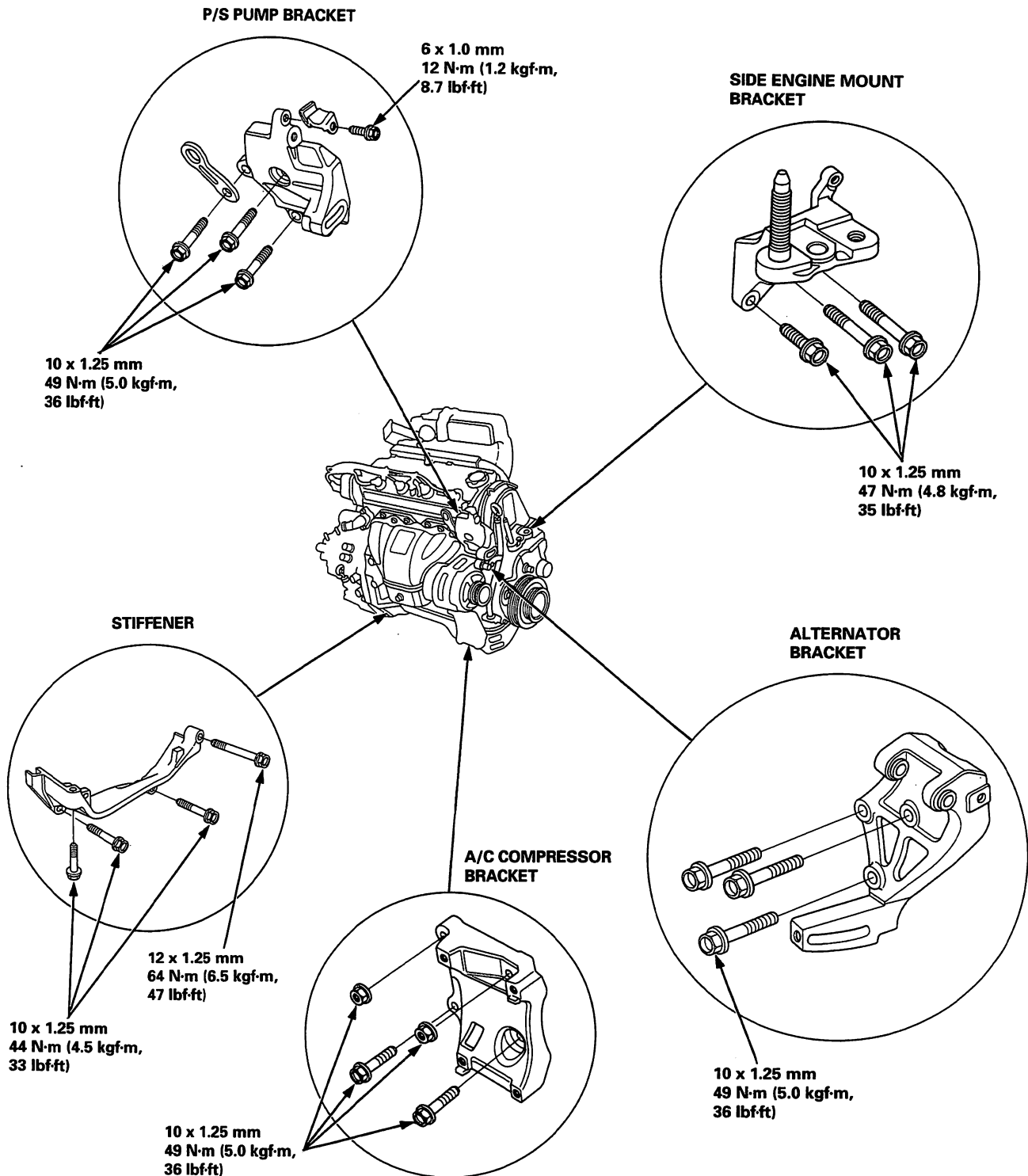
(cont'd)

Engine Removal/Installation

Installation (cont'd)

Bracket Bolts/Nuts Torque Specification:

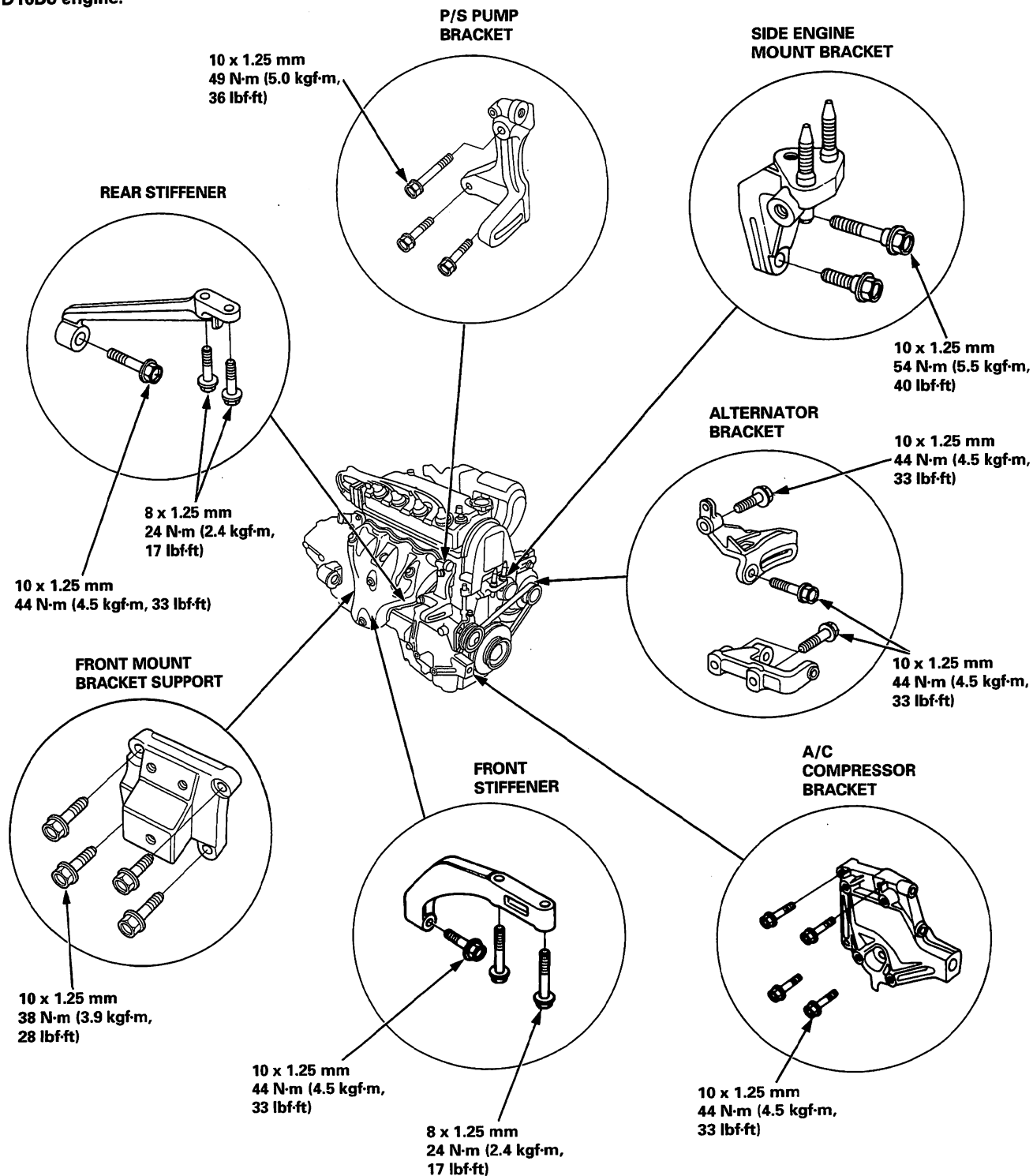
F18B2, F18B3, F20B6 engines:





Bracket Bolts/Nuts Torque Specification:

D16B6 engine:



(cont'd)

Engine Removal/Installation

Installation (cont'd)

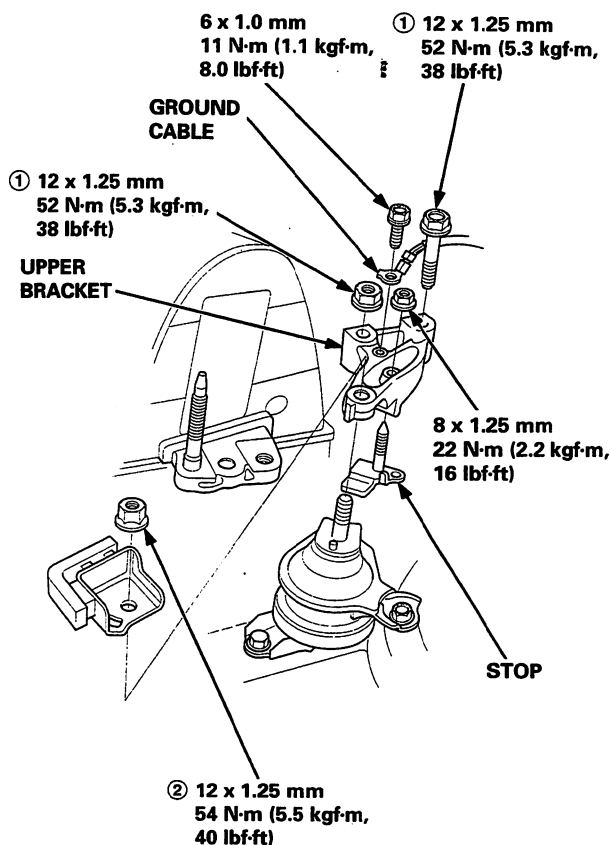
Engine Installation:

Install the engine in the reverse order of removal. Reinstall the mount bolts/nuts in the following sequence.

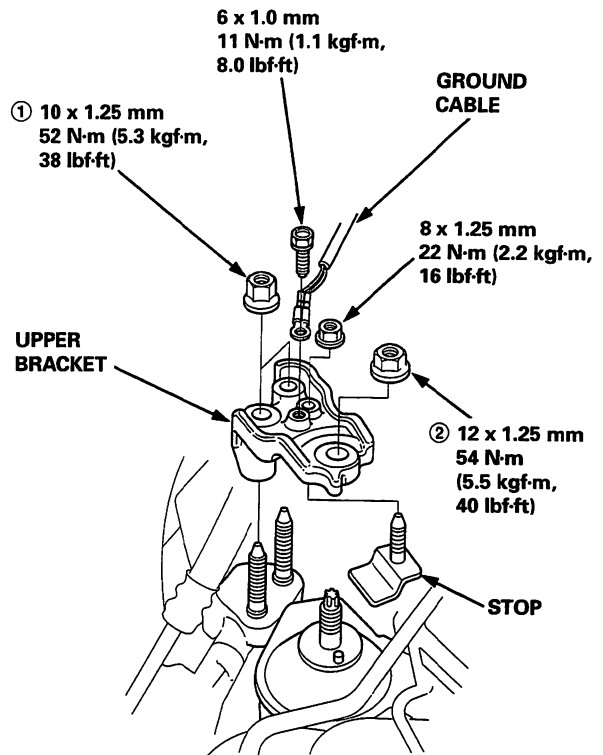
Failure to follow this procedure may cause excessive noise and vibration, and reduce bushing life.

1. Push the engine under the vehicle. Attach the chain hoist to the engine, then lift the engine into position in the vehicle.
2. Install the upper bracket, then tighten the bolt and nuts in the numbered sequence shown.
3. Install the stop.

Except D16B6 engine:



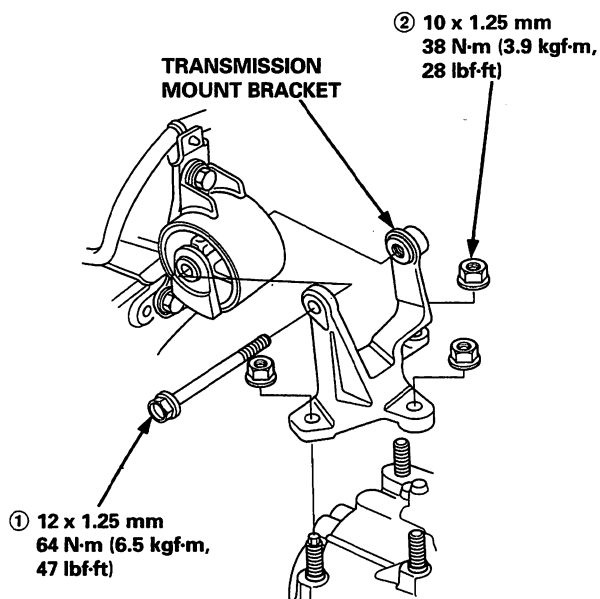
D16B6 engine:



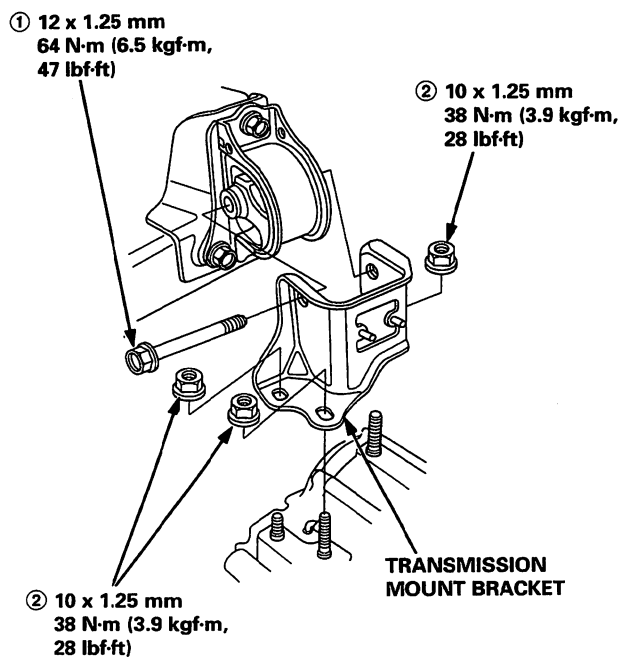


4. Install the transmission mount bracket, then tighten the bolt and nuts in the numbered sequence shown.

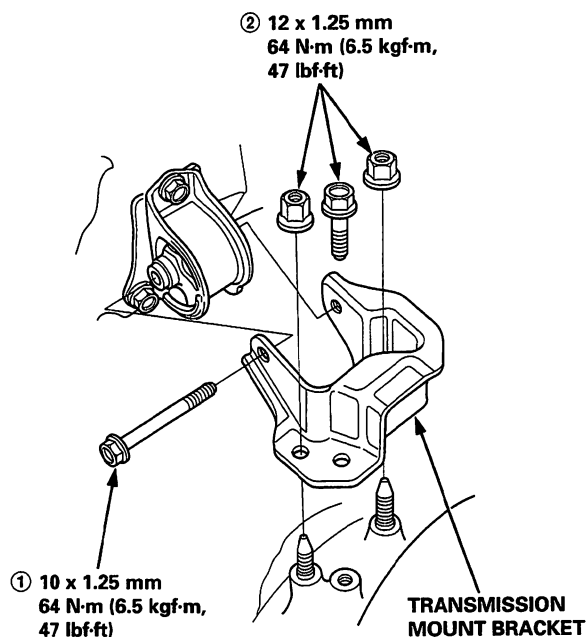
Except D16B6 engine with M/T:



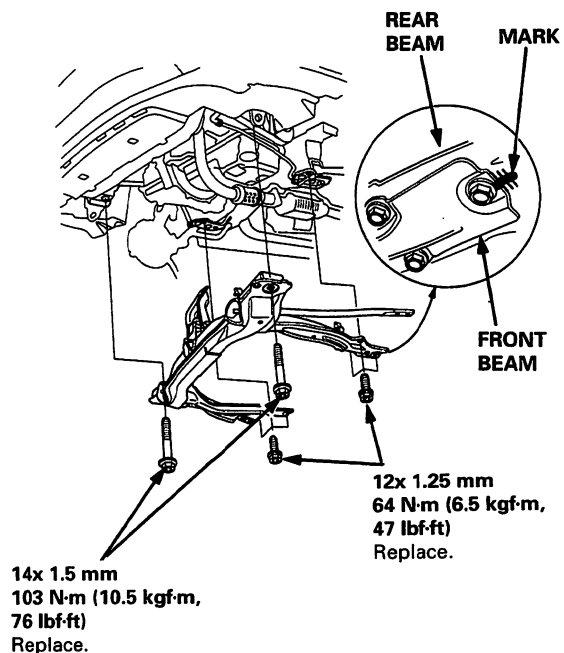
A/T:



D16B6 engine:



5. Remove the chain hoist from the engine.
6. Raise the hoist to full height.
7. Install the front beam. Align the marks on the rear beam and front beam, then tighten the bolts.

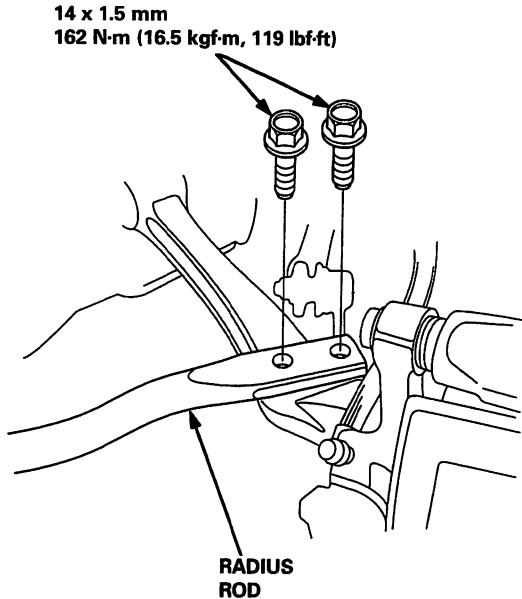


(cont'd)

Engine Removal/Installation

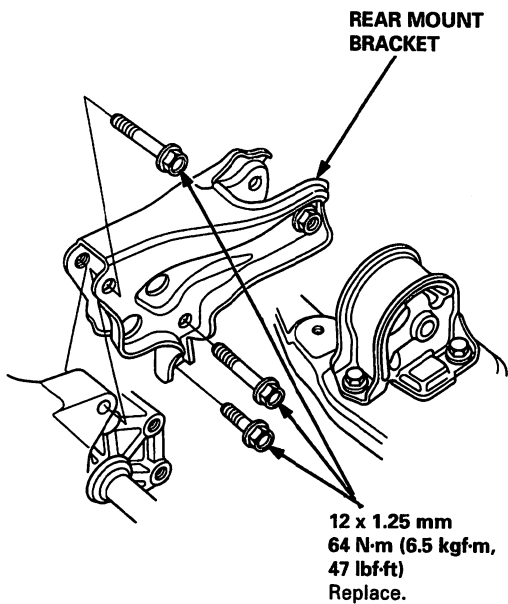
Installation (cont'd)

8. Tighten the flange bolts on the radius rods.

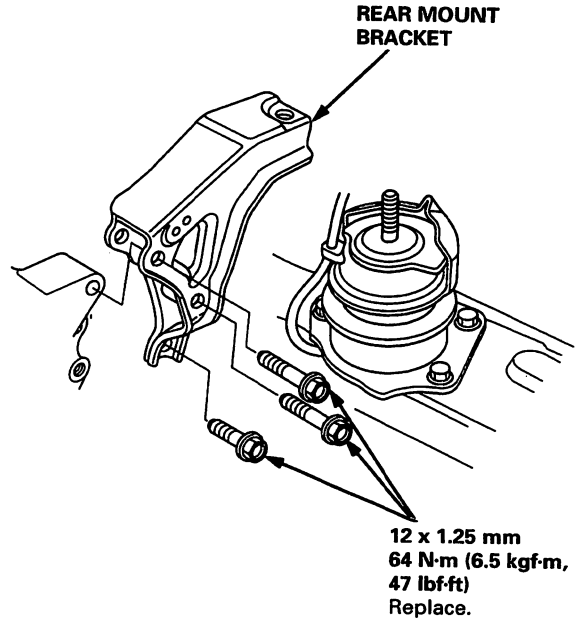


9. Install the rear mount bracket, then tighten the bolts.

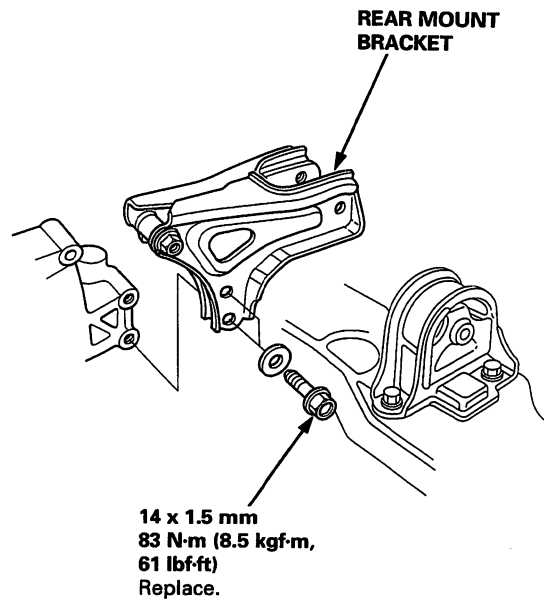
Except D16B6 engine with M/T:



A/T:



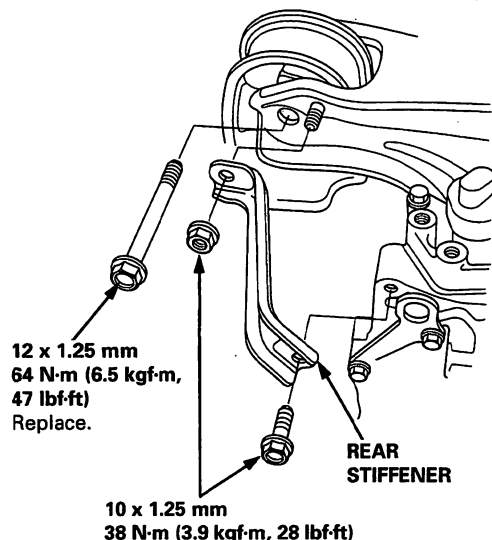
D16B6 engine:



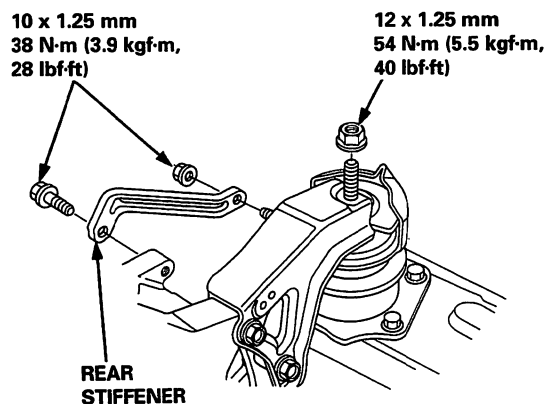


10. Lower the hoist.
11. Tighten the rear mount mounting bolt/nut, then install the rear stiffener.

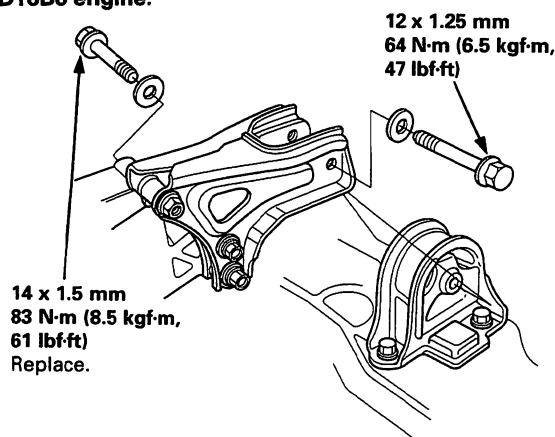
Except D16B6 engine with M/T:



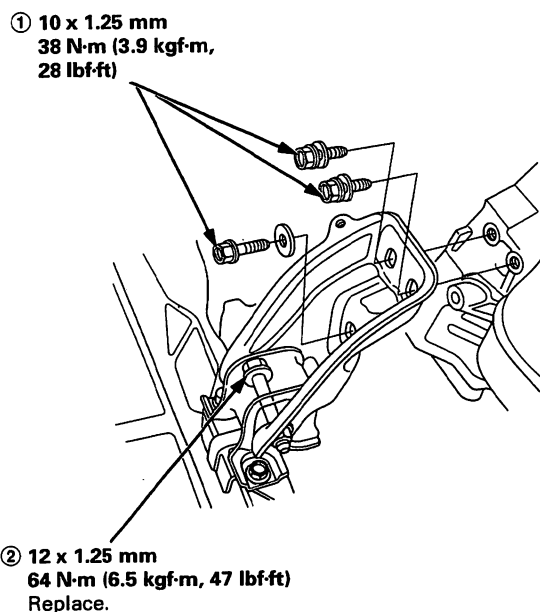
A/T:



D16B6 engine:



12. Tighten the front mount bracket mounting bolts in the numbered sequence shown.



13. Adjust and make sure as follows:

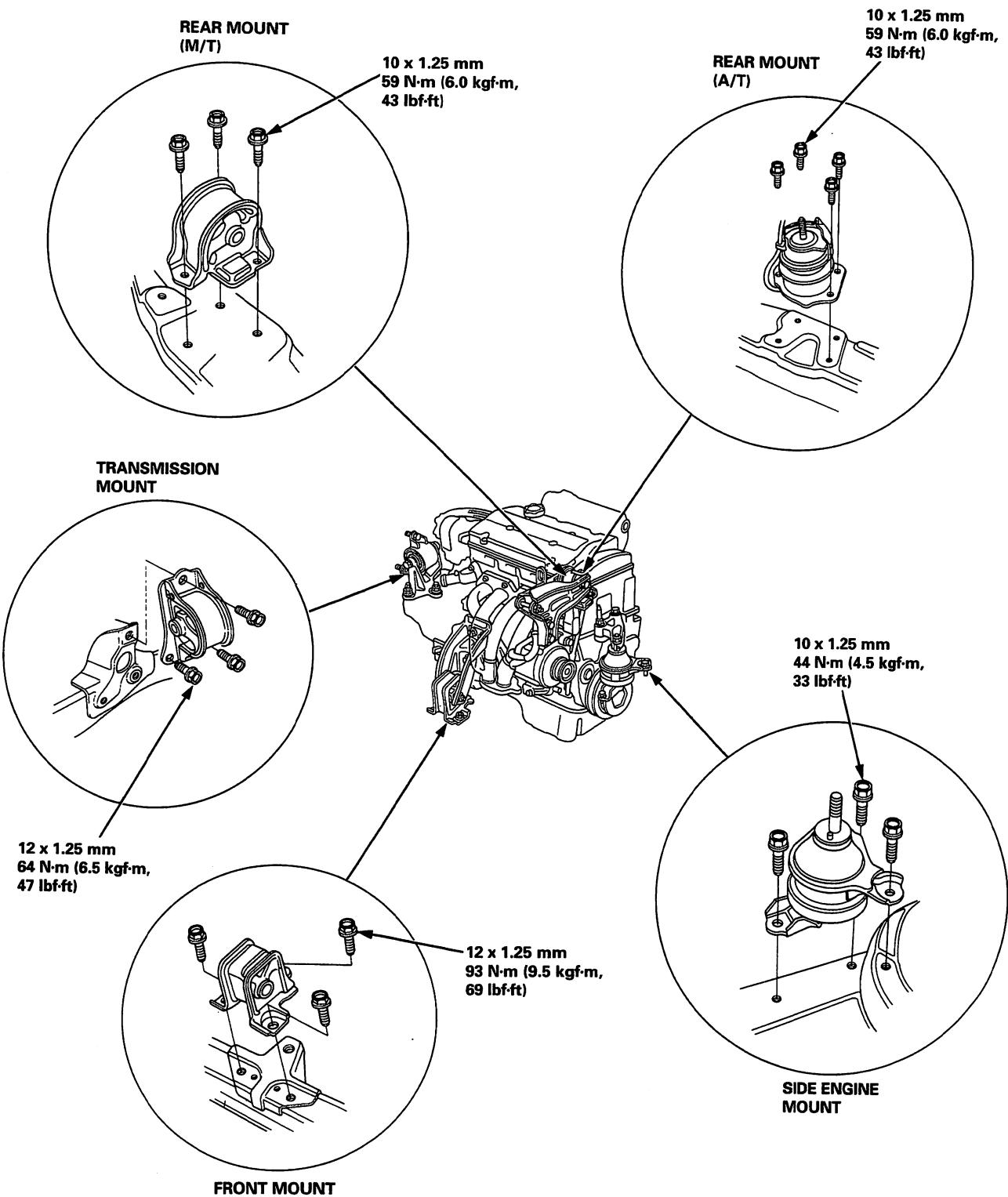
- Check that the set ring on the ends of the drive-shaft and intermediate shaft set rings into place.
- Adjust the throttle cable (see section 11).
- Refill the engine with engine oil (see page 8-7).
- Refill the transmission with oil or ATF (see section 13 or 14).
- Refill the radiator with engine coolant, and bleed air from the cooling system (see page 10-7).
- Clean the battery posts and cable terminals with sandpaper, assemble them, then apply grease to prevent corrosion.
- Inspect for fuel leakage (see section 11). After assembling fuel line parts, turn on (II) the ignition switch (do not operate the starter) so that the fuel pump operates for approximately two seconds and the fuel line pressurizes. Repeat this operation two or three times, and check for fuel leakage at any point in the fuel line.
- Check the wheel alignment (see section 18).
- Enter the anti-theft code for the radio, then enter the customer's radio station presets.

(cont'd)

Engine Removal/Installation

Installation (cont'd)

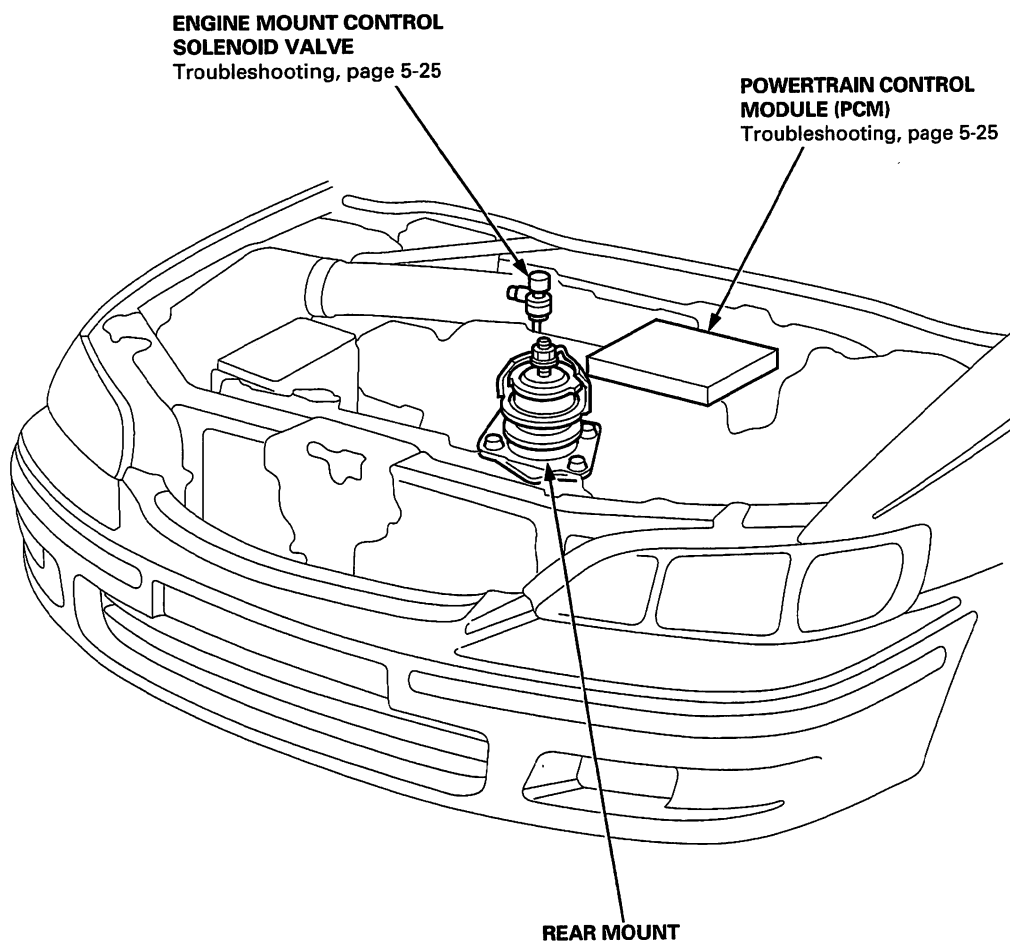
Mount and Bracket Bolts/Nuts Torque Value Specifications:



Engine Mount Control System (A/T)

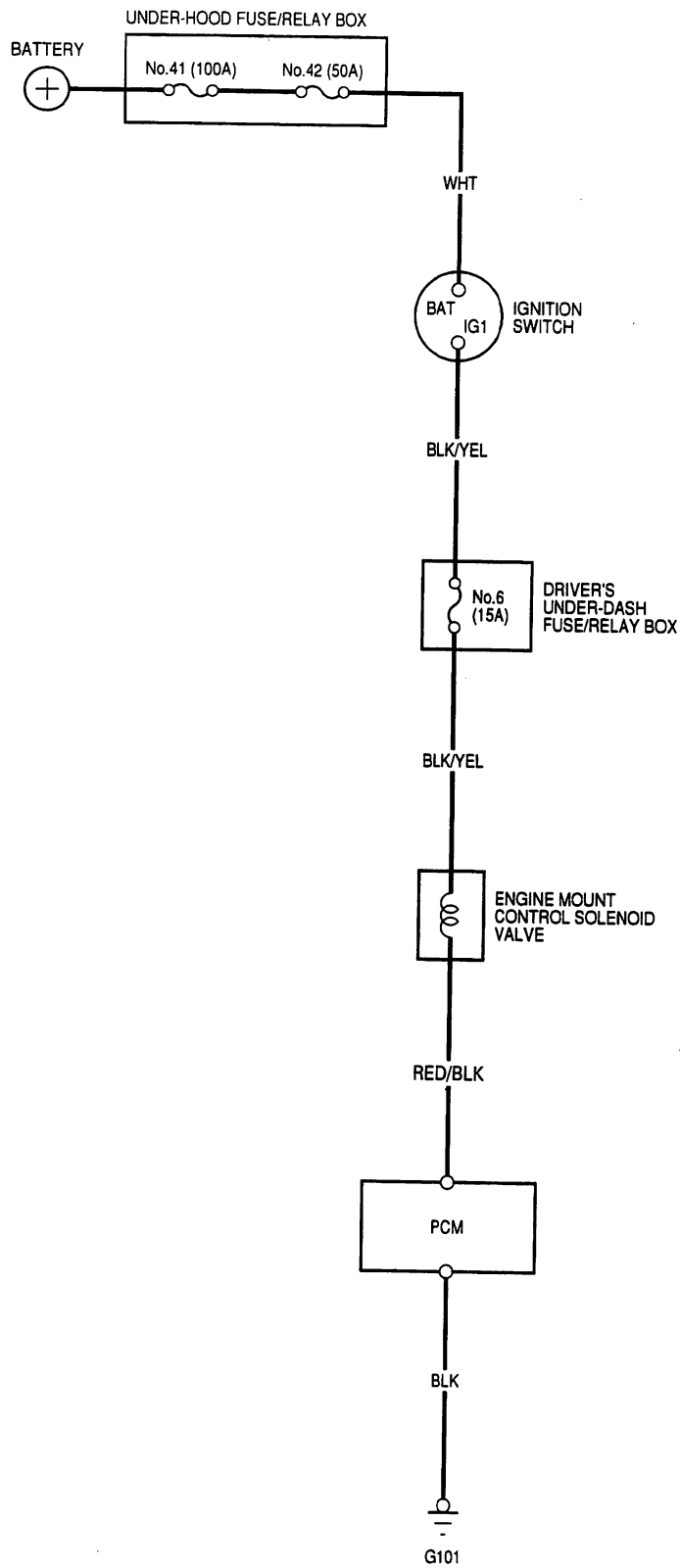


Component Location Index



Engine Mount Control System (A/T)

Circuit Diagram

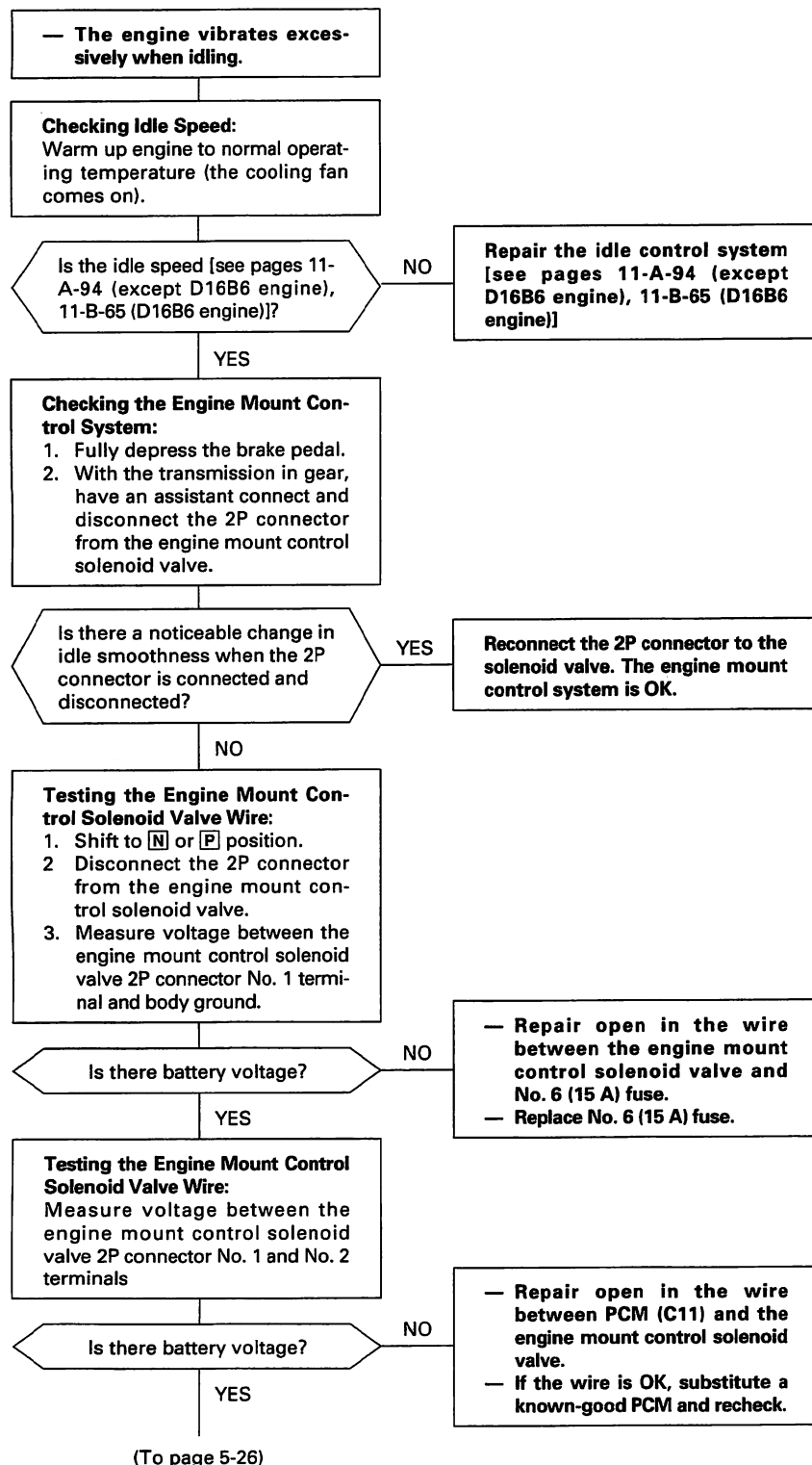




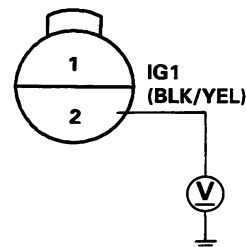
Troubleshooting Flowchart

NOTE:

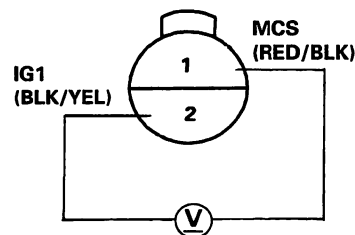
- Check the vacuum hoses and pipes for damage and proper connections.
- Refer to page 11-A-15 through 11-A-20 before troubleshooting.



ENGINE MOUNT CONTROL SOLENOID VALVE 2P CONNECTOR



Wire side of female terminals

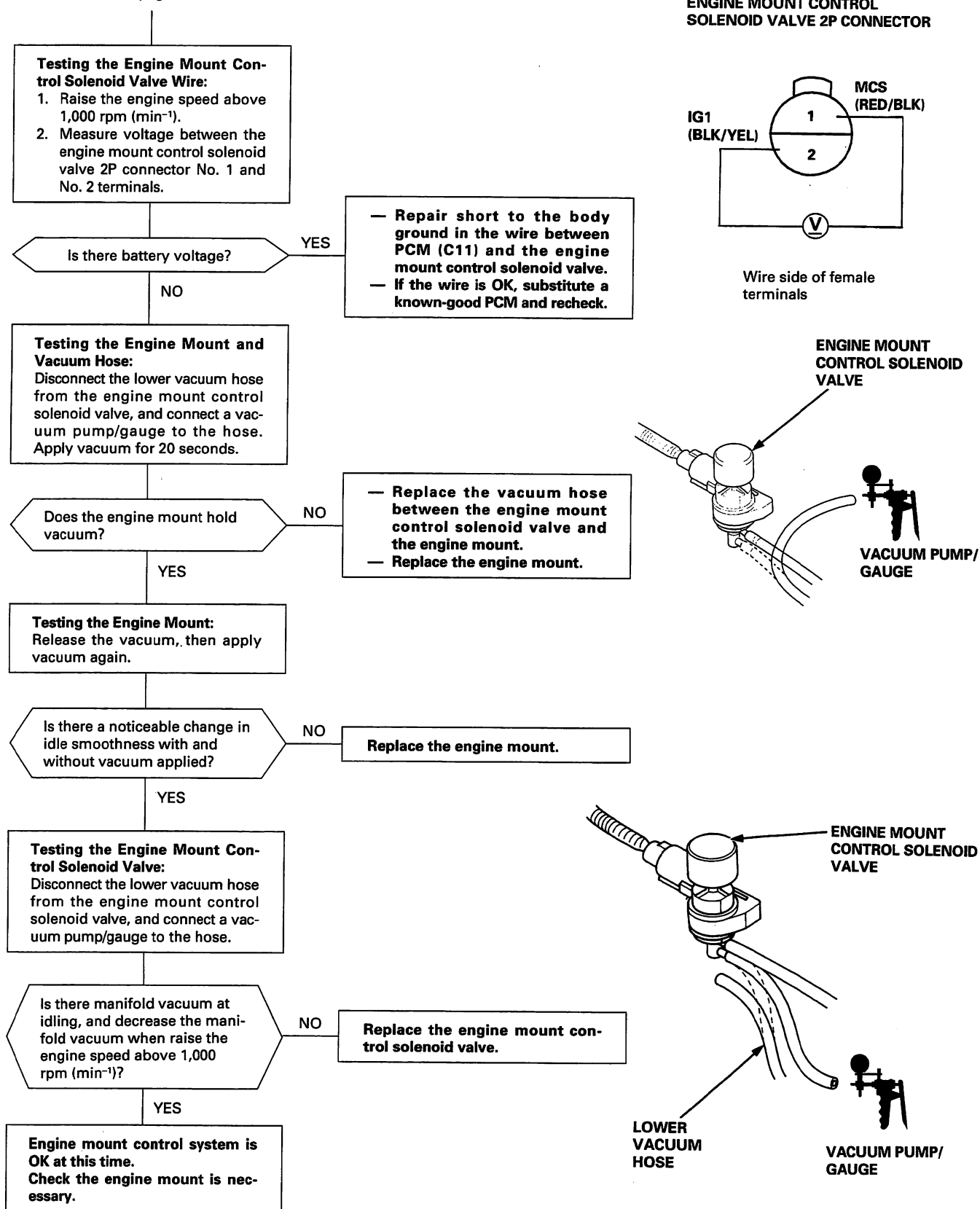


(cont'd)

Engine Mount Control System (A/T)

Troubleshooting Flowchart (cont'd)

(From page 5-25)



Cylinder Head/Valve Train D16B6 engine

Special Tools	6-A-2
Valve Clearance	
Adjustment	6-A-3
Crankshaft Pulley and Pulley Bolt	
Replacement	6-A-5
Timing Belt	
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Inspection	6-A-7
Tension Adjustment	6-A-7
Removal	6-A-8
Installation	6-A-9
CKF Sensor	
Replacement	6-A-11
Cylinder Head	
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Rocker Arms	
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Disassembly/Reassembly	6-A-19
Rocker Arms and Shafts	
Clearance Inspection	6-A-20
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Reaming	6-A-26
Valve Seats	
Reconditioning	6-A-25
Camshaft/Rocker Arms and Camshaft Seal/Pulley	
Installation	6-A-28



Special Tools

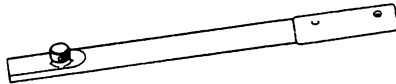
Ref. No.	Tool Number	Description	Qty	Remark
①	07HAH – PJ70100	Valve Guide Reamer, 5.525 mm	1	
②	07JAA – 0010100	Socket Wrench, 17 mm	1	
③	07JAB – 0010200	Handle	1	
④	07JAB – 0010400	Pulley Holder Attachment, HEX 50 mm	1	
⑤	07PAD – 0010000	Stem Seal Driver	1	
⑥	07742 – 0010100	Valve Guide Driver, 5.5 mm	1	
⑦	07757 – 0010000	Valve Spring Compressor	1	



①



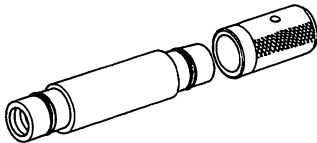
②



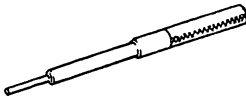
③



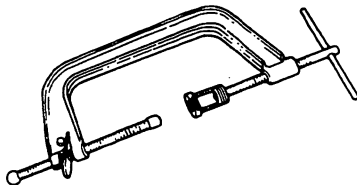
④



⑤



⑥



⑦

Valve Clearance



Adjustment

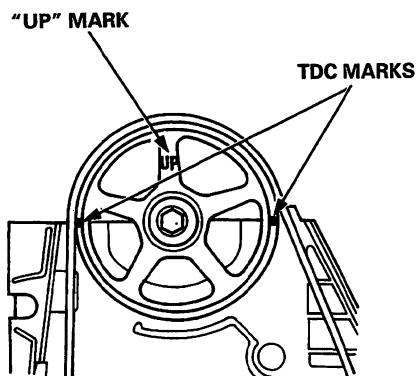
NOTE:

- Valves should be adjusted only when the cylinder head temperature is less than 38°C (100°F).
- After adjusting, loosen the crankshaft pulley bolt, then retorque the crankshaft pulley bolt to 20 N·m (2.0 kgf·m, 14 lbf·ft) + 90°.

1. Remove the cylinder head cover.

NOTE: Refer to page 6-A-30 when installing the cylinder head cover.

2. Remove the upper cover (see page 6-A-8).
3. Set the No. 1 piston at TDC. "UP" mark on the camshaft pulley should be at top, and TDC marks should align with the cylinder head upper surface.



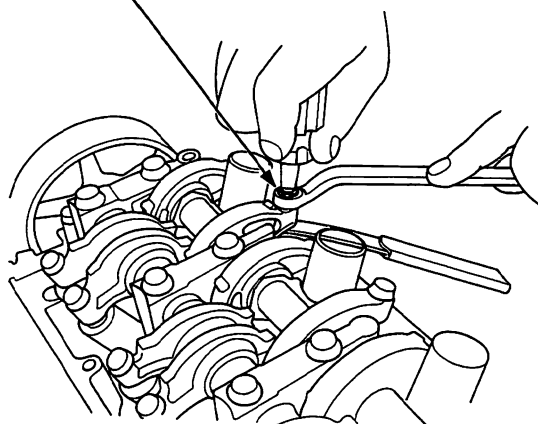
4. Adjust valves on No. 1 cylinder.

Intake: 0.20 mm (0.008 in) ± 0.02 mm (0.0008 in)
Exhaust: 0.25 mm (0.010 in) ± 0.02 mm (0.0008 in)

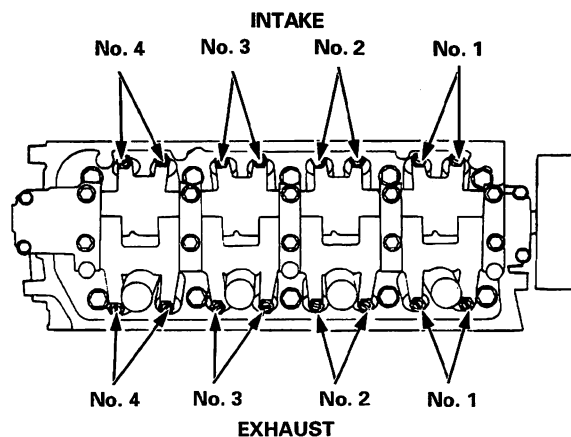
5. Loosen locknut and turn adjustment screw until feeler gauge slides back and forth with slight amount of drag.

NOTE: Do not overtighten the locknuts, for the rocker arms are made of aluminum.

INTAKE and EXHAUST VALVE LOCKNUTS 18 N·m (1.8 kgf·m, 13 lbf·ft)



Adjusting screw location:

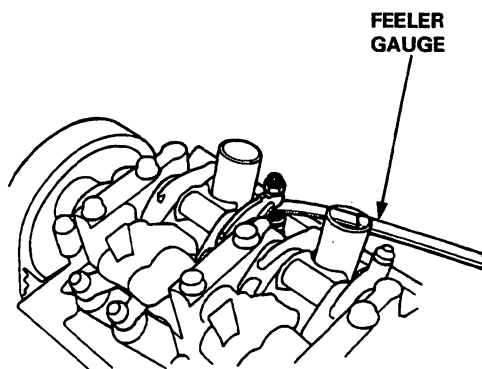


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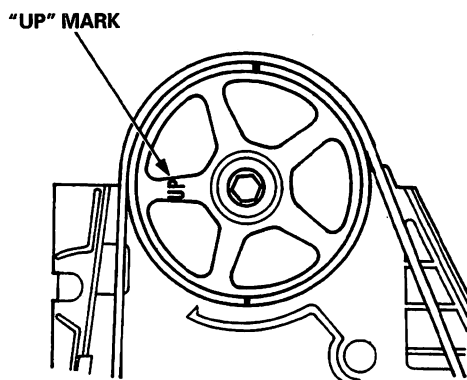
Valve Clearance

Adjustment (cont'd)

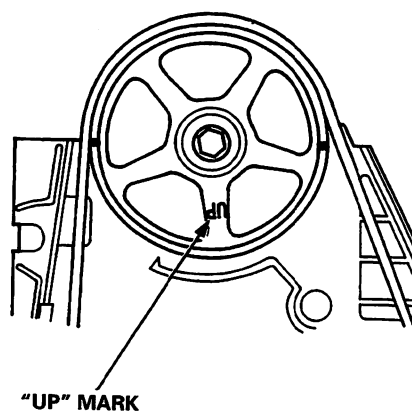
6. Tighten the locknut, and check clearance again. Repeat the adjustment if necessary.



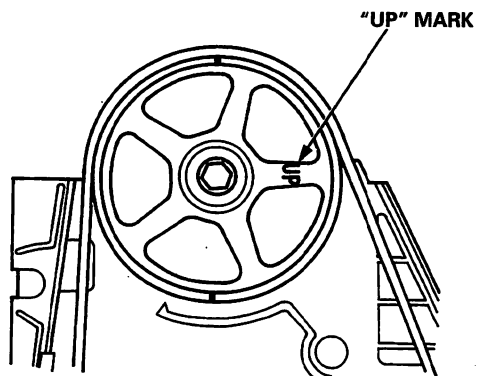
7. Rotate the crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" mark should be on the exhaust side. Adjust valves on No. 3 cylinder.



8. Rotate the crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both TDC grooves are once again visible. Adjust valves on No. 4 cylinder.



9. Rotate the crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" mark should be on the intake side. Adjust valves on No. 2 cylinder.



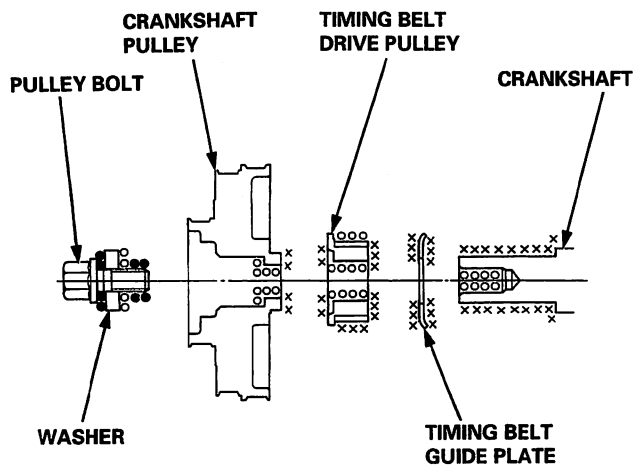
Crankshaft Pulley and Pulley Bolt



Replacement

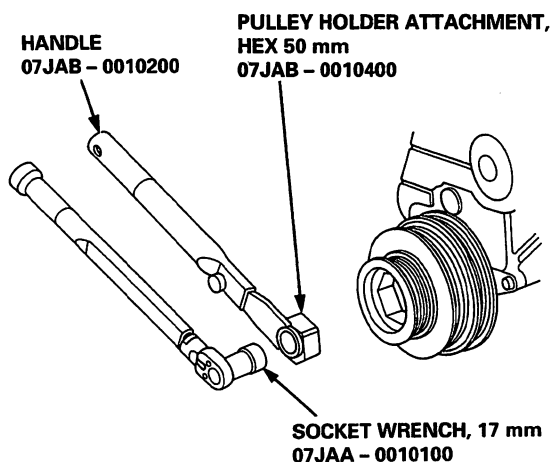
1. Remove any oil from the pulleys, crankshaft, bolt and washer. Clean and lubricate as shown below.

○: Clean
×: Remove any oil
●: Lubricate

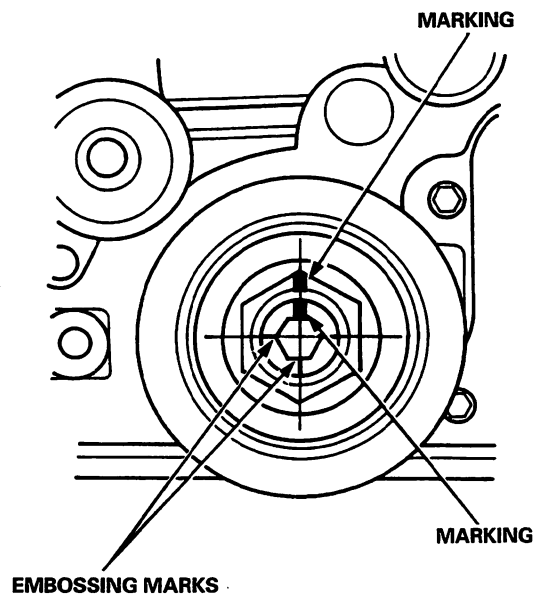


2. Tighten the pulley bolt to the specified torque.

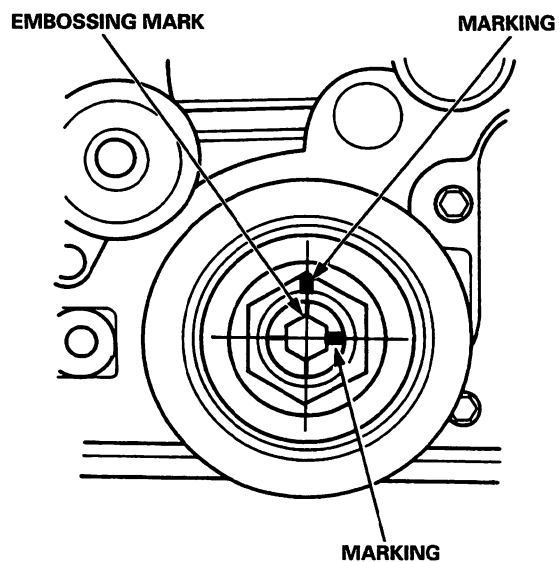
Torque: 20 N·m (2.0 kgf·m, 14 lbf·ft)



3. Use a felt tip pen to mark the pulley bolt head and washer.



4. Tighten the pulley bolt an additional 90°.

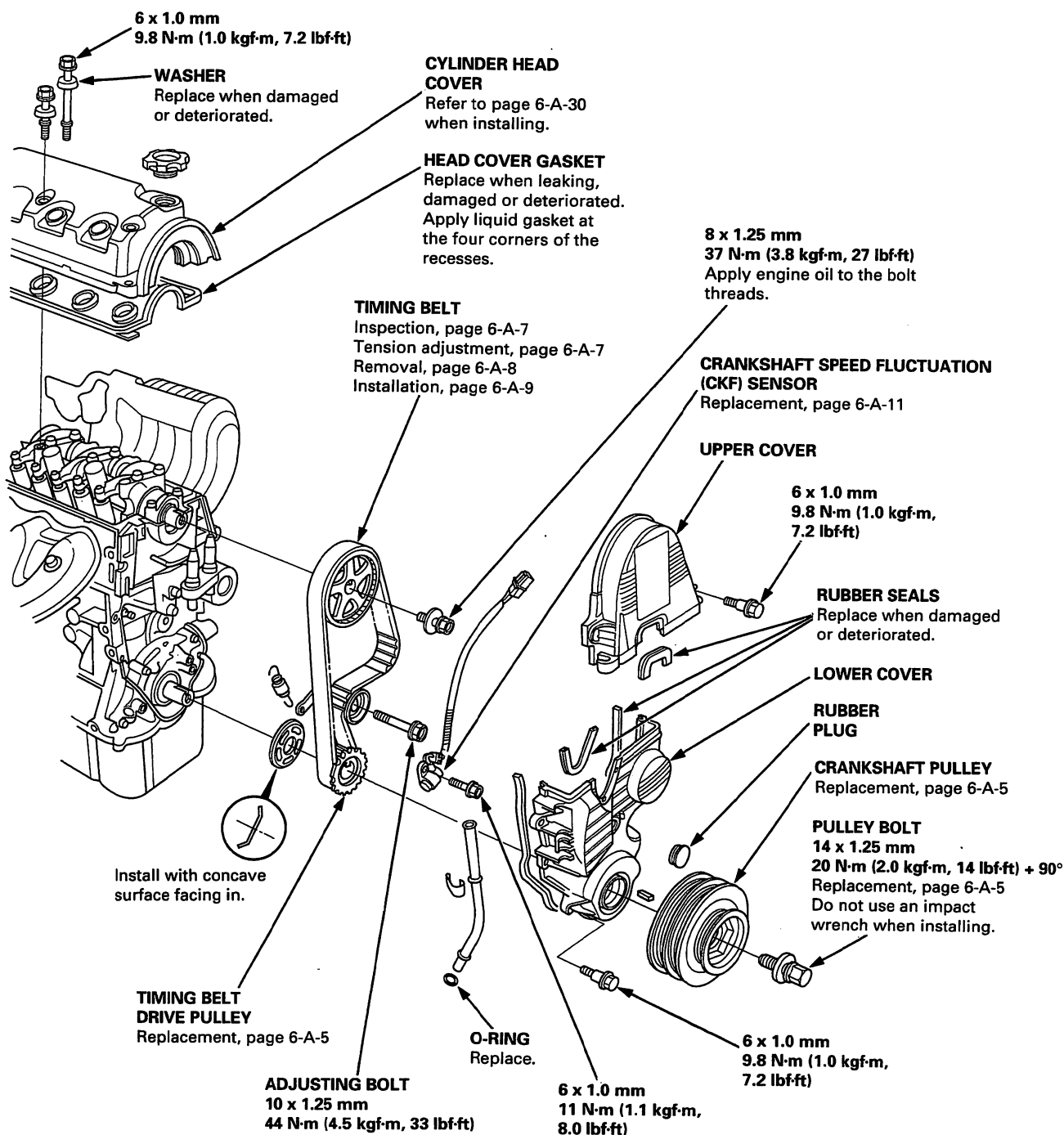


Timing Belt

Illustrated Index

NOTE:

- Refer to page 6-A-9 for how to position the crankshaft and pulley before installing the belt.
- Mark the direction of rotation on the belt before removing.
- Do not use the upper cover and lower cover for storing removed items.
- Clean the upper cover and lower cover before installing.
- Replace the camshaft seals and crankshaft seals if there is oil leakage.





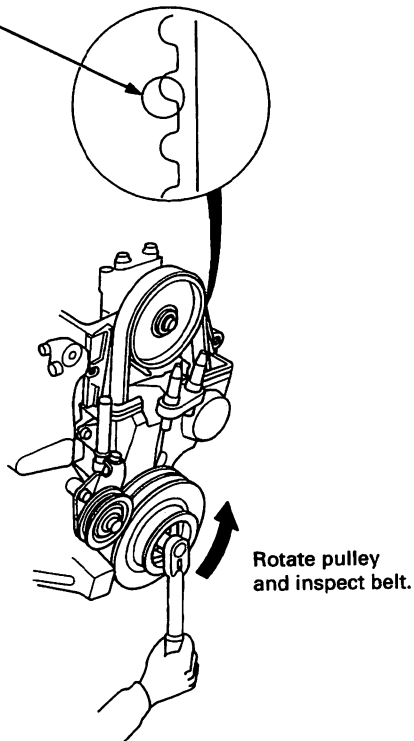
Inspection

1. Remove the cylinder head cover.
 - Refer to page 6-A-30 when installing.
2. Remove the upper cover (see page 6-A-8).
3. Inspect the timing belt for cracks and oil or coolant soaking.

NOTE:

- Replace the belt if oil or coolant soaked.
- Remove any oil or solvent that gets on the belt.

Inspect this area for wear.



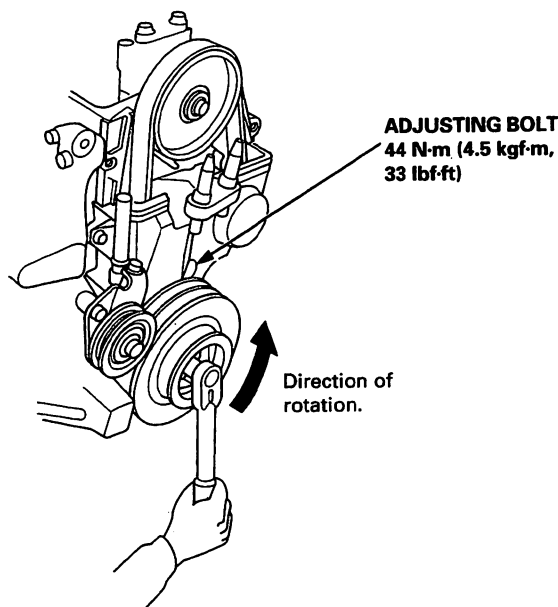
4. After inspecting, loosen the crankshaft pulley bolt, then retorque the crankshaft pulley bolt to 20 N·m (2.0 kgf·m, 14 lbf·ft) + 90°.

Tension Adjustment

NOTE:

- Always adjust the timing belt tension with the engine cold.
- The tensioner is spring-loaded to apply tension to the belt automatically after making the following adjustment.
- Always rotate the crankshaft counterclockwise when viewed from the pulley side. Rotating it clockwise may result in improper adjustment of the belt tension.
- Inspect the timing belt before adjusting the belt tension.

1. Remove the cylinder head cover.
 - Refer to page 6-A-30 when installing.
2. Remove the upper cover (see page 6-A-8).
3. Rotate the crankshaft five or six revolutions to set the belt.
4. Set the No. 1 piston at TDC (see page 6-A-10).
5. Loosen the adjusting bolt 180°.



6. Rotate the crankshaft counterclockwise three teeth on the camshaft pulley.
7. Tighten the adjusting bolt.
8. After inspecting, loosen the crankshaft pulley bolt, then retorque the crankshaft pulley bolt to 20 N·m (2.0 kgf·m, 14 lbf·ft) + 90°.

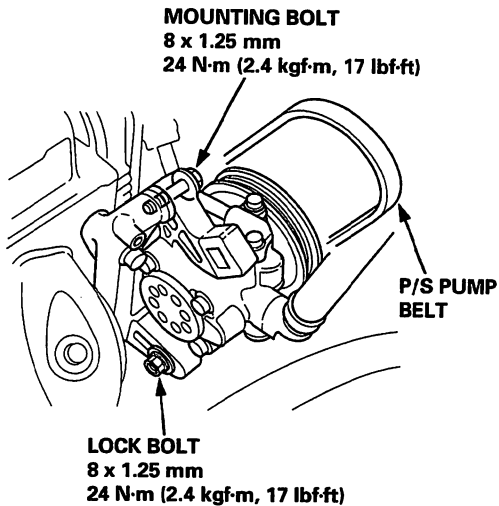
Timing Belt

Removal

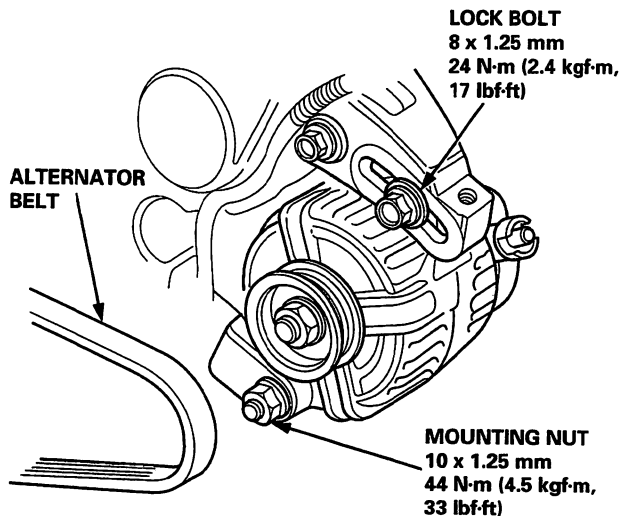
NOTE:

- Turn the crankshaft pulley so the No. 1 piston is at top dead center (TDC) before removing the belt (see page 6-A-10).
- Inspect the water pump before installing the timing belt (see page 10-17).

1. Remove the splash shield (see page 5-10).
2. Loosen the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump.

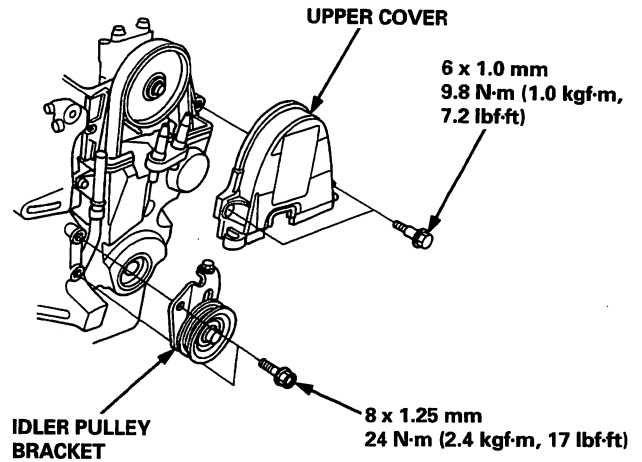


3. Loosen the idler pulley center nut and adjusting bolt, then remove the air conditioning (A/C) compressor belt (see page 5-7).
4. Loosen the mounting nut and lock bolt, then remove the alternator belt.



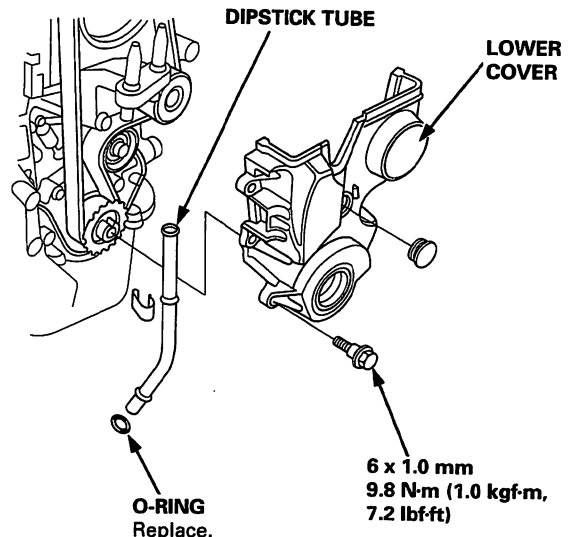
5. Remove the dipstick, then remove upper cover and idler pulley bracket.

NOTE: Do not use the upper cover for storing removed items.



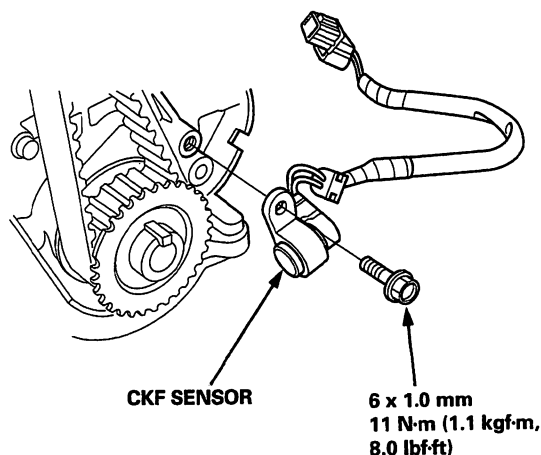
6. Support the engine with the jack and wood block under the oil pan.
7. Remove the stop and ground cable, then remove the upper bracket (see page 6-A-17).
8. Remove the crankshaft pulley (see page 6-A-5).
9. Remove the lower cover and dipstick tube.

NOTE: Do not use the lower cover for storing removed items.

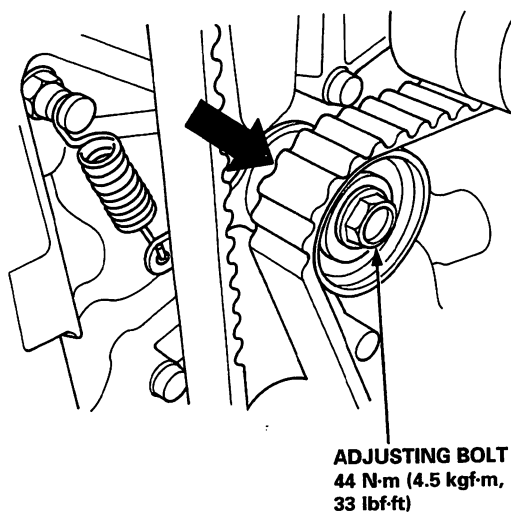




10. Remove the crankshaft speed fluctuation (CKF) sensor from the oil pump.



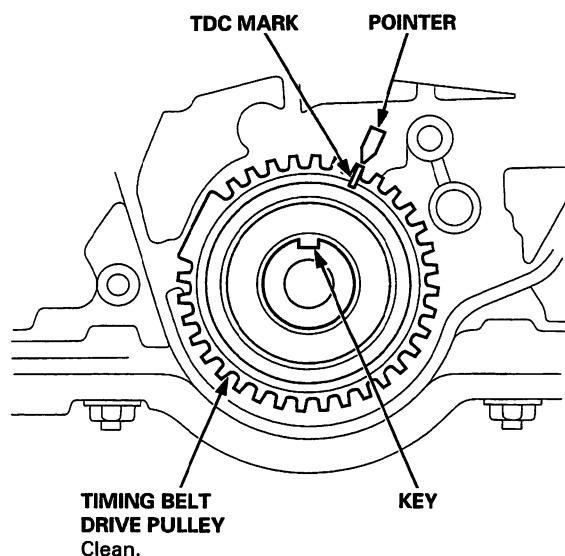
11. Loosen the adjusting bolt 180°. Push the tensioner to remove tension from the timing belt, then retighten the adjusting bolt.



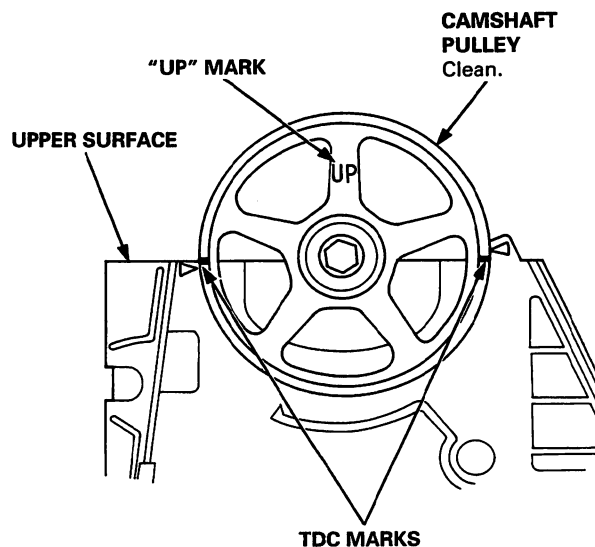
12. Remove the timing belt.

Install the timing belt in the reverse order of removal; Only key points are described here.

1. Set the timing belt drive pulley so that the No. 1 piston is at top dead center (TDC). Align the groove on the timing belt drive pulley to the pointer on the oil pump.



2. Set the camshaft pulley so that the No. 1 piston TDC. Align the TDC marks on the camshaft pulley with the cylinder head upper surface.



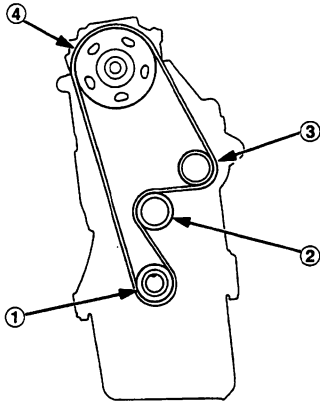
(cont'd)

Timing Belt

Installation (cont'd)

3. Install the timing belt tightly in the sequence shown.
①Timing belt drive pulley (crankshaft) →②Adjusting pulley →③Water pump pulley →④Camshaft pulley.

NOTE: Make sure the timing belt drive pulley and camshaft pulley are at TDC.



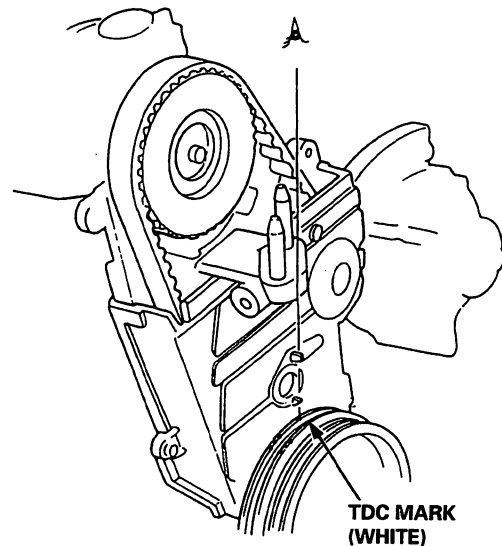
4. Loosen and retighten the adjusting bolt to tension the timing belt.
5. Install the lower cover and upper cover.

NOTE: Clean the upper and lower covers before installation.

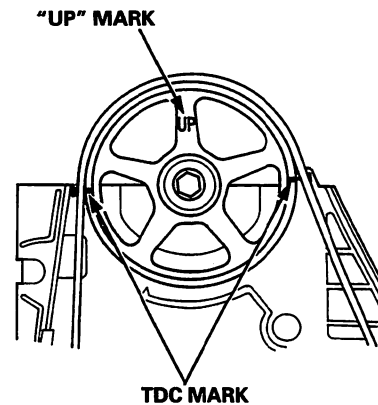
6. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-A-5).
7. Rotate the crankshaft pulley about five or six turns counterclockwise so that the timing belt positions on the pulleys.
8. Adjust the timing belt tension (see page 6-A-7).

9. Check that the crankshaft pulley and camshaft pulley are both at TDC.

CRANKSHAFT PULLEY:



CAMSHAFT PULLEY:



10. If the camshaft and crankshaft pulleys are not positioned at TDC remove the timing belt, and adjust the position following the procedure on page 6-A-9, then reinstall the timing belt.
11. After installation, adjust the tension of each belt.
- See section 4 for alternator belt tension adjustment.
 - See section 22 for A/C compressor belt tension adjustment.
 - See section 17 for P/S pump belt tension adjustment.

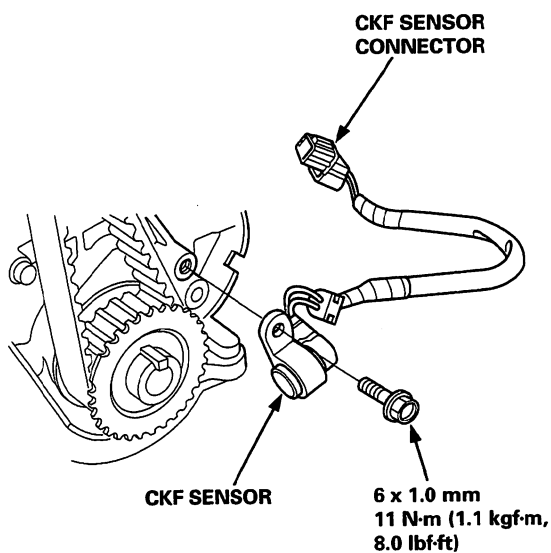


Replacement

1. Remove the cylinder head cover.

NOTE: Refer to page 6-A-30 when installing.

2. Remove the crankshaft pulley (see page 6-A-5).
3. Remove the upper cover and idler pulley bracket (see page 6-A-8).
4. Remove the dipstick tube, then remove lower cover (see page 6-A-8).
5. Disconnect the CKF sensor connector, then remove the CKF sensor.



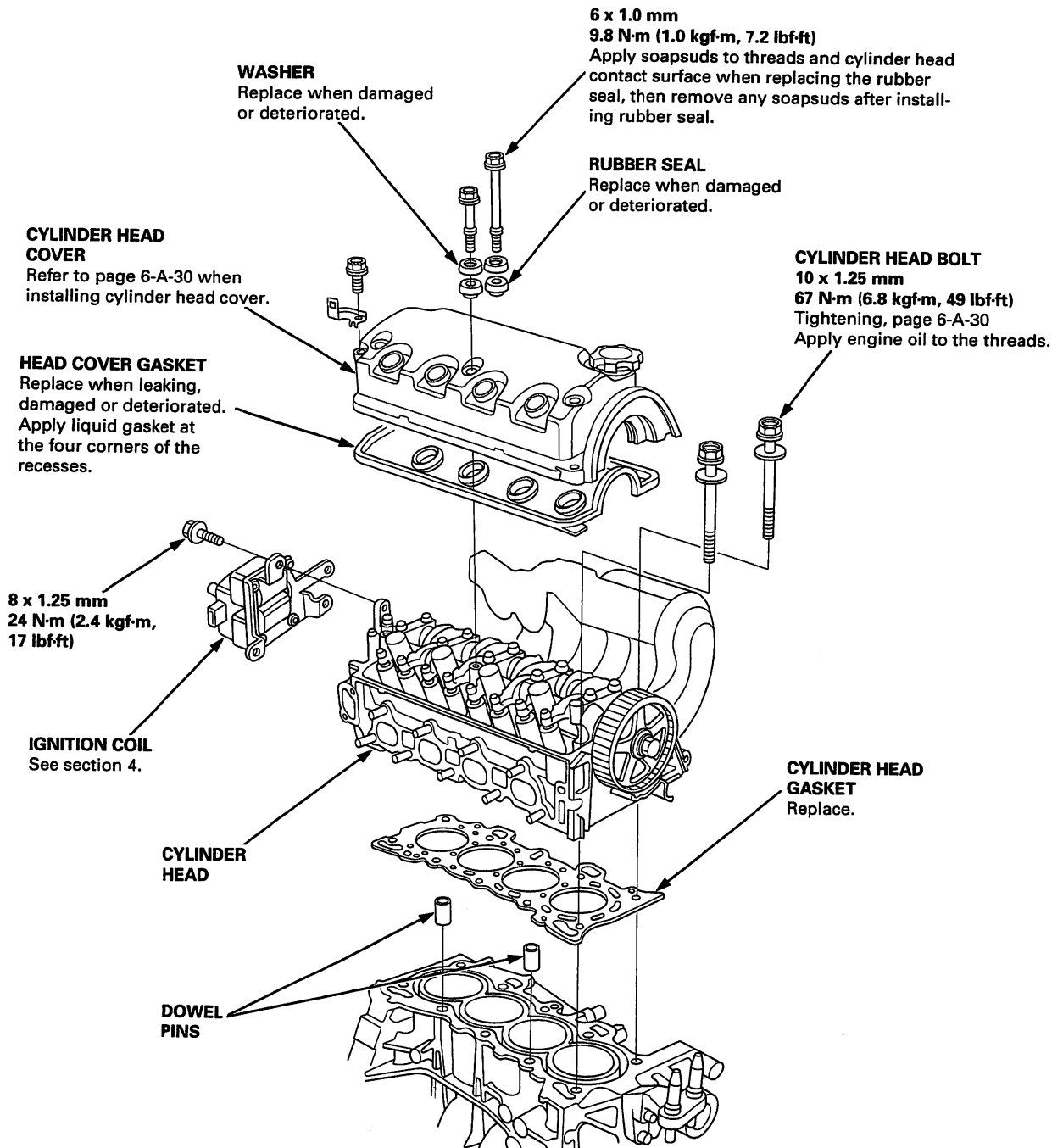
6. Install the CKF sensor in reverse order of removal.

Cylinder Head

Illustrated Index

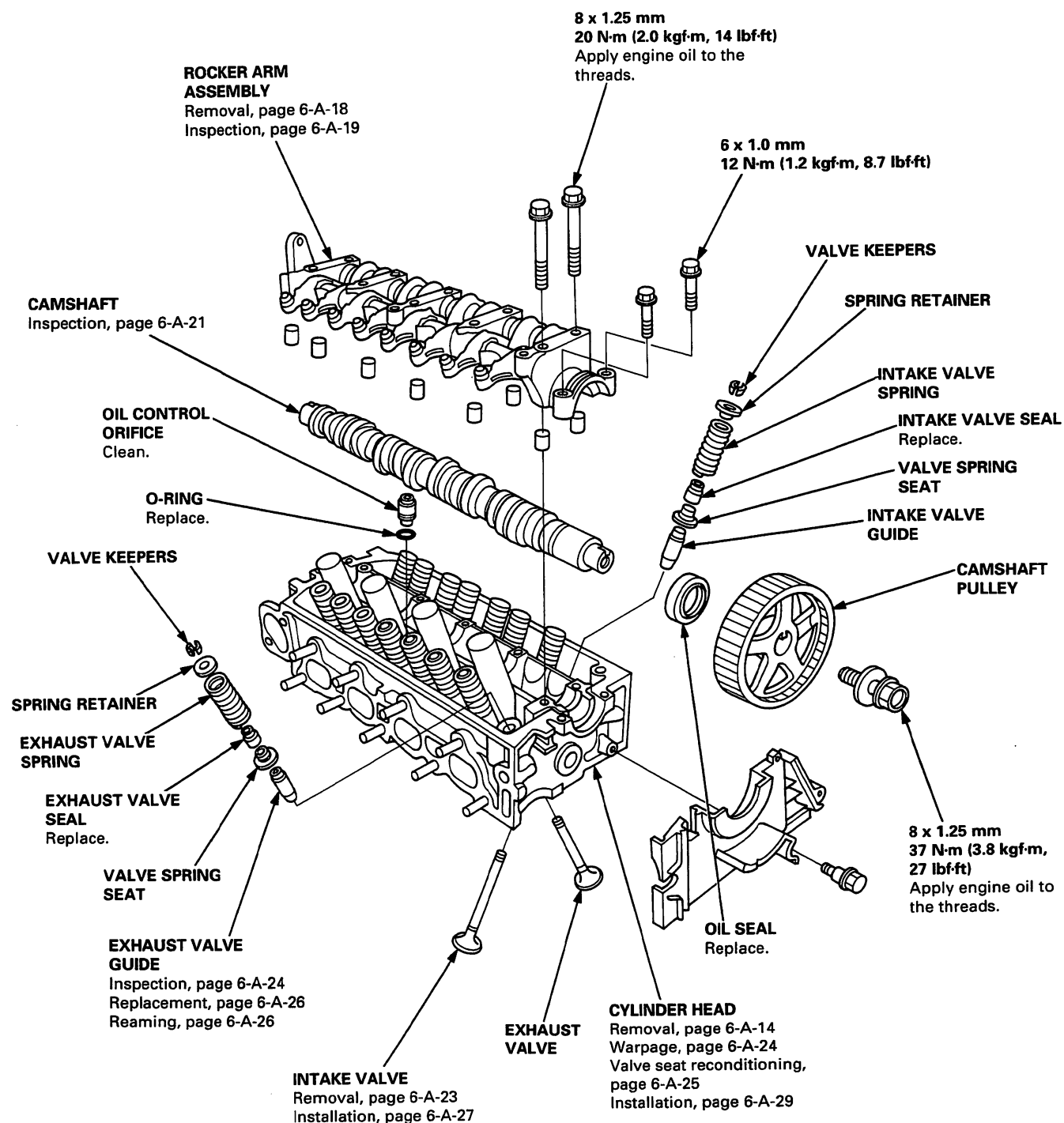
NOTE:

- To avoid damage, wait until the engine coolant temperature drops below 38°C (100°F) before removing the cylinder head.
- When handling a metal gasket, take care not to fold it or damage the contact surface.
- Use new O-rings and gaskets when reassembling.





Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact parts.



Cylinder Head

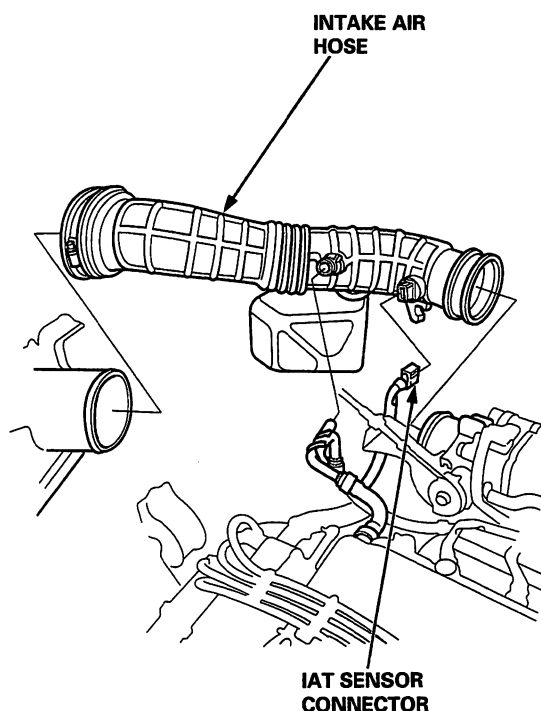
Removal

Engine Removal is not required this procedure.

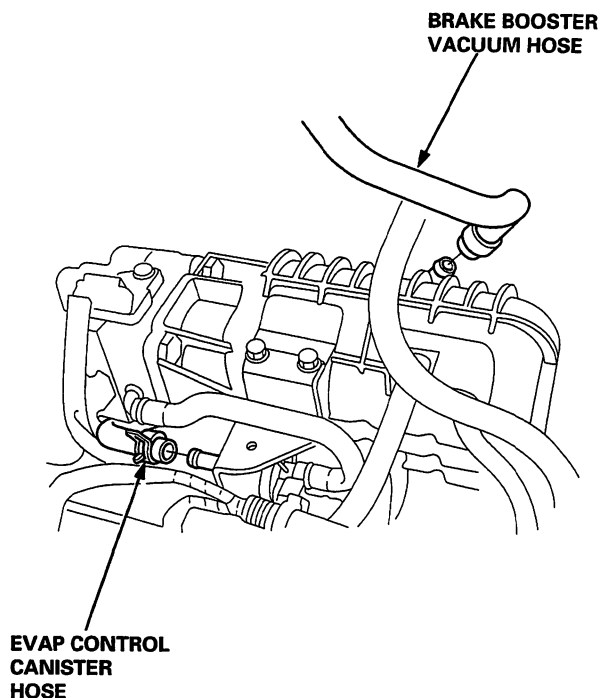
NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage. Unplug the wiring connectors carefully while holding the connector portion.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 38°C (100°F) before loosening the retaining bolts.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

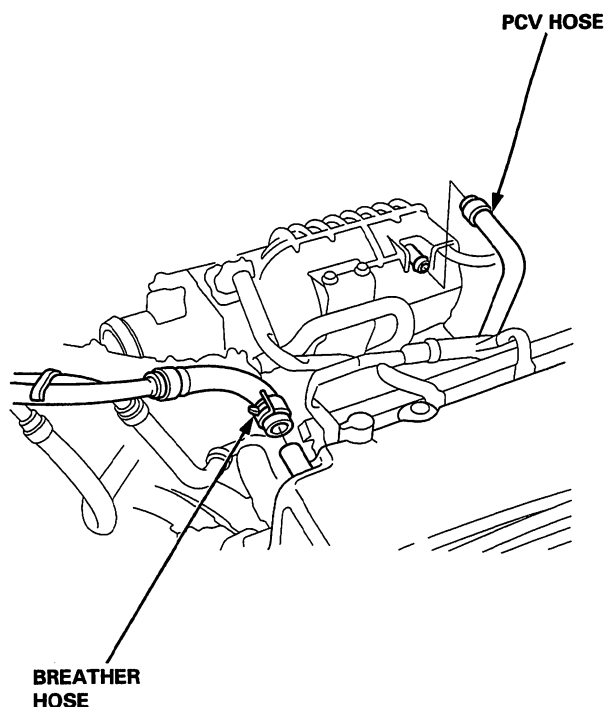
1. Secure the hood in the open position.
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's pre-set buttons.
3. Disconnect the battery negative terminal first, then the positive terminal.
4. Drain the engine coolant (see page 10-7).
5. Disconnect the intake air temperature (IAT) sensor connector, then remove the intake air duct.



6. Remove the brake booster vacuum hose and evaporative emission (EVAP) control canister hose.

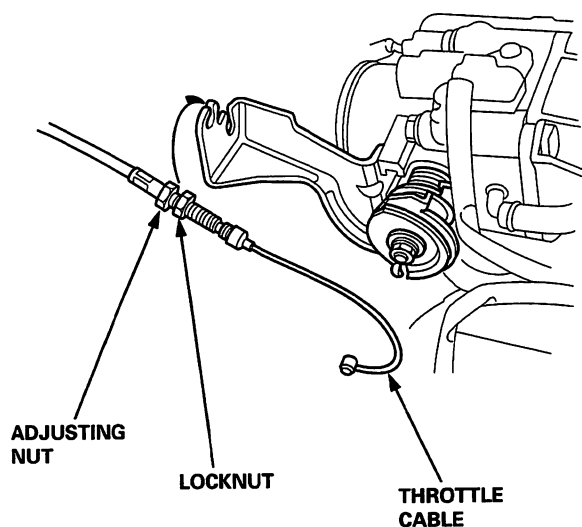


7. Remove the breather hose and positive crankcase ventilation (PCV) hose.



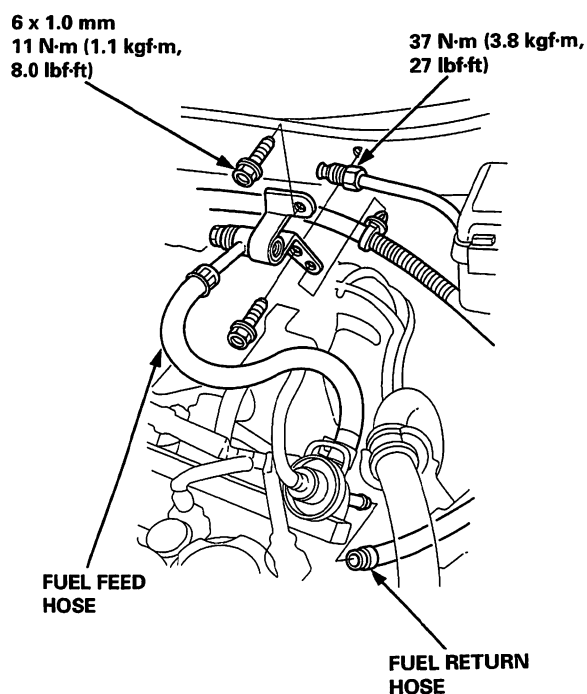


8. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage. Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.

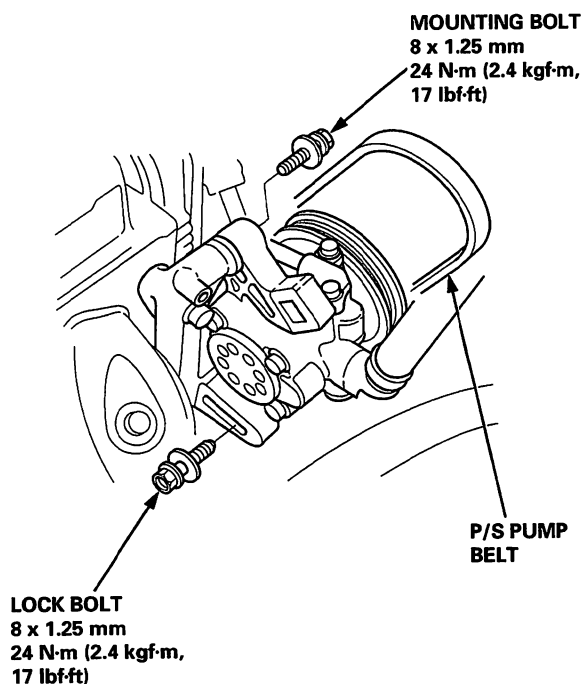


9. Relieve fuel pressure (see section 11).

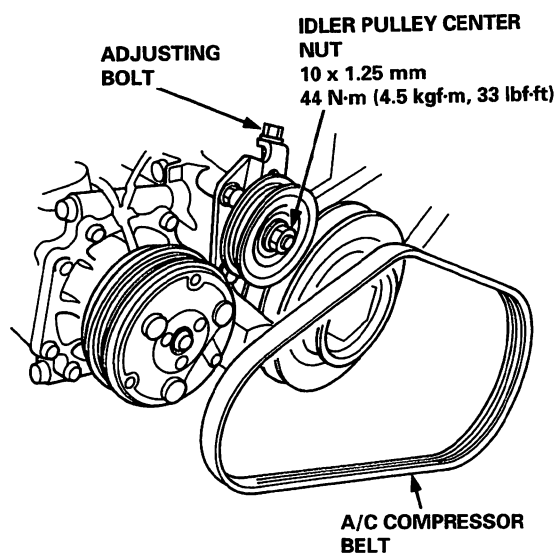
10. Remove the fuel feed hose and fuel return hose.



11. Remove the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump without disconnecting the P/S hoses.



12. Loosen the idler pulley center nut and adjusting bolt, then remove the air conditioning (A/C) compressor belt.

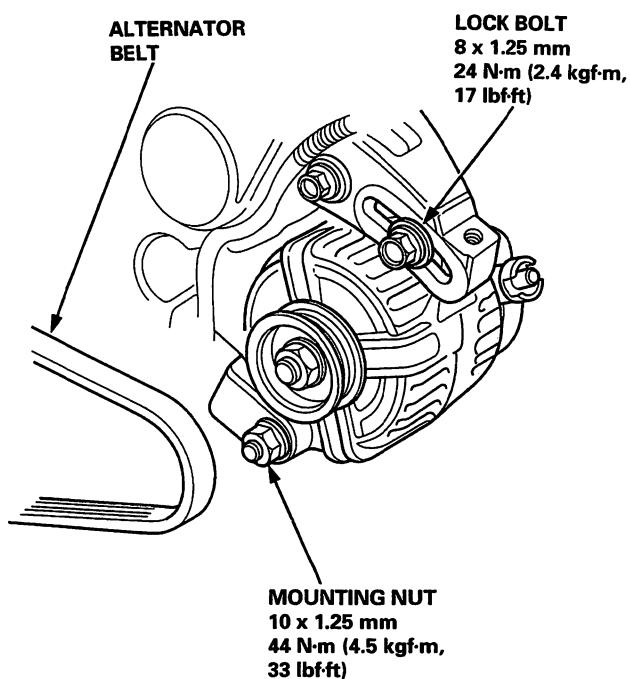


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Cylinder Head

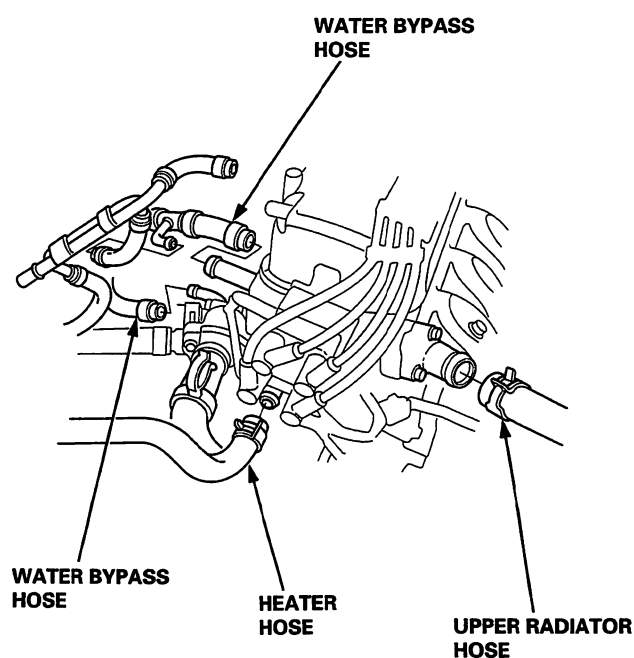
Removal (cont'd)

13. Loosen the mounting nut and lock bolt, then remove the alternator belt.



14. Remove the P/S pump bracket (see page 5-17).

15. Remove the upper radiator hose, heater hose and water bypass hoses.

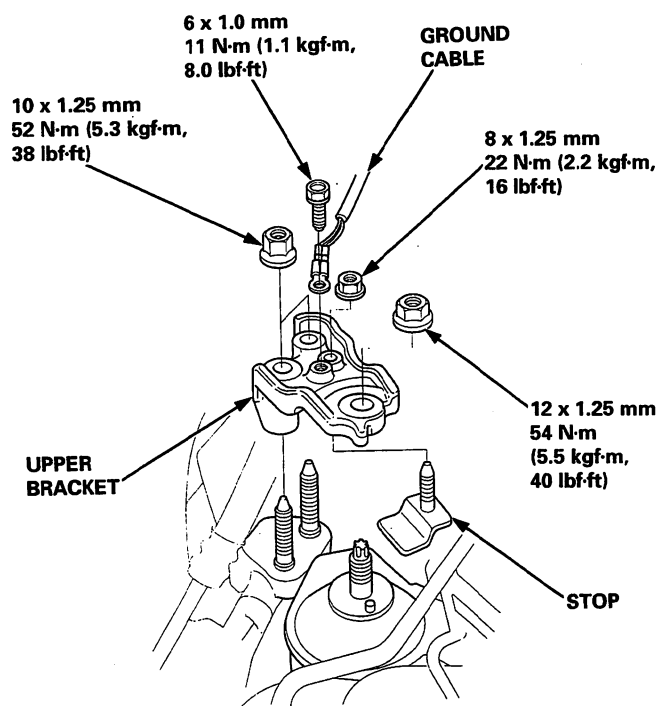


16. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.
- Four fuel injector connectors
 - Idle air control (IAC) valve connector
 - Throttle position sensor connector
 - Manifold absolute pressure (MAP) sensor connector
 - Engine coolant temperature (ECT) sensor connector
 - Radiator fan switch connector
 - Coolant temperature gauge sending unit connector
 - Heated oxygen sensor (HO2S) connector
17. Remove the spark plug caps and ignition coil from the cylinder head.

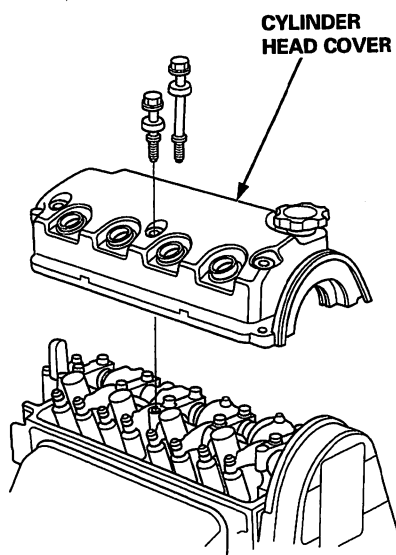


18. Support the engine with the jack and wood block under the oil pan.

19. Remove the stop and ground cable, then remove the upper bracket.

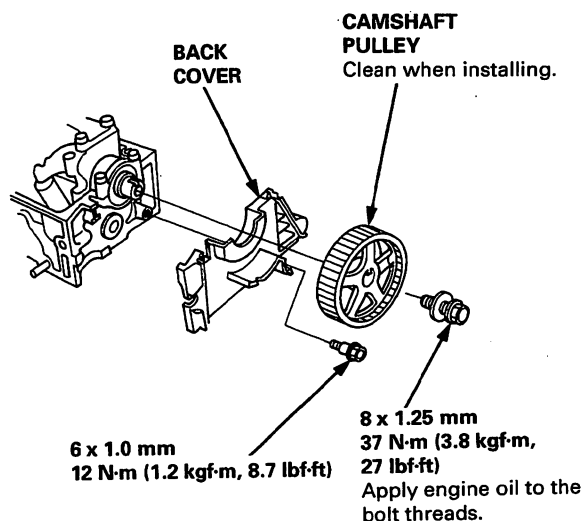


20. Remove the cylinder head cover.

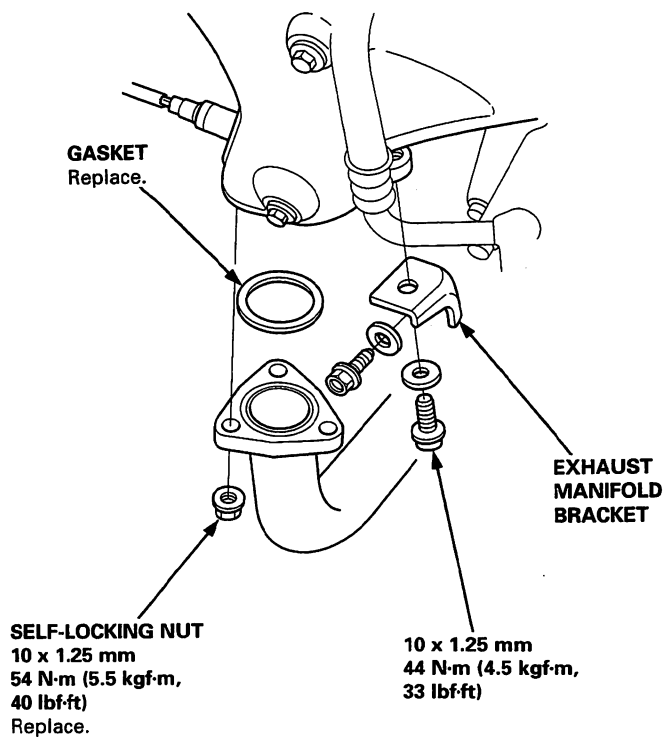


21. Remove the timing belt (see page 6-A-8).

22. Remove the camshaft pulley and back cover.



23. Remove the exhaust manifold brackets and self-locking nuts.



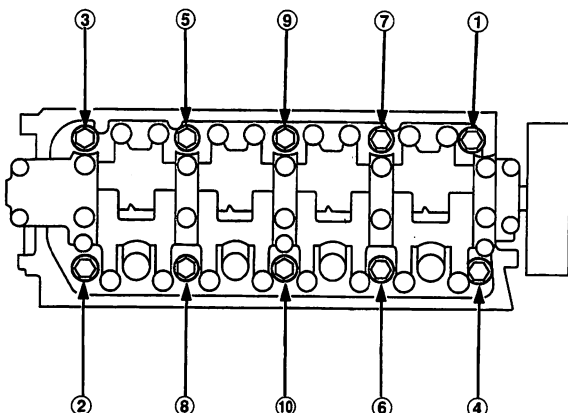
(cont'd)

Cylinder Head

Removal (cont'd)

24. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

CYLINDER HEAD BOLT LOOSENING SEQUENCE:

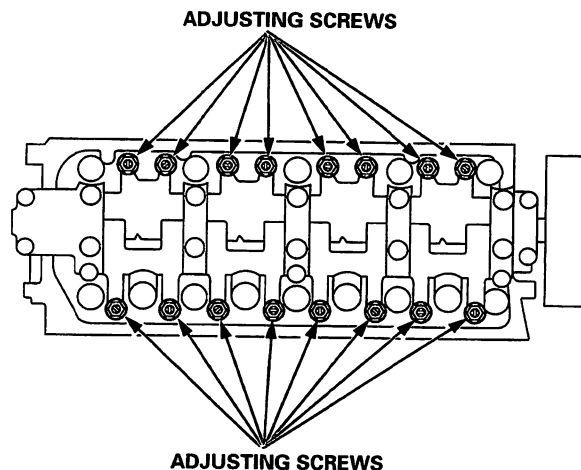


25. Remove the cylinder head.

Rocker Arms

Removal

1. Loosen the adjusting screws.

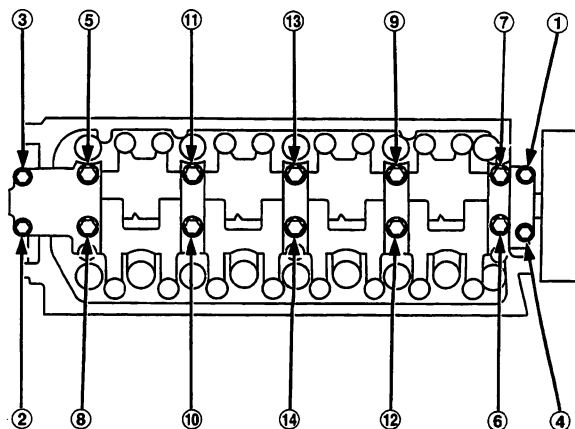


2. Unscrew the camshaft holder bolts, then remove the rocker arm assembly.

NOTE:

- Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern, to prevent damaging the valves or rocker arm assembly.
- When removing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the camshaft holders, the springs and the rocker arms on the shaft.

CAMSHAFT HOLDER BOLTS LOOSENING SEQUENCE:

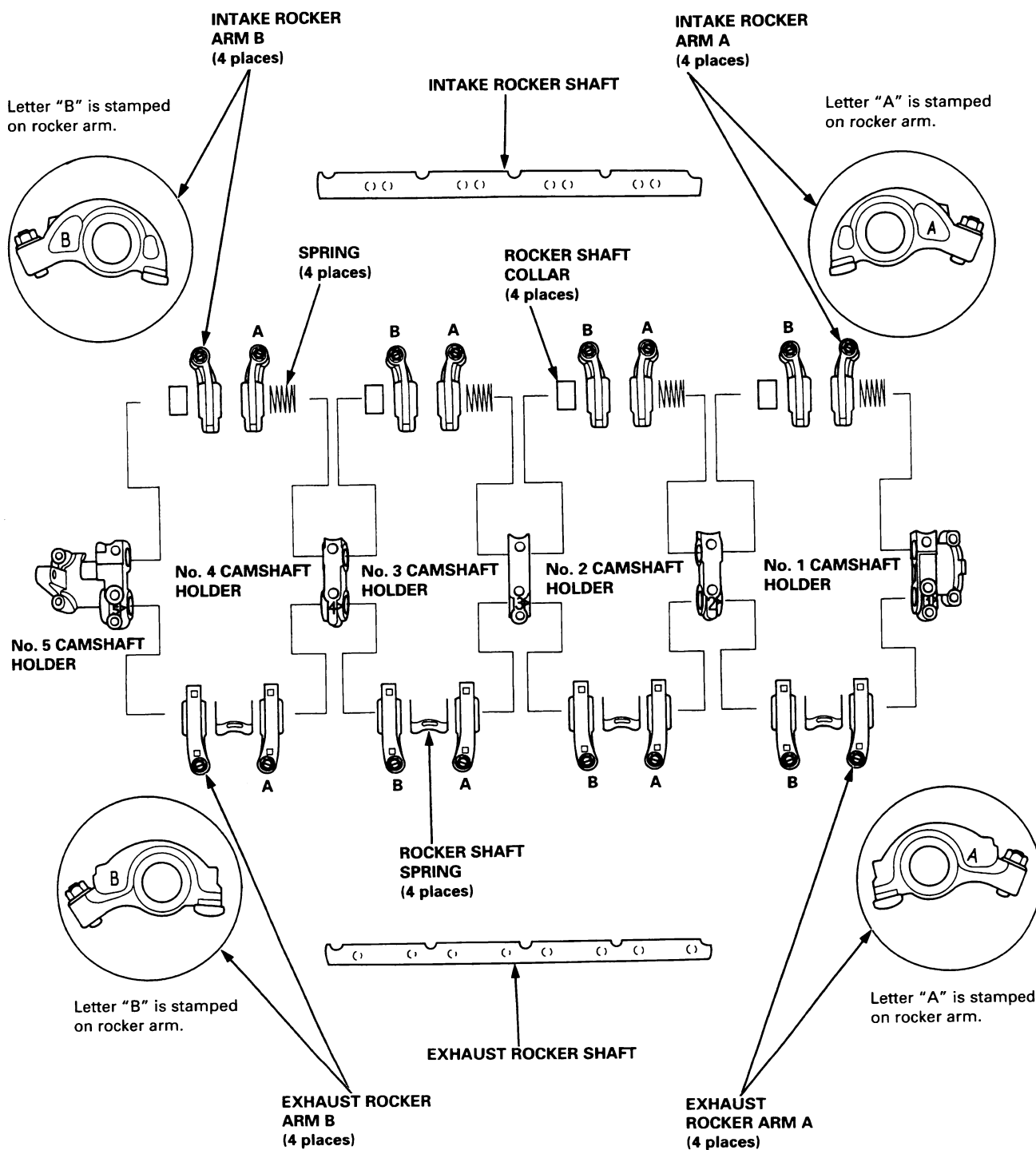




Disassembly/Reassembly

NOTE:

- Identify parts as they are removed to ensure reinstallation in original locations.
- Inspect rocker shafts and rocker arms (see page 6-A-20).
- Rocker arms must be installed in the same position if reused.
- When removing or installing rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders, springs and rocker arms on the shaft.

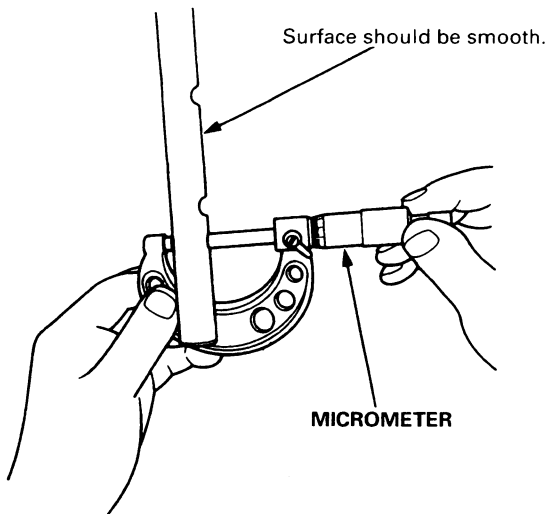


Rocker Arms and Shafts

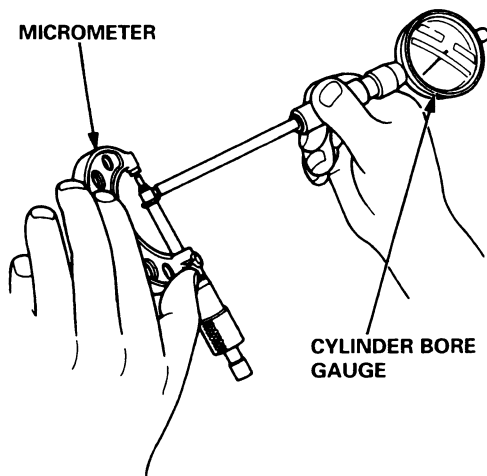
Clearance Inspection

Measure both the intake rocker shaft and exhaust rocker shaft.

1. Measure the diameter of shaft at the first rocker location.



2. Zero the gauge to the shaft diameter.



3. Measure inside diameter of rocker arm and check for out-of-round condition.

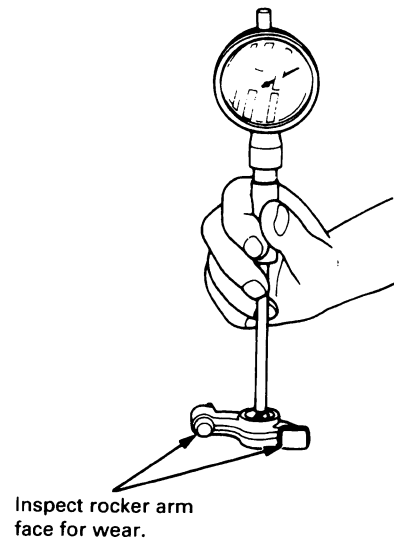
Rocker Arm-to-Shaft Clearance:

Standard (New):

Intake: 0.017 – 0.050 mm
(0.0007 – 0.0020 in)

Exhaust: 0.018 – 0.054 mm
(0.0007 – 0.0021 in)

Service Limit: 0.08 mm (0.003 in)



4. Repeat for all the rockers.
— If the clearance is over the service limit, replace the rocker shaft and all over tolerance rocker arms.



Inspection

NOTE:

- Do not rotate the camshaft during inspection.
- Remove the rocker arms and rocker shafts.

1. Put the camshaft and the camshaft holders on the cylinder head, then tighten the bolts to the specified torque.

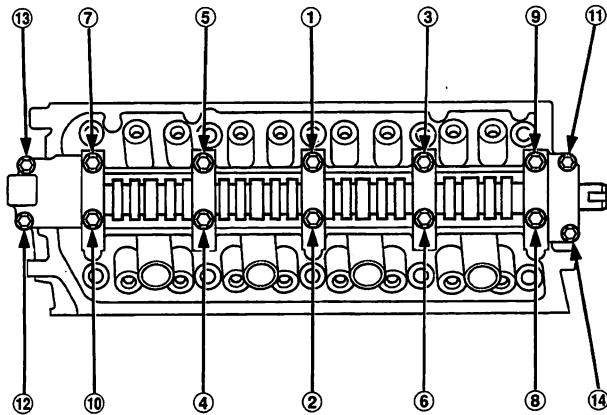
Specified torque:

8 mm bolts: 20 N·m (2.0 kgf·m 14 lbf·ft)

Apply engine oil to the threads.

6 mm bolts: 12 N·m (1.2 kgf·m 8.7 lbf·ft)

6 mm bolts: ⑪, ⑫, ⑬, ⑭

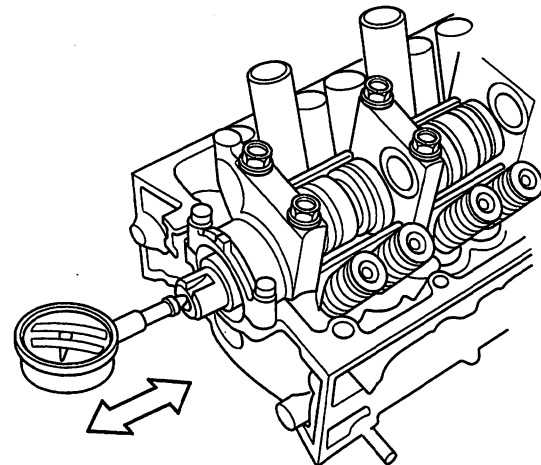


2. Seat the camshaft by pushing it toward the rear of the cylinder head.
3. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth, and read the end play.

Camshaft End Play:

Standard (New): 0.05 – 0.15 mm
(0.002 – 0.006 in)

Service Limit: 0.5 mm (0.02 in)



4. Remove the bolts, then remove the camshaft holders from the cylinder head.
 - Lift camshaft out of cylinder head, wipe clean, then inspect lift ramps. Replace camshaft if lobes are pitted, scored, or excessively worn.
 - Clean the camshaft bearing surfaces in the cylinder head, then set camshaft back in place.
 - Insert plastigage strip across each journal.
5. Install the camshaft holders and tighten the bolts to the specified torque.

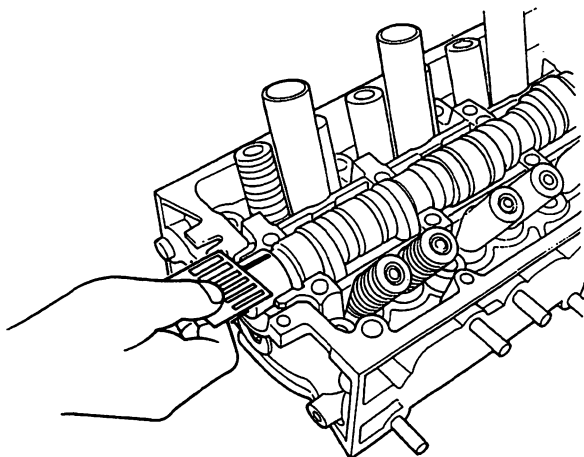
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Camshaft

Inspection (cont'd)

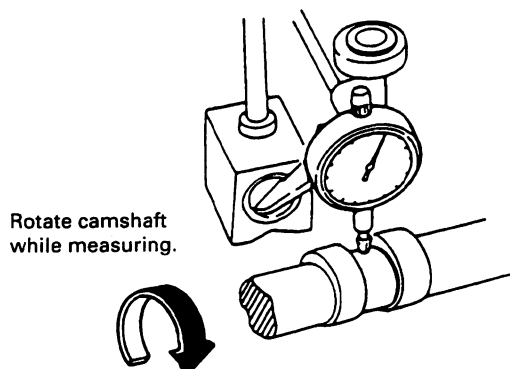
6. Remove the camshaft holders, then measure the widest portion of the plastigage on each journal.

Camshaft-to-Holder Oil Clearance:
Standard (New): 0.050 – 0.089 mm
(0.002 – 0.004 in)
Service Limit : 0.15 mm (0.006 in)



7. If the camshaft-to-holder oil clearance is out of tolerance:
- And the camshaft has already been replaced, you must replace the cylinder head.
 - If the camshaft has not been replaced, first check the total runout with the camshaft supported on V-blocks.

Camshaft Total Runout:
Standard (New): 0.03 mm (0.001 in) max.
Service Limit: 0.04 mm (0.002 in)

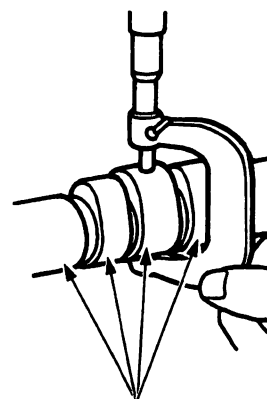
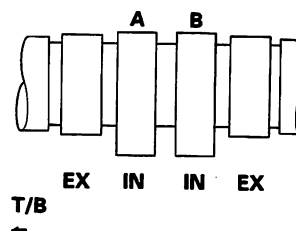


- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the bearing clearance is still out of tolerance, replace the cylinder head.

8. Check the cam lobe height wear.

Cam Lobe Height Standard (New):
Intake A: 35.019 mm (1.3787 in)
Intake B: 34.734 mm (1.3675 in)
Exhaust: 37.904 mm (1.4923 in)

T/B: Timing belt
IN: Intake, **EX:** Exhaust



Check this area for wear.

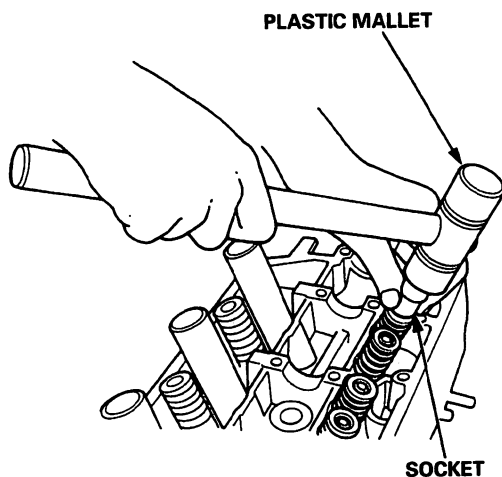


Valves, Valve Springs and Valve Seals

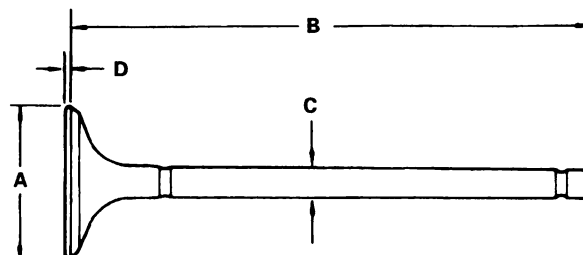
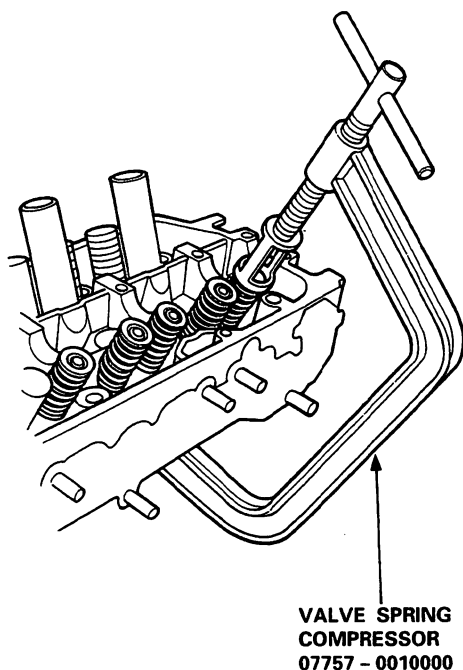
Removal

NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Using an appropriate-sized socket and plastic mallet, lightly tap the valve retainer to loosen the valve keepers before installing the valve spring compressor.



2. Install the spring compressor. Compress the spring and remove the valve keeper.



Intake Valve Dimensions

- A Standard (New):** 29.90 – 30.10 mm
(1.177 – 1.185 in)
- B Standard (New):** 117.42 – 117.72 mm
(4.623 – 4.635 in)
- C Standard (New):** 5.48 – 5.49 mm
(0.2157 – 0.2161 in)
- C Service Limit:** 5.45 mm (0.2146 in)
- D Standard (New):** 0.75 – 1.25 mm
(0.030 – 0.049 in)
- D Service Limit:** 0.55 mm (0.022 in)

Exhaust Valve Dimensions

- A Standard (New):** 25.90 – 26.10 mm
(1.020 – 1.028 in)
- B Standard (New):** 114.60 – 114.90 mm
(4.512 – 4.524 in)
- C Standard (New):** 5.45 – 5.46 mm
(0.2146 – 0.2150 in)
- C Service Limit:** 5.42 mm (0.2134 in)
- D Standard (New):** 0.95 – 1.45 mm
(0.037 – 0.057 in)
- D Service Limit:** 0.85 mm (0.033 in)

Valve Guides

Cylinder Head

Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

Intake Valve Stem-to-Guide Clearance:

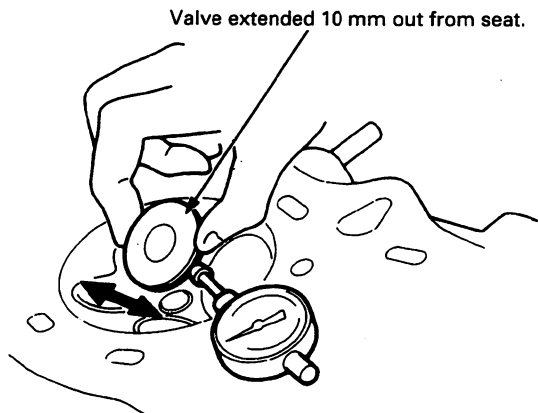
Standard (New): 0.04 – 0.10 mm
(0.002 – 0.004 in)

Service Limit: 0.16 mm (0.006 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10 – 0.16 mm
(0.004 – 0.006 in)

Service Limit: 0.22 mm (0.009 in)



- If measurement exceeds the service limit, recheck using a new valve.
- If measurement is now within the service limit, reassemble using a new valve.
- If measurement still exceeds limit, recheck using alternate method below, then replace valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge. Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.02 – 0.05 mm
(0.001 – 0.002 in)

Service Limit: 0.08 mm (0.003 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.05 – 0.08 mm
(0.002 – 0.003 in)

Service Limit: 0.11 mm (0.004 in)

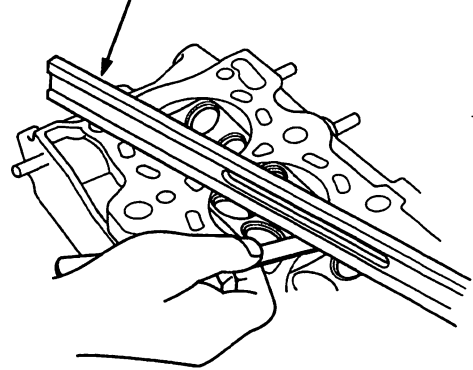
Warpage

NOTE: If the camshaft-to-holder oil clearances (see page 6-A-21) are not within specification, the cylinder head cannot be resurfaced.

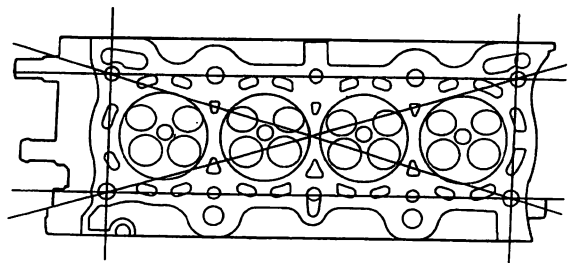
If the camshaft-to-holder oil clearances are within specifications, check the cylinder head for warpage.

- If warpage is less than 0.05 mm (0.002 in) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 93 mm (3.66 in).

PRECISION STRAIGHT EDGE



Measure along edges, and three ways across center.



Cylinder Head Height:

Standard (New): 92.95 – 93.05 mm
(3.659 – 3.663 in)

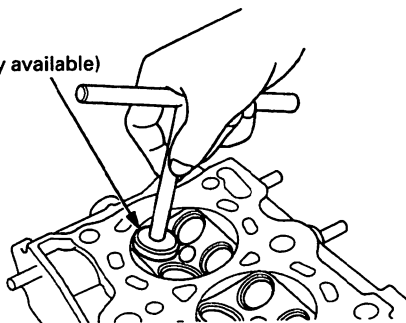


Reconditioning

1. Renew the valve seats in the cylinder head using a valve seat cutter.

NOTE: If the guides are worn (see page 6-A-24), replace them (see page 6-A-26) before cutting the valve seats.

VALVE SEAT CUTTER
(Commercially available)



2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check the width of seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

Valve Seat Width:

Standard (New):

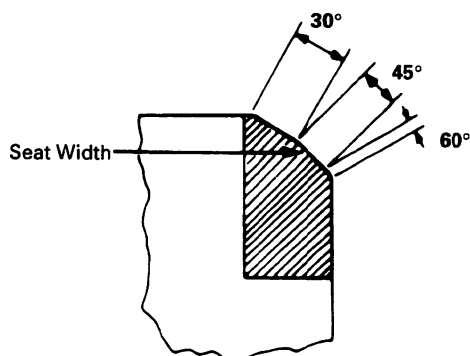
Intake: 0.85 – 1.15 mm (0.033 – 0.045 in)

Exhaust: 1.25 – 1.55 mm (0.049 – 0.061 in)

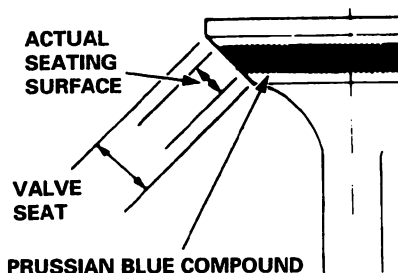
Service Limit:

Intake: 1.6 mm (0.063 in)

Exhaust: 2.0 mm (0.079 in)



5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face, and insert the valve in its original location in the head, then lift and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
 - If it is too low (closer to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert the intake and exhaust valves in the head and measure the valve stem installed height.

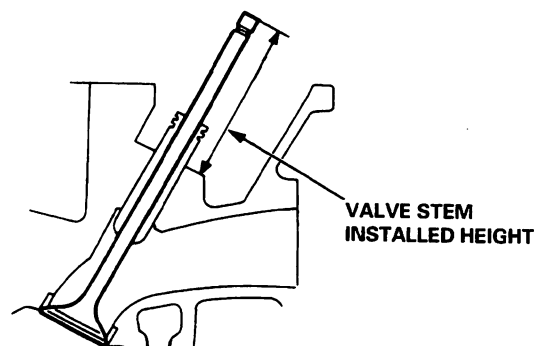
Intake, Exhaust Stem Installed Height:

Standard (New): 53.17 – 53.64 mm

(2.093 – 2.112 in)

Service Limit: 53.89 mm (2.122 in)

8. If the valve stem installed height is over the service limit, replace the valve and recheck. If it's still over the service limit, replace the cylinder head; the valve seat in the head is too deep.



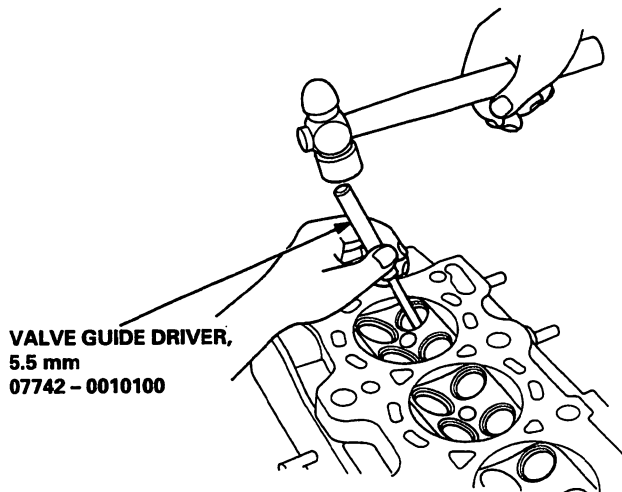
Valve Guides

Replacement

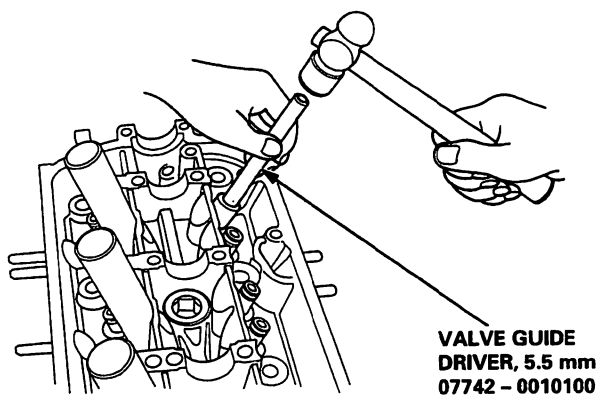
NOTE:

- For best results, heat cylinder head to 150°C (300°F) before removing or installing guides.
- It may be necessary to use an air hammer to remove some valve guides.

1. Drive the valve guide out from the bottom of the cylinder head.



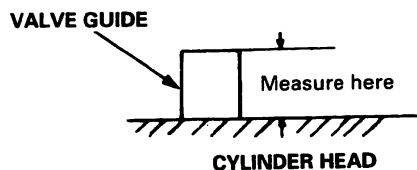
2. Drive in a new valve guide to the specified depth.



Valve Guide Installed Height:

Intake: 17.85 - 18.35 mm (0.703 - 0.722 in)

Exhaust: 18.65 - 19.15 mm (0.734 - 0.754 in)

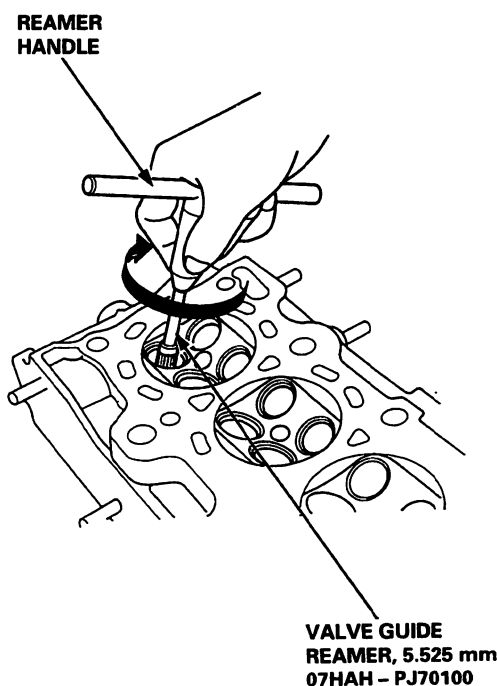


Reaming

NOTE: For new valve guides only.

1. Coat both the reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check the clearance with a valve (see page 6-A-24).
— Verify that the valve slides in the valve guide without exerting pressure.

Turn reamer in clockwise direction only.



Valves, Valve Springs and Valve Seals



Installation

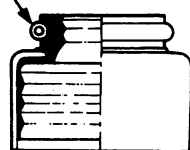
1. Insert the valves into the valve guides, coat the valve stems with engine oil before inserting the valves.

NOTE: Check the valves move up and down smoothly.

2. Install the spring seats on the cylinder head.
3. Install the valve seals using the special tool.

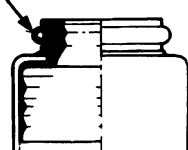
NOTE: Exhaust and intake valve seal are not interchangeable.

**WHITE
SPRING**



INTAKE VALVE SEAL

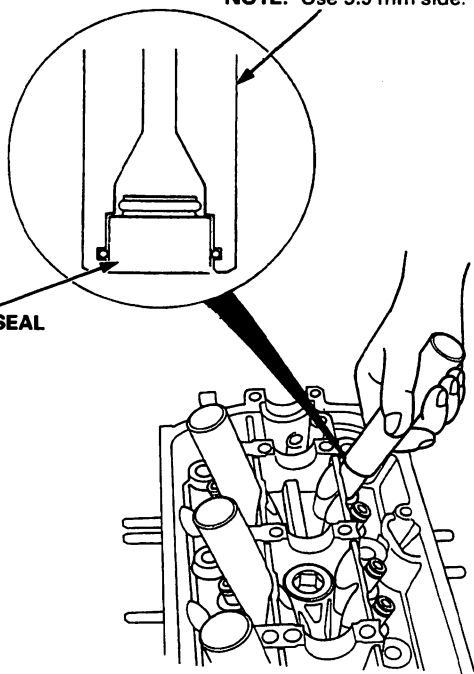
**BLACK
SPRING**



EXHAUST VALVE SEAL

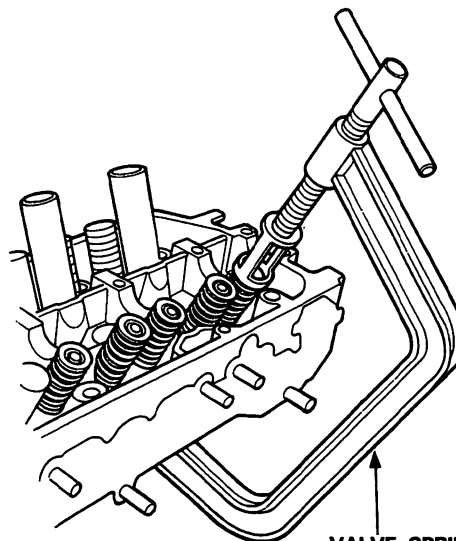
**STEM SEAL DRIVER,
07PAD - 0010000
NOTE: Use 5.5 mm side.**

**VALVE SEAL
Replace.**



4. Install the valve spring and valve retainer, then install the valve spring compressor. Compress the spring, and install the valve keepers.

NOTE: Place the end of valve spring with closely wound coils toward the cylinder head.

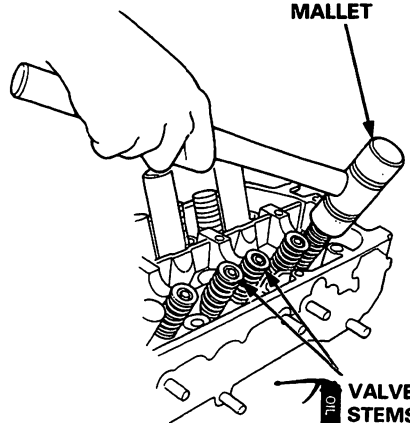


**VALVE SPRING
COMPRESSOR
07757 - 0010000**

5. Lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of valve and valve keepers.

NOTE: Tap the valve stem only along its so you do not bend the stem.

**PLASTIC
MALLET**



**VALVE
STEMS**

Camshaft/Rocker Arms and Camshaft Seal/Pulley

Installation

NOTE:

- Make sure that all rockers are in alignment with valves when torquing rocker assembly bolts.
- Valve locknuts should be loosened and adjusting screws backed off before installation.
- To prevent rocker arm assembly from coming apart, leave camshaft holder bolts in the holes.

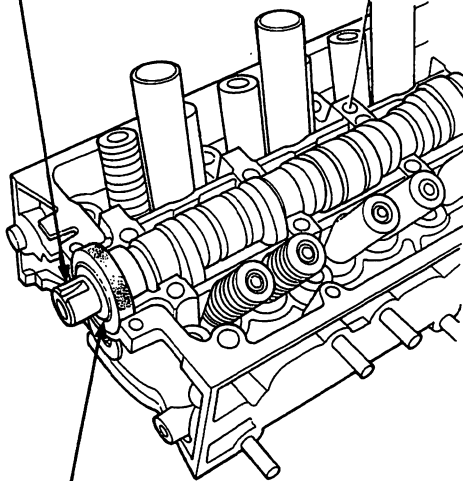
1. After wiping down the camshaft, camshaft seal and journals in the cylinder head, lubricate both surfaces and install the camshaft.

2. Clean and install the oil control orifice with new O-ring.

CAMSHAFT
Keyway up.

OIL CONTROL ORIFICE
Clean.

O-RING
Replace.



CAMSHAFT SEAL

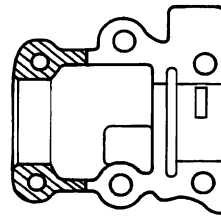
Seal housing surface should be dry.
Apply a light coat of oil to camshaft
and inner lip of seal.

3. Turn the camshaft until its keyway is facing up (No. 1 piston TDC).

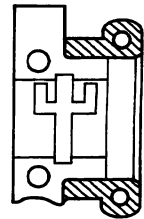
4. Apply liquid gasket (P/N 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S) to the head mating surfaces of the No. 1 and No. 5 camshaft holders.

NOTE: Clean and dry the cylinder head mating surfaces before applying liquid gasket.

— Apply liquid gasket to the shaded areas.



No. 5



No. 1

5. Set the rocker arm assembly in place and loosely install the bolts.

— Make sure that the rocker arms are properly positioned on the valve stems.

6. Tighten each bolt two turns at a time in the sequence shown below to ensure that the rockers do not bind on the valves.

NOTE: Wipe off the excess of liquid gasket from No. 1 and No. 5 camshaft holders with a shop towel.

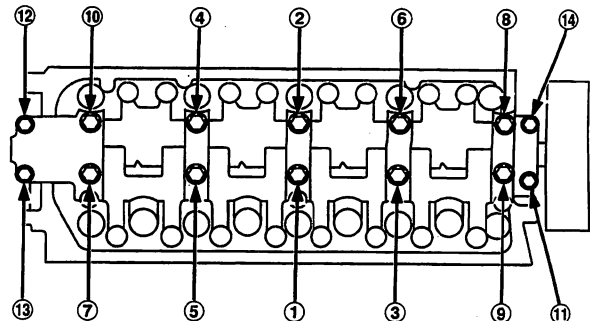
Specified torque:

8 mm bolts: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply engine oil to the threads.

6 mm bolts: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

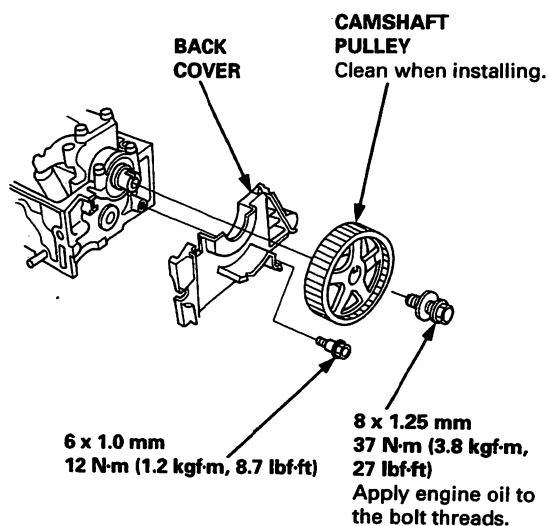
6 mm bolts: ⑪, ⑫, ⑬, ⑭



Cylinder Head



7. Install the back cover, then install the camshaft pulley.



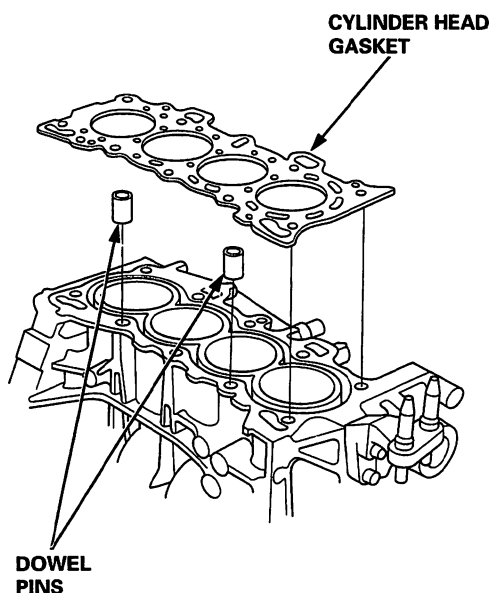
Installation

Install the cylinder head in the reverse order of removal:

NOTE:

- Always use a new head gasket.
- Cylinder head and cylinder block surface must be clean.
- "UP" mark on camshaft pulley should be at the top.
- Turn the crankshaft so the No. 1 piston is at TDC (see page 6-A-9).
- Clean the oil control orifice before installing.
- Do not use the upper cover and lower cover for storing items disassembled.
- Clean the upper cover and lower cover before installation.

1. Cylinder head dowel pins must be aligned.



(cont'd)

Cylinder Head

Installation (cont'd)

2. Position the camshaft correctly (see page 6-A-9).
3. Tighten the cylinder head bolts sequentially in four steps.

1st step: ① – ⑩ 20 N·m (2.0 kgf·m, 14 lbf·ft)

2nd step: ① – ⑩ 49 N·m (5.0 kgf·m, 36 lbf·ft)

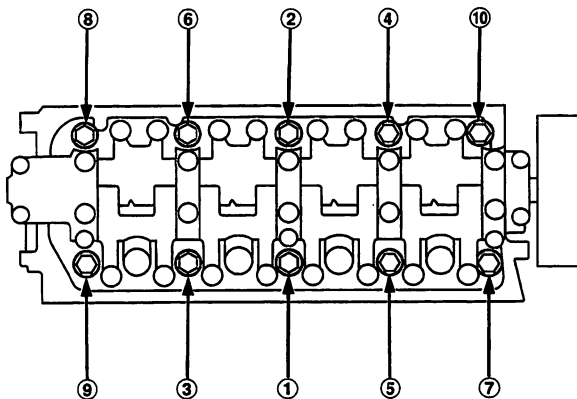
3rd step: ① – ⑩ 67 N·m (6.8 kgf·m, 49 lbf·ft)

4th step: ①, ② 67 N·m (6.8 kgf·m, 49 lbf·ft)

NOTE:

- We recommend using a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and not to overtighten.
- If a bolt makes any noise while you are torquing it, loosen the bolt, and retighten it from the 1st step.

CYLINDER HEAD BOLTS TORQUE SEQUENCE:

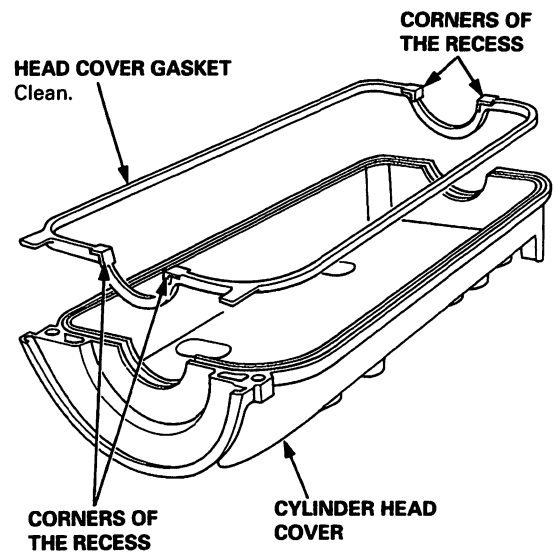


4. Install the exhaust manifold bracket, then install the exhaust pipe A and the bracket, and then install the cover.

5. Install the timing belt (see page 6-A-9).
6. Adjust the valve clearance (see page 6-A-3).
7. Install the head cover gasket in the groove of the cylinder head cover. Seat the recesses for the camshaft first, then work it into the groove around the outside edges.

NOTE:

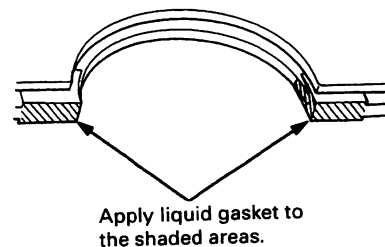
- Before installing the head cover gasket, thoroughly clean the seal and the groove.
- When installing, make sure the head cover gasket is seated securely in the corners of the recesses with no gap.



8. Apply liquid gasket to the head cover gasket at the four corners of the recesses.

NOTE:

- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



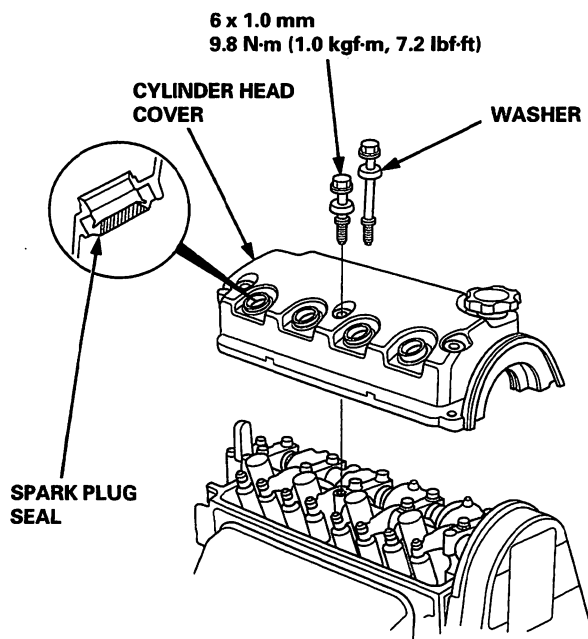


9. When installing the cylinder head cover, hold the head cover gasket in the groove by placing your fingers on the camshaft holder contacting surfaces (top of the semicircles).

Set the spark plug seal on the spark plug pipe. Once the cylinder head cover is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.

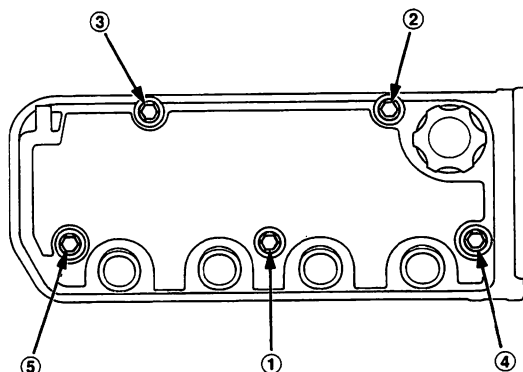
NOTE:

- Before installing the cylinder head cover, clean the cylinder head contacting surfaces with a shop towel.
- Do not touch the parts where liquid gasket was applied.
- Take care not to damage the spark plug seal when installing the cylinder head cover.
- Visually check the spark plug seal for damage.
- Replace the washer when damaged or deteriorated.



10. Tighten the nuts in two or three steps. In the final step, tighten all bolts, in sequence, to 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft).

NOTE: After assembly, wait at least 30 minutes before filling the engine with oil.



11. After installation, check that all tubes, hoses and connectors are installed correctly.
12. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Cylinder Head/Valve Train F18B2, F18B3, F20B6 engines



Special Tools	6-B-2	Cylinder Head Bolt	
Variable Valve Timing and Valve Lift		Inspection	6-B-30
Electronic Control (VTEC) Control System		Rocker Arm Assembly	
Troubleshooting Flowchart	6-B-3	Removal	6-B-30
VTEC Solenoid Valve		Rocker Arms	
Inspection	6-B-8	Disassembly/Reassembly	6-B-31
VTEC Rocker Arms		Inspection	6-B-32
Manual Inspection	6-B-9	Rocker Arms and Shafts	
Inspection Using Special Tools	6-B-9	Clearance Inspection	6-B-33
Valve Clearance		Camshaft	
Adjustment	6-B-12	Inspection	6-B-34
Crankshaft Pulley and Pulley Bolt		Valves, Valve Springs and Valve Seals	
Replacement	6-B-14	Removal	6-B-36
Timing Belt and Balancer Belt		Installation	6-B-41
Illustrated Index	6-B-15	Valve Seats	
Timing Belt Inspection	6-B-16	Reconditioning	6-B-37
Balancer Belt Inspection	6-B-16	Valve Guides	
Tension Adjustment	6-B-17	Valve Movement	6-B-39
Removal	6-B-18	Replacement	6-B-40
Installation	6-B-20	Reaming	6-B-40
CKP/TDC Sensors		Camshaft/Rocker Arms and	
Replacement	6-B-23	Camshaft Seal/Pulley	
Cylinder Head		Installation	6-B-42
Illustrated Index	6-B-24		
Removal	6-B-26		
Warpage	6-B-39		
Installation	6-B-43		

Special Tools

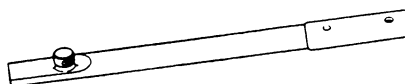
Ref. No.	Tool Number	Description	Qty	Remark
①	07HAH – PJ70100	Valve Guide Reamer, 5.525 mm	1	
②	07JAA – 0010200	Socket Wrench, 19 mm	1	
③	07JAB – 0010200	Handle	1	
④	07LAG – PT20100	Balancer Shaft Lock Pin	1	
⑤	07LAJ – PR30101	Valve Inspection Set	1	
⑥	07LAJ – PR30201	Air Stopper	1	
⑦	07MAB – PY30100	Pulley Holder Attachment, HEX 50 mm	1	
⑧	07NAJ – P070100	Oil Pressure Gauge Attachment	1	
⑨	07PAD – 0010000	Stem Seal Driver	1	
⑩	07406 – 0070001	Low Pressure Gauge	1	
⑪	07742 – 0010100	Valve Guide Driver, 5.5 mm	1	
⑫	07757 – 0010000	Valve Spring Compressor	1	



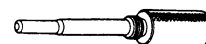
①



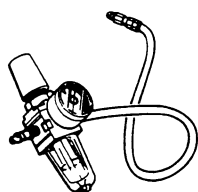
②



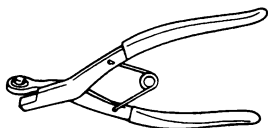
③



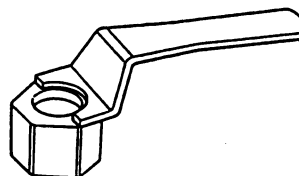
④



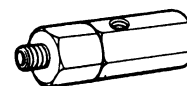
⑤



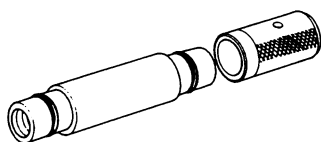
⑥



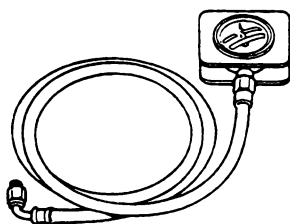
⑦



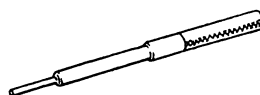
⑧



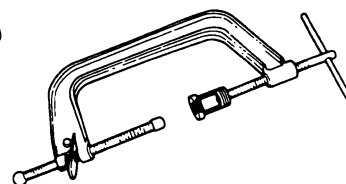
⑨



⑩



⑪

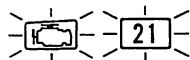


⑫

Variable Valve Timing and Valve Lift Electronic Control (VTEC) Control System



Troubleshooting Flowchart (F18B2, F18B3 engines)



Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 21: A problem in the VTEC Solenoid Valve circuit.

Refer to page 11-A-15 through 11-A-20 before troubleshooting.

- The MIL has been reported on.
- With the SCS short connector connected, code 21 is indicated.

Check the VTEC Control System:

1. Do the engine control module (ECM)/powertrain control module (PCM) Reset Procedure (see section 11).
2. Start the engine.
3. Warm up engine to normal operating temperature (cooling fan comes on).
4. Do the Road Test.*

* Road Test:

Accelerate in 1st gear to an engine speed over 6,000 rpm (min⁻¹). Hold that engine speed for at least two seconds. If the MIL not come on during the first road test, repeat this test two more times.

Is MIL on and does it indicate code 21?

NO

Intermittent failure, system is OK at this time.
Check for poor connections or loose wires at VTEC solenoid valve and ECM/PCM.

YES

Test the VTEC Solenoid Valve:

1. Turn the ignition switch OFF.
2. Disconnect the VTEC solenoid valve connector.
3. Check for continuity between VTEC solenoid valve 1P connector terminal No. 1 and body ground.

Is there 14 – 30 Ω?

NO

Replace the VTEC solenoid valve.

YES

Test the VTEC Solenoid Valve Wire:

Check for continuity between VTEC solenoid valve 1P connector terminal No. 1 and the ECM/PCM connector terminal B12.

Is there continuity?

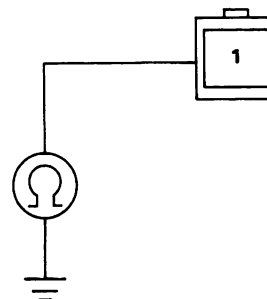
NO

Repair open in the wire between the ECM/PCM (B12) and VTEC solenoid valve connector.

YES

(To page 6-B-4)

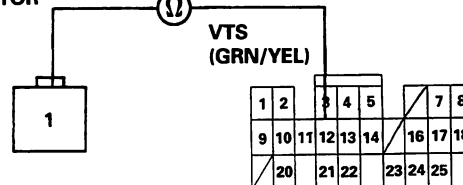
VTEC SOLENOID VALVE 1P CONNECTOR



Terminal side of male terminal

VTEC SOLENOID VALVE HARNESS CONNECTOR

ECM/PCM CONNECTOR B (25P)



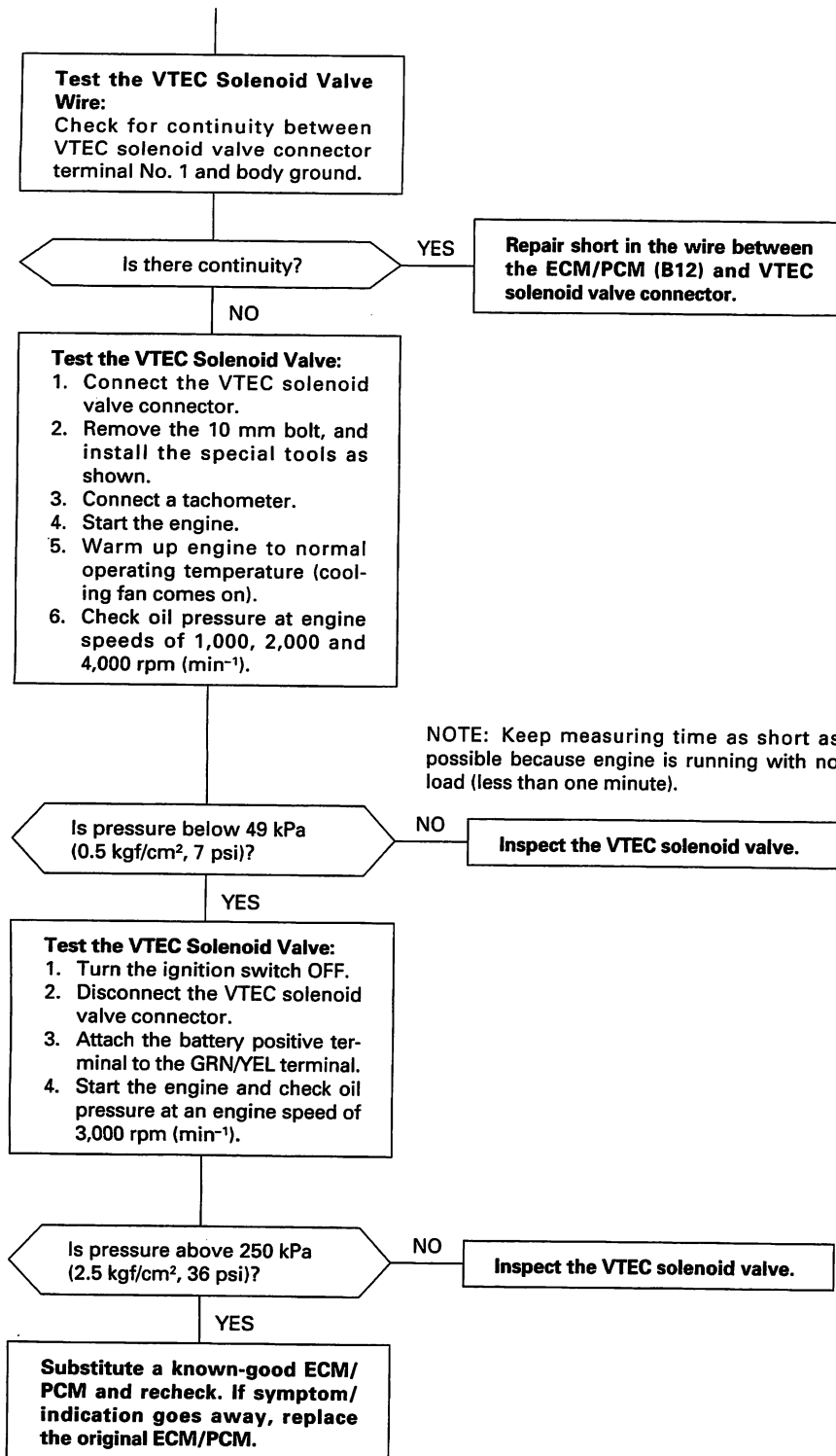
Wire side of female terminals

(cont'd)

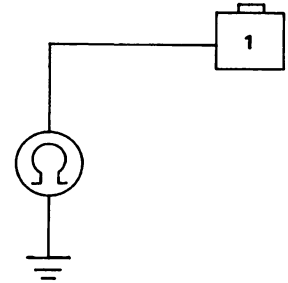
VTEC Control System

Troubleshooting Flowchart (F18B2, F18B3 engines) (cont'd)

(From page 6-B-3)

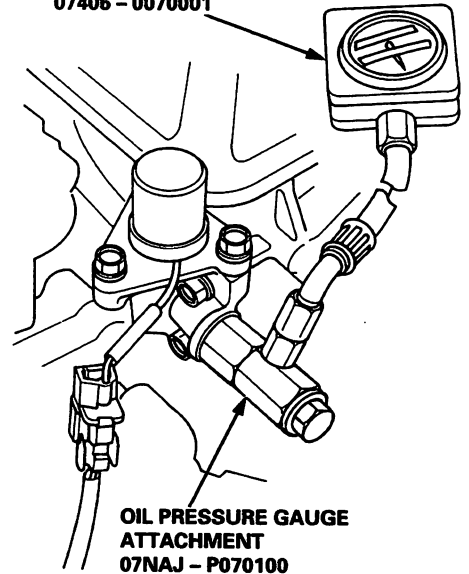


VTEC SOLENOID VALVE CONNECTOR



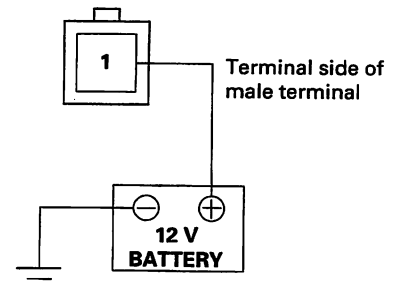
Wire side of female terminal

LOW PRESSURE GAUGE
07406 - 0070001



OIL PRESSURE GAUGE
ATTACHMENT
07NAJ - P070100

VTEC SOLENOID VALVE
1P CONNECTOR

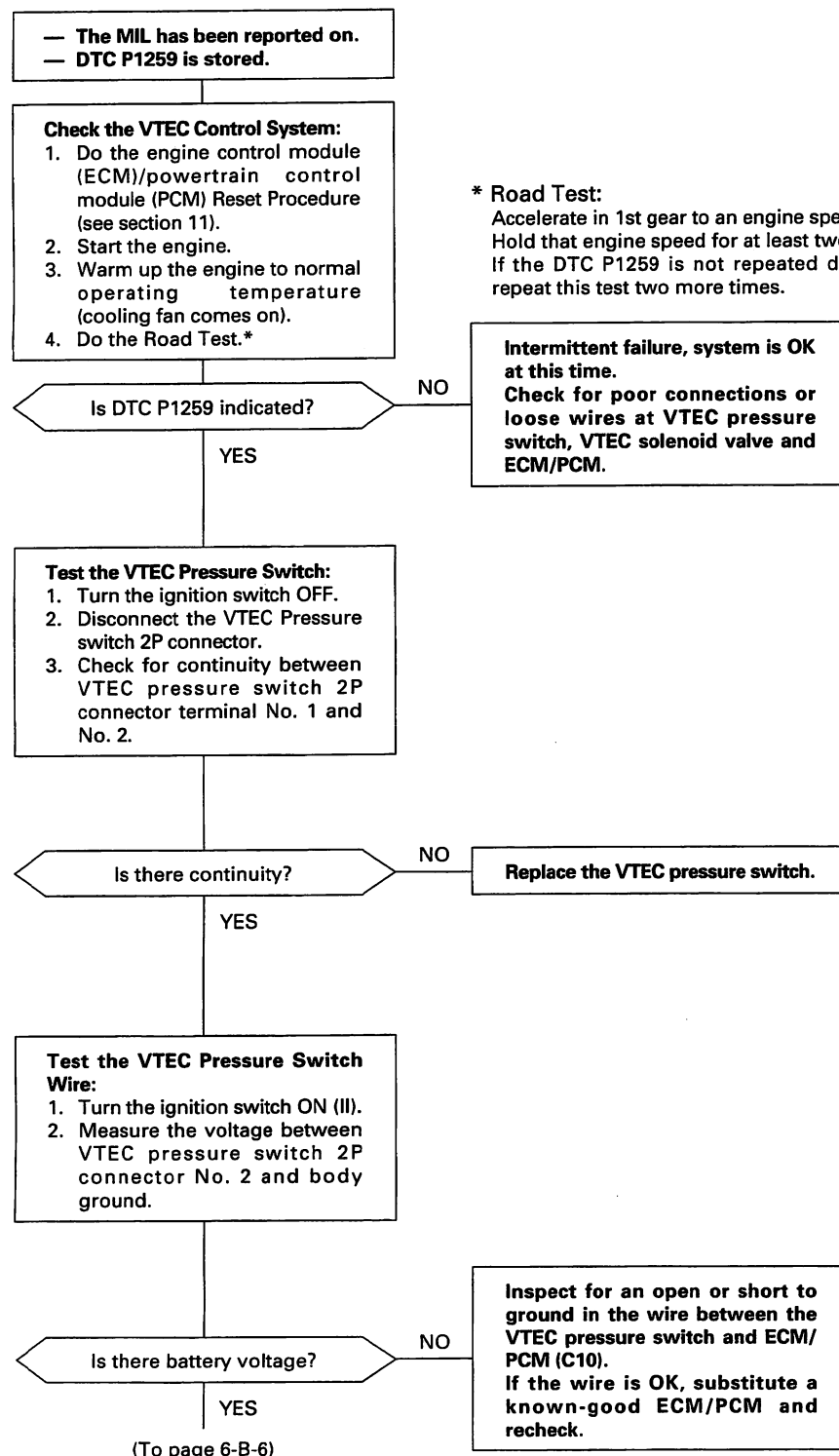




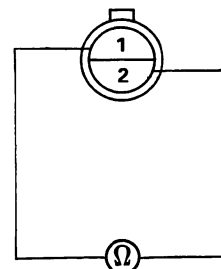
Troubleshooting Flowchart (F20B6 engine)

P1259 The scan tool indicates Diagnostic Trouble Code (DTC) P1259: A problem in the VTEC Pressure Switch circuit or VTEC Solenoid Valve circuit.

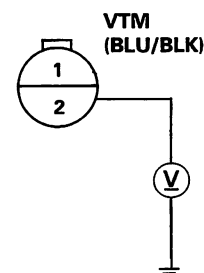
Refer to page 11-A-15 through 11-A-20 before troubleshooting.



VTEC PRESSURE SWITCH 2P CONNECTOR



Terminal side of male terminals



Wire side of female terminals

(cont'd)

VTEC Control System

Troubleshooting Flowchart (F20B6 engine) (cont'd)

(From page 6-B-5)

Test the VTEC Pressure Switch Wire:
Measure voltage across the VTEC pressure switch 2P connector.

Is there battery voltage?

NO

- Repair open in the wire between VTEC pressure switch and G101.
- If the wire is OK, substitute a known-good ECM/PCM and recheck.

YES

Test the VTEC Solenoid Valve:
1. Turn the ignition switch OFF.
2. Disconnect the VTEC solenoid valve 1P connector.
3. Check for continuity between the VTEC solenoid valve 1P connector terminal No. 1 and body ground.

Is there 14 – 30 Ω ?

NO

Replace VTEC solenoid valve.

YES

Test the VTEC Solenoid Valve:
1. Remove the VTEC pressure switch and install the special tool as shown, then reinstall the VTEC pressure switch.
2. Reconnect the VTEC solenoid valve 1P connector and VTEC pressure switch 2P connector.
3. Connect the tachometer (see section 11).
4. Start the engine
5. Warm up engine to normal operating temperature (cooling fan comes on).
6. Check oil pressure at engine speed of 1,000, 2,000 and 4,000 rpm (min^{-1}).

Is pressure below 49 kPa (0.5 kgf/cm^2 , 7 psi)?

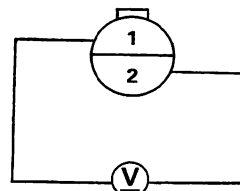
NO

Inspect the VTEC solenoid valve (see page 6-B-8).

YES

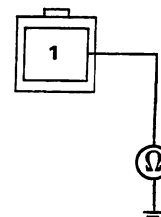
(To page 6-B-7)

VTEC PRESSURE SWITCH 2P CONNECTOR



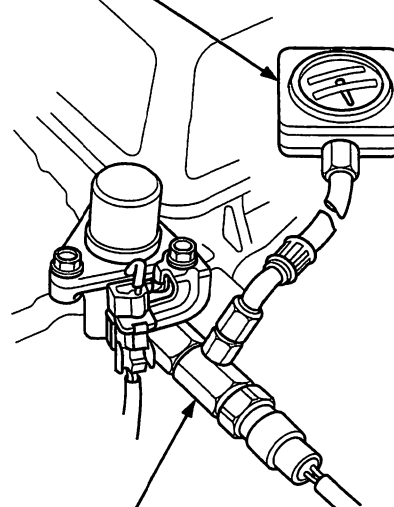
Wire side of female terminals

VTEC SOLENOID VALVE 1P CONNECTOR



Terminal side of male terminal

LOW PRESSURE GAUGE 07406 – 0070001



OIL PRESSURE GAUGE ATTACHMENT 07NAJ – P070100

NOTE: Keep measuring time as short as possible because engine is running with no load (less than one minute).



(From page 6-B-6)

Test the VTEC Solenoid Valve:
 1. Turn the ignition switch OFF.
 2. Disconnect the VTEC solenoid valve 1P connector.
 3. Attach the battery positive terminal to the VTEC solenoid valve terminal.
 4. Start the engine and check the oil pressure at engine speed of 3,000 rpm (min⁻¹).

Is the pressure above 250 kPa (2.5 kgf/cm², 36 psi)?

NO

Inspect the VTEC solenoid valve (see page 6-B-8).

YES

Test the VTEC Pressure Switch:
 With the battery positive terminal connected to the VTEC solenoid valve measure voltage between the ECM/PCM connector terminal C10 and body ground.

Is there battery voltage above 4,000 rpm (min⁻¹)?

NO

Replace the VTEC pressure switch.

YES

Test the VTEC Solenoid Valve Wire:

1. Turn the ignition switch OFF.
2. Check for continuity between the VTEC solenoid valve 1P connector terminal and the ECM/PCM connector terminal B12.

Is there continuity?

NO

Repair open in the wire between the ECM/PCM (B12) and VTEC solenoid valve connector.

YES

Test the VTEC Solenoid Valve Wire:

Check for continuity between the VTEC solenoid valve 1P connector terminal No. 1 and body ground.

Is there continuity?

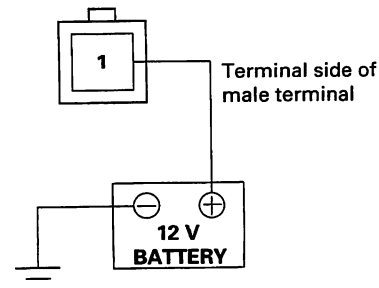
YES

Repair short in the wire between the ECM/PCM (B12) and VTEC solenoid valve connector.

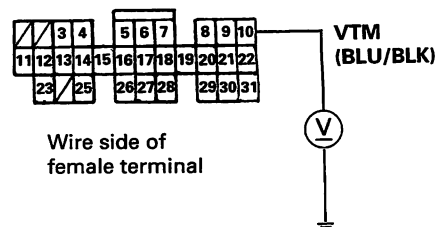
NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

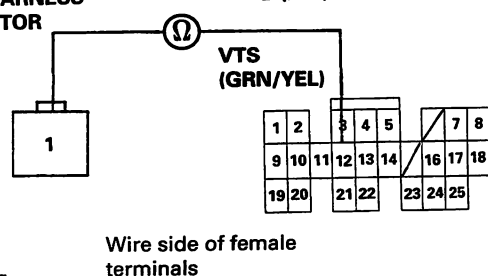
VTEC SOLENOID VALVE 1P CONNECTOR



ECM/PCM CONNECTOR C (31P)

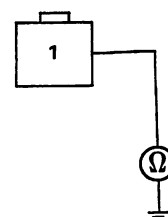


VTEC SOLENOID VALVE HARNESS CONNECTOR



ECM/PCM CONNECTOR B (25P)

VTEC SOLENOID VALVE CONNECTOR

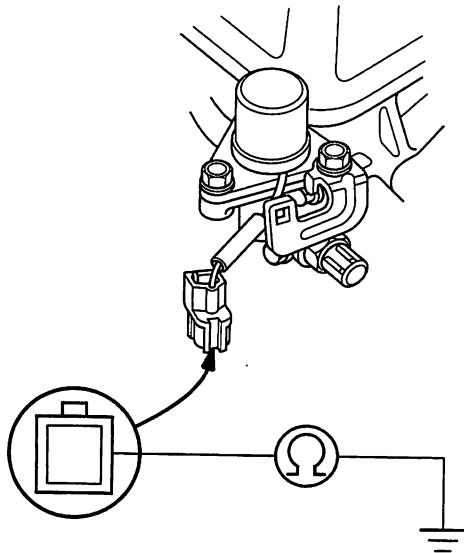


VTEC Solenoid Valve

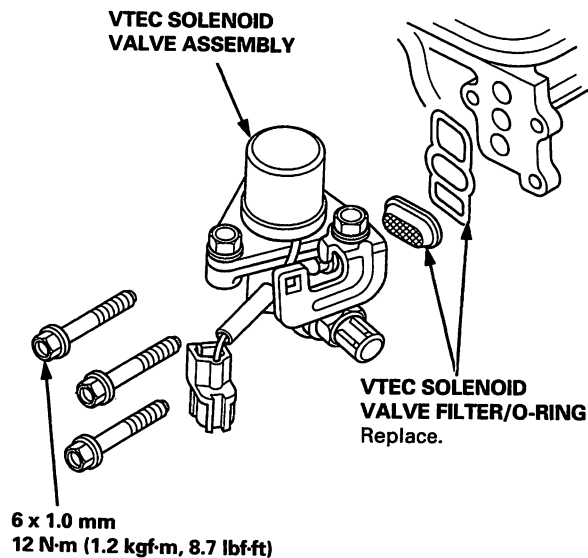
Inspection

1. Disconnect the 1P connector from the VTEC solenoid valve.
2. Measure resistance between the terminal and body ground.

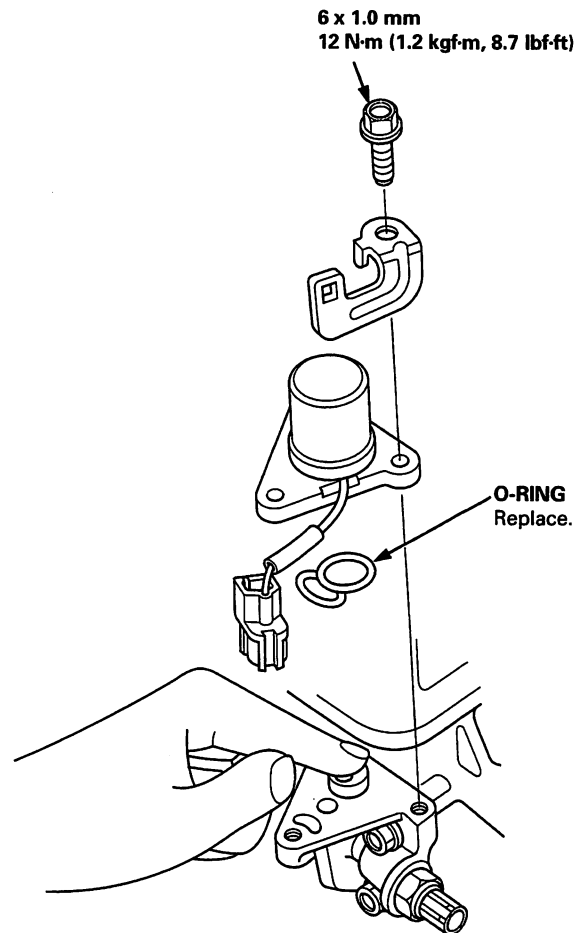
Resistance: 14 – 30 Ω



3. If the resistance is within specifications, remove the VTEC solenoid valve assembly from the cylinder head, and check the VTEC solenoid valve filter/O-ring for clogging. If there is clogging, replace the engine oil filter and the engine oil.



4. If the filter is not clogged, push the VTEC solenoid valve with your finger and check its movement. If the VTEC solenoid valve is normal, check the engine oil pressure.

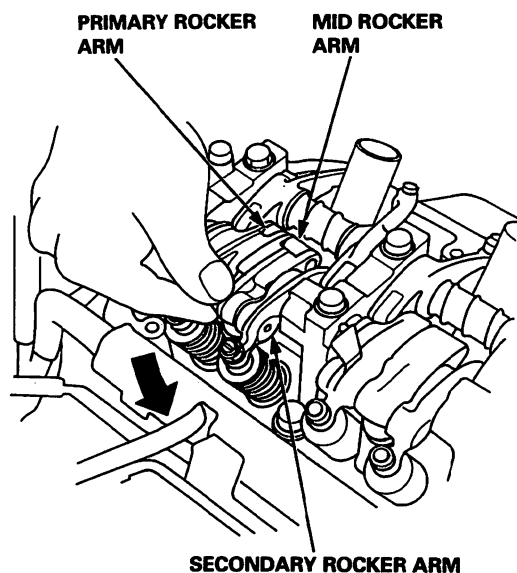




Manual Inspection

1. Set the No. 1 piston at TDC.
2. Remove the cylinder head cover.

NOTE: Refer to pages, 6-B-45, 46 when installing the cylinder head cover.
3. Push the intake mid rocker arm on the No. 1 cylinder manually.
4. Check that the intake mid rocker arm moves independently of the primary and secondary intake rocker arms.



5. Check the intake mid rocker arm of each cylinder at TDC.
 - If the intake mid rocker arm does not move, remove the mid, primary and secondary intake rocker arms as an assembly, and check that the pistons in the mid and primary rocker arms move smoothly.
 - If any rocker arm needs replacing, replace the primary, mid, and secondary rocker arms as an assembly.

Inspection Using Special Tools

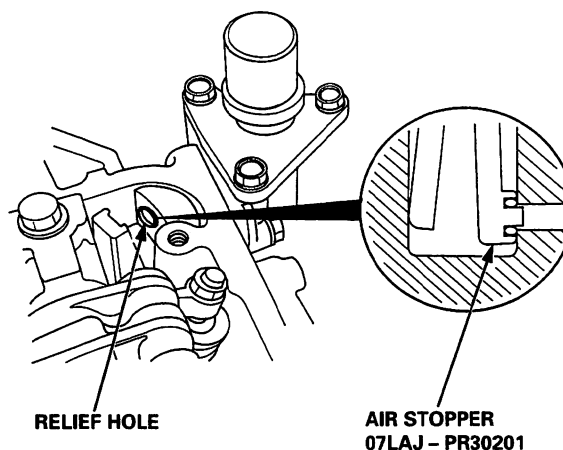
NOTE:

- Before using the Valve Inspection Tool, make sure that the air pressure gauge on the air compressor indicates over 400 kPa (4 kgf/cm², 57 psi).
- Inspect the valve clearance before rocker arm inspection.
- Cover the timing belt with a shop towel to protect the belt.
- Check the intake primary rocker arm of each cylinder at TDC.

1. Remove the cylinder head cover.

NOTE: Refer to pages 6-B-45, 46 when installing the cylinder head cover.

2. Plug the relief hole with the special tool.



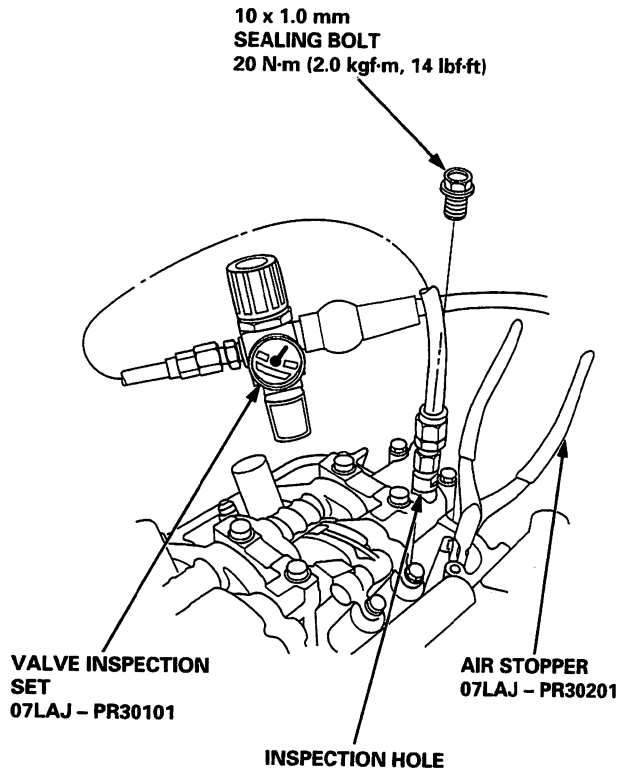
(cont'd)

VTEC Rocker Arms

Inspection Using Special Tools (cont'd)

3. Remove the sealing bolt from the inspection hole, and connect the special tool.

NOTE: Remove any oil from the bolt threads and camshaft holder threads before retightening the sealing bolt.



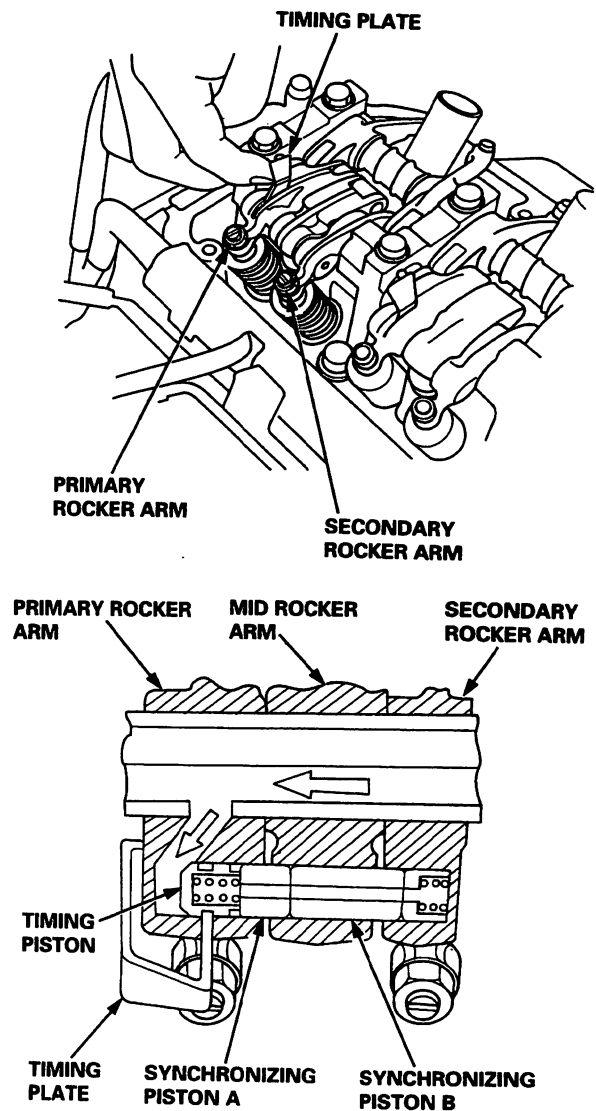
4. Loosen the regulator valve on the valve inspection tool, and apply the specified air pressure to the rocker arm synchronizing pistons A/B.

Specified Air Pressure:
250 kPa (2.5 kgf/cm², 36 psi)

5. With the specified air pressure applied, push up the timing plate 2 - 3 mm (0.08 - 0.12 in) at plate end; the synchronizing piston will pop out and engage the intake mid, primary and secondary rocker arms. Visually check the engagement of the synchronizing pistons A/B.

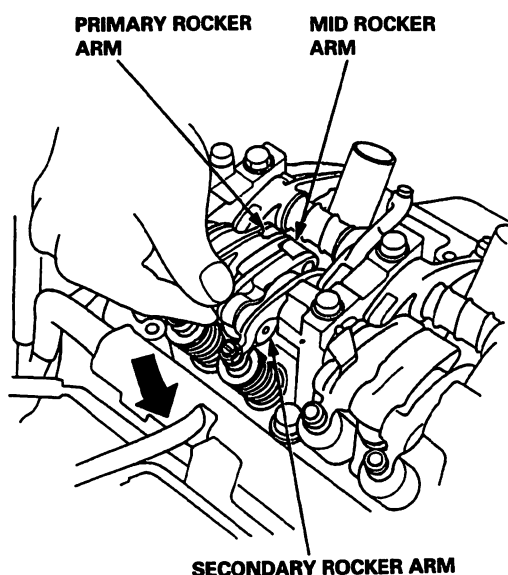
NOTE:

- The synchronizing pistons can be seen in the gap between the mid, secondary and primary rocker arms.
- With the timing plate engaged in the groove on the timing piston, the piston is locked in the pushed out position.
- Do not apply too much force when pushing up the timing plate.





6. Make sure that the intake primary and secondary rocker arms are mechanically connected by the pistons, and that the mid rocker arm does not move when pushed manually.



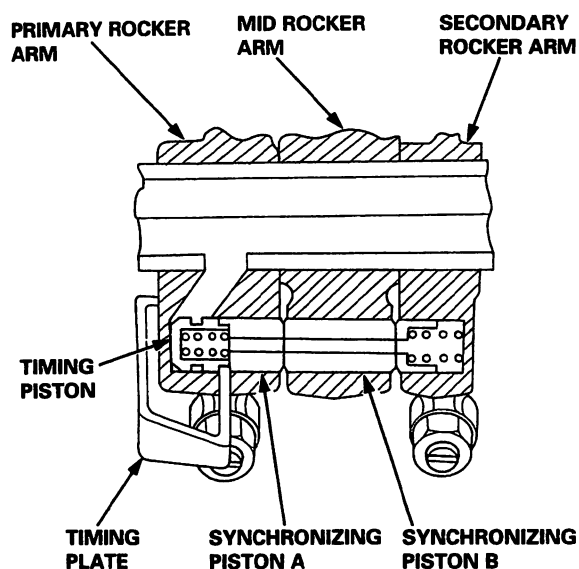
- If any intake mid rocker arm moves independently of the primary and secondary rocker arms, replace the rocker arms as a set.

7. Stop applying air pressure and push up the timing plate; the synchronizing pistons will snap back to their original positions.

Visually check the disengagement of the synchronizing pistons A/B.

NOTE:

- When the timing plate is pushed up, it releases the timing piston, letting the return spring move the synchronizing pistons to their original positions.
- Replace the intake rocker arms as an assembly if either does not work correctly.



8. Remove the special tools.
9. Check for smooth operation of each lost motion assembly. It is compressed slightly when the intake mid rocker arm is lightly pushed and compressed deeply when the mid rocker arm is strongly pushed.
 - Replace the lost motion assembly if it does not move smoothly.
10. After inspection, check that the MIL does not come on.

Valve Clearance

Adjustment

NOTE:

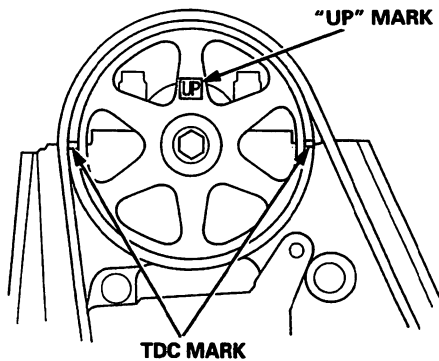
- Valves should be adjusted only when the cylinder head temperature is less than 38°C (100°F).
- After adjusting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).

1. Remove the cylinder head cover.

NOTE: Refer to pages 6-B-45, 46 when installing the cylinder head cover.

2. Set No. 1 piston at TDC. "UP" mark on the camshaft pulley should be at top, and TDC grooves on the camshaft pulley should align with the cylinder head surface.

Number 1 Piston at TDC:

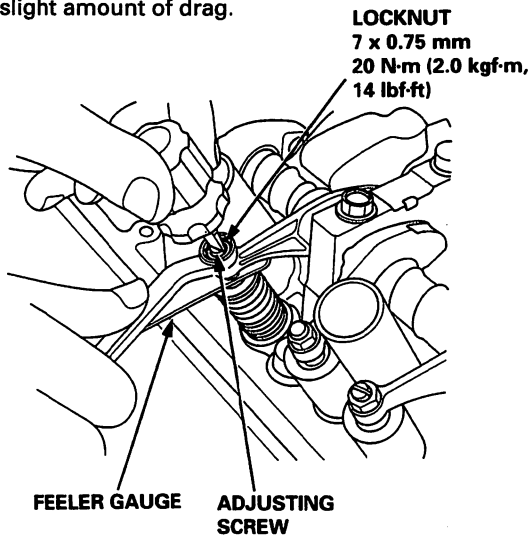


3. Adjust valves on No. 1 cylinder.

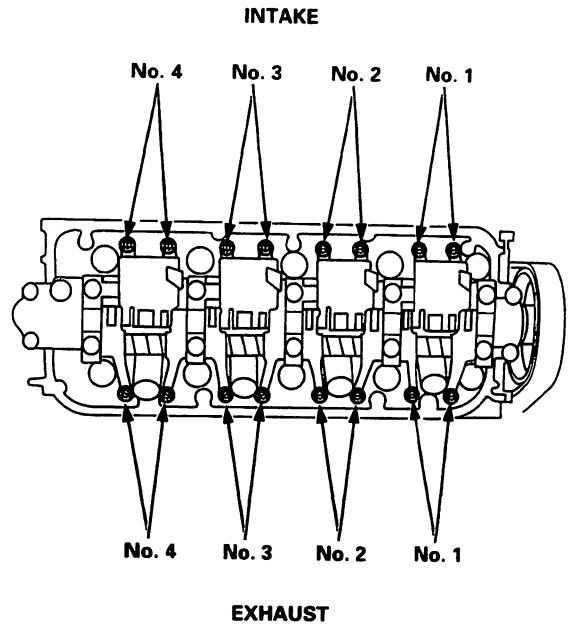
Intake: 0.26 mm (0.010 in) \pm 0.02 mm (0.0008 in)

Exhaust: 0.30 mm (0.012 in) \pm 0.02 mm (0.0008 in)

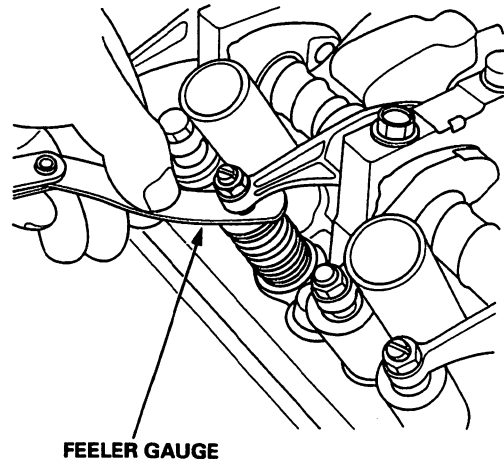
4. Loosen the locknut, and turn the adjusting screw until the feeler gauge slides back and forth with a slight amount of drag.



Adjusting screw location:



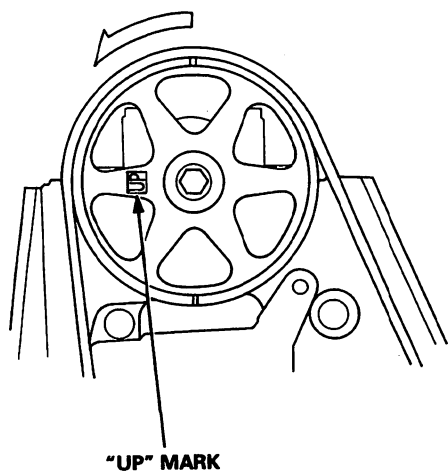
5. Tighten the locknut and check clearance again. Repeat adjustment if necessary.





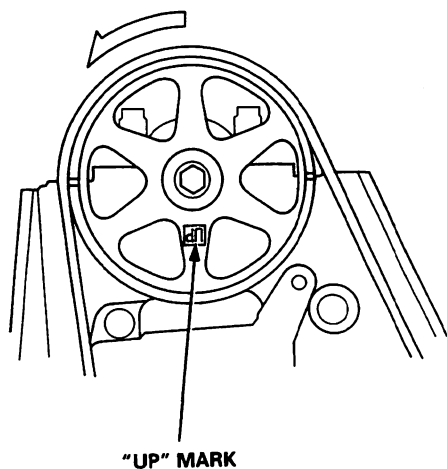
6. Rotate crankshaft 180° counterclockwise (Camshaft pulley turns 90°). The "UP" mark should be on the exhaust side. Adjust valves on No. 3 cylinder.

Number 3 Piston at TDC:



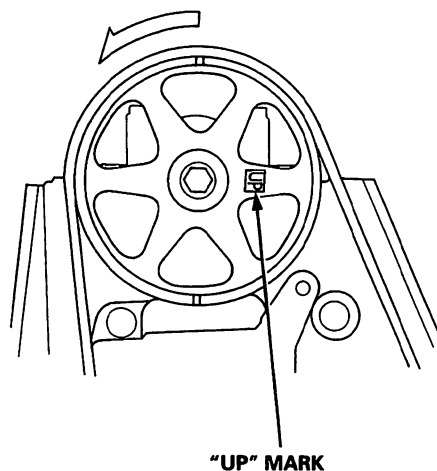
7. Rotate crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both TDC grooves are once again visible. Adjust valves on No. 4 cylinder.

Number 4 Piston at TDC:



8. Rotate crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" mark should be on the intake side. Adjust valves on No. 2 cylinder.

Number 2 Piston at TDC:



Crankshaft Pulley and Pulley Bolt

Replacement

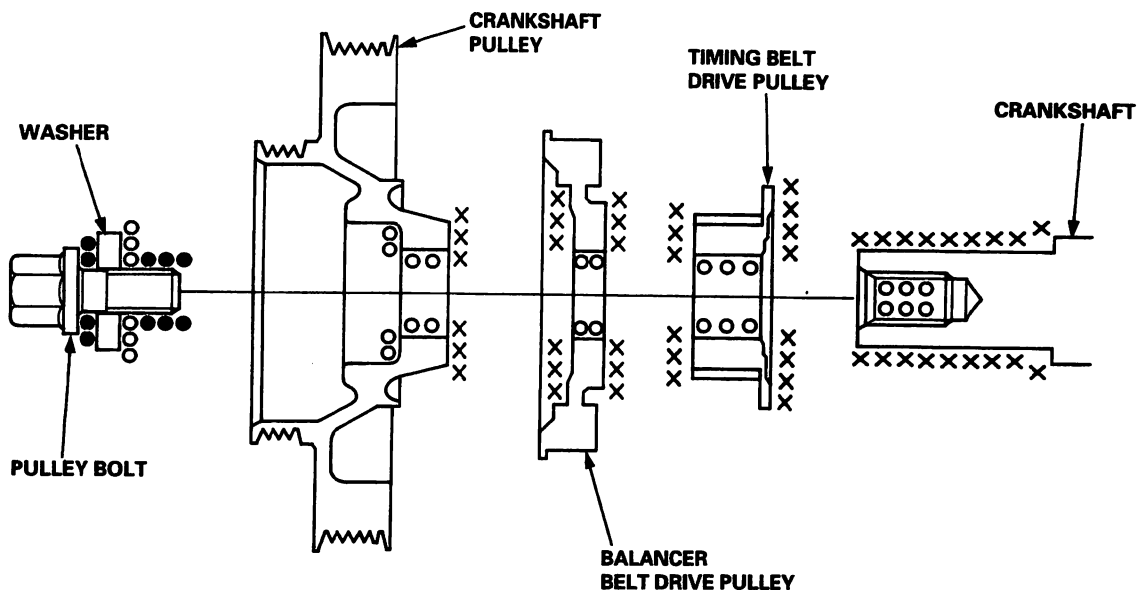
When installing and tightening the pulley, follow the procedure below.

Clean, remove any oil and lubricate points shown below.

○ : Clean

× : Remove any oil

● : Lubricate

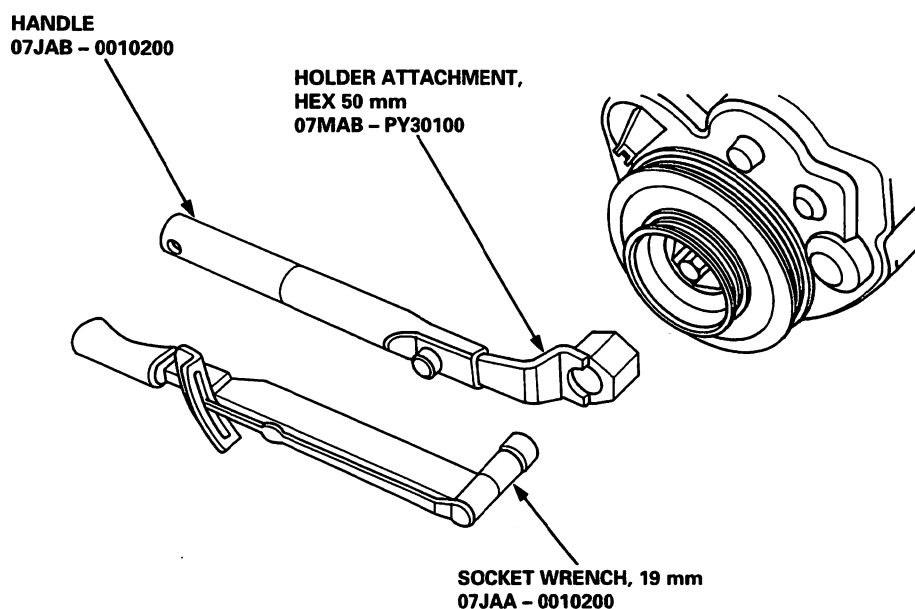


Crankshaft pulley bolt size and torque value:

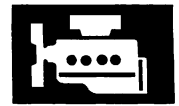
16 x 1.5 mm

245 N·m (25.0 kgf·m, 181 lbf·ft)

NOTE: Do not use an impact wrench when installing.



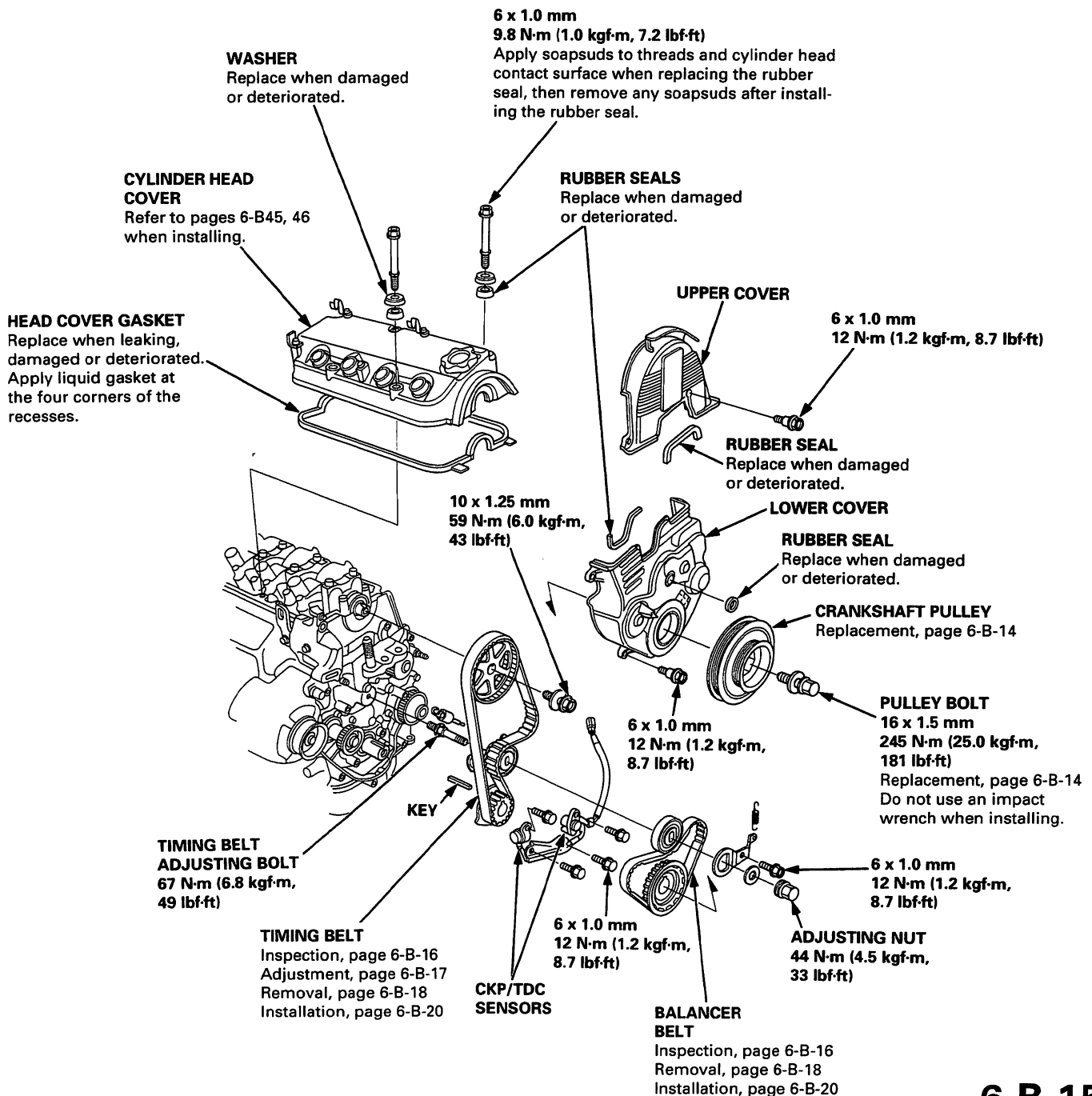
Timing Belt and Balancer Belt



Illustrated Index

NOTE:

- Refer to page 6-B-20 for how to position the crankshaft and pulley before installing the belt.
- Mark the direction of rotation on the belt before removing it.
- Do not use the upper cover and lower cover for storing removed items.
- Clean the upper cover and lower cover before installing them.
- Replace the camshaft seals and crankshaft seals if there is oil leakage.
- Refer to page 6-B-14 before installing the timing belt and balancer belt.
- Inspect the lower cover rubber seal for cracks and other damage before installing the lower cover.
- If the rubber seal is coming off, apply liquid gasket to the lower cover and put the rubber seal back. Wipe off any liquid gasket that is pressed out.
- When replacing rubber seal, clean the lower cover groove, cut the repair rubber seal to length, and put the rubber seal into the groove evenly.



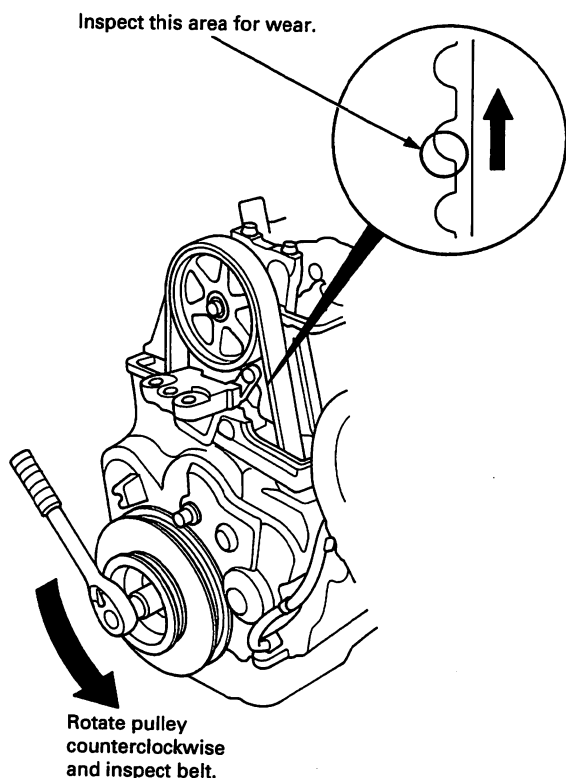
Timing Belt and Balancer Belt

Timing Belt Inspection

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
4. Remove the cylinder head cover.
 - Refer to pages 6-B-45, 46 when installing.
5. Remove the upper cover.
6. Inspect the timing belt for cracks and oil or coolant soaking.

NOTE:

- Replace the belt if it is oil or coolant soaked.
- Remove any oil or solvent that gets on the belt.



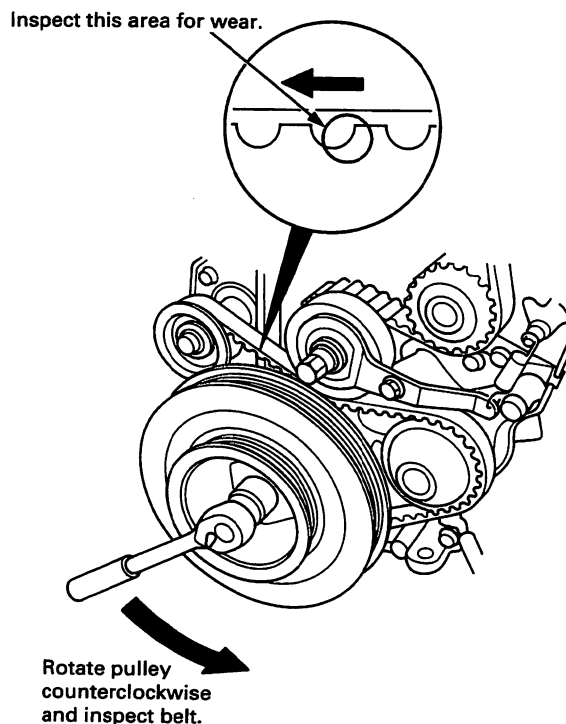
7. After inspecting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).
8. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Balancer Belt Inspection

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
4. Remove the cylinder head cover.
 - Refer to pages 6-B-45, 46 when installing.
5. Remove the upper cover.
6. Remove the crankshaft pulley.
7. Remove the lower cover.
8. Install the crankshaft pulley.
9. Inspect the balancer belt for cracks and oil or coolant soaking.

NOTE:

- Replace the belt if it is oil or coolant soaked.
- Remove any oil or solvent that gets on the belt.



10. After inspecting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).
11. Enter the anti-theft code for the radio, then enter the customer's radio station presets.



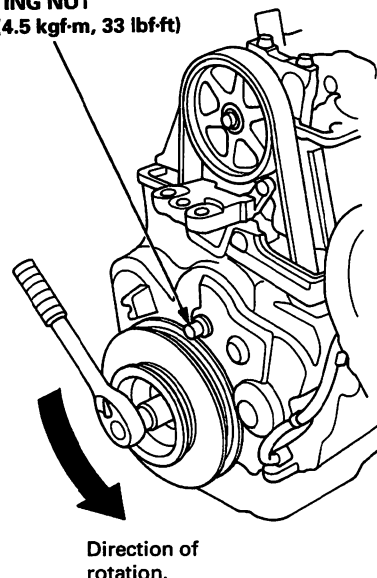
Tension Adjustment

NOTE:

- Always adjust timing belt tension with the engine cold.
 - The tensioner is spring-loaded to apply proper tension to the belts automatically after making the following adjustment.
 - Always rotate the crankshaft counterclockwise when viewed from the pulley side. Rotating it clockwise may result in improper adjustment of the belt tension.
 - Inspect the balancer belt before adjusting the belt tension.
 - Do not loosen the adjusting nut more than one full turn.
1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
 2. Disconnect the battery negative terminal first, then the positive terminal.
 3. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
 4. Remove the cylinder head cover. (Refer to pages 6-B-45, 46 when installing.)
 5. Rotate the crankshaft five or six revolutions to set the belt.
 6. Set the No. 1 piston at TDC.

7. Loosen the adjusting nut $2/3 - 1$ turn.

ADJUSTING NUT
44 N·m (4.5 kgf·m, 33 lbf·ft)



8. Rotate the crankshaft counterclockwise three teeth on the camshaft pulley.
9. Tighten the adjusting nut.
10. After adjusting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).
11. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Timing Belt and Balancer Belt

Removal

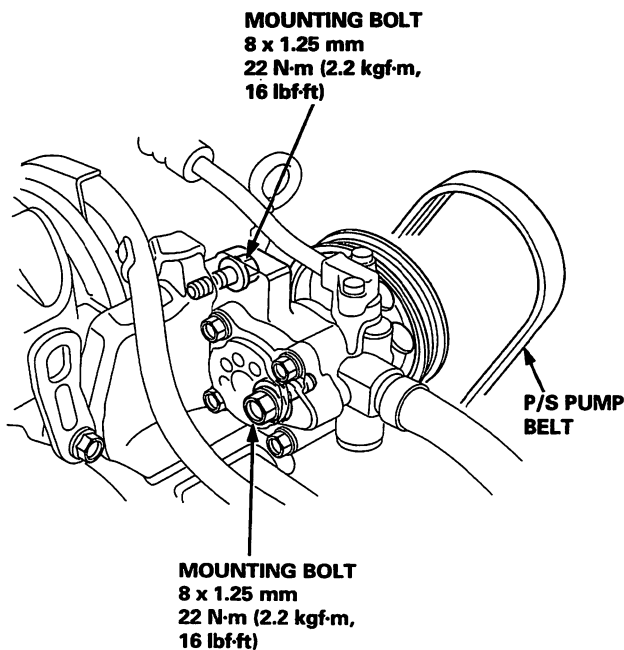
NOTE:

- Turn the crankshaft pulley so the No. 1 piston is at top dead center (TDC) before removing the belt (see page 6-B-21).
- Inspect the water pump (see page 10-17).

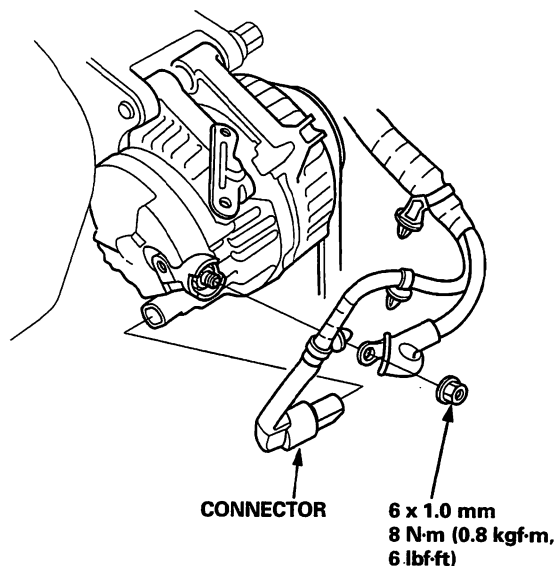
1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal.
3. Remove the splash shield (see page 5-10).
4. Remove the stop and ground cable, then remove the upper bracket (see page 6-B-28).

NOTE:

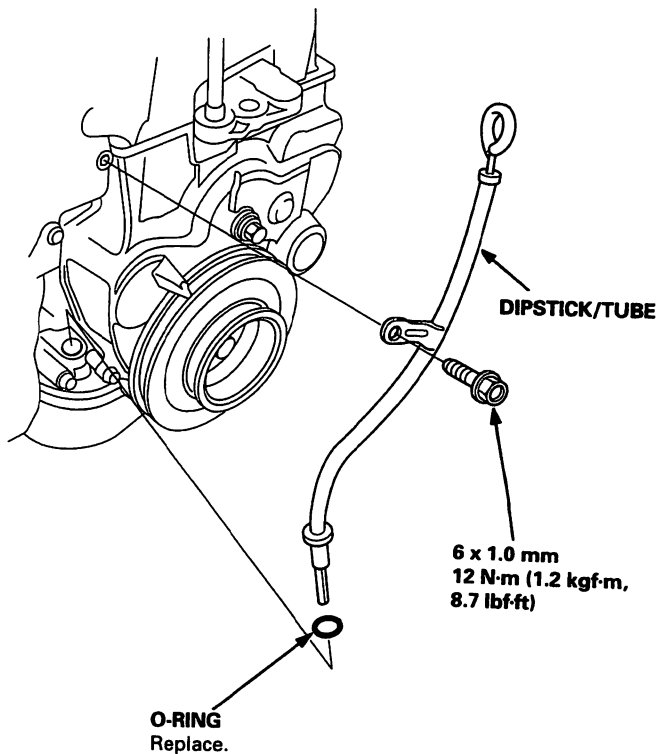
- Use a jack to support the engine before the upper bracket is removed.
 - Make sure to place a cushion between the oil pan and the jack.
5. Loosen the mounting bolts, then remove the power steering (P/S) pump belt.



6. Remove the alternator terminal and connector.



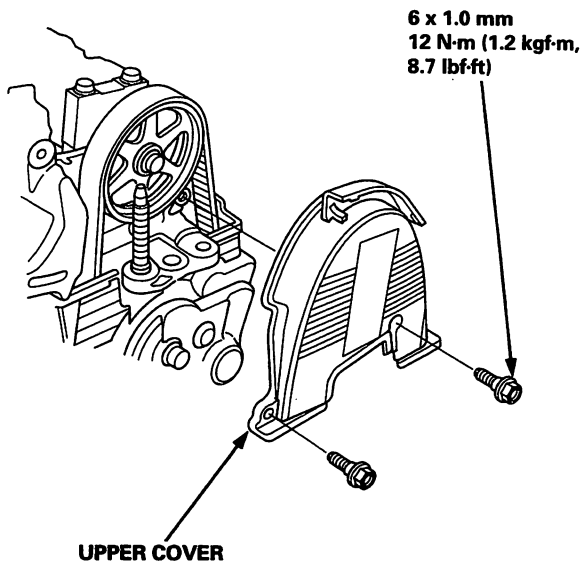
7. Remove the alternator (see section 4).
8. Remove the alternator bracket (see page 5-16).
9. Remove the dipstick and the tube.





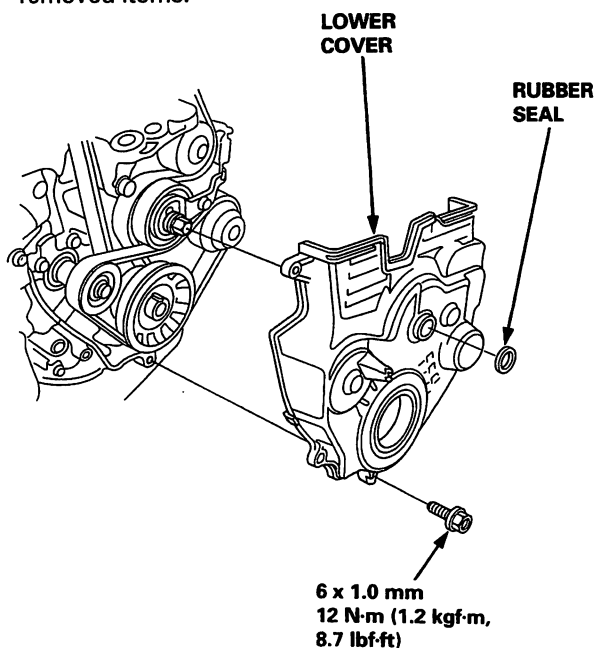
10. Remove the cylinder head cover.
 - Refer to pages 6-B-45, 46 when installing.
11. Remove the pulley bolt and crankshaft pulley (see page 6-B-14).
12. Remove the upper cover.

NOTE: Do not use the upper cover for storing removed items.

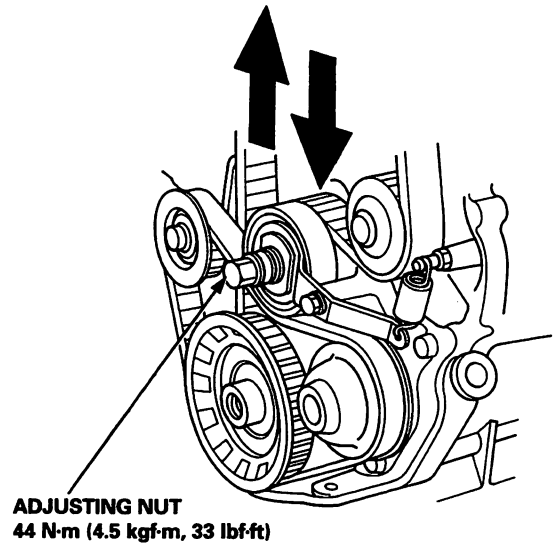


13. Remove rubber seal from the adjusting nut, then remove the lower cover.

NOTE: Do not use the lower cover for storing removed items.

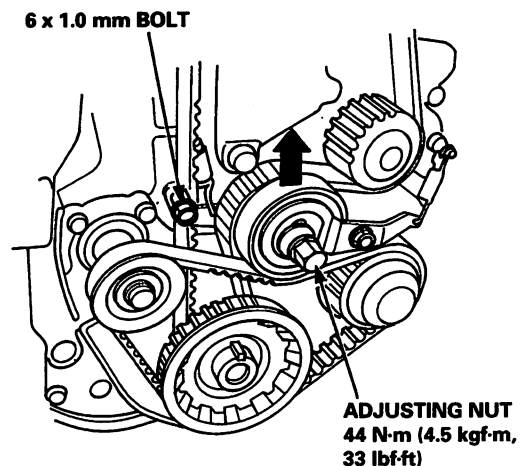


14. Loosen the adjusting nut 2/3 – 1 turn. Push the tensioner to remove tension from the timing belt and balancer belt, then retighten the adjusting nut.



NOTE: When removing the balancer belt only:

- Lock the timing belt adjuster arm in place by installing one of the 6 x 1.0 mm bolts.
- Loosen the adjusting nut 2/3 – 1 turn. Push the tensioner to remove tension from the balancer belt, then retighten the adjusting nut.



15. Remove the balancer belt and timing belt.

Timing Belt and Balancer Belt

Installation

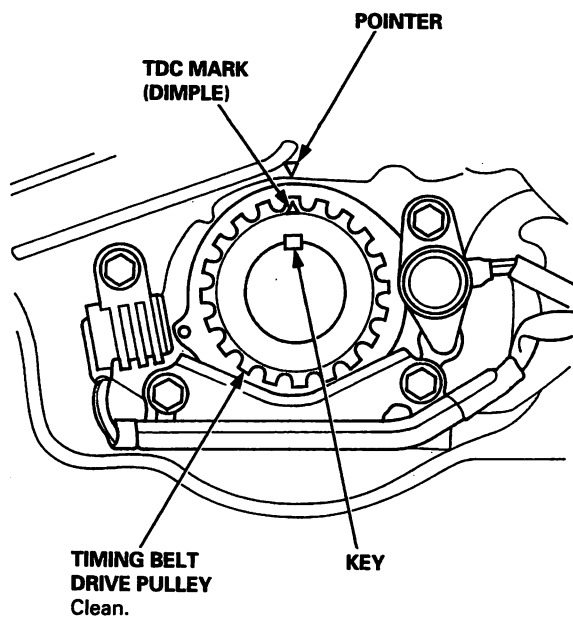
Install the timing belt and balancer belt in the reverse order of removal.

Only key points are described here.

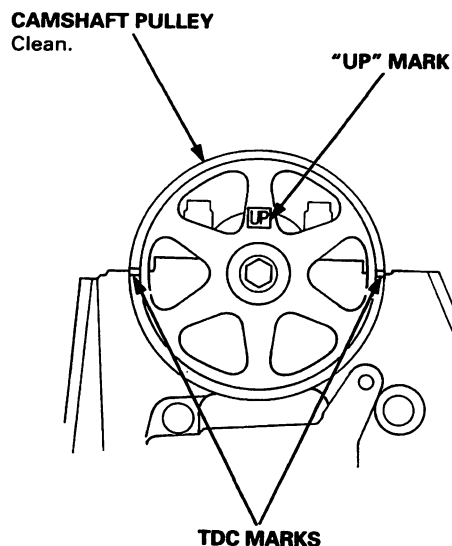
- When installing only the balancer belt, go to step 13.

NOTE: Clean the upper and lower covers before installation.

1. Remove the balancer belt drive pulley (see page 6-B-15).
2. Set the timing belt drive pulley so that the No. 1 piston is at top dead center (TDC). Align the dimple on the tooth of the timing belt drive pulley with the ∇ pointer on the oil pump.

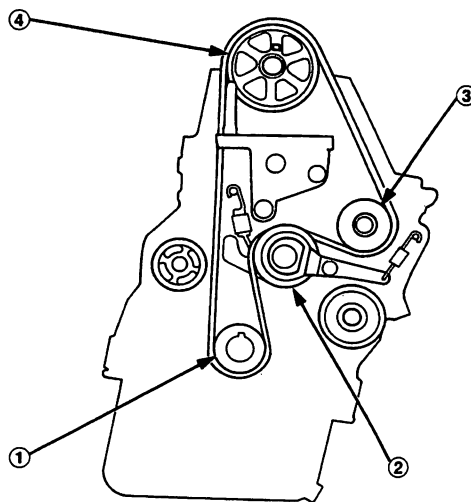


3. Set the camshaft pulley so that the No. 1 piston is at TDC. Align the TDC mark on the camshaft pulley with the back cover upper surface.



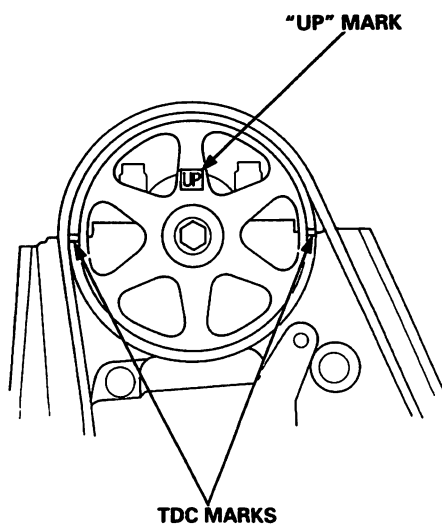
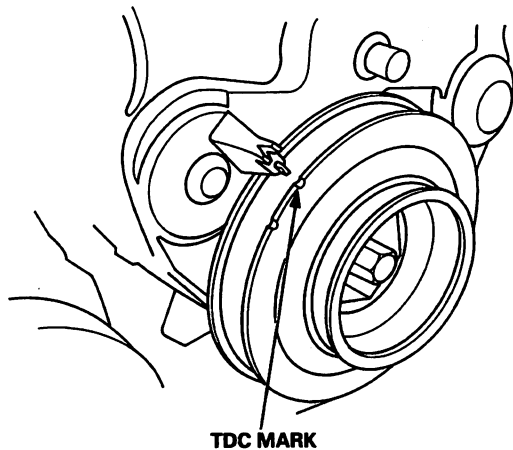
4. Install the timing belt tightly in the sequence shown.
① Timing belt drive pulley (crankshaft) → ② Adjusting pulley → ③ Water pump pulley → ④ Camshaft pulley.

NOTE: Make sure the timing belt drive pulley and camshaft pulley are at TDC.

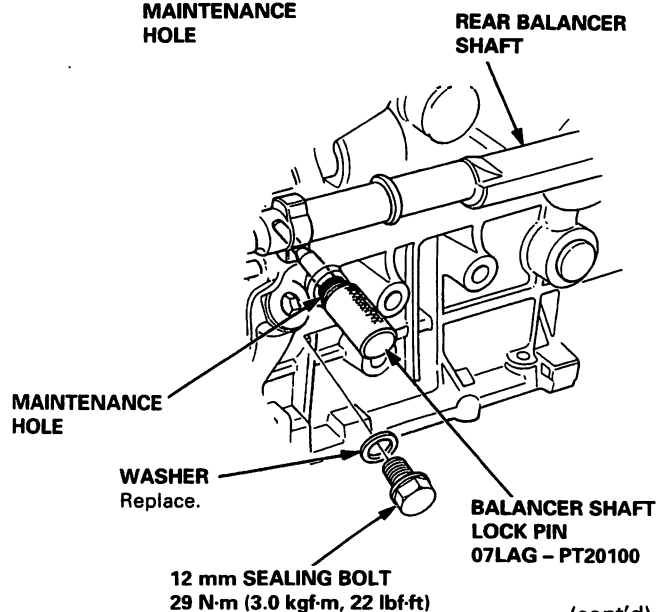
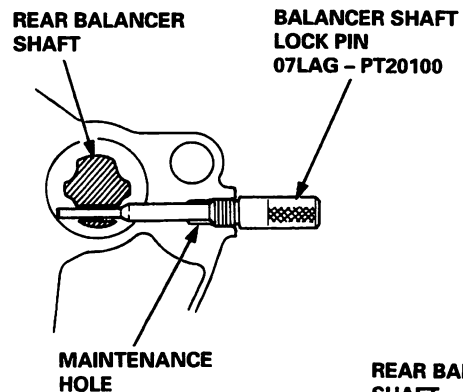




5. Loosen and retighten the adjusting nut to tension the timing belt.
6. Install the balancer belt drive pulley and lower cover.
7. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-B-14).
8. Rotate the crankshaft pulley about five or six turns counterclockwise so that the timing belt positions on the pulleys.
9. Adjust the timing belt tension (see page 6-B-17).
10. Make sure the crankshaft pulley and camshaft pulley are at TDC.



11. If the camshaft or crankshaft pulley is not positioned at TDC, remove the timing belt and adjust the positioning following the procedure on page 6-B-20, then reinstall the timing belt.
12. Remove the crankshaft pulley and lower cover.
13. Set the timing belt drive pulley so that the No. 1 piston at TDC.
14. Lock the timing belt adjuster arm in place by installing one of the 6 x 1.0 mm bolts.
15. Loosen the adjusting nut 2/3 – 1 turn, and verify that the balancer belt adjuster moves freely.
16. Push the tensioner to remove tension from the balancer belt, then retighten the adjusting nut.
17. Align the rear balancer shaft pulley by using a special tool. Insert the special tool into the maintenance hole to fix the rear balancer shaft.

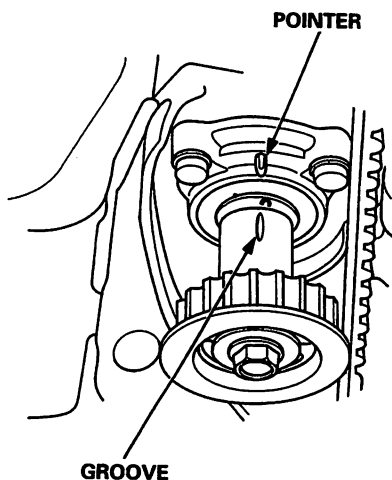
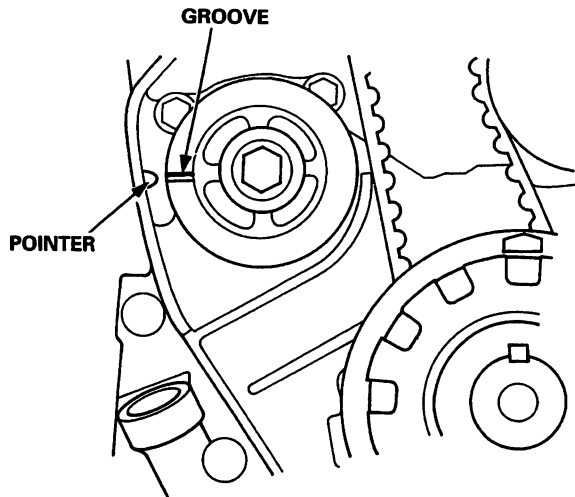


(cont'd)

Timing Belt and Balancer Belt

Installation (cont'd)

18. Align the groove on the front balancer shaft pulley with the pointer on the oil pump housing as shown.



19. Install the balancer belt. Loosen the adjusting nut $2/3 - 1$ turn to tension the balancer belt.
20. Remove the special tool from the rear balancer shaft, then install the 12 mm sealing bolt.
21. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-B-14).
22. Turn the crankshaft pulley about one turn counter-clockwise, then tighten the adjusting nut.
23. Remove the 6 x 1.0 mm bolt from the timing belt adjuster arm.

24. Check the lower cover rubber seal for cracks and other damage.

NOTE:

- If the rubber seal is coming off, apply liquid gasket to the lower cover and put the rubber seal back. Wipe off any liquid gasket that is pressed out.
- When replacing rubber seal, clean the lower cover groove, cut the repair rubber seal to length, and put the rubber seal into the groove evenly.

25. Remove the crankshaft pulley, then install the lower cover.

26. Install the rubber seal around the adjusting nut.

NOTE: Do not loosen the adjusting nut.

27. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-B-14).

28. After installation, adjust the tension of each belt.

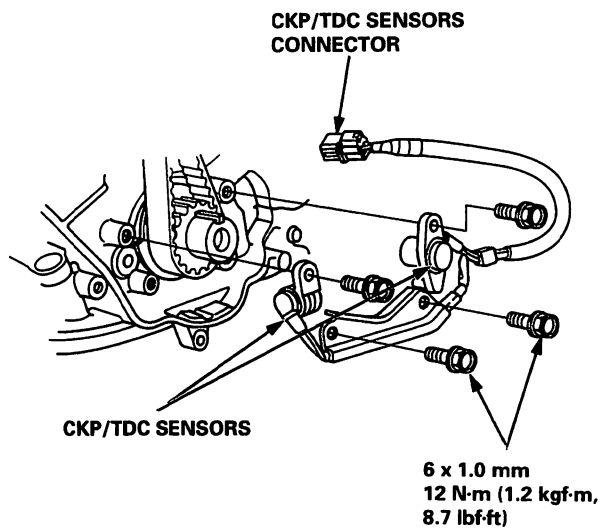
- See section 4 for alternator belt tension adjustment.
- See section 22 for air conditioning (A/C) compressor belt tension adjustment.
- See section 17 for P/S pump belt tension adjustment.

29. Enter the anti-theft code for the radio, then enter the customer's radio station presets.



Replacement

1. Removal the balancer belt (see page 6-B-18).
2. Remove the balancer belt drive pulley.
3. Disconnect the CKP/TDC sensors connector, then remove the CKP/TDC sensors.



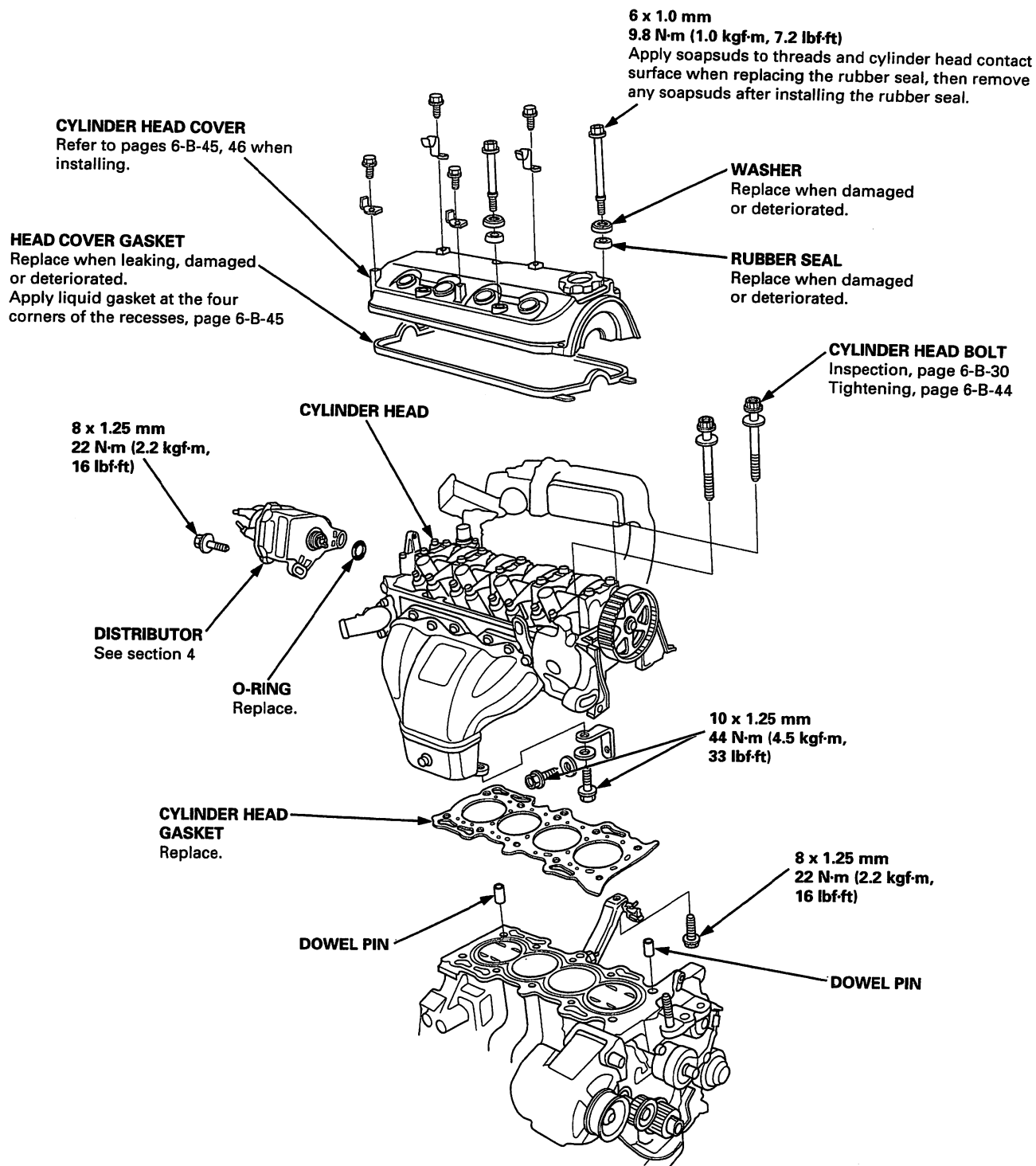
4. Install the CKP/TDC sensors in reverse order of removal.
5. Install the balancer belt (see page 6-B-20).

Cylinder Head

Illustrated Index

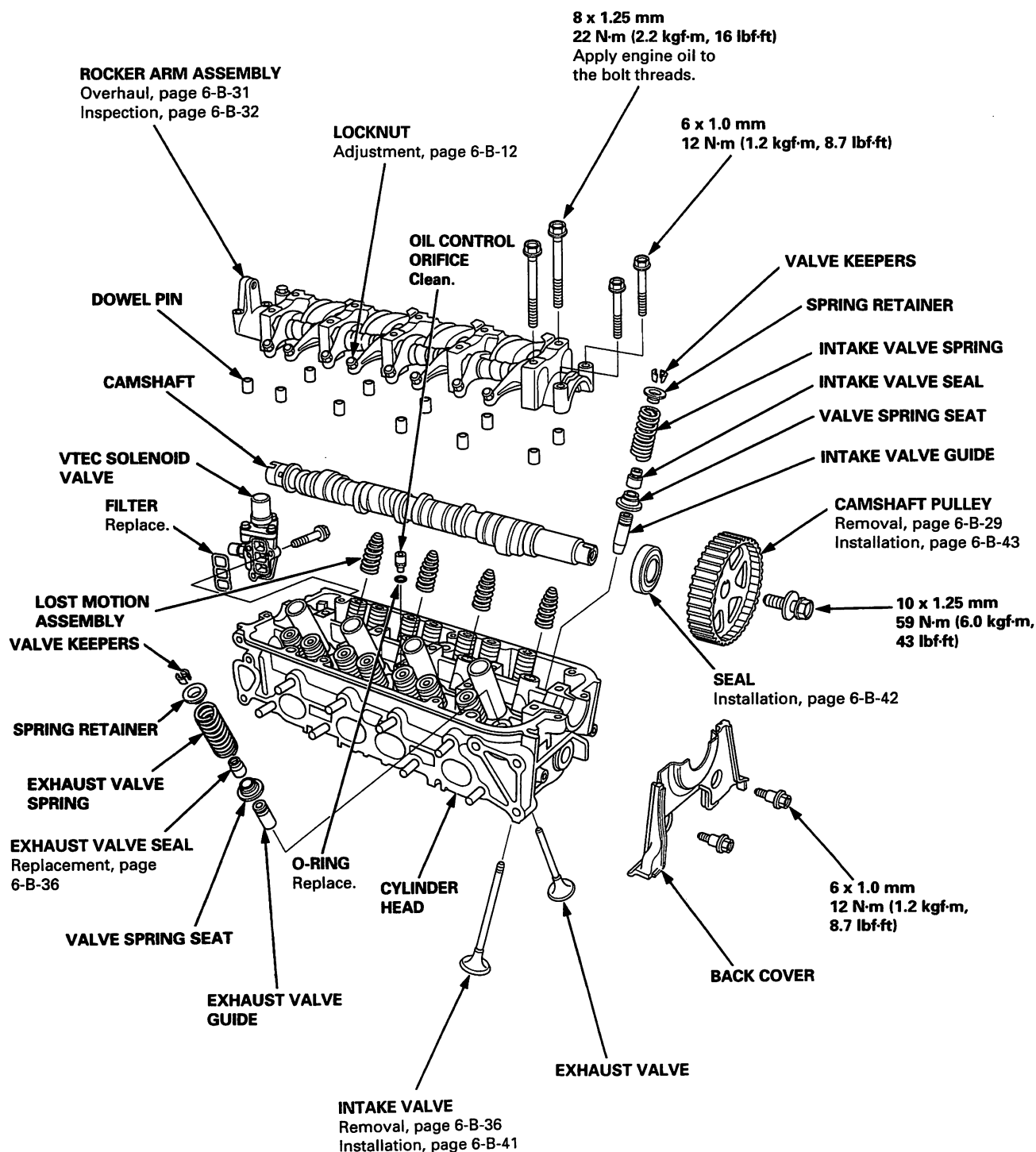
NOTE:

- To avoid damage, wait until the engine coolant temperature drops below 38°C (100°F) before removing the cylinder head.
- When handling a metal gasket, take care not to fold it or damage the contact surface.
- Use new O-rings and gaskets when reassembling.





Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact parts.



Cylinder Head

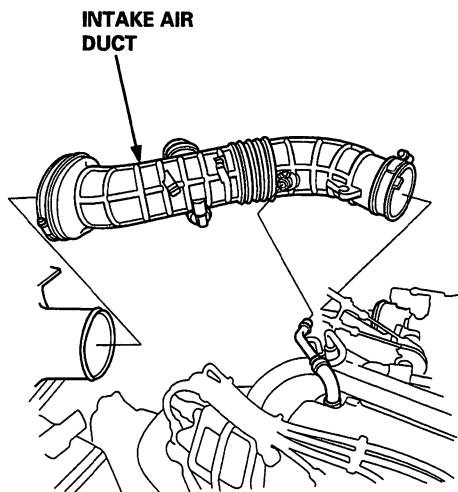
Removal

Engine Removal is not required this procedure.

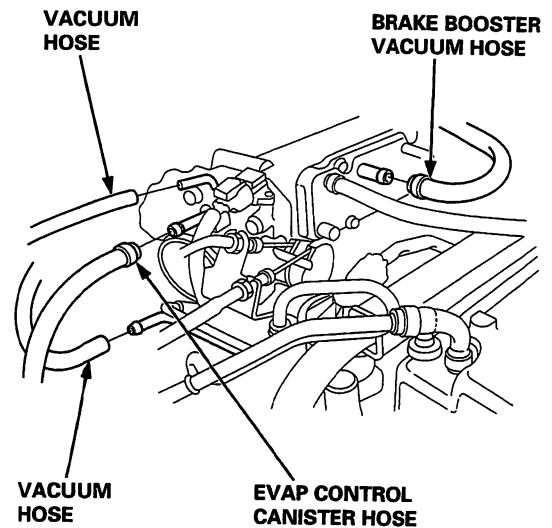
NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 38°C (100°F) before loosening the retaining bolts.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

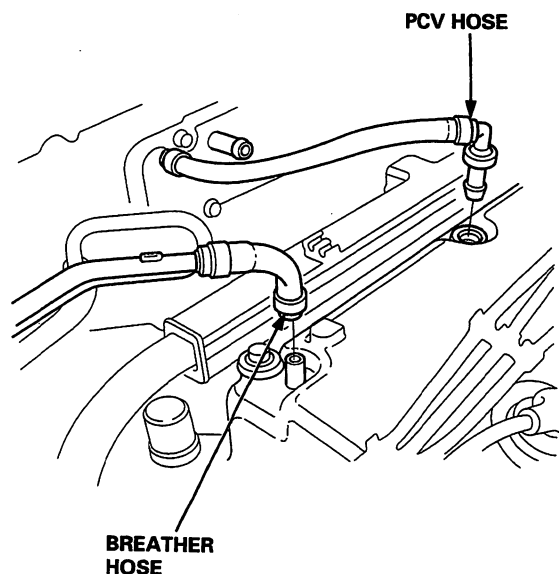
1. Secure the hood in the open position.
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
3. Disconnect the battery negative terminal first, then the positive terminal.
4. Drain the engine coolant (see page 10-7).
5. Remove the intake air duct.



6. Remove the brake booster vacuum hose, evaporative emission (EVAP) control canister hose and vacuum hoses.

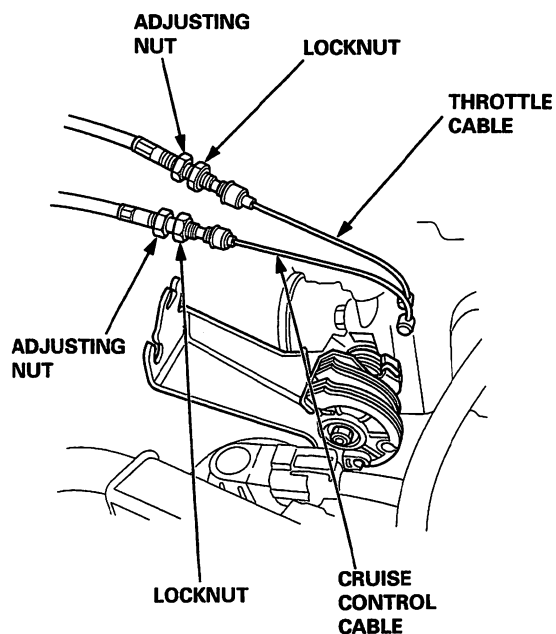


7. Remove the breather hose and positive crankcase ventilation (PCV) hose.

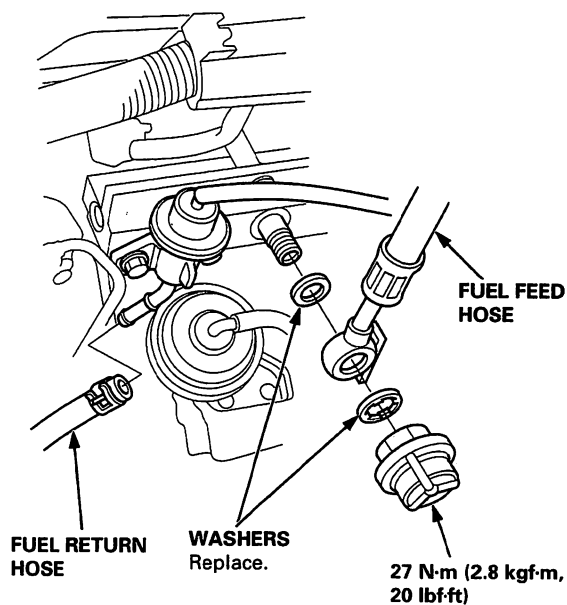




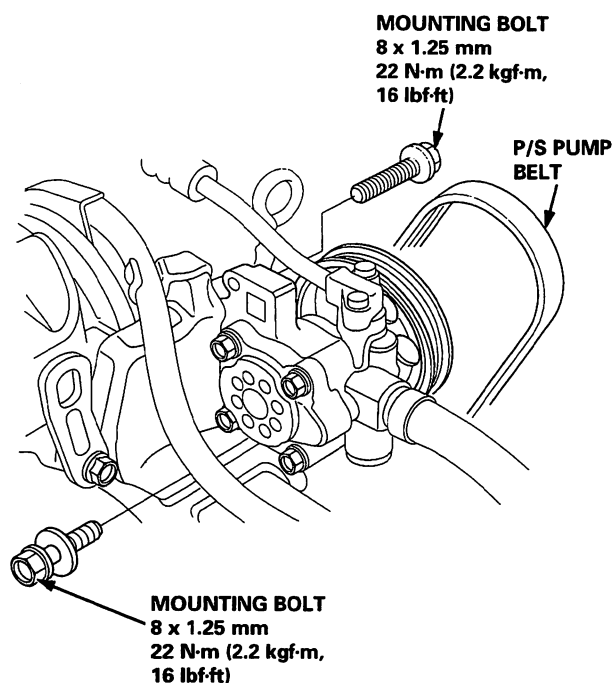
8. Remove the throttle cable and cruise control cable by loosening the locknuts, then slip the cable ends out of the accelerator linkage. Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.



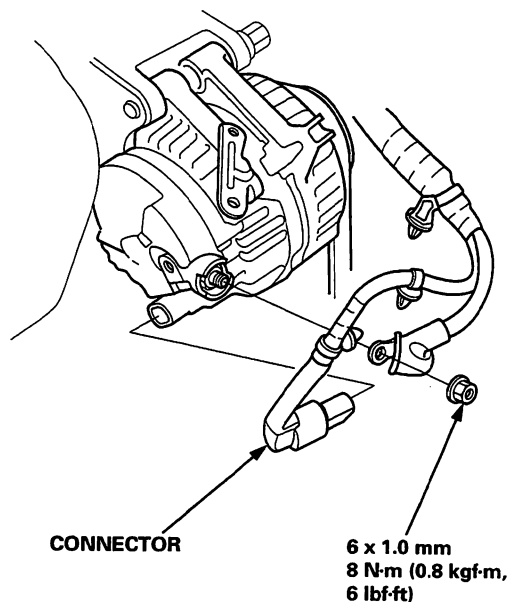
9. Relieve fuel pressure (see section 11).
10. Remove the fuel feed hose and fuel return hose.



11. Remove the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump without disconnecting the P/S hoses.



12. Remove the alternator terminal and connector.

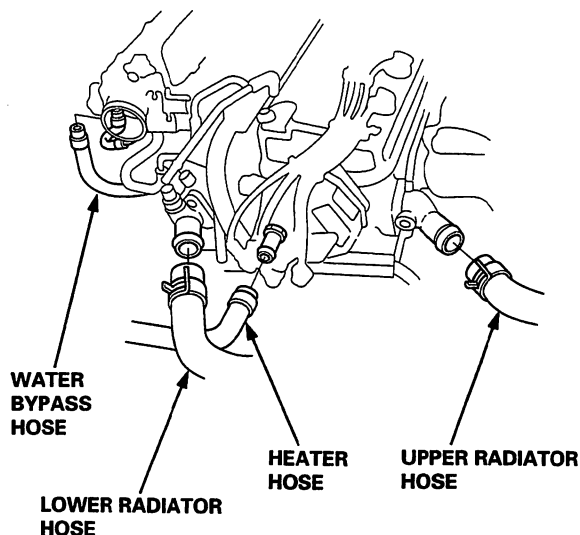


(cont'd)

Cylinder Head

Removal (cont'd)

13. Remove the alternator (see section 4).
14. Remove the upper radiator hose, lower radiator hose, heater hose and water bypass hoses.

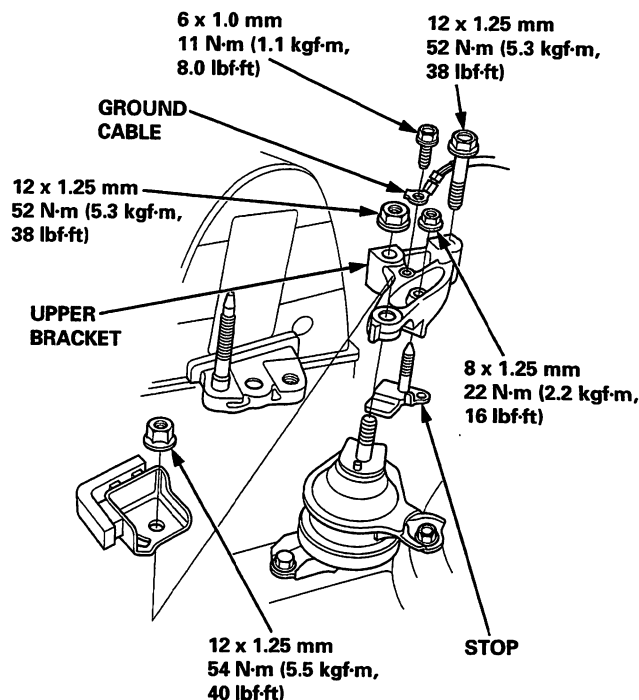


15. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.

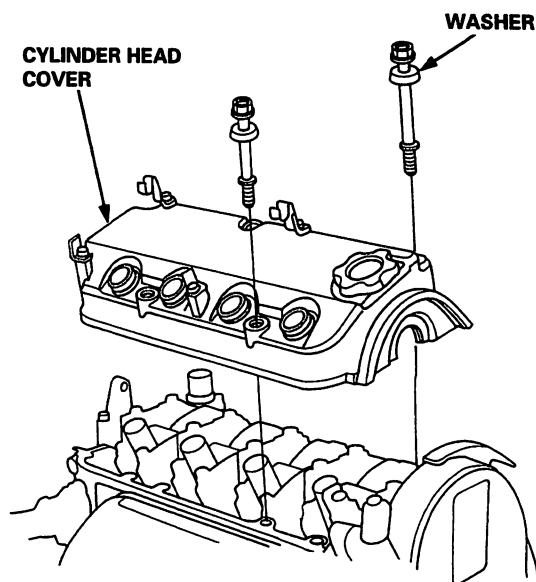
- Four fuel injector connectors
- Intake air temperature (IAT) sensor connector
- Idle air control (IAC) valve connector
- Throttle position sensor connector
- Manifold absolute pressure (MAP) sensor connector
- Engine coolant temperature (ECT) sensor connector
- Radiator fan switch A connector
- Radiator fan switch B connector
- Coolant temperature gauge sending unit connector
- Exhaust gas recirculation (EGR) connector
- Heated oxygen sensor (HO2S) connector
- CKP/TDC sensor connector
- VTEC solenoid valve connector
- VTEC oil pressure switch connector (F20B6 engine)

16. Remove the spark plug caps and distributor from the cylinder head.

17. Support the engine with the jack and wood block under the oil pan.
18. Remove the stop and ground cable, then remove the upper bracket.



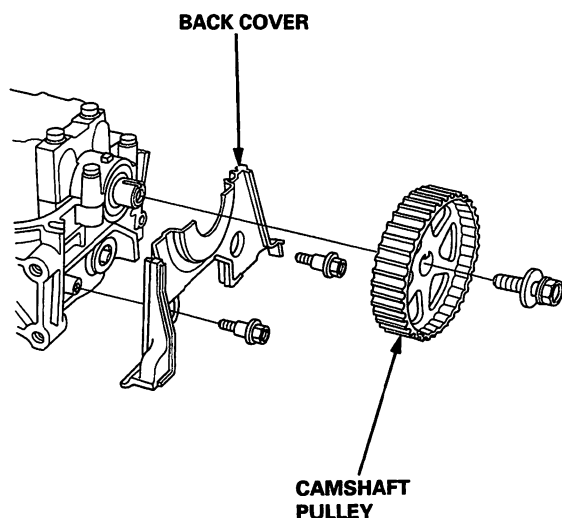
19. Remove the cylinder head cover.



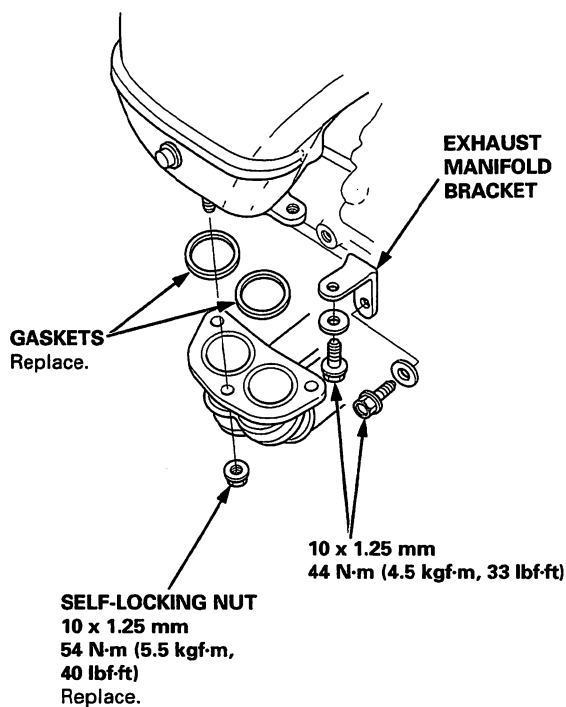


20. Remove the balancer belt and timing belt (see page 6-B-18).

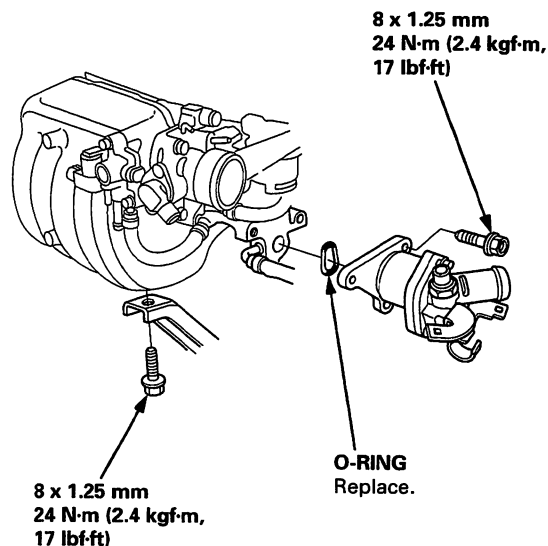
21. Remove the camshaft pulley and back cover.



22. Remove the exhaust manifold bracket and self-locking nuts.

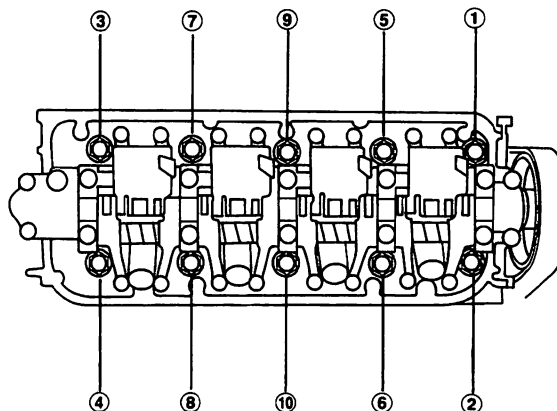


23. Remove the intake manifold bracket bolt and thermostat housing mounting bolts.



24. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time: repeat the sequence until all bolts are loosened.

CYLINDER HEAD BOLT LOOSENING SEQUENCE:



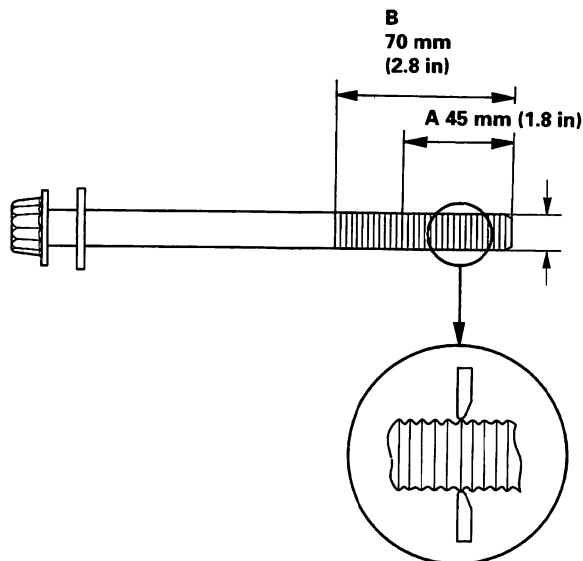
25. Remove the cylinder head.

Cylinder Head Bolt

Rocker Arms Assembly

Inspection

1. Measure the diameter of each cylinder head bolt at point A and point B.



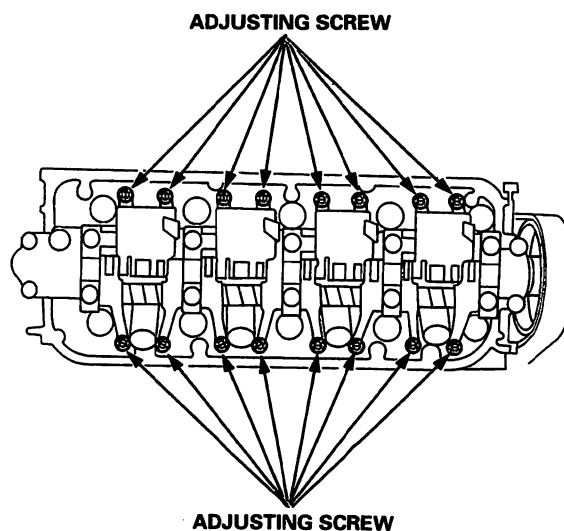
2. If either diameter is less than 11.3 mm (0.44 in), replace the cylinder head bolt.

Removal

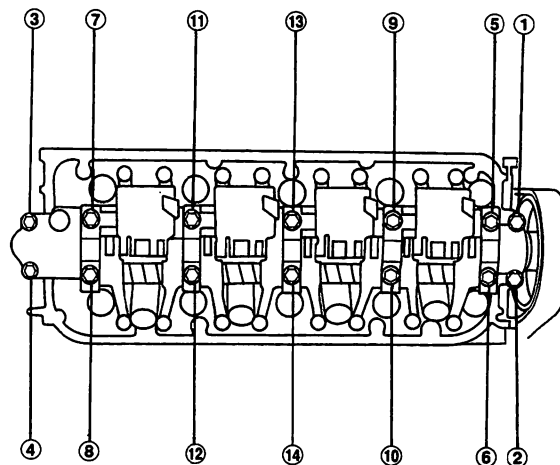
1. Loosen the adjusting screws, then remove the bolts and the rocker arm assembly.

NOTE:

- Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern, to prevent damaging the valves or rocker arm assembly.
- When removing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the camshaft holders, the springs and the rocker arms on the shafts.



CAMSHAFT HOLDER BOLT LOOSENING SEQUENCE:



Rocker Arms



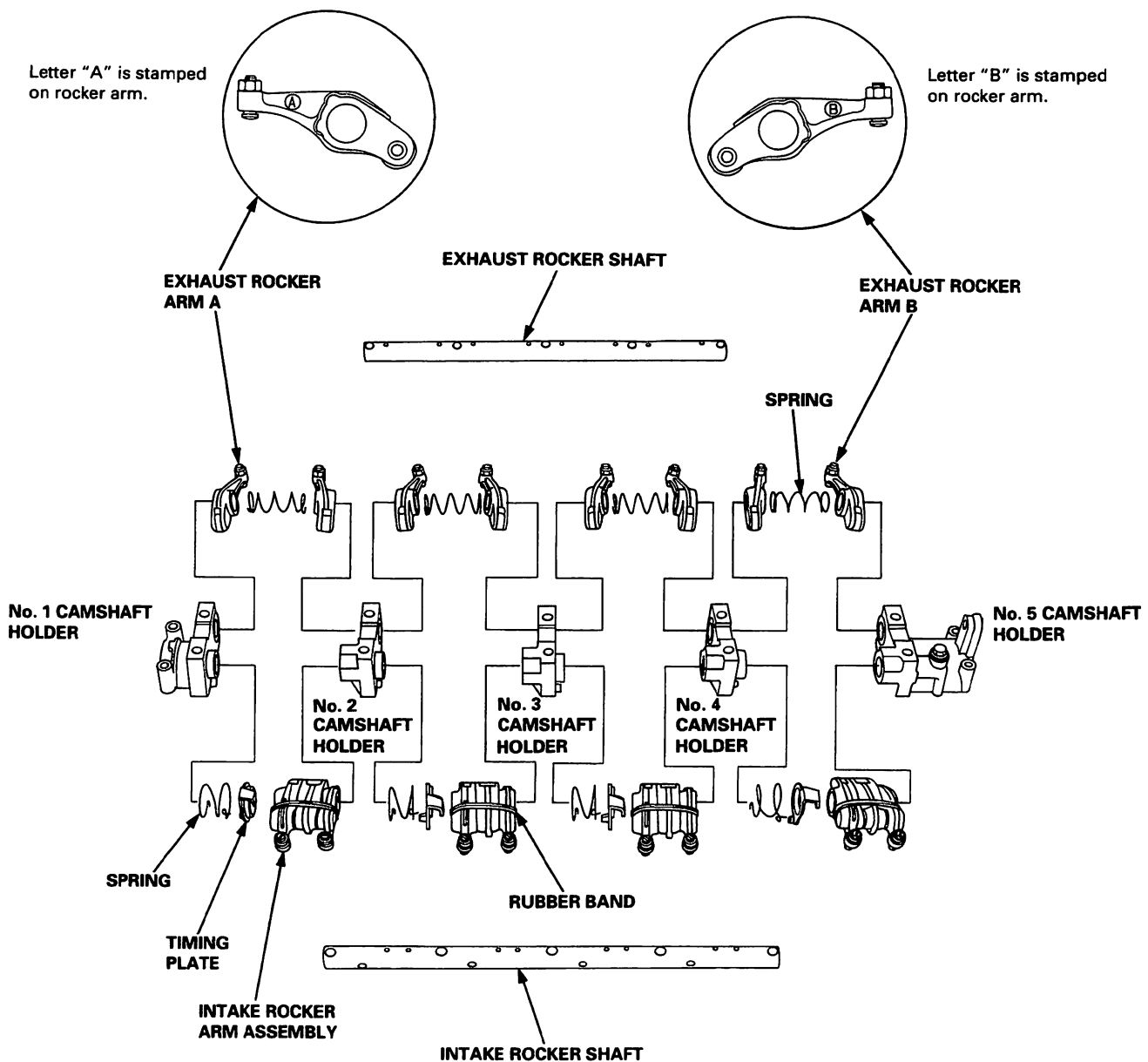
Disassembly/Reassembly

NOTE:

- Identify parts as they are removed to ensure reinstallation in the original locations.
- Inspect rocker shafts and rocker arms (see page 6-B-32).
- Rocker arms must be installed in the same positions if reused.
- When removing or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders, springs and rocker arms on the shaft.



Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact points.

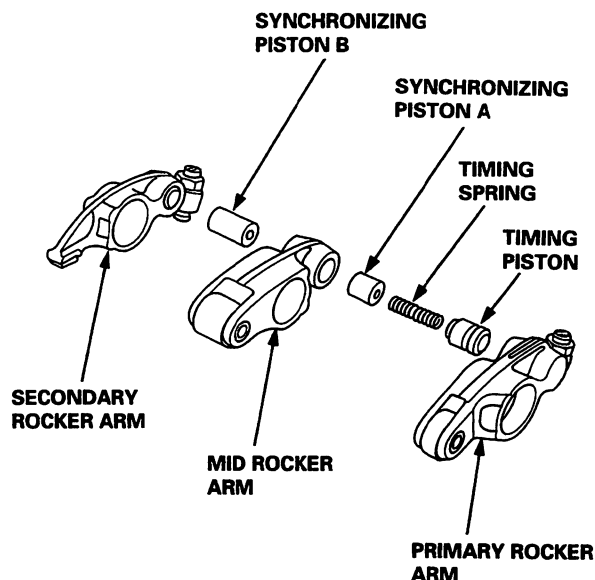


Rocker Arms

Inspection

NOTE: When reassembling the primary rocker arm, carefully apply air pressure to the oil passage of the rocker arm.

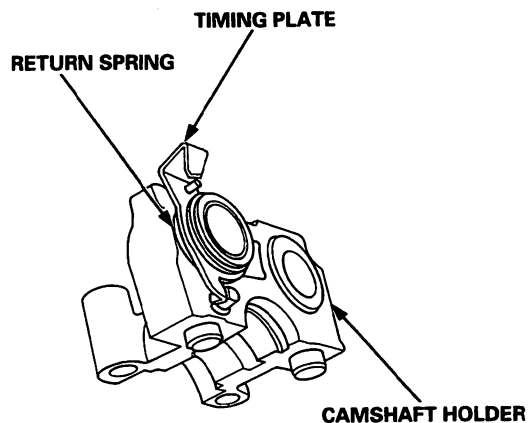
1. Inspect the rocker arm piston. Push it manually.
— If it does not move smoothly, replace the rocker arm assembly.



NOTE:

- Apply oil to the pistons when reassembling.
- Bundle the rocker arms with a rubber band to keep them together as a set.

NOTE: Set the timing plate and return spring as shown below.



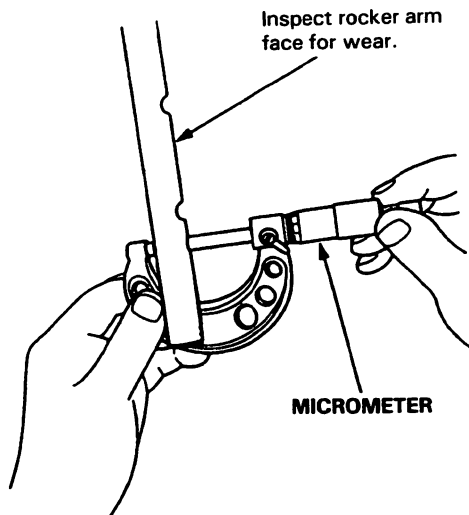
Rocker Arms and Shafts



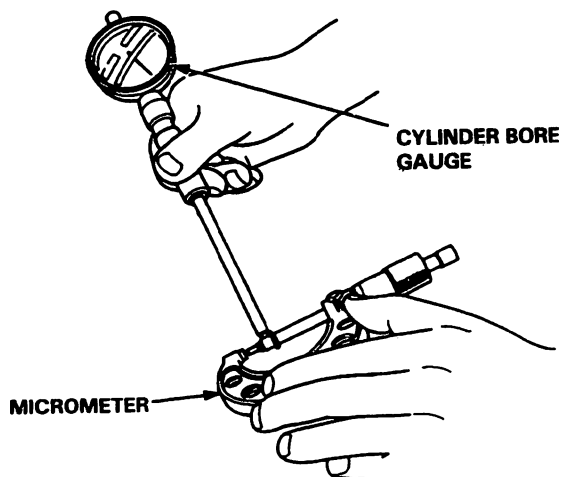
Clearance Inspection

Measure the intake rocker shaft and the exhaust rocker shaft.

1. Measure the diameter of the shaft at the first rocker location.



2. Zero the gauge to the shaft diameter.



3. Measure the inside diameter of the rocker arm, and check it for an out-of-round condition.

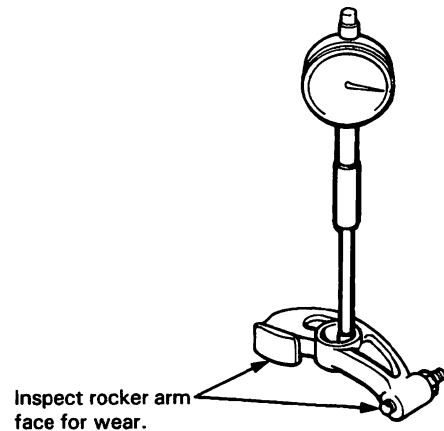
Rocker Arm-to-Shaft Clearance:

Standard (New):

Intake: 0.026 – 0.067 mm
(0.0010 – 0.0026 in)

Exhaust: 0.018 – 0.054 mm
(0.0007 – 0.0021 in)

Service Limit: 0.08 mm (0.003 in)



Repeat for all rockers.

— If the clearance is over the limit, replace the rocker shaft and all overtolerance rocker arms.

NOTE: If any intake rocker arm needs replacement, replace all three rocker arms in that set (primary, mid, and secondary).

Camshaft

Inspection

NOTE:

- Do not rotate the camshaft during inspection.
- Remove the rocker arms and rocker shafts.

1. Put the camshaft and the camshaft holders on the cylinder head, then tighten the bolts to the specified torque.

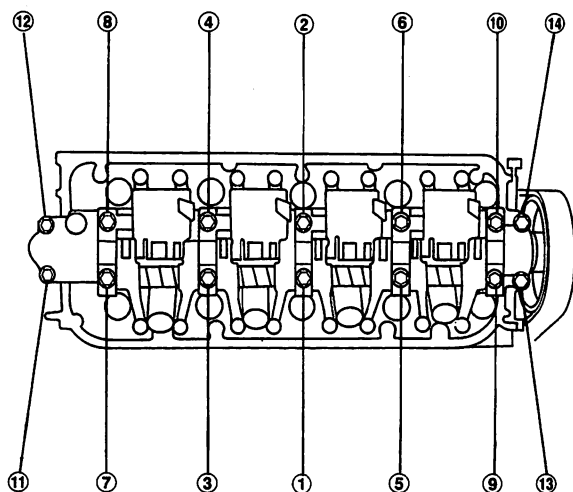
Specified torque:

8 mm bolts: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Apply engine oil to the bolt threads.

6 mm bolts: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

6 mm bolts: ⑪, ⑫, ⑬, ⑭



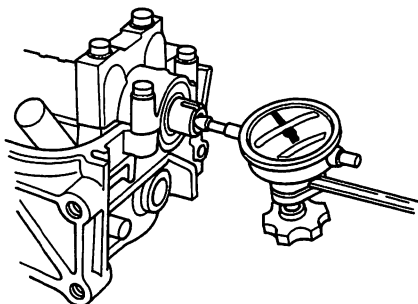
2. Seat the camshaft by pushing it toward the distributor end of the cylinder head.
3. Zero the dial indicator against the end of the distributor drive, then push the camshaft back and forth and read the end play.

Camshaft End Play:

Standard (New): 0.05 – 0.15 mm

(0.002 – 0.006 in)

Service Limit: 0.5 mm (0.02 in)



4. Remove the bolts, then remove the camshaft holders from the cylinder head.

— Lift the camshaft out of the cylinder head, wipe it clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.

— Clean the camshaft bearing surfaces in the cylinder head, then set the camshaft back in place.

— Place a plastigage strip across each journal.

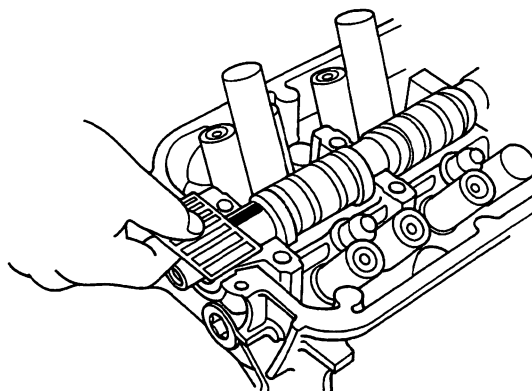
5. Install the camshaft holders, then tighten the bolts to the specified torque as shown in the left column of this page.
6. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.

Camshaft-to-Holder Oil Clearance:

Standard (New): 0.050 – 0.089 mm

(0.0020 – 0.0035 in)

Service Limit: 0.15 mm (0.006 in)





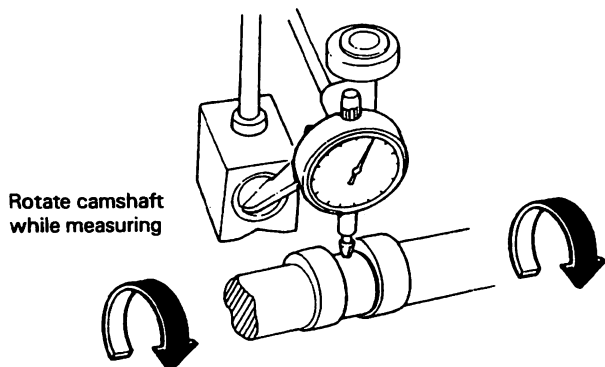
7. If camshaft-to-holder oil clearance is out of tolerance:

- And the camshaft has already been replaced, you must replace the cylinder head.
- If the camshaft has not been replaced, first check total runout with the camshaft supported on V-blocks.

Camshaft Total Runout:

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)



- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the oil clearance is still out of tolerance, replace the cylinder head.

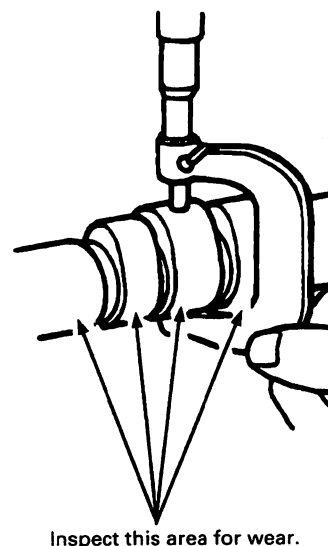
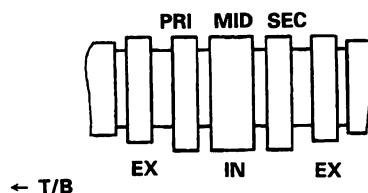
8. Measure cam lobe height.

Cam Lobe Height Standard (New):

Unit mm (in)

		INTAKE	EXHAUST
F18B2, F18B3 engines	PRI	38.539 (1.5173)	38.645 (1.5215)
	MID	39.223 (1.5442)	
	SEC	33.913 (1.3352)	
F20B6 engine	PRI	38.539 (1.5173)	38.645 (1.5215)
	MID	39.725 (1.5640)	
	SEC	33.913 (1.3352)	

PRI: Primary MID: Mid SEC: Secondary
IN: Intake EX: Exhaust T/B: Timing Belt

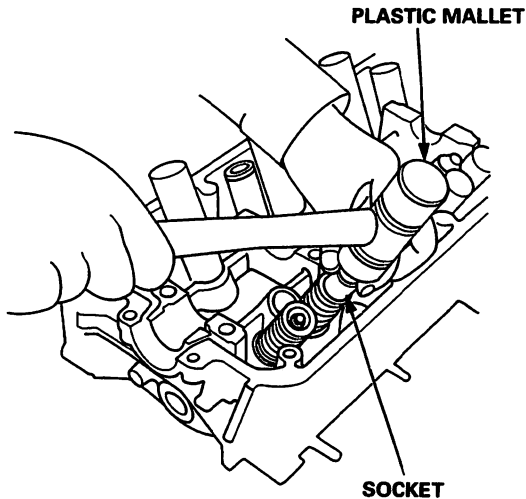


Valves, Valve Springs and Valve Seals

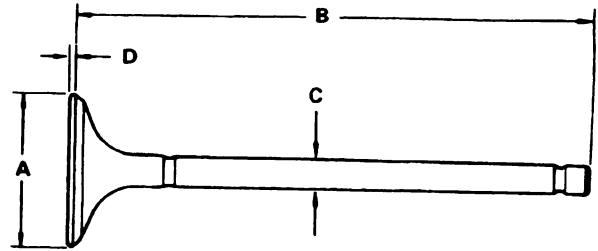
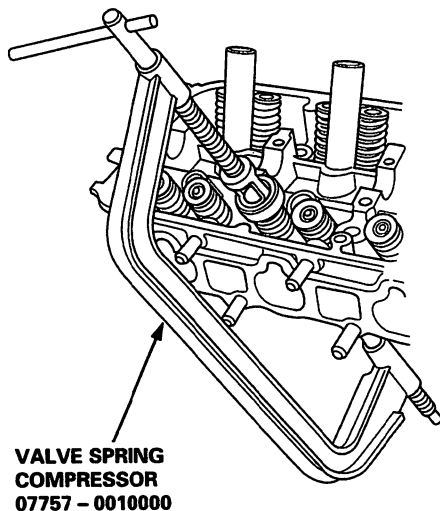
Removal

NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Using an appropriate-sized socket and plastic mallet, lightly tap the valve retainer to loosen the valve keepers.



2. Install the valve spring compressor. Compress the spring and remove the valve keepers.



F18B2, F20B6 engines:

Intake Valve Dimensions

- A Standard (New): 33.90 – 34.10 mm
(1.335 – 1.343 in)
B Standard (New): 114.85 – 115.15 mm
(4.522 – 4.533 in)
C Standard (New): 5.485 – 5.495 mm
(0.2159 – 0.2163 in)
C Service Limit: 5.455 mm (0.2148 in)
D Standard (New): 0.75 – 1.25 mm
(0.030 – 0.049 in)
D Service Limit: 0.55 mm (0.022 in)

Exhaust Valve Dimensions

- A Standard (New): 28.85 – 29.15 mm
(1.136 – 1.148 in)
B Standard (New): 112.85 – 113.15 mm
(4.443 – 4.455 in)
C Standard (New): 5.450 – 5.460 mm
(0.2146 – 0.2150 in)
C Service Limit: 5.420 mm (0.2134 in)
D Standard (New): 0.95 – 1.45 mm
(0.037 – 0.057 in)
D Service Limit: 0.85 mm (0.033 in)



Valve Seats

Reconditioning

F18B3 engine:

Intake Valve Dimensions

A Standard (New): 33.90 – 34.10 mm
(1.335 – 1.343 in)

B Standard (New): 114.85 – 115.15 mm
(4.522 – 4.533 in)

C Standard (New): 5.485 – 5.495 mm
(0.2159 – 0.2163 in)

C Service Limit: 5.455 mm (0.2148 in)

D Standard (New): 0.75 – 1.25 mm
(0.030 – 0.049 in)

D Service Limit: 0.55 mm (0.022 in)

Exhaust Valve Dimensions

A Standard (New): 28.90 – 29.10 mm
(1.138 – 1.146 in)

B Standard (New): 112.85 – 113.15 mm
(4.443 – 4.455 in)

C Standard (New): 5.450 – 5.460 mm
(0.2146 – 0.2150 in)

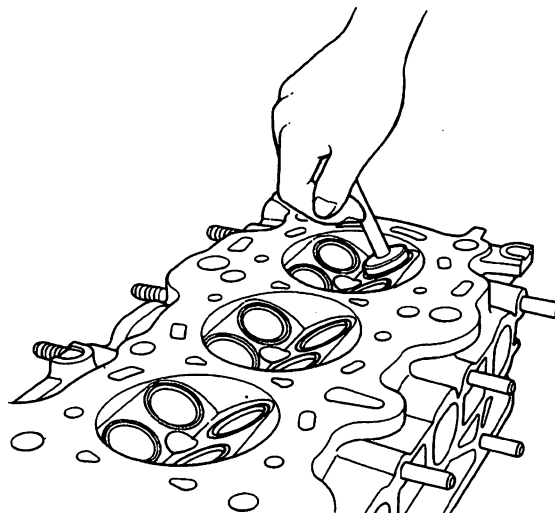
C Service Limit: 5.420 mm (0.2134 in)

D Standard (New): 1.55 – 1.85 mm
(0.061 – 0.073 in)

D Service Limit: 1.45 mm (0.057 in)

1. Renew the valve seats in the cylinder head using a valve seat cutter.

NOTE: If the valve guides are worn (see page 6-B-39), replace them (see page 6-B-40) before cutting the valve seats.

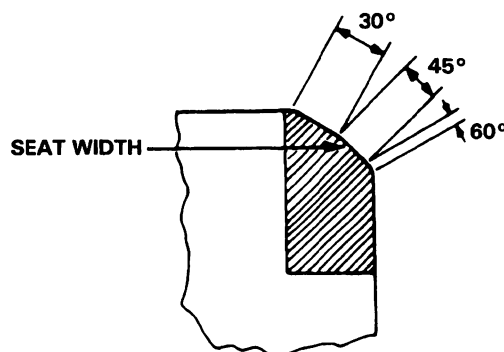


2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check the width of the seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutter.

Valve Seat Width:

Standard (New): 1.25 – 1.55 mm
(0.049 – 0.061 in)

Service Limit: 2.00 mm (0.079 in)

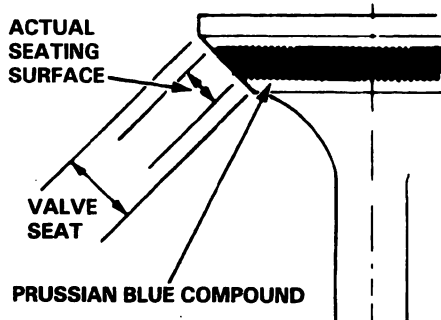


(cont'd)

Valve Seats

Reconditioning (cont'd)

5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face. Insert the valve in its original location in the head, then lift it and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
- If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
 - If it is too low (closer to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert the intake and exhaust valves in the head and measure valve stem installed height.

Intake Valve Stem Installed Height:

Standard (New): 46.75 – 47.55 mm

(1.841 – 1.872 in)

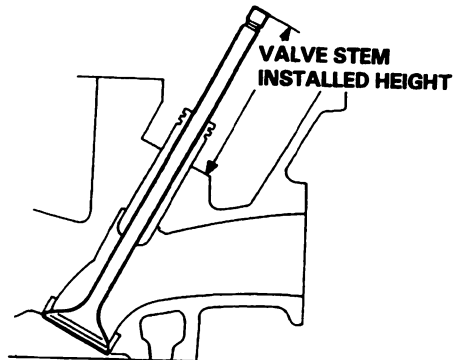
Service Limit: 47.80 mm (1.882 in)

Exhaust Valve Stem Installed Height:

Standard (New): 46.68 – 47.48 mm

(1.838 – 1.869 in)

Service Limit: 47.73 mm (1.879 in)



8. If valve stem installed height is over the service limit, replace the valve and recheck. If it is still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

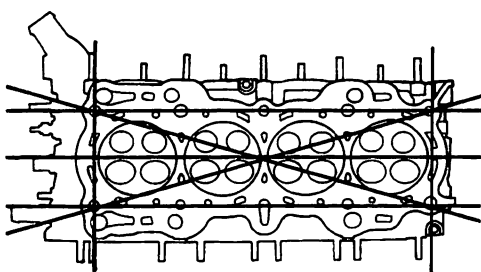
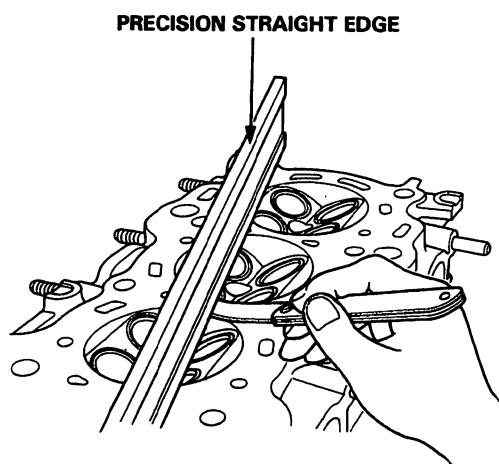


Warpage

NOTE: If camshaft-to-holder oil clearances (see page 6-B-34) are not within specifications, the cylinder head cannot be resurfaced.

If camshaft-to-holder oil clearances are within specifications, check the cylinder head for warpage.

- If warpage is less than 0.05 mm (0.002 in) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface the cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 100 mm (3.94 in).



Measure along edges, and three ways across center.

Cylinder Head Height:
Standard (New): 99.95 – 100.05 mm
 (3.935 – 3.939 in)

Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

Intake Valve Stem-to-Guide Clearance:

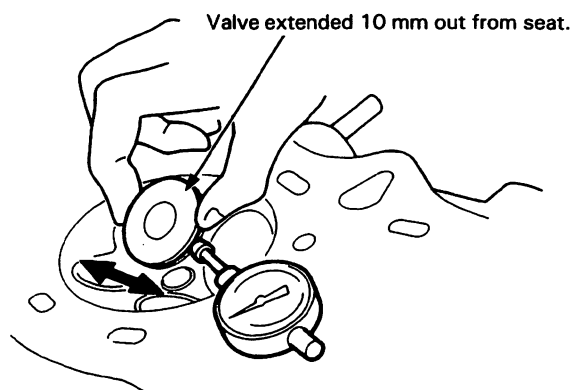
Standard (New): 0.04 – 0.09 mm
 (0.002 – 0.004 in)

Service Limit: 0.16 mm (0.006 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.11 – 0.16 mm
 (0.004 – 0.006 in)

Service Limit: 0.24 mm (0.009 in)



- If measurement exceeds the service limit, recheck using a new valve.
- If measurement is now within the service limit, reassemble using a new valve.
- If measurement still exceeds the limit, recheck using the alternate method below, then replace the valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide.

The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.020 – 0.045 mm
 (0.0008 – 0.0018 in)

Service Limit: 0.08 mm (0.003 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.055 – 0.080 mm
 (0.0022 – 0.0031 in)

Service Limit: 0.12 mm (0.005 in)

Valve Guides

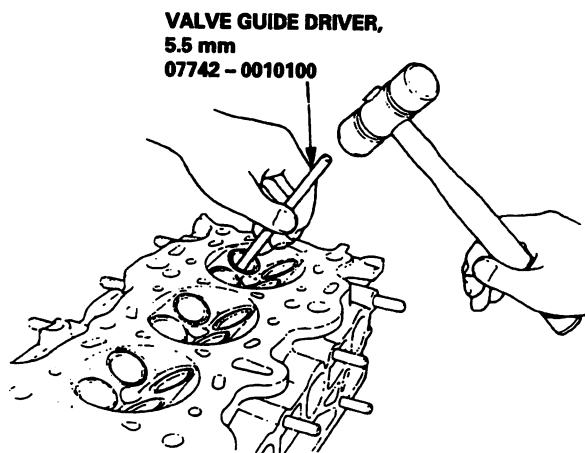
Replacement

NOTE:

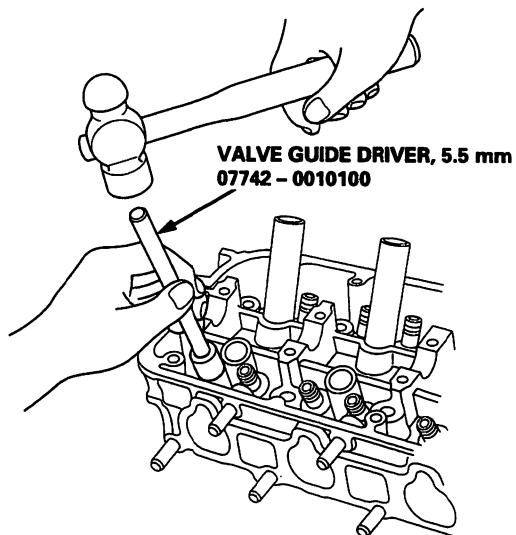
- For best results, heat cylinder head to 150°C (300°F) before removing or installing guides.
- It may be necessary to use an air hammer to remove some valve guides.

CAUTION: To avoid burns, use heavy gloves when handling heated cylinder head.

1. Drive the valve guide out from the bottom of the cylinder head.



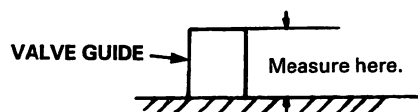
2. Drive in a new valve guide to the specified depth.



Valve Guide Installed Height:

Intake: 21.20 - 22.20 mm (0.835 - 0.874 in)

Exhaust: 20.63 - 21.63 mm (0.812 - 0.852 in)



Reaming

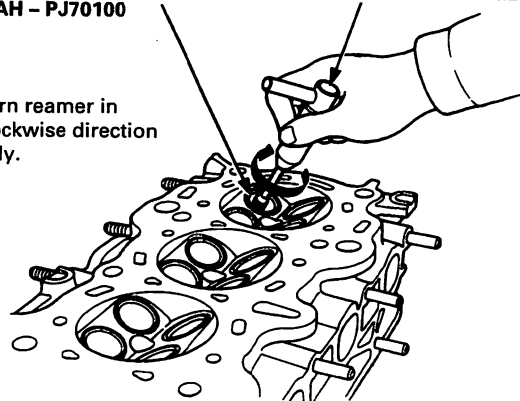
NOTE: For new valve guides only.

1. Coat both reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check the clearance with a valve (see page 6-B-39).
— Verify that the valve slides in the intake and exhaust valve guides without exerting pressure.

**VALVE GUIDE REAMER, 5.525 mm
07HAH - PJ70100**

REAMER HANDLE

Turn reamer in clockwise direction only.



Valves, Valve Springs and Valve Seals



Installation

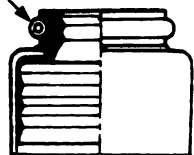
1. Coat the valve stems with engine oil. Install the valves in the valve guides.

NOTE: Make sure the valves move up and down smoothly.

2. Install the spring seats on the cylinder head.
3. Install the valve seals using the valve guide seal installer.

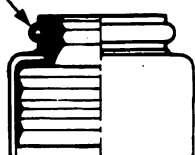
NOTE: Exhaust and intake valve seals are not interchangeable.

WHITE
SPRING



INTAKE VALVE SEAL

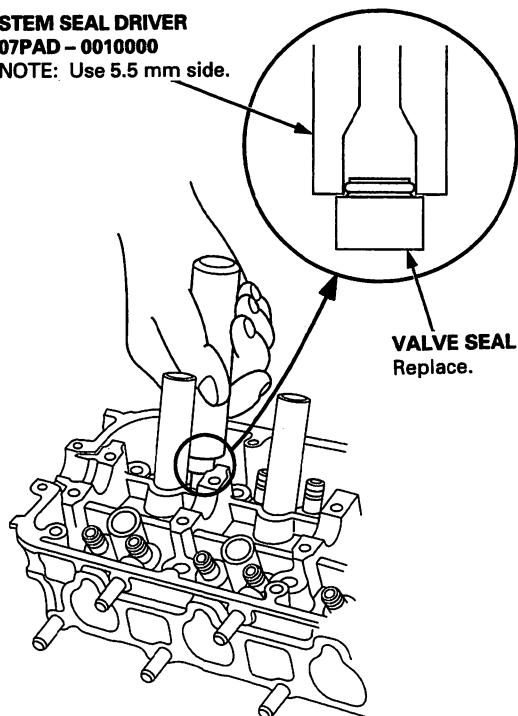
BLACK
SPRING



EXHAUST VALVE SEAL

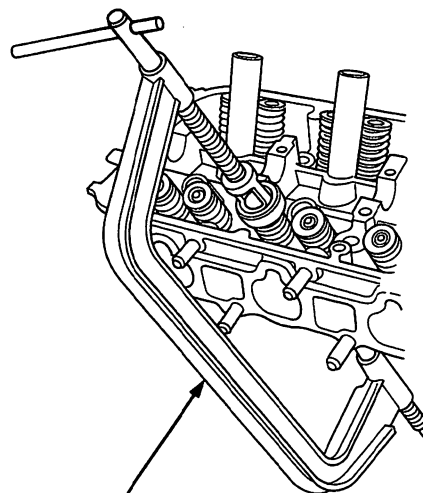
STEM SEAL DRIVER
07PAD - 0010000

NOTE: Use 5.5 mm side.



4. Install the valve spring and valve retainer, then install the valve spring compressor. Compress the spring and install the valve keepers.

NOTE: Place the end of the valve spring with closely wound coils toward the cylinder head.

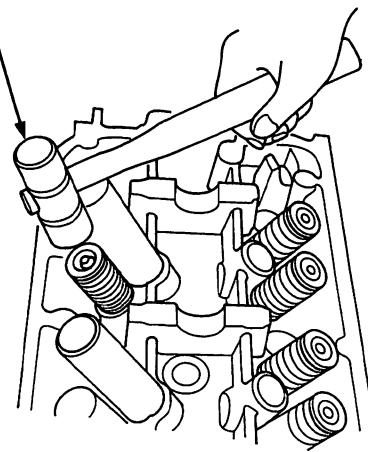


VALVE SPRING
COMPRESSOR
07757 - 0010000

5. Lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of the valve and valve keepers.

NOTE: Tap the valve stem only along its axis so you do not bend the stem.

PLASTIC
MALLET

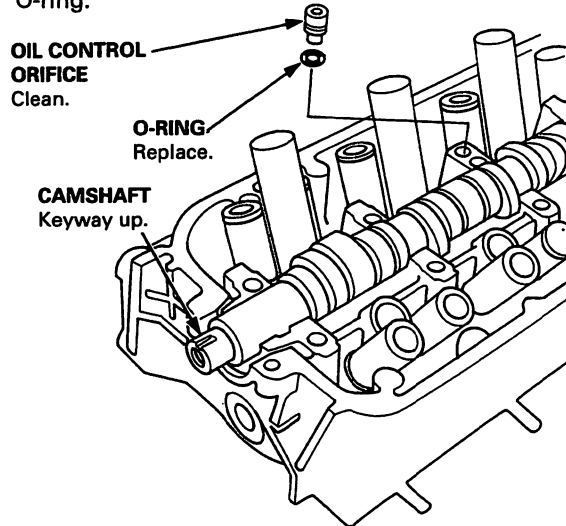


Camshaft/Rocker Arms and Camshaft Seal/Pulley

Installation

1. After wiping down the camshaft and journals in the cylinder head, lubricate both surfaces and install the camshaft and camshaft seal.

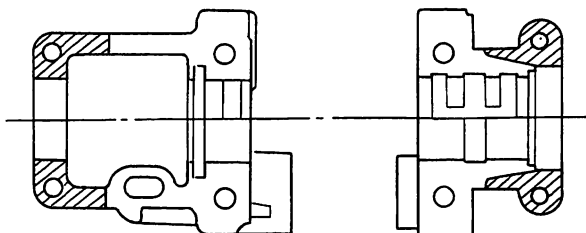
2. Clean and install the oil control orifice with a new O-ring.



3. Turn the camshaft until its keyway is facing up. (No. 1 piston TDC).
4. Apply liquid gasket to the head mating surfaces of the No. 1 and No. 5 camshaft holders.
— Apply liquid gasket to the shaded areas.

No. 5

No. 1



5. Set the rocker arm assembly in place and loosely install the bolts.
— Make sure that the rocker arms are properly positioned on the valve stems.
6. Tighten each bolt two turns at a time in the sequence shown below to ensure that the rockers do not bind on the valves.

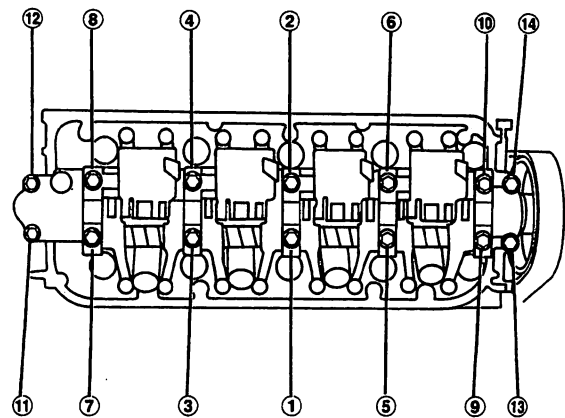
Specified torque:

8 mm bolts: 22 N·m (2.2 kgf·m, 16 lbf·t)

Apply engine oil to the bolt threads.

6 mm bolts: 12 N·m (1.2 kgf·m, 8.7 lbf·t)

6 mm bolts: ⑪, ⑫, ⑬, ⑭





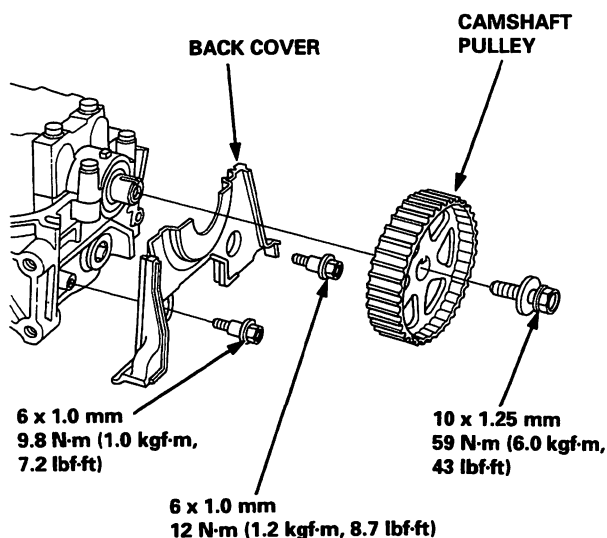
Installation

7. Check the back cover rubber seal for cracks and other damage.

NOTE:

- If the rubber seal is coming off, apply liquid gasket to the lower cover and put the rubber seal back. Wipe off any liquid gasket that is pressed out.
- When replacing rubber seal, clean the lower cover groove cut the repair rubber seal to length, and put the rubber seal into the groove evenly.
- After putting rubber seal check the jointing parts of the rubber seal. Apply liquid gasket if there is any gap or opening.

8. Install the back cover.
9. Install the camshaft pulley onto the camshaft, then tighten the retaining bolt to the torque shown.

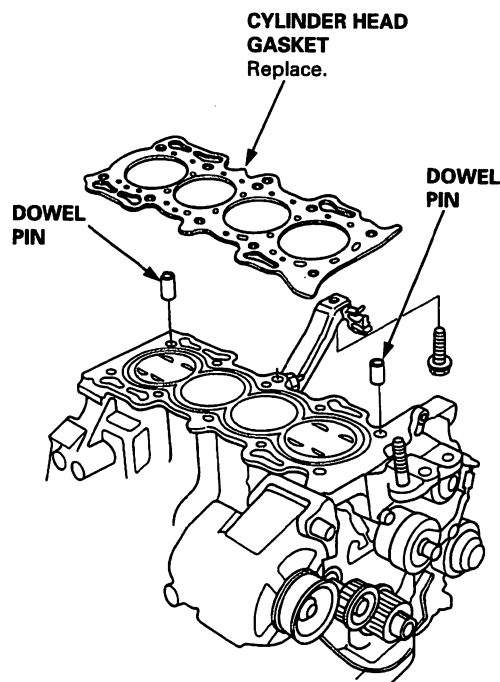


Install the cylinder head in the reverse order of removal:

NOTE:

- Always use a new head gasket.
- Cylinder head and cylinder block surface must be clean.
- "UP" mark on the camshaft pulley should be at the top.
- Turn the crankshaft so the No. 1 piston is at TDC (see page 6-B-20).
- Do not use the upper cover and lower cover for storing removed items.
- Clean the upper cover and lower cover before installation.

1. Cylinder head dowel pins must be aligned.



(cont'd)

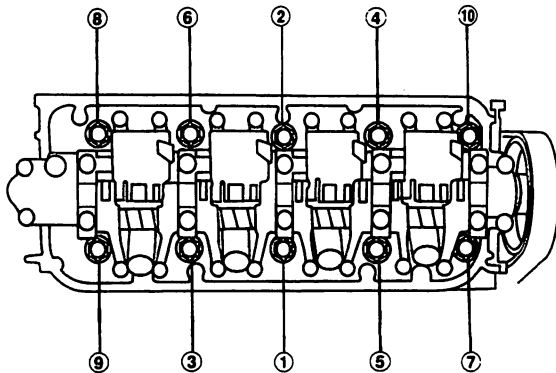
Cylinder Head

Installation (cont'd)

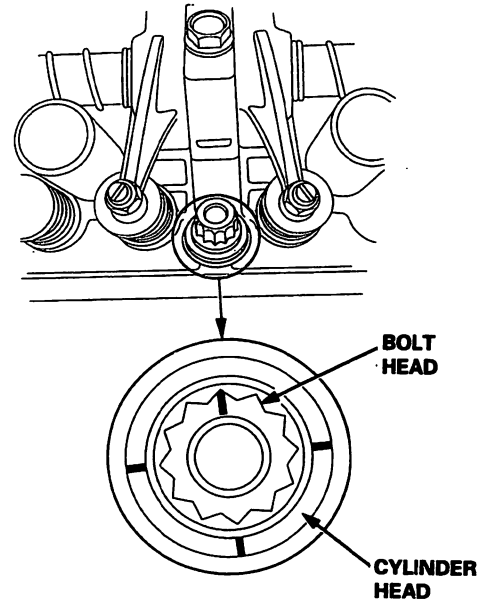
2. Position the camshaft correctly (see page 6-B-20).
3. Apply clean engine oil to the threads of the cylinder head bolts.
4. Tighten the cylinder head bolts in sequence to 29 N·m (3.0 kgf·m, 22 lbf·ft).

NOTE:

- We recommend using a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and not to overtighten.
- If a bolt makes any noise when you are torquing it, loosen the bolt, and retighten it.



5. Mark the bolt head and the cylinder head as shown.



6. Tighten the cylinder head bolts until the mark on the bolt head align to the mark on the cylinder head (turn the bolt 90°) twice.

NOTE: If using a new cylinder head bolt, tighten the bolt 90° further.

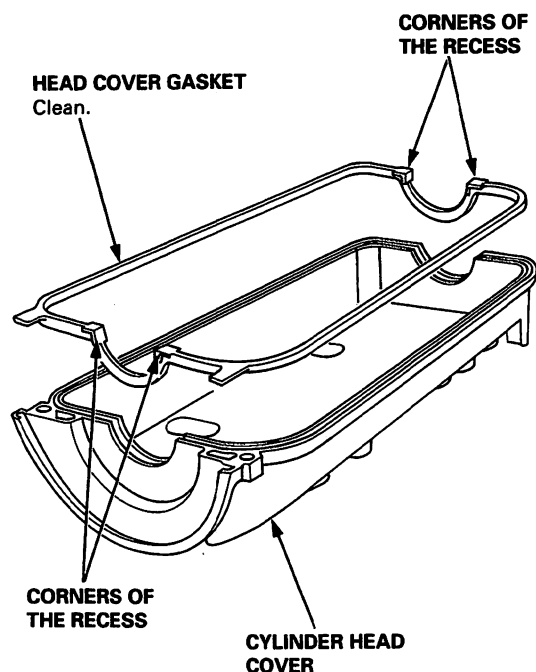
7. Tighten the intake manifold bracket mounting bolt and thermostat housing mounting bolts (see page 6-B-29).
8. Install the exhaust manifold bracket and exhaust pipe A, then install the cover (see page 6-B-29).



9. Install the timing belt (see page 6-B-20).
10. Adjust the valve clearance (see page 6-B-12).
11. Install the head cover gasket in the groove of the cylinder head cover. Seat the recesses for the camshaft first, then work it into the groove around the outside edges.

NOTE:

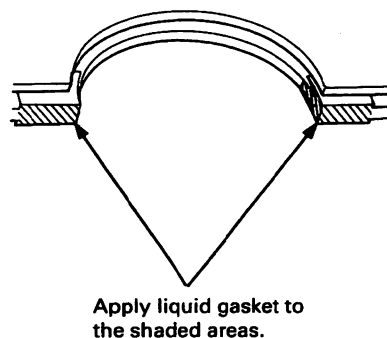
- Before installing the head cover gasket, thoroughly clean the seal and the groove.
- When installing, make sure the head cover gasket is seated securely in the corners of the recesses with no gap.



12. Apply liquid gasket to the head cover gasket at the four corners of the recesses.

NOTE:

- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



(cont'd)

Cylinder Head

Installation (cont'd)

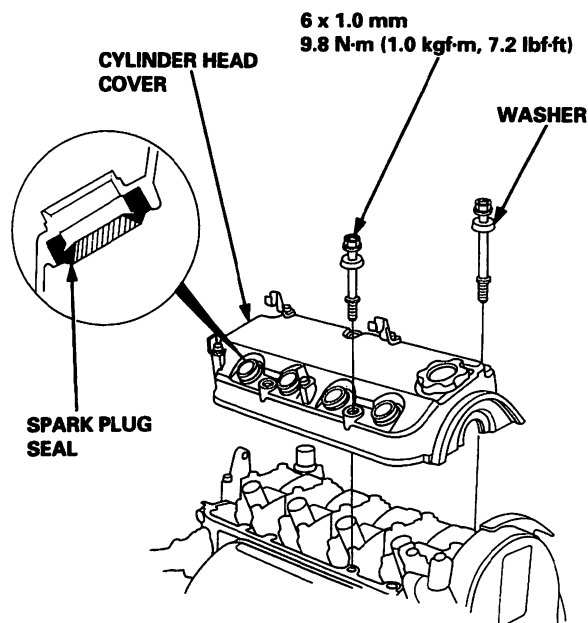
13. When installing the cylinder head cover, hold the head cover gasket in the groove by placing your fingers on the camshaft holder contacting surfaces (top of the semicircles).

Set the spark plug seal on the spark plug pipe.

Once the cylinder head cover is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.

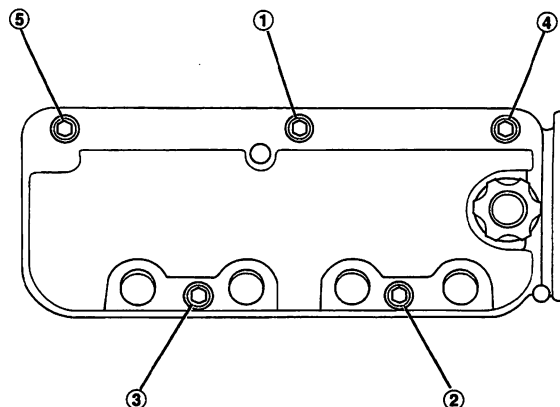
NOTE:

- Before installing the cylinder head cover, clean the cylinder head contacting surfaces with a shop towel.
- Do not touch the parts where liquid gasket was applied.
- Take care not to damage the spark plug seal when installing the cylinder head cover.
- Visually check the spark plug seal for damage.
- Replace the washer when damaged or deteriorated.



14. Tighten the nuts in two or three steps. In the final step, tighten all nuts, in sequence, to 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft).

NOTE: After assembly, wait at least 30 minutes before filling the engine with oil.



15. After installation, check that all tubes, hoses and connectors are installed correctly.
16. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Cylinder Head/Valve Train H22A7 engine

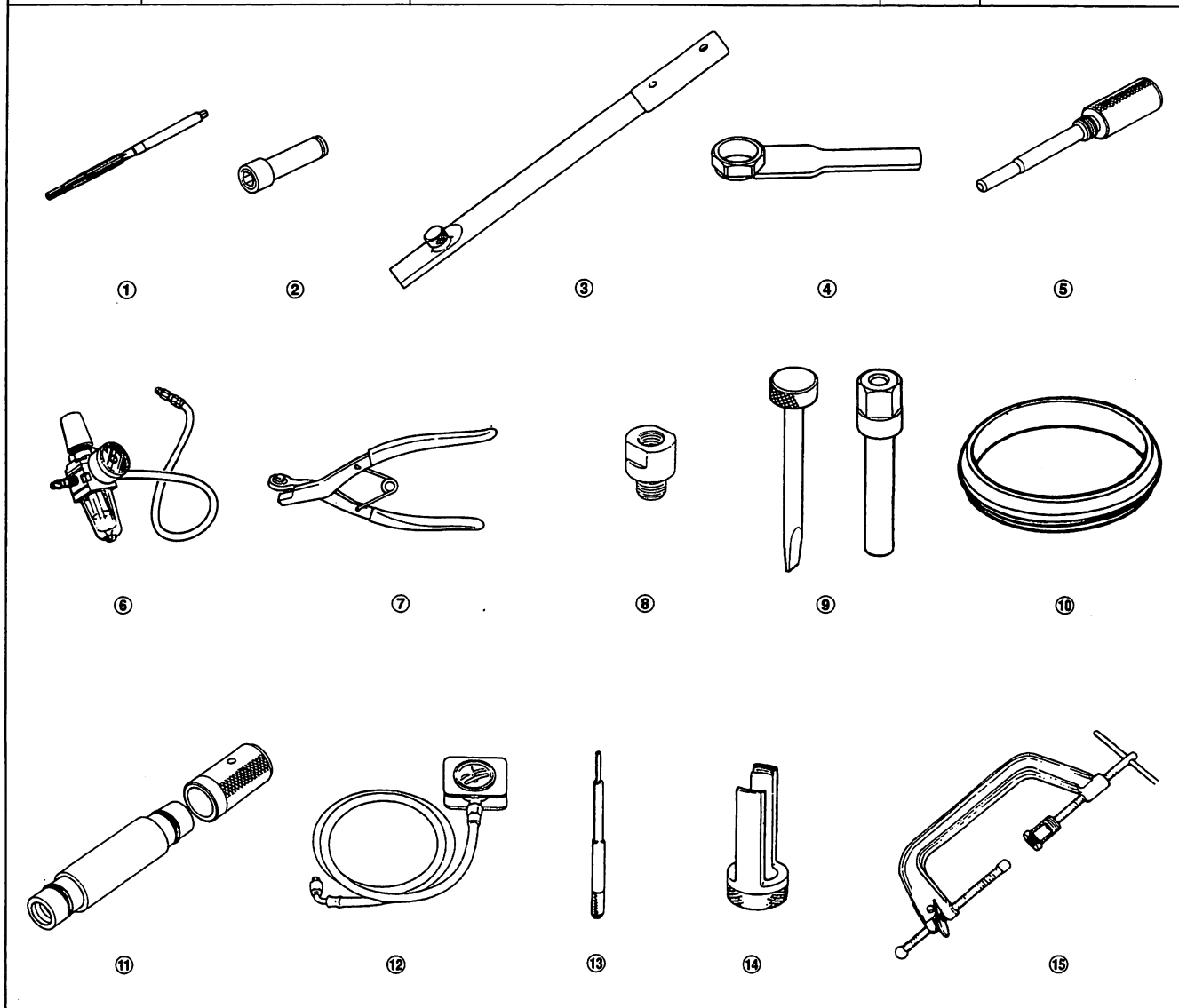
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Special Tools

Ref. No.	Tool Number	Description	Qty	Remark
①	07HAH – PJ70100	Valve Guide Reamer, 5.525 mm	1	
②	07JAA – 0010200	Socket Wrench, 19 mm	1	
③	07JAB – 0010200	Handle	1	
④	07JAB – 0010400	Pulley Holder Attachment, HEX 50 mm	1	
⑤	07LAG – PT20100	Balancer Shaft Lock Pin	1	
⑥	07LAJ – PR30101	Valve Inspection Set	1	
⑦	07LAJ – PR30201	Air Stopper	1	
⑧	07LAK – PR30100	Oil Pressure Gauge Attachment	1	
⑨	07MAA – PR70100	Tappet Adjuster Wrench Set	1	
⑩	07NAG – P130100	Timing Belt Slider	1	
⑪	07PAD – 0010000	Stem Seal Driver	1	
⑫	07406 – 0070001	Low Pressure Gauge	1	
⑬	07742 – 0010100	Valve Guide Driver, 5.5 mm	1	
⑭	07757 – PJ10100	Valve Spring Compressor Attachment	1	
⑮	07757 – 0010000	Valve Spring Compressor	1	



Variable Valve Timing and Valve Lift Electronic Control (VTEC) Control System

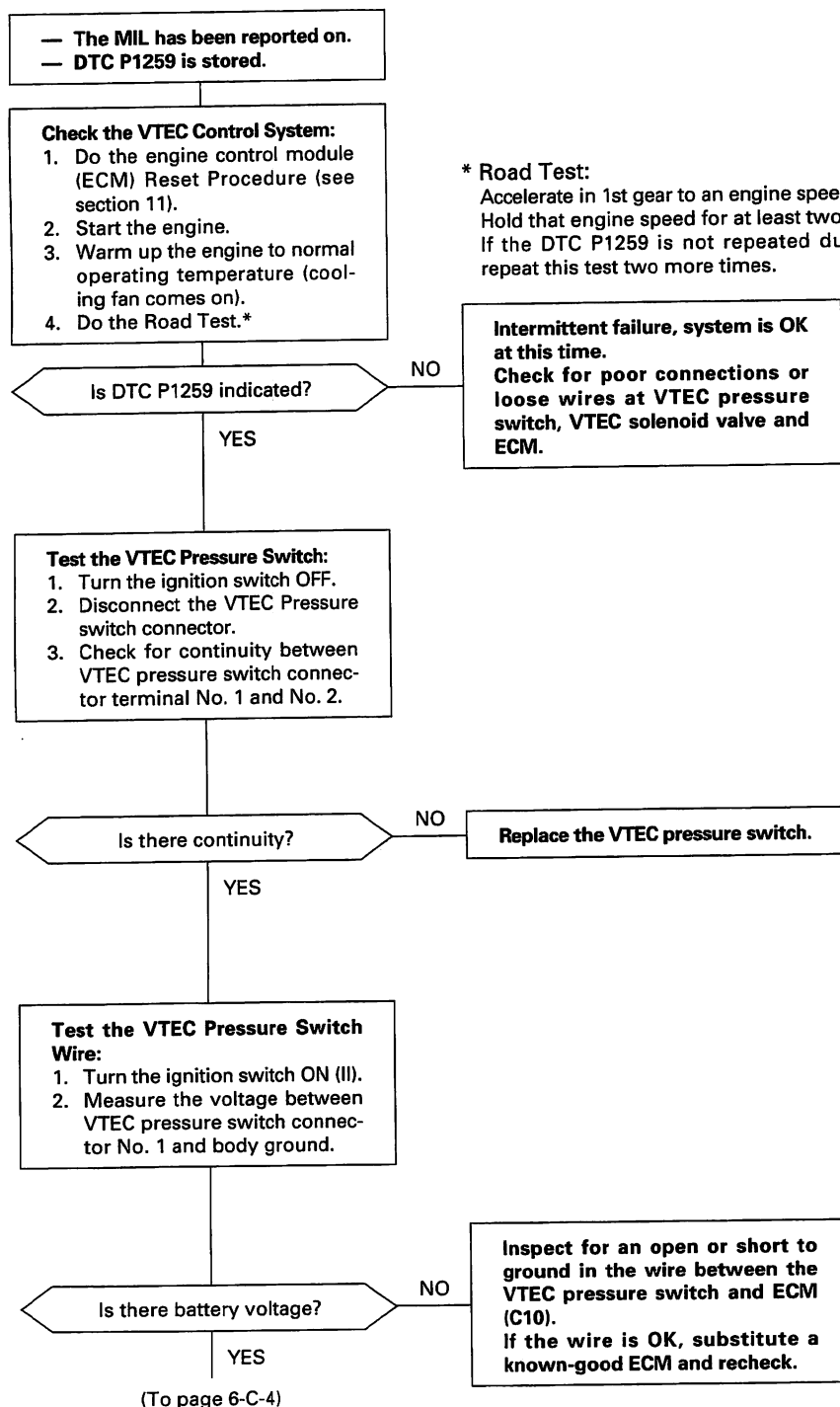


Troubleshooting Flowchart

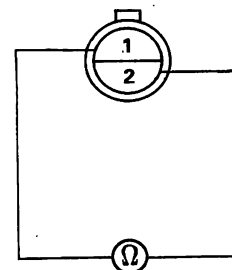
P1259

The scan tool indicates Diagnostic Trouble Code (DTC) P1259: A problem in the VTEC Pressure Switch circuit or VTEC Solenoid Valve circuit.

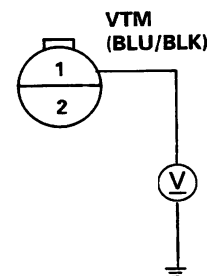
Refer to page 11-A-15 through 11-A-20 before troubleshooting.



VTEC PRESSURE SWITCH 2P CONNECTOR



Terminal side of male terminals



Wire side of female terminals

(cont'd)

VTEC Control System

Troubleshooting Flowchart (cont'd)

(From page 6-C-3)

Test the VTEC Pressure Switch Wire:
Measure voltage across the VTEC pressure switch 2P connector.

Is there battery voltage?

NO

- Repair open in the wire between VTEC pressure switch and G101.
- If the wire is OK, substitute a known-good ECM and recheck.

YES

Test the VTEC Solenoid Valve:
1. Turn the ignition switch OFF.
2. Disconnect the VTEC solenoid valve 1P connector.
3. Check for continuity between the VTEC solenoid valve 1P connector terminal No. 1 and body ground.

Is there 14 – 30 Ω ?

NO

Replace VTEC solenoid valve.

YES

Test the VTEC Solenoid Valve:
1. Remove the 10 mm bolt and install the special tool as shown.
2. Reconnect the VTEC solenoid valve 1P connector and VTEC pressure switch 2P connector.
3. Connect the tachometer (see section 11).
4. Start the engine.
5. Warm up engine to normal operating temperature (cooling fan comes on).
6. Check oil pressure at engine speed of 1,000, 2,000 and 5,000 rpm (min⁻¹).

Is pressure below 49 kPa (0.5 kgf/cm², 7 psi)?

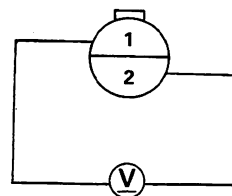
NO

Inspect the VTEC solenoid valve (see page 6-C-6).

YES

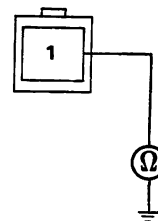
(To page 6-C-5)

VTEC PRESSURE SWITCH 2P CONNECTOR



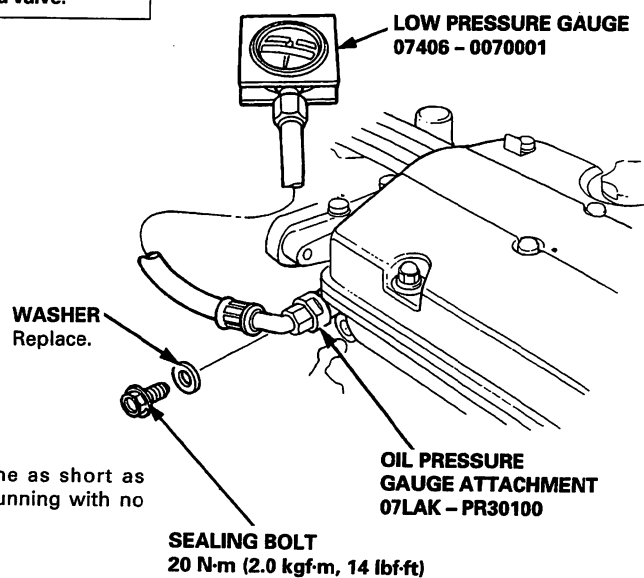
Wire side of female terminals

VTEC SOLENOID VALVE 1P CONNECTOR



Terminal side of male terminal

LOW PRESSURE GAUGE 07406 - 0070001



WASHER
Replace.

OIL PRESSURE GAUGE ATTACHMENT 07LAK - PR30100

SEALING BOLT
20 N-m (2.0 kgf-m, 14 lbf-ft)

NOTE: Keep measuring time as short as possible because engine is running with no load (less than one minute).



(From page 6-C-4)

Test the VTEC Solenoid Valve:

1. Turn the ignition switch OFF.
2. Disconnect the VTEC solenoid valve 1P connector.
3. Attach the battery positive terminal to the VTEC solenoid valve terminal.
4. Start the engine and check the oil pressure at engine speed of 5,000 rpm (min^{-1}).

Is the pressure above 250 kPa
(2.5 kgf/cm^2 , 36 psi)?

NO

Inspect the VTEC solenoid valve
(see page 6-C-6).

YES

Test the VTEC Pressure Switch:

With the battery positive terminal connected to the VTEC solenoid valve, measure voltage between the ECM connector terminal C10 and body ground.

Is there battery voltage above
5,000 rpm (min^{-1})?

NO

Replace the VTEC pressure switch.

YES

Test the VTEC Solenoid Valve Wire:

1. Turn the ignition switch OFF.
2. Check for continuity between the VTEC solenoid valve 1P connector terminal and the ECM connector terminal B12.

Is there continuity?

NO

Repair open in the wire between the ECM (B12) and VTEC solenoid valve connector.

YES

Test the VTEC Solenoid Valve Wire:

Check for continuity between the VTEC solenoid valve 1P connector terminal No. 1 and body ground.

Is there continuity?

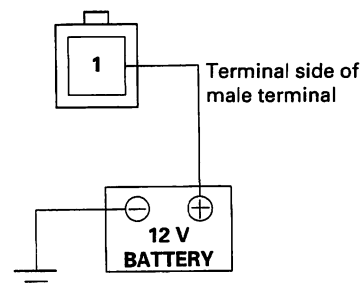
YES

Repair short in the wire between the ECM (B12) and VTEC solenoid valve connector.

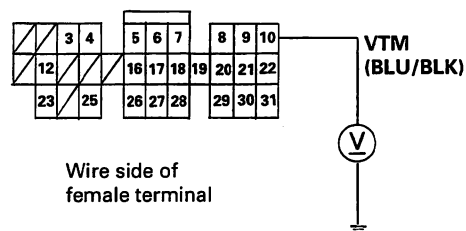
NO

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

**VTEC SOLENOID VALVE
1P CONNECTOR**

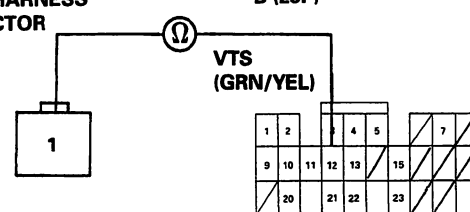


**ECM/PCM CONNECTOR
C (31P)**

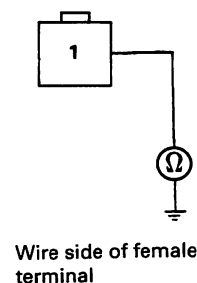


**VTEC SOLENOID
VALVE HARNESS
CONNECTOR**

**ECM/PCM CONNECTOR
B (25P)**



**VTEC SOLENOID VALVE
1P CONNECTOR**

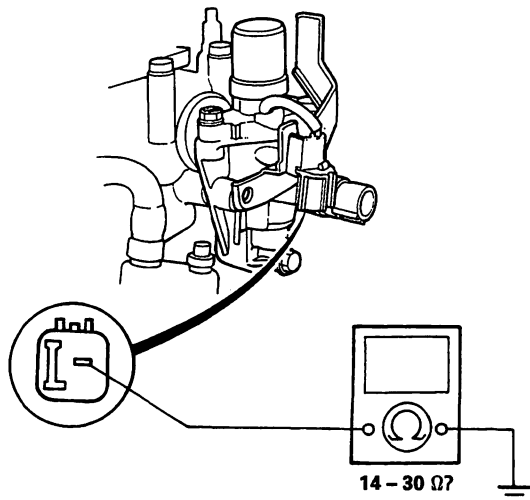


VTEC Solenoid Valve

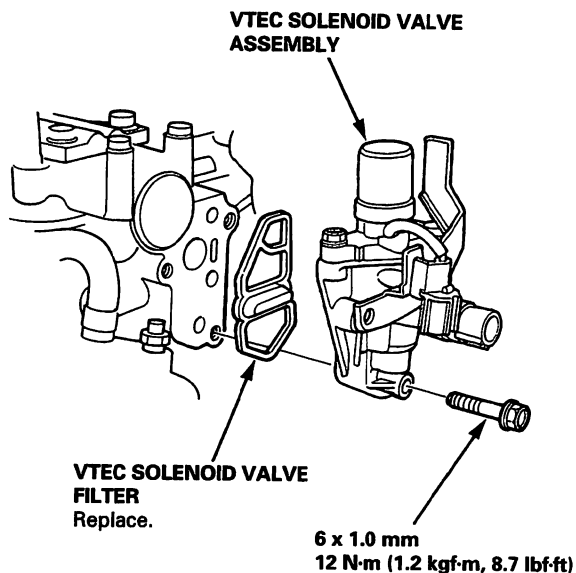
Inspection

1. Disconnect the 1P connector from the VTEC solenoid valve.
2. Measure resistance between the terminal and body ground.

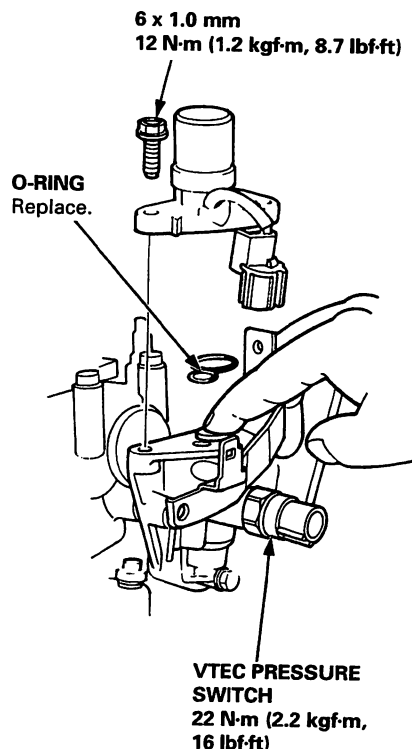
Resistance: 14 – 30 Ω



3. If the resistance is within specifications, remove the VTEC solenoid valve assembly from the cylinder head, and check the VTEC solenoid valve filter for clogging.
If there is clogging, replace the engine oil filter and the engine oil.



4. If the filter is not clogged, push the VTEC solenoid valve with your finger and check its movement.
If the VTEC solenoid valve is normal, check the engine oil pressure.

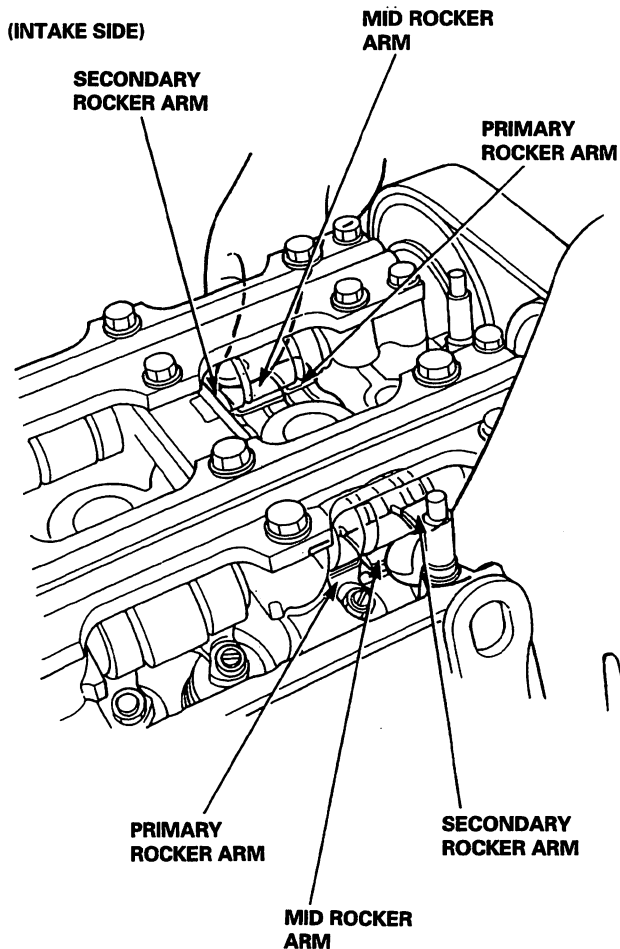




Manual Inspection

1. Set the No. 1 piston at TDC.
2. Remove the cylinder head cover.

NOTE: Refer to pages 6-C-45, 46 when installing the cylinder head cover.
3. Push the mid rocker arm on the No. 1 cylinder manually.
4. Check that the mid rocker arm moves independently of the primary and secondary intake rocker arms.



(EXHAUST SIDE)

5. Check the mid rocker arm of each cylinder at TDC.
 - If the mid rocker arm does not move, remove the mid, primary and secondary rocker arms as an assembly and check that the pistons in the mid and primary rocker arms move smoothly.
 - If any rocker arm needs replacing, replace the primary, mid, and secondary rocker arms as an assembly.

Inspection Using Special Tools

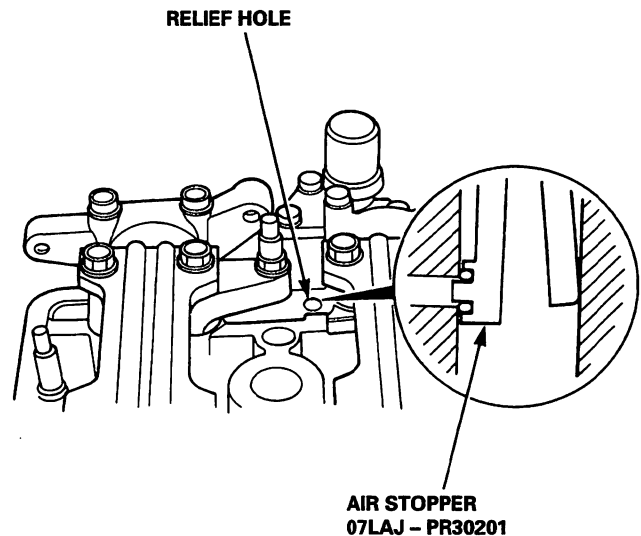
CAUTION:

- Before using the special tool (Valve Inspection Tool), make sure that the air pressure gauge on the air compressor indicates over 400 kPa (4 kgf/cm², 57 psi).
- Inspect the valve clearance before rocker arm inspection.
- Cover the timing belt with a shop towel to protect the belt from oil soaking.
- Check the mid rocker arm of each piston at TDC.

1. Remove the cylinder head cover.

NOTE: Refer to pages 6-C-45, 46 when installing the cylinder head cover.

2. Plug the relief hole with the special tool.

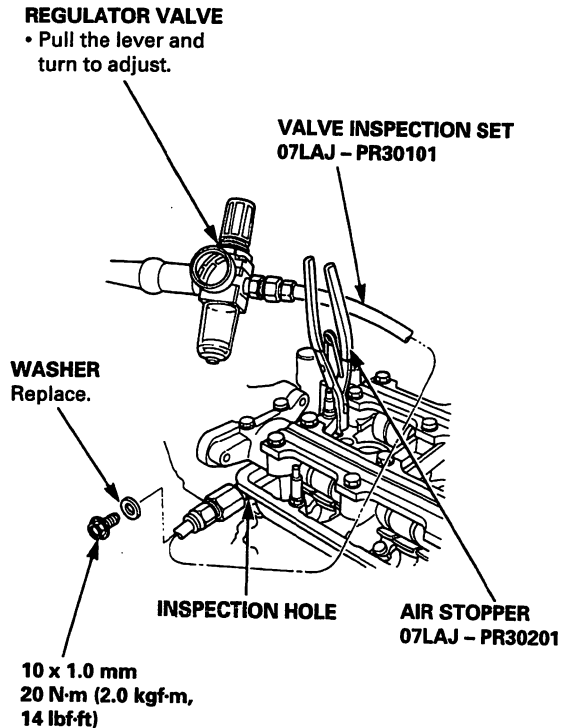


(cont'd)

VTEC Rocker Arms

Inspection Using Special Tools (cont'd)

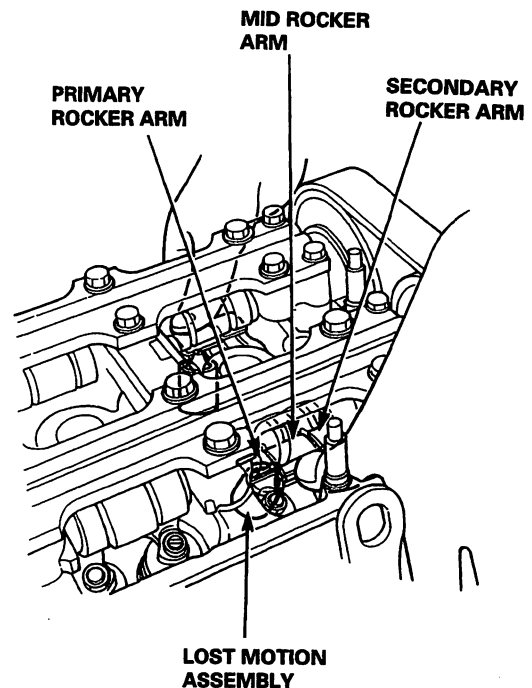
3. Remove the bolt and washer from the inspection hole and connect the special tool.



4. Loosen the regulator valve on the valve inspection set and apply the specified air pressure to the rocker arm pistons.

Specified Air Pressure:
250 kPa (2.5 kgf/cm², 36 psi)

5. Make sure that the intake primary and secondary rocker arms are mechanically connected by the pistons and that the mid rocker arms do not move when pushed manually.



- If any mid rocker arm moves independently of the primary and secondary rocker arms, replace the rocker arms, as a set.
6. Remove the tools.
 7. Check for smooth operation of the lost motion assembly. It is compressed slightly when the mid rocker arm is lightly pushed and compressed deeply when the mid rocker arm is strongly pushed.
- Replace the lost motion assembly if it does not move smoothly.
8. After inspection, check that the check engine light does not come on.

Valve Clearance



Adjustment

NOTE:

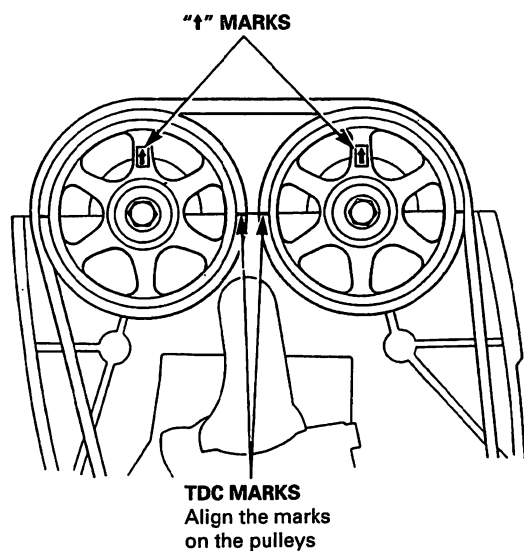
- Valves should be adjusted only when the cylinder head temperature is less than 38°C (100°F).
- After adjusting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).

1. Remove the cylinder head cover.

NOTE: Refer to pages 6-C-45, 46 when installing the cylinder head cover.

2. Set No. 1 piston at TDC. "↑" marks on the pulleys should be at the top, and the TDC grooves on the pulleys should align with the cylinder head surface.

Number 1 piston at TDC:



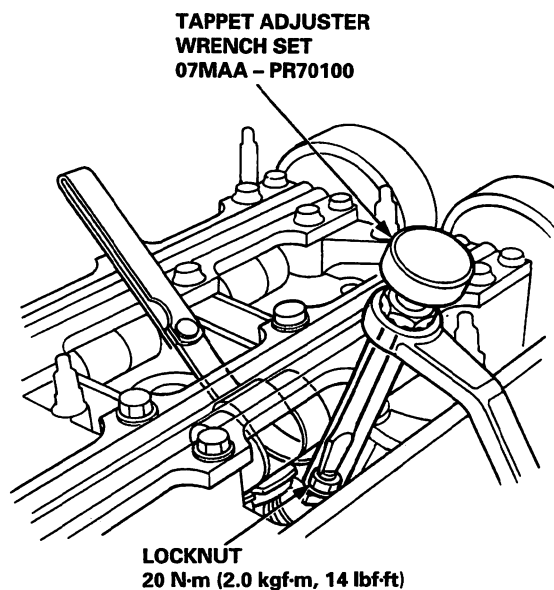
3. Adjust valves on No. 1 cylinder.

Valve Clearance:

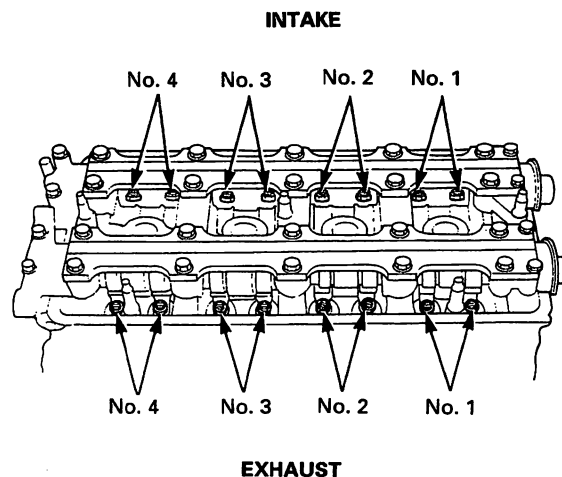
Intake: 0.17 mm (0.007 in) ± 0.02 mm (0.0008 in)

Exhaust: 0.19 mm (0.007 in) ± 0.02 mm (0.0008 in)

4. Loosen the locknut and turn the adjusting screw until a feeler gauge slides back and forth with a slight amount of drag.



Adjusting screw location:

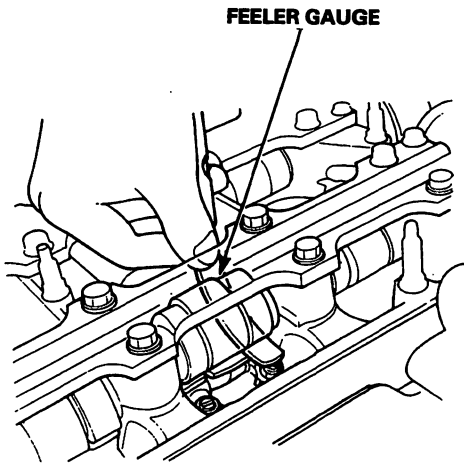


(cont'd)

Valve Clearance

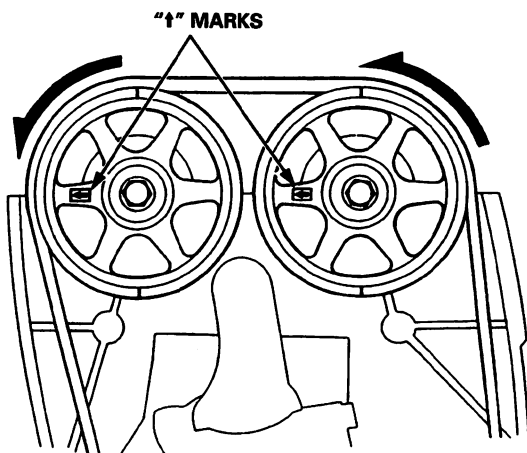
Adjustment (cont'd)

5. Tighten the locknut, and check the clearance again. Repeat the adjustment if necessary.



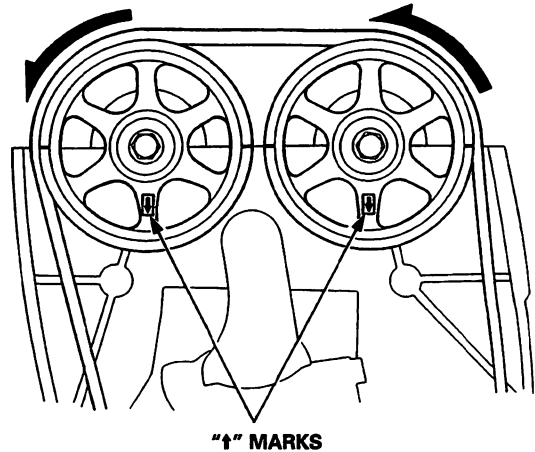
6. Rotate the crankshaft 180° counterclockwise (camshaft pulleys turn 90°). The "↑" marks should be on the exhaust side. Adjust the valves on No. 3 cylinder.

Number 3 piston at TDC:



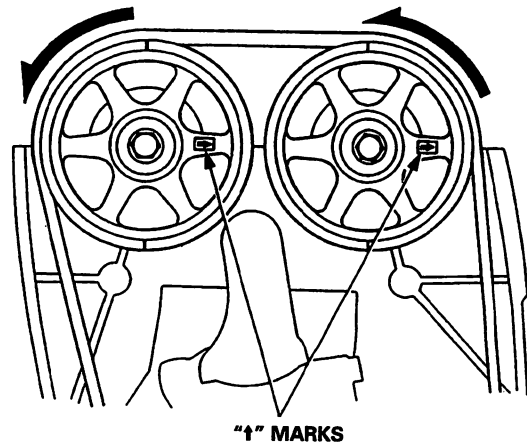
7. Rotate the crankshaft 180° counterclockwise to bring No. 4 piston to TDC. The TDC grooves are once again aligned. Adjust the valves on No. 4 cylinder.

Number 4 piston at TDC:



8. Rotate the crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "↑" marks should be on the intake side. Adjust the valves on No. 2 cylinder.

Number 2 piston at TDC:





Crankshaft Pulley and Pulley Bolt

Replacement

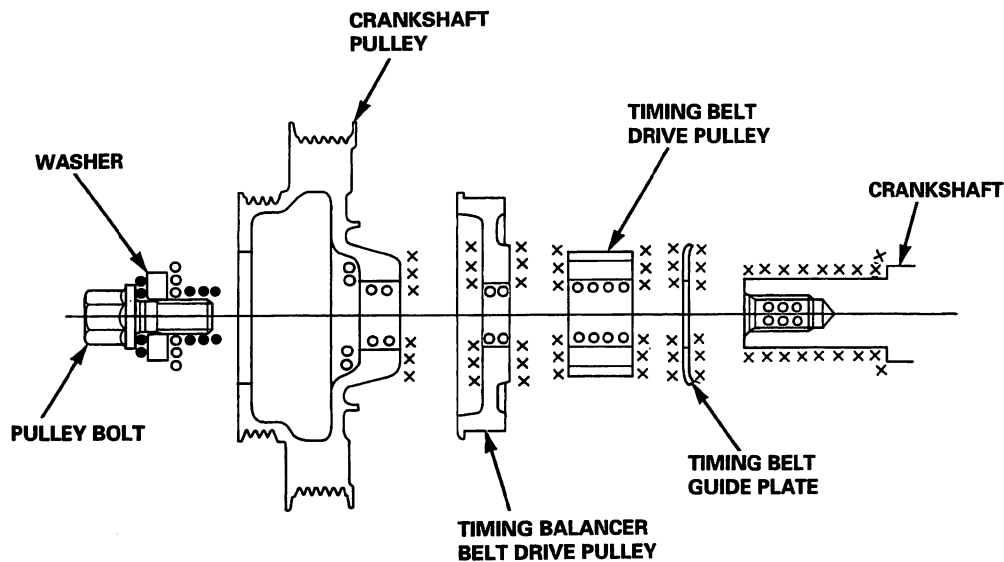
When installing and tightening the pulley, follow the procedure below.

Clean, remove any oil and lubricate all the points shown below.

○: Clean

×: Remove any oil

●: Lubricate

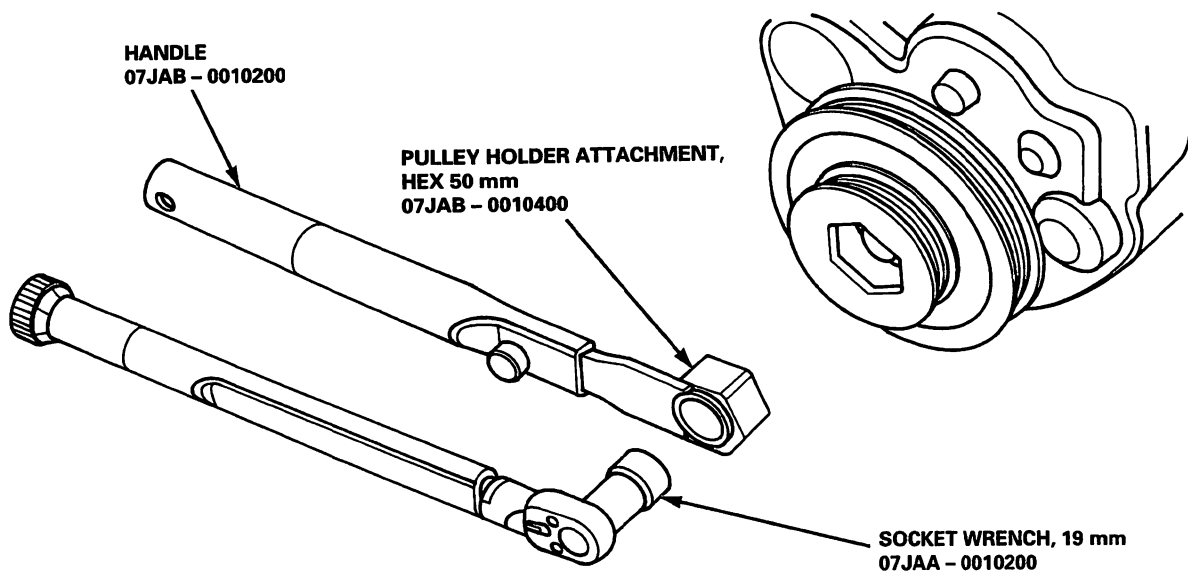


Crankshaft pulley bolt size and torque value:

16 x 1.5 mm

245 N·m (25.0 kgf·m, 181 lbf·ft)

NOTE: Do not use an impact wrench when installing.

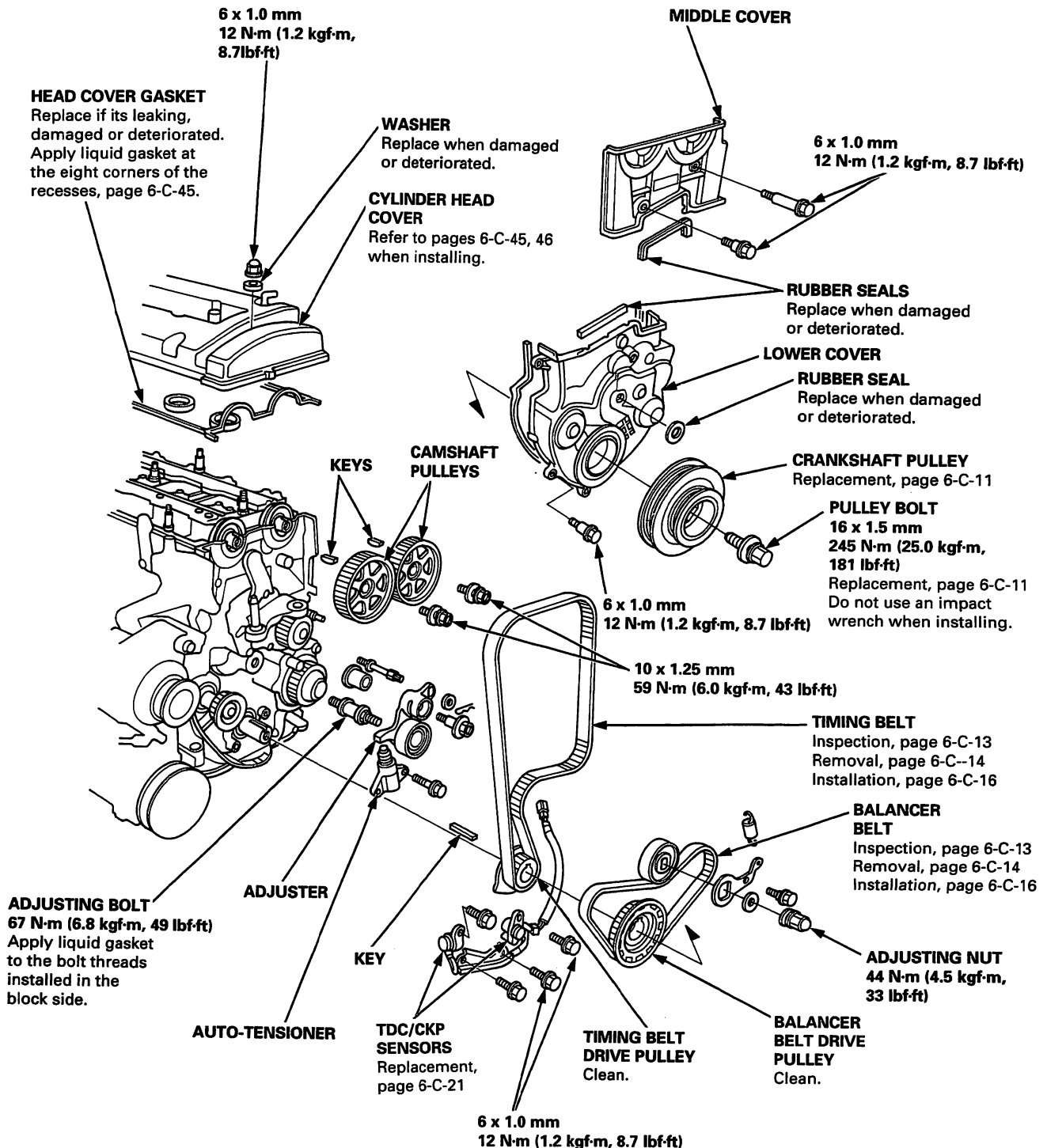


Timing Belt and Balancer Belt

Illustrated Index

NOTE:

- Refer to page 6-C-16 for how to position the crankshaft and pulley before installing the belt.
- Mark the direction of rotation on the belt before removing it.
- Do not use the middle cover and lower cover to store removed items.
- Clean the middle cover and lower cover before installing them.
- Replace the camshaft seals and crankshaft seals if there is oil leakage.
- Refer to page 6-C-11 before installing the timing belt and timing balancer belt.





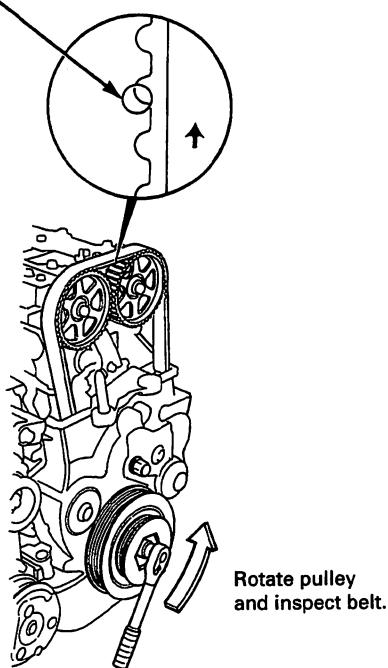
Timing Belt Inspection

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
4. Remove the cylinder head cover.
 - Refer to pages 6-C-45, 46 when installing.
5. Remove the middle cover.
6. Inspect the timing belt for cracks and oil or coolant soaking.

NOTE:

- Replace the belt if oil or coolant soaked.
- Remove any oil or solvent that gets on the belt.

Inspect this area for wear.



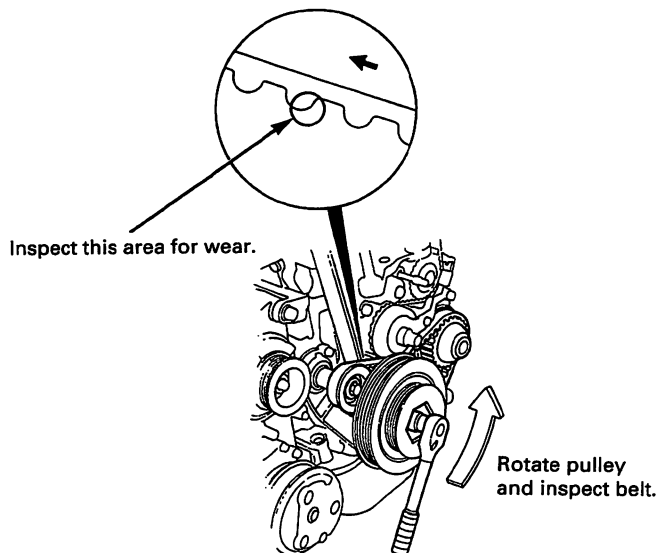
7. After inspecting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).
8. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Balancer Belt Inspection

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
4. Remove the cylinder head cover.
 - Refer to pages 6-C-45, 46 when installing.
5. Remove the middle cover.
6. Remove the crankshaft pulley.
7. Remove the lower cover.
8. Install the crankshaft pulley.
9. Inspect the balancer belt for cracks and oil or coolant soaking.

NOTE:

- Replace the belt if oil or coolant soaked.
- Remove any oil or solvent that gets on the belt.



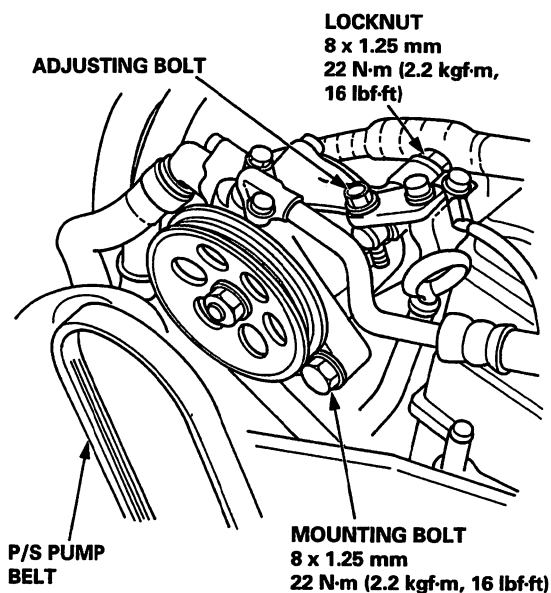
10. After inspecting, retorque the crankshaft pulley bolt to 245 N·m (25.0 kgf·m, 181 lbf·ft).
11. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Timing Belt and Balancer Belt

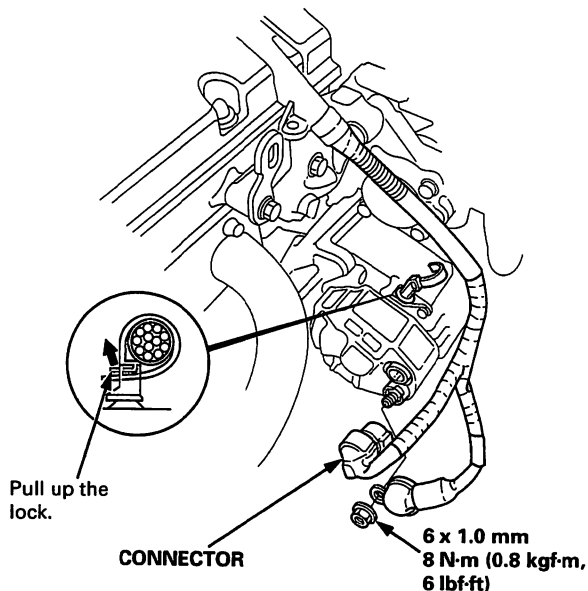
Removal

NOTE:

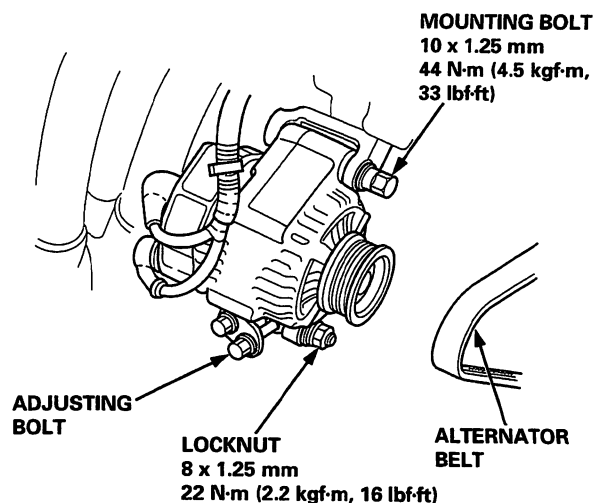
- Turn the crankshaft pulley so the No. 1 piston is at top dead center (TDC) before removing the belt (see page 6-C-17).
 - Inspect the water pump after removing the timing belt (see page 10-17).
1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
 2. Disconnect the battery negative terminal first, then the positive terminal.
 3. Remove the wheel well splash shield.
 4. Loosen the adjusting bolt, locknut and mounting bolt, then remove the power steering (P/S) pump belt.



5. Remove the alternator terminal and connector.



6. Loosen the adjusting bolt, mounting bolt and locknut, then remove the alternator belt.

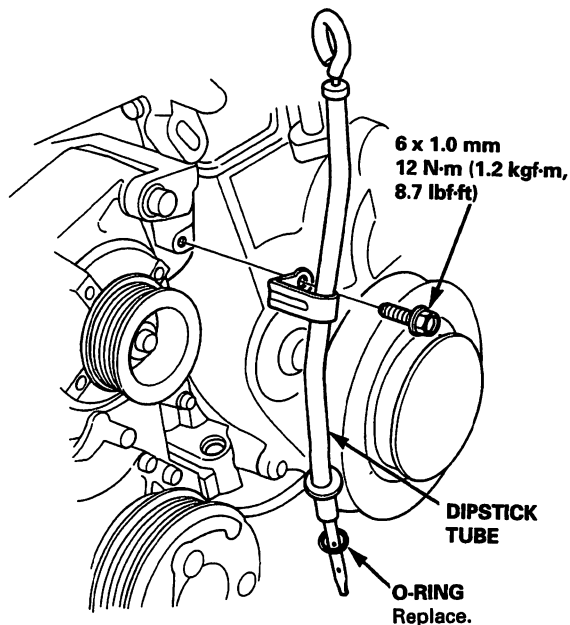


7. Remove the stop and ground cable, then remove the upper bracket (see page 6-C-27).

NOTE:

- Use a jack to support the engine before the upper bracket is removed.
- Make sure to place a cushion between the oil pan and the jack.

8. Remove the dipstick and tube.



9. Remove the cylinder head cover.
 - Refer to pages 6-C-45, 46 when installing.



NOTE: The procedures in steps 10 and 11 are for reusing the timing belt. For replacing the timing belt, skip these procedures and go to step 12.

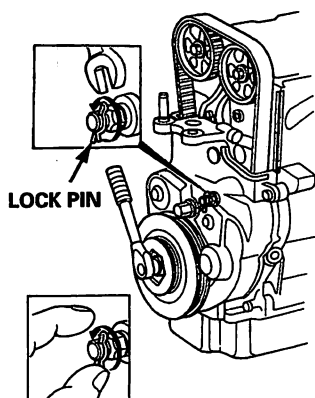
10. Use an open-end wrench to loosen the maintenance bolt. If it cannot be loosened with an open-end wrench, a box wrench can be used after removing the lock pin.

NOTE: Use of a tool should be limited to initial loosening only.

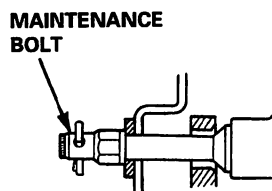
11. Unscrew the maintenance bolt by hand until it stops. The auto-tensioner bracket is now fixed.

NOTE:

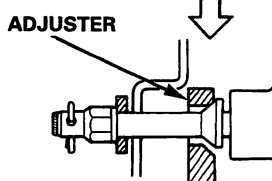
- Never use a tool to unscrew the maintenance bolt after initial loosening it.
- If the auto-tensioner has been extended and the timing belt cannot be installed, remove the auto-tensioner, compress it and reinstall it (see page 6-C-16).



Auto-tensioner functional:



Auto-tensioner fixed in place:



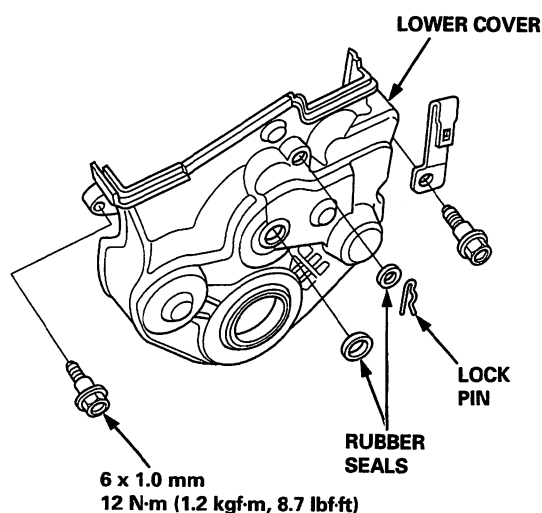
12. Remove the middle cover.

NOTE: Do not use the middle cover to store removed items.

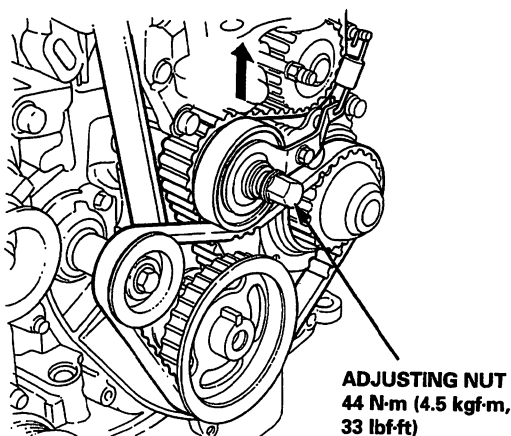
13. Remove the pulley bolt and crankshaft pulley (see page 6-C-11).

14. Remove the lock pin and rubber seals, then remove the lower cover.

NOTE: Do not use the lower cover to store removed items.



15. Loosen the adjusting nut 2/3-1 turn. Push the tensioner to remove tension from the balancer belt, then retighten the adjusting nut.



16. Remove the balancer belt and timing belt.

Timing Belt and Balancer Belt

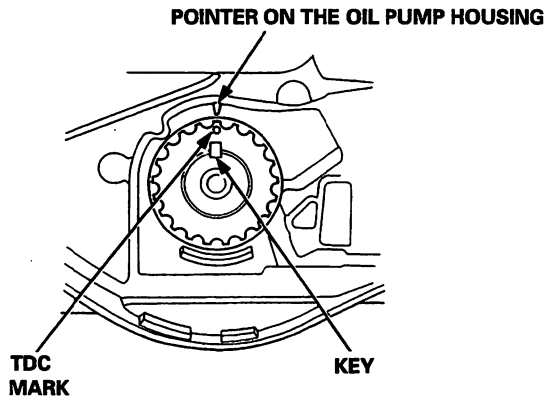
Installation

NOTE: This procedure is to replace the timing belt. If you are reusing the timing belt, go to page 6-C-19.

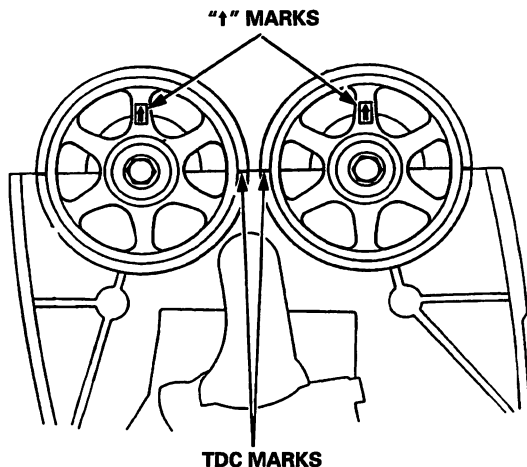
Install the timing belt and balancer belt in the reverse order of removal;
Only key points are described here.

NOTE: Clean the middle and lower covers before installation.

1. Remove the balancer belt drive pulley (see pages 6-C-12).
2. Set the timing belt drive pulley so that the No. 1 piston is at top dead center (TDC). Align the dimple on the teeth of the timing belt drive pulley with the ∇ pointer on the oil pump.



3. The "↑" marks on the camshaft pulleys should be at the top, and the TDC grooves on the pulleys should align with the cylinder head surface.



4. Remove the auto-tensioner.
5. Hold the auto-tensioner with the maintenance bolt pointing up. Loosen and remove the maintenance bolt.

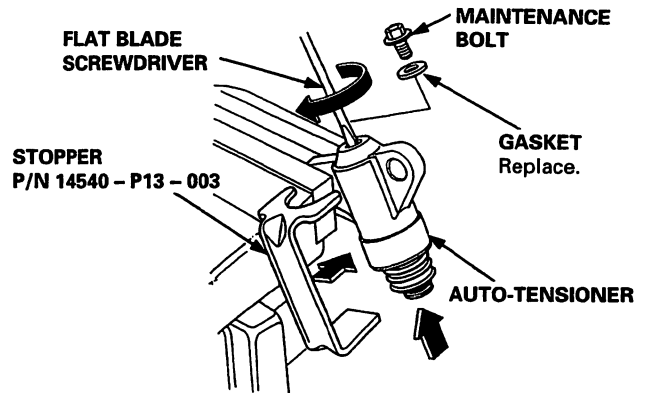
NOTE: Handle the auto-tensioner carefully so the oil inside does not spill or leak.
Replenish the auto-tensioner with oil if any spills or leaks. The total capacity is 8 ml (1/4 fl oz).

6. Clamp the boss of the auto-tensioner in a vise. Use pieces of wood or a cloth to protect the boss.

NOTE: Do not grip the housing of the auto-tensioner.

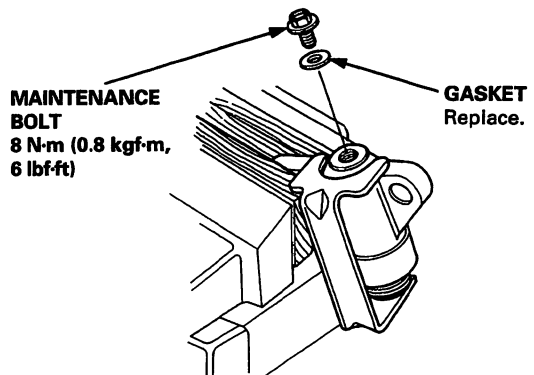
7. Insert a flat blade screwdriver into the maintenance hole. Place the stopper (P/N 14540 - P13 - 003) on the auto-tensioner while turning the screwdriver clockwise to compress the bottom.

NOTE: Take care not to damage the threads or the gasket contact surface with the screwdriver.



8. Reinstall the maintenance bolt.

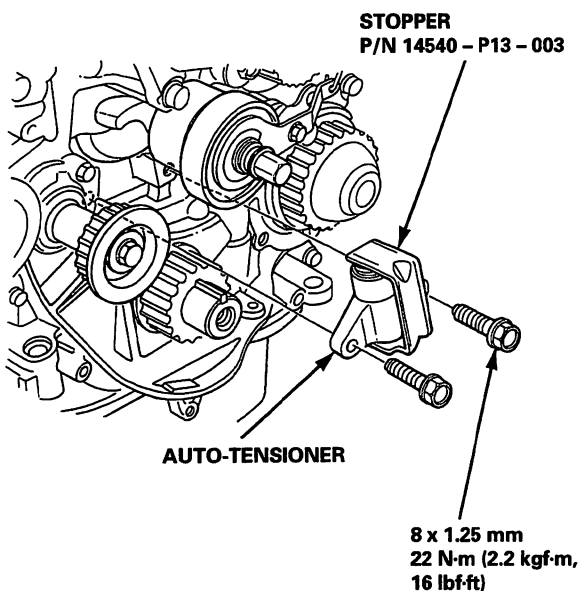
NOTE: Be sure to use a new gasket.





9. Make sure no oil is leaking around the maintenance bolt, then install the auto-tensioner.

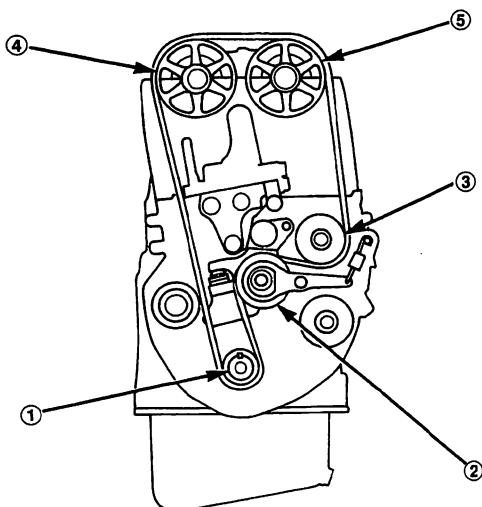
NOTE: Make sure the stopper stays in place.



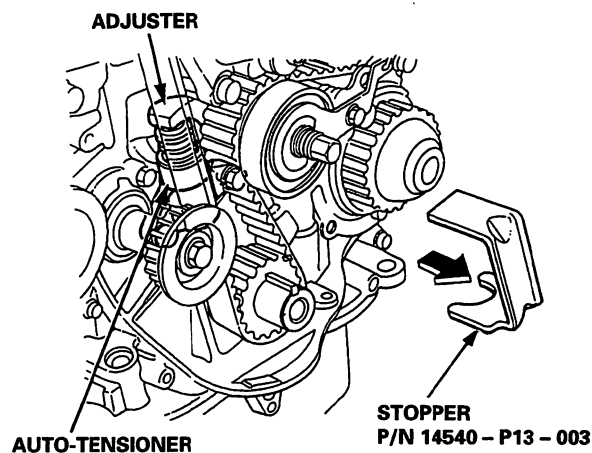
10. Install the timing belt tightly in the sequence shown.

① Timing belt drive pulley (crankshaft) → ② Adjusting pulley → ③ Water pump pulley → ④ Exhaust camshaft pulley → ⑤ Intake camshaft pulley.

NOTE: Make sure the timing belt drive pulley and camshaft pulleys are at TDC.



11. Remove the stopper.



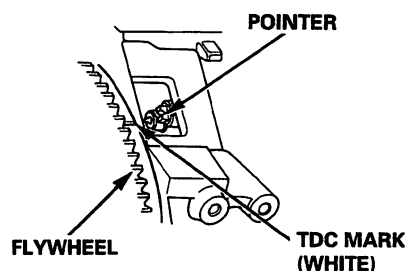
12. Install the balancer belt drive pulley and lower cover.

13. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-C-11).

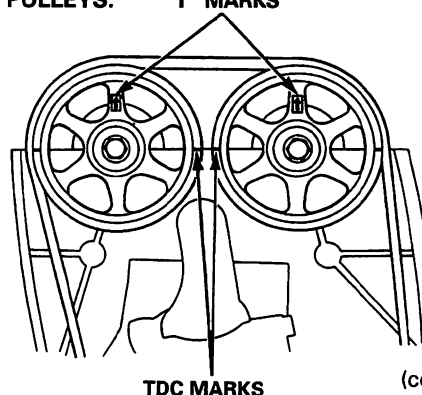
14. Rotate the crankshaft pulley about five or six turns counterclockwise so that the timing belt positions on the pulleys.

15. Make sure the crankshaft and camshaft pulleys are at TDC.

CRANKSHAFT:



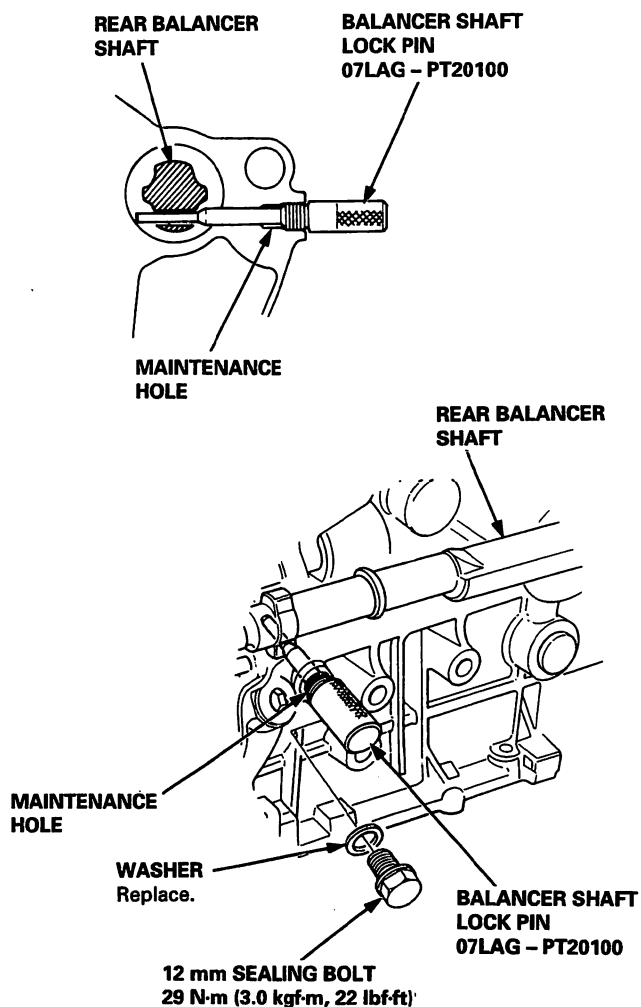
CAMSHAFT PULLEYS:



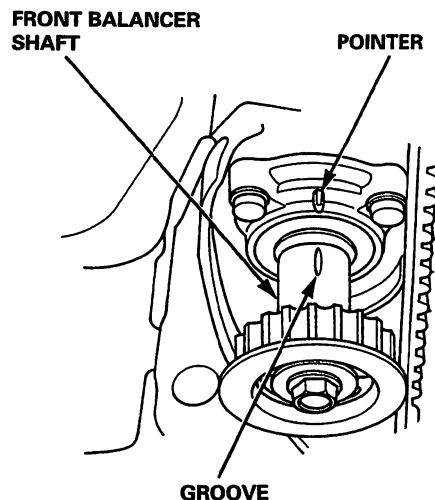
Timing Belt and Balancer Belt

Installation (cont'd)

16. If either camshaft and crankshaft pulley is not positioned at TDC, remove the timing belt and adjust the positioning following the procedure on page 6-C-16, then reinstall the timing belt.
17. Set the crankshaft pulley so that the No. 1 piston is at TDC.
18. Remove the crankshaft pulley and lower cover.
19. Loosen the adjusting nut 2/3-1 turn and verify that the balancer belt adjuster moves freely.
20. Retighten the adjusting nut.
21. Align the rear balancer shaft pulley by using a special tool. Insert the special tool into the maintenance hole to fix the rear balancer shaft.



22. Align the groove on the front balancer shaft with the pointer on the oil pump housing as shown.



23. Install the balancer belt. Loosen the adjusting nut 2/3-1 turn to tension the balancer belt.
 24. Remove the special tool, then install the 12 mm sealing bolt.
 25. Install the lower cover and crankshaft pulley, then tighten the pulley bolt (see page 6-C-11).
 26. Turn the crankshaft pulley about one turn counter-clockwise, then tighten the adjusting nut.
 27. Install the rubber seal around the adjusting nut.
- NOTE: Do not loosen the adjusting nut.
28. After installation, adjust the tension of each belt.
 - See section 4 for alternator belt tension adjustment
 - See section 17 for P/S pump belt tension adjustment.
 29. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

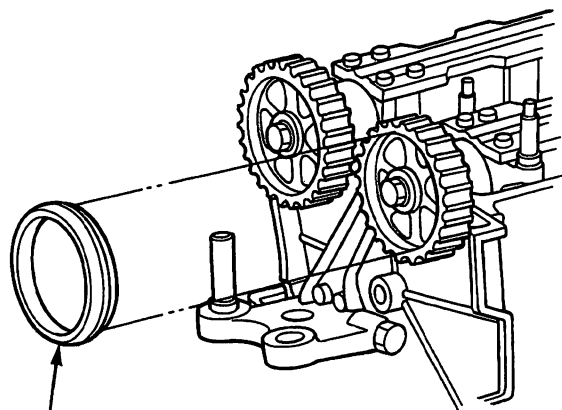


NOTE: Use this procedure when reusing the timing belt.

Install the timing belt and balancer belt in the reverse order of removal;
Only key points are described here.

NOTE: Clean the middle and lower covers before installation.

1. Remove the balancer belt drive pulley (see pages 6-C-12).
2. Set the timing belt drive pulley so that the No. 1 piston is at TDC (see page 6-C-16).
3. Set the camshaft pulleys so that the No. 1 piston is at TDC (see page 6-C-16).
4. Install the special tool on the intake camshaft pulley.

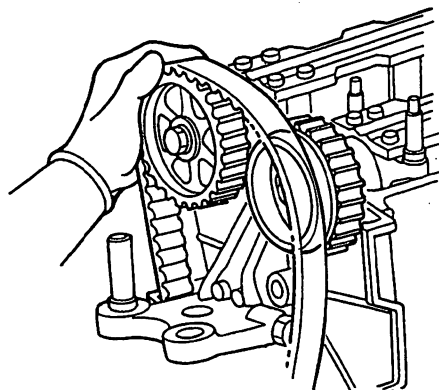


**TIMING BELT
SLIDER
07NAG - P130100**

5. Install the timing belt (see page 6-C-17).

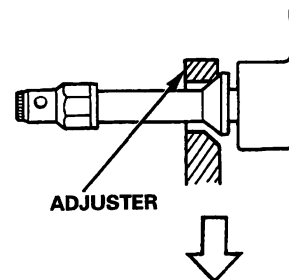
NOTE:

- If the auto-tensioner has extended and the timing belt cannot be installed, remove and compress the auto-tensioner (see page 6-C-16).
- Take care not to damage the timing belt when installing it.
- Make sure the timing belt drive pulley and camshaft pulleys are at TDC.

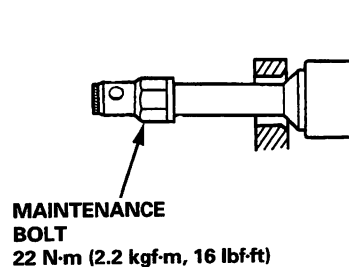


6. Remove the special tool.
7. Tighten the maintenance bolt to make the auto-tensioner functional.

Auto-tensioner
fixed in place:



Auto-tensioner
functional:



(cont'd)

Timing Belt and Balancer Belt

Installation (cont'd)

8. Install the balancer belt drive pulley and lower cover.
9. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-C-11).
10. Rotate the crankshaft pulley about five or six turns counterclockwise so that the timing belt positions on the pulleys.
11. Make sure the crankshaft pulley and camshaft pulleys are at TDC (see page 6-C-17).
12. If either camshaft and crankshaft pulley is not positioned at TDC, remove the timing belt and adjust the positioning following the procedure on page 6-C-16, then reinstall the timing belt.
13. Set the crankshaft pulley so that the No. 1 piston is at TDC.
14. Remove the crankshaft pulley and lower cover.
15. Loosen the adjusting nut $2/3$ -1 turn and verify that the balancer belt adjuster moves freely.
16. Retighten the adjusting nut.
17. Align the rear balancer shaft pulley by using a special tool. Insert the special tool into the maintenance hole to fix the rear balancer shaft (see page 6-C-18).
18. Align the groove on the front balancer shaft pulley with the pointer on the oil pump housing (see page 6-C-18).
19. Install the balancer belt. Loosen the adjusting nut $2/3$ -1 turn to tension the balancer belt.
20. Remove the special tool, then install the 12 mm sealing bolt.
21. Install the lower cover and crankshaft pulley, then tighten the pulley bolt (see page 6-C-11).
22. Turn the crankshaft pulley about one turn counterclockwise, then tighten the adjusting nut.
23. Install the rubber seal around the adjusting nut.

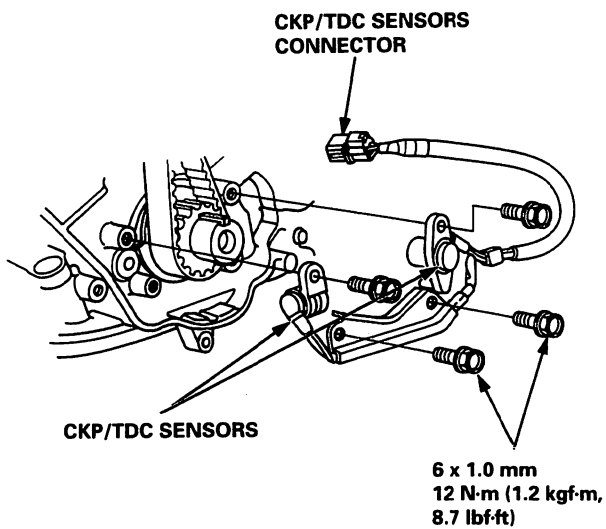
NOTE: Do not loosen the adjusting nut.

24. After installation, adjust the tension of each belt.
 - See section 4 for alternator belt tension adjustment.
 - See section 17 for P/S pump belt tension adjustment.
25. Enter the anti-theft code for the radio, then enter the customer's radio station presets.



Replacement

1. Removal the balancer belt (see page 6-C-14).
2. Remove the balancer belt drive pulley.
3. Disconnect the CKP/TDC sensors connector, then remove the CKP/TDC sensors.



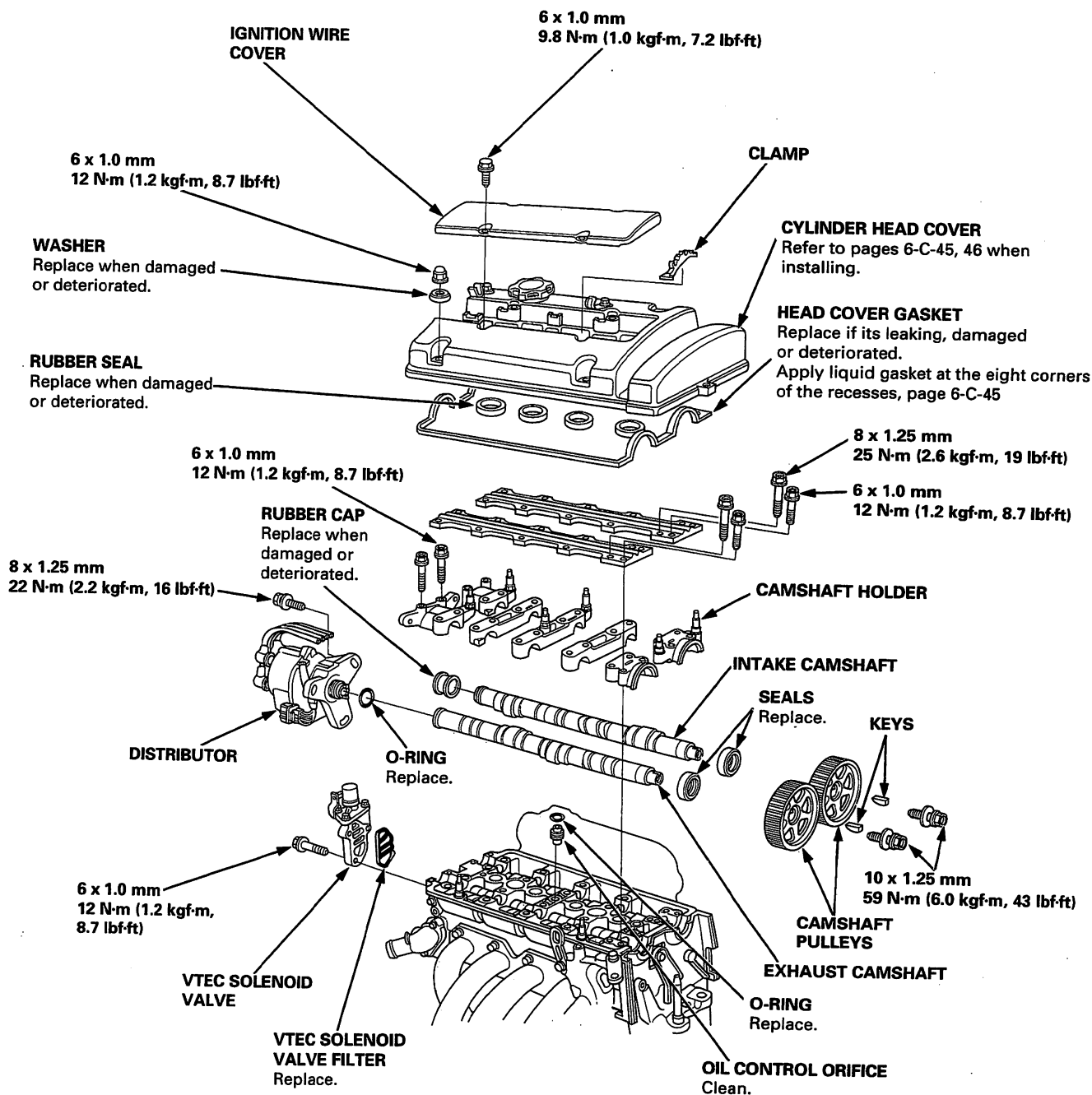
4. Install the CKP/TDC sensors in reverse order of removal.
5. Install the balancer belt (see page 6-C-16).

Cylinder Head

Illustrated Index

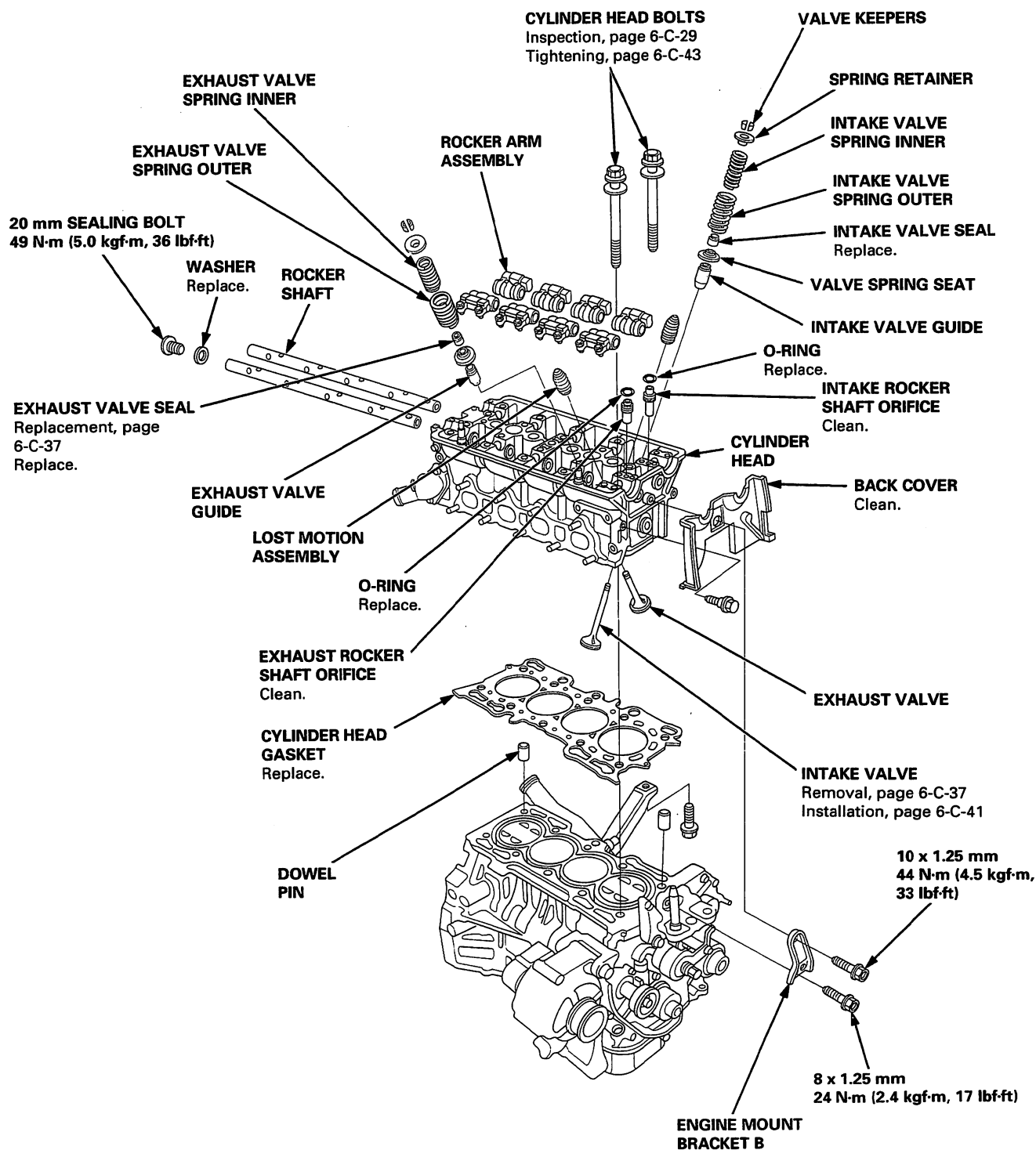
NOTE:

- To avoid damage, wait until the engine coolant temperature drops below 38°C (100°F) before removing the cylinder head.
- When handling a metal gasket, take care not to fold it or damage the contact surface.
- Use new O-rings and gaskets when reassembling.





Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact parts.



Cylinder Head

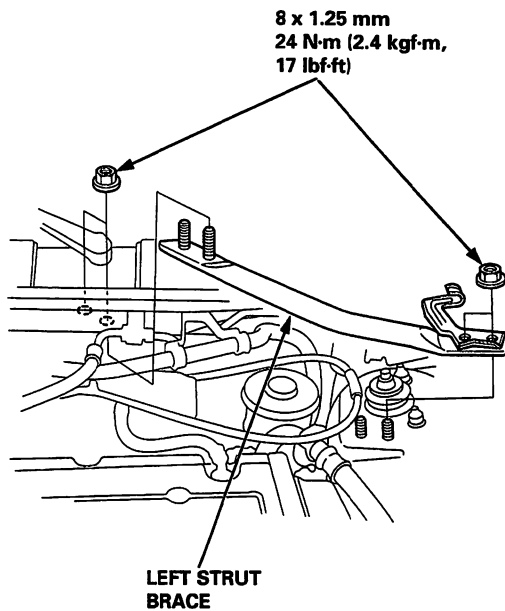
Removal

Engine Removal is not required this procedure.

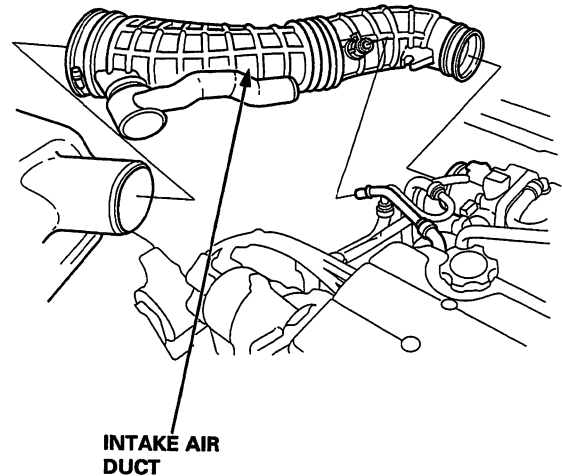
NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 38°C (100°F) before loosening the retaining bolts.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

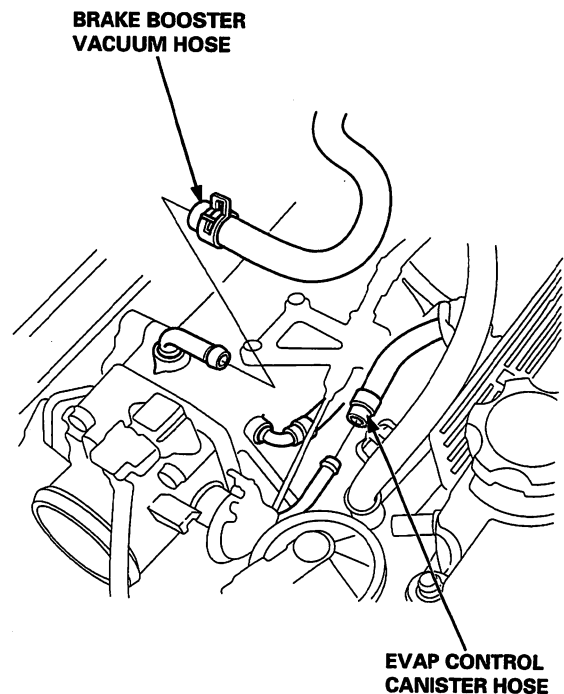
1. Secure the hood in the open position.
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
3. Disconnect the battery negative terminal first, then the positive terminal.
4. Drain the engine coolant (see page 10-7).
5. Remove the left strut brace.



6. Remove the intake air duct.

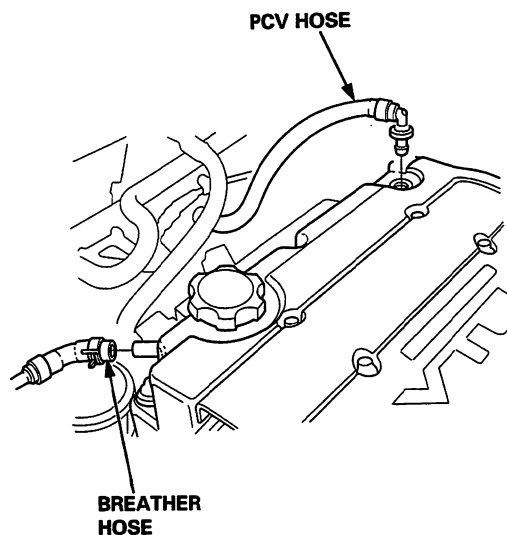


7. Remove the brake booster vacuum hose and evaporative emission (EVAP) control canister hose.

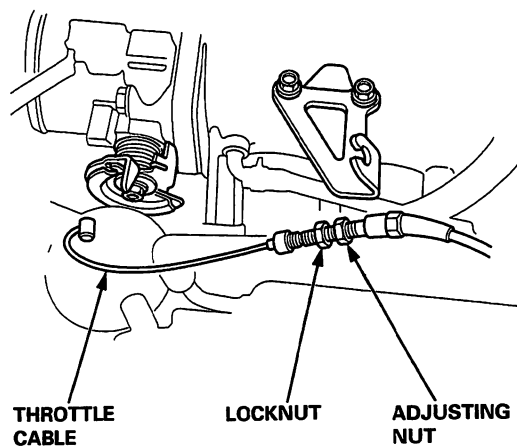




8. Remove the breather hose and positive crankcase ventilation (PCV) hose.

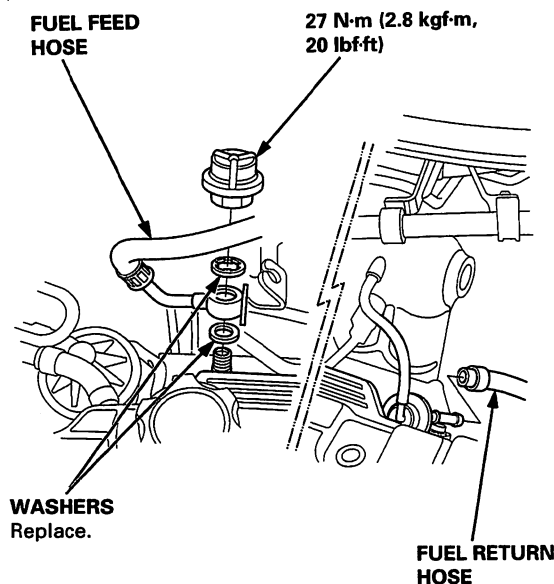


9. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage. Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.

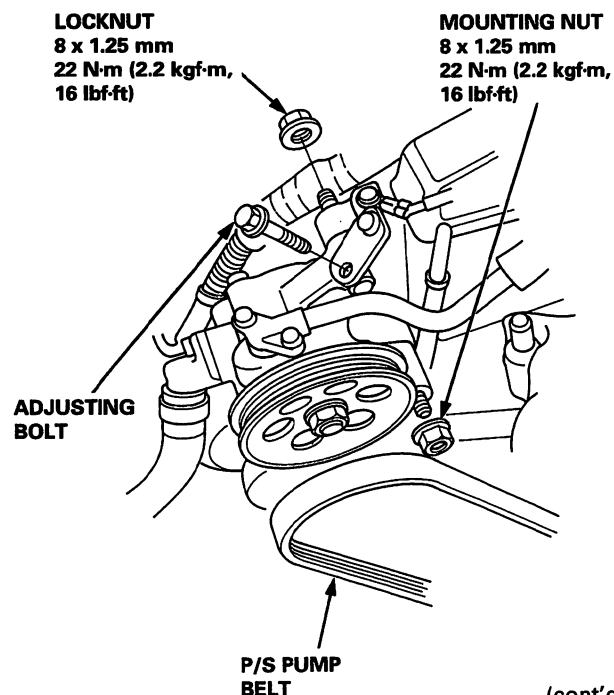


10. Relieve fuel pressure (see section 11).

11. Remove the fuel feed hose and fuel return hose.



12. Remove the adjusting bolt, mounting nut and locknut, then remove the power steering (P/S) pump belt and pump without disconnecting the P/S hoses.

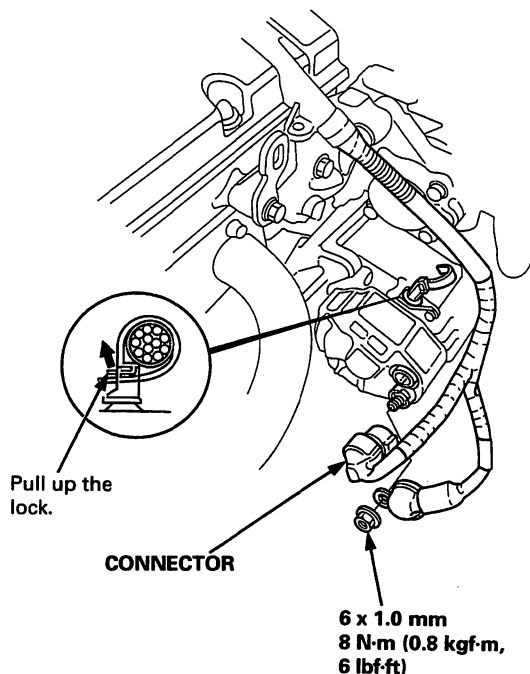


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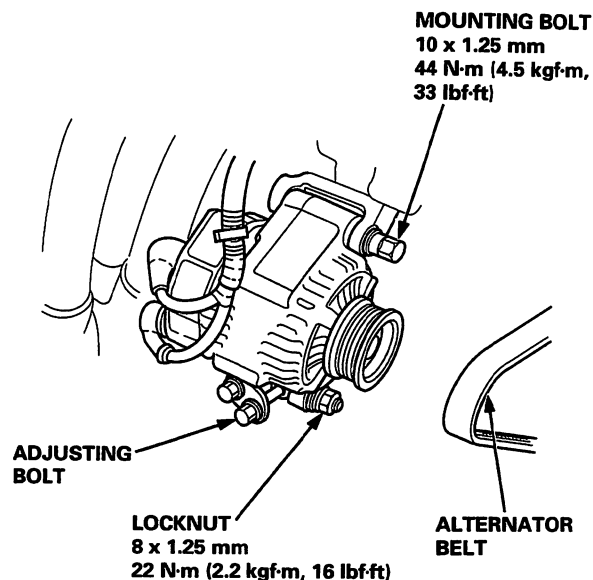
Cylinder Head

Removal (cont'd)

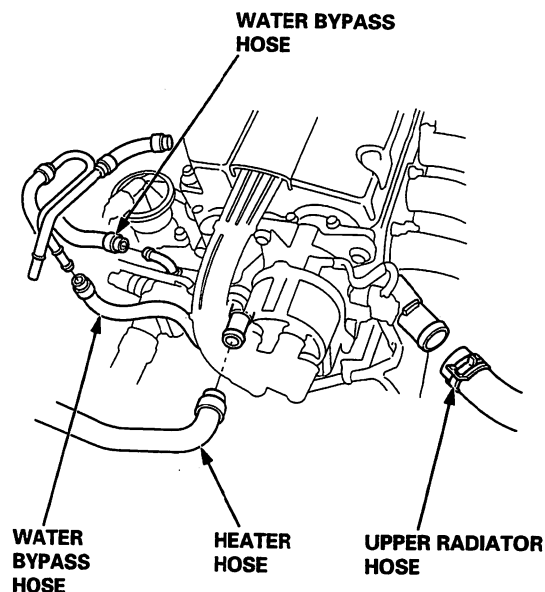
13. Remove the alternator terminal and connector.



14. Loosen the mounting bolt, locknut and adjusting bolt, then remove the alternator belt.



15. Remove the upper radiator hose, heater hose and water bypass hoses.



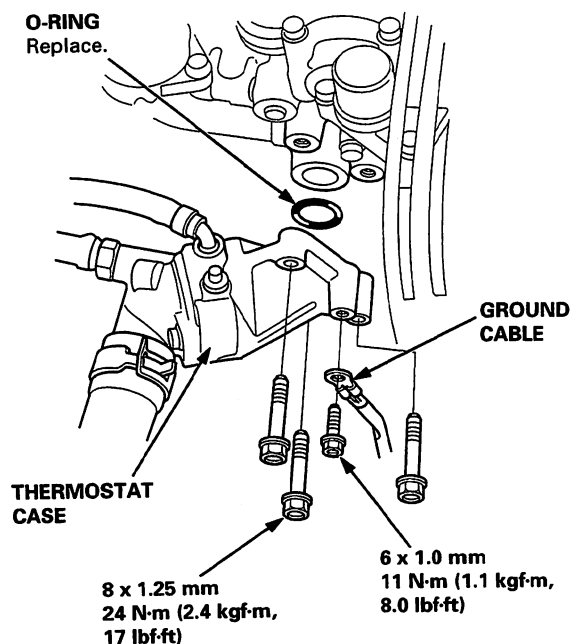
16. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.

- Four fuel injector connectors
- Intake air temperature (IAT) sensor connector
- Idle air control (IAC) valve connector
- Throttle position sensor connector
- Manifold absolute pressure (MAP) sensor connector
- Engine coolant temperature (ECT) sensor connector
- Radiator fan switch connector
- Coolant temperature gauge sending unit connector
- Exhaust gas recirculation (EGR) connector
- Heated oxygen sensor (HO2S) connector
- CKP/TDC sensor connector
- VTEC solenoid valve connector
- VTEC pressure switch connector

17. Remove the spark plug caps and distributor from the cylinder head.

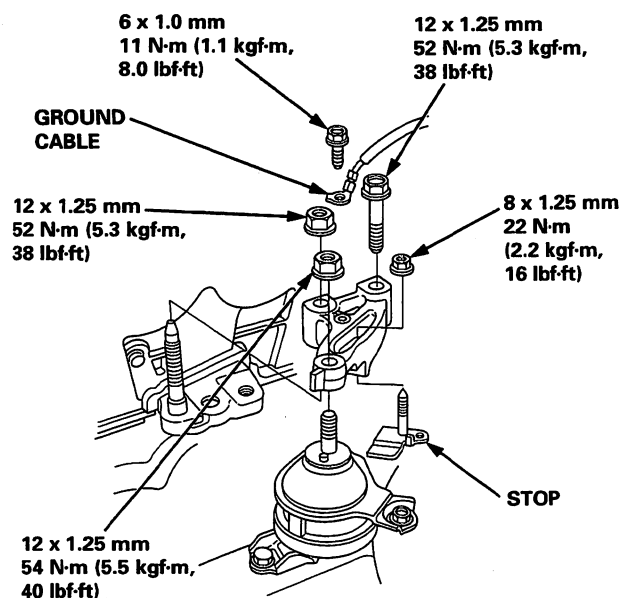


18. Remove the ground cable, then remove the thermostat housing mounting bolts.

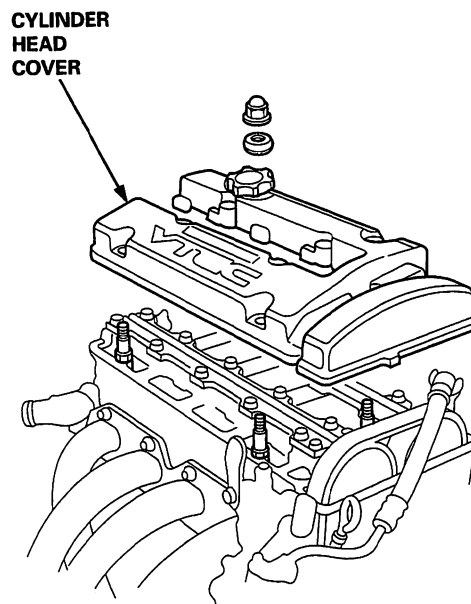


19. Support the engine with the jack and wood block under the oil pan.

20. Remove the stop and ground cable, then remove the upper bracket.

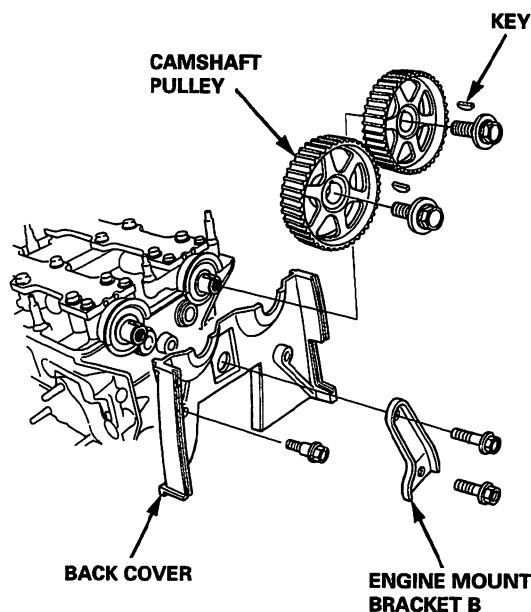


21. Remove the cylinder head cover.



22. Remove the timing belt (see page 6-C-14).

23. Remove the camshaft pulleys, engine mount bracket B and back cover.

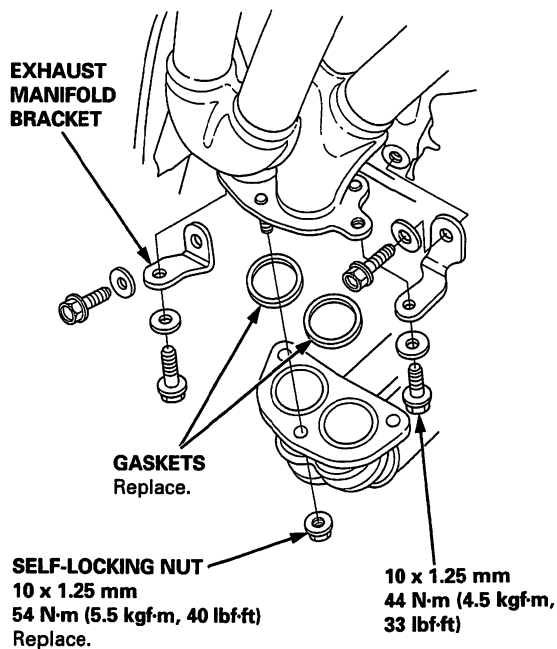


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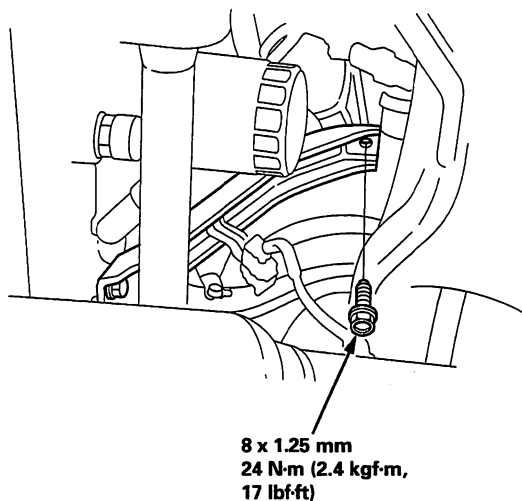
Cylinder Head

Removal (cont'd)

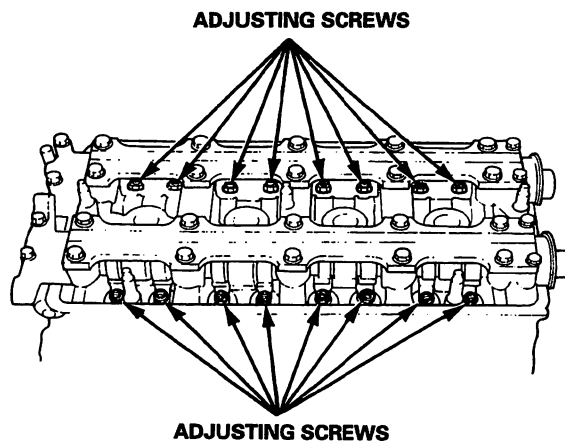
24. Remove the exhaust manifold brackets and self-locking nuts.



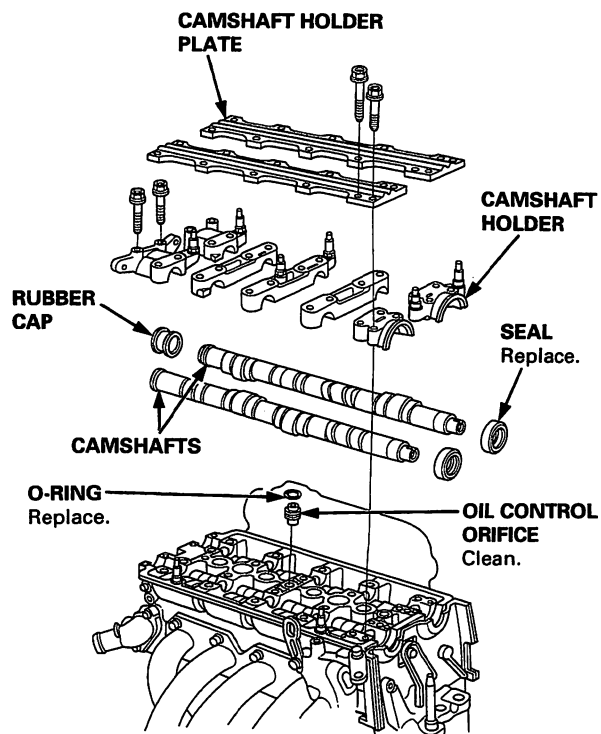
25. Remove the intake manifold bracket bolt.



26. Loosen the rocker arm adjusting screws.

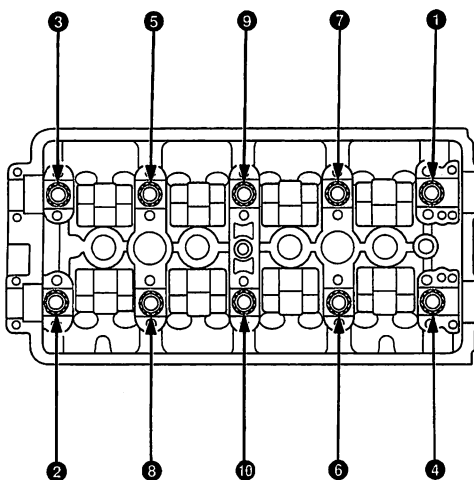


27. Remove the camshaft holder plates, camshaft holders and camshafts.





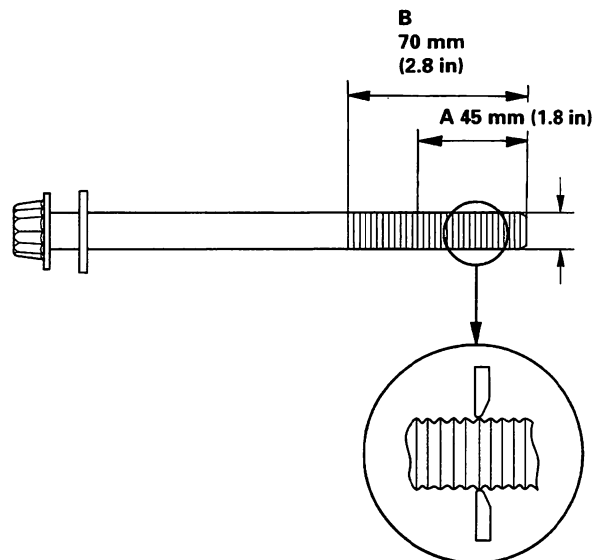
28. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time: repeat the sequence until all bolts are loosened.



29. Remove the cylinder head.

Inspection

1. Measure the diameter of each cylinder head bolt at point A and point B.



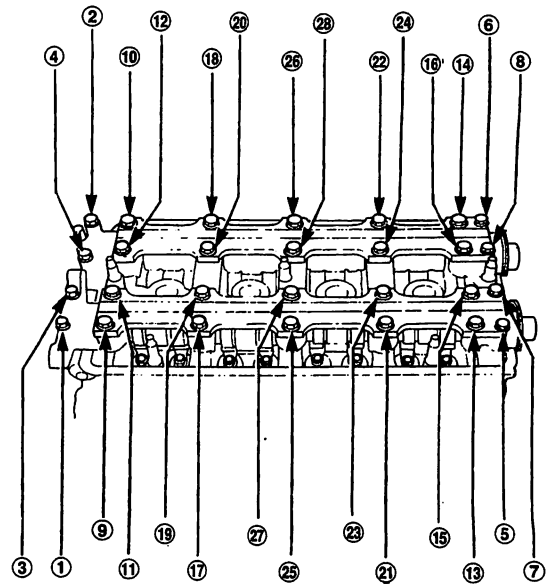
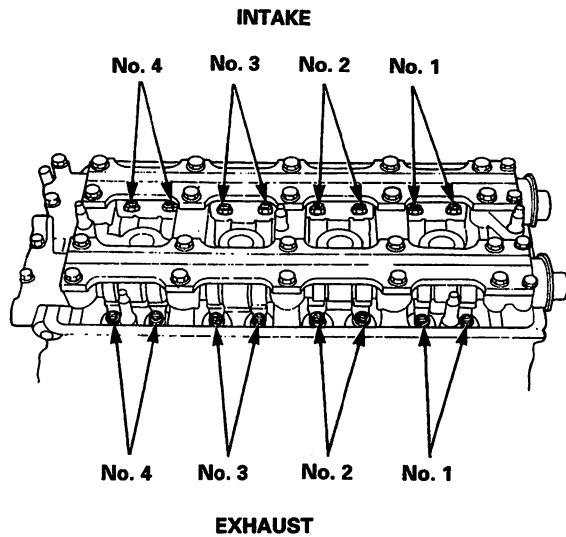
2. If either diameter is less than 11.3 mm (0.44 in), replace the cylinder head bolt.

Rocker Arms and Shafts

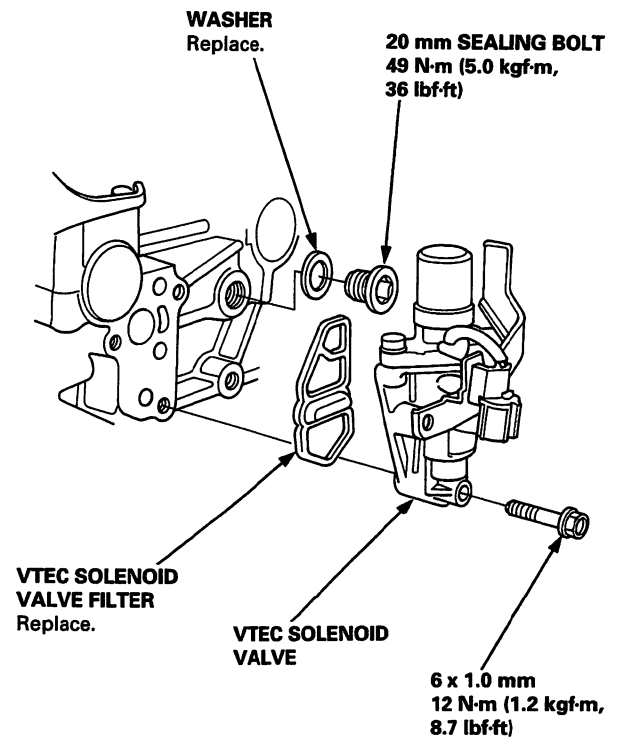
Removal

1. Loosen the adjusting screws, then remove the camshaft holder plates, camshaft holders and camshafts.

NOTE: Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern, to prevent damaging the valves or rocker arm assembly.

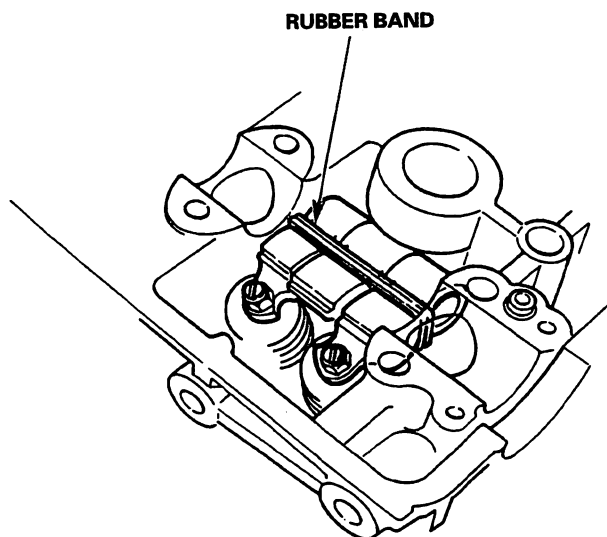


2. Remove the VTEC solenoid valve and 20 mm sealing bolt.



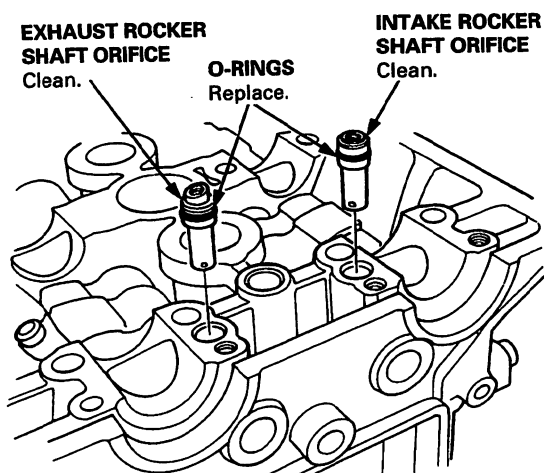


3. Hold the rocker arms together with a rubber band to prevent them from separating.

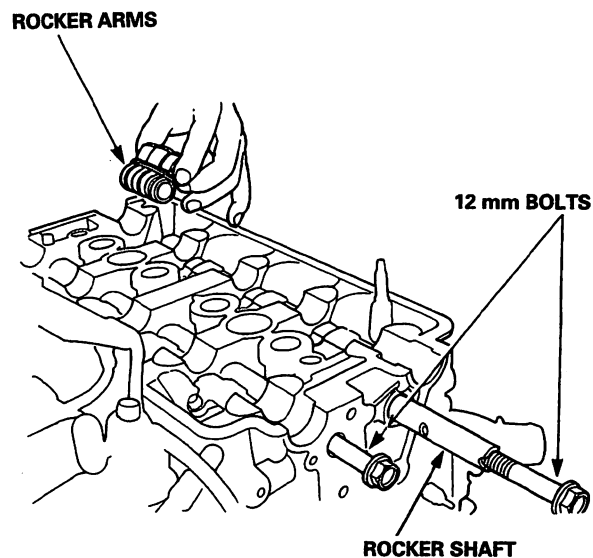


4. Remove the intake and exhaust rocker shaft orifices.

NOTE: The shapes of the rocker shaft orifices of the intake and exhaust are different. Identify the parts as they are removed to ensure reinstallation in the original locations.



5. Screw 12 mm bolts into the rocker arm shafts. Remove each rocker arm while slowly pulling out the intake and exhaust rocker arm shafts.



Rocker Arms and Shafts

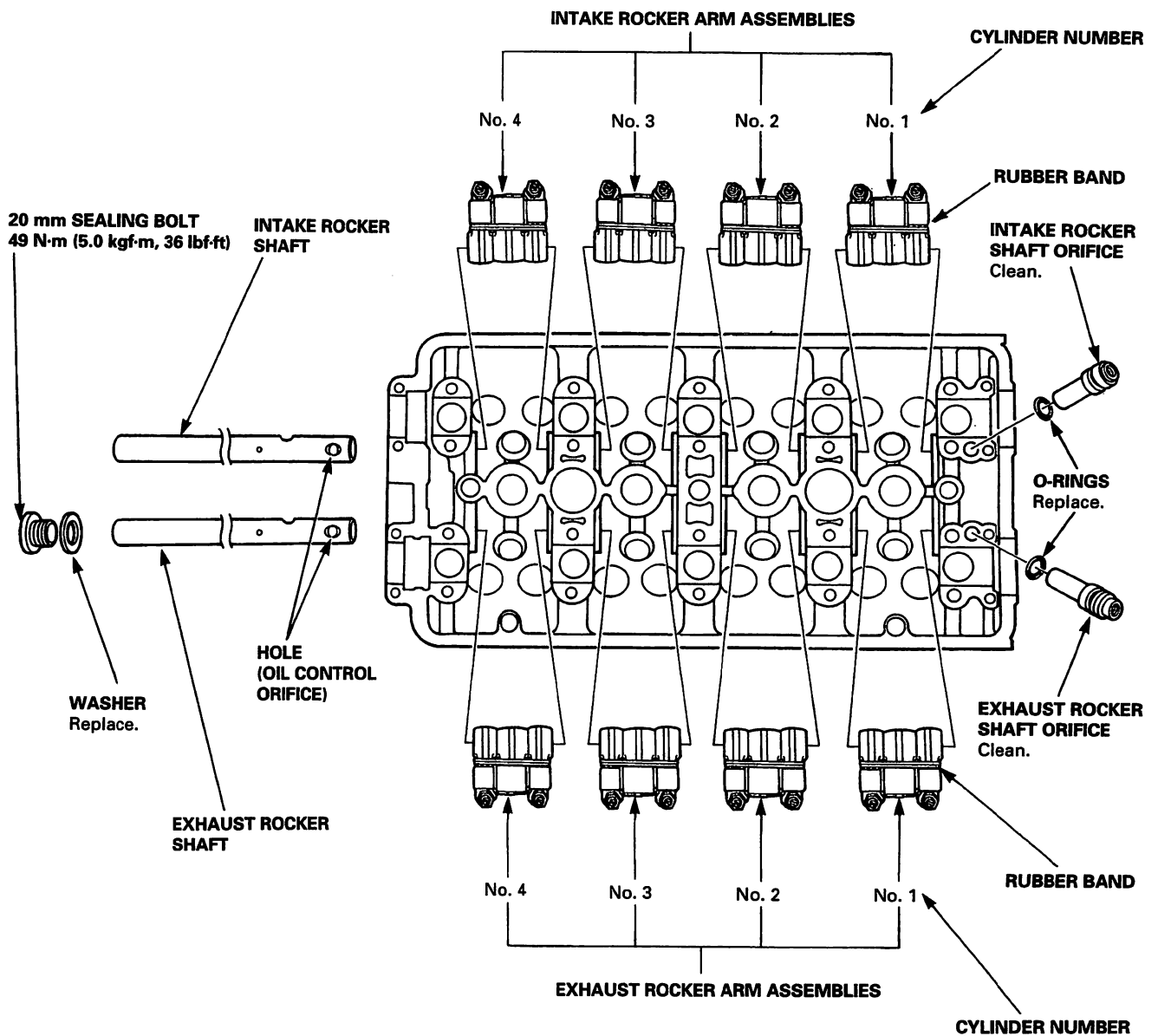
Disassembly/Reassembly

NOTE:

- Identify parts as they are removed to ensure reinstallation in original locations.
- Inspect rocker shafts and rocker arms (see page 6-C-33).
- Rocker arms must be installed in the same position if reused.
- Clean the intake and exhaust rocker shaft orifices before installing.
- After installing the rocker shaft orifice, try to turn the rocker shaft to make sure that the orifice has been inserted in the hole of rocker shaft correctly. If the orifice is in place, it should not turn.



Prior to reinstalling, clean all the parts in solvent, dry them and apply lubricant to any contact surfaces.

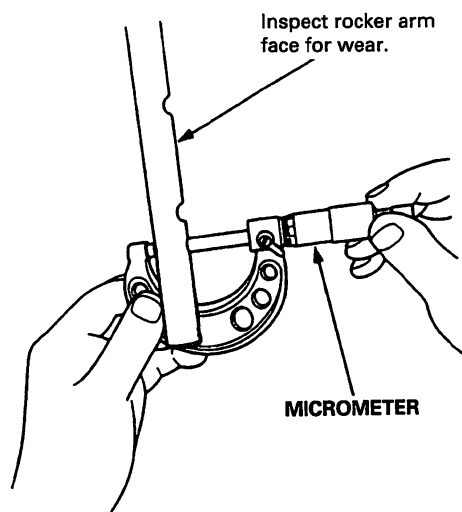




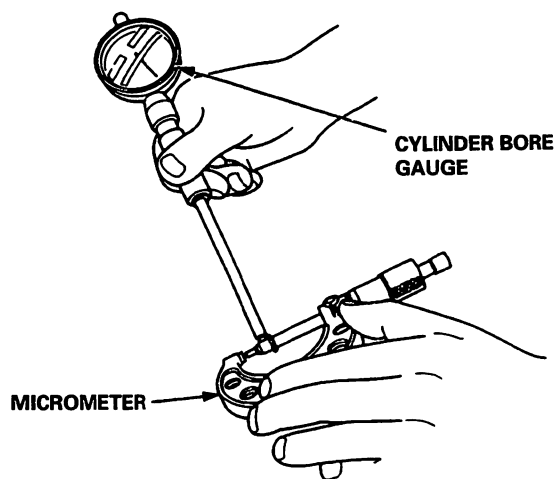
Clearance Inspection

Measure both the intake rocker shaft and exhaust rocker shaft.

1. Measure diameter of shaft at first rocker location.



2. Zero gauge to shaft diameter.



3. Measure inside diameter of rocker arm and check for out-of round condition.

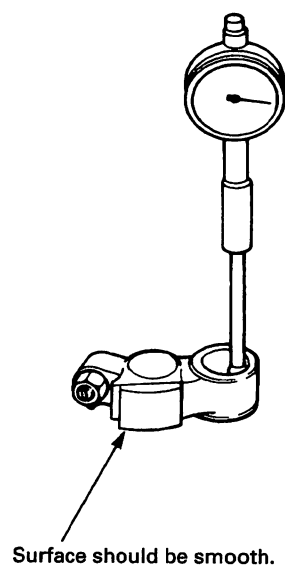
Rocker Arm-to-Shaft Clearance:

Intake and Exhaust

Standard (New): 0.025 – 0.052 mm

(0.0010 – 0.0020 in)

Service Limit: 0.08 mm (0.003 in)



Repeat for all rockers.

— If over limit, replace rocker shaft and all overtolerance rocker arms.

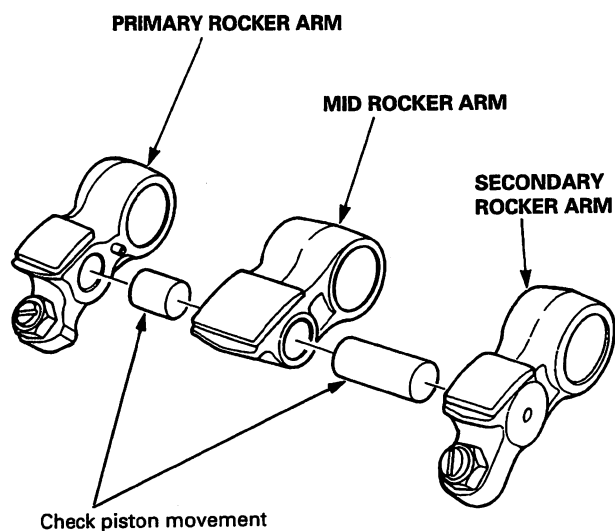
NOTE: If any rocker arm needs replacement, replace all three rocker arms in that set (primary, mid, and secondary).

Rocker Arms

Inspection

NOTE: When reassembling the primary rocker arm, carefully apply air pressure to the oil passage of the rocker arm.

1. Inspect the rocker arm piston. Push it manually.
 - If it does not move smoothly, replace the rocker arm assembly.



NOTE;

- Apply oil to the pistons when reassembling.
- Bundle the rocker arms with a rubber band to prevent them from separating.



Inspection

NOTE: Do not rotate the camshaft during inspection.

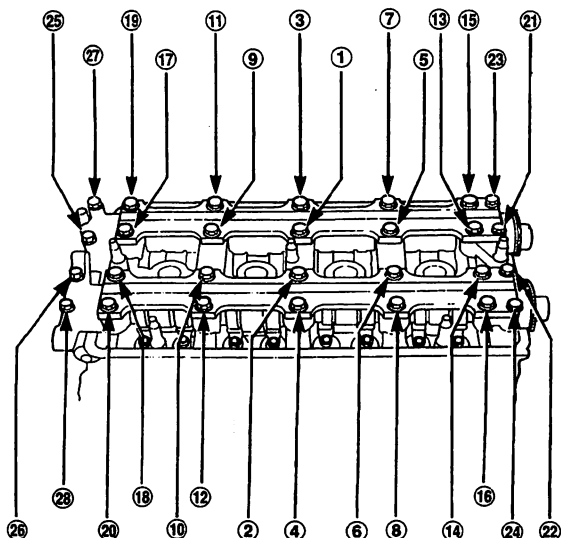
1. Remove the rocker arms and rocker shafts.

NOTE: Rocker arms must be installed in the same position if reused.

2. Put the camshafts, camshaft holders and holder plates on the cylinder head, then tighten the bolts to the specified torque.

Specified torque:

- ① - ②⑩: 8 x 1.25 mm
25 N·m (2.6 kgf·m, 19 lbf·ft)
- ②① - ②⑧: 6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)

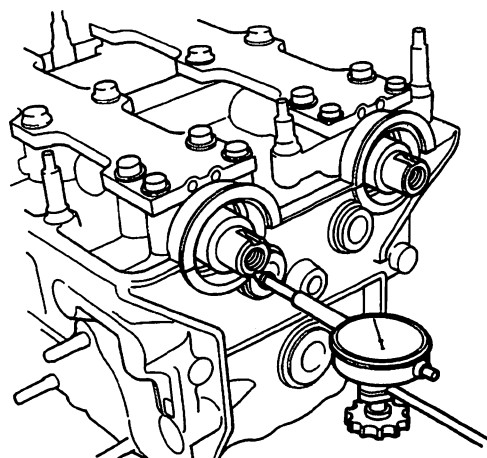


3. Seat the camshafts by pushing them toward the distributor end of the cylinder head.
4. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth. Read the end play.

Camshaft End Play:

Standard (New): 0.05 – 0.15 mm
(0.002 – 0.006 in)

Service Limit: 0.5 mm (0.02 in)



5. Remove the camshaft holders and holder plates bolts from the cylinder head.
6. Lift the camshaft out of the cylinder head, wipe it clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
7. Clean the camshaft holder surfaces in the cylinder head, then set the camshaft back in place.
8. Place a plastigage strip across each journal.
9. Install the camshaft holders and holder plates. Torque the bolts to the values and in the sequence shown in left column.

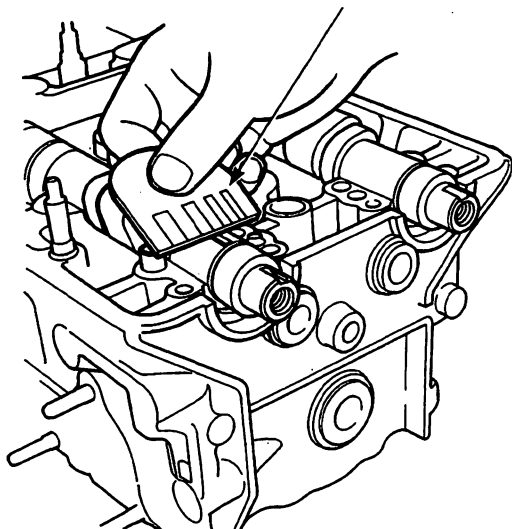
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Camshafts

Inspection (cont'd)

10. Measure widest the portion of the plastigage on each journal.

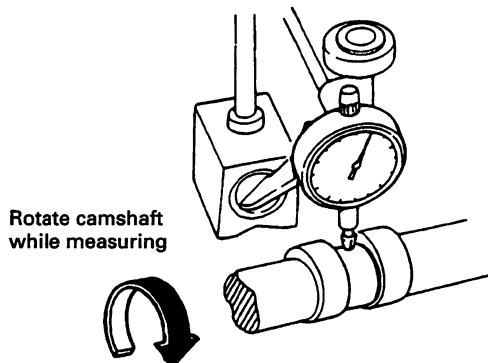
Camshaft-to-Holder Oil Clearance:
Standard (New): 0.050 – 0.089 mm
 (0.0020 – 0.0035 in)
Service Limit: 0.15 mm (0.006 in)



11. If camshaft-to-holder oil clearance is out of tolerance:

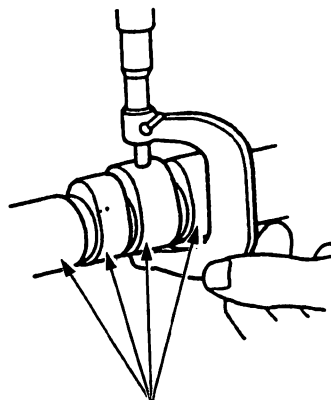
- And the camshaft has already been replaced, you must replace the cylinder head.
- If the camshaft has not been replaced, first check total runout with the camshaft supported on V-blocks.

Camshaft Total Runout:
Standard (New): 0.03 mm (0.001 in) max.
Service Limit: 0.04 mm (0.002 in)

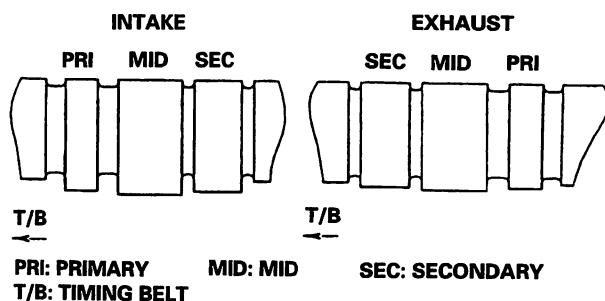


- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the bearing clearance is still out of tolerance, replace the cylinder head.

Measure cam lobe height.



Inspect this area for wear.



Cam Lobe Height Standard (New):

	INTAKE	EXHAUST
PRIMARY	34.041 mm (1.3402 in)	33.745 mm (1.3285 in)
MID	37.229 mm (1.4657 in)	36.704 mm (1.4450 in)
SECONDARY	34.071 mm (1.3414 in)	34.683 mm (1.3655 in)

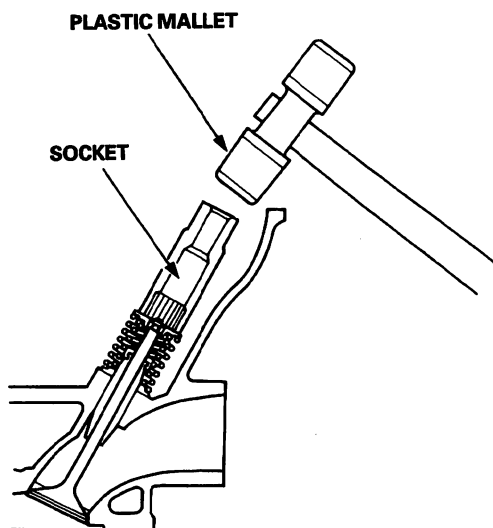
Valves, Valve Springs and Valve Seals



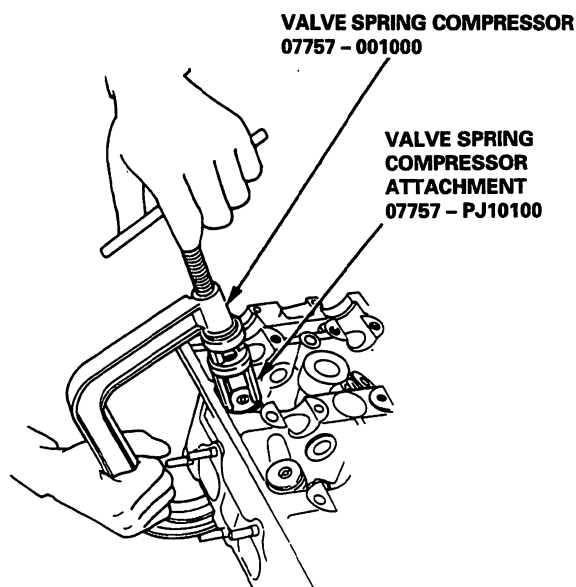
Removal

NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

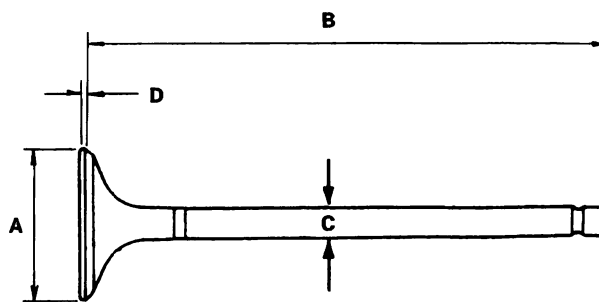
1. Using an appropriately-sized socket and plastic mallet, lightly tap the valve retainer to loosen the valve keepers before installing the valve spring compressor.



2. Install the spring compressor. Compress the spring and remove the valve keeper.



Valve Dimensions:



Intake Valve

A Standard (New):	34.90 – 35.10 mm (1.374 – 1.382 in)
B Standard (New):	105.40 – 105.70 mm (4.150 – 4.161 in)
C Standard (New):	5.475 – 5.485 mm (0.2156 – 0.2159 in)
C Service Limit:	5.445 (0.2144 in)
D Standard (New):	1.05 – 1.35 mm (0.041 – 0.053 in)
D Service Limit:	0.85 mm (0.034 in)

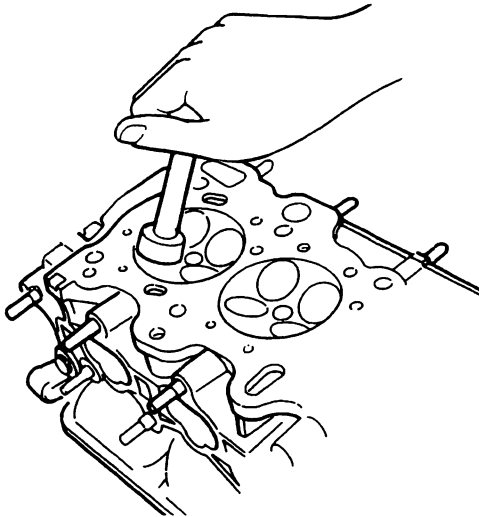
Exhaust Valve

A Standard (New):	29.90 – 30.10 mm (1.177 – 1.185 in)
B Standard (New):	105.00 – 105.30 mm (4.134 – 4.146 in)
C Standard (New):	5.475 – 5.485 mm (0.2156 – 0.2159 in)
C Service Limit:	5.445 (0.2144 in)
D Standard (New):	1.65 – 1.95 mm (0.065 – 0.078 in)
D Service Limit:	1.45 mm (0.057 in)

Valve Seats

Reconditioning

1. Renew the valve seats in the cylinder head using a valve seat cutter.



NOTE: If guides are worn (see page 6-C-39), replace them (see page 6-C-40) before cutting the valve seats.

2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check the width of the seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

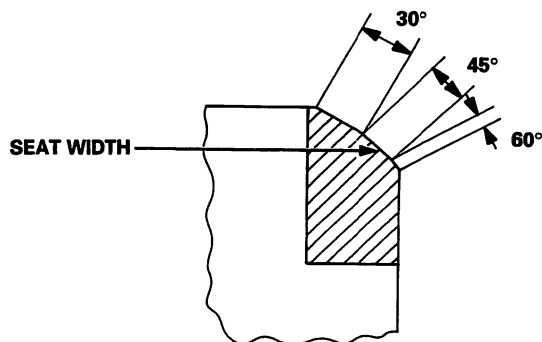
Valve Seat Width:

Standard (New):

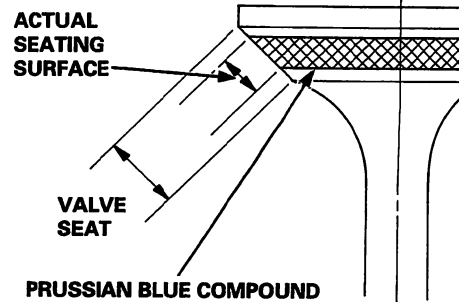
Intake: 1.30 – 1.50 mm (0.051 – 0.059 in)

Exhaust: 1.25 – 1.55 mm (0.049 – 0.061 in)

Service Limit: 2.00 mm (0.079 in)



5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face, and insert the valve in the original location in the head, then lift it and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
 - If it is too low (close to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert the intake and exhaust valves in the head and measure valve stem installed height.

Intake Valve Stem Installed Height:

Standard (New): 42.5 – 42.7 mm

(1.673 – 1.681 in)

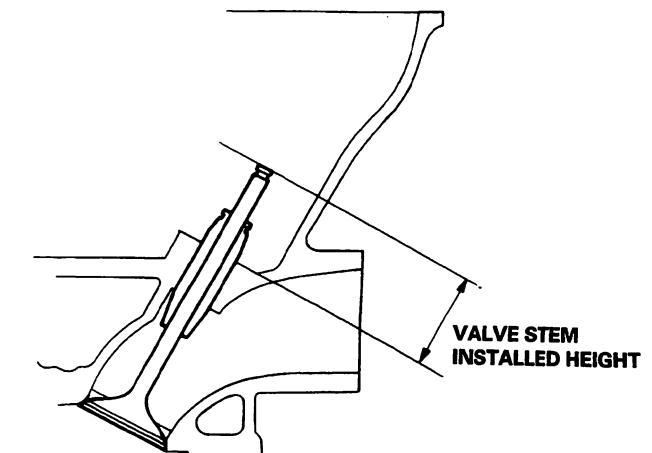
Service Limit: 42.95 mm (1.691 in)

Exhaust Valve Stem Installed Height:

Standard (New): 43.9 – 44.1 mm

(1.728 – 1.736 in)

Service Limit: 44.35 mm (1.746 in)



8. If valve stem installed height is over the service limit, replace the valve and recheck. If it is still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

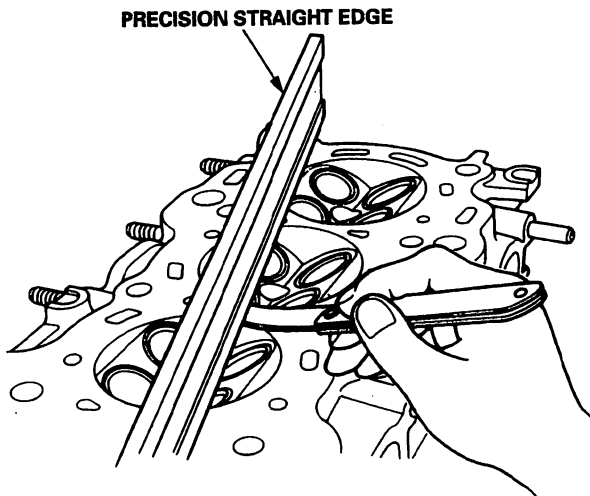


Warpage

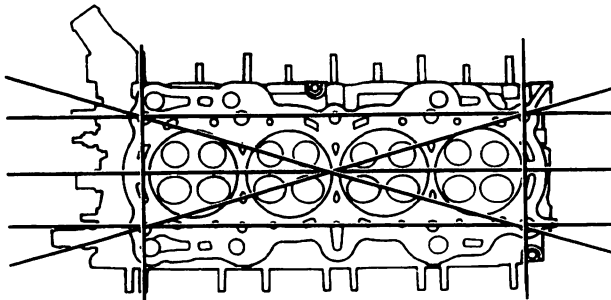
NOTE: If camshaft-to-holder oil clearances (see page 6-C-35) are not within specification, the head cannot be resurfaced.

If camshaft-to-holder oil clearances are within specifications, check the head for warpage.

- If warpage is less than 0.05 mm (0.002 in), cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface the cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 147 mm (5.79 in).



Measure along edges, and three ways across center.



Cylinder Head Height:
Standard (New): 146.95 – 147.05
 (5.785 – 5.789 in)

Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.05 – 0.11 mm
 (0.002 – 0.004 in)

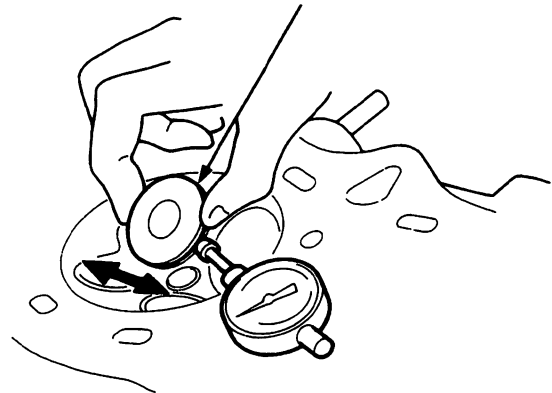
Service Limit: 0.16 mm (0.006 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10 – 0.16 mm
 (0.004 – 0.006 in)

Service Limit: 0.22 mm (0.009 in)

Valve extended 10 mm out from seat.



- If the measurement exceeds the service limit, recheck it using a new valve.
- If the measurement is now within the service limit, reassemble with the new valve.
- If the measurement still exceeds limit, recheck using the alternate method below, then replace the valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge. Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.025 – 0.055 mm
 (0.0010 – 0.0022 in)

Service Limit: 0.08 mm (0.003 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.050 – 0.080 mm
 (0.0020 – 0.0031 in)

Service Limit: 0.11 mm (0.004 in)

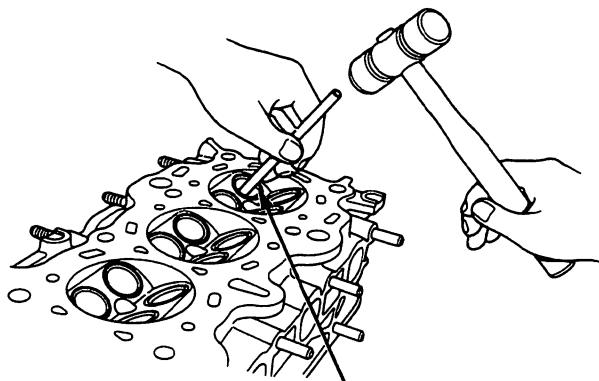
Valve Guides

Replacement

NOTE:

- For best results, heat cylinder head to 150°C (300°F) before removing or installing guides.
- It may be necessary to use an air hammer to guides, remove some valve guides.

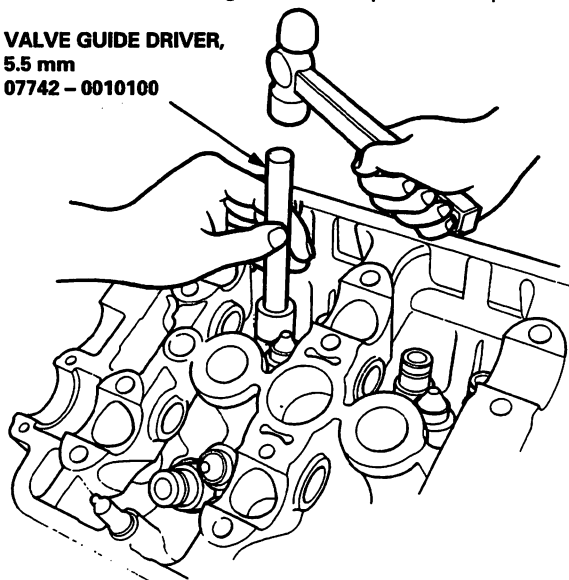
1. Drive the valve guide out from the bottom of the cylinder head.



**VALVE GUIDE DRIVER,
5.5 mm
07742 - 0010100**

2. Drive in a new valve guide to the specified depth.

**VALVE GUIDE DRIVER,
5.5 mm
07742 - 0010100**



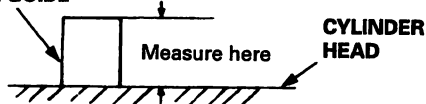
Valve Guide Installed Height:

Standard (New):

Intake: 14.55 - 15.05 mm (0.573 - 0.593 in)

Exhaust: 14.95 - 15.45 mm (0.589 - 0.608 in)

VALVE GUIDE



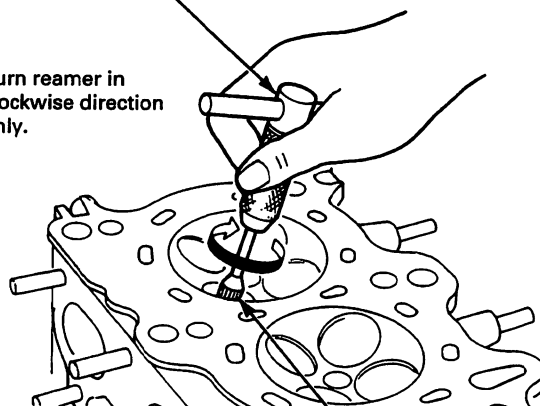
Reaming

NOTE: For new valve guides only.

1. Coat both reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check the clearance with a valve (see page 6-C-39).
 - Verify that the valve slides in the intake and exhaust valve guides without exerting pressure.

REAMER HANDLE

Turn reamer in
clockwise direction
only.



**VALVE GUIDE REAMER,
5.525 mm
07HAH - PJ70100**

Valves, Valve Springs and Valve Seals



Installation

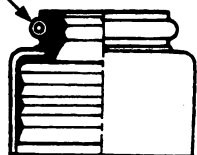
1. Coat the valve stems with engine oil. Install the valves in the valve guides.

NOTE: Make sure the valves move up and down smoothly.

2. Install the spring seats on the cylinder head.
3. Install the valve seals using the valve guide seal installer.

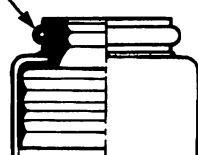
NOTE: Exhaust and intake valve seals are not interchangeable.

**WHITE
SPRING**

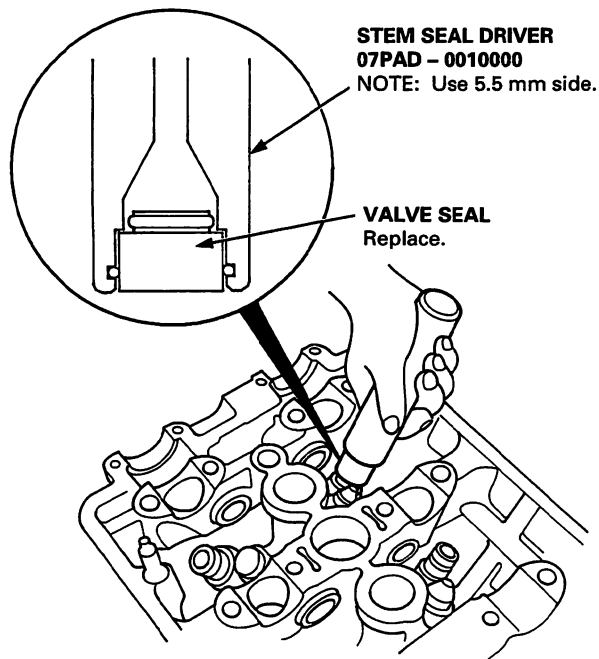


INTAKE VALVE SEAL

**BLACK
SPRING**



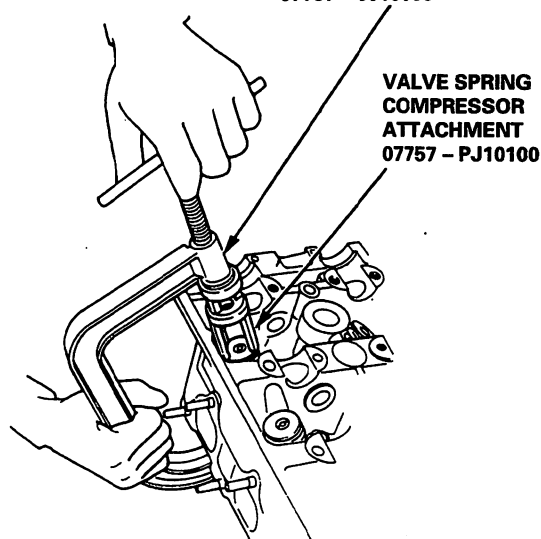
EXHAUST VALVE SEAL



4. Install the valve spring and valve retainer, then install the valve spring compressor. Compress the spring and install the valve keepers.

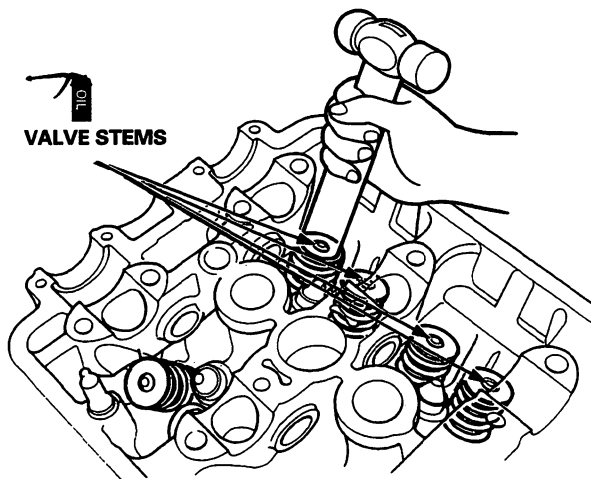
NOTE: Place the end of the valve spring with closely wound coils toward the cylinder head.

VALVE SPRING COMPRESSOR
07757 - 0010000



5. Lightly tap the end of each valve stem two or three times with the wooden handle of a hammer to ensure proper seating of the valve and valve keepers.

NOTE: Tap the valve stem only along its axis so you do not bend the stem.

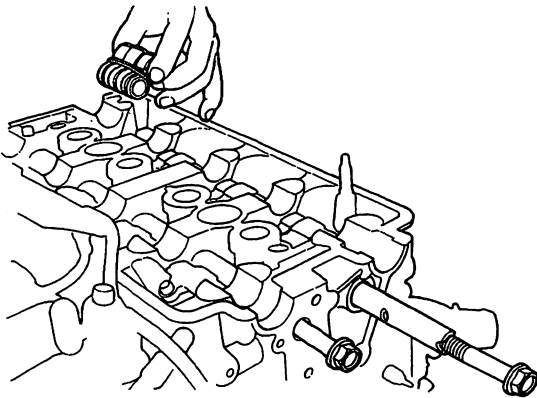


Rocker Arms

Installation

1. Install the lost motion assemblies.
2. Install the rocker arms while passing the rocker arm shaft through the cylinder head.
 - Valve adjusting locknuts should be loosened and adjusting screw backed off before installation.
 - The component parts must be reinstalled in the original locations.

NOTE: Remove the rubber bands after installing the rocker arms.



3. Install the rocker shaft orifices. If the holes in the rocker arm shaft and cylinder head are not in line with each other, thread a 12 mm bolt into the rocker arm shaft and rotate the shaft.

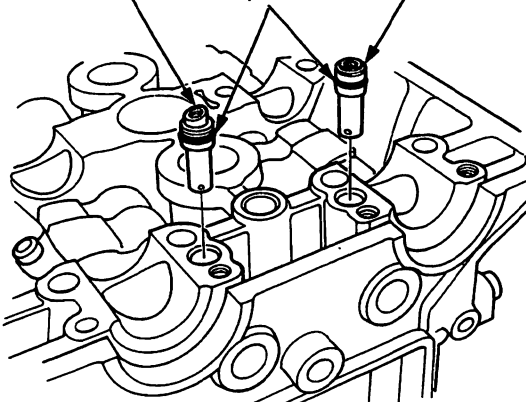
NOTE:

- The shapes of the rocker shaft orifices for the intake and exhaust are different. The orifices must be installed in the original locations.
- Clean the rocker shaft orifices and install them with new O-rings.

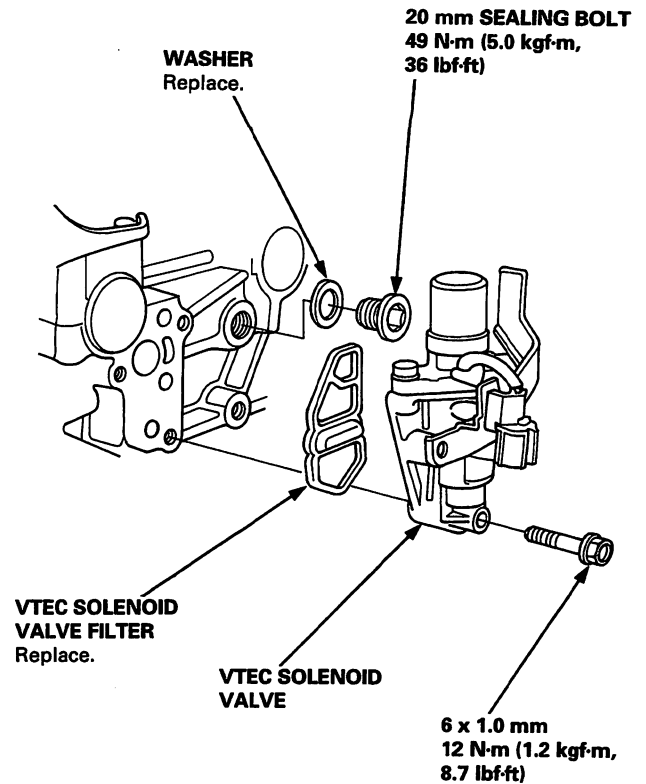
**EXHAUST ROCKER
SHAFT ORIFICE**
Clean.

O-RING
Replace.

**INTAKE ROCKER
SHAFT ORIFICE**
Clean.



4. Install the VTEC solenoid valve and 20 mm sealing bolt.





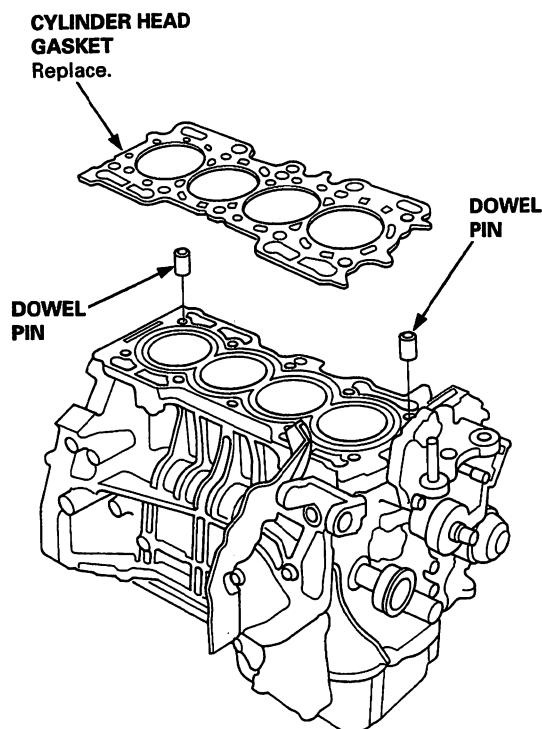
Installation

Install the cylinder head in the reverse order of removal:

NOTE:

- Always use a new head gasket.
- Cylinder head and cylinder block surface must be clean.
- Turn the crankshaft so the No. 1 piston is at TDC (see page 6-C-16).
- Do not use the middle cover and lower cover to store removed items.
- Clean the middle cover and lower cover before installation.

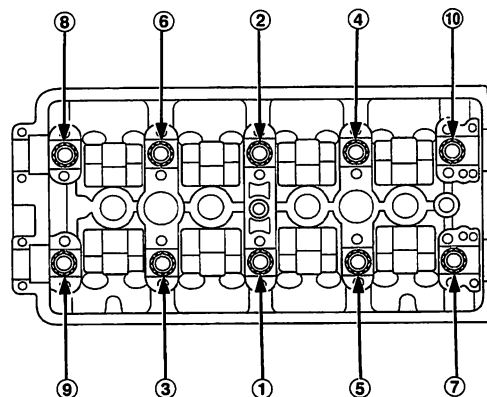
1. Cylinder head dowel pins must be aligned.



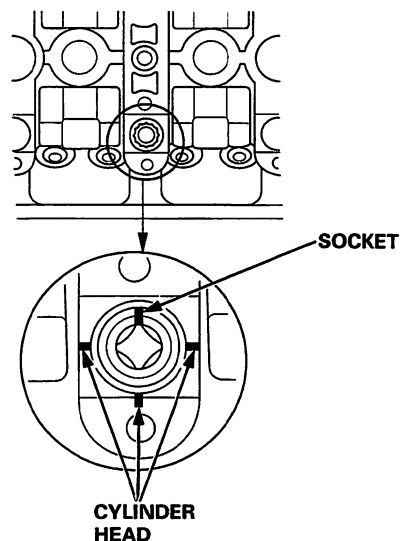
2. Apply clean engine oil to the threads of the cylinder head bolts.
3. Tighten the cylinder head bolts in sequence to 29 N·m (3.0 kgf·m, 22lbf·ft).

NOTE:

- We recommend using a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and not to overtighten.
- If a bolt makes any noise when you are torquing it, loosen the bolt, and retighten it.



4. Attach the socket to the cylinder head bolt without lash by turning the socket clockwise slightly, then mark the socket and the cylinder head as shown.



5. Tighten the cylinder head bolts until the mark on the bolt head align to the mark on the cylinder head (turn the bolt 90°) twice.

NOTE: If using a new cylinder head bolt, tighten the bolt 90° further.
(cont'd)

Cylinder Head

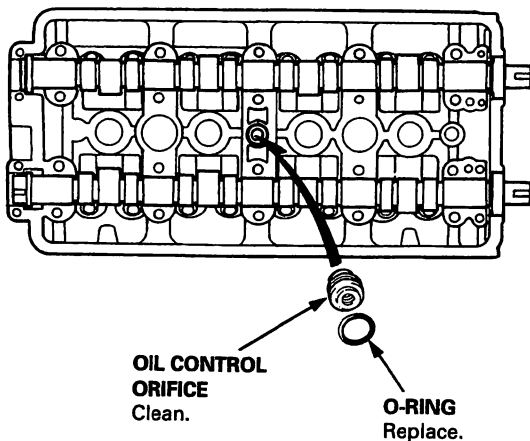
Installation (cont'd)

6. Tighten the intake manifold mounting bolt (see page 6-C-28).
7. Install the exhaust manifold bracket, and tighten the new self-locking nuts (see page 6-C-28).
8. Install the camshafts and camshaft oil seals.

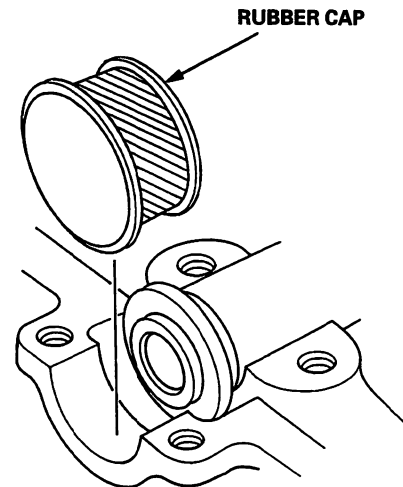
NOTE:

- Install the camshafts with the keyways facing up.
- Install the oil seal with the spring side facing in.
- The oil seal housing surface should be dry.

9. Clean and install the oil control orifice with a new O-ring in the oil passage of the No. 3 camshaft holder.



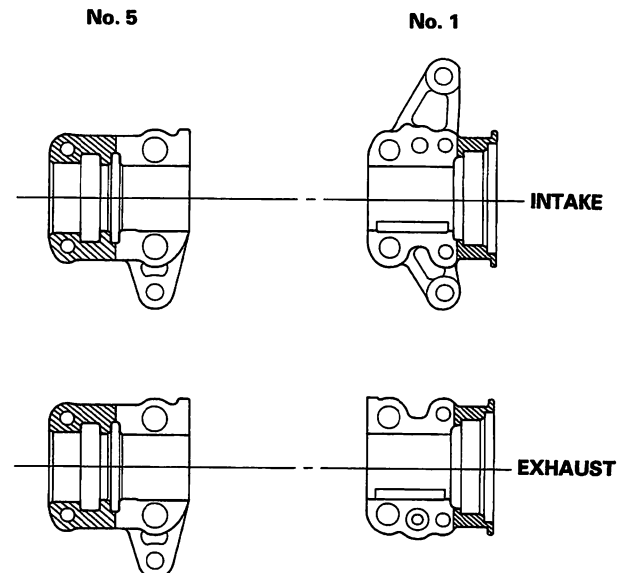
10. Apply liquid gasket around the rubber cap, then install the rubber cap.



11. Apply liquid gasket to the head mating surface of the No. 1 and No. 5 camshaft holders on both the intake and exhaust side. Confirm that the camshaft keyways face up, then place those holders, together with the No. 2, No. 3 and No. 4 camshaft holders, on the cylinder head.

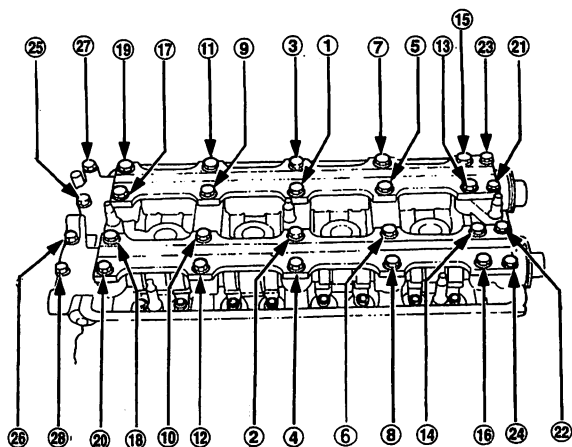
NOTE: The arrows marked on the camshaft holders should point toward the timing belt.

— Apply liquid gasket to the shaded areas.

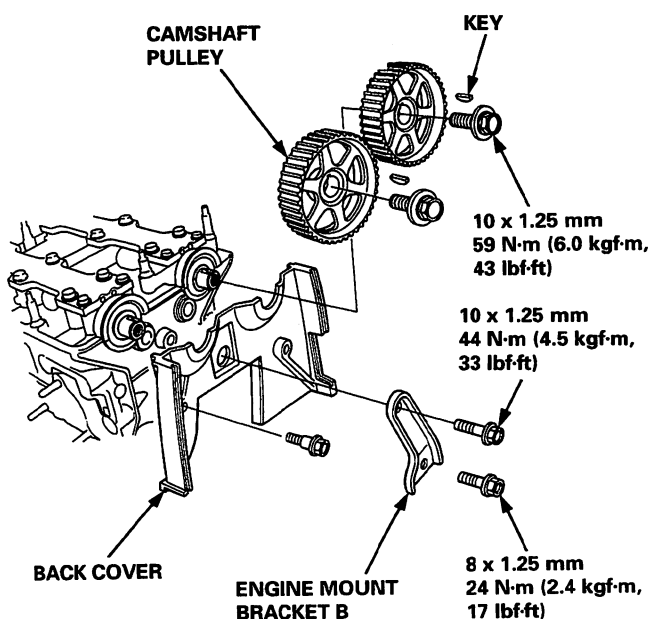




12. Tighten the bolts in the sequence shown below.



13. Install the back cover, camshaft pulleys and engine mount bracket B.



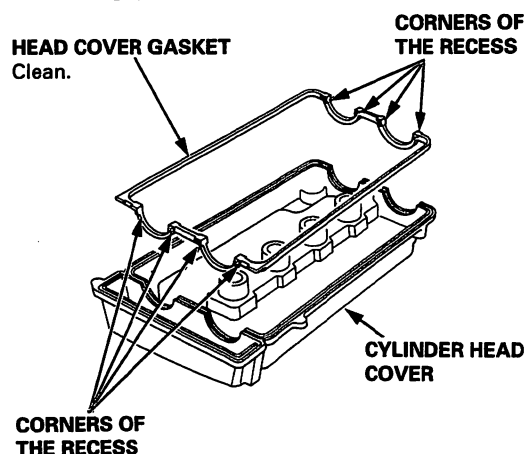
14. Install the timing belt (see page 6-C-16).

15. Adjust the valve clearance (see page 6-C-9).

16. Install the head cover gasket in the groove of the cylinder head cover. Seat the recesses for the camshaft first, then work it into the groove around the outside edges.

NOTE:

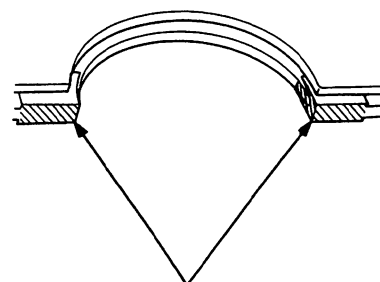
- Before installing the head cover gasket, thoroughly clean the seal and the groove.
- When installing, make sure the head cover gasket is seated securely in the corners of the recesses with no gap.



17. Apply liquid gasket to the head cover gasket at the eight corners of the recesses.

NOTE:

- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



Apply liquid gasket to the shaded areas.

(cont'd)

Cylinder Head

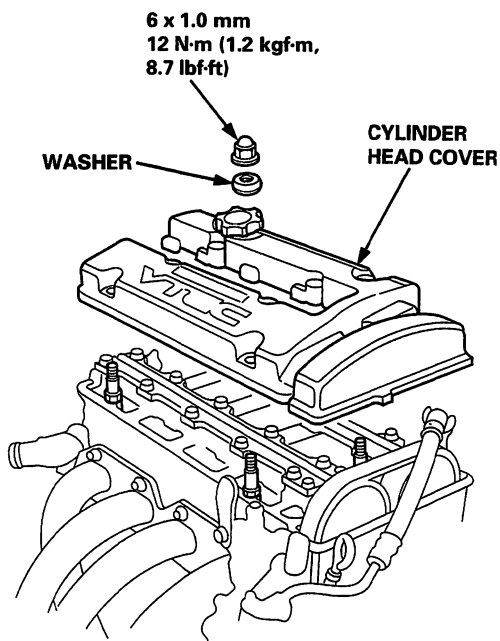
Installation (cont'd)

18. When installing the cylinder head cover, hold the head cover gasket in the groove by placing your fingers on the camshaft holder contacting surfaces (top of the semicircles).

Once the cylinder head cover is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.

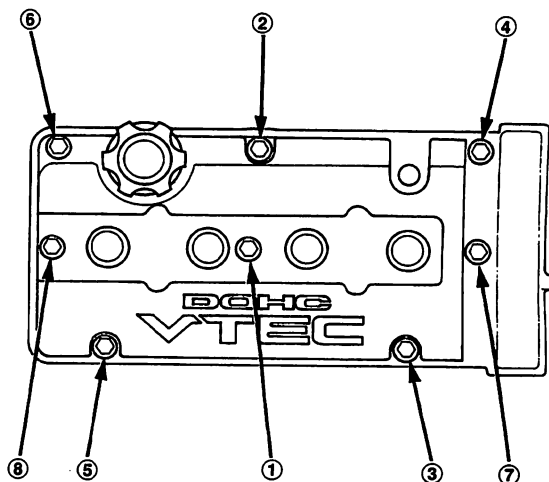
NOTE:

- Before installing the cylinder head cover, clean the cylinder head contacting surfaces with a shop towel.
- Do not touch the parts where liquid gasket was applied.
- Replace the washer when damaged or deteriorated.



19. Tighten the nuts in two or three steps. In the final step, tighten all nuts, in sequence, to 12 N·m (1.2 kgf·m, 8.7 lbf·ft).

NOTE: After assembly, wait at least 30 minutes before filling the engine with oil.



20. After installation, check that all tubes, hoses and connectors are installed correctly.
21. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

Engine Block

D16B6 engine

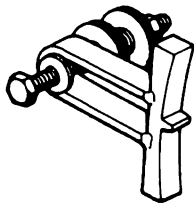
Special Tools	7-A-2
Illustrated Index	7-A-3
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End Play	7-A-6
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Alignment	7-A-19
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Installation	7-A-20
Oil Pan	
Installation	7-A-24

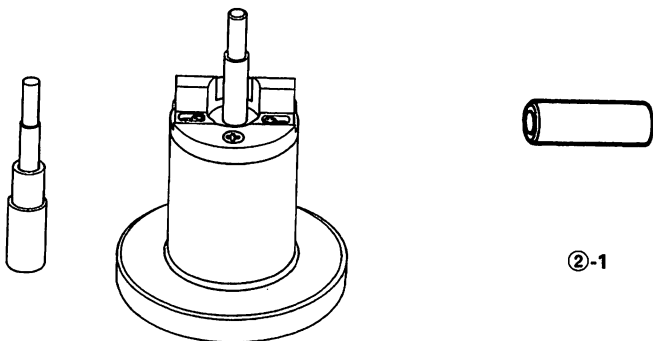


Special Tools

Ref. No.	Tool Number	Description	Qty	Remark
①	07LAB – PV00100	Ring Gear Holder	1	
②	07PAF – 0010000	Piston Pin Assembly Tool Set	1	
②-1	07PAF – 0010650	Pilot Collar, O.D. 19 mm	1	
③	07749 – 0010000	Handle Driver	1	
④	07948 – SB00101	Driver Attachment, 96 mm	1	

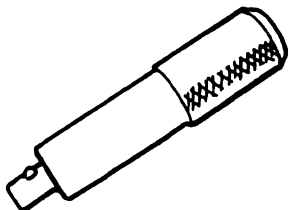


①

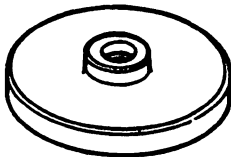


②

②-1



③



④

Illustrated Index

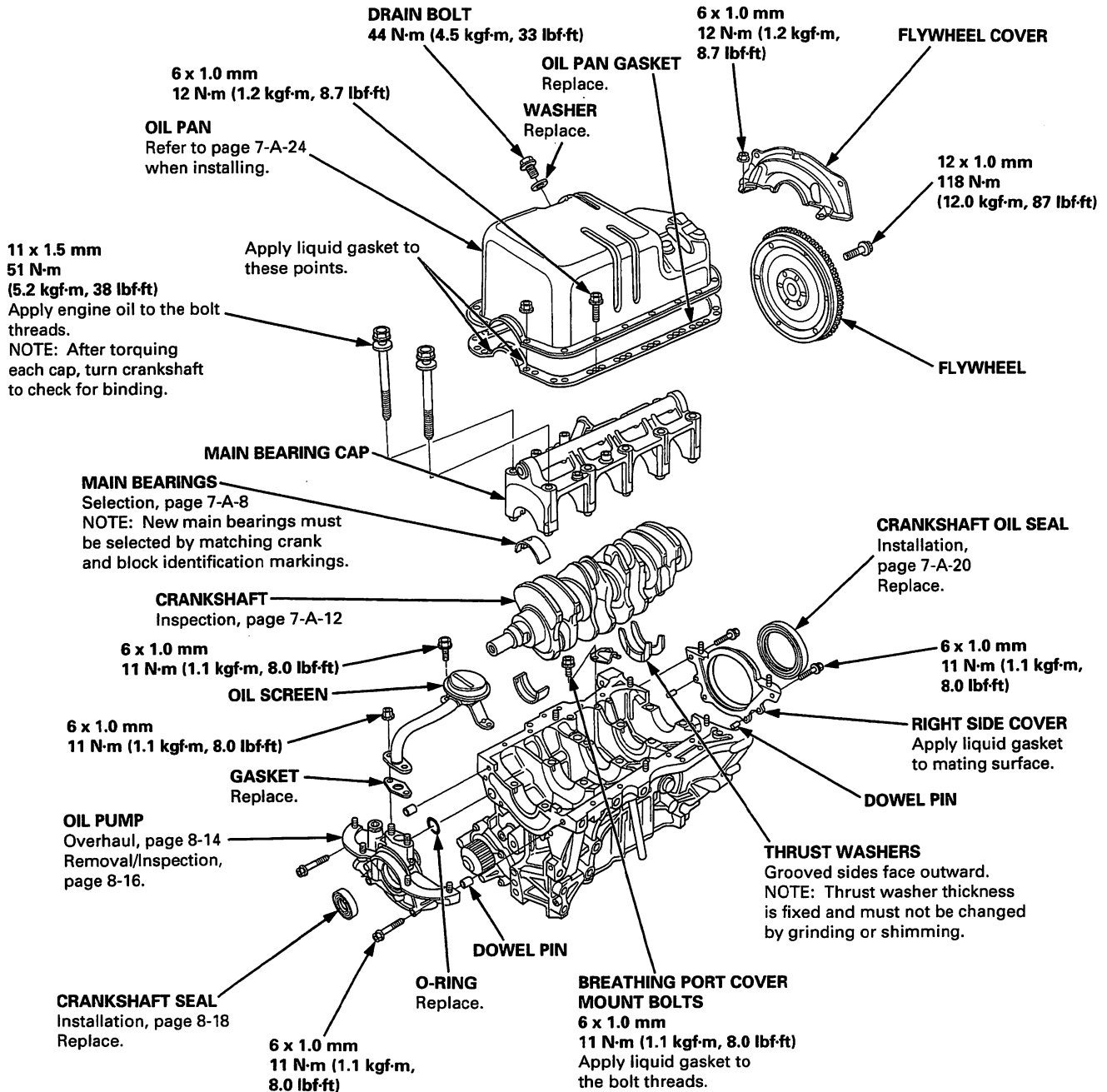


NOTE:

- Apply liquid gasket to the mating surfaces of the right side cover and oil pump housing before installing them.
- Use liquid gasket, part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Clean the oil pan gasket mating surfaces before installing it.



Lubricate all internal parts with engine oil during reassembly.




(cont'd)

Illustrated Index

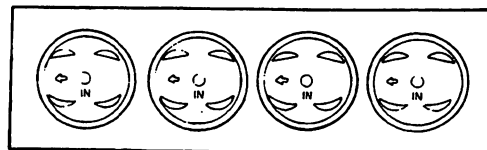
(cont'd)

NOTE: New rod bearings must be selected by matching connecting rod assembly and crankshaft identification markings (see page 7-A-9).

 Lubricate all internal parts with engine oil during reassembly.

PISTON INSTALLATION DIRECTION:

EXHAUST



INTAKE

PISTON RINGS

Replacement, page 7-A-18
Measurement, pages 7-A-18, 19
Alignment, page 7-A-19

PISTON PIN

Removal, page 7-A-15
Installation, page 7-A-16
Inspection, page 7-A-17

PISTON

Inspection, page 7-A-13
NOTE: Before removing piston, inspect the top of the cylinder bore for carbon build-up or ridge. Remove ridge if necessary, page 7-A-11

CONNECTING ROD

End play, page 7-A-6
Selection, page 7-A-16

ENGINE BLOCK

Cylinder bore inspection, page 7-A-14
Warpage inspection, page 7-A-14
Cylinder bore honing, page 7-A-15

CONNECTING ROD BEARINGS

Clearance, page 7-A-9
Selection, page 7-A-9

Inspect top of each cylinder bore for carbon build-up or ridge before removing piston.
Remove ridge if necessary, page 7-A-11

CONNECTING ROD BEARING CAP

Installation, page 7-A-21
NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

CONNECTING ROD CAP NUT

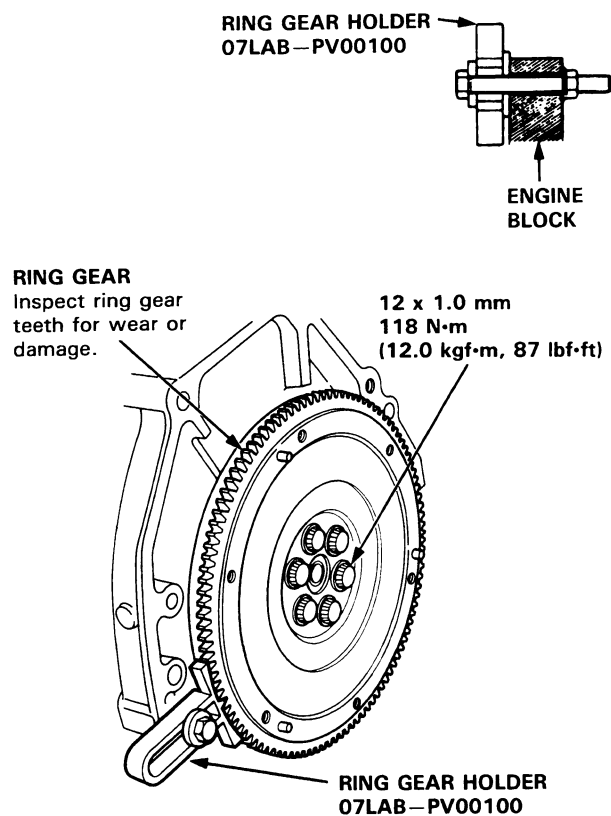
8 x 0.75 mm
31 N·m (3.2 kgf·m,
23 lbf·ft)
Apply engine oil to the bolt threads.
NOTE: After torquing each bearing cap, rotate crankshaft to check for binding.



Flywheel

Replacement

Remove the six flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in a crisscross pattern.



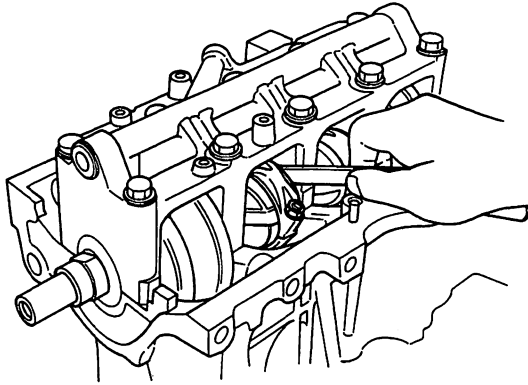
Connecting Rod and Crankshaft

End Play

Connecting Rod End Play:

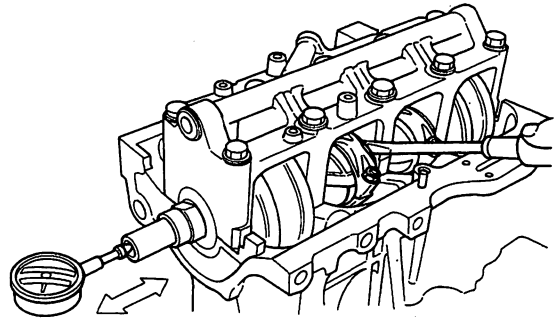
Standard (New): 0.15 – 0.30 mm
(0.006 – 0.012 in)

Service Limit: 0.40 mm (0.016 in)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft (pages 7-A-10 and 7-A-21).

Push the crankshaft firmly away from the dial indicator, and zero the dial against the end of the crankshaft. Then pull the crankshaft firmly back toward the indicator; dial reading should not exceed service limit.



Crankshaft End Play:

Standard (New): 0.10 – 0.35 mm
(0.004 – 0.014 in)

Service Limit: 0.45 mm (0.018 in)

- If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary.

NOTE: Thrust washer thickness is fixed and must not be changed either by grinding or shimming.

Thrust washers are installed with grooved sides facing outward.



Main Bearings

Clearance

1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crankshaft and flywheel will flatten the plastigage further than just the torque on the cap bolt, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights and check only one bearing at a time.

4. Reinstall the bearings and caps, then torque the bolts.

1st step: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Final step: 51 N·m (5.2 kgf·m, 38 lbf·ft)

NOTE: Do not rotate the crankshaft during inspection.

5. Remove the cap and bearing again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance:

Standard (New):

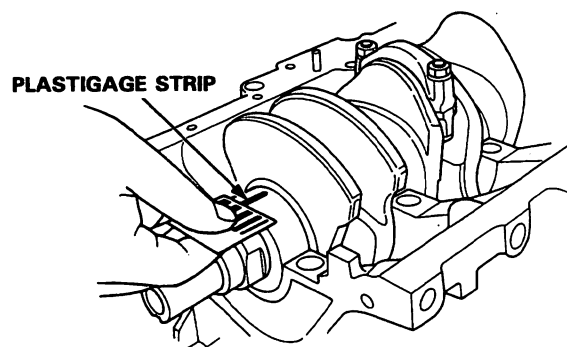
No. 1, 5 Journals:

0.018 – 0.036 mm (0.0007 – 0.0014 in)

No. 2, 3, 4 Journals:

0.024 – 0.042 mm (0.0009 – 0.0017 in)

Service Limit: 0.05 mm (0.002 in)



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

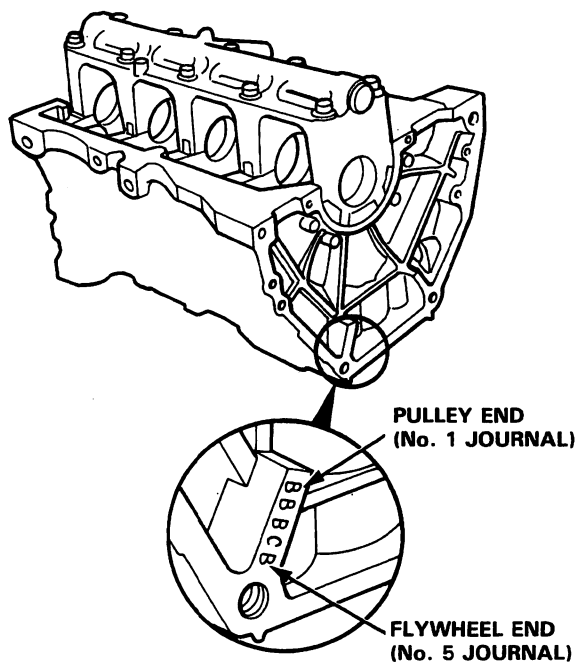
Main Bearings

Selection

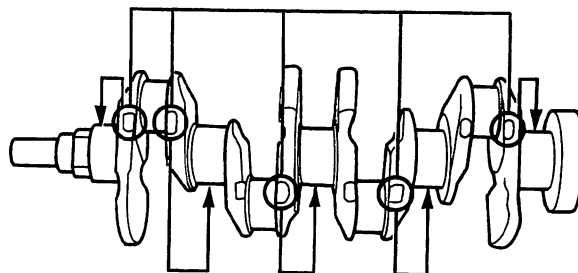
NOTE: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Crankshaft Bore Code Location

Letters have been stamped on the end of the block as a code for the size of each of the 5 main journal bores. Use them, and the numbers stamped on the crankshaft (codes for main journal size), to choose the correct bearings.



Main Journal Code Location (Numbers)



Bearing Identification

Color code is → Larger crank bore on the edge of the bearing.

A	B	C	D
---	---	---	---

→ Smaller bearing (thicker)

↓
1
2
3
4
↓
Smaller main journal Smaller bearing (thicker)

Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

Connecting Rod Bearings



Clearance

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop towel.
3. Place the plastigage across the rod journal.
4. Reinstall the bearing half and cap, and torque the nuts.

Torque: 31 N·m (3.2 kgf·m, 23 lbf·ft)

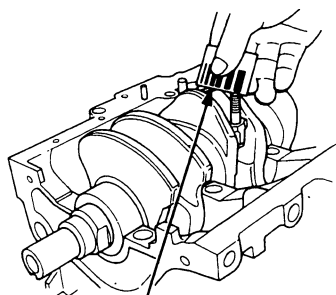
NOTE: Do not rotate the crankshaft during inspection.

5. Remove the rod cap and bearing half and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil Clearance:

Standard (New): 0.020 – 0.038 mm
(0.0008 – 0.0015 in)

Service Limit: 0.05 mm (0.002 in)



PLASTIGAGE STRIP

6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code (select the color as shown in the right column), and recheck the clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

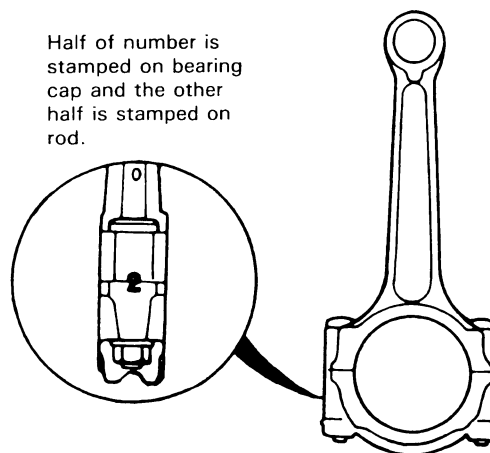
NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

Selection

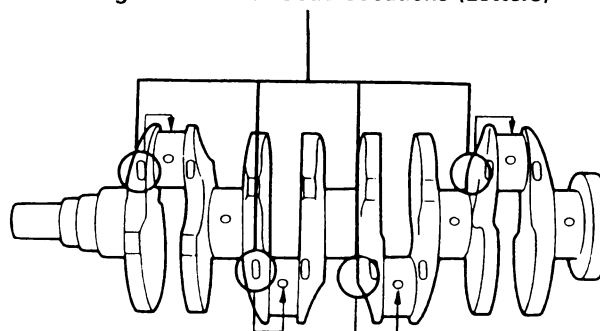
NOTE: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Connecting Rod Code Location

Numbers have been stamped on the side of each connecting rod as a code for the size of the big end. Use them, and the letters stamped on the crankshaft (codes for rod journal size), to choose the correct bearings.



Connecting Rod Journal Code Locations (Letters)



Bearing Identification

Color code is on the _____
edge of the bearing. → Larger big end bore

1	2	3	4
---	---	---	---

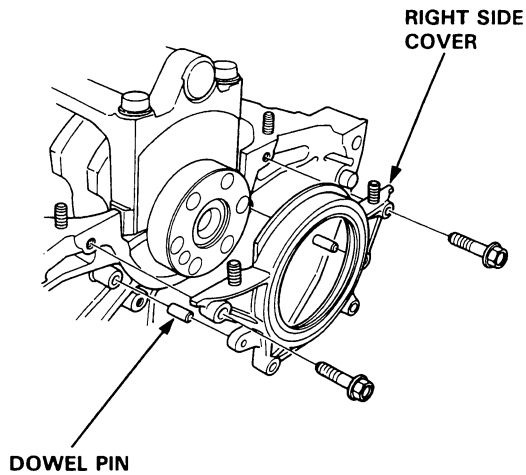
↓	A or I	↓	Smaller rod journal
↓	B or II	↓	Smaller bearing (thicker)
↓	C or III	↓	
↓	D or IIII	↓	

Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

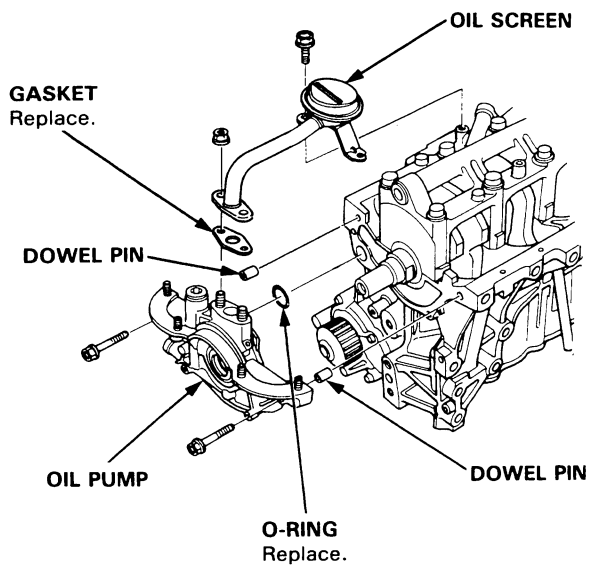
Pistons and Crankshaft

Removal

1. Remove the oil pan assembly.
2. Remove the right side cover.

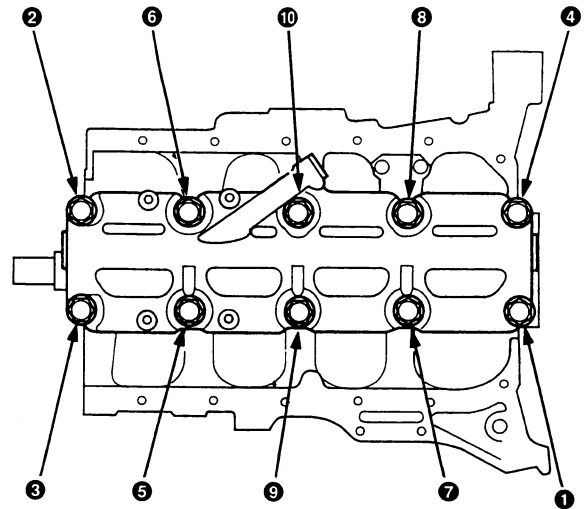


3. Remove the oil screen.
4. Remove the oil pump.

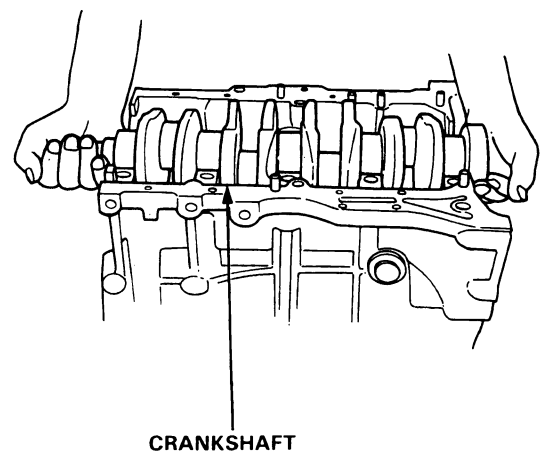


5. Remove the bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened, then remove the bearing cap.

MAIN BEARING CAP BOLTS LOOSENING SEQUENCE

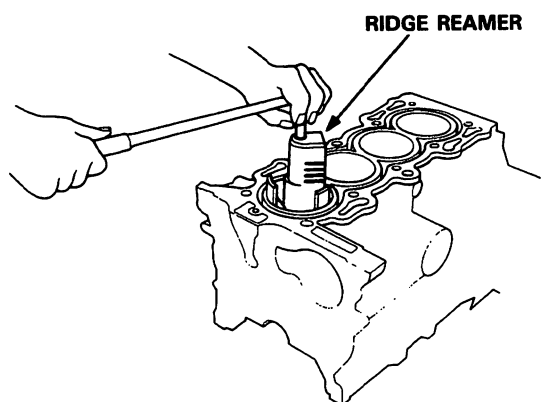


6. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
7. Lift the crankshaft out of the engine, being careful not to damage journals.

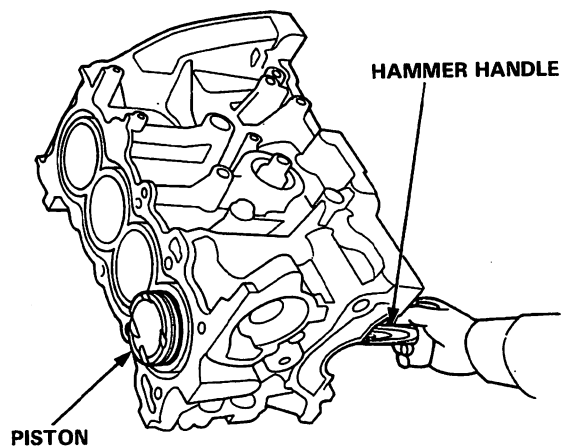




8. Remove the upper bearing halves from the connecting rods and set them aside with their respective caps.
9. Reinstall the main caps and bearings on the engine in proper order.
10. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the pistons as they are pushed out.



11. Use the wooden handle of a hammer to drive the pistons out.



12. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
13. Mark each piston/connecting rod assembly with its cylinder number to avoid mixup on reassembly.

NOTE: The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

Crankshaft

Inspection

- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

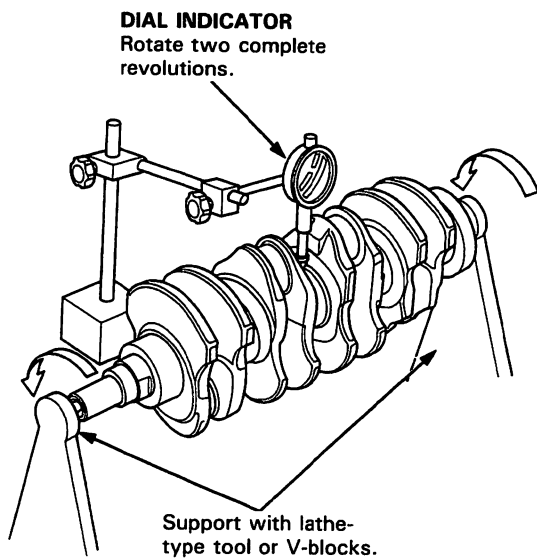
Alignment

- Measure runout on all main journals to make sure the crank is not bent.
- The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Indicated Runout:

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)



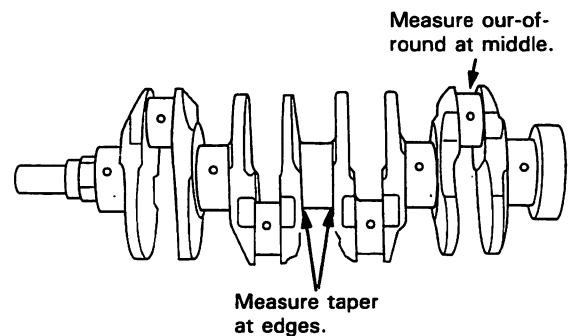
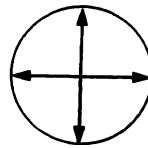
Out-of-Round and Taper

- Measure out-of-round at the middle of each rod and main journal in two places.
- The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round:

Standard (New): 0.0025 mm (0.0001 in) max.

Service Limit: 0.005 mm (0.0002 in)



- Measure taper at edges of each rod and main journal.
- The difference between measurements on each journal must not be more than the service limit.

Journal Taper:

Standard (New): 0.0025 mm (0.0001 in) max.

Service Limit: 0.005 mm (0.0002 in)



Inspection

1. Check the piston for distortion or cracks.

NOTE: If cylinder is bored, an oversized piston must be used.

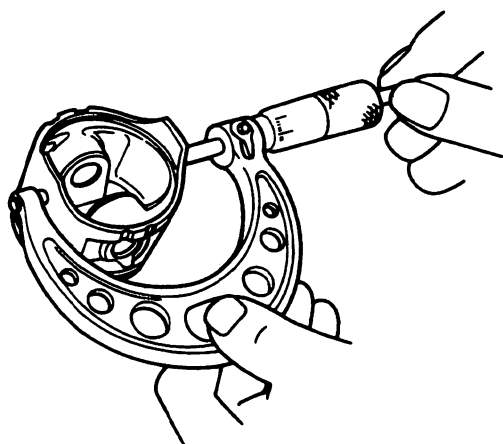
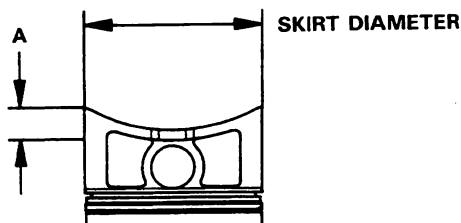
2. Measure piston diameter at a point A from bottom of skirt.

A: 5 mm (0.2 in)

Piston Diameter:

Standard (New): 74.980 – 74.990 mm
(2.9520 – 2.9524 in)

Service Limit: 74.970 mm (2.9516 in)

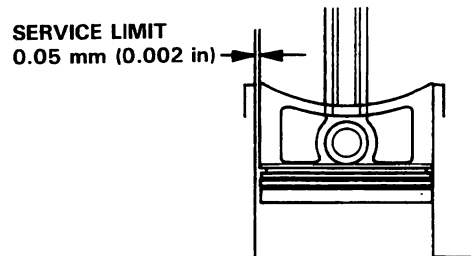


3. Calculate difference between cylinder bore diameter (see page 7-A-14) and piston diameter.

Piston-to-Cylinder Clearance

Standard (New): 0.010 – 0.040 mm
(0.0004 – 0.0016 in)

Service Limit: 0.05 mm (0.002 in)



If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.

Oversize Piston Diameter

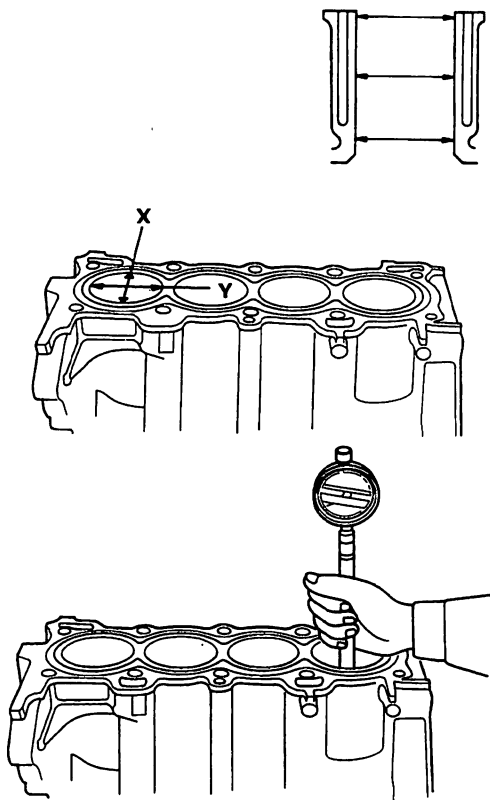
0.25: 75.23 – 75.24 mm (2.9618 – 2.9622 in)

0.50: 75.48 – 75.49 mm (2.9716 – 2.9720 in)

Cylinder Block

Inspection

1. Measure wear and taper in directions X and Y at three levels in each cylinder as shown.



Cylinder Bore Size:

Standard (New): 75.00 – 75.02 mm
(2.953 – 2.954 in)

Service Limit: 75.07 mm (2.956 in)

Oversize

0.25: 75.25 – 75.27 mm (2.9626 – 2.9634 in)

0.50: 75.50 – 75.52 mm (2.9724 – 2.9732 in)

Bore Taper

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in)

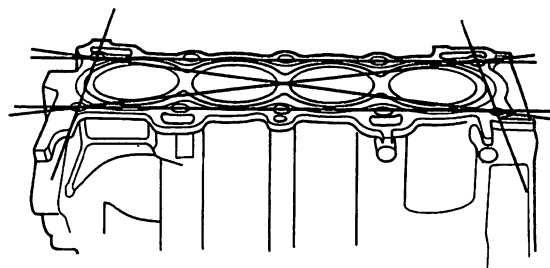
- If measurements in any cylinder are beyond Oversize Bore Service Limit, replace the block.
- If block is to be rebored, refer to Piston Clearance Inspection (see page 7-A-13) after reboring.

NOTE: Scored or scratched cylinder bores must be honed.

Reboring Limit: 0.50 mm (0.02 in)

2. Check the top of the block for warpage. Measure along the edges and across the center as shown.

SURFACES TO BE MEASURED

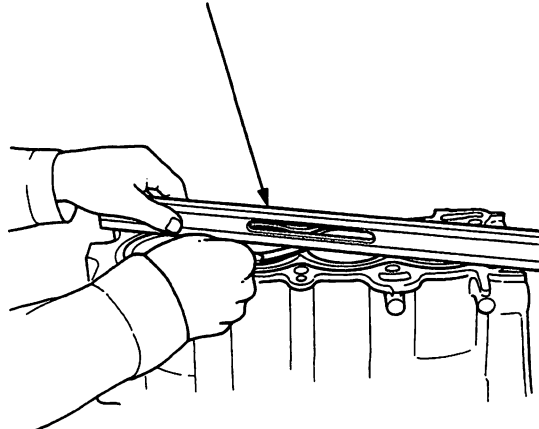


Engine Block Warpage:

Standard (New): 0.07 mm (0.003 in) max.

Service Limit: 0.10 mm (0.004 in)

PRECISION STRAIGHT EDGE



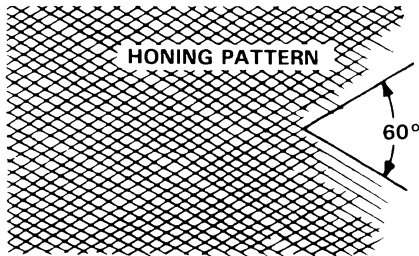


Bore Honing

1. Measure cylinder bores as shown on page 7-A-14. If the block is to be reused, hone the cylinders and remeasure the bores.
2. Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.

NOTE:

- Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
- Do not use stones that are worn or broken.

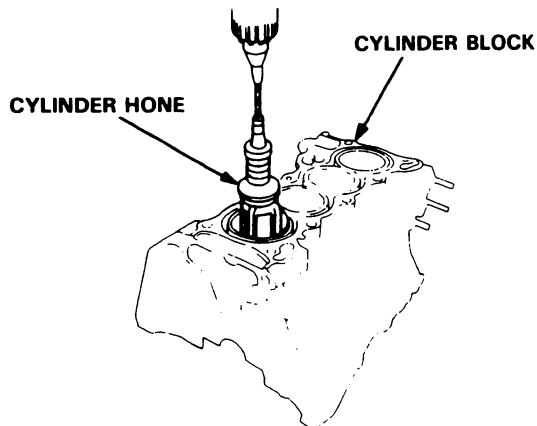


3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in cylinder bores after honing to the service limit, rebore the cylinder block.

NOTE: Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



NOTE:

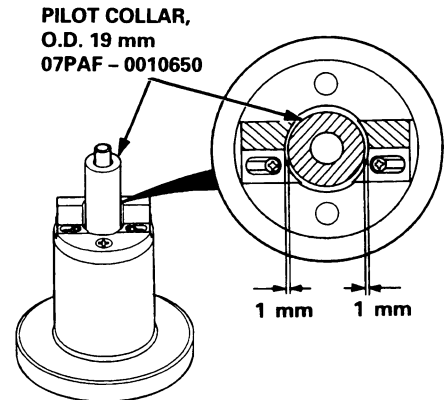
- After honing, clean the cylinder thoroughly with soapy water.
- Only a scored or scratched cylinder bore must be honed.

Removal

NOTE:

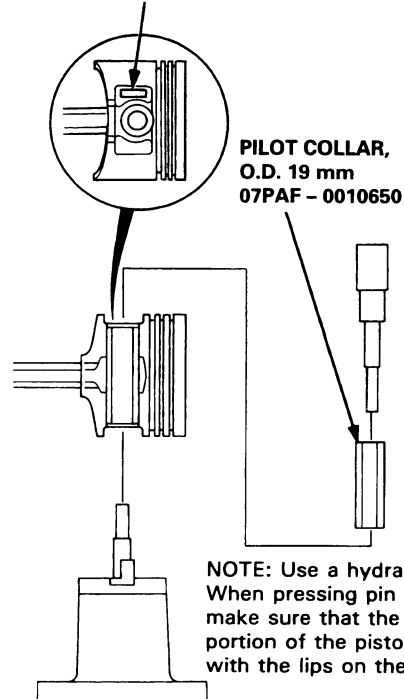
- Use the piston pin assembly tool set (No. 07PAF – 0010000) for removal of piston pins.
- Be sure to use the pilot collar of correct No. as designated.

1. Set the special tools as shown.



2. Place the piston on the special tools and press the pin out using a hydraulic press.

Embossed mark facing up.



NOTE: Use a hydraulic press. When pressing pin in or out, make sure that the recessed portion of the piston aligns with the lips on the collar.

Connecting Rods

Selection

Each rod falls into one of four tolerance ranges (from 0 to + 0.024 mm (0 to + 0.0009 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3, or 4) indicating the range.

You may find any combination of 1, 2, 3, or 4 in any engine.

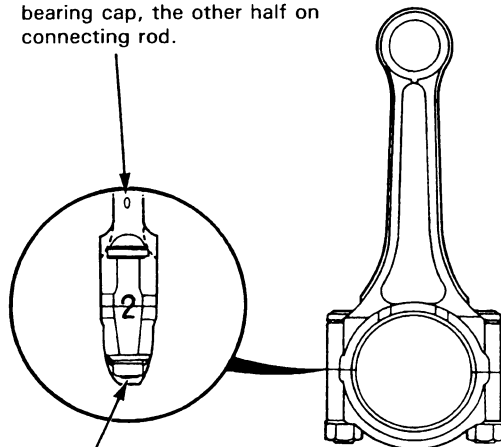
Normal Bore Size: 48.0 mm (1.89 in)

NOTE:

- Reference numbers are for big end bore size and do NOT indicate the position of the rod in the engine.
- Inspect connecting rod for cracks and heat damage.

CONNECTING ROD BORE REFERENCE NUMBER

Half of number is stamped on bearing cap, the other half on connecting rod.



Inspect bolts and nuts for stress cracks.

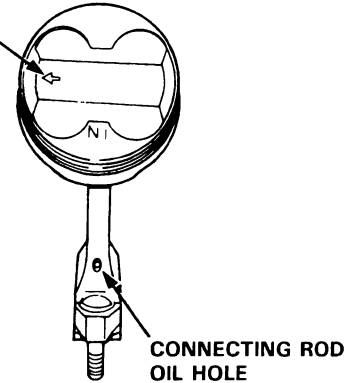
Piston Pins

Installation

NOTE:

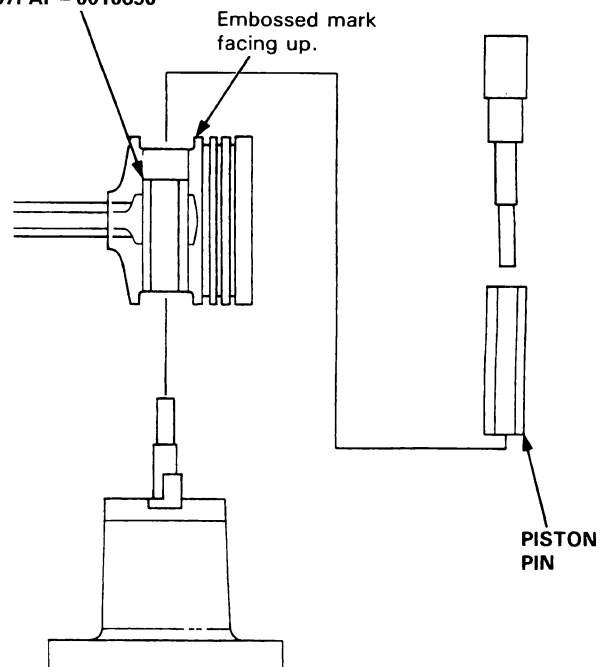
- Use the piston pin assembly tool set (No. 07PAF - 0010000) with a hydraulic press.
- Be sure to use the pilot collar of correct No. as designated.

The arrow must face the timing belt side of the engine and the connecting rod oil hole must face the rear of the engine.



1. Install the piston pin as shown.

PILOT COLLAR,
O.D. 19 mm
07PAF - 0010650



NOTE: Install the assembled piston and rod with the oil hole facing the intake manifold.



Inspection

1. Measure the diameter of the piston pin.

Piston Pin Diameter:

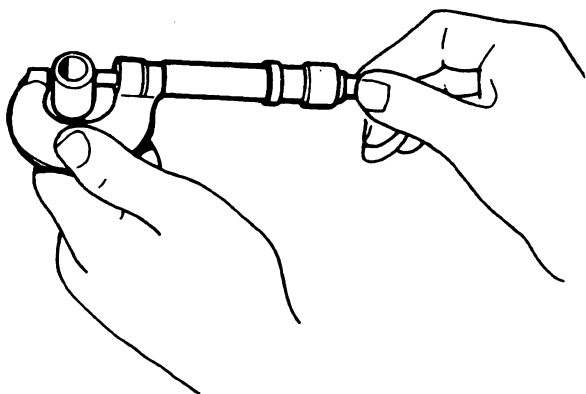
Standard (New): 18.994 – 19.000 mm

(0.7478 – 0.7480 in)

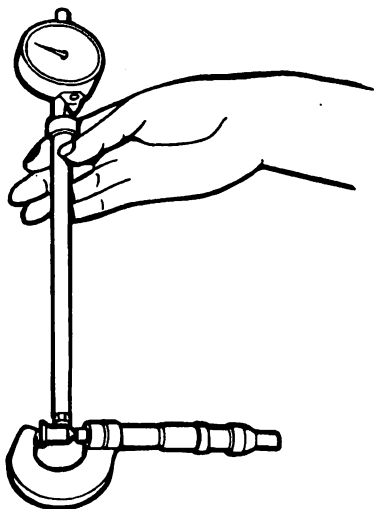
Oversize: 18.997 – 19.003 mm

(0.7479 – 0.7481 in)

NOTE: All replacement piston pins are oversize.



2. Zero the dial indicator to the piston pin diameter.



3. Measure the piston pin-to-piston clearance.

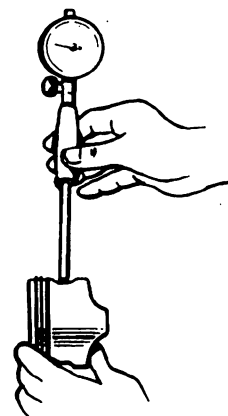
NOTE: Check the piston for distortion or cracks.

If the piston pin clearance is greater than 0.024 mm (0.0009 in), remeasure using an oversized piston pin.

Piston Pin-to-Piston Clearance:

Standard (New): 0.010 – 0.022 mm

(0.0004 – 0.0009 in)

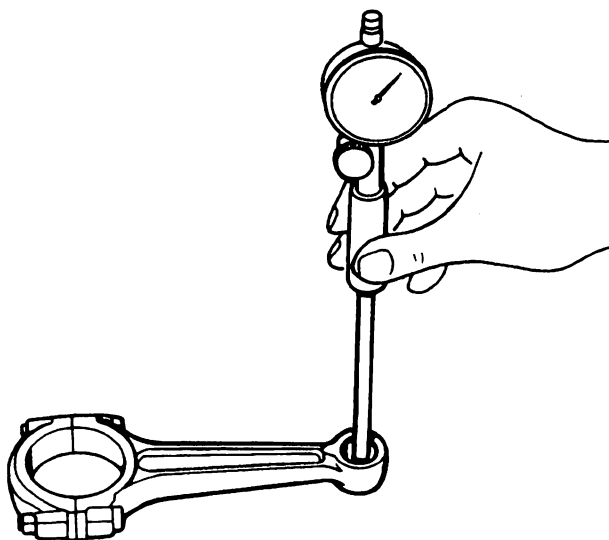


4. Check the difference between piston pin diameter and connecting rod small end diameter.

Piston Pin-to-Connecting Rod Interference:

Standard (New): 0.014 – 0.040 mm

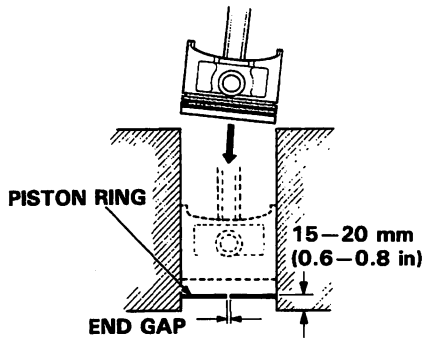
(0.0006 – 0.0016 in)



Piston Rings

End Gap

1. Using a piston, push a new ring into the cylinder bore 15 – 20 mm (0.6 – 0.8 in) from the bottom.



2. Measure the piston ring end-gap with a feeler gauge:

- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits on page 7-A-14. If the bore is over the service limit, the cylinder block must be rebored.

Piston Ring End-Gap:

Top Ring

Standard (New): 0.15 – 0.30 mm
(0.006 – 0.012 in)

Service Limit: 0.70 mm (0.028 in)

Second Ring

Standard (New): 0.20 – 0.70 mm
(0.008 – 0.028 in)

Service Limit: 0.80 mm (0.031 in)

Oil Ring

Standard (New): 0.20 – 0.80 mm
(0.008 – 0.031 in)

Service Limit: 0.90 mm (0.035 in)

Replacement

1. Using a ring expander, remove the old piston rings.
2. Clean all ring grooves thoroughly.

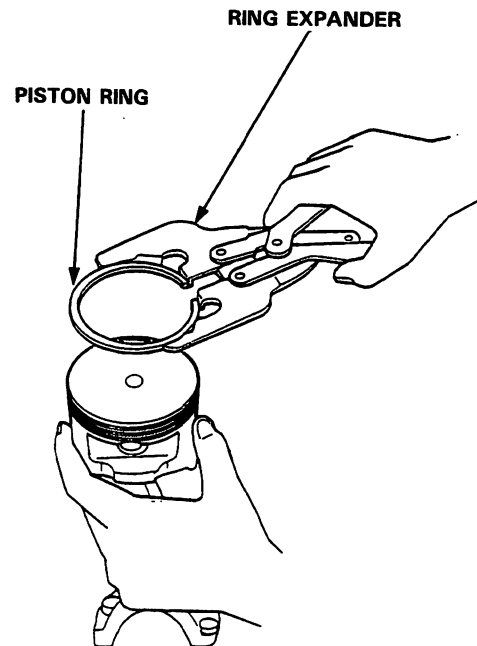
NOTE:

- Use a squared-off broken ring or ring groove cleaner with blade to fit piston grooves.
- Top ring groove is 1.0 mm (0.039 in) wide.
- Second ring groove is 1.2 mm (0.047 in) wide.
- Oil ring groove is 2.8 mm (0.11 in) wide.
- File down blade if necessary.
- Do not use a wire brush to clean ring lands, or cut ring lands deeper with cleaning tool.

3. Install new rings in proper sequence and position (see page 7-A-20).

NOTE:

- Do not reuse old piston rings.
- If piston is to be separated from connecting rod, do not install new rings yet.





Ring-to-Groove Clearance

After installing a new set of rings, measure ring-to-groove clearances:

Top Ring Clearance

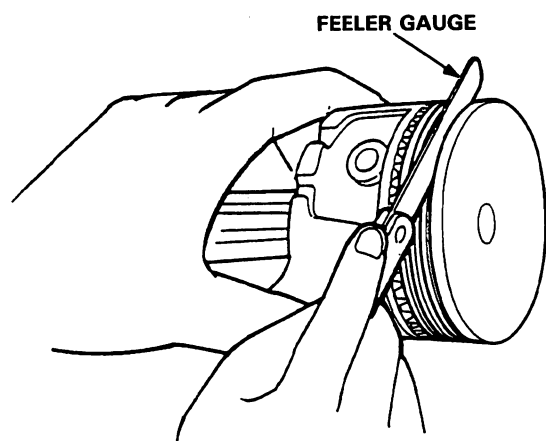
Standard (New): 0.030 – 0.060 mm (0.0012 – 0.0024 in)

Service Limit: 0.13 mm (0.005 in)

Second Ring Clearance

Standard (New): 0.030 – 0.055 mm (0.0012 – 0.0022 in)

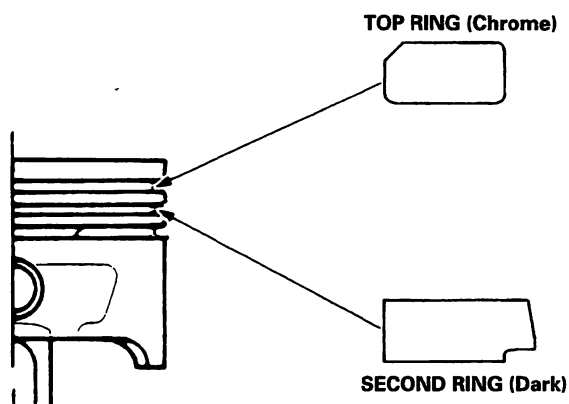
Service Limit: 0.13 mm (0.005 in)



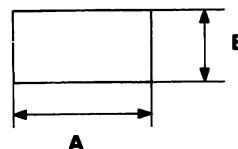
Alignment

1. Install the rings as shown.

NOTE: The manufacturing marks must be facing upward.



Piston Ring Dimensions:



Top Ring (Standard):

A: 2.6 mm (0.10 in)

B: 1.0 mm (0.04 in)

Second Ring (Standard):

A: 3.0 mm (0.12 in)

B: 1.2 mm (0.05 in)

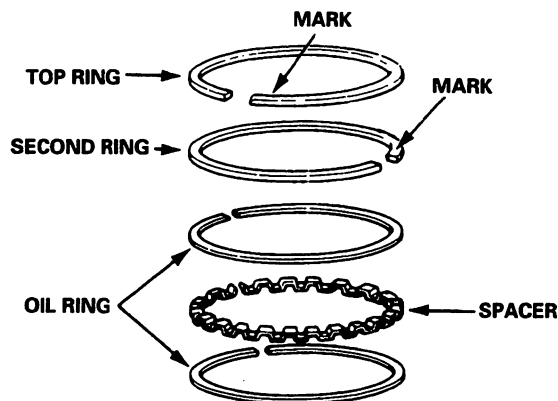
(cont'd)

Piston Rings

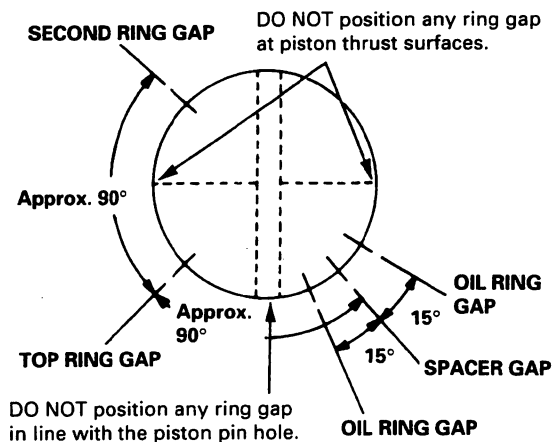
Crankshaft Oil Seal

Alignment (cont'd)

2. Rotate the rings in their grooves to make sure they do not bind.



3. Position the ring end gaps as shown:

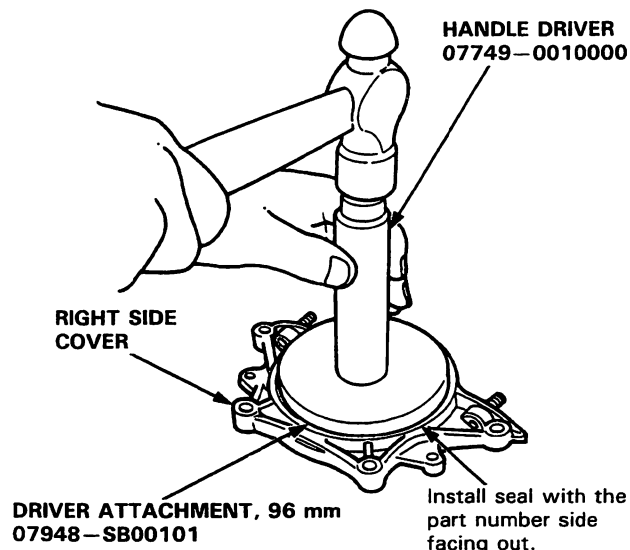


Installation

1. The seal surface on the block should be dry. Apply a light coat of oil to the crankshaft and to the lip of the seal.

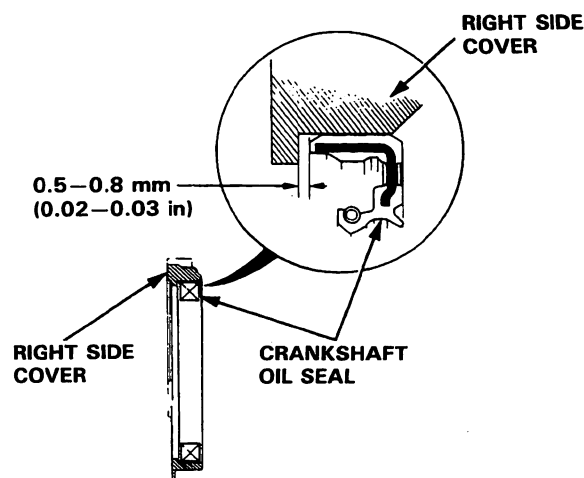
1. Drive in crankshaft oil seal against right side cover.

NOTE: Drive the crankshaft oil seal in squarely.



2. Confirm that the clearance is equal all the way around with a feeler gauge.


Clearance: 0.5 – 0.8 mm (0.02 – 0.03 in)



NOTE: Refer to page 8-18 for installation of the oil pump side crankshaft oil seal.



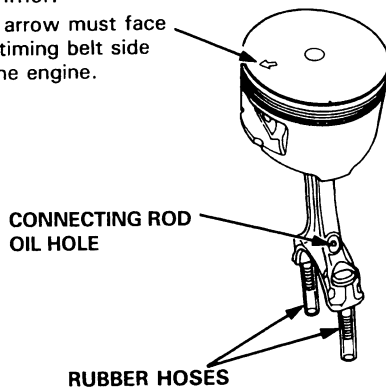
Installation

 Before installing the piston, apply a coat of engine oil to the ring grooves and cylinder bores.

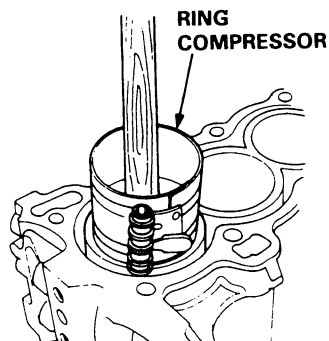
1. If the crankshaft is already installed:
 - Set the crankshaft to BDC for each cylinder.
 - Remove the connecting rod caps, and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
 - Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder, and tap it in using the wooden handle of a hammer.
 - Stop after the ring compressor pops free, and check the connecting rod-to-crank journal alignment before pushing piston into place.
 - Install the rod caps with bearings, and torque the nuts to:
31 N·m (3,2 kgf·m, 23 lbf·ft)
Apply engine oil to the bolt threads.

2. If the crankshaft is not installed:
 - Remove the rod caps and bearings, install the ring compressor, then position the piston in the cylinder, and tap it in using the wooden handle of a hammer.


The arrow must face the timing belt side of the engine.



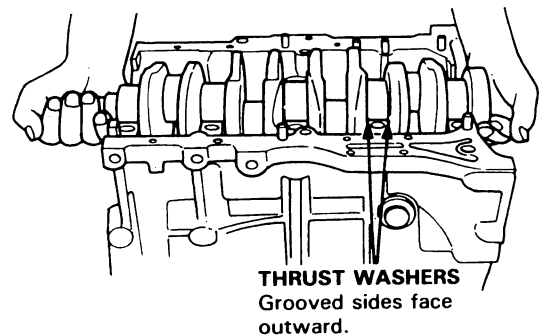
- Position all pistons at top dead center.
- NOTE: Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.



Installation

 Before installing the crankshaft, apply a coat of engine oil to the main bearings and rod bearings.

1. Insert the thrust washers in the No. 4 journal of the cylinder block.
2. Insert bearing halves in the cylinder block and connecting rods.
3. Hold the crankshaft so rod journals for cylinders No. 2 and No. 3 are straight down.
4. Lower the crankshaft into the block, seating the rod journals into connecting rods No. 2 and No. 3, and install the rod caps and nuts finger-tight.



5. Rotate the crankshaft clockwise, seat journals into connecting rods No. 1 and No. 4, and install the rod caps and nuts finger-tight.

NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

(cont'd)

Crankshaft

Installation (cont'd)

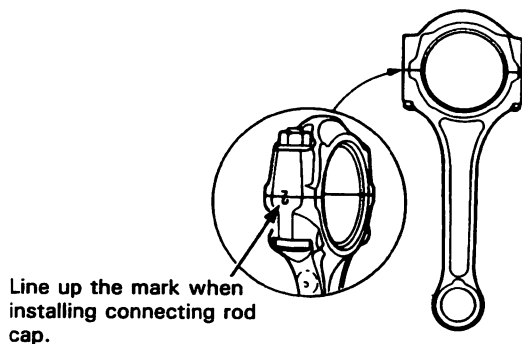
6. Check rod bearing clearance with plastigage (see page 7-A-9), then torque the cap nuts.

31 N·m (3.2 kgf·m, 23 lbf·ft)

Apply engine oil to the bolt threads.

NOTE: Reference numbers on connecting rod are for big-end bore tolerance and do not indicate the position of piston in the engine.

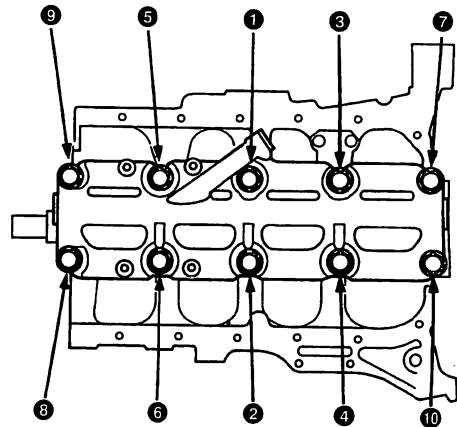
7. Install the thrust washers on the No. 4 journal. Oil the thrust washer surfaces.



8. Install the main bearing caps.
9. Check clearance with plastigage (see page 7-A-7), then tighten the bearing cap bolts in 2 steps.
1st step: 25 N·m (2.5 kgf·m, 18 lbf·ft)
2nd step: 51 N·m (5.2 kgf·m, 38 lbf·ft)

NOTE: Coat the thrust washer surfaces and bolt threads with oil.

MAIN BEARING CAP BOLTS TIGHTENING SEQUENCE



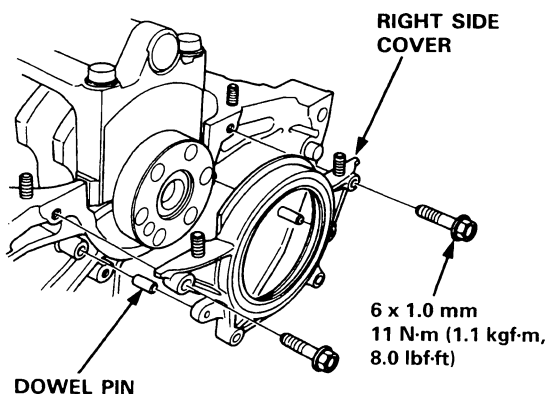
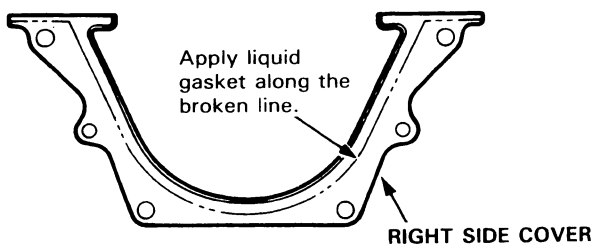
NOTE: Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.



NOTE:

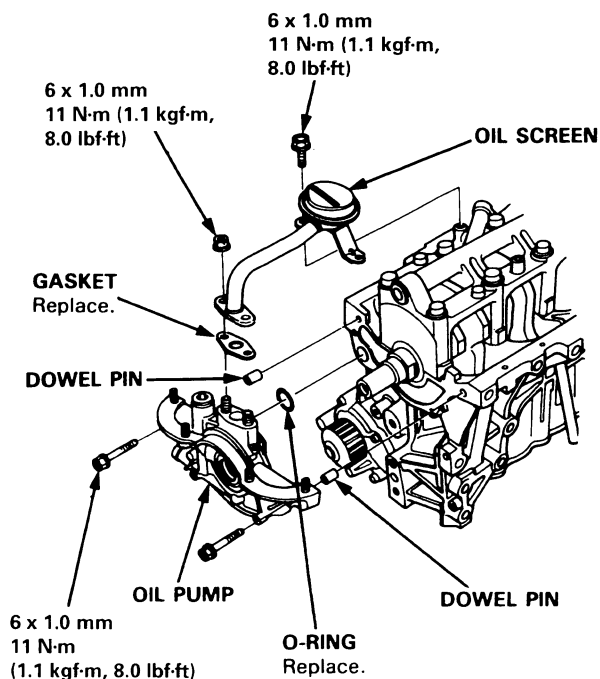
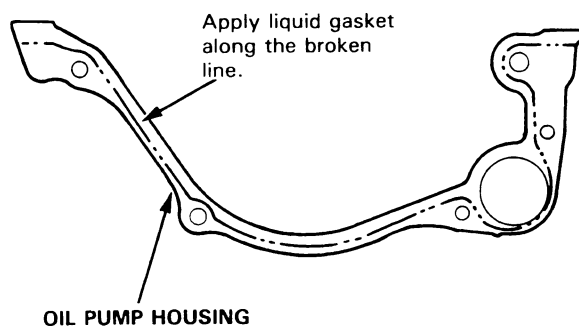
- Use liquid gasket, part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, being careful to cover all the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying the liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

10. Apply liquid gasket to the block mating surface of the right side cover, then install it on the cylinder block.



11. Apply liquid gasket to the oil pump mating surface of the block, then install the oil pump on the cylinder block.

- Apply grease to the lips of the oil seals. Then, install the oil pump while aligning the inner rotor with the crankshaft. When the pump is in place, clean any excess grease off the crankshaft, then check that the oil seal lips are not distorted.



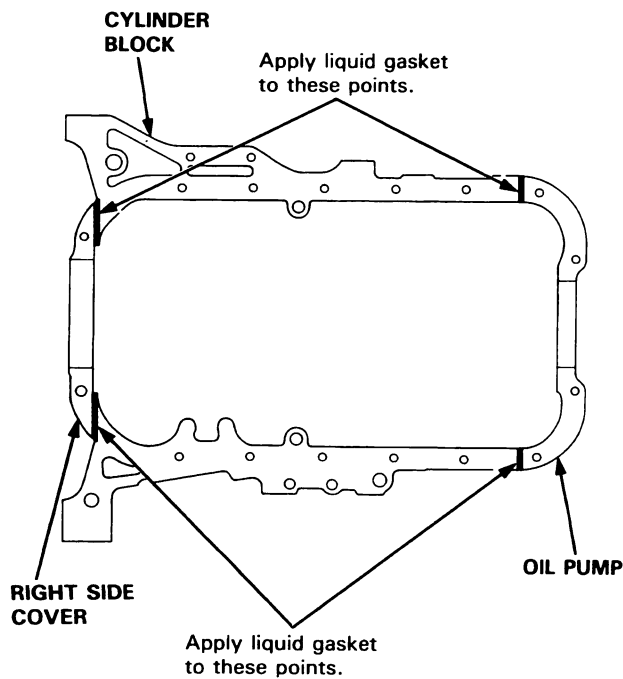
Oil Pan

Installation

NOTE:

- Use liquid gasket, part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket as an even bead, centered between the edges of the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying the liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

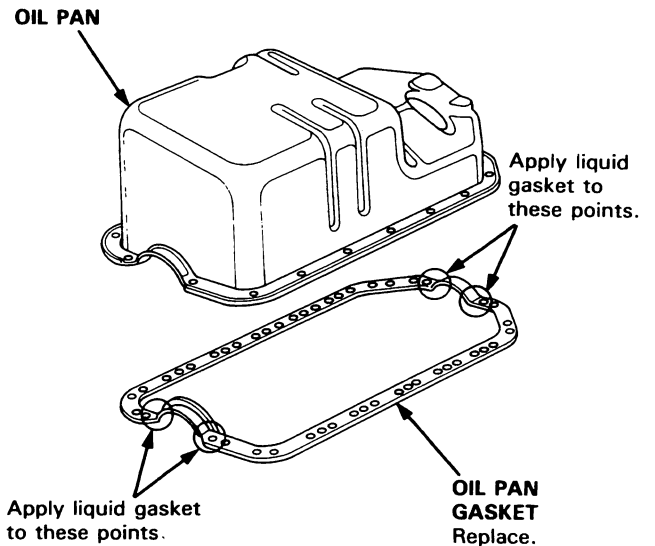
1. Apply liquid gasket on the oil pump and right side cover mating areas as shown below.



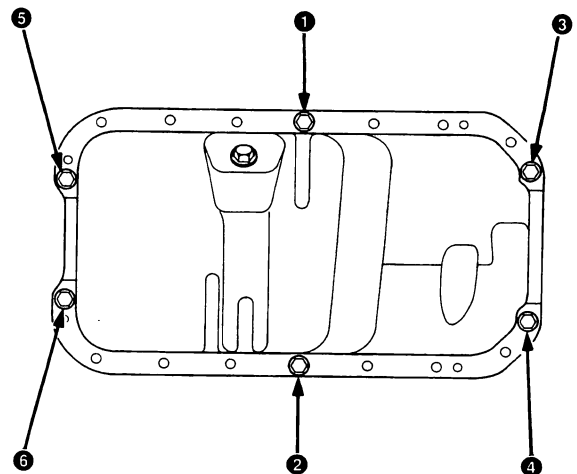
2. Install the oil pan gasket and oil pan.

NOTE:

- Use a new oil pan gasket.
- Install oil pan no more than five minutes after liquid gasket applied.



3. Tighten bolts and nuts finger tight at six points as shown below.



4. Tighten all bolts and nuts, starting from bolt ①, clockwise in these steps.

NOTE: Excessive tightening can cause distortion of oil pan gasket and oil leakage.

Torque: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

Engine Block

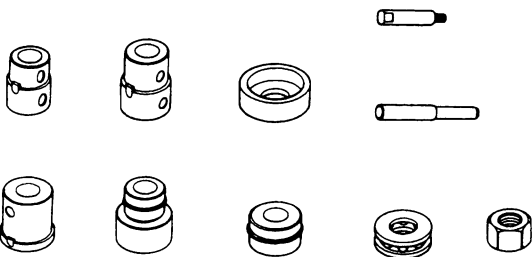
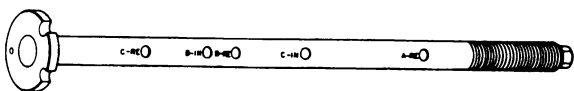
F18B2, F18B3, F20B6, H22A7 engines

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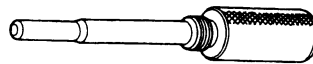


Special Tools

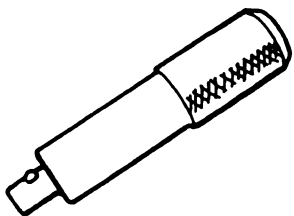
Ref. No.	Tool Number	Description	Qty	Remark
①	07LAF – PT20100	Bearing Replacement Tool Set	1	
②	07LAG – PT20100	Balancer Shaft Lock Pin	1	
③	07749 – 0010000	Handle Driver	1	
④	07948 – SB00101	Driver Attachment, 96 mm	1	



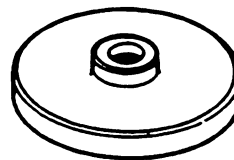
①



②



③

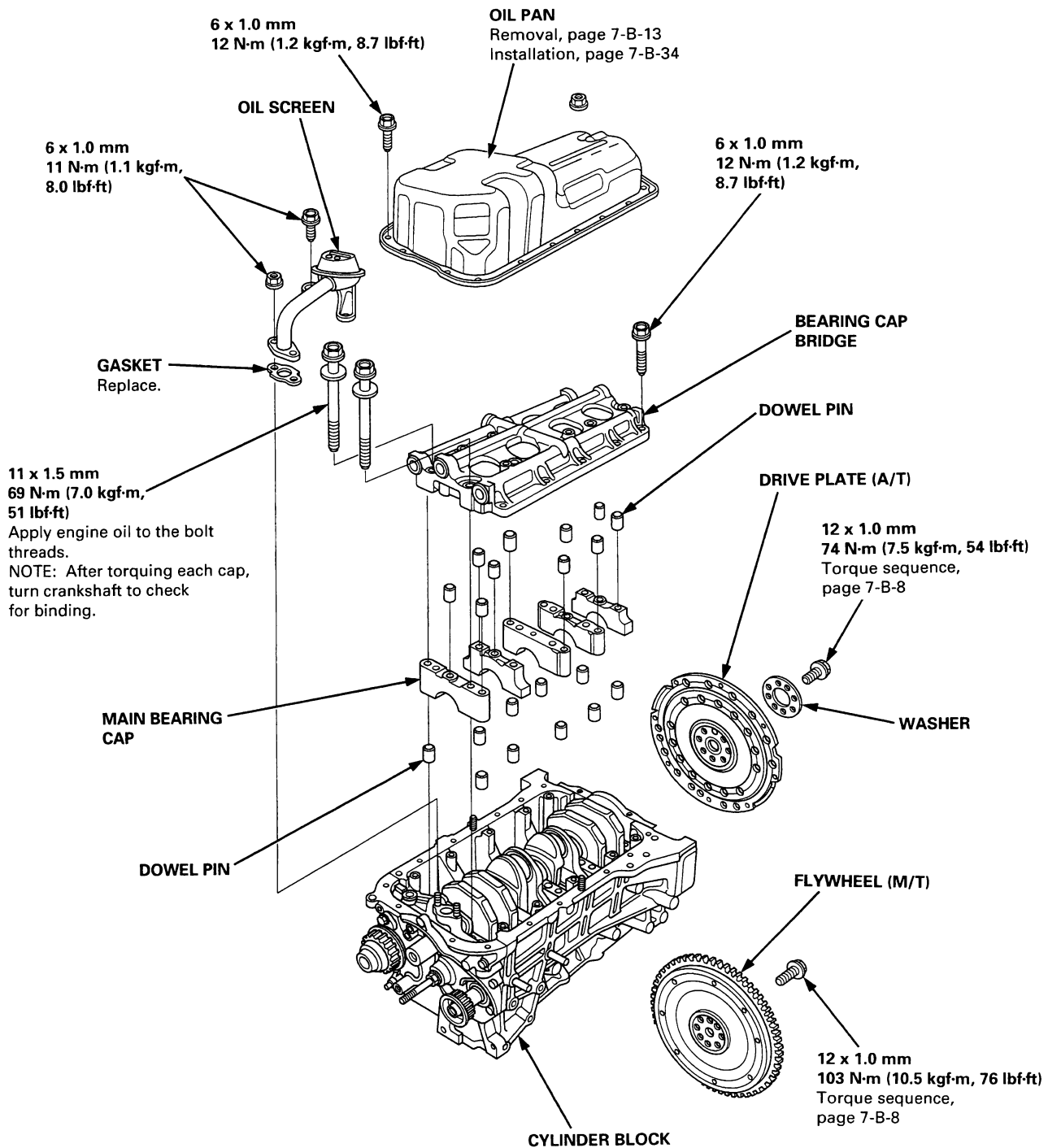


④



Lubricate all internal parts with engine oil during reassembly.

F18B2, F18B3, F20B6 engines:



(cont'd)

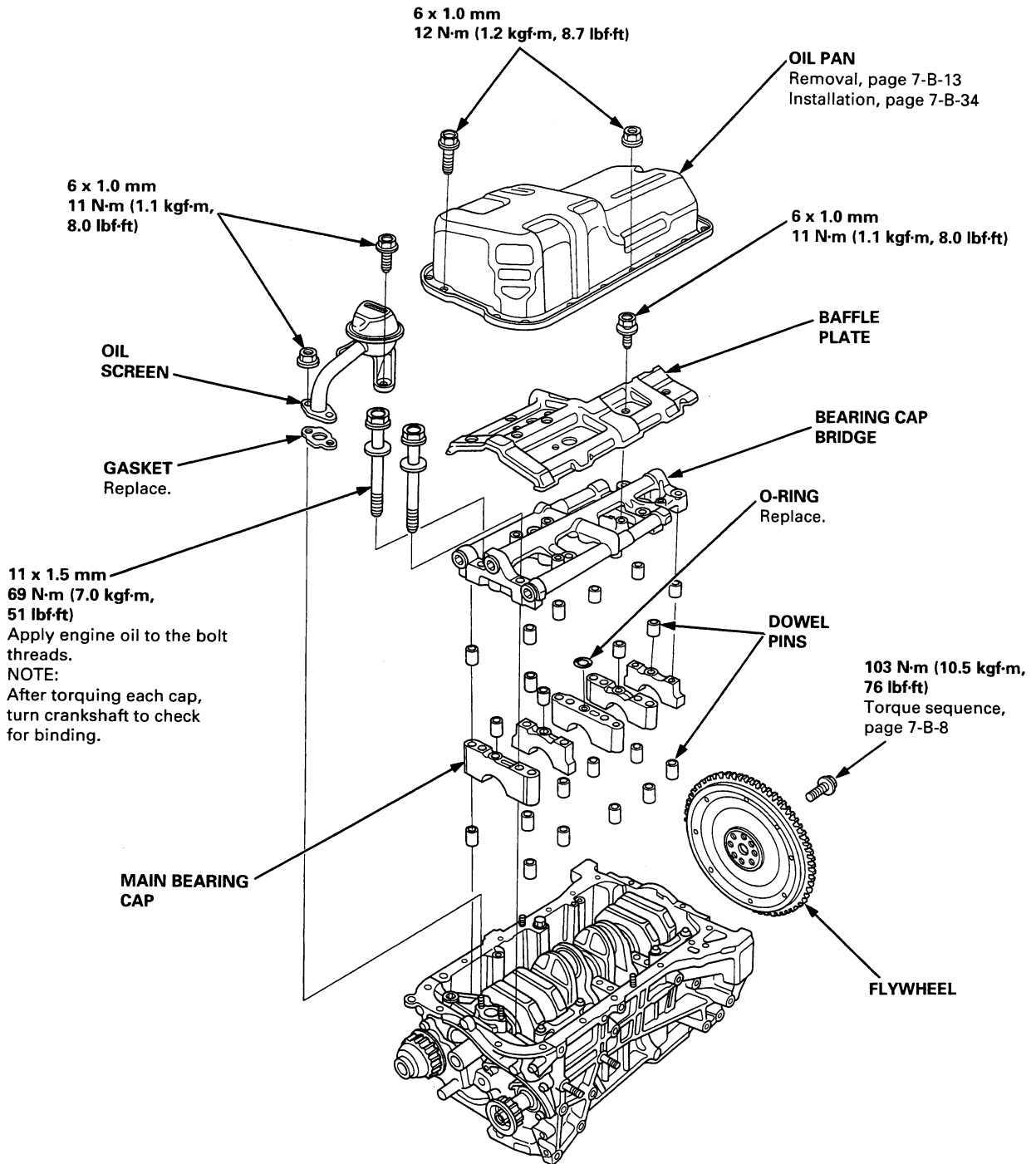
Illustrated Index

(cont'd)



Lubricate all internal parts with engine oil during reassembly.

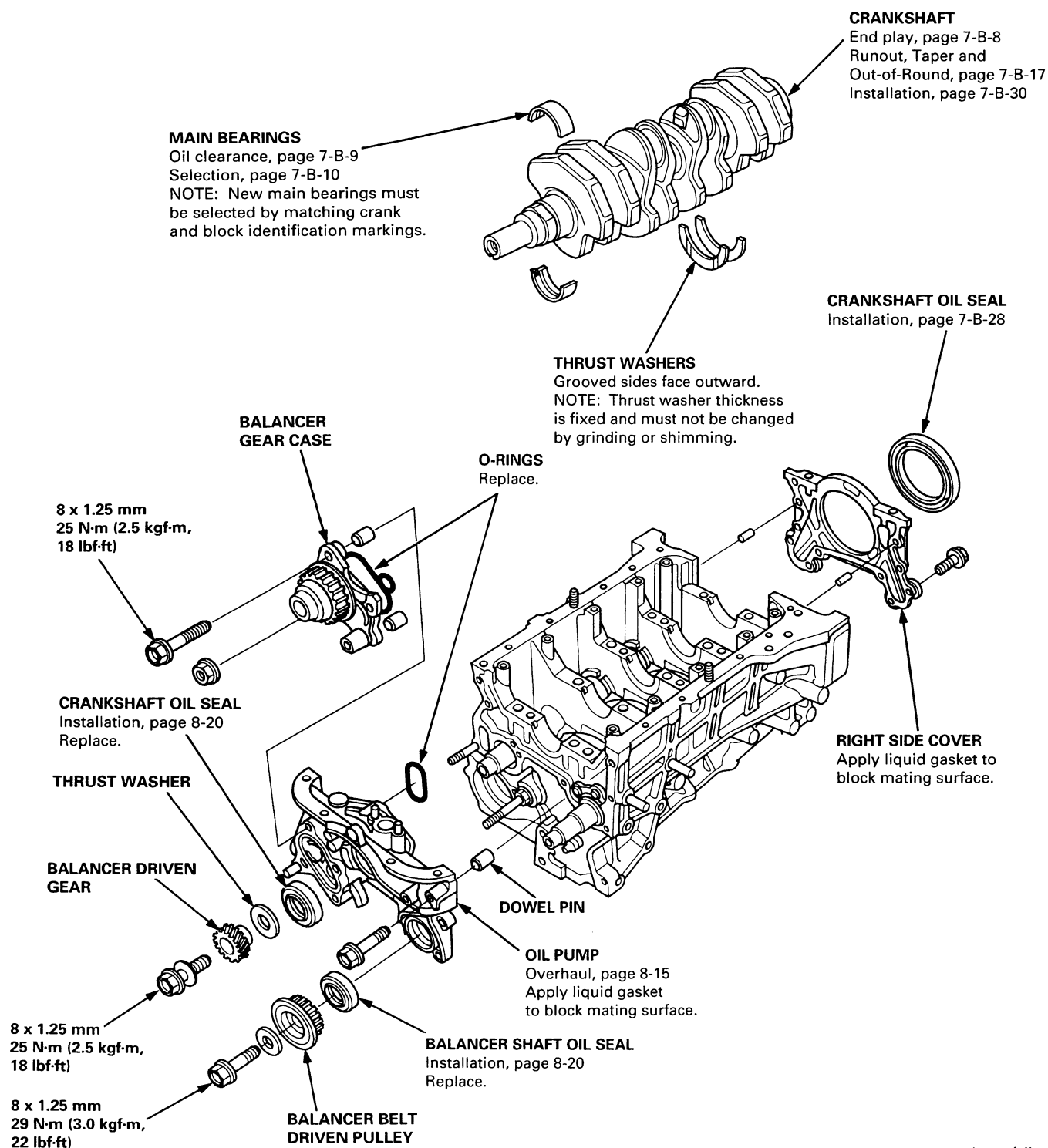
H22A7 engine:





NOTE:

- Apply liquid gasket to the mating surfaces of the right side cover and oil pump case before installing them.
- Use liquid gasket, part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.



(cont'd)

Illustrated Index

(cont'd)



Lubricate all internal parts with engine oil during reassembly.

OIL JET

Handle the nozzle with care. Do not damage or deform.

Inspection, page 8-13

OIL JET BOLT

39 N·m (4.0 kgf·m, 29 lbf·ft)

Inspection, page 8-13

H22A7 engine:

6 x 1.0 mm
11 N·m (1.1 kgf·m,
8.0 lbf·ft)

RIGHT BREATHER
COVER

LEFT BREATHER
COVER

REAR BALANCER SHAFT

End play, page 7-B-35

Runout, Taper and

Out-of-Round, pages 7-B-35, 36

Installation, page 7-B-32

RETAINER

NOTE: Retainer thickness is fixed
and must not be changed by
grinding or shimming.

6 x 1.0 mm
20 N·m (2.0 kgf·m,
14 lbf·ft)

FRONT BALANCER
SHAFT

BALANCER SHAFT BEARINGS

Inspection, page 7-B-37

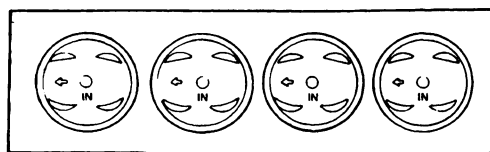
Replacement, page 7-B-38



NOTE: New rod bearings must be selected by matching connecting rod and crankshaft identification markings (see pages 7-B-11).

PISTON INSTALLATION DIRECTION

EXHAUST



INTAKE

PISTON RINGS

Replacement, page 7-B-26
Measurement, pages 7-B-25, 26
Alignment, page 7-B-27

PISTON PIN

Removal, page 7-B-20
Installation, page 7-B-24
Inspection, page 7-B-23

PISTON

Removal, page 7-B-13
Measurement, page 7-B-18
NOTE: To maintain proper clearance, match the letter on the piston top with the letter for each cylinder stamped on the block.

On the piston top	On the block
No letter	A or I
B	B or II

SNAP RING

CYLINDER BLOCK

Cylinder bore inspection, page 7-B-19
Warpage inspection, page 7-B-19
Cylinder bore honing, page 7-B-20
Ridge removal, page 7-B-16

CONNECTING ROD

End play, page 7-B-8
Small end measurement, page 7-B-23

CONNECTING ROD BEARINGS

Clearance, page 7-B-11
Selection, page 7-B-12

DOWEL PIN

CONNECTING ROD BEARING CAP

NOTE: Install cap so the bearing recess is on the same side as the recess in the rod.

CONNECTING ROD BOLT

Inspection, page 7-B-22
Tightening, page 7-B-30

CYLINDER BORE SIZES

(A or I, B or II)

NOTE: To maintain proper piston clearance, match these letters with the letters on the pistons. The letters on the block read from left to right, No. 1 through No. 4 cylinders.

On the block	On the piston top
A or I	No letter
B or II	B

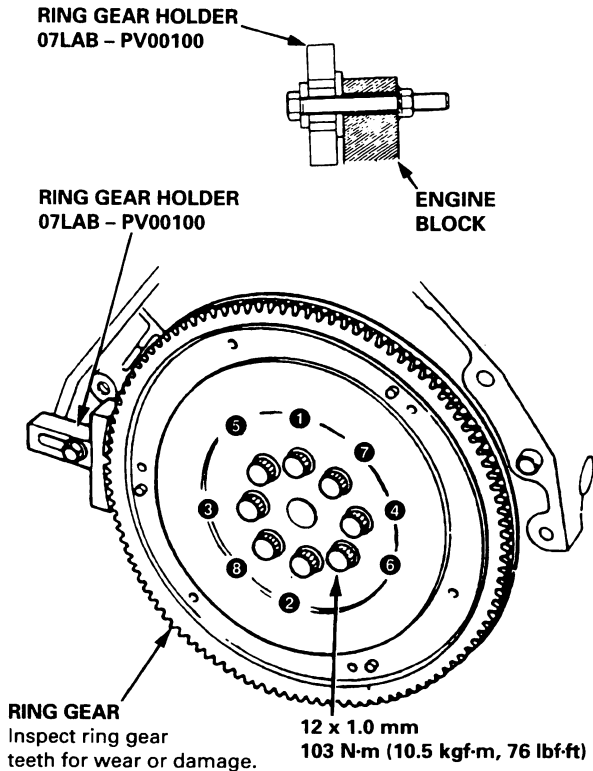
Flywheel and Drive Plate

Connecting Rod and Crankshaft

Replacement

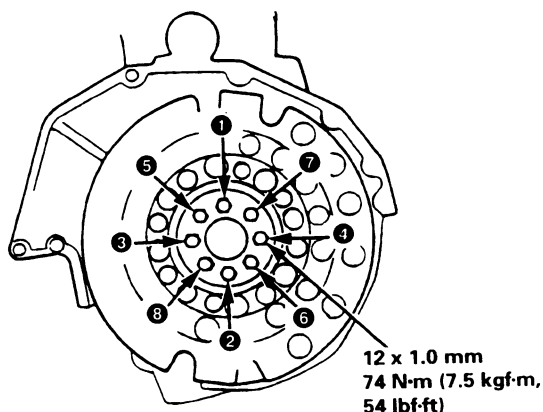
Manual Transmission:

Remove the eight flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



Automatic Transmission:

Remove the eight drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



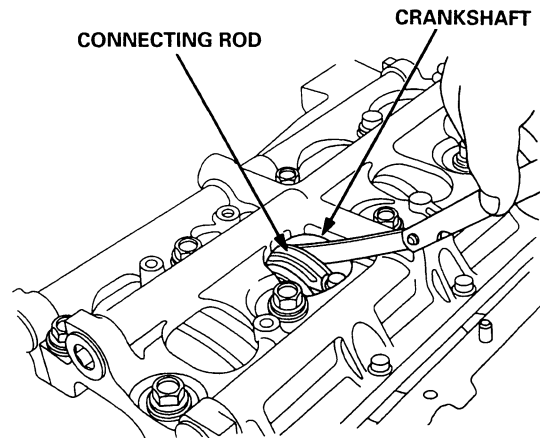
End Play

Connecting Rod End Play:

Standard (New): 0.15 – 0.30 mm

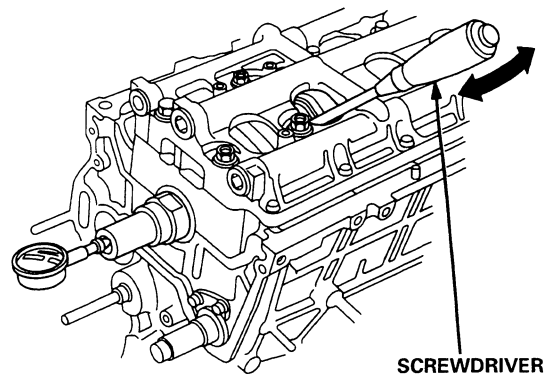
(0.006 – 0.012 in)

Service Limit: 0.40 mm (0.016 in)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft (see pages 7-B-13 and 7-B-30).

Push the crankshaft firmly away from the dial indicator, and zero the dial against the end of the crankshaft. Then pull the crankshaft firmly back toward the indicator; dial reading should not exceed service limit.



Crankshaft End Play:

Standard (New): 0.10 – 0.35 mm

(0.004 – 0.014 in)

Service Limit: 0.45 mm (0.018 in)

- If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary.

NOTE: Thrust washer thickness is fixed and must not be changed either by grinding or shimming. Thrust washers are installed with the grooved sides facing outward.

Main Bearings



Clearance

1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crankshaft and flywheel will flatten the plastigage further than just the torque on the cap bolt and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights, and check only one bearing at a time.

4. Reinstall the bearings and caps, then torque the bolts (see page 7-B-31).

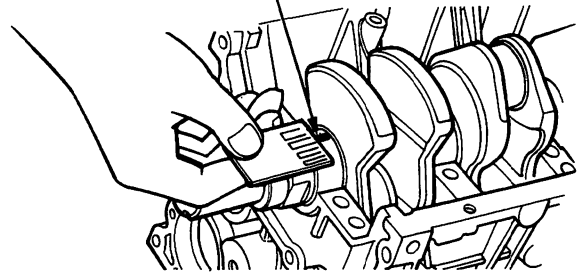
NOTE: Do not rotate the crankshaft during inspection.

5. Remove the cap and bearings again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance: Standard (New):

No. 1 and 4	0.013 – 0.037 mm (0.0005 – 0.0015 in)
Service Limit:	0.050 mm (0.0020 in)
No. 2	0.021 – 0.045 mm (0.0008 – 0.0018 in)
Service Limit:	0.050 mm (0.0020 in)
No. 3	0.025 – 0.049 mm (0.0010 – 0.0019 in)
Service Limit:	0.055 mm (0.0022 in)
No. 5	0.009 – 0.033 mm (0.0004 – 0.0013 in)
Service Limit:	0.040 mm (0.0016 in)

PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

Main Bearings

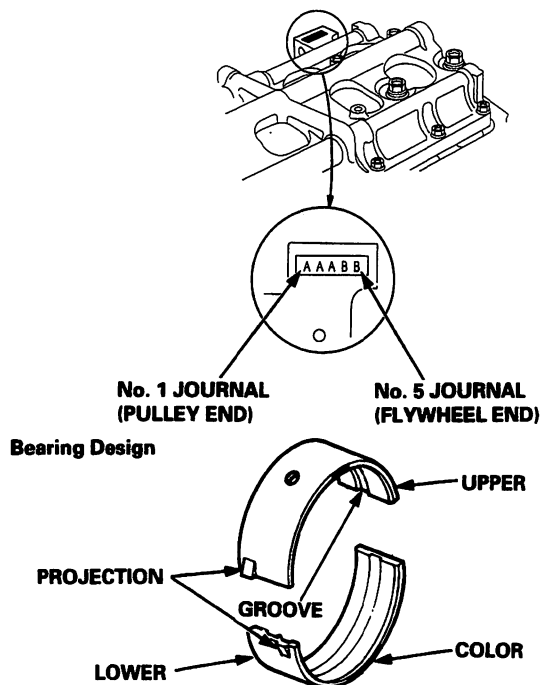
Selection

NOTE: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Crankshaft Bore Code Location

Numbers or Letters or Bars have been stamped on the end of the block as a code for the size of each of the 5 main journal bores.

Use them, and the numbers stamped on the crankshaft (codes for main journal size), to choose the correct bearings.



No. 1 and 4 journals:

Bearing Identification

Color code is on the edge of the bearing.

1 or I
2 or II
3 or III
4 or IIII
5 or IIIII
6 or IIIIII

Smaller main journal

Smaller bearing (Thicker)

→ Larger crank bore			
1 or A or I	2 or B or II	3 or C or III	4 or D or IIII

→ Smaller bearing (Thicker)			
Yellow	Yellow/ Green	Green	Green/ Brown
Yellow/ Green	Green	Green/ Brown	Brown
Green	Green/ Brown	Brown	Brown/ Black
Green/ Brown	Brown	Brown/ Black	Black
Brown	Brown/ Black	Black	Black/ Blue
Brown/ Black	Black	Black/ Blue	Blue

NOTE: When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

No. 2, 3 and 5 journals:

Bearing Identification

Color code is on the edge of the bearing.

1 or I
2 or II
3 or III
4 or IIII
5 or IIIII
6 or IIIIII

Smaller main journal

Smaller bearing (Thicker)

→ Larger crank bore			
1 or A or I	2 or B or II	3 or C or III	4 or D or IIII

→ Smaller bearing (Thicker)			
Pink	Pink/ Yellow	Yellow	Yellow/ Green
Pink/ Yellow	Yellow	Yellow/ Green	Green
Yellow	Yellow/ Green	Green	Green/ Brown
Yellow/ Green	Green	Green/ Brown	Brown
Green	Green/ Brown	Brown	Brown/ Black
Green/ Brown	Brown	Brown/ Black	Black

NOTE: When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

Connecting Rod Bearings

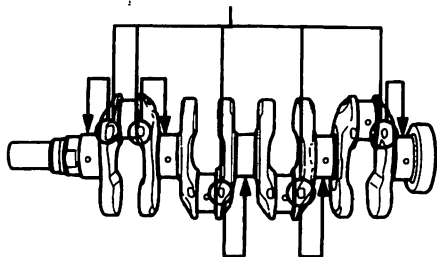


Main Journal Code Locations (Numbers or Bars)

The Main Journal Codes are stamped in one of the following locations.

Except H22A7 engine:

Main Journal Code Locations (Numbers or Bars)



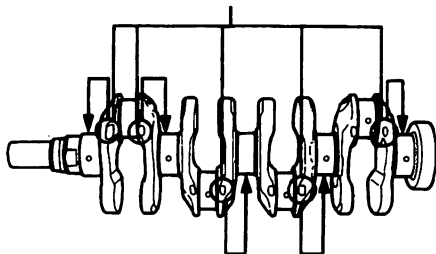
No. 1 CRANK WEB

Arrows point to No. 1 main and connecting rod journal codes.

→CCCC
→33322

H22A7 engine:

Main Journal Code Locations (Numbers or Bars)



Clearance

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop towel.
3. Place plastigage across the rod journal.
4. Reinstall the bearing half and cap, and torque the bolts (see page 7-B-30).

NOTE: Do not rotate the crankshaft during inspection.

5. Remove the rod cap and bearing half and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil Clearance:

Except H22A7 engine:

Standard (New): 0.015 – 0.043 mm
(0.0006 – 0.0017 in)

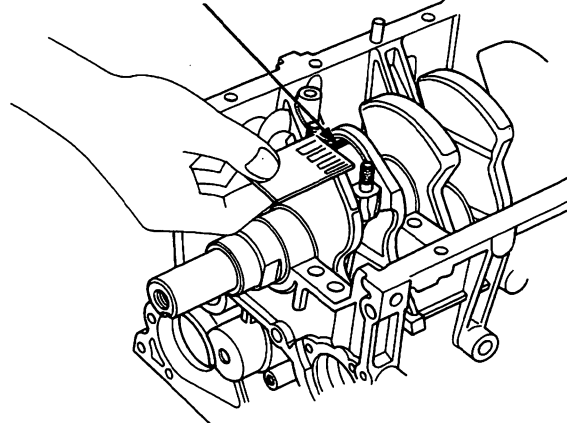
Service Limit: 0.050 mm (0.0020 in)

H22A7 engine:

Standard (New): 0.027 – 0.055 mm
(0.0011 – 0.0022 in)

Service Limit: 0.060 mm (0.0024 in)

PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

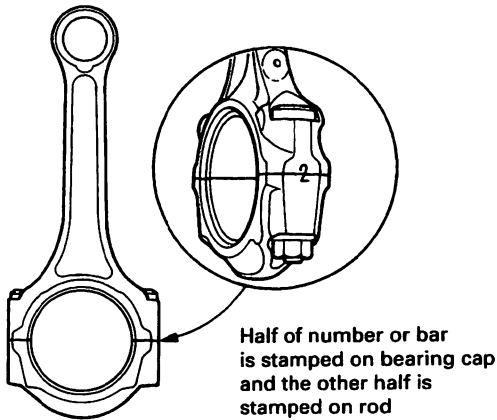
Connecting Rod Bearings

Selection

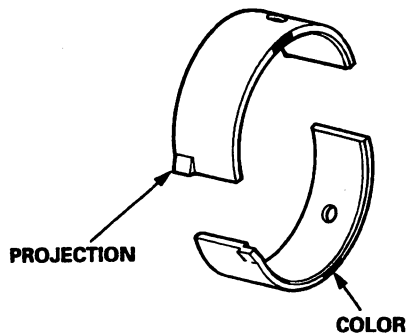
NOTE: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Connecting Rod Journal Code Locations

Numbers or Bars have been stamped on the side of each connecting rod as a code for the size of the big end. Use them, and the letters or bars stamped on the crank (codes for rod journal size), to choose the correct bearings.



Bearing Design



Bearing Identification

Color code is on the edge of the bearing.

A or I	Smaller rod journal
B or II	Smaller bearing (Thicker)
C or III	
D or IIII	

→ Larger big end bore

1 or I	2 or II	3 or III	4 or IIII
--------	---------	----------	-----------

→ Smaller bearing (Thicker)

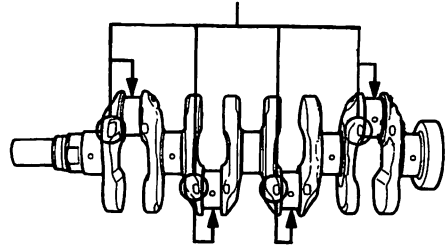
Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

Connecting Rod Journal Code Locations (Letters or Bars)

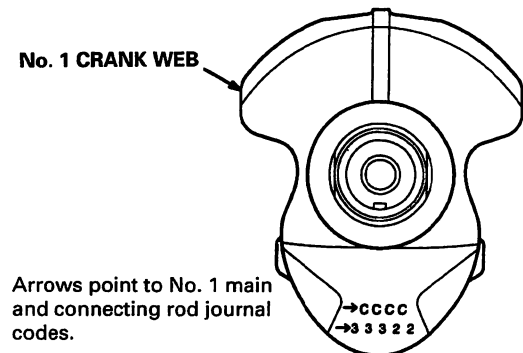
The Connecting Rod Journal Codes are stamped in one of the following locations.

Except H22A7 engine:

Connecting Rod Journal Code Locations (Letters or Bars)



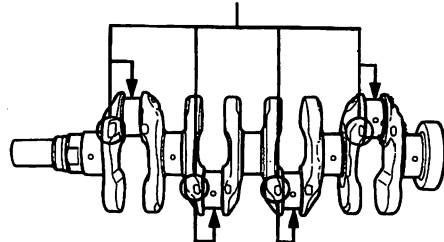
No. 1 CRANK WEB



Arrows point to No. 1 main and connecting rod journal codes.

H22A7 engine:

Connecting Rod Journal Code Locations (Letters or Bars)

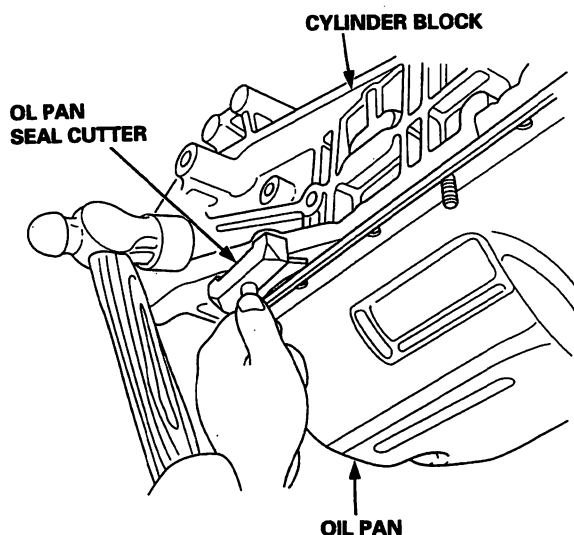




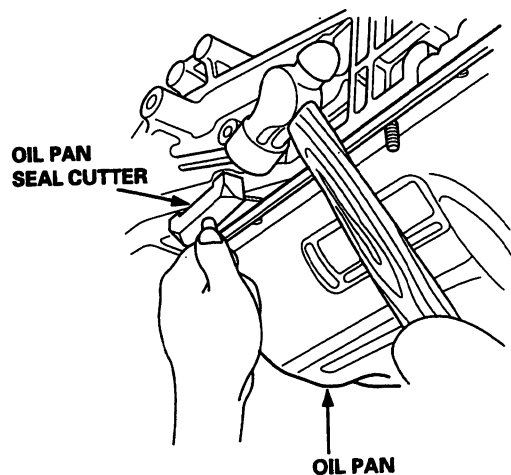
Crankshaft, Balancer Shafts and Pistons

Removal

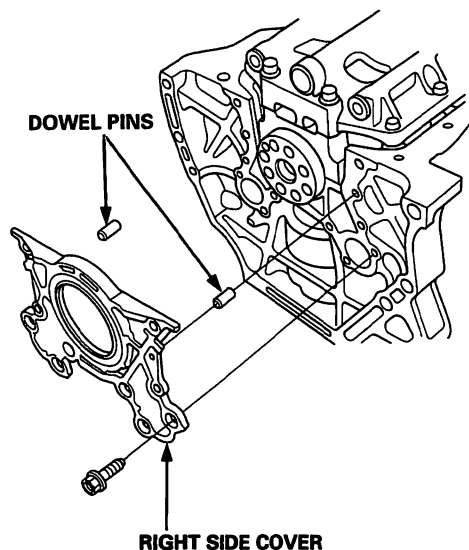
1. Remove the bolts securing the oil pan.
2. Hammer in a oil pan seal cutter between the oil pan and cylinder block.



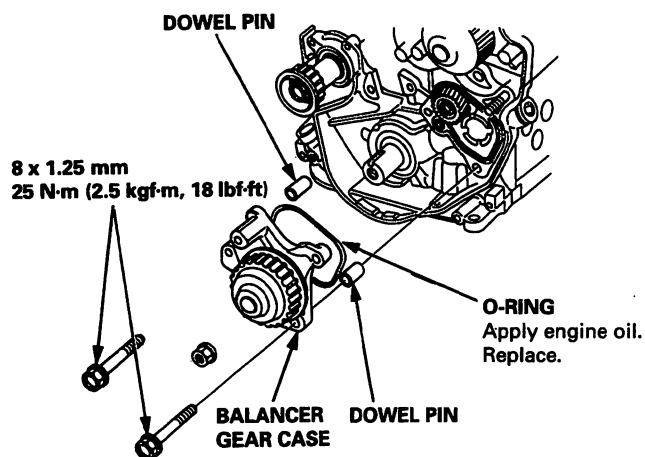
3. Cut the oil pan seal by striking the side of the cutter to slide the cutter along the oil pan. Remove the oil pan.



4. Remove the right side cover.



5. Remove the CKP/TDC sensors, then remove the timing belt drive pulley (see section 6).
6. Remove the balancer gear case.

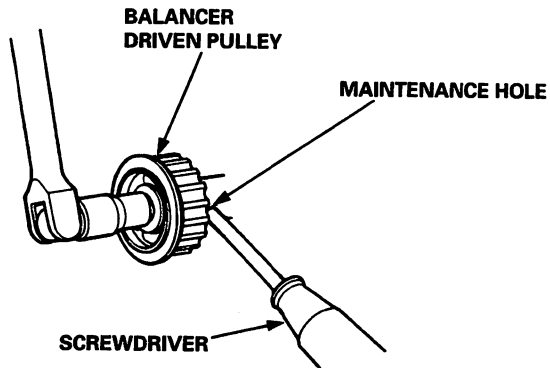


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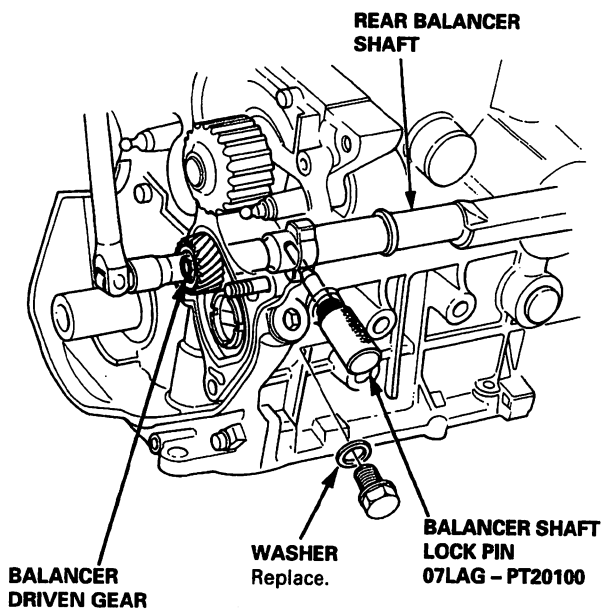
Crankshaft, Balancer Shafts and Pistons

Removal (cont'd)

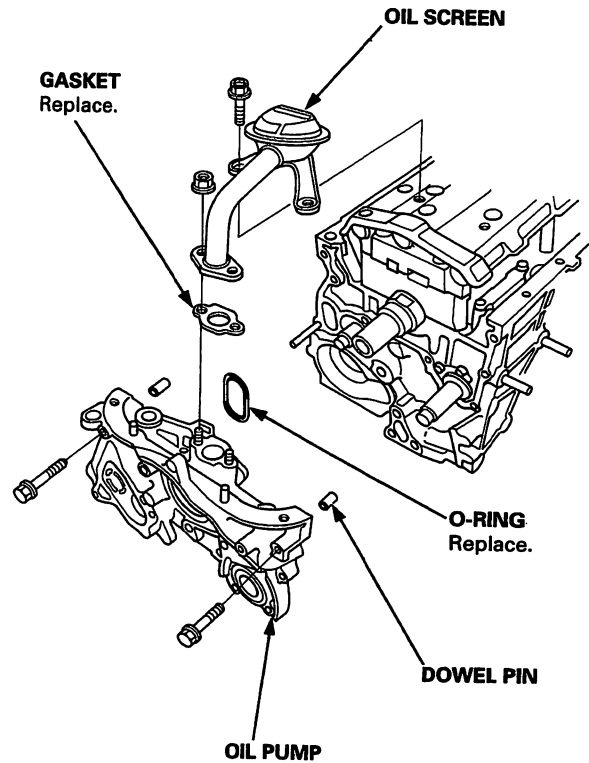
7. Remove the front balancer driven pulley as shown.



8. Align the bolt hole and the balancer shaft hole, then insert a special tool to hold the rear balancer shaft.
9. Remove the bolt and the balancer driven gear.



10. Remove the oil screen and the oil pump.



11. Remove the baffle plate (H22A7 engine).

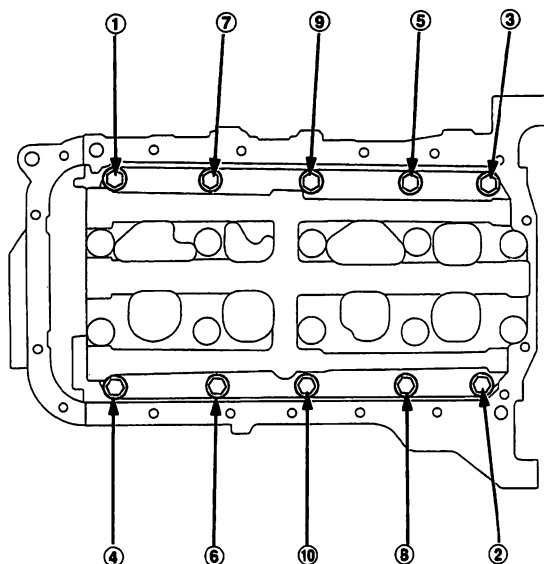


12. Remove the bolts and the bearing cap bridge, then remove the bearing caps.

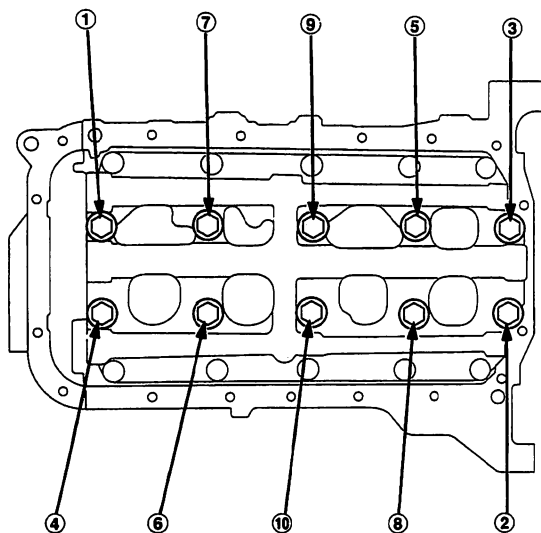
CAUTION: To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

F18B2, F18B3, F20B6 engines:

- 1. Remove the 6 mm bolts.

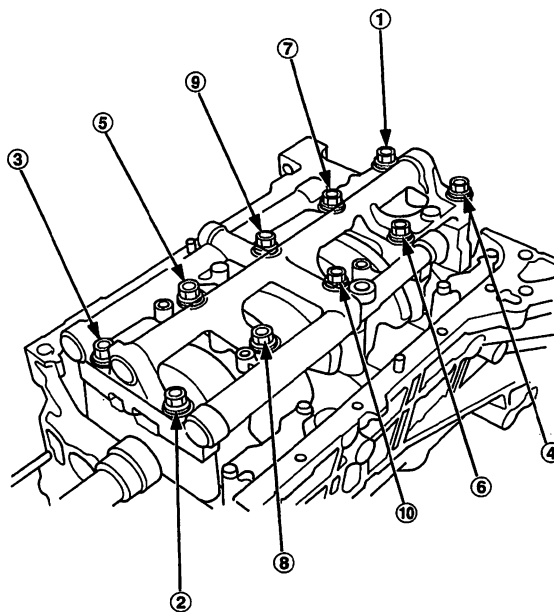


- 2. Remove the 11 mm bolts.



H22A7 engine:

- 1. Remove the 11 mm bolts.

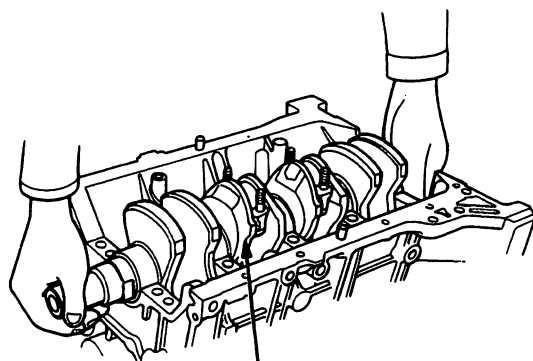


(cont'd)

Crankshaft, Balancer Shafts and Pistons

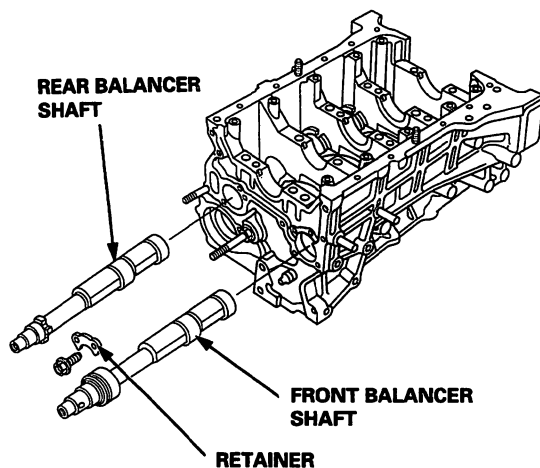
Removal (cont'd)

13. Remove the bearing cap bridge and bearing caps.
14. Turn the crankshaft so No. 2 and 3 crankpins are at the top.
15. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
16. Lift the crankshaft out of the engine, being careful not to damage the journals.



CRANKSHAFT

17. Remove the bolts and the retainer, then remove the front balancer shaft and the rear balancer shaft.

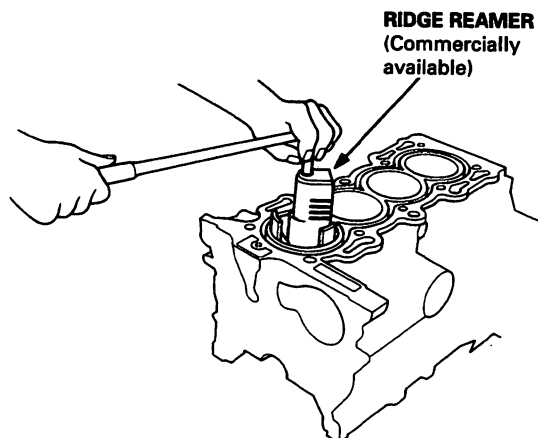


REAR BALANCER
SHAFT

FRONT BALANCER
SHAFT

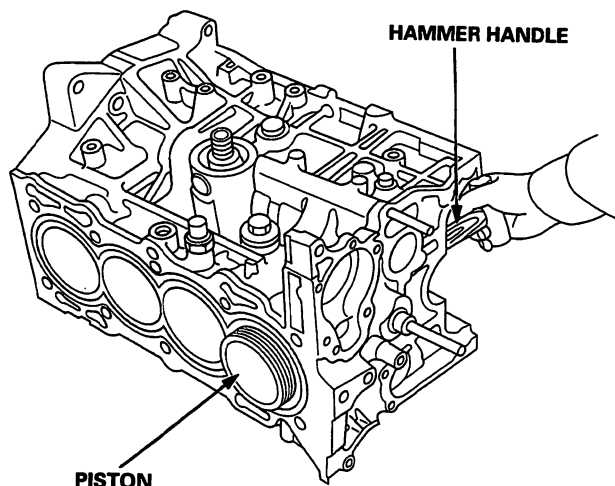
RETAINER

18. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow the reamer manufacturer's instructions.



RIDGE REAMER
(Commercially
available)

19. Use the wooden handle of a hammer to drive the pistons out.



HAMMER HANDLE

PISTON

20. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
21. To avoid mixup on reassembly, mark each piston/connecting rod assembly with its cylinder number.

NOTE: The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.



Inspection

- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

Alignment

- Measure runout on all main journals to make sure the crank is not bent.
- The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Indicated Runout:

F18B2, F18B3, F20B6 engines:

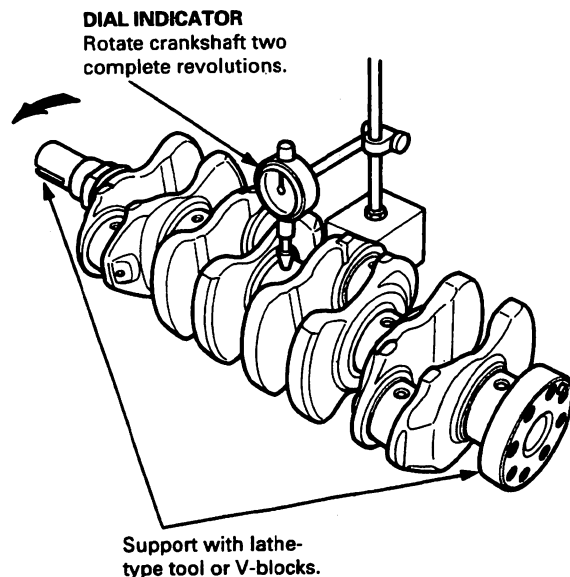
Standard (New): 0.02 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)

H22A7 engine:

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)



Out-of-Round and Taper

- Measure out-of-round at the middle of each rod and main journal in two places.
- The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round:

F18B2, F18B3, F20B6 engines:

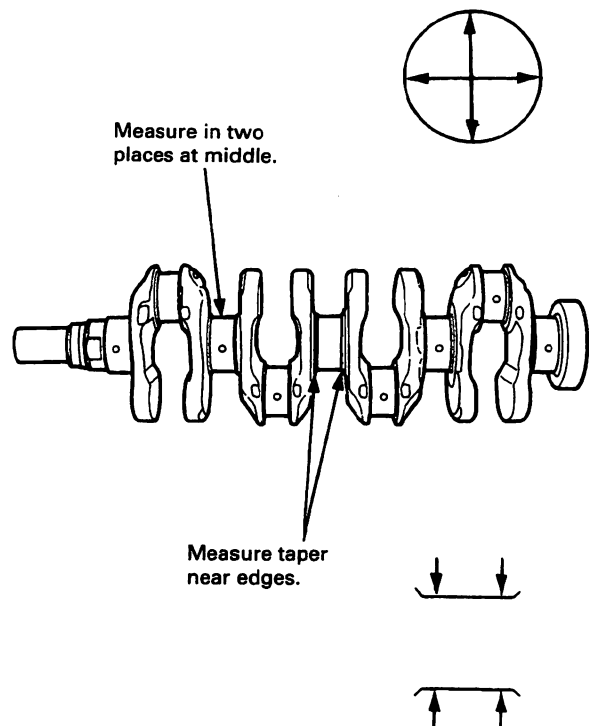
Standard (New): 0.005 mm (0.0002 in) max.

Service Limit: 0.010 mm (0.0004 in)

H22A7 engine:

Standard (New): 0.004 mm (0.0002 in) max.

Service Limit: 0.006 mm (0.0002 in)



- Measure taper at the edge of each rod and main journal.
- The difference between measurements on each journal must not be more than the service limit.

Journal Taper:

F18B2, F18B3, F20B6 engines:

Standard (New): 0.005 mm (0.0002 in) max.

Service Limit: 0.010 mm (0.0004 in)

H22A7 engine:

Standard (New): 0.005 mm (0.0002 in) max.

Service Limit: 0.006 mm (0.0002 in)

Pistons

Inspection

1. Check the piston for distortion or cracks.

NOTE: If the cylinder is bored, an oversized piston must be used.

2. Measure the piston diameter at a point A from the bottom of the skirt.

Point A:

F18B2, F18B3, F20B6 engines: 16 mm (0.6 in)

H22A7 engine: 15 mm (0.6 in)

NOTE: There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the block as cylinder bore sizes.

Piston Diameter:

F18B2, F18B3, F20B6 engines:

Standard (New):

No Letter (A): 84.980 – 84.990 mm
(3.3457 – 3.3461 in)

B: 84.970 – 84.980 mm
(3.3453 – 3.3457 in)

Service Limit:

No Letter (A): 84.970 mm (3.3453 in)

B: 84.960 mm (3.3449 in)

H22A7 engine:

Standard (New):

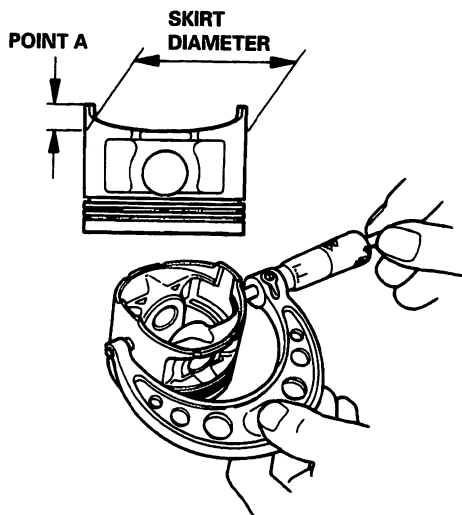
No Letter (A): 86.993 – 87.006 mm
(3.4249 – 3.4254 in)

B: 86.983 – 86.996 mm
(3.4245 – 3.4250 in)

Service Limit:

No Letter (A): 86.980 mm (3.4244 in)

B: 86.970 mm (3.4240 in)



3. Calculate the difference between the cylinder bore diameter (see page 7-B-19) and piston diameter.

Piston-to-Cylinder Clearance:

F18B2, F18B3, F20B6 engines:

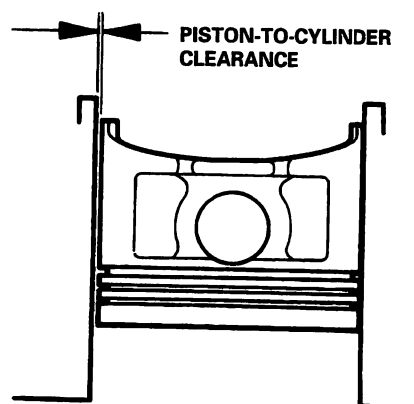
Standard (New): 0.020 – 0.040 mm
(0.0008 – 0.0016 in)

Service Limit: 0.05 mm (0.002 in)

H22A7 engine:

Standard (New): 0.004 – 0.027 mm
(0.0002 – 0.0011 in)

Service Limit: 0.04 mm (0.002 in)



If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.

Oversize Piston Diameter:

F18B2, F18B3, F20B6 engines:

0.25: 85.230 – 85.240 mm (3.3555 – 3.3559 in)

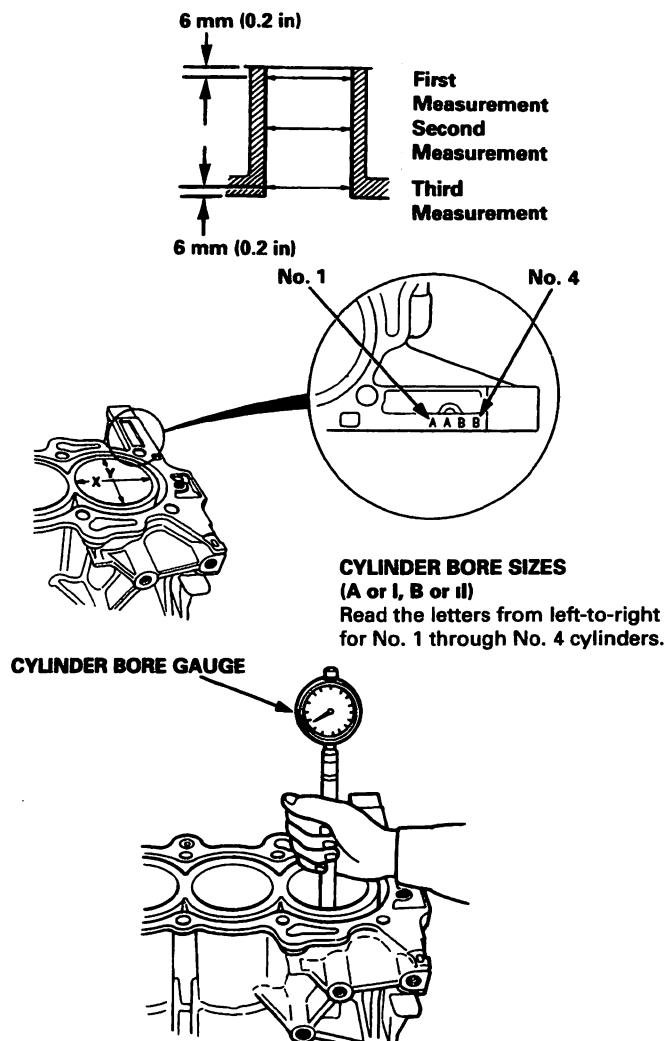
H22A7 engine:

0.25: 87.233 – 87.246 mm (3.4344 – 3.4349 in)



Inspection

1. Measure wear and taper in direction X and Y at three levels in each cylinder as shown.



Cylinder Bore Size:

F18B2, F18B3, F20B6 engines:

Standard (New):

A or I: 85.010 – 85.020 mm (3.3468 – 3.3472 in)

B or II: 85.000 – 85.010 mm (3.3465 – 3.3468 in)

Service Limit: 85.070 mm (3.3492 in)

H22A7 engine:

Standard (New):

A or I: 87.010 – 87.020 mm (3.4256 – 3.4260 in)

B or II: 87.000 – 87.010 mm (3.4252 – 3.4256 in)

Service Limit: 87.070 mm (3.4279 in)

Oversize:

F18B2, F18B3, F20B6 engines:

0.25: 85.250 – 85.260 mm (3.3563 – 3.3567 in)

H22A7 engine:

0.25: 87.250 – 87.260 mm (3.4350 – 3.4354 in)

Bore Taper:

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in)

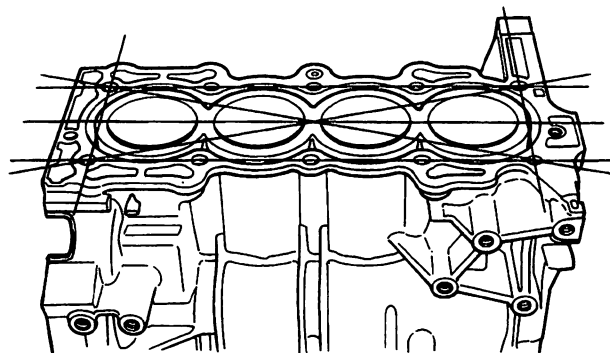
- If measurements in any cylinder are beyond Oversize Bore Service Limit, replace the block.
- If the block is to be rebored, refer to Piston Clearance Inspection (see page 7-B-18) after reboring.

NOTE: Scored or scratched cylinder bores must be honed.

Reboring Limit: 0.25 mm (0.01 in)

2. Check the top of the block for warpage.
Measure along the edges and across the center as shown.

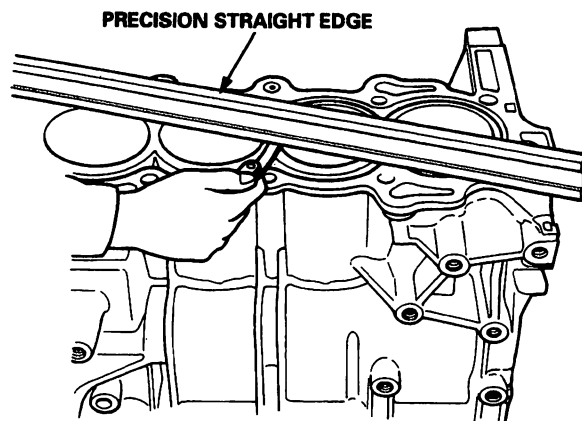
SURFACES TO BE MEASURED



Cylinder Block Warpage:

Standard (New): below 0.07 mm (0.003 in) max.

Service Limit: 0.10 mm (0.004 in)

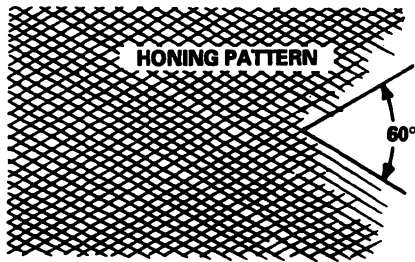


Bore Honing

1. Measure cylinder bores as shown on page 7-B-19. If the block is to be reused, hone the cylinders and remeasure the bores.
2. Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.

NOTE:

- Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
- Do not use stones that are worn or broken.

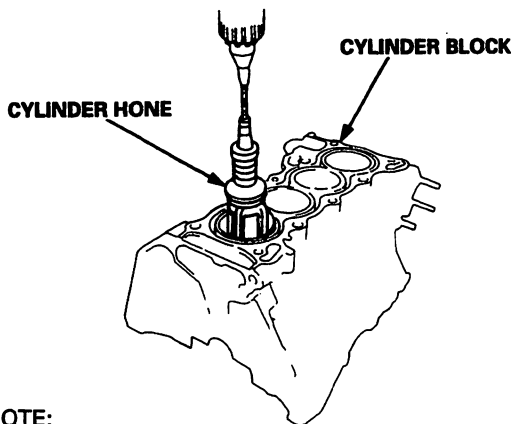


3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in cylinder bores after honing to the service limit, rebore the cylinder block.

NOTE: Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



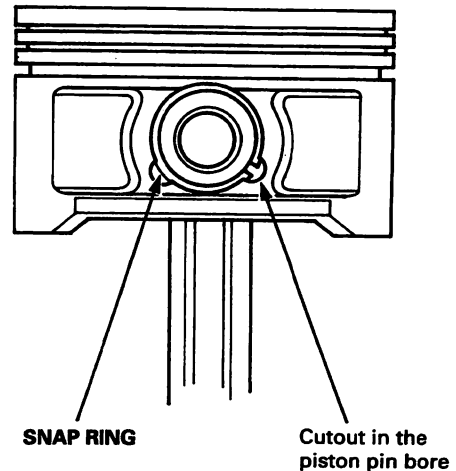
NOTE:

- After honing, clean the cylinder thoroughly with soapy water.
- Only a scored or scratched cylinder bore must be honed.

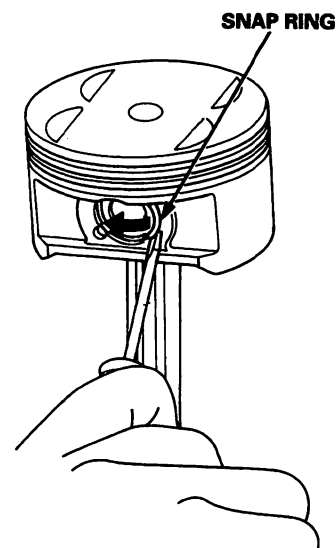
Removal

1. Apply engine oil to the piston pin snap rings and turn them in the ring grooves until the end gaps are lined up with the cutouts in the piston pin bores.

NOTE: Take care not to damage the ring grooves.

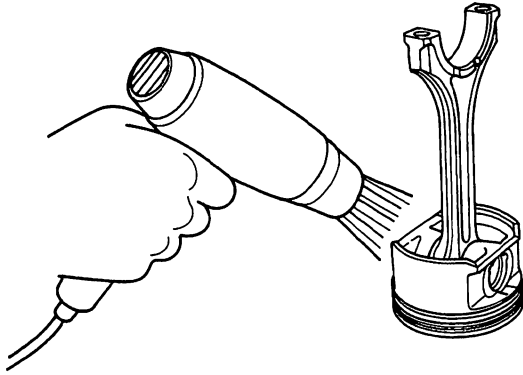


2. Remove both snap rings. Start at the cutout in the piston pin bore. Remove the snap rings carefully so they do not go flying or get lost. Wear eye protection.





3. Heat the piston and connecting rod assembly to approximately 70°C (158°F), then remove the piston pin.



NOTE: Inspect the piston, piston pin and connecting rod when they are at the room temperature.

Selection

Each rod falls into one of four tolerance ranges (F18B2, F18B3, F20B6 engines: from 0 to 0.024 mm (0.0009 in), in 0.006 mm (0.0002 in) increments, H22A7 engine: from 0.008 mm (0.0003 in) to 0.032 mm (0.0013 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore.

It's then stamped with a number (1, 2, 3, or 4/I, II, III, or IIII) indicating the range. You may find any combination of 1, 2, 3, or 4/I, II, III, or IIII in any engine.

Normal Bore Size:

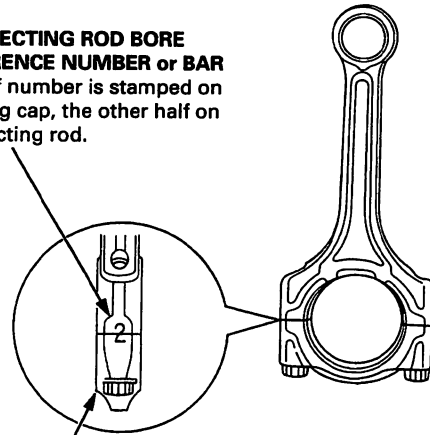
F18B2, F18B3, F20B6 engines: 48.0 mm (1.89 in)

H22A7 engine: 51.0 mm (2.01 in)

NOTE:

- Reference numbers or bars are for big end bore size and do not indicate the position of the rod in the engine.
- Inspect each connecting rod for cracks and heat damage.

**CONNECTING ROD BORE
REFERENCE NUMBER or BAR**
Half of number is stamped on
bearing cap, the other half on
connecting rod.

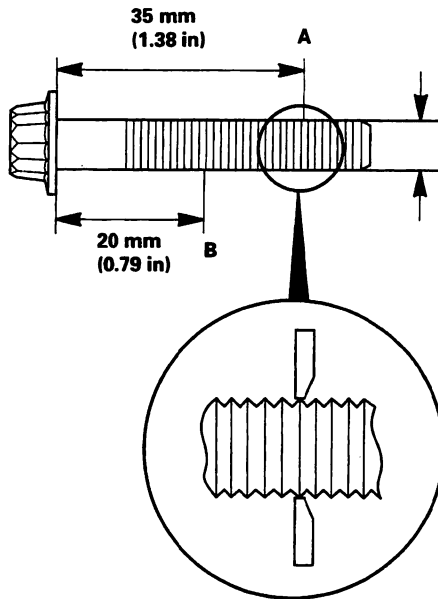


Inspect bolts
and nuts for
stress cracks.

Connecting Rod Bolts

Inspection

1. Measure the diameter of each connecting rod bolt at point A and point B.



2. Calculate the difference in diameter between point A and point B.

Point A – Point B = Difference in Diameter

Difference in Diameter:

Specification: 0 – 0.1 mm (0 – 0.004 in)

3. If the difference in diameter is out of tolerance, replace the connecting rod bolt.



Inspection

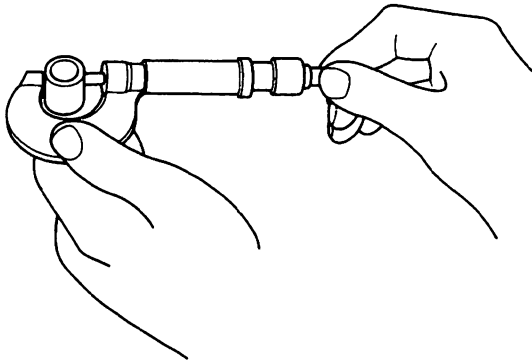
NOTE: Inspect the piston, piston pin and connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

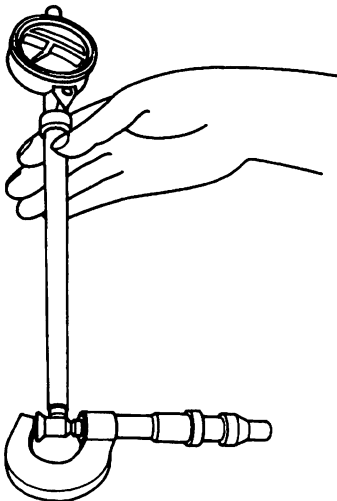
Piston Pin Diameter:

Standard (New): 21.961 – 21.965 mm
(0.8646 – 0.8648 in)

Service Limit: 21.953 mm (0.8643 in)



2. Zero the dial indicator to the piston pin diameter.



3. Check the difference between the piston pin diameter and piston pin hole diameter on the piston.

Piston Pin-to-Piston Clearance:

F18B2, F18B3, F20B6 engines:

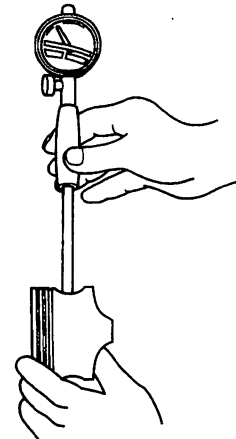
Standard (New): -0.0050 to +0.0020 mm
(-0.00020 to +0.00008 in)

Service Limit: 0.004 mm (0.0002 in)

H22A7 engine:

Standard (New): -0.0030 to +0.0060 mm
(-0.00012 to +0.00024 in)

Service Limit: 0.009 mm (0.0004 in)

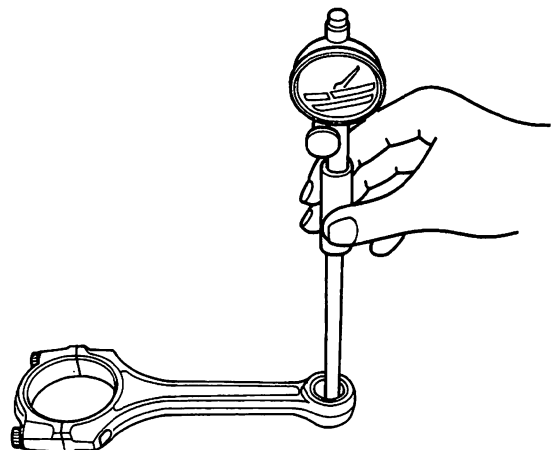


4. Measure the piston pin-to-connecting rod clearance.

Piston Pin-to-Connecting Rod Clearance:

Standard (New): 0.005 – 0.015 mm
(0.0002 – 0.0006 in)

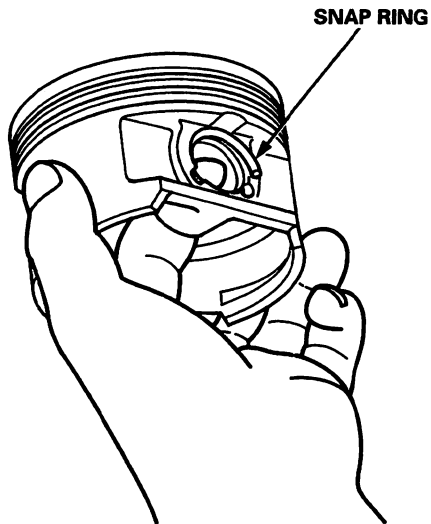
Service Limit: 0.020 mm (0.0008 in)



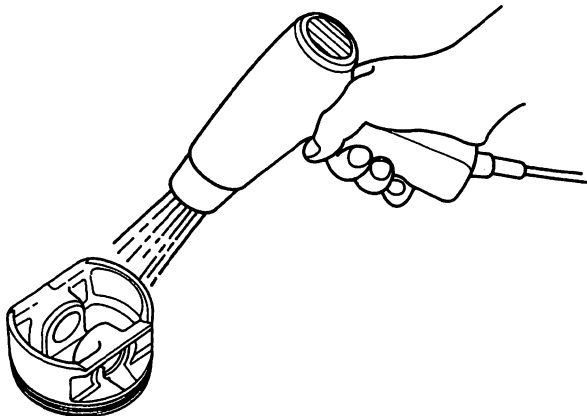
Piston Pins

Installation

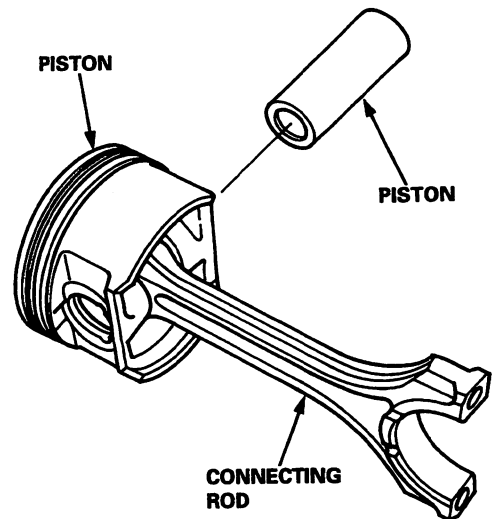
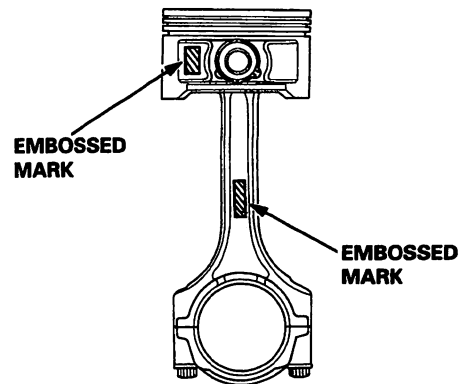
1. Install a piston pin snap ring.



2. Coat the piston pin bore in the piston, the bore in the connecting rod, and the piston pin with engine oil.
3. Heat the piston to approximately 70°C (158°F).



4. Install the piston pin. Assemble the piston and connecting rod with the embossed marks on the same side.



5. Install the remaining snap ring.



End Gap

1. Using a piston, push a new ring into the cylinder bore 15 – 20 mm (0.6 – 0.8 in) from the bottom.
2. Measure the piston ring end-gap with a feeler gauge:
 - If the gap is too small, check to see if you have the proper rings for your engine.
 - If the gap is too large, recheck the cylinder bore diameter against the wear limits on page 7-B-19. If the bore is over the service limit, the cylinder block must be rebored.

Piston Ring End-Gap:

F18B2, F18B3, F20B6 engines:

Top Ring

Standard (New): 0.20 – 0.35 mm

(0.008 – 0.014 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring

Standard (New): 0.40 – 0.55 mm

(0.016 – 0.022 in)

Service Limit: 0.70 mm (0.028 in)

Oil Ring

Standard (New): 0.20 – 0.70 mm

(0.008 – 0.028 in)

Service Limit: 0.80 mm (0.031 in)

H22A7 engine:

Top Ring

Standard (New): 0.25 – 0.35 mm

(0.010 – 0.014 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring

Standard (New): 0.60 – 0.70 mm

(0.024 – 0.028 in)

Service Limit: 0.90 mm (0.035 in)

Oil Ring

Standard (New): 0.20 – 0.70 mm^{*1}

(0.008 – 0.028 in)

0.20 – 0.50 mm^{*2}

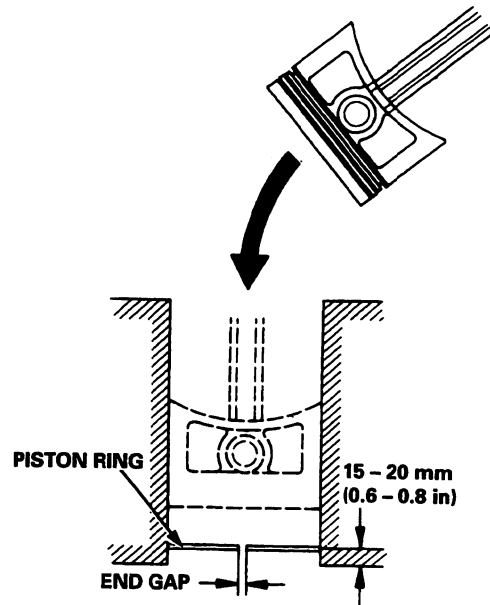
(0.008 – 0.020 in)

Service Limit: 0.80 mm (0.031 in)^{*1}

0.60 mm (0.024 in)^{*2}

^{*1}: RIKEN manufactured piston ring

^{*2}: TEIKOKU PISTON RING manufactured piston ring



Piston Rings

Replacement

1. Using a ring expander, remove the old piston rings.
2. Clean all ring grooves thoroughly.

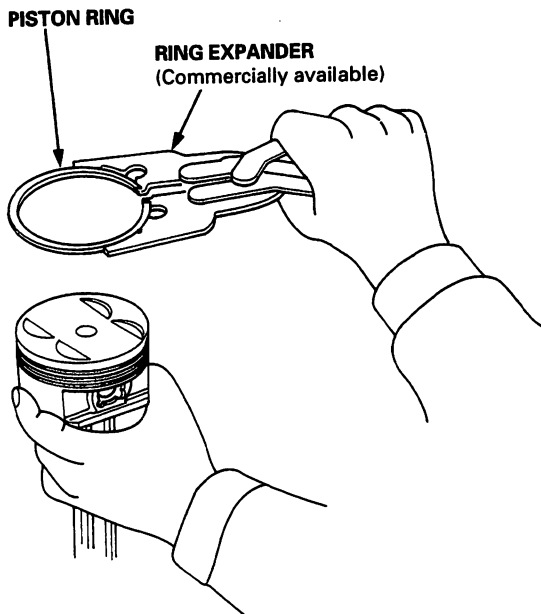
NOTE:

- Use a squared-off broken ring or ring groove cleaner with a blade to fit the piston grooves.
- The top and 2nd ring grooves are 1.2 mm (0.05 in) wide. The oil ring groove is 2.8 mm (0.11 in) wide.
- File down a blade if necessary.
- Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with cleaning tools.

NOTE: If the piston is to be separated from the connecting rod, do not install new rings yet.

3. Install new rings in the proper sequence and position (see page 7-B-27).

NOTE: Do not use old piston rings.



Ring-to-Groove Clearance

After installing a new set of rings, measure the ring-to-groove clearances:

Top Ring Clearance

F18B2, F18B3, F20B6 engines:

Standard (New): 0.035 – 0.060 mm
(0.0014 – 0.0024 in)

Service Limit: 0.13 mm (0.005 in)

H22A7 engine:

Standard (New): 0.055 – 0.085 mm
(0.0022 – 0.0033 in)

Service Limit: 0.13 mm (0.005 in)

Second Ring Clearance

F18B2, F18B3, F20B6 engines:

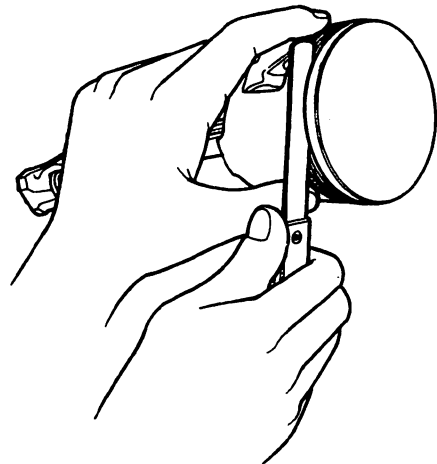
Standard (New): 0.030 – 0.055 mm
(0.0012 – 0.0022 in)

Service Limit: 0.13 mm (0.005 in)

H22A7 engine:

Standard (New): 0.040 – 0.070 mm
(0.0016 – 0.0028 in)

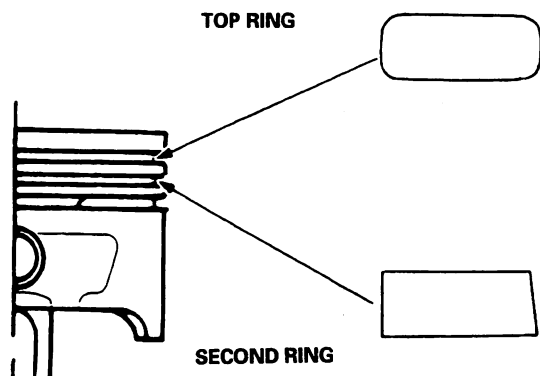
Service Limit: 0.13 mm (0.005 in)



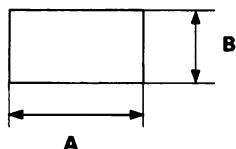


Alignment

1. Install the rings as shown.



Piston Ring Dimensions:



Top Ring (Standard):

A: 3.1 mm (0.12 in)

B: 1.2 mm (0.05 in)

Second Ring (Standard):

F18B2, F18B3, F20B6 engines:

A: 3.4 mm (0.13 in)

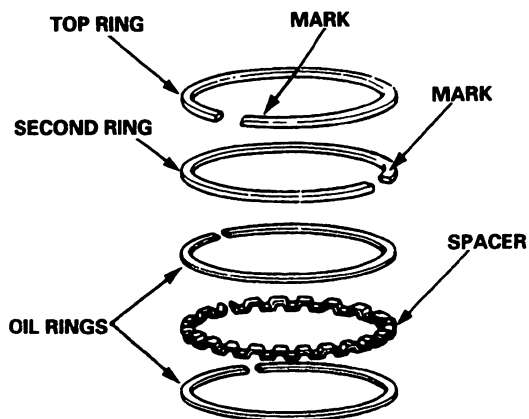
B: 1.2 mm (0.05 in)

H22A7 engine:

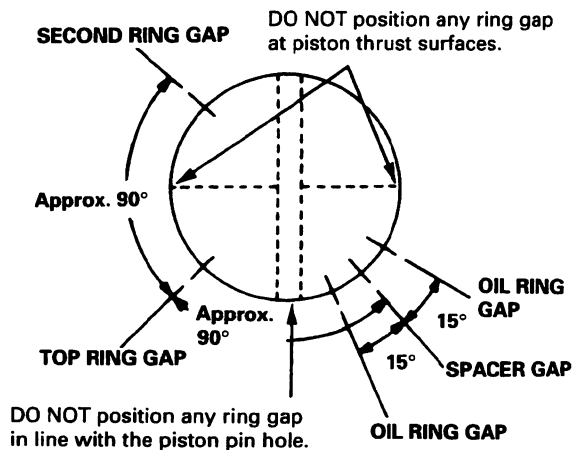
A: 3.2 mm (0.13 in)

B: 1.2 mm (0.05 in)

NOTE: The manufacturing marks must be facing upward.




2. Rotate the rings in their grooves to make sure they do not bind.
3. Position the ring end gaps as shown:



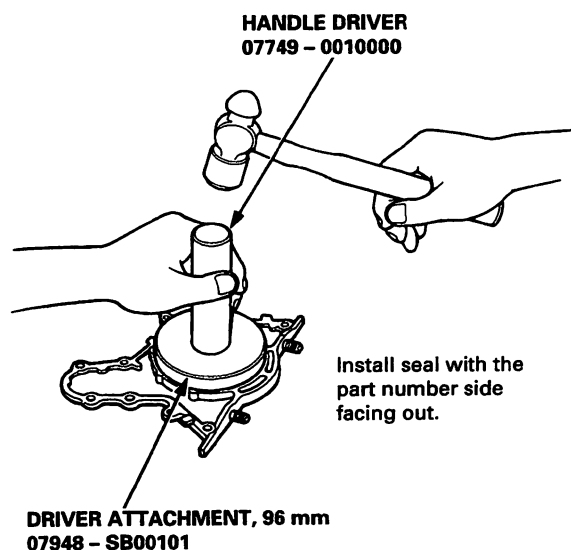
Crankshaft Oil Seal

Installation

-  The seal surface on the block should be dry. Apply a light coat of oil to the crankshaft and to the lip of the seal.

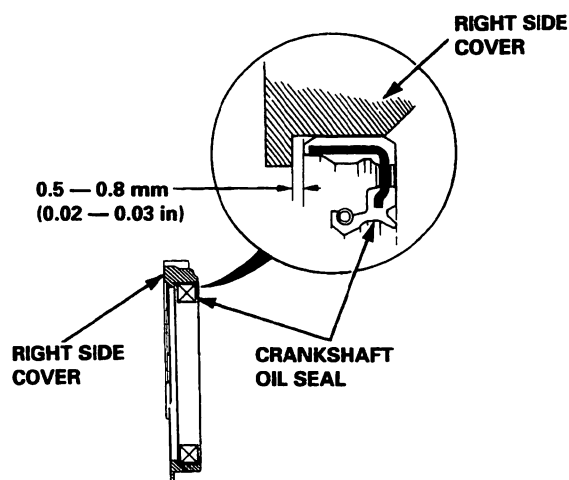
1. Drive in the crankshaft oil seal against the right side cover.

NOTE: Drive the crankshaft oil seal in squarely.



2. Confirm that the clearance is equal all the way around with a feeler gauge.


Clearance: 0.5 – 0.8 mm (0.02 – 0.03 in)



NOTE: Refer to page 8-20 for installation of the oil pump side crankshaft oil seal.

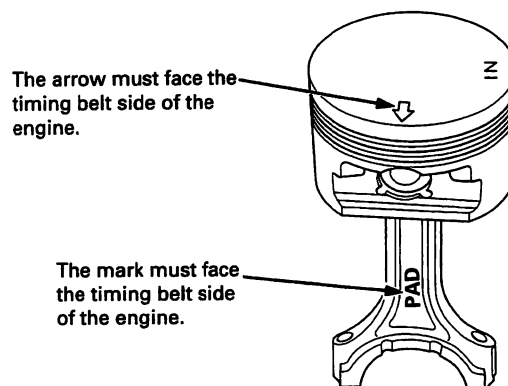
Pistons

Installation

-  Before installing the pistons, apply a coat of engine oil to the ring grooves and cylinder bores.

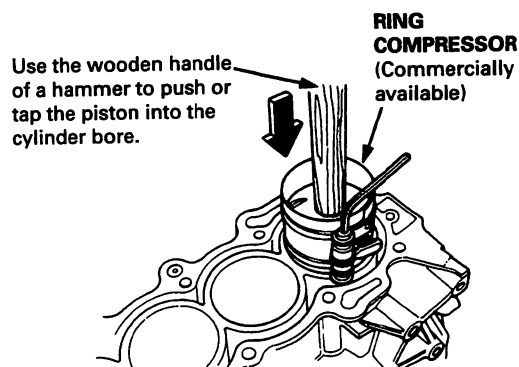
If the crankshaft is already installed

1. Set the crankshaft to BDC for each cylinder.
2. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
3. Position the arrow and the mark facing the timing belt side of the engine.



4. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer.

NOTE: Maintain downward force on the ring compressor to prevent the rings from expanding before entering the cylinder bore.



5. Stop after the ring compressor pops free, and check the connecting rod-to-crank journal alignment before pushing the piston into place.



6. Check the connecting rod bearing clearance with plastigage (see page 7-B-11).
7. Apply engine oil to the bolt threads, then install the rod caps with bearings, then torque the bolts.

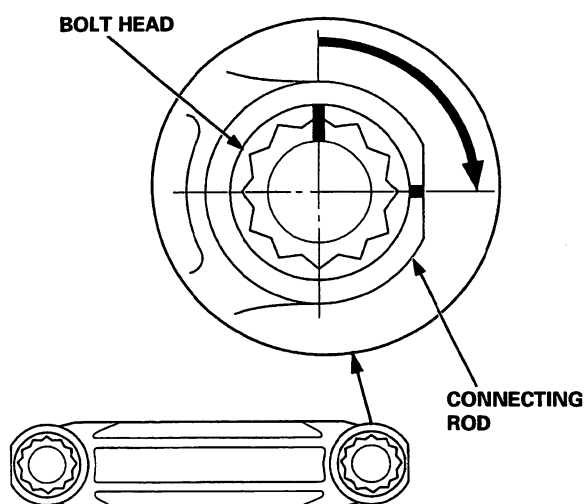
F18B2, F18B3, F20B6 engines:

20 N·m (2.0 kgf·m, 14 lbf·ft)

H22A7 engine:

25 N·m (2.5 kgf·m, 18 lbf·ft)

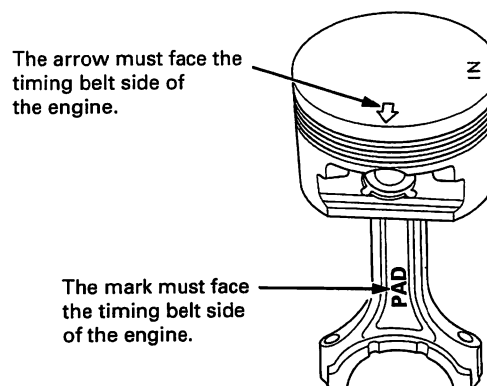
8. Mark the connecting rod and bolt head as shown.



9. Tighten the bolt until the mark on the bolt head lines up with the mark on the connecting rod (Turn the bolt 90°).

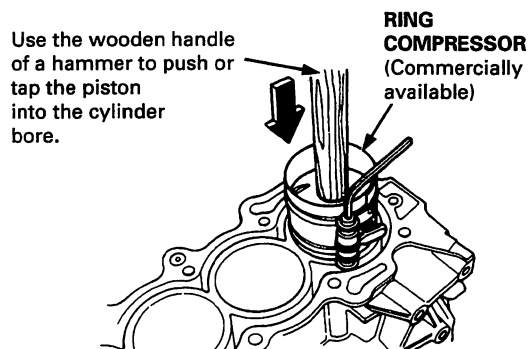
If the crankshaft is not installed

1. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
2. Position the arrow and the mark facing the timing belt side of the engine.



3. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer.


NOTE: Maintain downward force on the ring compressor to prevent the rings from expanding before entering the cylinder bore.



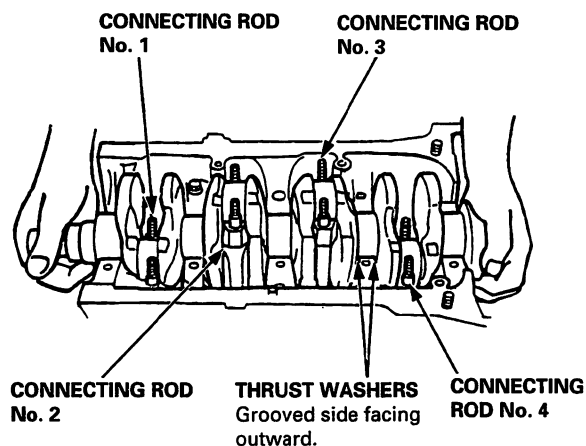
4. Position all pistons at top dead center.

Crankshaft and Balancer Shafts

Installation

 Before installing the crankshaft, apply a coat of engine oil to the main bearings, rod bearings and balancer shaft bearings.

1. Install the bearing halves in the cylinder block and connecting rods.
2. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up.
3. Install the thrust washers in the No. 4 journal of the cylinder block.



4. Lower the crankshaft into the block, seating the rod journals into connecting rod No. 1 and connecting rod No. 4. Install the connecting rod caps and bolts finger tight.
5. Rotate the crankshaft clockwise, seat the journals into connecting rod No. 2 and connecting rod No. 3. Install the connecting rod caps and bolts finger tight. Install caps so the bearing recess is on the same side as the recess in the rod.

6. Check the connecting rod bearing clearance with plastigage (see page 7-B-11).
7. Apply engine oil to the bolt threads, then install the rod caps with bearings, then torque the bolts.

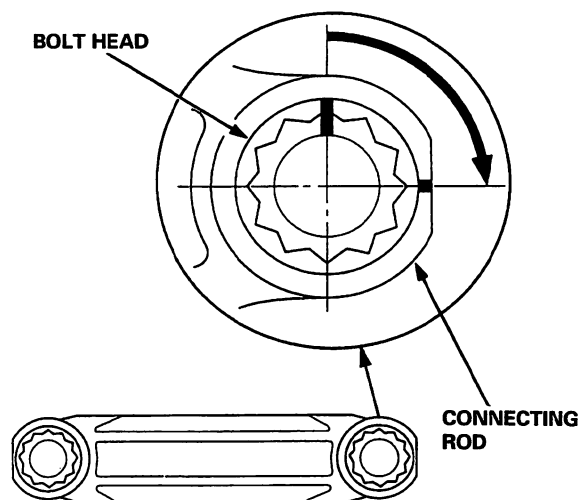
F18B2, F18B3, F20B6 engines:

20 N·m (2.0 kgf-m, 14 lbf-ft)

H22A7 engine:

25 N·m (2.5 kgf-m, 18 lbf-ft)

8. Mark the connecting rod and bolt head as shown.



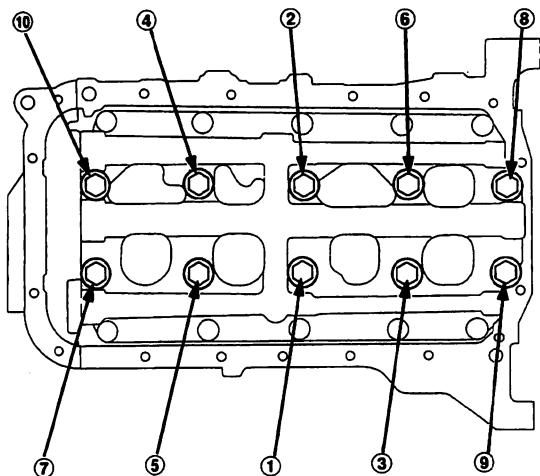
9. Tighten the bolt until the mark on the bolt head lines up with the mark on the connecting rod (Turn the bolt 90°).



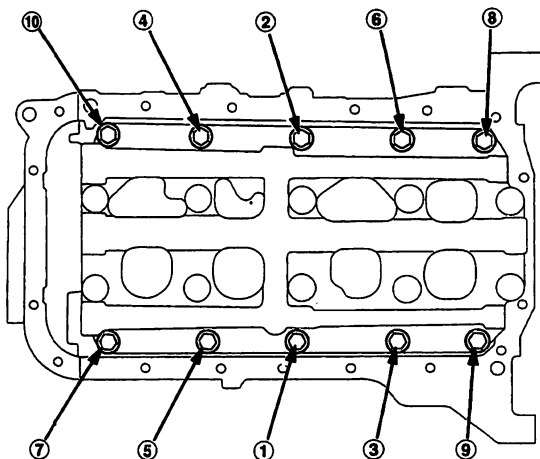
10. Install the main bearing caps and bearing cap bridge. Coat the bolt threads with engine oil.
11. Check clearance with plastigage (see page 7-B-9).
12. Tighten the bearing cap bolts.

F18B2, F18B3, F20B6 engines:

- 1. Tighten the 11 mm bolts in two steps. In the first step, tighten all bolts in sequence to about 29 N·m (3.0 kgf·m, 22 lbf·ft); in the final step, tighten in same sequence to 78 N·m (8.0 kgf·m, 58 lbf·ft).

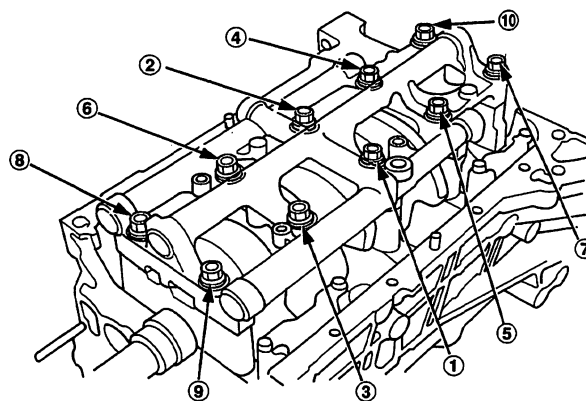


- 2. Tighten the 6 mm bolts in sequence to 12 N·m (1.2 kgf·m, 8.7 lbf·ft).



H22A7 engine:

- 1. Tighten the 11 mm bolts in two steps. In the first step, tighten all bolts in sequence to about 29 N·m (3.0 kgf·m, 22 lbf·ft); in the final step, tighten in same sequence to 78 N·m (8.0 kgf·m, 58 lbf·ft).



NOTE: Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.

(cont'd)

Crankshaft and Balancer Shafts

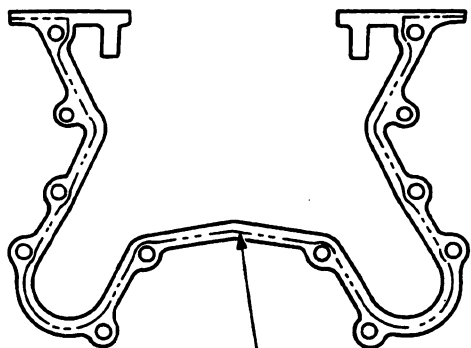
Installation (cont'd)

NOTE:

- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, being careful to cover all the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying the liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

13. Apply liquid gasket to the block mating surface of the right side cover, then install it on the cylinder block.

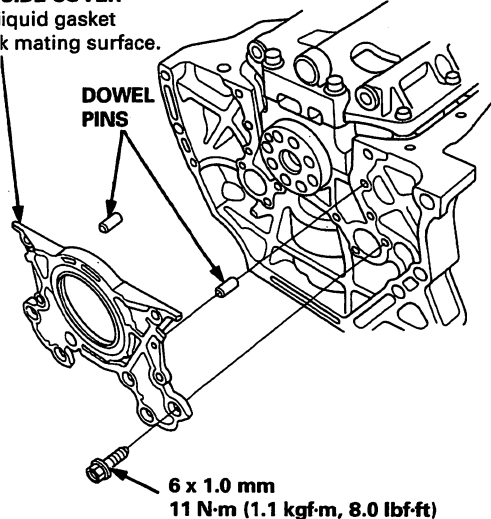
RIGHT SIDE COVER:



Apply liquid gasket along the broken line.

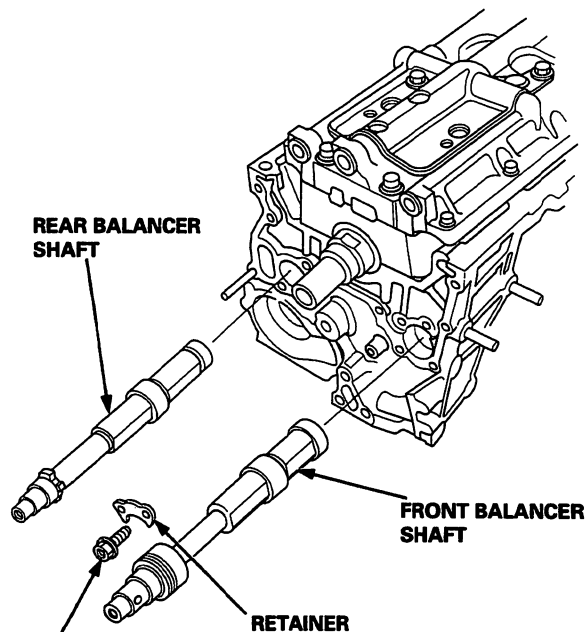
RIGHT SIDE COVER

Apply liquid gasket to block mating surface.



6 x 1.0 mm
11 N·m (1.1 kgf·m, 8.0 lbf·ft)

14. Insert the balancer shafts into the block, then install the retainer to the front balancer shaft and block.

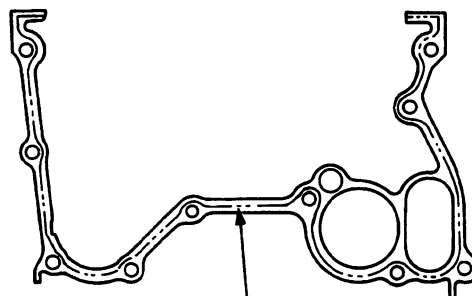


6 x 1.0 mm
20 N·m (2.0 kgf·m, 14 lbf·ft)

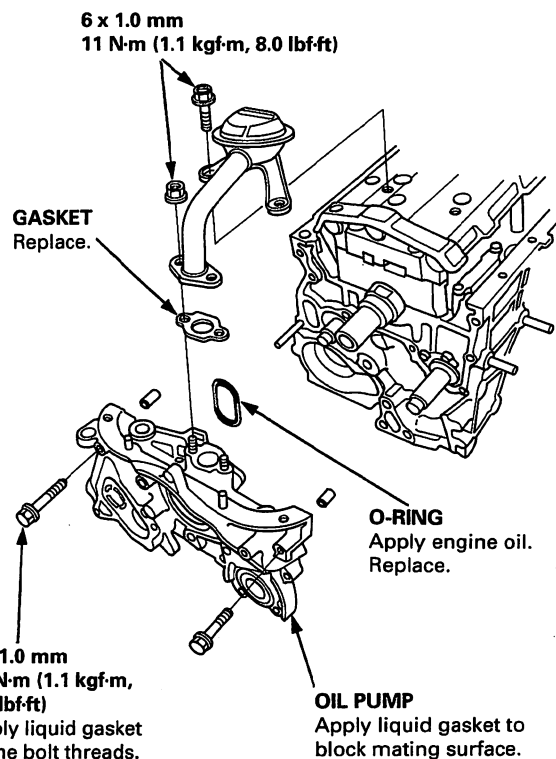
15. Apply liquid gasket to the oil pump mating surface of the block, then install the oil pump on the cylinder block.

- Apply grease to the lips of the oil seals. Then, install the oil pump while aligning the inner rotor with the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and the balancer shaft, then check that the oil seal lips are not distorted.

OIL PUMP:



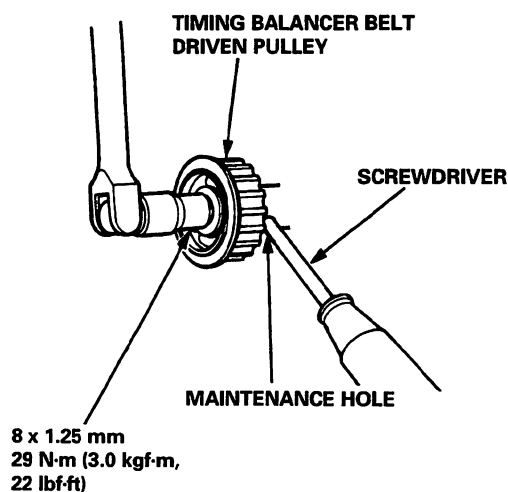
Apply liquid gasket along the broken line.



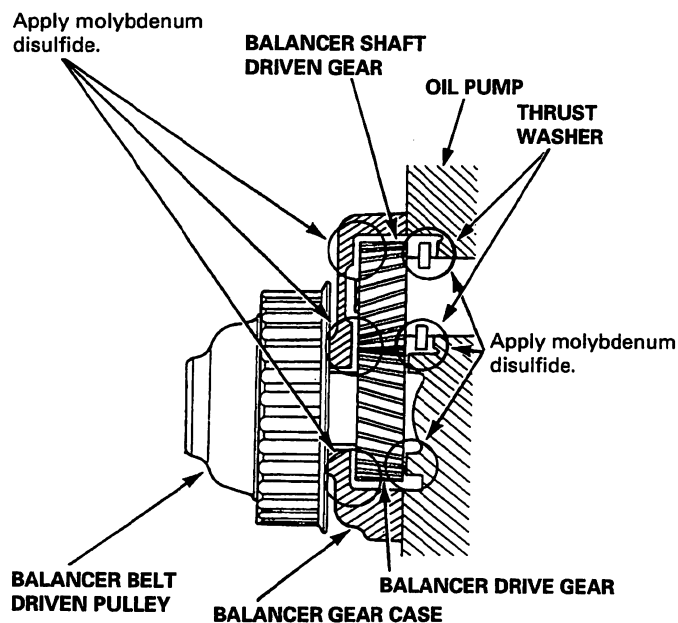
16. Install the oil screen.

17. Hold the front balancer shaft with a screwdriver, then install the timing balancer belt driven pulley.

FRONT BALANCER SHAFT:

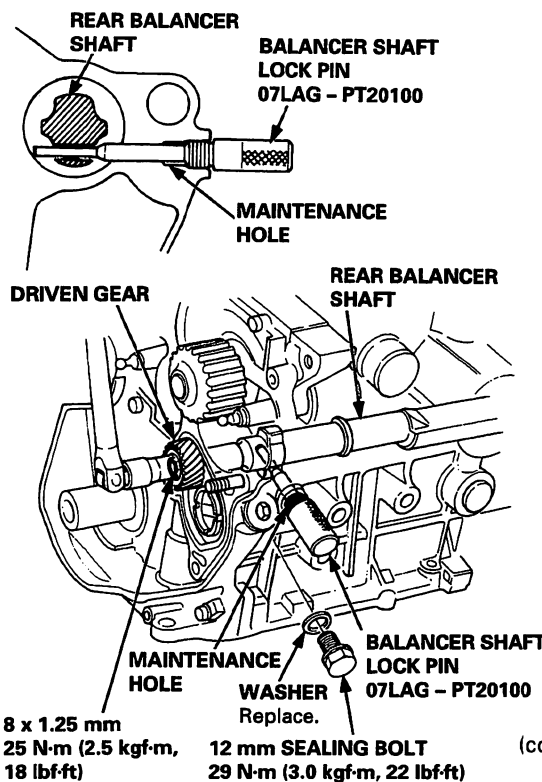


18. Before installing the balancer driven gear and the balancer gear case, apply molybdenum disulfide to the thrust surfaces of the balancer gears as shown.



19. Hold the rear balancer shaft with the special tool, then install the balancer driven gear.

REAR BALANCER SHAFT:



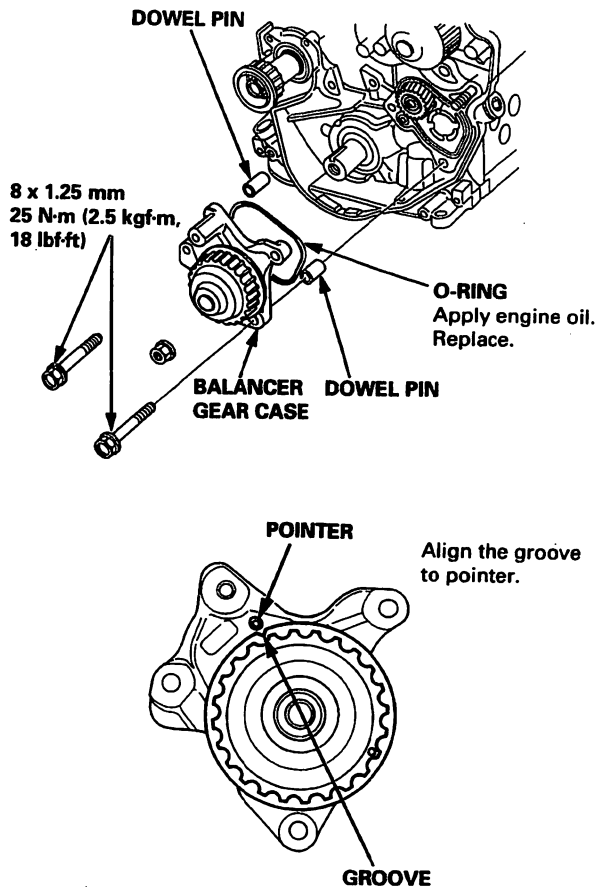
(cont'd)

Crankshaft and Balancer Shafts

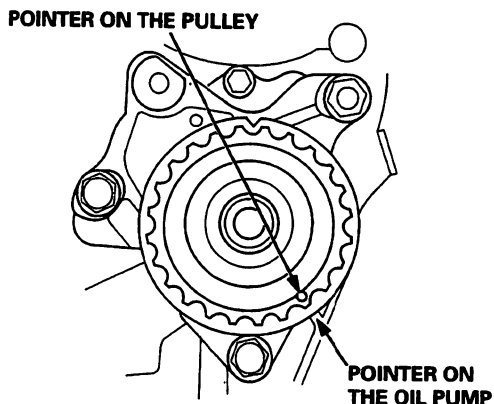
Installation (cont'd)

20. Install the balancer gear case to the oil pump.

NOTE: Align the groove on the pulley edge to the pointer on the gear case while holding the rear balancer with the special tool, then install the gear case.



21. Check the alignment of the pointers after installing the gear case.

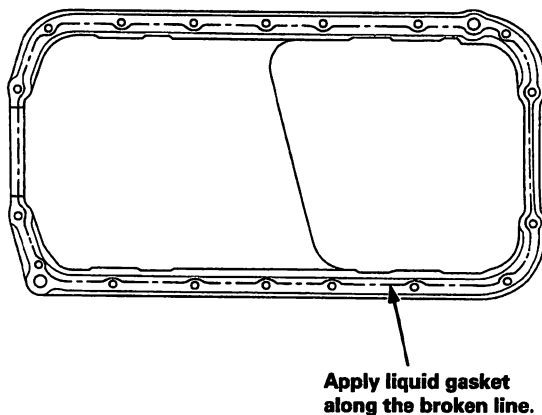


22. Clean and dry the cylinder block mating surfaces.

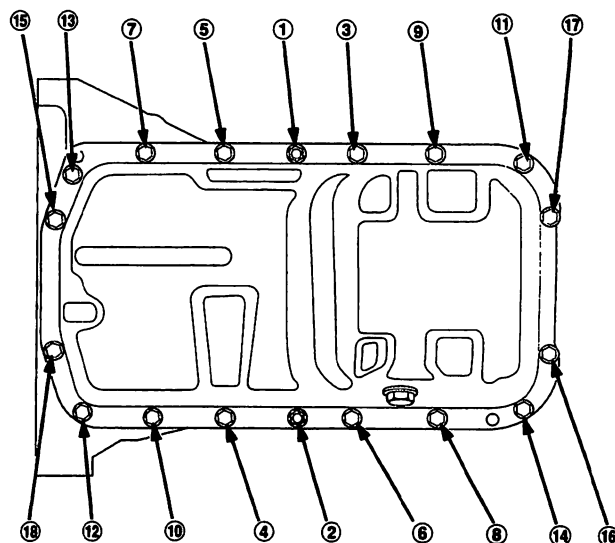
23. Apply liquid gasket, Part No. 08C70 – K0334M or 08C70 – X0331S, evenly to the cylinder block mating surface of the oil pan and to the inner threads of the bolt holes. Install the oil pan.

NOTE:

- Apply liquid gasket 4 mm wide.
- Apply liquid gasket doubly to the jointing point of the liquid gasket.



24. Tighten the bolts/nuts in two or three steps. In the final step, tighten all bolts/nuts, in sequence to 12 N·m (1.2 kgf·m, 8.7 lbf·ft).





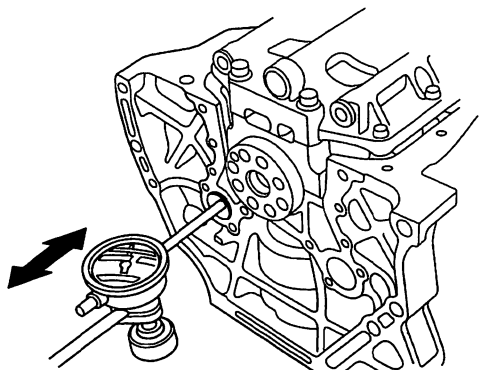
Inspection

NOTE: Inspect the balancer shaft before removing the right side cover and the balancer gear case (see page 7-B-13).

1. Push the balancer shaft firmly away from the dial indicator. Zero the dial against the front end of the balancer shaft, then pull the balancer shaft firmly back toward the indicator.

Front Balancer Shaft End Play

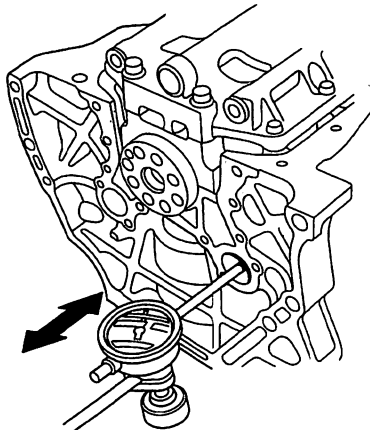
Standard (New): 0.10 – 0.40 mm
(0.004 – 0.016 in)



- If end play is excessive, inspect the retainer and thrust surfaces on the balancer shaft.

Rear Balancer Shaft End Play

Standard (New): 0.04 – 0.15 mm
(0.002 – 0.006 in)



- If end play is excessive, inspect the thrust washer and thrust surfaces on the driven gear and oil pump body.

NOTE: The thickness of the retainer (front) and thrust washer (rear) are fixed and must not be changed either by grinding or shimming.

2. Remove the balancer shafts (see page 7-B-13).

NOTE: Clean the balancer shafts.

3. Inspect the surface of the balancer shaft journal and balancer bearing.
4. Replace the bearing or balancer shaft if there is wear, damage or discoloration on the surface of the bearing or the balancer shaft journal. When replacing the rear No. 1 bearing, be sure to replace the oil pump housing with a new one.

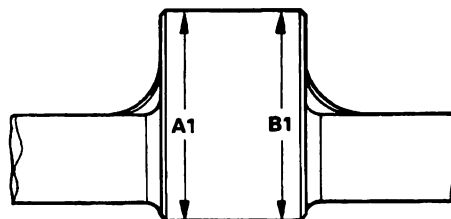
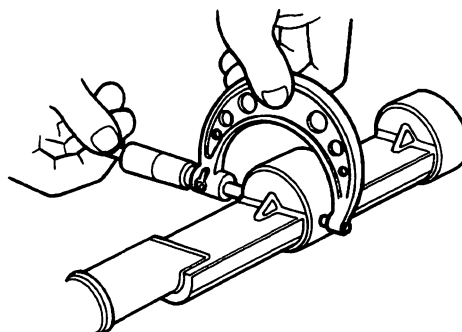
NOTE: A mirror-like surface is normal.

5. Measure taper at the edges of each journal.

- The difference between measurements on each journal must not exceed the standard.

Journal Taper

Standard (New): 0.005 mm (0.0002 in)



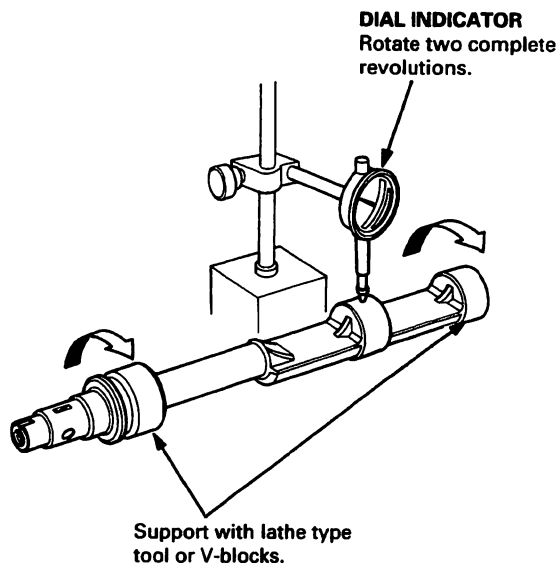
(cont'd)

Balancer Shafts

Inspection (cont'd)

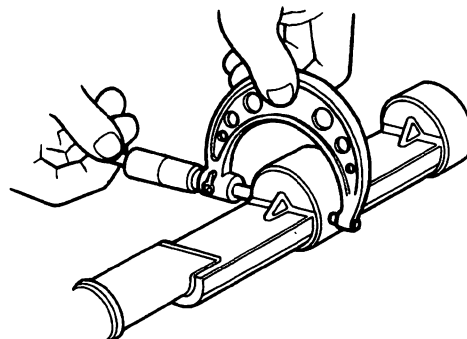
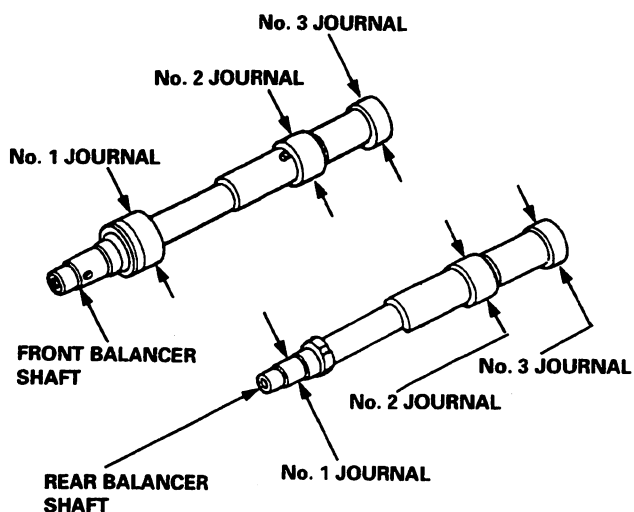
6. Measure runout on the No. 2 journal of each balancer shaft to make sure the balancer shafts are not bent.

Balancer Shaft Total Indicated Runout
Standard (New): 0.02 mm (0.001 in) max.
Service Limit: 0.03 mm (0.001 in)



7. Measure the diameters of the balancer shaft journals.

MEASURING POINTS



Journal Diameter

Standard (New):

No. 1 journal:

Front: 42.722 – 42.734 mm
(1.6820 – 1.6824 in)
Rear: 20.938 – 20.950 mm
(0.8243 – 0.8248 in)

No. 2 journals front and rear:

38.712 – 38.724 mm
(1.5241 – 1.5246 in)

No. 3 journals front and rear:

34.722 – 34.734 mm
(1.3670 – 1.3675 in)

Service Limit:

No. 1 journal:

Front: 42.71 mm (1.681 in)
Rear: 20.92 mm (0.824 in)

No. 2 journals front and rear:

38.70 mm (1.524 in)

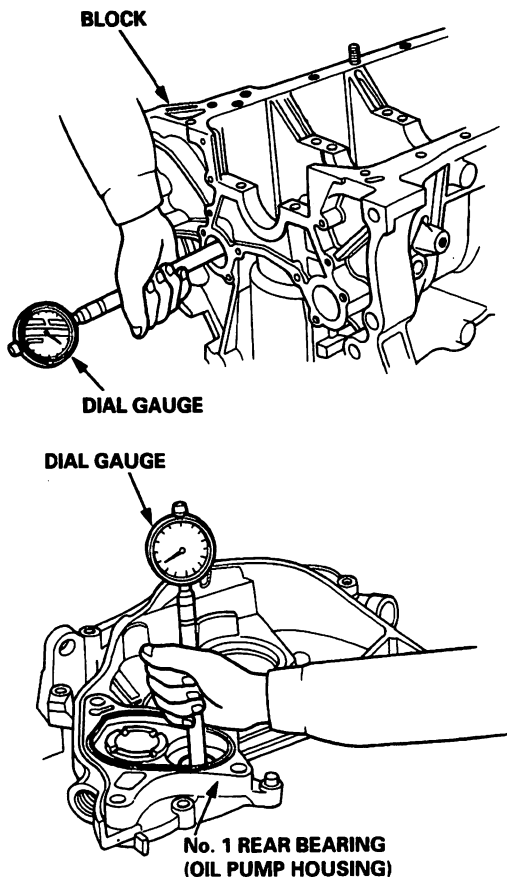
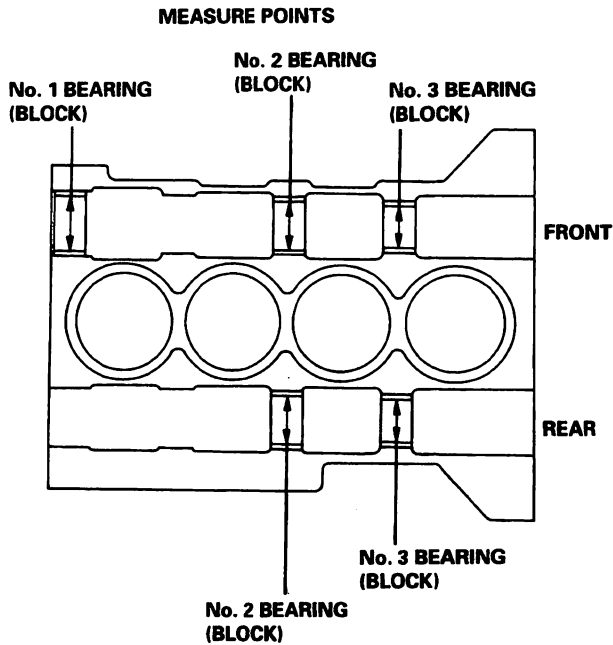
No. 3 journals front and rear:

34.71 mm (1.367 in)

8. Remove the crankshaft, the pistons and the other parts from the block, then clean the balancer shaft journal bearings in the block and the oil pump housing with a clean shop towel.
9. Check the surface of the bearings; if there is wear, damage or discoloration, replace the bearings or the oil pump housing.



10. Measure the inner diameters of the balancer shaft journal bearings.



Bearing Inner Diameter

Standard (New):

No. 1 journals:

Front: 42.800 – 42.820 mm
(1.6850 – 1.6858 in)

Rear: 21.000 – 21.013 mm
(0.8268 – 0.8273 in)

No. 2 journals front and rear:

38.800 – 38.820 mm
(1.5276 – 1.5283 in)

No. 3 journals front and rear:

34.800 – 34.820 mm
(1.3701 – 1.3709 in)

Service Limit:

No. 1 journals:

Front: 42.83 mm (1.686 in)

Rear: 21.02 mm (0.828 in)

No. 2 journals front and rear:

38.83 mm (1.529 in)

No. 3 journals front and rear:

34.83 mm (1.371 in)

11. Calculate the shaft-to-bearings oil clearances.

BEARING I.D. – JOURNAL O.D. = OIL CLEARANCE

Shaft-to-Bearings Oil Clearances

Standard (New):

No. 1 front journal, No. 3 front and rear journals:

0.066 – 0.098 mm (0.0026 – 0.0039 in)

No. 2 front and rear journals:

0.076 – 0.108 mm (0.0030 – 0.0043 in)

No. 1 rear journal:

0.050 – 0.075 mm (0.0020 – 0.0030 in)

Service Limit:

No. 1 front journal, No. 3 front and rear journals:

0.12 mm (0.005 in)

No. 2 front and rear journals: 0.13 mm (0.005 in)

No. 1 rear journal: 0.09 mm (0.004 in)

Balancer Shaft Bearings

Replacement

The procedure shown below is used when using the bearing replacement tool set (07LAF – PT20100).

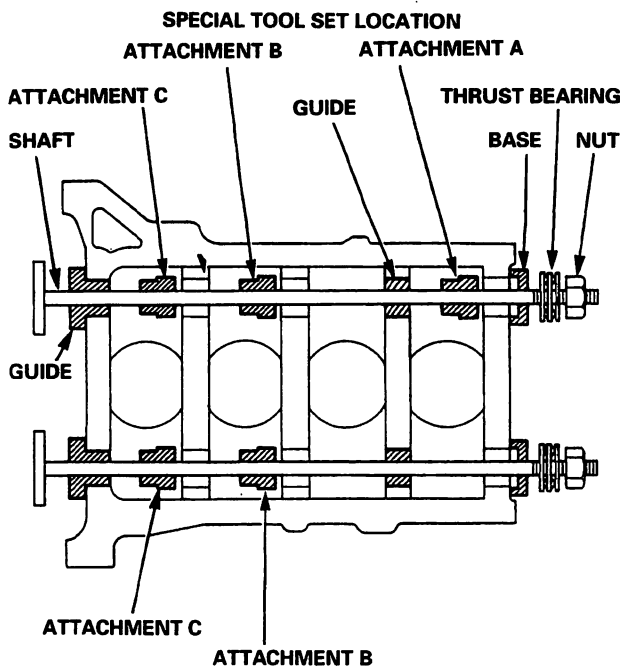
NOTE:

- Remove all attachment parts from the cylinder block and lay it with its oil pan side up.
- Remove or reinstall bearings one at a time.
- Remove bearings from the transmission side to the timing belt side and reinstall them in reverse sequence.

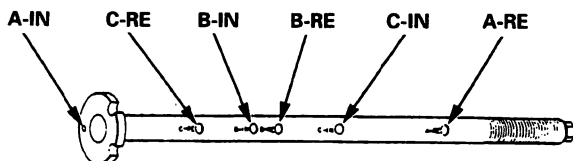
Removal:

NOTE:

- By changing the size and attachment point of the attachment, all balancer bearings can be removed from the cylinder block in the same procedure.
- The illustration shows the attachment points of each special tool.
- When removing bearings successively, put the corresponding attachment through the shaft without fixing them in advance.

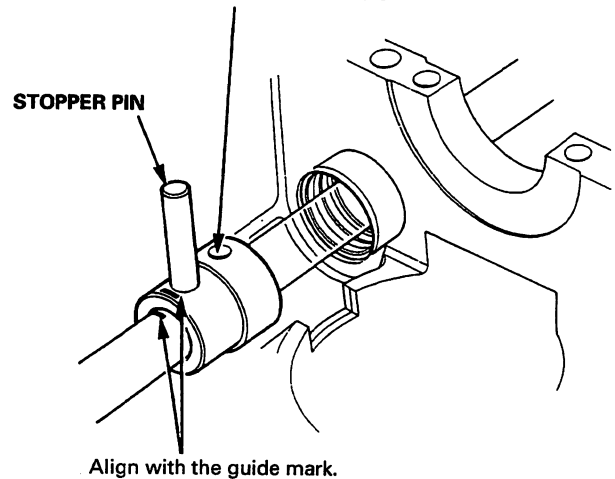


- Position of attachment fixing holes and guide marks on the shaft.

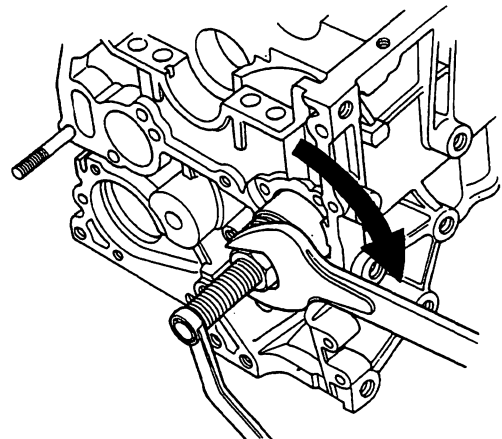


1. Put the attachment with the side having larger diameter facing the bearing. Align the stopper pin holes of the attachment and the shaft. Insert the stopper pin to fix the attachment.

FRONT No. 1 BEARING: ATTACHMENT A
No. 2 BEARINGS: ATTACHMENT B
No. 3 BEARINGS: ATTACHMENT C



2. Hold the shaft end with a wrench and turn the nut clockwise until the bearing comes off.
- Do not rotate the shaft.



3. When removing bearings in succession, loosen the nut, remove the stopper pin from the pin hole you have finished and repeat above step 1 and 2 on the next bearing.

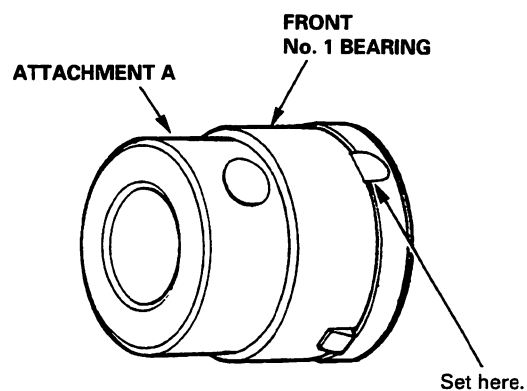


Installation:

Front No. 1 bearing

NOTE: Always use new bearings.

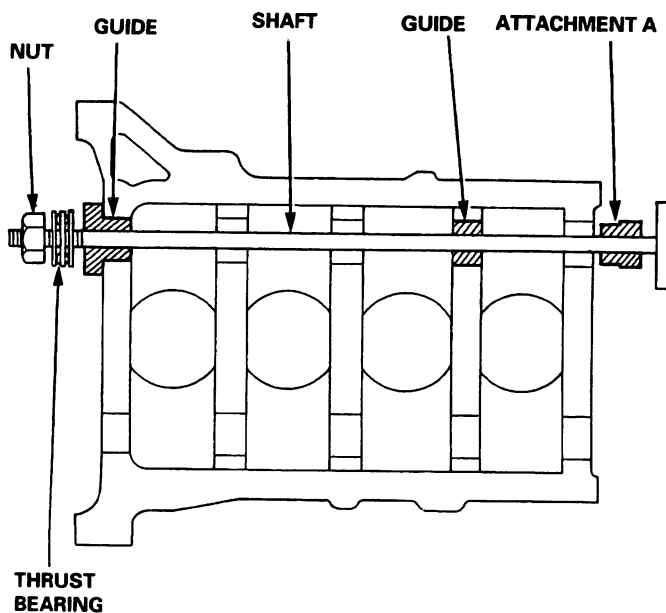
1. Set the recess of the bearing to the detent of the attachment.



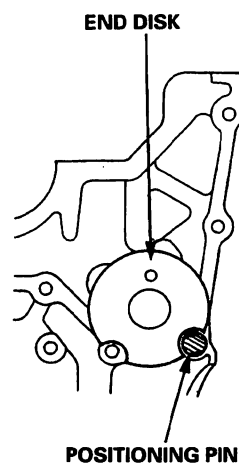
Attachment

Front No. 1 bearing: Attachment A

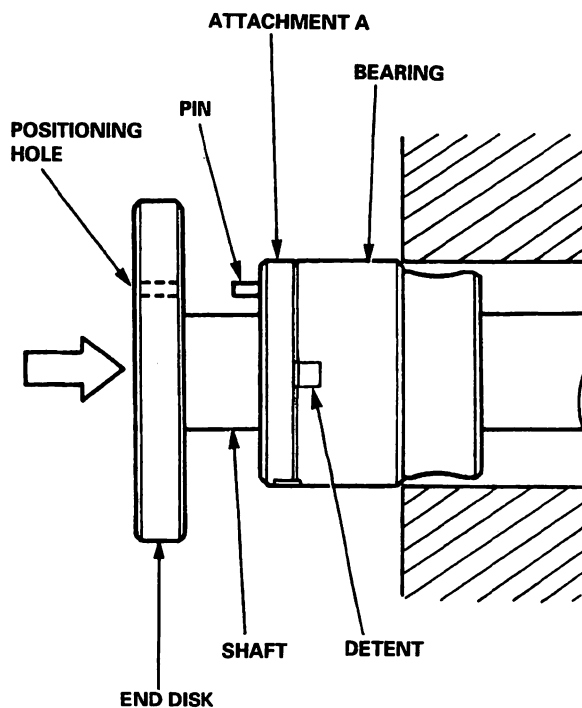
- The illustration shows the attachment points of the special tools.



2. Install the shaft positioning pin.



3. Set the shaft so that the attachment pin is aligned with the positioning hole in the end disc.

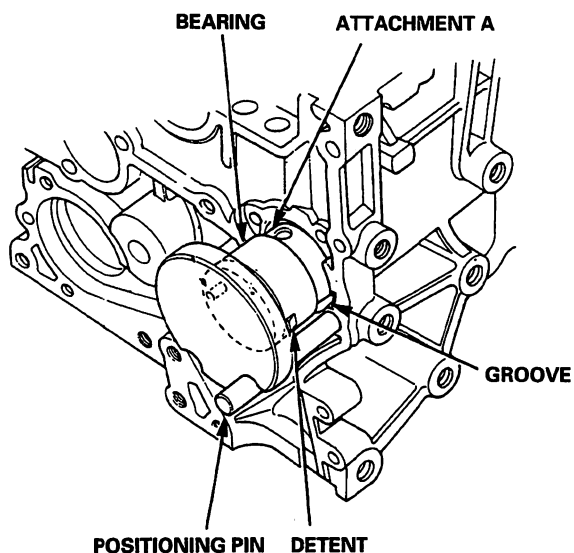


(cont'd)

Balancer Shaft Bearings

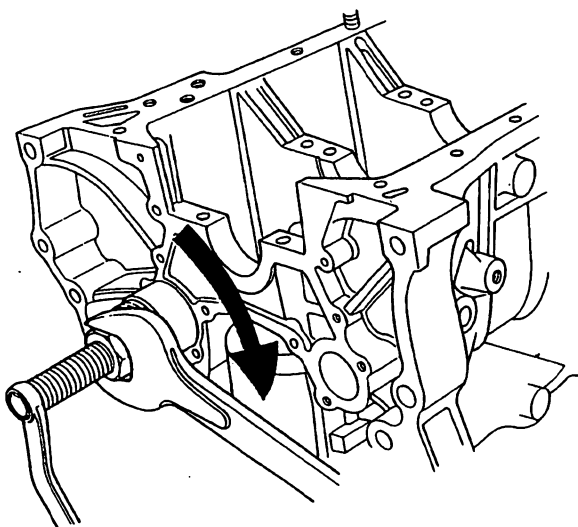
Replacement (cont'd)

4. Set the detent of the bearing to the groove of the cylinder block.



5. Hold the end of the shaft with wrench and install the bearing by turning the nut clockwise.

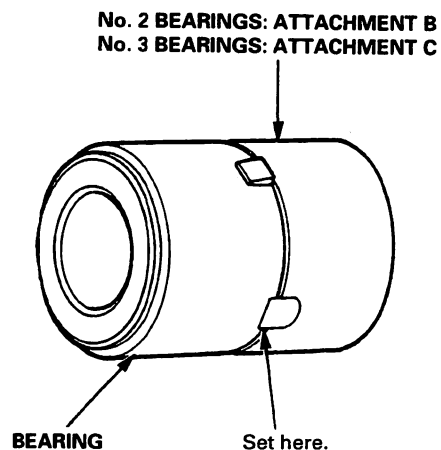
- Do not rotate the shaft.



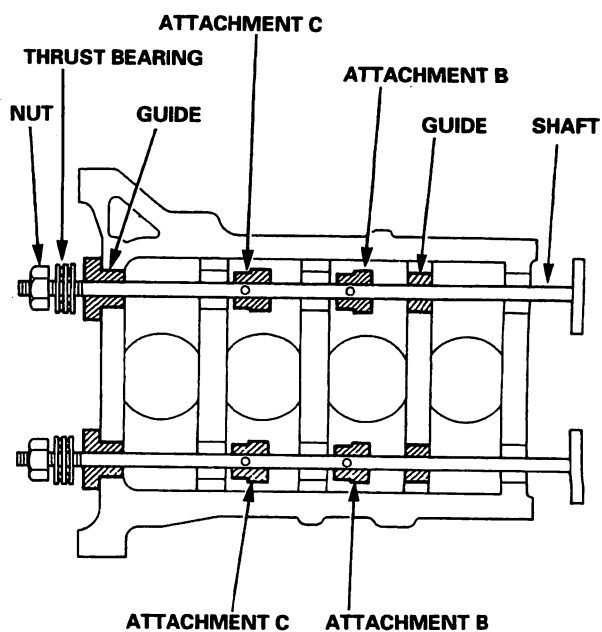
Installation:

No. 2 and No. 3 Bearings

1. Set the resess of the bearing to the detent of the attachment.

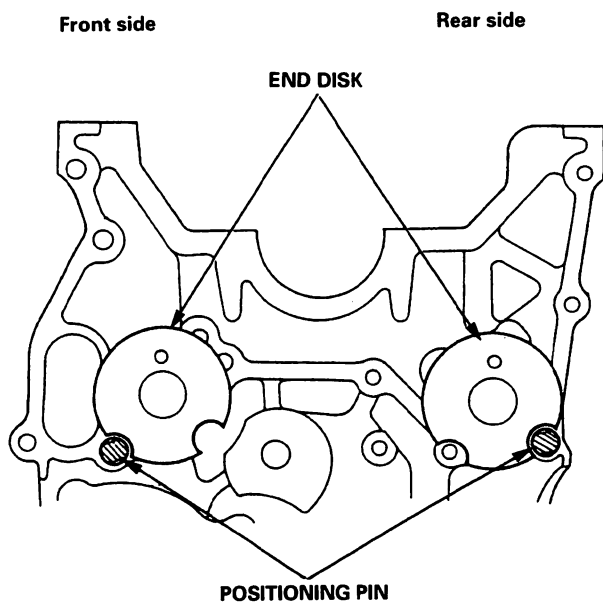


- The illustration shows attachment points of each special tool.
- When installing bearings successively, set the bearings to the attachment and put them through the shaft without fixing them in advance.

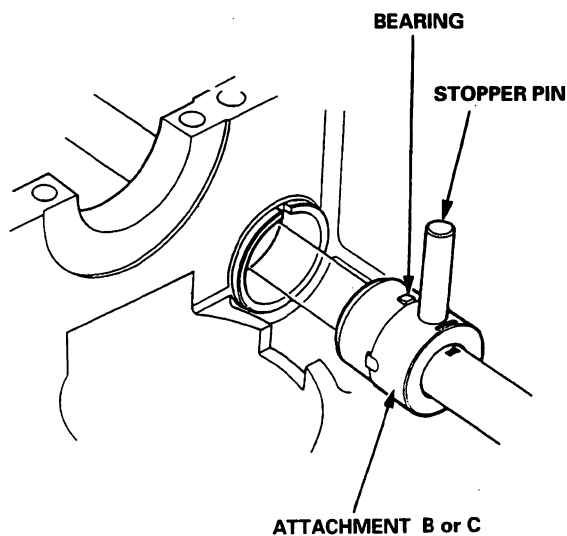




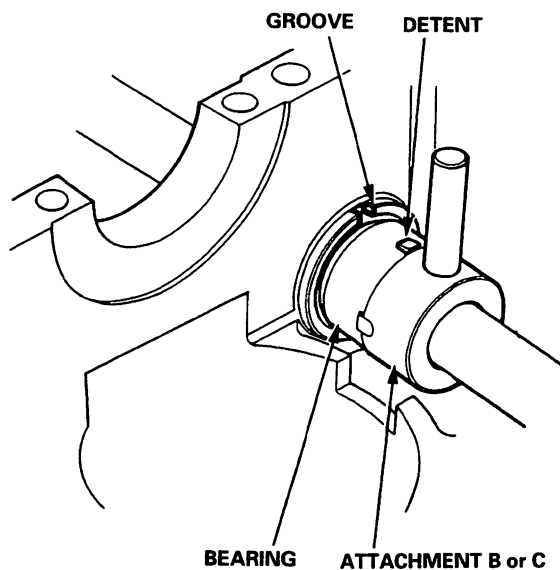
2. Install the shaft positioning pin.



3. Align the attachment with the guide mark. Applicable bearing No. is indicated at the guide mark. Align the pin holes of the attachment and the shaft. Insert the stopper pin to fix the attachment (for No. 2, and No. 3 bearings).

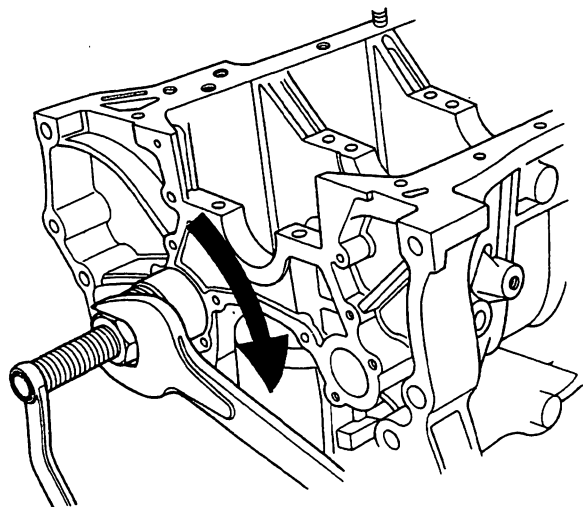


4. Set the detent of the bearing to the groove of the cylinder block.



5. Hold the end of the shaft with wrench and install the bearing by turning the nut clockwise.

- Do not rotate the shaft.



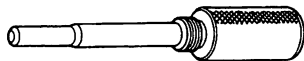
Engine Lubrication

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Special Tools

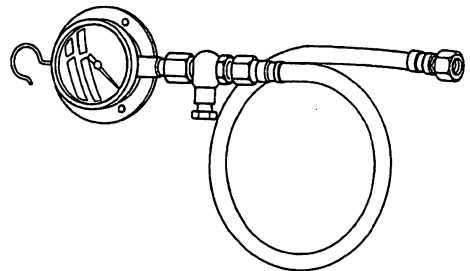
Ref. No.	Tool Number	Description	Qty	Remark
①	07LAG – PT20100	Balancer Shaft Lock Pin	1	
②	07406 – 0030000	Oil Pressure Gauge Attachment	1	
③	07506 – 3000000	Oil Pressure Gauge	1	
④	07746 – 0010300	Driver Attachment, 42 x 47 mm	1	
⑤	07746 – 0010400	Driver Attachment, 52 x 55 mm	1	
⑥	07749 – 0010000	Handle Driver	1	
⑦	07912 – 6110001	Oil Filter Wrench	1	



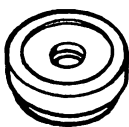
①



②



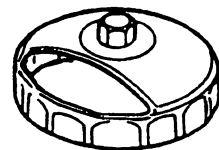
③



④ ⑤



⑥



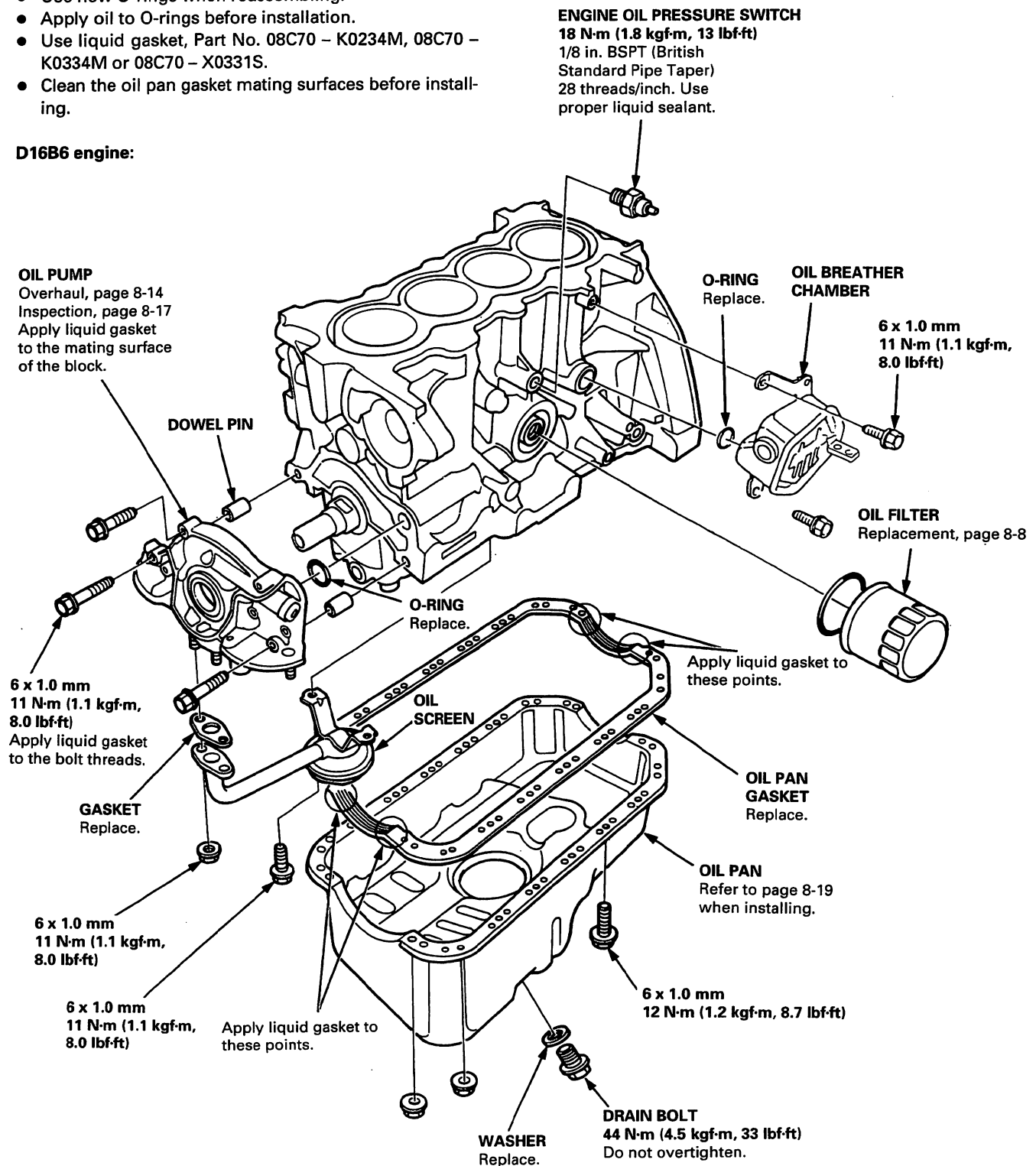
⑦



NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- Clean the oil pan gasket mating surfaces before installing.

D16B6 engine:



(cont'd)

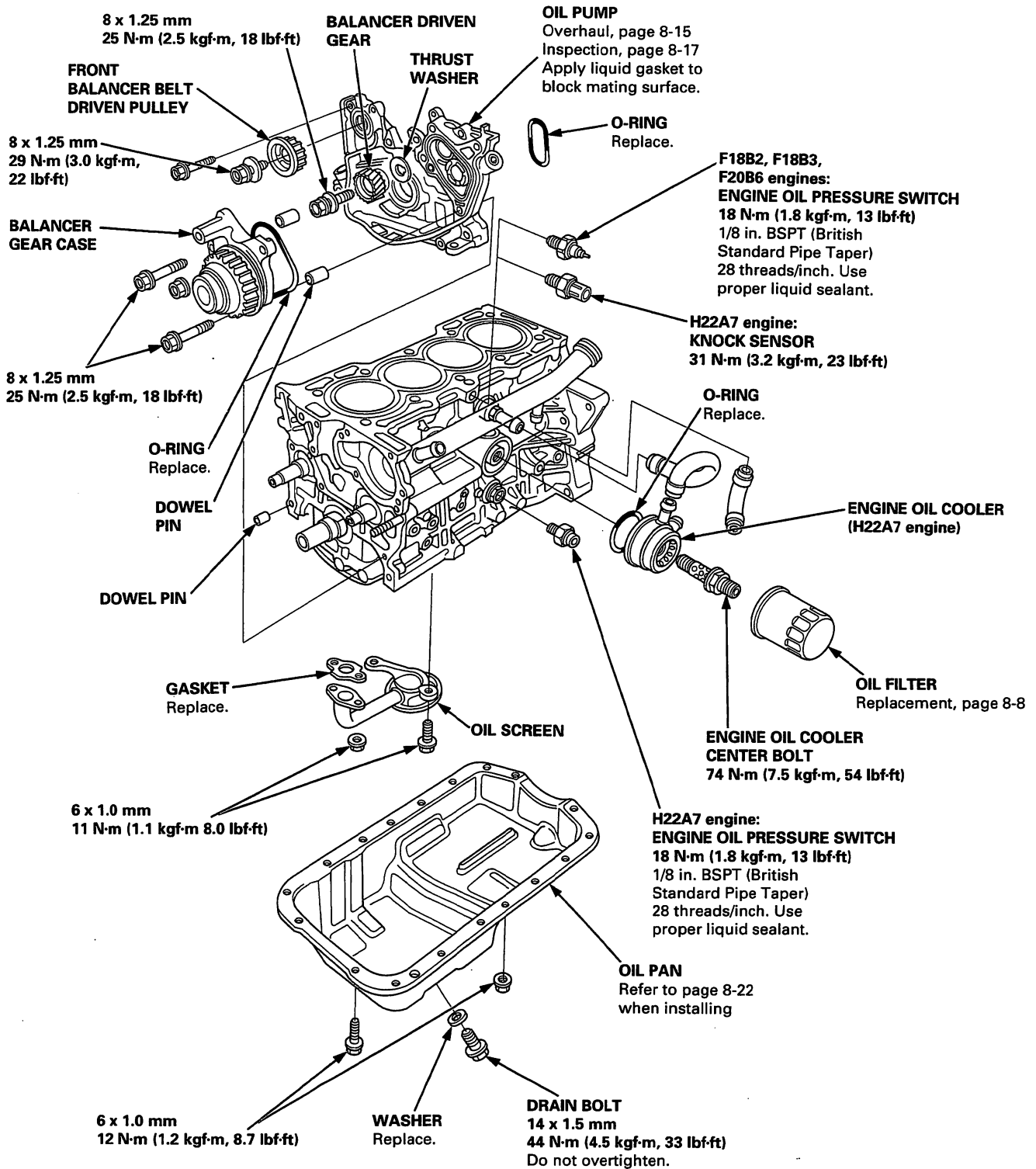
Illustrated Index

(cont'd)

NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings for before installation.
- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.

F18B2, F18B3, F20B6, H22A7 engines:





H22A7 engine:

11 x 1.5 mm
69 N·m (7.0 kgf·m,
51 lbf·ft)

Apply engine oil to the bolt threads.

NOTE:

After torquing each cap,
turn crankshaft to check
for binding.

BAFFLE PLATE

6 x 1.0 mm
11 N·m (1.1 kgf·m, 8.0 lbf·ft)

BEARING CAP
BRIDGE

DOWEL
PIN

O-RING
Replace.

MAIN BEARING
CAP

DOWEL PIN

CRANKSHAFT

MAIN BEARING

THRUST WASHERS
Grooved side faces
outward.

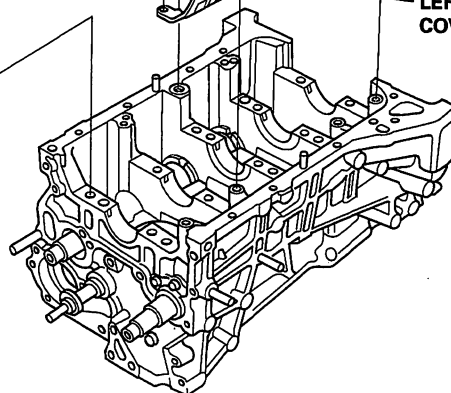
OIL JET BOLT
39 N·m (4.0 kgf·m, 29 lbf·ft)
Inspection, page 8-13

OIL JET
Handle the nozzle with
care. Do not damage or
deform.
Inspection, page 8-13

6 x 1.0 mm
11 N·m (1.1 kgf·m,
8.0 lbf·ft)

RIGHT BREATHER
COVER

LEFT BREATHER
COVER

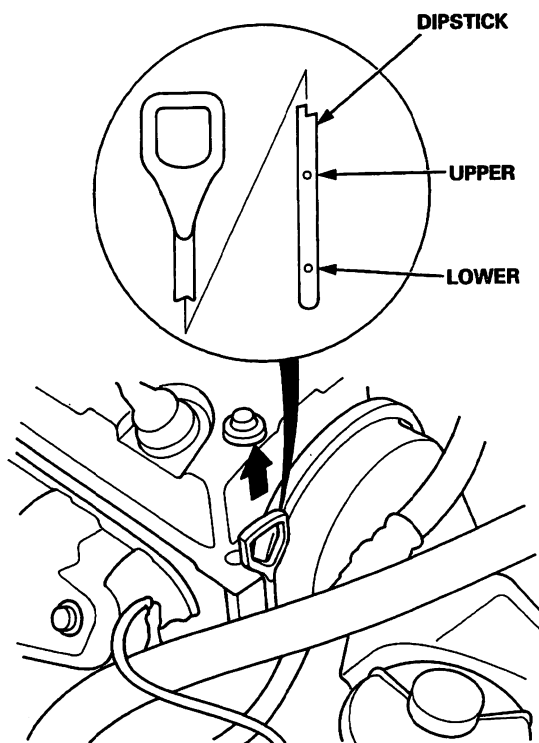


Engine Oil

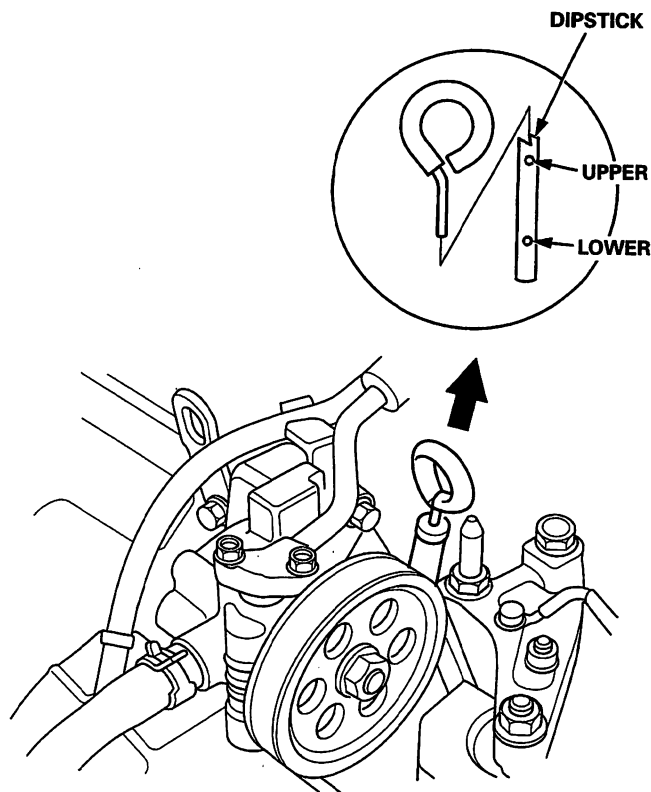
Inspection

1. Park the vehicle on level ground, and turn off the engine. Allow the oil a few minutes to drain back into the oil pan so the dipstick will show the actual level.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks.

D16B6 engine:



Except D16B6 engine:

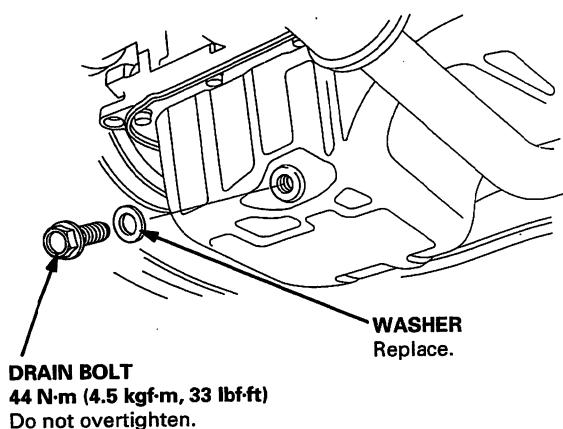


3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.



Replacement

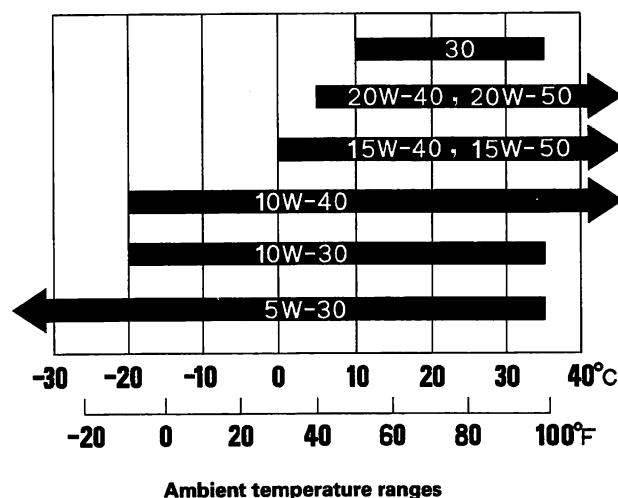
1. Warm up the engine.
2. Drain the engine oil.



3. Reinstall the drain plug with a new washer, and refill with the recommended oil.

Requirement	Always use a fuel-efficient oil is that says "API Service SG, SH or SJ" SAE Viscosity; See chart right column.
Capacity	<p>D16B6 engine: 3.3 ℓ (3.5 US qt, 2.9 Imp qt) at oil change. 3.6 ℓ (3.8 US qt, 3.2 Imp qt) at oil change, including filter. 4.0 ℓ (4.2 US qt, 3.5 Imp qt) after engine overhaul.</p> <p>F18B2, F18B3, F20B6 engines: 4.1 ℓ (4.3 US qt, 3.6 Imp qt) at oil change. 4.4 ℓ (4.6 US qt, 3.9 Imp qt) at oil change including filter. 5.7 ℓ (6.0 US qt, 5.0 Imp qt) after engine overhaul.</p> <p>H22A7 engine: 4.5 ℓ (4.8 US qt, 4.0 Imp qt) at oil change. 4.8 ℓ (5.1 US qt, 4.2 Imp qt) at oil change including filter. 5.9 ℓ (6.2 US qt, 5.2 Imp qt) after engine over haul.</p>
Change interval	<p>European models: Every 10,000 km (6,000 miles) or 12 months (Normal condition). Every 5,000 km (3,000 miles) or 6 months (Severe condition).</p> <p>Except european models: Every 5,000 km (3,000 miles) or 6 months.</p>

Engine Oil SAE Viscosity for Outside Temperature Ranges.



4. Fill the engine with oil up to the specified level, run the engine for more than three minutes, then check for oil leakage and oil level.

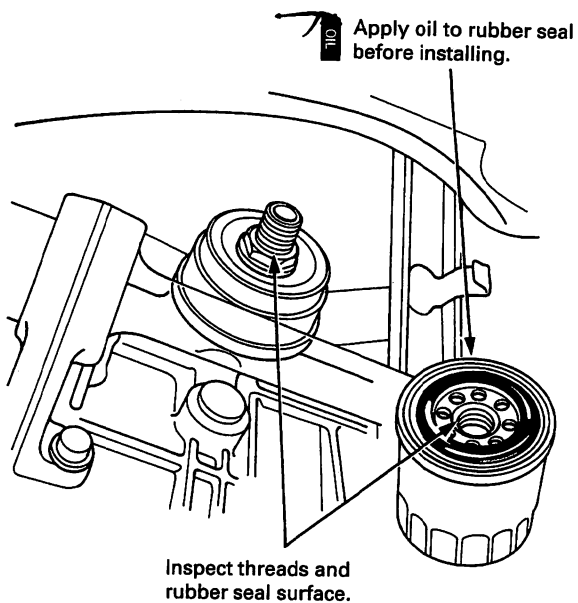
Oil Filter

Replacement

A type oil filter:

1. Remove the oil filter with the special oil filter wrench.
2. Inspect the threads and rubber seal on the new filter. Wipe off the seat on the engine block, then apply a light coat of oil to the filter rubber seal.

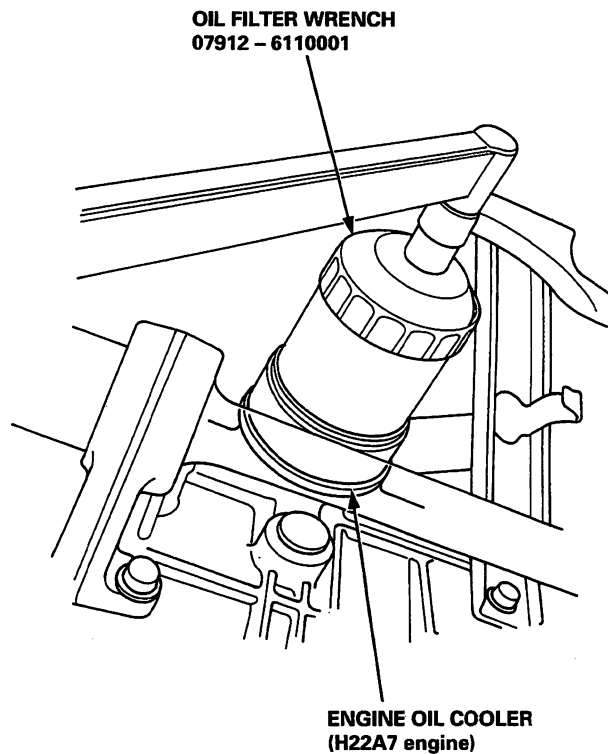
NOTE: Use only filters with a built-in bypass system.



3. Install the oil filter by hand.
4. After the rubber seal seats, tighten the oil filter clockwise with the special tool.

Tighten: 7/8 turn clockwise.

Tightening torque: 22 N·m (2.2 kgf·m, 16 lbf·ft)

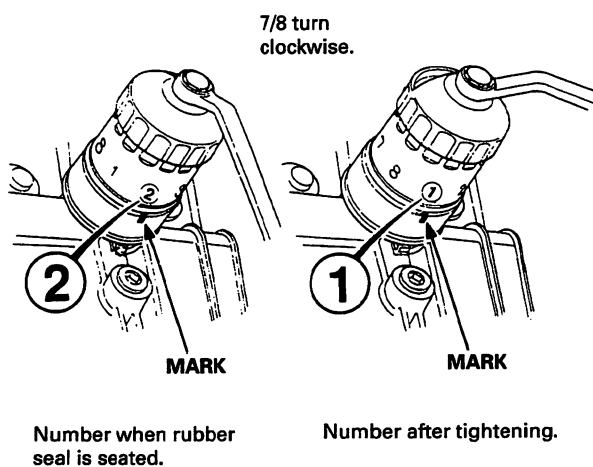




Eight numbers (1 to 8) are printed on the surface of the filter.

The following explains the procedure for tightening filters using these numbers.

- 1) Make a mark on the cylinder block under the number that shows at the bottom of the filter when the rubber seal is seated.
- 2) Tighten the filter by turning it clockwise seven numbers from the marked point. For example, if a mark is made under the number 2 when the rubber seal is seated, the filter should be tightened until the number 1 comes up to the marked point.



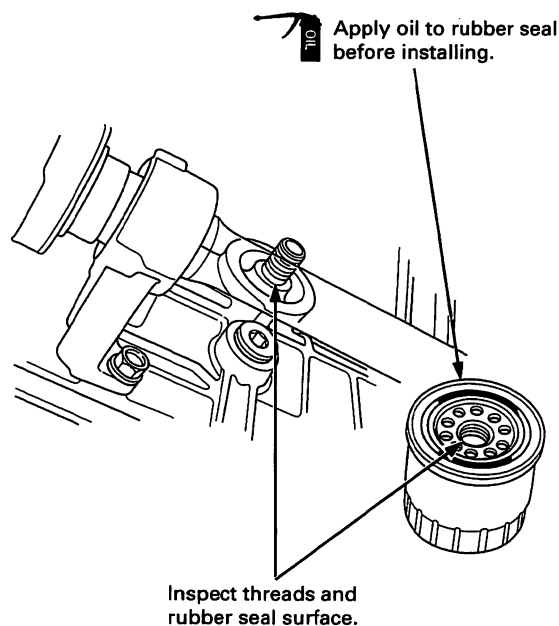
Number when rubber seal is seated	1	2	3	4	5	6	7	8
Number after tightening	8	1	2	3	4	5	6	7

5. After installation, fill the engine with oil up to the specified level, run the engine for more than three minutes, then check for oil leakage.

B type oil filter:

1. Remove the oil filter with the oil filter wrench.
2. Inspect the threads and rubber seal on the new filter. Wipe off seat on the engine block. Apply a light coat of oil to the filter rubber seal.

NOTE: Use only filters with a built-in bypass system.



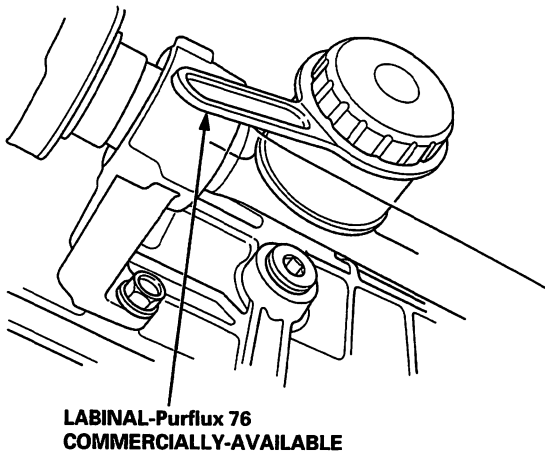
(cont'd)

Oil Filter

Replacement (cont'd)

- 3. Install the oil filter by hand.
- 4. After the rubber seal seats, tighten the oil filter clockwise with the tool.

Tighten: three quarter turn clockwise.
Tightening torque: 22 N·m (2.2 kgf·m, 16 lbf·ft)

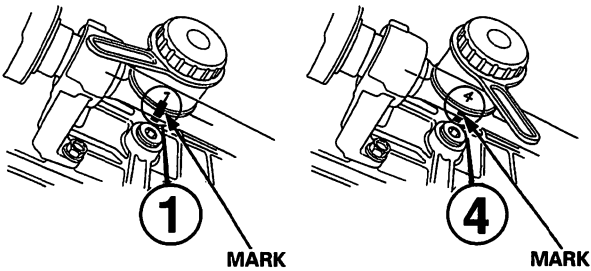


Four numbers (1 to 4) are printed on the surface of the filter.

The following explains the procedure for tightening filters using these numbers.

- 1) Make a mark on the engine oil cooler under the number that shows at the bottom of the filter when the rubber seal is seated.
- 2) Tighten the filter by turning it clockwise three numbers from the marked point. For example, if a mark is made under the number 2 when the rubber seal is seated, the filter should be tightened until the number 1 comes up to the marked point.

3/4 turn
clockwise.



Number when rubber
seal is seated.

Number after tightening.

Number when rubber seal is seated	1	2	3	4
Number after tightening	4	1	2	3

- 5. After installation, fill the engine with oil up to the specified level, run the engine for more than three minutes, then check for oil leakage.

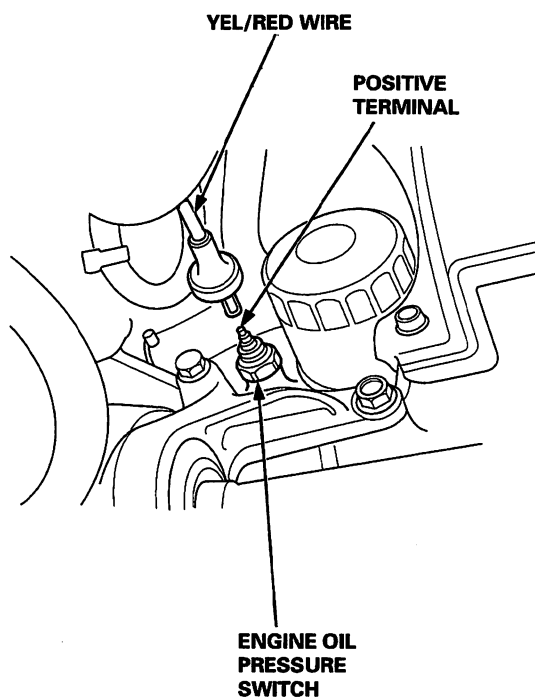
Oil Pressure Switch



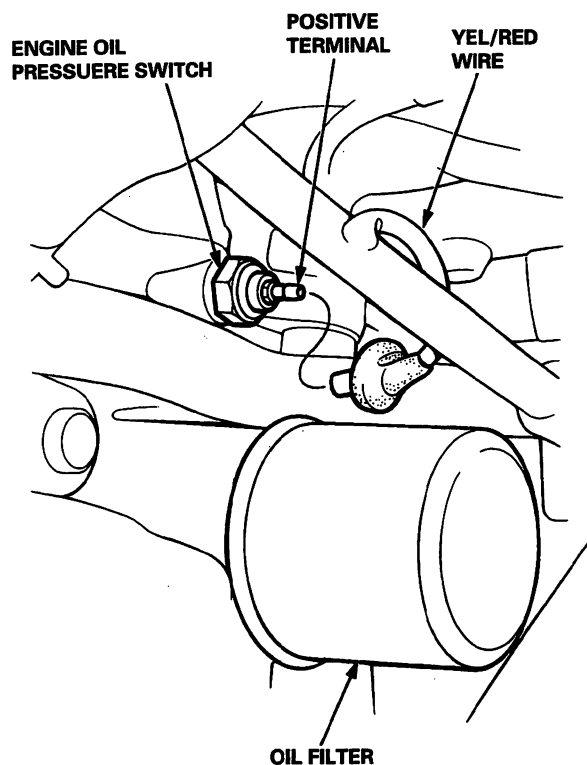
Testing

1. Remove the YEL/RED wire from the engine oil pressure switch.
2. Check for continuity between the positive terminal and the engine (ground).
 - There should be continuity with the engine stopped.
 - There should be no continuity with the engine running.

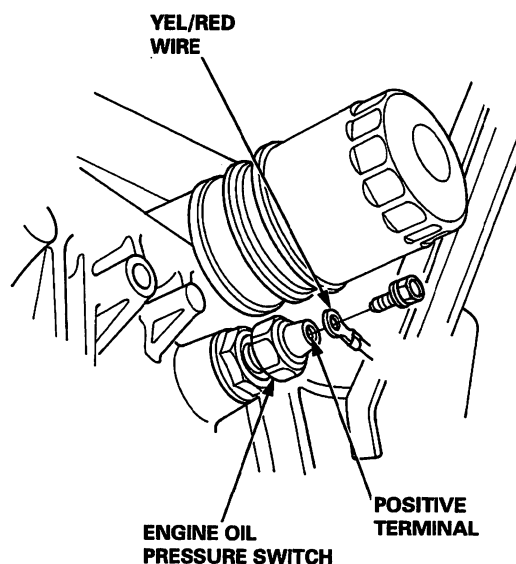
D16B6 engine:



F18B2, F18B3, F20B6 engines:



H22A7 engine:



3. If the switch fails to operate, check the engine oil level. If the engine oil level is OK, check the engine oil pressure.

Oil Pressure

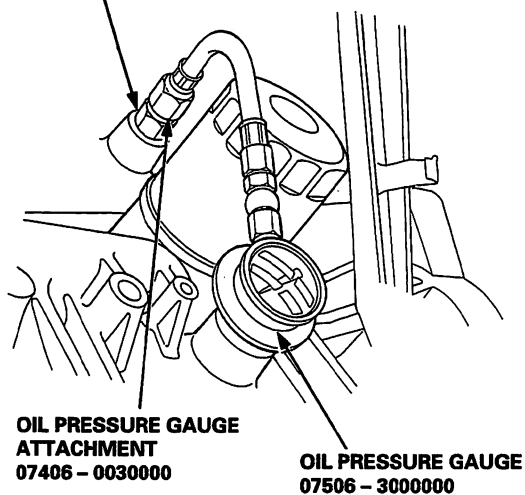
Testing

If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

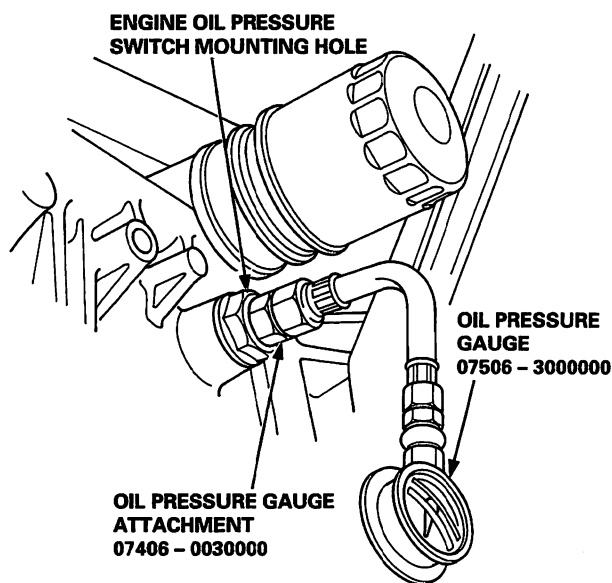
1. Connect a tachometer.
2. Remove the engine oil pressure switch and install an oil pressure gauge.

Except H22A7 engine:

ENGINE OIL PRESSURE SWITCH
MOUNTING HOLE



H22A7 engine:



3. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
4. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

Engine Oil Temperature: 80°C (176°F)

Engine Oil Pressure:

At Idle: 70 kPa (0.7 kgf/cm², 10 psi) minimum

At 3,000 rpm (min⁻¹): 340 kPa (3.5 kgf/cm², 50 psi) minimum

- If oil pressure is NOT within specifications, inspect the oil pump (see page 8-17).

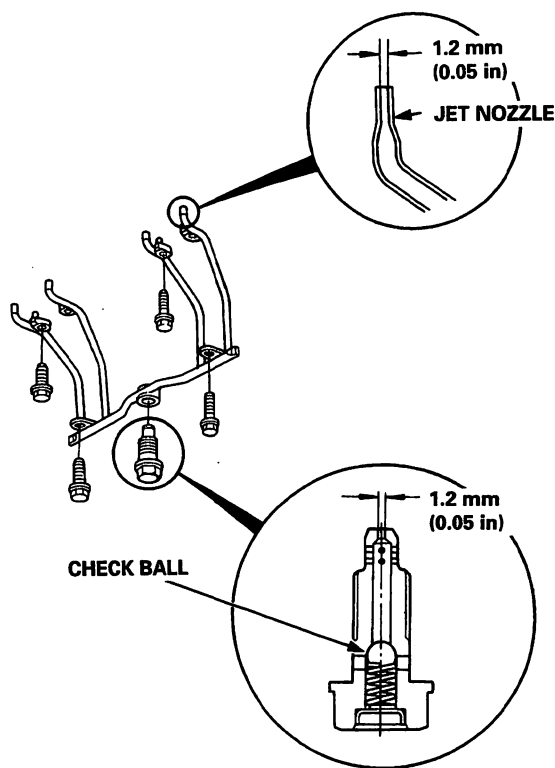


Inspection

1. Remove the oil jet (see page 8-5) and inspect it as follows.

- Make sure that a 1.1 mm (0.04 in) diameter drill will go through the nozzle hole (1.2 mm (0.05 in) diameter).
- Insert the other end of the same 1.1 mm (0.04 in) drill into the oil intake (1.2 mm (0.05 in) diameter). Make sure the check ball moves smoothly and has a stroke of approximately 4.0 mm (0.16 in).
- Check the oil jet operation with an air nozzle. It should take at least 200 kPa (2.0 kgf/cm², 28 psi) to unseat the check ball.

NOTE: Replace the oil jet assembly if the nozzle is damaged or bent.



2. Mounting torque is critical. Be very precise when installing.

Torque: 39 N·m (4.0 kgf·m, 29 lbf·ft)

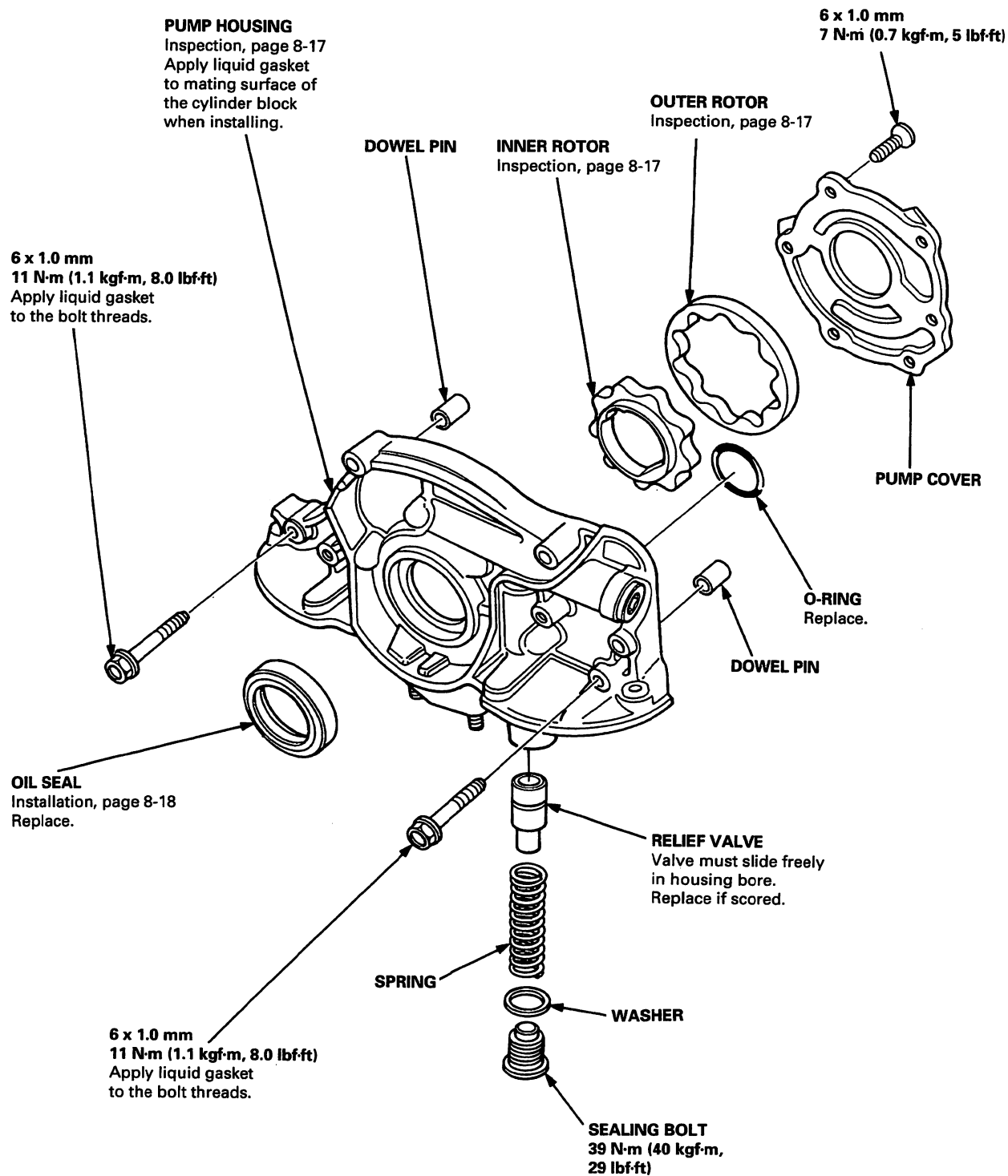
Oil Pump

Overhaul

NOTE:

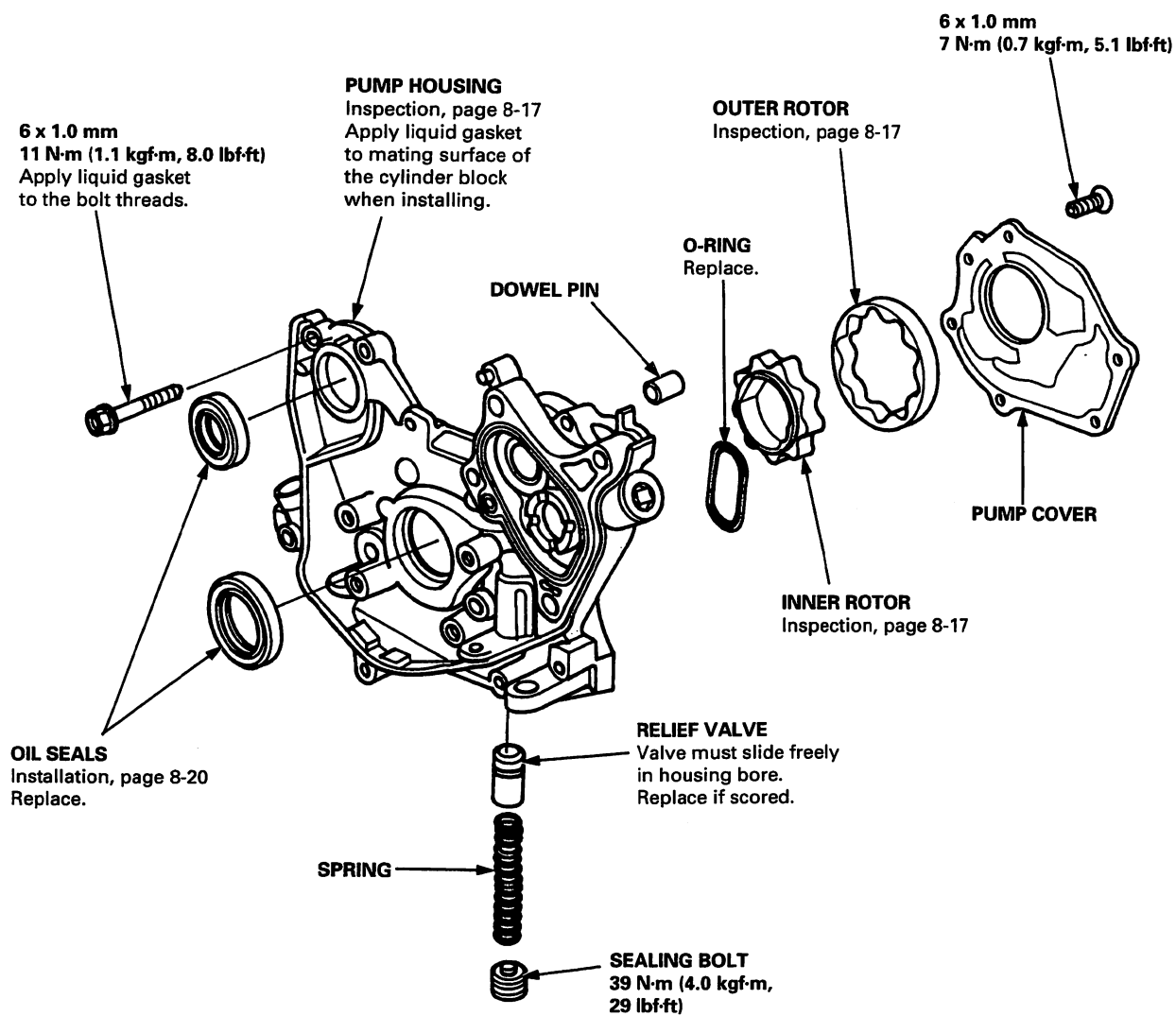
- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08C70 – K0234M, 08C70 – K0334M or 08C70 – X0331S.
- The rotors must be installed to the same direction.
- After reassembly, check that the rotors move without binding.

D16B6 engine:





Except D16B6 engine:

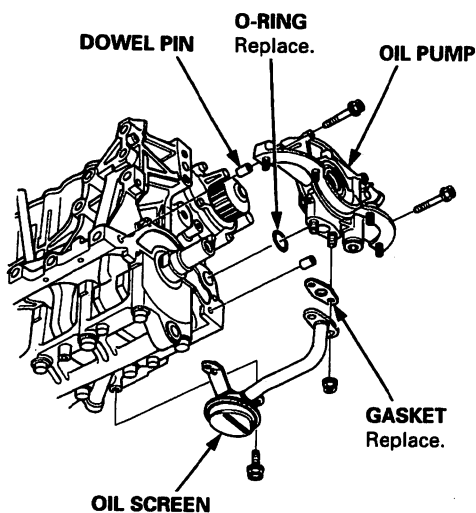


Oil Pump

Removal

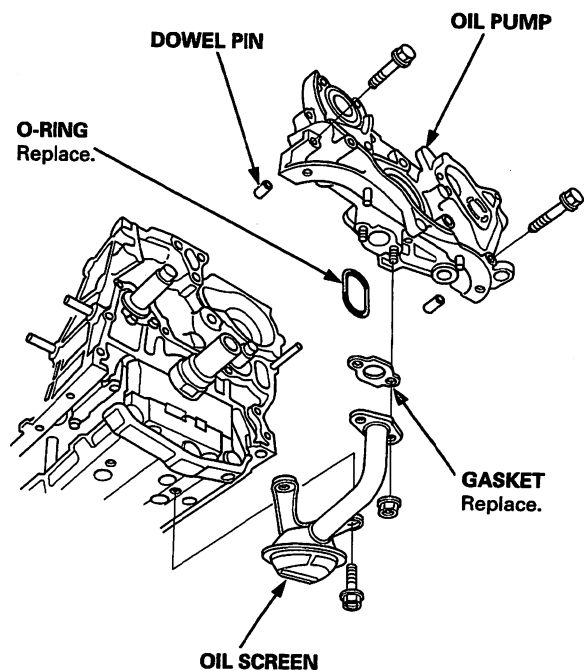
D16B6 engine:

1. Drain the engine oil.
2. Turn the crankshaft so that the No. 1 piston is at top dead center (see section 6).
3. Remove the timing belt (see section 6).
4. Remove the oil pan and the oil screen.
5. Remove the mounting bolts and the oil pump assembly.



Except D16B6 engine:

1. Drain the engine oil.
2. Turn the crankshaft so that the No. 1 piston is at top dead center (see section 6).
3. Remove the timing belt and the balancer belt (see section 6).
4. Remove the timing belt tensioner and the balancer belt tensioner.
5. Remove the CKP/TDC sensors, then remove the timing belt drive pulley (see section 6).
6. Remove the balancer belt driven pulley (see page 7-B-13).
7. Remove the balancer gear case and the balancer driven gear (see page 7-B-14).
8. Remove the oil pan and the oil screen.
9. Remove the mounting bolts and the oil pump assembly.





Inspection

1. Remove the screws from the pump housing, then separate the housing and cover.
2. Check the inner-to-outer rotor radial clearance on the pump rotor. If the inner-to-outer rotor clearance exceeds the service limit, replace the inner and outer rotors.

Inner Rotor-to-Outer Rotor Radial Clearance

D16B6 engine:

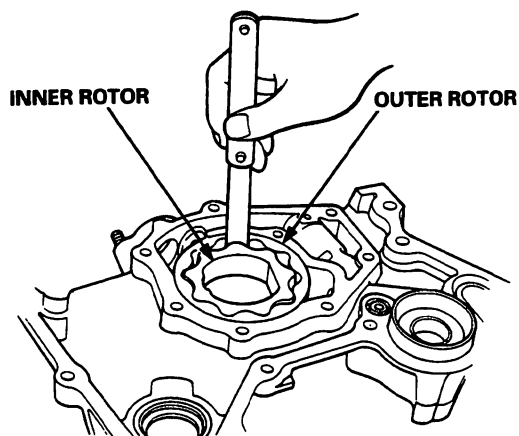
Standard (New): 0.02 – 0.14 mm (0.001 – 0.006 in)

Service Limit: 0.20 mm (0.008 in)

Except D16B6 engine:

Standard (New): 0.02 – 0.16 mm (0.001 – 0.006 in)

Service Limit: 0.20 mm (0.008 in)



3. Check the housing-to-rotor axial clearance on the pump rotor. If the housing-to-rotor axial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

Housing-to-Rotor Axial Clearance

D16B6 engine:

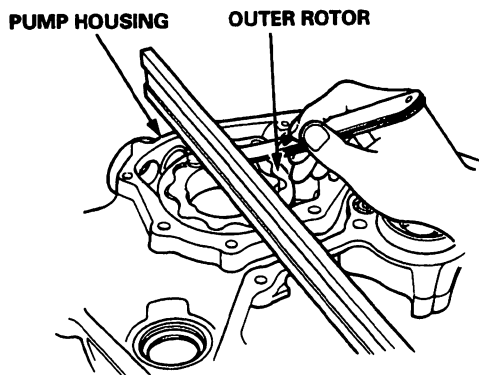
Standard (New): 0.03 – 0.08 mm (0.001 – 0.003 in)

Service Limit: 0.15 mm (0.006 in)

Except D16B6 engine:

Standard (New): 0.02 – 0.07 mm (0.001 – 0.003 in)

Service Limit: 0.12 mm (0.005 in)



4. Check the housing-to-outer rotor radial clearance. If the housing-to-outer rotor radial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

Housing-to-Outer Rotor Radial Clearance

D16B6 engine:

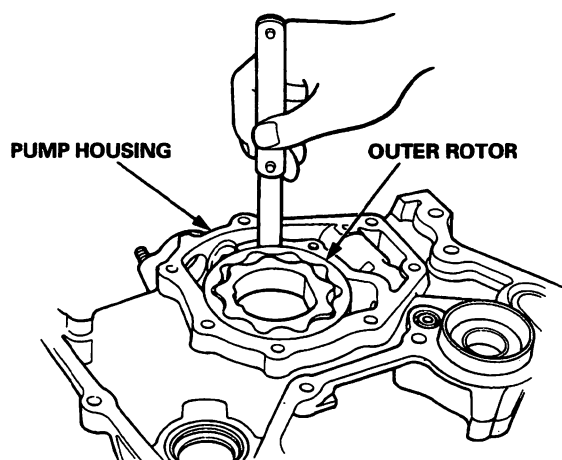
Standard (New): 0.10 – 0.18 mm (0.004 – 0.007 in)

Service Limit: 0.20 mm (0.008 in)

Except D16B6 engine:

Standard (New): 0.10 – 0.19 mm (0.004 – 0.007 in)

Service Limit: 0.21 mm (0.008 in)



5. Inspect both rotors and the pump housing for scoring or other damage. Replace parts if necessary.

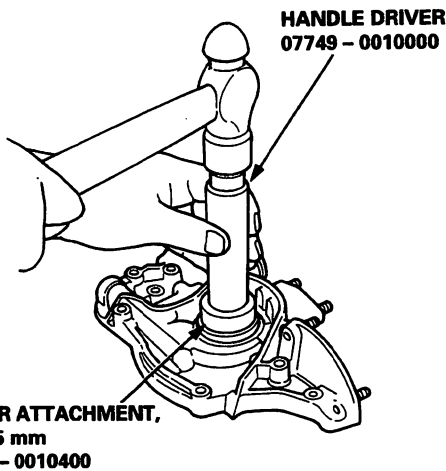
Oil Pump

Installation

D16B6 engine:

1. Remove the old oil seal from the oil pump.
2. Using the special tool, gently tap in the new oil seal until the driver bottoms against the pump.

NOTE: The oil seal alone can be replaced without removing the oil pump.

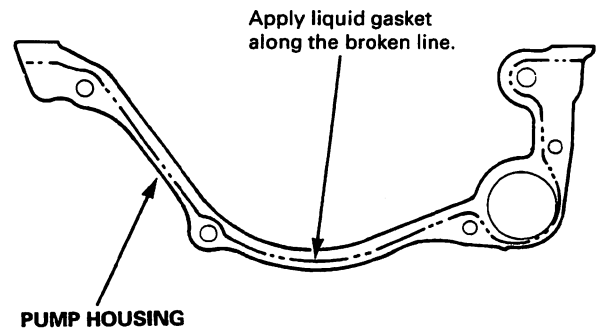


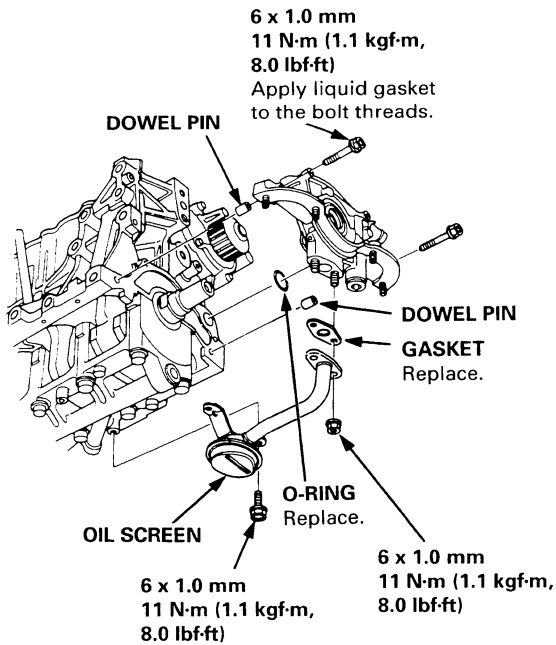
3. Reassemble the oil pump, applying thread lock to the pump housing screws.
4. Check that the oil pump turns freely.
5. Apply a light coat of oil to the seal lip.
6. Install the two dowel pins and new O-ring on the oil pump.

7. Apply liquid gasket to the oil pump and install it.

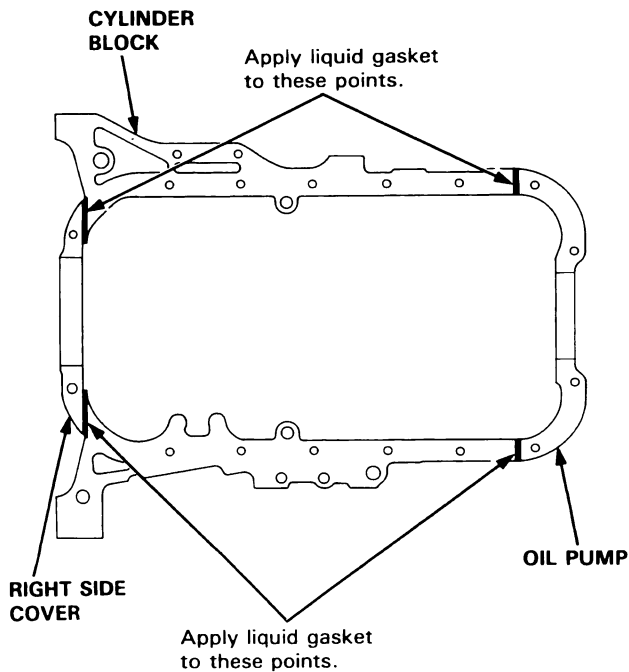
NOTE:

- Use liquid gasket, Part No. 08C70 - K0234M, 08C70 - K0334M or 08C70 - X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.
- Apply grease to the lips of the crankshaft oil seal. Then, install the oil pump inner rotor onto the crankshaft. When the pump is in place, clean any excess grease off the crankshaft, then check that the oil seal lips are not distorted.





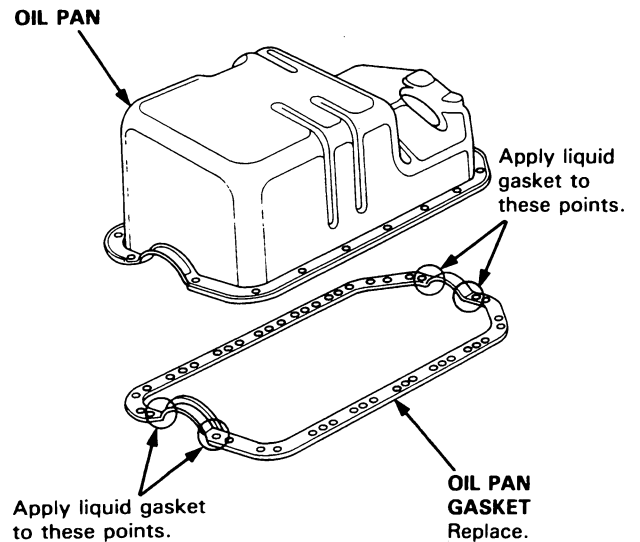
8. Install the oil screen.
9. Apply liquid gasket on the oil pump and right side cover mating areas as shown below.



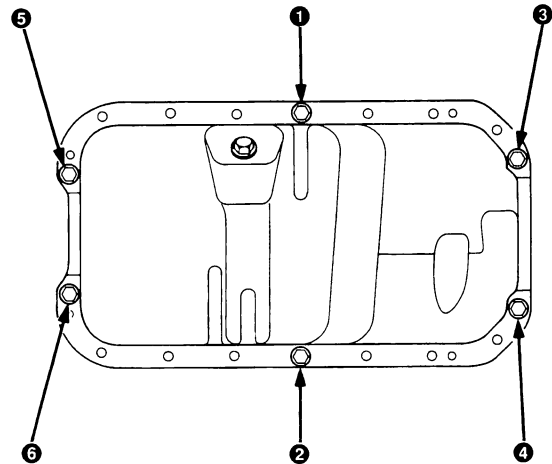
10. Install the oil pan gasket and oil pan.

NOTE:

- Use a new oil pan gasket.
- Install oil pan no more than five minutes after liquid gasket applied.



11. Tighten bolts and nuts finger tight at six points as shown below.



12. Tighten all bolts and nuts, starting from bolt ①, clockwise in these steps.

NOTE: Excessive tightening can cause distortion of oil pan gasket and oil leakage.

Torque: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

(cont'd)

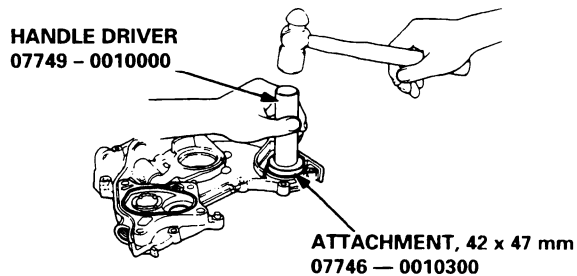
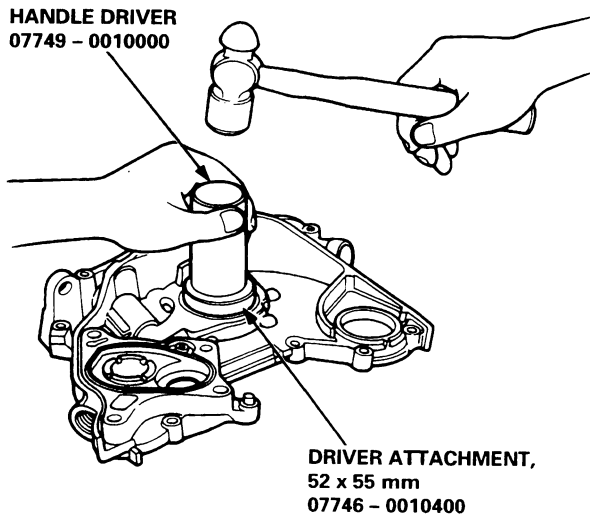
Oil Pump

Installation (cont'd)

Except D16B6 engine:

1. Remove the old oil seals from the oil pump.
2. Gently tap in the new oil seals until the special tool bottoms on the pump.

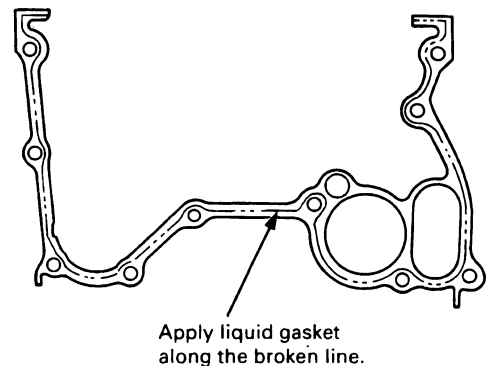
NOTE: The oil seals alone can be replaced without removing the oil pump by using the special tools.

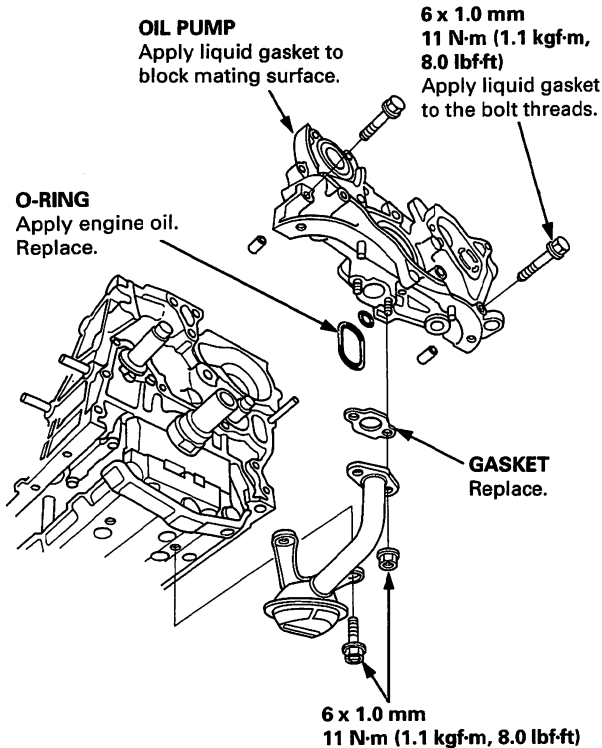


3. Reassemble the oil pump, applying liquid thread lock to the pump housing screws.
4. Check that the oil pump turns freely.
5. Install a dowel pin and the new O-ring on the pump.
6. Apply liquid gasket to the oil pump and install it.

NOTE:

- Use liquid gasket, Part No. 08C70 - K0234M, 08C70 - K0334M or 08C70 - X0331S.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.
- Apply grease to the lips of the crankshaft oil seal and the balancer shaft seal. Then, install the oil pump inner rotor onto the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and the balancer shaft, then check that the oil seal lips are not distorted.

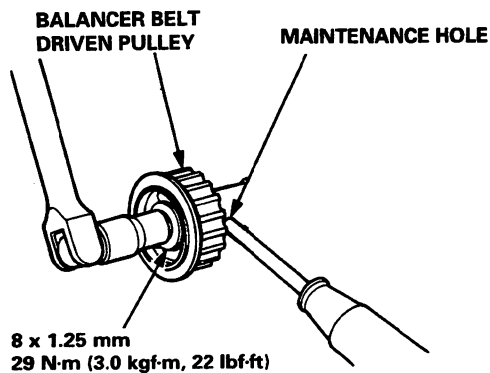




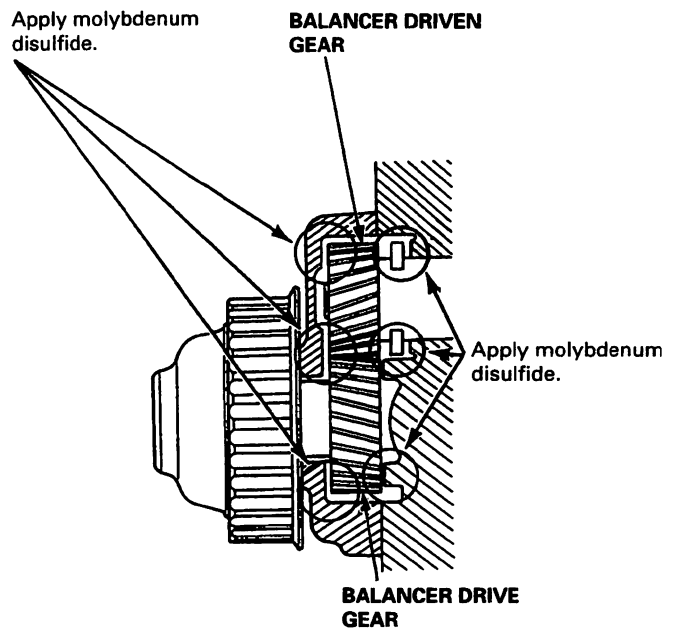
7. Install the oil screen.

8. Hold the front balancer shaft with a screwdriver, then install the timing balancer belt driven pulley.

FRONT BALANCER:

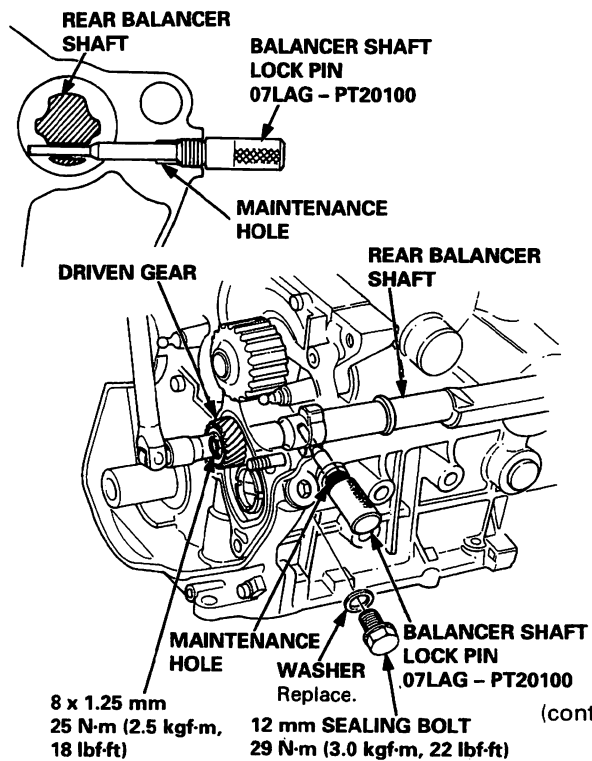


9. Before installing the balancer driven gear and the balancer gear case, apply molybdenum disulfide to the thrust surfaces of the balancer gears as shown.



10. Hold the rear balancer shaft with the special tool, then install the balancer driven gear.

REAR BALANCER SHAFT:



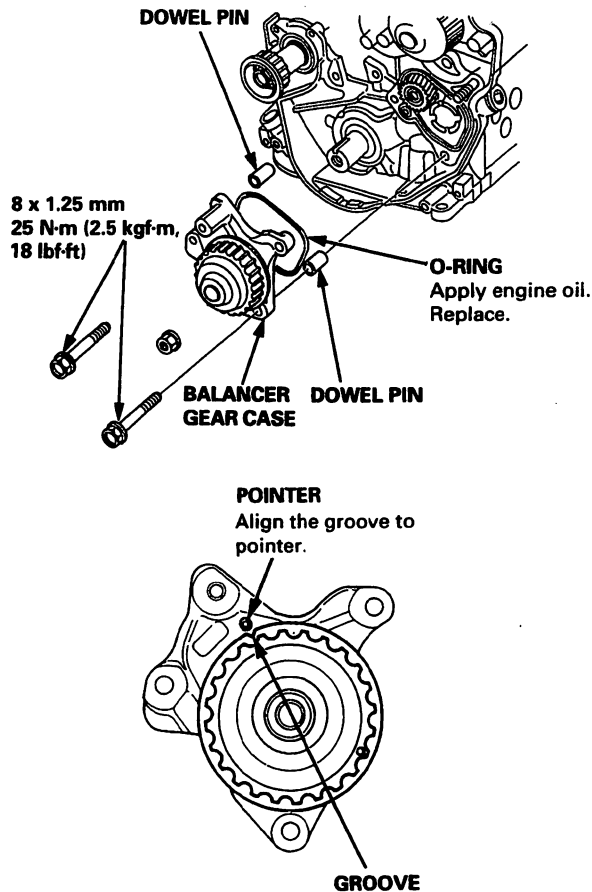
(cont'd)

Oil Pump

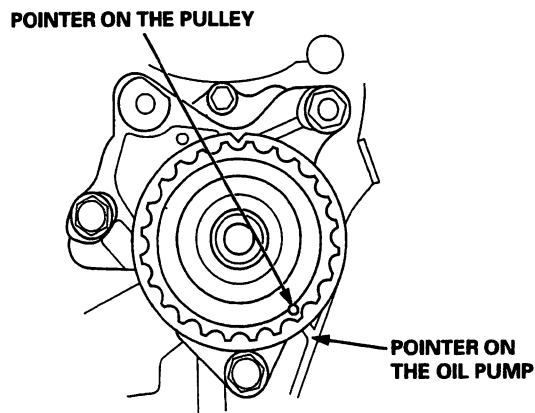
Installation (cont'd)

11. Install the balancer gear case on the oil pump.

NOTE: Align the groove on the pulley edge to the pointer on the gear case while holding the rear balancer with the special tool, then install the gear case.



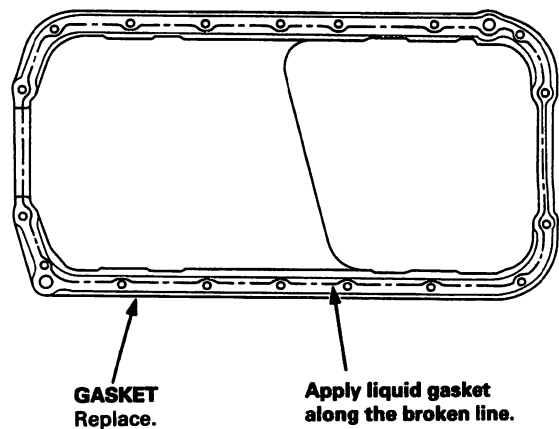
12. Check the alignment of the pointers after installing the gear case.



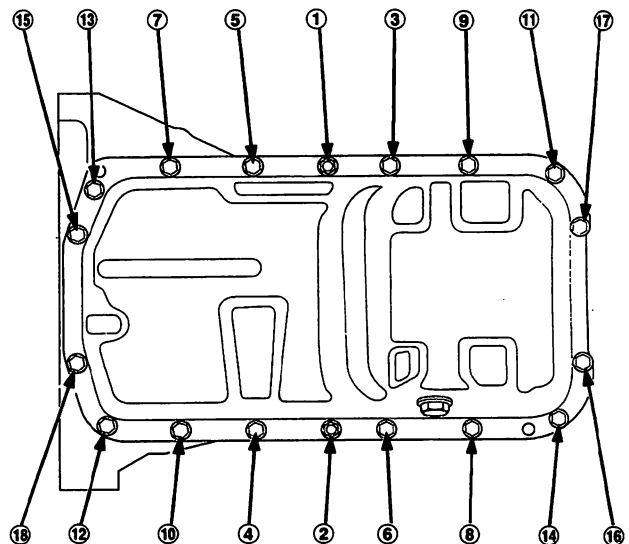
13. Apply liquid gasket, Part No. 08C70 – K0334M or 08C70 – X0331S, to the cylinder block mating surface of the oil pan, then install the oil pan.

NOTE:

- Apply liquid gasket 4 mm wide.
- Apply liquid gasket doubly to the jointing point of the liquid gasket.



14. Tighten the bolts/nuts in two or three steps. In the final step, tighten all bolts/nuts, in sequence to 12 N-m (1.2 kgf-m, 8.7 lbf-ft).



Intake Manifold/Exhaust System

Intake Manifold

Replacement 9-2

Exhaust Manifold

Replacement 9-5

Exhaust Pipe and Muffler

Replacement 9-9

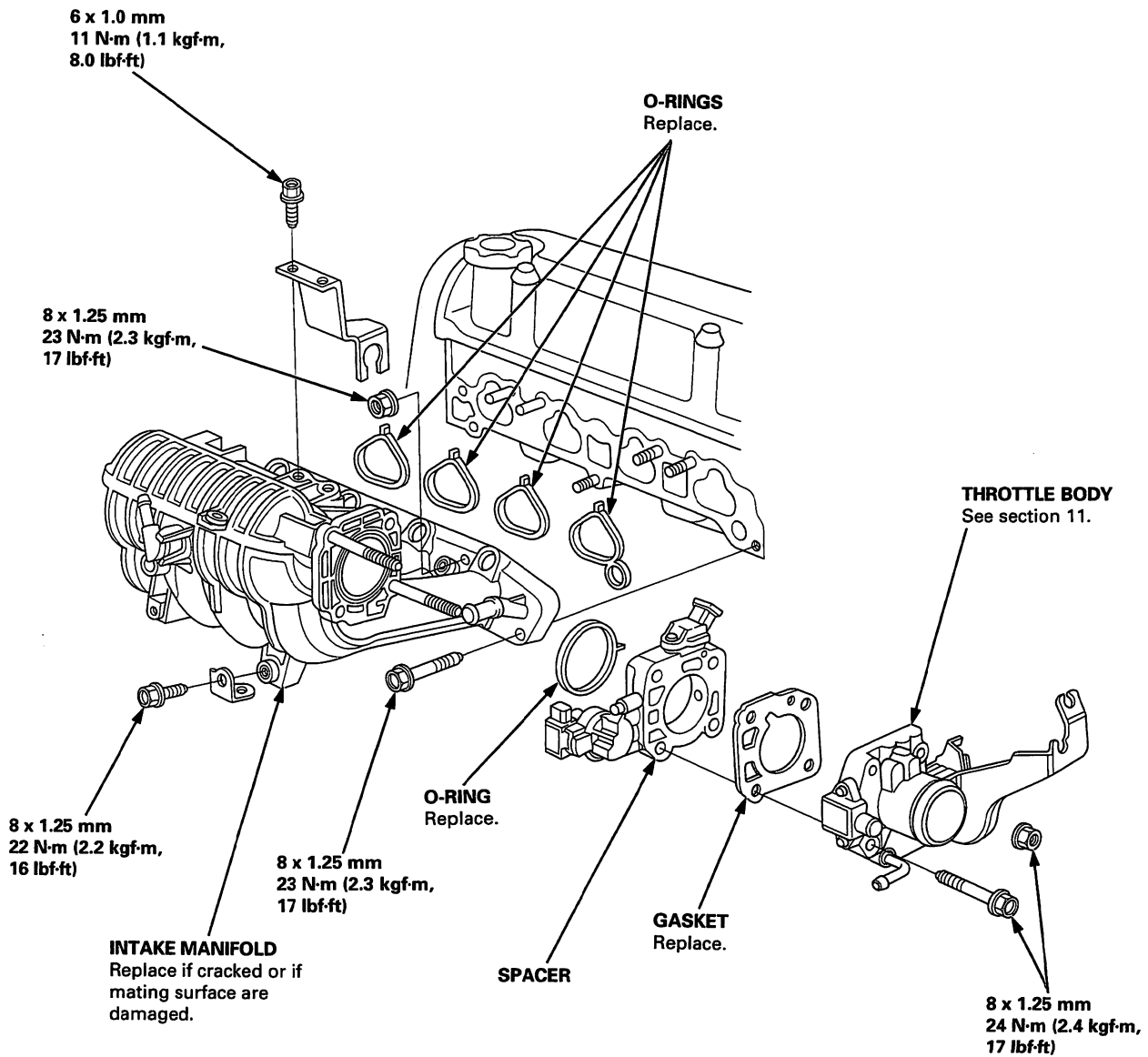


Intake Manifold

Replacement

NOTE: Use new O-rings and gaskets when reassembling.

D16B6 engine:



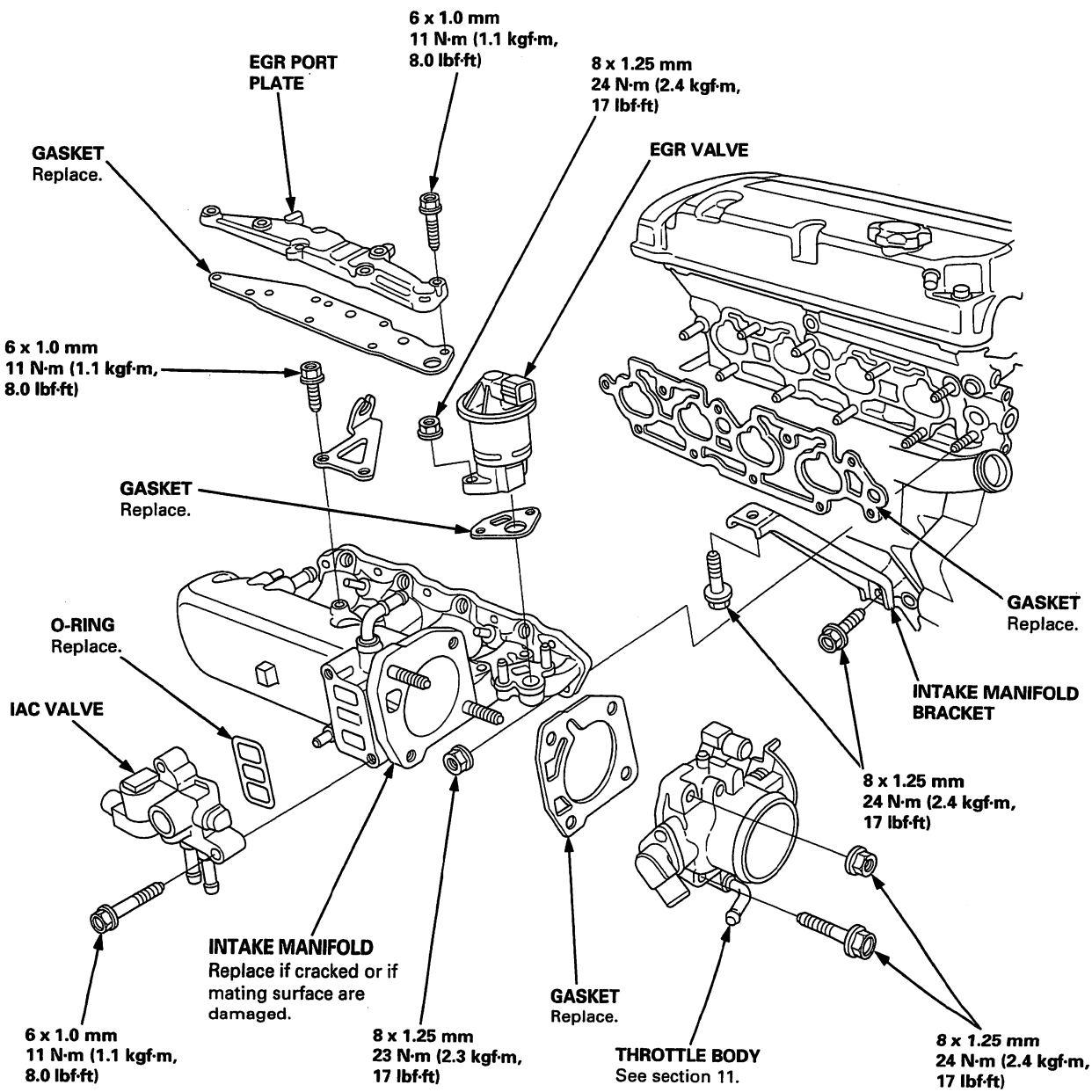
Intake Manifold

Replacement (cont'd)

NOTE:

- Use new O-rings and gaskets when reassembling.
- Remove the wire harness clamp from the rear mount bracket before removing the intake manifold.

H22A7 engine:



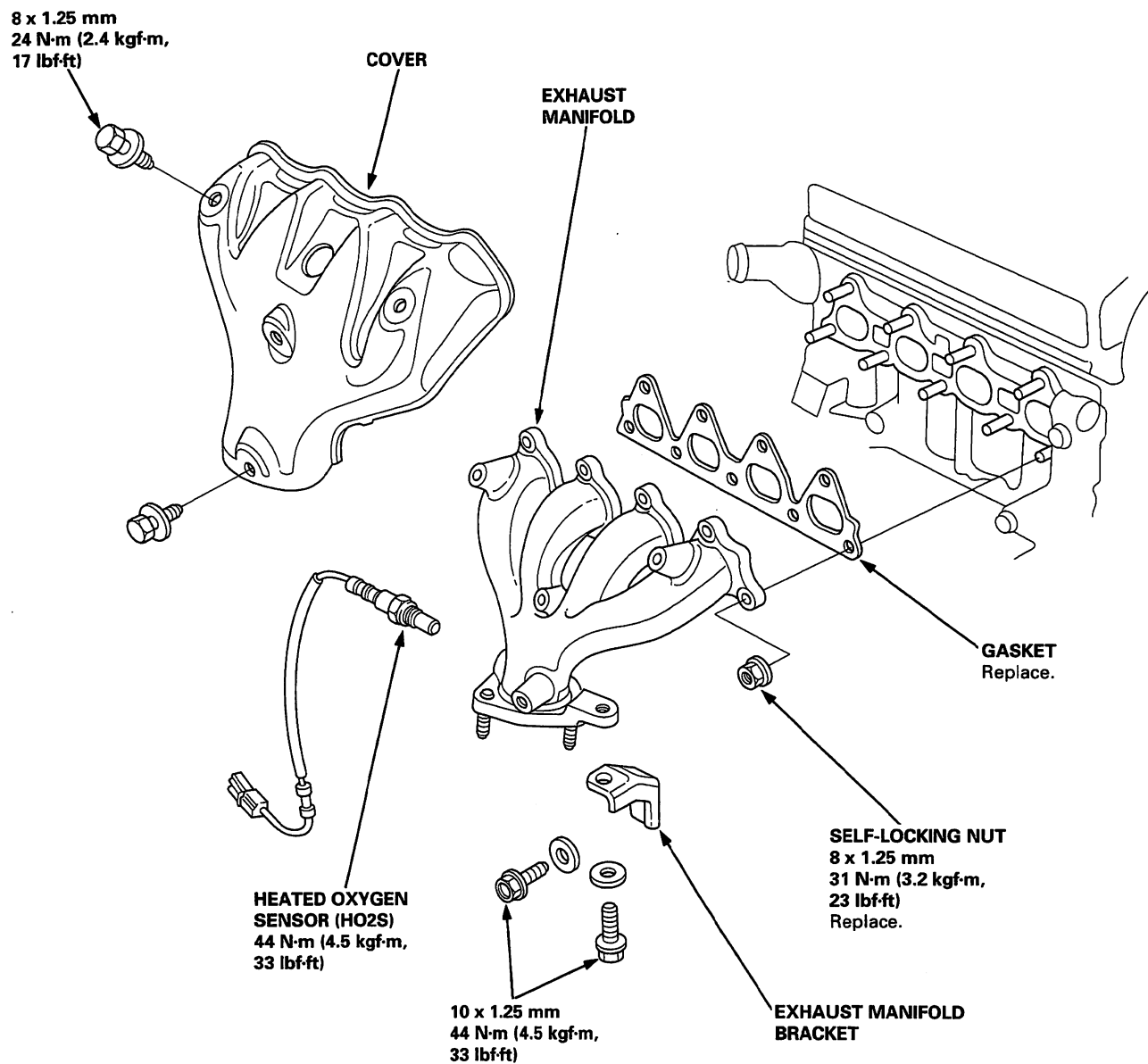
Exhaust Manifold



Replacement

NOTE: Use new gasket and self-locking nuts when reassembling.

D16B6 engine:



(cont'd)

Exhaust Manifold

Replacement (cont'd)

NOTE: Use new gasket and self-locking nuts when reassembling.

F18B2, F18B3 engines:

8 x 1.25 mm
24 N·m (2.4 kgf·m,
17 lbf·ft)

COVER

EXHAUST
MANIFOLD

GASKET
Replace.

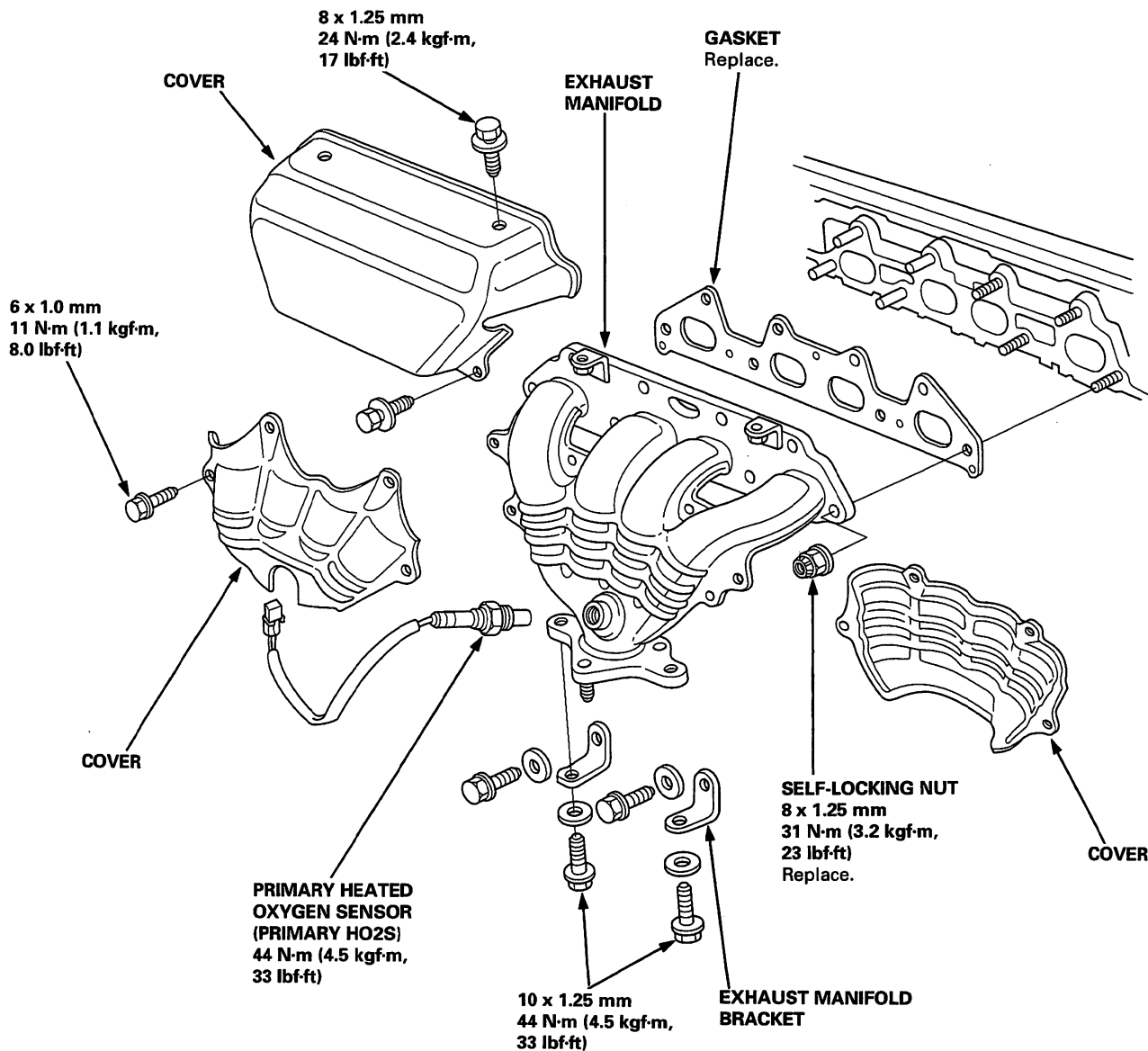
SELF-LOCKING NUT
8 x 1.25 mm
31 N·m (3.2 kgf·m,
23 lbf·ft)
Replace.

EXHAUST MANIFOLD
BRACKET

10 x 1.25 mm
44 N·m (4.5 kgf·m,
33 lbf·ft)



F20B6 engine:



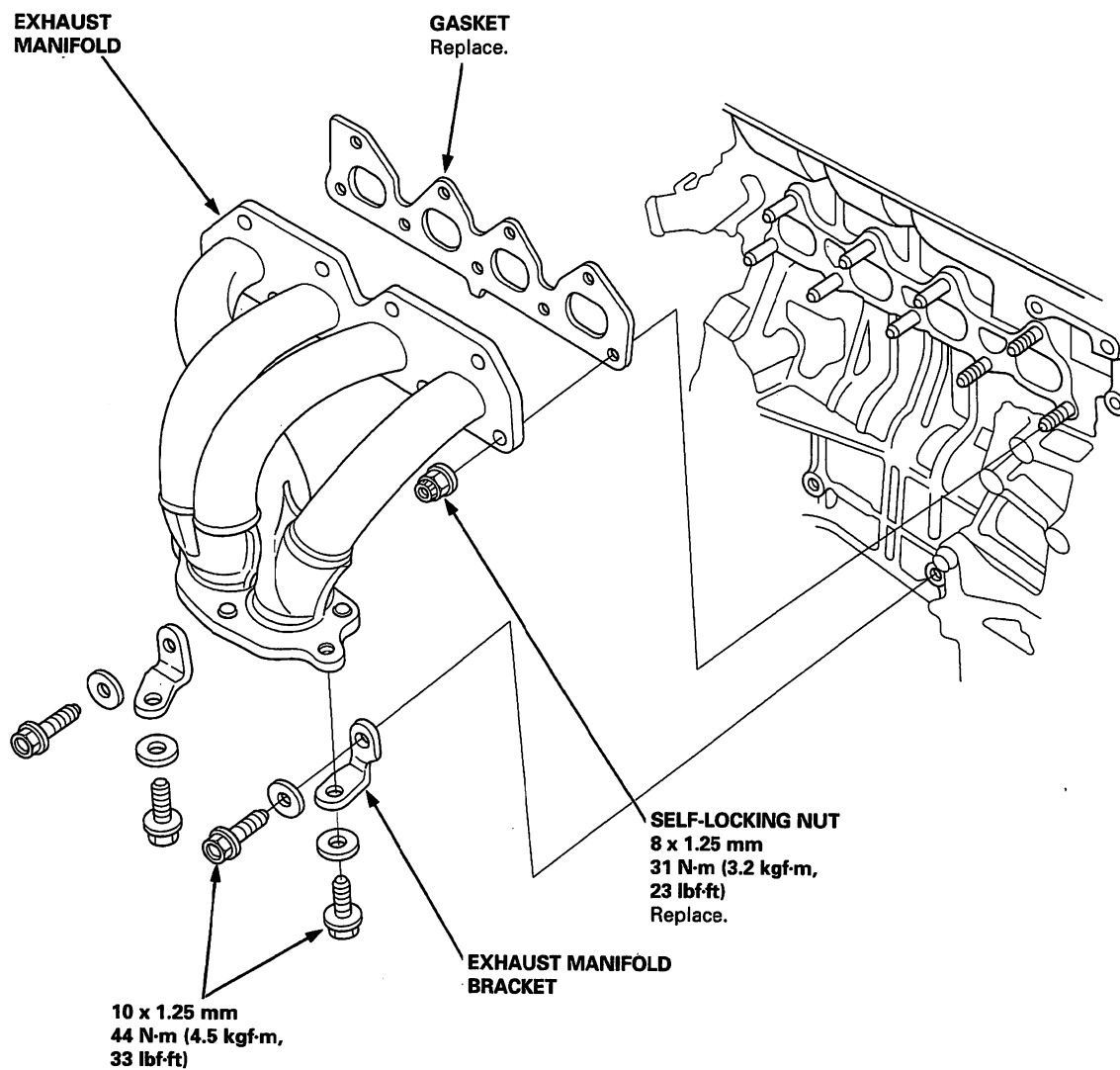
(cont'd)

Exhaust Manifold

Replacement (cont'd)

NOTE: Use new gasket and self-locking nuts when reassembling.

H22A7 engine:



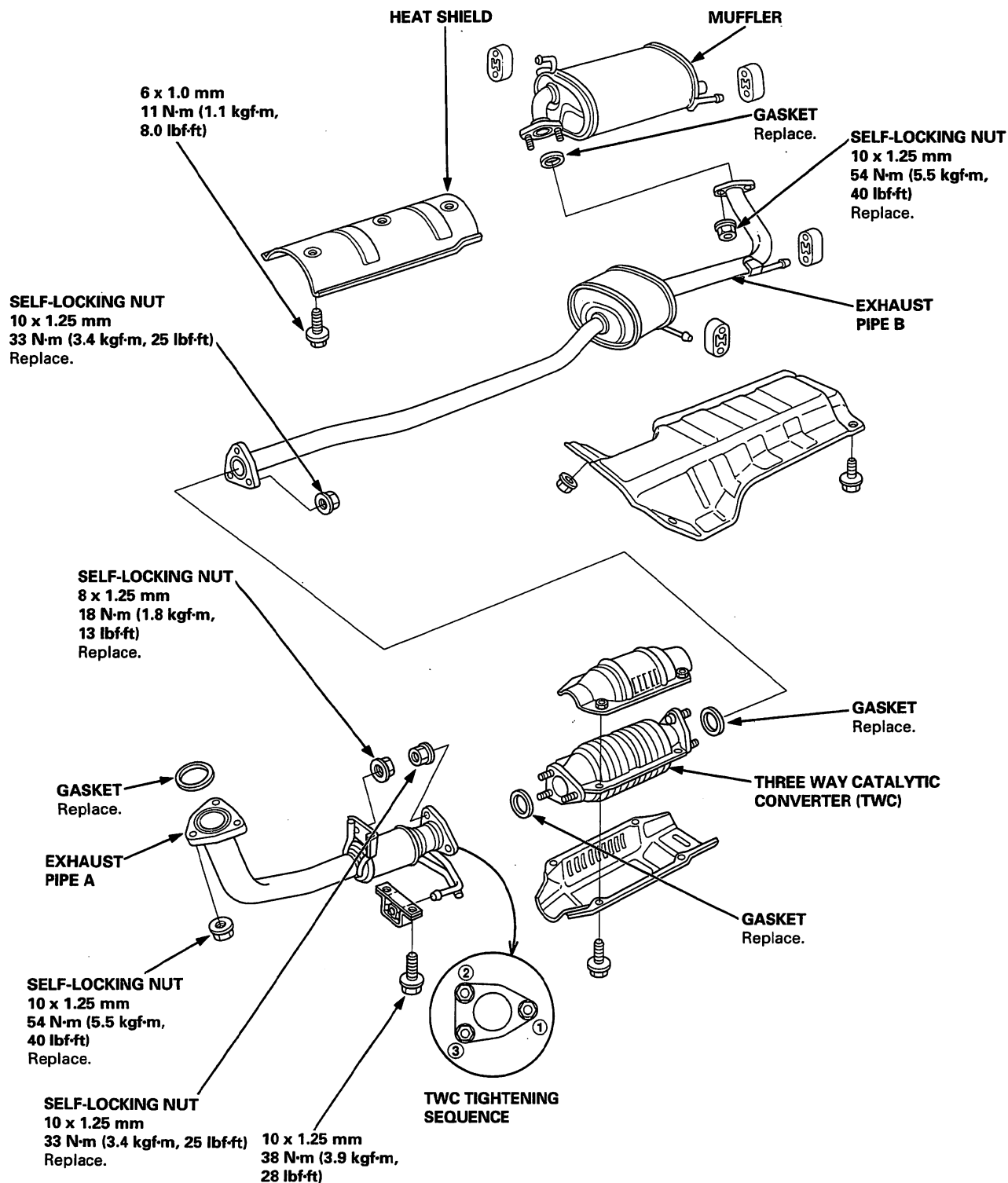
Exhaust Pipe and Muffler



Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.

D16B6 engine:



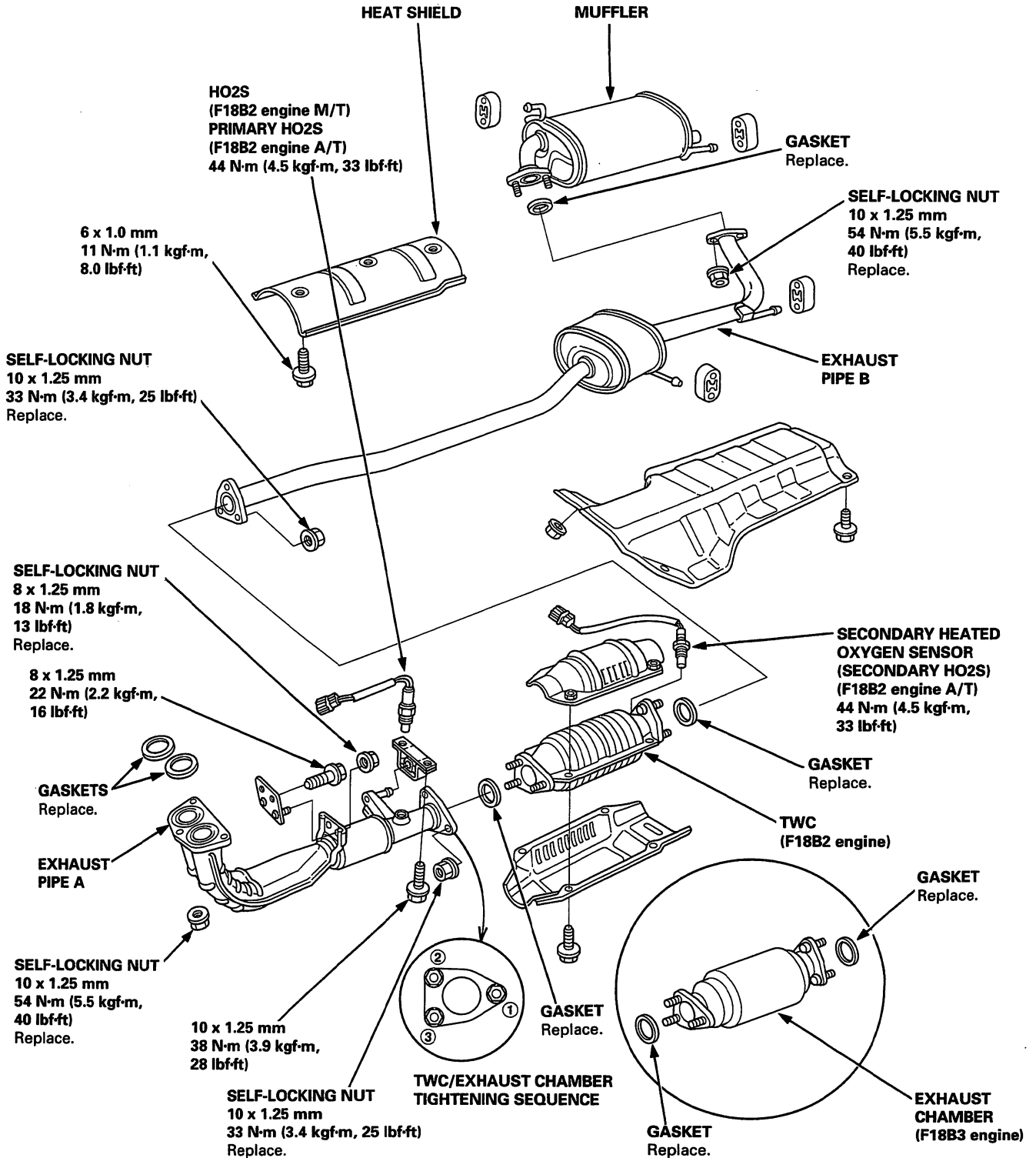
(cont'd)

Exhaust Pipe and Muffler

Replacement (cont'd)

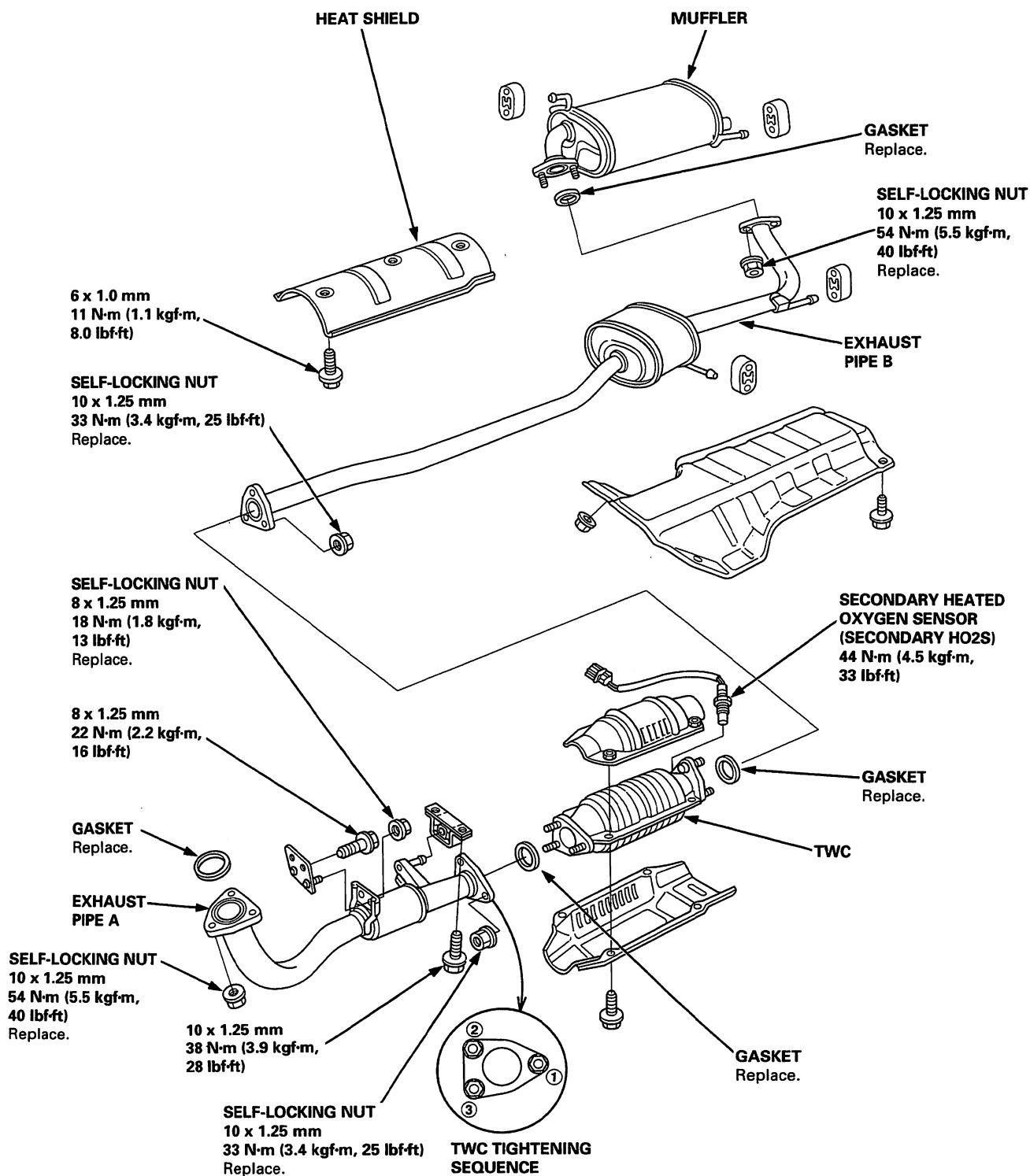
NOTE: Use new gaskets and self-locking nuts when reassembling.

F18B2, F18B3 engines:





F20B6 engine:



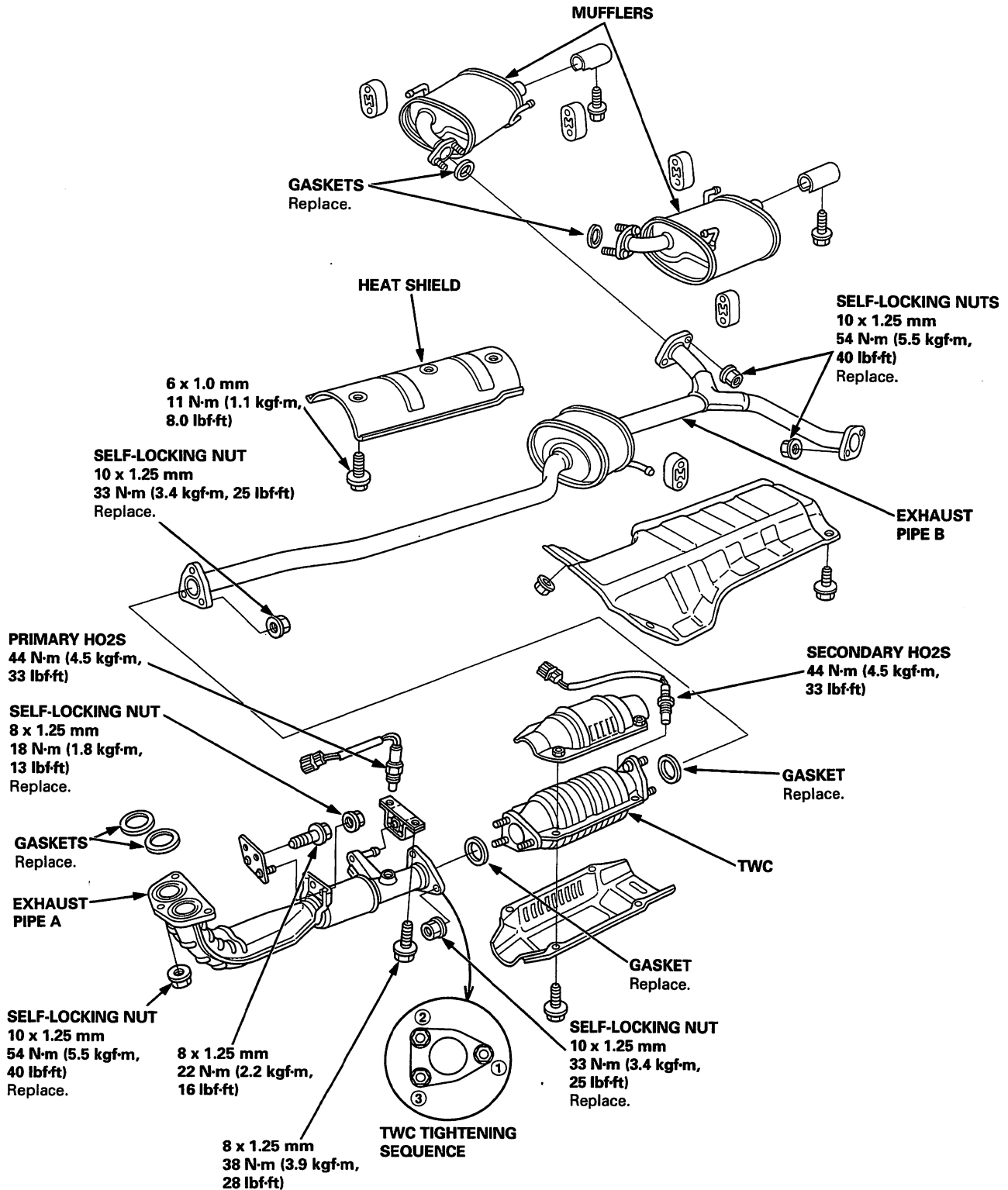
(cont'd)

Exhaust Pipe and Muffler

Replacement (cont'd)

NOTE: Use new gaskets and self-locking nuts when reassembling.

H22A7 engine:



Cooling

Radiator

Illustrated Index	10-2
Replacement	10-6
Engine Coolant Refilling and Bleeding	10-7
Cap Testing	10-10
Testing	10-10

Thermostat

Replacement	10-11
Testing	10-13

Water Pump

Illustrated Index	10-14
Inspection	10-17
Replacement	10-17

Fan Controls

Component Location Index	10-18
Circuit Diagram	10-19
Module Input Test	10-21
Fan Motor Testing	10-22
Radiator Fan Switch Testing	10-22

Engine Coolant Temperature Gauge

Gauge Testing	10-24
Sending Unit Testing	10-24



Radiator

Illustrated Index

Total Cooling System Capacity [Including heater and reservoir]

D16B6 engine: 4.6 ℓ (4.9 US qt, 4.0 Imp qt)

F18B2, F18B3, F20B6 engines:

M/T: 5.8 ℓ (6.1 US qt, 5.1 Imp qt)

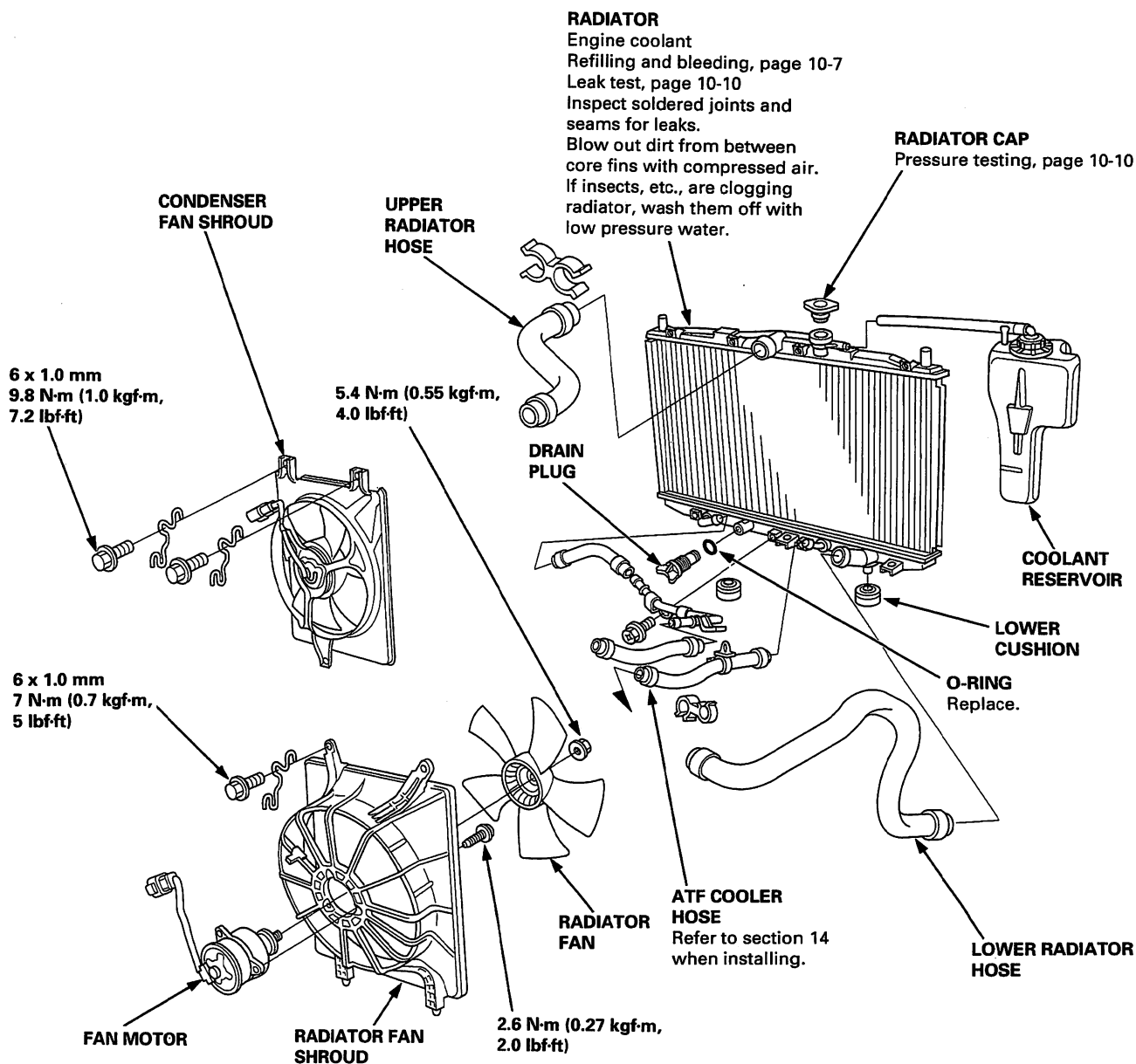
A/T: 5.7 ℓ (6.0 US qt, 5.0 Imp qt)

H22A7 engine: 6.9 ℓ (7.3 US qt, 6.1 Imp qt)

Reservoir capacity: 0.55 ℓ (0.58 US qt, 0.48 Imp qt)

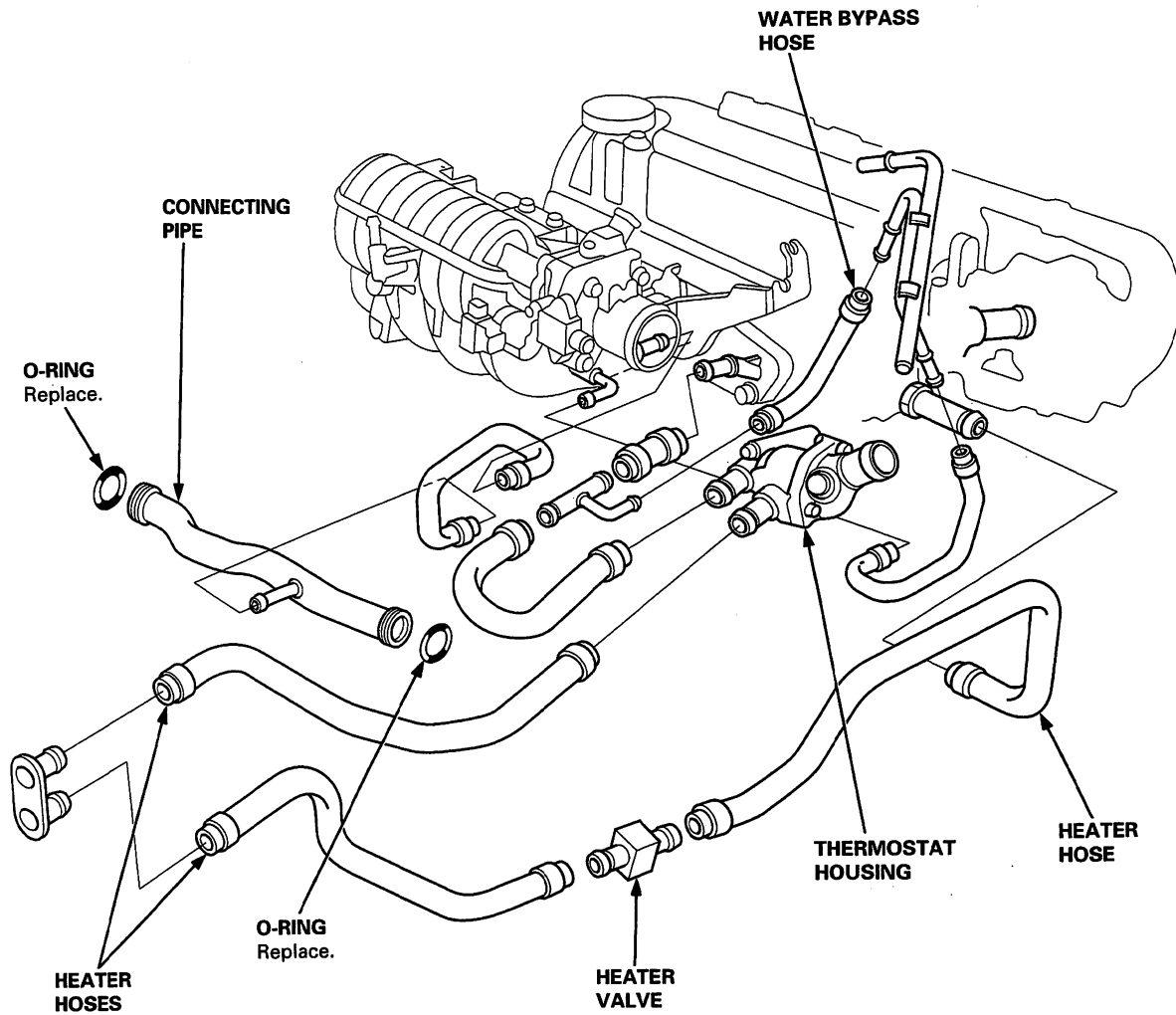
NOTE:

- Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
- Check all hose clamps and retighten if necessary.
- Use new O-rings when reassembling.





**Engine Hose Connection:
D16B6 engine:**

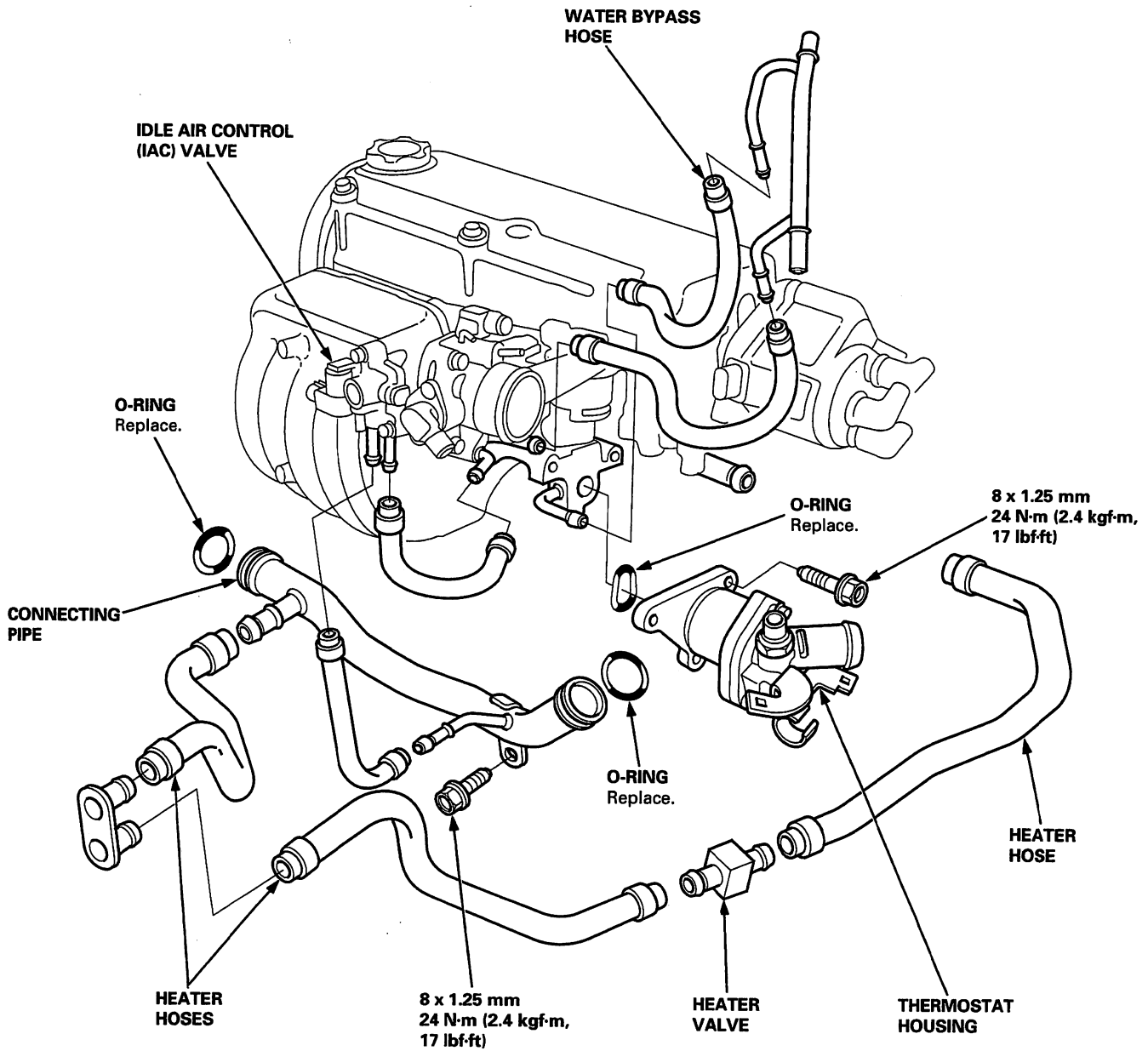


(cont'd)

Radiator

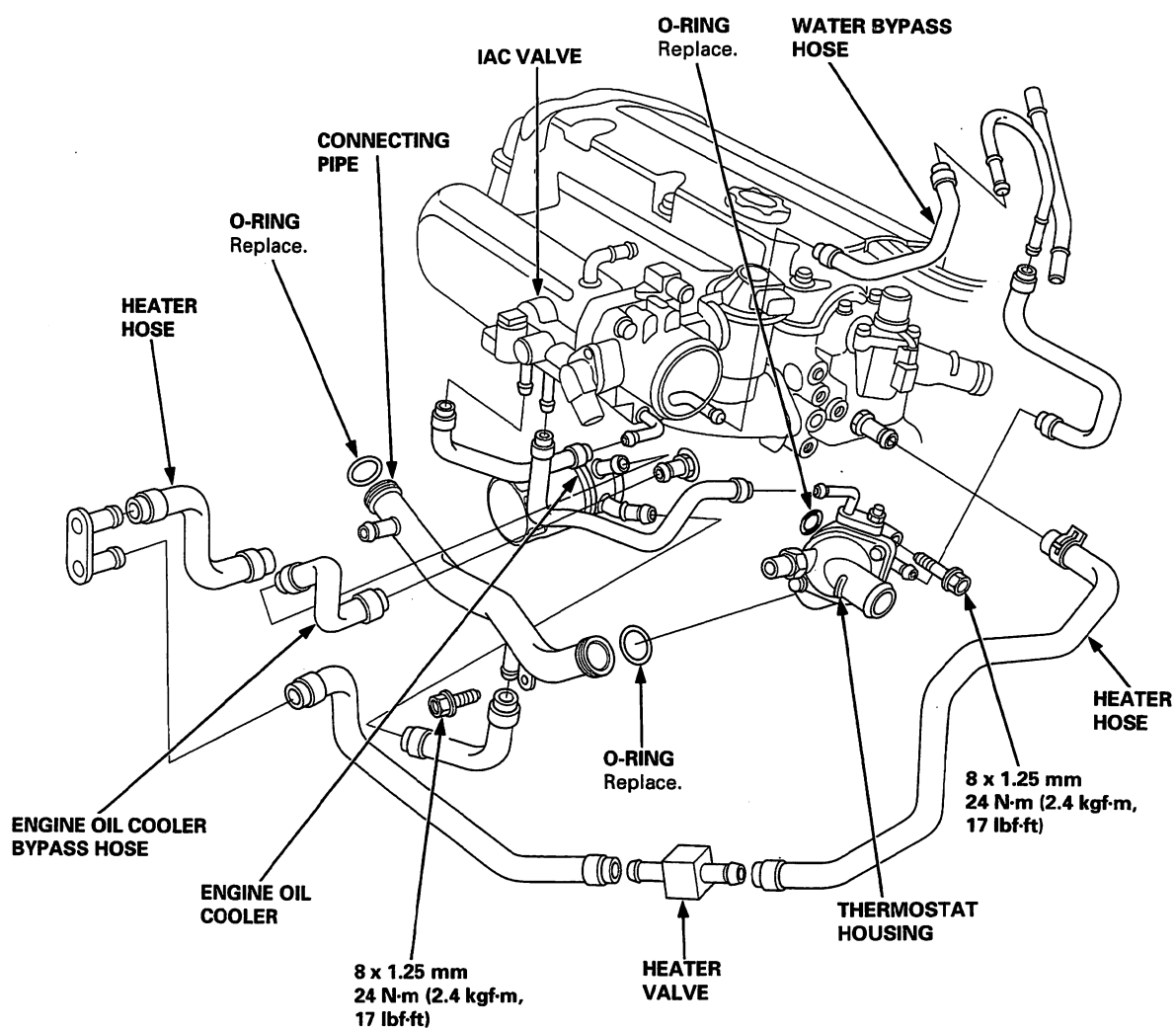
Illustrated Index (cont'd)

F18B2, F18B3, F20B6 engines:





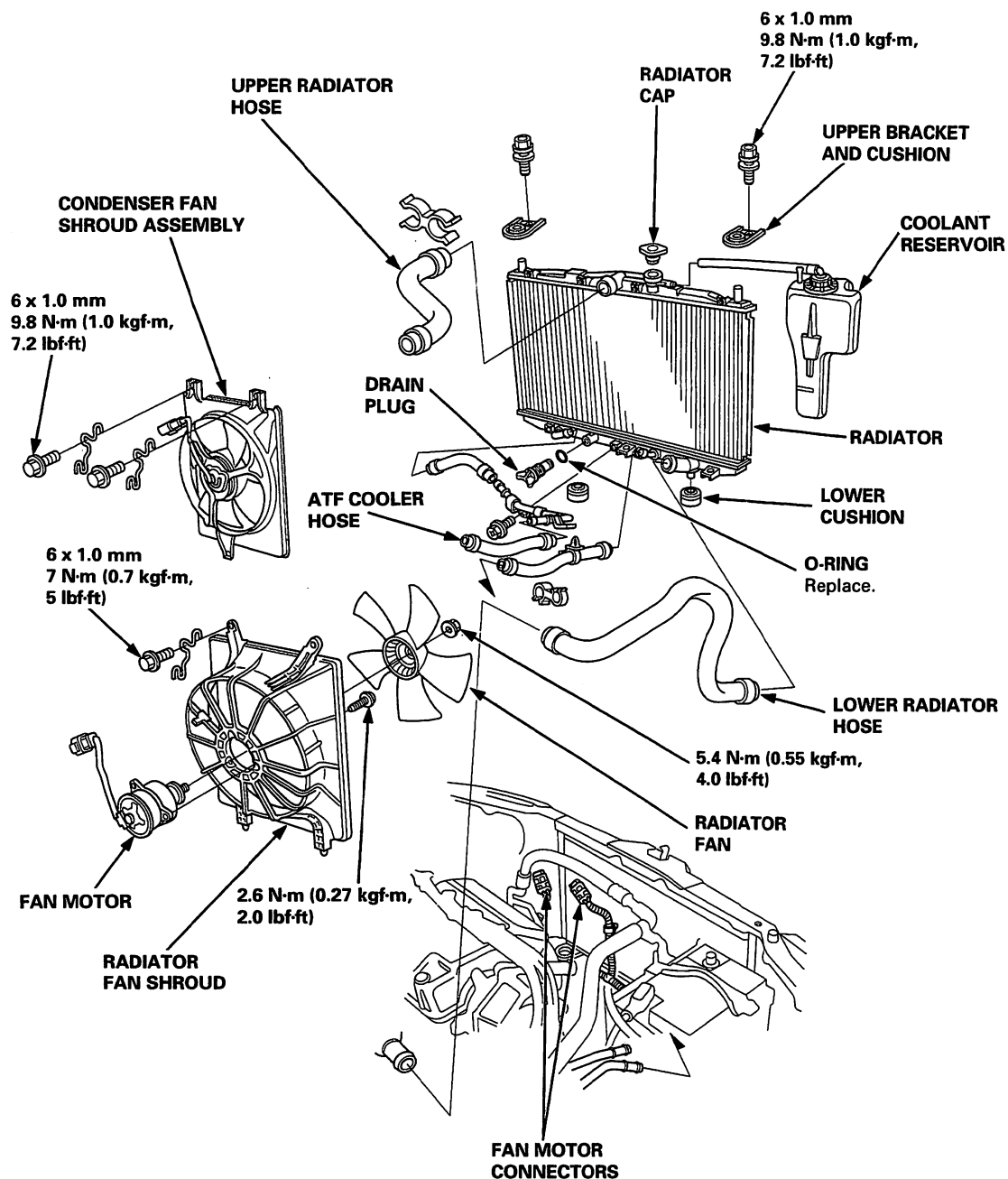
H22A7 engine:



Radiator

Replacement

1. Drain the engine coolant.
2. Remove the upper and lower radiator hoses, and ATF cooler hoses.
3. Disconnect the fan motor connectors.
4. Remove the radiator upper brackets, then pull up the radiator.
5. Remove the fan shroud assemblies and other parts from the radiator.
6. Install the radiator in the reverse order of removal. Make sure the upper and lower cushions are set securely.
7. Fill the radiator with engine coolant and bleed the air.

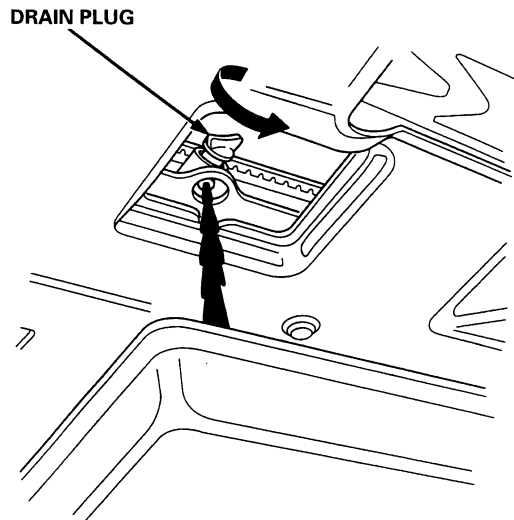




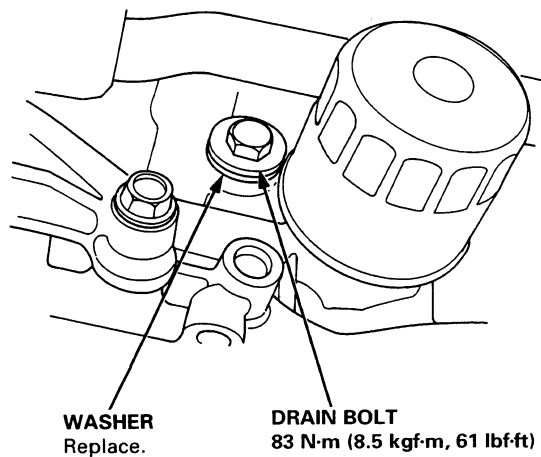
Engine Coolant Refilling and Bleeding

Except H22A7 engine:

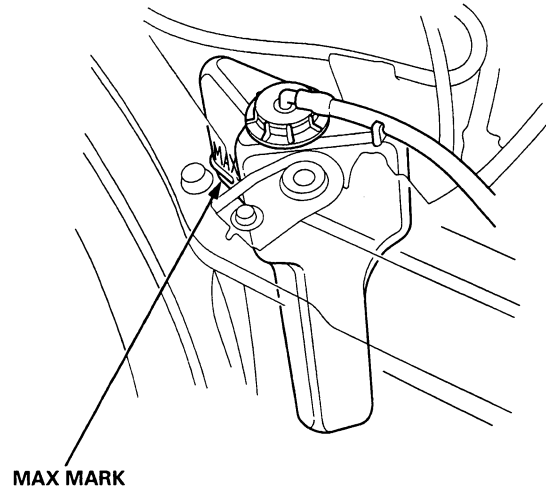
1. Start the engine. Set the heater temperature control dial to maximum heat, then turn off the engine. Make sure the engine and radiator are cool to the touch.
2. Remove the radiator cap.
3. Loosen the drain plug, and drain the coolant.



4. Remove the drain bolt from the rear side of the cylinder block.



5. Apply liquid gasket to the drain bolt threads, then reinstall the bolt with a new washer and tighten it securely.
6. Tighten the radiator drain plug securely.
7. Remove, drain and reinstall the reservoir. Fill the tank halfway to the MAX mark with water, then up to MAX mark with antifreeze.



8. Mix the recommended antifreeze with an equal amount of water in a clean container.

NOTE:

- Use only genuine Honda antifreeze/coolant.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% minimum. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.
- Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the coolant.

Engine Coolant Refill Capacity [including reservoir (0.55 ℓ (0.58 US qt, 0.48 Imp qt))]:

D16B6 engine: 3.9 ℓ (4.1 US qt, 3.4 Imp qt)

F18B2, F18B3, F20B6 engine:

M/T: 4.2 ℓ (4.4 US qt, 3.7 Imp qt)

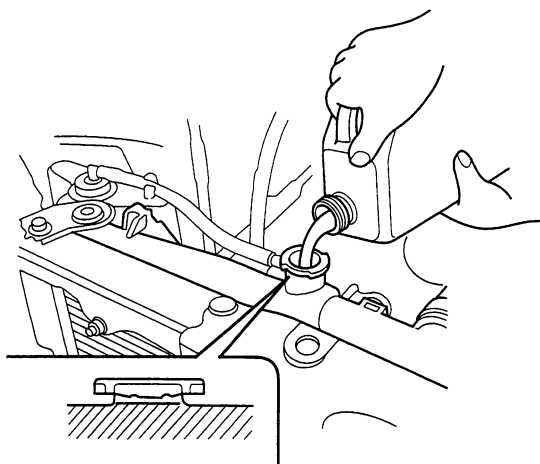
A/T: 4.1 ℓ (4.3 US qt, 3.6 Imp qt)

(cont'd)

Radiator

Engine Coolant Refilling and Bleeding (cont'd)

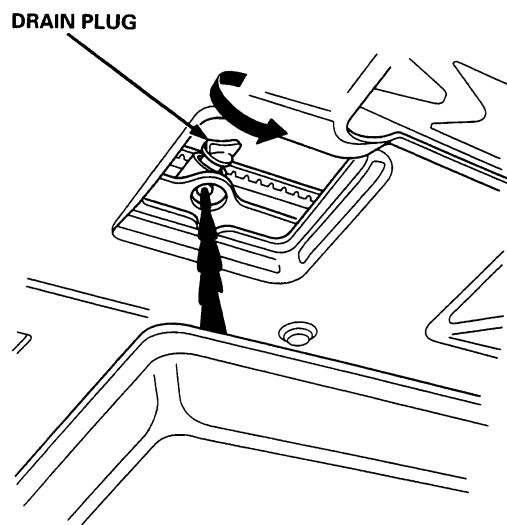
9. Pour coolant into the radiator up to the base of the filler neck.



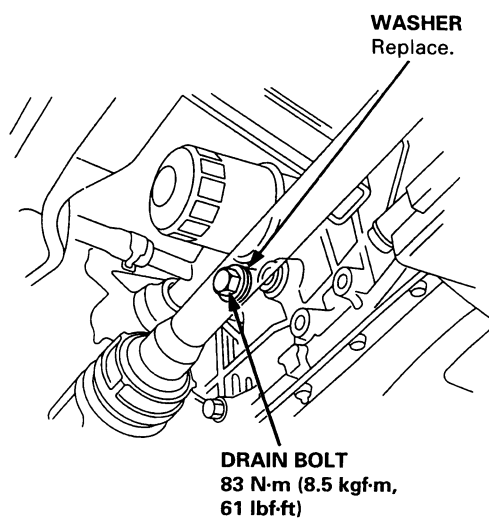
10. Start the engine and let it run until it warms up (the radiator fan comes on at least twice).
11. Turn off the engine. Check the level in the radiator, add coolant if needed.
12. Put the radiator cap on tightly, then run the engine again and check for leaks.

H22A7 engine:

1. Start the engine. Set the heater temperature control dial to maximum heat, then turn off the engine. Make sure the engine and radiator are cool to the touch.
2. Remove the radiator cap.
3. Loosen the drain plug, and drain the coolant.



4. Remove the drain bolt from the rear side of the cylinder block.





5. After the coolant has drained, apply liquid gasket to the drain bolt threads, then reinstall the bolt with a new washer and tighten it securely.
6. Tighten the radiator drain plug securely.
7. Remove, drain and reinstall the reservoir. Fill the tank halfway to the MAX mark with water, then up to the MAX mark with antifreeze.
8. Mix the recommended antifreeze with an equal amount of water in a clean container.

NOTE:

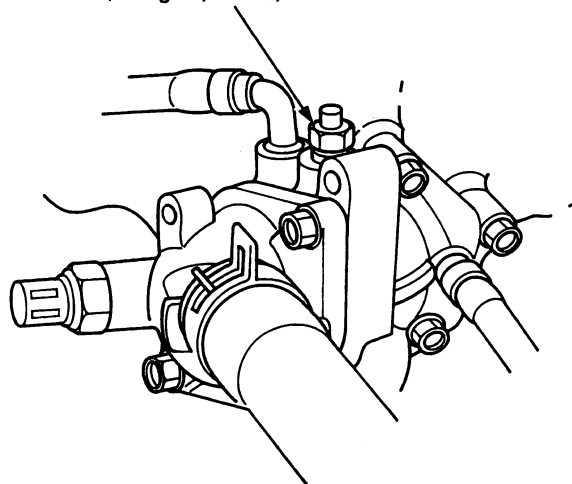
- Always use Genuine Honda Antifreeze/Coolant. Using a non-Honda coolant can result in corrosion, causing the cooling system to malfunction or fail.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% minimum. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing. Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.
- Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the coolant.

Engine Coolant Refill Capacity [including reservoir (0.55 ℓ (0.58 US qt, 0.48 Imp qt))]:
3.5 ℓ (3.5 US qt, 2.9 Imp qt)

9. Loosen the air bleed bolt in the thermostat housing, then pour coolant into the radiator to the bottom of the filler neck. Do not let coolant spill on any electrical parts or the paint. If any coolant spills, rinse it off immediately.

BLEED BOLT

9.8 N·m (1.0 kgf-m, 7 lbf-ft)

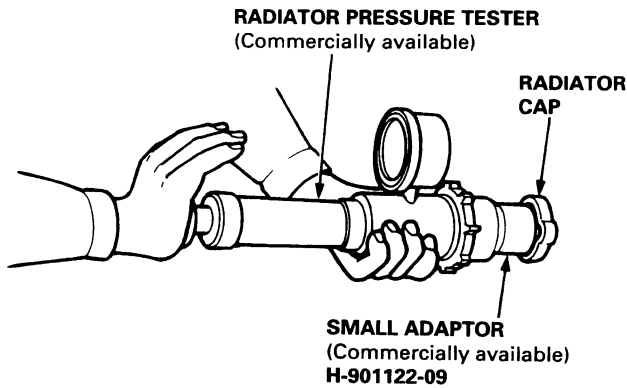


10. Tighten the bleed bolt as soon as coolant starts to run out in a steady stream.
11. With the radiator cap off, start the engine and let it run until warmed up (radiator fan comes on at least twice). Then, if necessary, add more coolant mix to bring the level back up to the bottom of the filler neck.
12. Put the radiator cap on tightly, then run the engine again and check for leaks.

Radiator

Cap Testing

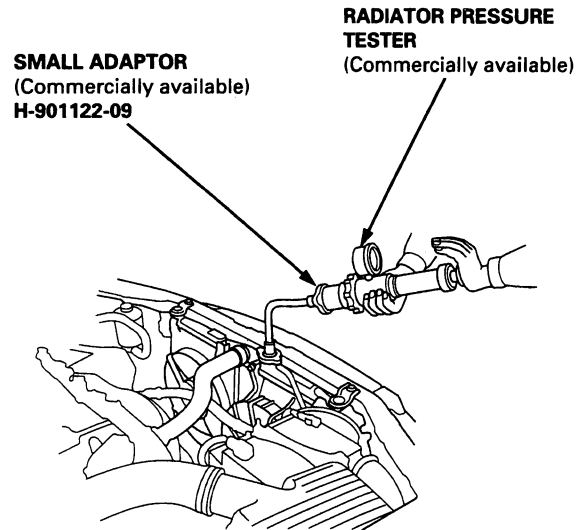
1. Remove the radiator cap, wet its seal with engine coolant, then install it on the pressure tester.



2. Apply a pressure of 93 – 123 kPa (0.95 – 1.25 kgf/cm², 14 – 18 psi).
3. Check for a drop in pressure.
4. If the pressure drops, replace the cap.

Testing

1. Wait until the engine is cool, then carefully remove the radiator cap and fill the radiator with engine coolant to the top of the filler neck.
2. Attach the pressure tester to the radiator and apply a pressure of 93 – 123 kPa (0.95 – 1.25 kgf/cm², 14 – 18 psi).



3. Inspect for engine coolant leaks and a drop in pressure.
4. Remove the tester and reinstall the radiator cap.

NOTE: Check for engine oil in the coolant and/or coolant in engine oil.

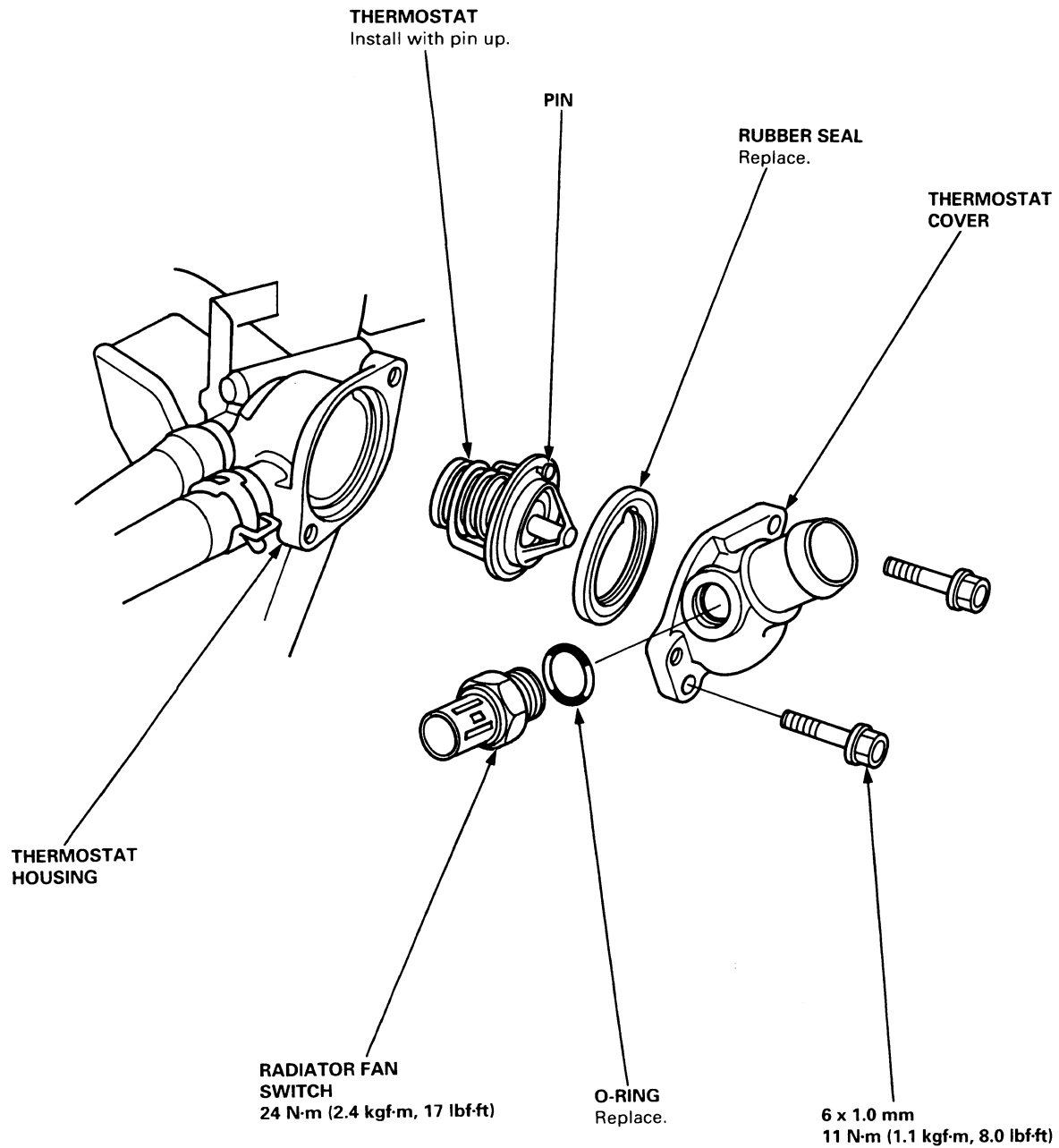
Thermostat



Replacement

NOTE: Use new O-rings when reassembling.

D16B6 engine:



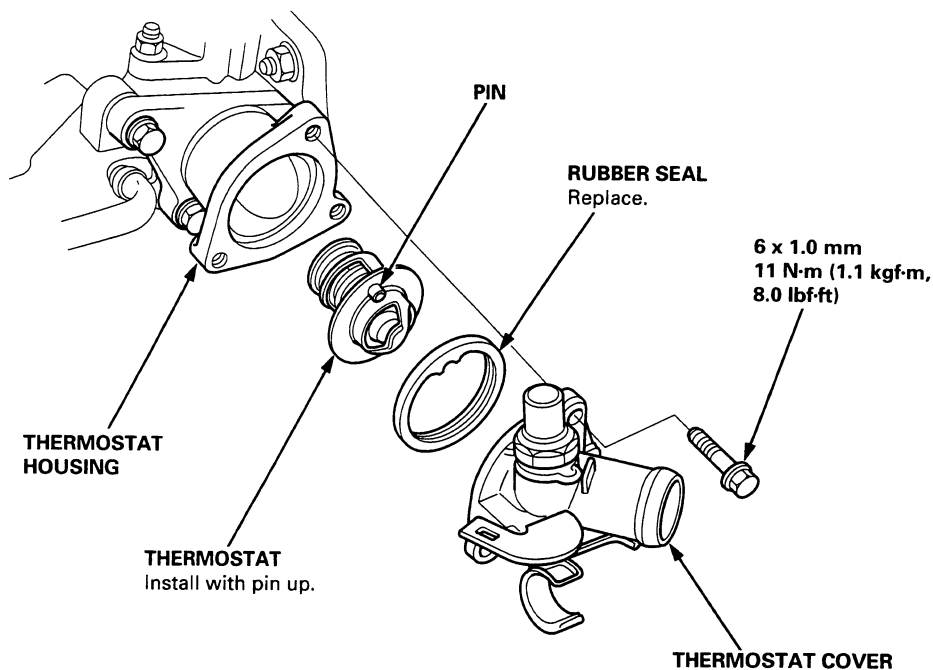
(cont'd)

Thermostat

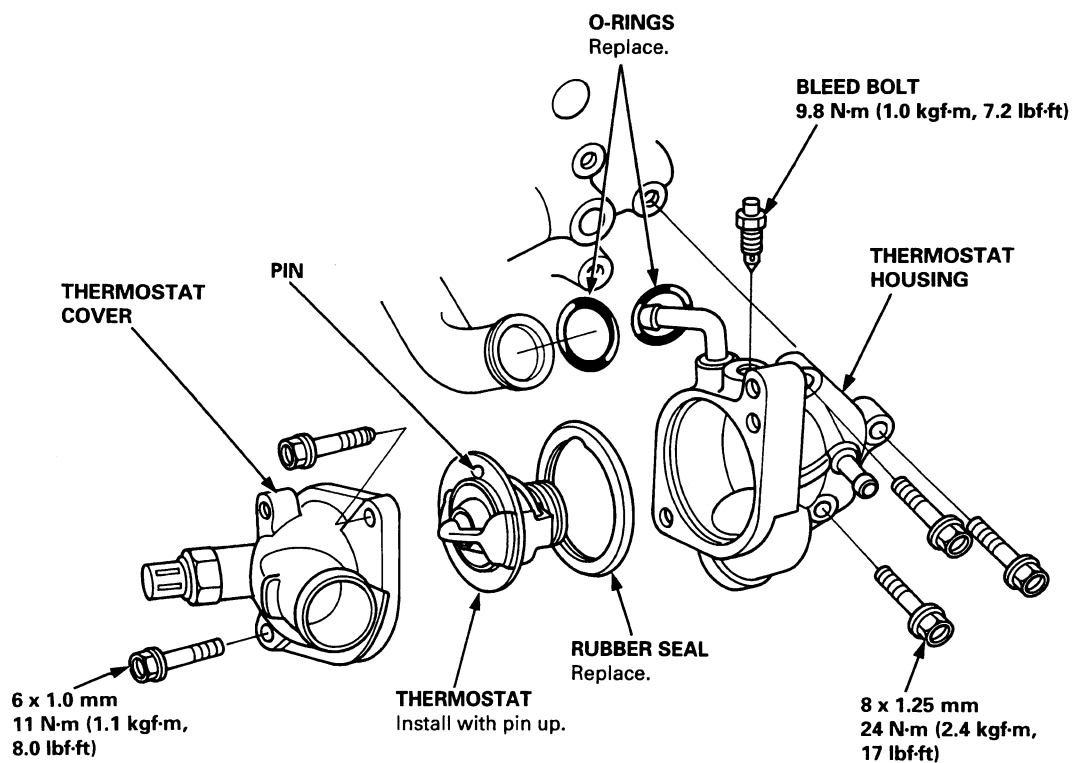
Replacement (cont'd)

NOTE: Use new O-rings when reassembling.

F18B2, F18B3, F20B6 engines:



H22A7 engine:



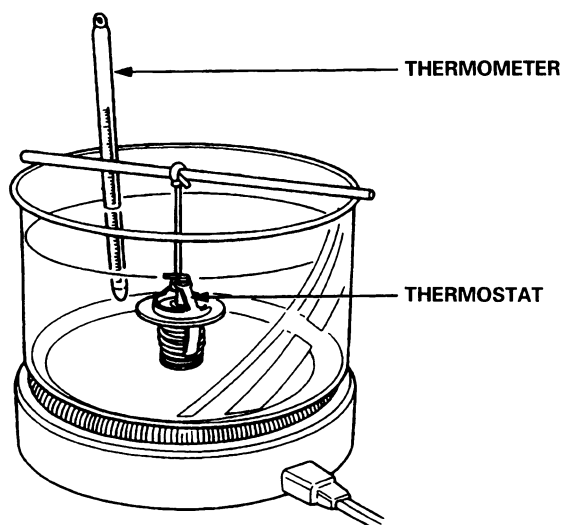


Testing

Replace the thermostat if it is open at room temperature.

To test a closed thermostat:

1. Suspend the thermostat in a container of water as shown.



2. Heat the water and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.
3. Measure lift height of the thermostat when it is fully open.

STANDARD THERMOSTAT

Lift height:

Except H22A7 engine:

above 8.0 mm (0.31 in)

H22A7 engine: above 10.0 mm (0.39 in)

Starts opening: 76 – 80°C (169 – 176°F)

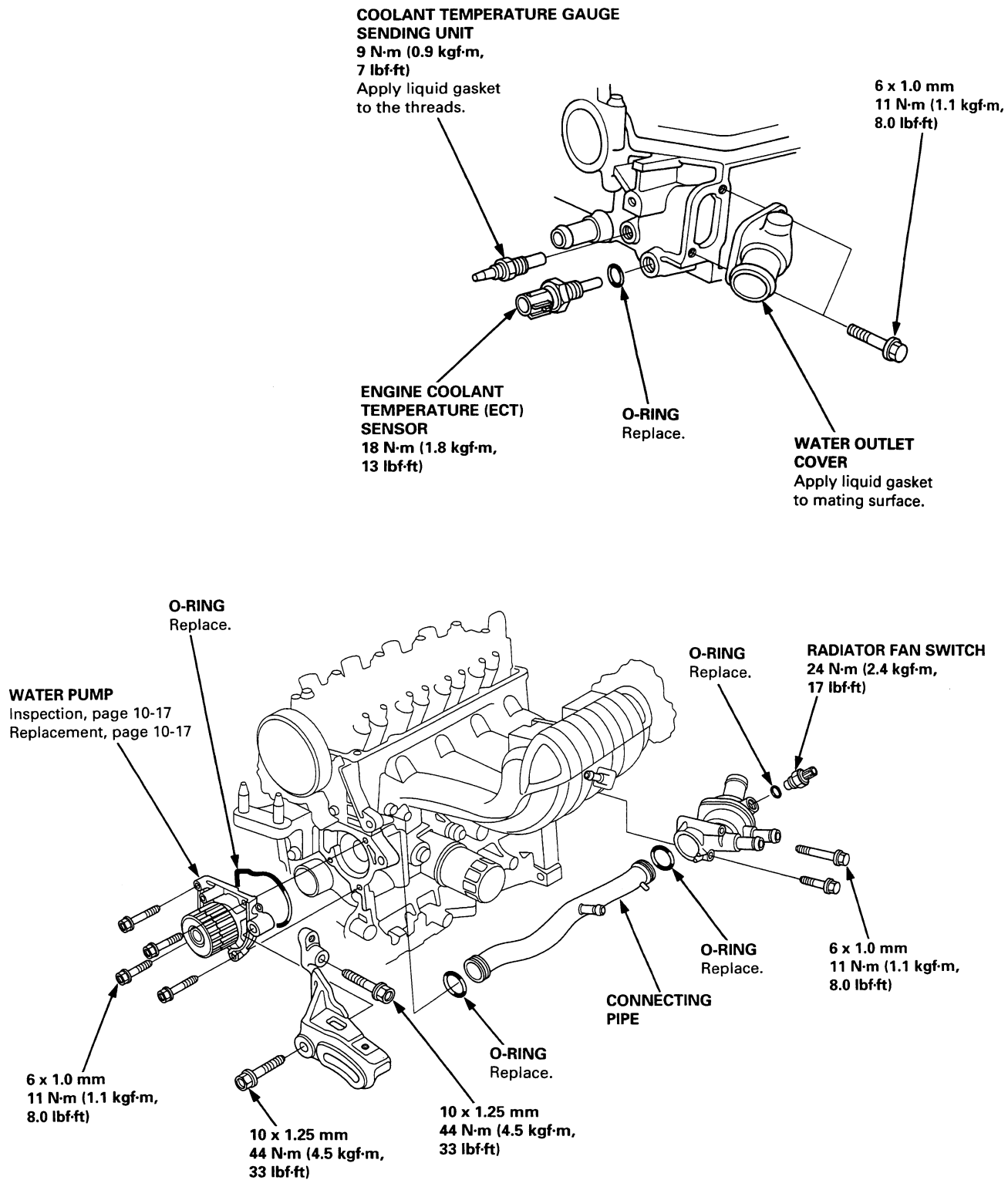
Fully open: 90°C (194°F)

Water Pump

Illustrated Index

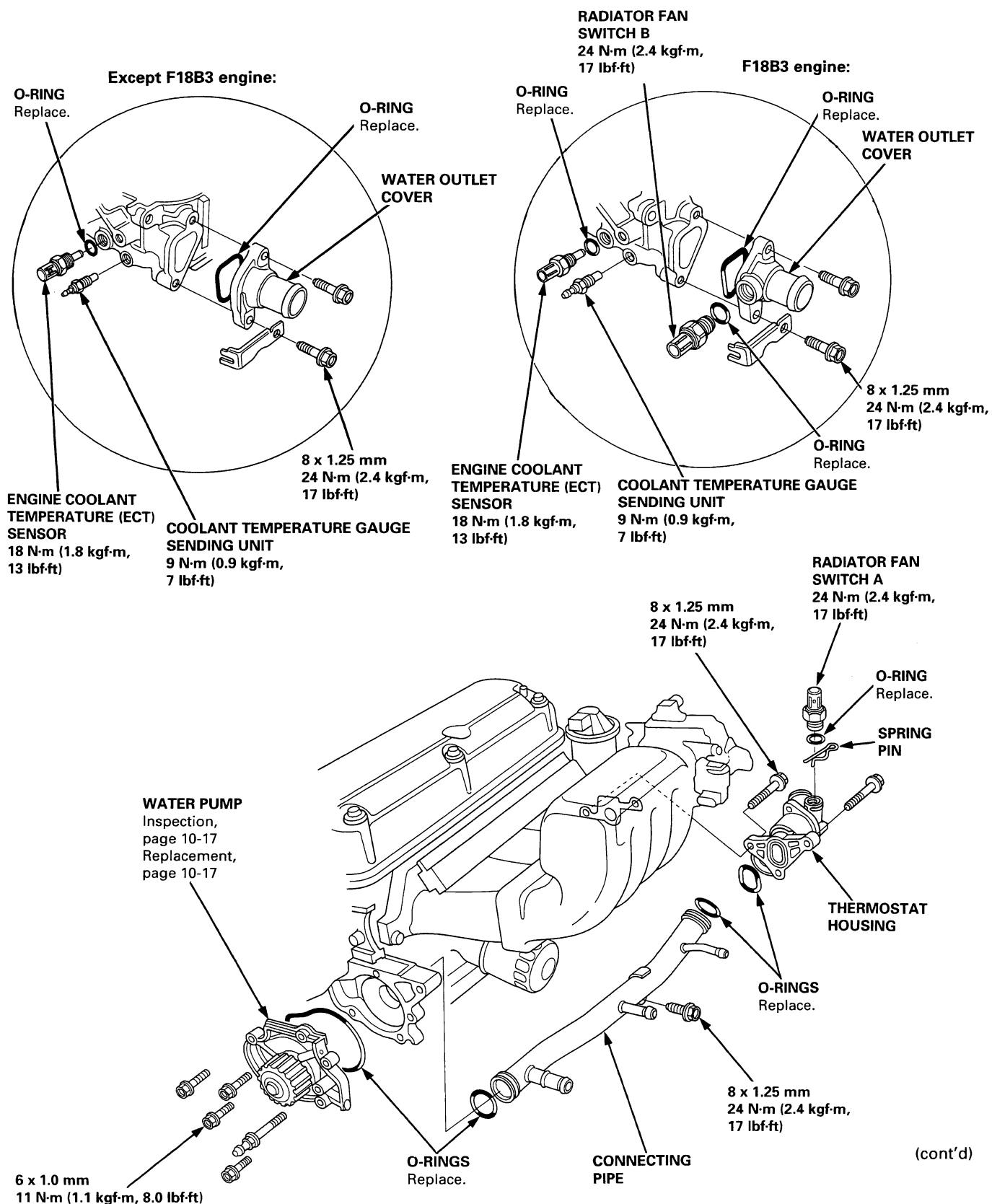
NOTE: Use new O-rings when reassembling.

D16B6 engine:





F18B2, F18B3, F20B6 engines:



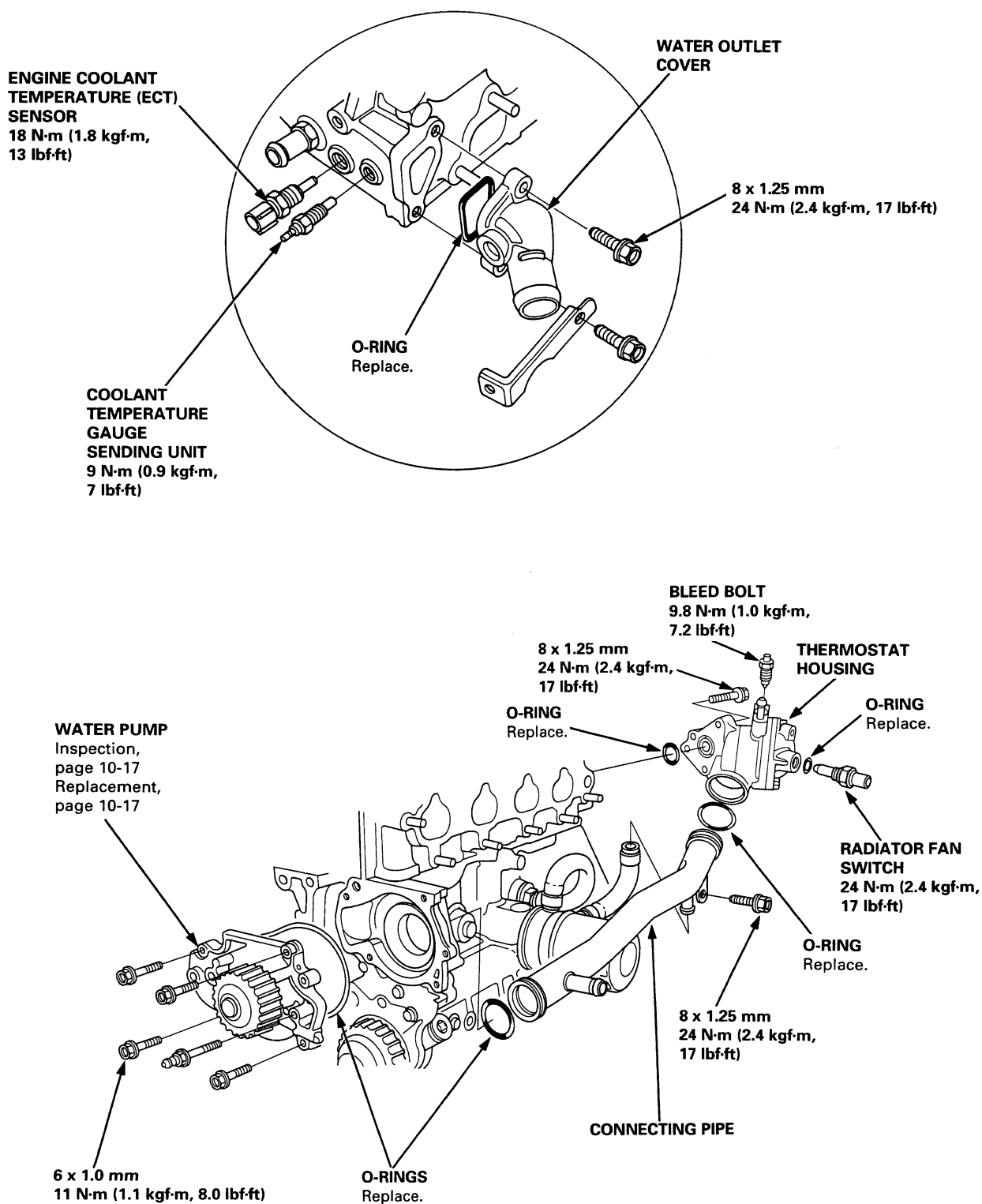
(cont'd)

Water Pump

Illustrated Index (cont'd)

NOTE: Use new O-rings when reassembling.

H22A7 engine:



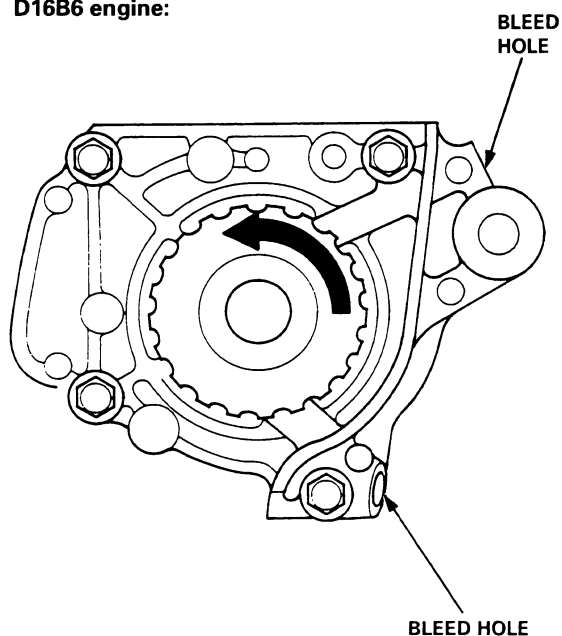


Inspection

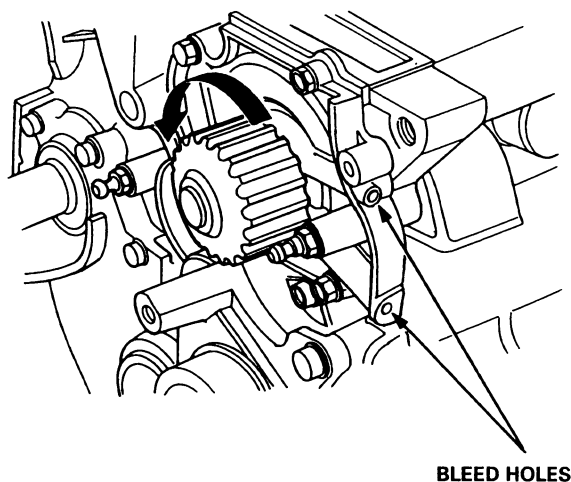
1. Remove the timing belt (see section 6).
2. Check that the water pump pulley turns counter-clockwise.
3. Check for signs of seal leakage.

NOTE: A small amount of "weeping" from the bleed hole is normal.

D16B6 engine:



Except D16B6 engine:

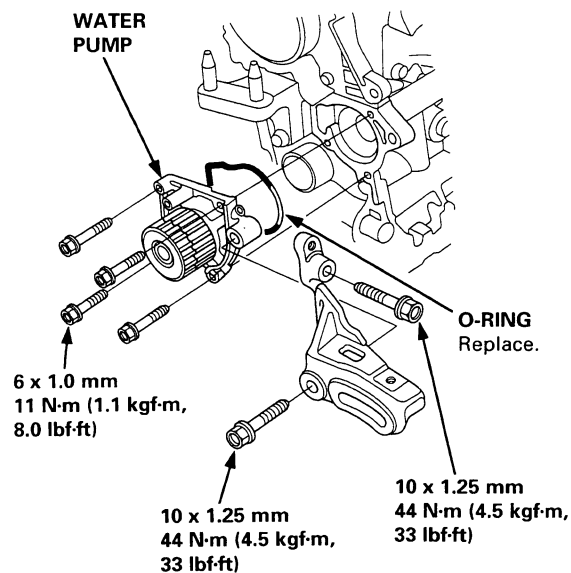


Replacement

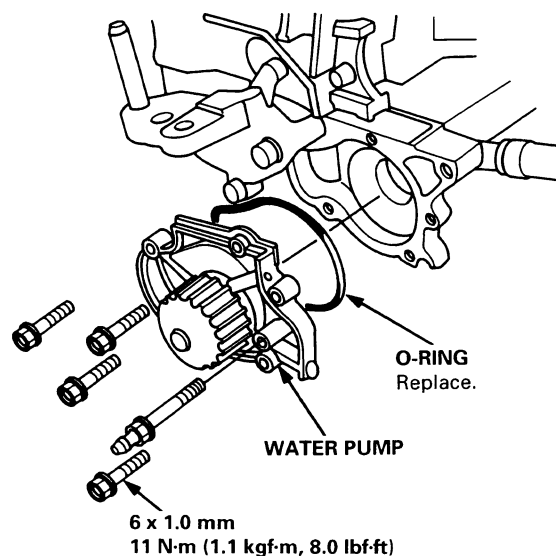
1. Remove the timing belt (see section 6).
2. Remove the water pump by removing five bolts.

NOTE: Inspect, repair and clean the O-ring groove and mating surface with the cylinder block.

D16B6 engine:



Except D16B6 engine:



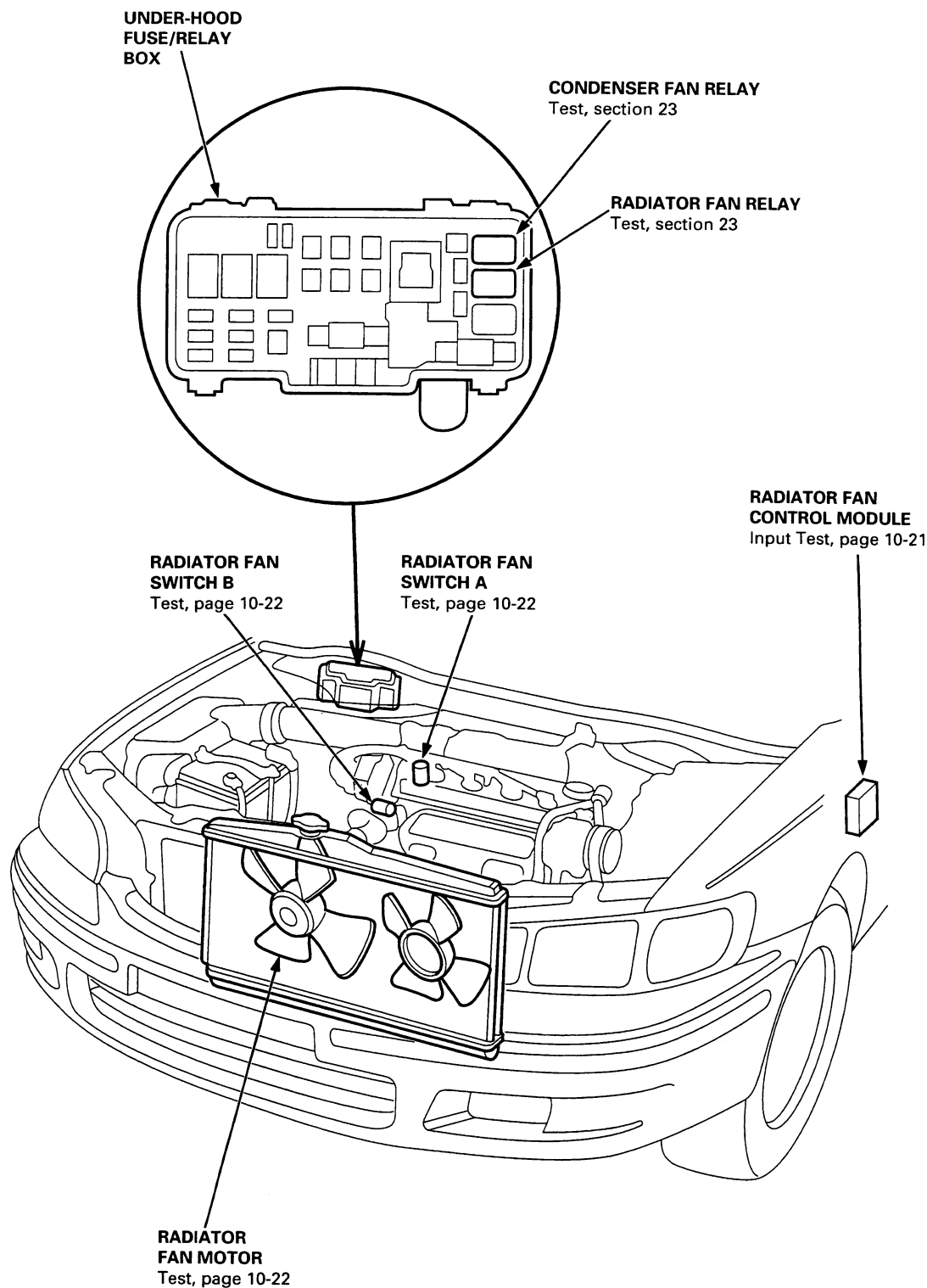
3. Install the water pump in the reverse order of removal.

NOTE:

- Keep the O-ring in position when installing.
- Clean the spilled engine coolant.

Fan Controls

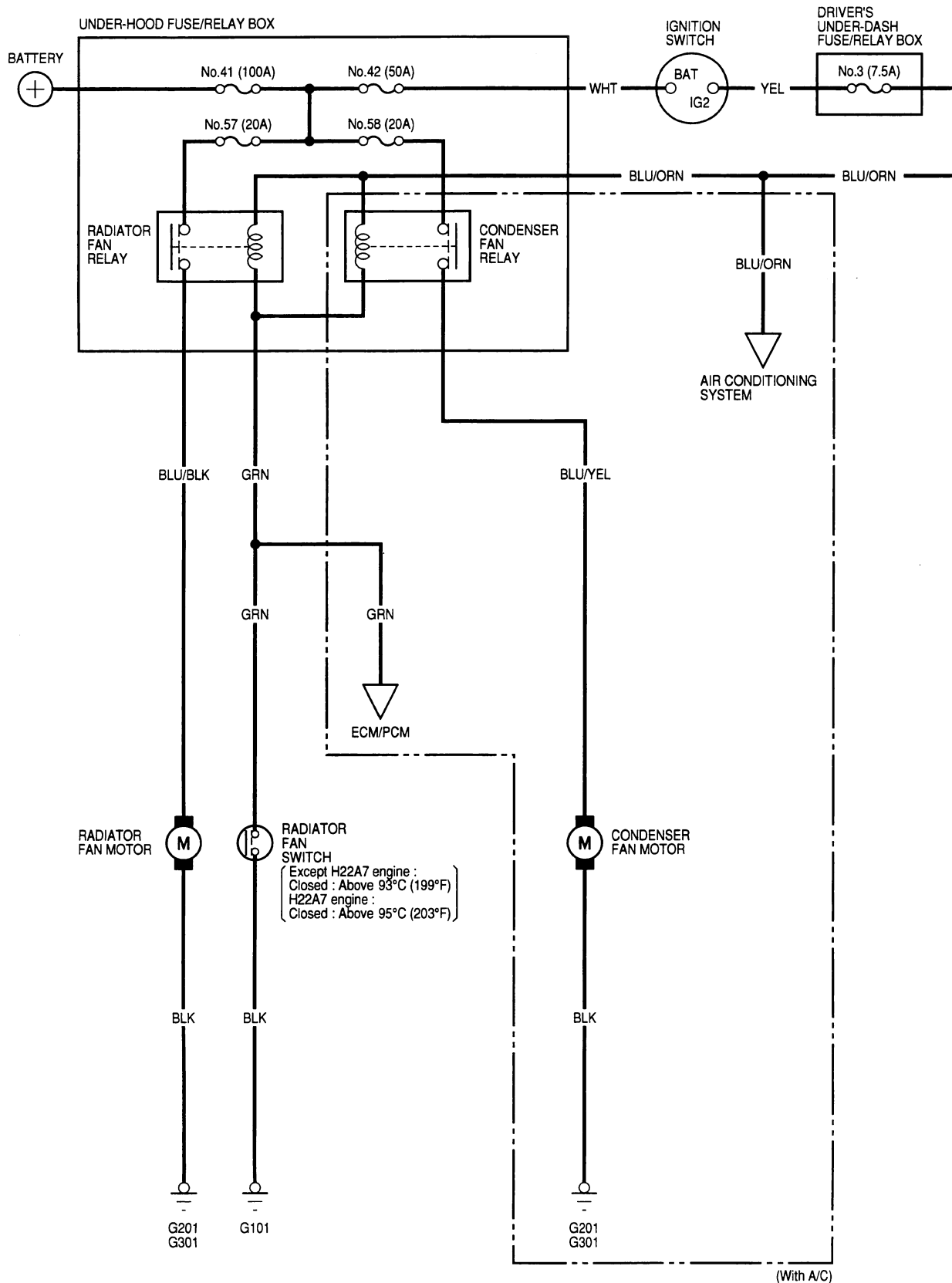
Component Location Index





Circuit Diagram

Except F18B3 engine:

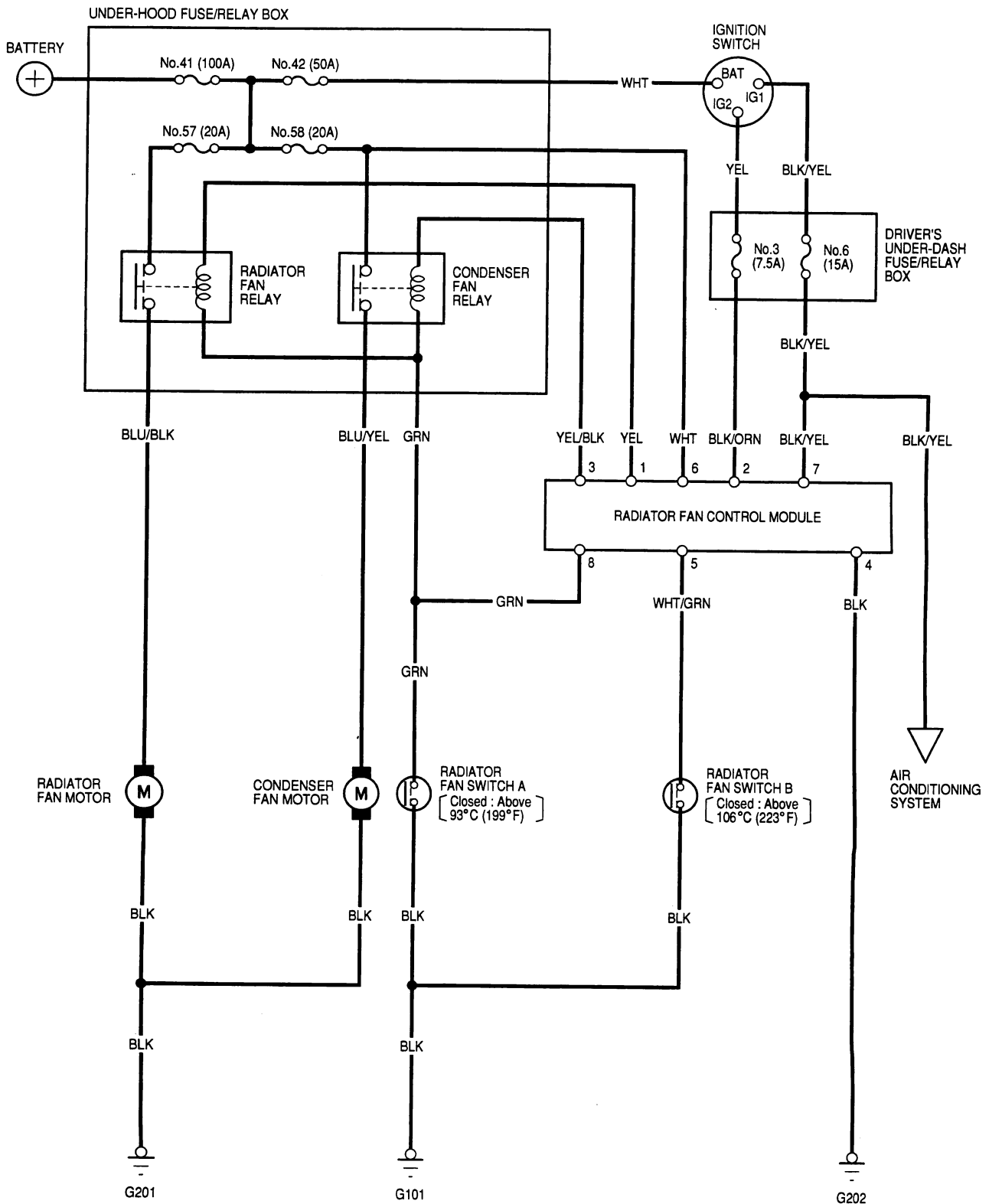


(cont'd)

Fan Controls

Circuit Diagram (cont'd)

F18B3 engine:

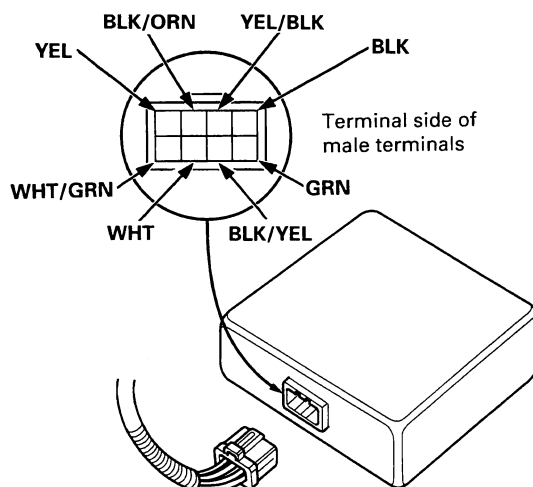




Module Input Test (F18B3 engine)

Perform the following tests with the radiator fan control module 8P connector connected, the ignition switch ON (II) and the A/C switch OFF.

If you find the cause of a problem, correct it before you continue.

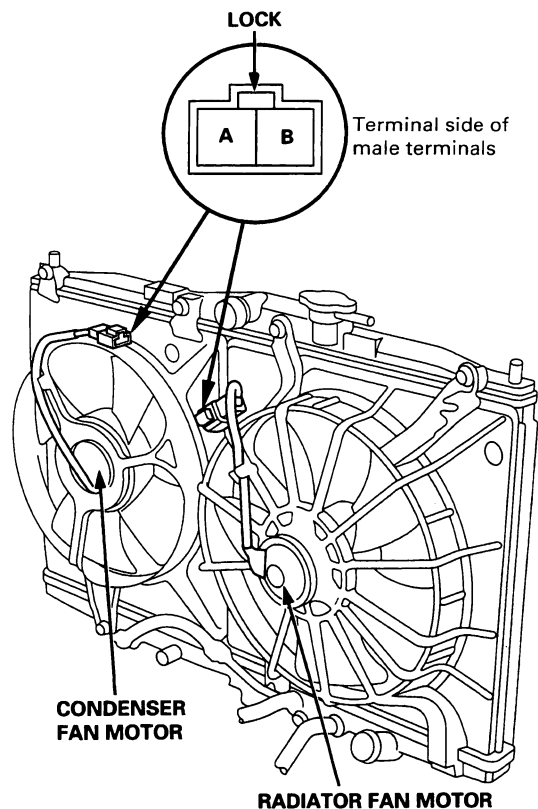


Wire color	Test condition	Desired result	Possible cause if desired result is not obtained
BLK	Check for voltage to body ground.	There should be less than one volt.	<ul style="list-style-type: none"> • Poor ground (G202) • An open in the wire
WHT	Check for battery voltage to body ground.	There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 58 (20 A) fuse in the under-hood fuse/relay box • An open in the wire
BLK/YEL	Check battery voltage to body ground: Ignition switch-ON (II)		<ul style="list-style-type: none"> • Blown No. 6 (15 A) fuse in the under-dash driver's fuse/relay box • An open in the wire
BLK/ORN	Check battery voltage to body ground: Ignition switch-ON (II)		<ul style="list-style-type: none"> • Blown No. 3 (7.5 A) fuse in the under-dash driver's fuse/relay box • An open in the wire
YEL/BLK	Check battery voltage to body ground: Ignition switch-ON (II)		<ul style="list-style-type: none"> • Faulty radiator fan control module • An open in the wire
YEL	Check battery voltage to body ground: Ignition switch-ON (II)		
GRN	Connect to body ground: Ignition switch-ON (II)	Radiator fan and condenser fan should come on.	<ul style="list-style-type: none"> • Blown No. 58 (20 A) fuse or No. 57 (20 A) fuse in the under-hood fuse relay box. • Faulty radiator fan relay or condenser fan relay • An open in the wire • Faulty radiator fan control module
WHT/GRN	Check for voltage: Engine coolant temperature below 106°C (223°F)	There should be approx. 11 volt.	<ul style="list-style-type: none"> • Faulty radiator fan switch B • Faulty radiator fan control module

Fan Controls

Fan Motor Testing

1. Disconnect the 2P connectors from the radiator fan motor and condenser fan motor.



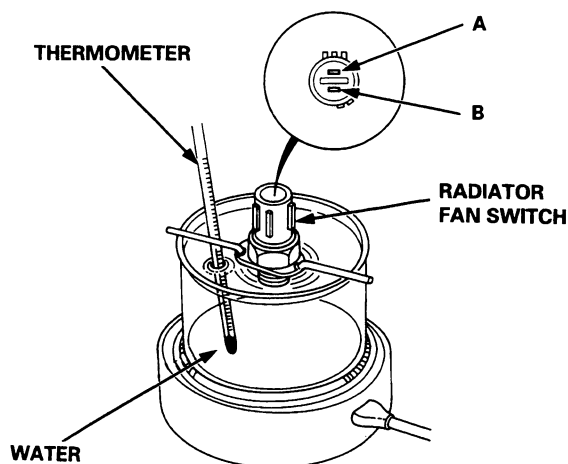
2. Test the motor by connecting battery power to the B terminal, and ground the A terminal.
3. If the motor fails to run or does not run smoothly, replace it.

Radiator Fan Switch Testing

Except F18B3 engine:

NOTE: Bleed air from the cooling system after installing the radiator fan switch (see page 10-7).

1. Remove the radiator fan switch from the thermostat cover (see pages 10-11, 12).
2. Suspend the radiator fan switch in a container of water as shown.



3. Heat the water and check the temperature with a thermometer. Do not let the thermometer touch the bottom of hot container.
4. Measure the continuity between the A terminal and B terminal according to the table.

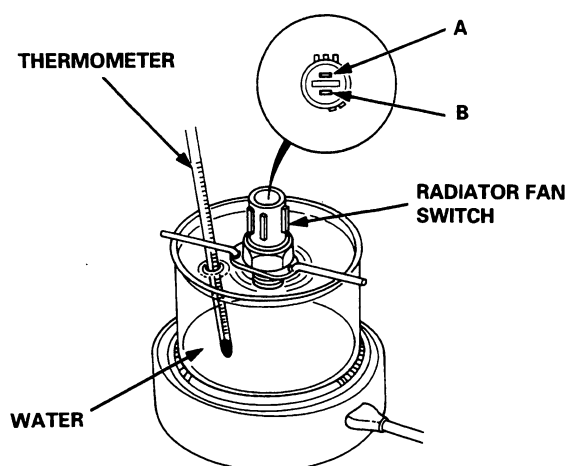
		Terminal	
Operation	Temperature	A	B
Except H22A7 engine	ON	91 – 95°C (196 – 203°F)	
	OFF	3 – 8°C (5 – 15°F) lower than the temperature when it goes on	
H22A7 engine	ON	92 – 98°C (198 – 208°F)	
	OFF	2 – 7°C (4 – 12°F) lower than the temperature when it goes on	



F18B3 engine:

NOTE: Bleed air from the cooling system after installing the radiator fan switch (see page 10-7).

1. Remove the radiator fan switch A from the water passage and radiator fan switch B from the cylinder head. (see page 10-15).
2. Suspend the radiator fan switch in a container of water as shown.



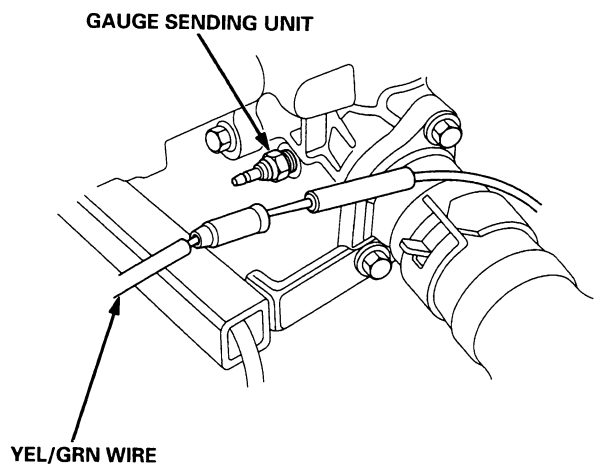
3. Heat the water and check the temperature with a thermometer. Do not let the thermometer touch the bottom of the hot container.
4. Measure the continuity between the A terminal and B terminal according to the table.

		Terminal	
Operation		Temperature	
SWITCH A	ON	91 – 95°C (196 – 203°F)	<input type="radio"/> — <input type="radio"/>
	OFF	3 – 8°C (5 – 15°F) lower than the temperature when it goes on	<input type="radio"/> — <input type="radio"/>
SWITCH B	ON	103 – 109°C (217 – 228°F)	<input type="radio"/> — <input type="radio"/>
	OFF	4 – 9°C (7 – 16°F) lower than the tempera- ture when it goes on	<input type="radio"/> — <input type="radio"/>

Engine Coolant Temperature Gauge

Gauge Testing

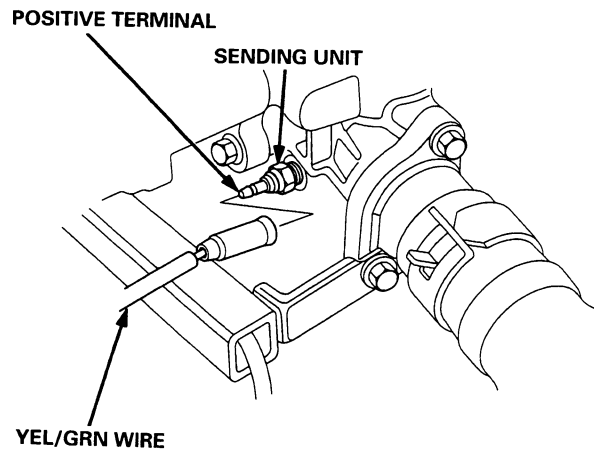
1. Check the No. 9 (7.5 A) fuse in the driver's underdash fuse/relay box before testing.
2. Make sure the ignition switch is OFF, then disconnect the YEL/GRN wire from the coolant temperature gauge sending unit, and ground it with a jumper wire.



3. Turn the ignition switch ON (II). Check that the pointer of the coolant temperature gauge starts moving toward the "H" mark. Turn the ignition switch OFF before the pointer reaches "H" on the gauge dial. Failure to do so may damage the gauge.
 - If the pointer of the gauge does not move at all, check for an open in the YEL/GRN wire. If the wires are OK, replace the coolant temperature gauge.
 - If the coolant temperature gauge works, test the coolant temperature sending unit.

Sending Unit Testing

1. Disconnect the YEL/GRN wire from the coolant temperature gauge sending unit.



2. Using an ohmmeter, measure the change in resistance between the positive terminal and the engine (ground) with the engine cold and with the engine at operating temperature.

Temperature	56°C (133°F)	85 – 100°C (185 – 212°F)
Resistance (Ω)	137	46 – 30

3. If the obtained readings are substantially different from the specifications above, replace the sending unit.

Fuel and Emissions

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D16B6 engine	11-C-1



F20B6, H22A7 engine

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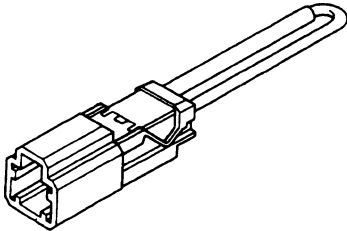
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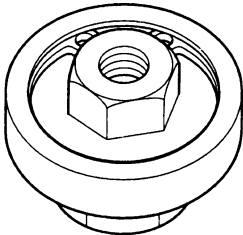


Special Tools


Ref. No	Tool Number	Description	Qty	Remark
①	07PAZ – 0010100	SCS Short Connector	1	Component Tools
②	07VAJ – 0040100	Fuel Pressure Gauge Attachment	1	
③	07406 – 0040002	Fuel Pressure Gauge Set	1	
③-1	07406 – 0040202	Fuel Pressure Hose Assembly	(1)	
④	07WAA – 0010100	Adjustable Ring Nut Wrench	1	




①



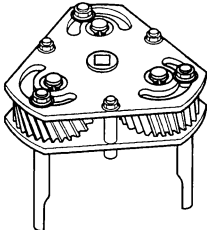
②



③



③-1



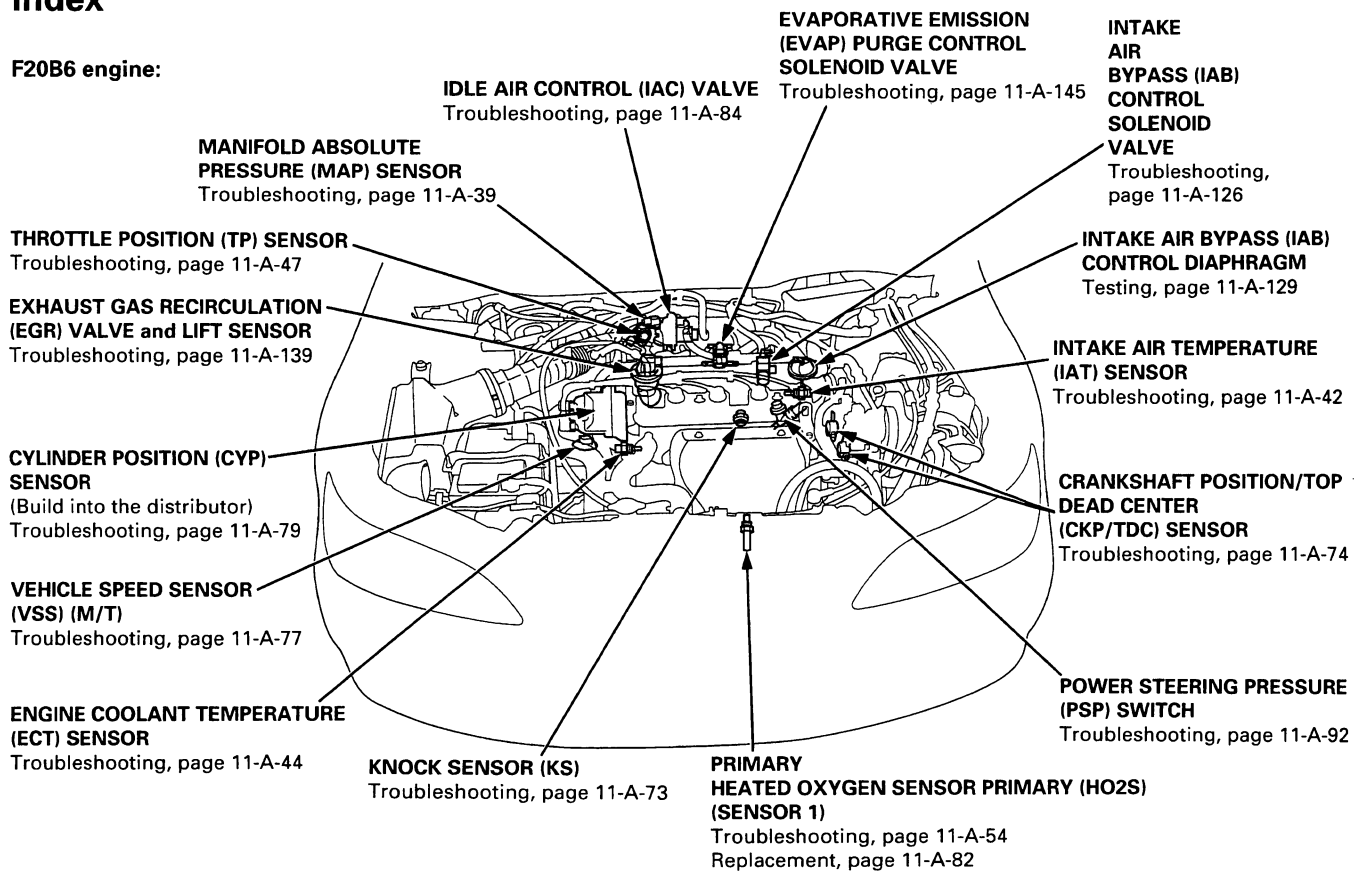
④

Component Locations

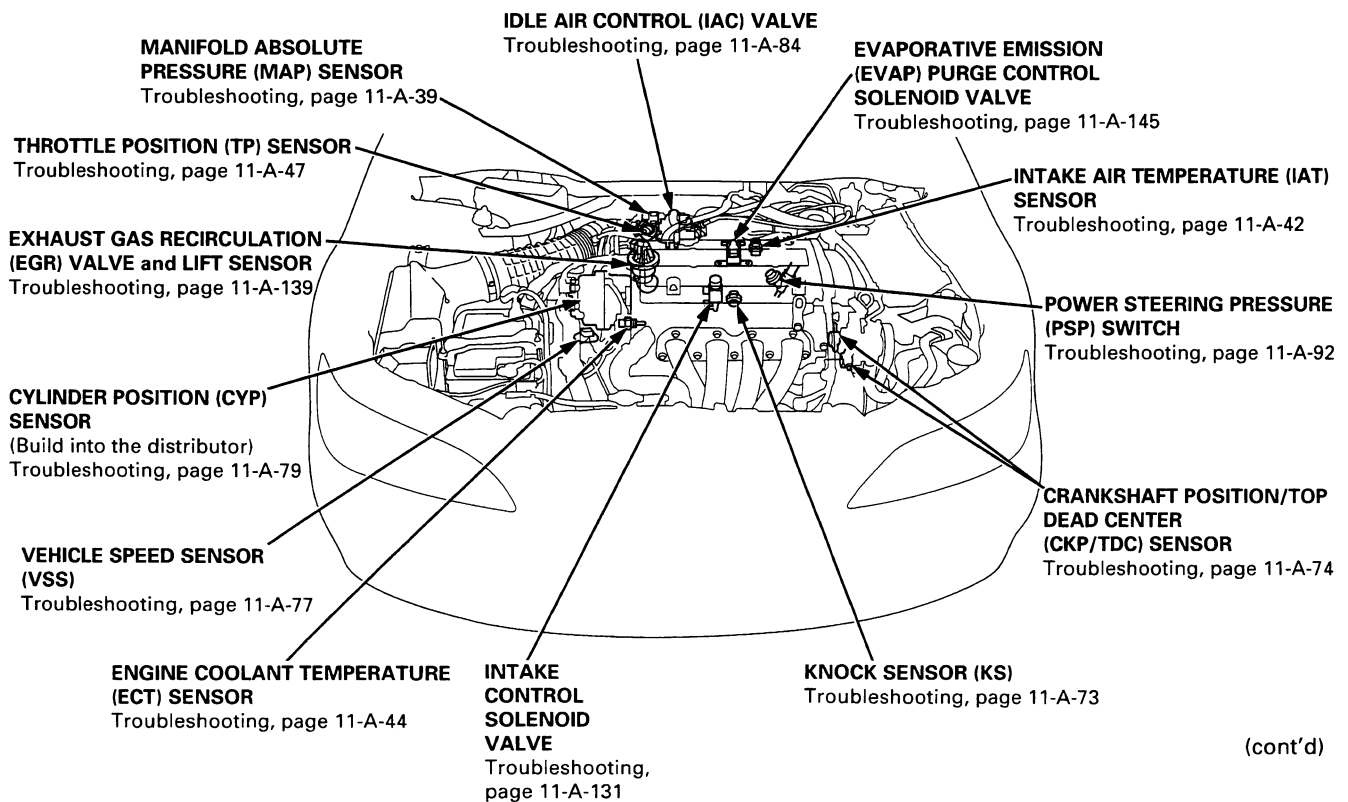


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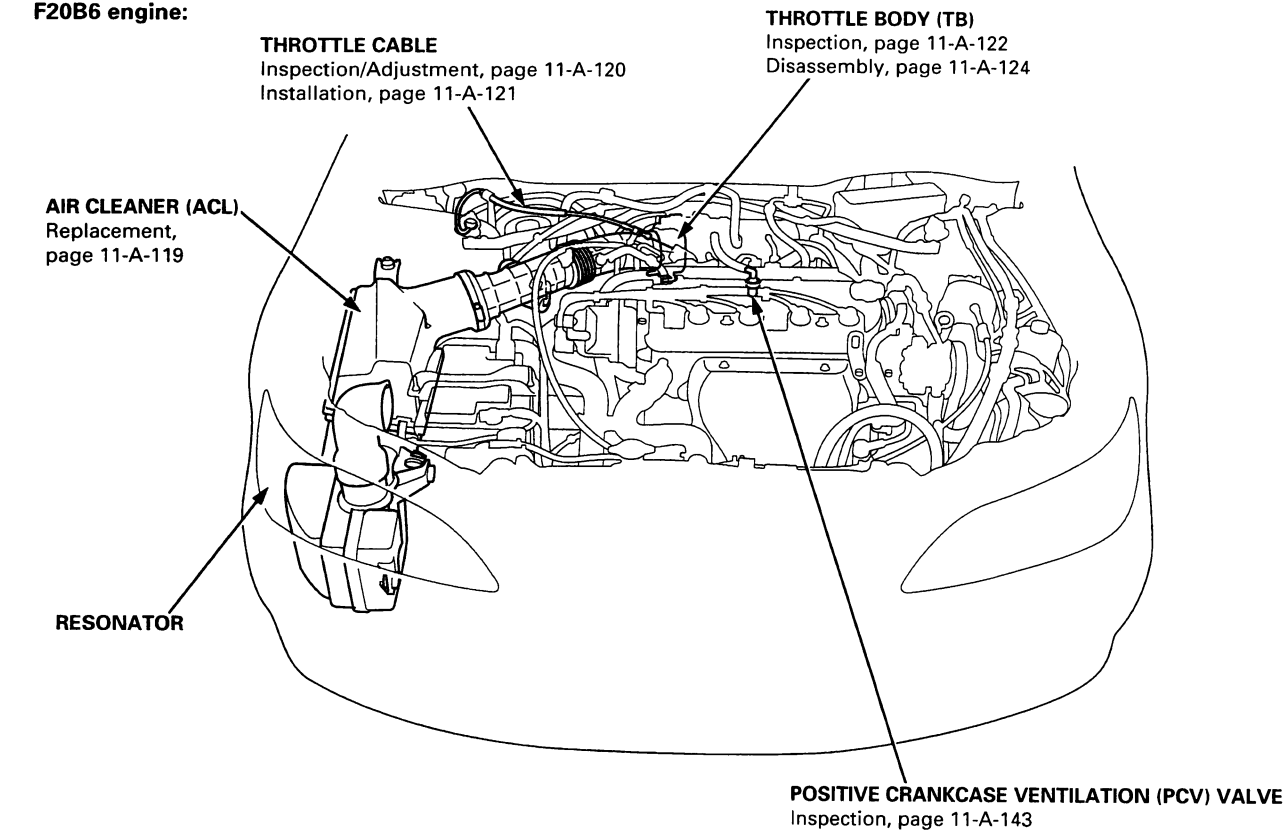


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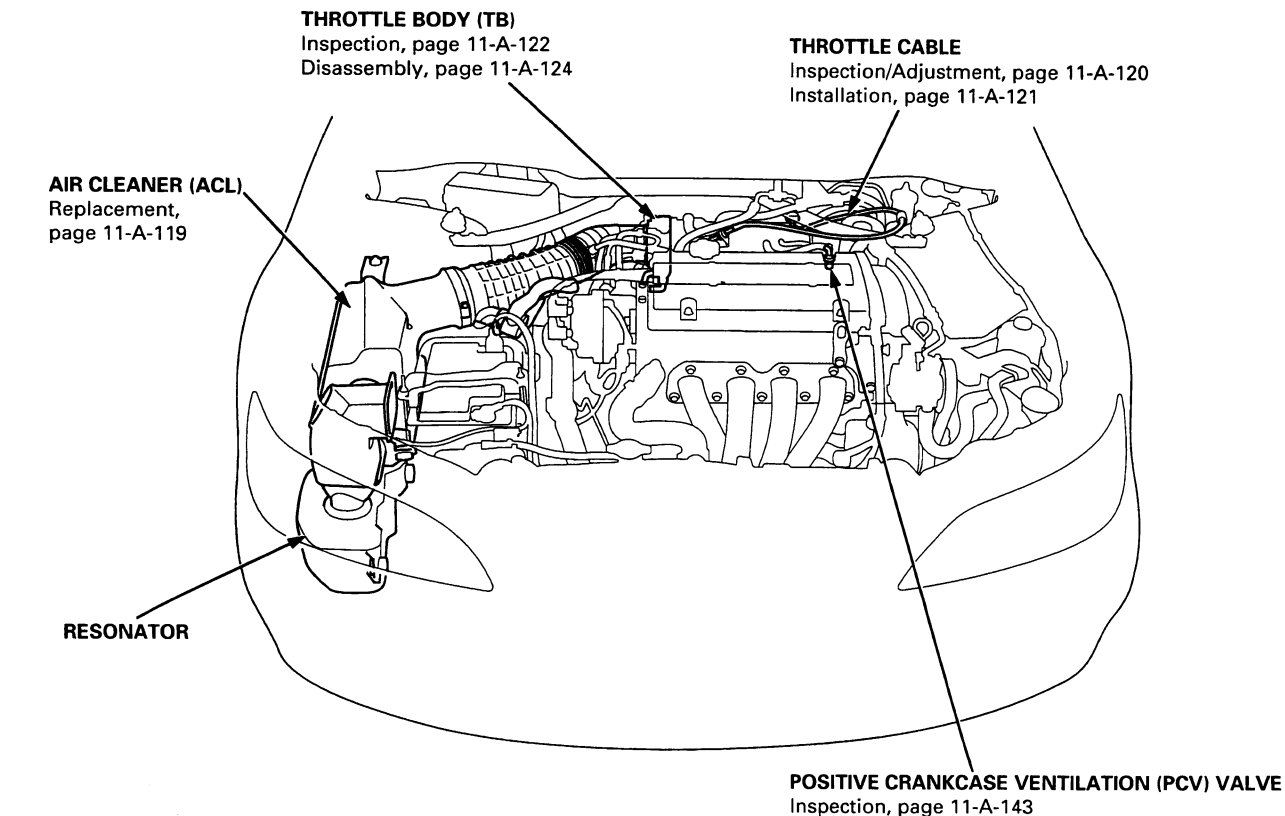
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SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) (SENSOR 2)

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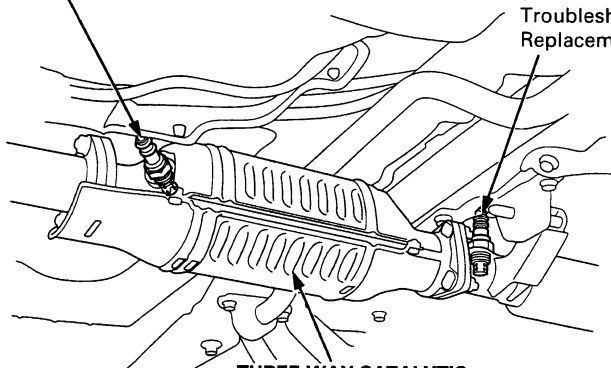
PRIMARY

HEATED OXYGEN SENSOR PRIMARY (HO2S) (SENSOR 1)

(H22A7 engine)

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THREE WAY CATALYTIC CONVERTER (TWC)

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POWERTRAIN CONTROL MODULE (PCM)**

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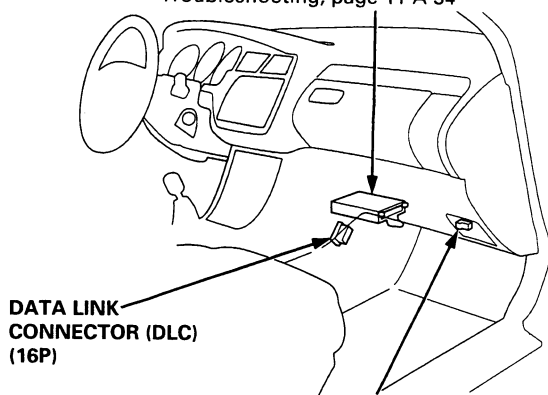
PGM-FI MAIN RELAY

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INERTIA SWITCH

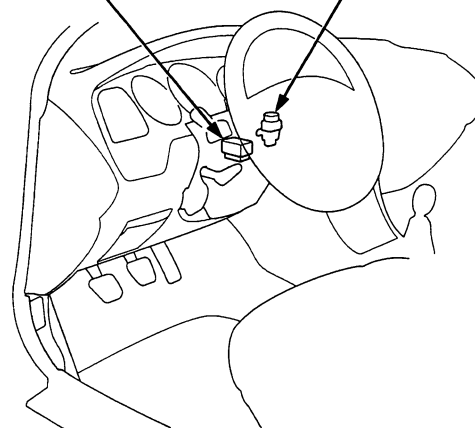
Description, page 11-A-110



**DATA LINK
CONNECTOR (DLC)
(16P)**

SERVICE CHECK CONNECTOR

Troubleshooting Procedures, page 11-A-15



RHD:

SERVICE CHECK CONNECTOR

Troubleshooting Procedures, page 11-A-15

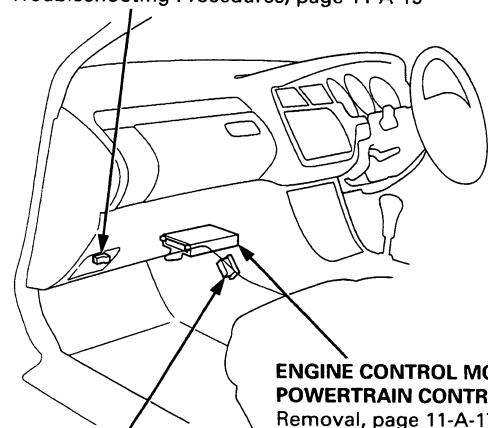
INERTIA SWITCH

Description, page 11-A-110

PGM-FI MAIN RELAY

Relay testing, page 11-A-111

Troubleshooting, page 11-A-112



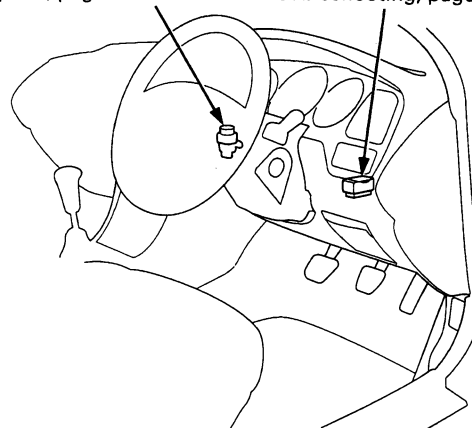
**DATA LINK
CONNECTOR (DLC)
(16P)**

**ENGINE CONTROL MODULE (ECM)/
POWERTRAIN CONTROL MODULE (PCM)**

Removal, page 11-A-17

Troubleshooting Procedures, page 11-A-15

Troubleshooting, page 11-A-34



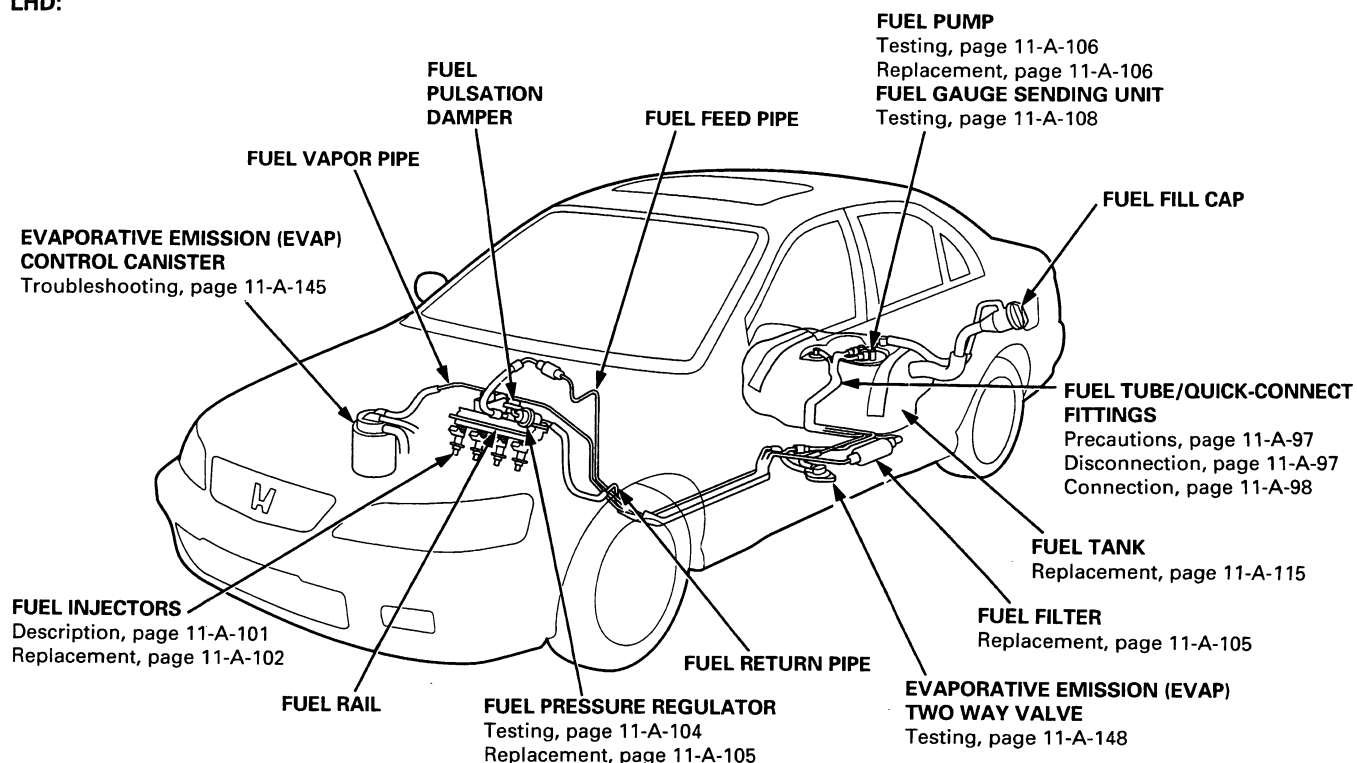
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Component Locations

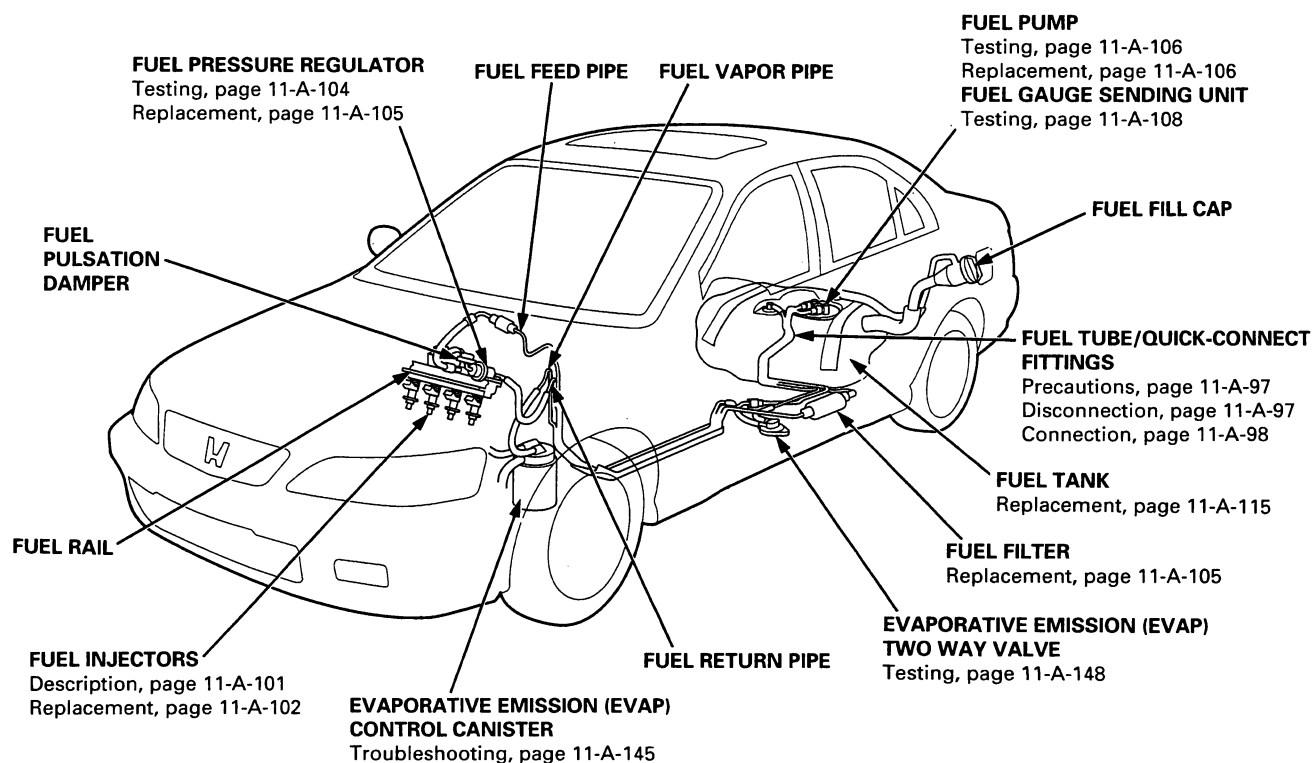
Index (cont'd)

F20B6 engine:

LHD:

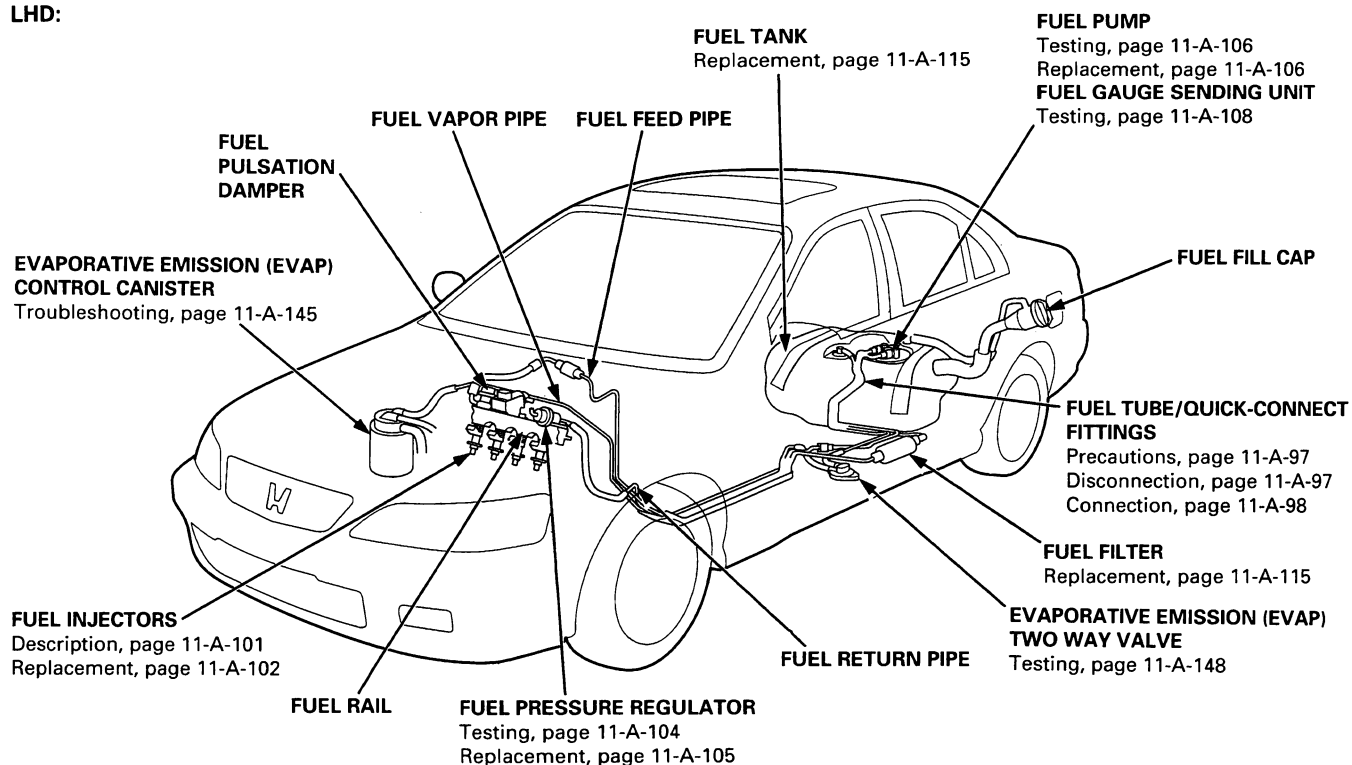


RHD:

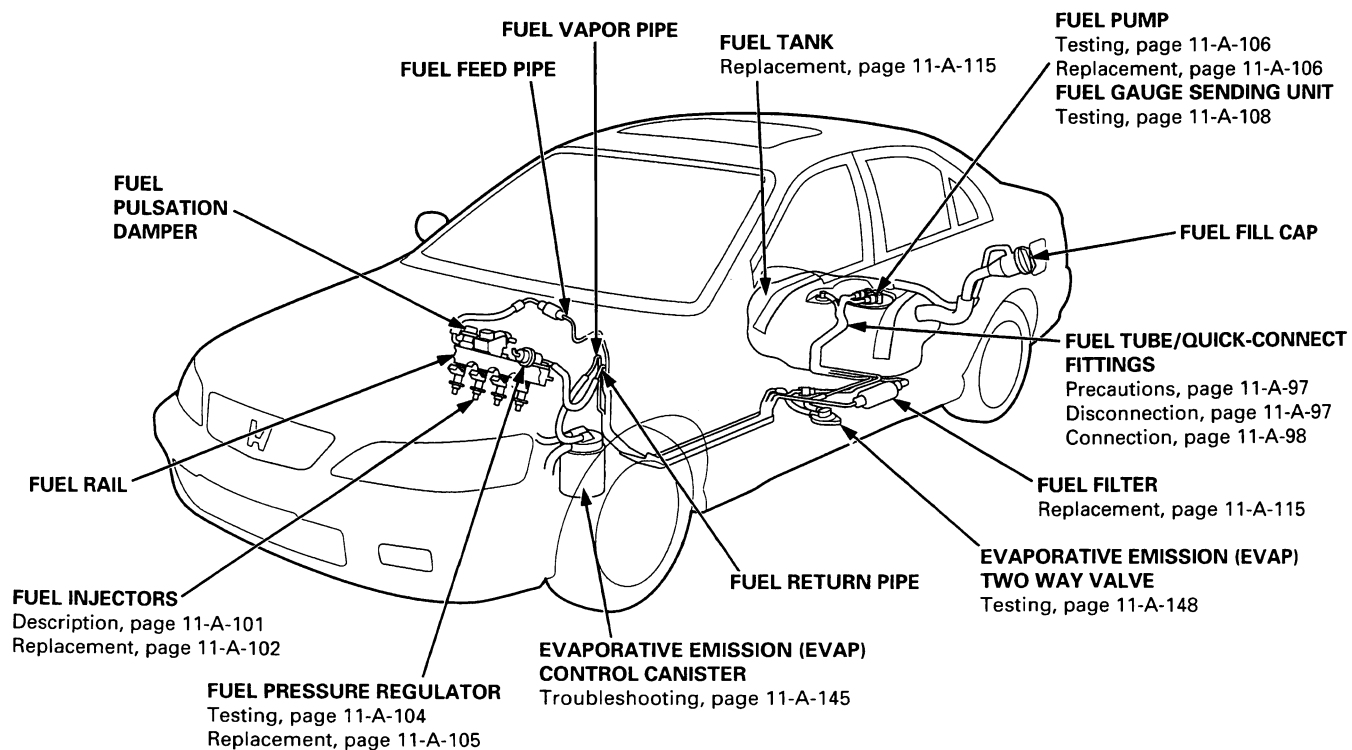




**H22A7 engine:
LHD:**



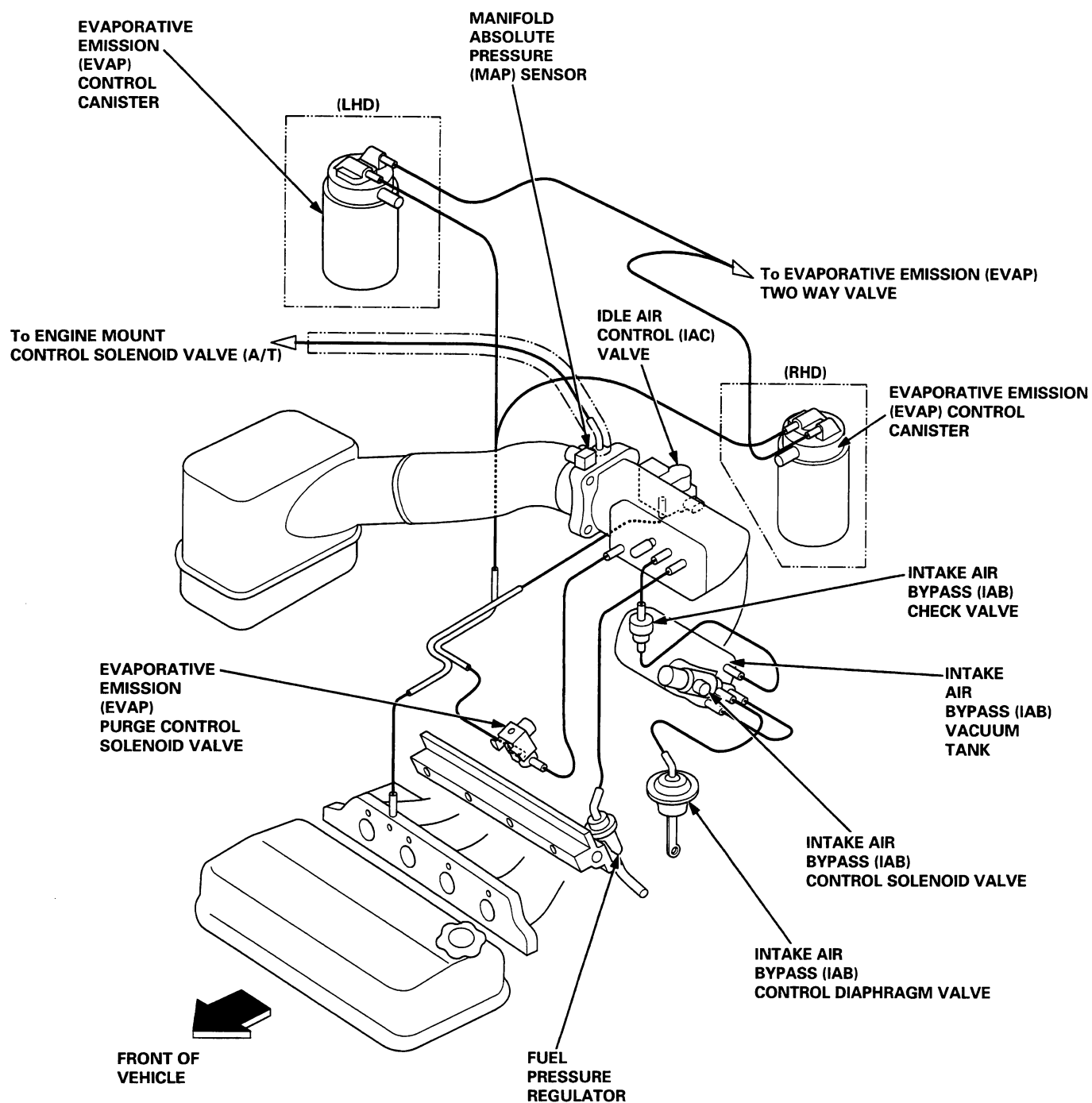
RHD:



System Description

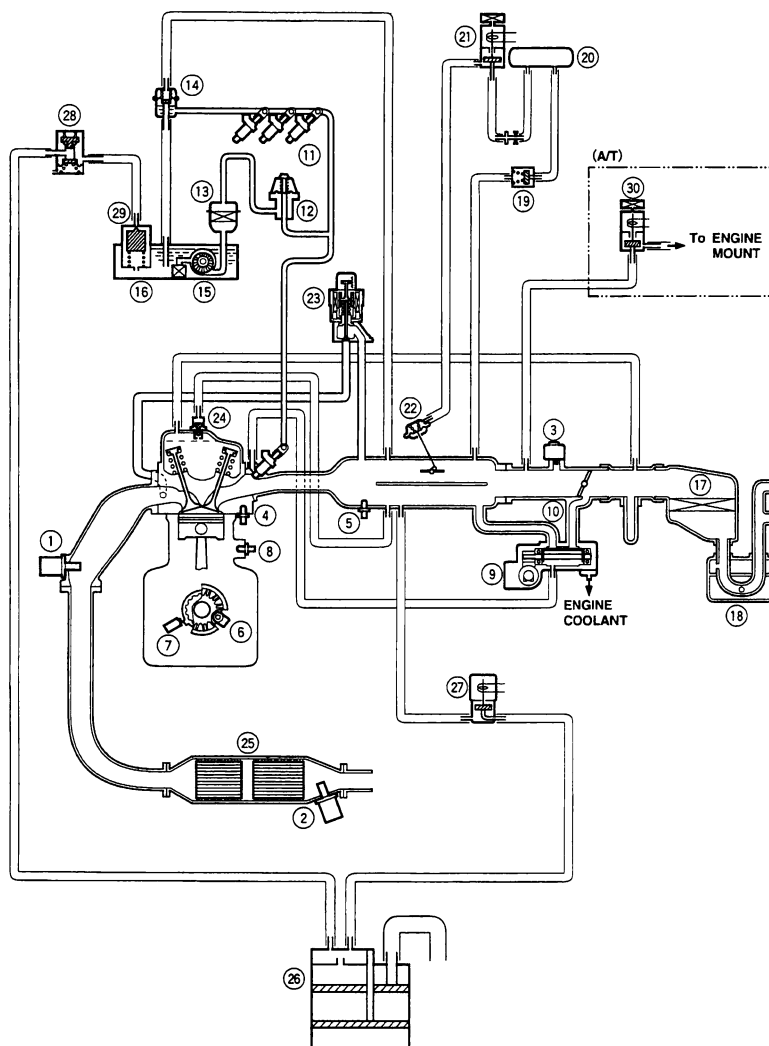
Vacuum Connections

F20B6 engine:





F20B6 engine:



- ① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S) (SENSOR 1)
- ② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) (SENSOR 2)
- ③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ⑥ CRANKSHAFT POSITION (CKP) SENSOR
- ⑦ TOP DEAD CENTER (TDC) SENSOR
- ⑧ KNOCK SENSOR (KS)
- ⑨ IDLE AIR CONTROL (IAC) VALVE
- ⑩ THROTTLE BODY (TB)
- ⑪ FUEL INJECTOR
- ⑫ FUEL PULSATION DAMPER
- ⑬ FUEL FILTER
- ⑭ FUEL PRESSURE REGULATOR
- ⑮ FUEL PUMP (FP)
- ⑯ FUEL TANK
- ⑰ AIR CLEANER
- ⑱ RESONATOR

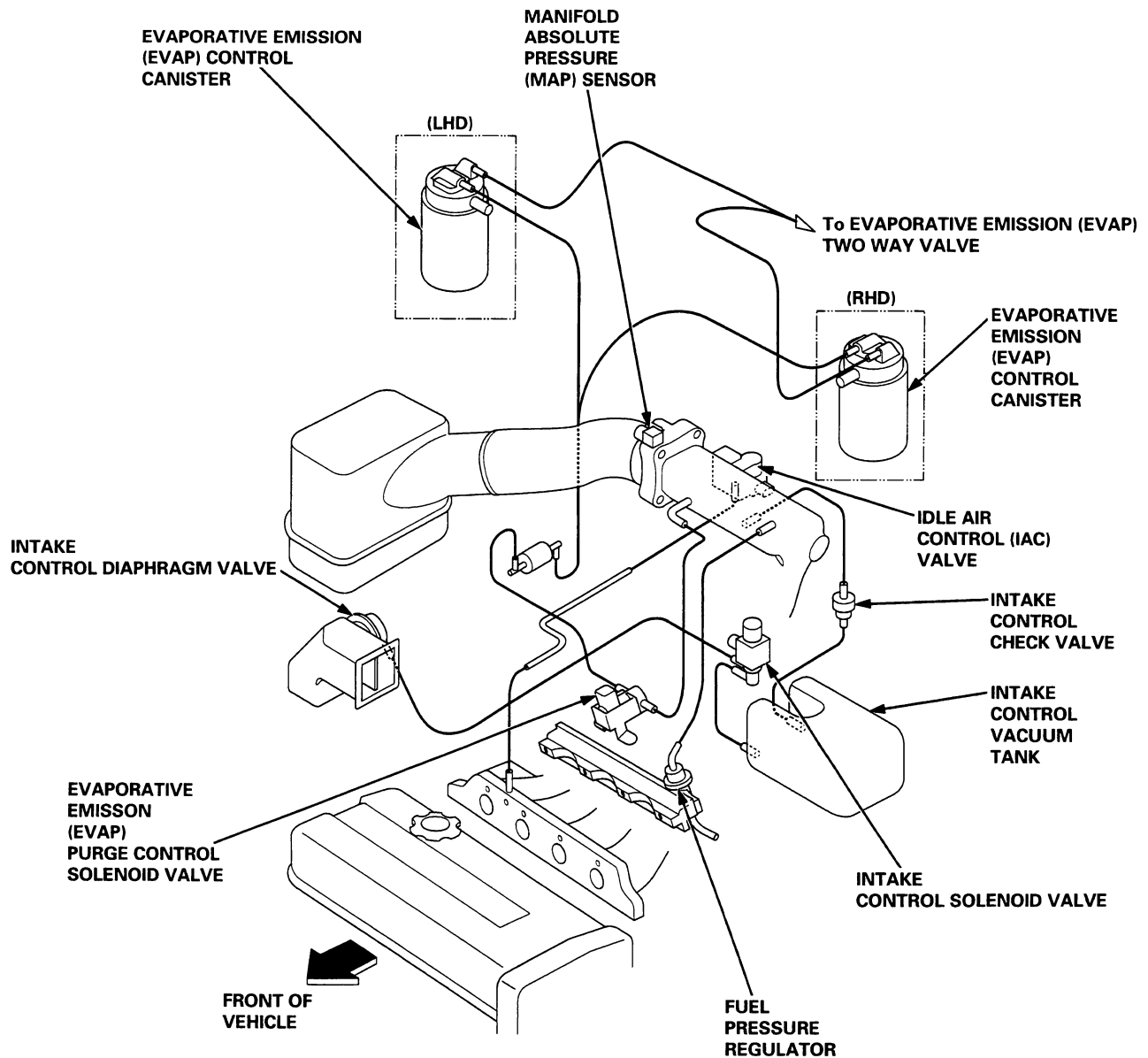
- ⑲ INTAKE AIR BYPASS (IAB) CHECK VALVE
- ⑳ INTAKE AIR BYPASS (IAB) VACUUM TANK
- ㉑ INTAKE AIR BYPASS (IAB) CONTROL SOLENOID VALVE
- ㉒ INTAKE AIR BYPASS (IAB) CONTROL DIAPHRAGM VALVE
- ㉓ EXHAUST GAS RECIRCULATION (EGR) VALVE and LIFT SENSOR
- ㉔ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ㉕ THREE WAY CATALYTIC CONVERTER
- ㉖ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ㉗ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
- ㉘ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
- ㉙ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE
- ㉚ ENGINE MOUNT CONTROL SOLENOID VALVE

(cont'd)

System Description

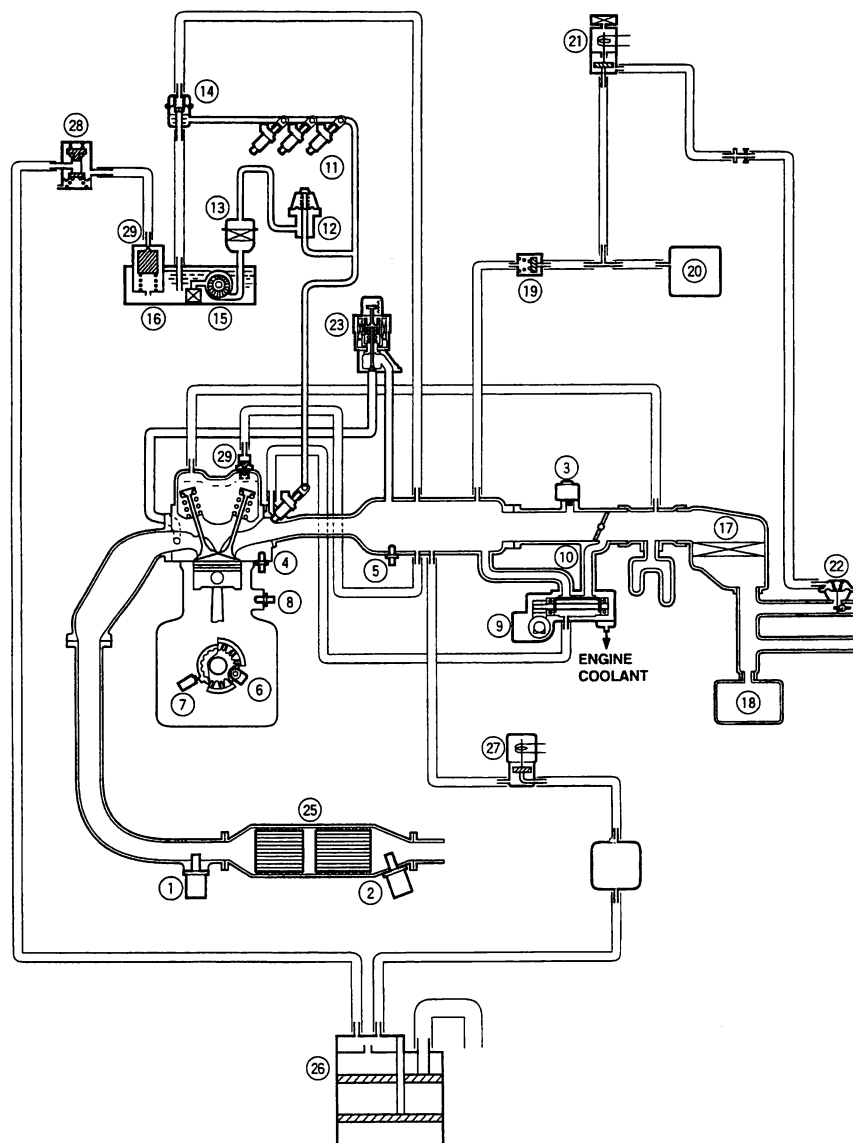
Vacuum Connections (cont'd)

H22A7 engine:





H22A7 engine:

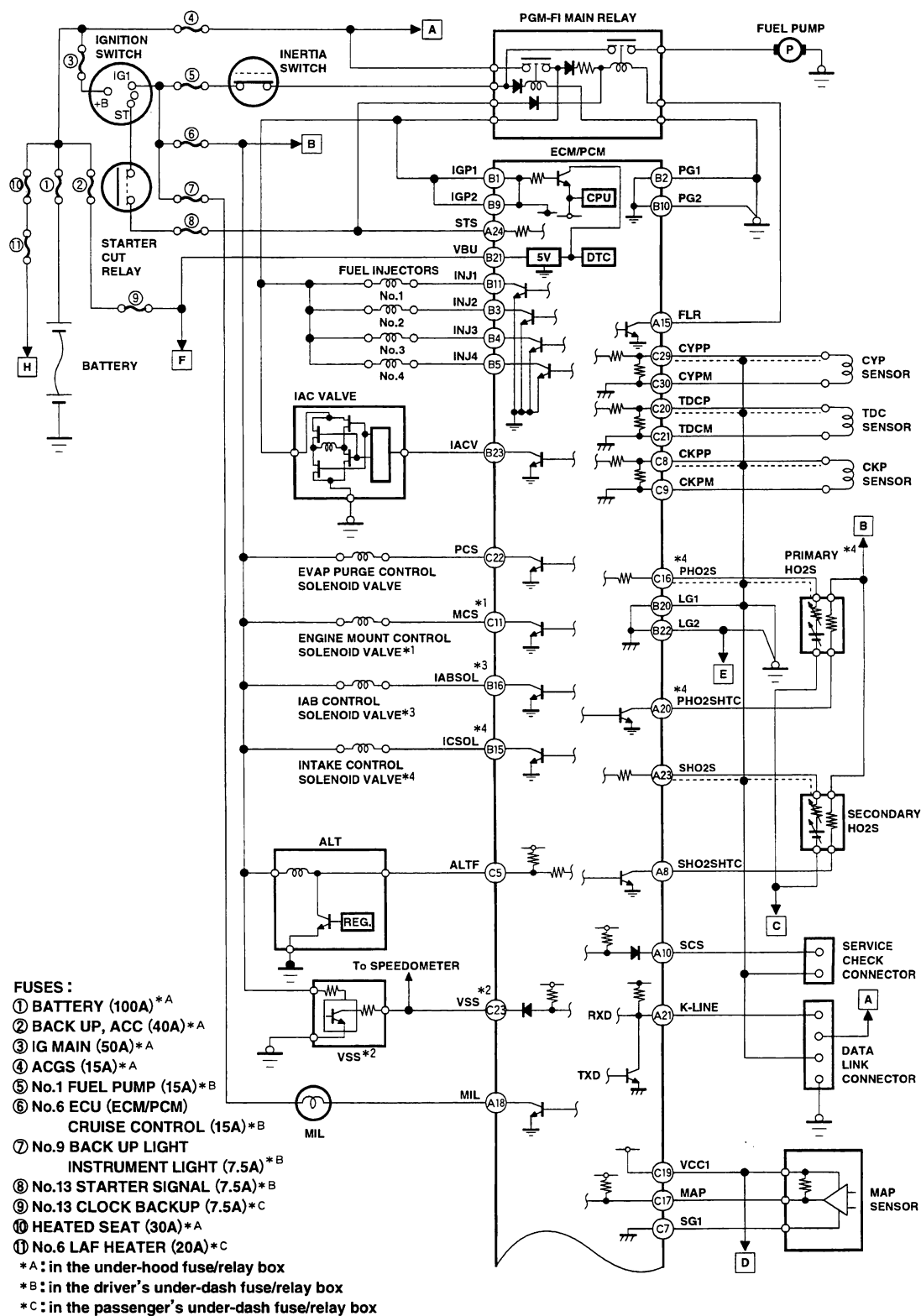


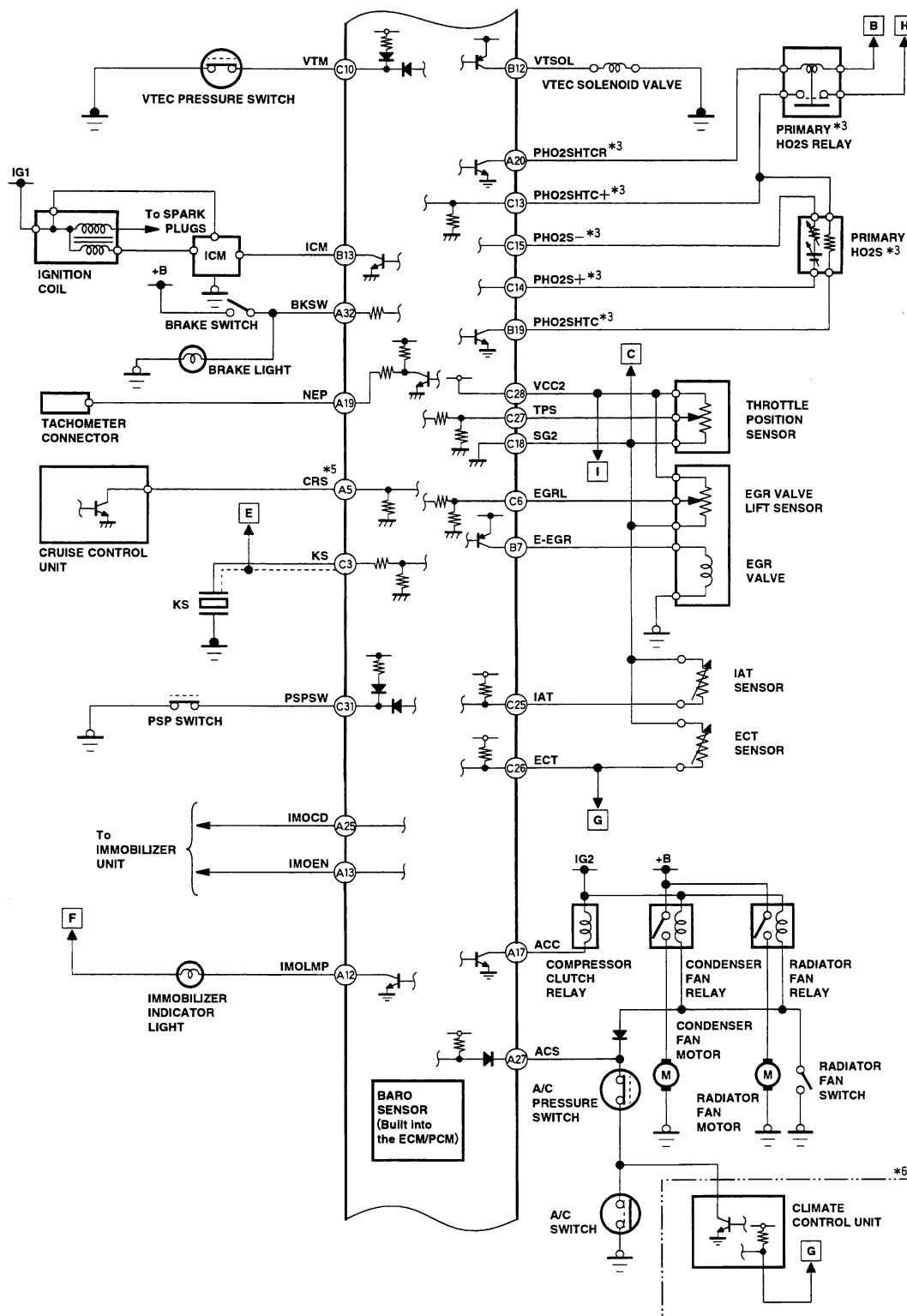
- ① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO₂S) (SENSOR 1)
- ② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO₂S) (SENSOR 2)
- ③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ⑥ CRANKSHAFT POSITION (CKP) SENSOR
- ⑦ TOP DEAD CENTER (TDC) SENSOR
- ⑧ KNOCK SENSOR (KS)
- ⑨ IDLE AIR CONTROL (IAC) VALVE
- ⑩ THROTTLE BODY (TB)
- ⑪ FUEL INJECTOR
- ⑫ FUEL PULSATION DAMPER
- ⑬ FUEL FILTER
- ⑭ FUEL PRESSURE REGULATOR
- ⑮ FUEL PUMP (FP)

- ⑯ FUEL TANK
- ⑰ AIR CLEANER
- ⑱ RESONATOR
- ⑲ INTAKE CONTROL CHECK VALVE
- ⑳ INTAKE CONTROL VACUUM TANK
- ㉑ INTAKE CONTROL SOLENOID VALVE
- ㉒ INTAKE CONTROL DIAPHRAGM VALVE
- ㉓ EXHAUST GAS RECIRCULATION (EGR) VALVE and LIFT SENSOR
- ㉔ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ㉕ THREE WAY CATALYTIC CONVERTER
- ㉖ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ㉗ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
- ㉘ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
- ㉙ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE

System Description

Electrical Connections

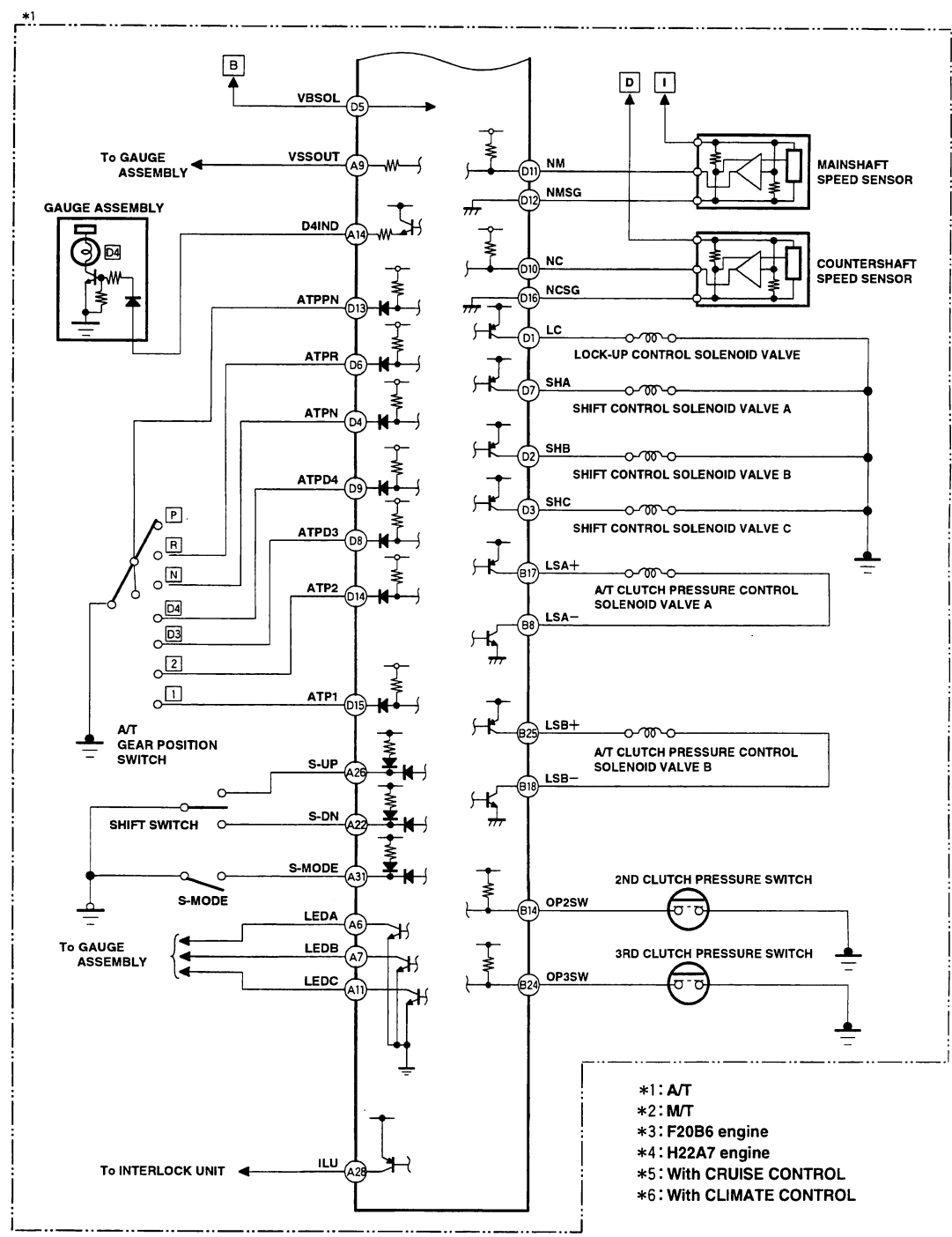




(cont'd)

System Description

Electrical Connections (cont'd)



- *1: A/T
- *2: M/T
- *3: F20B6 engine
- *4: H22A7 engine
- *5: With CRUISE CONTROL
- *6: With CLIMATE CONTROL

ECM/PCM CONNECTOR TERMINAL LOCATIONS															
A (32P)								B (25P)							
12	13	14	15	5	6	7	11	1	2	11	12	13	14	7	8
25	26	27	28	17	18	19	20	9	10	15	16	17	18	11	13
			31	21	22	23	24	19	20	21	22	23	24	25	14
			32												15

C (31P)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1
															2
															3
															4
															5

D (16P)							
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16



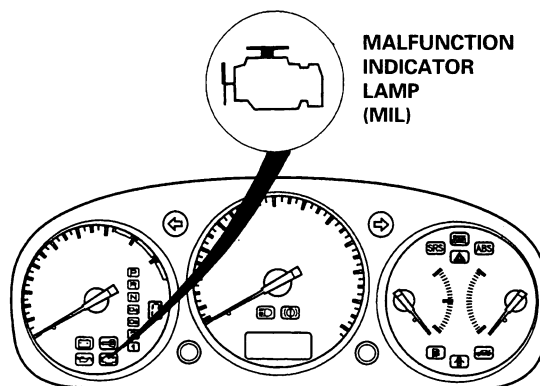
Troubleshooting Procedures

How To Begin Troubleshooting

When the Malfunction indicator Lamp (MIL) has been reported on, or there is a driveability problem, use the appropriate procedure below to diagnose and repair the problem.

A. When the MIL has come on:

1. Connect the Honda PGM Tester or a scan tool to the 16P Data Link Connector (DLC) located on the Passengers side of the center console.
2. Turn the ignition switch ON (II).
3. Check the Diagnostic Trouble Code (DTC) and note it. Also check and note the freeze frame data.
4. Refer to the Diagnostic Trouble Code Chart and begin troubleshooting.

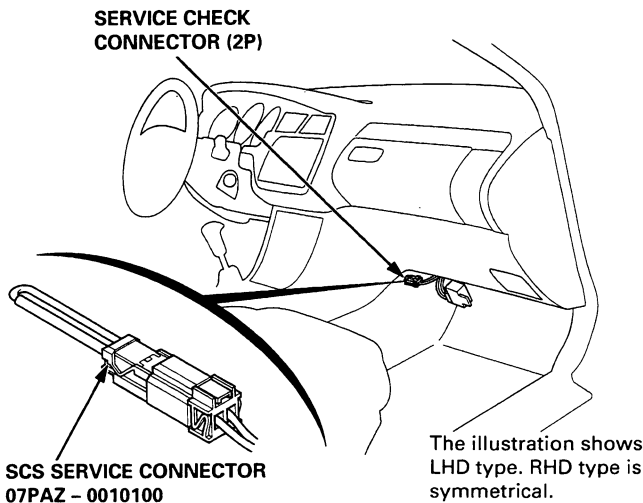
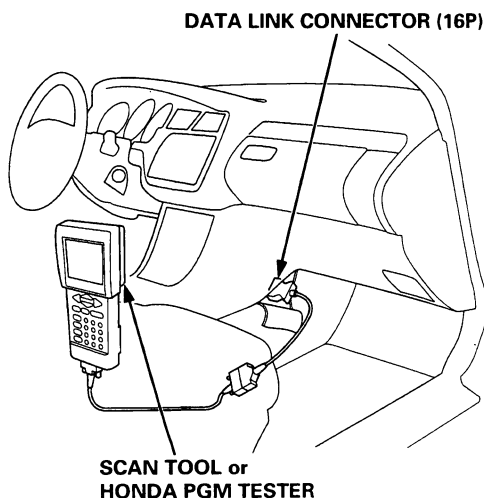


NOTE:

- See the scan tool or Honda PGM Tester user's manuals for specific operating instructions.
- The scan tool or tester can read the Diagnostic Trouble Codes (DTC), freeze frame data, current data, and other Engine Control Module (ECM)/Powertrain Control Module (PCM) data.
- Freeze frame data indicates the engine conditions when the first malfunction, misfire or fuel trim malfunction was detected. It can be useful information when troubleshooting.

B. When the MIL has not come on , but there is a driveability problem, refer to the Symptom Chart on page 11-A-18.

- C. DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS service connector connected. Connect the SCS short connector to Service Check Connector as shown. (The 2P Service Check Connector is located under the dash on the passenger's side of the car.) Turn the ignition switch ON (II).



The illustration shows LHD type. RHD type is symmetrical.

(cont'd)

Troubleshooting

Troubleshooting Procedures (cont'd)

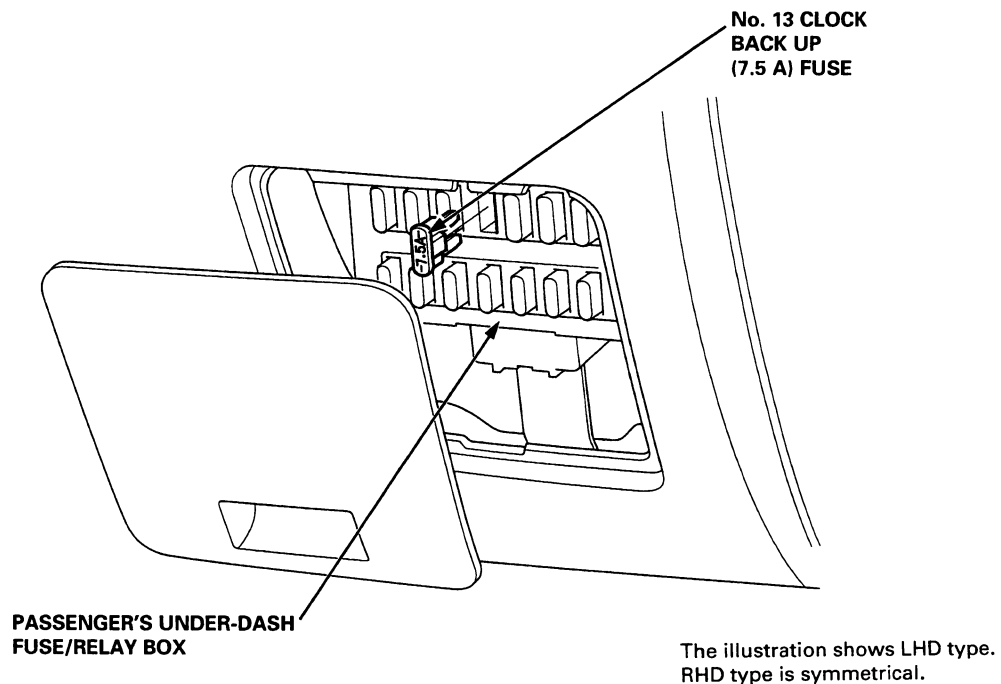
Engine Control Module (ECM)/Powertrain Control Module (PCM) Reset Procedure

Either of the following actions will reset the ECM/PCM.

- Use the scan tool or Honda PGM Tester to clear the ECM's/PCM's memory.

NOTE: See the scan tool or Honda PGM Tester user's manuals for specific operating instructions.

- Turn the ignition switch OFF. Remove the No. 13 CLOCK BACK UP (7.5 A) fuse from the Passenger's under-dash fuse/relay box for 10 seconds.



Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the SCS short connector if it connected.

NOTE: If the SCS short connector is connected and there is no DTCs stored in the ECM/PCM, the MIL will stay on when the ignition switch is turned ON (II).

2. Do the ECM/PCM Reset Procedure.
3. Turn the ignition switch OFF.
4. Disconnect the scan tool or Honda PGM Tester from the Data Link Connector (16P).

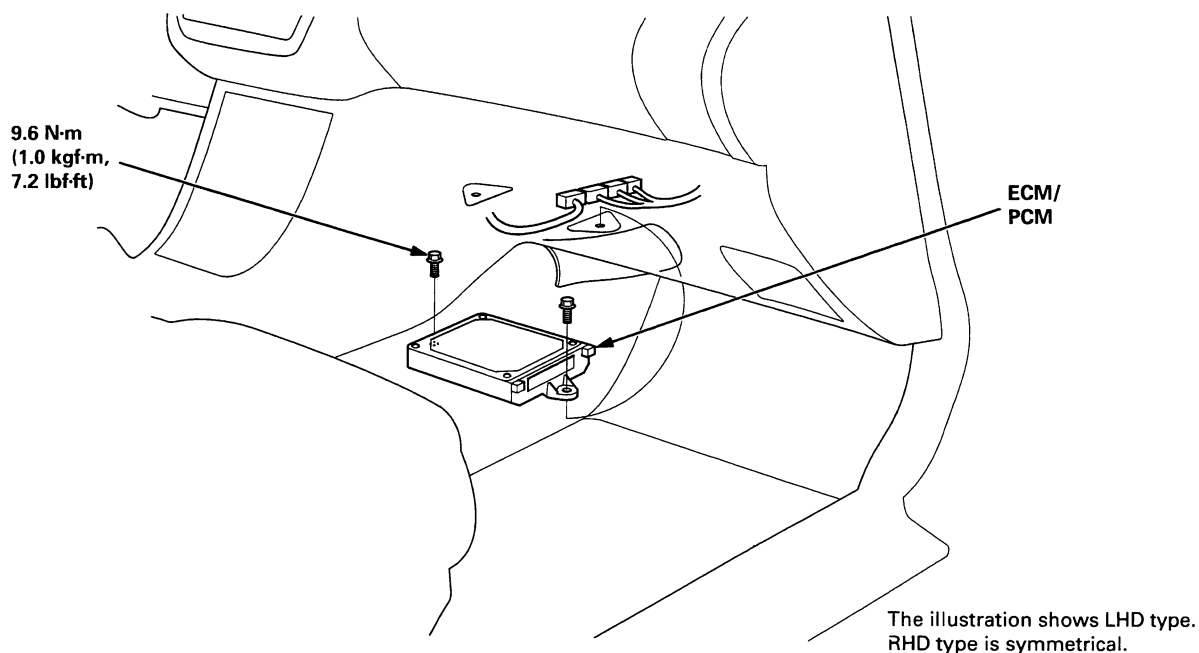
Known-Good ECM/PCM Substitution.

The ECM/PCM is part of the immobilizer system. If you substitute a known-good ECM/PCM the ECM/PCM will have a different immobilizer code. In order for the engine to start, you must rewrite the immobilizer code with the Honda PGM Tester.



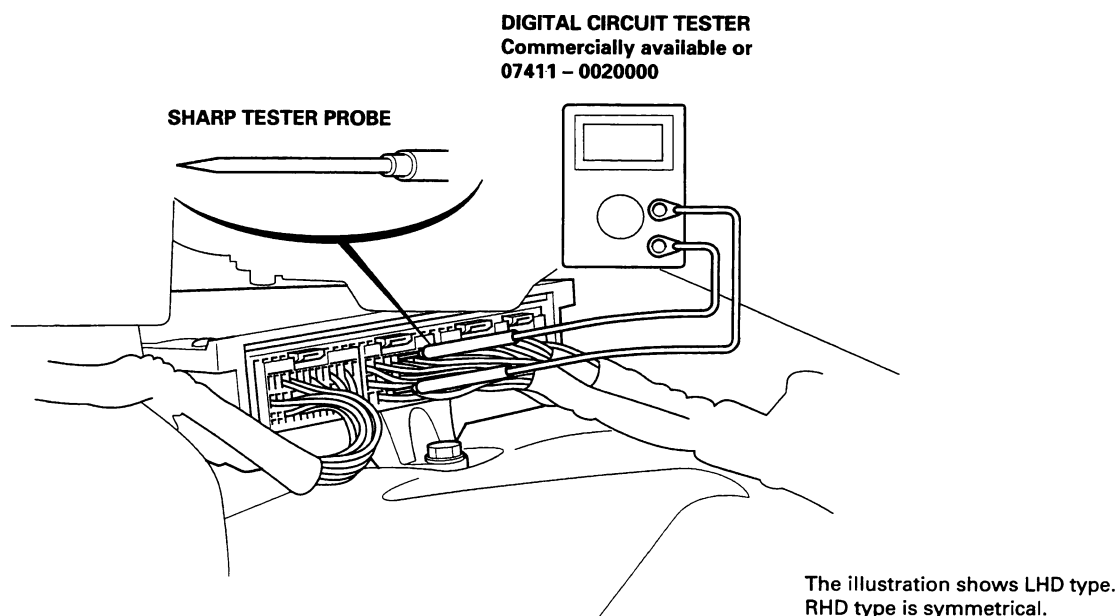
ECM/PCM Removal

Pull the carpet from the passenger's side of the center console to expose the ECM/PCM. Remove the two bolts from the ECM/PCM. Check the system according to the procedure described for the appropriate DTC listed on the following pages.



Checking The ECM/PCM Connector Terminals

When checking the ECM/PCM connector terminals, gently slide the sharp tester probe from the wire side into the connector until it comes in contact with the terminal end of the wire.



(cont'd)

Troubleshooting

Troubleshooting Procedures (cont'd)

Symptom Chart

Listed below are symptoms and probable causes for problems that DO NOT cause the Malfunction indicator Lamp (MIL) to come on. If the MIL was reported on, go to page 11-A-15.

Troubleshoot each probable cause in the order listed (from left to right) until the symptom is eliminated.

The probable cause and troubleshooting page reference can be found below.

SYMPTOM	PROBABLE CAUSE
Engine will not start	4, 2, 3, 5, 19, 13, 1
Hard starting	2, 4, 10, 15, 12, 18
Cold fast idle too low	7, 6, 15
Cold fast idle too high	7, 9, 10
Idle speed fluctuates	7, 8, 9
Misfire or rough running	Troubleshoot for misfire on pages 11-A-69, 70
Low power	2, 8, 9, 11, 16, 15, 17, 19
Engine stalls	2, 4, 10, 7, 19, 5, 14

Other Probable Causes for an engine that will not start:

- Compression
- Intake air leakage
- Engine locked up
- Timing belt
- Starting system
- Overheating
- Battery
- Immobilizer system
- Inertia switch

Probable Cause List (For the DTC Chart, see page 11-A-26.)

Probable Cause	Page	System
1	11-A-34	Engine Control Module (ECM)/Powertrain Control Module (PCM)
2	11-A-101	Fuel pressure
3	11-A-111	PGM-FI main relay
4	Section 4	Ignition system
5	11-A-74, 79	Crankshaft Position/Top Dead Center/Cylinder Position sensor circuit
6	11-A-42	Intake Air Temperature (IAT) sensor circuit
7	11-A-84	Idle Air Control Valve (IACV)
8	11-A-122	Throttle body
9	11-A-120	Throttle cable
10	11-A-39	Manifold Absolute Pressure (MAP) sensor
11	11-A-47	Throttle Position (TP) sensor
12	11-A-78	Barometric pressure (BARO) sensor
13	Section 14	A/T gear position signal
14	11-A-90	Brake switch signal
15	11-A-119	Air Cleaner
16	11-A-125, 130, 134	Intake control system, intake air pipe
17	11-A-136	Three Way Catalytic Converter (TWC)
18	11-A-144	Evaporative emission (EVAP) control
19	—	Contaminated fuel



ECM/PCM Data

You can retrieve data from the ECM/PCM by connecting the scan tool or the Honda PGM Tester to the 16P data link connector (DLC). The items listed in the table below can be indicated by both scan tool and Honda PGM tester. The Honda PGM Tester also reads data beyond these items. Understanding this data may help you find the causes of intermittent problems.

NOTE:

- The “operating values” listed are approximate and may vary depending on the environment and the individual vehicle.
- Unless noted otherwise, “at idle speed” means idling with the engine completely warmed up, A/T in park or neutral, M/T in neutral, and the A/C and all accessories turned off.

Data	Description	Operating Value	Freeze Data
Diagnostic Trouble Code (DTC)	If the ECM/PCM detects a problem, it will store it as a code consisting of one letter and four numbers.	If no problem is detected, there is no output.	YES
Engine Speed	The ECM/PCM computes engine speed from the signals sent from the Crankshaft Position sensor. This data is used for determining the time and amount of fuel injection.	Nearly the same as tachometer indication At idle speed: F20B6 engine: M/T: 750 ± 50 rpm (min^{-1}) A/T: 730 ± 50 rpm (min^{-1}) H22A7 engine: 790 ± 50 rpm (min^{-1})	YES
Vehicle Speed	The ECM/PCM converts pulse signals from the Vehicle Speed Sensor (VSS) (M/T) or countershaft speed sensor (A/T) into speed data.	Nearly the same as speedometer indication	YES
Manifold Absolute Pressure (MAP)	The absolute pressure caused in the intake manifold by engine load and speed.	With engine stopped: Nearly the same as atmospheric pressure At idle speed: $21 - 41$ kPa ($160 - 310$ mmHg, $6.3 - 12.2$ inHg)	YES
Engine Coolant Temperature (ECT)	The ECT sensor converts coolant temperature into voltage and signals the ECM/PCM. The sensor is a thermistor whose internal resistance changes with coolant temperature. The ECM/PCM uses the voltage signals from the ECT sensor to determine the amount of injected fuel.	With cold engine: Same as ambient temperature and IAT With engine warmed up: approx. $70 - 100^{\circ}\text{C}$ ($158 - 212^{\circ}\text{F}$)	YES
Heated Oxygen Sensor (HO2S) (Primary, Sensor 1) (Secondary Sensor 2)	The Heated Oxygen Sensor detects the oxygen content in the exhaust gas and sends voltage signals to the ECM/PCM. Based on these signals, the ECM/PCM controls the air/fuel ratio. When the oxygen content is high (that is, when the ratio is leaner than the stoichiometric ratio), the voltage signal is lower. When the oxygen content is low (that is, when the ratio is richer than the stoichiometric ratio), the voltage signal is higher.	$0.0 - 1.25$ V At idle speed: about $0.1 - 0.9$ V	YES (Primary Sensor 1 only)
Heated Oxygen Sensor (HO2S) (Primary, Sensor 1) (F20B6 engine)	The Heated Oxygen Sensor detects the oxygen content in the exhaust gas and sends voltage signals to the ECM/PCM. Based on these signals, the ECM/PCM controls the air/fuel ratio. When the oxygen content is high (that is, when the ratio is leaner than the stoichiometric ratio), the voltage signal is lower. When the oxygen content is low (that is, when the ratio is richer than the stoichiometric ratio), the voltage signal is higher. The Heated Oxygen Sensor signals are electrical current that are indicated as voltage on the scan tool		YES

(cont'd)

Troubleshooting

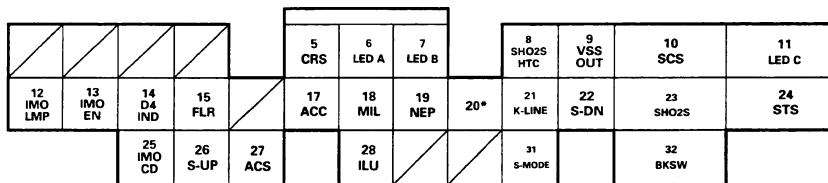
Troubleshooting Procedures (cont'd)

Data	Description	Operating Value	Freeze Data
HO2S Feedback Loop Status	Loop status is indicated as "open" or "closed". Closed: Based on the HO2S output, the ECM/PCM determines the air/fuel ratio and controls the amount of injected fuel. Open: ignoring HO2S output, the ECM/PCM refers to signals from the TP, MAP, and ECT sensors to control the amount of injected fuel.	At idle speed: closed	YES
Short Term Fuel Trim	The air/fuel ratio correction coefficient for correcting the amount of injected fuel when HO2S feedback is in the closed loop status. When the signal from the HO2S is weak, short term fuel trim gets higher, and the ECM/PCM increases the amount of injected fuel. The air/fuel ratio gradually gets richer, causing a higher HO2S output. Consequently, the short term fuel trim is lowered, and the ECM/PCM reduces the amount of injected fuel. This cycle keeps the air/fuel ratio close to the stoichiometric ratio when in closed loop status.	$\pm 20\%$	YES
Long Term Fuel Trim	Long term fuel trim is computed from short term fuel trim and indicates changes occurring in the fuel supply system over a long period. If long term fuel trim is higher than 1.00, the amount of injected fuel must be increased. If it is lower than 1.00, the amount of injected fuel must be reduced.	$\pm 20\%$	YES
Intake Air Temperature (IAT)	The IAT sensor converts intake air temperature into voltage and signals the ECM/PCM. When intake air temperature is low, the internal resistance of the sensor increases, and the voltage signal is higher.	With cold engine: Same as ambient temperature and ECT	YES
Throttle Position	Based on the accelerator pedal position, the opening angle of the throttle valve is indicated.	At idle speed: approx. 10%	YES
Ignition Timing	Ignition timing is the ignition advance angle set by the ECM/PCM. The ECM/PCM matches ignition timing to the driving conditions.	At idle speed: F20B6 engine: $12^\circ \pm 2^\circ$ H22A7 engine: $15^\circ \pm 2^\circ$ BTDC with the SCS service signal line is jumped with the Honda PGM tester	NO
Calculated Load Value (CLV)	CLV is the engine load calculated from the MAP data.	At idle speed: 12 – 34%	YES



Engine/Powertrain Control Module Terminal Arrangement

ECM/PCM CONNECTOR A (32P)



*: PHO2S
HTCR*³
PHO2S
HTC*⁴

Wire side female terminals

ECM/PCM CONNECTOR A (32P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
5* ¹	PUR	CRS (CRUISE CONTROL SIGNAL)	Down shift signal input from cruise control unit.	When cruise control is used: pulses
6* ¹	BLU/YEL	LED A	Shift indicator light control	In manual mode: • In 4th gear position: Battery voltage • In 1st, 2nd and 3rd gear positions: 0 V
7	PUR	LED B	Shift indicator light control	In manual mode: • In 2nd and 3rd gear positions: Battery voltage • In 1st and 4th gear positions: 0 V
8	BLK/WHT	SH02SHTC (SECONDARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives secondary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: 0 V
9* ¹	BLU/WHT	VSSOUT (VEHICLE SPEED SENSOR OUTPUT SIGNAL)	Vehicle speed signal detected from counter-shaft speed sensor.	Depending on vehicle speed: pulses
10	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check connector signal (the signal causing a DTC indication)	With the terminal connected: 0 V With the terminal disconnected: battery voltage
11* ¹	BLU/BLK	LED C	Shift indicator light control	In manual mode: • In 1st and 3rd gear positions: Battery voltage • In 2nd and 4th gear positions: 0 V
12	PNK	IMOLMP (IMMOBILIZER INDICATOR LIGHT)	Drives immobilizer indicator light.	With immobilizer indicator light turned ON: 0 V With immobilizer indicator light turned OFF: battery voltage
13	PNK/BLK	IMOEN (IMMOBILIZER ENABLE SIGNAL)	Sends immobilizer enable signal.	
14* ¹	GRN/BLK	D4IND (D4 INDICATOR)	Drives D4 indicator light.	With D4 indicator light turned ON: 0 V With D4 indicator light turned OFF: battery voltage
15	GRN/YEL	FLR (IMMOBILIZER FUEL PUMP RELAY)	Drives fuel pump relay.	0 V for two seconds after turning ignition switch ON (II), then battery voltage
17	RED	ACC (A/C CLUTCH RELAY)	Drives A/C clutch relay.	With compressor ON: 0 V With compressor OFF: battery voltage
18	GRN/ORN	MIL (MALFUNCTION INDICATOR LIGHT)	Drives MIL.	With MIL turned ON: 0 V With MIL turned OFF: battery voltage
19	BLU	NEP (ENGINE SPEED PULSE)	Outputs engine speed pulse.	With engine running: pulses
20* ⁴	BLK/WHT	PO2SHTC (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives primary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: 0 V
20* ³	GRN/RED	PHO2SHTCR (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL RELAY)	Drives primary heated oxygen sensor heater relay.	With ignition switch ON (II): 0 V
21	GRY	K-LINE	Sends and receives scan tool signal.	With ignition switch ON (II): pulses

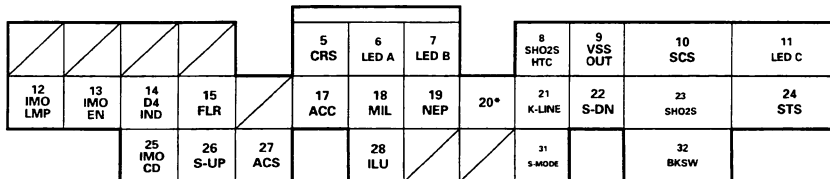
*1: A/T *3: F20B6 engine
*2: M/T *4: H22A7 engine

(cont'd)

Troubleshooting

Engine/Powertrain Control Module Terminal Arrangement (cont'd)

ECM/PCM CONNECTOR A (32P)



*: PHO2S
HTCR*3
PHO2S
HTC*4

Wire side female terminals

ECM/PCM CONNECTOR A (32P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
22*1	ORN	S-DN (SHIFT DOWN)	Detects downshift switch signal.	In manual mode and shift lever pushed toward downshift position (marked with "-"): 0 V In manual mode and shift lever in neutral position: Battery voltage
23	WHT	SHO2S (SECONDARY HEATED OXYGEN SENSOR, SENSOR 2)	Detects secondary heated oxygen sensor (sensor 2) signal.	With throttle fully opened from idle with fully warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
24	BLU/ORN	STS (STARTER SWITCH SIGNAL)	Detects starter switch signal.	With starter switch ON (III): battery voltage With starter switch OFF: 0 V
25	RED	IM OCD (IMMOBILIZER CODE)	Detects immobilizer signal.	
26*1	WHT/BLU	S-UP (SHIFT UP)	Detects upshift switch signal.	In manual mode and shift lever pushed toward upshift position (marked with "+"): 0 V In manual mode and shift lever in neutral position: Battery voltage
27	BLU/RED	ACS (A/C SWITCH SIGNAL)	Detects A/C switch signal.	With A/C switch ON: 0 V With A/C switch OFF: about 5 V
28*1	WHT/RED	ILU (INTERLOCK CONTROL UNIT)	Drives interlock control unit.	With ignition switch ON (II) and brake pedal depressed: battery voltage
31*1	BRN	S-MODE (SHIFT MODE)	Detects manual mode switch signal.	In manual mode (shift lever is positioned in manual mode): 0 V In other than manual mode: Battery voltage
32	WHT/BLK	BKSW (BRAKE SWITCH)	Detects brake switch signal.	With brake pedal released: 0 V With brake pedal depressed: battery voltage

*1: A/T *3: F20B6 engine
*2: M/T *4: H22A7 engine



ECM/PCM CONNECTOR B (25P)

1 IGP1		2 PG1					3 INJ2		4 INJ3		5 INJ4				7 E-EGR		8 LSA-		
9 IGP2		10 PG2		11 INJ1		12 VTS		13 ICM		14 OP 2SW		15 IC SOL		16 IAB SOL		17 LSA+		18 LSB-	
19 PHO2S HTC		20 LG1				21 VBU		22 LG2				23 IACV		24 OP 3SW		25 LSB+			

Wire side female terminals

PCM CONNECTOR B (25P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL/BLK	IGP1 (POWER SOURCE)	Power source for the ECM/PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
2	BLK	PG1 (POWER GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
3	RED	INJ2 (No. 2 FUEL INJECTOR)	Drives No. 2 fuel injector.	With engine running: pulses
4	BLU	INJ3 (No. 3 FUEL INJECTOR)	Drives No. 3 fuel injector.	
5	YEL	INJ4 (No. 4 FUEL INJECTOR)	Drives No. 4 fuel injector.	
7	PNK	E-EGR	Drives EGR valve.	With EGR operation during driving with fully warmed up engine: duty controlled With EGR not operating: 0 V
8*1	WHT	LSA- (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A - SIDE)	A/T clutch pressure control solenoid valve A power supply negative electrode.	With ignition switch ON (II): pulses
9	YEL/BLK	IGP2 (POWER SOURCE)	Power source for the ECM/PCM control circuit.	With ignition switch ON (III): battery voltage With ignition switch OFF: 0 V
10	BLK	PG2 (POWER GROUND)	Ground for the ECM/PCM control circuit.	Less than at all times
11	BRN	INJ1 (No. 1 FUEL INJECTOR)	Drives No. 1 fuel injector.	With engine running: pulses
12	GRN/YEL	VTS (VTEC SOLENOID VALVE)	Drives VTEC solenoid valve.	With engine at low rpm: 0 V With engine at high rpm: battery voltage
13	YEL/GRN	ICM (IGNITION CONTROL MODULE)	Sends ignition pulse.	With ignition switch ON (II): battery voltage With engine running: about 10 V (depending on engine speed)
14*1	BLU/BLK	OP2SW (2ND OIL PRESSURE SWITCH)	Detects 2nd oil pressure switch.	With ignition switch ON (II): battery voltage
15*4	RED/BLU	ICSOL (INTAKE CONTROL SOLENOID VALVE)	Drives intake control solenoid valve.	With engine running, engine speed below 3,950 rpm (min ⁻¹): battery voltage With engine running, engine speed above 3,950 rpm (min ⁻¹): 0 V
16*3	RED/BLU	IABSOL (INTAKE AIR BYPASS CONTROL SOLENOID VALVE)	Drives IAB control solenoid valve.	With engine running, engine speed below 4,200 rpm (min ⁻¹): battery voltage With engine running, engine speed above 4,200 rpm (min ⁻¹): 0 V
17*1	RED	LSA+ (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A + SIDE)	A/T clutch pressure control solenoid valve A power supply positive electrode	With ignition switch ON (II): pulses
18*1	GRN	LSB- (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B - SIDE)	A/T clutch pressure control solenoid valve B power supply negative electrode	With ignition switch ON (II): pulses
19*3	BLK/WHT	PHO2SHTC (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives primary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled
20	BRN/BLK	LG1 (LOGIC GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
21	WHT/BLU	VBU (VOLTAGE BACK UP)	Power source for the ECM/PCM control circuit. Power source for the DTC memory.	Battery voltage at this times
22	BRN/BLK	LG2 (LOGIC GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
23	BLK/BLU	IACV (IDLE AIR CONTROL VALVE)	Drives IAC valve.	With engine running: pulses
24*1	BLU/WHT	OP3SW (3RD OIL PRESSURE SWITCH)	Detects 3rd oil pressure switch.	With ignition switch ON (II): battery voltage
25*1	ORN	LSB+ (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B + SIDE)	A/T clutch pressure control solenoid valve B power supply positive electrode	With ignition switch ON (II): pulses

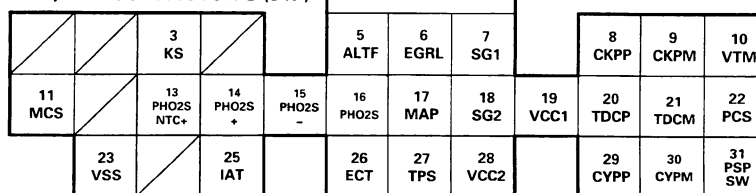
*1: A/T *3: F20B6 engine
*2: M/T *4: H22A7 engine

(cont'd)

Troubleshooting

Engine/Powertrain Control Module Terminal Arrangement (cont'd)

ECM/PCM CONNECTOR C (31P)



Wire side female terminals

ECM/PCM CONNECTOR C (31P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
3	RED/BLU	KS (KNOCK SENSOR)	Detects KS signal.	With engine knocking: pulses
5	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal.	With fully warmed up engine running: 0 V – battery voltage (depending on electrical load)
6	WHT/BLK	EGRL (EGR VALVE LIFT SENSOR)	Detects EGR valve lift sensor signal.	At idle: about 1.2 V
7	GRN/WHT	SG1 (SENSOR GROUND)	Ground for MAP sensor.	Less than 1.0 V at all times
8	BLU	CKPP (CKP SENSOR P SIDE)	Detects CKP sensor.	With engine running: pulses
9	WHT	CKPM (CKP SENSOR M SIDE)	Ground for CKP sensor.	
10	BLU/BLK	VTM (VTEC PRESSURE SWITCH SIGNAL)	Detects VTEC pressure switch signal.	With engine at low engine speed: 0 V With engine at high engine speed : battery voltage
11*1	RED/BLK	MCS (ENGINE MOUNT CONTROL SOLENOID VALVE)	Drives engine mount control solenoid valve.	At idle: 0 V Above idle: battery voltage
13*3	WHT	PHO2SHTC + (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL + SIDE)	Detects primary heated oxygen sensor heater voltage.	With ignition switch ON (II): battery voltage
14*3	RED	PHO2S + (PRIMARY HEATED OXYGEN SENSOR, SENSOR 1+ SIDE)	Detects primary heated oxygen sensor (sensor 1) signal.	
15*3	BLU	PHO2S – (PRIMARY HEATED OXYGEN SENSOR, SENSOR 1– SIDE)	Detects primary heated oxygen sensor (sensor 1) signal.	
16	WHT	PHO2S (PRIMARY HEATED OXYGEN SENSOR, SENSOR 1)	Detects primary heated oxygen sensor (sensor 1) signal.	With throttle fully opened from idle with fully, warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
17	RED/GRN	MAP (MANIFOLD ABSOLUTE PRESSURE SENSOR)	Detects MAP sensor signal.	With ignition switch ON (II): about 3 V At idle: about 1.0 V (depending on engine speed)
18	GRN/BLK	SG2 (SENSOR GROUND)	Sensor ground.	Less than 1.0 V at all times
19	YEL/RED	VCC1 (SENSOR VOLTAGE)	Power source to MAP sensor.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
20	GRN	TDCP (TDC SENSOR P SIDE)	Detects TDC sensor.	With engine running: pulses
21	RED	TDCM (TDC SENSOR M SIDE)	Ground for TDC sensor.	
22	RED/YEL	PCS (EVAP PURGE CONTROL SOLENOID VALVE)	Drives EVAP purge control solenoid valve.	With engine running, engine coolant, below 55°C (131°F)*3, 65°C (149°F)*4: battery voltage With engine running, engine coolant, above 55°C (131°F)*3, 65°C (149°F)*4: 0 V
23*2	BLU/WHT	VSS (VEHICLE SPEED SENSOR)	Detects VSS signal.	With ignition switch ON (II) and front wheel rotating: cycles 0 V – about 5 V or battery voltage
25	RED/YEL	IAT (INTAKE AIR TEMPERATURE SENSOR)	Detects IAT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on intake air temperature)
26	RED/WHT	ECT (ENGINE COOLANT TEMPERATURE SENSOR)	Detects ECT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on engine coolant temperature)
27	RED/BLK	TPS (THROTTLE POSITION SENSOR)	Detects TP sensor signal.	With throttle fully open: about 4.8 V With throttle fully closed: about 0.5 V
28	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
29	YEL	CYP (CYP SENSOR P SIDE)	Detects CYP sensor.	With engine running: pulses
30	BLK	CYPM (CYP SENSOR M SIDE)	Ground for CYP sensor.	
31	GRN	PSPSW (P/S PRESSURE SWITCH SIGNAL)	Detects PSP switch signal.	At idle with steering wheel in straight ahead position: 0 V At idle with steering wheel at full lock: battery voltage

*1: A/T *3: F20B6 engine
*2: M/T *4: H22A7 engine



PCM CONNECTOR D (16P) (A/T only)

1 LC		2 SHB	3 SHC	4 ATPN		5 VBSOL
6 ATPR	7 SHA	8 ATPD3	9 ATPD4	10 NC	11 NM	12 NMSG
13 ATPPN	14 ATP2	15 ATP1		16 NCSG		

Wire side female terminals

PCM CONNECTOR D (16P) (A/T only)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL	LC (LOCK-UP CONTROL SOLENOID VALVE)	Drives lock-up control solenoid valve.	During half and full lock-up conditions, and during deceleration condition: Battery voltage during no lock-up condition: 0 V
2	GRN/WHT	SHB (SHIFT CONTROL SOLENOID VALVE B)	Drives shift control solenoid valve B.	Battery voltage in following positions: • [1], [2] and positions • [D ₄], and [D ₃] positions in 1st and 2nd gear. • [P], [R] and [N] positions 0 V in following positions: • [D ₄], and [D ₃] positions in 3rd gear • [D ₄] position in 4th gear
3	GRN	SHC (SHIFT CONTROL SOLENOID VALVE C)	Drives shift control solenoid valve C.	Battery voltage in following positions: • [1] position • [D ₄], and [D ₃] positions in 1st and 3rd gear 0 V in following positions: • [2] position • [D ₄], and [D ₃] positions in 2nd gear • [D ₄] position in 4th gear • [P], [R] and [N] positions
4	RED/BLK	ATPN (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [N] position: 0 V In any other position: about 5 V
5	BLK/YEL	VBSOL (BATTERY VOLTAGE FOR SOLENOID VALVE)	Power source of solenoid valve.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
6	WHT	ATPR (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [R] position: 0 V In any other position: about 5 V
7	BLU/YEL	SHA (SHIFT CONTROL SOLENOID VALVE A)	Drives shift control solenoid valve A.	Battery voltage in following positions: • [2] position • [D ₄], and [D ₃] positions in 2nd and 3rd gear 0 V in following positions: • [1] position • [D ₄], and [D ₃] positions in 1st gear • [D ₄] position in 4th gear • [P], [R] and [N] positions
8	PNK	ATPD3 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [D ₃] position: 0 V In any other position: about 5 V
9	YEL	ATPD4 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [D ₄] position: 0 V In any other position: about 5 V
10	BLU	NC (COUNTERSHAFT SPEED SENSOR)	Detects countershaft speed sensor signals.	Depending on vehicle speed: Pulsing signal When engine is stopped: Approx. 0 V
11	RED	NM (MAINSHAFT SPEED SENSOR)	Detects mainshaft speed sensor signals.	Depending on vehicle speed: Pulsing signal When vehicle is stopped: Approx. 0 V
12	WHT	NMSG (MAINSHAFT SPEED SENSOR GROUND)	Ground for mainshaft speed sensor.	
13	BLU/WHT	ATPPN (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [P] or [N] position: 0 V In any other position: about 5 V
14	BLU	ATP2 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [2] position: 0 V In any other position: about 5 V
15	BRN	ATP1 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [1] position: 0 V In any other position: about 5 V
16	GRN	NCSG (COUNTERSHAFT SPEED SENSOR GROUND)	Ground for countershaft speed sensor.	

Troubleshooting

Diagnostic Trouble Code (DTC) Chart

DTC (MIL indication*)	Detection Item	Probable Cause	Page
P0107 (3)	Manifold Absolute Pressure Circuit Low Input	<ul style="list-style-type: none"> • Open or short in MAP sensor circuit • MAP sensor • ECM/PCM 	11-A-39
P0108 (3)	Manifold Absolute Pressure Circuit High Input	<ul style="list-style-type: none"> • Open in MAP sensor circuit • MAP sensor • ECM/PCM 	11-A-41
P0112 (10)	Intake Air Temperature Circuit Low Input	<ul style="list-style-type: none"> • Short in IAT sensor circuit • IAT sensor • ECM/PCM 	11-A-42
P0113 (10)	Intake Air Temperature Circuit High Input	<ul style="list-style-type: none"> • Open in IAT sensor circuit • IAT sensor • ECM/PCM 	11-A-43
P0117 (6)	Engine Coolant Temperature Circuit Low Input	<ul style="list-style-type: none"> • Short in ECT sensor circuit • ECT sensor • ECM/PCM 	11-A-44
P0118 (6)	Engine Coolant Temperature Circuit High Input	<ul style="list-style-type: none"> • Open in ECT sensor circuit • ECT sensor • ECM/PCM 	11-A-46
P0122 (7)	Throttle Position Circuit Low Input	<ul style="list-style-type: none"> • Open or short in TP sensor circuit • TP sensor • ECM/PCM 	11-A-47
P0123 (7)	Throttle Position Circuit High Input	<ul style="list-style-type: none"> • Open in TP sensor circuit • TP sensor • ECM/PCM 	11-A-49
P0131*4 (1)	Primary Heated Oxygen Sensor Circuit Low Voltage (Sensor 1)	<ul style="list-style-type: none"> • Short in Primary HO2S (Sensor 1) circuit • Primary HO2S (Sensor 1) • Fuel supply system • ECM 	11-A-50
P0132*4 (1)	Primary Heated Oxygen Sensor Circuit High Voltage (Sensor 1)	<ul style="list-style-type: none"> • Open in Primary HO2S (Sensor 1) circuit • Primary HO2S (Sensor 1) • ECM 	11-A-52
P0133*4 (61)	Primary Heated Oxygen Sensor Slow Response (Sensor 1)	<ul style="list-style-type: none"> • Primary HO2S (Sensor 1) • Exhaust system 	11-A-53
P0135*4 (41)	Primary Heated Oxygen Sensor Heater Circuit Malfunction (Sensor 1)	<ul style="list-style-type: none"> • Open or short in Primary HO2S (Sensor 1) heater circuit • ECM 	11-A-62
P0137 (63)	Secondary Heated Oxygen Sensor Circuit Low Voltage (Sensor 2)	<ul style="list-style-type: none"> • Short in Secondary HO2S (Sensor 2) circuit • Secondary HO2S (Sensor 2) • ECM/PCM 	11-A-59
P0138 (63)	Secondary Heated Oxygen Sensor Circuit High Voltage (Sensor 2)	<ul style="list-style-type: none"> • Open in Secondary HO2S (Sensor 2) circuit • Secondary HO2S (Sensor 2) • ECM/PCM 	11-A-60
P0139 (63)	Secondary Heated Oxygen Sensor Slow Response (Sensor 2)	<ul style="list-style-type: none"> • Secondary HO2S (Sensor 2) 	11-A-61

*: These DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS short connector connected.

** : The  indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T *3: F20B6 engine

*2: M/T *4: H22A7 engine



DTC (MIL indication)	Detection Item	Probable Cause	Page
P0141 (65)	Secondary Heated Oxygen Sensor Heater Circuit Malfunction (Sensor 2)	<ul style="list-style-type: none"> • Open or short in Secondary HO2S (Sensor 2) heater circuit • ECM/PCM 	11-A-62
P0171 (45)	System Too Lean	<ul style="list-style-type: none"> • Fuel supply system • Primary HO2S (Sensor 1) • MAP sensor • Contaminated fuel • Valve clearance • Exhaust leakage 	11-A-67
P0172 (45)	System Too Rich	<ul style="list-style-type: none"> • Fuel supply system • Primary HO2S (Sensor 1) • MAP sensor • Contaminated fuel • Valve clearance 	11-A-67
P0300 and some of P0301 P0302 P0303 P0304 (71 72 73 74)	Random Misfire	<ul style="list-style-type: none"> • Ignition system • Fuel supply system • MAP sensor • EGR system • IAC valve • Contaminated fuel • Lack of fuel 	11-A-69
P0301 P0302 P0303 P0304 (71 72 73 74)	<ul style="list-style-type: none"> — Cylinder 1 — Cylinder 2 — Cylinder 3 — Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Fuel injector • Fuel injector circuit • Ignition system • Low compression • Valve clearance 	11-A-70
P0325 (23)	Knock Sensor (KS) Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in Knock Sensor (KS) circuit • Knock Sensor (KS) • ECM/PCM 	11-A-73
P0335 (4)	Crankshaft Position Sensor Circuit Low Input	<ul style="list-style-type: none"> • Crankshaft Position Sensor • Crankshaft Position Sensor circuit • ECM/PCM 	11-A-74
P0336 (4)	Crankshaft Position Sensor Range/Performance	<ul style="list-style-type: none"> • Crankshaft Position Sensor • Timing belt skipped teeth 	11-A-74
P0401 (80)	Exhaust Gas Recirculation Insufficient Flow Detected	<ul style="list-style-type: none"> • EGR valve • EGR line 	11-A-139
P0420 (67)	Catalyst System Efficiency Below Threshold	<ul style="list-style-type: none"> • Three Way Catalytic converter • Secondary HO2S (Sensor 2) 	11-A-137
P0443 (92)	Evaporative Emission (EVAP) Purge Control Solenoid Valve Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in Evaporative Emission (EVAP) Purge Control Solenoid Valve circuit • Evaporative Emission (EVAP) Purge Control Solenoid Valve • ECM/PCM 	11-A-145

*: These DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS short connector connected.

**: The  indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T

*2: M/T

(cont'd)

Troubleshooting

Diagnostic Trouble Code (DTC) Chart (cont'd)

DTC (MIL indication)	Detection Item	Probable Cause	Page
P0500 (17)*2	Vehicle Speed Sensor Circuit Malfunction	<ul style="list-style-type: none"> Vehicle Speed Sensor Vehicle Speed Sensor circuit ECM 	11-A-77
P0715 P0720 P0730 P0753 P0758 P0763 (70)*1**	Automatic Transaxle	—	Section 14
P1107 (13)	Barometric Pressure Circuit Low Input	<ul style="list-style-type: none"> ECM/PCM (Baro sensor) 	11-A-78
P1108 (13)	Barometric Pressure Circuit High Input	<ul style="list-style-type: none"> ECM/PCM (Baro sensor) 	11-A-78
P1149*3 (61)	Primary Heated Oxygen sensor (Sensor 1) Circuit Range/ Performance Problem	<ul style="list-style-type: none"> Primary HO2S (Sensor 1) ECM/PCM 	11-A-54
P1162*3 (48)	Primary Heated Oxygen Sensor (Sensor 1) Circuit Malfunction	<ul style="list-style-type: none"> Open or short in Primary HO2S (Sensor 1) circuit Primary HO2S (Sensor 1) ECM/PCM 	11-A-55
P1163*3 (61)	Primary Heated Oxygen Sensor (Sensor 1) Circuit Slow Response	<ul style="list-style-type: none"> Primary HO2S (Sensor 1) ECM/PCM 	11-A-57
P1164*3 (61)	Primary Heated Oxygen Sensor (Sensor 1) Circuit Range/ Performance Problem	<ul style="list-style-type: none"> Primary HO2S (Sensor 1) ECM/PCM 	11-A-58
P1165*3 (61)	Primary Heated Oxygen Sensor (Sensor 1) Circuit Range/ Performance Problem	<ul style="list-style-type: none"> Primary HO2S (Sensor 1) ECM/PCM 	11-A-54
P1166*3 (41)	Primary Heated Oxygen Sensor (Sensor 1) Heater System Electrical Problem	<ul style="list-style-type: none"> Open or short in Primary HO2S (Sensor 1) circuit Primary HO2S (Sensor 1) ECM/PCM 	11-A-64
P1167*3 (41)	Primary Heated Oxygen Sensor (Sensor 1) Heater System Malfunction	<ul style="list-style-type: none"> Open or short in Primary HO2S (Sensor 1) circuit Primary HO2S (Sensor 1) ECM/PCM 	11-A-66
P1259 (22)	VTEC System Malfunction	<ul style="list-style-type: none"> VTEC Solenoid Valve Open or short in VTEC Solenoid Valve circuit VTEC Pressure Switch Open or short in VTEC Pressure Switch circuit ECM/PCM 	Section 6

*: These DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS short connector connected.

**: The  indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T *3: F20B6 engine

*2: M/T *4: H22A7 engine



DTC (MIL indication)	Detection Item	Probable Cause	Page
P1359 (8)	Crankshaft Position/Top Dead Center Sensor Connector Disconnection	• CKP/TDC sensor circuit	11-A-76
P1361 (8)	Top Dead Center Sensor Intermittent Interruption	• TDC sensor	11-A-74
P1362 (8)	Top Dead Center Sensor No Signal	• TDC sensor • TDC sensor circuit • ECM/PCM	11-A-74
P1381 (9)	Cylinder Position Sensor Intermittent Interruption	• CYP sensor	11-A-79
P1382 (9)	Cylinder Position Sensor No Signal	• CYP sensor • CYP sensor circuit • ECM/PCM	11-A-79
P1491 (12)	EGR Valve Lift Insufficient Detected	• EGR valve (with lift sensor) • EGR valve lift sensor circuit • EGR valve circuit • EGR line • ECM/PCM	11-A-140
P1498 (12)	EGR Valve Lift Sensor High Voltage	• EGR valve (with lift sensor) • EGR valve lift sensor circuit • ECM/PCM	11-A-142
P1519 (14)	Idle Air Control Valve Circuit Failure	• IAC valve • IAC valve circuit • ECM	11-A-84
P1607 (–)	Engine Control Module/Powertrain Control Module Internal Circuit Failure A	• ECM/PCM	11-A-81
P1705 P1706 P1738 P1739 P1753 P1768 P1773 P1791 (70)**	Automatic Transaxle	—	Section 14

*: These DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS short connector connected.

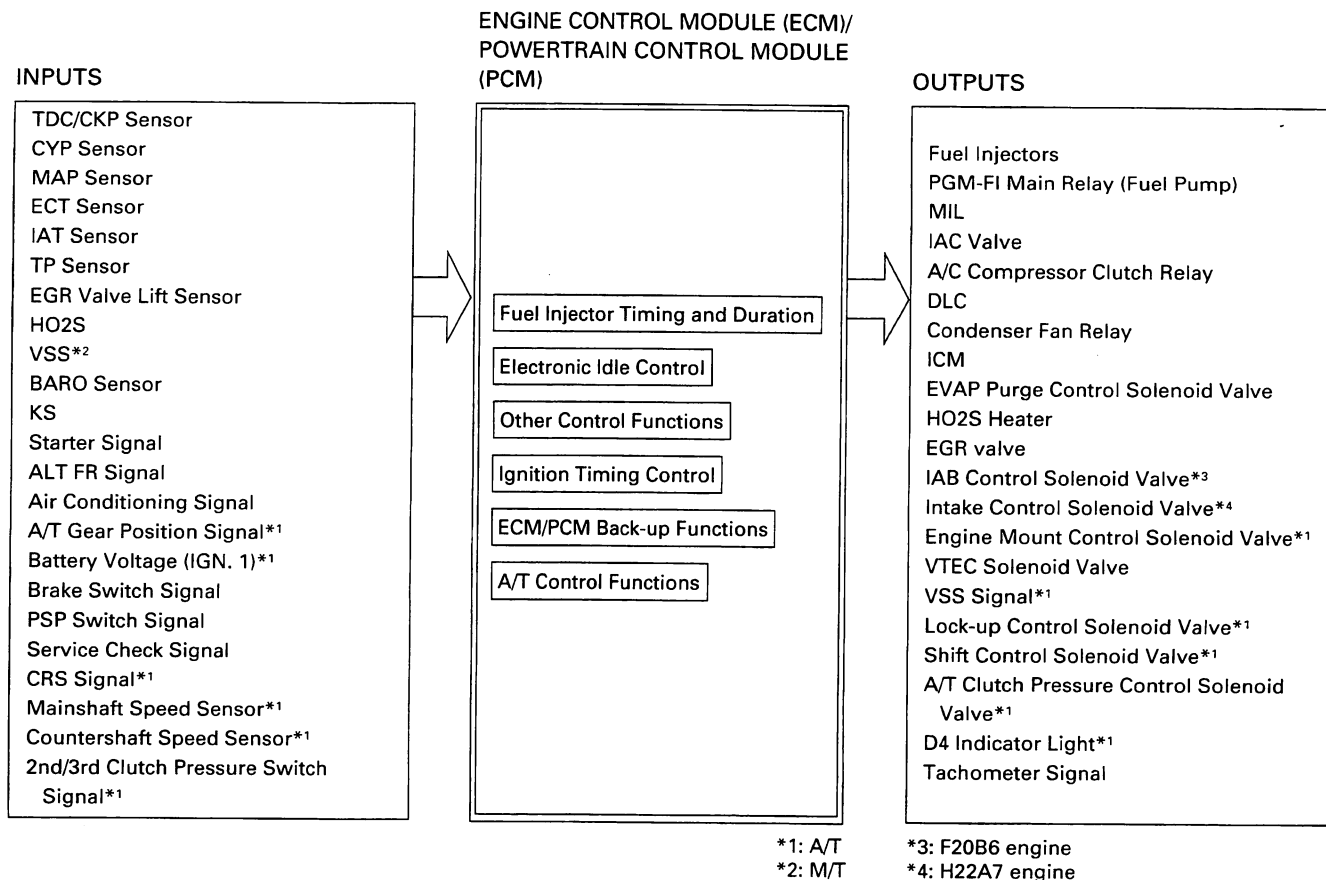
** : The  indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T

*2: M/T

PGM-FI System

System Description



PGM-FI System

The PGM-FI system on this model is a sequential multiport fuel injection system.

Fuel Injector Timing and Duration

The ECM/PCM contains memories for the basic discharge durations at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

Idle Air Control

When the engine is cold, the A/C compressor is on, the transmission is in gear*1, the brake pedal is depressed, the P/S load is high, or the alternator is charging, the ECM/PCM controls current to the IAC Valve to maintain the correct idle speed.

Ignition Timing Control

- The ECM/PCM contains memories for basic ignition timing at various engine speeds and manifold air flow rates. Ignition timing is also adjusted for engine coolant temperature.
- A knock control system is also used. When detonation is detected by a knock sensor (KS), the ignition timing is retarded.



Other Control Functions

1. **Starting Control**
When the engine is started, the ECM/PCM provides a rich mixture by increasing fuel injector duration.
2. **Fuel Pump Control**
 - When the ignition switch is initially turned ON (II), the ECM/PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pump for two seconds to pressurize the fuel system.
 - When the engine is running, the ECM/PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pump.
 - When the engine is not running and the ignition is ON (II), the ECM/PCM cuts ground to the PGM-FI main relay which cuts current to the fuel pump.
3. **Fuel Cut-off Control**
 - During deceleration with the throttle valve closed, current to the fuel injectors is cut off to improve fuel economy at speeds over 1,100 rpm (min^{-1}).
 - Fuel cut-off action also takes place when engine speed exceed 6,500 rpm (min^{-1}): F20B6 engine, 7,700 rpm (min^{-1}): H22A7 engine, regardless of the position of the throttle valve, to protect the engine from over-revving.
4. **A/C Compressor Clutch Relay**
When the ECM/PCM receives a demand for cooling from the air conditioning system, it delays the compressor from being energized, and enriches the mixture to assure smooth transition to the A/C mode.
5. **Intake Control Solenoid Valve*⁴**
When the engine speed is below 3,950 rpm (min^{-1}), the ECM supplies a ground to the intake control solenoid valve. This opens the solenoid valve sending intake manifold vacuum to the intake control diaphragm.
6. **Intake Air Bypass (IAB) Control Solenoid Valve*³**
When the engine rpm is below 4,200 rpm (min^{-1}), the IAB control solenoid valve is activated by a signal from the ECM/PCM, intake air flows through the long intake path, then high torque is delivered. At speeds higher than 4,200 rpm (min^{-1}), the solenoid valve is deactivated by the ECM/PCM, and intake air flows through the short intake path in order to reduce the resistance in airflow.
7. **Evaporative Emission (EVAP) Purge Control Solenoid Valve**
When the engine coolant temperature is above 55°C (131°F): F20B6 engine, 65°C (149°F): H22A7 engine, the ECM/PCM controls the EVAP purge control solenoid valve which controls vacuum to the EVAP purge control canister.
8. **Exhaust Gas Recirculation (EGR) Control Solenoid Valve**
When the EGR is required for control of oxides of nitrogen (NOx) emissions, the ECM/PCM controls the EGR valve.

(cont'd)

PGM-FI System

System Description (cont'd)

ECM/PCM Fail-safe/Back-up Functions

1. **Fail-safe Function**
When an abnormality occurs in a signal from a sensor, the ECM/PCM ignores that signal and assumes a pre-programmed value for that sensor that allows the engine to continue to run.
2. **Back-up Function**
When an abnormality occurs in the ECM/PCM itself, the fuel injectors are controlled by a back-up circuit independent of the system in order to permit minimal driving.
3. **Self-diagnosis Function [Malfunction Indicator Lamp (MIL)]**
When an abnormality occurs in a signal from a sensor, the ECM/PCM supplies ground for the MIL and stores the code in erasable memory. When the ignition is initially turned ON (II), the ECM/PCM supplies ground for the MIL for two seconds to check the MIL bulb condition.
4. **Two Driving Cycle Detection Method**
To prevent false indications, the "two driving cycle detection method" is used for the EGR system and other self-diagnostic functions. When an abnormality occurs, the ECM/PCM stores it in its memory. When the same abnormality recurs after switch is turned OFF and ON (II) again, the ECM/PCM informs the driver by turning on the MIL.



How to Read Flowcharts

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. But beware: If you go off the "map" anywhere but a "stop" symbol, you can easily get lost.

START

(bold type)

Describes the conditions or situation to start a troubleshooting flowchart.

ACTION

Asks you to do something; perform a test, set up a condition etc.

DECISION

Asks you about the result of an action, then sends you in the appropriate troubleshooting direction.

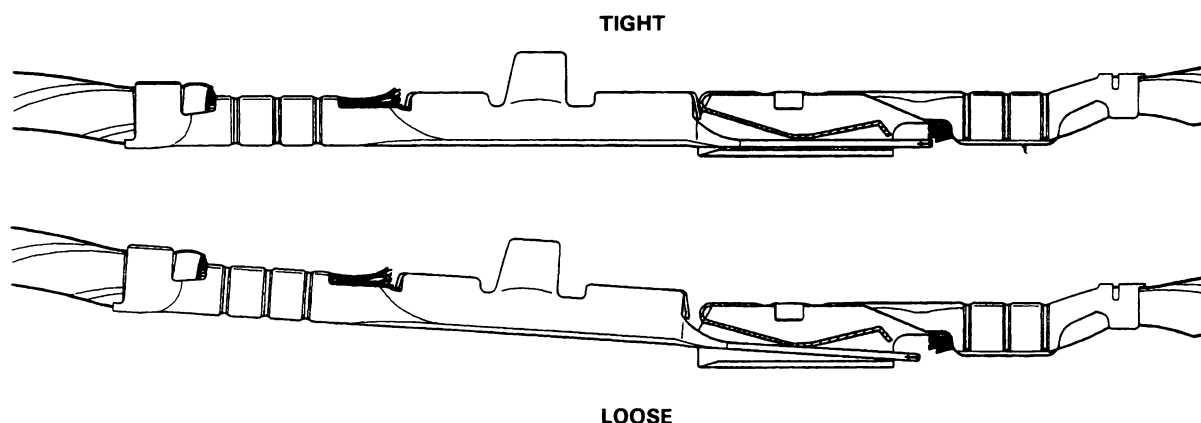
STOP

(bold type)

The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flowchart to confirm your repair.

NOTE:

- The term "Intermittent Failure" is used in these charts. It simply means a system may have had a failure, but it checks out OK at this time. If the Malfunction Indicator Lamp (MIL) on the dash does not come on, check for poor connections or loose wires at all connectors related to the circuit that you are troubleshooting (see illustration below).
- Most of the troubleshooting flowcharts have you reset the Engine Control Module (ECM)/Powertrain Control Module (PCM) and try to duplicate the Diagnostic Trouble Code (DTC). If the problem is intermittent and you can't duplicate the code, do not continue through the flowchart. To do so will only result in confusion and, possibly, a needlessly replaced ECM/PCM.
- "Open" and "Short" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something won't work at all. In complex electronics (like ECM's/PCM's), this can sometimes mean something works, but not the way it's supposed to.



PGM-FI System

Engine Control Module/Powertrain Control Module (ECM/PCM)

The Malfunction Indicator Lamp (MIL) never comes on (even for two seconds) after ignition is turned ON (II).

Check the inertia switch:

1. Press the inertia switch button.
2. Turn the ignition switch ON (II).

Does the MIL come on for two seconds after ignition switch turned ON (II)?

YES

Intermittent failure, system is OK at this time.

NO

Check the inertia switch:

1. Disconnect the inertia switch 3P connector.
2. Connect the inertia switch 3P connector terminals No. 1 and No. 3 with a jumper wire.

Does the MIL come on for two seconds after ignition switch turned ON (II)?

YES

Replace the inertia switch.

NO

Is the low oil pressure light on?

NO

- Repair short or open in the wire between No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse and gauge assembly.
- Replace No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse.

YES

Try to start the engine.

Does the engine start?

YES

Check for an open in the wire or bulb (MIL line):

1. Turn the ignition switch OFF.
2. Connect the ECM/PCM connector terminal A18 to body ground with a jumper wire.
3. Turn the ignition switch ON (II).

Is the MIL on?

NO

- Repair open in the wires between ECM/PCM (A18) and gauge assembly.
- Replace the MIL bulb.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

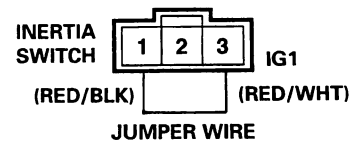
(To page 11-A-35)

NOTE:

• If this symptom is intermittent, check for:

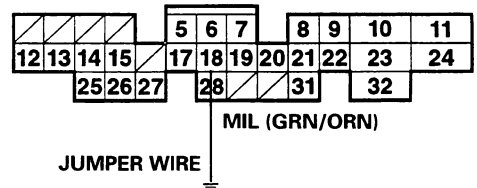
- A loose ACGS (15 A) fuse in the under-hood fuse/relay box
- A loose No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse in the driver's under-dash fuse/relay box
- A loose No. 1 FUEL PUMP (15 A) fuse in the driver's under-dash fuse/relay box
- An intermittent short in the wire between the ECM/PCM (A18) and the gauge assembly
- An intermittent short in the wire between the ECM/PCM (C19) and the MAP sensor, countershaft speed sensor
- An intermittent short in the wire between the ECM/PCM (C28) and the TP sensor, the EGR valve lift sensor, mainshaft speed sensor
- PGM-FI main relay

INERTIA SWITCH 3P CONNECTOR



Terminal side of male terminals

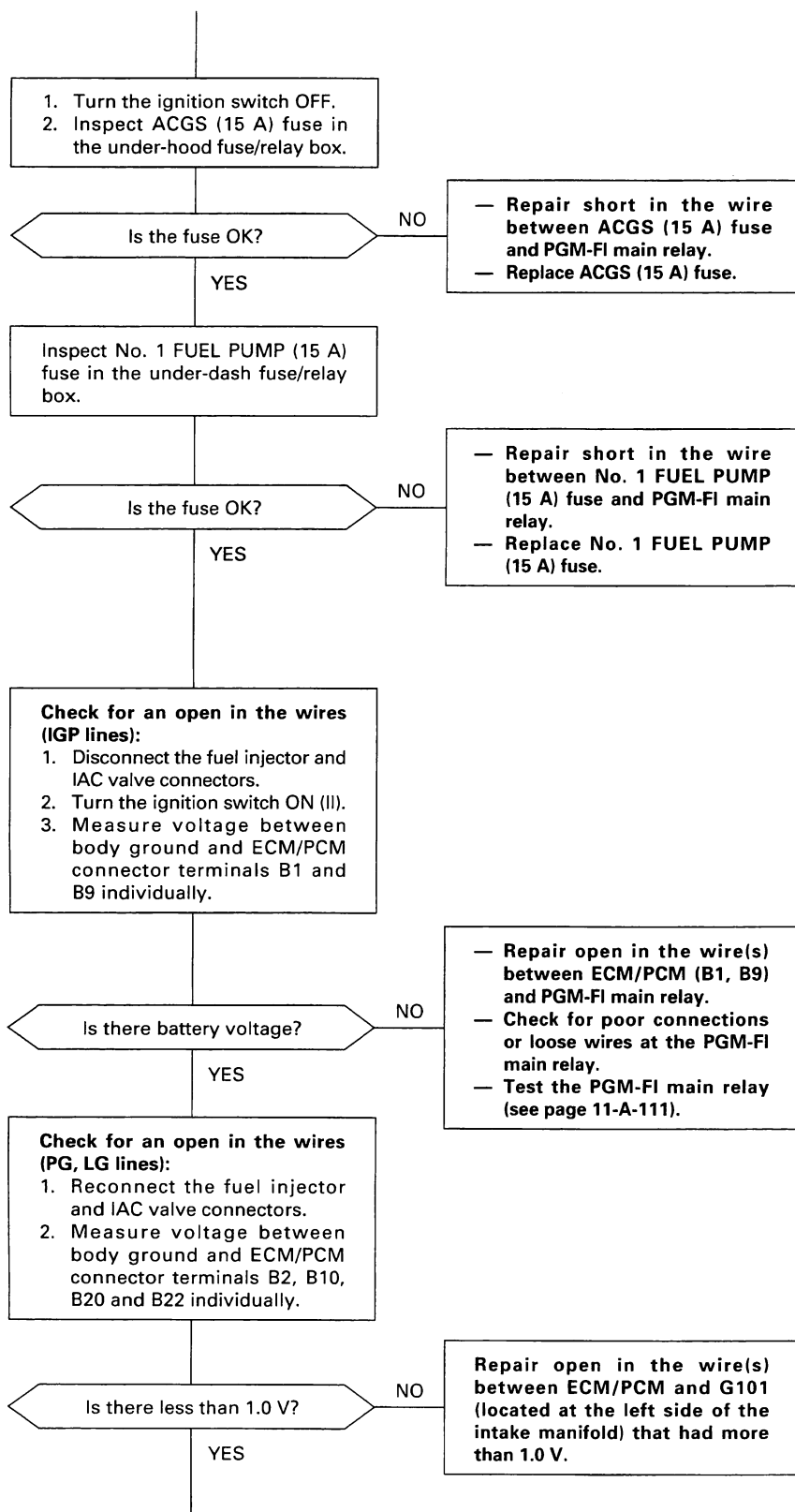
ECM/PCM CONNECTOR A (32P)



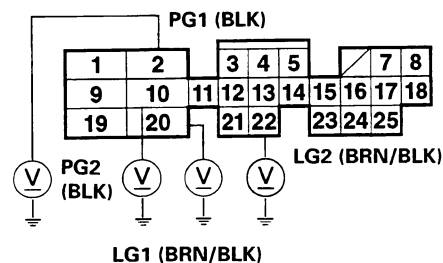
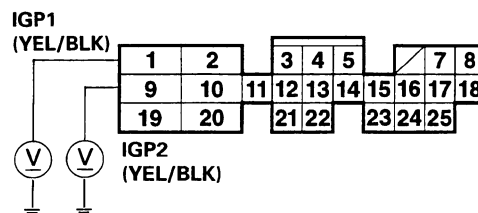
Wire side of female terminal



(From page 11-A-34)



ECM/PCM CONNECTOR B (25P)

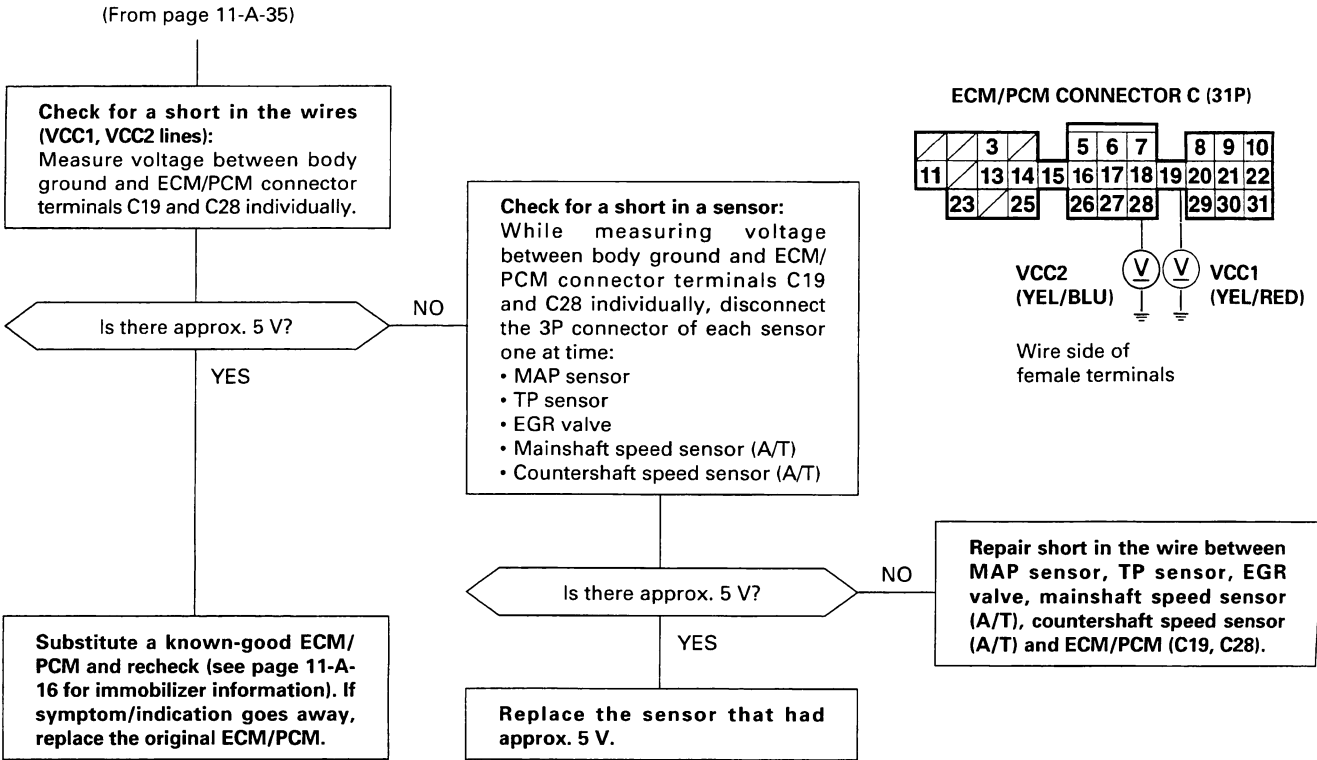


(cont'd)

(To page 11-A-36)

PGM-FI System

Engine Control Module/Powertrain Control Module (ECM/PCM) (cont'd)





The Malfunction Indicator Lamp (MIL) stays on or comes on after two seconds.

Check the Diagnostic Trouble Code (DTC):
 1. Connect a scan tool or Honda PGM Tester.
 2. Turn the ignition switch ON (II).
 3. Read the DTC with the scan tool or Honda PGM Tester.

Are any DTC(s) indicated?

YES

Go to troubleshooting procedures. (see page 11-A-15)

NO

Check the DTC by MIL indication:
 1. Turn the ignition switch OFF.
 2. Connect the SCS short connector to the service check connector.
 3. Turn the ignition switch ON (II).

Does the MIL indicate any DTC?

YES

— Repair open or short in wire between the ECM/PCM (A21) and Data Link Connector.
 — Go to troubleshooting procedures. (see page 11-A-15)

NO

Try to start the engine.

Does the engine start?

NO

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

YES

Check for a short in the wire (SCS line):
 1. Turn the ignition switch OFF and turn the ignition switch ON (II).
 2. Measure voltage between body ground and the ECM/PCM connector terminal A10.

Is there battery voltage?

NO

Repair short to body ground in the wire between ECM/PCM (A10) and service check connector.

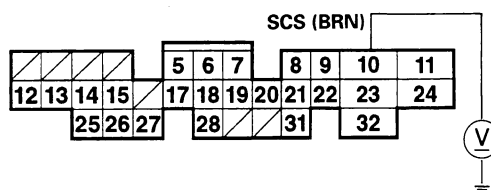
YES

(To page 11-A-38)

NOTE:

- When there is no Diagnostic Trouble Code (DTC) stored, the MIL will stay on if the SCS short connector is connected and the ignition switch is ON (II).
- If this symptom is intermittent, check for:
 - An intermittent short in the wire between the ECM/PCM (A10) and the service check connector
 - An intermittent short in the wire between the ECM/PCM (A18) and the gauge assembly
- See the scan tool or Honda PGM Tester user's manuals for specific operating instructions.

ECM/PCM CONNECTOR A (32P)



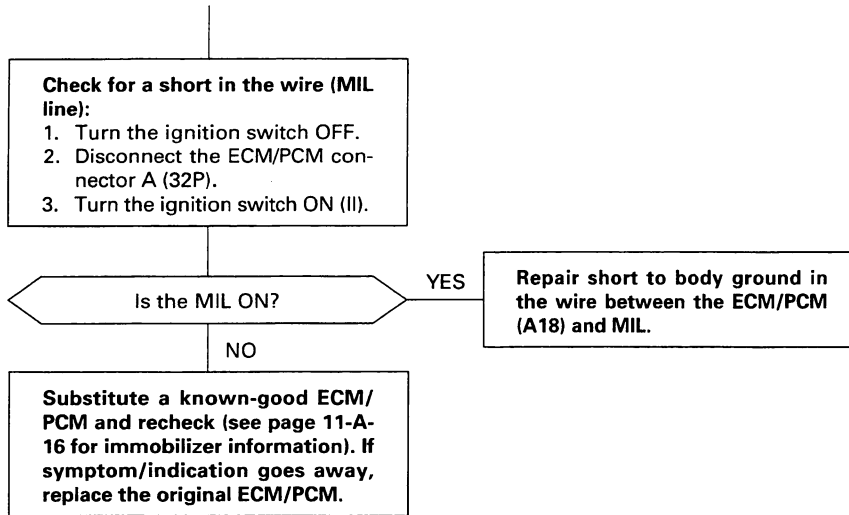
Wire side of female terminals

(cont'd)

PGM-FI System

Engine Control Module/Powertrain Control Module (ECM/PCM) (cont'd)

(From page 11-A-37)

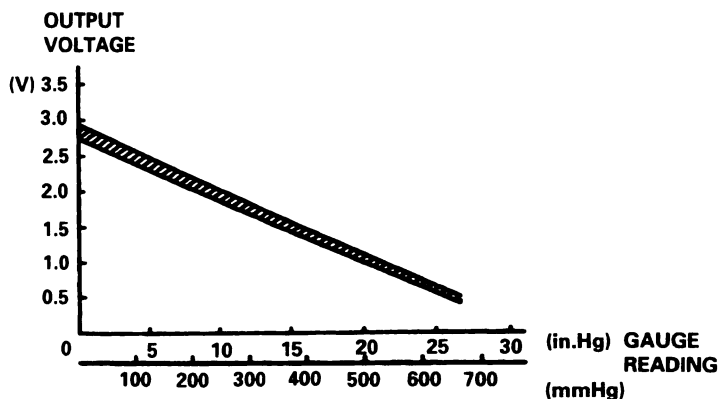
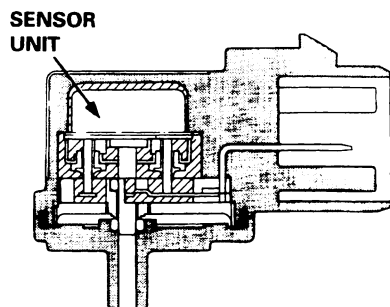




Manifold Absolute Pressure (MAP) Sensor

P0107 The scan tool indicates Diagnostic Trouble Code (DTC) P0107: A low input (high vacuum) problem in the Manifold Absolute Pressure (MAP) sensor.

The MAP sensor converts manifold absolute pressure into electrical signals and inputs the ECM/PCM.



— The MIL has been reported on.
— DTC P0107 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the MAP with the scan tool.

Is approx. 101 kPa (760 mmHg, 30 in.Hg) indicated?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at MAP sensor and ECM/PCM.

NO

Check for an open in wire (VCC1 line):

1. Turn the ignition switch OFF.
2. Disconnect the MAP sensor connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the MAP sensor connector No. 1 terminal and No. 2 terminal.

Is there approx. 5 V?

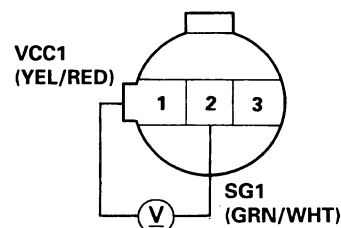
NO

Repair open in the wire between ECM/PCM (C19) and MAP sensor.

YES

(To page 11-A-40)

MAP SENSOR 3P CONNECTOR



Wire side of female terminals

(cont'd)

PGM-FI System

Manifold Absolute Pressure (MAP) Sensor (cont'd)

(From page 11-A-39)

Check for an open or short in the MAP sensor:
Check the MAP with the scan tool.

Is approx. 2 kPa (15 mmHg, 0.6 in.Hg) or less indicated?

NO

Replace the MAP sensor.

YES

Check for a short in the wire (MAP line):

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector C (31P).
3. Check for continuity between the MAP sensor connector No. 3 terminal and body ground.

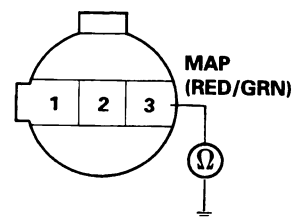
Is there continuity?

YES

Repair short in the wire between ECM/PCM (C17) and MAP sensor.

NO

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If normal MAP is indicated, replace the original ECM/PCM.





P0108

The scan tool indicates Diagnostic Trouble Code (DTC) P0108: A high voltage (low vacuum) problem in the Manifold Absolute Pressure (MAP) sensor.

- The MIL has been reported on.
- DTC P0108 is stored.

Problem verification:

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Check the MAP with the scan tool.

Is 101 kPa (760 mmHg, 30 in.Hg), 1.0 V or higher indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at MAP sensor and the ECM/PCM.

YES

Check for an open in the MAP sensor:

1. Turn the ignition switch OFF.
2. Disconnect the MAP sensor 3P connector.
3. Install a jumper wire between the MAP sensor 3P connector terminals No. 3 and No. 2.
4. Turn the ignition switch ON (II).
5. Check the MAP with the scan tool.

Is 101 kPa (760 mmHg, 30 in.Hg), 1.0 V or higher indicated?

NO

Replace the MAP sensor.

YES

Check for an open in wire (SG1 line):

1. Remove the jumper wire.
2. Measure voltage between the MAP sensor 3P connector terminals No. 1 and No. 2.

Is there approx. 5 V?

NO

Repair open in the wire between the ECM/PCM (C7) and the MAP sensor.

YES

Check for an open in the wire (MAP line):

1. Turn the ignition switch OFF.
2. Install a jumper wire on the ECM/PCM connectors between C7 and C17.
3. Turn the ignition switch ON (III).
4. Check the MAP with the scan tool.

Is 101 kPa (760 mmHg, 30 in.Hg), 1.0 V or higher indicated?

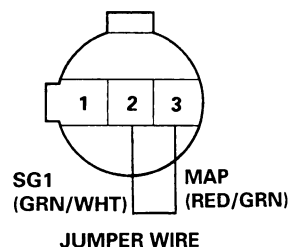
NO

Repair open in the wires between the ECM/PCM (C17) and the MAP sensor.

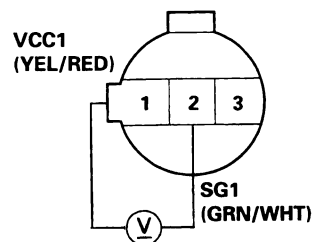
YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If normal MAP is indicated, replace the original ECM/PCM.

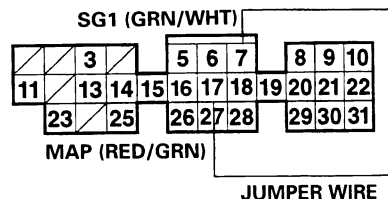
MAP SENSOR 3P CONNECTOR



Wire side of female terminals



ECM/PCM CONNECTOR C (31P)



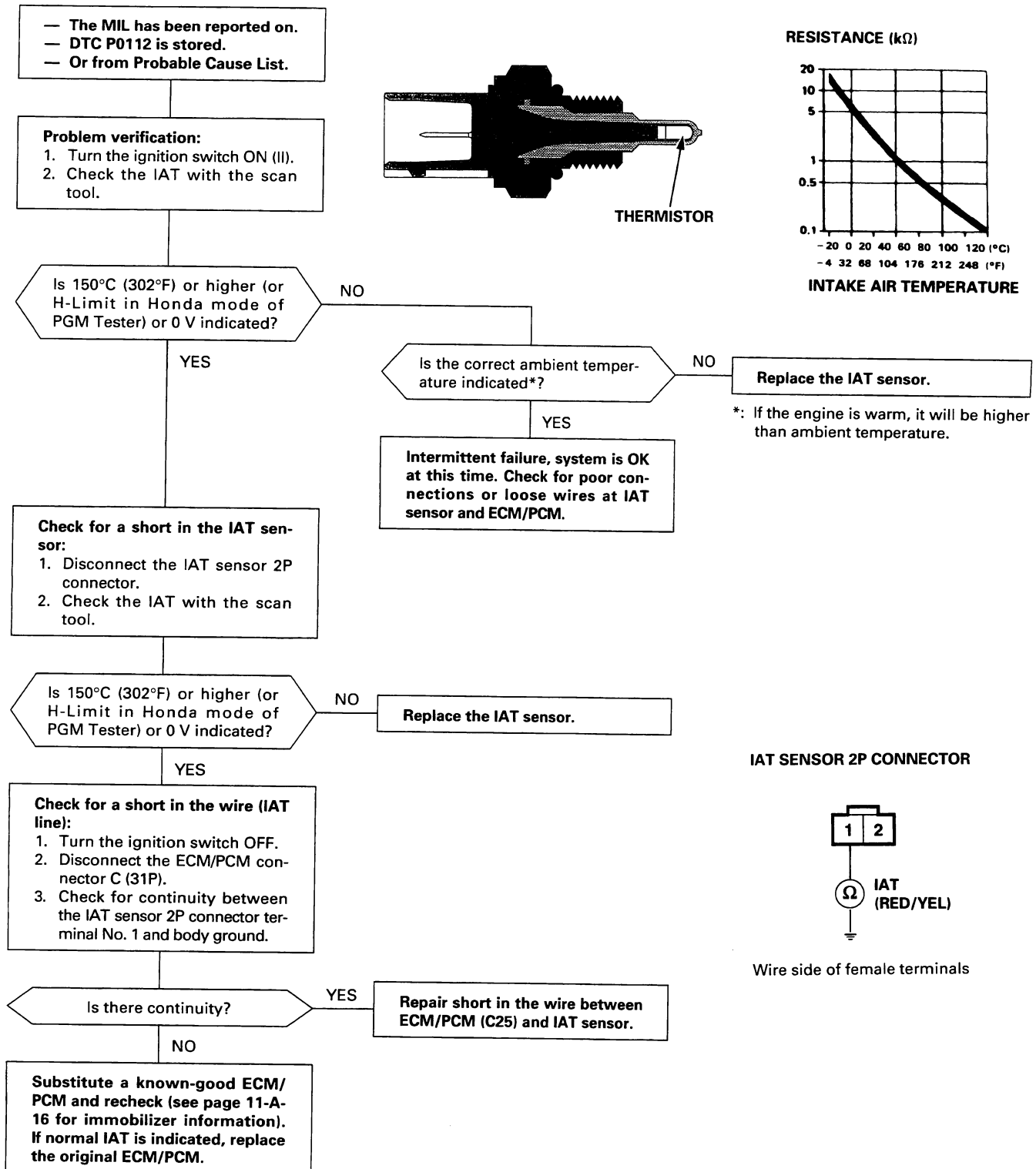
Wire side of female terminals

PGM-FI System

Intake Air Temperature (IAT) Sensor

P0112 The scan tool indicates Diagnostic Trouble Code (DTC) P0112: A low voltage (high temperature) problem in the Intake Air Temperature (IAT) sensor circuit.

The IAT Sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases as shown below.



**P0113**

The scan tool indicates Diagnostic Trouble Code (DTC) P0113: A high voltage (low temperature) problem in the Intake Air Temperature (IAT) sensor circuit.

- The MIL has been reported on.
- DTC P0113 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the IAT with the scan tool.

Is -20°C (-4°F) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

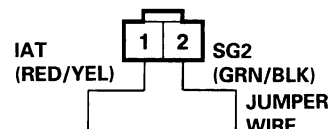
NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at IAT sensor and ECM/PCM.

YES

Check for an open in the IAT sensor:

1. Disconnect the IAT sensor 2P connector.
2. Connect the IAT sensor 2P connector terminals No. 1 and No. 2 with a jumper wire.
3. Check the intake air temperature with the scan tool.

IAT SENSOR 2P CONNECTOR

Wire side of female terminals

Is -20°C (-4°F) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

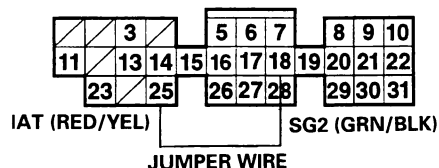
NO

Replace the IAT sensor.

YES

Check for an open in the wires (IAT, SG2 lines):

1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals C18 and C25 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the IAT with the scan tool.

ECM/PCM CONNECTOR C (31P)

Wire side of female terminals

Is -20°C (-4°F) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO

Repair open in the wires between ECM/PCM (C18, C25) and IAT sensor.

YES

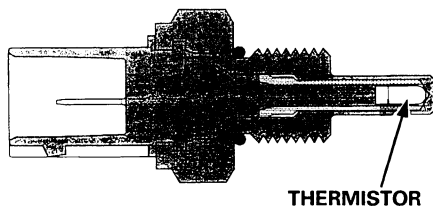
Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If normal IAT is indicated, replace the original ECM/PCM.

PGM-FI System

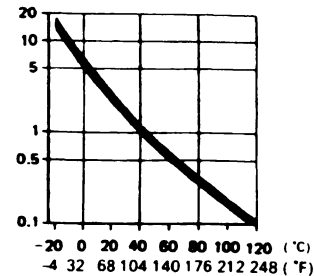
Engine Coolant Temperature (ECT) Sensor

P0117 The scan tool indicates Diagnostic Trouble Code (DTC) P0117: A low voltage (high temperature) problem in the Engine Coolant Temperature (ECT) sensor circuit.

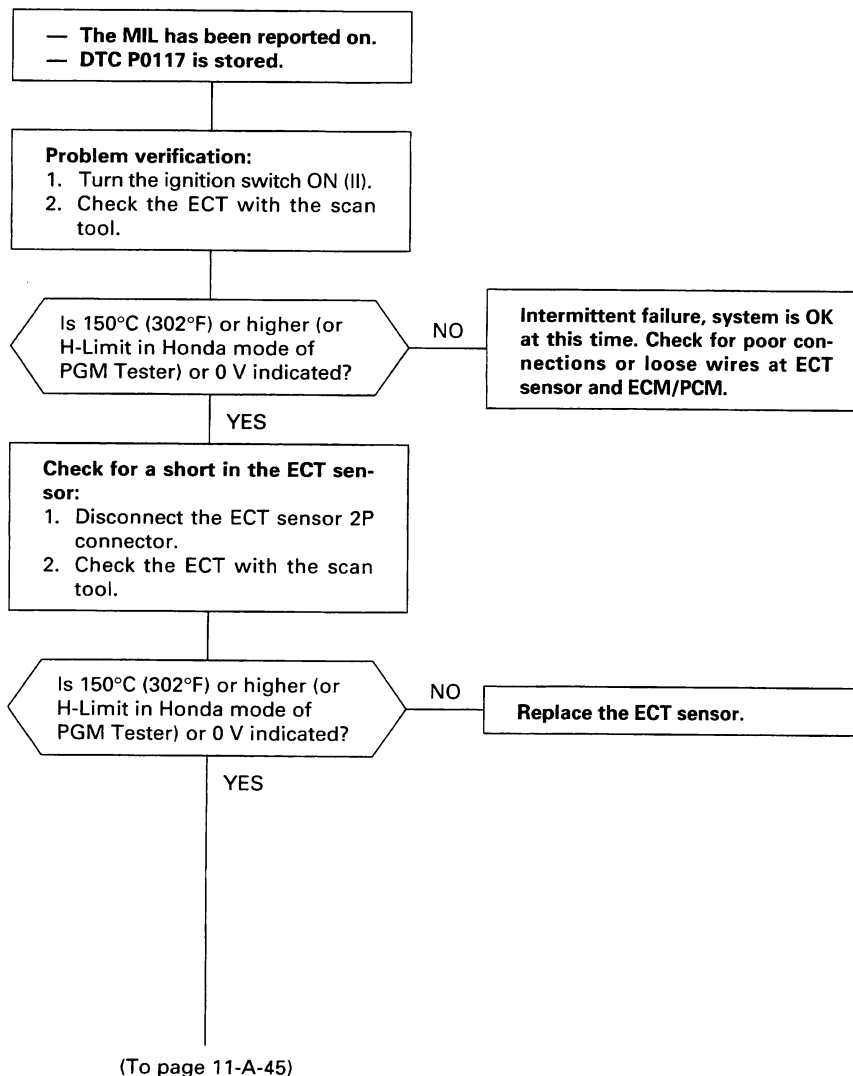
The ECT Sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases as shown below.



RESISTANCE
(k Ω)



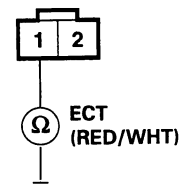
ENGINE COOLANT TEMPERATURE



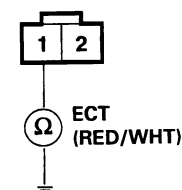
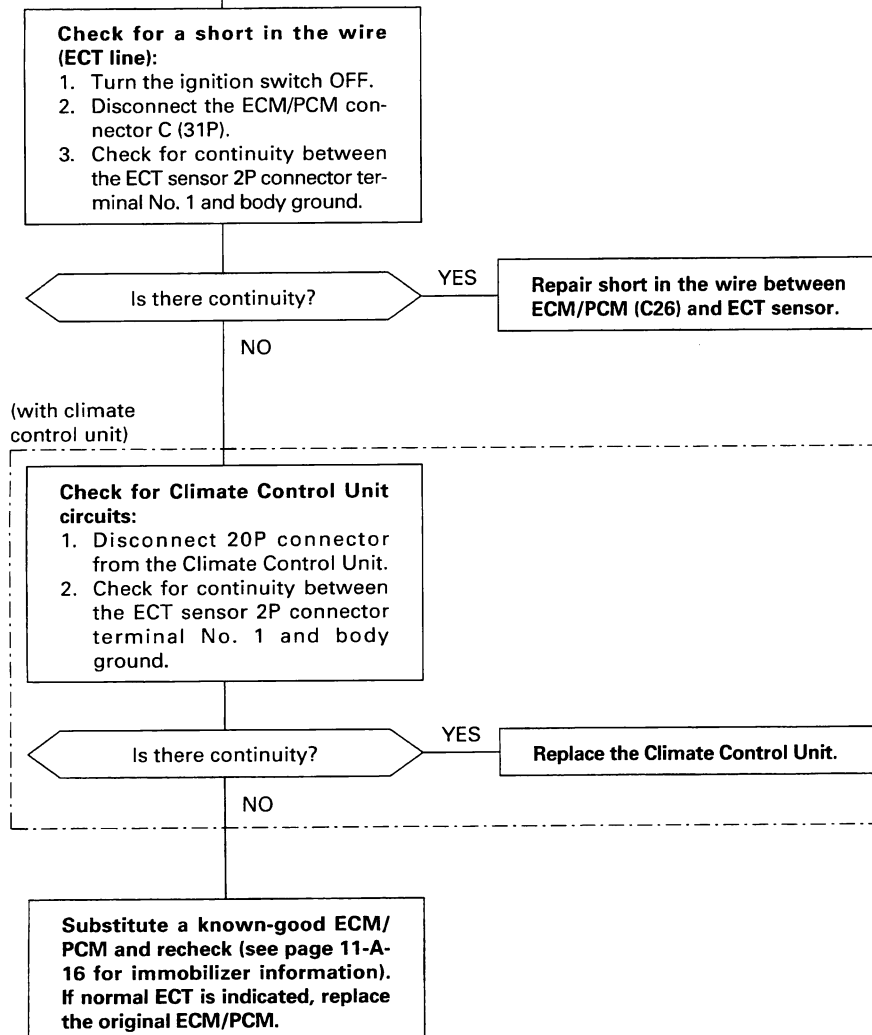


(From page 11-A-44)

ECT SENSOR 2P CONNECTOR



Wire side of female terminals



(cont'd)

PGM-FI System

Engine Coolant Temperature (ECT) Sensor (cont'd)

P0118 The scan tool indicates Diagnostic Trouble Code (DTC) P0118: A high voltage (low temperature) problem in the Engine Coolant Temperature (ECT) sensor circuit.

- The MIL has been reported on.
- DTC P0118 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the ECT with the scan tool.

Is -20°C (-4°F) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at ECT sensor and ECM/PCM.

YES

Check for an open in the ECT sensor:

1. Disconnect the ECT sensor 2P connector.
2. Connect the ECT sensor 2P connector terminals No. 1 and No. 2 with a jumper wire.
3. Check the ECT with the scan tool.

Is -20°C (-4°F) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO

Replace the ECT sensor.

YES

Check for an open in the wires (ECT, SG2 lines):

1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals C18 and C26 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the ECT with the scan tool.

Is -20°C (-4°F) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

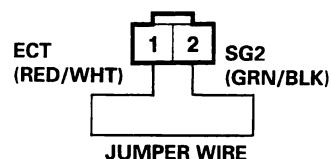
NO

Repair open in the wires between ECM/PCM (C18, C26) and ECT sensor.

YES

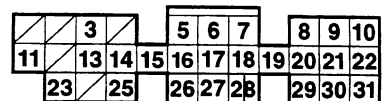
Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If normal ECT is indicated, replace the original ECM/PCM.

ECT SENSOR 2P CONNECTOR



Wire side of female terminals

ECM/PCM CONNECTOR C (31P)



ECT (RED/WHT) SG2 (GRN/BLK)

JUMPER WIRE

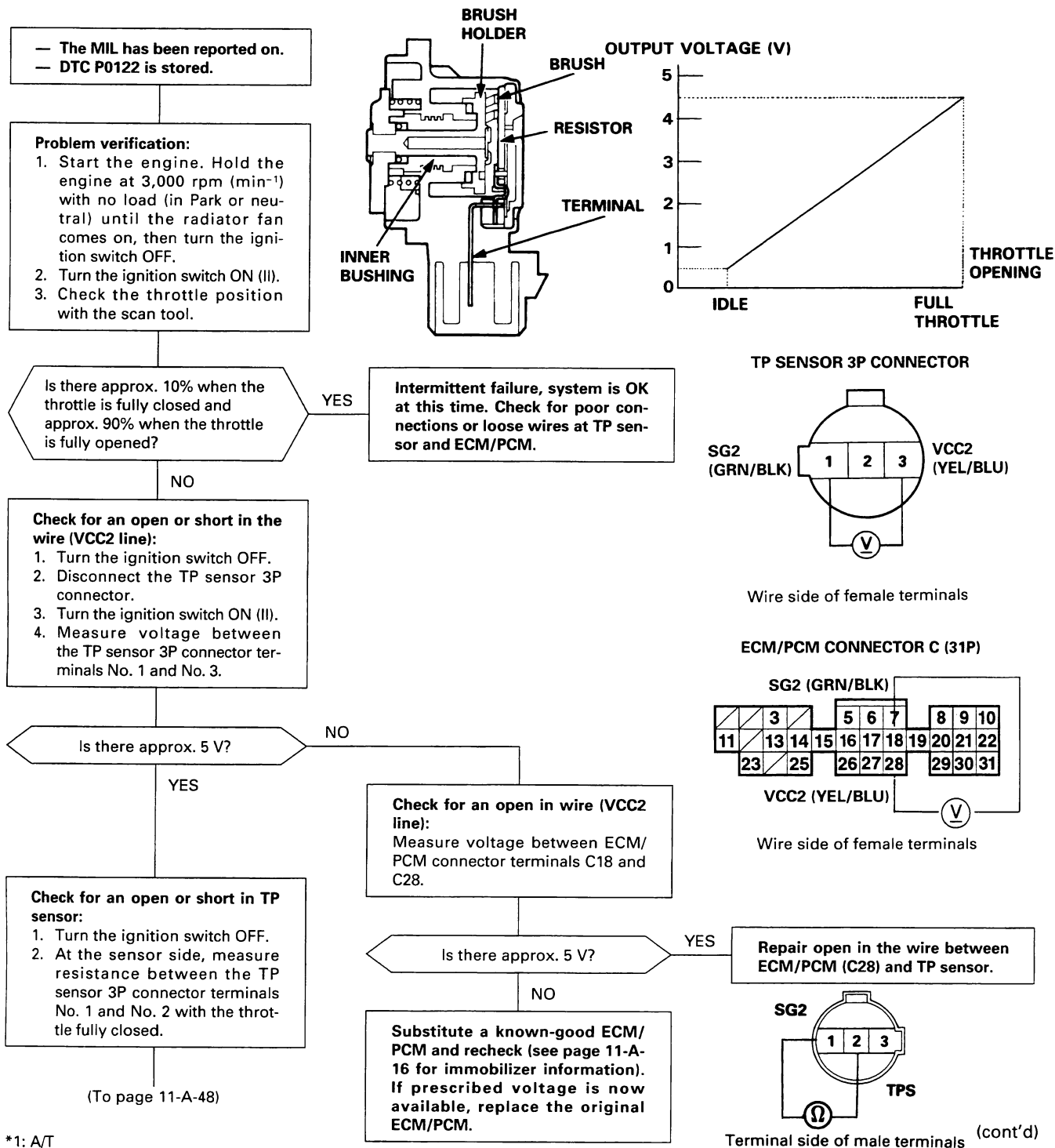
Wire side of female terminals



Throttle Position (TP) Sensor

P0122 The scan tool indicates Diagnostic Trouble Code (DTC) P0122: A low voltage problem in the Throttle Position (TP) sensor circuit.

The TP Sensor is a potentiometer. It is connected to the throttle valve shaft. As the throttle position changes, the throttle position sensor varies the voltage signal to the ECM/PCM.

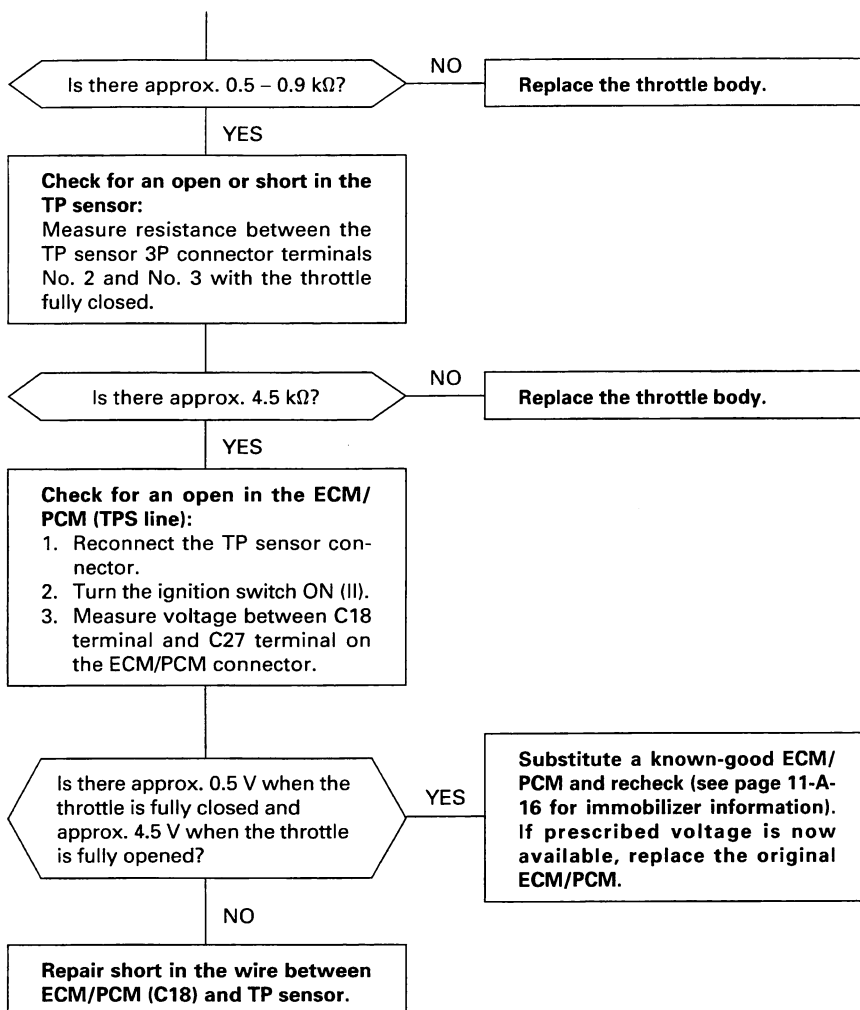


*1: A/T
*2: M/T

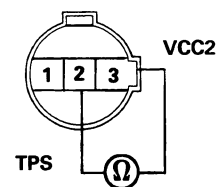
PGM-FI System

Throttle Position (TP) Sensor (cont'd)

(From page 11-A-47)

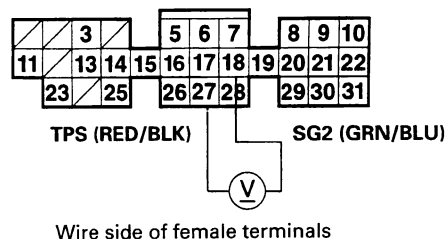


TP SENSOR 3P CONNECTOR



Terminal side of male terminals

ECM/PCM CONNECTOR C (31P)





P0123 The scan tool indicates Diagnostic Trouble Code (DTC) P0123: A high voltage problem in the Throttle Position (TP) sensor circuit.

- The MIL has been reported on.
- DTC P0123 is stored.

Problem verification:

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. Check the throttle position with the scan tool.

Is there approx. 10% when the throttle is fully closed and approx. 90% when the throttle is fully opened?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at TP sensor and ECM/PCM.

NO

Check for an open in the TP sensor:

1. Turn the ignition switch OFF.
2. Disconnect the TP sensor 3P connector.
3. Turn the ignition switch ON (II).
4. At the wire harness side, measure voltage between the TP sensor 3P connector terminals No. 1 and No. 3.

Is there approx. 5 V?

YES

Replace the throttle body.

NO

Check for an open in the wire (SG2 line):

Measure voltage between ECM/PCM connector C (31P) terminals C18 and C28.

Is there approx. 5 V?

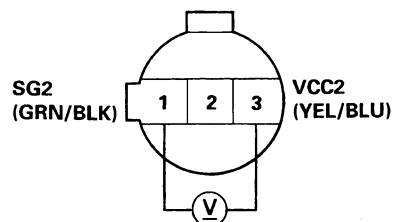
YES

Repair open in the wire between ECM/PCM (C18) and TP sensor.

NO

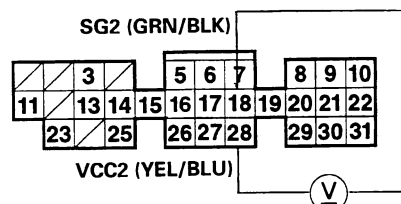
Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If prescribed voltage is now available, replace the original ECM/PCM.

TP SENSOR 3P CONNECTOR



Wire side of female terminals

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

*1: A/T

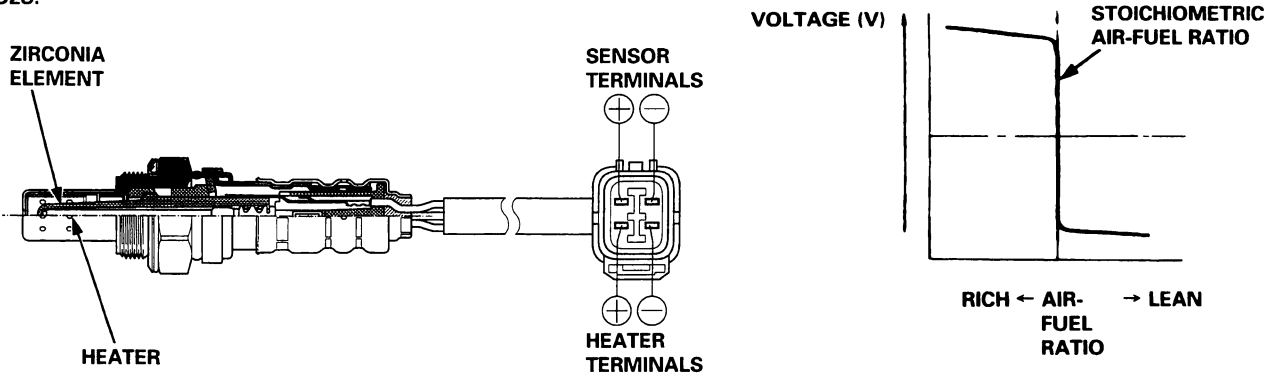
*2: M/T

PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (H22A7 engine)

The Heated Oxygen Sensors (HO2S) detect the oxygen content in the exhaust gas and signals the ECM. In operation, the ECM receives the signals from the sensor and varies the duration during which fuel is injected. To stabilize the sensor's output, the sensor has an internal heater. The Primary HO2S (Sensor 1) is installed in exhaust pipe A.

HO2S:



P0131

The scan tool indicates Diagnostic Trouble Code (DTC) P0131: A low voltage problem in the Primary Heated Oxygen Sensor (HO2S) (Sensor 1) circuit.

- The MIL has been reported on.
- DTC P0131 is stored.

Problem verification:

1. Do the ECM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on.
3. Check the Primary HO2S (Sensor 1) output voltage with the scan tool during acceleration using wide open throttle.

Does the voltage stay at 0.5 V or less?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Primary HO2S (Sensor 1) and ECM.

YES

Check the fuel pressure (see page 11-101).

Is it normal?

NO

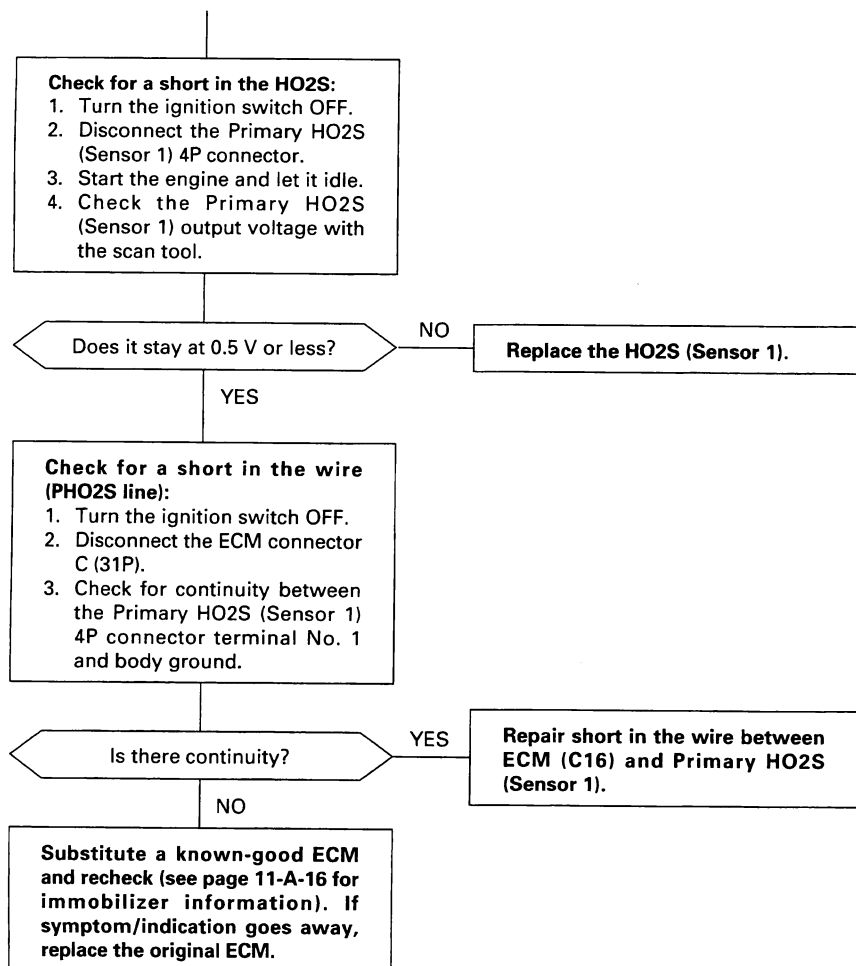
Repair fuel supply system.

YES

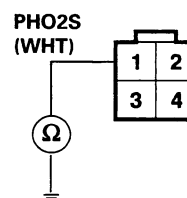
(To page 11-A-51)



(From page 11-A-50)



**PRIMARY HO2S (Sensor 1)
4P CONNECTOR**



Wire side of female terminals

(cont'd)

PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (H22A7 engine) (cont'd)

P0132 The scan tool indicates Diagnostic Trouble Code (DTC) P0132: A high voltage problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

- The MIL has been reported on.
- DTC P0132 is stored.

Problem verification:

1. Do the ECM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on.
3. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Does the voltage stay at 1.5 V or more?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Primary HO2S (Sensor 1) and ECM.

YES

Check for an open in the Primary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S (Sensor 1) connector.
3. Connect the Primary HO2S (Sensor 1) 4P connector terminals No. 1 and No. 2 with a jumper wire.
4. Turn the ignition switch ON (II).
5. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Is there 1.5 V or more?

NO

Replace the Primary HO2S.

YES

Check for an open in the wire (PHO2S line):

1. Turn the ignition switch OFF.
2. Connect ECM connector terminals C16 and C18 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Is there 1.5 V or more?

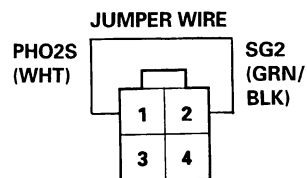
YES

Repair open in the wire between ECM (C16) and Primary HO2S (Sensor 1).

NO

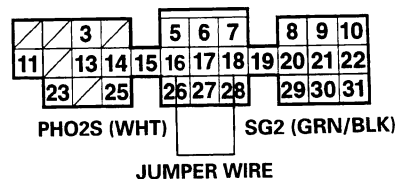
Substitute a known-good ECM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM.

PRIMARY HO2S (Sensor 1) 4P CONNECTOR



Wire side of female terminals

ECM CONNECTOR C (31P)



Wire side of female terminals



P0133 The scan tool indicates Diagnostic Trouble Code (DTC) P0133: A slow response problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

Description

By controlling the air/fuel ratio with a Primary HO2S (Sensor 1) and a Secondary HO2S (Sensor 2), the deterioration of the Primary HO2S (Sensor 1) can be evaluated by its feedback period. When the feedback period of the HO2S exceeds a certain value during stable driving conditions, the sensor will be judged as deteriorated.

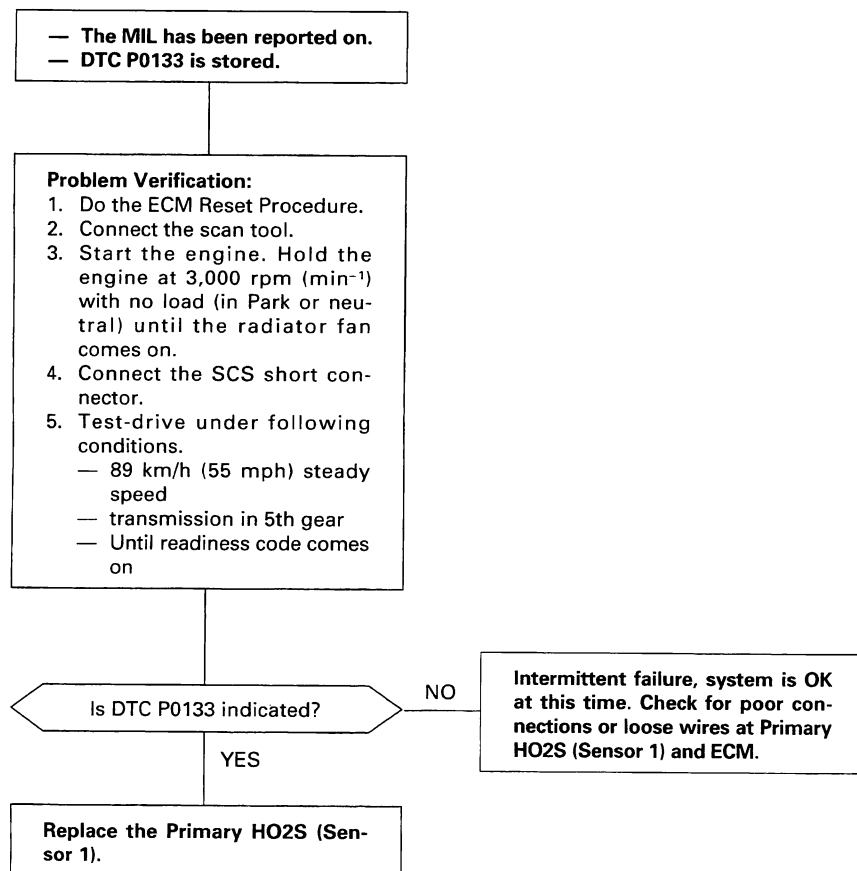
When deterioration has been detected during two consecutive trips, the MIL comes on and DTC P0133 will be stored.

NOTE: If DTC P0131, P0132 and/or P0135 are stored at the same time as DTC P0133, troubleshoot those DTCs first, then troubleshoot DTC P0133.

Possible Cause

- Primary HO2S (Sensor 1) Deterioration
- Primary HO2S Heater (Sensor 1) Deterioration
- Exhaust system leakage

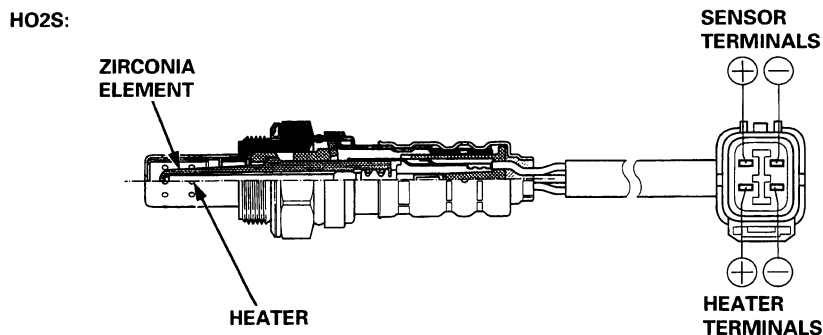
Troubleshooting Flowchart



PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (F20B6 engine)

The Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) operates over a wide air/fuel range. The Primary HO2S (Sensor 1) is installed in the exhaust manifold.



P1149 The scan tool indicates Diagnostic Trouble Code (DTC) P1149: A range/performance problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

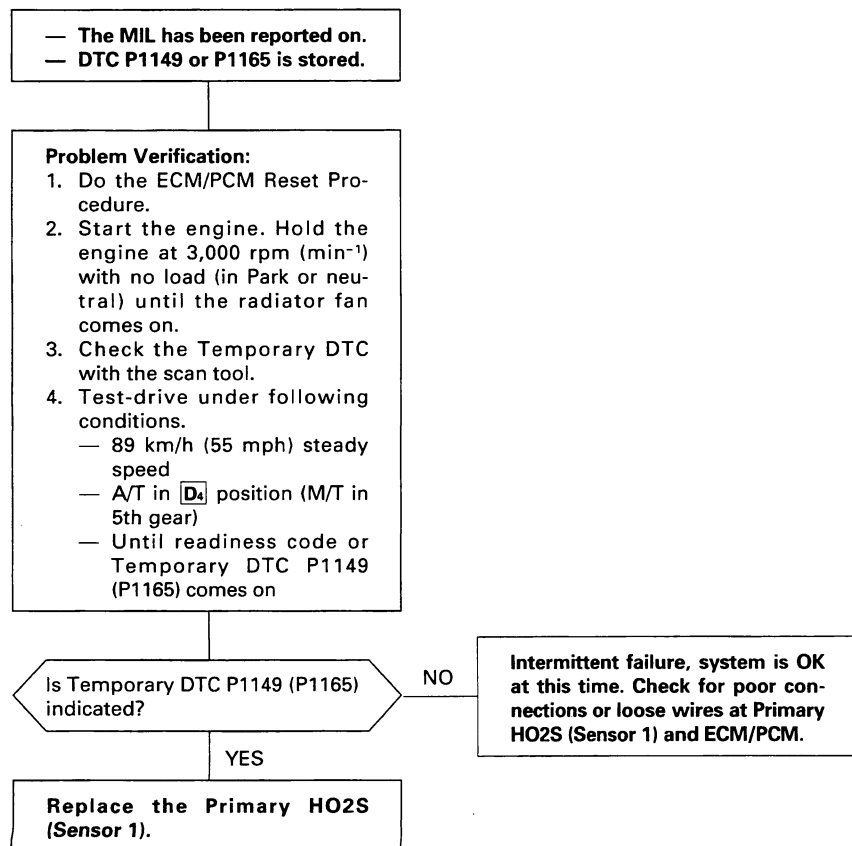
P1165 The scan tool indicates Diagnostic Trouble Code (DTC) P1165: A range/performance problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

NOTE: If some of the DTCs listed below are stored at the same time as DTC P1149 or P1165, troubleshoot those DTCs first, then troubleshoot DTC P1149 or P1165.

P0137, P0138: Secondary HO2S (sensor 2)

P0141: Secondary HO2S (sensor 2) Heater

Troubleshooting Flowchart





P1162

The scan tool indicates Diagnostic Trouble Code (DTC) P1162: A malfunction in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

Troubleshooting Flowchart

- The MIL has been reported on.
- DTC P1162 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine, and wait at least two minutes.

Is DTC P1162 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at the Primary HO2S (Sensor 1) and the ECM/PCM.

YES

Check for an open or short in the wires (PHO2S+, PHO2S- lines):

1. Turn the ignition switch OFF.
2. Start the engine.
3. Measure voltage between the ECM/PCM connector terminals C14 and B20 and between C15 and B20.

Is there 2.5 – 3.0 V?

NO

A (To page 11-A-56)

YES

Check for an open in the wires (PHO2S+, PHO2S- lines):

1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S 4P connector, and the ECM/PCM connector C (31P).
3. Check for continuity between the Primary HO2S (Sensor 1) 4P connector terminal No. 2 the and ECM/PCM connector terminal C14 and between Primary HO2S (Sensor 1) 4P connector terminal No. 1 and ECM/PCM connector terminal C15.

Is there continuity?

NO

Repair open in the wire between Primary HO2S (Sensor 1) and ECM/PCM (C14 or C15).

YES

Replace the Primary HO2S (Sensor 1).

ECM/PCM CONNECTORS

B (25P)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

LG1 (BRN/BLK)

C (31P)

PHO2S+ (RED)

V

V

PHO2S- (BLU)

Wire side of female terminals

PRIMARY HO2S (SENSOR 1) 4P CONNECTOR

1	2
3	4

PHO2S+ (RED)

Terminal side of male terminals

ECM/PCM CONNECTOR C (31P)

PHO2S- (BLU)

PHO2S+ (RED)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

PHO2S- (BLU)

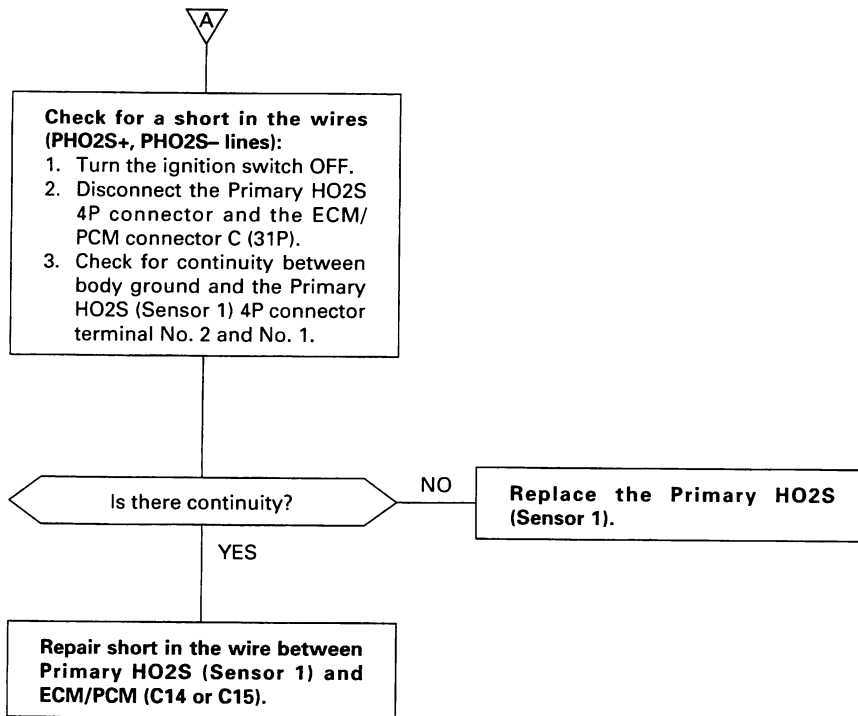
Wire side of female terminals

(cont'd)

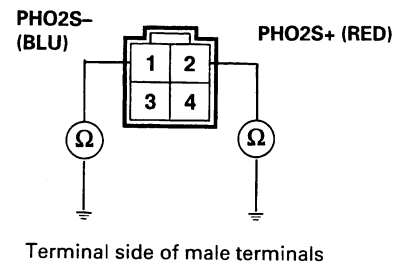
PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (F20B6 engine) (cont'd)

(From page 11-A-55)



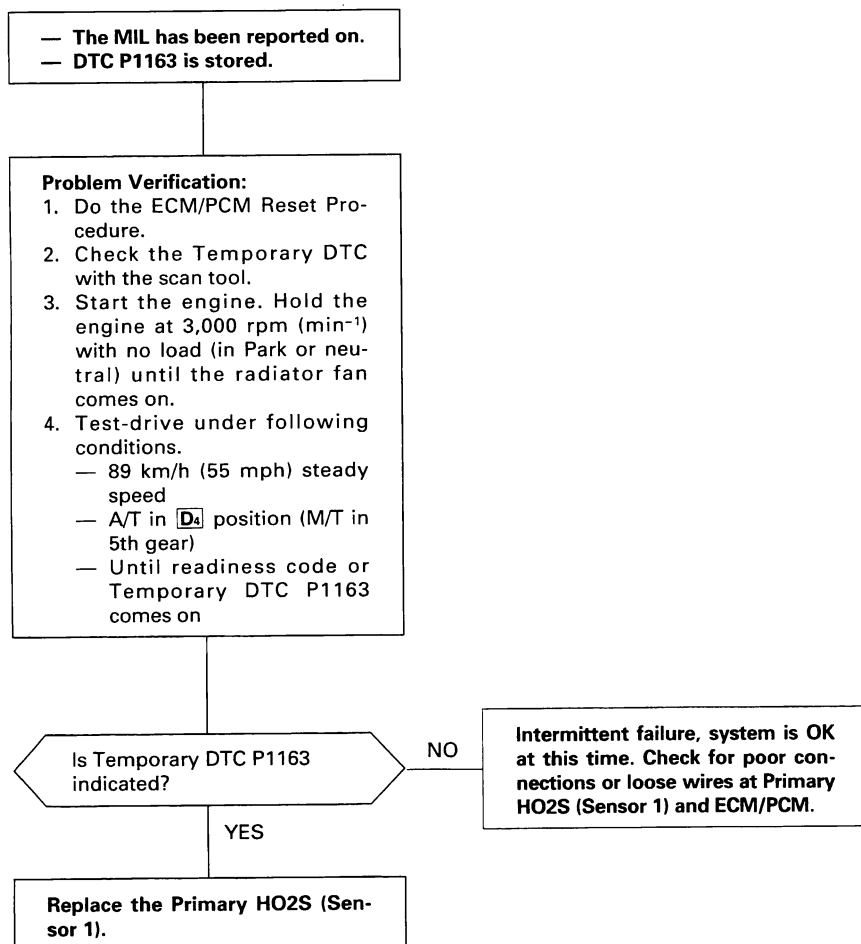
PRIMARY HO2S (SENSOR 1) 4P CONNECTOR



**P1163**

The scan tool indicates Diagnostic Trouble Code (DTC) P1163: A slow response problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

NOTE: If DTC P1162 is stored at the same time as DTC P1163, troubleshoot DTC P1162 first, then troubleshoot DTC P1163.

Troubleshooting Flowchart

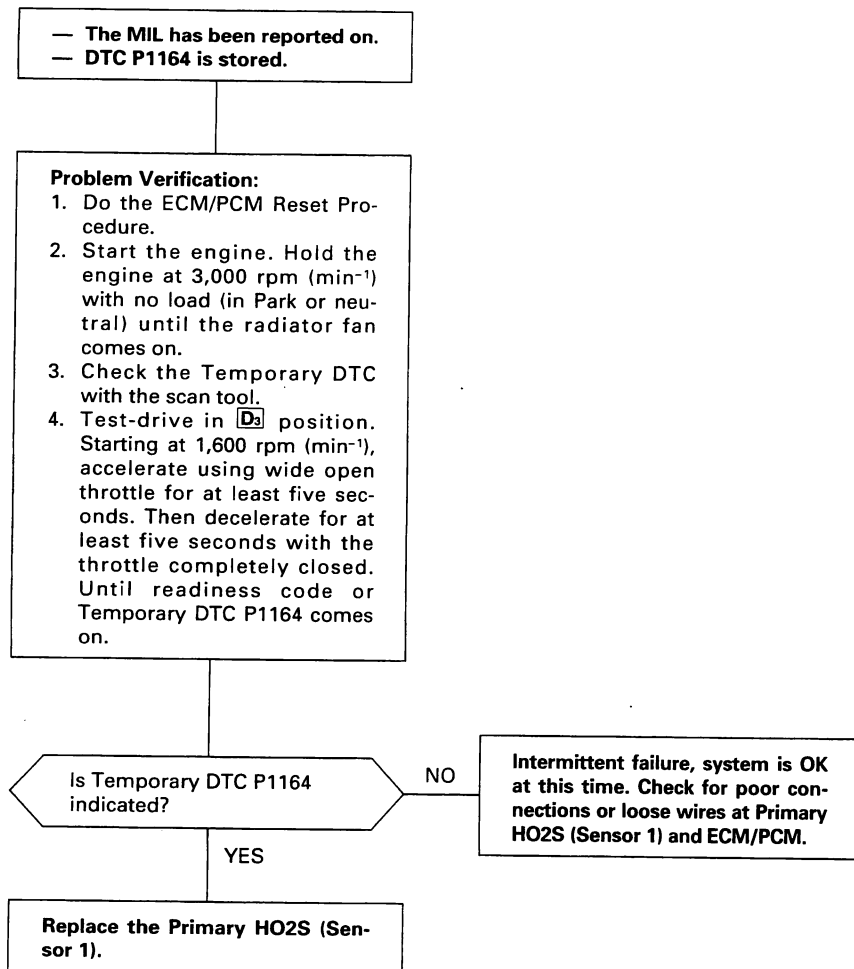
(cont'd)

PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (F20B6 engine) (cont'd)

P1164 The scan tool indicates Diagnostic Trouble Code (DTC) P1164: A Range/Performance problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

Troubleshooting Flowchart





Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2)

P0137

The scan tool indicates Diagnostic Trouble Code (DTC) P0137: A low voltage problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) circuit.

- The MIL has been reported on.
- DTC P0137 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on.
3. Check the Secondary HO2S (Sensor 2) output voltage at 3,000 rpm (min^{-1}) with the scan tool.

Does the voltage stay at 0.3 V or less?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Secondary HO2S (Sensor 2) and ECM/PCM.

YES

Check for a short in the Secondary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Secondary HO2S (Sensor 2) 4P connector.
3. Start the engine.
4. Check the Secondary HO2S (Sensor 2) output with the scan tool.

Does the voltage stay at 0.3 V or less?

NO

Replace the Secondary HO2S (Sensor 2).

YES

Check for a short in the wire (SHO2S line):

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Check for continuity between the Secondary HO2S (Sensor 2) 4P connector terminal No. 2 and body ground.

Is there continuity?

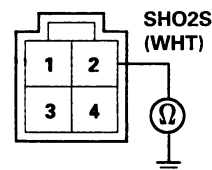
YES

Repair short in the wire between ECM/PCM (A23) and Secondary HO2S (Sensor 2).

NO

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

SECONDARY HO2S (Sensor 2) 4P CONNECTOR



Terminal side of male terminals

(cont'd)

PGM-FI System

Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) (cont'd)

P0138 The scan tool indicates Diagnostic Trouble Code (DTC) P0138: A high voltage problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) circuit.

- The MIL has been reported on.
- DTC P0138 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on.
3. Check the Secondary HO2S (Sensor 2) output voltage at 3,000 rpm (min^{-1}) with the scan tool.

Does the voltage stay at 0.6 V or more?

YES

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Secondary HO2S (Sensor 2) and ECM/PCM.

Check for an open in the Secondary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Secondary HO2S (Sensor 2) 4P connector.
3. Connect the Secondary HO2S (Sensor 2) 4P connector terminals No. 1 and No. 2 with a jumper wire.
4. Turn the ignition switch ON (II).
5. Check the Secondary HO2S (Sensor 2) output voltage with the scan tool.

Is there 0.6 V or more?

YES

NO

Replace the Secondary HO2S (Sensor 2).

Check for an open in the wire (SHO2S line):

1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals A23 and C18 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Secondary HO2S (Sensor 2) output voltage with the scan tool.

Is there 0.6 V or more?

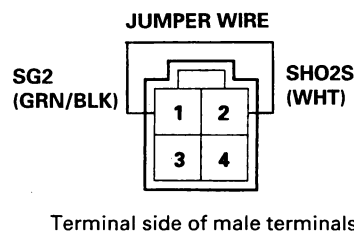
YES

NO

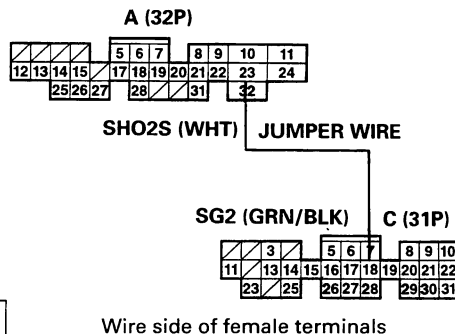
Repair open in the wire between ECM/PCM (A23) and Secondary HO2S (Sensor 2).

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

SECONDARY HO2S (Sensor 2) 4P CONNECTOR



ECM/PCM CONNECTORS



**P0139**

The scan tool indicates Diagnostic Trouble Code (DTC) P0139: A slow response problem in the Secondary Heated Oxygen Sensor (HO2S) (Sensor 2) circuit.

- The MIL has been reported on.
- DTC P0139 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on.
3. Check the Secondary HO2S (Sensor 2) output at 3,000 rpm (min^{-1}) with the scan tool.

Does the voltage stay within 0.3 – 0.6 V for two minutes?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Secondary HO2S (Sensor 2) and ECM/PCM.

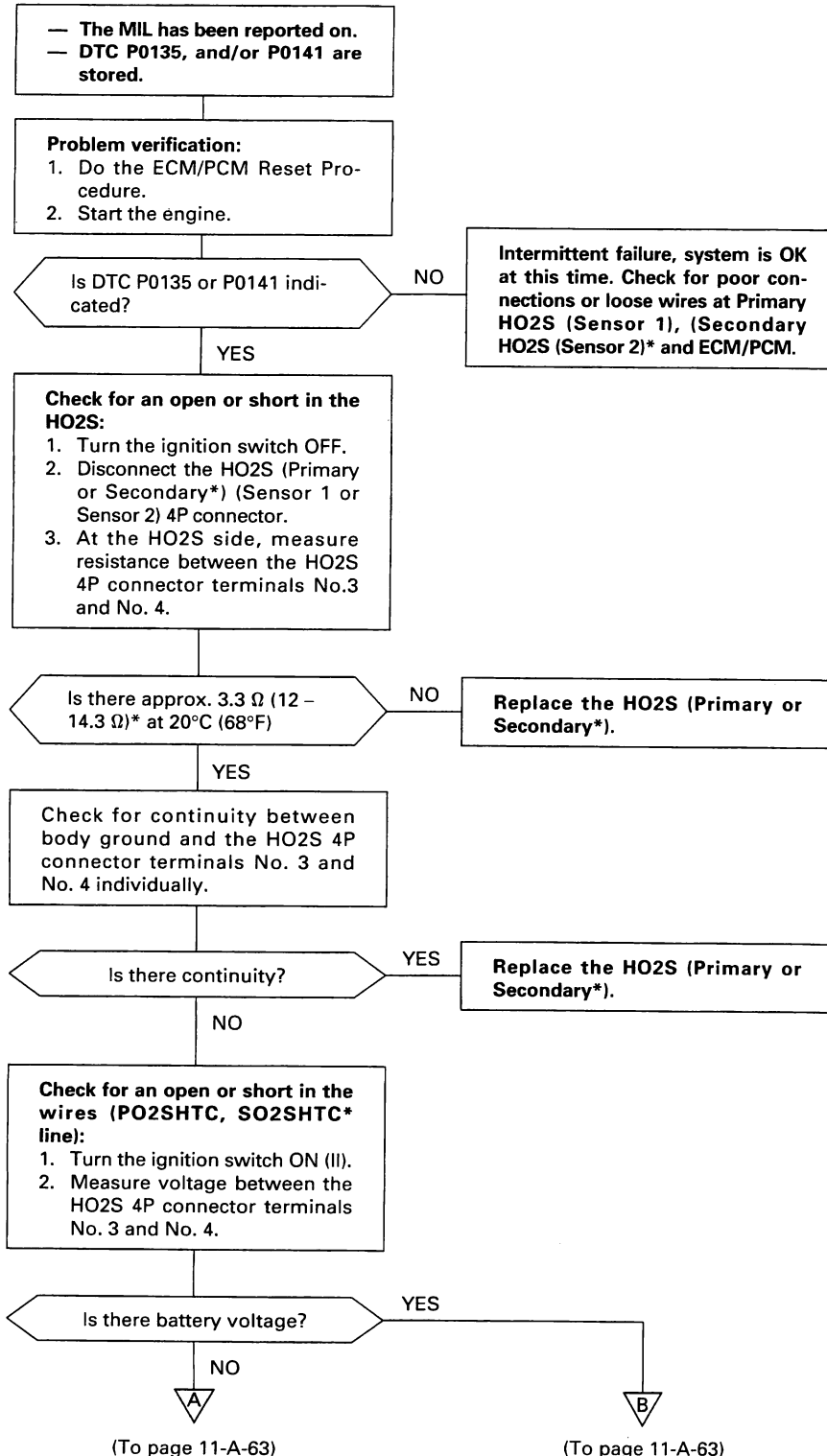
YES

Replace the Secondary HO2S (Sensor 2).

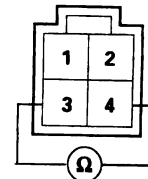
PGM-FI System

Heated Oxygen Sensor (HO2S) Heater

- P0135** The scan tool indicates Diagnostic Trouble Code (DTC) P0135: A problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Heater circuit (H22A7 engine).
- P0141** The scan tool indicates Diagnostic Trouble Code (DTC) P0141: A problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Heater circuit.

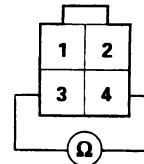


PRIMARY HO2S (Sensor 1) 4P CONNECTOR

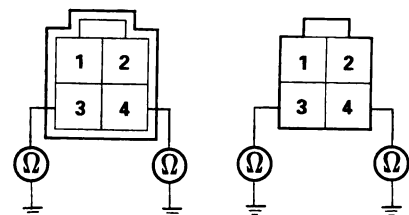


Terminal side of male terminals

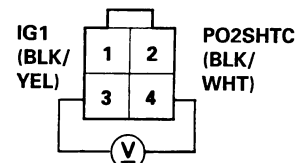
SECONDARY HO2S (Sensor 2) 4P CONNECTOR*



Wire side of female terminals

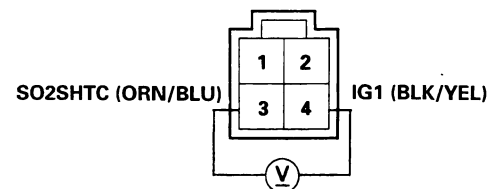


PRIMARY HO2S (Sensor 1) 4P CONNECTOR



Wire side of female terminals

SECONDARY HO2S (Sensor 2) 4P CONNECTOR*

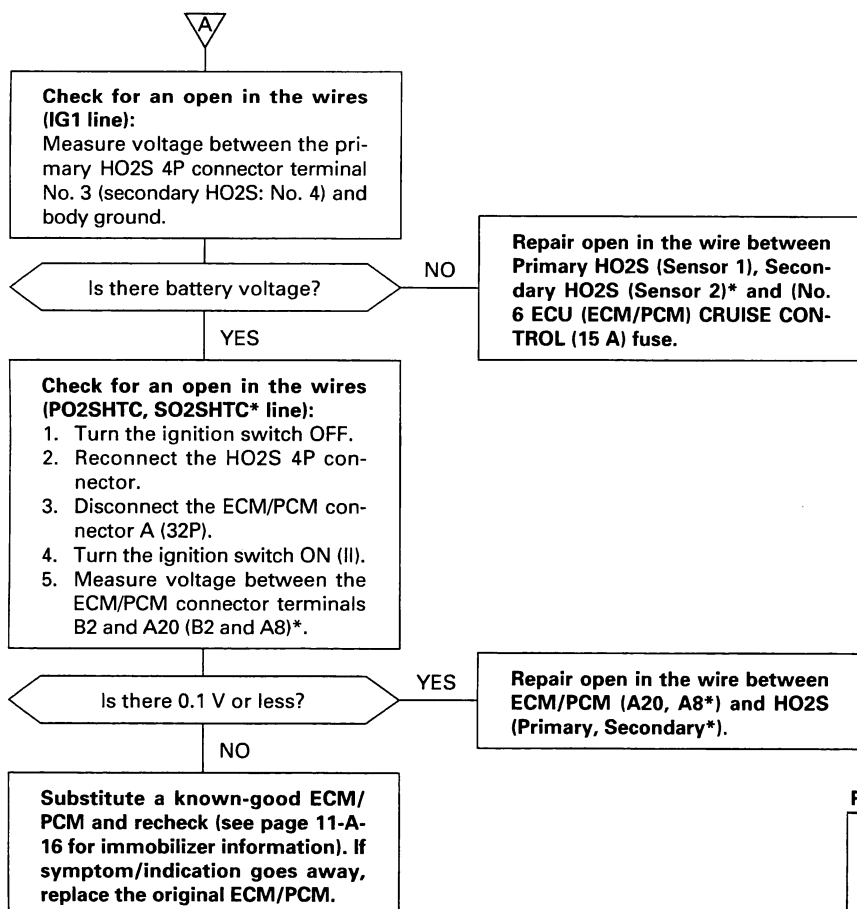


Terminal side of male terminals

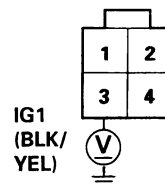
*: P0141



(From page 11-A-62)

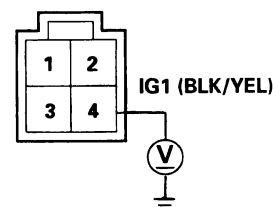


PRIMARY HO2S (Sensor 1) 4P CONNECTOR



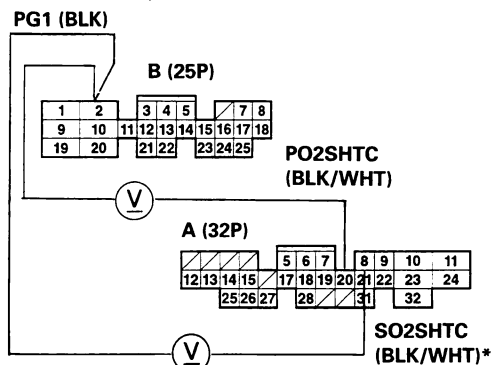
Wire side of female terminals

SECONDARY HO2S (Sensor 2) 4P CONNECTOR*



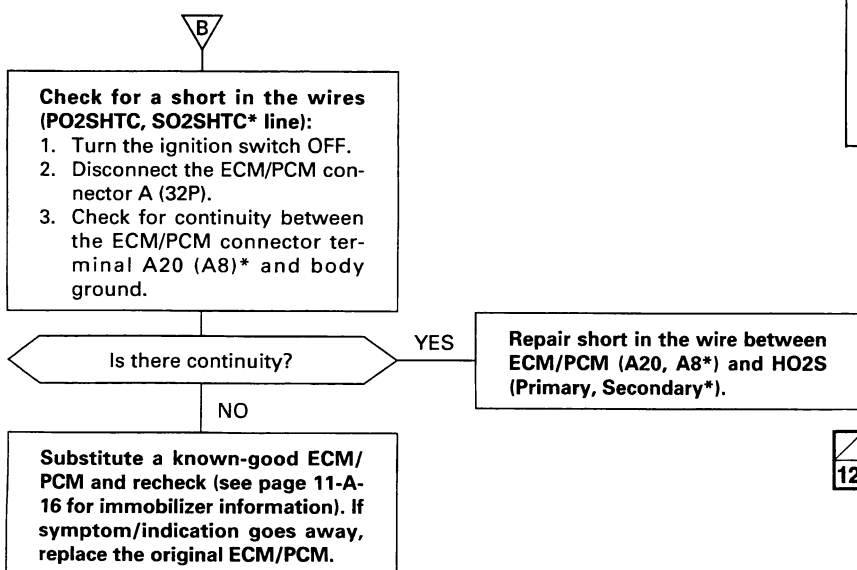
Terminal side of male terminals

ECM/PCM CONNECTORS

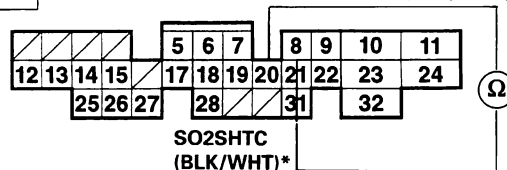


Wire side of female terminals

(From page 11-A-62)



ECM/PCM CONNECTOR PO2SHTC (BLK/WHT)



Wire side of female terminals

*: P0141

PGM-FI System

Heated Oxygen Sensor (HO2S) Heater (F20B6 engine)

P1166 The scan tool indicates Diagnostic Trouble Code (DTC) P1166: An electrical problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Heater circuit.

- The MIL has been reported on.
- DTC P1166 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine.

Is DTC P1166 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Primary HO2S (Sensor 1) and ECM/PCM.

YES

Check for an open or short in the wire (PHO2SHTC line):
Measure voltage between ECM/PCM connector terminals B19 and B20, 30 seconds after ignition switch is turned ON (II).

Is there battery voltage?

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

NO

Check for an open or short in the wire (PHO2SHTC + line):
Measure voltage between ECM/PCM connector terminals C13 and B20.

Is there battery voltage?

NO

A (To page 11-A-65)

YES

Check for an open or short in the wire (PHO2SHTC line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector B (25P).
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals B19 and B20.

Is there battery voltage?

NO

Repair open or short in the wire between Primary HO2S (Sensor 1) and ECM/PCM (B19).

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

ECM/PCM CONNECTOR B (25P)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

PHO2SHTC
(BLK/WHT)

LG1 (BRN/BLK)

Wire side of female terminals

ECM/PCM CONNECTORS

B (25P)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

LG1 (BRN/BLK)

C (31P)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

PHO2SHTC+
(WHT)

Wire side of female terminals

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

PHO2SHTC
(BLK/WHT)

LG1 (BRN/BLK)



(From page 11-A-64)



Check for a short in the wire (PHO2SHTC + line):

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector C (25P) and the Primary HO2S (Sensor 1) 4P connector.
3. Check for continuity between the Primary HO2S (Sensor 1) 4P connector terminal No. 4 and body ground.

Is there continuity?

YES

Repair short in the wire between Primary HO2S relay, Primary HO2S (Sensor 1) and ECM/PCM (C13).

NO

Check for a short in the wire (PHO2SHTCR line):

1. Turn the ignition switch ON (III).
2. Measure voltage between ECM/PCM connector terminals A20 and B20.

Is there battery voltage?

YES

Replace the Primary HO2S (Sensor 1).

NO

Check for a short in the wire:

Check the following fuses:

- HEATED SEAT (20 A) fuse in under-hood fuse/relay box.
- No. 6 ECU (ECM/PCM) CRUISE CONTROL (15 A) fuse in driver's under-dash fuse/relay box.
- No. 6 LAF HEATER (20 A) in passenger's under-dash fuse/relay box.

Are any of the fuses blown?

YES

Repair short in the wire between the primary HO2S relay and the fuses.

NO

Check for an open in the wire:

Check for continuity in the wires between the primary HO2S relay and the fuses.

Is there continuity?

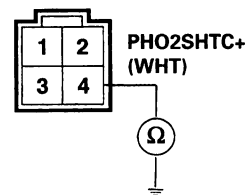
NO

Repair open in the wire between the primary HO2S relay and the fuses.

YES

The wires are OK, replace the primary HO2S relay.

PRIMARY HO2S (SENSOR 1) 4P CONNECTOR



Terminal side of male terminals

ECM/PCM CONNECTORS

A (32P)



PHO2SHTCR (GRN/RED)

B (25P)



LG1 (BRN/BLK)

Wire side of female terminals

(cont'd)

PGM-FI System

Heated Oxygen Sensor (HO2S) Heater (F20B6 engine) (cont'd)

P1167 The scan tool indicates Diagnostic Trouble Code (DTC) P1167: A system malfunction in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Heater circuit.

NOTE: If DTC P1162 is stored at the same time as DTC P1167, troubleshoot DTC P1162 first, then troubleshoot DTC P1167.

— The MIL has been reported on.
— DTC P1167 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. Wait for at least 80 seconds.

Does DTC P1167 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at Primary HO2S (Sensor 1) and ECM/PCM.

YES

Check for an open in the wire (PHO2S+, PHO2S- lines):

1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S 4P connector and the ECM/PCM connector C (31P).
3. Check for continuity between the Primary HO2S (Sensor 1) 4P connector terminal No. 2 and the ECM/PCM connector terminal C14 and between Primary HO2S (Sensor 1) 4P connector terminal No. 1 and ECM/PCM connector terminal C15.

Is there continuity?

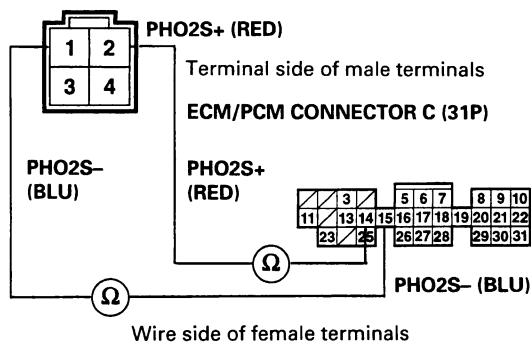
NO

Repair open in the wire between Primary HO2S (Sensor 1) and ECM/PCM (C14 or C15).

YES

Replace the Primary HO2S (Sensor 1).

PRIMARY HO2S (SENSOR 1) 4P CONNECTOR





Fuel Supply System

P0171 The scan tool indicates Diagnostic Trouble Code (DTC) P0171: The fuel system is too lean.

P0172 The scan tool indicates Diagnostic Trouble Code (DTC) P0172: The fuel system is too rich.

Description

By monitoring the Long Term Fuel Trim, long term malfunctions in the fuel system will be detected. If a malfunction has been detected during two consecutive trips, the MIL will come on and DTC P0171 and/or P0172 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as DTC P0171 and/or P0172, troubleshoot those DTCs first, then troubleshoot DTC P0171 and/or P0172.

P0107-8: MAP Sensor

P0135*¹, P1166*², P1167*²: Primary HO₂S (Sensor 1) Heater

P0137-8: Secondary HO₂S (Sensor 2)

P0141: Secondary HO₂S (Sensor 2) Heater

P0401: EGR Flow Insufficient

P0443: EVAP purge control solenoid valve circuit

P1259: VTEC System

P1491: EGR Valve Lift Insufficient

P1498: EGR Valve Lift Sensor High Voltage

*¹: H22A7 engine

*²: F20B6 engine

Possible Cause

DTC P0171
System too lean

- Fuel Pump insufficient flow/pressure
- Fuel Feed Line clogged, leaking
- Fuel Pressure Regulator stuck open
- Fuel Filter clogged
- Fuel Injector clogged, air inclusion
- Gasoline doesn't meet Owner's Manual spec.
- Primary HO₂S (Sensor 1) deteriorated
- MAP Sensor range/performance
- EGR System malfunction (too much flow)
- Valve Clearance
- Exhaust leak

DTC P0172
System too rich

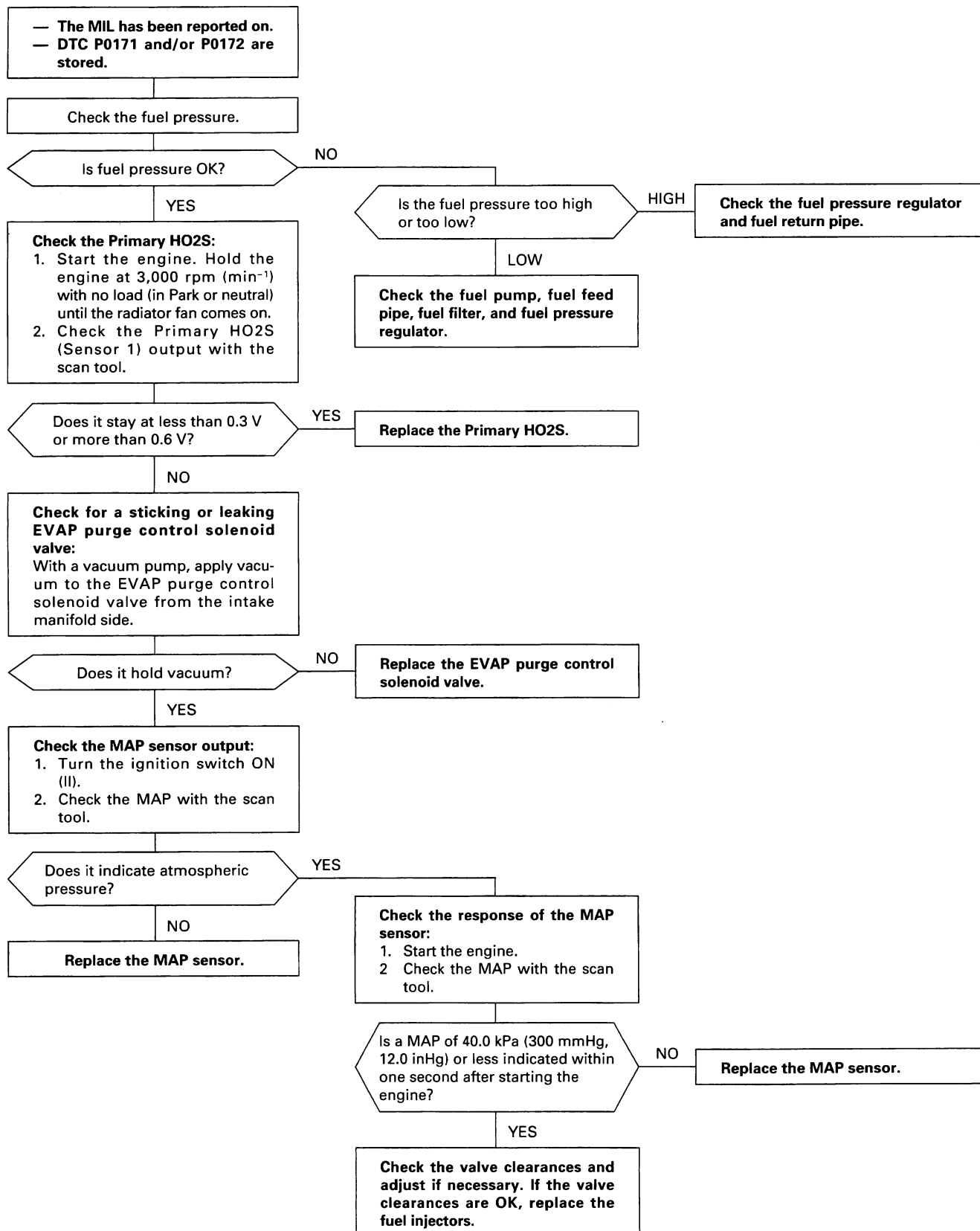
- Fuel Pressure Regulator clogged, stuck closed
- Fuel Return Pipe clogged
- Fuel Injector leaking
- Gasoline doesn't meet Owner's Manual spec.
- Primary HO₂S (Sensor 1) deteriorated
- MAP Sensor range/performance
- EGR System insufficient flow
- EVAP Purge Control Solenoid Valve leaking, stuck opened
- Valve Clearance

(cont'd)

PGM-FI System

Fuel Supply System (cont'd)

Troubleshooting Flowchart





Random Misfire

P0300 and **P0301 through P0304** The scan tool indicates Diagnostic Trouble Code (DTC) P0300 and some of P0301 – P0304: Random misfire.

Description

Misfire detection is accomplished by monitoring the crankshaft speed with the crankshaft position (CKP) sensor which is attached to the crankshaft. If misfiring strong enough to damage the catalyst is detected, the MIL will blink during the time of its occurrence, and DTC P0300 and some of DTCs P0301 through P0304 will be stored. Then, after misfire has ceased, the MIL will come on. If misfiring that increases emissions is detected during two consecutive driving cycles, the MIL will come on, and DTC P0300 and some of DTCs P0301 through P0304 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as a misfire DTC, troubleshoot those DTCs first, then troubleshoot the misfire DTC.

P0107, P0108: MAP Sensor
 P0171, P0172: Fuel metering
 P0401, P1491, P1498: EGR system
 P1259: VTEC System
 P1361, P1362: TDC sensor
 P1381, P1382: CYP sensor
 P1519: IAC valve

Possible Cause

- Fuel pump insufficient fuel pressure, amount of flow
- Fuel line clogging, blockage, leakage
- Fuel filter clogging
- Fuel pressure regulator stuck open
- EGR system malfunction
- Distributor malfunction
- Ignition coil wire open, leakage
- Ignition control module malfunction
- MAP sensor range/performance, poor response
- Valves carbon deposit
- Compression low
- IAC valve malfunction
- VTEC system malfunction
- Fuel does not meet Owner's Manual spec., lack of fuel

Troubleshooting

By test-driving, determine the conditions during which misfire occurs. Depending on these conditions, test in the order described in the table below.

Possible cause	EGR system	MAP sensor	Crankshaft position sensor	Fuel pressure	Distributor and Ignition wires	ICM	Valve Clearance	IAC Valve
Page								
Condition	11-A-139	11-A-39	section 6	11-A-101	section 4	section 4	section 6	11-A-84
Only low rpm and load	③	②	⑤	④			⑤	①
Only accelerating		④		②	①	③		
Only high rpm and load		④	⑤	①	②	③	⑤	
Not specific		③	⑤	①	②	④	⑤	

NOTE: If misfire doesn't recur, some possible causes are fuel that doesn't meet owner's manual spec, lack of fuel, carbon deposits on spark plug, etc.

PGM-FI System

Misfire Detected in One Cylinder

P0301 The scan tool indicates Diagnostic Trouble Code (DTC) P0301: Cylinder 1 misfire detected.

P0302 The scan tool indicates Diagnostic Trouble Code (DTC) P0302: Cylinder 2 misfire detected.

P0303 The scan tool indicates Diagnostic Trouble Code (DTC) P0303: Cylinder 3 misfire detected.

P0304 The scan tool indicates Diagnostic Trouble Code (DTC) P0304: Cylinder 4 misfire detected.

Description

Misfire detection is accomplished by monitoring the crankshaft speed with the crankshaft position (CKP) sensor which is attached to the crankshaft. If misfiring strong enough to damage the catalyst is detected, the MIL will blink during the time of its occurrence, and DTC P0301, P0302, P0303 or P0304 will be stored. Then, after the misfire has ceased, the MIL will come on. If misfiring that increases emissions is detected during two consecutive driving cycles, the MIL will come on, and DTC P0301, P0302, P0303 or P0304 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as a misfire DTC, troubleshoot those DTCs first, then troubleshoot the misfire DTC.

P0107, P0108: MAP Sensor
P0171, P0172: Fuel metering
P0401, P1491, P1498: EGR system
P1259: VTEC System
P1361, P1362: TDC sensor
P1381, P1382: CYP sensor
P1519: IAC valve

Possible Cause

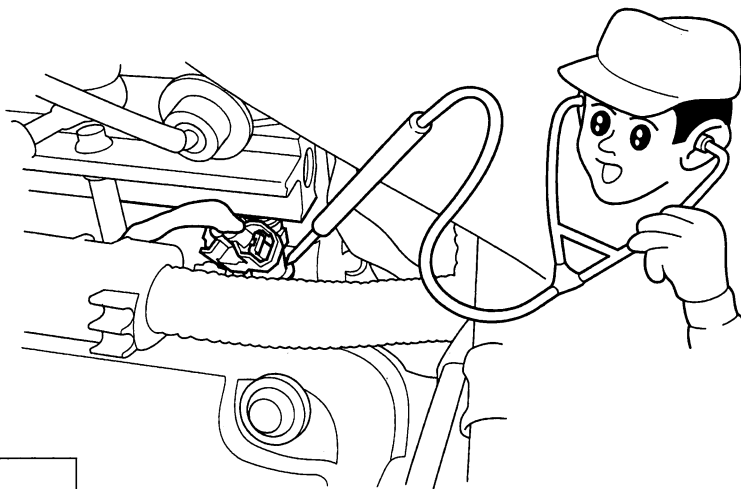
- Fuel injector clogging, fuel leakage, air leakage
- Fuel injector circuit open or shorted
- Spark plug carbon deposits, fouling, malfunction
- Ignition wires open, leaking
- Distributor malfunction
- Compression low
- Valve clearance out of spec.



Troubleshooting Flowchart

- The MIL has been reported on.
- DTC P0301, P0302, P0303, or P0304 is indicated.

Check the fuel injector function:
Start the engine, and listen for a clicking sound at the fuel injector in the problem cylinder.



Does it click?

NO

YES

Check for an open or short in the harness between ECM/PCM, and the fuel injector.

Are the wires OK?

NO

Repair open or short in the wire.

YES

- Replace the fuel injector.
- Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

Problem verification:

1. After checking the freeze data, do the ECM/PCM Reset Procedure.
2. Exchange the spark plug from the problem cylinder with one of another cylinder.
3. Connect the SCS short connector.
4. Test-drive the car several times in the range of the freeze data.

NOTE:

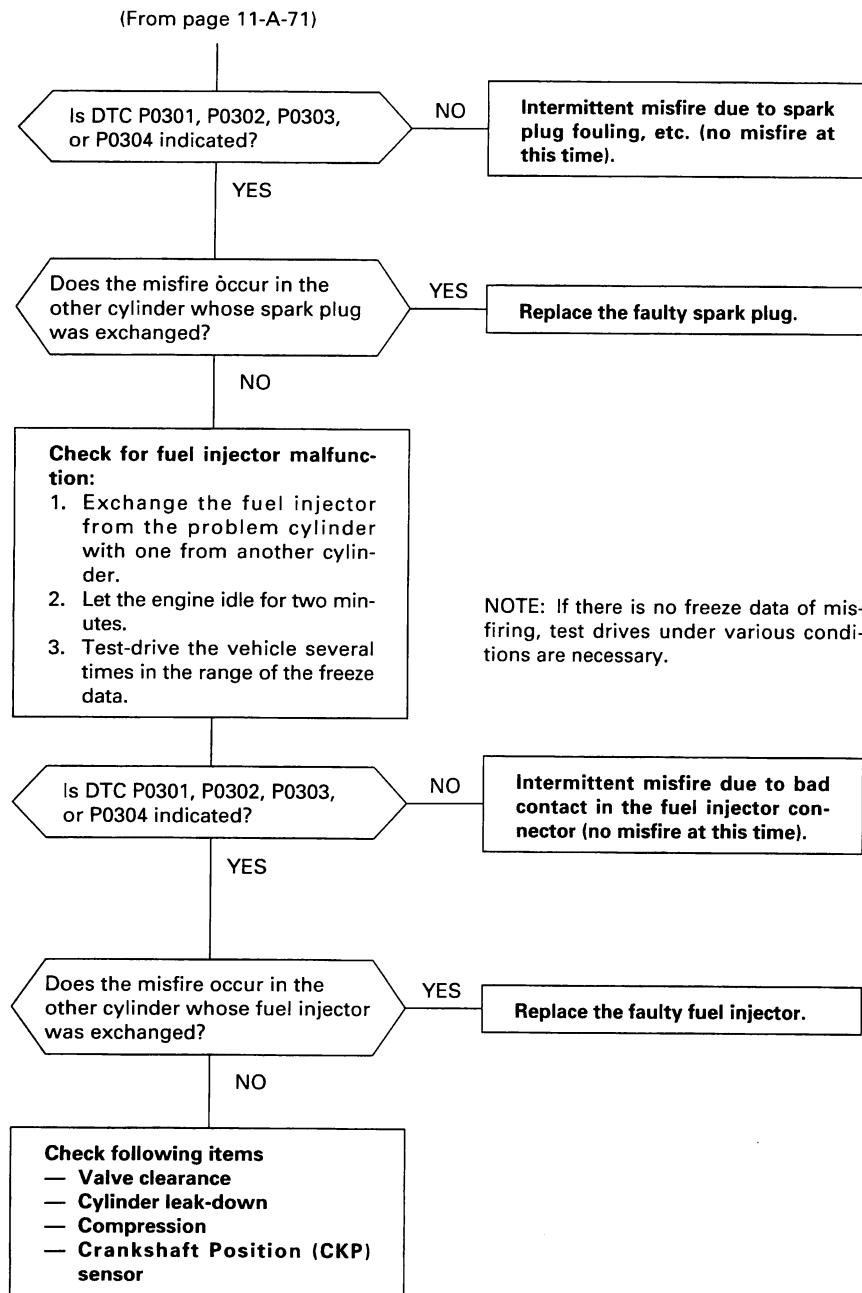
- If there is no freeze data of misfiring, just clear the DTC.
- If there is no freeze data of misfiring, test drives under various conditions are necessary.

(To page 11-A-72)

(cont'd)

PGM-FI System

Misfire Detected in One Cylinder (cont'd)





Knock Sensor (KS)

P0325

The scan tool indicates Diagnostic Trouble Code (DTC) P0325: A malfunction in the circuit of the Knock Sensor (KS).

- The MIL has been reported on.
- DTC P0325 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Hold the engine at 3,000 – 4,000 rpm (min^{-1}) for at least 60 seconds.

Is DTC P0325 indicated?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at knock sensor (KS) and ECM/PCM.

YES

Check for a short in the wire (KS line):

1. Turn the ignition switch OFF.
2. Disconnect the knock sensor 1P connector.
3. Check for continuity between ECM/PCM connector terminals C3 and body ground.

Is there continuity?

YES

Repair short in the wire between ECM/PCM (C3) and knock sensor.

NO

Check for an open in the wire (KS line):

Check for continuity between ECM/PCM connector terminal C3 and knock sensor connector terminal No. 1.

Is there continuity?

NO

Repair open in the wire between ECM/PCM (C3) and knock sensor.

YES

Substitute a known-good knock sensor and recheck.

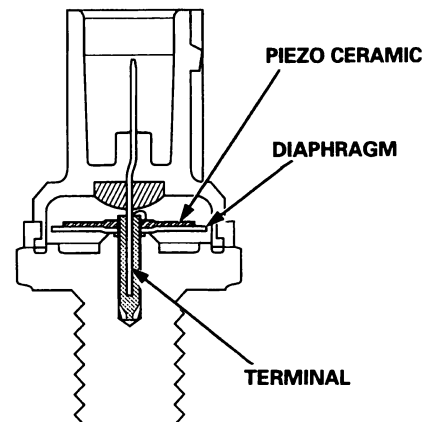
Is DTC P0325 indicated?

NO

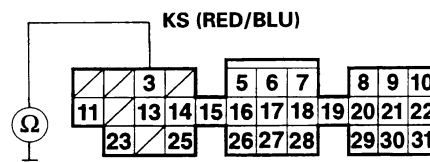
Replace the original knock sensor.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

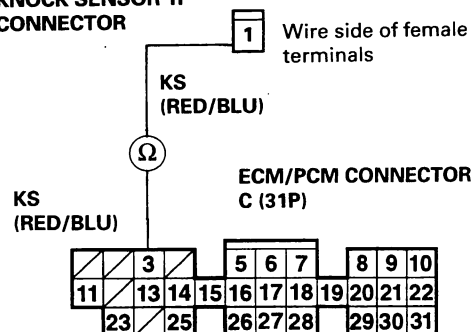


ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

KNOCK SENSOR 1P CONNECTOR



Wire side of female terminals

PGM-FI System

Crankshaft Position/Top Dead Center (CKP/TDC) Sensor

P0335 The scan tool indicates Diagnostic Trouble Code (DTC) P0335: A malfunction in the Crankshaft Position (CKP) sensor circuit.

P0336 The scan tool indicates Diagnostic Trouble Code (DTC) P0336: A range/performance problem in the Crankshaft Position (CKP) sensor circuit.

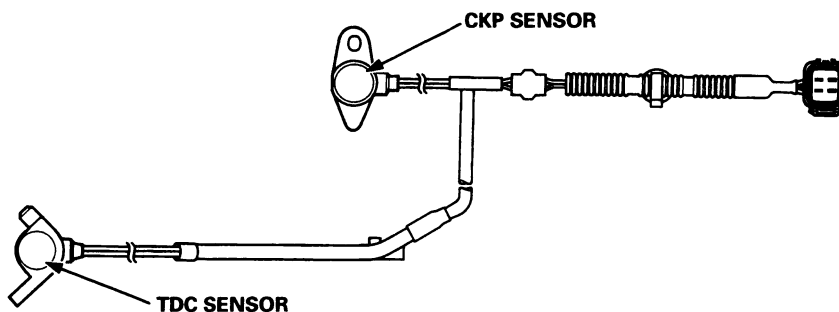
P1361 The scan tool indicates Diagnostic Trouble Code (DTC) P1361: Intermittent interruption in the Top Dead Center (TDC) sensor circuit.

P1362 The scan tool indicates Diagnostic Trouble Code (DTC) P1362: No signal in the Top Dead Center (TDC) sensor circuit.

Description

The CKP Sensor determines timing for fuel injection and ignition of each cylinder and also detects engine speed. The TDC Sensor determines ignition timing at start-up (cranking) and when crank angle is abnormal.

NOTE: If DTC P1359 is stored at the same time as DTC P0335, P0336, P1361 and/or P1362, troubleshoot DTC P1359 first, then troubleshoot those DTCs.



- The MIL has been reported on.
- DTC P0335, P0336, P1361 and/or P1362 are stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. If the engine does not start, turn the ignition switch start position (III) for 10 seconds.

Is DTC P0335, P0336, P1361 or P1362 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at CKP/TDC Sensor and ECM/PCM.

YES

Check for an open in the CKP/TDC sensor:

1. Turn the ignition switch OFF.
2. Disconnect the CKP/TDC sensor 4P connector.
3. Measure resistance between the terminals of the indicated sensor (*see table).

Is there 2,010 – 2,510 Ω at 20°C (68°F)

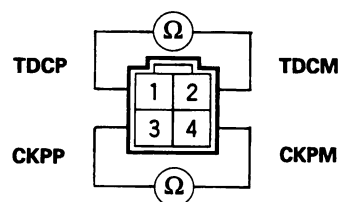
NO

Replace the CKP/TDC sensor (see section 6).

YES

(To page 11-A-75)

CKP/TDC SENSOR 4P CONNECTOR

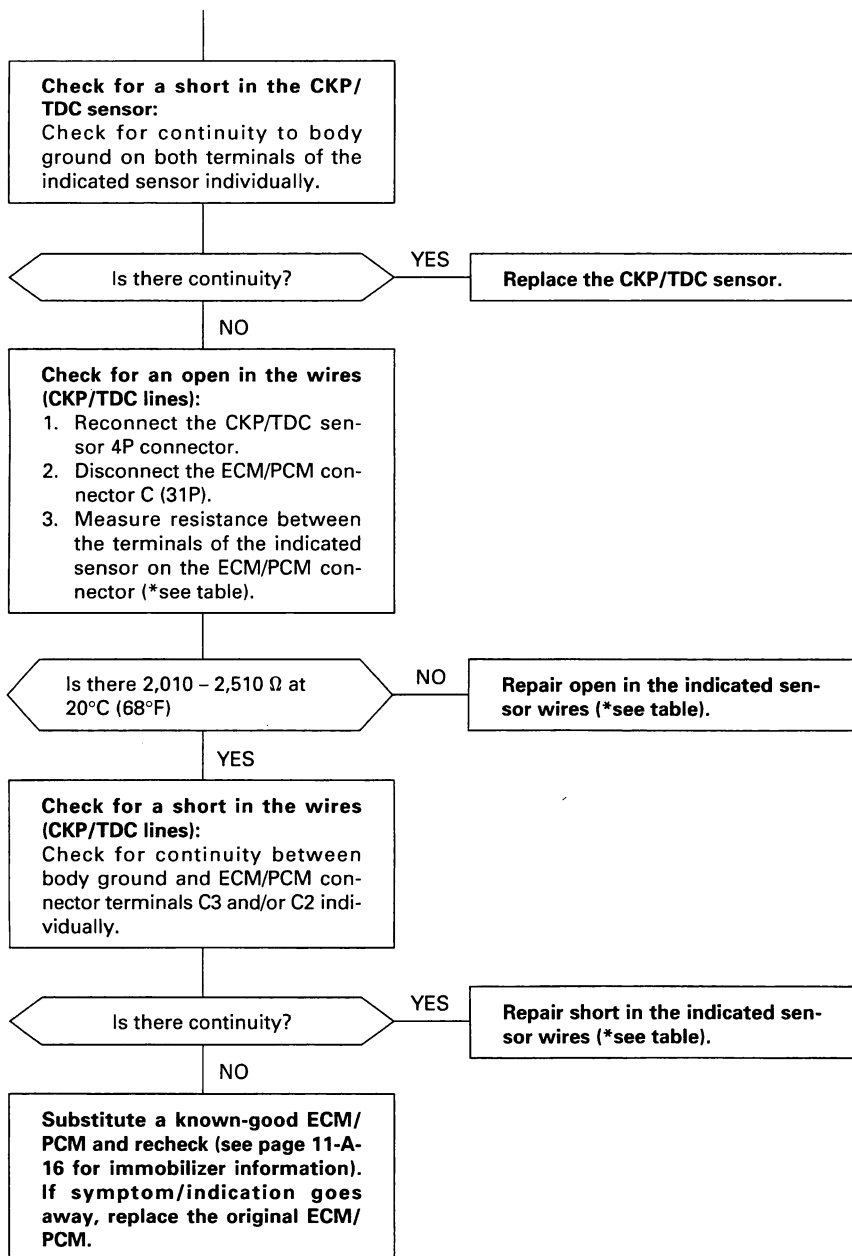


Terminal side of male terminals,

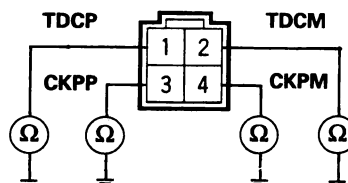
SENSOR	DTC	SENSOR TERMINAL	ECM/PCM TERMINAL	WIRE COLOR
TDC	P1361	1	C20	GRN
	P1362	2	C21	RED
CKP	P0335	3	C8	BLU
	P0336	4	C9	WHT



(From page 11-A-74)

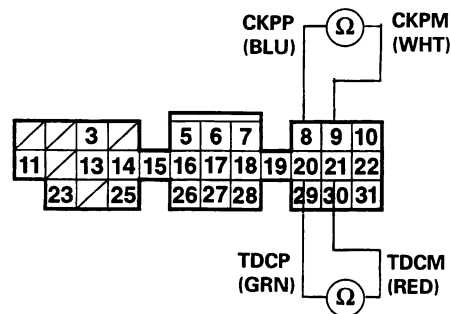


CKP/TDC SENSOR 4P CONNECTOR

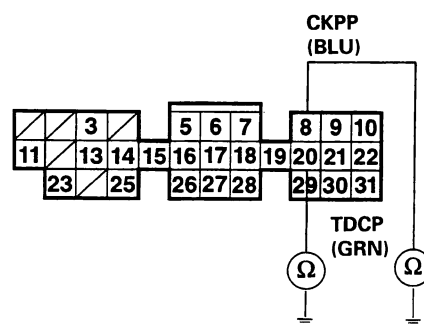


Terminal side of male terminals

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals



(cont'd)

PGM-FI System

Crankshaft Position/Top Dead Center (CKP/TDC) Sensor (cont'd)

P1359 The scan tool indicates Diagnostic Trouble Code (DTC) P1359: A problem Crankshaft Position/Top Dead Center (CKP/TDC) sensor circuit.

- The MIL has been reported on.
- DTC P1359 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. If the engine does not start, turn the ignition switch start position (III) for 10 seconds.

Is DTC P1359 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at CKP/TDC sensor and ECM/PCM.

YES

Check for poor connections or loose wires between the CKP/TDC sensor and the ECM/PCM.

Are the connections OK?

NO

Repair as necessary.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.



Vehicle Speed Sensor (VSS) (M/T)

P0500

The scan tool indicates Diagnostic Trouble Code (DTC) P0500: A malfunction in the Vehicle Speed Sensor (VSS) circuit.

- The MIL has been reported on.
- DTC P0500 is stored.

Problem verification:

1. Test-drive the vehicle.
2. Check the vehicle speed with the scan tool.

Is the correct speed indicated?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at VSS and ECM.

NO

Check for an open in the ECM:

1. Turn the ignition switch OFF.
2. Block the rear wheels and set the parking brake.
3. Jack up the front of the vehicle and support it with safety stands.
4. Turn the ignition switch ON (II).
5. Block the right front wheel and slowly rotate the left front wheel.
6. Measure voltage between the ECM connector terminals B20 and C23.

Does the voltage pulse between 0 V and approx. 5 V or battery voltage?

YES

Substitute a known-good ECM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM.

NO

Check for a short in the ECM:

1. Turn the ignition switch OFF.
2. Disconnect the ECM connector C (31P).
3. Turn the ignition switch ON (II).
4. Block the right front wheel and slowly rotate the left front wheel.
5. Measure voltage between the ECM connector terminals B20 and C23.

Does the voltage pulse between 0 V and approx. 5 V or battery voltage?

YES

Substitute a known-good ECM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM.

NO

- Repair short in the wire between ECM (C23) and the VSS.
- Repair open in the wire between ECM (C23) and the VSS.
- If wire is OK, test the VSS (see section 23).

ECM CONNECTORS

B (25P)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

LG1 (BRN/BLK)

C (31P)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

VSS (BLU/WHT)

Wire side of female terminals

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

LG1 (BRN/BLK)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

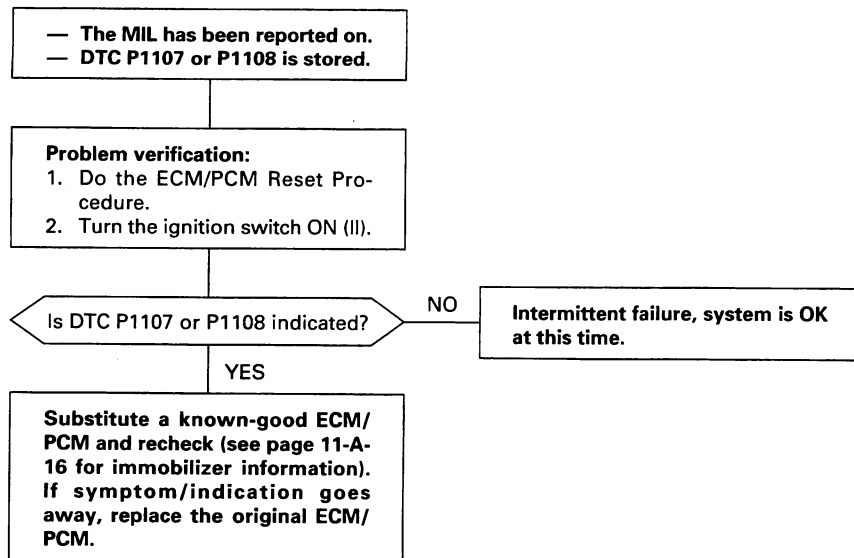
VSS (BLU/WHT)

PGM-FI System

Barometric Pressure (BARO) Sensor

P1107 The scan tool indicates Diagnostic Trouble Code (DTC) P1107: A low voltage problem in the Baro sensor circuit.

P1108 The scan tool indicates Diagnostic Trouble Code (DTC) P1108: A high voltage problem in the Baro sensor circuit.





Cylinder Position (CYP) Sensor

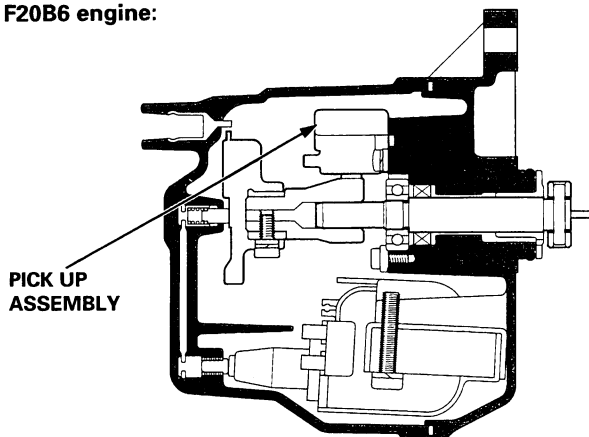
P1381 The scan tool indicates Diagnostic Trouble Code (DTC) P1381: Intermittent interruption in the Cylinder Position (CYP) sensor circuit.

P1382 The scan tool indicates Diagnostic Trouble Code (DTC) P1382: No signal in the Cylinder Position (CYP) sensor circuit.

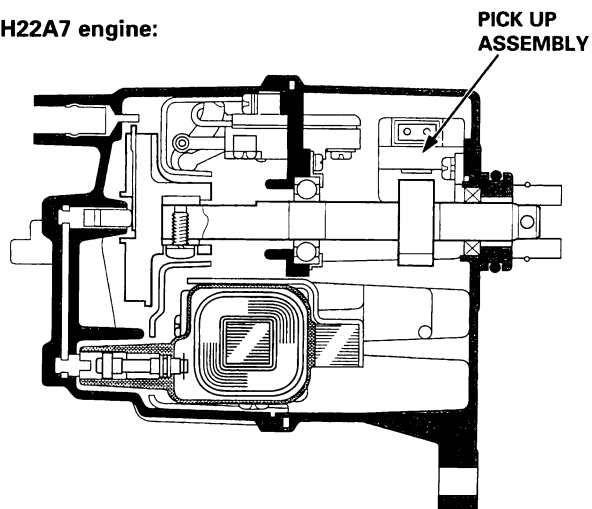
Description

The CYP Sensor detects the position of No. 1 cylinder for sequential fuel injection to each cylinder.

F20B6 engine:



H22A7 engine:



- The MIL has been reported on.
- DTC P1381 and/or P1382 are stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine.

Is DTC P1381 and/or P1382 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C267 distributor and ECM/PCM.

YES

Check the ignition (spark plug) wires:

Check for poor connections at the ignition (spark plug) wires and the condition of the ignition wires (see section 4).

Are the wires OK?

NO

Reconnect or replace the ignition (spark plug) wires.

YES

(To page 11-A-80)

(cont'd)

PGM-FI System

Cylinder Position (CYP) Sensor (cont'd)

(From page 11-A-79)

Check for an open in the CYP sensor:
 1. Turn the ignition switch OFF.
 2. Disconnect the distributor connector.
 3. Measure the resistance between the distributor 4P connector terminals No. 3 and No. 4 (No. 2 and No. 4)*.

Is there 0.8 – 1.5 k Ω ?

NO

*: H22A7 engine

Replace the distributor ignition housing (see section 4).

YES

Check for a short in the CYP sensor:
 Check for continuity between body ground and the distributor connector terminals No. 3 and No. 4 (No. 2 and No. 4)* individually.

Is there continuity?

YES

Replace the distributor ignition housing (see section 4).

NO

Check for an open in the wires (CYP lines):
 1. Reconnect the distributor connector.
 2. Disconnect the ECM/PCM connector C (31P).
 3. Measure resistance between ECM/PCM connector terminals C29 and C30.

Is there 0.8 – 1.5 Ω ?

NO

Repair open in the wire between ECM/PCM (C29, C30) and the distributor.

YES

Check for a short in the wire (CYP line):
 Check for continuity between body ground and ECM/PCM connector terminal C29.

Is there continuity?

YES

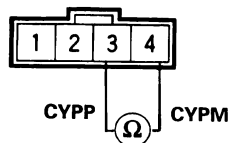
Repair short in the wire between ECM/PCM (C29) and the distributor.

NO

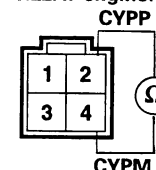
Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

DISTRIBUTOR 4P CONNECTOR

F20B6 engine:

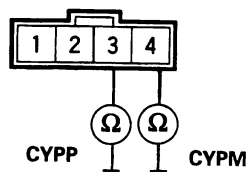


H22A7 engine:

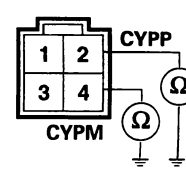


Terminal side of male terminals Terminal side of male terminals

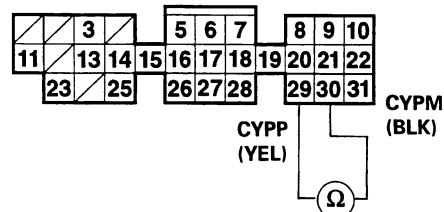
F20B6 engine:



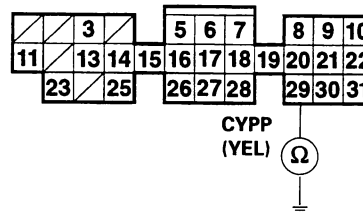
H22A7 engine:



ECM/PCM CONNECTOR C (31P)



Wire side of female terminals





ECM/PCM Internal Circuit

P1607 The scan tool indicates Diagnostic Trouble Code (DTC) P1607: An ECM/PCM Internal Circuit Problem.

- The MIL has been reported on.
- DTC P1607 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Turn the ignition switch ON (II).
3. Wait three seconds.

Is DTC P1607 indicated?

NO

Intermittent failure, system is OK this time.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

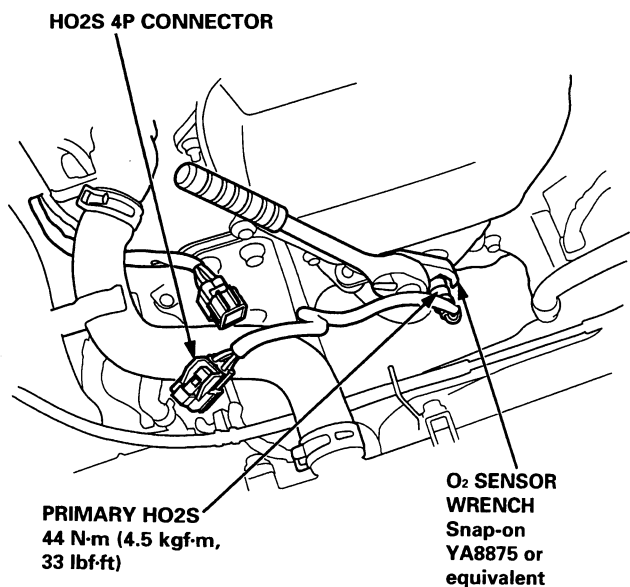
Heated Oxygen Sensor

Replacement

1. Disconnect the HO2S 4P connector, then remove the HO2S.

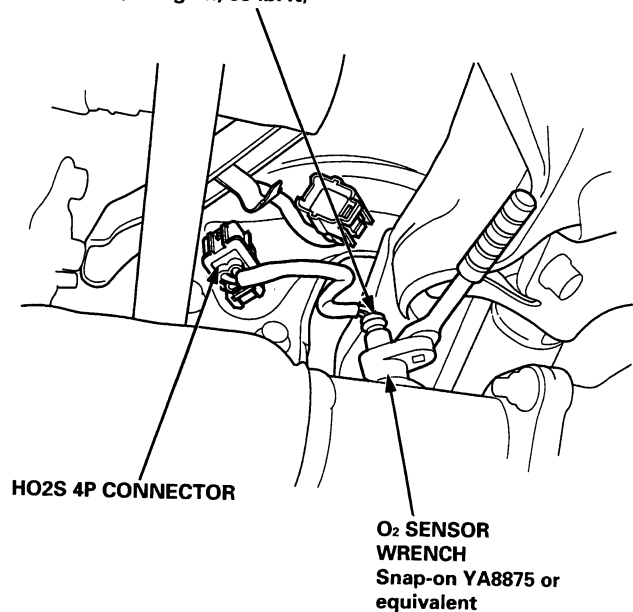
Primary HO2S:

F20B6 engine:



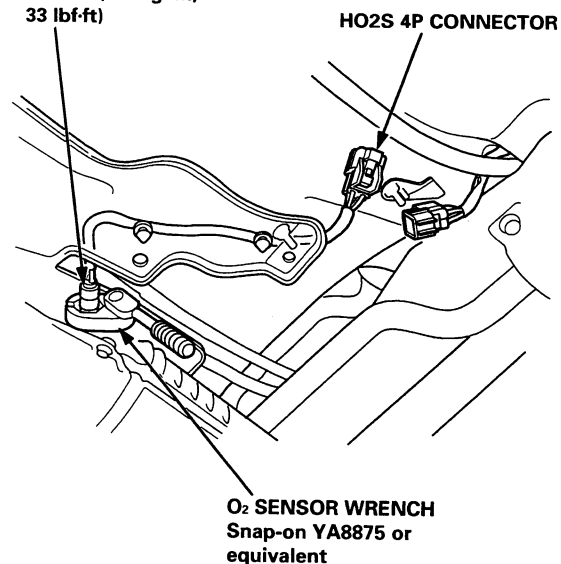
H22A7 engine:

PRIMARY HO2S
44 N·m (4.5 kgf·m, 33 lbf·ft)



Secondary HO2S:

SECONDARY HO2S
44 N·m (4.5 kgf·m,
33 lbf·ft)

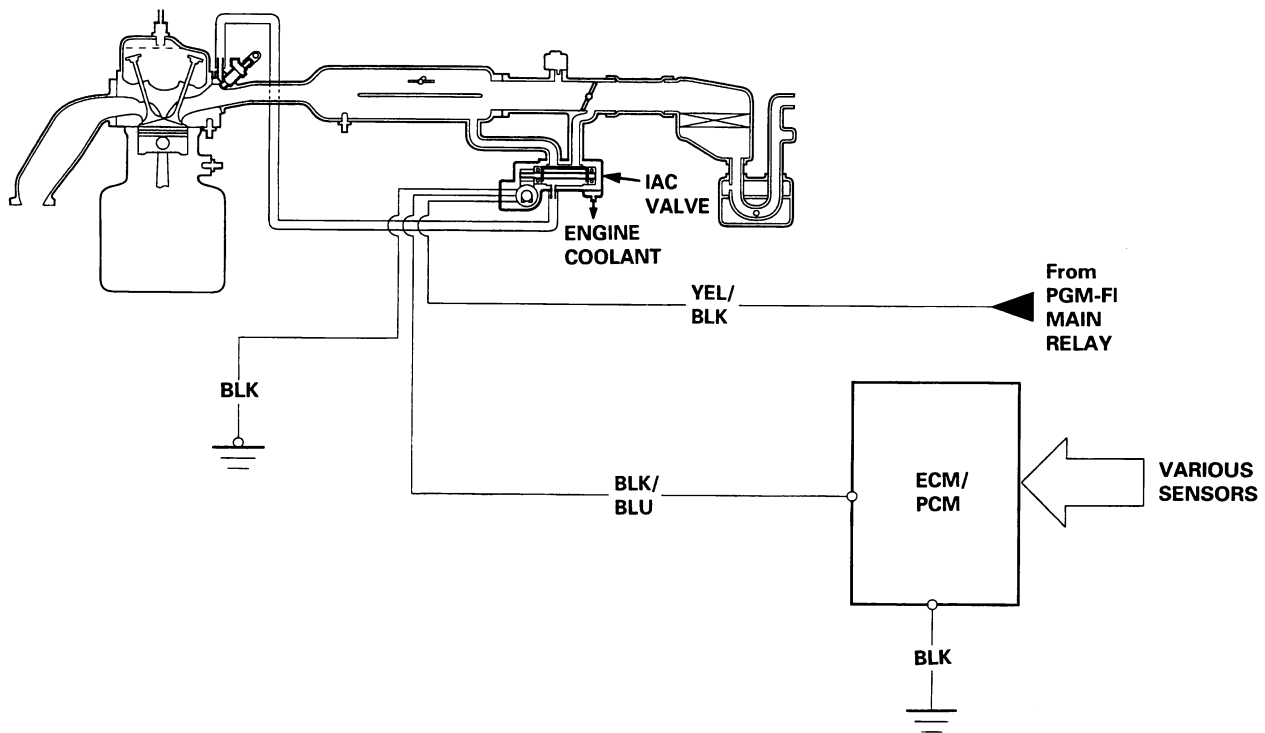


2. Install the HO2S in reverse order of removal.



System Description

The idle speed of the engine is controlled by the Idle Air Control (IAC) Valve. The valve changes the amount of air bypassing into the intake manifold in response to electric current controlled by the ECM/PCM. When the IAC Valve is activated, the valve opens to maintain the proper idle speed.



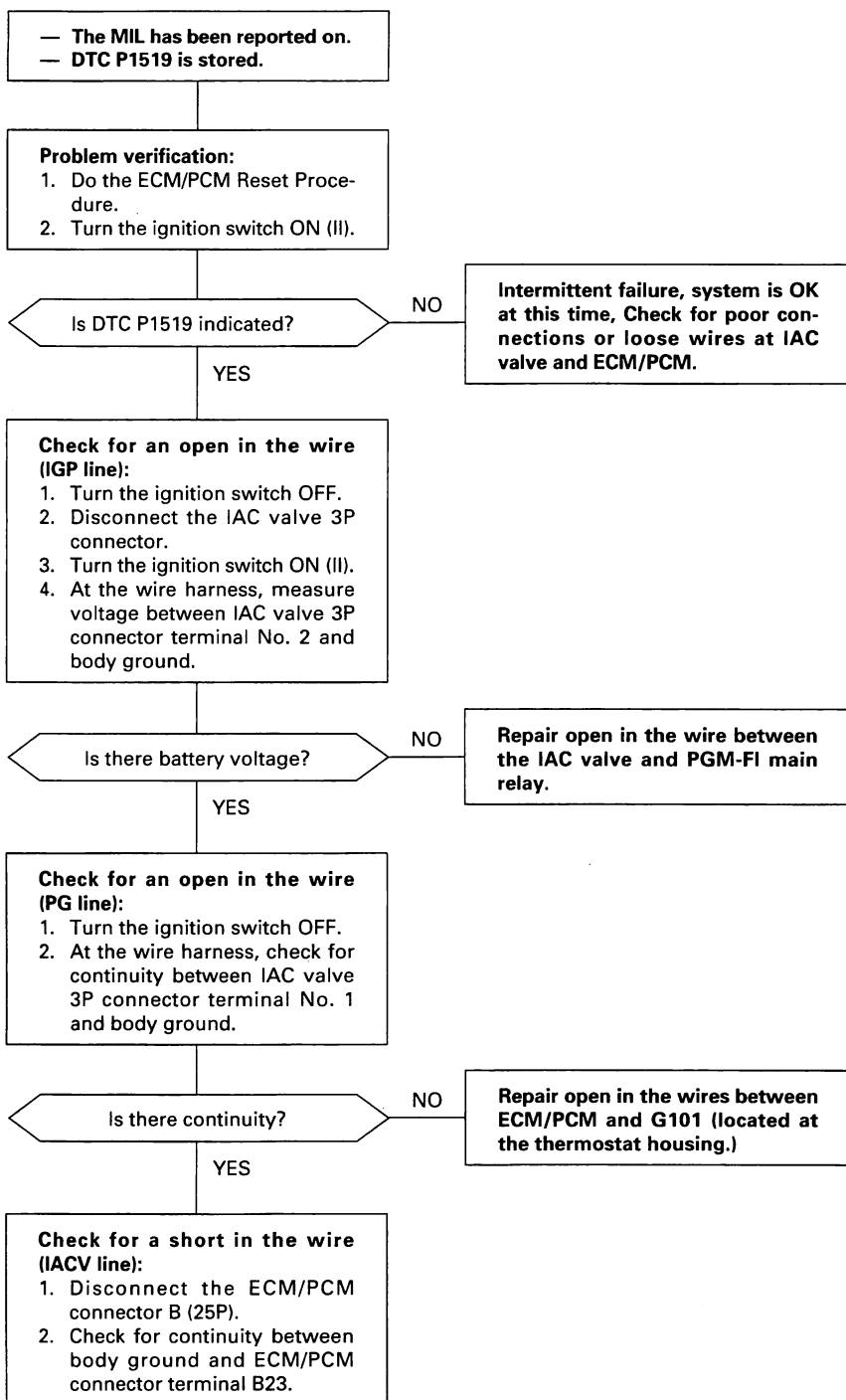
1. After the engine starts, the IAC valve opens for a certain time. The amount of air is increased to raise the idle speed about 150 – 300 rpm (min^{-1}).
2. When the coolant temperature is low, the IAC valve is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the engine coolant temperature.
3. When the idle speed is out of specification and the scan tool does not indicate Diagnostic Trouble Code (DTC) P1519, check the following items:
 - Air conditioning signal (see page 11-A-86)
 - ALT FR signal (see page 11-A-88)
 - Brake switch signal (see page 11-A-90)
 - Starter switch signal (see page 11-A-91)
 - A/T gear position signal (see section 14)
 - PSP switch signal (see page 11-A-92)
 - Hoses and connections
 - IAC valve and its mounting O-rings
4. If the above items are normal (and the scan tool does not indicate DTC P1519), after IAC valve replacement, substitute a known-good ECM/PCM and recheck. If symptom goes away, replace the original ECM/PCM.

Idle Control System

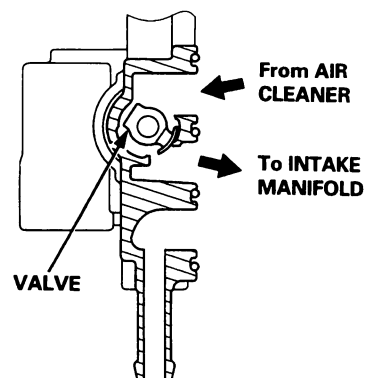
Idle Air Control (IAC) Valve

P1519 The scan tool indicates Diagnostic Trouble Code (DTC) P1519: A problem in the idle Air Control (IAC) valve circuit.

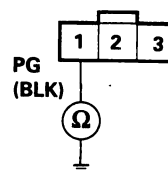
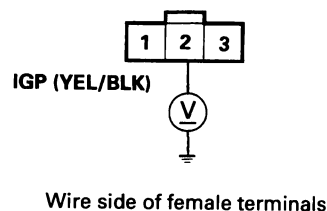
The IAC Valve changes the amount of air bypassing the throttle body in response to a duty signal from the ECM/PCM in order to maintain the proper idle speed.



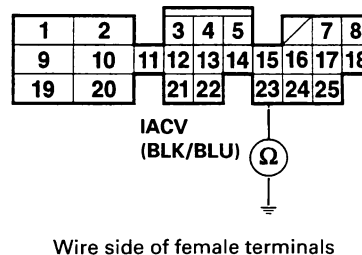
(To page 11-A-85)



IAC VALVE 3P CONNECTOR

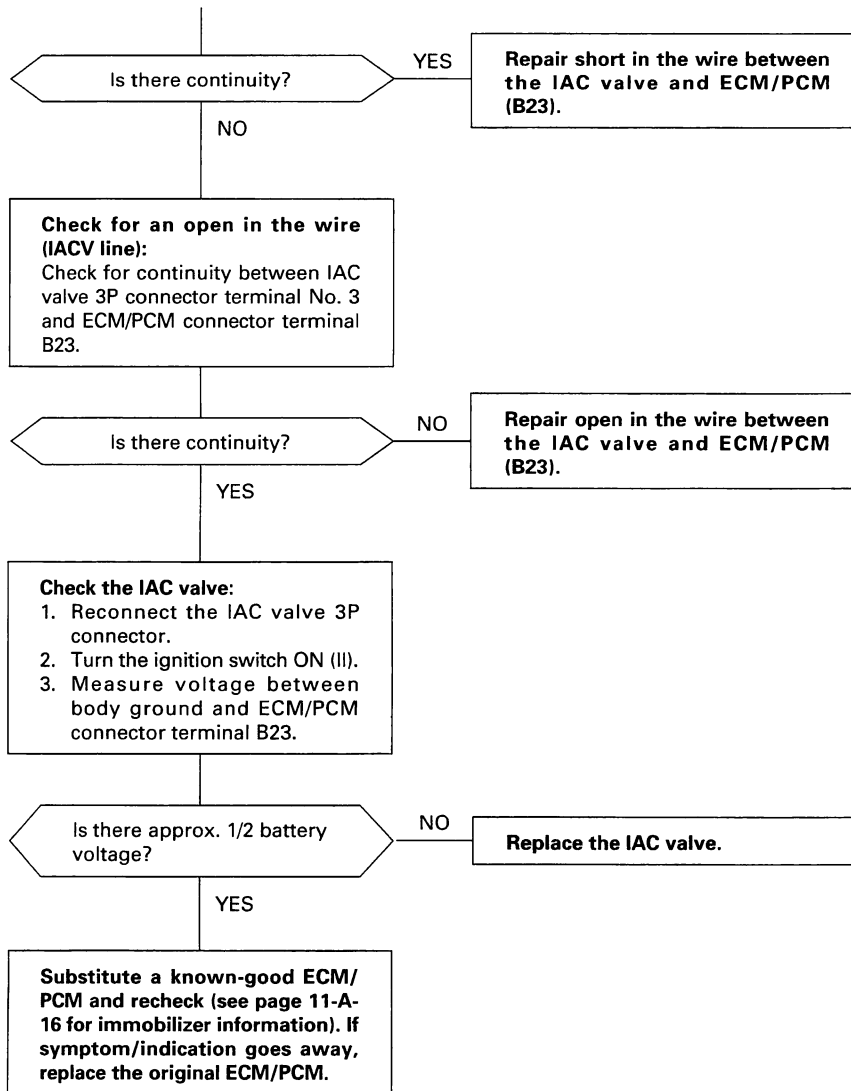


ECM/PCM CONNECTOR B (25P)



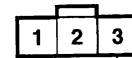


(From page 11-A-84)



IAC VALVE 3P CONNECTOR

Wire side of female terminals



IACV (BLK/BLU)

ECM/PCM CONNECTOR B (25P)



1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

IACV (BLK/BLU)

Wire side of female terminals

ECM/PCM CONNECTOR B (25P)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

IACV (BLK/BLU)

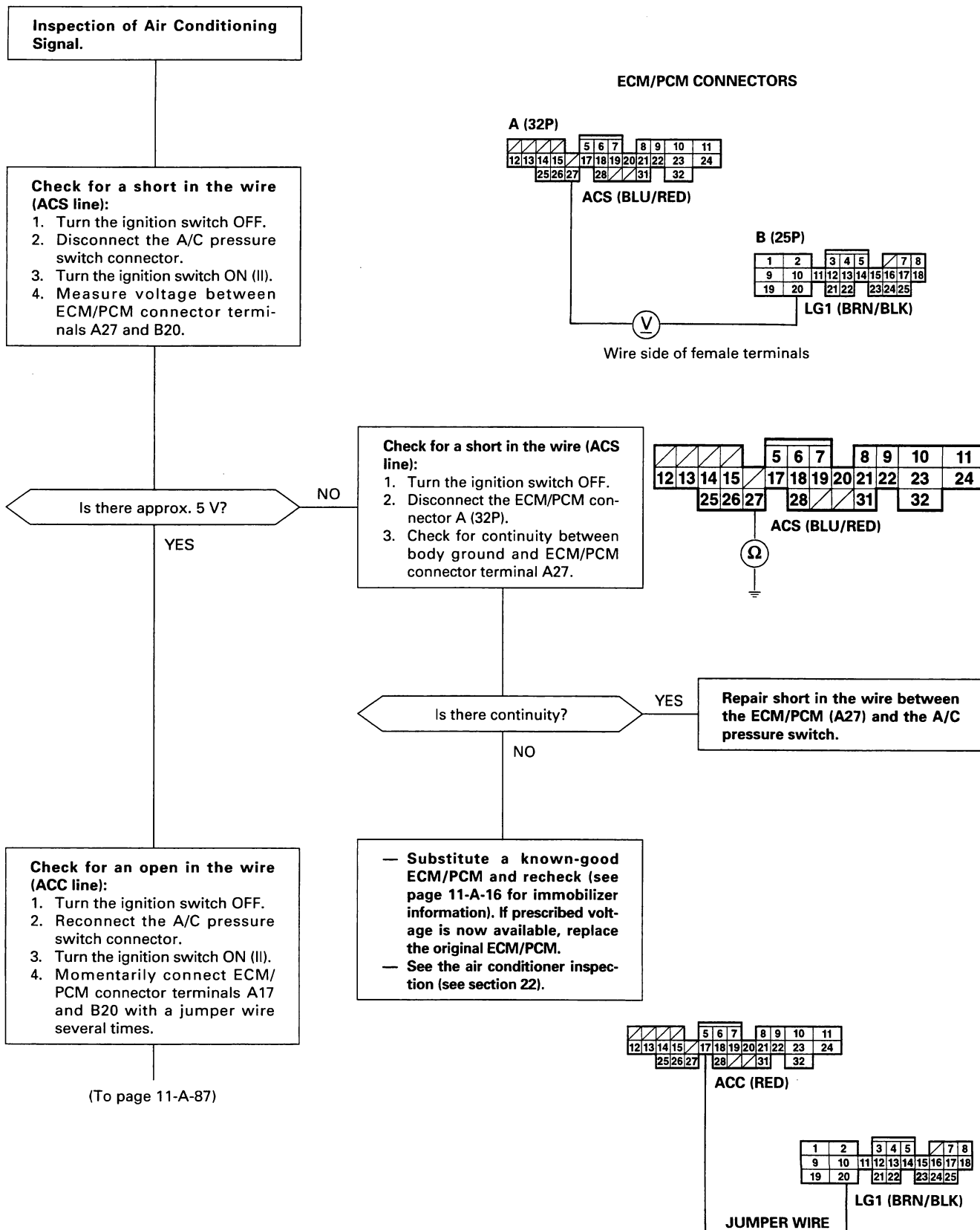


Wire side of female terminals

Idle Control System

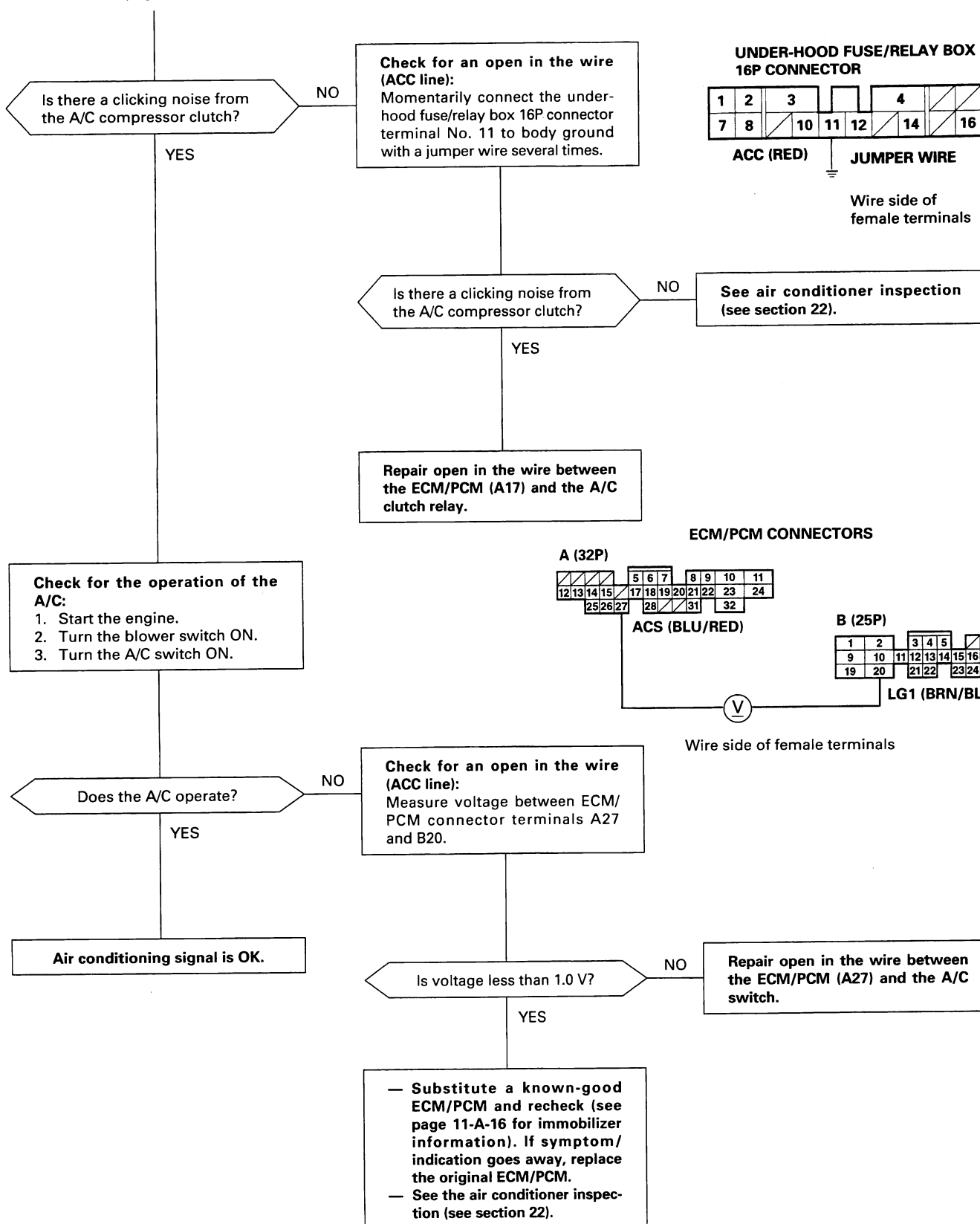
Air Conditioning Signal

This signals the ECM/PCM when there is a demand for cooling from the air conditioning system.





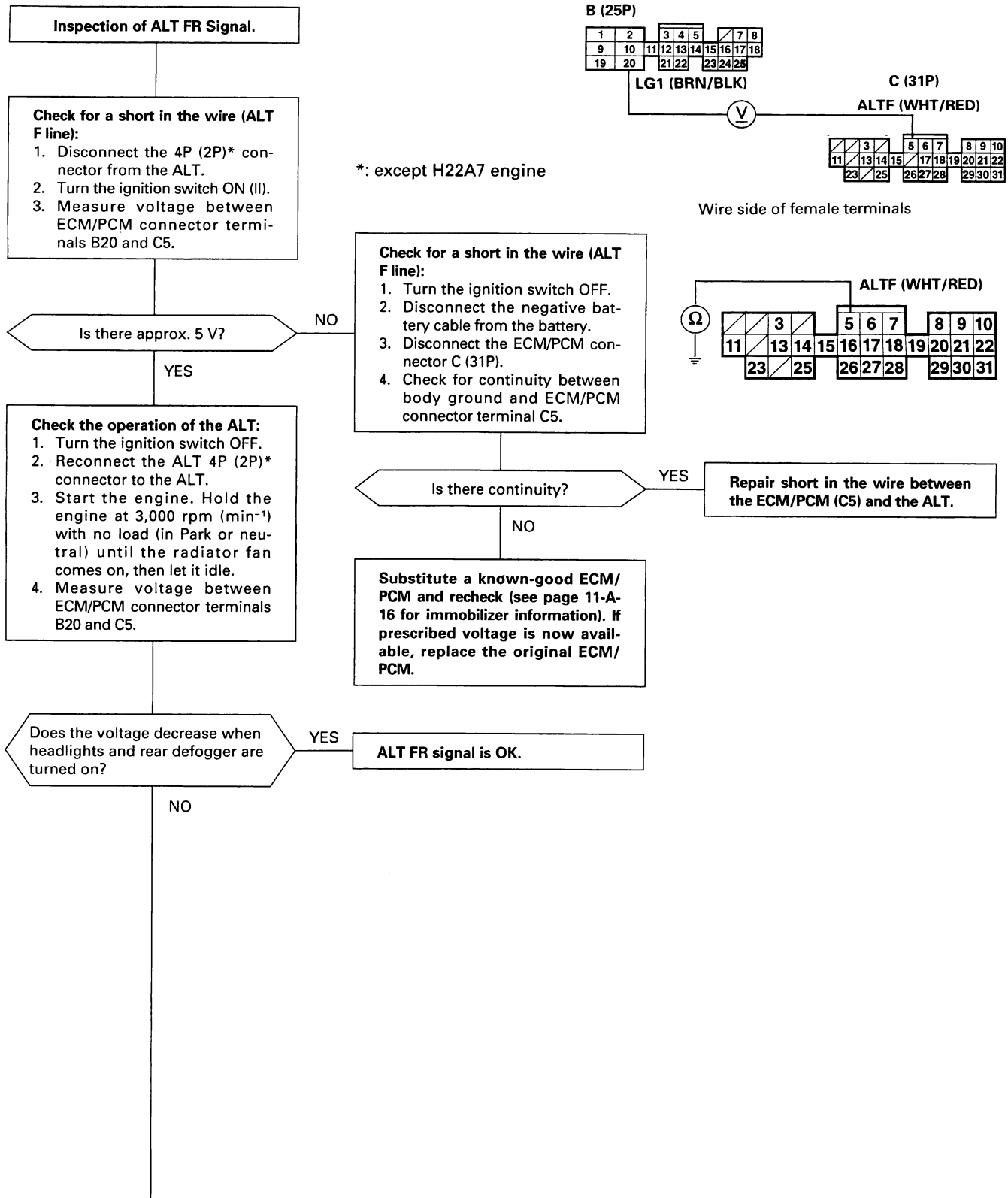
(From page 11-A-86)



Idle Control System

Alternator (ALT) FR Signal

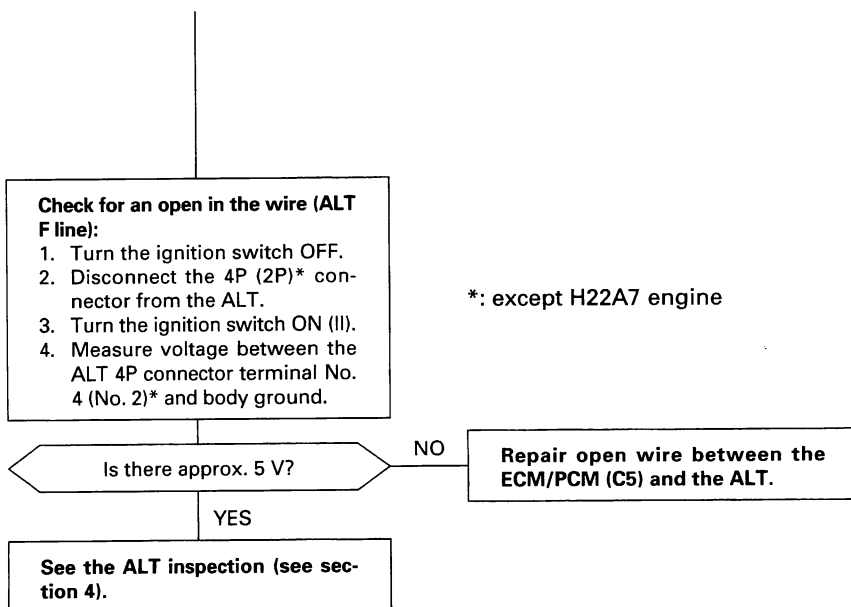
This signals the ECM/PCM when the Alternator (ALT) is charging.



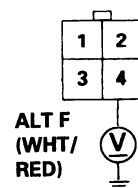
(To page 11-A-89)



(From page 11-A-88)

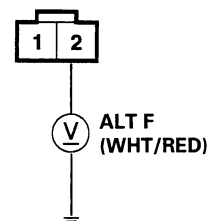


ALT 4P CONNECTOR



Wire side of female terminals

ALT 2P CONNECTOR*

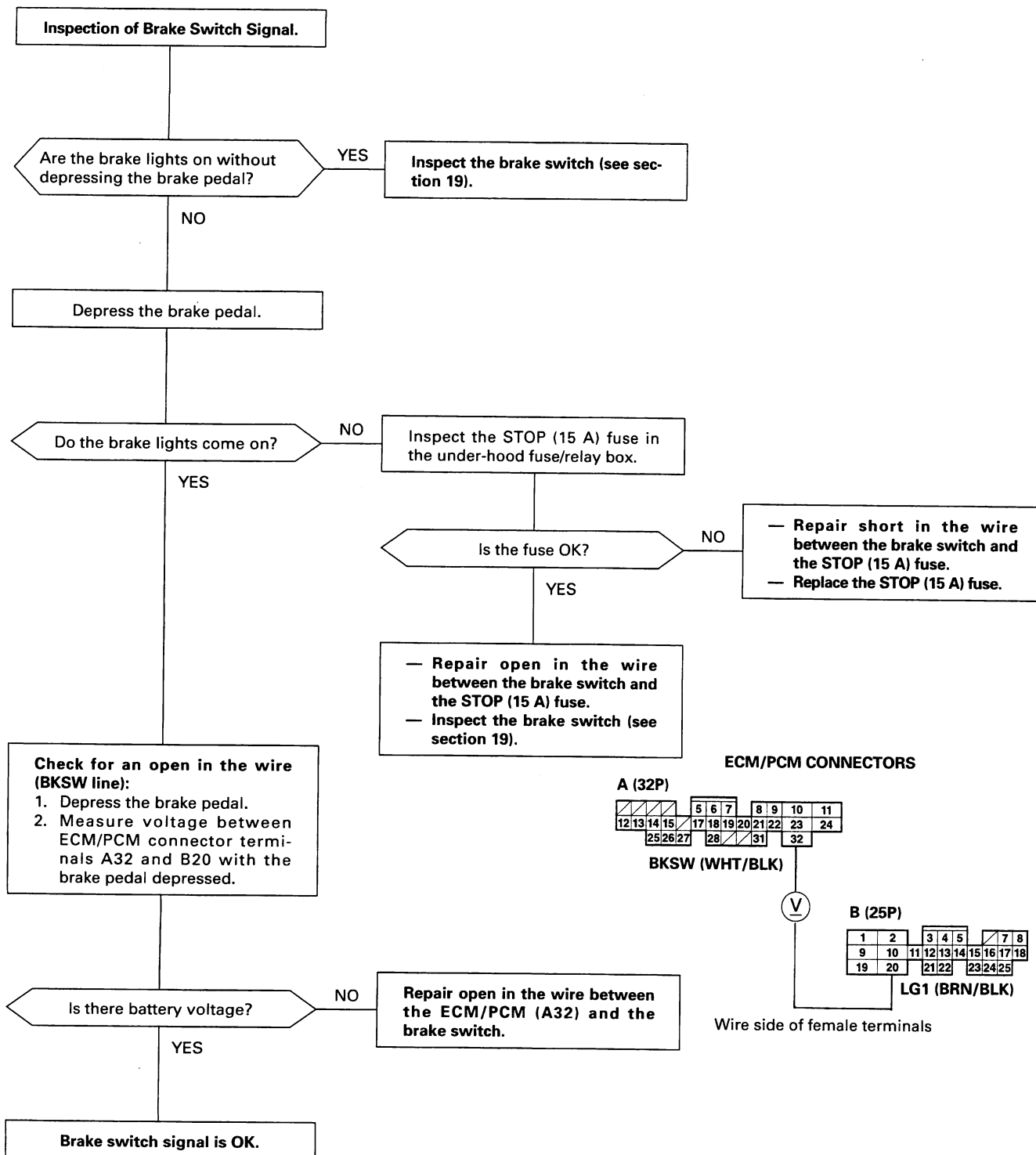


Wire side of female terminals

Idle Control System

Brake Switch Signal (except KY model: M/T)

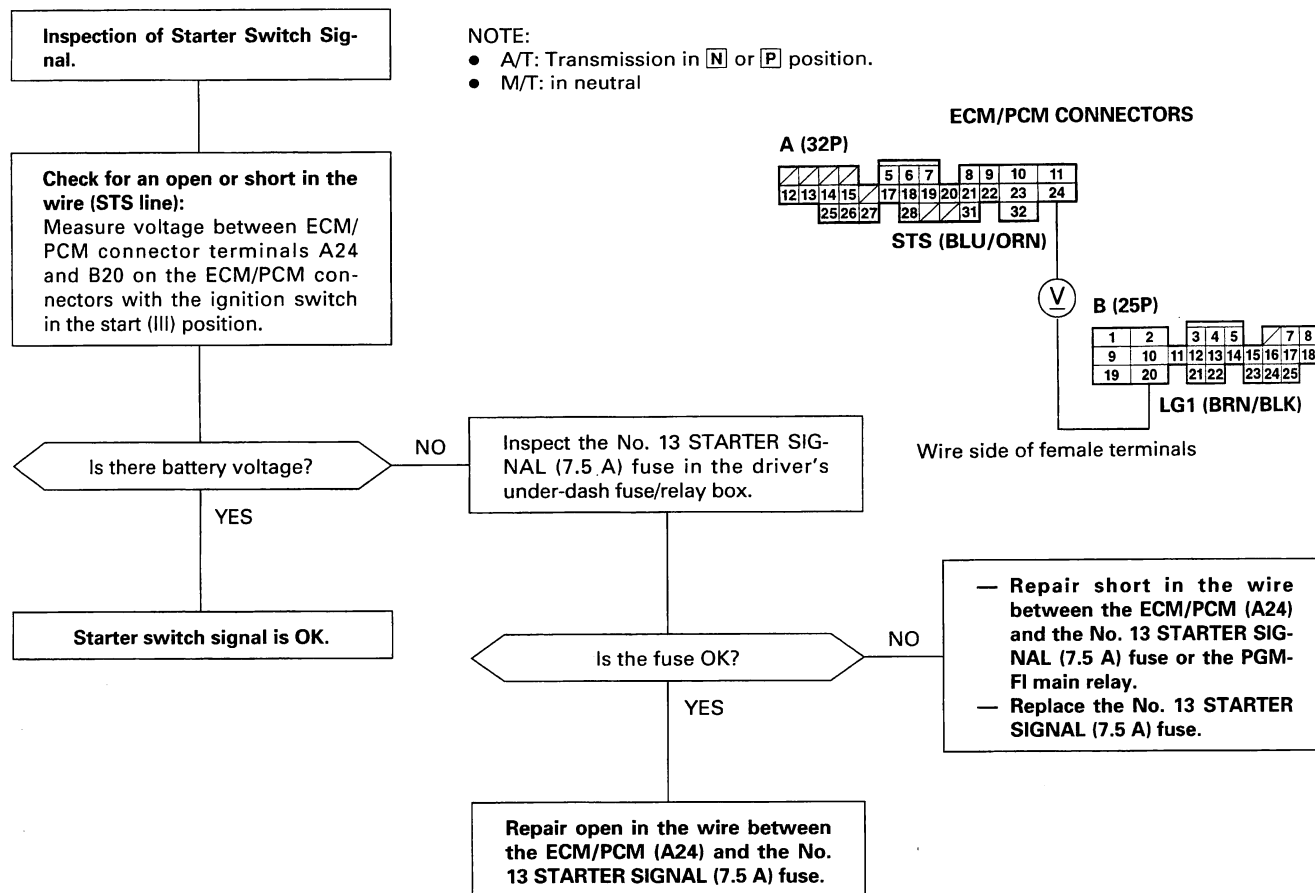
This signals the ECM/PCM when the brake pedal is depressed.





Starter Switch Signal

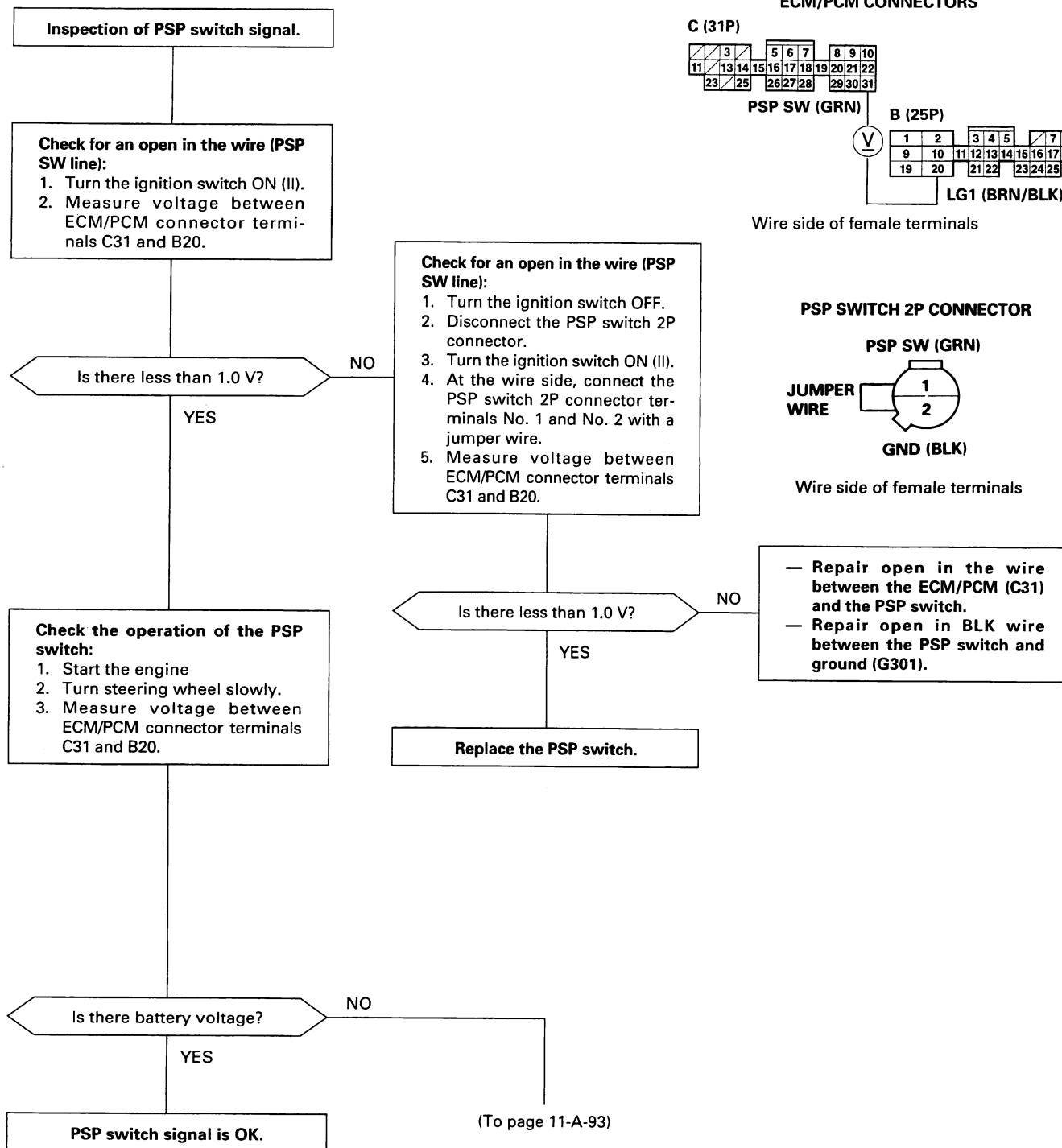
This signals the ECM/PCM when the engine is cranking.



Idle Control System

Power Steering Pressure (PSP) Switch Signal

This signals the ECM/PCM when the power steering load is high.





(From page 11-A-92)

Check for a short in the PSP switch:

1. Turn the ignition switch OFF.
2. Disconnect the 2P connector from the PSP switch.
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals C31 and B20.

Is there battery voltage?

NO

YES

Replace the PSP switch.

Check for a short in the wire (PSP SW line):

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Check for continuity between body ground and ECM/PCM connector terminal C31.

Is there continuity?

YES

NO

ECM/PCM CONNECTORS

C (31P)

11	3	5	6	7	8	9	10
13	14	15	16	17	18	19	20
21	22	23	25	26	27	28	29
30	31						

PSP SW
(GRN)



B (25P)

1	2	3	4	5	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25				

LG1 (BRN/BLK)

Wire side of female terminals

11	3	5	6	7	8	9	10
13	14	15	16	17	18	19	20
21	22	23	25	26	27	28	29
30	31						

PSP SW (GRN)



Repair short in the wire between the ECM/PCM (C31) and the PSP switch.

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If prescribed voltage is now available, replace the original ECM/PCM.

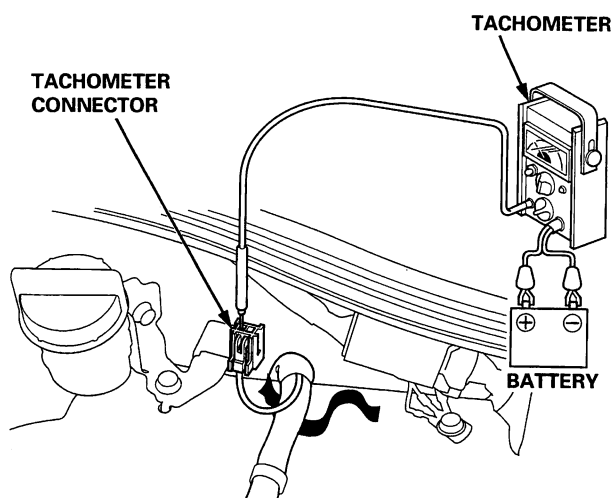
Idle Control System

Idle Speed Inspection

NOTE:

- Leave the IAC valve connected.
- Before inspect the idle speed, check these items:
 - The MIL has not been reported on.
 - Ignition timing
 - Spark plugs
 - Air cleaner
 - PCV system

1. Connect a tachometer.



2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Check the idle speed with no-load conditions: head-lights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

Idle speed should be:

F20B6 engine:

M/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$
A/T	$730 \pm 50 \text{ rpm (min}^{-1}\text{)}$ (in N or P position)

H22A7 engine:

$790 \pm 50 \text{ rpm (min}^{-1}\text{)}$

4. Idle the engine for one minute with heater fan switch at HI and air conditioner on, then check the idle speed.

Idle speed should be:

F20B6 engine:

M/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$
A/T	$730 \pm 50 \text{ rpm (min}^{-1}\text{)}$ (in N or P position)

H22A7 engine:

$790 \pm 50 \text{ rpm (min}^{-1}\text{)}$

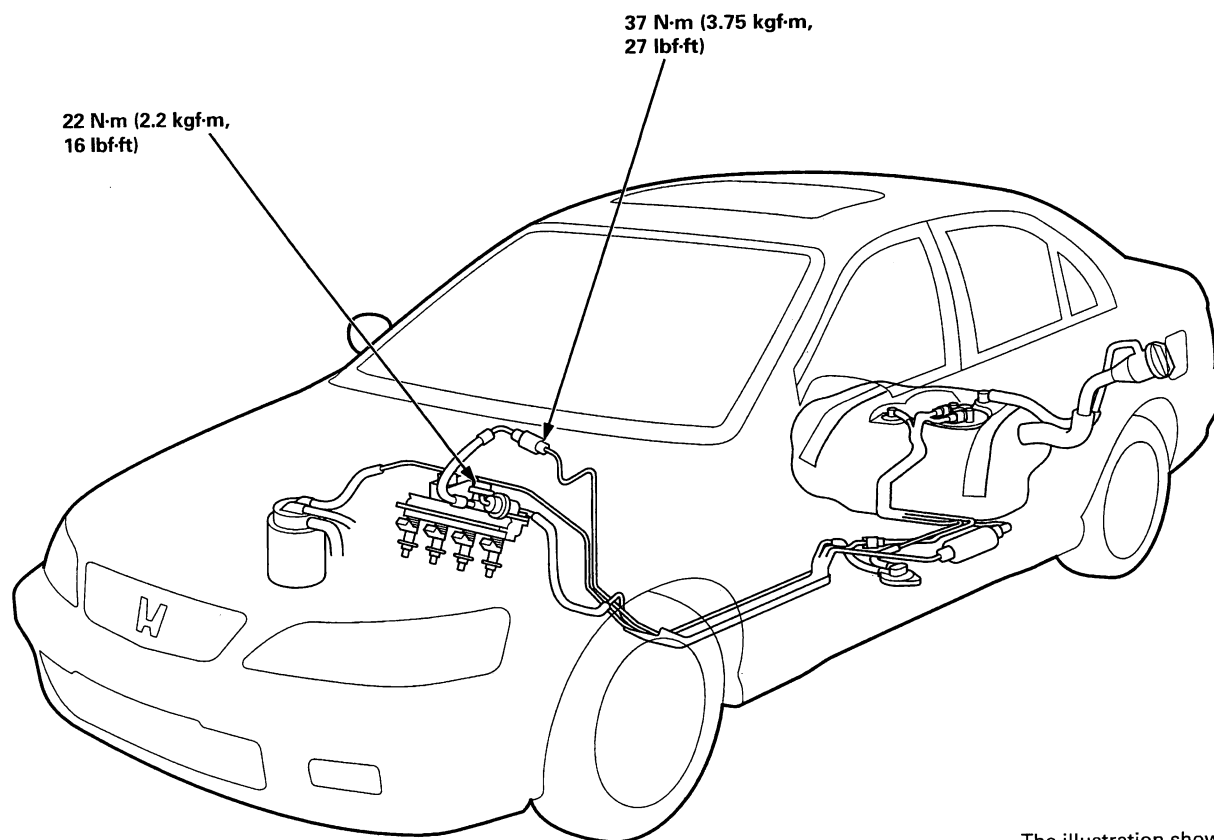
NOTE: If the idle speed is not within specification, see Symptom Chart on page 11-A-18.

Fuel Supply System



Fuel Lines

NOTE: Check fuel system lines, hoses and fuel filter for damage, leaks or deterioration, and replace if necessary.



The illustration shows
LHD type.
Refer to 11-A-6, 7
page for RHD type.

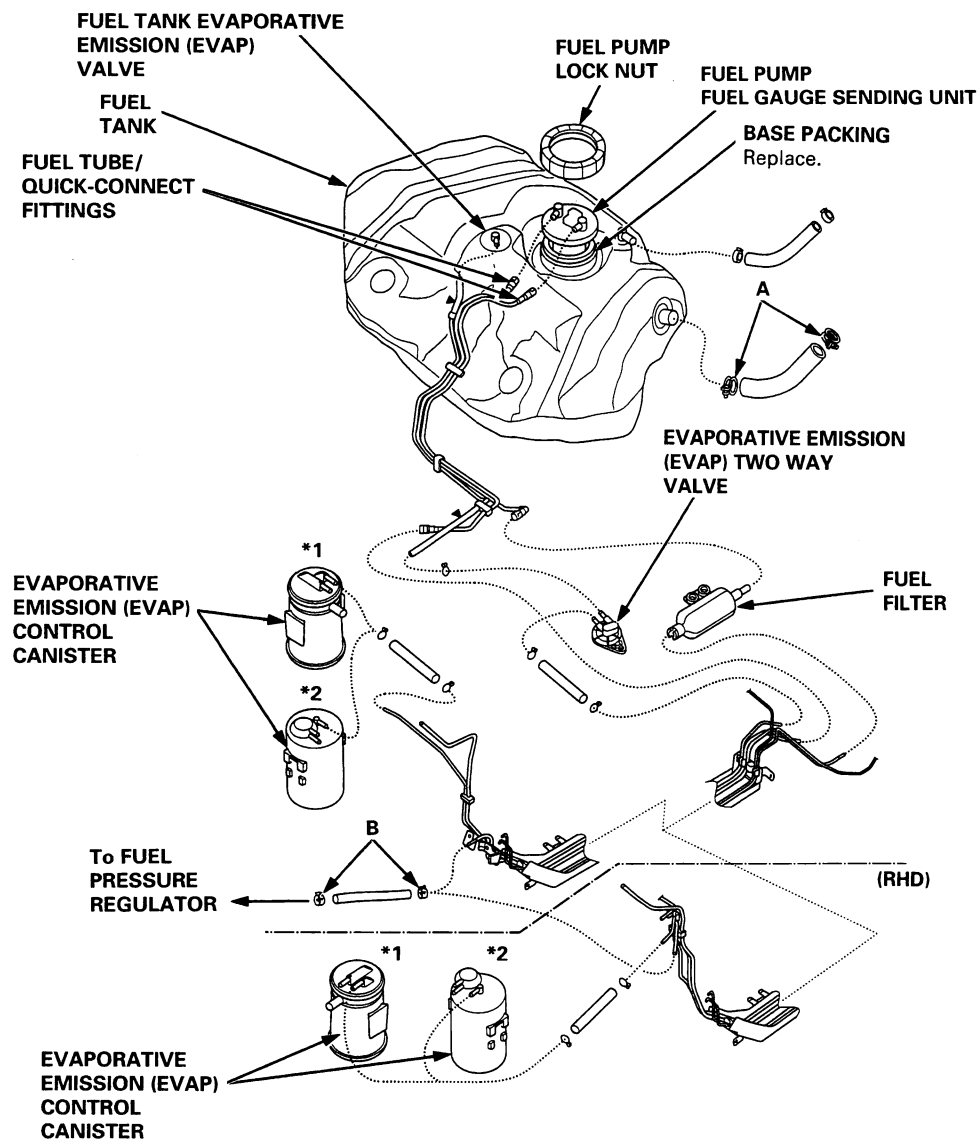
(cont'd)

Fuel Supply System

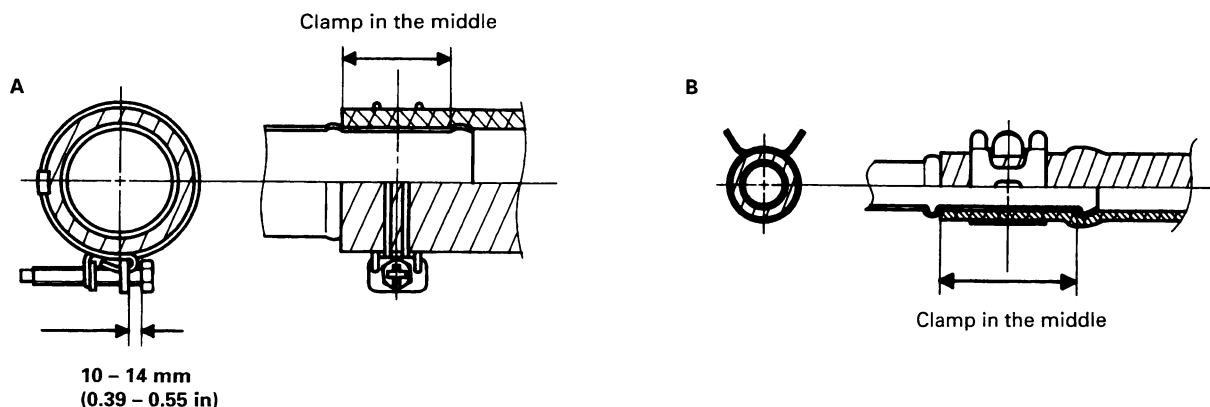
Fuel Lines (cont'd)

NOTE: Check all hose clamps and retighten if necessary.

▲: Do not disconnect the hose from the pipe.



*1: F20B6, H22A7 engine
*2: F18B2, F18B3 engine





Fuel Tube/Quick-Connect Fittings

Precautions

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

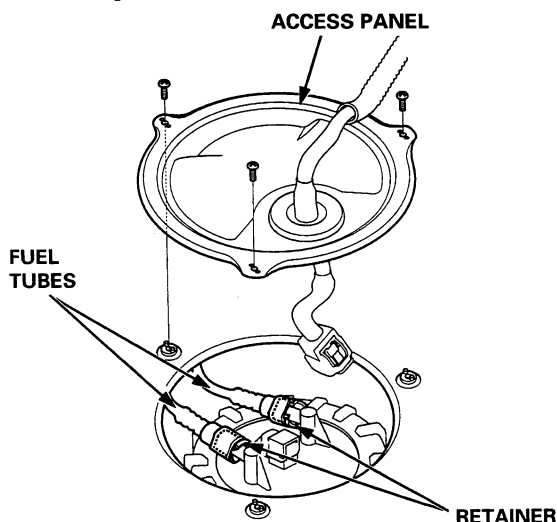
The fuel tube/quick-connect fittings assembly connects the in-tank fuel pump with the fuel filter and the fuel return pipe, the fuel filter with the fuel feed pipe. For removing or installing the fuel filter, the fuel pump and fuel tank, it is necessary to disconnect or connect the quick-connect fittings.

Pay attention to following:

- The fuel tube/quick-connect fittings assembly is not heat-resistant; be careful not to damage it during welding or other heat-generating procedures.
- The fuel tube/quick-connect fittings assembly is not acid-proof; do not touch it with a shop towel which was used for wiping battery electrolyte. Replace the fuel tube/quick-connect fittings assembly if it came into contact with electrolyte or something similar.
- When connecting or disconnecting the fuel tube/quick-connect fittings assembly, be careful not to bend or twist it excessively. Replace it if damaged.

A disconnected quick-connect fittings can be reconnected, but the retainer on the mating pipe cannot be reused once it has been removed from the pipe. Replace the retainer when

- replacing the fuel pump.
- replacing the fuel filter.
- replacing the fuel feed pipe.
- it has been removed from the pipe.
- it is damaged.



Disconnection

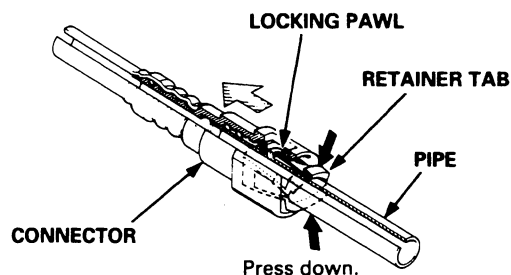
⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

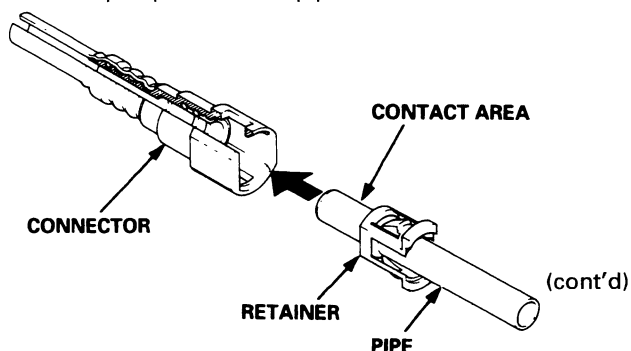
1. Disconnect the battery negative cable.
2. Remove the fuel fill cap, and relieve fuel pressure in the tank.
3. Relieve fuel pressure (see page 11-A-100).
4. Check the fuel quick-connect fittings for dirt, and clean if necessary.
5. Hold the connector with one hand and press down the retainer tabs with the other hand, then pull the connector off.

NOTE:

- Be careful not to damage the pipe or other parts. Do not use tools.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes off easily.
- Do not remove the retainer from the pipe; once removed, the retainer must be replaced with a new one.



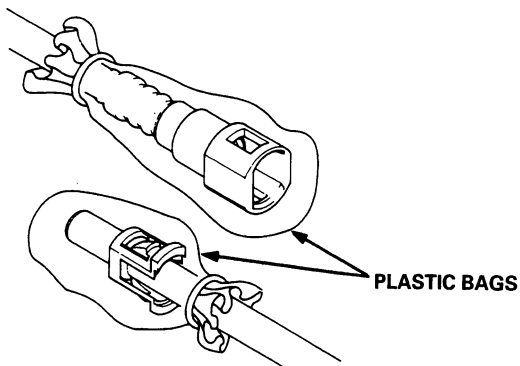
6. Check the contact area of the pipe for dirt and damage.
 - If the surface is dirty, clean it.
 - If the surface is rusty or damaged, replace the fuel pump or fuel feed pipe.



Fuel Supply System

Fuel Tube/Quick-Connect Fittings (cont'd)

7. To prevent damage and keep out foreign matter, cover the disconnected connector and pipe end with plastic bags.



NOTE:

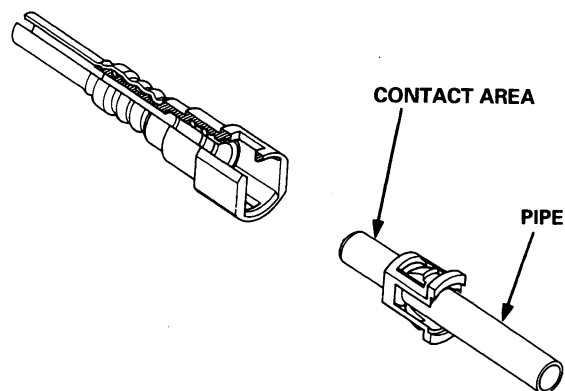
- The retainer cannot be reused once it has been removed from the pipe.
Replace the retainer when
 - replacing the fuel pump.
 - replacing the fuel filter.
 - replacing the fuel feed pipe.
 - it has been removed from the pipe.
 - it is damaged.

Connection

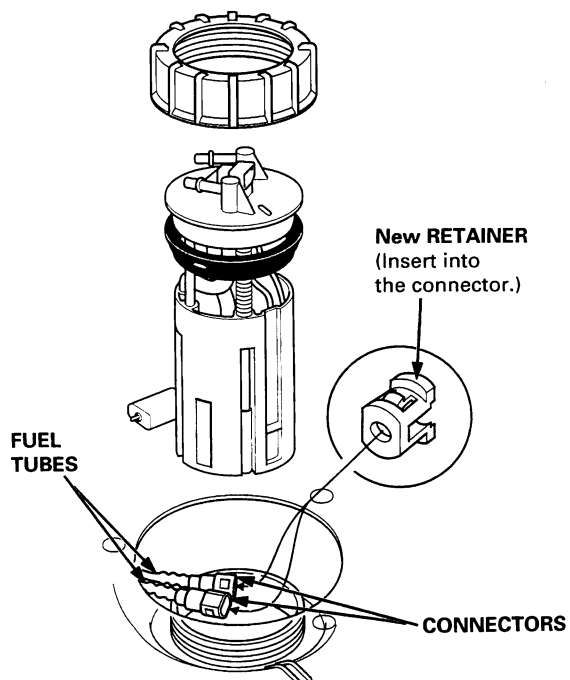
⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Check the pipe contact area for dirt and damage, and clean if necessary.

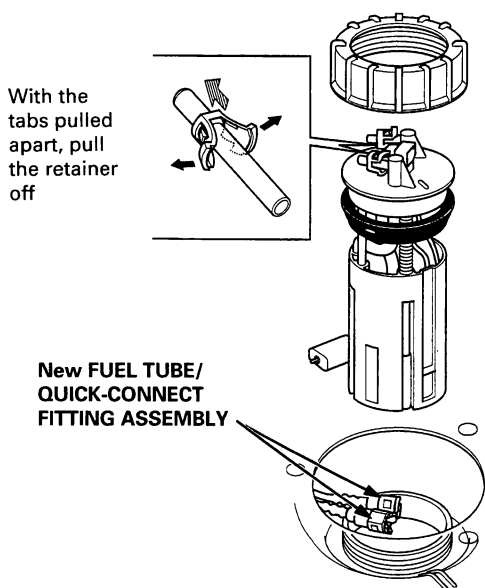


2. Insert a new retainer into the connector if the retainer is damaged, or after
 - replacing the fuel pump.
 - replacing the fuel filter.
 - replacing the fuel feed pipe.
 - removing the retainer from the pipe.





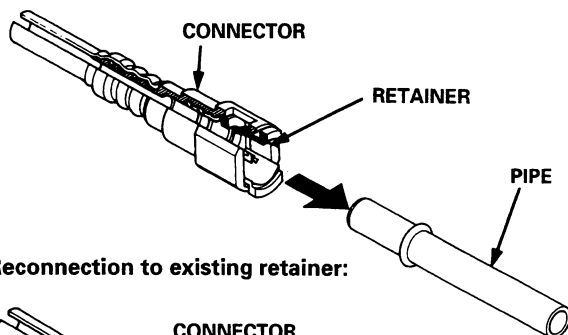
Before connecting a new fuel tube/quick-connect fitting assembly, remove the old retainer from the mating pipe.



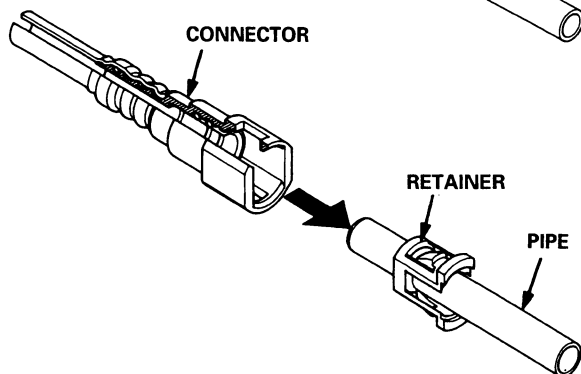
3. Align the quick-connect fittings with the pipe, and align the retainer locking pawls with the connector grooves. Then press the quick-connect fittings onto the pipe until both retainer pawls lock with a clicking sound.

NOTE: If it is hard to connect, put a small amount of new engine oil on the pipe end.

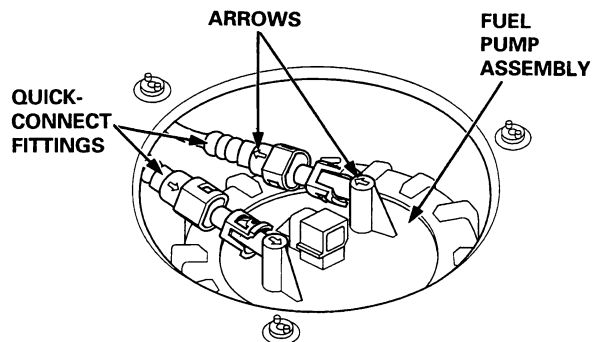
Connection with new retainer:



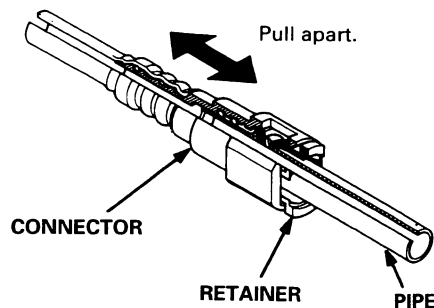
Reconnection to existing retainer:



4. Reconnect the quick-connect fittings checking their arrows fit with the arrows on the fuel pump assembly.



5. Make sure the connection is secure and that the pawls are firmly locked into place; check visually and by pulling the connector.



6. Reconnect the battery negative cable, and turn the ignition switch ON (II). The fuel pump will run for about two seconds, and fuel pressure will rise. Repeat two or three times, and check that there is no leakage in the fuel supply system.

Fuel Supply System

System Description

The fuel supply system consists of a fuel tank, in-tank high-pressure fuel pump, PGM-FI main relay, fuel filter, fuel pressure regulator, fuel injectors, and fuel delivery and return lines. This system delivers pressure-regulated fuel to the fuel injectors and cuts the fuel delivery when the engine is not running.

Fuel Pressure

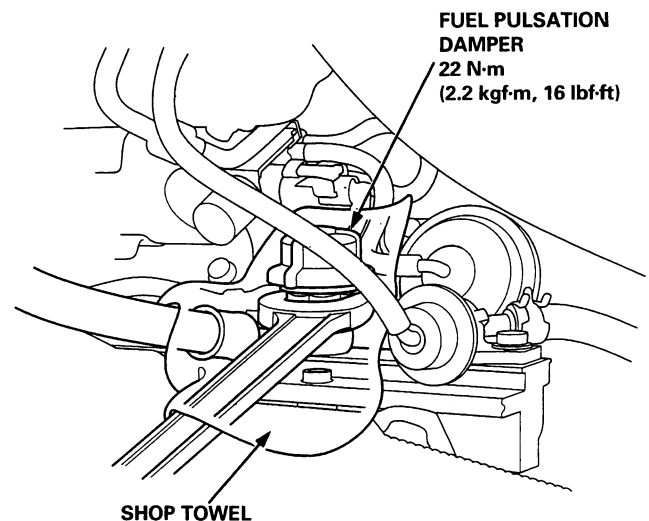
Relieving

Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the fuel pulsation damper on top of the fuel rail.

! WARNING

Do not smoke while working on the fuel system. Keep open flame or sparks away from the work area. Be sure to relieve fuel pressure while the ignition switch is off.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Remove the fuel fill cap.
3. Use a wrench on the fuel pulsation damper at the fuel rail.
4. Place a rag or shop towel over the fuel pulsation damper.
5. Slowly loosen the fuel pulsation damper one complete turn.



NOTE: Replace the washers whenever the fuel pulsation damper is loosened or removed.

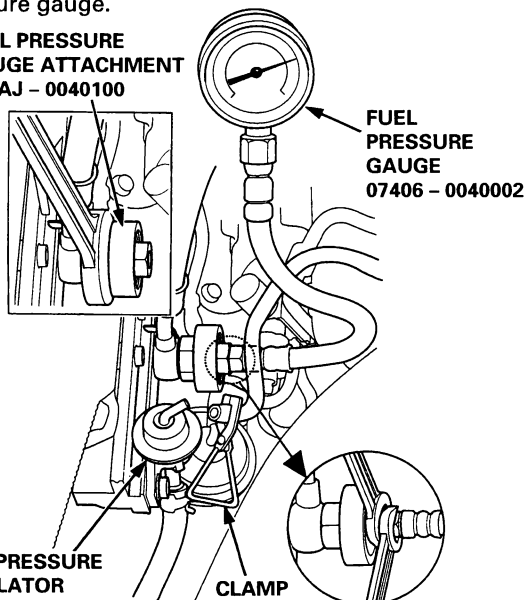


Fuel Injectors

Inspection

1. Relieve fuel pressure (see page 11-A-100).
2. Remove the fuel pulsation damper from the fuel rail. Attach the fuel pressure gauge attachment and fuel pressure gauge.

**FUEL PRESSURE
GAUGE ATTACHMENT**
07VAJ - 0040100



3. Start the engine. Measure the fuel pressure with the engine idling and the vacuum hose of the fuel pressure regulator disconnected from the fuel pressure regulator and pinched. If the engine will not start, turn the ignition switch ON (II), wait for two seconds, turn it off, then back on again and read the fuel pressure.

Pressure should be:

F20B6, F18B2, F18B3 engine:

280 - 330 kPa (2.9 - 3.4 kgf/cm², 41 - 48 psi)

H22A7 engine:

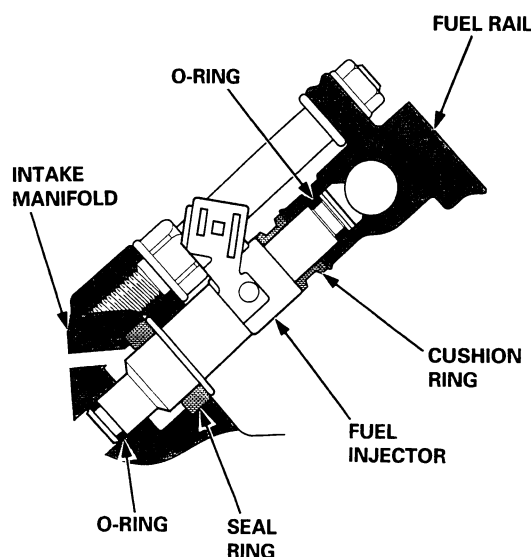
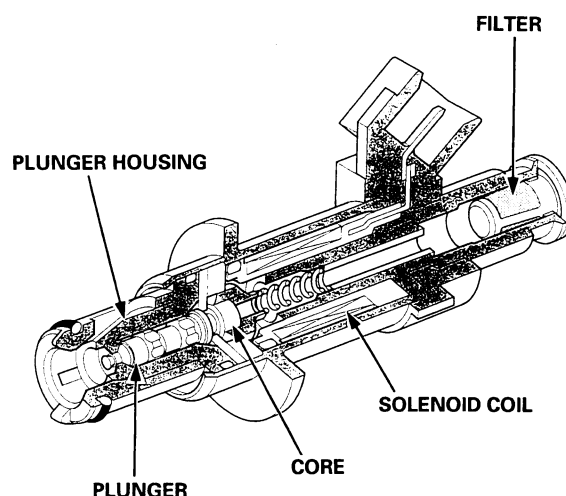
330 - 380 kPa (3.4 - 3.9 kgf/cm², 48 - 55 psi)

If the fuel pressure is not as specified, first check the fuel pump (see page 11-A-106). If the fuel pump is OK, check the following:

- If the fuel pressure is higher than specified, inspect for:
 - Pinched or clogged fuel return hose or line.
 - Faulty fuel pressure regulator (see page 11-A-104).
- If the fuel pressure is lower than specified, inspect for:
 - Clogged fuel filter.
 - Faulty fuel pressure regulator (see page 11-A-104).
 - Leakage in the fuel line.

Description

The fuel injectors are a solenoid-actuated constant-stroke, pintle-type consisting of a solenoid, plunger needle valve and housing. When current is applied to the solenoid coil, the valve lifts up and pressurized fuel is injected. Because the needle valve lift and the fuel pressure are constant, the injection quantity is determined by the length of time that the valve is open (that is the duration the current is supplied to the solenoid coil). The fuel injector is sealed by an O-ring and seal ring at the top and bottom. These seals also reduce operating noise.



(cont'd)

Fuel Supply System

Fuel Injectors (cont'd)

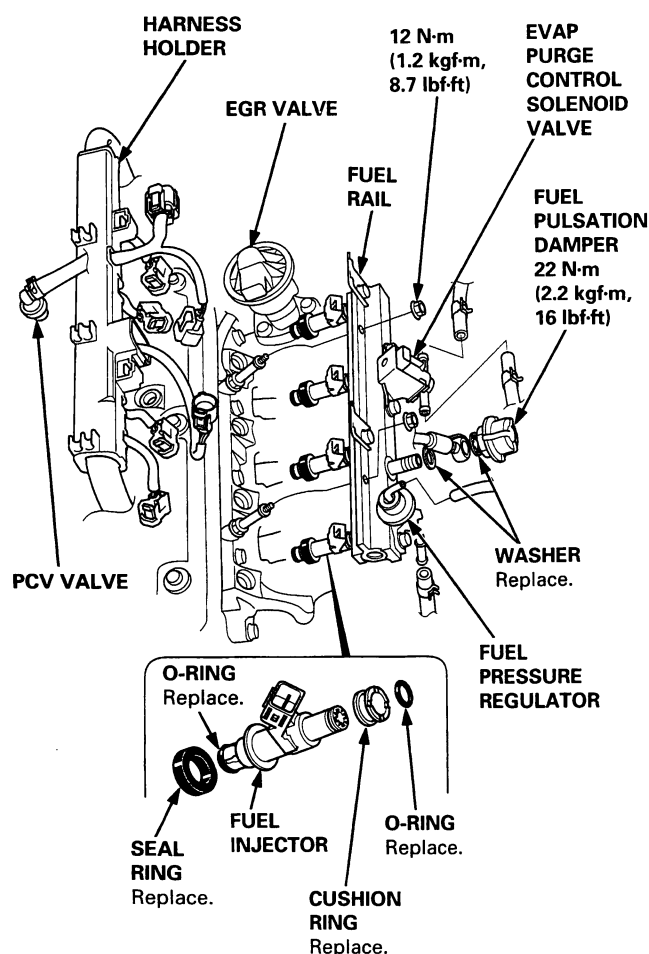
Replacement

⚠ WARNING

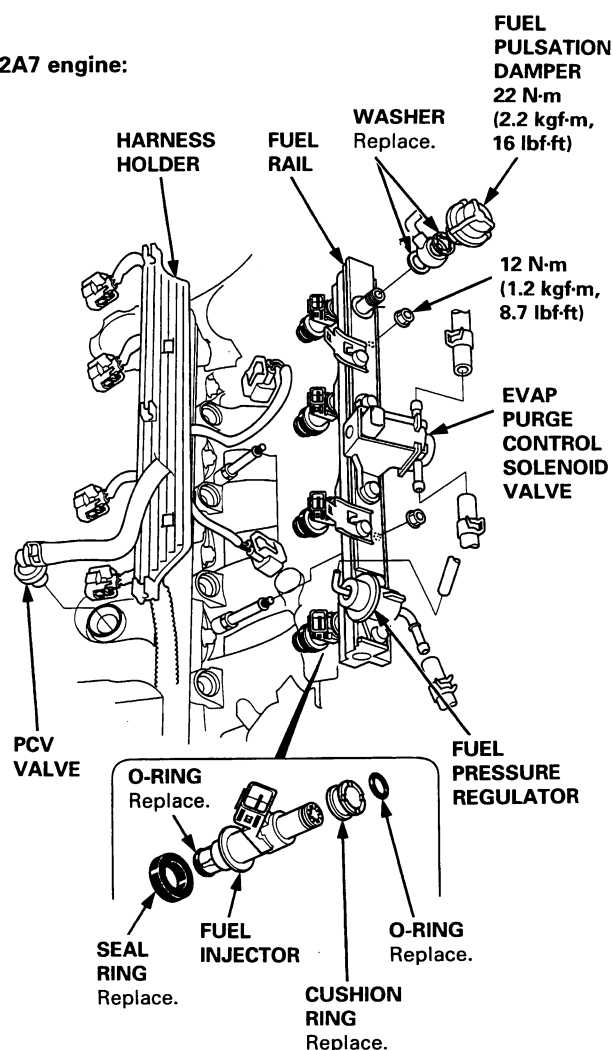
Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Relieve the fuel pressure (see page 11-A-100).
2. Disconnect the connectors from the fuel injectors, EGR valve and EVAP purge control solenoid valve.
3. Disconnect the vacuum hose from the EVAP purge control solenoid valve.
4. Disconnect the vacuum hoses and fuel return hose from the fuel pressure regulator.
NOTE: Place a rag or shop towel over the hoses before disconnecting them.
5. Disconnect the fuel hose from the fuel rail.
6. Remove the retainer nuts from the fuel rail and harness holder.
7. Disconnect the PCV valve.
8. Disconnect the fuel rail.
9. Remove the fuel injectors from the intake manifold.

F20B6 engine:



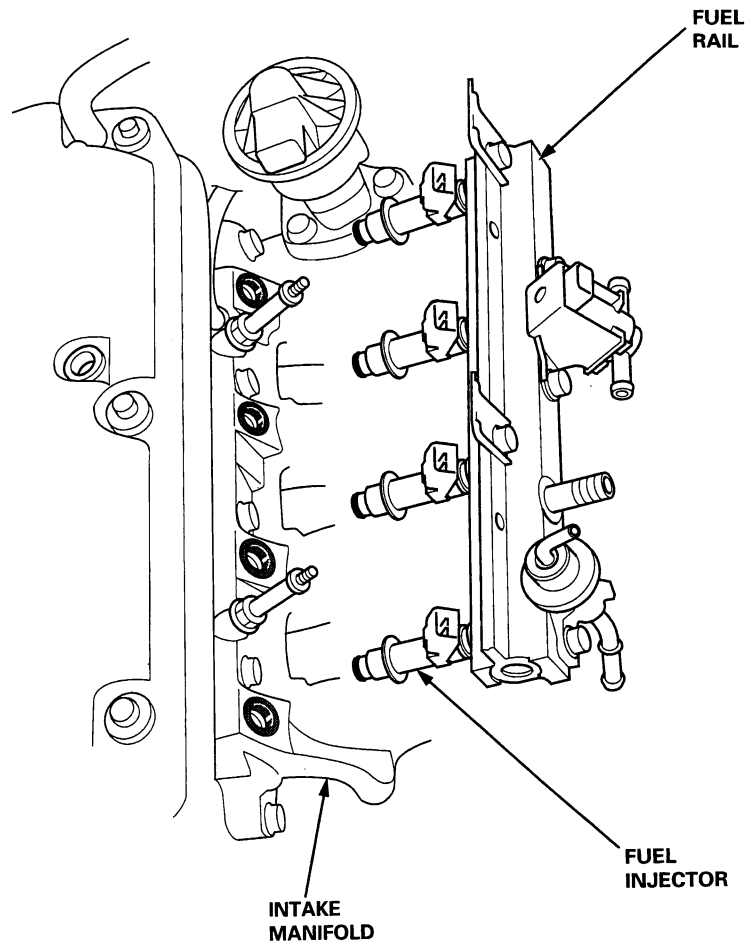
H22A7 engine:



10. Slide new cushion rings onto the fuel injectors.
11. Coat new O-rings with clean engine oil, and put them on the fuel injectors.
12. Insert the fuel injectors into the fuel rail first.
13. Coat new seal rings with clean engine oil, and press them into the intake manifold.



14. To prevent damage to the O-rings, install the fuel injectors in the fuel rail first, then install them in the intake manifold.



15. Install and tighten the retainer nuts.
16. Connect the fuel hose to the fuel rail with new washers.
17. Connect the vacuum hoses and fuel return hose to the fuel pressure regulator.
18. Connect the vacuum hose to the EVAP purge control solenoid valve.
19. Install the connectors on the fuel injectors, EGR valve and EVAP purge control solenoid valve.
20. Connect the PCV valve.
21. Turn the ignition switch ON (II), but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

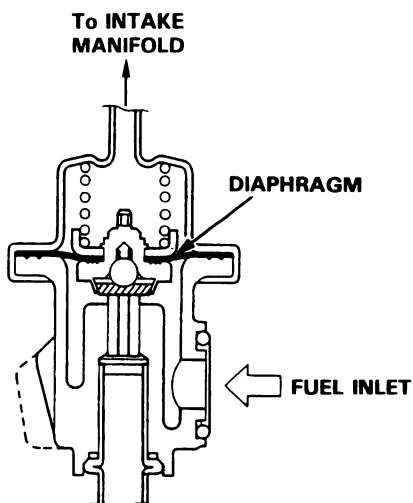
Fuel Supply System

Fuel Pressure Regulator

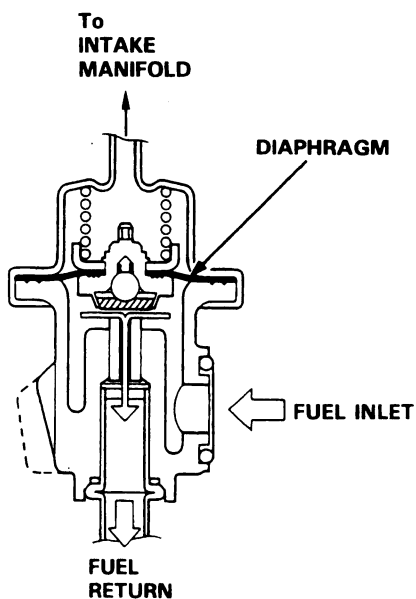
Description

The fuel pressure regulator maintains a constant fuel pressure to the fuel injectors. When the difference between the fuel pressure and manifold pressure exceeds F20B6, F18B2, F18B3 engine: 290 kPa (3.0 kgf/cm², 43 psi), H22A7 engine: 340 kPa (3.5 kgf/cm², 50 psi) the diaphragm is pushed upward, and the excess fuel is fed back into the fuel tank through the return line.

CLOSED:



OPEN:



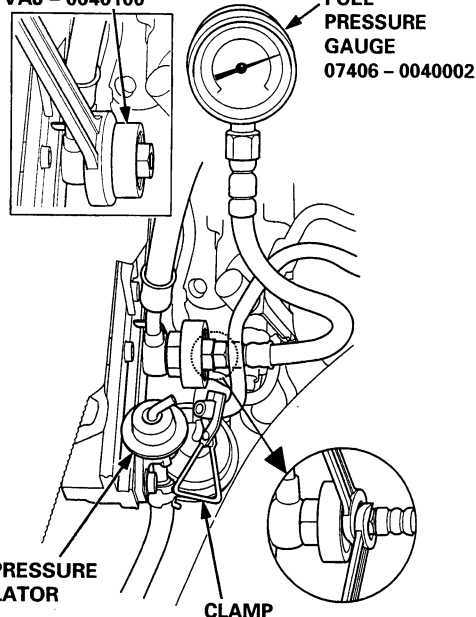
Testing

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Attach the fuel pressure gauge attachment and fuel pressure gauge (see page 11-A-101). Start the engine.

FUEL PRESSURE
GAUGE ATTACHMENT
07VAJ - 0040100



Pressure should be:
F20B6, F18B2, F18B3 engine:
280 - 330 kPa (2.9 - 3.4 kgf/cm², 41 - 48 psi)
H22A7 engine:
330 - 380 kPa (3.4 - 3.9 kgf/cm², 48 - 55 psi)
(with the fuel pressure regulator vacuum hose disconnected and pinched)

2. Reconnect the vacuum hose to the fuel pressure regulator.
3. Check that the fuel pressure rises when the vacuum hose from the fuel pressure regulator is disconnected again.
 - If the fuel pressure did not rise, replace the fuel pressure regulator.

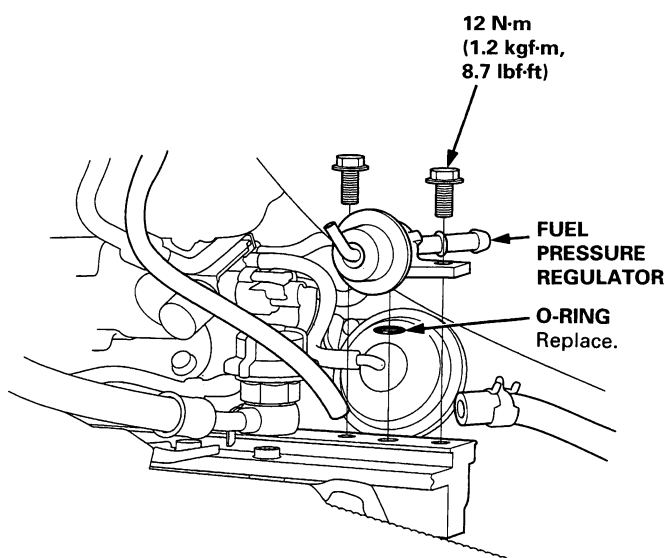


Replacement

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Place a shop towel under the fuel pressure regulator, then relieve fuel pressure (see page 11-A-100).
2. Disconnect the vacuum hose and fuel return hose.
3. Remove the two 6 mm retainer bolts.



4. Apply clean engine oil to a new O-ring, and carefully install it into its proper position.
5. Install the fuel pressure regulator and the 6 mm retainer bolts.
6. Reconnect the vacuum hose and fuel return hose.

Fuel Filter

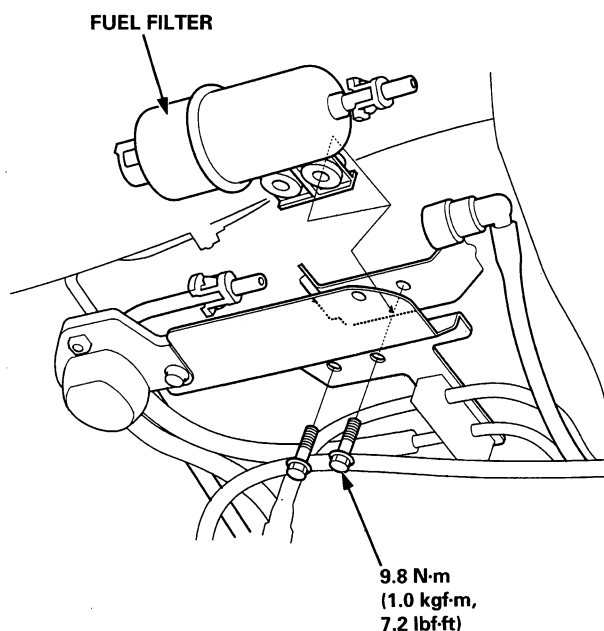
Replacement

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.
While replacing the fuel filter, be careful to keep a safe distance between battery terminals and any tools.

The fuel filter should be replaced whenever the fuel pressure drops below the specified value [F20B6, F18B2, F18B3 engine: 280 – 330 kPa (2.9 – 3.4 kgf/cm², 41 – 48 psi), H22A7 engine: 330 – 380 kPa (3.4 – 3.9 kgf/cm², 48 – 55 psi) with the fuel pressure regulator vacuum hose disconnected and pinched] after making sure that the fuel pump and the fuel pressure regulator are OK.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Relieve fuel pressure (see page 11-A-100).
3. Disconnect the hose and quick-connect fittings (see page 11-A-97).
4. Remove the fuel filter.



Fuel Supply System

Fuel Pump

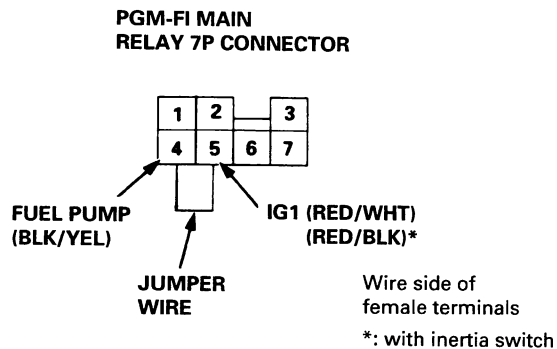
Testing

⚠ WARNING

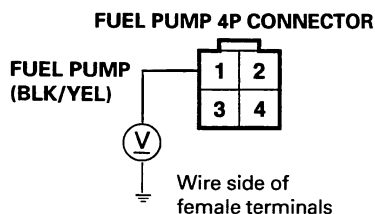
Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

If you suspect a problem with the fuel pump, check that the fuel pump actually runs; when it is ON (II), you will hear some noise if you hold your ear to the fuel fill port with the fuel fill cap removed. The fuel pump should run for two seconds when ignition switch is first turned ON (II). If the fuel pump does not make noise, check it as follows:

1. Remove the spare tire lid.
2. Remove the access panel from the floor.
3. Turn the ignition switch OFF, then disconnect the 5P connector from fuel pump.
4. Connect the PGM-FI main relay 7P connector terminal No. 4 and No. 5 with a jumper wire.



5. Check that battery voltage is available between the fuel pump 4P connector terminal No. 1 and body ground when the ignition switch is turned ON (II).



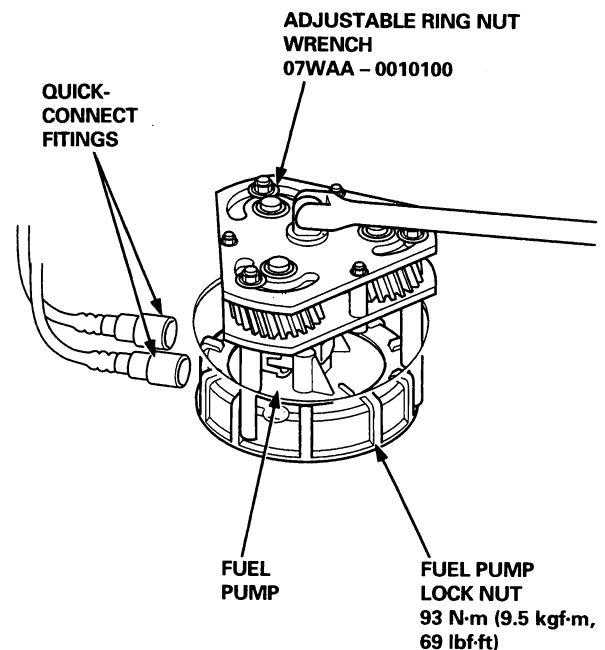
- If battery voltage is available, check the fuel pump ground. If the ground is OK, replace the fuel pump.
- If there is no voltage, check the wire harness (see page 11-A-112).

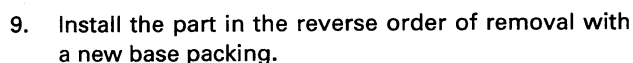
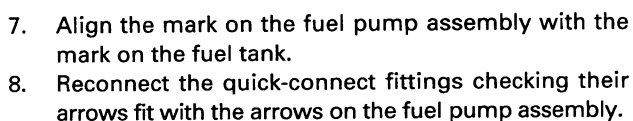
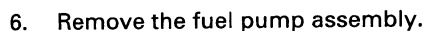
Replacement

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Remove the spare tire lid.
2. Remove the access panel from the floor.
3. Turn the ignition switch OFF, then disconnect the fuel pump 4P connector.
4. Disconnect the quick-connect fittings from the fuel pump.
5. Attach the adjustable ring nut wrench, and remove the fuel pump lock nut.





Testing

NOTE: See section 23 for the fuel gauge system circuit diagram.

1. Check the No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse in the driver's under-dash fuse/relay box before testing.
2. Remove the spare tire lid.
3. Remove the access panel from the floor.
4. Turn the ignition switch OFF, then disconnect the fuel pump 4P connector.
5. Measure voltage between the fuel pump 4P connector terminals No. 3 and No. 4 with the ignition switch ON (II).
There should be between 5 and 8 V.

FUEL PUMP 4P CONNECTOR



- If the voltage is as specified, go to step 6.
- If the voltage is not as specified, check for:
 - an open in the YEL/BLU or BLK wire.
 - poor ground (LHD: G551, RHD: G581).

6. Turn the ignition switch OFF.
7. Connect the fuel pump 4P connector terminals No. 3 and No. 4 with a jumper wire, then turn the ignition switch ON (II).

FUEL PUMP 4P CONNECTOR



(cont'd)

Fuel Supply System

Fuel Gauge (cont'd)

8. Check that the pointer of the fuel gauge starts moving toward the "F" mark.
 - If the pointer of the fuel gauge does not move at all, replace the gauge.
 - If the gauge is OK, inspect the fuel gauge sending unit.

NOTE:

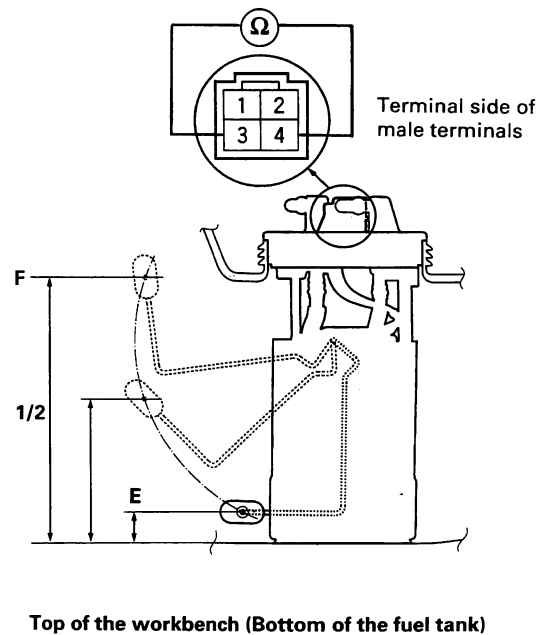
- Turn the ignition switch OFF before the pointer reaches "F" on the gauge dial. Failure to do so may damage the fuel gauge.
- The fuel gauge is a bobbin (cross-coil) type, hence the fuel level is continuously indicated even when the ignition switch is OFF, and the pointer moves more slowly than that of a bimetal type.

Fuel Gauge Sending Unit

Testing

1. Remove the spare tire lid.
2. Remove the access panel from the floor.
3. Turn the ignition switch OFF, then disconnect the fuel pump 4P connector.
4. Disconnect the quick-connect fittings from the fuel pump.
5. Remove the fuel pump assembly (see page 11-A-106).
6. Measure the resistance between the No. 1 and No. 2 terminals at E (EMPTY), 1/2 (HALF FULL) and F (FULL) by moving the float.

Float Position	E	1/2	F
Resistance (Ω)	130 – 132	68.5 – 74.5	11 – 12



If you do not get the above readings, replace the fuel gauge sending unit (see page 11-A-109).

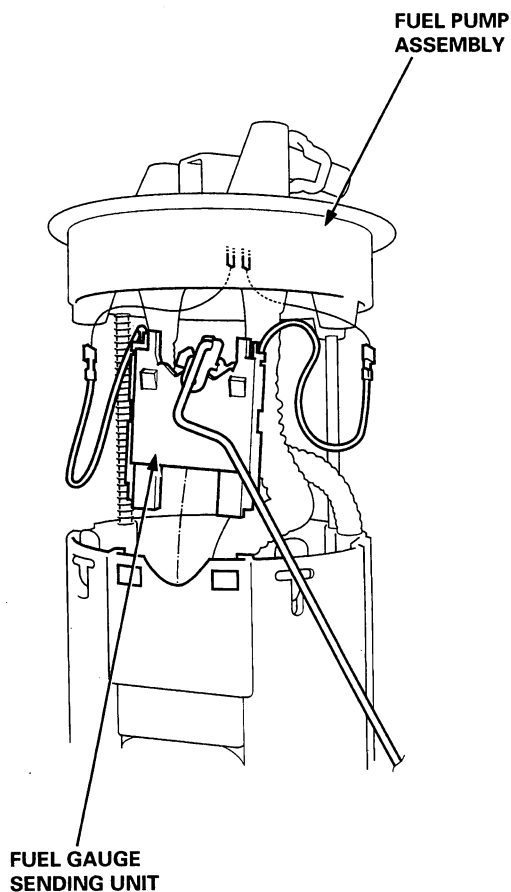
7. Install the part in the reverse order of removal with a new base packing (see page 11-A-106).



Low Fuel Indicator Light System

Replacement

1. Remove the fuel pump assembly (see page 11-A-106).
2. Remove the fuel gauge sending unit from the fuel pump assembly.

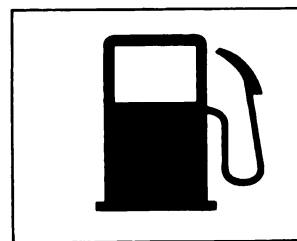


3. Install the parts in the reverse order of removal.

Indicator Light Testing

NOTE: See section 23 for the low fuel indicator circuit diagram.

1. Check the No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse in the driver's under-dash fuse/relay box before testing.
2. Park the vehicle on level ground.
3. Drain the fuel tank: Remove the fuel return line from the fuel pressure regulator, and attach a suitable hose to the regulator fitting. Place the other end of the hose in a container suitable for gasoline. Start the engine, and run it until the tank is empty (the engine stalls).
4. Add less than 8.5 l (2.2 U.S. Gal, 1.8 Imp. Gal) of fuel, and turn the ignition switch ON (II). The low fuel indicator light should come on within four minutes.



LOW FUEL INDICATOR LIGHT

- If the light comes on within four minutes, go to step 9.
 - If the light does not come on within four minutes, go to step 5.
5. Remove the spare tire lid.
 6. Remove the access panel from the floor.
 7. Turn the ignition switch OFF, then disconnect the fuel pump 4P connector.

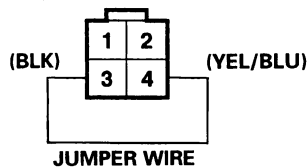
(cont'd)

Fuel Supply System

Low Fuel Indicator Light System (cont'd)

8. Connect the fuel pump 4P connector terminals No. 3 and No. 4 with a jumper wire.
 - If the light comes on, replace the fuel gauge sending unit (see page 11-A-109).
 - If the light does not come on, check for:
 - an open in the YEL/BLU wire between the fuel gauge sending unit and fuel gauge assembly.
 - blown bulb.
 - poor ground (LHD: G551, RHD: G581)

FUEL PUMP 4P CONNECTOR



Wire side of female terminals

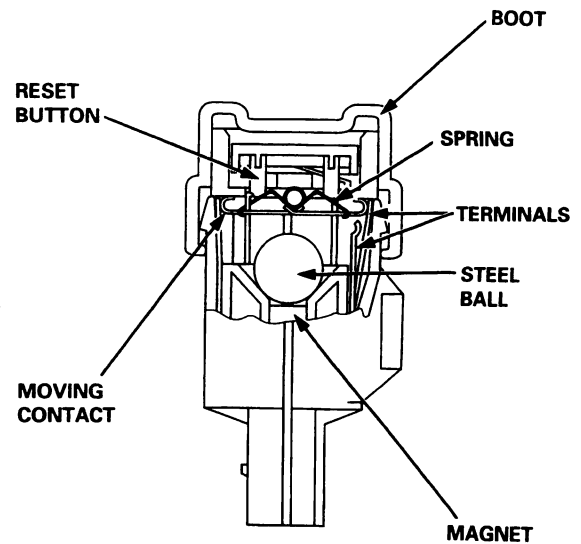
9. Add 4 ℓ of fuel (1.1 U.S.Gal, 0.9 Imp. Gal). The light should go off within four minutes.

Inertia Switch (KG, KE, KS, KR model)

Description

The inertia switch is a safety device which automatically cuts off the fuel supply in the event of a collision or sudden impact.

The switch is located behind the glove box. After an impact, the switch must be reset by pressing the button before the engine can be restarted.

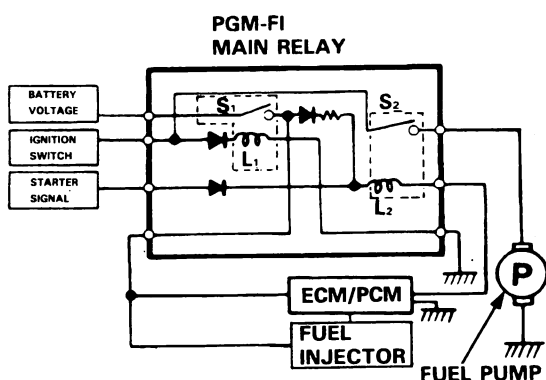




PGM-FI Main Relay

Description

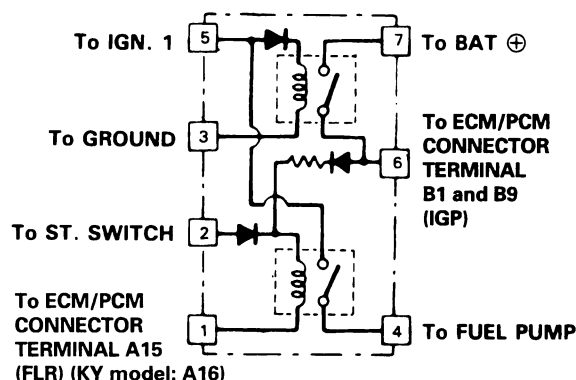
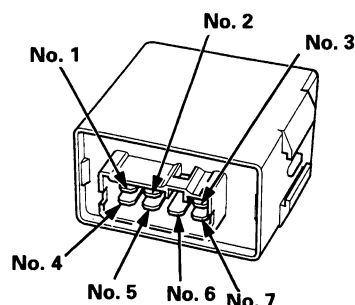
The PGM-FI main relay actually contains two individual relays. This relay is located at the driver side of the cowl. One relay is energized whenever the ignition is on which supplies the battery voltage to the ECM/PCM, power to the fuel injectors, and power for the second relay. The second relay is energized for two seconds when the ignition is switched on, and when the engine is running, to supply power to the fuel pump.



Relay Testing

NOTE: If the car starts and continues to run, the PGM-FI main relay is OK.

1. Remove the PGM-FI main relay.
2. Attach the battery positive terminal to the No. 2 terminal and the battery negative terminal to the No. 1 terminal of the PGM-FI main relay. Then check for continuity between the No. 5 terminal and No. 4 terminal of the PGM-FI main relay.
 - If there is continuity, go on to step 3.
 - If there is no continuity, replace the PGM-FI main relay and retest.



3. Attach the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 3 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 7 terminal and No. 6 terminal of the PGM-FI main relay.
 - If there is continuity, go on to step 4.
 - If there is no continuity, replace the PGM-FI main relay and retest.
4. Attach the battery positive terminal to the No. 6 terminal and the battery negative terminal to the No. 1 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 5 terminal and No. 4 terminal of the PGM-FI main relay.
 - If there is continuity, the PGM-FI main relay is OK.
 - If there is no continuity, replace the PGM-FI main relay and retest.

(cont'd)

Fuel Supply System

PGM-FI Main Relay (cont'd)

Troubleshooting

- Engine will not start.
- Inspection of PGM-FI main relay and relay harness.

Check for an open in the wire (GND line):

1. Turn the ignition switch OFF.
2. Disconnect the PGM-FI main relay connector.
3. Check for continuity between the PGM-FI main relay 7P connector terminal No. 3 and body ground.

Is there continuity?

NO

Repair open in the wire between the PGM-FI main relay and G101.

YES

Check for an open or short in the wire (BAT line):

Measure voltage between the PGM-FI main relay 7P connector terminal No. 7 and body ground.

Is there battery voltage?

NO

- Replace the ACGS (15 A) fuse in the under-hood fuse/relay box.
- Repair open or short in the wire between the PGM-FI main relay and the ACGS (15 A) fuse.

YES

Check for an open or short in the wire (IG1 line):

1. Turn the ignition switch ON (II).
2. Measure the voltage between the PGM-FI main relay 7P connector terminal No. 5 and body ground.

Is there battery voltage?

NO

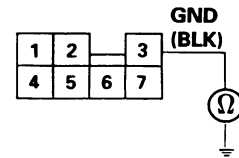
- (KG, KE, KS KR model)
- Check the inertia switch:**
1. Turn the ignition switch ON (II).
 2. Disconnect the 3P connector from the inertia switch.
 3. Turn the ignition switch ON (II).
 4. Measure voltage between the inertia switch 3P connector terminals No. 1 and No. 3.

Is there battery voltage?

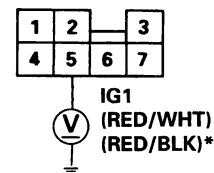
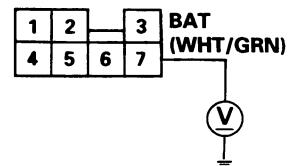
YES

Replace the inertia switch.

PGM-FI MAIN RELAY 7P CONNECTOR

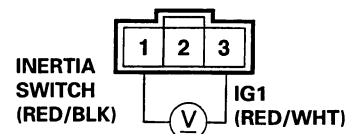


Wire side of female terminals



*: with inertia switch

INERTIA SWITCH 3P CONNECTOR



Terminal side of male terminals

- Replace the No. 1 FUEL PUMP (15 A) fuse in the driver's under-hood fuse/relay box.
- Repair open or short in the wire between the PGM-FI main relay and the No. 1 FUEL PUMP (15 A) fuse.

(To page 11-A-113)



(From page 11-A-112)

Check for an open or short in the wire (STS line):

1. Turn the ignition switch to the START (III) position.
NOTE: M/T in neutral, A/T in **N** or **P** position.
2. Measure the voltage between the PGM-FI main relay 7P connector terminal No. 2 and body ground.

Is there battery voltage?

YES

NO

- Replace the No. 13 **STARTER SIGNAL** (7.5 A) fuse in the driver's under-hood fuse/relay box.
- Repair open or short in the wire between the PGM-FI main relay and the No. 13 **STARTER SIGNAL** (7.5 A) fuse.

Check for an open in the wire (FLR line):

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Check for continuity between the PGM-FI main relay 7P connector terminal No. 1 and ECM/PCM connector terminal A15 (A16)*.

Is there continuity?

YES

NO

Repair open in the wire between the ECM/PCM (A15, A16*) and the PGM-FI main relay.

Check for an open in the wires (IGP1, IGP2 lines):

1. Reconnect the ECM/PCM connector B (25P).
2. Reconnect the PGM-FI main relay 7P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals B20, B1 and B9.

Is there battery voltage?

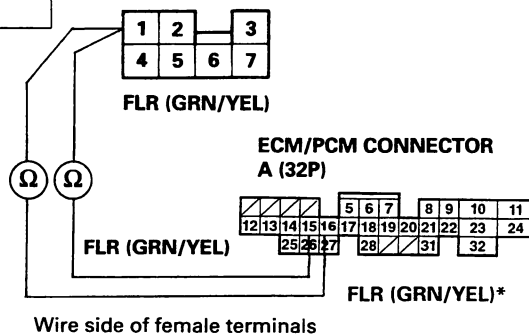
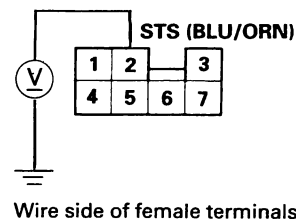
YES

NO

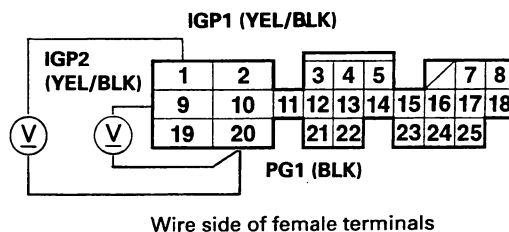
- Repair open in the wire between the ECM/PCM (B1, B9) and the PGM-FI main relay.
- Replace the PGM-FI main relay.

(To page 11-A-114)

PGM-FI MAIN RELAY 7P CONNECTOR



ECM/PCM CONNECTOR B (25P)



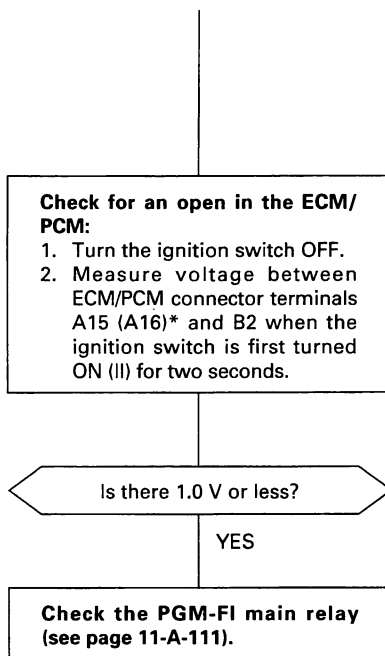
*: KY model

(cont'd)

Fuel Supply System

PGM-FI Main Relay (cont'd)

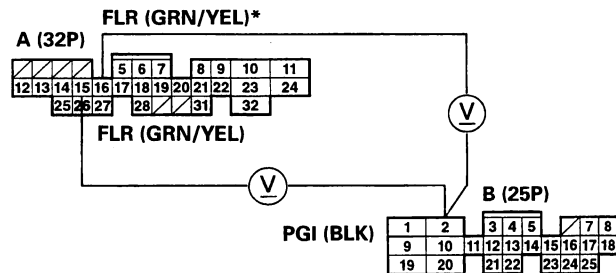
(From page 11-A-113)



NO

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If prescribed voltage is now available, replace the original ECM/PCM.

ECM/PCM CONNECTORS



*: KY model



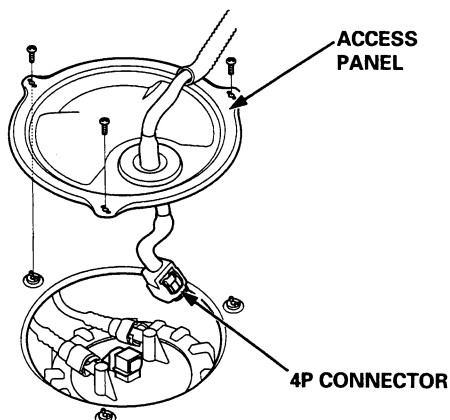
Fuel Tank

⚠ WARNING

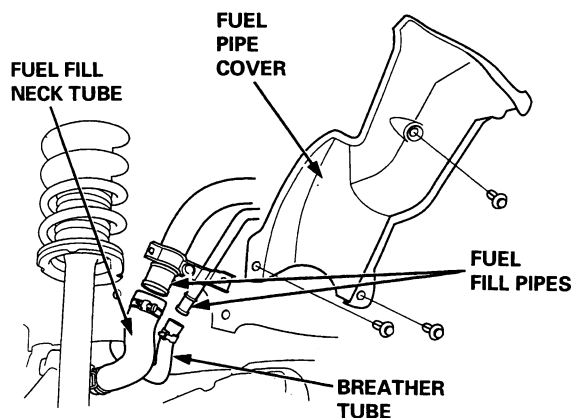
Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

Removal

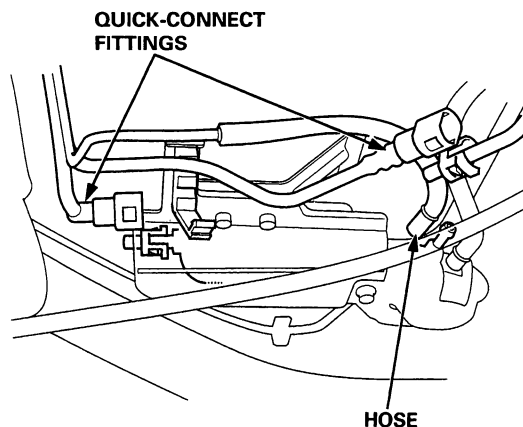
1. Relieve the fuel pressure (see page 11-A-100).
2. Remove the fuel fill cap.
3. Drain the fuel tank: Remove the fuel return line from the fuel pressure regulator, and attach a suitable hose to the regulator fitting. Place the other end of hose in a container suitable for gasoline. Start the engine, and run it until the tank is empty (the engine stalls).
4. Remove the spare tire lid (see section 20), and the access panel from the floor. Disconnect the fuel pump 4P connector.



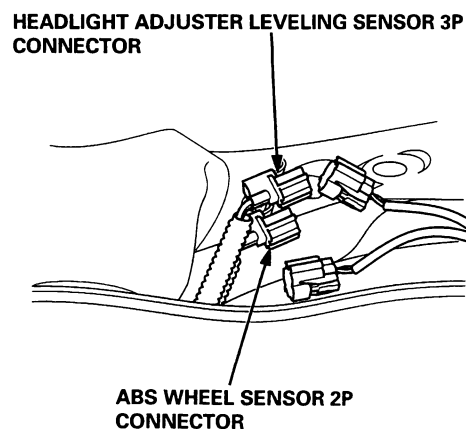
5. Loosen the rear wheel nuts slightly, then raise the vehicle and make sure it is securely supported. Remove the rear wheels.
6. Release the parking brake lever fully.
7. Remove the TWC (see section 9).
8. Remove the fuel pipe cover, and disconnect the fuel fill neck tube and the breather tube from the fuel fill pipes.



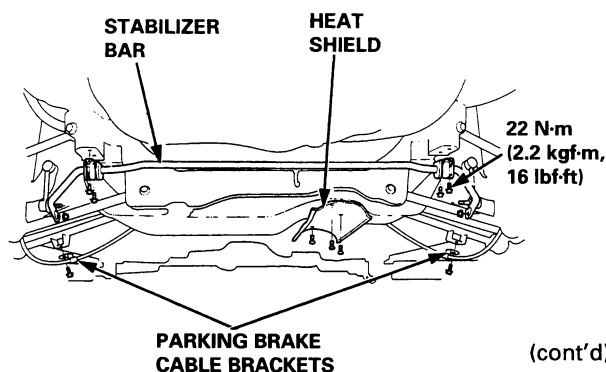
9. Disconnect the hose and quick-connect fittings (see page 11-A-97).



10. Disconnect the ABS wheel sensor 2P connectors, and headlight adjuster leveling sensor 3P connector if equipped.



11. Remove the stabilizer bar, the heat shield and the parking brake cable bracket.



(cont'd)

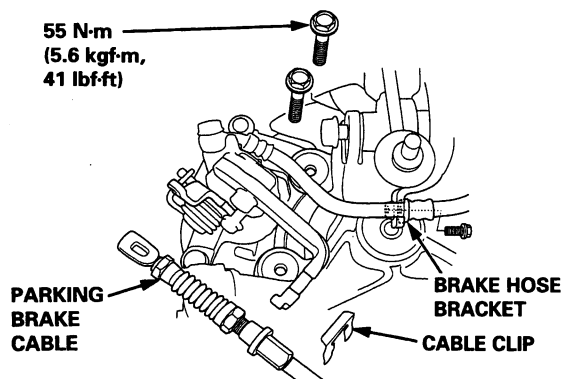
Fuel Supply System

Fuel Tank (cont'd)

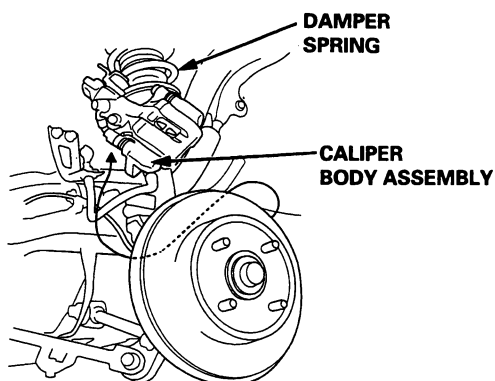
12. Remove the rear brakes:

With rear disc brakes

- 1. Remove the cable clip and parking brake cable. Remove the two caliper bolts, caliper body assembly. Remove the brake hose bracket.



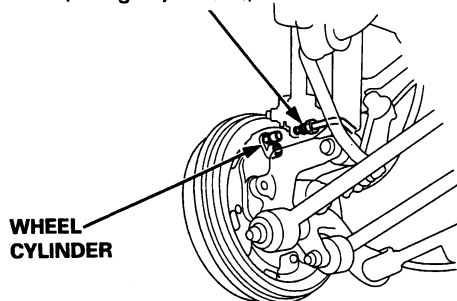
- 2. Hold the caliper body assembly to the damper spring.



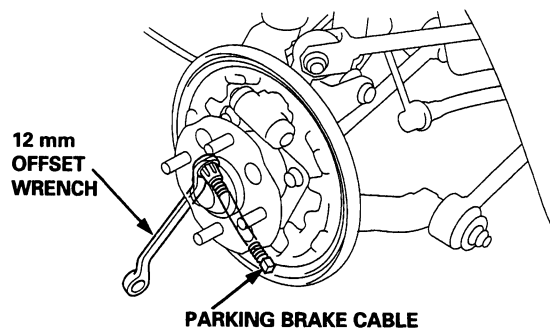
With rear drum brakes

- 1. Disconnect the brake line from the wheel cylinder.

BRAKE LINK
16 N-m (1.6 kgf-m, 12 lbf-ft)

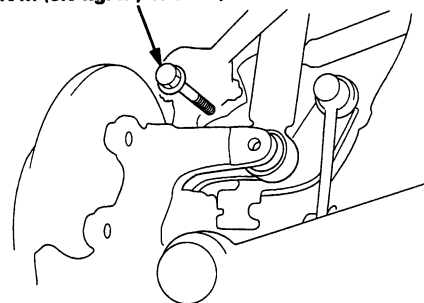


- 2. Remove the brake drum and brake shoe. Remove the parking brake cable from the backing plate using a 12 mm offset wrench.

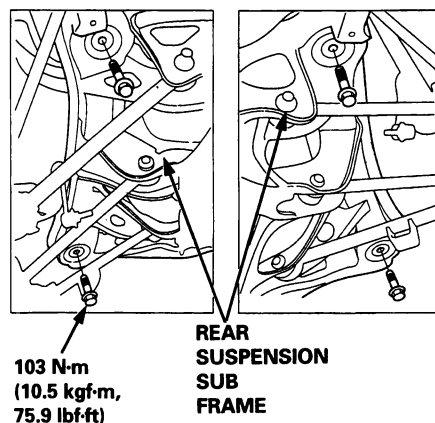


13. Remove the flange bolt.

59 N-m (6.0 kgf-m, 43 lbf-ft)

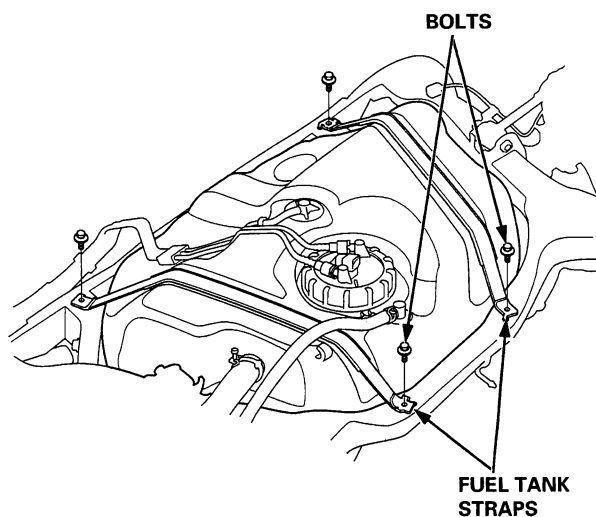


14. Place the jack, or support, under the rear suspension sub frame. Remove the mounting bolts, and the rear suspension sub frame.



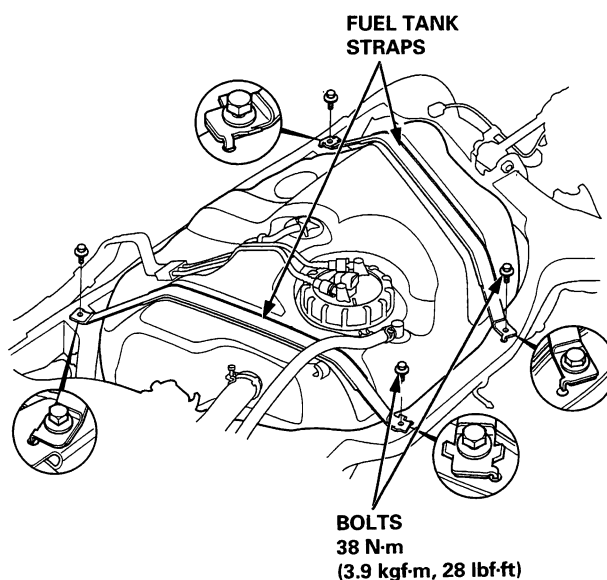


15. Remove the bolts, and the fuel tank straps.

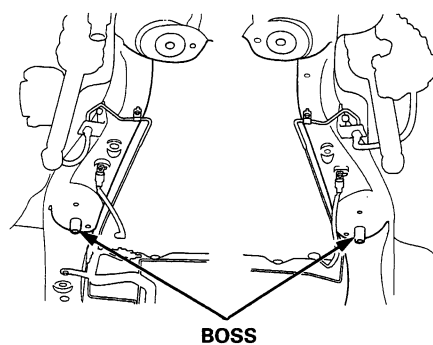


Installation

1. Install the fuel tank straps, and tighten the bolts.



2. Place the jack, or support, under the rear suspension sub frame. Install the rear suspension sub frame, installing the boss with the holes in the rear suspension sub frame.

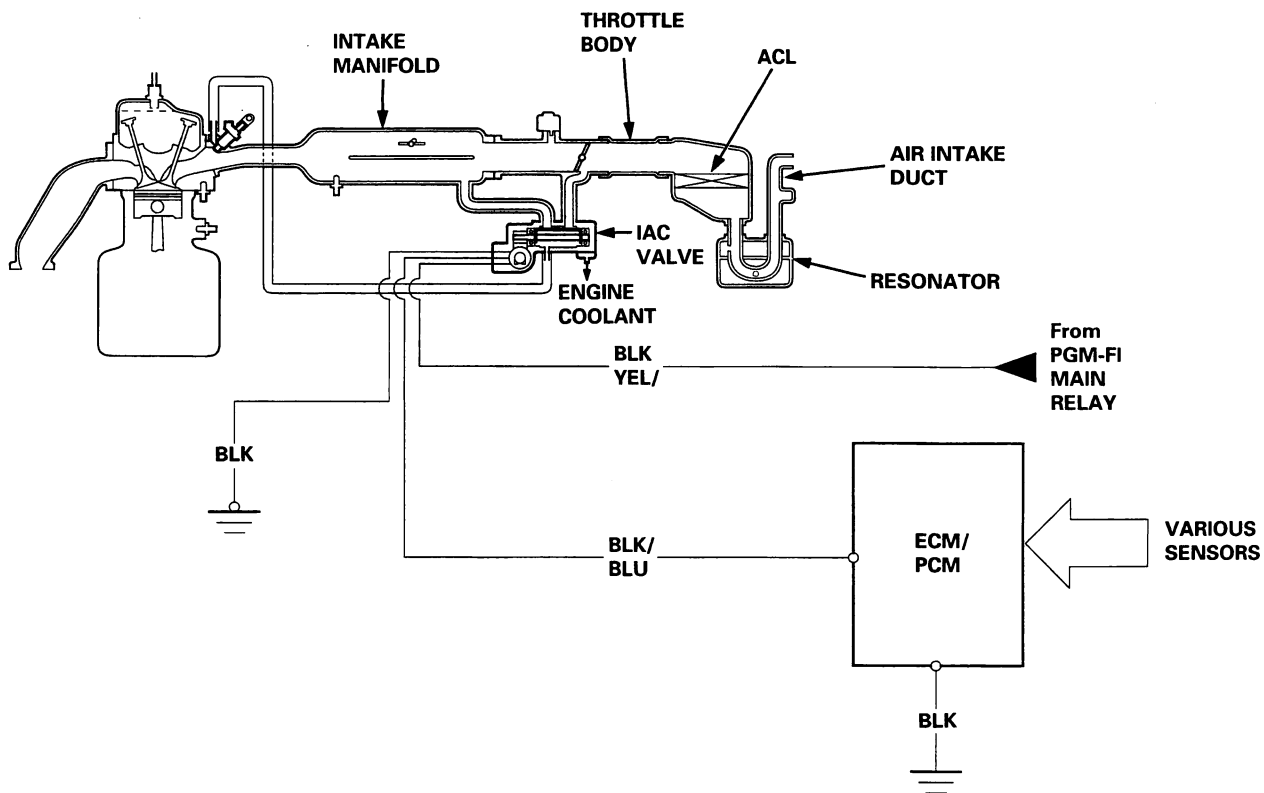


3. Install the remaining parts in the reverse order of removal.
4. If the equipped with drum brakes, after installing the brake hose, bleed the brake system (see section 19). If not go to step 5.
5. After installing, adjust the wheel alignment (see section 18).

Intake Air System

System Description

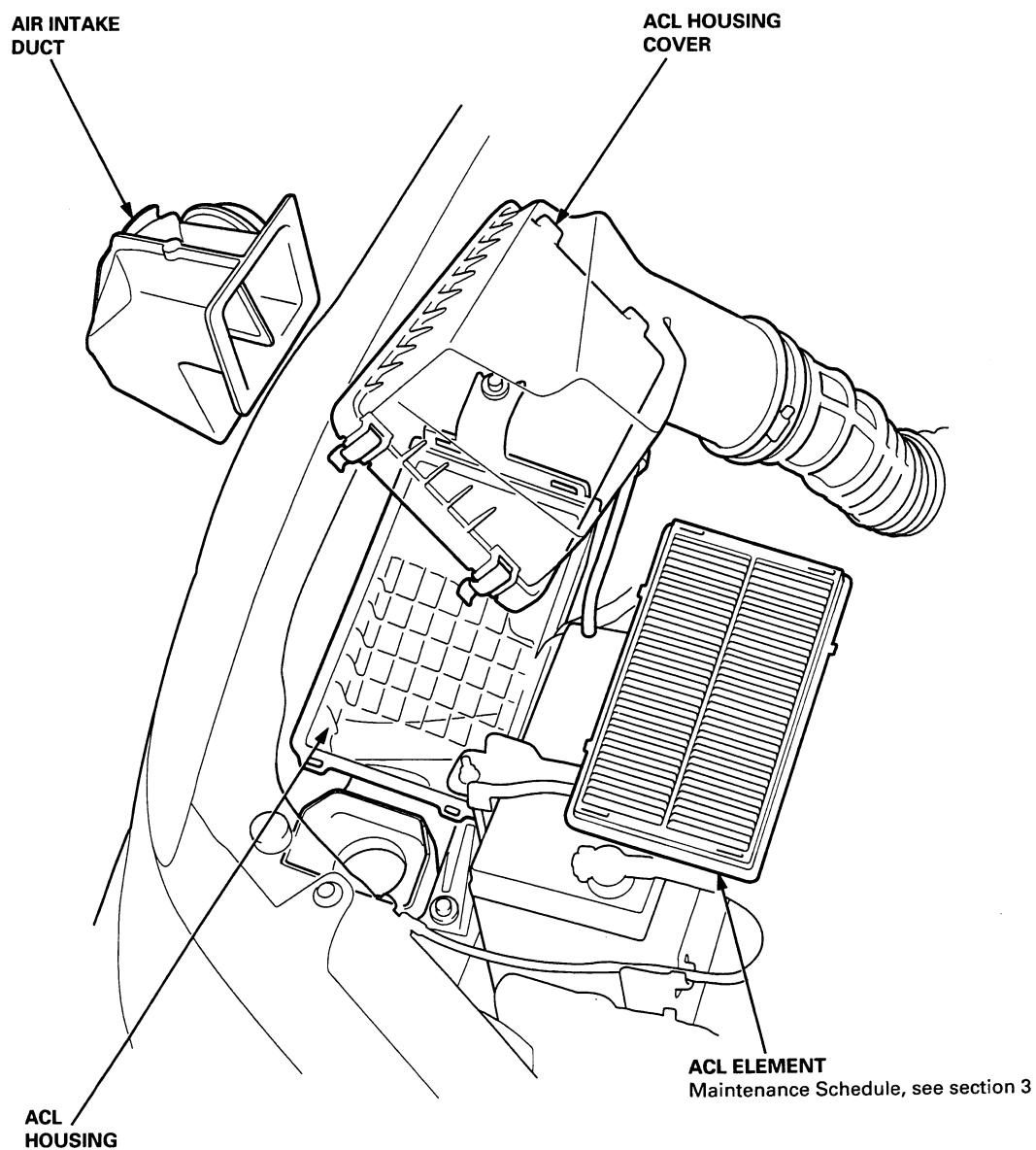
The system supplies air for all engine needs. It consists of the intake air pipe, Air Cleaner (ACL), intake air duct, Throttle Body (TB), Idle Air Control (IAC) Valve and intake manifold. A resonator in the intake air pipe provides additional silencing as air is drawn into the system.



Air Cleaner (ACL)

ACL Element Replacement

Remove the air intake duct and ACL housing cover.



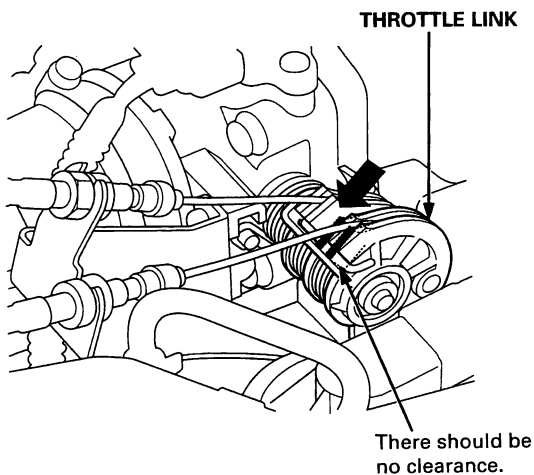
The illustration shows
H22A7 engine

Intake Air System

Throttle Cable

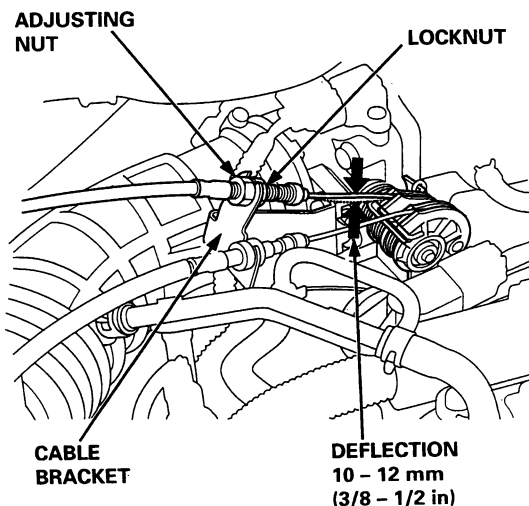
Inspection/Adjustment

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Hold the throttle link to the throttle lever, then there should be no clearance (with cruise control).

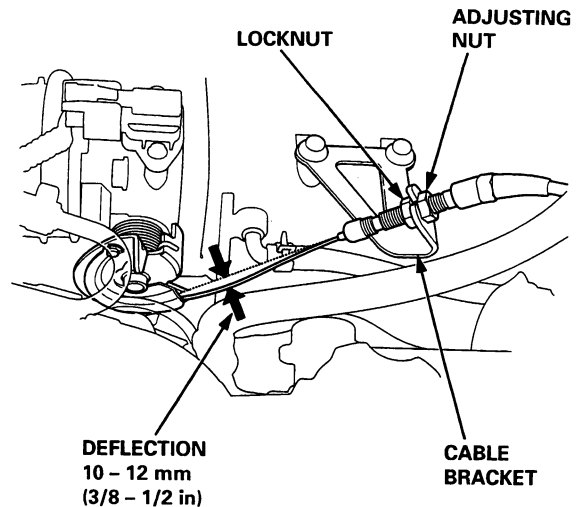


3. Check cable free play at the throttle linkage. Cable deflection should be 10 – 12 mm ($3/8 - 1/2$ in.).

F20B6, F18B2, F18B3 engine:



H22A7 engine:



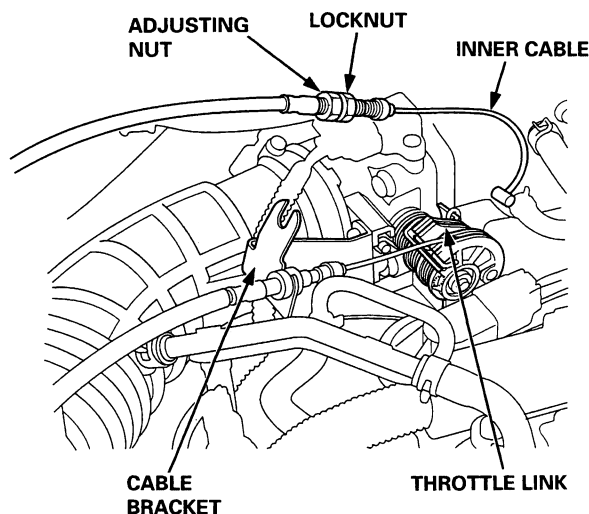
4. If deflection is not within specs, loosen the locknut, turn the adjusting nut until the deflection is as specified, then retighten the locknut.
5. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure it returns to the idle position whenever you release the accelerator pedal.



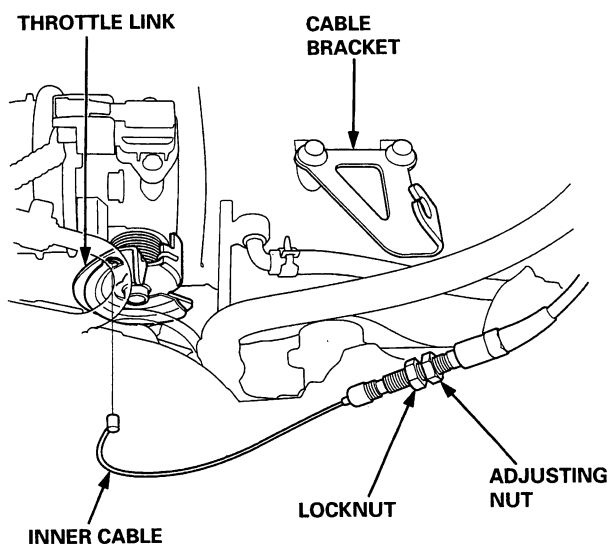
Installation

1. Fully open the throttle valve, then install the throttle cable in the throttle link, and install the cable housing in the cable bracket.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.

F20B6, F18B2, F18B3 engine:

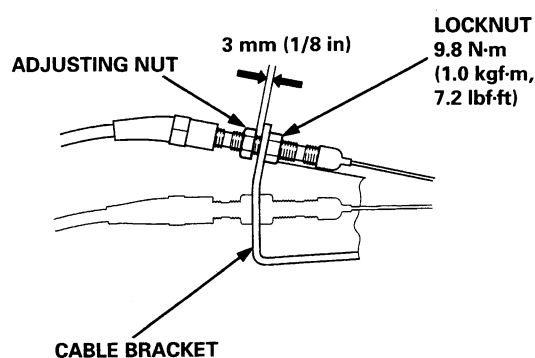


H22A7 engine:

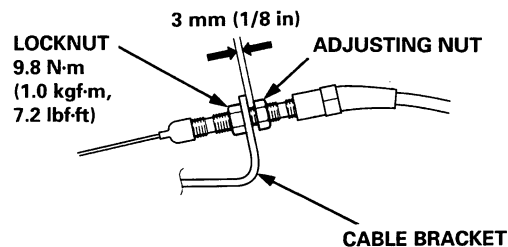


3. Hold the cable sheath, removing all slack from the cable.
4. Turn the adjusting nut until it is 3 mm (0.12 in.) away from the cable bracket.
5. Tighten the locknut. The cable deflection should now be 10 – 12 mm ($3/8 - 1/2$ in.). If not, see Inspection/Adjustment.

F20B6, F18B2, F18B3 engine:



H22A7 engine:

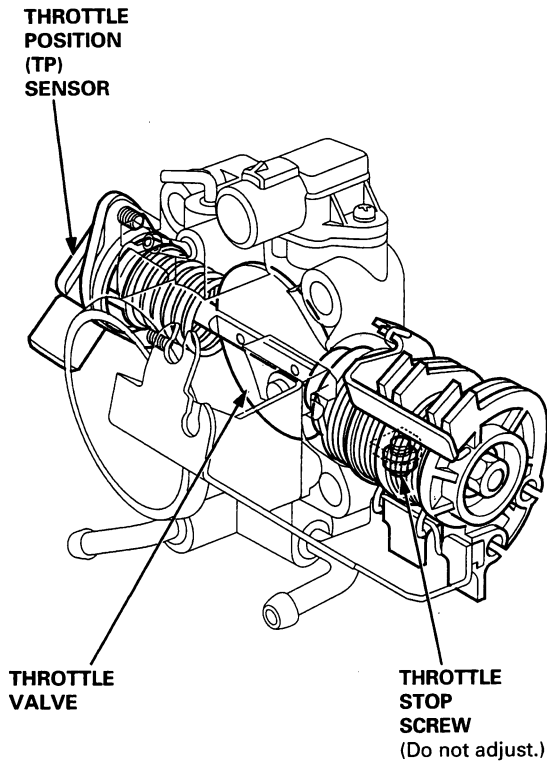


Intake Air System

Throttle Body

Description

The throttle body is a single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head.



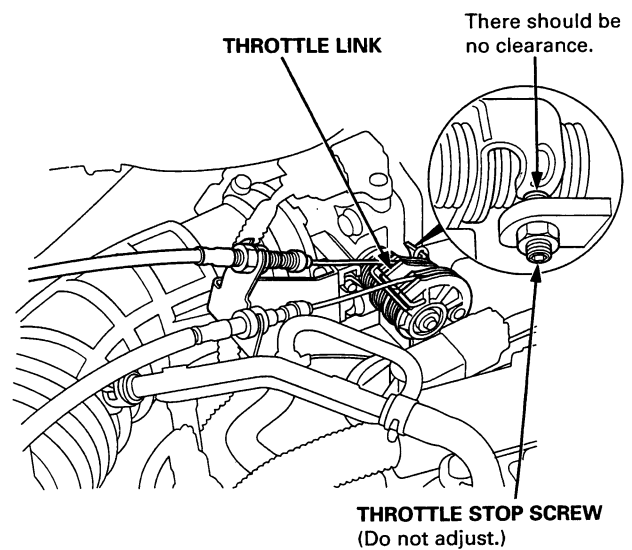
Inspection

Check that the throttle cable operates smoothly without binding or sticking.

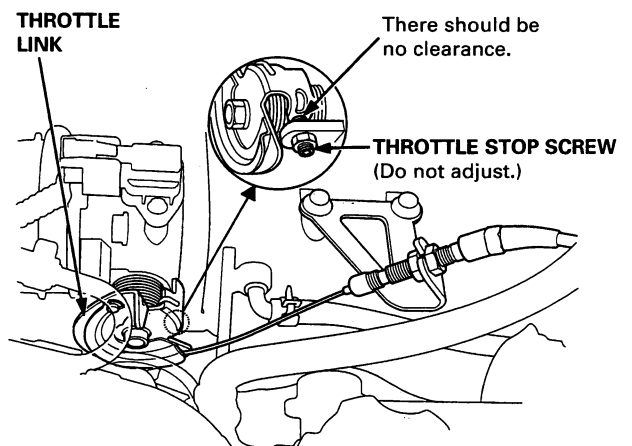
If there are any abnormalities, check for:

- Excessive wear or play in the throttle valve shaft.
- Sticky or binding throttle link at the fully closed position.
- Clearance between throttle stop screw and throttle link at the fully closed position.

F20B6 engine:



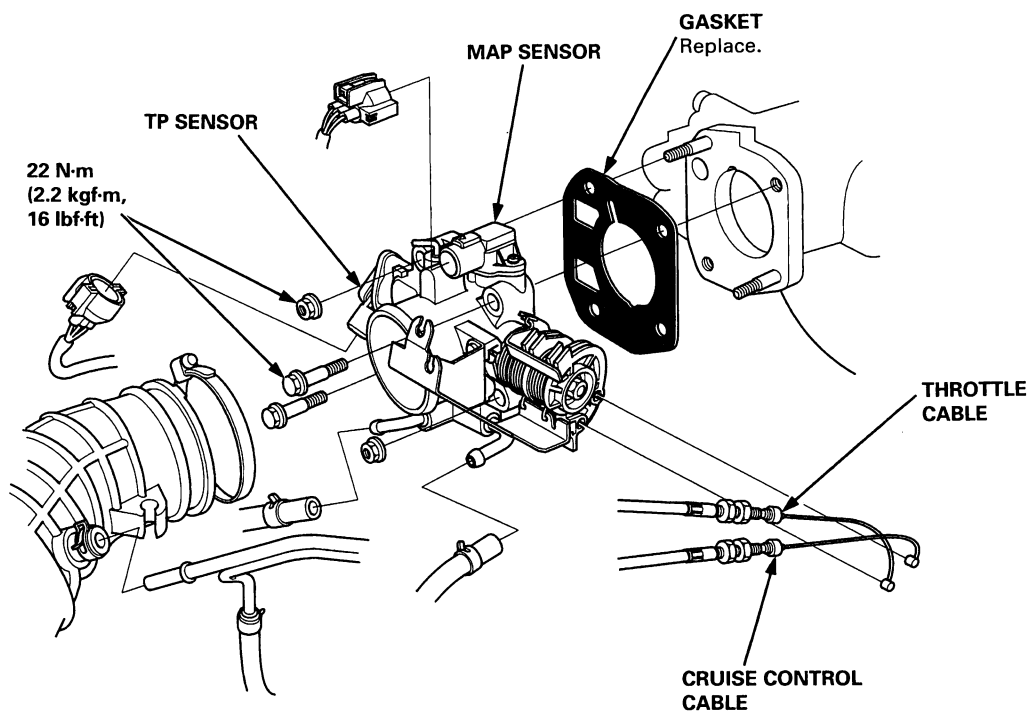
H22A7 engine:



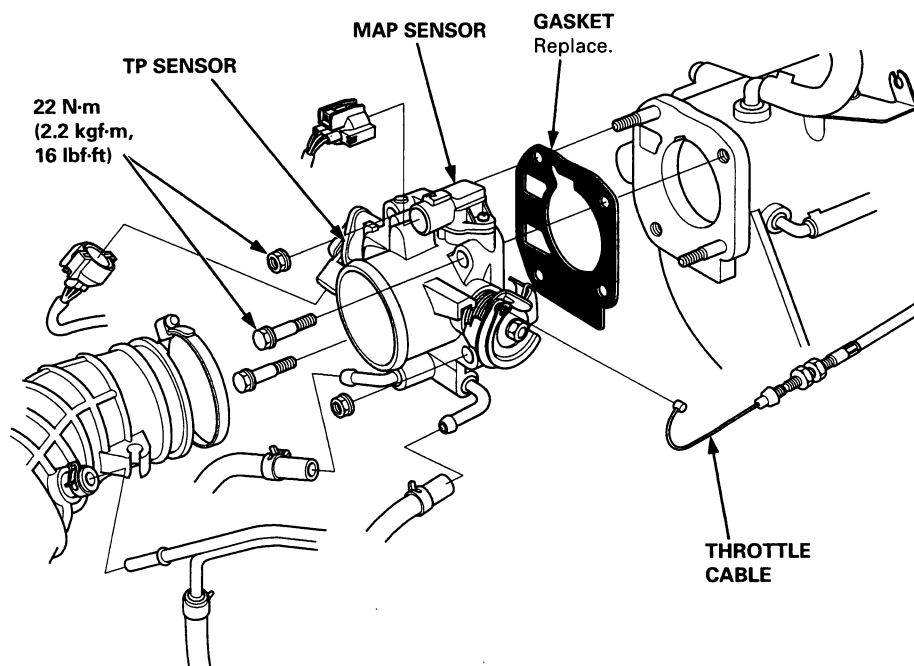
Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.



Removal
F20B6 engine:



H22A7 engine:



NOTE:

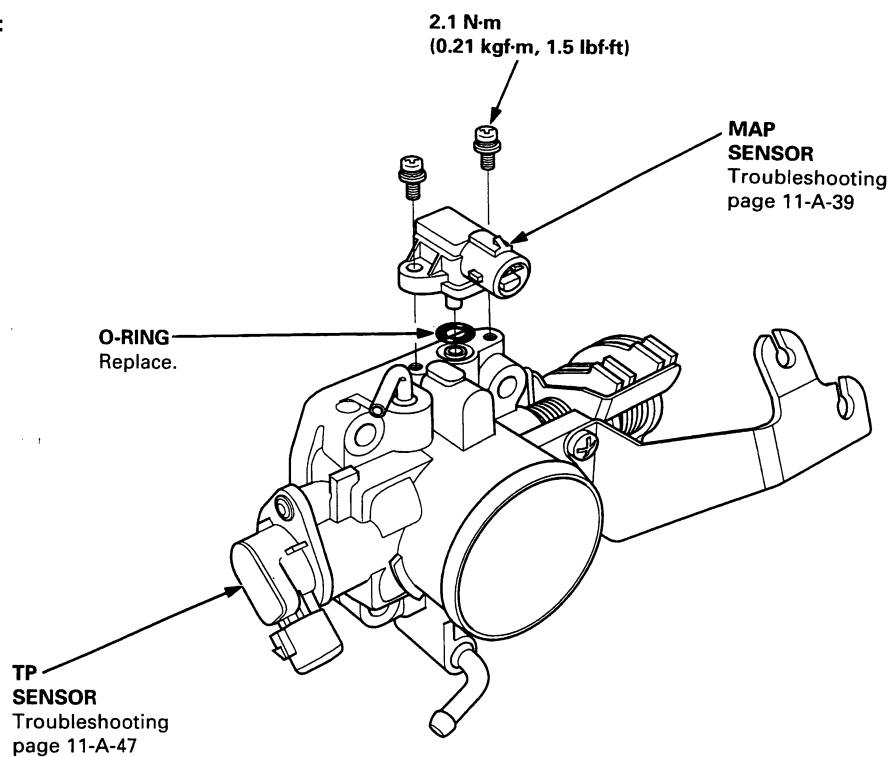
- Do not adjust the throttle stop screw.
- After reassembly, adjust the cruise control cable (see section 4), the throttle cable (see page 11-A-120).
- The TP sensor is not removable.

(cont'd)

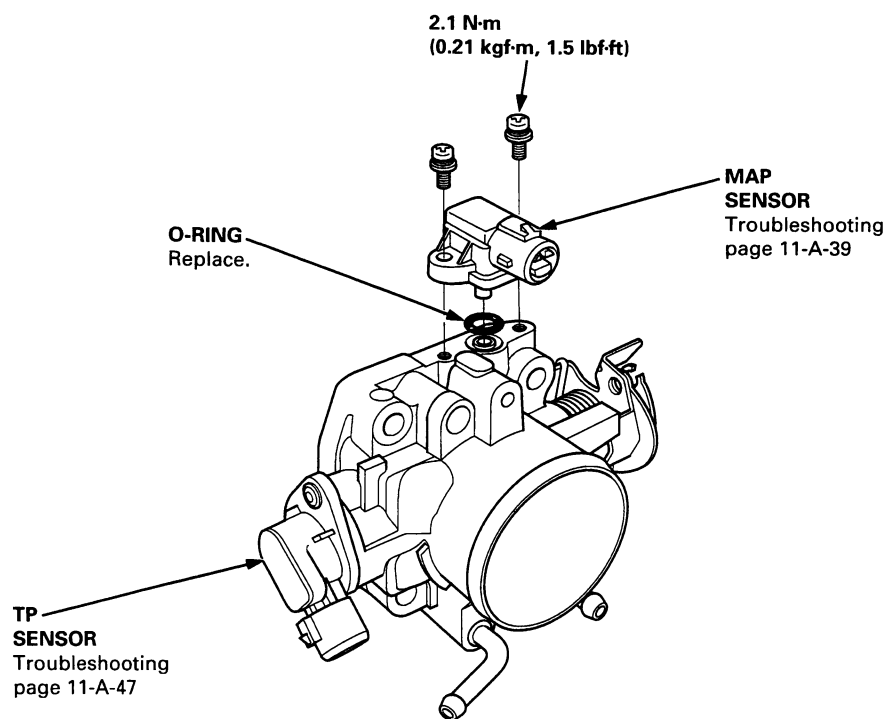
Intake Air System

Throttle Body (cont'd)

Disassembly
F20B6 engine:



H22A7 engine:

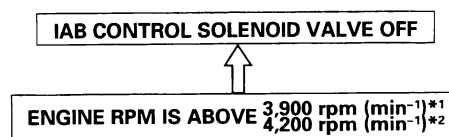
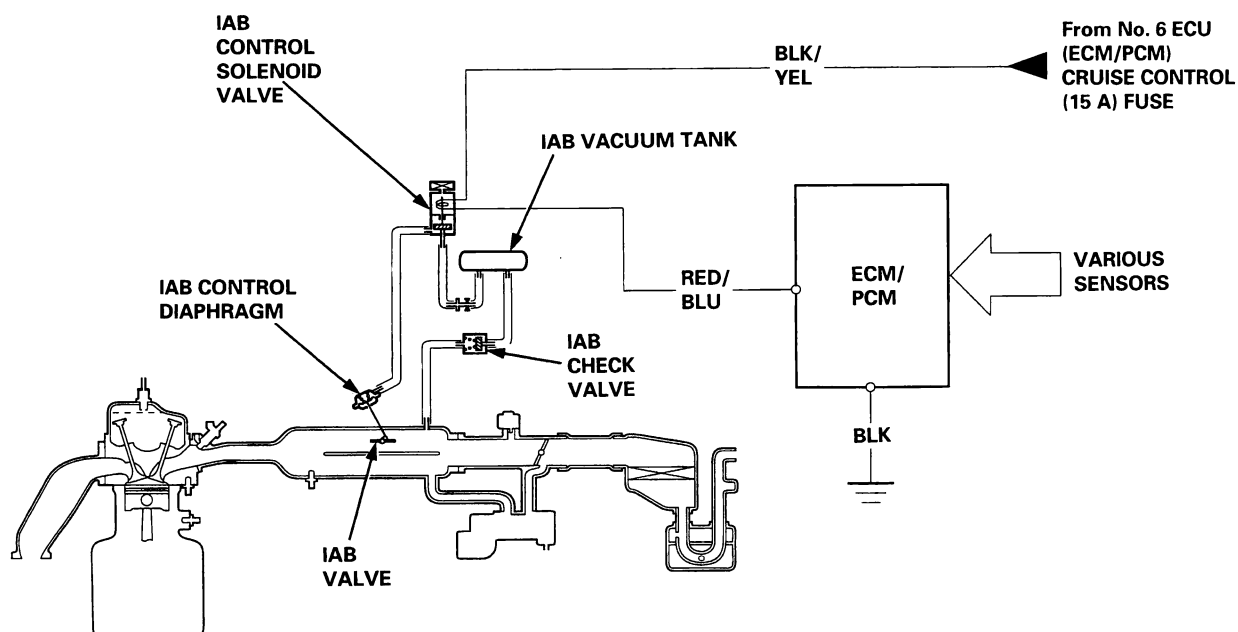




Intake Air Bypass (IAB) Control System (F20B6, F18B2, F18B3 engine)

Description

Two air intake paths are provided in the intake manifold to allow the selection of the intake path most favorable for a given engine speed. Satisfactory power performance is achieved by closing and opening the Intake Air Bypass (IAB) valves. High torque at low rpm is achieved when the IAB valves are closed, whereas high power at high rpm is achieved when the IAB valves are opened.



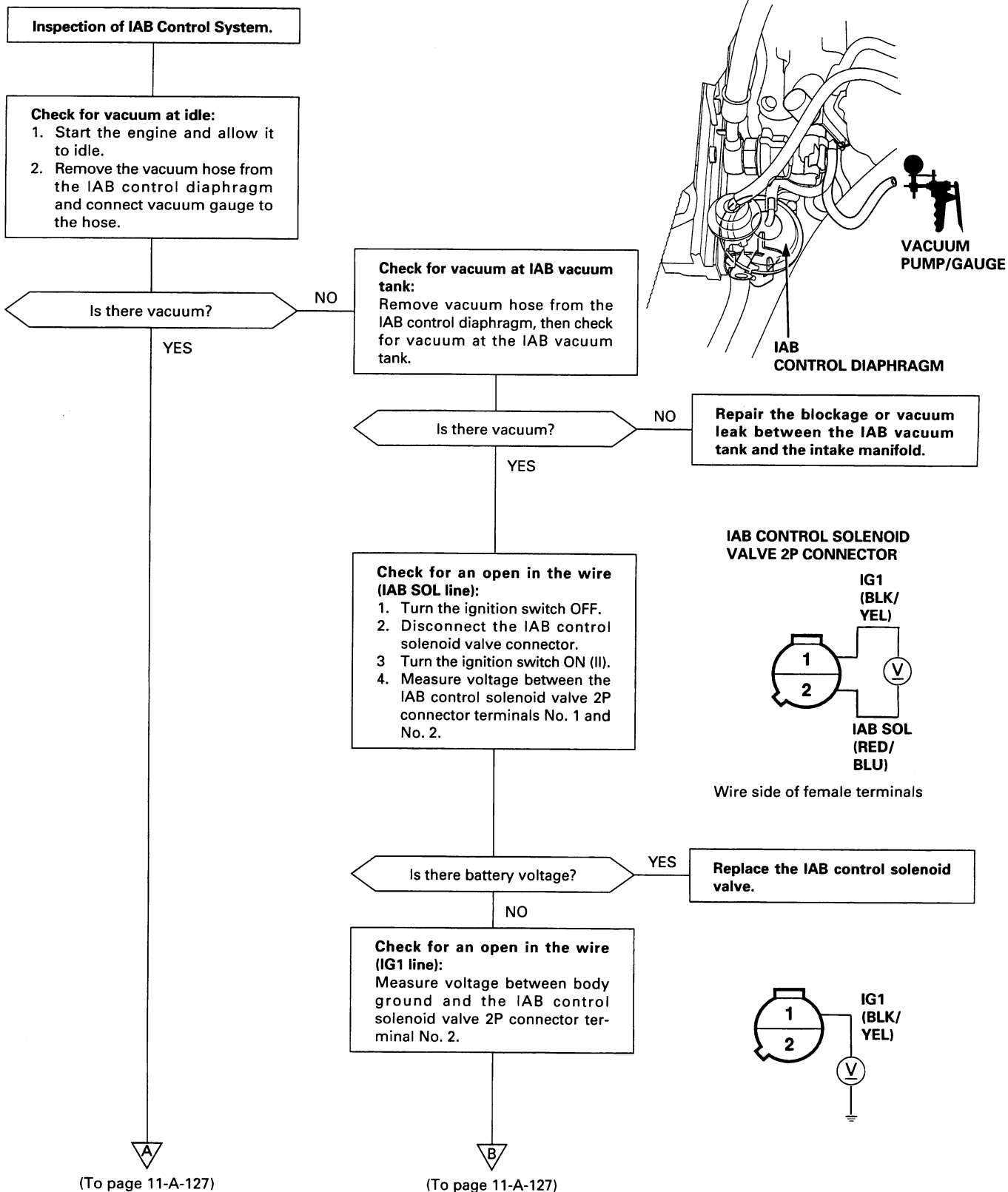
*1: F18B2, F18B3 engine
*2: F20B6 engine

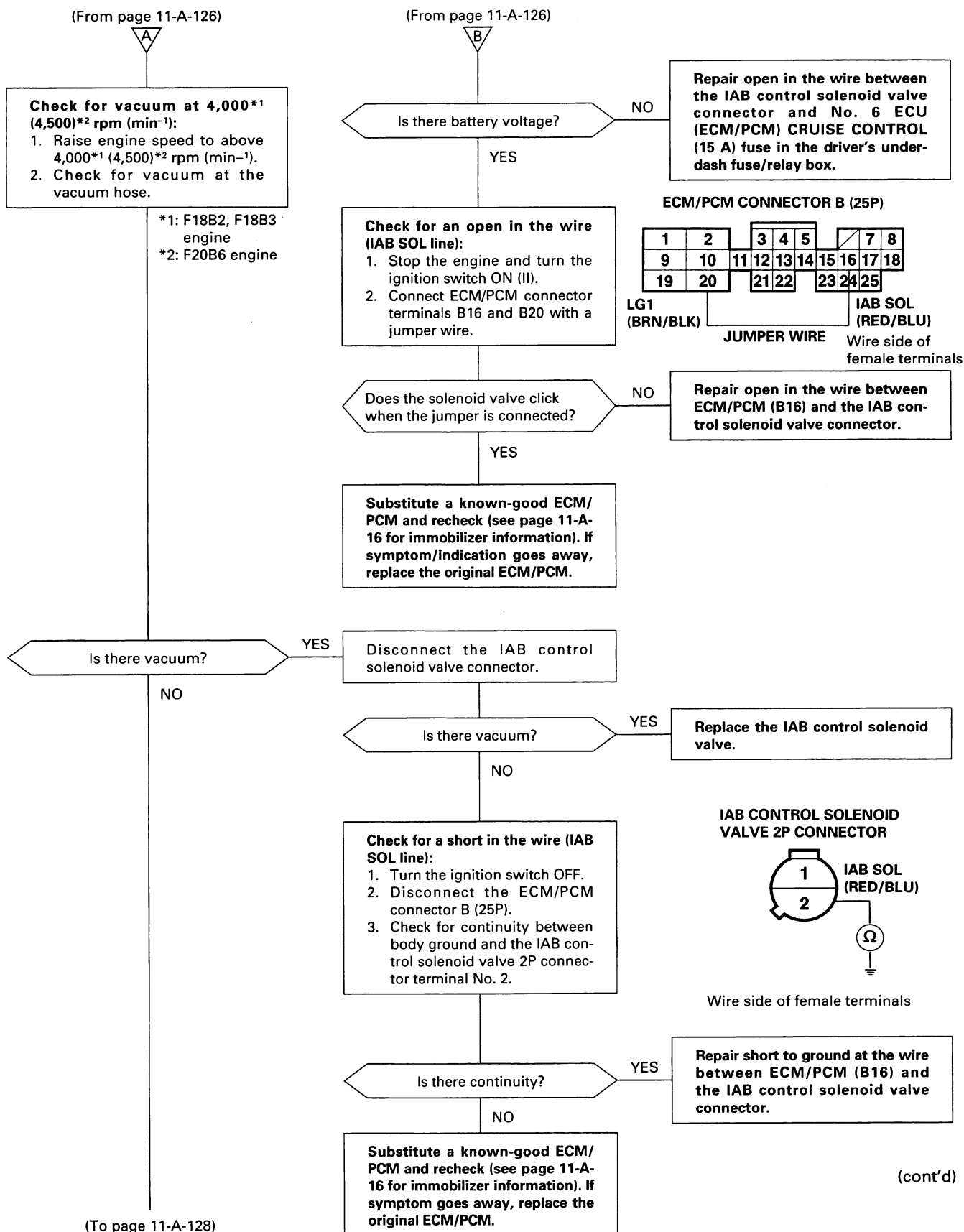
(cont'd)

Intake Air System

Intake Air Bypass (IAB) Control System (cont'd)

Troubleshooting



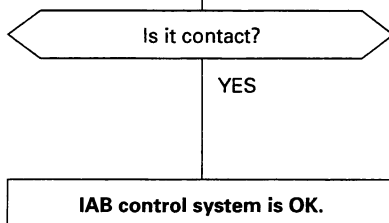
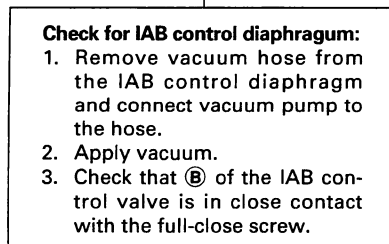


(cont'd)

Intake Air System

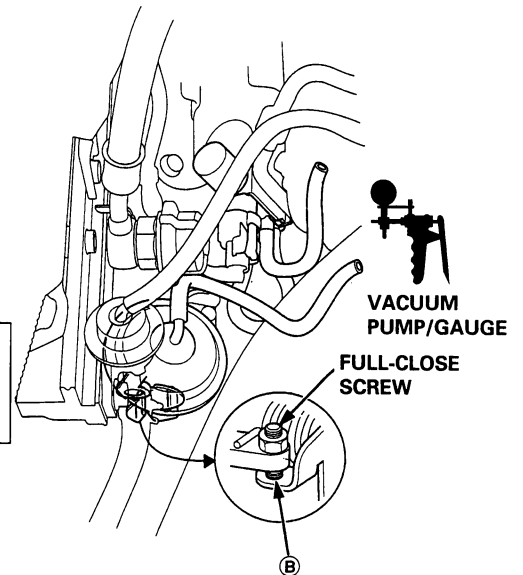
Intake Air Bypass (IAB) Control System (cont'd)

(From page 11-A-127)



NO

Check the vacuum line for proper connection or damage. If OK, go to the IAB control valve testing (see page 11-A-129).

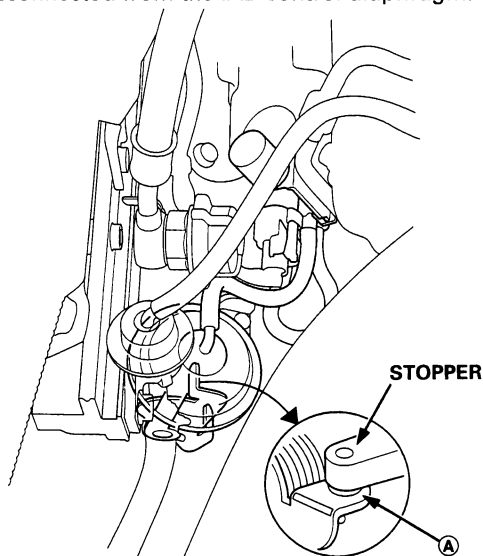




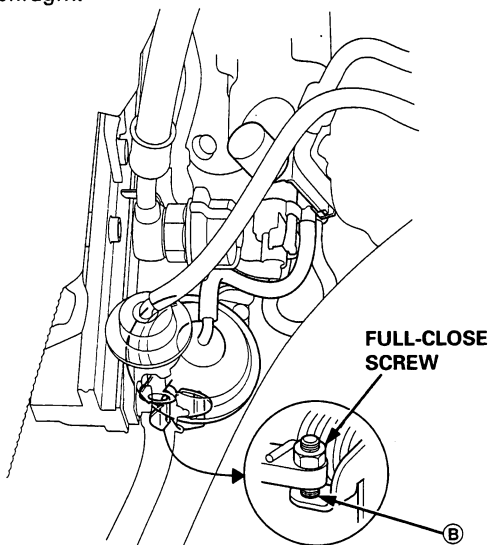
Intake Air Bypass (IAB) Control Valve Testing

CAUTION: Do not adjust the IAB control valve full-close screw. It was preset at the factory.

1. Check the IAB control valve shaft for binding or sticking.
2. Check the IAB control valve for smooth movement.
3. Check that **A** of the IAB control valve is in close contact with the stopper when the vacuum hose is disconnected from the IAB control diaphragm.



4. Check that **B** of the IAB control valve is in close contact with the full-close screw when you apply 51 kPa (380 mmHg, 15 in.Hg) of vacuum to the IAB control diaphragm.



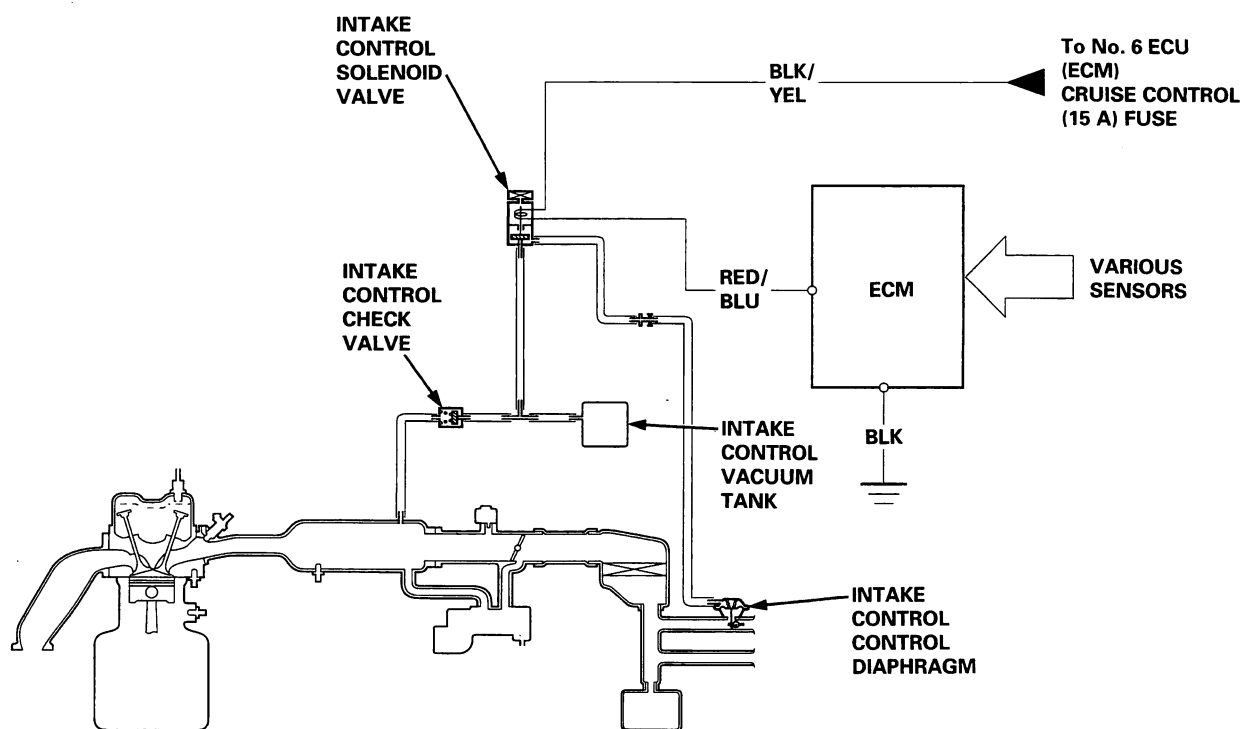
- If any fault is found, clean the linkage and shafts with carburetor cleaner.
- If the problem still exists after cleaning, disassemble the intake manifold and check the IAB valve body assembly (see section 9).

Intake Air System

Intake Control System (H22A7 engine)

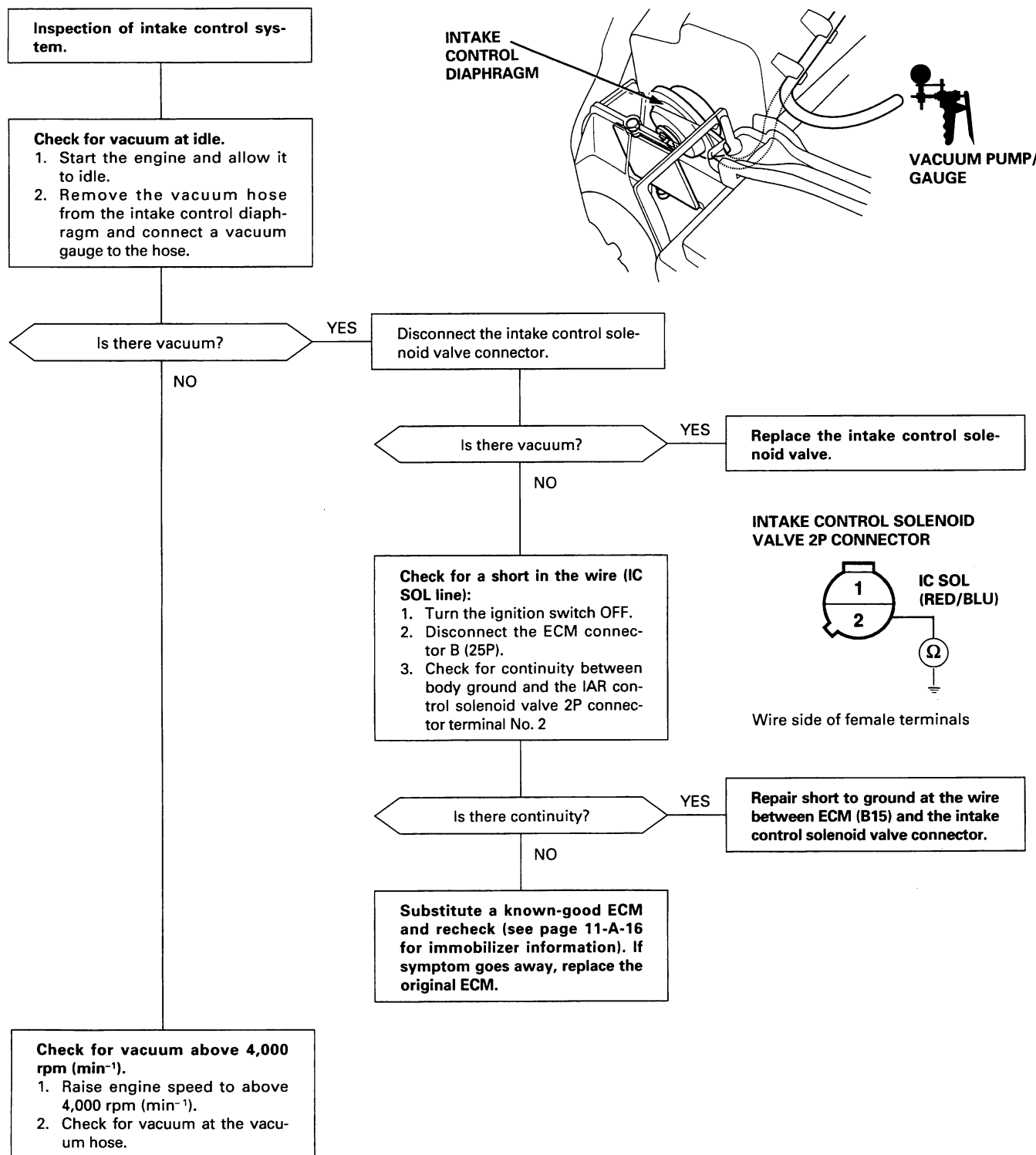
Description

When the engine speed is below 3,950 rpm (min⁻¹), the ECM supplies a ground to the intake control solenoid valve. This opens the solenoid valve sending intake manifold vacuum to the intake control diaphragm.





Troubleshooting



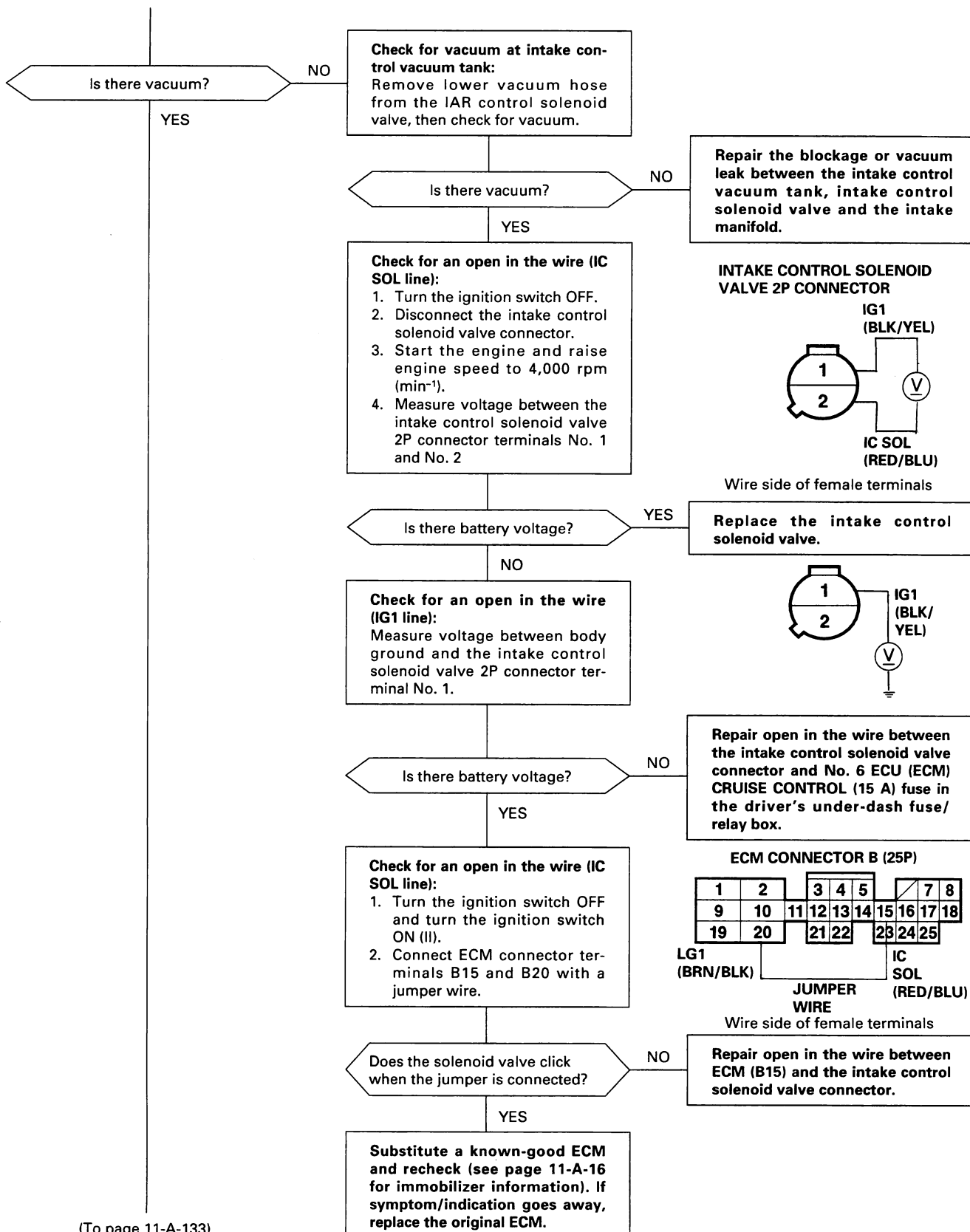
(To page 11-A-132)

(cont'd)

Intake Air System

Intake Control System (H22A7 engine) (cont'd)

(From page 11-A-131)





(From page 11-A-132)

Check the intake control diaphragm:
1. Connect a vacuum pump to the intake control diaphragm.

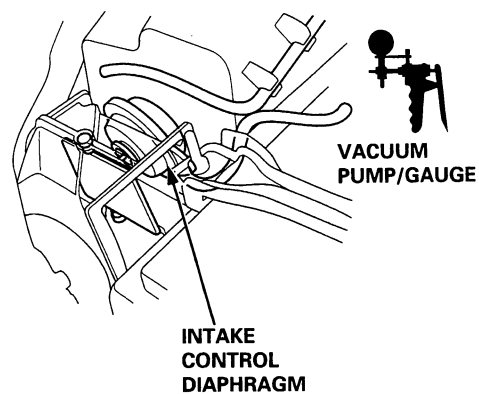
Does it hold vacuum?

NO

Check the vacuum line for proper connection or damage.
If OK, replace the intake control diaphragm.

YES

Intake control system is OK.

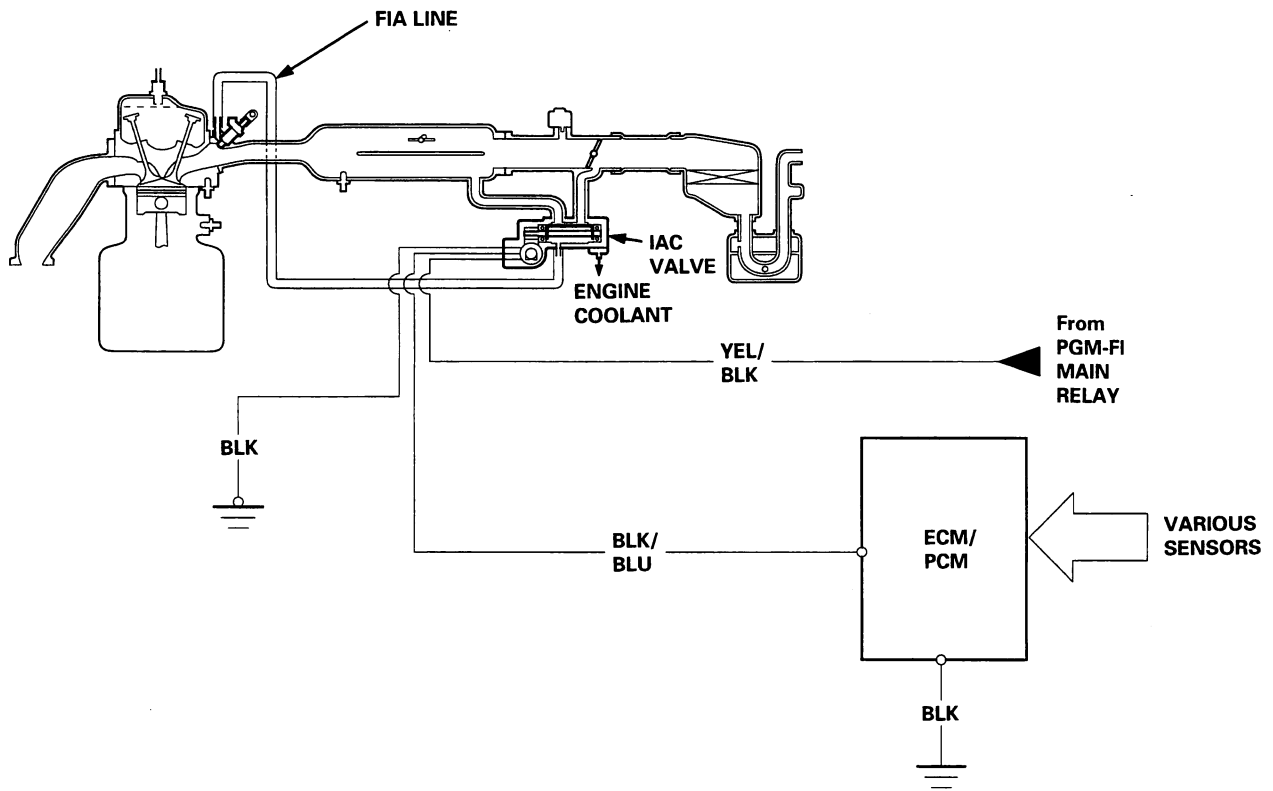


Intake Air System

Fuel Injection Air (FIA) Control System

Description

When the engine running, the IAC Valve sends intake air to the fuel injectors.





Inspection of the Fuel Injection Air (FIA) control system.

Check for Air Assist line:

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Remove the vacuum hose from the IAC valve and connect a vacuum gauge to the hose.

Is there vacuum?

NO

Repair the blockage or vacuum leak between the IAC valve and the intake manifold.

YES

Check the IAC valve:

1. Turn the ignition switch OFF.
2. Remove the vacuum gauge, and connect a 3-way joint and vacuum gauge as shown.
3. Disconnect the IAC valve 3P connector.
4. Start the engine and check the vacuum.

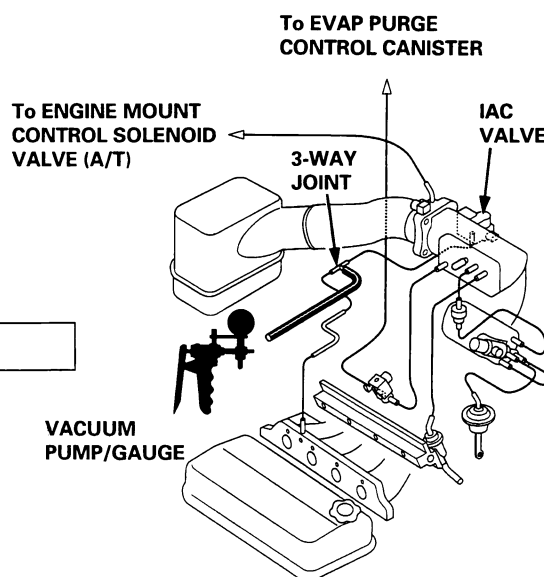
Is there vacuum over -40 kpa (-300 mmHg, 11.8 in.Hg)?

YES

Replace the IAC valve.

NO

Fuel Injection Air (FIA) control system is OK.



Emission Control System

System Description

The emission control system includes a Three Way Catalytic Converter (TWC), Exhaust Gas Recirculation (EGR) system, Positive Crankcase Ventilation (PCV) system and Evaporative Emission (EVAP) Control system.

Tailpipe Emission

Inspection

WARNING

Do not smoke during this procedure.
Keep open flame or sparks away from the work area.

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Connect a tachometer.
3. Check the idle speed (see page 11-A-94).
4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

CO meter should indicate 0.1% maximum.

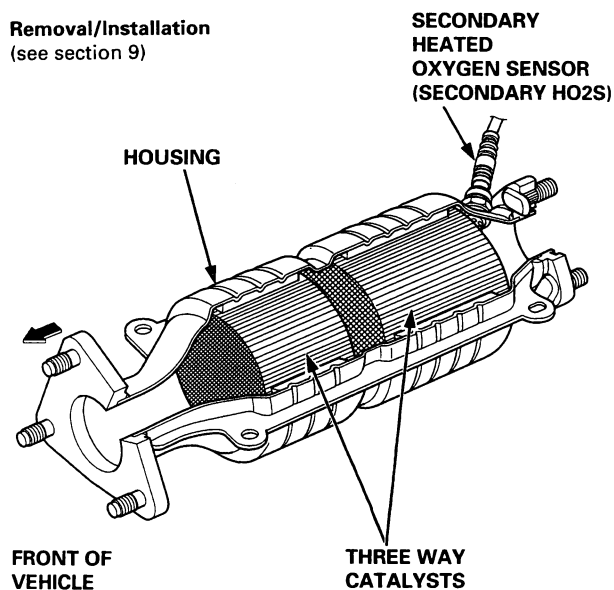
Three Way Catalytic Converter (TWC)

Description

Three Way Catalytic Converter (TWC):

The Three Way Catalytic Converter (TWC) is used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO_x) in the exhaust gas to carbon dioxide (CO_2), dinitrogen (N_2) and water vapor.

Removal/Installation (see section 9)

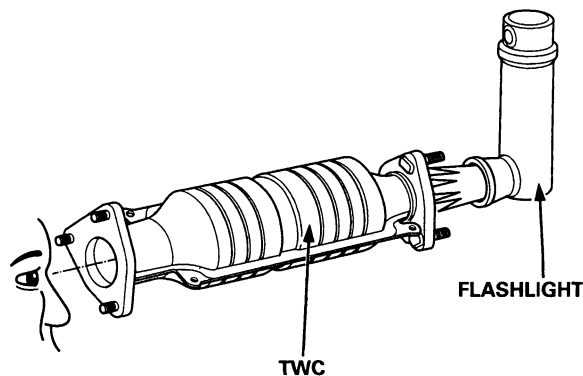


Inspection

If excessive exhaust system back-pressure is suspected, remove the TWC from the car.

Using a flashlight, make a visual check for plugging, melting or cracking of the catalyst.

Replace the TWC if any of the visible area is damaged or plugged.





P0420 The scan tool indicates Diagnostic Trouble Code (DTC) P0420: Catalyst system efficiency below threshold.

Description

This system evaluates the catalyst's capacity by means of the HO₂S (Primary and Secondary) output during stable driving conditions. If deterioration has been detected during three consecutive driving cycles, the MIL comes on and DTC P0420 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as DTC P0420, troubleshoot those DTCs first, then troubleshoot DTC P0420.

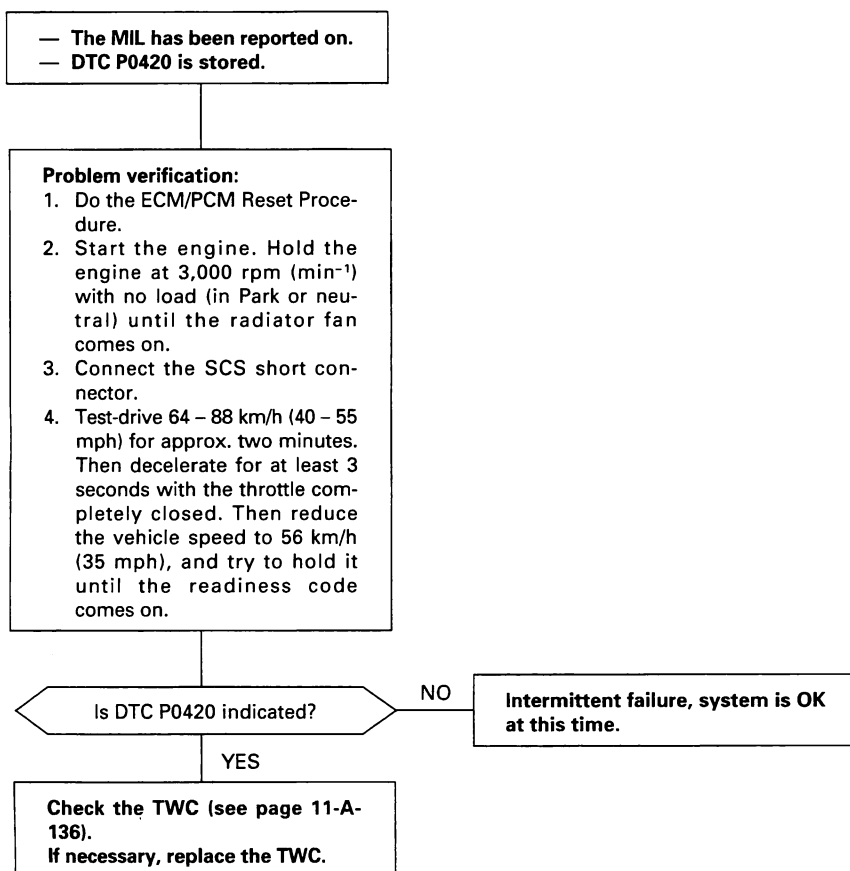
P0137, P0138: Secondary HO₂S (Sensor 2)

P0141: Secondary HO₂S (Sensor 2) Heater

Possible Cause

- TWC Deterioration
- Exhaust system leakage

Troubleshooting Flowchart



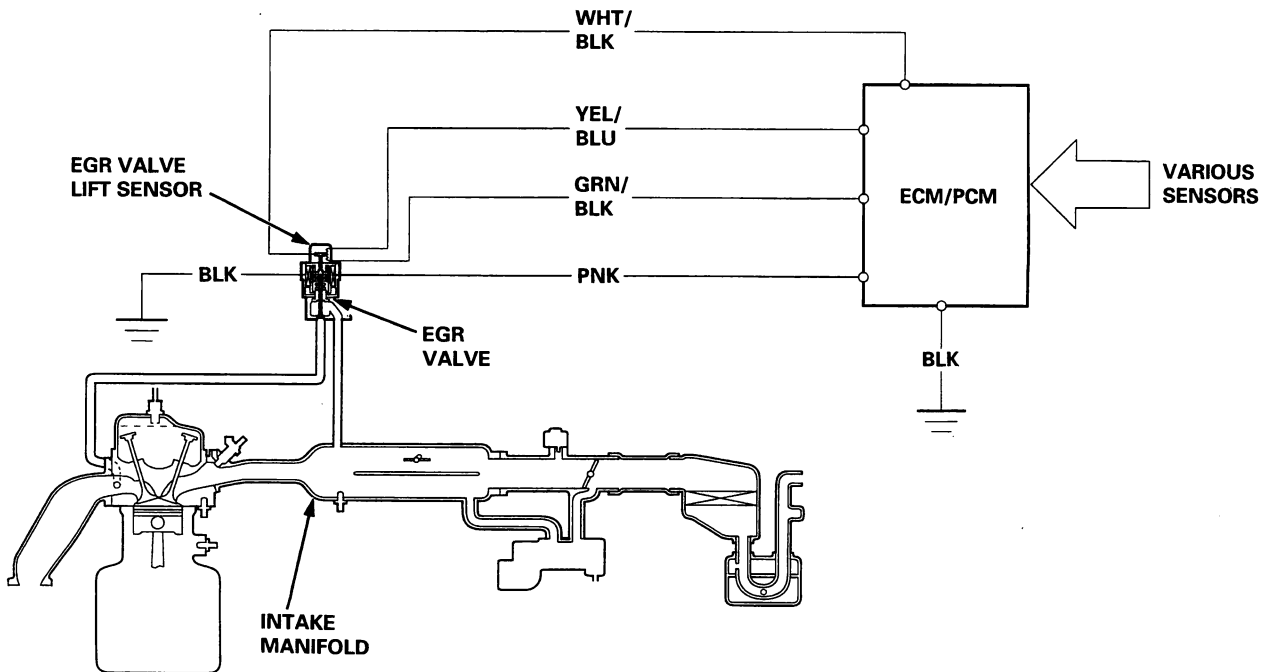
Emission Control System

Exhaust Gas Recirculation (EGR) System

Description

The EGR system reduces oxides of nitrogen (NOx) emissions by recirculating exhaust gas through the EGR valve and the intake manifold into the combustion chambers. The ECM/PCM memory includes the ideal EGR valve lift for varying operating conditions.

The EGR valve lift sensor detects the amount of EGR valve lift and sends it to the ECM/PCM. The ECM/PCM then compares it with the ideal lift in its memory (based on signals sent from other sensors). If there is any difference between the two, the ECM/PCM cuts current to the EGR valve.





P0401 The scan tool indicates Diagnostic Trouble Code (DTC) P0401: Insufficient flow in the Exhaust Gas Recirculation (EGR) system.

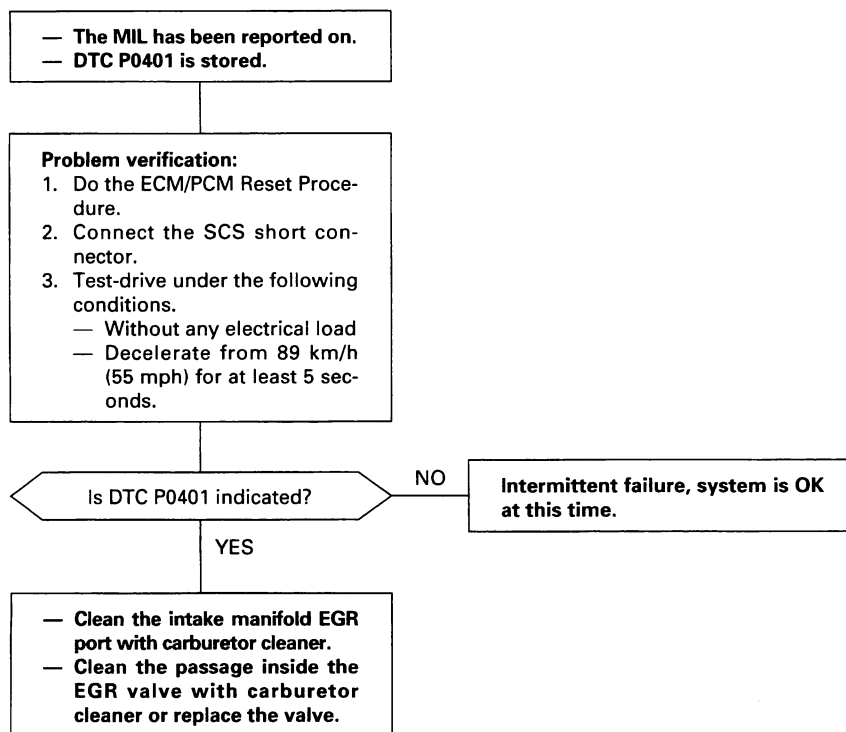
Description

Deterioration (clogging, leakage, etc.) in the EGR line or EGR valve is detected by means of the changes in MAP before and after the operation of the EGR valve. If deterioration has been detected during two consecutive driving cycles, the MIL will come on and DTC P0401 will be stored.

Possible Causes

- Clogging, leakage in the EGR line
- Faulty EGR valve

Troubleshooting Flowchart



(cont'd)

Emission Control System

Exhaust Gas Recirculation (EGR) System (cont'd)

P1491 The scan tool indicates Diagnostic Trouble Code (DTC) P1491: A malfunction in the Exhaust Gas Recirculation (EGR) system.

— The MIL has been reported on.
— DTC P1491 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Connect the SCS short connector.
3. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on.
4. Drive the vehicle on the road for approx. 10 minutes. Try to keep the engine speed in the 1,700 – 2,500 rpm (min^{-1}) range.

Is DTC P1491 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at EGR valve and ECM/PCM.

YES

Check for a malfunction in the EGR valve:

1. Start the engine and let it idle.
2. Measure voltage between the EGR valve 6P connector terminal No. 4 and No. 6.

Is there battery voltage?

NO

Check the EGR valve:

1. Turn the ignition switch OFF.
2. Disconnect the EGR valve 6P connector.
3. Connect the battery positive terminal to EGR valve 6P connector terminal No. 6.
4. Start the engine and let it idle, then connect the battery negative terminal to EGR valve 6P connector terminal No. 4.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

Does the engine stall or run rough?

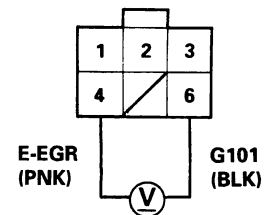
NO

Replace the EGR valve.

YES

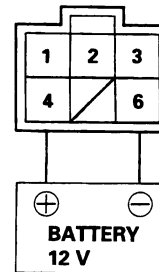
(To page 11-A-141)

EGR VALVE 6P CONNECTOR



Wire side of female terminals

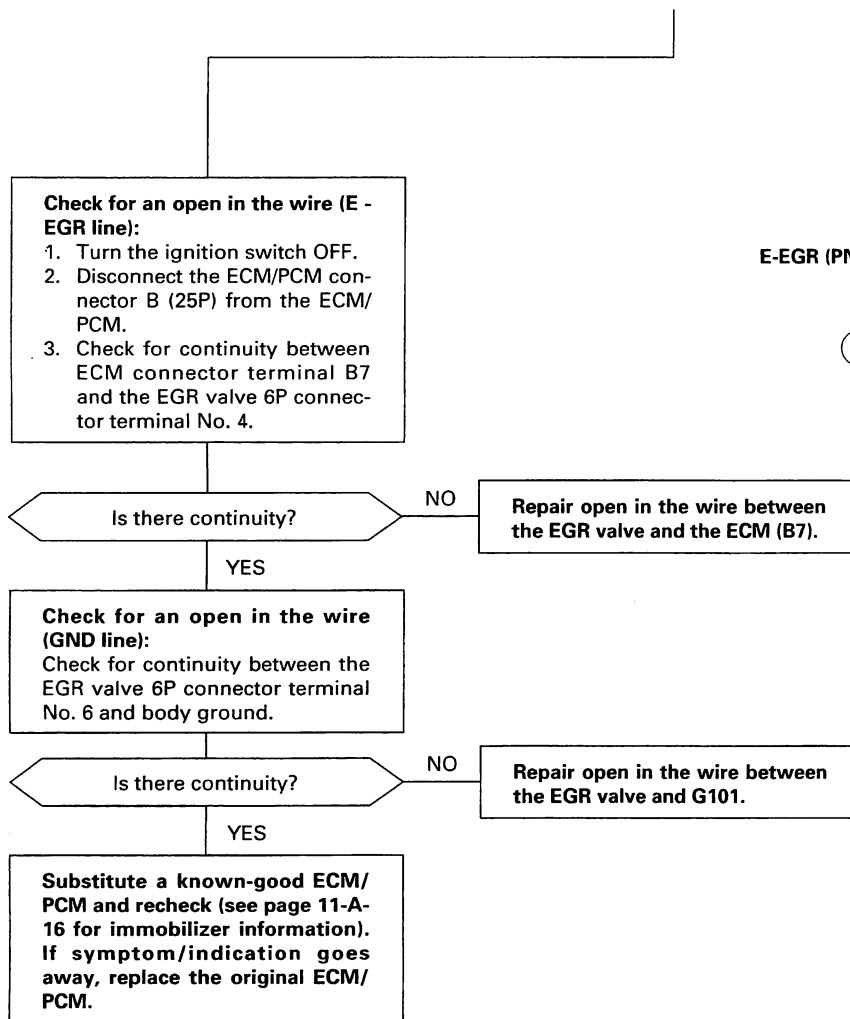
EGR VALVE 6P CONNECTOR



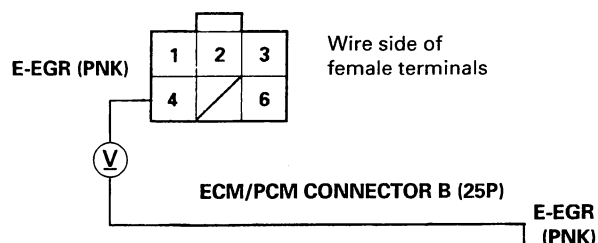
Terminal side of male terminals



(From page 11-A-140)

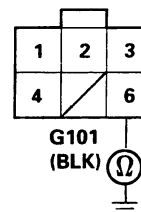


EGR VALVE 6P CONNECTOR



1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25							

Wire side of female terminals



(cont'd)

Emission Control System

Exhaust Gas Recirculation (EGR) System (cont'd)

P1498

The scan tool indicates Diagnostic Trouble Code (DTC) P1498: A high voltage problem in the Exhaust Gas Recirculation (EGR) valve lift sensor circuit.

- The MIL has been reported on.
- DTC P1498 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine.

Is DTC P1498 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between EGR valve and ECM/PCM.

YES

Check for an open in the EGR valve lift sensor:

1. Turn the ignition switch OFF.
2. Disconnect the EGR valve lift sensor 6P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the EGR valve lift sensor 6P connector terminals No. 3 and No. 2.

Is there approx. 5 V?

YES

Replace the EGR valve.

NO

Check for open in the wire (SG2 line):

Measure voltage between ECM/PCM connector terminals C18 and C28.

Is there approx. 5 V?

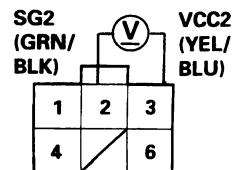
YES

Repair open in the wire between ECM (D18) and EGR valve lift sensor.

NO

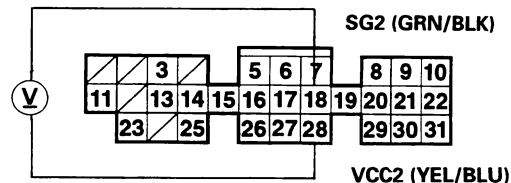
Substitute a known-good ECM/PCM and recheck (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

EGR VALVE LIFT SENSOR 6P CONNECTOR



Wire side of female terminals

ECM/PCM CONNECTOR C (31P)



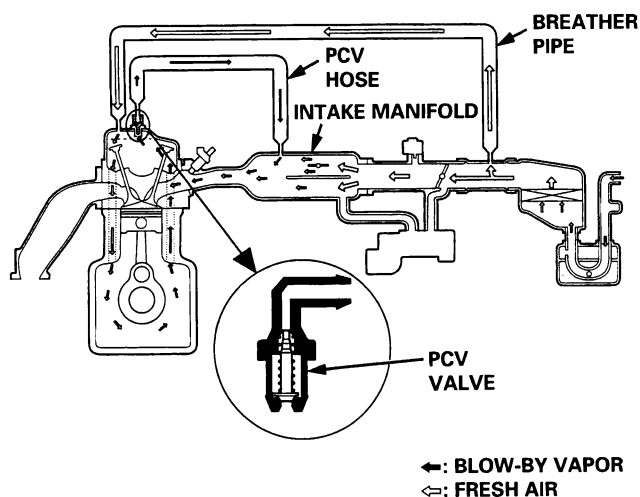
Wire side of female terminals



Positive Crankcase Ventilation (PCV) System

Description

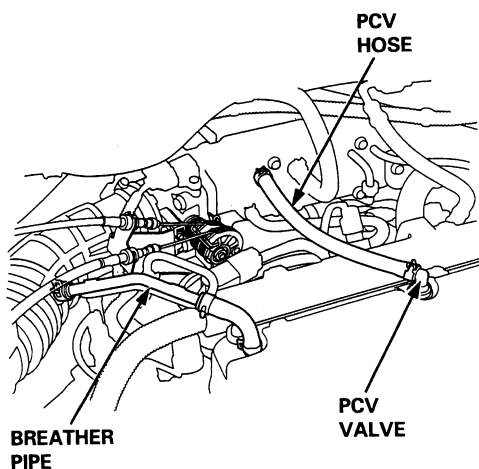
The Positive Crankcase Ventilation (PCV) system is designed to prevent blow-by gas from escaping to the atmosphere. The PCV valve contains a spring-loaded plunger. When the engine starts, the plunger in the PCV valve is lifted in proportion to intake manifold vacuum and the blow-by gas is drawn directly into the intake manifold.



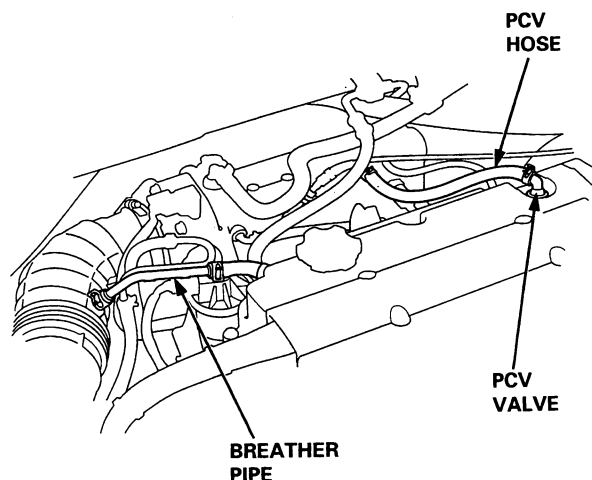
Inspection

1. Check the PCV hoses and connections for leaks and clogging.

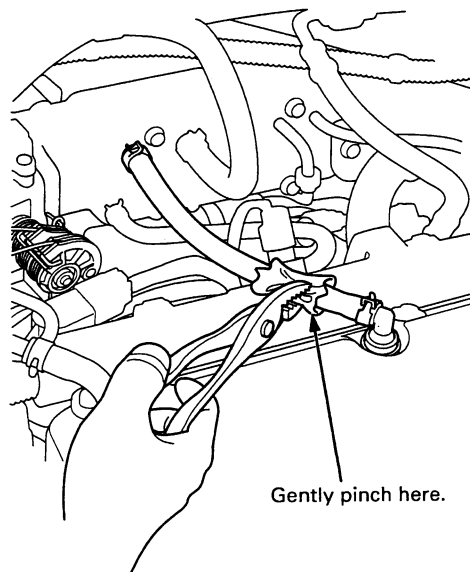
F20B6, F18B2, F18B3 engine:



H22A7 engine:



2. At idle, make sure there is a clicking sound from the PCV valve when the hose between PCV valve and intake manifold is lightly pinched with your fingers or pliers. If there is no clicking sound, check the PCV valve grommet for cracks or damage. If the grommet is OK, replace the PCV valve and recheck.



Emission Control System

Evaporative Emission (EVAP) Controls

Description

The evaporative emission controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

A. Evaporative Emission (EVAP) Control Canister

An EVAP control canister is used for the temporary storage of fuel vapor until the fuel vapor can be purged from the EVAP control canister into the engine and burned.

B. Vapor Purge Control System

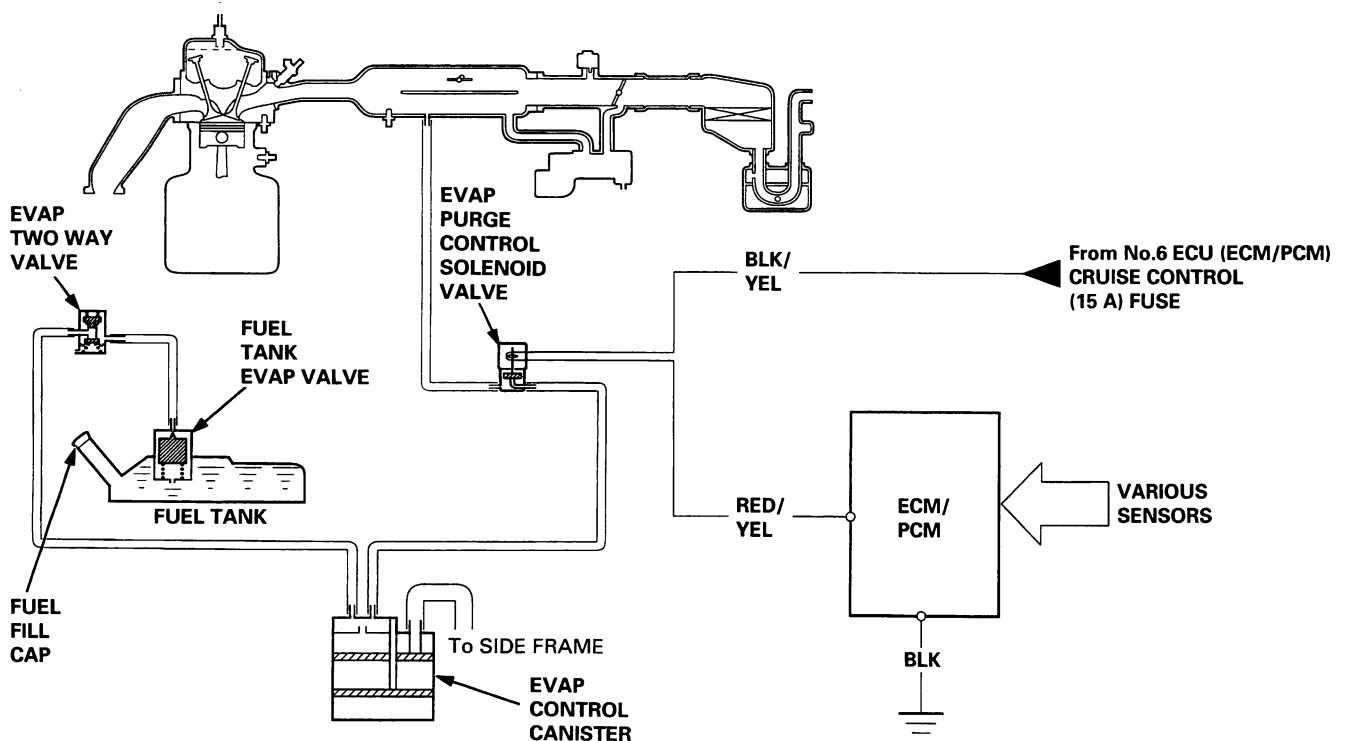
EVAP control canister purging is accomplished by drawing fresh air through the EVAP control canister and into a port on the throttle body. The purging vacuum is controlled by the EVAP purge control canister and the EVAP purge control solenoid valve.

EVAP PURGE CONTROL DIAPHRAGM VALVE OPEN AFTER STARTING ENGINE
EVAP PURGE CONTROL SOLENOID VALVE DUTY CONTROLLED

ENGINE COOLANT TEMPERATURE ABOVE 55°C (131°F): F20B6 engine, 65°C (149°F): H22A7 engine

C. Fuel Tank Vapor Control System

When fuel vapor pressure in the fuel tank is higher than the set value of the EVAP two way valve, the valve opens and regulates the flow of fuel vapor to the EVAP control canister.





P0443 The scan tool indicates Diagnostic Trouble Code (DTC) P0443: A electrical problem in the EVAP Purge Control Solenoid Valve circuit.

- The MIL has been reported on.
- DTC P0443 is stored.

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Turn the ignition switch ON (II).

Is DTC P0443 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the EVAP Purge Control Solenoid Valve and the ECM/PCM.

YES

Check the EVAP purge control solenoid valve:

1. Turn the ignition switch OFF.
2. Disconnect the vacuum hose from the EVAP purge control canister and connect a vacuum gauge to the hose.
3. Start the engine and allow it to idle.

Is there vacuum?

YES

NO

Check for a short in the wire (PCS line):

1. Turn the ignition switch OFF.
2. Disconnect the 2P connector from the EVAP purge control solenoid valve.
3. Check for continuity between the EVAP purge control solenoid valve 2P connector terminal No. 2 and body ground.

Is there continuity?

NO

Replace the EVAP purge control solenoid valve.

YES

Check for a short in the ECM/PCM:

1. Disconnect the ECM/PCM connector C (31P).
2. Check for continuity between the EVAP purge control solenoid valve 2P connector terminal No. 2 and body ground.

Is there continuity?

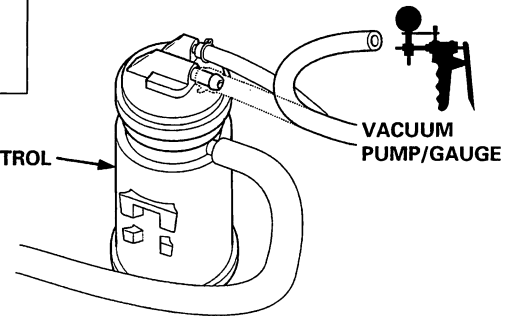
YES

Repair short in the wire between the EVAP purge control solenoid valve and the ECM/PCM (C22).

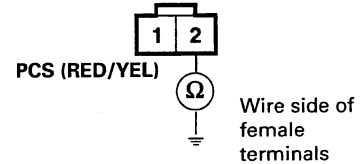
NO

Substitute a known-good ECM/PCM and retest (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

(To page 11-A-146)



EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR



Wire side of female terminals

(cont'd)

Emission Control System

Evaporative Emission (EVAP) Controls (cont'd)

(From page 11-A-145)

Check the EVAP purge control valve:

1. Turn the ignition switch OFF.
2. Disconnect the 2P connector from the EVAP purge control solenoid valve.
3. Turn the ignition switch ON (II).
4. At the harness side, measure voltage between the EVAP purge control solenoid valve 2P connector terminal No. 1 and body ground.

Is there battery voltage?

NO

YES

Repair open in the wire between EVAP purge control solenoid valve and the No. 6 ECU (ECM/PCM) CRUISE CONTROL (15 A fuse).

Check for an open in the wire (PCS line):

1. Turn the ignition switch OFF.
2. Reconnect the 2P connector to the EVAP purge control solenoid valve.
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals C22 and B2.

Is there battery voltage?

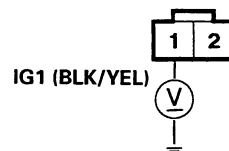
NO

YES

Repair open in the wire between the EVAP purge control solenoid valve and the ECM/PCM (C22). If wire is OK, replace EVAP purge control solenoid valve.

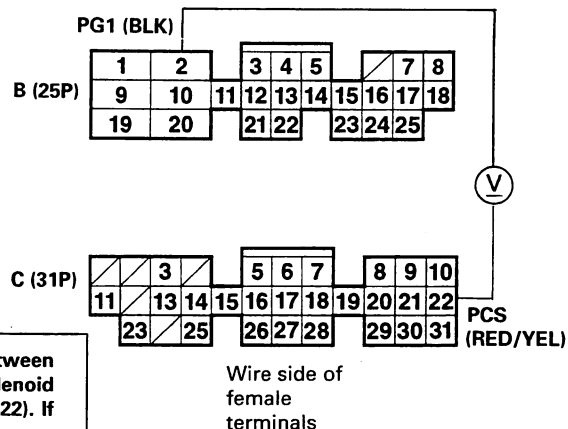
Substitute a known-good ECM/PCM and retest (see page 11-A-16 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR



Wire side of female terminals

ECM/PCM CONNECTORS





Inspection

Inspection of Evaporative Emission Controls

Check the vacuum when cold:

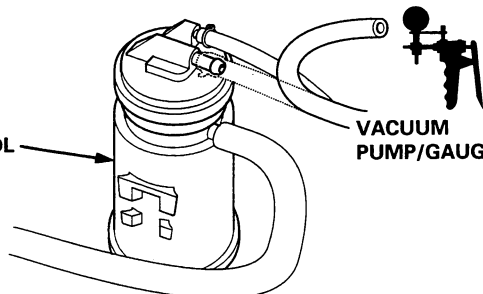
1. Disconnect the vacuum hose from the EVAP purge control canister and connect a vacuum gauge to the hose.

2. Start the engine and allow it to idle:

NOTE: Engine coolant temperature must be below 55°C (131°F): B20B6 engine, 65°C (149°F): H22A7 engine.

EVAP
PURGE CONTROL
CANISTER

VACUUM
PUMP/GAUGE



Is there vacuum?

YES

Inspect vacuum hose routing.
If OK, replace the EVAP purge control solenoid valve.

NO

Check the vacuum when hot:

1. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then raise the engine speed to 3,000 rpm (min^{-1}).

2. Check for vacuum at the vacuum hose.

Is there vacuum?

NO

Inspect vacuum hose routing.
If OK, replace EVAP purge control solenoid valve.

YES

Check the EVAP control canister:

1. Turn the ignition switch OFF.
2. Reconnect the vacuum hose to the EVAP purge control canister.
3. Remove the fuel fill cap.
4. Connect a vacuum gauge to canister purge air hose.
5. Start the engine and raise speed to 3,500 rpm (min^{-1}).

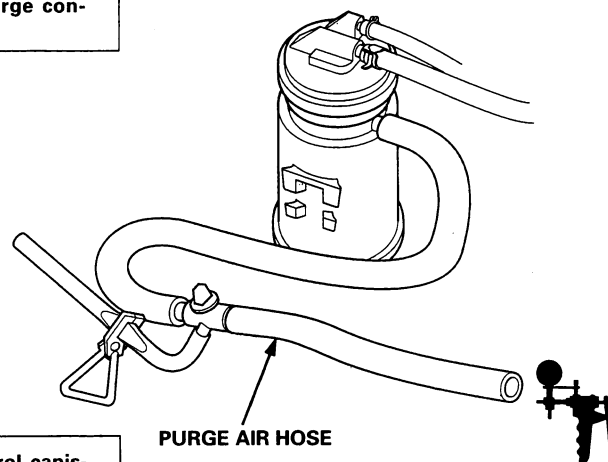
Does vacuum appear on gauge within 1 minute?

NO

Replace the EVAP control canister.

YES

See EVAP two way valve test to complete.
Evaporative emission controls are OK.



PURGE AIR HOSE

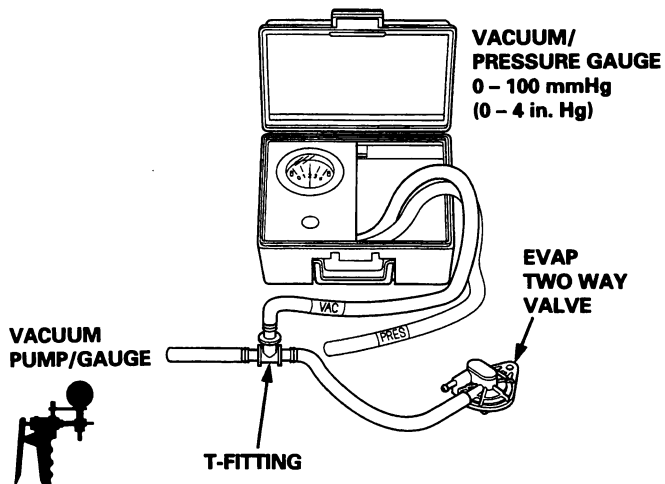
(cont'd)

Emission Control System

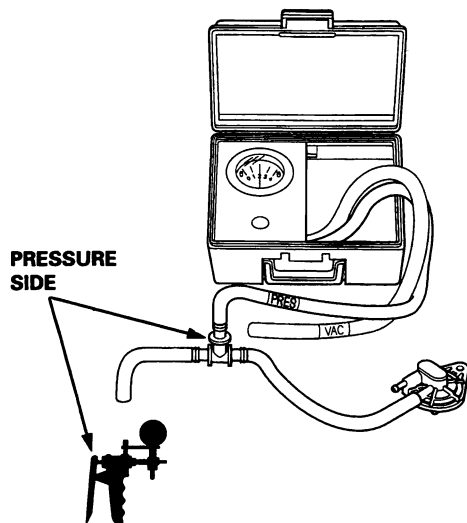
Evaporative Emission (EVAP) Controls (cont'd)

Evaporative Emission (EVAP) Two Way Valve Testing

1. Remove the fuel fill cap.
2. Remove vapor line from the two way valve on the fuel tank and connect to T-fitting from vacuum gauge and vacuum pump as shown.



3. Apply vacuum slowly and continuously while watching the gauge.
Vacuum should stabilize momentarily at 0.7 – 2.0 kPa (5 – 15 mmHg, 0.2 – 0.6 in.Hg).
 - If vacuum stabilizes (valve opens) below 0.7 kPa (5 mmHg, 0.2 in.Hg) or above 2.0 kPa (15 mmHg, 0.6 in.Hg), install a new valve and retest.
4. Move vacuum pump hose from vacuum to pressure fitting, and move vacuum gauge hose from vacuum to pressure side as shown.



5. Slowly pressurize the vapor line while watching the gauge.
Pressure should stabilize at 1.3 – 4.7 kPa (10 – 35 mmHg, 0.4 – 1.4 in.Hg).
 - If pressure momentarily stabilizes (valve opens) at 1.3 – 4.7 kPa (10 – 35 mmHg, 0.4 – 1.4 in.Hg), the valve is OK.
 - If pressure stabilizes below 1.3 kPa (10 mmHg, 0.4 in.Hg) or above 4.7 kPa (35 mmHg, 1.4 in.Hg), install a new valve and retest.

F18B2, F18B3 engine

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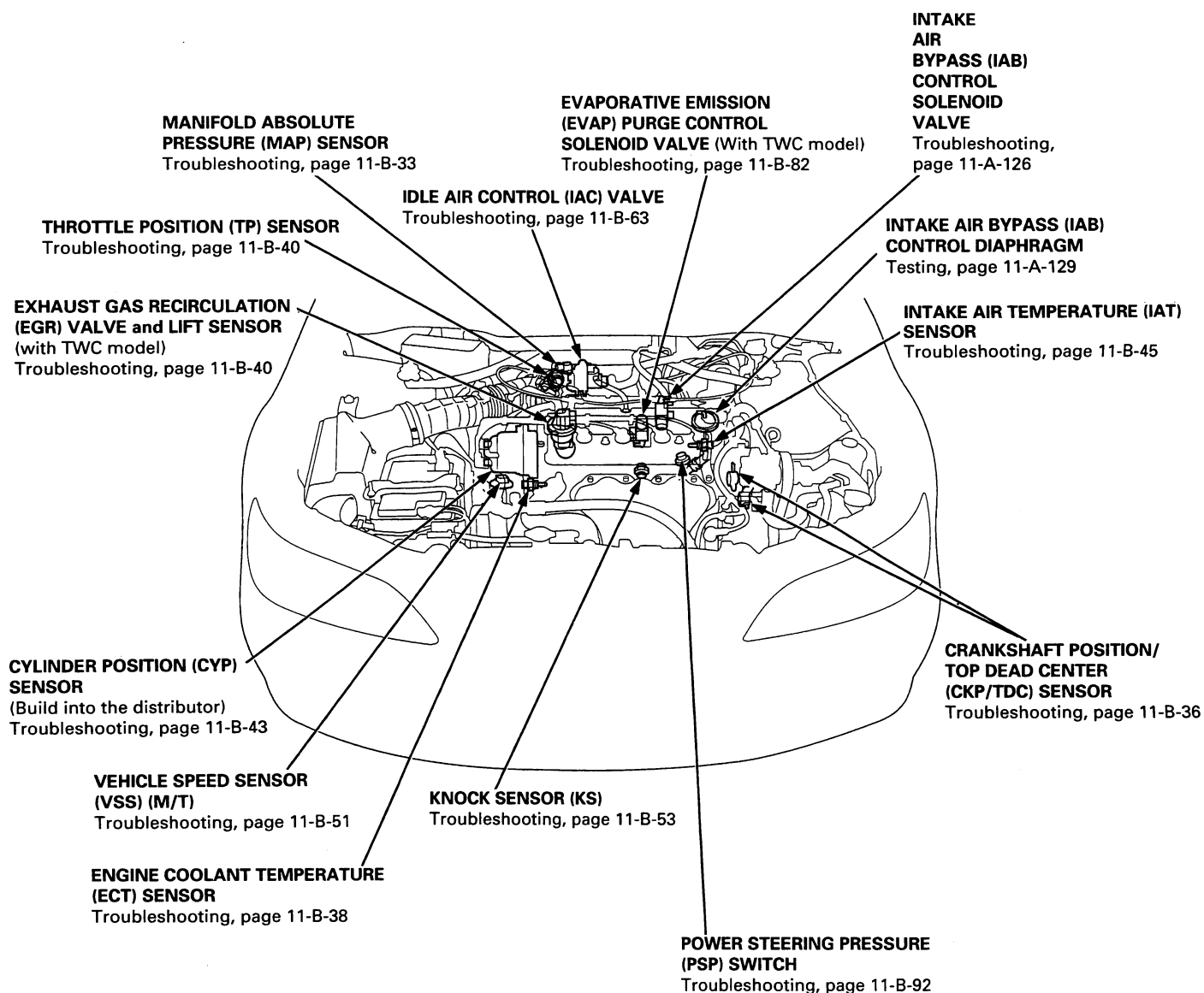
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Component Locations

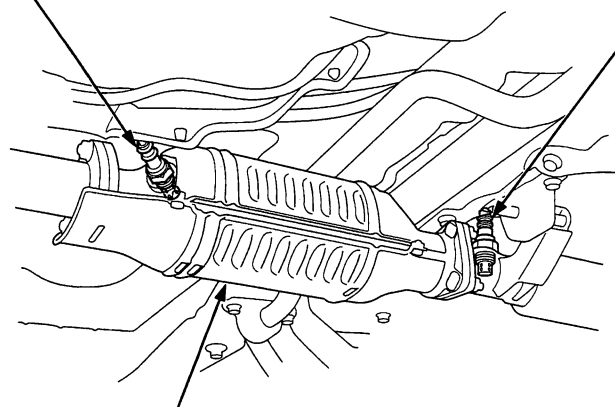
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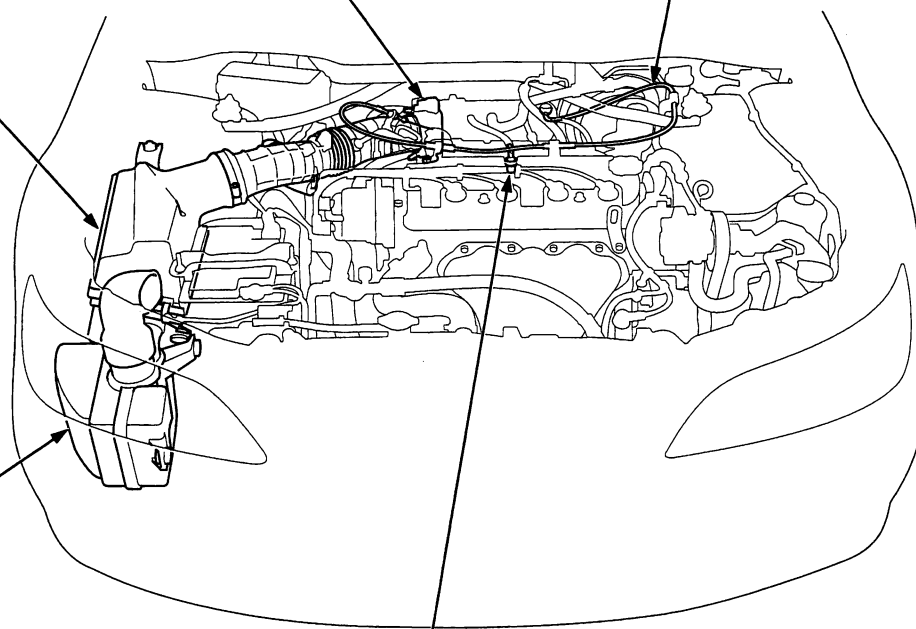
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(cont'd)

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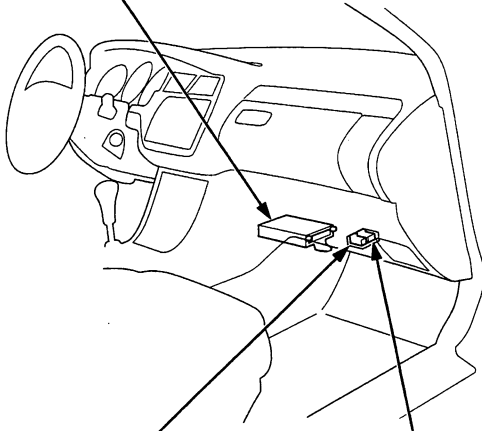
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DATA LINK CONNECTOR (DLC) (5P)

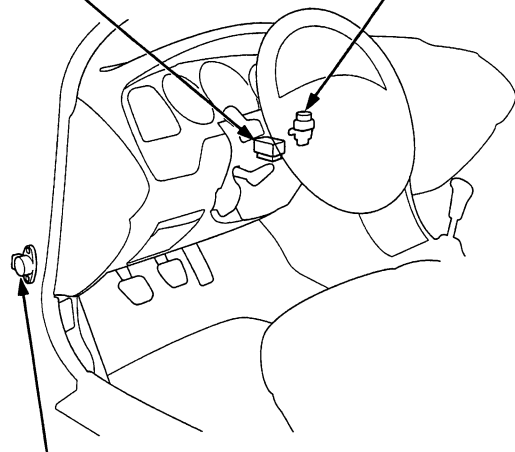
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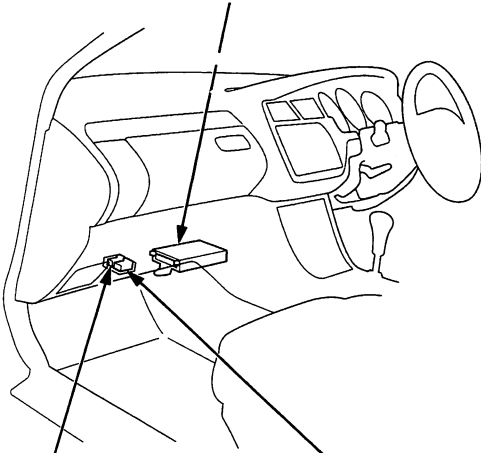
RHD:

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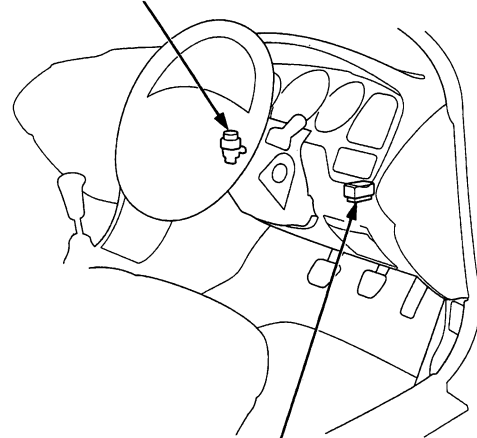
DATA LINK CONNECTOR (DLC) (5P)

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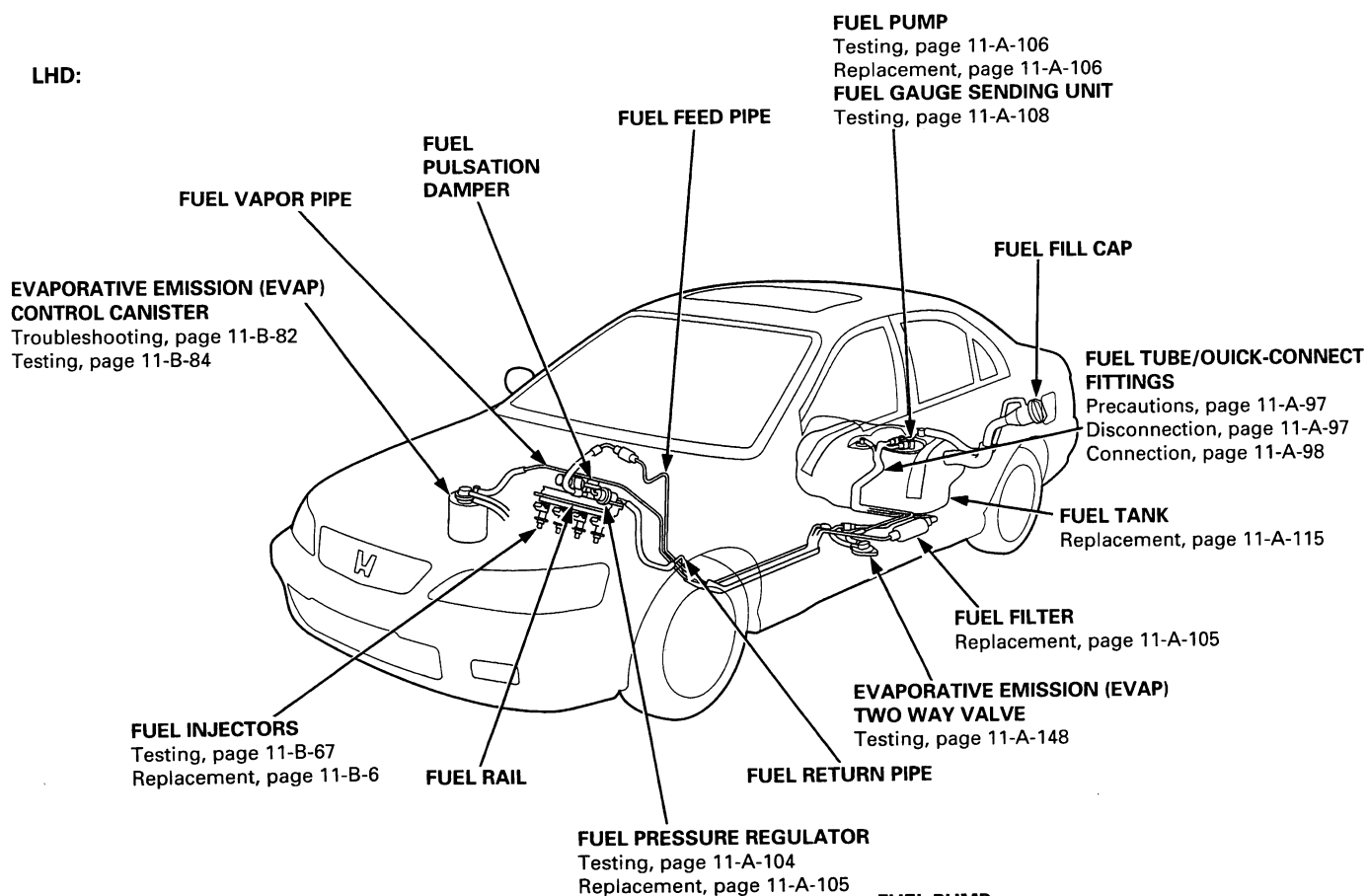
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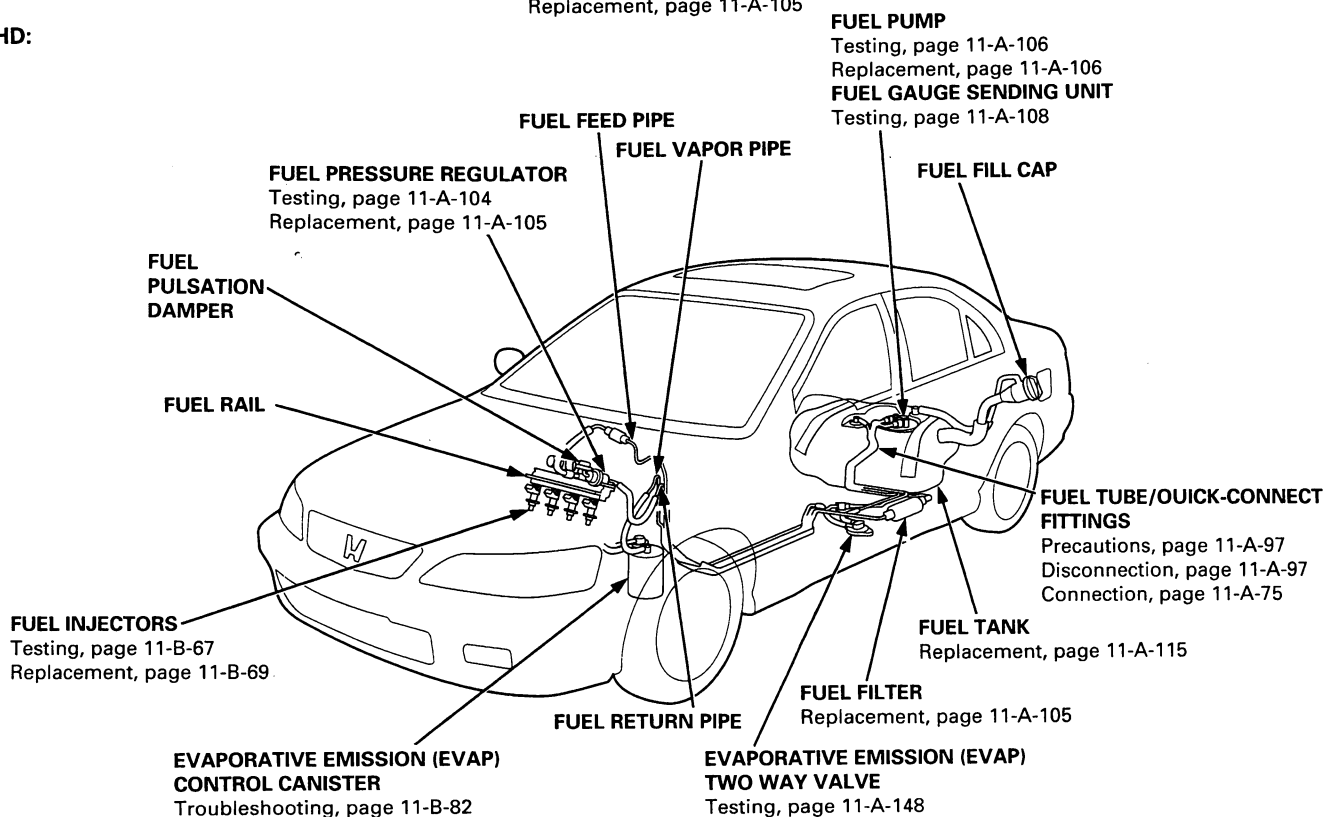
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LHD:



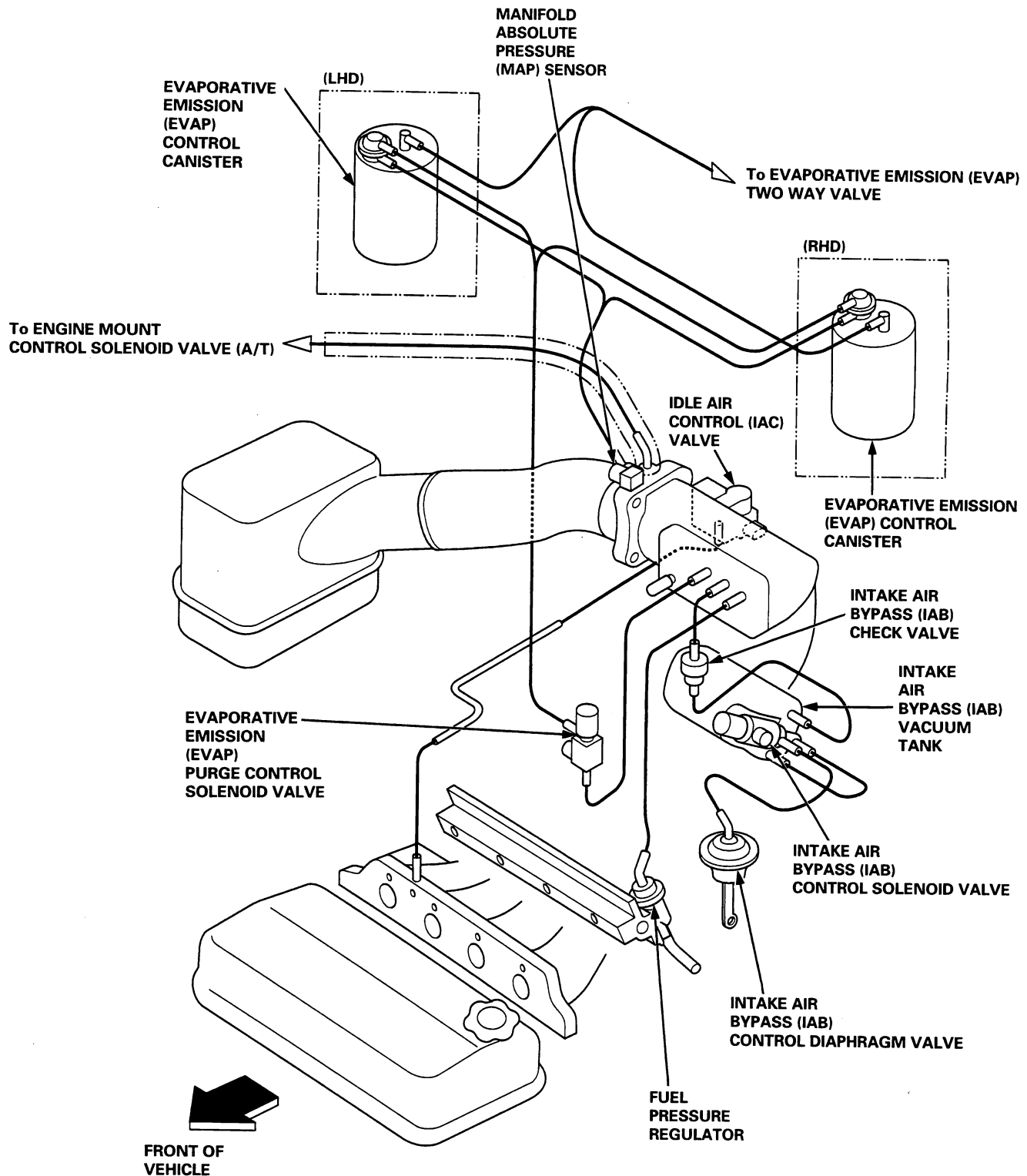
RHD:



System Description

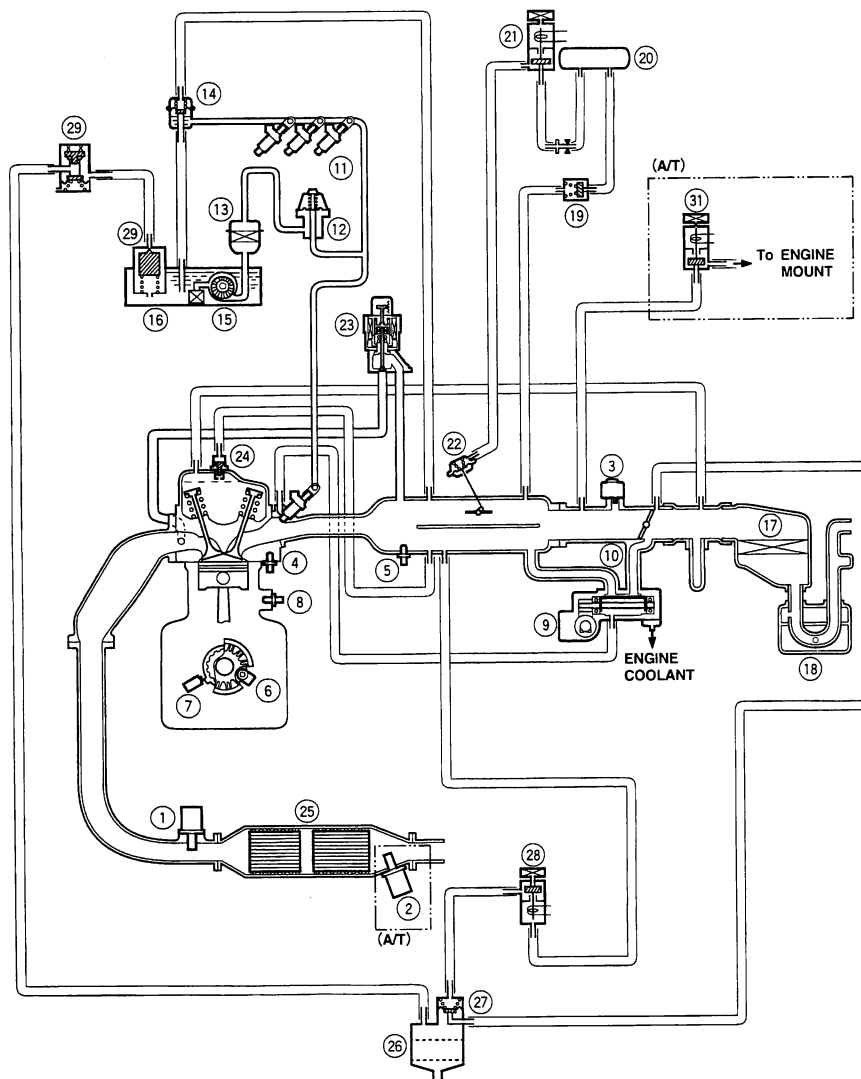
Vacuum Connections

With TWC model:





With TWC model:



- ① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S)
- ② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S)
- ③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ⑥ CRANKSHAFT POSITION (CKP) SENSOR
- ⑦ TOP DEAD CENTER (TDC) SENSOR
- ⑧ KNOCK SENSOR (KS)
- ⑨ IDLE AIR CONTROL (IAC) VALVE
- ⑩ THROTTLE BODY (TB)
- ⑪ FUEL INJECTOR
- ⑫ FUEL PULSATION DAMPER
- ⑬ FUEL FILTER
- ⑭ FUEL PRESSURE REGULATOR
- ⑮ FUEL PUMP (FP)
- ⑯ FUEL TANK
- ⑰ AIR CLEANER
- ⑱ RESONATOR

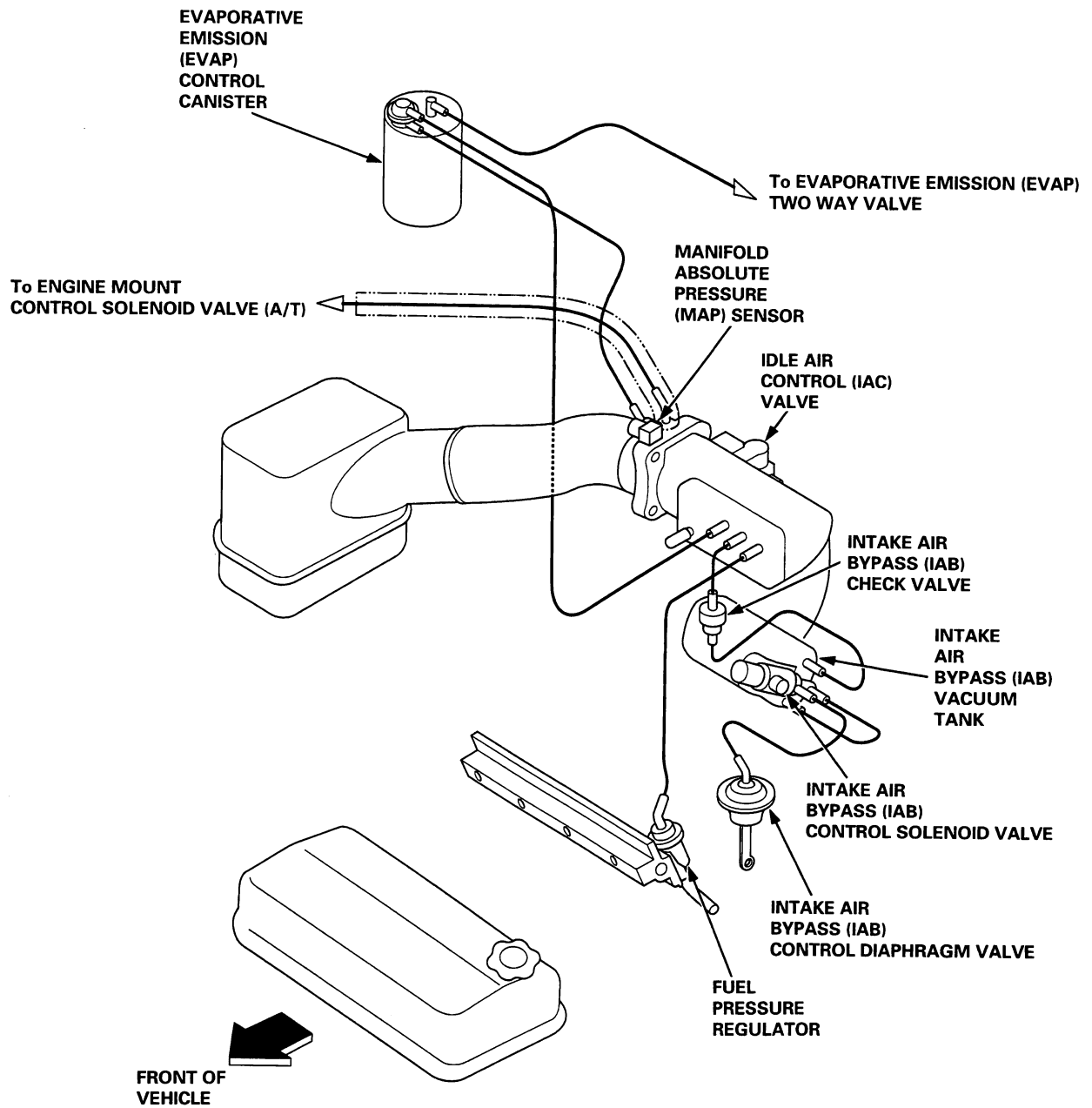
- ⑲ INTAKE AIR BYPASS (IAB) CHECK VALVE
- ⑳ INTAKE AIR BYPASS (IAB) VACUUM TANK
- ㉑ INTAKE AIR BYPASS (IAB) CONTROL SOLENOID VALVE
- ㉒ INTAKE AIR BYPASS (IAB) CONTROL DIAPHRAGM VALVE
- ㉓ EXHAUST GAS RECIRCULATION (EGR) VALVE AND LIFT SENSOR
- ㉔ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ㉕ THREE WAY CATALYTIC CONVERTER
- ㉖ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ㉗ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL DIAPHRAGM VALVE
- ㉘ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
- ㉙ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
- ㉚ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE
- ㉛ ENGINE MOUNT CONTROL SOLENOID VALVE

(cont'd)

System Description

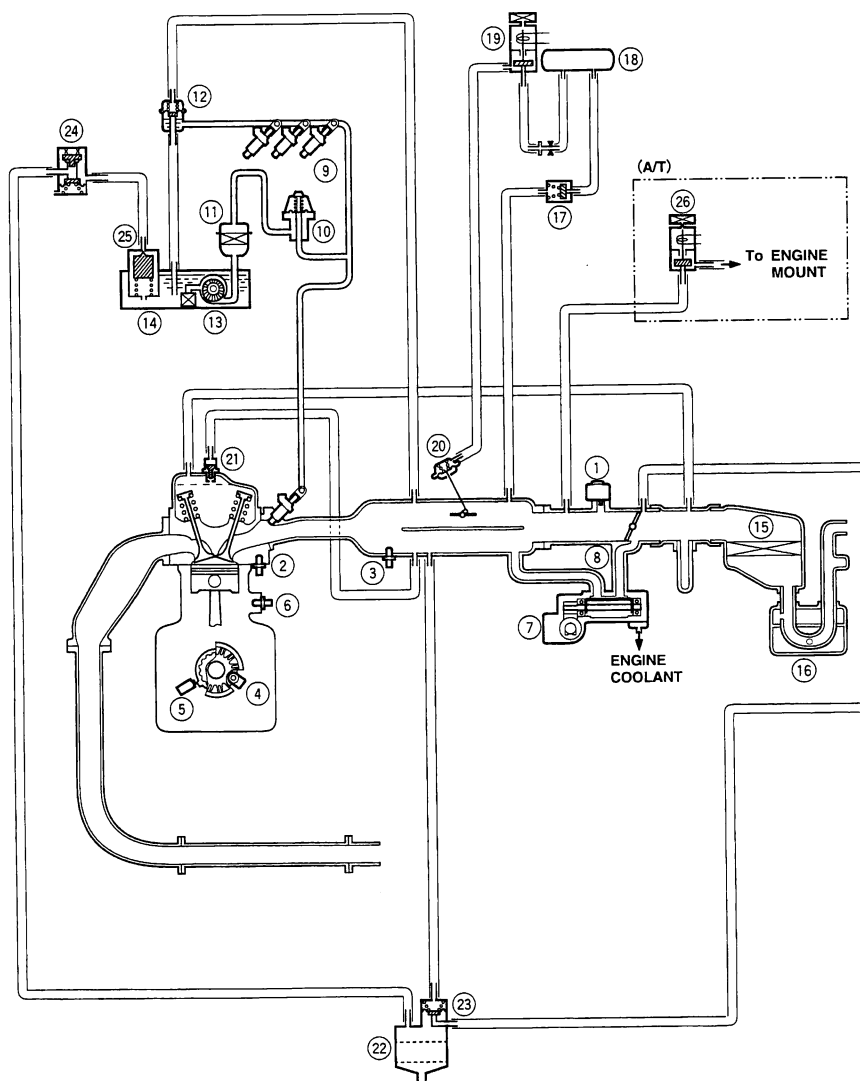
Vacuum Connections (cont'd)

Without TWC model:





Without TWC model:

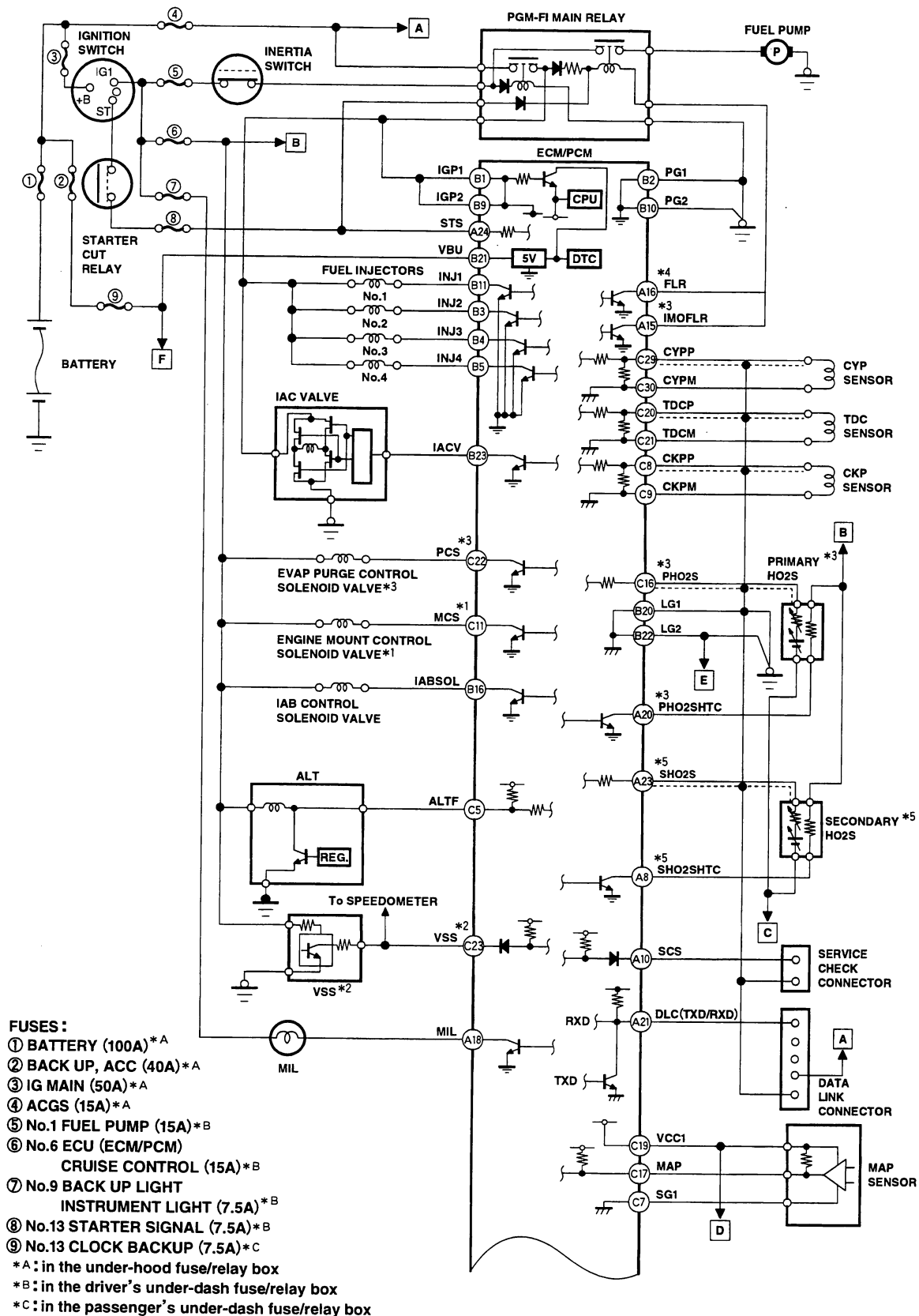


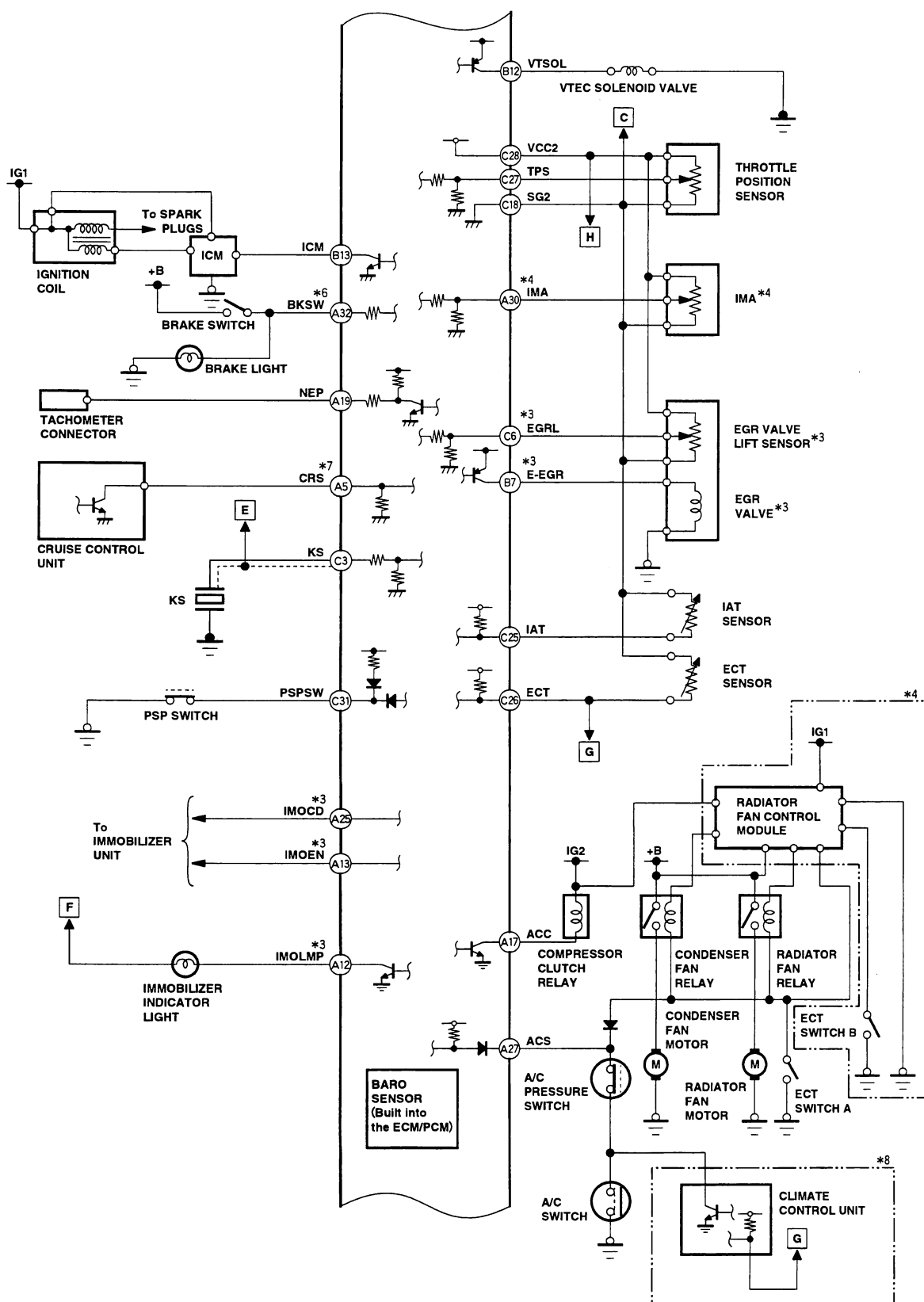
- ① MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ② ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ③ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ④ CRANKSHAFT POSITION (CKP) SENSOR
- ⑤ TOP DEAD CENTER (TDC) SENSOR
- ⑥ KNOCK SENSOR (KS)
- ⑦ IDLE AIR CONTROL (IAC) VALVE
- ⑧ THROTTLE BODY (TB)
- ⑨ FUEL INJECTOR
- ⑩ FUEL PULSATION DAMPER
- ⑪ FUEL FILTER
- ⑫ FUEL PRESSURE REGULATOR
- ⑬ FUEL PUMP (FP)
- ⑭ FUEL TANK
- ⑮ AIR CLEANER
- ⑯ RESONATOR
- ⑰ INTAKE AIR BYPASS (IAB) CHECK VALVE
- ⑱ INTAKE AIR BYPASS (IAB) VACUUM TANK

- ⑲ INTAKE AIR BYPASS (IAB) CONTROL SOLENOID VALVE
- ⑳ INTAKE AIR BYPASS (IAB) CONTROL DIAPHRAGM VALVE
- ㉑ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ㉒ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ㉓ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL DIAPHRAGM VALVE
- ㉔ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
- ㉕ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE
- ㉖ ENGINE MOUNT CONTROL SOLENOID VALVE

System Description

Electrical Connections

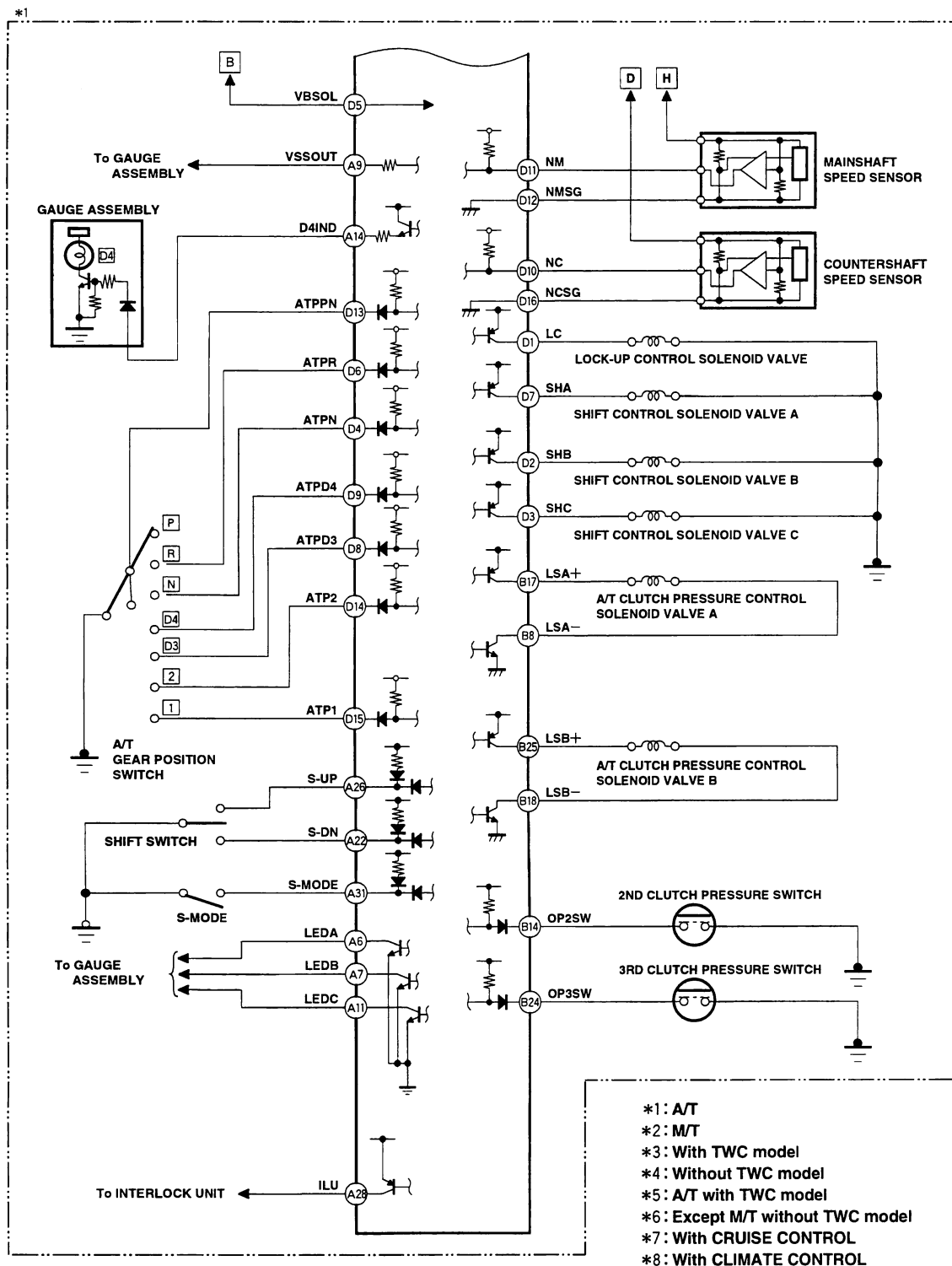




(cont'd)

System Description

Electrical Connections (cont'd)



ECM/PCM CONNECTOR TERMINAL LOCATIONS

A (32P)												B (25P)								C (31P)											D (16P)																
12	13	14	15	16	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32				
25	26	27	28	29	30	31	32					9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32												



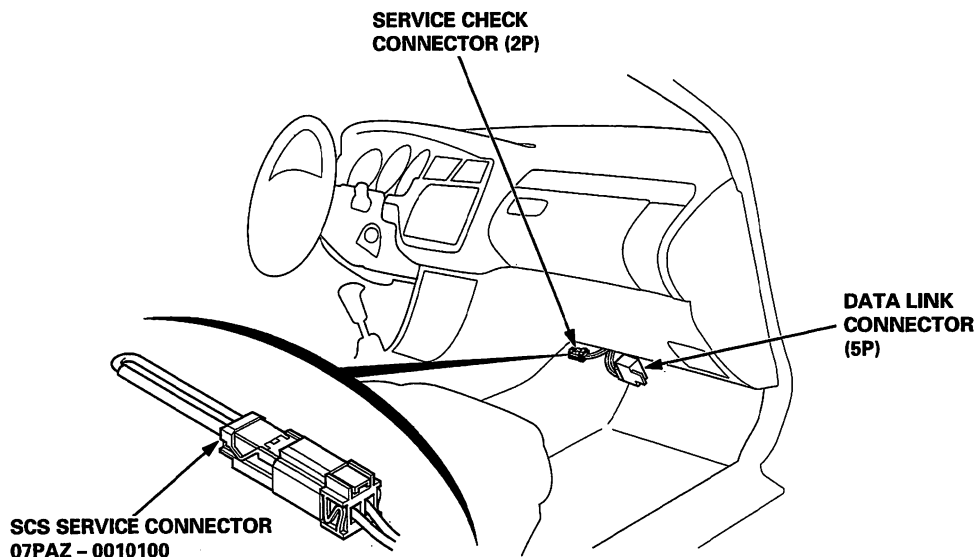
Troubleshooting Procedures

How To Begin Troubleshooting

When the Malfunction Indicator Lamp (MIL) has been reported on, check the Diagnostic Trouble Code (DTC) as following:

NOTE: This operation can also be carried out with Honda PGM Tester connected to data link connector (5P).

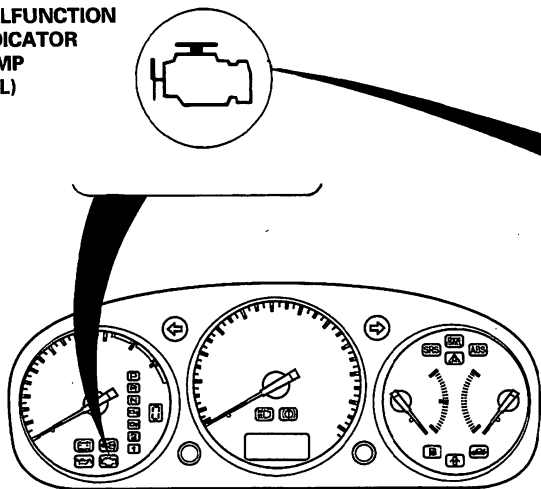
1. Connect the SCS short connector to Service Check Connector as shown (The 2P Service Check Connector is located under the dash on the passenger side of the car). Turn the ignition switch ON (II).



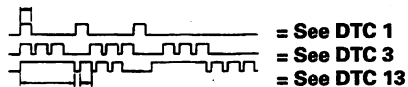
The illustration shows LHD type. RHD type is symmetrical.

2. Note the Diagnostic Trouble Code (DTC): The MIL indicates a code by the length and number of blinks. The MIL can indicate multiple problems by blinking separate codes, one after another. Codes 1 through 9 are indicated by individual short blinks. Codes 10 through 65 are indicated by a series of long and short blinks. The number of long blinks equals the first digit, the number of short blinks equals the second digit. Sometimes the first blink is difficult to see; always count the blinks at least twice to verify the code.

MALFUNCTION
INDICATOR
LAMP
(MIL)

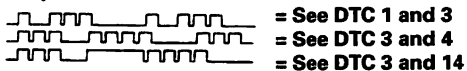


Separate Problems: Short



Long short

Multiple Problems:



(cont'd)

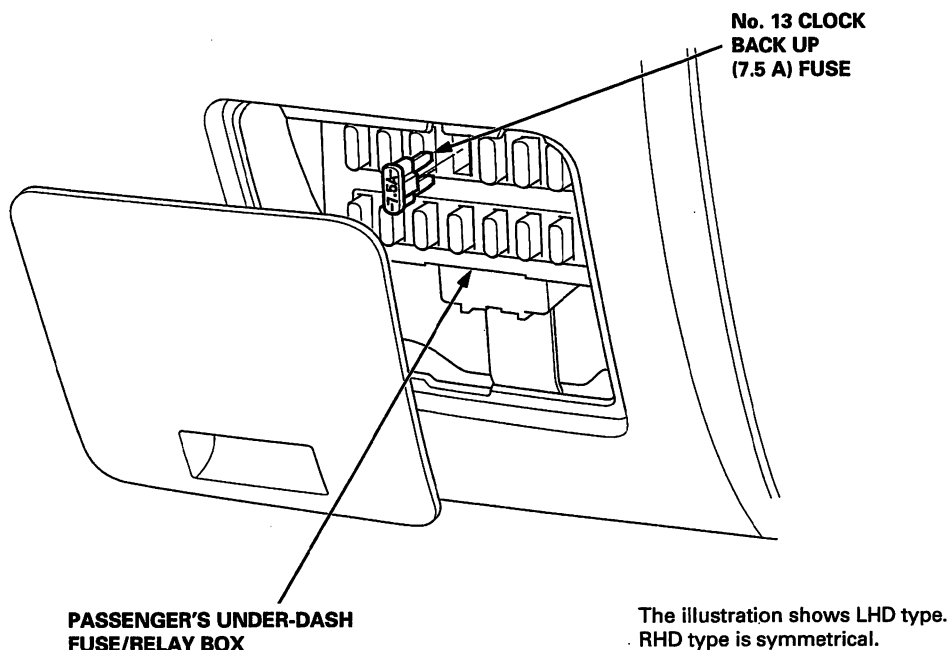
Troubleshooting

Troubleshooting Procedures (cont'd)

Engine/Powertrain Control Module (ECM/PCM) Reset Procedure

NOTE: This operation can also be carried out with Honda PGM Tester.

1. Turn the ignition switch off.
2. Remove the No. 13 CLOCK BACK UP (7.5 A) fuse from the passenger's under-dash fuse/relay box for 10 seconds to reset the ECM/PCM.



Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the SCS Short Connector.

NOTE: If the SCS short connector is connected and there are no DTCs stored in the ECM/PCM, the MIL will stay on when the ignition switch is turned ON (II).

2. Do the ECM/PCM Reset Procedure.

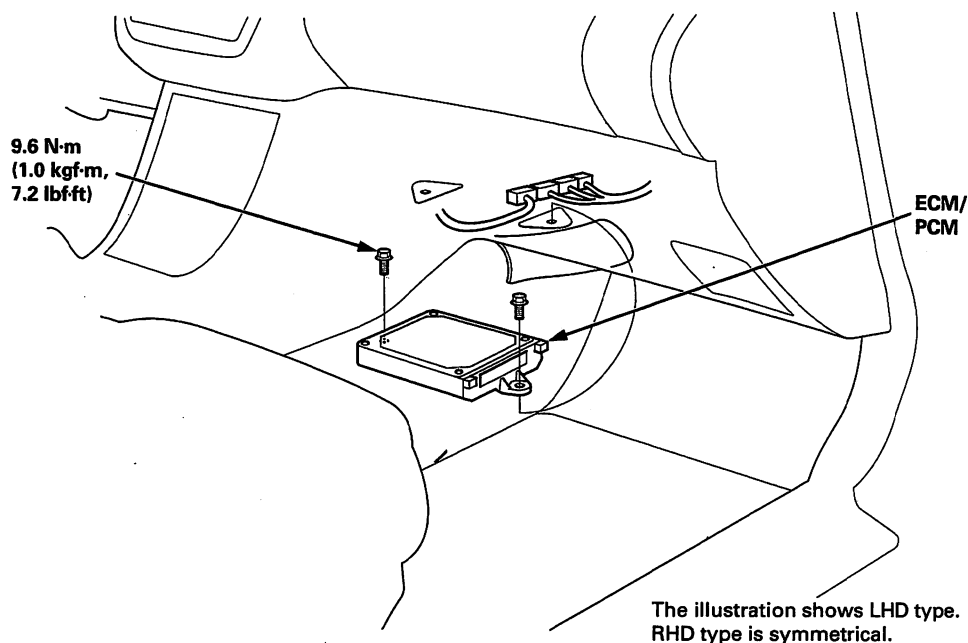
Known-Good ECM/PCM Substitution (KG, KE, KS, KR models)

The ECM/PCM is part of the immobilizer system. If you substitute a known-good ECM/PCM, the ECM/PCM will have a different immobilizer code. In order for the engine to start, you must rewrite the immobilizer code with the Honda PGM Tester.



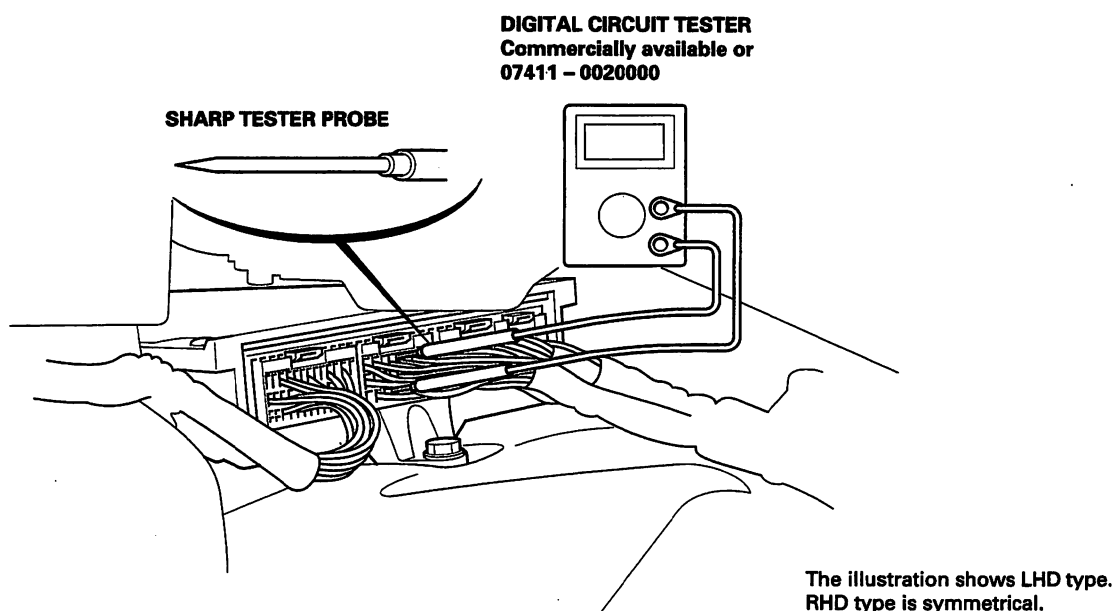
ECM/PCM Removal

Pull the carpet from the passenger's side of the center console to expose the ECM/PCM. Remove the two bolts from the ECM/PCM. Check the system according to the procedure described for the appropriate DTC listed on the following pages.



Checking The ECM/PCM Connector Terminals

When checking the ECM/PCM connector terminals, gently slide the sharp tester probe from the wire side into the connector until it comes in contact with the terminal end of the wire.



Troubleshooting

Troubleshooting Guide

NOTE: Across each row in the chart, the systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE		SYSTEM	PGM-FI							
			ENGINE/ POWER- TRAIN CONTROL MODULE	HEATED OXYGEN SENSOR*1	MANIFOLD ABSOLUTE PRESSURE SENSOR	TOP DEAD CEN- TER/CRANKSHAFT POSITION/CYLIN- DER POSITION SENSOR	ENGINE COOLANT TEMPERA- TURE SENSOR	THROTTLE POSITION SENSOR	INTAKE AIR TEMPERA- TURE SENSOR	IDLE MIXTURE ADJUSTER*2
SYMPTOM		11-B-26	11-B-31, 55, 58	11-B-33	11-B-36, 43	11-B-38	11-B-40	11-B-45	11-B-47	11-B-50
MALFUNCTION INDICATOR LAMP (MIL) TURNS ON										
MALFUNCTION INDICATOR LAMP (MIL) BLINKS										
ENGINE WON'T START		①			③					
DIFFICULT TO START ENGINE WHEN COLD		Ⓑⓤ		③	③	①				
IRREGULAR IDLING	WHEN COLD FAST IDLE OUT OF SPEC	Ⓑⓤ				③				
	ROUGH IDLE	Ⓑⓤ		③						
	WHEN WARM ENGINE SPEED TOO HIGH	Ⓑⓤ				③				
	WHEN WARM ENGINE SPEED TOO LOW	Ⓑⓤ								
FREQUENT STALLING	WHILE WARMING UP	Ⓑⓤ				③				
	AFTER WARMING UP	Ⓑⓤ								
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING	Ⓑⓤ		②	③					
	FAILS EMISSION TEST	Ⓑⓤ	③	②						
	LOSS OF POWER	Ⓑⓤ		③			②			

* If codes other than those listed above are indicated, count the number of blinks again. If the MIL is in fact blinking these codes, replace the ECM/PCM.

⑧U If the MIL is on while the engine is running, connect the SCS short connector to the service check connector. If no code is displayed (MIL stays on steady), the back-up system is in operation.
Substitute a known-good ECM/PCM and recheck. If the indication goes away, replace the original ECM/PCM.

*1: with TWC model

*2: without TWC model

*3: M/T

*4: with TWC model (A/T)

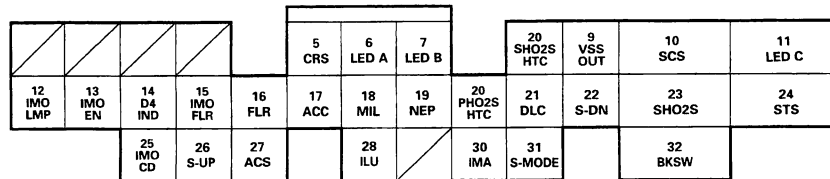


PGM-FI			IDLE CONTROL		FUEL SUPPLY		INTAKE AIR	EMISSION CONTROL	
VEHICLE SPEED SENSOR*3	VTEC SOLENOID VALVE*	KNOCK SENSOR	IDLE AIR CONTROL VALVE	OTHER IDLE CONTROLS	FUEL INJECTOR	OTHER FUEL SUPPLY		EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM*1	OTHER EMISSION CONTROL SYSTEM
11-B-51	6-B-3	11-B-53	11-B-63	11-B-61	11-B-67	11-B-66	11-B-71	11-B-76	11-B-74
						②			
						②			
			①	②					
			①	②	②			③	
			①	②					
			①	②	②				
			①	②		③			
			③			①		②	
					①			③	
									①
					③	①	③		③

Troubleshooting

Engine/Powertrain Control Module Terminal Arrangement

ECM/PCM CONNECTOR A (32 P)



Wire side female terminals

ECM/PCM CONNECTOR A (32P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
5*1	PUR	CRS (CRUISE CONTROL SIGNAL)	Down shift signal input from cruise control unit.	When cruise control is used: pulses
6*1	BLU/YEL	LED A	Shift indicator light control	In manual mode: • In 4th gear position: Battery voltage • In 1st, 2nd and 3rd gear positions: 0 V
7*1	PUR	LED B	Shift indicator light control	In manual mode: • In 2nd and 3rd gear position: Battery voltage • In 1st and 4th gear positions: 0 V
8*5	BLK/WHT	SHO2SHTC (SECONDARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives secondary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled
9*1	BLU/WHT	VSSOUT (VEHICLE SPEED SENSOR OUTPUT SIGNAL)	Vehicle speed signal detected from countershaft speed sensor.	Depending on vehicle speed: pulses
10	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check connector signal (the signal causing a DTC indication)	With the terminal connected: 0 V With the terminal disconnected: battery voltage
11*1	BLU/BLK	LED C	Shift indicator light control	In manual mode: • In 1st and 3rd gear positions: Battery voltage • In 2nd and 4th gear positions: 0 V
12*3	PNK	IMOLMP (IMMOBILIZER INDICATOR LIGHT)	Drives immobilizer indicator light.	With immobilizer indicator light turned ON: 0 V With immobilizer indicator light turned OFF: battery voltage
13*3	PNK/BLK	IMOEN (IMMOBILIZER ENABLE SIGNAL)	Sends immobilizer enable signal.	
14*1	GRN/BLK	D4IND (D4 INDICATOR)	Drives D4 indicator light.	With D4 indicator light turned ON: 0 V With D4 indicator light turned OFF: battery voltage
15*3	GRN/YEL	IMO FLR (IMMOBILIZER FUEL PUMP RELAY)	Drives fuel pump relay.	0 V for two seconds after turning ignition switch ON (II), then battery voltage
16*4	GRN/YEL	FLR (FUEL PUMP RELAY)	Drives fuel pump relay.	0 V for two seconds after turning ignition switch ON (II), then battery voltage
17	RED	ACC (A/C CLUTCH RELAY)	Drives A/C clutch relay.	With compressor ON: 0 V With compressor OFF: battery voltage
18	GRN/ORN	MIL (MALFUNCTION INDICATOR LIGHT)	Drives MIL.	With MIL turned ON: 0 V With MIL turned OFF: battery voltage
19	BLU	NEP (ENGINE SPEED PULSE)	Outputs engine speed pulse.	With engine running: pulses
20*3	BLK/WHT	PHO2SHTC (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives primary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled
21	LT BLU	DLC (TXD/RXD)	Sends and receives scan tool signal.	With ignition switch ON (II): pulses

*1: A/T *3: with TWC model *5: A/T with TWC model
*2: M/T *4: without TWC model *6: Except M/T without TWC model



ECM/PCM CONNECTOR A (32 P)

					5 CRS	6 LED A	7 LED B		8 SO2S HTC	9 VSS OUT	10 SCS	11 LED C
12 IMO LMP	13 IMO EN	14 D4 IND	15 IMO FLR	16 FLR	17 ACC	18 MIL	19 NEP	20 PHO2S HTC	21 DLC	22 S-DN	23 SHO2S	24 STS
		25 IMO CD	26 S-UP	27 ACS		28 ILU		30 IMA	31 S-MODE		32 BKS	

Wire side female terminals

ECM/PCM CONNECTOR A (32P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
22*1	ORN	S-DN (SHIFT DOWN)	Detects downshift switch signal.	In manual mode and shift lever pushed toward downshift position (marked with "-"): 0 V In manual mode and shift lever in neutral position: Battery voltage
23*5	WHT	SHO2S (SECONDARY HEATED OXYGEN SENSOR, SENSOR 2)	Detects secondary heated oxygen sensor (sensor 2) signal.	With throttle fully opened from idle with fully warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
24	BLU/ORN	STS (STARTER SWITCH SIGNAL)	Detects starter switch signal.	With starter switch ON (III): battery voltage With starter switch OFF: 0 V
25*3	RED	IMOCOD (IMMOBILIZER CODE)	Detects immobilizer signal.	
26*1	WHT/BLU	S-UP (SHIFT UP)	Detects upshift switch signal.	In manual mode and shift lever pushed toward upshift position (marked with "+"): 0 V In manual mode and shift lever in neutral position: Battery voltage
27	BLU/RED	ACS (A/C SWITCH SIGNAL)	Detects A/C switch signal.	With A/C switch ON: 0 V With A/C switch OFF: about 5 V
28*1	WHT/RED	ILU (INTERLOCK CONTROL UNIT)	Drives interlock control unit.	With ignition switch ON (II) and brake pedal depressed: battery voltage
30*4	GRN/RED	IMA (IDLE MIXTURE ADJUSTER)	Detects IMA signal.	With ignition switch ON (II): about 0.5 – 4.5 V (depending on idle mixture)
31*1	BRN	S-MODE (SHIFT MODE)	Detects manual mode switch signal.	In manual mode (shift lever is positioned in manual mode): 0 V In other than manual mode: Battery voltage
32*6	WHT/BLK	BKS (BRAKE SWITCH)	Detects brake switch signal.	With brake pedal released: 0 V With brake pedal depressed: battery voltage

*1: A/T *3: with TWC model *5: A/T with TWC model
*2: M/T *4: without TWC model *6: Except M/T without TWC model

(cont'd)

Troubleshooting

Engine/Powertrain Control Module Terminal Arrangement (cont'd)

ECM/PCM CONNECTOR B (25P)

1 IGP1	2 PG1		3 INJ2	4 INJ3	5 INJ4		7 E-EGR	8 LSA-
9 IGP2	10 PG2	11 INJ1	12 VTS	13 ICM	14 OP 2SW		16 IAB SOL	17 LSA+
	20 LG1		21 VBU	22 LG2		23 IACV	24 OP 3SW	25 LSB+

Wire side female terminals

PCM CONNECTOR B (25P)

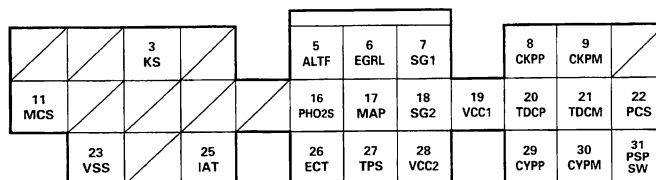
NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL/BLK	IGP1 (POWER SOURCE)	Power source for the ECM/PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
2	BLK	PG1 (POWER GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
3	RED	INJ2 (No. 2 FUEL INJECTOR)	Drives No. 2 fuel injector.	With engine running: pulses
4	BLU	INJ3 (No. 3 FUEL INJECTOR)	Drives No. 3 fuel injector.	
5	YEL	INJ4 (No. 4 FUEL INJECTOR)	Drives No. 4 fuel injector.	
7*3	PNK	E-EGR	Drives EGR valve.	With EGR operation during driving with fully warmed up engine: duty controlled With EGR not operating: 0 V
8*1	WHT	LSA- (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A - SIDE)	A/T clutch pressure control solenoid valve A power supply negative electrode.	With ignition switch ON (II): pulses
9	YEL/BLK	IGP2 (POWER SOURCE)	Power source for the ECM/PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
10	BLK	PG2 (POWER GROUND)	Ground for the ECM/PCM control circuit.	Less than at all times
11	BRN	INJ1 (No. 1 FUEL INJECTOR)	Drives No. 1 fuel injector.	With engine running: pulses
12	GRN/YEL	VTS (VTEC SOLENOID VALVE)	Drives VTEC solenoid valve.	With engine at low rpm: 0 V With engine at high rpm: battery voltage
13	YEL/GRN	ICM (IGNITION CONTROL MODULE)	Sends ignition pulse.	With ignition switch ON (II): battery voltage With engine running: about 10 V (depending on engine speed)
14*1	BLU/BLK	OP2SW (2ND OIL PRESSURE SWITCH)	Detects 2nd oil pressure switch.	With ignition switch ON (II): battery voltage
16	RED/BLU	IABSOL (INTAKE AIR BYPASS CONTROL SOLENOID VALVE)	Drives IAB control solenoid valve.	With engine running, engine speed below: 3,900 rpm (min ⁻¹) battery voltage With engine running, engine speed above: 3,900 rpm (min ⁻¹) 0 V
17*1	RED	LSA+ (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A + SIDE)	A/T clutch pressure control solenoid valve A power supply positive electrode	With ignition switch ON (II): pulses
18*1	GRN	LSB- (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B - SIDE)	A/T clutch pressure control solenoid valve B power supply negative electrode	With ignition switch ON (II): pulses
20	BRN/BLK	LG1 (LOGIC GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
21	WHT/BLU	VBU (VOLTAGE BACK UP)	Power source for the ECM/PCM control circuit. Power source for the DTC memory.	Battery voltage at this times
22	BRN/BLK	LG2 (LOGIC GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
23	BLK/BLU	IACV (IDLE AIR CONTROL VALVE)	Drives IAC valve.	With engine running: pulses
24*1	BLU/WHT	OP3SW (3RD OIL PRESSURE SWITCH)	Detects 3rd oil pressure switch.	With ignition switch ON (II): battery voltage
25*1	ORN	LSB+ (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B + SIDE)	A/T clutch pressure control solenoid valve B power supply positive electrode	With ignition switch ON (II): pulses

*1: A/T *3: with TWC model
*2: M/T *4: without TWC model



ECM/PCM CONNECTOR C (31P)



Wire side female terminals

ECM/PCM CONNECTOR C (31P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
3	RED/BLU	KS (KNOCK SENSOR)	Detects KS signal.	With engine knocking: pulses
5	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal.	With fully warmed up engine running: 0 V – battery voltage (depending on electrical load)
6*3	WHT/BLK	EGR (EGR VALVE LIFT SENSOR)	Detects EGR valve lift sensor signal.	At idle: about 1.2 V
7	GRN/WHT	SG1 (SENSOR GROUND)	Ground for MAP sensor.	Less than 1.0 V at all times
8	BLU	CKPP (CKP SENSOR P SIDE)	Detects CKP sensor.	With engine running: pulses
9	WHT	CKPM (CKP SENSOR M SIDE)	Ground for CKP sensor.	
11*1	RED/BLK	MCS (ENGINE MOUNT CONTROL SOLENOID VALVE)	Drives engine mount control solenoid valve.	At idle: 0 V Above idle: battery voltage
16*3	WHT	PHO2S (PRIMARY HEATED OXYGEN SENSOR, SENSOR 1)	Detects primary heated oxygen sensor (sensor 1) signal.	With throttle fully opened from idle with fully warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
17	RED/GRN	MAP (MANIFOLD ABSOLUTE PRESSURE SENSOR)	Detects MAP sensor signal.	With ignition switch ON (II): about 3 V At idle: about 1.0 V (depending on engine speed)
18	GRN/BLK	SG2 (SENSOR GROUND)	Sensor ground.	Less than 1.0 V at all times
19	YEL/RED	VCC1 (SENSOR VOLTAGE)	Power source to MAP sensor.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
20	GRN	TDCP (TDC SENSOR P SIDE)	Detects TDC sensor.	With engine running: pulses
21	RED	TDCM (TDC SENSOR M SIDE)	Ground for TDC sensor.	
22*3	RED	PCS (EVAP PURGE CONTROL SOLENOID VALVE)	Drives EVAP purge control solenoid valve.	With engine running, engine coolant, below 65°C (149°F): battery voltage With engine running, engine coolant, above 65°C (149°F): 0 V
23*2	BLU/WHT	VSS (VEHICLE SPEED SENSOR)	Detects VSS signal.	With ignition switch ON (II) and front wheel rotating: cycles 0 V – about 5 V or battery voltage
25	RED/YEL	IAT (INTAKE AIR TEMPERATURE SENSOR)	Detects IAT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on intake air temperature)
26	RED/WHT	ECT (ENGINE COOLANT TEMPERATURE SENSOR)	Detects ECT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on engine coolant temperature)
27	RED/BLK	TPS (THROTTLE POSITION SENSOR)	Detects TP sensor signal.	With throttle fully open: about 4.8 V With throttle fully closed: about 0.5 V
28	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
29	YEL	CYPP (CYP SENSOR P SIDE)	Detects CYP sensor.	With engine running: pluses
30	BLK	CYPM (CYP SENSOR M SIDE)	Ground for CYP sensor.	
31	GRN	PSPSW (P/S PRESSURE SWITCH SIGNAL)	Detects PSP switch signal.	At idle with steering wheel in straight ahead position: 0 V At idle with steering wheel at full lock: battery voltage

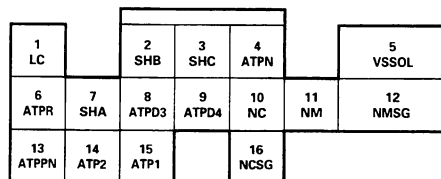
*1: A/T *3: with TWC model
*2: M/T *4: without TWC model

(cont'd)

Troubleshooting

Engine/Powertrain Control Module Terminal Arrangement (cont'd)

PCM CONNECTOR D (16P)



Wire side of female terminals

PCM CONNECTOR D (16P) (A/T only)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL	LC (LOCK-UP CONTROL SOLENOID VALVE)	Drives lock-up control solenoid valve.	During half and full lock-up conditions, and during deceleration condition: Battery voltage during no lock-up condition: 0 V
2	GRN/WHT	SHB (SHIFT CONTROL SOLENOID VALVE B)	Drives shift control solenoid valve B.	Battery voltage in following positions: <ul style="list-style-type: none"> • [1], [2] and positions • [D₄] and [D₃] positions in 1st and 2nd gear. • [P], [R] and [N] positions 0 V in following positions: <ul style="list-style-type: none"> • [D₄] and [D₃] positions in 3rd gear • [D₄] position in 4th gear
3	GRN	SHC (SHIFT CONTROL SOLENOID VALVE C)	Drives shift control solenoid valve C.	Battery voltage in following positions: <ul style="list-style-type: none"> • [1] position • [D₄] and [D₃] positions in 1st and 3rd gear 0 V in following positions: <ul style="list-style-type: none"> • [2] position • [D₄] and [D₃] positions in 2nd gear • [D₄] position in 4th gear • [P], [R] and [N] positions
4	RED/BLK	ATPN (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [N] position: 0 V In any other position: about 5 V
5	BLK/YEL	VBSOL (BATTERY VOLTAGE FOR SOLENOID VALVE)	Power source of solenoid valve.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
6	WHT	ATPR (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [R] position: 0 V In any other position: about 5 V
7	BLU/YEL	SHA (SHIFT CONTROL SOLENOID VALVE A)	Drives shift control solenoid valve A.	Battery voltage in following positions: <ul style="list-style-type: none"> • [2] position • [D₄] and [D₃] positions in 2nd and 3rd gear 0 V in following positions: <ul style="list-style-type: none"> • [1] position • [D₄] and [D₃] positions in 1st gear • [D₄] position in 4th gear • [P], [R] and [N] positions
8	PNK	ATPD3 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [D ₃] position: 0 V In any other position: about 5 V
9	YEL	ATPD4 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [D ₄] position: 0 V In any other position: about 5 V
10	BLU	NC (COUNTERSHAFT SPEED SENSOR)	Detects countershaft speed sensor signals.	Depending on vehicle speed: Pulsing signal When engine is stopped: Approx. 0 V
11	RED	NM (MAINSHAFT SPEED SENSOR)	Detects mainshaft speed sensor signals.	Depending on vehicle speed: Pulsing signal When vehicle is stopped: Approx. 0 V
12	WHT	NMSG (MAINSHAFT SPEED SENSOR GROUND)	Ground for mainshaft speed sensor.	
13	BLU/WHT	ATPPN (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [P] or [N] position: 0 V In any other position: about 5 V
14	BLU	ATP2 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [2] position: 0 V In any other position: about 5 V
15	BRN	ATP1 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In [1] position: 0 V In any other position: about 5 V
16	GRN	NCSG (COUNTERSHAFT SPEED SENSOR GROUND)	Ground for countershaft speed sensor.	



Diagnostic Trouble Code (DTC) Chart

DIAGNOSTIC TROUBLE CODE (DTC)	SYSTEM INDICATED	Page
0	ENGINE/POWERTRAIN CONTROL MODULE (ECM/PCM)	11-B-26
1	PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S)* ¹	11-B-31
3	MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR	11-B-33
4	CRANKSHAFT POSITION (CKP) SENSOR	11-B-36
6	ENGINE COOLANT TEMPERATURE (ECT) SENSOR	11-B-38
7	THROTTLE POSITION (TP) SENSOR	11-B-40
8	TOP DEAD CENTER POSITION (TDC) SENSOR	11-B-36
9	No. 1 CYLINDER POSITION (CYP) SENSOR	11-B-43
10	INTAKE AIR TEMPERATURE (IAT) SENSOR	11-B-45
11	IDLE MIXTURE ADJUSTER (IMA)* ²	11-B-47
12	EXHAUST GAS RECIRCULATION (EGR) VALVE LIFT SENSOR* ¹	11-B-76
13	BAROMETRIC PRESSURE (BARO) SENSOR	11-B-50
14	IDLE AIR CONTROL (IAC) VALVE	11-B-63
17	VEHICLE SPEED SENSOR (VSS)* ³	11-B-51
21	VTEC SOLENOID VALVE	6-B-3
23	KNOCK SENSOR	11-B-53
41	PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S) HEATER* ¹	11-B-55
63	SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S)* ⁵	11-B-58
65	SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) HEATER* ⁵	11-B-55
70* ⁴	AUTOMATIC TRANSMISSION	section 14

*1: with TWC model

*2: without TWC model

*3: M/T

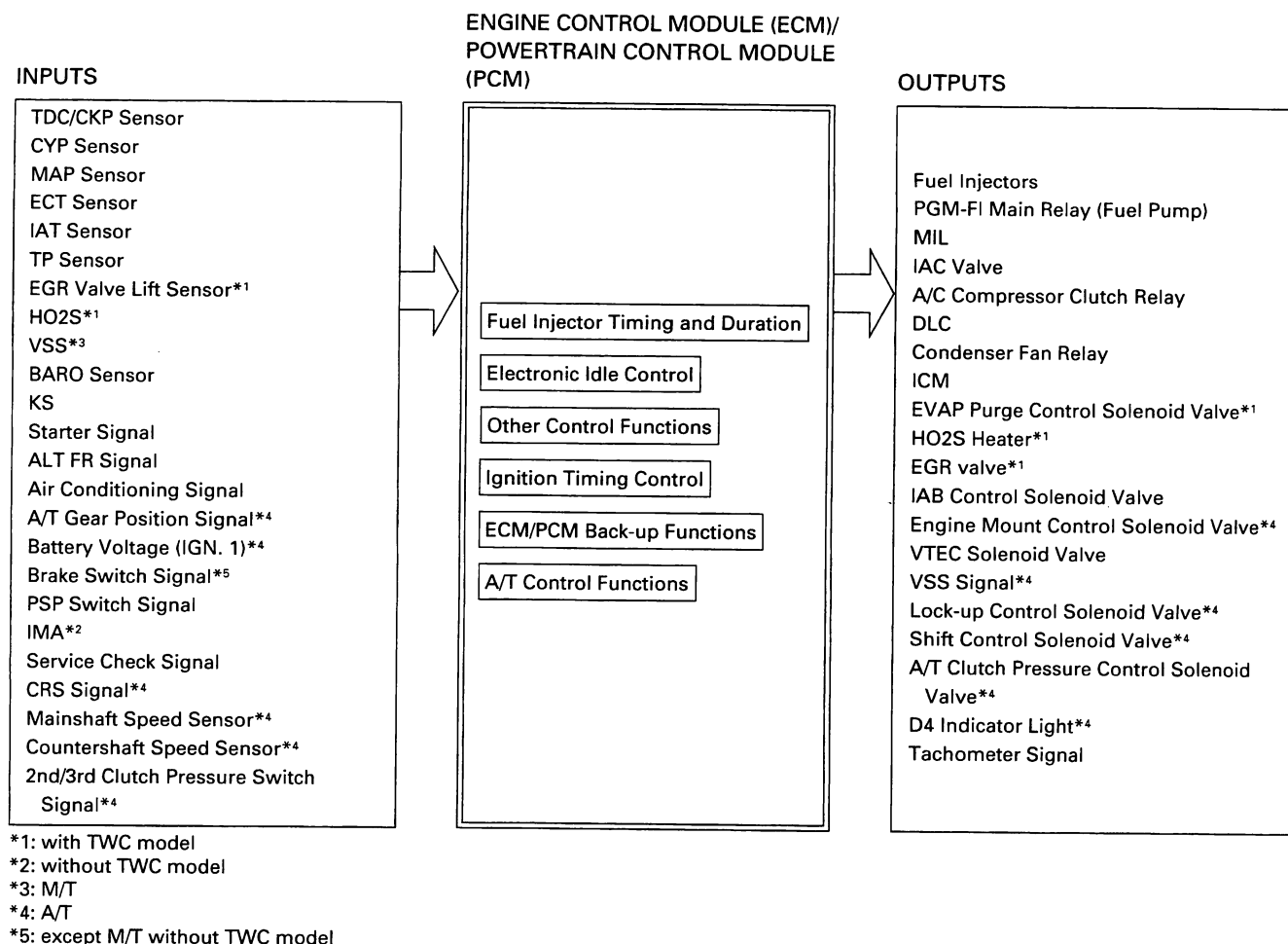
*4: A/T

*5: A/T with TWC model

- If codes other than those listed above are indicated, verify the code. If the code indicated is not listed above, replace the ECM/PCM (see page 11-B-14 for immobilizer information).
- The MIL may come on, indicating a system problem when, in fact, there is a poor or intermittent electrical connection. First, check the electrical connections, clean or repair connections if necessary.

PGM-FI System

System Description



PGM-FI System

The PGM-FI system on this model is a sequential multiport fuel injection system.

Fuel Injector Timing and Duration

The ECM/PCM contains memories for the basic discharge durations at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

Idle Air Control

When the engine is cold, the A/C compressor is on, the transmission is in gear*⁴, the brake pedal is depressed*⁵, the P/S load is high, or the alternator is charging, the ECM/PCM controls current to the IAC Valve to maintain the correct idle speed.

Ignition Timing Control

- The ECM/PCM contains memories for basic ignition timing at various engine speeds and manifold air flow rates. Ignition timing is also adjusted for engine coolant temperature.
- A knock control system is also used. When detonation is detected by a knock sensor (KS), the ignition timing is retarded.



Other Control Functions

1. **Starting Control**
When the engine is started, the ECM/PCM provides a rich mixture by increasing fuel injector duration.
2. **Fuel Pump Control**
 - When the ignition switch is initially turned ON (II), the ECM/PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pump for two seconds to pressurize the fuel system.
 - When the engine is running, the ECM/PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pump.
 - When the engine is not running and the ignition is ON (II), the ECM/PCM cuts ground to the PGM-FI main relay which cuts current to the fuel pump.
3. **Fuel Cut-off Control**
 - During deceleration with the throttle valve closed, current to the fuel injectors is cut off to improve fuel economy at speeds over 1,100 rpm (min^{-1}).
 - Fuel cut-off action also takes place when engine speed exceeds, 6,500 rpm (min^{-1}), regardless of the position of the throttle valve, to protect the engine from over-revving.
4. **A/C Compressor Clutch Relay**
When the ECM/PCM receives a demand for cooling from the air conditioning system, it delays the compressor from being energized, and enriches the mixture to assure smooth transition to the A/C mode.
5. **Intake Air Bypass (IAB) Control Solenoid Valve**
When the engine rpm is below 3,900 rpm (min^{-1}), the IAB control solenoid valve is activated by a signal from the ECM/PCM, intake air flows through the long intake path, then high torque is delivered. At speeds higher than 3,900 rpm (min^{-1}), the solenoid valve is deactivated by the ECM/PCM, and intake air flows through the short intake path in order to reduce the resistance in airflow.
6. **Evaporative Emission (EVAP) Purge Control Solenoid Valve*¹**
When the engine coolant temperature is below 65°C (149°F), the ECM/PCM supplies a ground to the EVAP purge control solenoid valve which cuts vacuum to the EVAP purge control canister.
7. **Exhaust Gas Recirculation (EGR) Control Solenoid Valve*¹**
When the EGR is required for control of oxides of nitrogen (NOx) emissions, the ECM/PCM controls the EGR valve.

ECM/PCM Fail-safe/Back-up Functions

1. **Fail-safe Function**
When an abnormality occurs in a signal from a sensor, the ECM/PCM ignores that signal and assumes a pre-programmed value for that sensor that allows the engine to continue to run.
2. **Back-up Function**
When an abnormality occurs in the ECM/PCM itself, the fuel injectors are controlled by a back-up circuit independent of the system in order to permit minimal driving.
3. **Self-diagnosis Function [Malfunction Indicator Lamp (MIL)]**
When an abnormality occurs in a signal from a sensor, the ECM/PCM supplies ground for the MIL and stores the code in erasable memory. When the ignition is initially turned ON (II), the ECM/PCM supplies ground for the MIL for two seconds to check the MIL bulb condition.
4. **Two Driving Cycle Detection Method**
To prevent false indications, the “two driving cycle detection method” is used for the EGR system and other self-diagnostic functions. When an abnormality occurs, the ECM/PCM stores it in its memory. When the same abnormality recurs after switch is turned OFF and ON (II) again, the ECM/PCM informs the driver by turning on the MIL.

PGM-FI System

Engine Control Module/Powertrain Control Module (ECM/PCM)

The Malfunction Indicator Lamp (MIL) never comes on (even for two seconds) after ignition is turned ON (II).

NOTE:

- If this symptom is intermittent, check for:
 - A loose ACGS (15 A) fuse in the under-hood fuse/relay box
 - A loose No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse in the driver's under-dash fuse/relay box
 - A loose No. 1 FUEL PUMP fuse (15 A) in the driver's under-dash fuse/relay box
 - An intermittent short in the wire between the ECM/PCM (A18) and the gauge assembly
 - An intermittent short in the wire between the ECM/PCM (C19), the MAP sensor and/or Countershaft Speedsensor
 - An intermittent short in the wire between the ECM/PCM (C28), the TP sensor, Mainshaft Speed sensor, the EGR valve lift sensor (with TWC model engine) and/or IMA (without TWC model)
 - PGM-FI main relay

(KG, KE, KS, KR models)

Check the inertia switch:

1. Press the inertia switch button.
2. Turn the ignition switch ON (II).

Does the MIL come on for two seconds after ignition switch turned ON (II)?

YES

Intermittent failure, system is OK at this time.

NO

Check the inertia switch:

1. Disconnect the inertia switch 3P connector.
2. Connect the inertia switch 3P connector terminals No. 1 and No. 3 with a jumper wire.

Does the MIL come on for two seconds after ignition switch turned ON (II)?

YES

Replace the inertia switch.

NO

Is the low oil pressure light on?

NO

- Repair short in the wire between No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse and gauge assembly.
- Replace No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse.

YES

Check the engine starting:
Try to start the engine.

Does the engine start?

YES

Check the MIL:

1. Turn the ignition switch OFF.
2. Connect the ECM/PCM connector terminal A18 to body ground.
3. Turn the ignition switch ON (II).

Is the MIL on?

NO

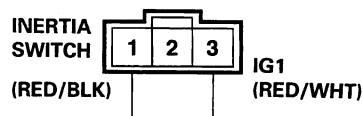
- Replace the MIL bulb.
- Repair open wire between the ECM/PCM (A18) and the gauge assembly.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

(To page 11-B-27)

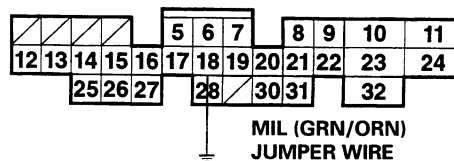
INERTIA SWITCH 3P CONNECTOR



JUMPER WIRE

Terminal side of male terminals

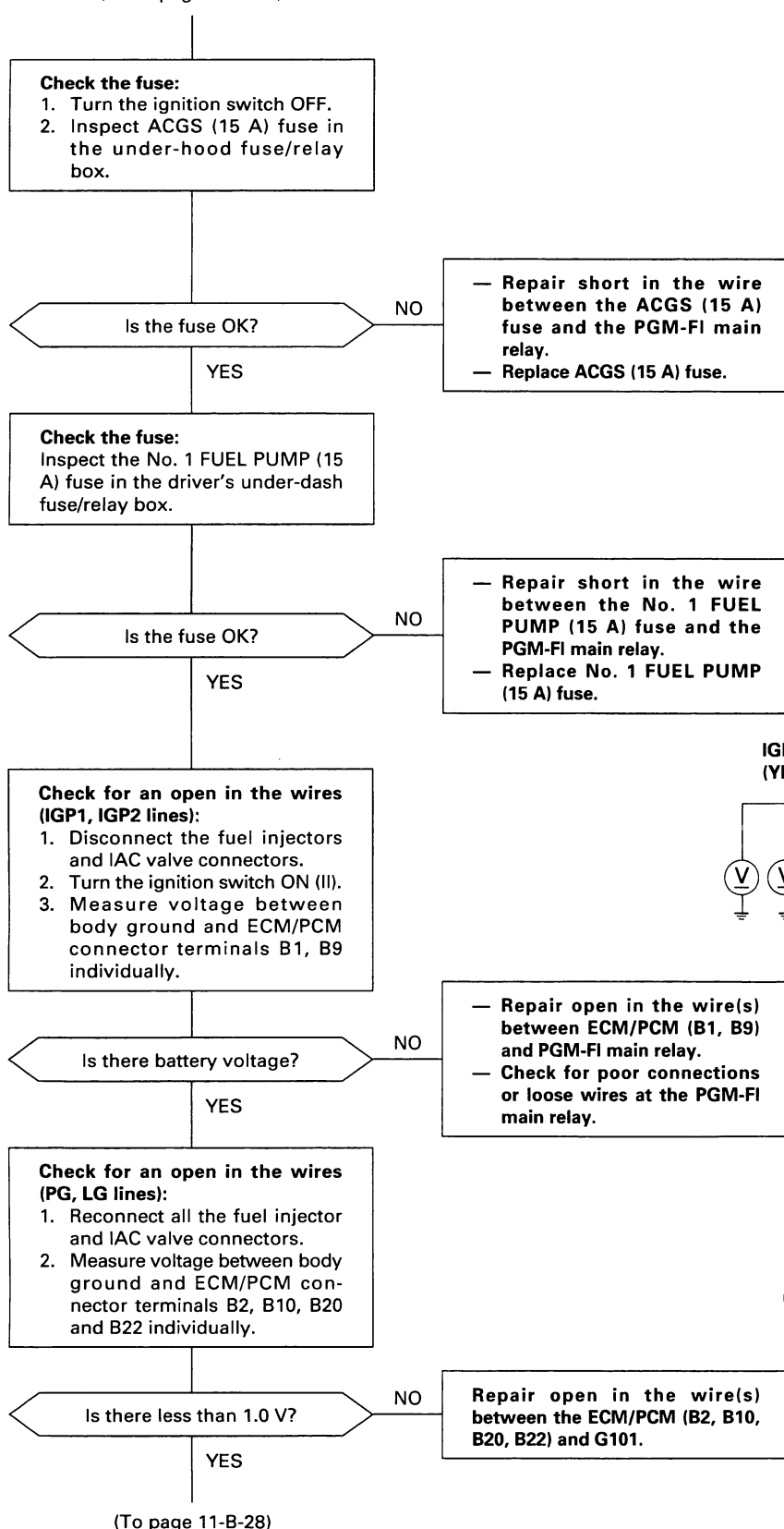
ECM/PCM CONNECTOR A (32P)



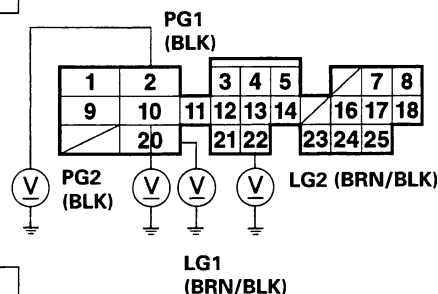
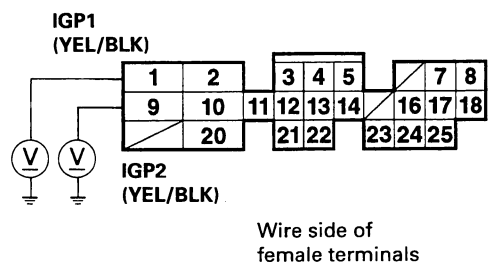
Wire side of female terminals



(From page 11-B-26)



ECM/PCM CONNECTOR B (25P)

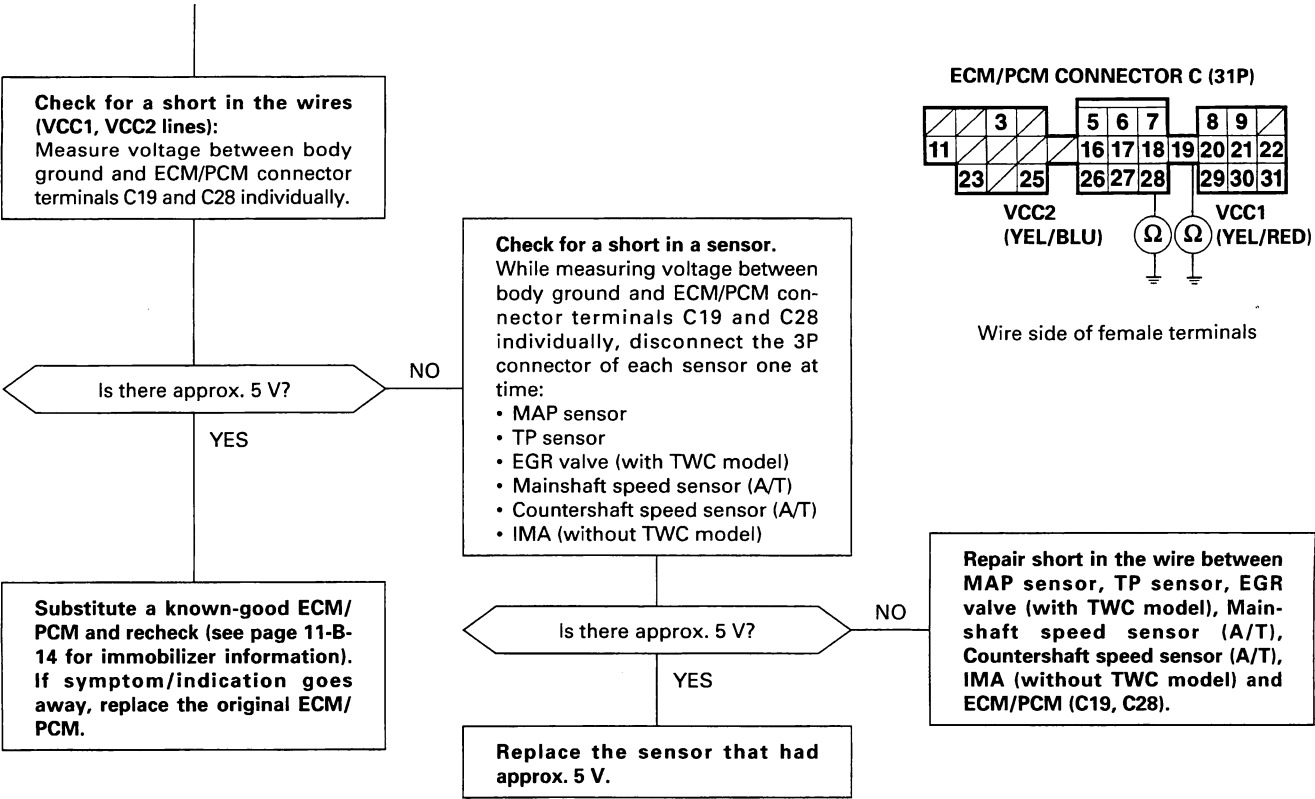


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PGM-FI System

Engine Control Module/Powertrain Control Module (ECM/PCM) (cont'd)

(From page 11-B-27)





The Malfunction Indicator Lamp (MIL) stays on or comes on after two seconds.

NOTE:

- When there is no Diagnostic Trouble Code (DTC) stored, the MIL will stay on if the SCS short connector is connected and the ignition switch is ON (II).
- If this symptom is intermittent, check for:
 - An intermittent short in the wire between the ECM/PCM (A10) and the service check connector.
 - An intermittent short in the wire between the ECM/PCM (A18) and the gauge assembly.

Check the DTC by MIL indication:
 1. Turn the ignition switch OFF.
 2. Connect the SCS short connector to the service check connector.
 3. Turn the ignition switch ON (II).

Does the MIL indicate any DTC?

YES

Go to troubleshooting procedures (see page 11-B-13).

NO

Check the engine starting:
 1. Remove the SCS short connector from the service check connector.
 2. Try to start the engine.

Does the engine start?

NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

YES

Check for a short in the wire (SCS line):
 1. Turn the ignition switch OFF and turn the ignition switch ON (II).
 2. Measure voltage between body ground and the ECM/PCM connector terminal A10.

Is there battery voltage?

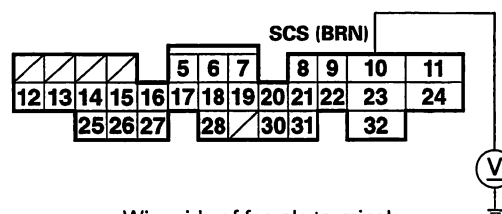
NO

Repair short to body ground in the wire between ECM/PCM (A10) and service check connector.

YES

(To page 11-B-30)

ECM/PCM CONNECTOR A (32P)

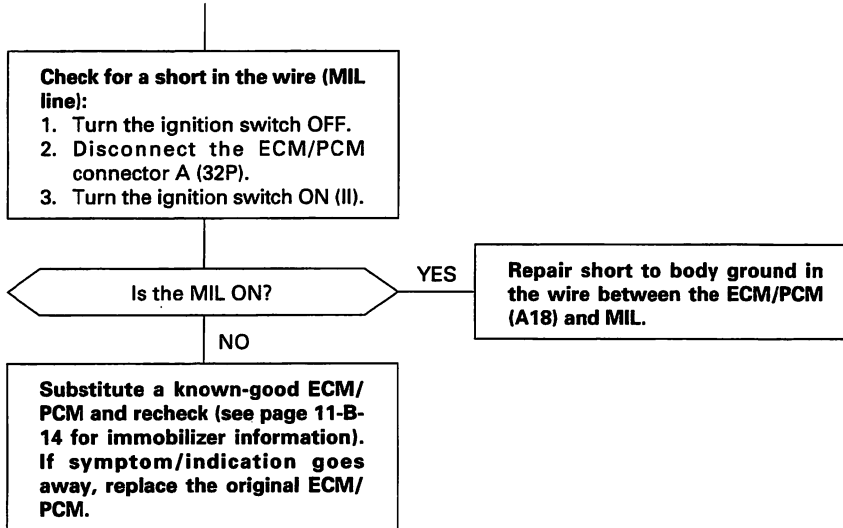


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PGM-FI System

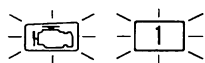
Engine Control Module/Powertrain Control Module (ECM/PCM) (cont'd)

(From page 11-B-29)



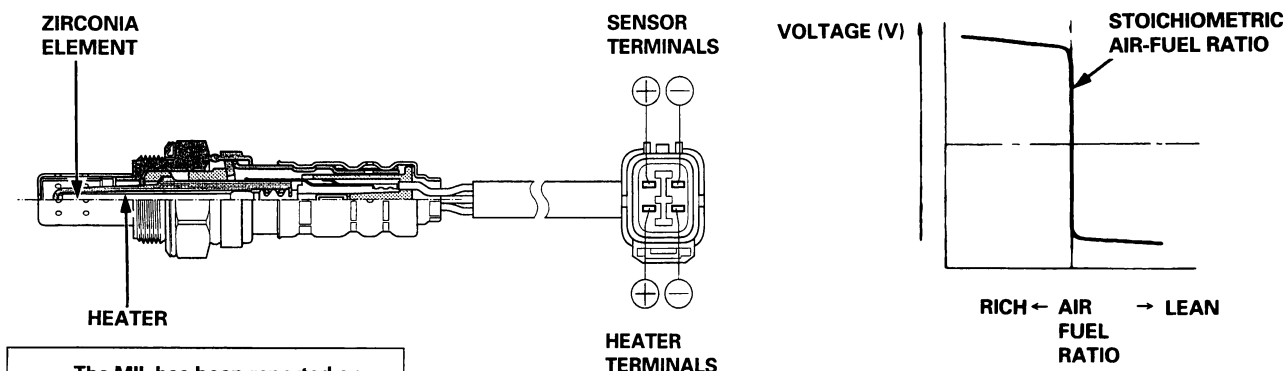


Heated Oxygen Sensor (HO2S) (with TWC model)



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 1: A problem in the Heated Oxygen Sensor (HO2S) circuit.

The Heated Oxygen Sensor (HO2S) detects the oxygen content in the exhaust gas and signals the ECM/PCM. In operation, the ECM receives the signals from the sensor and varies the duration during which fuel is injected. To stabilize the sensor's output, the sensor has an internal heater. The HO2S is installed in the exhaust pipe A.



- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 1 is indicated.

Check the fuel pressure:
Inspect fuel pressure (see page 11-A-101).

Is it normal?

NO

Go to page 11-B-66 Fuel Supply System.

YES

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle for at least one minute before test-driving.
3. Test-drive under following conditions.
 - A/T in **2** position (M/T in 4th gear)
 - Accelerate using wide open throttle for at least five seconds, then decelerate for at least five seconds with the throttle completely closed.

Is the MIL on and does it indicate code 1?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the Primary HO2S and the ECM/PCM.

YES

(To page 11-B-32)

(cont'd)

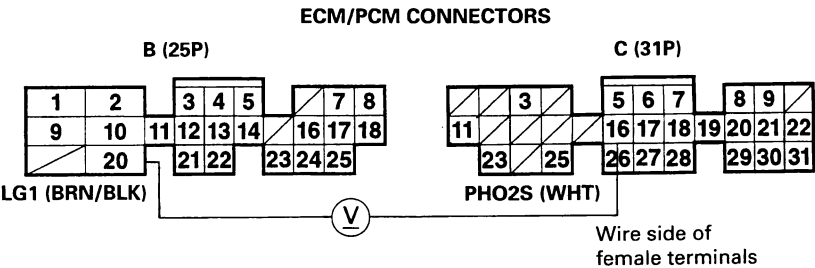
PGM-FI System

Heated Oxygen Sensor (HO2S) (with TWC model) (cont'd)

(From page 11-B-31)

Check the ECM/PCM input voltage:

1. Start the engine. Hold the engine at 3,000 rpm (min⁻¹) with no load (in Park or neutral) until the radiator fan comes on, then let it idle for at least one minute before test-driving.
2. Measure voltage between ECM/PCM connector terminals B20 and C16.
3. Open the throttle wide open, then quickly release it.



Is the voltage above 0.6 V at wide open throttle to 4,500 rpm (min⁻¹) and below 0.4 V when the throttle is quickly released from 4,500 rpm (min⁻¹)?

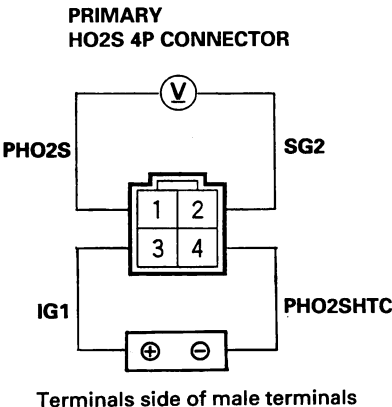
YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

NO

Check the Primary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the 4P connector from the Primary HO2S.
3. At the Primary HO2S harness side, connect the battery positive terminal to terminal No. 3 and battery negative terminal to terminal No. 4.
4. Start the engine.
5. After two minutes, measure voltage between Primary HO2S 4P connector terminals No. 1 and No. 2.



Is the voltage above 0.6 V at wide open throttle to 4,500 rpm (min⁻¹) and below 0.4 V when the throttle is quickly released from 4,500 rpm (min⁻¹)?

NO

Replace the Primary HO2S (see page 11-B-60).

YES

Repair open or short in the wire ECM/PCM (C16) and the Primary HO2S.



Manifold Absolute Pressure (MAP) Sensor



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 3: An electrical problem in the Manifold Absolute Pressure (MAP) Sensor circuit.

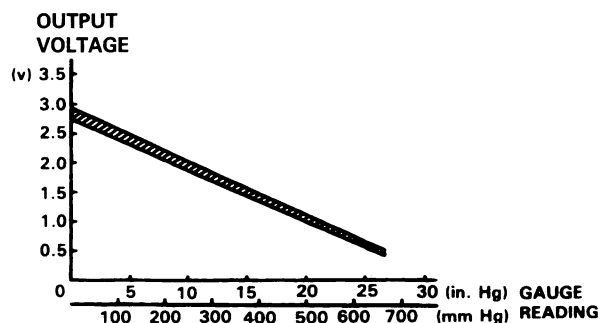
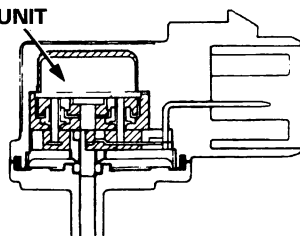
The MAP sensor converts manifold absolute pressure into electrical signals and inputs the ECM/PCM.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 3 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine and allow it to idle.

SENSOR UNIT



Is the MIL on and does it indicate code 3?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the MAP sensor and the ECM/PCM.

YES

Check the ECM/PCM output voltage (VCC1 line):

1. Turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. Measure voltage between ECM/PCM connector terminals C7 and C19.

Is there approx. 5 V?

NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

YES

Check the ECM/PCM output voltage (MAP line):

Measure voltage between ECM/PCM connector terminals C7 and C17.

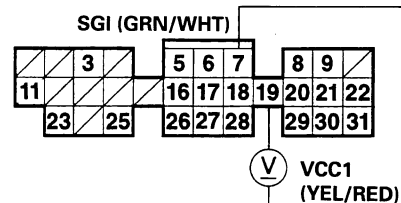
Is there approx. 3 V?

YES

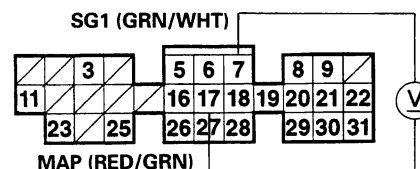
Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

NO

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

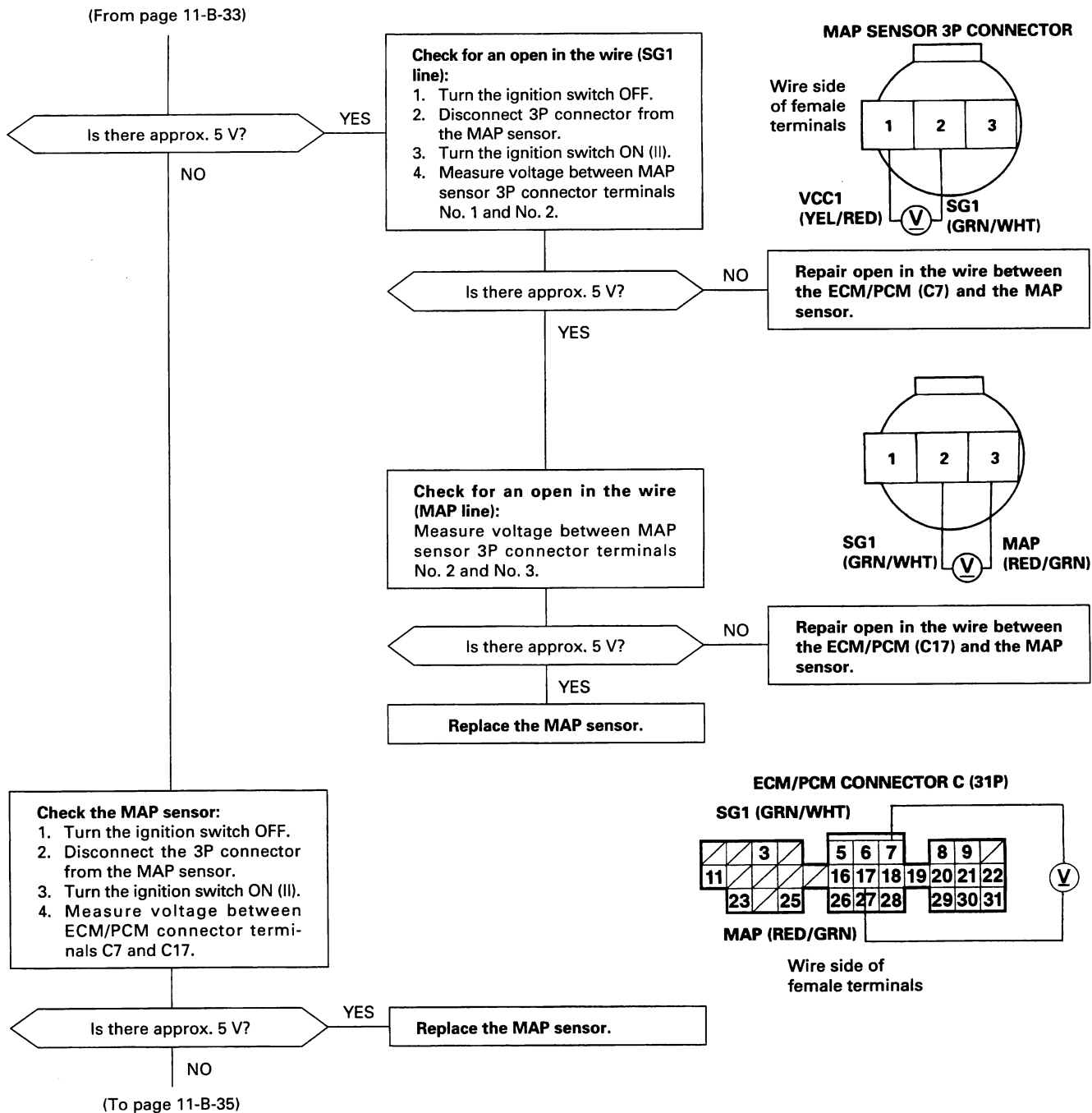


(To page 11-B-34)

(cont'd)

PGM-FI System

Manifold Absolute Pressure (MAP) Sensor (cont'd)





(From page 11-B-34)

Check for an open in the wire (VCC1 line):

Measure voltage between MAP sensor 3P connector terminal No. 1 and body ground.

Is there approx. 5 V?

NO

Repair open in the wire between the ECM/PCM (C19) and the MAP sensor.

YES

Check for a short in the wire (MAP line):

1. Turn the ignition switch OFF.
2. Disconnect ECM/PCM connector C (31P) from the ECM/PCM.
3. Check for continuity between ECM/PCM connector terminal C17 and body ground.

Is there continuity?

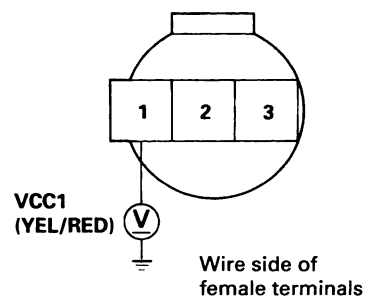
YES

Repair short in the wire between the ECM/PCM (C17) and the MAP sensor.

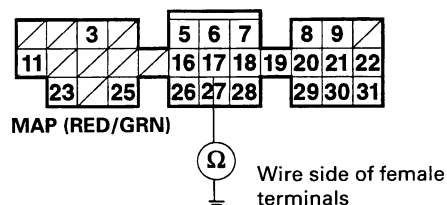
NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

MAP SENSOR 3P CONNECTOR

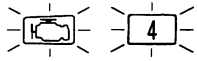


ECM/PCM CONNECTOR C (31P)

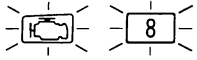


PGM-FI System

CKP/TDC Sensor

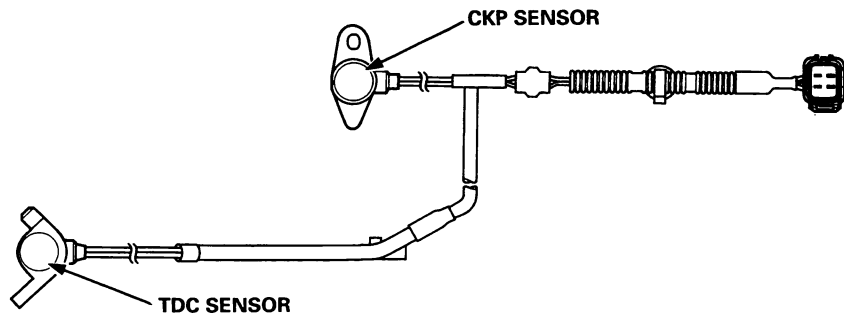


The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 4: A problem in the Crankshaft Position (CKP) Sensor circuit.



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 8: A problem in the Top Dead Center (TDC) Sensor circuit.

The CKP Sensor determines timing for fuel injection and ignition of each cylinder and also detects engine speed. The TDC Sensor determines ignition timing at start-up (cranking) and when crank angle is abnormal.



- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 4 and/or 8 are indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine.

Is the MIL on and does it indicate code 4 and/or 8?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary).
Check for poor connections or loose wires between the CKP/TDC sensor and the ECM/PCM.

YES

Check the sensor resistance:

1. Turn the ignition switch OFF.
2. Disconnect the CKP/TDC sensor 4P connector.
3. Measure resistance between terminals of the indicated sensor.
*see table

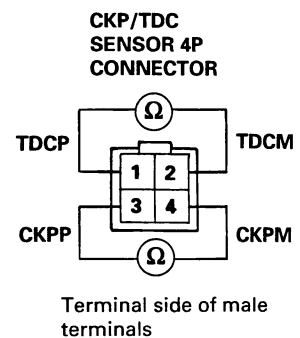
Is there 2,010 – 2,510 Ω ?

NO

Replace the CKP/TDC sensor.

YES

(To page 11-B-37)



*,

SENSOR	DTC	SENSOR TERMINAL	ECM/PCM TERMINAL	WIRE COLOR
CKP	4	3	C8	BLU
		4	C9	WHT
TDC	8	1	C20	GRN
		2	C21	RED

PGM-FI System

Engine Coolant Temperature (ECT) Sensor



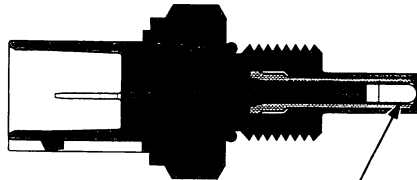
The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 6: A problem in the Engine Coolant Temperature (ECT) Sensor circuit.

The ECT sensor is a temperature dependent resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases as shown below.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 6 is indicated.

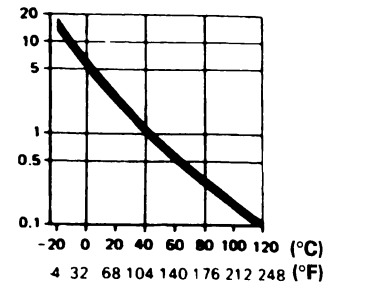
Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Turn the ignition switch ON (II).



THERMISTOR

RESISTANCE
(k Ω)



ENGINE COOLANT TEMPERATURE

Is the MIL on and does it indicate code 6?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the ECT sensor, the ECM/PCM and the climate control unit (with climate control unit model).

YES

Check the sensor resistance:

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Turn the ignition switch OFF.
3. Disconnect the 2P connector from the ECT sensor.
4. Measure resistance between the 2 terminals on the ECT sensor.

Is there 200 – 400 Ω ?

NO

Replace the ECT sensor.

YES

Check the ECM/PCM output voltage (ECT line):

1. Turn the ignition switch ON (II).
2. At the engine harness side, measure voltage between the ECT sensor 2P connector terminal No. 1 and body ground.

Is there approx. 5 V?

YES

NO

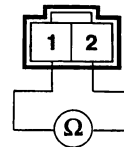


(To page 11-B-39)



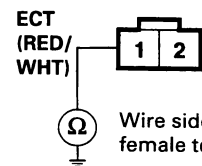
(To page 11-B-39)

ECT SENSOR 2P CONNECTOR



Terminal side of male terminals

ECT SENSOR 2P CONNECTOR



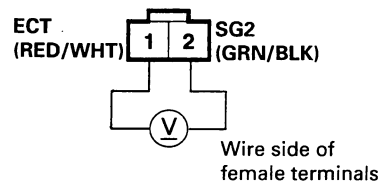
Wire side of female terminals



(From page 11-B-38)

(From page 11-B-38)

ECT SENSOR 2P CONNECTOR



Check for an open in the wire (SG2 line):
Measure voltage between the ECT sensor 2P connector terminals No. 1 and No. 2.

Is there approx. 5 V?

NO

Repair open in the wire between the ECM/PCM (C18) and ECT sensor.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

(with climate control unit)

Check for Climate Control Unit circuits:

1. Turn the ignition switch OFF.
2. Disconnect 20P connector from the Climate Control Unit.
3. Turn the ignition switch ON (II).
4. At the engine harness side, measure voltage between the ECT sensor 2P connector terminal No. 1 and body ground.

Is there approx. 5 V?

YES

Replace the Climate Control Unit.

NO

Check for an open in the wire (ECT line):
Measure voltage between ECM/PCM connector terminal C26 and body ground.

Is there approx. 5 V?

YES

Repair open in the wire between the ECM/PCM (C26) and ECT sensor.

NO

Check for a short in the wire (ECT line):
1. Turn the ignition switch OFF.
2. Disconnect ECM/PCM connector C (31P) from the ECM/PCM.
3. Check the continuity between ECM/PCM connector terminal C26 and body ground.

Is there continuity?

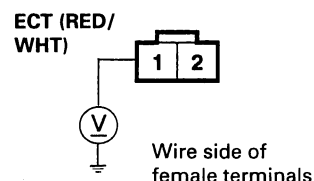
YES

Repair short in the wire between the ECM/PCM (C26) and ECT sensor.

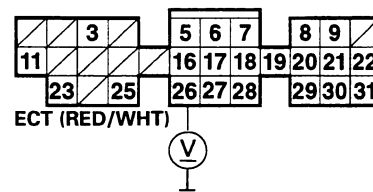
NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

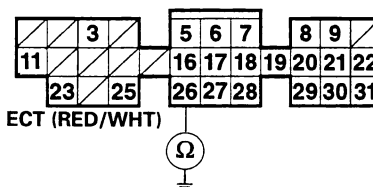
ECT SENSOR 2P CONNECTOR



ECM/PCM CONNECTOR C (31P)

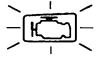


Wire side of female terminals



PGM-FI System

Throttle Position (TP) Sensor



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 7: A problem in the Throttle Position (TP) Sensor circuit.

The TP sensor is a potentiometer. It is connected to the throttle valve shaft. As the throttle position changes, the throttle position sensor varies the voltage signal to the ECM/PCM.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 7 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine.

Is the MIL on and does it indicate code 7?

NO

YES

Check the sensor output voltage:

1. Turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. Measure voltage between ECM/PCM connector terminals C18 and C27.

Is the voltage approx. 0.5 V at full close throttle, and approx. 4.5 V at full open throttle?

NOTE: There should be a smooth transition as the throttle is depressed.

YES

NO

Check the TP circuit:

1. Turn the ignition switch OFF.
2. Disconnect 3P connector from the TP sensor.
3. Turn the ignition switch ON (II).
4. At the engine harness side, measure voltage between the TP sensor 3P connector terminal No. 3 and body ground.

Is there approx. 5 V?

NO

YES

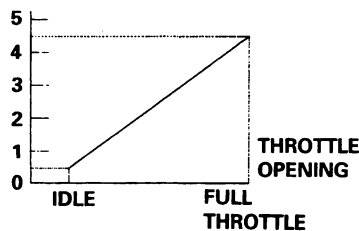


(To page 11-B-41)

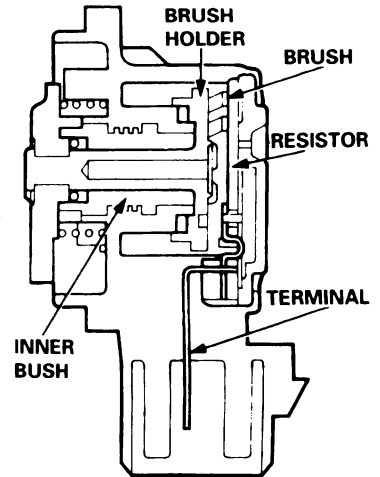


(To page 11-B-41)

OUTPUT VOLTAGE (V)



Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the TP sensor and the ECM/PCM.



ECM/PCM CONNECTOR C (31P)

11	3	5	6	7	8	9	10
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31

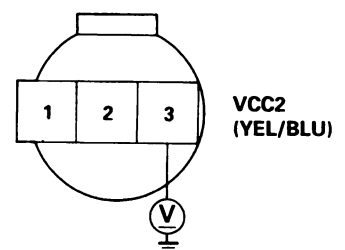
TPS (RED/BLK)

SG2 (GRN/BLK)



Wire side of female terminals

TP SENSOR 3P CONNECTOR



Wire side of female terminals



(From page 11-B-40)



Check for an open in the wire (SG2 line):
At the engine harness side, measure voltage between the TP sensor 3P connector terminals No. 1 and No. 3.

Is there approx. 5 V?

YES

NO

Repair open in the wire between the ECM/PCM (C18) and TP sensor.

Check for a short in the wire (TPS line):
1. Turn the ignition switch OFF.
2. Disconnect 3P connector from the TP sensor.
3. Disconnect ECM/PCM connector C (31P) from the ECM/PCM.
4. Check for continuity between ECM/PCM connector terminal C27 and body ground.

Is there continuity?

NO

YES

Repair short in the wire between the ECM/PCM (C27) and TP sensor.

(To page 11-B-42)

(From page 11-B-40)



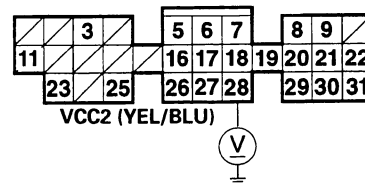
Check for an open in the wire (VCC2 line):
Measure voltage between ECM/PCM connector terminal C28 and body ground.

Is there approx. 5 V?

NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

ECM/PCM CONNECTOR C (31P)



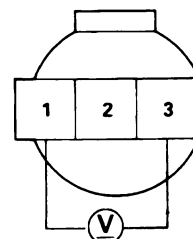
Wire side of female terminals

YES

Repair open in the wire between the ECM/PCM (C28) TP sensor.

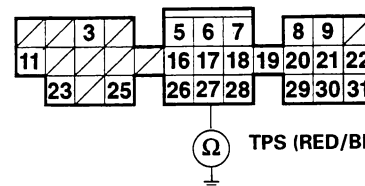
TP SENSOR 3P CONNECTOR

SG2 (GRN/BLK)



VCC2 (YEL/BLU)

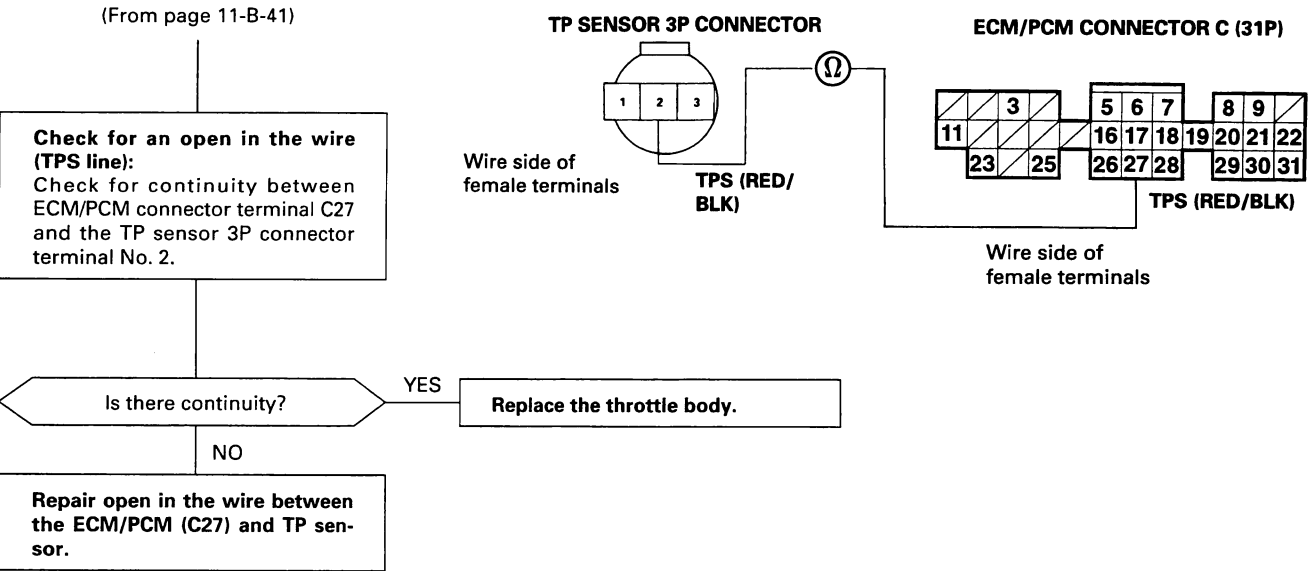
Wire side of female terminals



(cont'd)

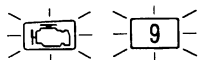
PGM-FI System

Throttle Position (TP) Sensor (cont'd)





CYP Sensor



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 9: A problem in the Cylinder Position (CYP) Sensor circuit.

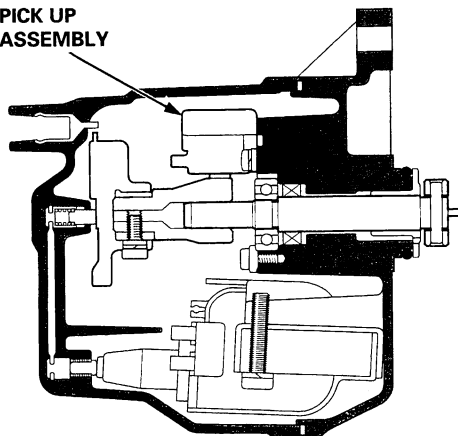
The CYP Sensor detects the position of No. 1 cylinder for sequential fuel injection to each cylinder. The CYP Sensor is built into the distributor.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 9 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine.

PICK UP ASSEMBLY



Is the MIL on and does it indicate code 9?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the distributor and the ECM/PCM.

YES

Check for poor conditions at ignition wires:

Are the wires OK?

NO

Correct as necessary.

YES

Check the ignition wires:

Check the condition of the ignition wires (see section 4).

Are the wires OK?

NO

Replace the ignition wires.

YES

Check the sensor resistance:

1. Turn the ignition switch OFF.
2. Disconnect the distributor 4P connector.
3. Measure resistance between the distributor 4P connector terminals No. 3 and No. 4.

Is there 800 – 1,500 Ω ?

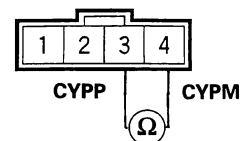
NO

Replace the distributor ignition housing (see section 4).

YES

(To page 11-B-44)

DISTRIBUTOR 4P CONNECTOR



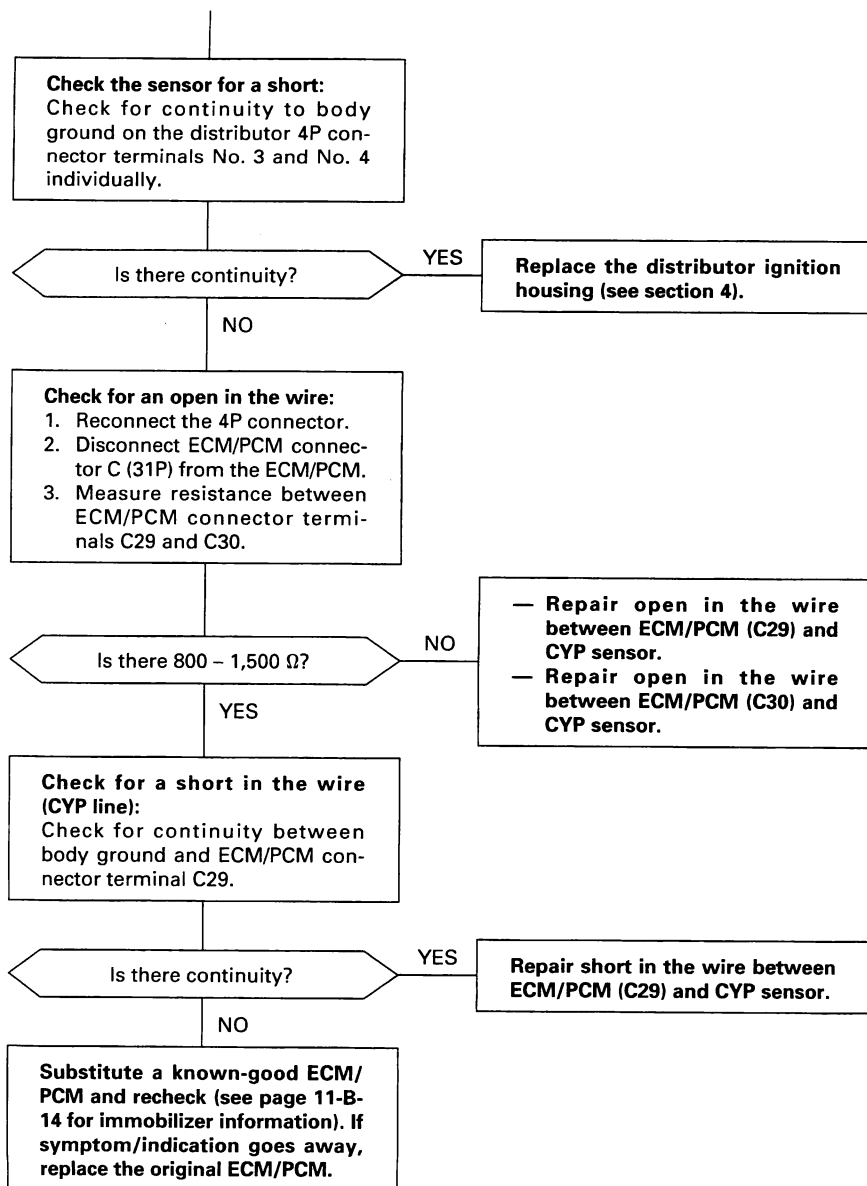
Terminal side of male terminals

(cont'd)

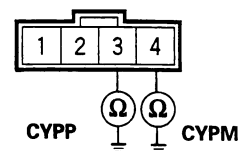
PGM-FI System

CYP Sensor (cont'd)

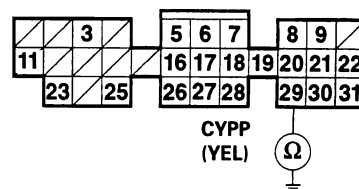
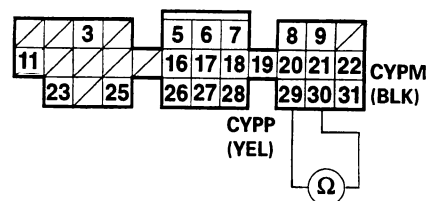
(From page 11-B-43)



**DISTRIBUTOR
4P CONNECTOR**

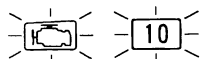


ECM/PCM CONNECTOR C (31P)





Intake Air Temperature (IAT) Sensor



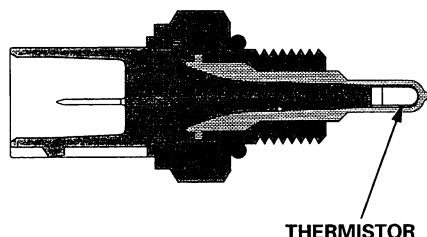
The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 10: A problem in the Intake Air Temperature (IAT) Sensor circuit.

The IAT sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the air temperature increases as shown below.

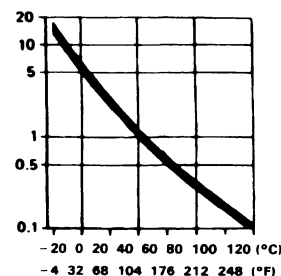
- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 10 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Turn the ignition switch ON (II).



RESISTANCE (k Ω)



INTAKE AIR TEMPERATURE

Is the MIL on and does it indicate code 10?

NO

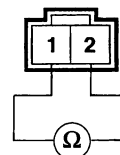
Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the IAT sensor and the ECM/PCM.

YES

Check the sensor resistance:

1. Turn the ignition switch OFF.
2. Disconnect 2P connector from the IAT sensor.
3. Measure resistance between the 2 terminals on the IAT sensor.

IAT SENSOR 2P CONNECTOR



Terminal side of male terminals

Is there 0.4 – 4.0 k Ω ?

NO

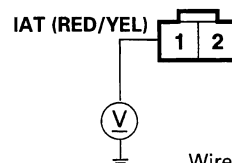
Replace the IAT sensor.

YES

Check the ECM/PCM output voltage (IAT line):

1. Turn the ignition switch ON (II).
2. At the main wire harness side, measure voltage between IAT sensor 2P connector terminal No. 1 and body ground.

IAT SENSOR 2P CONNECTOR



Wire side of female terminals

Is there approx. 5 V?

YES

NO



(To page 11-B-46)



(To page 11-B-46)

(cont'd)

PGM-FI System

Intake Air Temperature (IAT) Sensor (cont'd)

(From page 11-B-45)



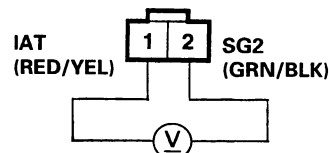
Check for an open in the wire (IAT line):
Measure voltage between ECM/PCM connector terminal C25 and body ground.

(From page 11-B-45)



Check for an open in the wire (SG2 line):
Measure voltage between the IAT sensor 2P connector terminal No. 1 and No. 2.

IAT SENSOR 2P CONNECTOR



Wire side of female terminals

Is there approx. 5 V?

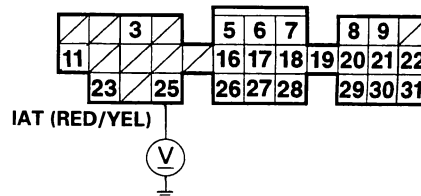
NO

Repair open in the wire between the ECM/PCM (C18) and IAT sensor.

YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is there approx. 5 V?

YES

Repair open in the wire between the ECM/PCM (C25) and IAT sensor.

NO

Check for a short in the wire (IAT line):

1. Turn the ignition switch OFF.
2. Disconnect ECM/PCM connector C (31P) from the ECM/PCM.
3. Check the continuity between ECM/PCM connector terminal C25 and body ground.

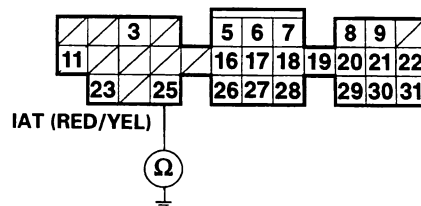
Is there continuity?

YES

Repair short in the wire between the ECM/PCM (C25) and IAT sensor.

NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.





Idle Mixture Adjuster (IMA) (without TWC model)



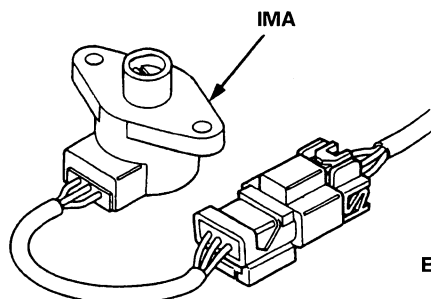
Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 11: A problem in the Idle Mixture Adjuster (IMA) circuit.

The Idle Mixture Adjuster (IMA) is selected resistance device used to control idle mixture.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 11 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Turn the ignition switch ON (II).



Is the MIL on and does it indicate code 11?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the IMA and the ECM/PCM.

YES

Check the ECM output voltage (VCC2 line):

1. Turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. Measure voltage between ECM/PCM connector terminals C18 and C28.

Is there approx. 5 V?

NO

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

YES

Check the ECM/PCM output voltage (IMA line):

Measure voltage between ECM/PCM connector terminals A30 and C18.

Is there approx. 0.5 – 4.5 V?

YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

NO

Is there approx. 5 V?

YES

NO

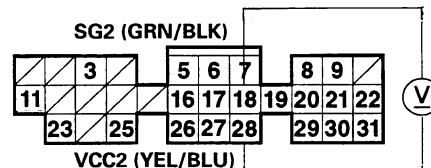


(To page 11-B-48)

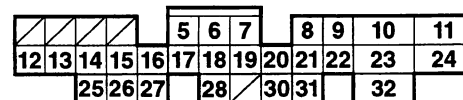


(To page 11-B-48)

ECM/PCM CONNECTOR C (31P)

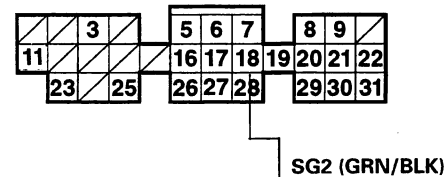


ECM/PCM CONNECTORS A (32P)



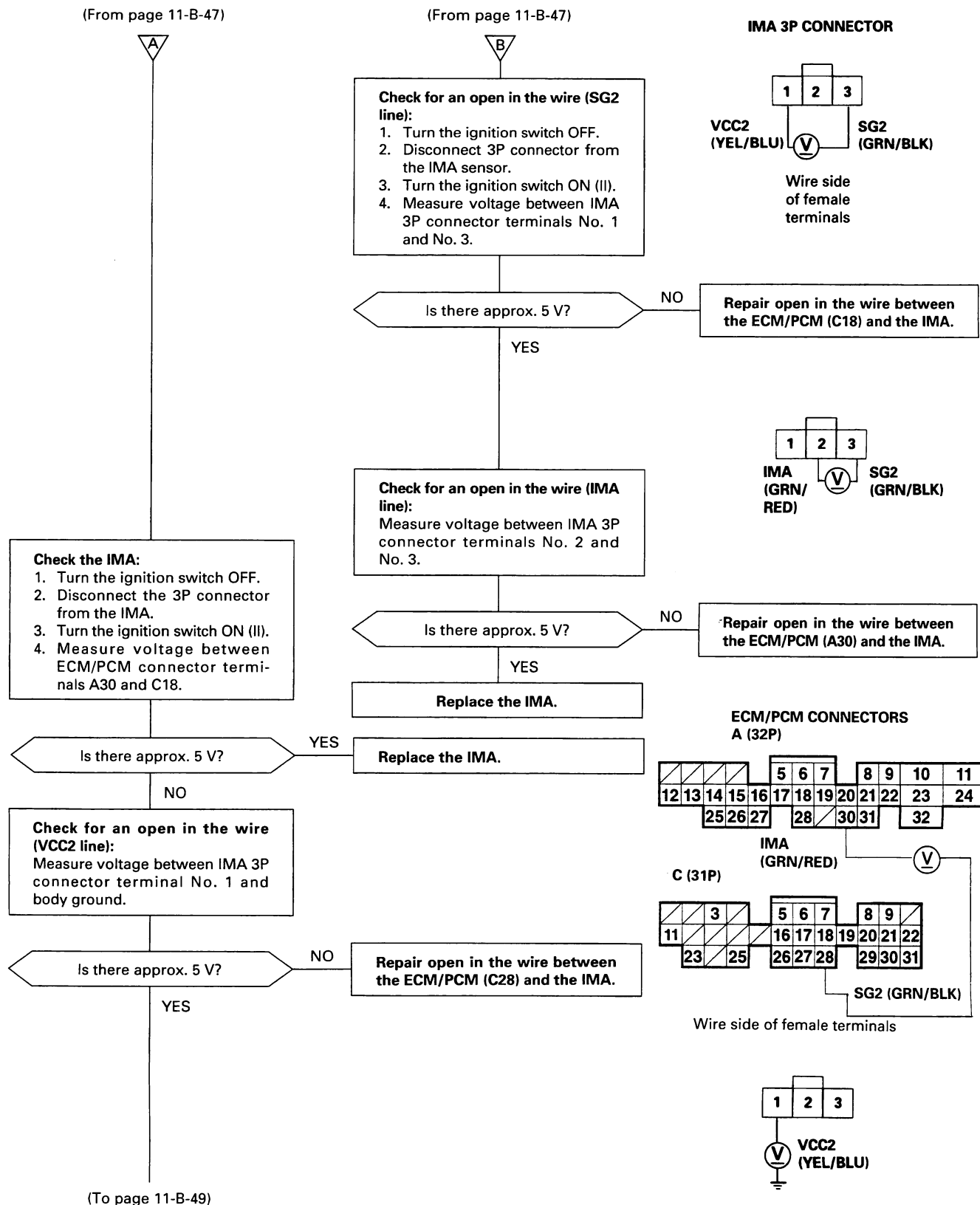
IMA (GRN/RED)

C (31P)



(cont'd)

Idle Mixture Adjuster (IMA) (without TWC model) (cont'd)



PGM-FI System

Barometric Pressure (BARO) Sensor



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 13: A problem in the Barometric Pressure (BARO) Sensor.

The BARO Sensor is built into the ECM/PCM.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 13 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Turn the ignition switch ON (II).

Is the MIL on and does it indicate code 13?

NO

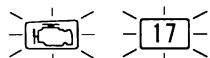
Intermittent failure, system is OK at this time (test-drive may be necessary).

YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.



Vehicle Speed Sensor (VSS) (M/T)



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 17: A problem in the Vehicle Speed Sensor (VSS) circuit.

The VSS generates a pulsing signal when the front wheels turn.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 17 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-B-14).
2. Test-drive transmission in 2nd gear, accelerate to 4,000 rpm (min^{-1}), then decelerate to 1,500 rpm (min^{-1}) with throttle fully closed for at least 5 seconds.

Is the MIL on and does it indicate code 17?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the VSS, the ECM.

YES

Check the ECM input voltage:

1. Turn the ignition switch OFF.
2. Block rear wheels and set the parking brake. Jack up the front of the car and support with safety stands.
3. Turn the ignition switch ON (II).
4. Block the right front wheel and slowly rotate left front wheel and measure voltage between ECM connector terminal B20 and C23.

Does voltage pulse 0 V and approx. 5 V or battery voltage?

YES

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.

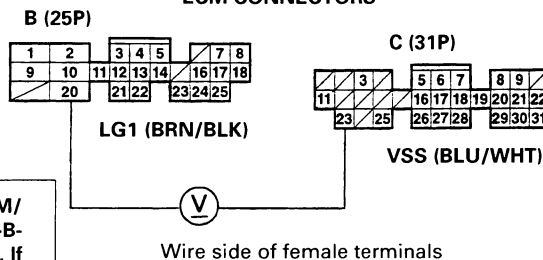
NO

(To page 11-B-52)

⚠ WARNING

Make sure lifts, jacks and safety stands are placed properly (see section 1).

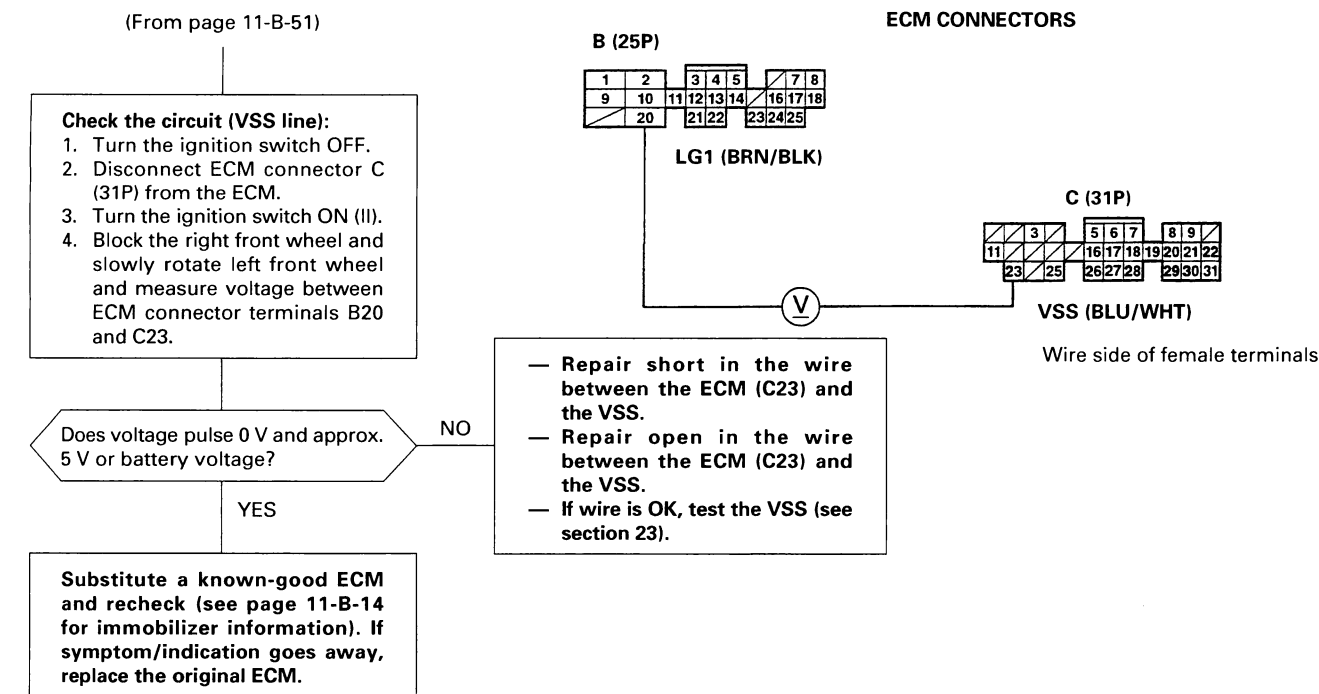
ECM CONNECTORS



(cont'd)

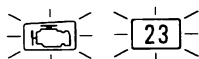
PGM-FI System

Vehicle Speed Sensor (VSS) (M/T) (cont'd)





Knock Sensor (KS)



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 23: A problem in the Knock Sensor (KS) circuit.

A knock control system was adopted which sets the ideal ignition timing for the octane number of the gasoline used.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 23 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Hold engine at 3,000 – 4,000 rpm (min^{-1}) for 10 seconds A/T in **N** or **P** position, M/T in neutral.

Is the MIL on and does it indicate code 23?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the KS and the ECM/PCM.

YES

Check for a short in the wire (KS line):

1. Turn the ignition switch OFF.
2. Disconnect the KS connector.
3. Disconnect the ECM/PCM connector C (31P).
4. Check for continuity between ECM/PCM connector terminal C3 and body ground.

Is there continuity?

YES

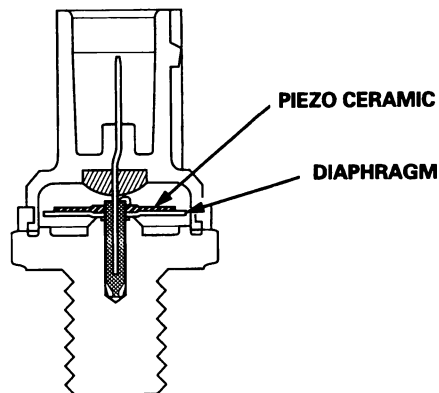
Repair short in the wire between ECM/PCM (C3) and KS.

NO

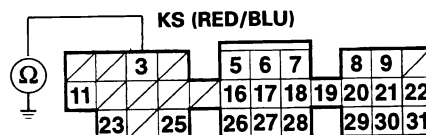
Check for an open in the wire (KS line):

Check for continuity between ECM/PCM connector terminal C3 and the KS 1P connector terminal No. 1.

(To page 11-B-54)

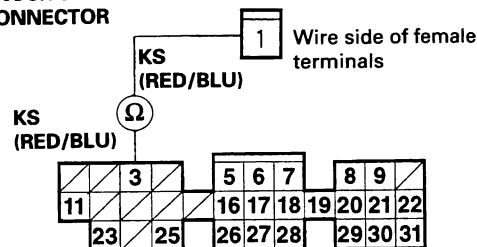


ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

KNOCK SENSOR 1P CONNECTOR

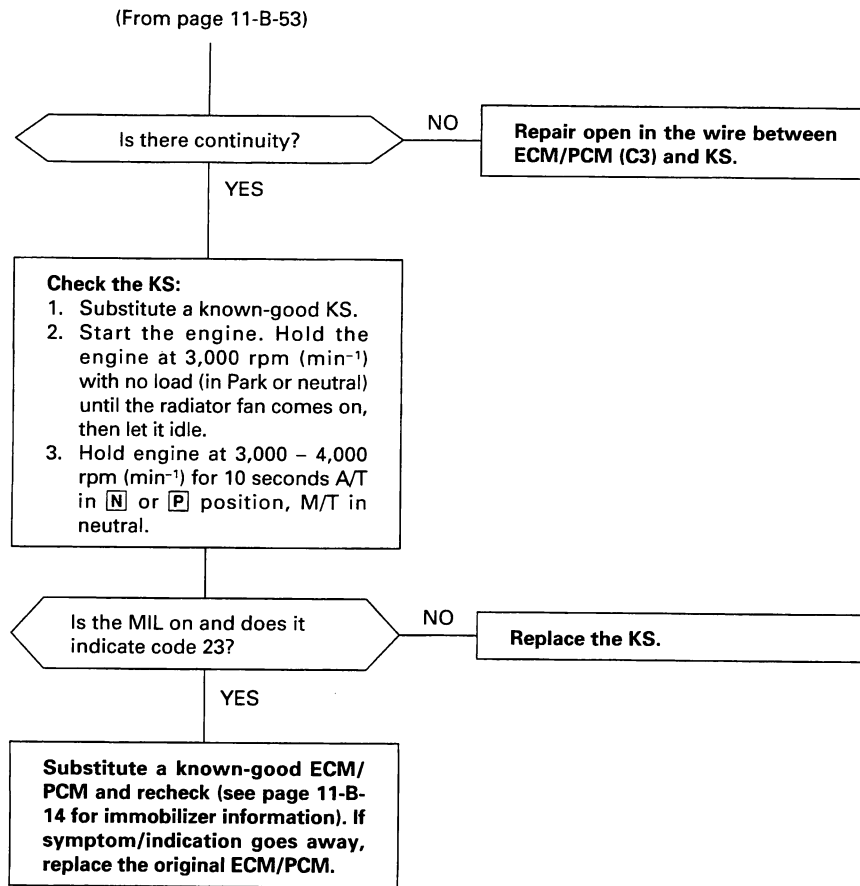


Wire side of female terminals

(cont'd)

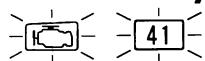
PGM-FI System

Knock Sensor (KS) (cont'd)

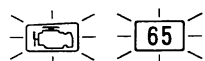




Heated Oxygen Sensor (HO2S) Heater (with TWC model)



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 41: A problem in the Primary Heated Oxygen Sensor (PHO2S) Heater circuit.



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 41: A problem in the Secondary Heated Oxygen Sensor (SHO2S) Heater circuit (A/T model).

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 41, and/or 65 are indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine.

Is the MIL on and does it indicate code 41 or 65?

NO

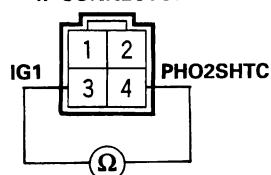
Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the Primary HO2S, Secondary HO2S and the ECM/PCM.

YES

Check for an open or short in the HO2S:

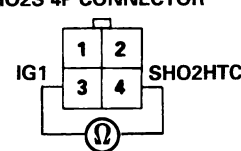
1. Turn the ignition switch OFF.
2. Disconnect the HO2S (Primary or Secondary*) 4P connector.
3. At the HO2S side, measure resistance between the HO2S 4P connector terminals No. 3 and No. 4.

PRIMARY HO2S 4P CONNECTOR



Terminal side of male terminals

SECONDARY HO2S 4P CONNECTOR*



Terminal side of female terminals

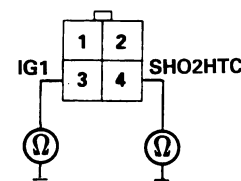
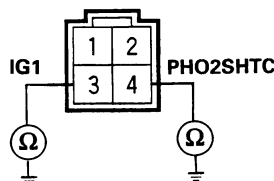
Is there approx. 3.3 Ω at 20°C (68°F).

NO

Replace the HO2S (Primary or Secondary*) (see page 11-B-60).

YES

Check for continuity between body ground and the HO2S 4P connector terminals No. 3 and No. 4 individually.



Is there continuity?

YES

Replace the HO2S (Primary or Secondary*) (see page 11-B-60).

NO

(To page 11-B-56)

(cont'd)

*: CODE 65

PGM-FI System

Heated Oxygen Sensor (HO2S) Heater (With TWC model) (cont'd)

(From page 11-B-55)

Check for an open or short in the wires (PHO2SHTC, SHO2HTC* line):
 1. Turn the ignition switch ON (II).
 2. Measure voltage between the HO2S 4P connector terminals No. 3 and No. 4.

Is there battery voltage?

NO

YES

Check for an open in the wires (IG1 line):
 Measure voltage between body ground and the HO2S 4P connector terminal No. 3 (secondary: No. 4).

Is there battery voltage?

YES

NO

Repair open in the wire between HO2S and No. 6 ECU (ECM/PCM) CRUISE CONTROL (15 A) fuse in the driver's under-dash fuse/relay box.

Check for an open in the wires (PHO2SHTC, SHO2SHTC* line):
 1. Turn the ignition switch OFF.
 2. Reconnect the HO2S connector.
 3. Disconnect the ECM/PCM connector A (32P).
 4. Turn the ignition switch ON (II).
 5. Measure voltage between ECM/PCM connector terminals B2 and A20 (B2 and A8)*.

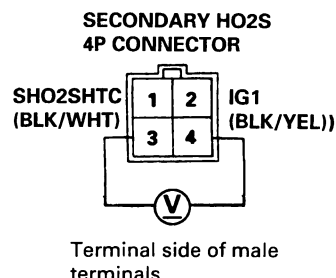
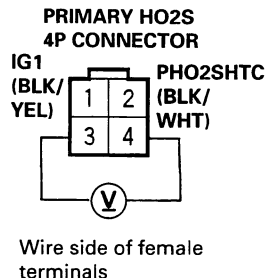
Is there 0.1 V or less?

NO

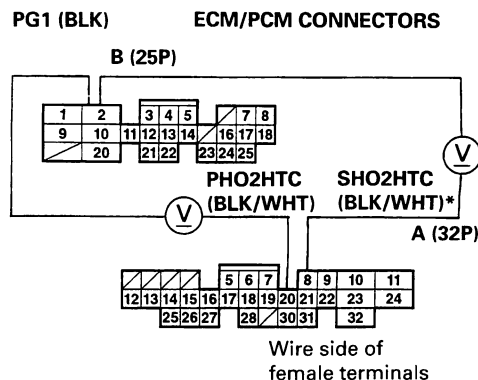
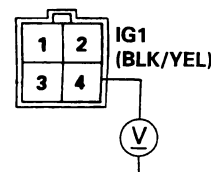
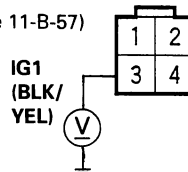
YES

Repair open in the wire between ECM/PCM (A20, A8*) and HO2S.

Substitute a known-good ECM/PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original ECM/PCM.



(To page 11-B-57)



*: DTC 65



(From page 11-B-56)



**Check for a short in the wires
(PHO2SHTC, SHO2SHTC* line):**

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Check for continuity between body ground and ECM/PCM connector terminal A20 (A8)*.

Is there continuity?

YES

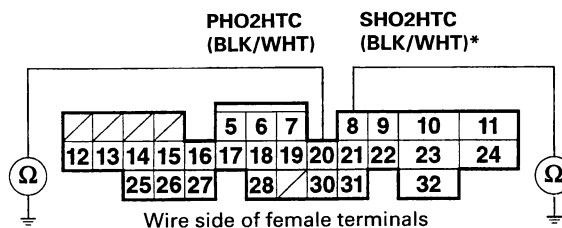
**Repair short in the wire between
ECM/PCM (A20, A8*) and HO2S.**

NO

**Substitute a known-good ECM/
PCM and recheck (see page 11-B-
14 for immobilizer information). If
symptom/indication goes away,
replace the original ECM/PCM.**

*: DTC 65

ECM/PCM CONNECTOR A (32P)



PGM-FI System

Secondary Heated Oxygen Sensor (Secondary HO2S) (With TWC model: A/T)



63

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 63: A problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) circuit.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 63 (Secondary oxygen sensor) is indicated.

Problem verification:

1. Do the PCM Reset Procedure (see page 11-B-14).
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle for at least one minute before test-driving.

Does the MIL blink and does it indicate code 63?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the Secondary HO2S and the PCM.

YES

Check the fuel pressure:

Inspect fuel pressure (see page 11-A-101).

Is it normal?

NO

Go to Page 11-B-66 Fuel Supply System.

YES

Check the PCM input voltage:

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle for at least one minute before test-driving.
2. Measure voltage between PCM connector terminals A23 and C18.
3. Open the throttle wide open, then quickly release it.

Is the voltage above 0.6 V at wide open throttle to 4,500 rpm (min^{-1}) and below 0.4 V when the throttle is quickly released from 4,500 rpm (min^{-1})?

YES

Substitute a known-good PCM and recheck (see page 11-B-14 for immobilizer information). If symptom/indication goes away, replace the original PCM.

NO

(To page 11-B-59)

PCM CONNECTOR

A (32P)

					5	6	7		8	9	10	11	
12	13	14	15	16	17	18	19	20	21	22	23	24	
		25	26	27		28		30	31		32		

SHO2S
(WHT)

C (31P)

		3			5	6	7		8	9		
11					16	17	18	19	20	21	22	
	23		25		26	27	28		29	30	31	

SG2
(GRN/BLK)

Wire side of female terminals



(From page 11-B-58)

Check the Secondary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the 4P connector from the Secondary HO2S.
3. At the Secondary HO2S harness side, connect the battery positive terminal to terminal No. 3 and battery negative terminal to terminal No. 4.
4. Start the engine.
5. After two minutes, measure voltage between Secondary HO2S 4P connector terminals No. 1 and No. 2.

Is the voltage above 0.6 V at wide open throttle to 4,500 rpm (min^{-1}) and below 0.4 V when the throttle is quickly released from 4,500 rpm (min^{-1})?

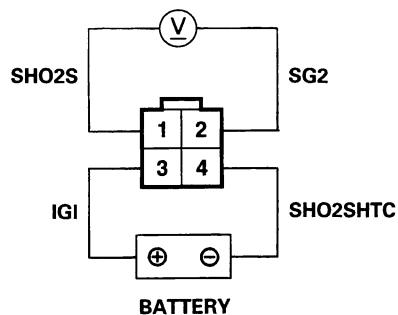
NO

Replace the Secondary HO2S (see page, 11-B-60).

YES

Repair open or short in the wire PCM (A23) and the Secondary HO2S.

**SECONDARY
HO2S 4P CONNECTOR**



Terminal side of female terminals

Heated Oxygen Sensor

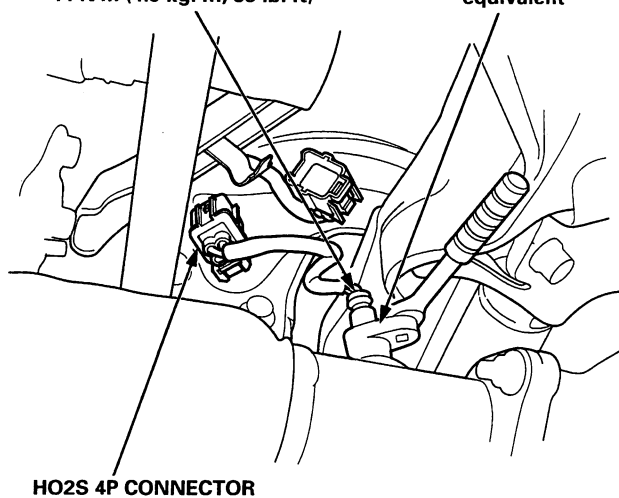
Replacement

1. Disconnect the HO2S 4P connector, then remove the HO2S.

Primary HO2S:

PRIMARY HO2S
44 N·m (4.5 kgf·m, 33 lbf·ft)

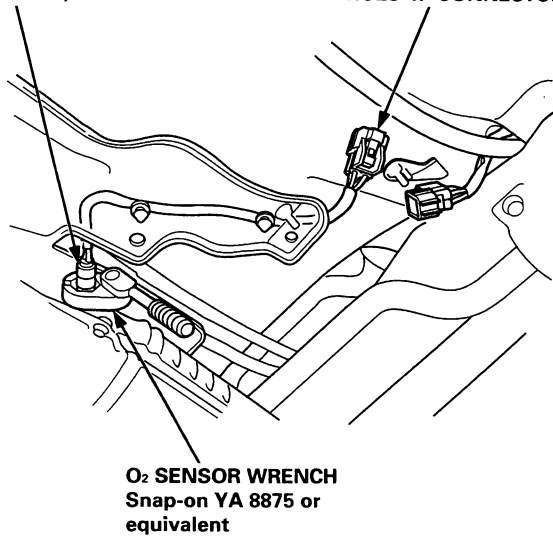
**O₂ SENSOR
WRENCH**
Snap-on
YA 8875 or
equivalent



Secondary HO2S:

SECONDARY HO2S
44 N·m (4.5 kgf·m,
33 lbf·ft)

HO2S 4P CONNECTOR



2. Install the HO2S in reverse order of removal.

Idle Control System



System Troubleshooting Guide

NOTE:

- Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected, starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.
- If the idle speed is out of specification and the Malfunction indicator Lamp (MIL) does not blink Diagnostic Trouble Code (DTC) 14, go to inspection described on page 11-B-61.

PAGE	SUB-SYSTEM	IDLE AIR CONTROL VALVE	AIR CONDITIONING SIGNAL	ALTERNATOR FR SIGNAL	BRAKE SWITCH SIGNAL*2	STARTER SWITCH SIGNAL	POWER STEERING PRESSURE SWITCH SIGNAL	AUTOMATIC TRANSAXLE GEAR POSITION SIGNAL*1	HOSES AND CONNECTIONS
SYMPTOM		11-B-63	11-A-86	11-A-88	11-A-90	11-A-91	11-A-92	Section 14	—
DIFFICULT TO START ENGINE WHEN COLD						①			
WHEN COLD FAST IDLE OUT OF SPEC [1,000 – 2,000 rpm (min ⁻¹)]		①							
ROUGH IDLE		②							①
WHEN WARM ENGINE SPEED TOO HIGH		①					③		②
WHEN WARM RPM TOO LOW	Idle speed is below specified rpm (no load)	①							
	Idle speed does not increase after initial start up.	①							
	On models with automatic transmission, the idle speed drops in gear	②						①	
	Idle speeds drops when air conditioner in ON	②	①						
	Idle speed drops when steering wheel is turning	②					①		
	Idle speed fluctuates with electrical load	②		③					①
FRE-QUENT STALLING	WHILE WARMING UP	①							
	AFTER WARMING UP	①							
FAILS EMISSION TEST									①

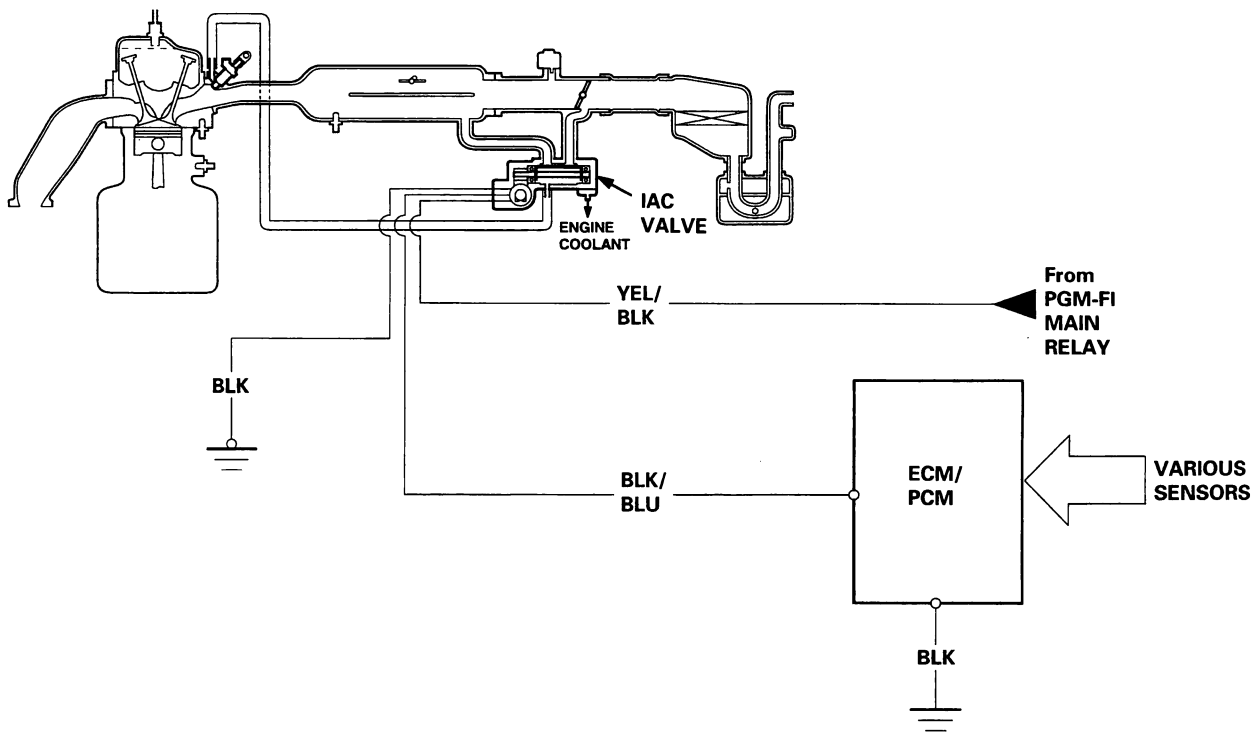
*1: A/T

*2: except M/T with out TWC model

Idle Control System

System Description

The idle speed of the engine is controlled by the Idle Air Control (IAC) Valve. The valve changes the amount of air bypassing into the intake manifold in response to electric current controlled by the ECM/PCM. When the IAC Valve is activated, the valve opens to maintain the proper idle speed.



1. After the engine starts, the IAC valve opens for a certain time. The amount of air is increased to raise the idle speed about 150 – 300 rpm (min^{-1})
2. When the coolant temperature is low, the IAC valve is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the engine coolant temperature.
3. When the idle speed is out of specification and the Malfunction Indicator Lamp (MIL) does not indicate Diagnostic Trouble Code (DTC) 14, check the following items:
 - Air conditioning signal (see page 11-A-86)
 - ALT FR signal (see page 11-A-88)
 - Brake switch signal (see page 11-A-90)
 - Starter switch signal (see page 11-A-91)
 - A/T gear position signal (see section 14)
 - PSP switch signal (see page 11-A-92)
 - Hoses and connections
 - IAC valve and its mounting O-rings
4. If the above items are normal (and the MIL does not indicate DTC 14), after IAC valve replacement, substitute a known-good ECM/PCM and recheck. If symptom goes away, replace the original ECM/PCM.



Idle Air Control (IAC) Valve



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 14: A problem in the Idle Air Control (IAC) Valve circuit.

The IAC Valve changes the amount of air bypassing the throttle body in response to a current signal from the ECM/PCM in order to maintain the proper idle speed.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 14 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Start the engine.

Is the MIL on and does it indicate code 14?

NO

Intermittent failure, system is OK at this time, Check for poor connections or loose wires between the IAC valve and ECM/PCM.

YES

Check for an open in the wire (IGP line):

1. Turn the ignition switch OFF.
2. Disconnect the IAC valve 3P connector.
3. Turn the ignition switch ON (II).
4. At the wire harness, measure voltage between IAC valve 3P connector terminal No. 2 and body ground.

Is there battery voltage?

NO

Repair open in the wire between the IAC valve and PGM-FI main relay.

YES

Check for an open in the wire (PG line):

1. Turn the ignition switch OFF.
2. At the wire harness, check for continuity between IAC valve 3P connector terminal No. 1 and body ground.

Is there continuity?

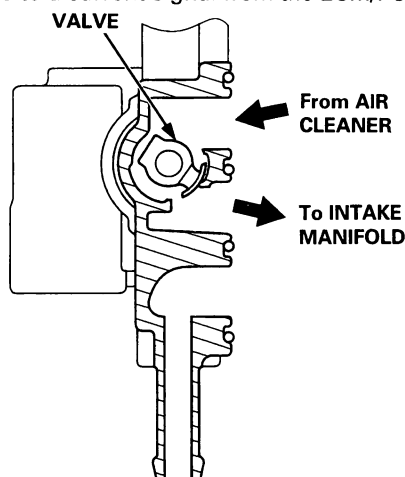
NO

Repair open in the wires between ECM/PCM and G101 (located at the thermostat housing.)

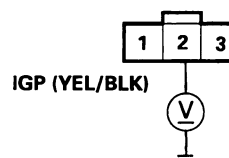
YES

Check for a short in the wire (IACV line):

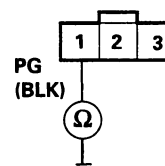
1. Disconnect the ECM/PCM connector B (25P).
2. Check for continuity between body ground and ECM/PCM connector terminal B23.



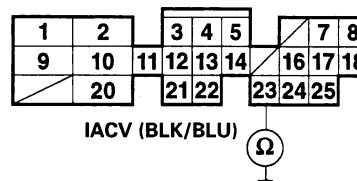
IAC VALVE 3P CONNECTOR



Wire side of female terminals



ECM/PCM CONNECTOR B (25P)



Wire side of female terminals

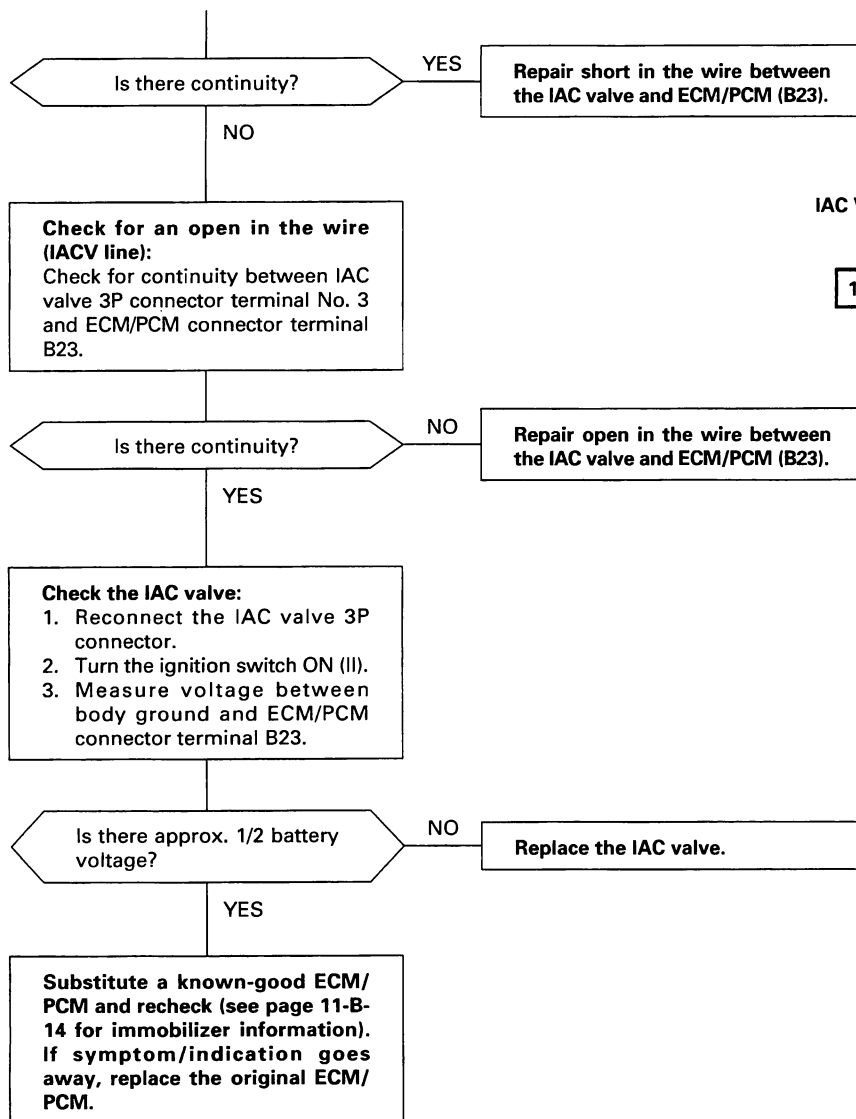
(To page 11-B-64)

(cont'd)

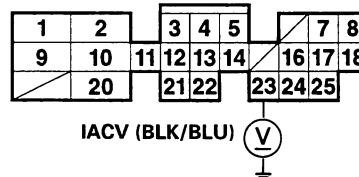
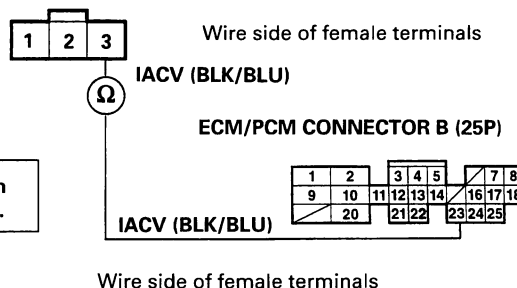
Idle Control System

Idle Air Control (IAC) Valve (cont'd)

(From page 11-B-63)



IAC VALVE 3P CONNECTOR



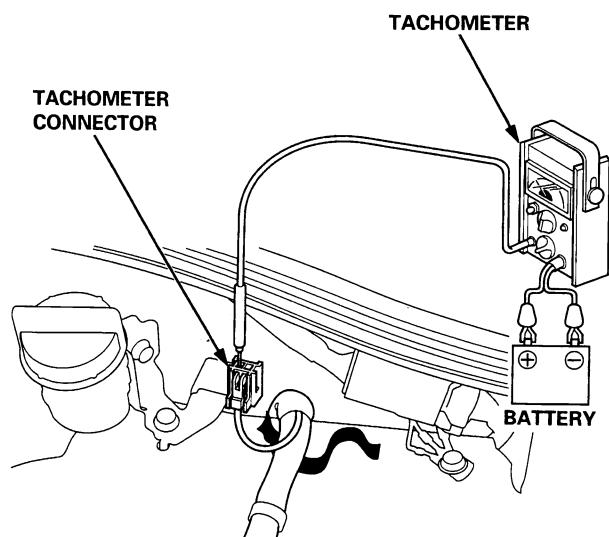


Idle Speed Inspection

NOTE:

- Leave the IAC valve connected.
- Before inspect the idle speed, check these items:
 - The MIL has not been reported on.
 - Ignition timing
 - Spark plugs
 - Air cleaner
 - PCV system

1. Connect a tachometer.



2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Check the idle speed with no-load conditions: head-lights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

Idle speed should be:

KG, KE, KS, KR model:

M/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$
A/T	$730 \pm 50 \text{ rpm (min}^{-1}\text{)}$ (in N or P position)

KY model:

M/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$
A/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$ (in N or P position)

4. Idle the engine for one minute with heater fan switch at HI and air conditioner on, then check the idle speed.

Idle speed should be:

KG, KE, KS, KR model:

M/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$
A/T	$730 \pm 50 \text{ rpm (min}^{-1}\text{)}$ (in N or P position)

KY model:

M/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$
A/T	$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$ (in N or P position)

NOTE: If the idle speed is not within specification, see Symptom Chart on page 11-B-61.

Fuel Supply System

System Troubleshooting Guide

NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

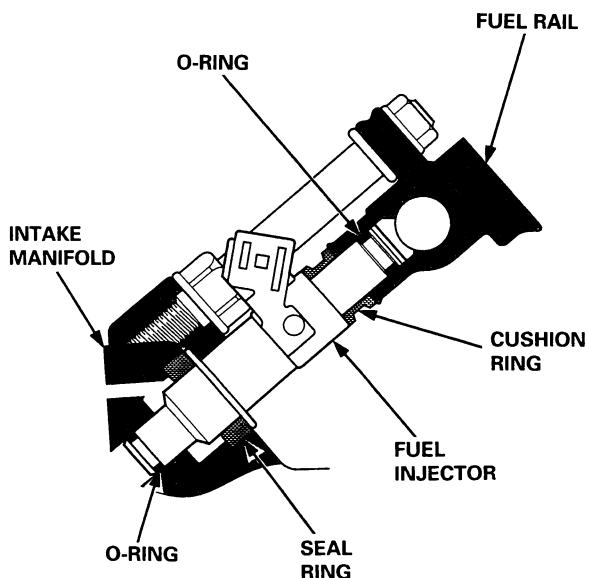
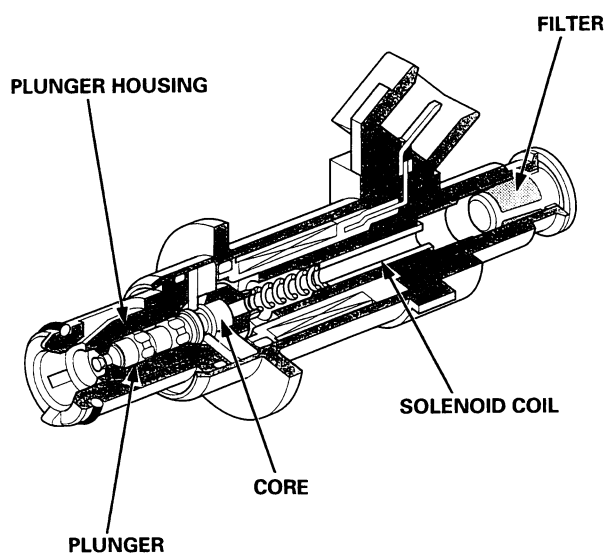
PAGE	SUB-SYSTEM	FUEL LINES	FUEL INJECTOR	FUEL PRESSURE REGULATOR	FUEL FILTER	FUEL PUMP	PGM-FI MAIN RELAY	CONTAMINATED FUEL
SYMPTOM		11-A-95	11-B-67	11-A-104	11-A-105	11-A-106	11-A-111	—
ENGINE WON'T START			③		③	①	②	
DIFFICULT TO START ENGINE WHEN COLD OR HOT					①	②		
ROUGH IDLE			①					②
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING		①	②				②
	FAILS EMISSION TEST		②	①				
	LOSS OF POWER		③		②	①		
FREQUENT STALLING	WHILE WARMING UP			①				
	AFTER WARMING UP			①				



Fuel Injectors

Description

The fuel injectors are a solenoid-actuated constantstroke, pintle-type consisting of a solenoid, plunger needle valve and housing. When current is applied to the solenoid coil, the valve lifts up and pressurized fuel is injected. Because the needle valve lift and the fuel pressure are constant, the injection quantity is determined by the length of time that the valve is open (that is the duration the current is supplied to the solenoid coil). The fuel injector is sealed by an O-ring and seal ring at the top and bottom. These seals also reduce operating noise.

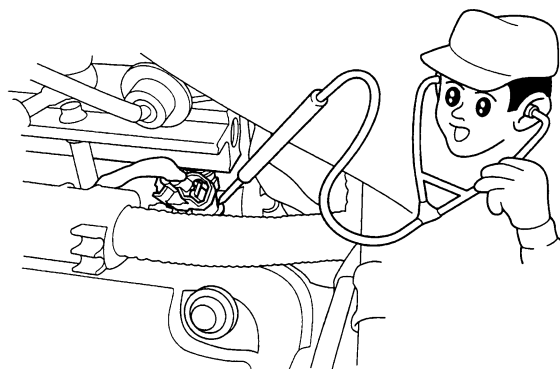


Testing

NOTE: Check the following items before testing: idle speed, ignition timing and idle CO%.

If the engine runs:

1. With the engine idling, disconnect each fuel injector connector individually and inspect the change in the idle speed.
 - If the idle speed drop is almost the same for each cylinder, the fuel injectors are normal.
 - If the idle speed or quality remains the same when you disconnect a particular fuel injector, replace the fuel injector and retest.
2. Check the clicking sound of each fuel injector by means of a stethoscope when the engine is idling.



- If any fuel injector fails to make the typical clicking sound, check the sound again after replacing the fuel injector.
- If clicking sound is still absent, check the following.
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the PGM-FI main relay and the junction connector.
 - Whether the junction connector is open or corroded.
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the junction connector and the fuel injector.
 - Whether there is any short-circuiting, wire breakage or poor connection in the wire between the fuel injector and the ECM/PCM.

If all is OK, check the ECM/PCM (see page 11-B-26) and PGM-FI main relay (see page 11-A-111).

(cont'd)

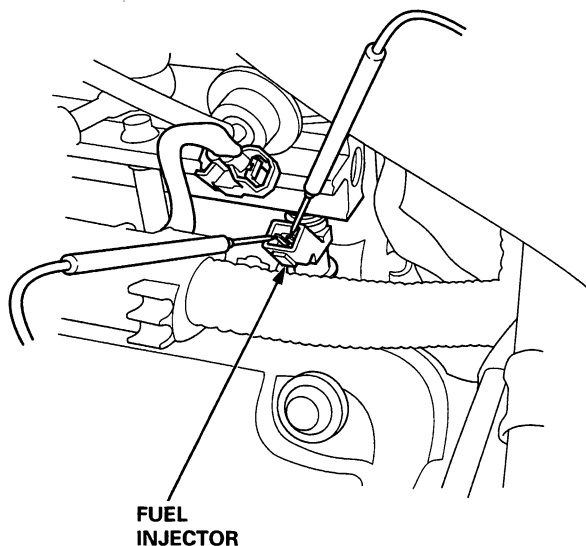
Fuel Supply System

Fuel Injectors (cont'd)

If the engine cannot be started:

1. Remove the connector of the fuel injector, and measure the resistance between the 2 terminals of the fuel injector.

Resistance should be: 11 – 20 Ω



- If the resistance is not as specified, replace the fuel injector.
- If the resistance is as specified, check the fuel pressure (see page 11-A-101).
- If the fuel pressure is as specified, check the following:
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the PGM-FI main relay and the junction connector.
 - Whether the junction connector is open or corroded.
 - Whether there is any short-circuiting, wire breakage, or poor connection in the YEL/BLK wire between the junction connector and the fuel injector.
 - Whether there is any short-circuiting, wire breakage or poor connection in the wire between the fuel injector and the ECM/PCM.

If all is OK, check the ECM/PCM (see page 11-B-26).



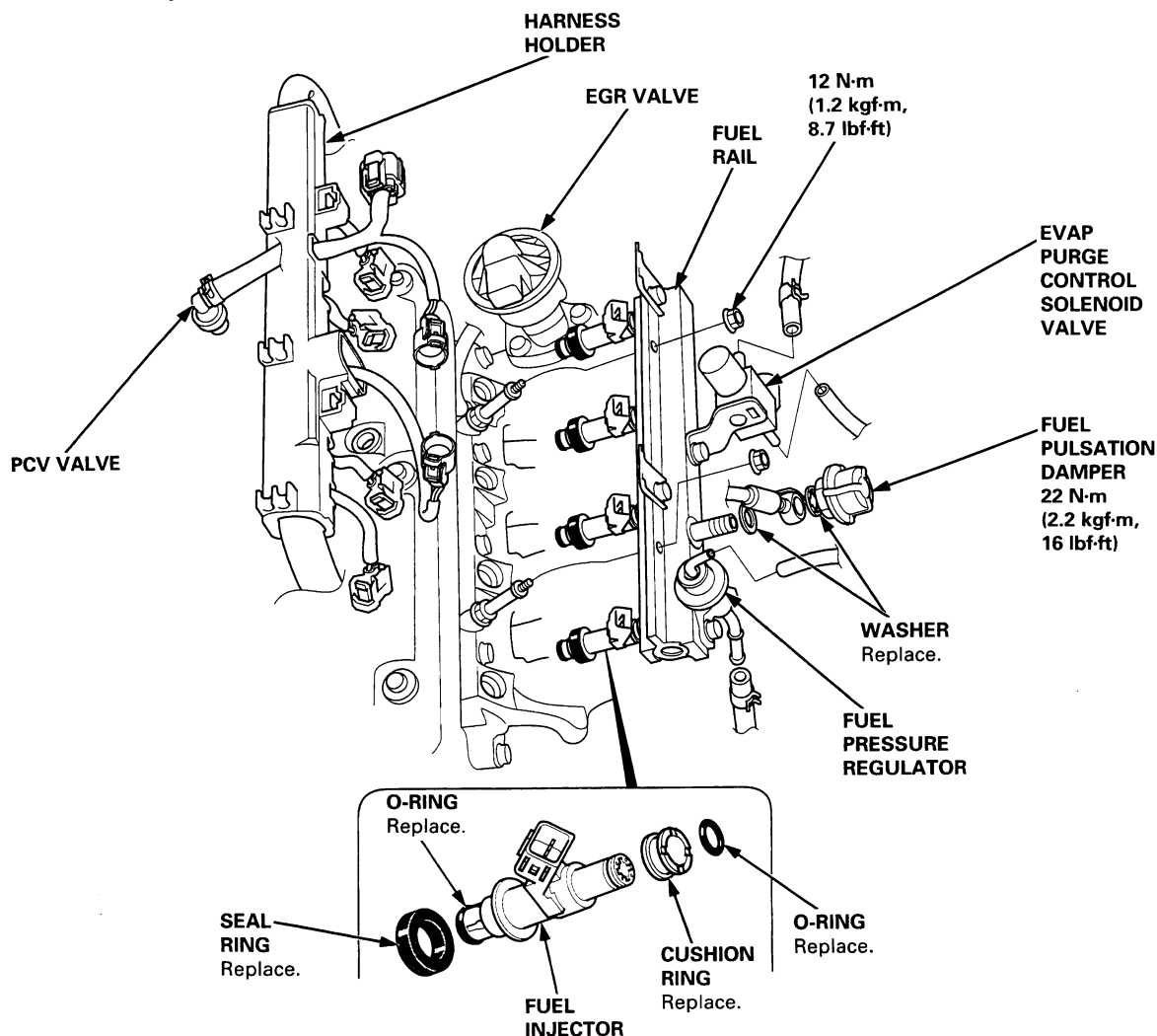
Replacement

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Relieve the fuel pressure (see page 11-A-100).
2. Disconnect the connectors from the fuel injectors, EGR valve* and EVAP purge control solenoid valve*.
3. Disconnect the vacuum hose from the EVAP purge control solenoid valve*.
4. Disconnect the vacuum hoses and fuel return hose from the fuel pressure regulator.
NOTE: Place a rag or shop towel over the hoses before disconnecting them.
5. Disconnect the fuel hose from the fuel rail.
6. Remove the retainer nuts from the fuel rail and harness holder.
7. Disconnect the PCV valve.
8. Disconnect the fuel rail.
9. Remove the fuel injectors from the intake manifold.

*: With TWC model



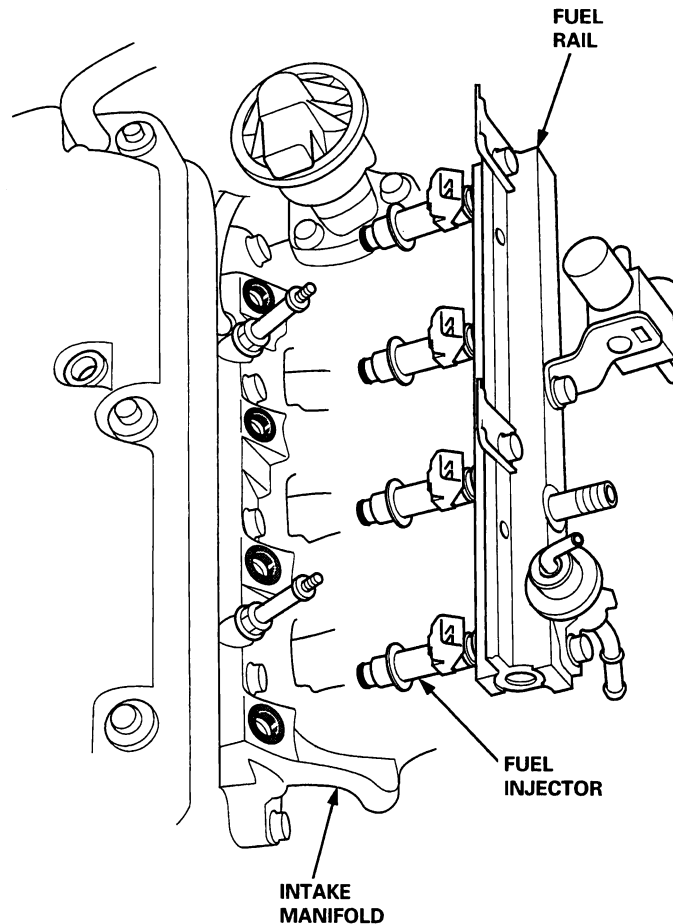
10. Slide new cushion rings onto the fuel injectors.
11. Coat new O-rings with clean engine oil, and put them on the fuel injectors.
12. Insert the fuel injectors into the fuel rail first.
13. Coat new seal rings with clean engine oil, and press them into the intake manifold.

(cont'd)

Fuel Supply System

Fuel Injectors (cont'd)

14. To prevent damage to the O-rings, install the fuel injectors in the fuel rail first, then install them in the intake manifold.



15. Install and tighten the retainer nuts.
16. Connect the fuel hose to the fuel rail with new washers.
17. Connect the vacuum hoses and fuel return hose to the fuel pressure regulator.
18. Connect the vacuum hose to the EVAP purge control solenoid valve*.
19. Install the connectors on the fuel injectors, EGR valve and EVAP purge control solenoid valve*.
20. Connect the PCV valve.
21. Turn the ignition switch ON (II), but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

Intake Air System



System Troubleshooting Guide

NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.

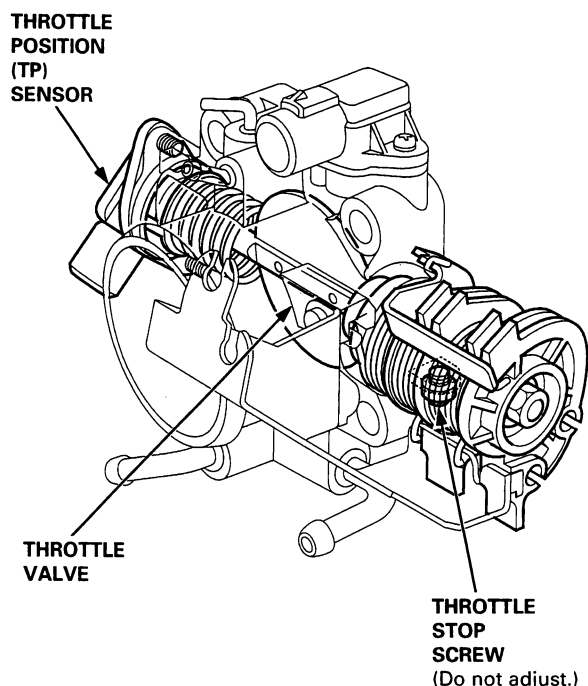
PAGE	SUB-SYSTEM	AIR CLEANER AND INTAKE AIR DUCT	THROTTLE CABLE	THROTTLE BODY	INTAKE AIR BYPASS CONTROL
		11-A-119	11-A-120	11-B-72	11-A-125
	SYMPTOM				
	WHEN COLD FAST IDLE OUT OF SPEC			①	
	WHEN WARM IDLE SPEED TOO HIGH		②	①	
	LOSS OF POWER	②		①	②

Intake Air System

Throttle Body

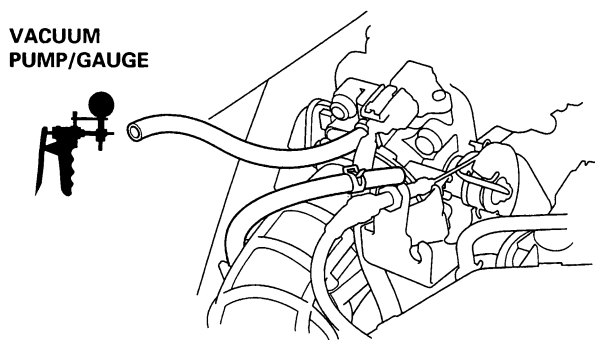
Description

The throttle body is a single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head. The Evaporative Emission (EVAP) Control Canister port are located on the top of the throttle body.



Inspection

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.



2. Disconnect the vacuum hose (to the EVAP control canister) from the top of the throttle body, connect a vacuum gauge to the throttle body.

3. Allow the engine to idle, and check that the gauge indicates no vacuum.

If there is vacuum, check the throttle cable (see page 11-A-120).

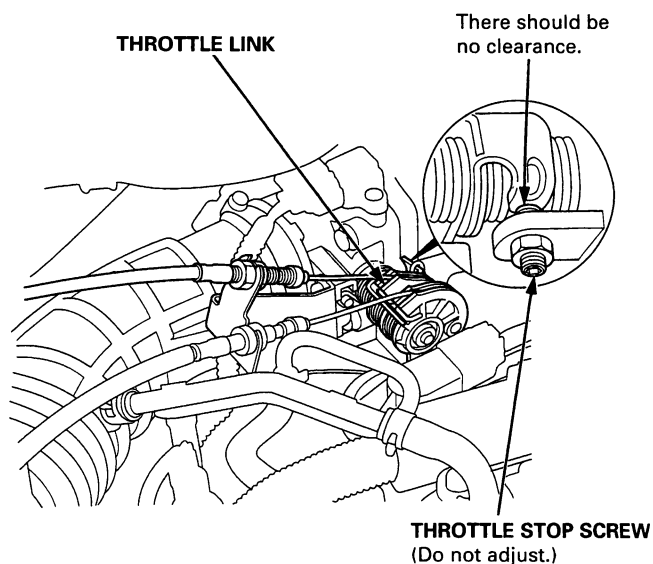
4. Check that vacuum is indicated on the gauge when the throttle is opened slightly from idle.

If the gauge indicates no vacuum, check the throttle body port. If the throttle body port is clogged, clean it with carburetor cleaner.

5. Stop the engine, and check that the throttle cable operates smoothly without binding or sticking.

If there are any abnormalities in the above steps, check for.

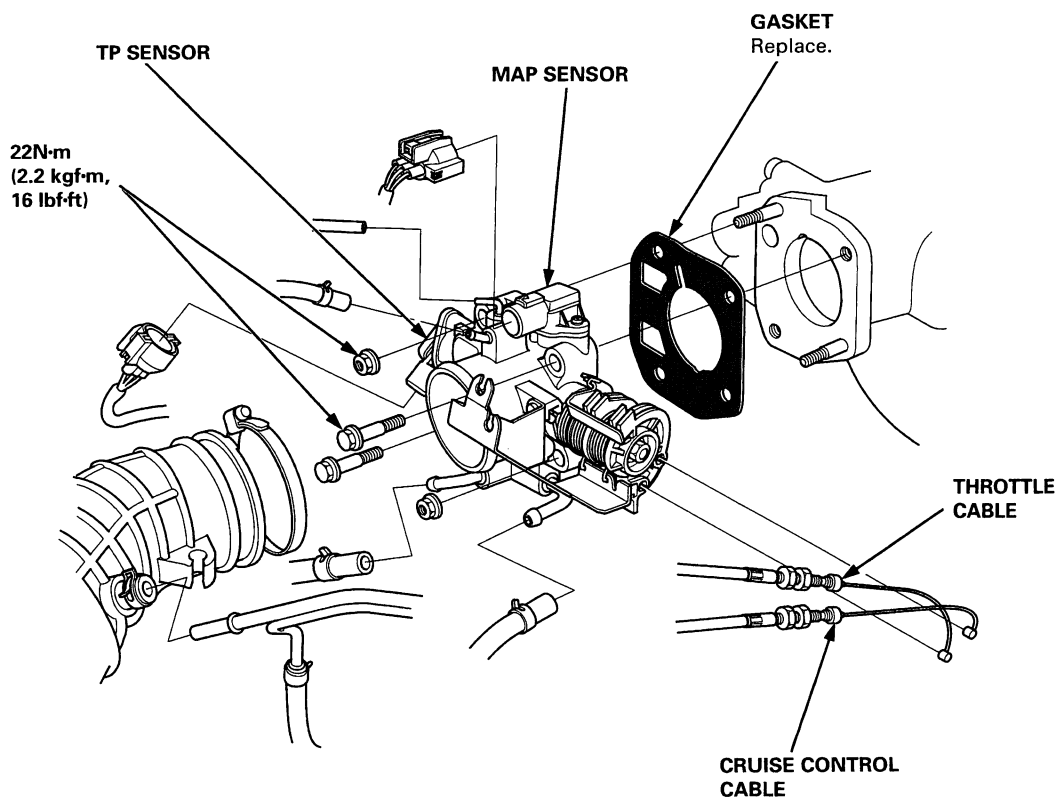
- Excessive wear or play in the throttle valve shaft.
- Sticky or binding throttle link at full close position.
- Clearance between throttle stop screw and throttle link at the fully closed position.



Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.



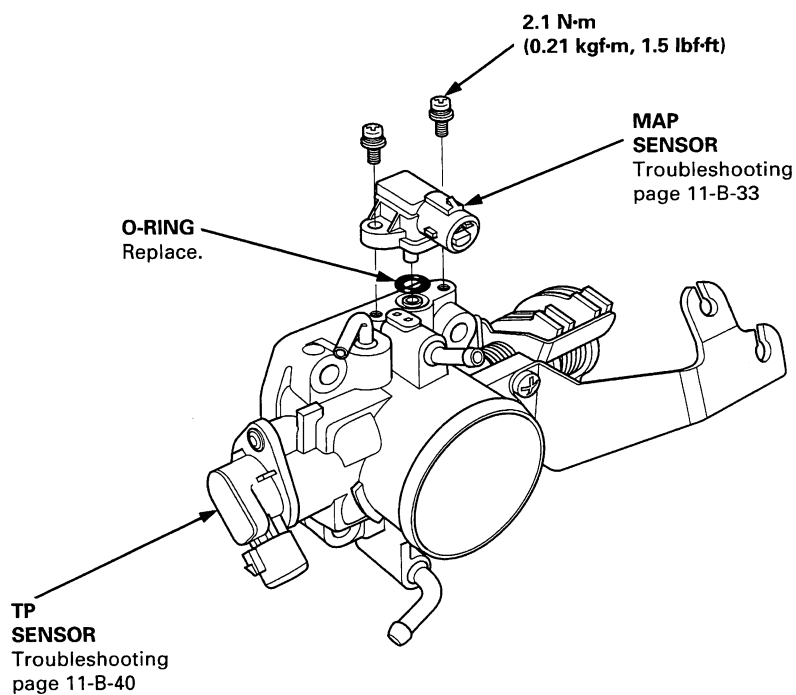
Removal



NOTE:

- Do not adjust the throttle stop screw.
- After reassembly, adjust the cruise control cable (see section 4), the throttle cable (see page 11-A-120).
- The TP sensor is not removable.

Disassembly



Emission Control System

System Troubleshooting Guide

NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of the column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SUB-SYSTEM	THREE WAY CATALYTIC CONVERTER* ¹	EXHAUST GAS RECIRCULATION SYSTEM* ¹	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
SYMPTOM		11-B-75	11-B-76	11-A-143	11-B-80
ROUGH IDLE			①	②	
FREQUENT STALLING	AFTER WARMING UP		①		
POOR PERFORMANCE	FAILS EMISSION TEST	①			②
	LOSS OF POWER	①			

*1: with TWC model



System Description

The emission control system include, a Three Way Catalytic Converter (TWC)*¹, Exhaust Gas Recirculation (EGR) system*¹, Positive Crankcase Ventilation (PCV) system and Evaporative Emission (EVAP) Control system.

*¹: with TWC model

Tailpipe Emission

Inspection

⚠ WARNING

Do not smoke during this procedure.
Keep open flame or sparks away from the work area.

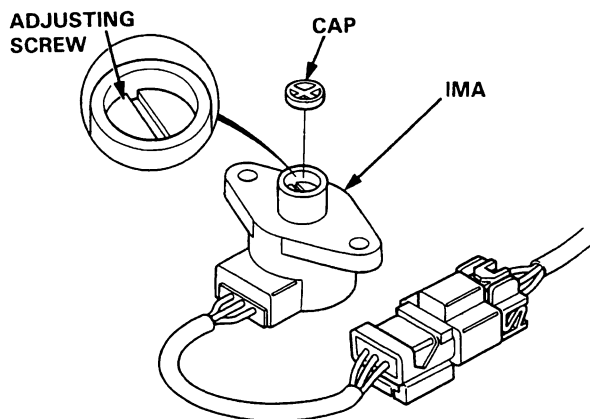
1. Connect a tachometer.
2. Start the engine. Hold the engine at 3,000 rpm (min⁻¹) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Check the idle speed (see page 11-B-65).
4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

Specified CO%:

For cars with TWC model: 0.1% maximum

For cars without TWC model: $1.0 \pm 1.0\%$

- If unable to obtain this reading:
Without TWC model, adjust by turning the adjusting screw of the IMA.
With TWC model, see ECM/PCM troubleshooting guide (see page 11-B-26).



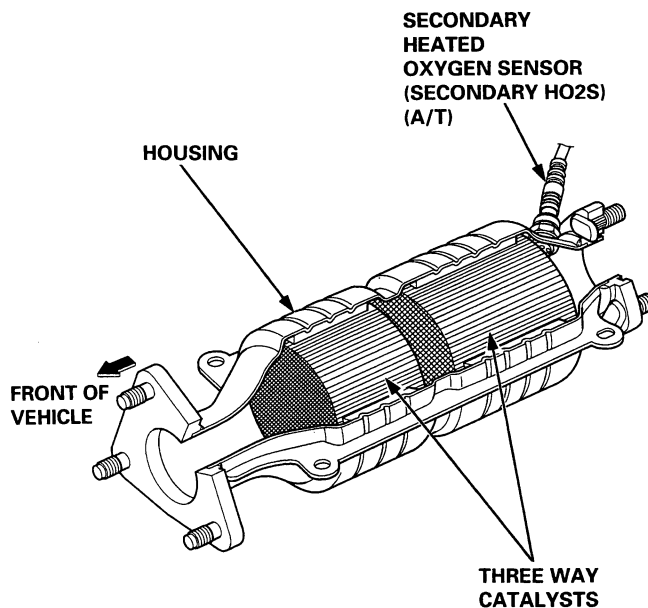
— If unable to obtain a CO reading of specified % by this procedure, check the engine tune-up condition.

Three Way Catalytic Converter (TWC) (with TWC model)

Description

The Three Way Catalytic Converter (TWC) is used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO_x) in the exhaust gas, to carbon dioxide (CO₂), dinitrogen (N₂) and water vapor.

Removal/Installation (see section 9)

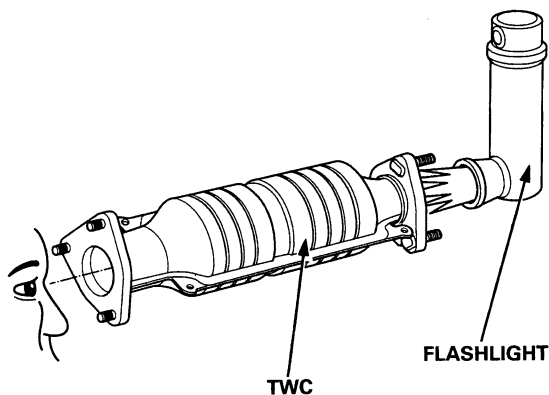


Inspection

If excessive exhaust system back-pressure is suspected, remove the TWC from the car.

Using a flashlight, make a visual check for plugging, melting or cracking of the catalyst.

Replace the TWC if any of the visible area is damaged or plugged.



Emission Control System

Exhaust Gas Recirculation (EGR) System (with TWC model)

Troubleshooting Flowchart

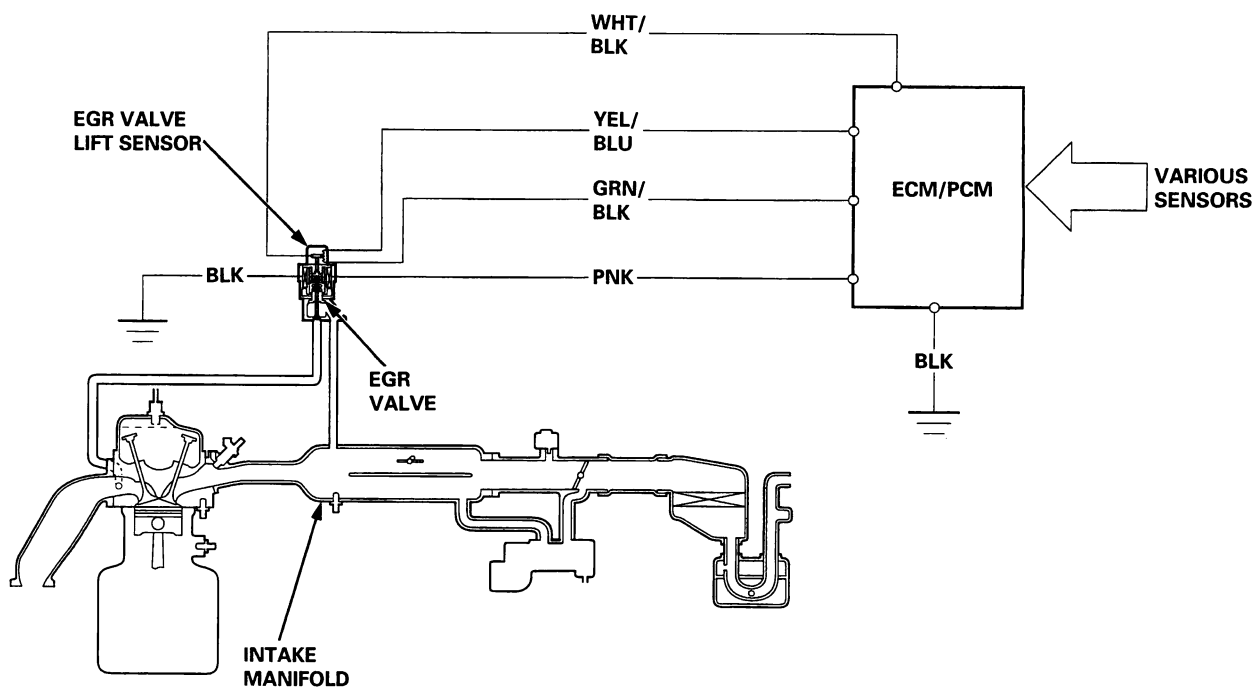


12

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 12: A problem in the Exhaust Gas Recirculation (EGR) system.

The EGR system is designed to reduce oxides of nitrogen emissions (NO_x) by recirculating exhaust gas through the EGR valve and the intake manifold into the combustion chambers. It is composed of the EGR valve, ECM/PCM and various sensors.

The EGR valve lift sensor detects the amount of EGR valve lift and sends the information to the ECM/PCM. The ECM/PCM then compares it with the ideal EGR valve lift which is determined by signals sent from the other sensors. If there is any difference between the two, the ECM/PCM reduces current to the EGR valve to reduce EGR valve.





- The MIL has been reported on.
- With the SCS short connector connected (see page 11-B-13), code 12 is indicated.

Problem verification:

1. Do the ECM/PCM Reset Procedure (see page 11-B-14).
2. Connect the SCS service check connector (see page 11-B-13).
3. Test-drive necessary: Start engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (in Park or neutral) until the radiator fan comes on, then let it idle. Drive the vehicle on the road for approx. 10 minutes. Try to keep the engine speed in the 1,700 – 2,500 rpm (min^{-1}) range.

Does the MIL blink and does it indicated code 12?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the EGR valve and ECM/PCM.

YES

Check the ECM/PCM output voltage (VCC2 line):

1. Turn the ignition switch OFF.
2. Disconnect the EGR valve 6P connector.
3. Turn the ignition switch ON (II).
4. At the harness side, measure voltage between the EGR valve 6P connector terminals No. 2 and No. 3.

Is there approx. 5 V?

NO

Check for an open in the wire (SG2 line):
Measure voltage between the EGR valve 6P connector terminal No. 3 and body ground.

YES

(To page 11-B-78)

Is there approx. 5 V?

YES

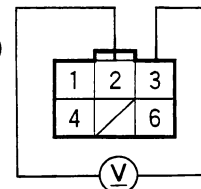
Repair open in the wire between the EGR valve and the ECM/PCM (C18).

NO

(To page 11-B-78)

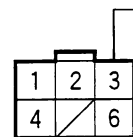
EGR VALVE 6P CONNECTOR

SG2
(GRN/BLK)



VCC2
(YEL/BLU)

Wire side of female terminals

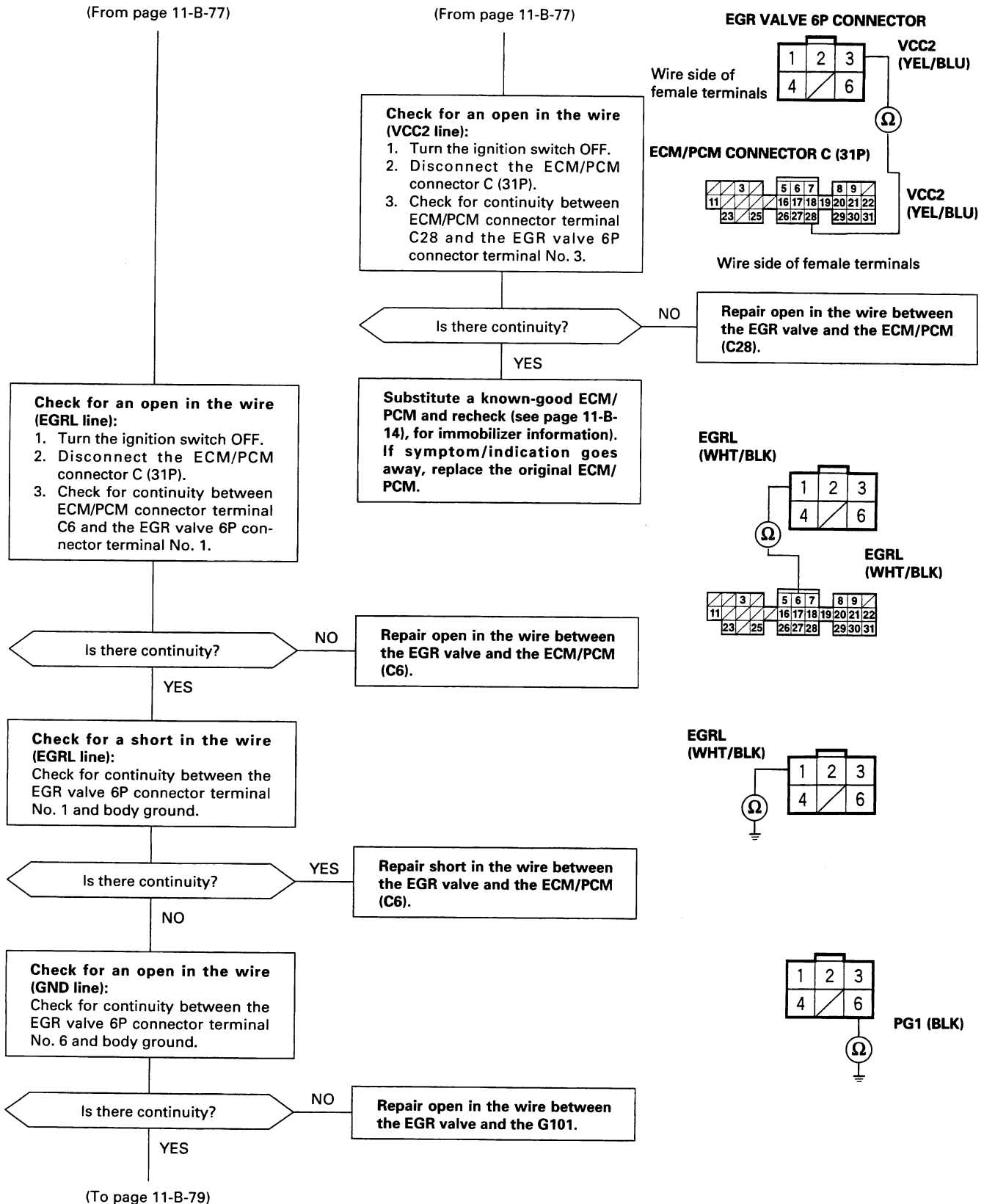


VCC2
(YEL/BLU)

(cont'd)

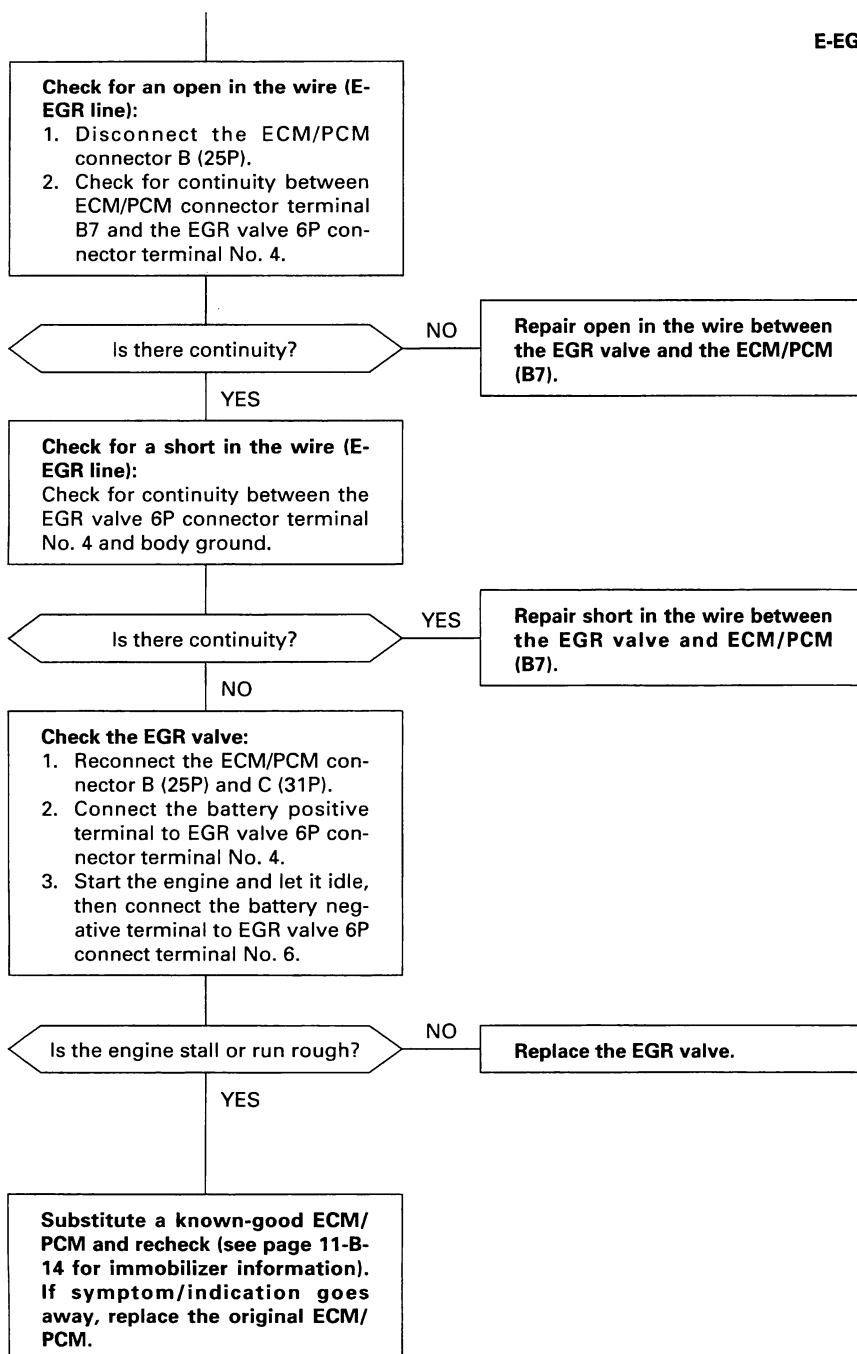
Emission Control System

Exhaust Gas Recirculation (EGR) System (with TWC model) (cont'd)

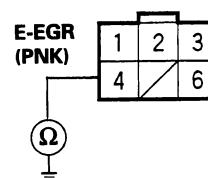
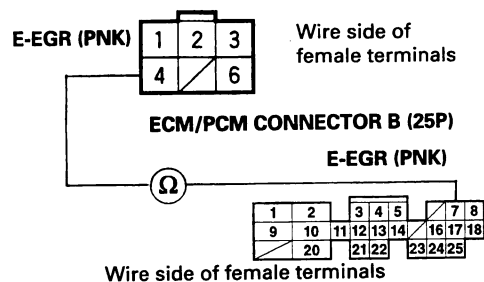




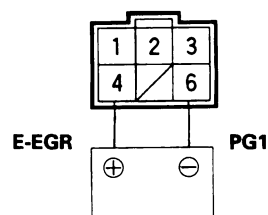
(From page 11-B-78)



EGR VALVE 6P CONNECTOR



EGR VALVE 6P CONNECTOR



Terminal side of male terminals

Emission Control System

Evaporative Emission (EVAP) Controls

Description

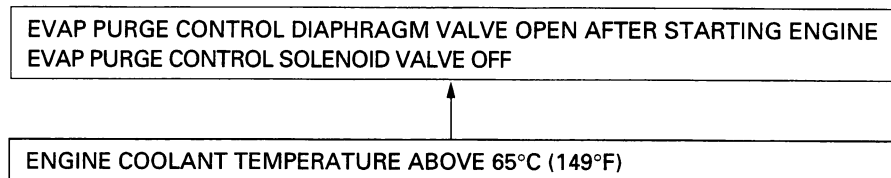
The evaporative emission controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

A. Evaporative Emission (EVAP) Control Canister

An EVAP control canister is used for the temporary storage of fuel vapor until the fuel vapor can be purged from the EVAP control canister into the engine and burned.

B. Vapor Purge Control System

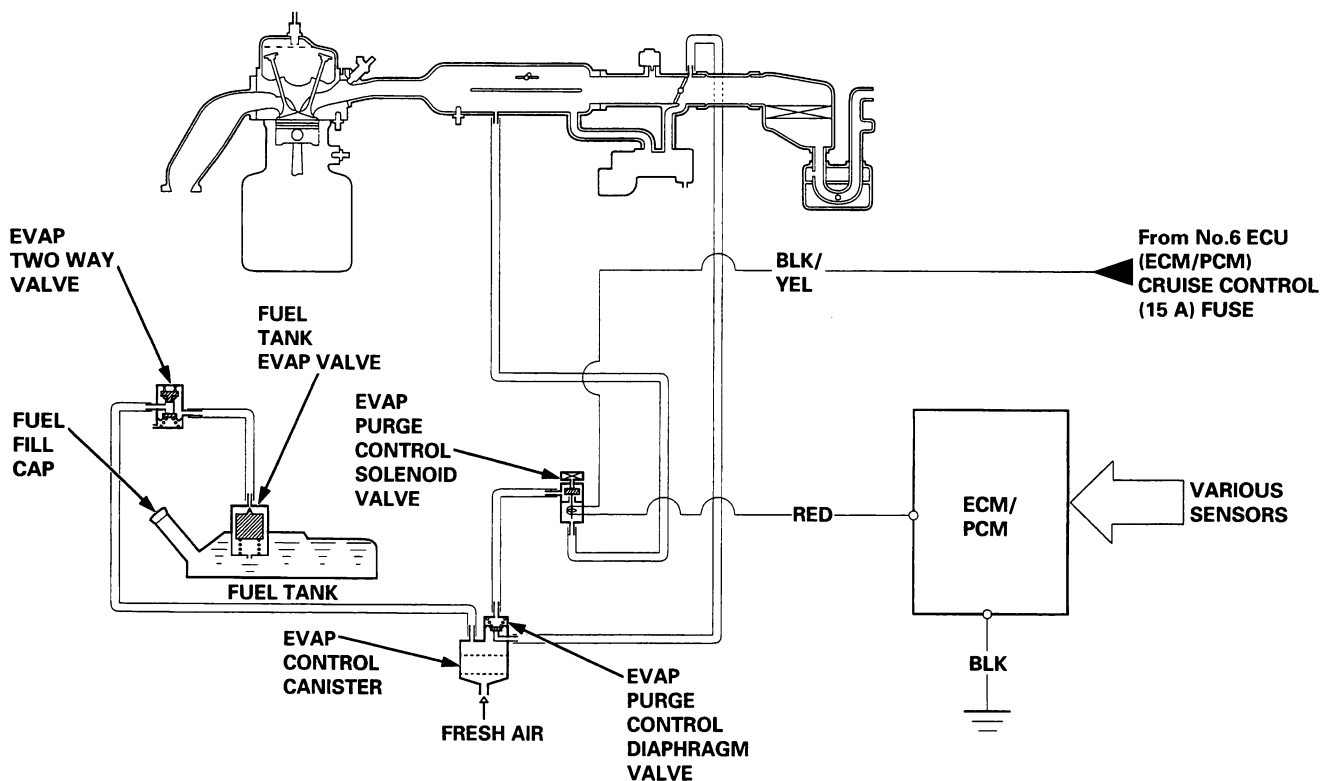
EVAP control canister purging is accomplished by drawing fresh air through the EVAP control canister and into a port on the throttle body. The purging vacuum is controlled by the EVAP purge control diaphragm valve and the EVAP purge control solenoid valve (with TWC model).



C. Fuel Tank Vapor Control System

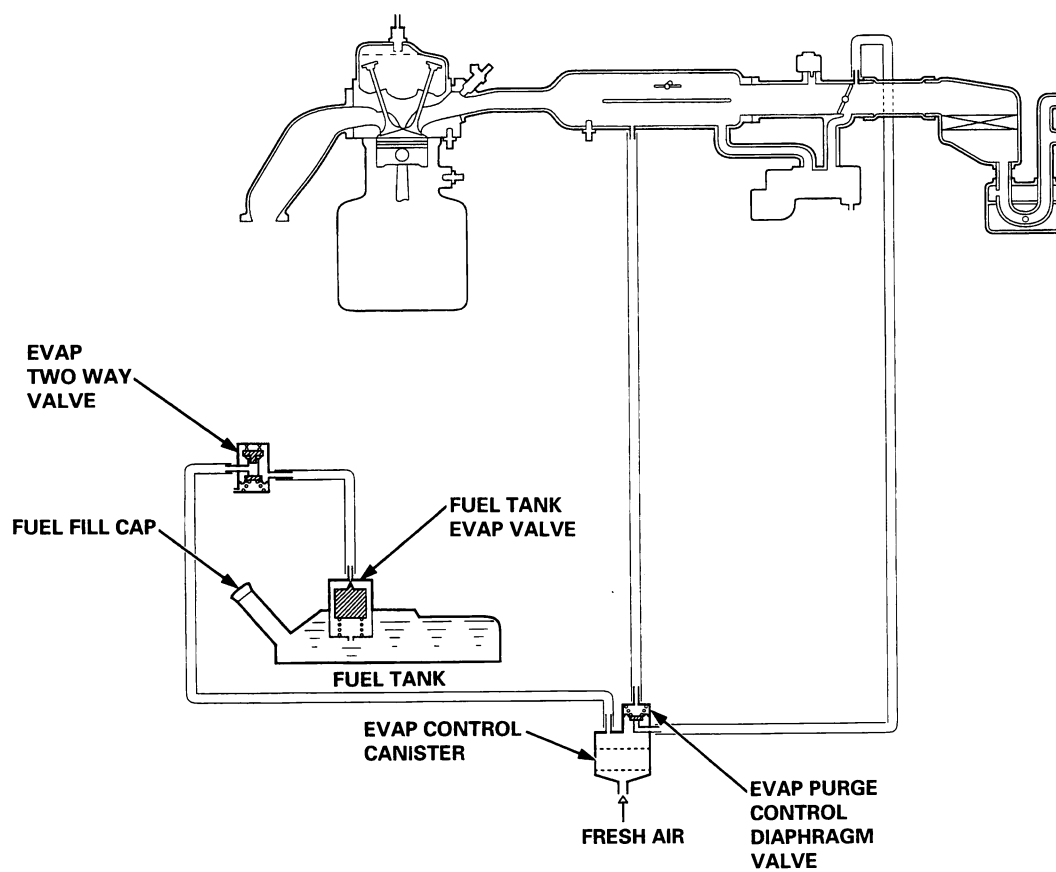
When fuel vapor pressure in the fuel tank is higher than the set value of the EVAP two way valve, the valve opens and regulates the flow of fuel vapor to the EVAP control canister.

with TWC model:





without TWC model:



(cont'd)

Emission Control System

Evaporative Emission (EVAP) Controls (cont'd)

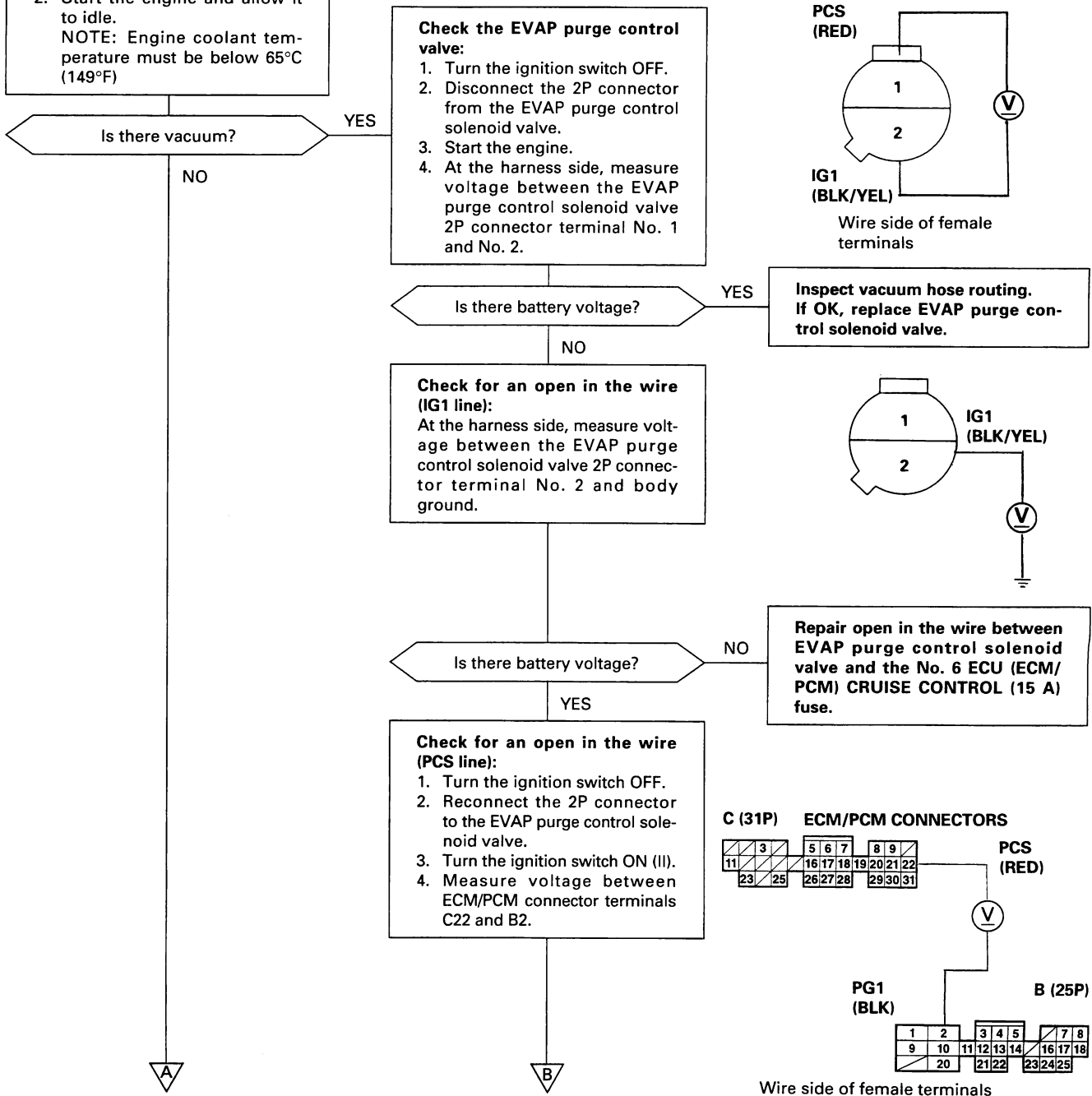
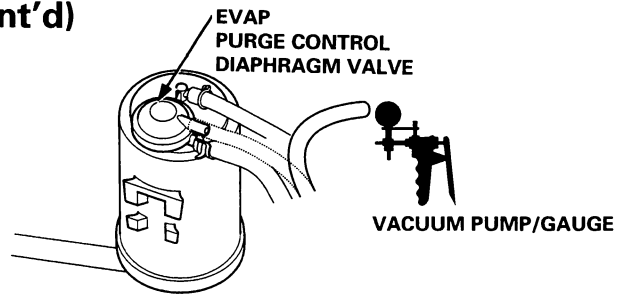
Troubleshooting (with TWC model)

Inspection of Evaporative Emission Controls

Check the vacuum when cold:

1. Disconnect the vacuum hose from the EVAP purge control canister and connect a vacuum gauge to the hose.
2. Start the engine and allow it to idle.

NOTE: Engine coolant temperature must be below 65°C (149°F)



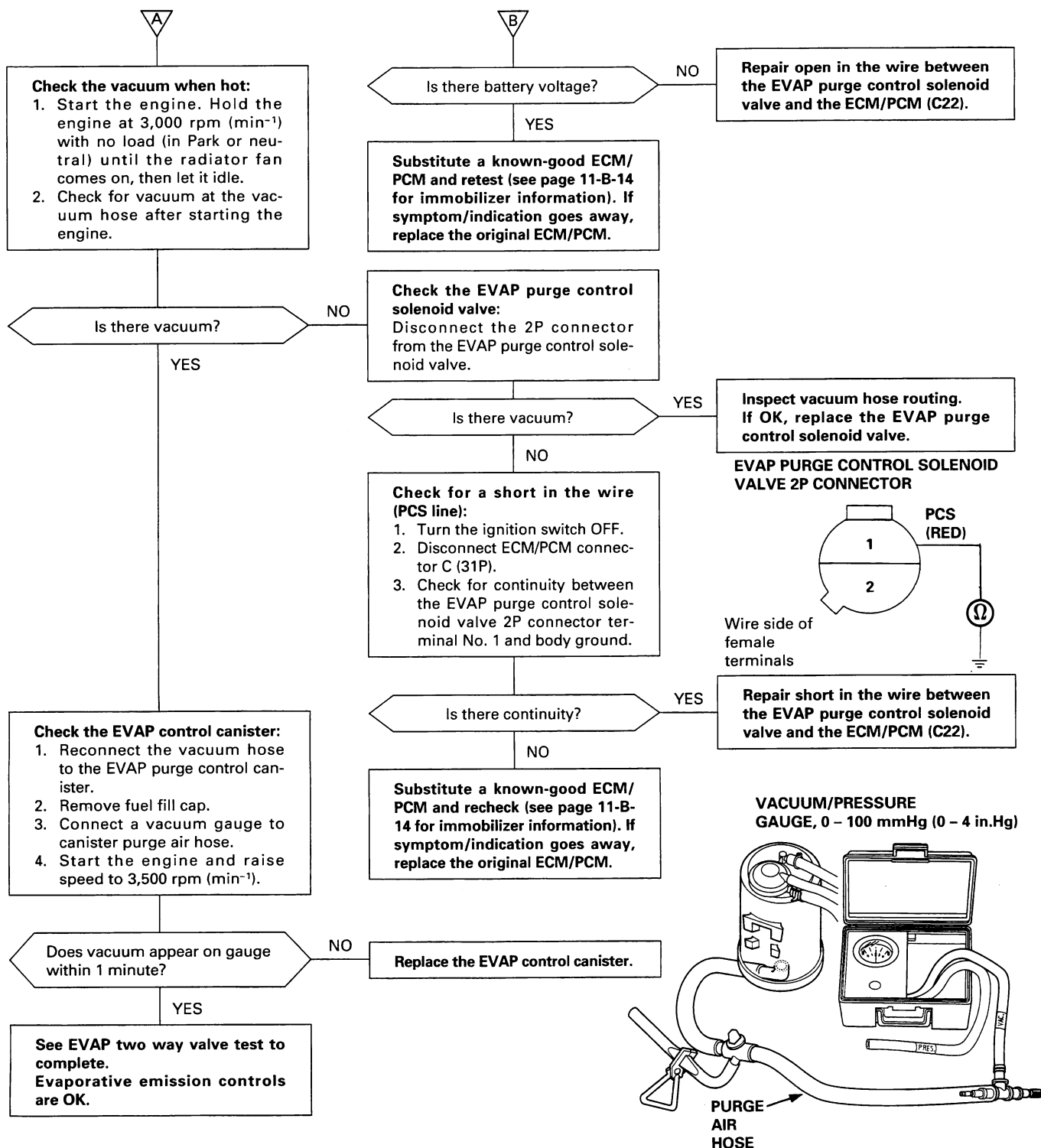
(To page 11-B-83)

(To page 11-B-83)



(From page 11-B-82)

(From page 11-B-82)



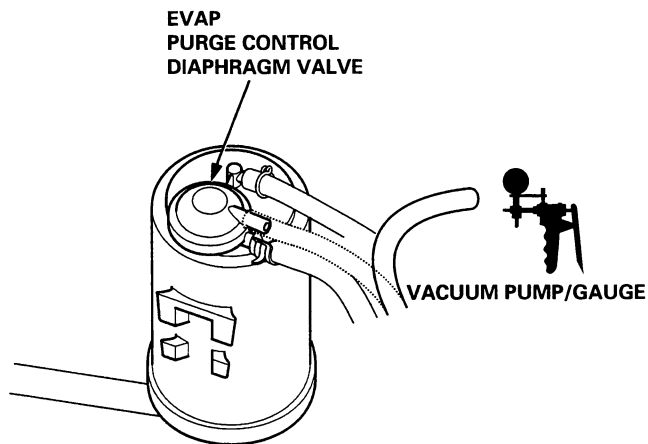
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Emission Control System

Evaporative Emission (EVAP) Controls (cont'd)

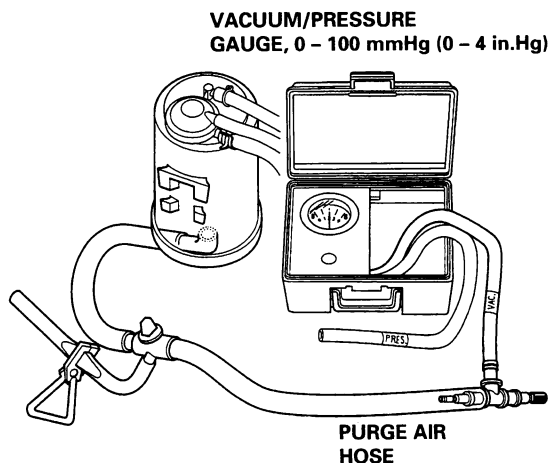
Testing (without TWC model)

1. Remove the fuel fill cap.
2. Start the engine and allow to idle.
3. Disconnect vacuum hose at the EVAP purge control diaphragm valve (on the EVAP control canister) and connect a vacuum gauge to the hose.



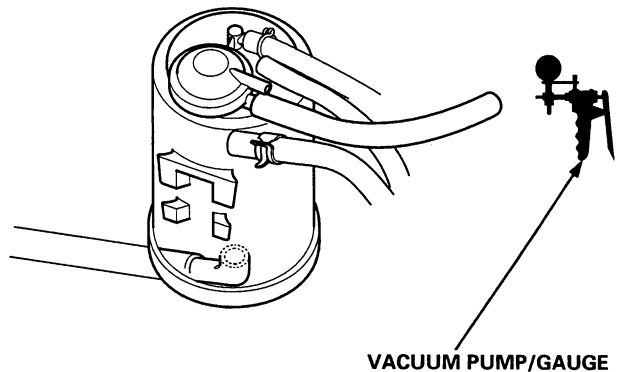
- If there is no vacuum, check vacuum hose for blockage, cracks or disconnected hose, as well as vacuum port for blockage.

4. Disconnect the vacuum gauge and reconnect the hose.
5. Connect a vacuum gauge to EVAP control canister purge air hose.



6. Raise engine speed to 3,500 rpm (min^{-1}). Vacuum should appear on gauge within 1 minute.
 - If vacuum appears on gauge in 1 minute, remove gauge, test is complete.
 - If no vacuum, disconnect vacuum gauge and reinstall fuel fill cap.
7. Remove EVAP control canister and check for signs of damage or defects.
 - If defective, replace EVAP control canister.
8. Stop engine. Disconnect upper vacuum hose from EVAP purge control diaphragm valve. Connect a vacuum pump to lower vacuum as shown, and apply vacuum.

Vacuum should remain steady.



- If vacuum drops, replace the EVAP control canister and retest.
9. Restart engine. Reconnect upper vacuum hose to EVAP purge control diaphragm valve.
- Vacuum (lower vacuum hose side) should drop to zero.
- If vacuum does not drop to zero, replace the EVAP control canister and retest.

D16B6 engine

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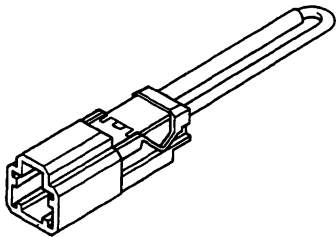
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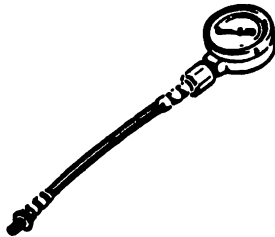


Special Tools

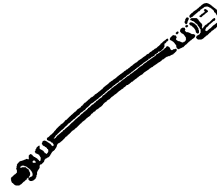
Ref. No	Tool Number	Description	Qty	Remark
①	07PAZ – 0010100	SCS Short Connector	1	Component Tools
②	07406 – 0040002	Fuel Pressure Gauge Set	1	
②-1	07406 – 0040202	Fuel Pressure Hose Assembly	(1)	
③	07XAZ – S1A0300	ECM Test Harness	1	
④	07XAZ – 0010100	Test Pin Box (Pin Box 130 Seem)	1	



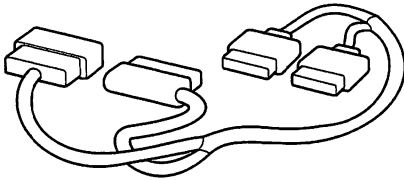
①



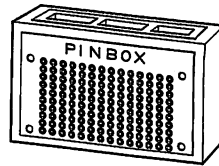
②



②-1



③

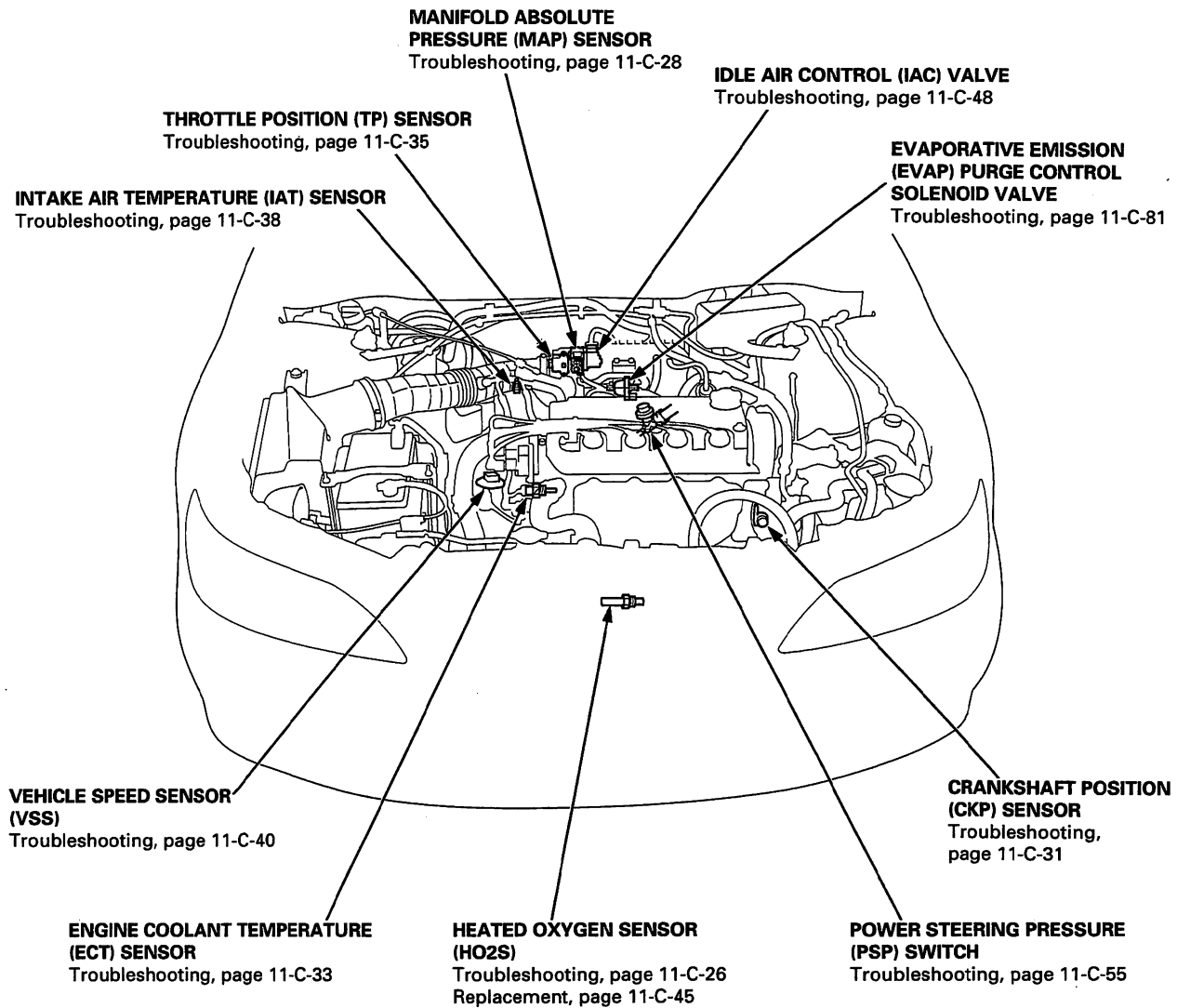


④

Component Locations



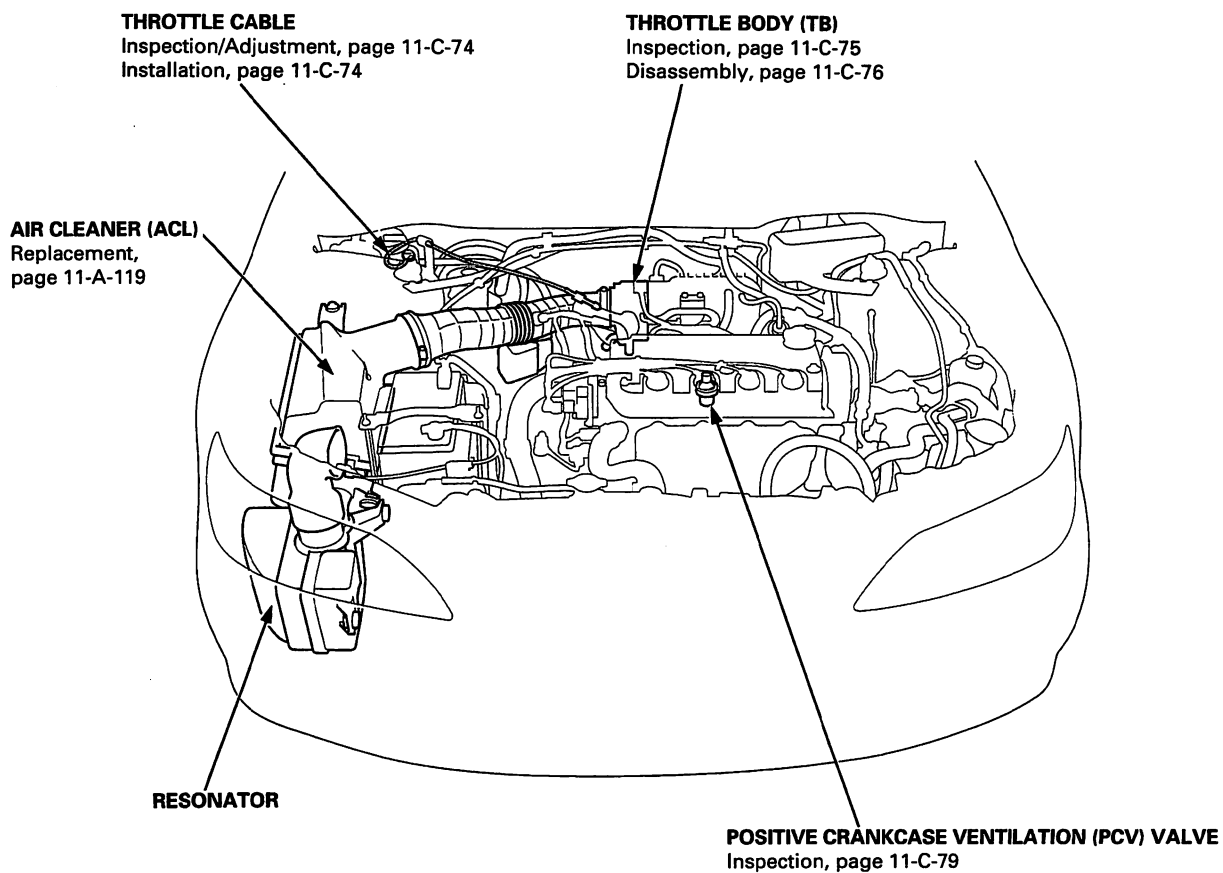
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(cont'd)

Component Locations

Index (cont'd)





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ENGINE CONTROL MODULE (ECM)

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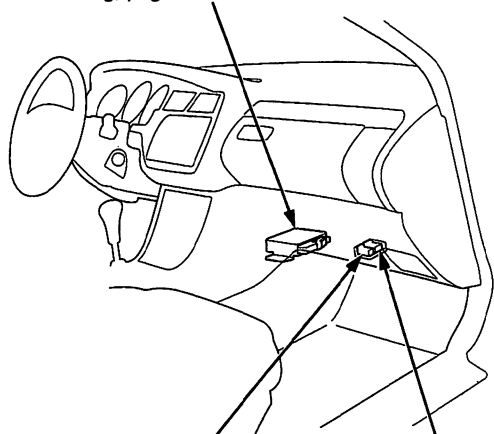
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SERVICE CHECK CONNECTOR

Self-diagnostic Procedures, page 11-C-13

DATA LINK CONNECTOR (DLC) (5P)



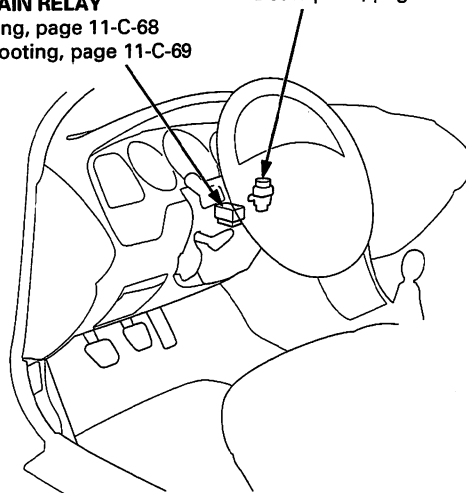
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INERTIA SWITCH

Description, page 11-C-67



RHD:

ENGINE CONTROL MODULE (ECM)

Removal, page 11-C-13

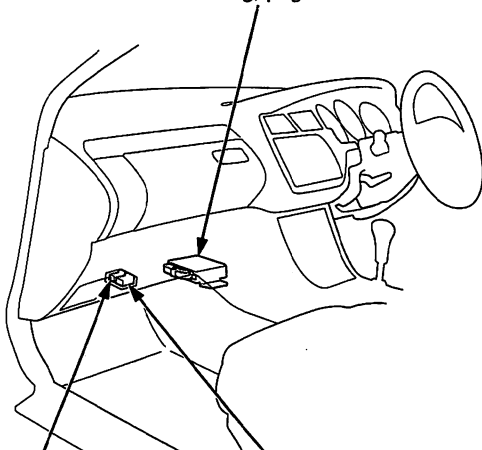
Troubleshooting Procedures, page 11-C-11

Troubleshooting, page 11-C-21

DATA LINK CONNECTOR (DLC) (5P)

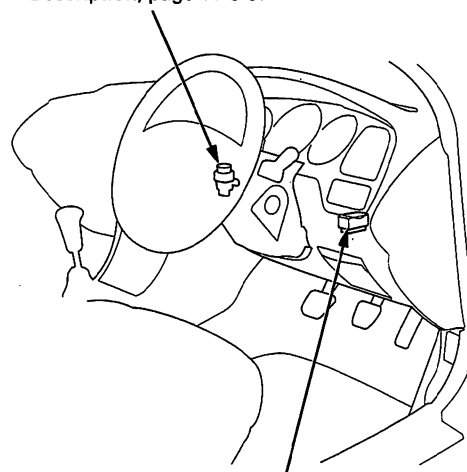
SERVICE CHECK CONNECTOR

Self-diagnostic Procedures, page 11-C-13



INERTIA SWITCH

Description, page 11-C-67



PGM-FI MAIN RELAY

Relay testing, page 11-C-68

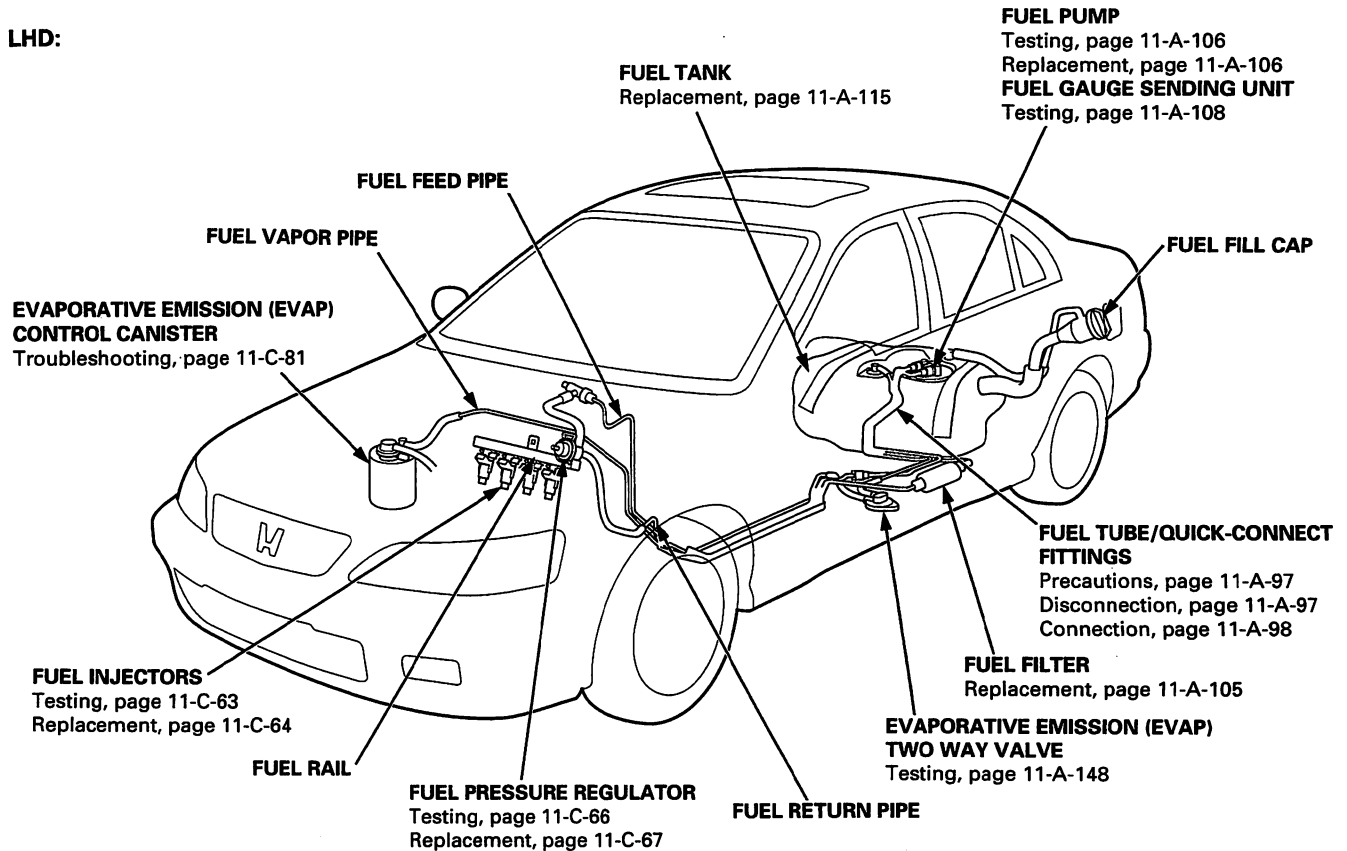
Troubleshooting, page 11-C-69

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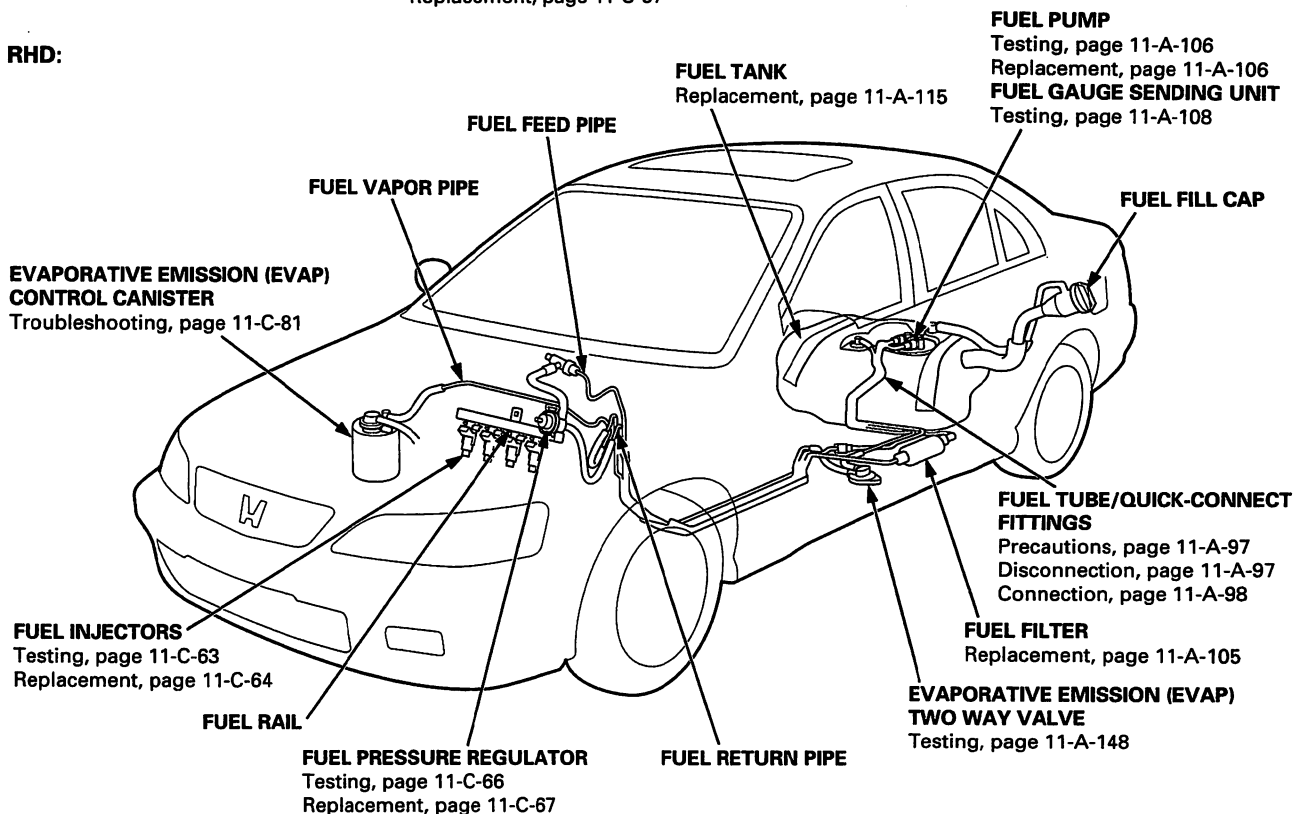
System Description

Index (cont'd)

LHD:

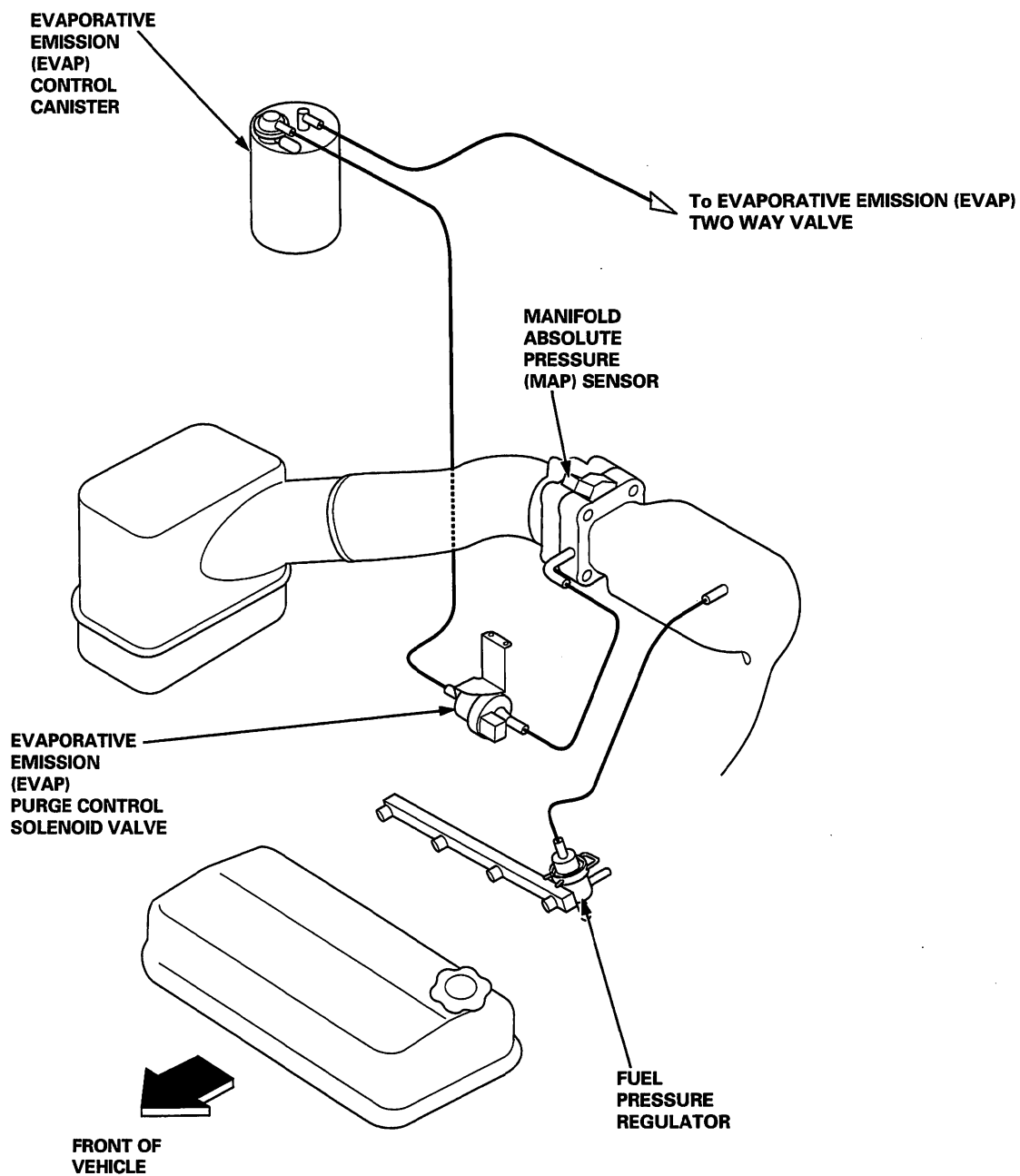


RHD:





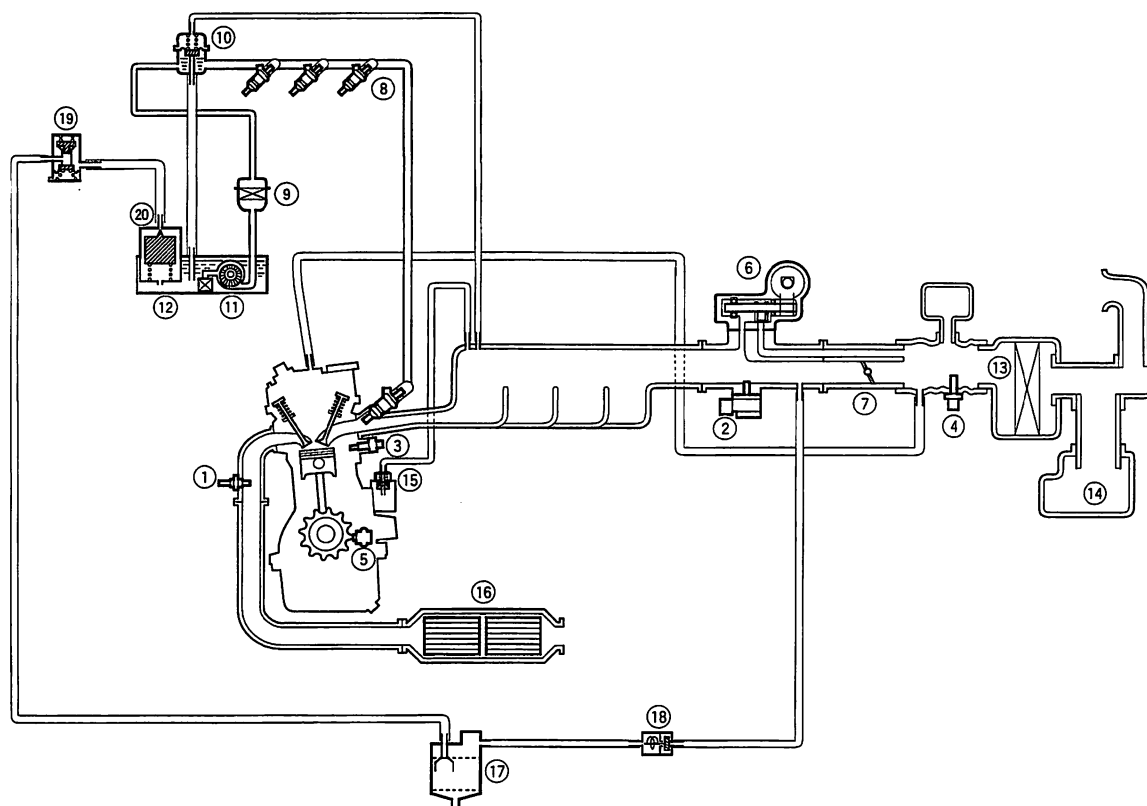
Vacuum Connections



(cont'd)

System Description

Vacuum Connections (cont'd)

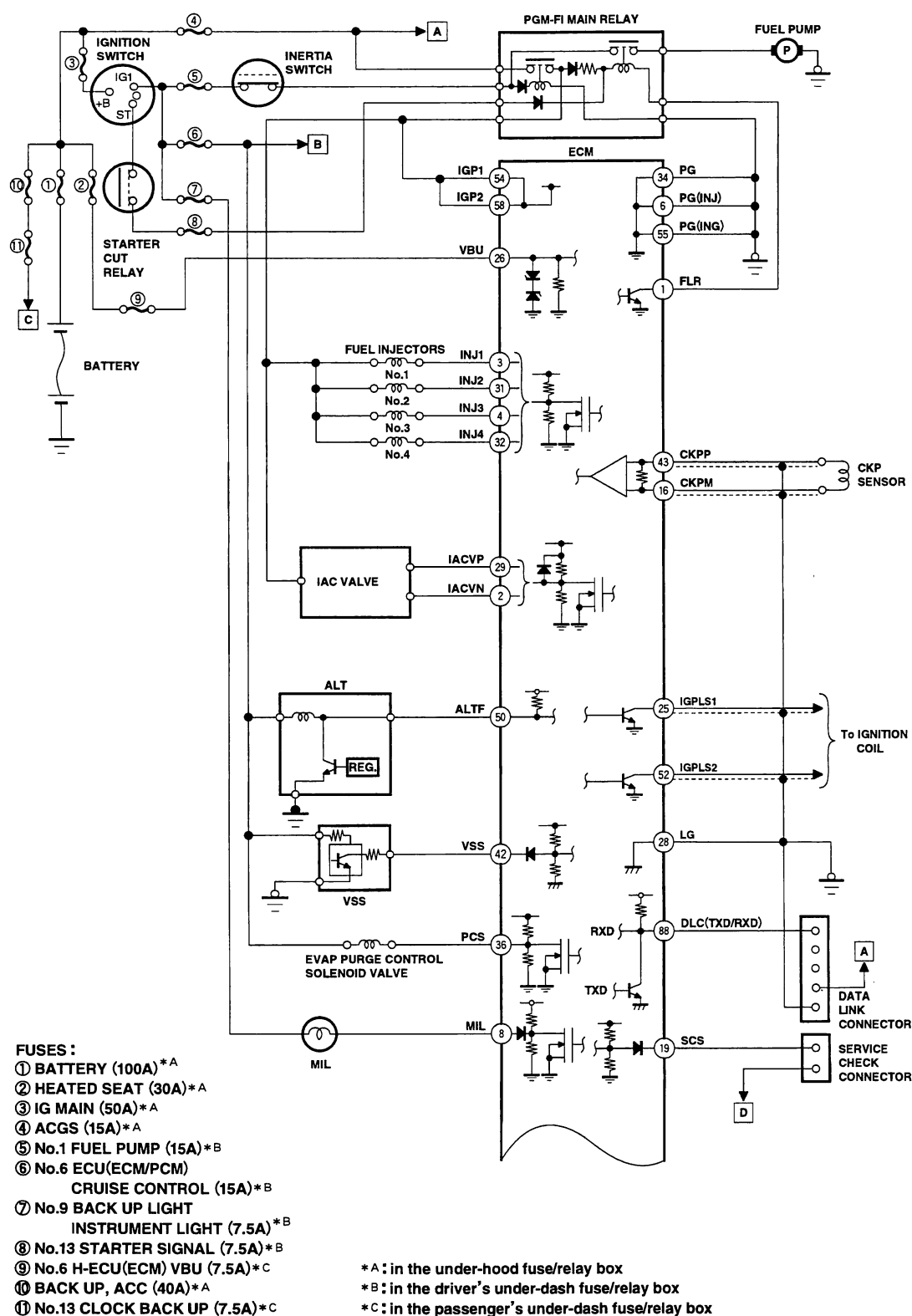


- ① HEATED OXYGEN SENSOR (HO2S)
- ② MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ③ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ④ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ⑤ CRANKSHAFT POSITION (CKP) SENSOR
- ⑥ IDLE AIR CONTROL (IAC) VALVE
- ⑦ THROTTLE BODY (TB)
- ⑧ FUEL INJECTOR
- ⑨ FUEL FILTER
- ⑩ FUEL PRESSURE REGULATOR
- ⑪ FUEL PUMP (FP)
- ⑫ FUEL TANK

- ⑬ AIR CLEANER
- ⑭ RESONATOR
- ⑮ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ⑯ THREE WAY CATALYTIC CONVERTER
- ⑰ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ⑱ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
- ⑲ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
- ⑳ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE



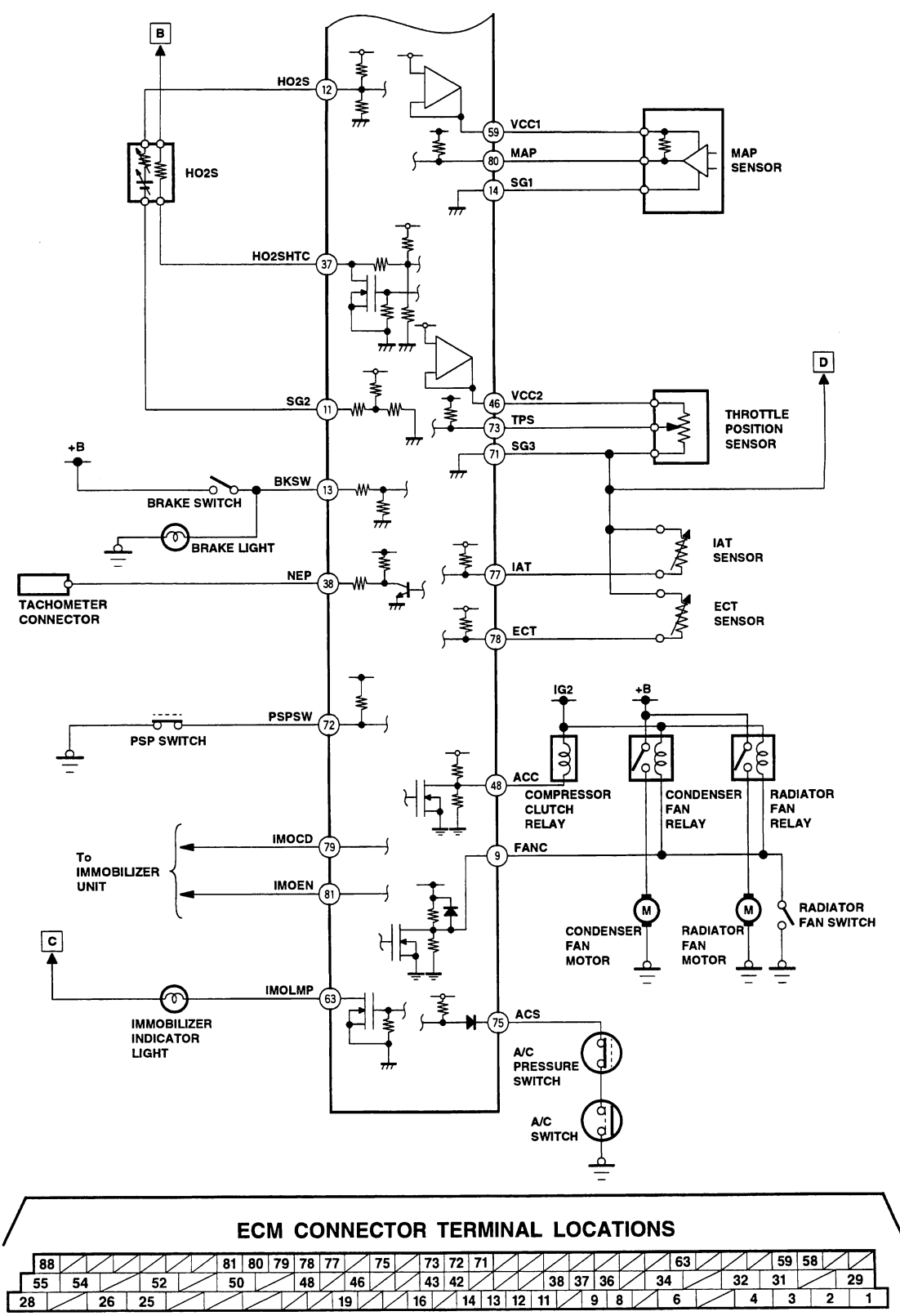
Electrical Connections



(cont'd)

System Description

Electrical Connections (cont'd)





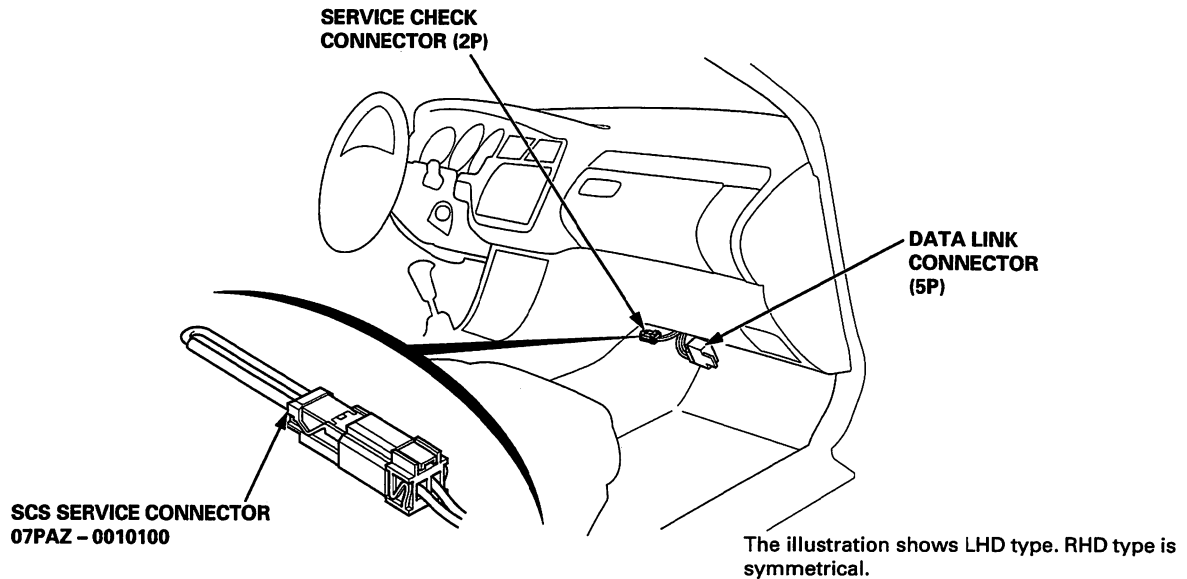
Troubleshooting Procedures

How To Begin Troubleshooting

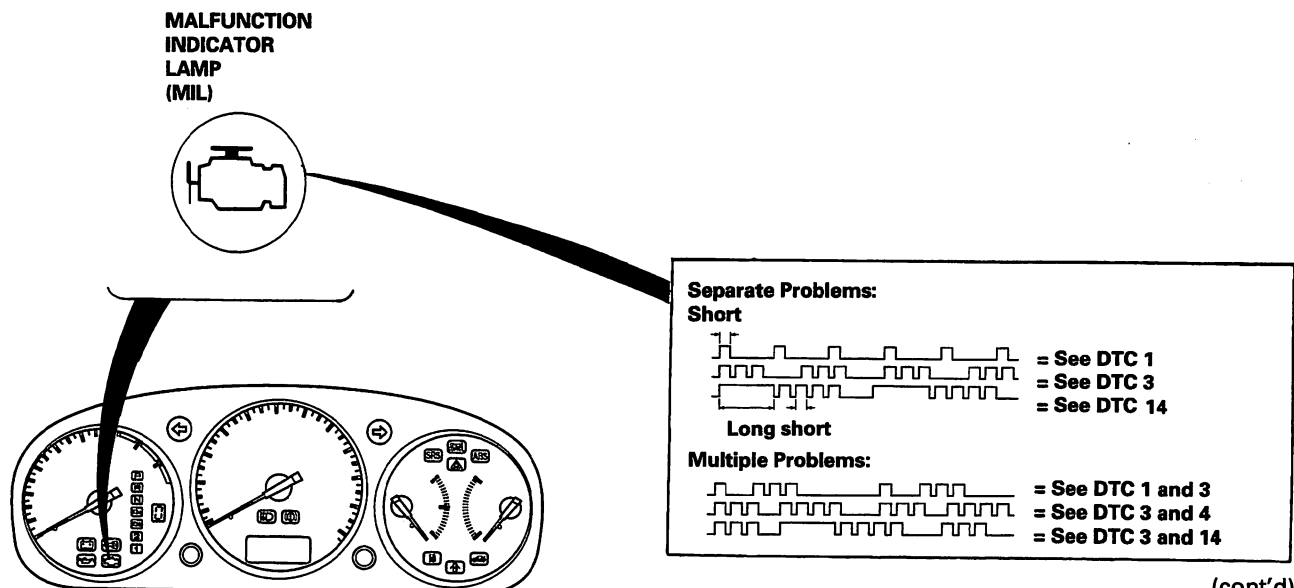
When the Malfunction Indicator Lamp (MIL) has been reported on, check the Diagnostic Trouble Code (DTC) as following:

NOTE: This operation can also be carried out with Honda PGM Tester connected to data link connector (5P).

1. Connect the SCS short connector to Service Check Connector as shown (The 2P Service Check Connector is located under the dash on the passenger side of the vehicle). Turn the ignition switch ON (II).



2. Note the Diagnostic Trouble Code (DTC): The MIL indicates a code by the length and number of blinks. The MIL can indicate multiple problems by blinking separate codes, one after another. Codes 1 through 9 are indicated by individual short blinks. Codes 10 through 41 are indicated by a series of long and short blinks. The number of long blinks equals the first digit, the number of short blinks equals the second digit. Sometimes the first blink is difficult to see; always count the blinks at least twice to verify the code.



(cont'd)

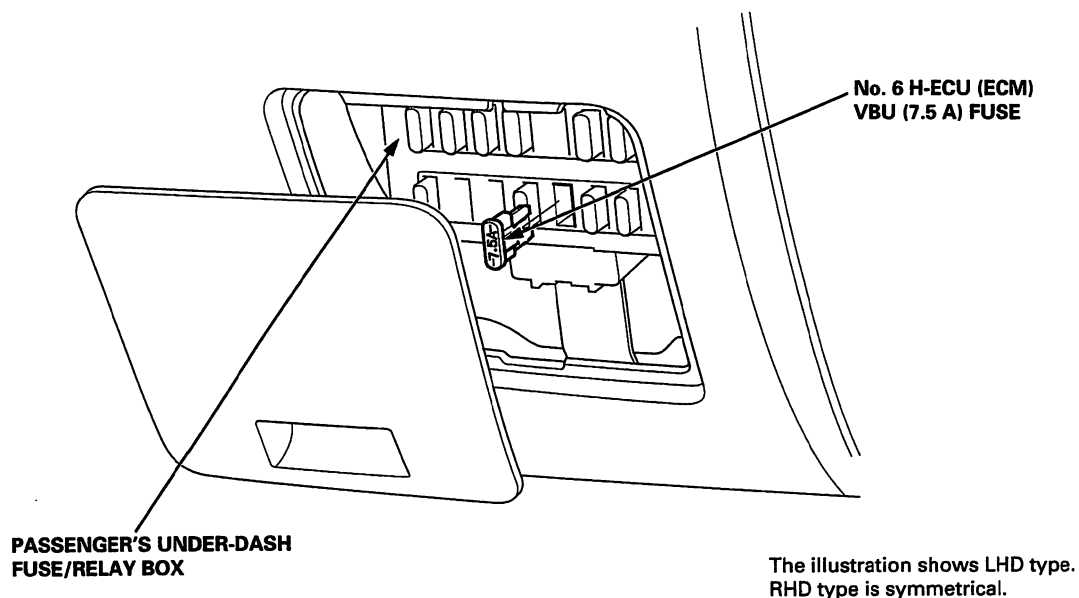
Troubleshooting

Troubleshooting Procedures (cont'd)

Engine Control Module (ECM) Reset Procedure

NOTE: This operation can also be carried out with Honda PGM Tester.

1. Turn the ignition switch off.
2. Remove the No. 6 H-ECU (ECM) VBU (7.5 A) fuse from the passenger's under-dash fuse/relay box for 10 seconds to reset the ECM.



Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the SCS Short Connector.

NOTE: If the SCS short connector is connected and there are no DTCs stored in the ECM, the MIL will stay on when the ignition switch is turned ON (II).

2. Do the ECM Reset Procedure.

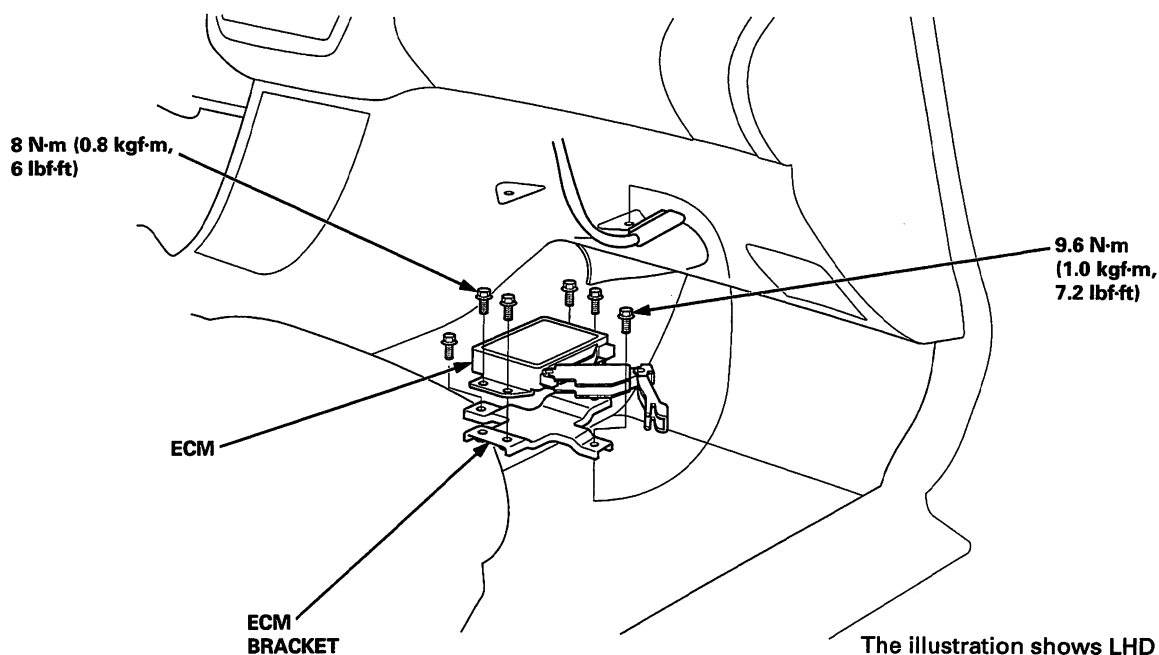
Known-Good ECM Substitution

The ECM is part of the immobilizer system. If you substitute a known-good ECM, the ECM will have a different immobilizer code. In order for the engine to start, you must rewrite the immobilizer code with the Honda PGM Tester.



ECM Removal

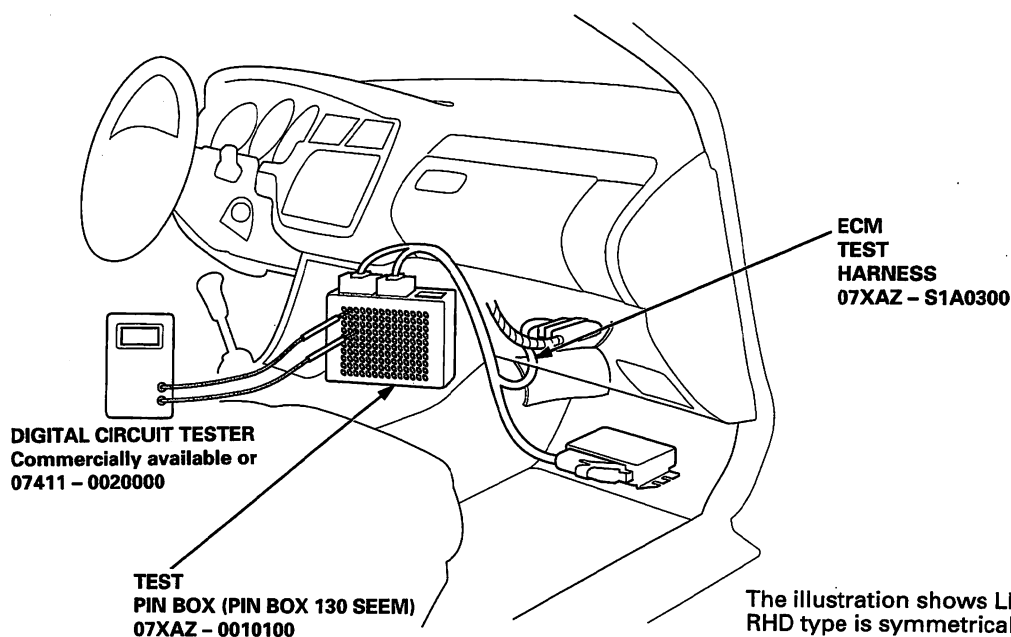
Pull the carpet from the passenger's side of the center console to expose the ECM. Unbolt the ECM bracket. Remove the four bolts from the ECM.



The illustration shows LHD type.
RHD type is symmetrical.

Checking The ECM Connector Terminals

When checking the ECM connector terminals, connect the ECM test harness and test pin box. Check the system according to the procedure described for the appropriate DTC listed on the following pages.



The illustration shows LHD type.
RHD type is symmetrical.

Troubleshooting



Troubleshooting Guide

NOTE: Across each row in the chart, the systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SYSTEM	PGM-FI							
		ENGINE CONTROL MODULE	HEATED OXY-GEN SENSOR**	MANIFOLD ABSOLUTE PRESSURE SENSOR	CRANKSHAFT POSITION SENSOR	ENGINE COOLANT TEMPERATURE SENSOR	THROTTLE POSITION SENSOR	INTAKE AIR TEMPERATURE SENSOR	VEHICLE SPEED SENSOR
SYMPTOM		11-C-21	11-C-26, 42	11-C-28	11-C-31	11-C-33	11-C-35	11-C-38	11-C-40
MALFUNCTION INDICATOR LAMP (MIL) TURNS ON									
MALFUNCTION INDICATOR LAMP (MIL) BLINKS									
ENGINE WON'T START		①			③				
DIFFICULT TO START ENGINE WHEN COLD				③	③	①			
IRREGULAR IDLING	WHEN COLD FAST IDLE OUT OF SPEC					③			
	ROUGH IDLE			③					
	WHEN WARM ENGINE SPEED TOO HIGH					③			
	WHEN WARM ENGINE SPEED TOO LOW								
FREQUENT STALLING	WHILE WARMING UP					③			
	AFTER WARMING UP								
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING			②	③				
	FAILS EMISSION TEST		③	②					
	LOSS OF POWER			③			②		

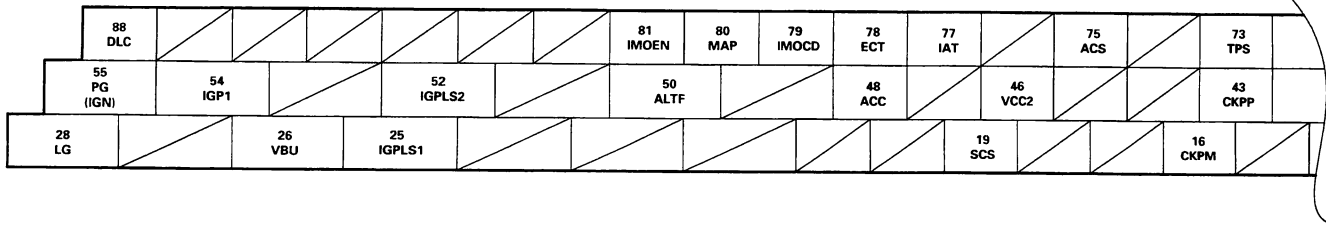
* If codes other than those listed above are indicated, count the number of blinks again. If the MIL is in fact blinking these codes, replace the ECM.



IDLE CONTROL		FUEL SUPPLY		INTAKE AIR	EMISSION CONTROL SYSTEM
IDLE AIR CONTROL VALVE	OTHER IDLE CONTROLS	FUEL INJECTOR	OTHER FUEL SUPPLY		
11-C-48	11-C-46	11-C-62	11-C-58	11-C-72	11-C-77
					
					
			②		
			②		
①	②				
①	②	②			
①	②				
①	②	②			
①	②		③		
②			①		
		①			
					①
		③	①	③	③

Troubleshooting

Engine Control Module (ECM) Terminal Arrangement



Wire side female terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	GRN/YEL	FLR (FUEL PUMP RELAY)	Drives fuel pump relay.	0 V for two seconds after turning ignition switch ON (II), then battery voltage
2	ORN	IACV N (IDLE AIR CONTROL VALVE N SIDE)	Drives IAC valve N side coil.	With engine running: pulses
3	BRN	INJ1 (No. 1 FUEL INJECTOR)	Drives No. 1 fuel injector.	With engine running: pulses
4	BLU	INJ3 (No. 3 FUEL INJECTOR)	Drives No. 3 fuel injector.	
6	BLK	PG (INJ) (POWER GROUND)	Ground for the injector circuit.	Less than 1.0 V at all times
8	GRN/ORN	MIL (MALFUNCTION INDICATOR LIGHT)	Drives MIL.	With MIL turned ON: 0 V With MIL turned OFF: battery voltage
9	GRN	FANC (RADIATOR FAN CONTROL)	Drives radiator fan relay.	With radiator fan running: 0 V With radiator fan stopped: battery voltage
11	GRN/BLK	SG2 (SENSOR GROUND)	Ground for HO2S	Less than 1.0 V at all times
12	WHT	HO2S (HEATED OXYGEN SENSOR)	Detects heated oxygen sensor signal.	With throttle fully opened from idle with fully, warmed up engine: above 0.9 V With throttle quickly closed: below 0.6 V
13	GRN/WHT	BKSW (BRAKE SWITCH)	Detects brake switch signal.	With brake pedal released: 0 V With brake pedal depressed: battery voltage
14	GRN/WHT	SG1 (SENSOR GROUND)	Ground for MAP sensor.	Less than 1.0 V at all times
16	WHT	CKPM (CKP SENSOR M SIDE)	Ground for CKP sensor.	
19	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check connector signal (the signal causing a DTC indication)	With the terminal connected: 0 V With the terminal disconnected: battery voltage
25	WHT	IGPLS1 (IGNITION PULSE)	Sends ignition pulse to ignition coil No. 1 and No. 4	With engine running: pulses
26	WHT/BLU	VBU (VOLTAGE BACK UP)	Power source for the ECM control circuit. Power source for the DTC memory.	Battery voltage at this times
28	BRN/BLK	LG (LOGIC GROUND)	Ground for the ECM control circuit.	Less than 1.0 V at all times
29	BLK/BLU	IACV P (IDLE AIR CONTROL VALVE P SIDE)	Drives IAC valve P side coil.	With engine running: pulses
31	RED	INJ2 (No. 2 FUEL INJECTOR)	Drives No. 2 fuel injector.	With engine running: pulses
32	YEL	INJ4 (No. 4 FUEL INJECTOR)	Drives No. 4 fuel injector.	
34	BLK	PG (POWER GROUND)	Ground for the ECM control circuit.	Less than 1.0 V at all times
36	RED/YEL	PCS (EVAP PURGE CONTROL SOLENOID VALVE)	Drives EVAP purge control solenoid valve.	With engine running, engine coolant, below 39°C (102°F): battery voltage With engine running, engine coolant, above 39°C (102°F): duty controlled
37	BLK/WHT	HO2SHTC (HEATED OXYGEN SENSOR HEATER CONTROL)	Drives heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: 0 V



72 PSP SW	71 SG3								63 IMO LMP					59 VCC1	58 IGP2		
42 VSS				38 NEP	37 HO2S HTC	36 PCS			34 PG			32 INJ4	31 INJ2				29 IACV P
	14 SG1	13 BKSW	12 HO2S	11 SG2		9 FANC	8 MIL			6 PG (INJ)		4 INJ3	3 INJ1		2 IACV N		1 FLR

Wire side female terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
38	BLU	NEP (ENGINE SPEED PULSE)	Outputs engine speed pulse.	With engine running: pulses
42	BLU/WHT	VSS (VEHICLE SPEED SENSOR)	Detects VSS signal.	With ignition switch ON (II) and front wheel rotating: cycles 0 V – 5 V
43	BLU	CKPP (CKP SENSOR P SIDE)	Detects CKP sensor	With engine running: pulses
46	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
48	RED	ACC (A/C CLUTCH RELAY)	Drives A/C clutch relay.	With compressor ON: 0 V With compressor OFF: battery voltage
50	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal.	With fully warmed up engine running: 0 V – battery voltage (depending on electrical load)
52	WHT/GRN	IGPLS2 (IGNITION PULSE)	Sends ignition pulse to ignition coil No. 2 and No. 3.	With engine running: pulses
54	YEL/BLK	IGP1 (POWER SOURCE)	Power source for the ECM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
55	BLK	PG (IGN) (POWER GROUND)	Ground for the ignition system.	Less than 1.0 V at all times
58	YEL/BLK	IGP2 (POWER SOURCE)	Power source for the ECM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
59	YEL/RED	VCC1 (SENSOR VOLTAGE)	Power source to MAP sensor.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
63	PNK	IMOLMP (IMMOBILIZER INDICATOR LIGHT)	Drives immobilizer indicator light.	With immobilizer indicator light turned ON: 0 V With immobilizer indicator light turned OFF: battery voltage
71	GRN/BLK	SG3 (SENSOR GROUND)	Sensor ground.	Less than 1.0 V at all times
72	GRN	PSPSW (P/S PRESSURE SWITCH SIGNAL)	Detects PSP switch signal.	At idle with steering wheel in straight ahead position: 0 V At idle with steering wheel at full lock: battery voltage
73	RED/BLK	TPS (THROTTLE POSITION SENSOR)	Detects TP sensor signal.	With throttle fully open: about 4.3 V With throttle fully closed: about 0.5 V
75	BLU/RED	ACS (A/C SWITCH SIGNAL)	Detects A/C switch signal.	With A/C switch ON: 0 V With A/C switch OFF: about 5 V
77	RED/YEL	IAT (INTAKE AIR TEMPERATURE SENSOR)	Detects IAT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on intake air temperature)
78	RED/WHT	ECT (ENGINE COOLANT TEMPERATURE SENSOR)	Detects ECT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on engine coolant temperature)
79	BLU/GRN	IM OCD (IMMOBILIZER CODE)	Detects immobilizer signal.	
80	RED/GRN	MAP (MANIFOLD ABSOLUTE PRESSURE SENSOR)	Detects MAP sensor signal.	With ignition switch ON (II): about 3 V At idle: about 1.0 V (depending on engine speed)
81	ORN/BLU	IMOEN (IMMOBILIZER ENABLE SIGNAL)	Sends immobilizer enable signal.	
88	LT BLU	DLC (TXD/RXD)	Sends and receives scan tool signal.	With ignition switch ON (II): pulses

Troubleshooting

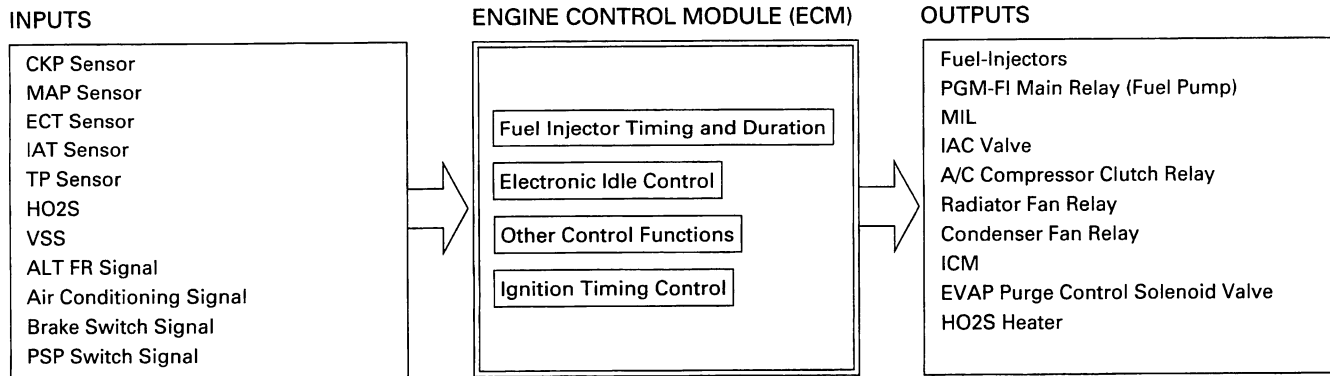
Diagnostic Trouble Code (DTC) Chart

DIAGNOSTIC TROUBLE CODE (DTC)	SYSTEM INDICATED	Page
0	ENGINE CONTROL MODULE (ECM)	11-C-21
1	HEATED OXYGEN SENSOR (HO2S)	11-C-26
3	MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR	11-C-28
4	CRANKSHAFT POSITION (CKP) SENSOR	11-C-31
6	ENGINE COOLANT TEMPERATURE (ECT) SENSOR	11-C-33
7	THROTTLE POSITION (TP) SENSOR	11-C-35
10	INTAKE AIR TEMPERATURE (IAT) SENSOR	11-C-38
14	IDLE AIR CONTROL (IAC) VALVE	11-C-48
17	VEHICLE SPEED SENSOR (VSS)	11-C-40
41	HEATED OXYGEN SENSOR (HO2S) HEATER	11-C-42

- If codes other than those listed above are indicated, verify the code. If the code indicated is not listed above, replace the ECM (see page 11-C-12 for immobilizer information).
- The MIL may come on, indicating a system problem when, in fact, there is a poor or intermittent electrical connection. First, check the electrical connections, clean or repair connections if necessary.



System Description



PGM-FI System

The PGM-FI system on this model is a multiport fuel injection system.

Fuel Injector Timing and Duration

The ECM contains memories for the basic discharge durations at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

Idle Air Control

Idle Air Control Valve (IAC Valve)

When the engine is cold, the A/C compressor is on, the brake pedal is depressed, the P/S load is high, or the alternator is charging, the ECM controls duty to the IAC Valve to maintain the correct idle speed.

Ignition Timing Control

- The ECM contains memories for basic ignition timing at various engine speeds and manifold pressures. Ignition timing is also adjusted for engine coolant temperature.

Other Control Functions

1. Starting Control

When the engine is started, the ECM provides a rich mixture by increasing fuel injector duration.

2. Fuel Pump Control

- When the engine is running, the ECM supplies ground to the PGM-FI main relay that supplies current to the fuel pump.
- When the engine is not running and the ignition is on, the ECM cuts ground to the PGM-FI main relay which cuts current to the fuel pump.

(cont'd)

PGM-FI System

System Description (cont'd)

3. Fuel Cut-off Control

- During deceleration with the throttle valve closed, current to the fuel injectors is cut off to improve fuel economy at speeds over 1,160 rpm (min^{-1}).
- Fuel cut-off action also takes place when engine speed exceeds 6,780 rpm (min^{-1}), regardless of the position of the throttle valve, to protect the engine from over-revving.

4. A/C Compressor Clutch Relay

When the ECM receives a demand for cooling from the air conditioning system, it delays the compressor from being energized.

5. Evaporative Emission (EVAP) Purge Control Solenoid Valve

When the engine coolant temperature is below 39°C (102°F), the ECM controls the EVAP purge control solenoid valve which controls vacuum to the EVAP purge control canister.

ECM Fail-safe/Self-diagnosis Functions

1. Fail-safe Function

When an abnormality occurs in a signal from a sensor, the ECM ignores that signal and assumes a pre-programmed value for that sensor that allows the engine to continue to run.

2. Self-diagnosis Function [Malfunction Indicator Lamp (MIL)]

When an abnormality occurs in a signal from a sensor, the ECM supplies ground for the MIL and stores the code in erasable memory. When the ignition is initially turned on, the ECM supplies ground for the MIL for two seconds to check the MIL bulb condition.



Engine Control Module (ECM)

The Malfunction Indicator Lamp (MIL) never comes on (even for two seconds) after ignition is turned ON (II).

NOTE:

- If this symptom is intermittent, check for:
 - A loose ACGS (15 A) fuse in the under-hood fuse/relay box
 - A loose No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse in the driver's under-dash fuse/relay box
 - A loose No. 1 FUEL PUMP fuse (15 A) in the driver's under-dash fuse/relay box
 - An intermittent short in the wire between the ECM (8) and the gauge assembly
 - An intermittent short in the wire between the ECM (59) and the MAP sensor
 - An intermittent short in the wire between the ECM (46), the TP sensor
 - PGM-FI main relay

Check the inertia switch:

1. Press the inertia switch button.
2. Turn the ignition switch ON (II).

Does the MIL come on for two seconds after ignition switch turned ON (II)?

YES

Intermittent failure, system is OK at this time.

NO

Check the inertia switch:

1. Disconnect the inertia switch 3P connector.
2. Connect the inertia switch 3P connector terminals No. 1 and No. 3 with a jumper wire.

Does the MIL come on for two seconds after ignition switch turned ON (II)?

YES

Replace the inertia switch.

NO

Is the low oil pressure light on?

NO

- Repair short in the wire between No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse and gauge assembly.
- Replace No. 9 BACK UP LIGHT INSTRUMENT LIGHT (7.5 A) fuse.

YES

Check the engine starting:
Try to start the engine.

Does the engine start?

YES

Check the MIL:

1. Turn the ignition switch OFF.
2. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
3. Connect the test pin box terminal No. 8 to body ground.
4. Turn the ignition switch ON (II).

Is the MIL on?

NO

- Replace the MIL bulb.
- Repair open wire between the ECM (8) and the gauge assembly.

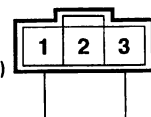
YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

(To page 11-C-22)

INERTIA SWITCH 3P CONNECTOR

INERTIA SWITCH
(RED/BLK)



IG1
(RED/WHT)

JUMPER WIRE

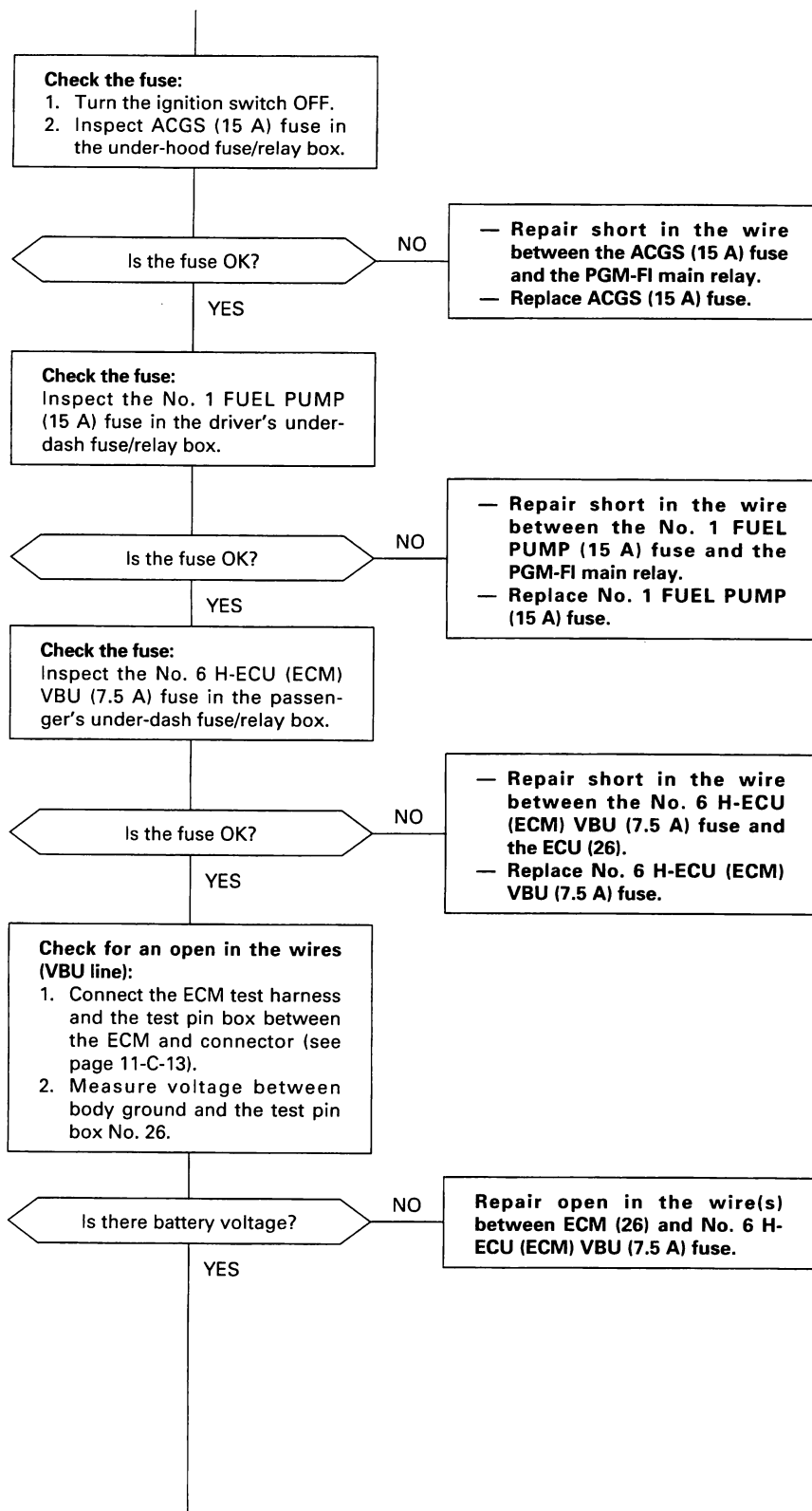
Terminal side of male terminals

(cont'd)

PGM-FI System

Engine Control Module (ECM) (cont'd)

(From page 11-C-21)



(To page 11-C-23)



(From page 11-C-22)

Check for an open in the wires (IGP1, IGP2 lines):

1. Disconnect the fuel injectors and IAC valve connectors.
2. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the test pin box terminals No. 54, No. 58 individually.

Is there battery voltage?

NO

— Repair open in the wire(s) between ECM (54, 58) and PGM-FI main relay.
— Check for poor connections or loose wires at the PGM-FI main relay.

YES

Check for an open in the wires (PG, LG lines):

1. Reconnect all the fuel injectors and IAC valve connectors.
2. Measure voltage between body ground and the test pin box terminals No. 6, No. 34, No. 55 and No. 28 individually.

Is there less than 1.0 V?

NO

Repair open in the wire(s) between the ECM (6, 34, 55, 28) and G202(G302)*.

YES

*: RHD

Check for a short in the wires (VCC1, VCC2 lines):
Measure voltage between body ground and the test pin box terminals No. 59 and No. 46 individually.

Is there approx. 5 V?

NO

Check for a short in a sensor.
While measuring voltage between body ground and the test pin box terminals No. 59 and No. 46 individually, disconnect the 3P connector of each sensor one at time:

- MAP sensor
- TP sensor

YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

Is there approx. 5 V?

NO

Repair short in the wire between MAP sensor, TP sensor and ECM (59, 46).

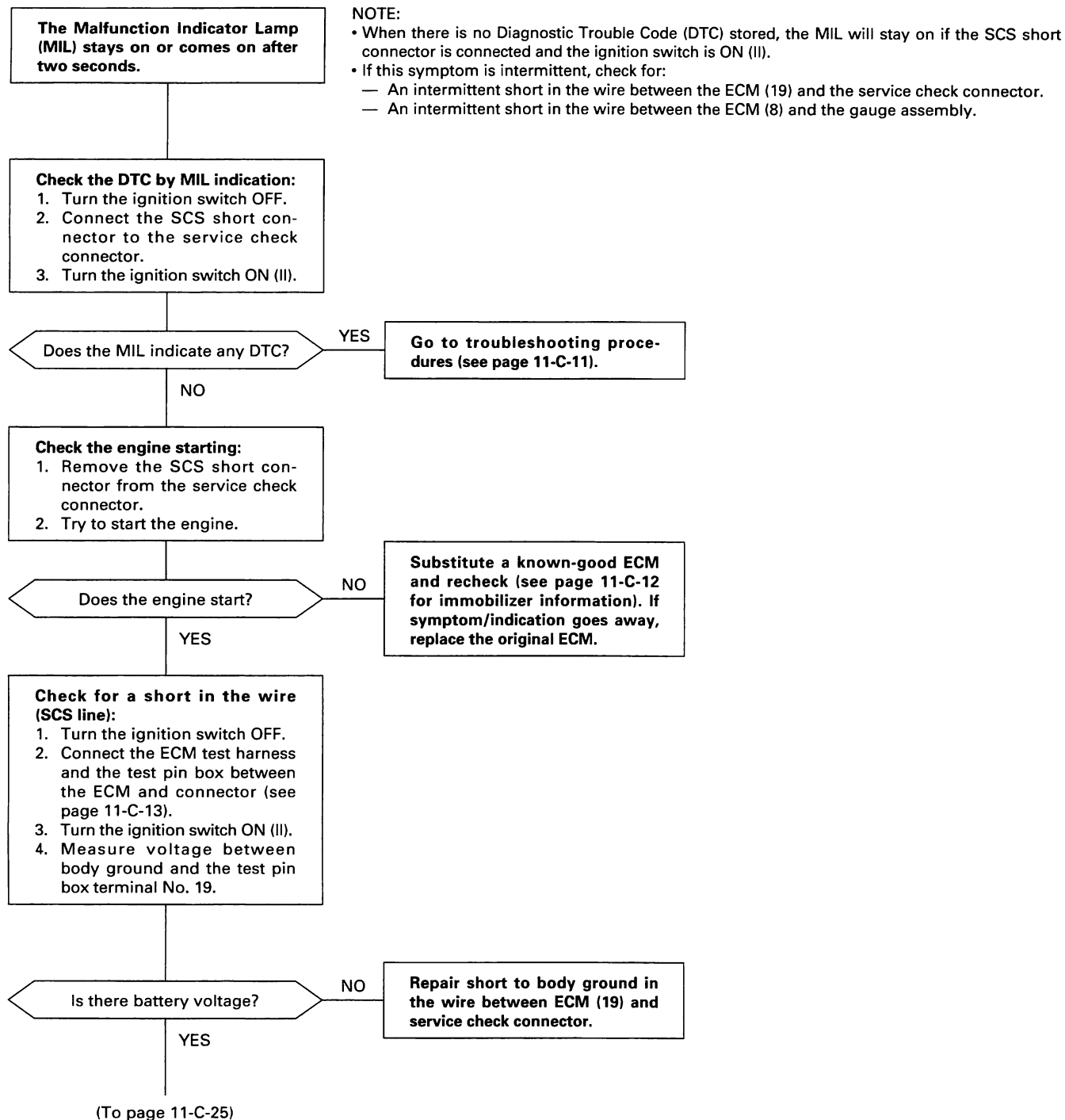
YES

Replace the sensor that had approx. 5 V.

(cont'd)

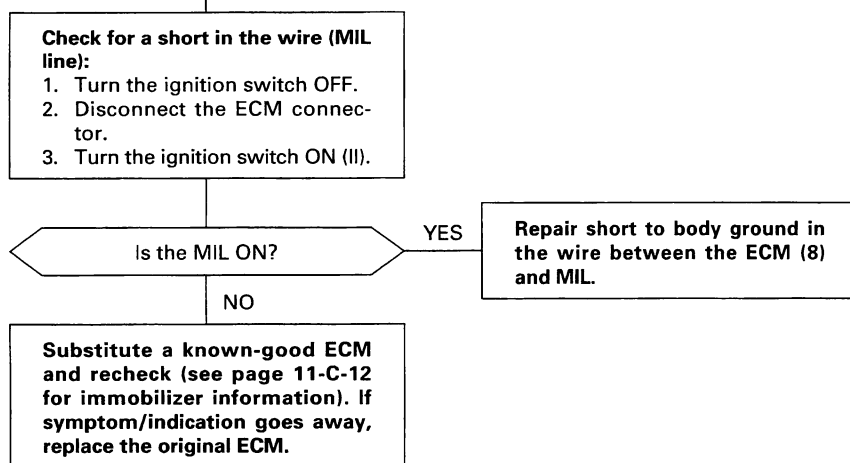
PGM-FI System

Engine Control Module (ECM) (cont'd)



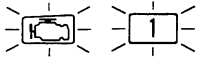


(From page 11-C-24)



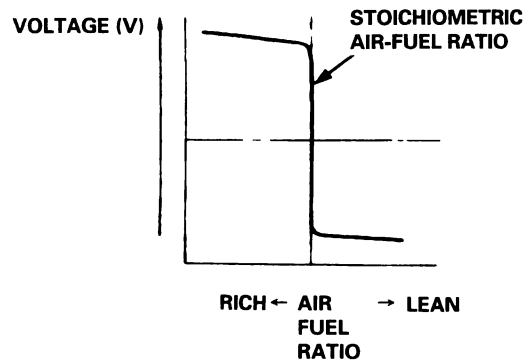
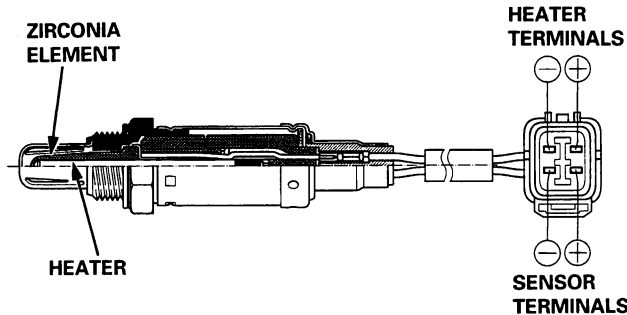
PGM-FI System

Heated Oxygen Sensor (HO2S)



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 1: A problem in the Heated Oxygen Sensor (HO2S) circuit.

The Heated Oxygen Sensor (HO2S) detects the oxygen content in the exhaust gas and signals the ECM. In operation, the ECM receives the signals from the sensor and varies the duration during which fuel is injected. To stabilize the sensor's output, the sensor has an internal heater. The HO2S is installed in the exhaust manifold.



- The MIL has been reported on.
- With the SCS short connector connected (see page 11-C-11), code 1 is indicated.

Check the fuel pressure:
Inspect fuel pressure (see page 11-C-12).

Is it normal?

NO

Go to page 11-C-58 Fuel Supply System.

YES

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle for at least one minute before test-driving.
3. Test-drive under following conditions.
 - Transmission in 4th gear.
 - Accelerate using wide open throttle for at least five seconds, then decelerate for at least five seconds with the throttle completely closed.

Is the MIL on and does it indicate code 1?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the HO2S and the ECM.

YES

(To page 11-C-27)



(From page 11-C-26)

Check the ECM input voltage:

1. Turn the ignition switch OFF.
2. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
3. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle for at least one minute before test-driving.
4. Measure voltage between ECM connector terminals No. 11 and No. 12.
5. Open the throttle wide open, then quickly release it.

Is the voltage above 0.6 V at wide open throttle to 4,500 rpm (min^{-1}) and below 0.4 V when the throttle is quickly released from 4,500 rpm (min^{-1})?

YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

NO

Check the HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the 4P connector from the HO2S.
3. At the HO2S sensor side, connect the battery positive terminal to terminal No. 2 and battery negative terminal to terminal No. 1.
4. Start the engine.
5. After two minutes, measure voltage between HO2S 4P connector terminals No. 3 and No. 4.

Is the voltage above 0.6 V at wide open throttle to 4,500 rpm (min^{-1}) and below 0.4 V when the throttle is quickly released from 4,500 rpm (min^{-1})?

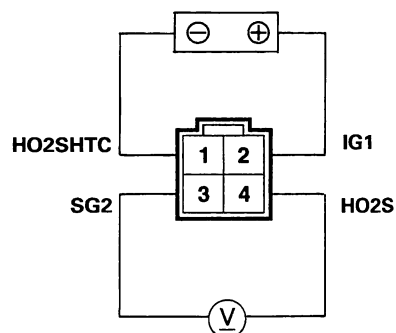
NO

Replace the HO2S (see page 11-C-45).

YES

Repair open or short in the wire ECM (12) and the HO2S.

HO2S 4P CONNECTOR



Terminals side of male terminals

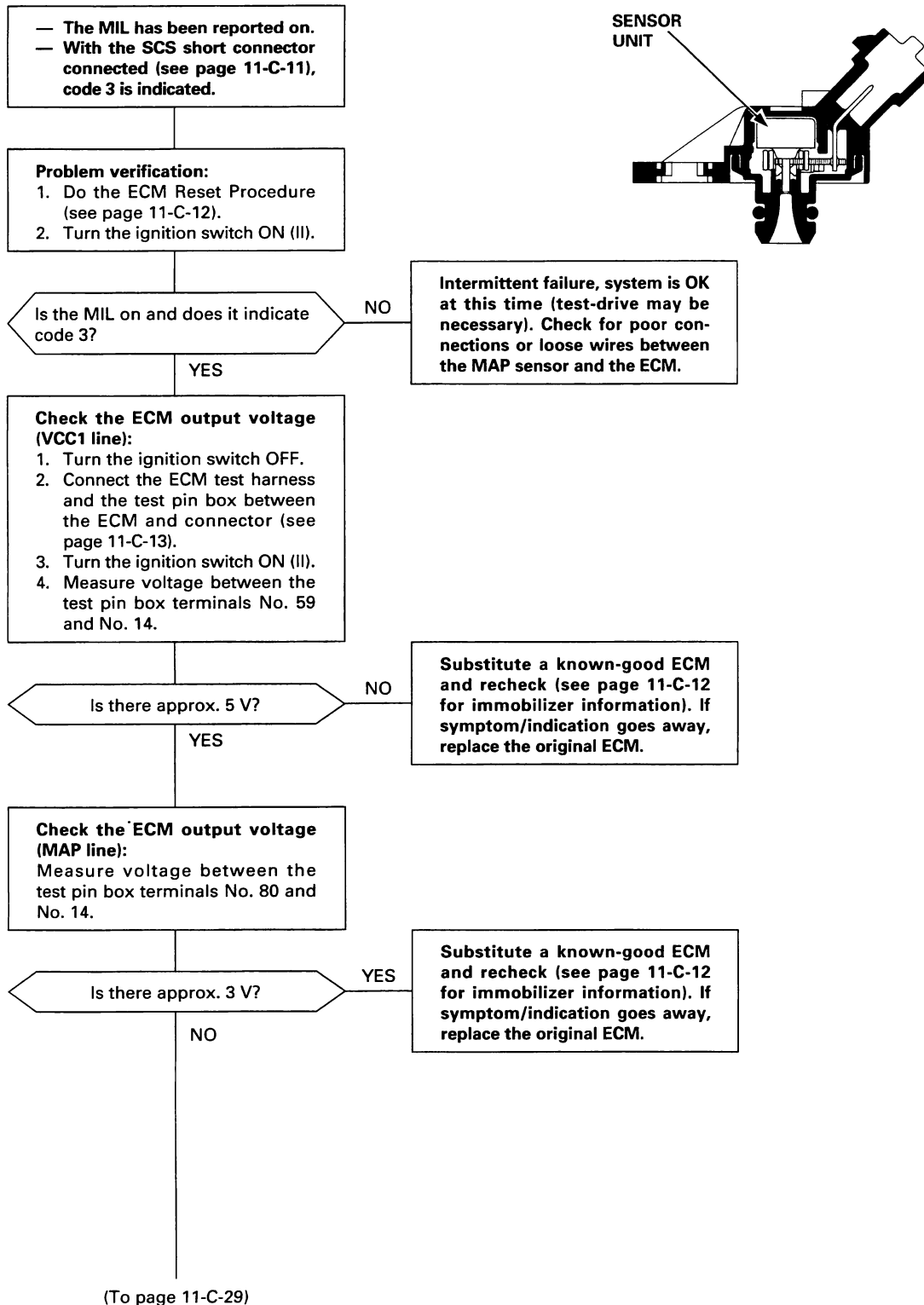
PGM-FI System

Manifold Absolute Pressure (MAP) Sensor



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 3: An electrical problem in the Manifold Absolute Pressure (MAP) Sensor circuit.

The MAP sensor converts manifold absolute pressure into electrical signals and inputs the ECM.

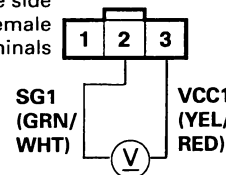




(From page 11-C-28)

MAP SENSOR 3P CONNECTOR

Wire side
of female
terminals



Is there approx. 5 V?

YES

Check for an open in the wire (SG1 line):

1. Turn the ignition switch OFF.
2. Disconnect 3P connector from the MAP sensor.
3. Turn the ignition switch ON (II).
4. Measure voltage between MAP sensor 3P connector terminals No. 2 and No. 3.

NO

Is there approx. 5 V?

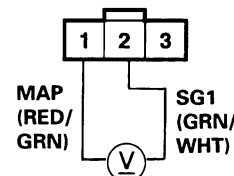
NO

Repair open in the wire between the ECM (14) and the MAP sensor.

YES

Check for an open in the wire (MAP line):

Measure voltage between MAP sensor 3P connector terminals No. 1 and No. 2.



Is there approx. 5 V?

NO

Repair open in the wire between the ECM (80) and the MAP sensor.

YES

Replace the MAP sensor.

Check the MAP sensor:

1. Turn the ignition switch OFF.
2. Disconnect the 3P connector from the MAP sensor.
3. Turn the ignition switch ON (II).
4. Measure voltage between the test pin box terminals No. 80 and No. 14.

Is there approx. 5 V?

YES

Replace the MAP sensor.

NO

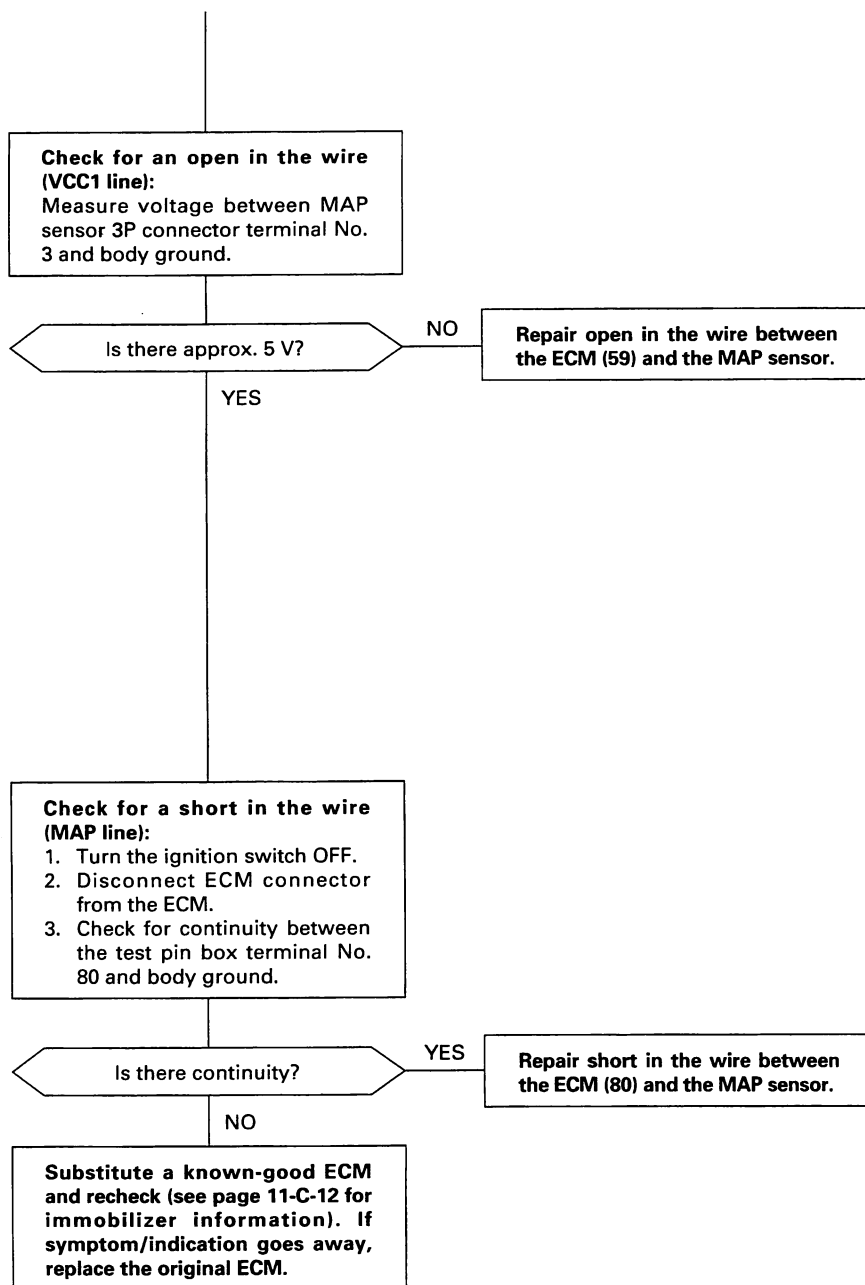
(To page 11-C-30)

(cont'd)

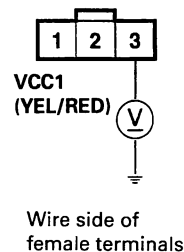
PGM-FI System

Manifold Absolute Pressure (MAP) Sensor (cont'd)

(From page 11-C-29)

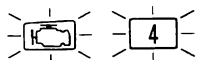


MAP SENSOR 3P CONNECTOR



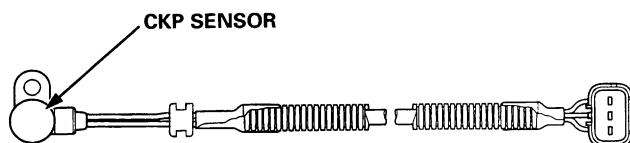


CKP Sensor



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 4: A problem in the Crankshaft Position (CKP) Sensor circuit.

The CKP Sensor determines timing for fuel injection and ignition of each cylinder and also detects engine speed.



— The MIL has been reported on.
— With the SCS short connector connected (see page 11-C-11), code 4 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Try to start the engine.

Is the MIL on and does it indicate code 4?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary).
Check for poor connections or loose wires between the CKP sensor and the ECM.

YES

Check the sensor resistance:

1. Turn the ignition switch OFF.
2. Disconnect the CKP sensor 3P connector.
3. Measure resistance between the CKP sensor 3P connector terminals No. 1 and No. 3.

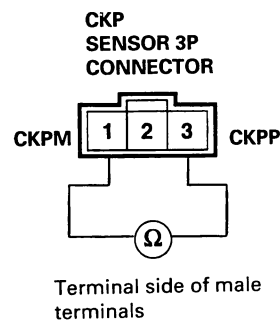
Is there 1,850 – 2,450 Ω ?

NO

Replace the CKP sensor.

YES

(To page 11-C-32)

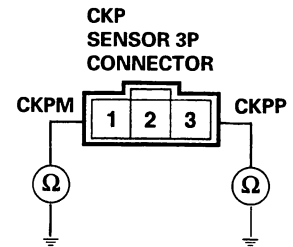
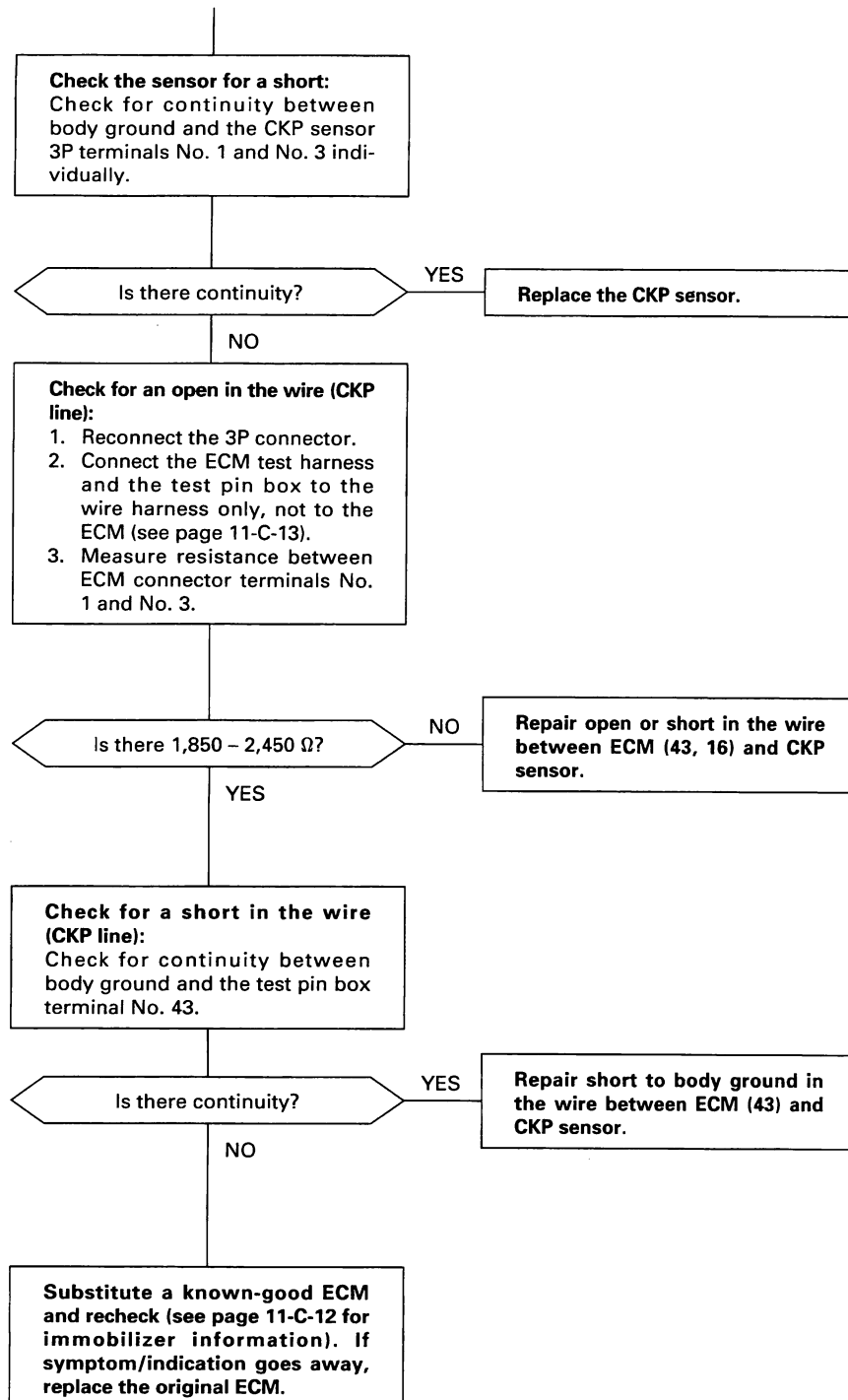


(cont'd)

PGM-FI System

CKP Sensor (cont'd)

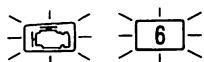
(From page 11-C-31)



Terminal side of
male terminals



Engine Coolant Temperature (ECT) Sensor



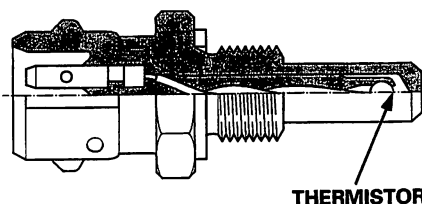
The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 6: A problem in the Engine Coolant Temperature (ECT) Sensor circuit.

The ECT sensor is a temperature dependent resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases as shown below.

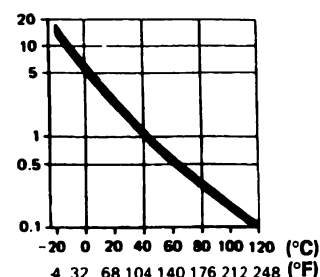
- The MIL has been reported on.
- With the SCS short connector connected (see page 11-C-11), code 6 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Turn the ignition switch ON (II).



RESISTANCE
(k Ω)



ENGINE COOLANT TEMPERATURE

Is the MIL on and does it indicate code 6?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the ECT sensor and the ECM.

YES

Check the sensor resistance:

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle.
2. Turn the ignition switch OFF.
3. Disconnect the 2P connector from the ECT sensor.
4. Measure resistance between the 2 terminals on the ECT sensor.

Is there 200 – 400 Ω ?

NO

Replace the ECT sensor.

YES

Check the ECM output voltage (ECT line):

1. Turn the ignition switch ON (II).
2. At the engine harness side, measure voltage between the ECT sensor 2P connector terminal No. 2 and body ground.

Is there approx. 5 V?

YES

NO

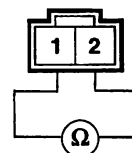


(To page 11-C-34)



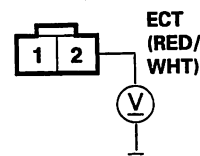
(To page 11-C-34)

ECT SENSOR 2P CONNECTOR



Terminal side of male terminals

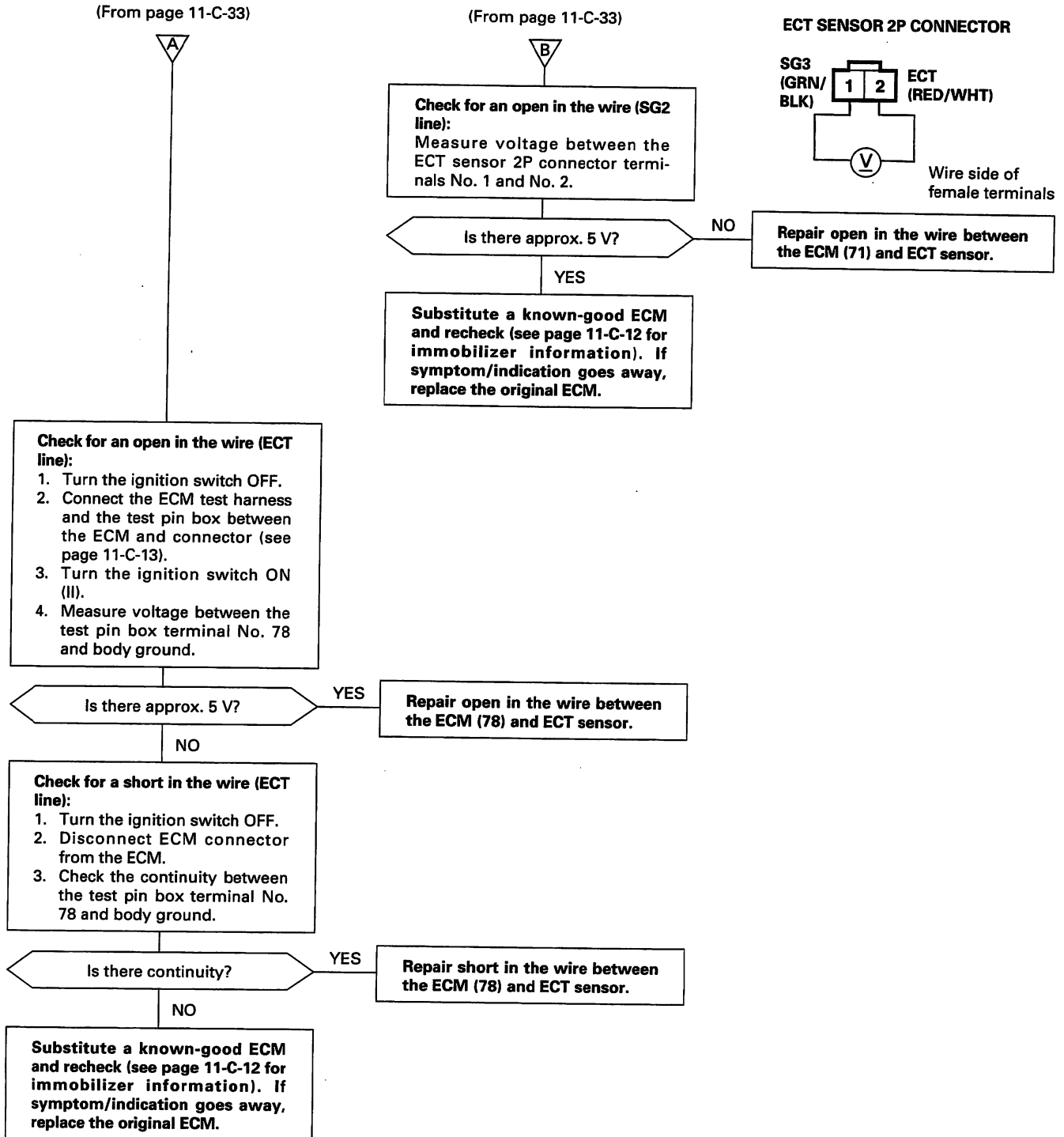
ECT SENSOR 2P CONNECTOR



Wire side of female terminals

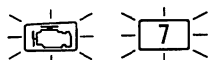
(cont'd)

Engine Coolant Temperature (ECT) Sensor (cont'd)



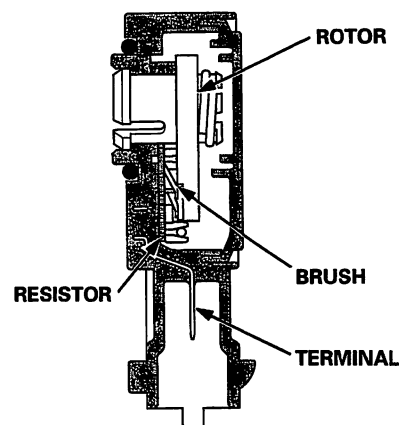
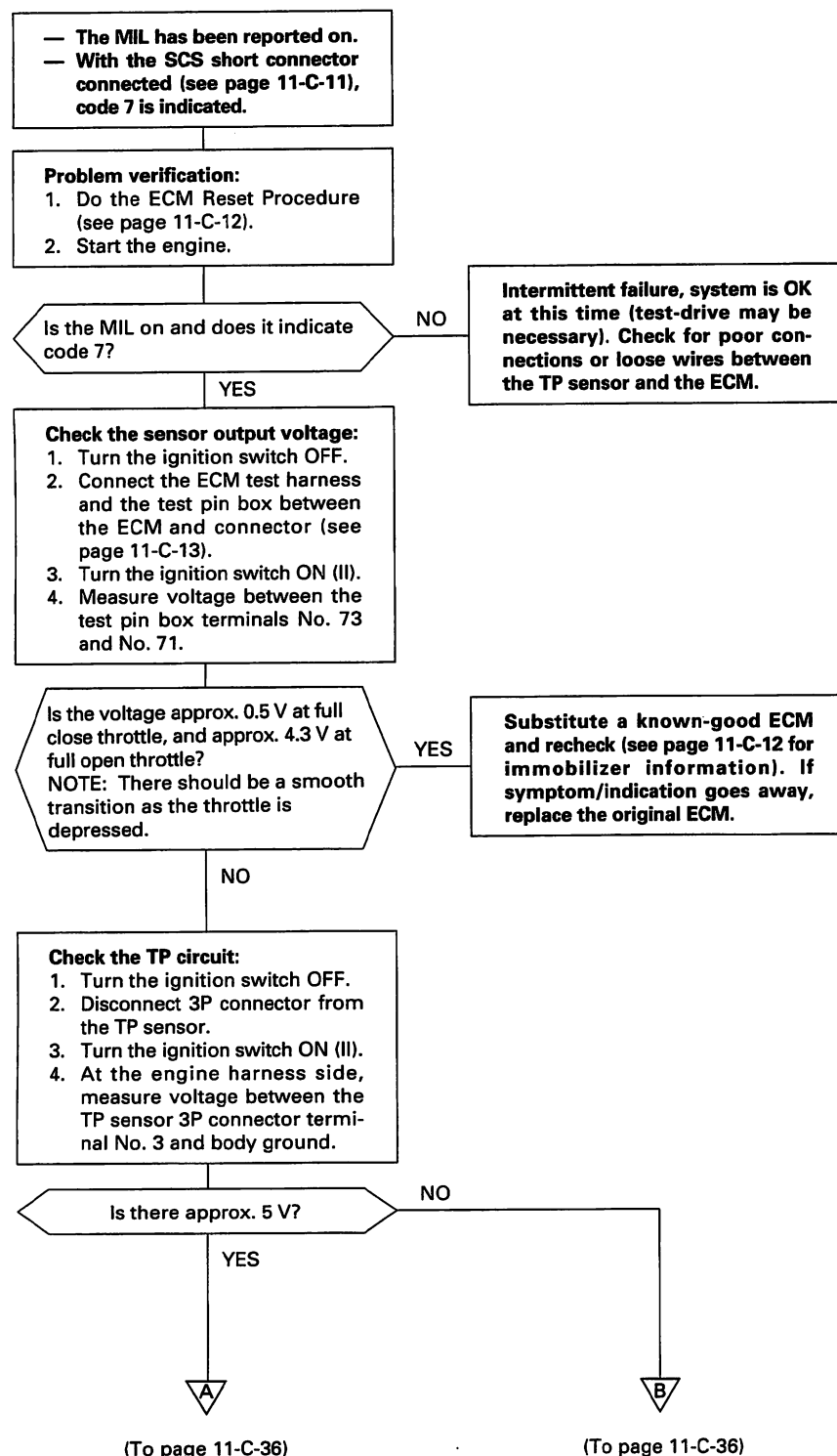


Throttle Position (TP) Sensor

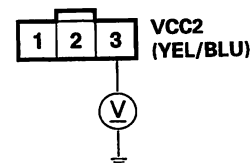


The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 7: A problem in the Throttle Position (TP) Sensor circuit.

The TP sensor is a potentiometer. It is connected to the throttle valve shaft. As the throttle position changes, the throttle position sensor varies the voltage signal to the ECM.



TP SENSOR 3P CONNECTOR

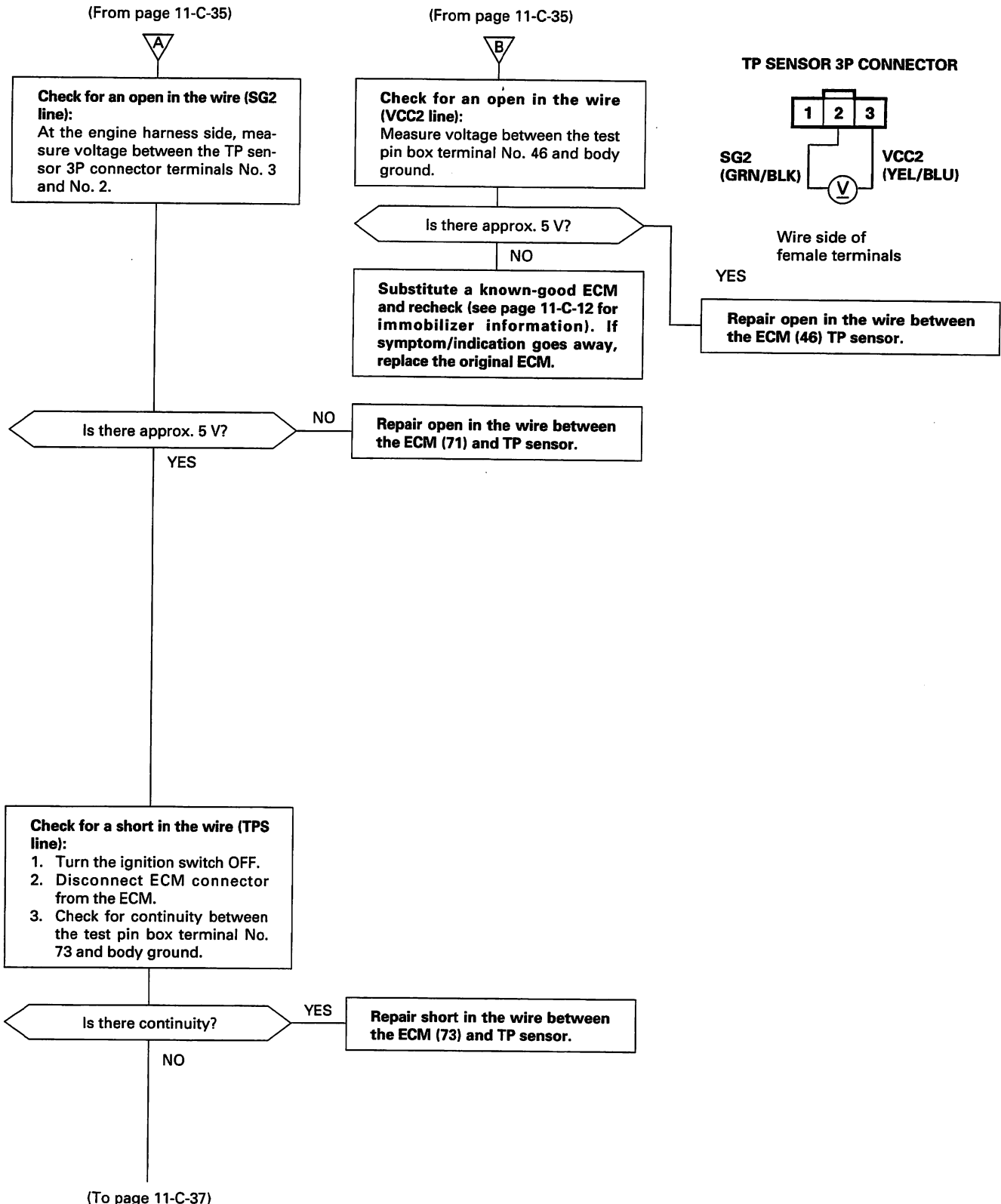


Wire side of female terminals

(cont'd)

PGM-FI System

Throttle Position (TP) Sensor (cont'd)





(From page 11-C-36)

Check for an open in the wire (TPS line):
Check for continuity between the test pin box terminal No. 73 and the TP sensor 3P connector terminal No. 1.

Is there continuity?

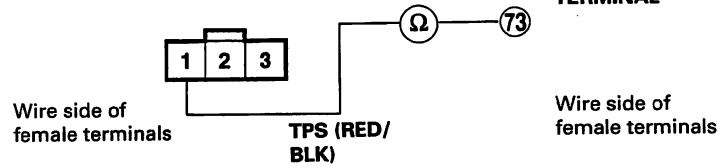
YES

Replace the TP sensor (see page 11-C-76).

NO

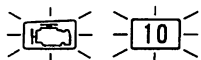
Repair open in the wire between the ECM (73) and TP sensor.

TP SENSOR 3P CONNECTOR



PGM-FI System

Intake Air Temperature (IAT) Sensor



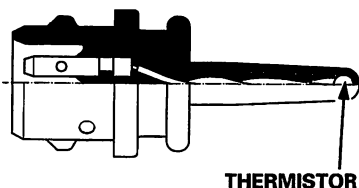
The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 10: A problem in the Intake Air Temperature (IAT) Sensor circuit.

The IAT sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the air temperature increases as shown below.

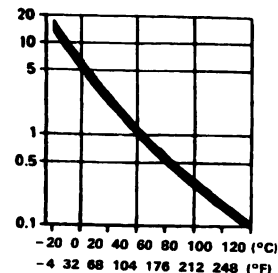
- The MIL has been reported on.
- With the SCS short connector connected (see page 11-C-11), code 10 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Turn the ignition switch ON (II).



RESISTANCE (k Ω)



INTAKE AIR TEMPERATURE

Is the MIL on and does it indicate code 10?

NO

Intermittent failure, system is OK at this time (test-drive may be necessary). Check for poor connections or loose wires between the IAT sensor and the ECM.

YES

Check the sensor resistance:

1. Turn the ignition switch OFF.
2. Disconnect 2P connector from the IAT sensor.
3. Measure resistance between the 2 terminals on the IAT sensor.

Is there 0.4 – 4.0 k Ω ?

NO

Replace the IAT sensor.

YES

Check the ECM output voltage (IAT line):

1. Turn the ignition switch ON (II).
2. At the main wire harness side, measure voltage between IAT sensor 2P connector terminal No. 2 and body ground.

Is there approx. 5 V?

YES

NO

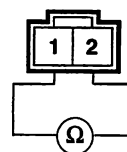


(To page 11-C-39)



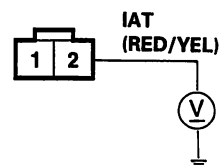
(To page 11-C-39)

IAT SENSOR 2P CONNECTOR



Terminal side of male terminals

IAT SENSOR 2P CONNECTOR



Wire side of female terminals



(From page 11-C-38)



Check for an open in the wire (IAT line):

1. Turn the ignition switch OFF.
2. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM connector terminal No. 77 and body ground.

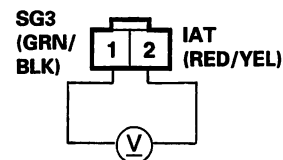
(From page 11-C-38)



Check for an open in the wire (SG2 line):

Measure voltage between the IAT sensor 2P connector terminal No. 1 and No. 2.

IAT SENSOR 2P CONNECTOR



Wire side of female terminals

Is there approx. 5 V?

NO

Repair open in the wire between the ECM (71) and IAT sensor.

YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

Is there approx. 5 V?

YES

Repair open in the wire between the ECM (77) and IAT sensor.

NO

Check for a short in the wire (IAT line):

1. Turn the ignition switch OFF.
2. Disconnect ECM connector from the ECM.
3. Check the continuity between the test pin box terminal No. 77 and body ground.

Is there continuity?

YES

Repair short in the wire between the ECM (77) and IAT sensor.

NO

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

PGM-FI System

Vehicle Speed Sensor (VSS)



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 17: A problem in the Vehicle Speed Sensor (VSS) circuit.

The VSS generates a pulsing signal when the front wheels turn.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-C-11), code 17 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Test-drive transmission in neutral, accelerate to 4,000 rpm (min^{-1}), then decelerate to 1,500 rpm (min^{-1}) with throttle fully closed for at least 5 seconds.

Is the MIL on and does it indicate code 17?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the VSS, the ECM.

YES

Check the ECM input voltage:

1. Turn the ignition switch OFF.
2. Block rear wheels and set the parking brake. Jack up the front of the car and support with safety stands.
3. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
4. Turn the ignition switch ON (II).
5. Block the right front wheel and slowly rotate left front wheel and measure voltage between the test pin box terminal No. 42 and No. 28.

⚠ WARNING

Make sure lifts, jacks and safety stands are placed properly (see section 1).

Does voltage pulse 0 V and approx. 5 V?

YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

NO

(To page 11-C-41)



(From page 11-C-40)

Check the circuit (VSS line):

1. Turn the ignition switch OFF.
2. Disconnect ECM connector from the ECM.
3. Turn the ignition switch ON (II).
4. Block the right front wheel and slowly rotate left front wheel and measure voltage between the test pin box terminals No. 42 and No. 28.

Does voltage pulse 0 V and approx. 5 V?

NO

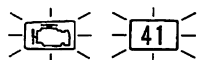
- Repair short in the wire between the ECM (42).
- Repair open in the wire between ECM (42) and the VSS.
- If wire is OK, test the VSS (see section 23).

YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

PGM-FI System

Heated Oxygen Sensor (HO2S) Heater



The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 41: A problem in the Heated Oxygen Sensor (HO2S) Heater circuit.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-C-11), code 41 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Start the engine.

Is the MIL on and does it indicate code 41?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the HO2S and the ECM.

YES

Check for an open or short in the HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the HO2S 4P connector.
3. At the HO2S side, measure resistance between the HO2S 4P connector terminals No. 1 and No. 2.

Is there 2 – 20 Ω ?

NO

Replace the HO2S (see page 11-C-45).

YES

At the HO2S side, check for continuity between body ground and the HO2S 4P connector terminals No. 1 and No. 2 individually.

Is there continuity?

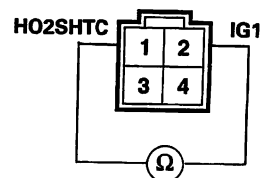
YES

Replace the HO2S (see page 11-C-45).

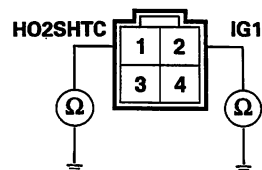
NO

(To page 11-C-43)

HO2S 4P CONNECTOR



Terminal side of male terminals





(From page 11-C-42)

Check for an open or short in the wires (HO2SHTC line):

1. Start the engine.
2. At the harness side, measure voltage between the HO2S 4P connector terminals No. 1 and No. 2.

Is there battery voltage?

YES

NO



(To page 11-C-44)

Check for an open in the wires (IG1 line):
Measure voltage between body ground and the HO2S 4P connector terminal No. 2.

Is there battery voltage?

NO

YES

Repair open in the wire between HO2S and No. 6 ECU (ECM) CRUISE CONTROL (15 A) fuse in the driver's under-dash fuse/relay box.

Check for an open in the wires (HO2SHTC line):

1. Turn the ignition switch OFF.
2. Reconnect the HO2S connector.
3. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
4. Start the engine.
5. Measure voltage between the test pin box terminals No. 37 and No. 34.

Is there 1.0 V or less?

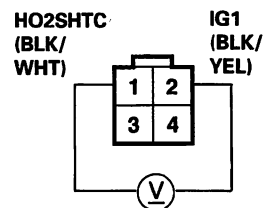
YES

NO

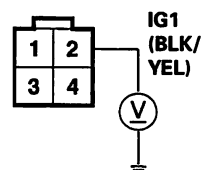
Repair open in the wire between ECM (37) and HO2S.

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

HO2S 4P CONNECTOR



Wire side of female terminals

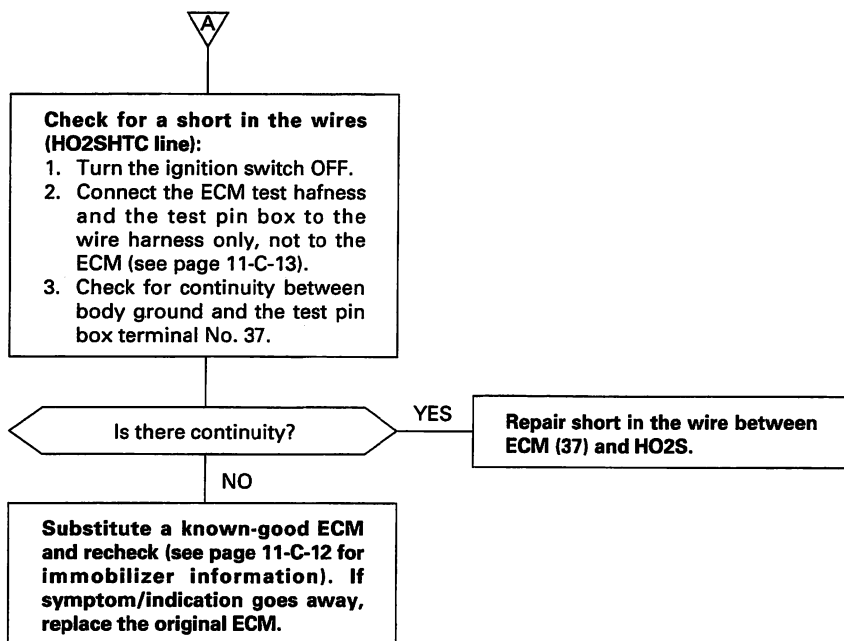


(cont'd)

PGM-FI System

Heated Oxygen Sensor (HO2S) Heater (cont'd)

(From page 11-C-43)

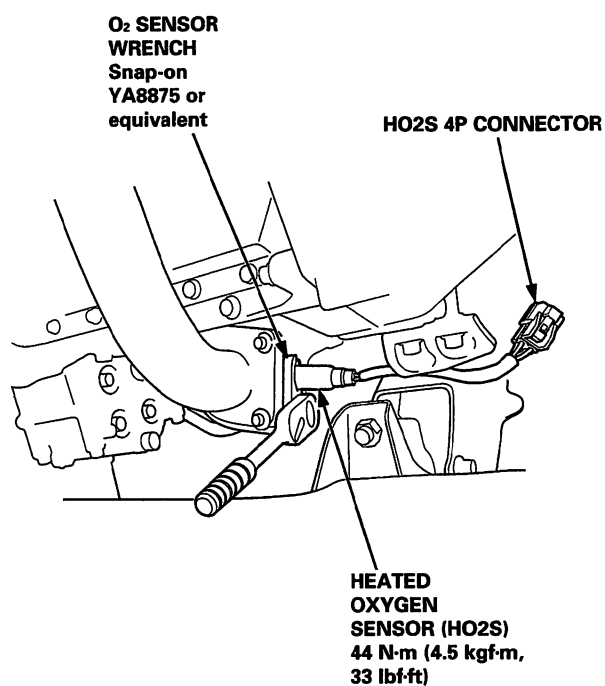


Heated Oxygen Sensor



Replacement

1. Disconnect the HO2S 4P connector, then remove the HO2S.



2. Install the HO2S in reverse order of removal.

Idle Control System

System Troubleshooting Guide

NOTE:

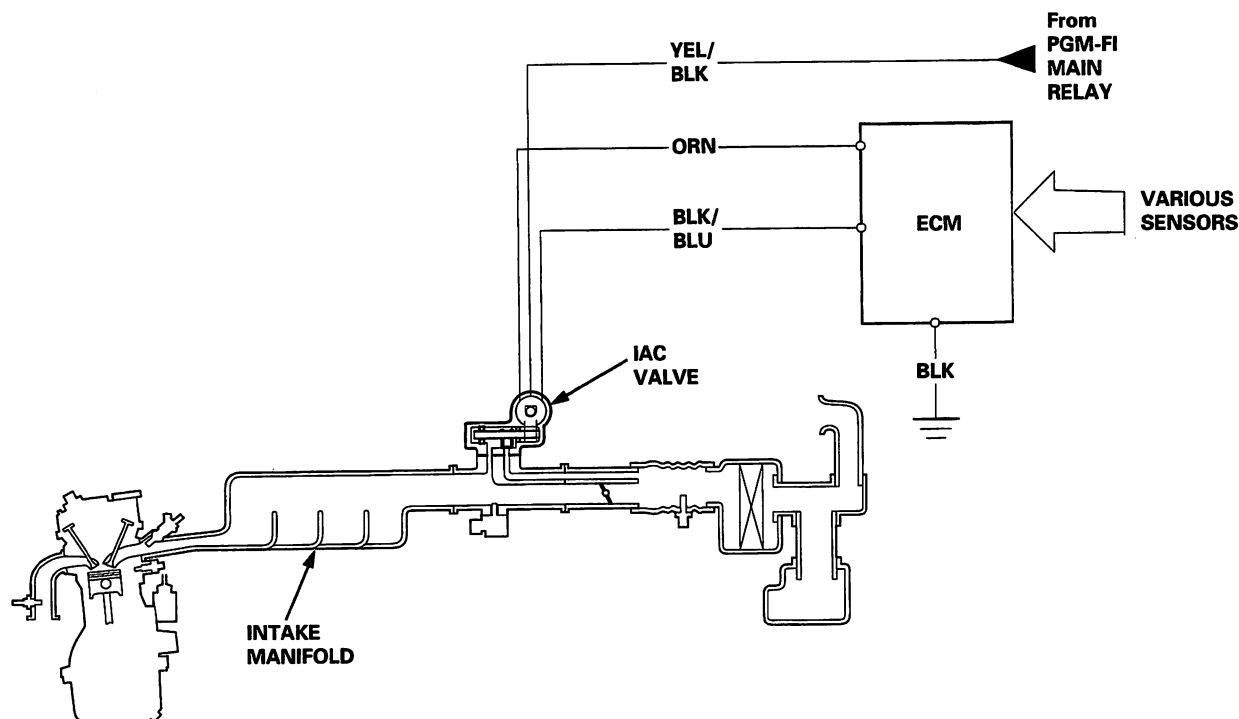
- Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected, starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.
- If the idle speed is out of specification and the Malfunction indicator Lamp (MIL) does not blink Diagnostic Trouble Code (DTC) 14, go to inspection described on page 11-C-47.

PAGE	SUB-SYSTEM	IDLE AIR CONTROL VALVE	AIR CONDITIONING SIGNAL	ALTERNATOR FR SIGNAL	BRAKE SWITCH SIGNAL	POWER STEERING PRESSURE SWITCH SIGNAL	HOSES AND CONNECTIONS
SYMPTOM		11-C-48	11-C-50	11-C-52	11-C-54	11-C-55	—
DIFFICULT TO START ENGINE WHEN COLD							
WHEN COLD FAST IDLE OUT OF SPEC [1,000 – 2,000 rpm (min ⁻¹)]		①					
ROUGH IDLE		②					①
WHEN WARM ENGINE SPEED TOO HIGH		①				③	②
WHEN WARM RPM TOO LOW	Idle speed is below specified rpm (no load)	①					
	Idle speed does not increase after initial start up.	①					
	Idle speeds drops when air conditioner in ON	②	①				
	Idle speed drops when steering wheel is turning	②				①	
	Idle speed fluctuates with electrical load	②		③			①
FREQUENT STALLING	WHILE WARMING UP	①					
	AFTER WARMING UP	①					
FAILS EMISSION TEST							①



System Description

The idle speed of the engine is controlled by the Idle Air Control (IAC) Valve. The valve changes the amount of air bypassing into the intake manifold in response to electric duty controlled by the ECM. When the IAC Valve is activated, the valve opens to maintain the proper idle speed.



1. When the coolant temperature is low, the IAC valve is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the engine coolant temperature.
2. When the idle speed is out of specification and the Malfunction Indicator Lamp (MIL) does not indicate Diagnostic Trouble Code (DTC) 14, check the following items:
 - Air conditioning signal (see page 11-C-50)
 - ALT FR signal (see page 11-C-52)
 - Brake switch signal (see page 11-C-54)
 - PSP switch signal (see page 11-C-55)
 - Hoses and connections
 - IAC valve and its mounting gasket
3. If the above items are normal (and the MIL does not indicate DTC 14), after IAC valve replacement, substitute a known-good ECM and recheck. If symptom goes away, replace the original ECM.

Idle Control System

Idle Air Control (IAC) Valve



The Malfunction Indicator Lamp (MIL) Diagnostic Trouble Code (DTC) 14: A problem in the Idle Air Control (IAC) Valve.

The IAC Valve changes the amount of air bypassing the throttle body in response to a current signal from the ECM in order to maintain the proper idle speed.

- The MIL has been reported on.
- With the SCS short connector connected (see page 11-C-11), code 14 is indicated.

Problem verification:

1. Do the ECM Reset Procedure (see page 11-C-12).
2. Turn the ignition switch ON (II).

Does the MIL blink and does it indicated code 14?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires between the IAC valve and the ECM.

YES

Check the ECM input voltage:

1. Turn the ignition switch OFF.
2. Connect the ECM test harness and the test pin box between the ECM and connector (see page 11-C-13).
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the test pin box terminals No. 29, No. 2* individually.

*: IACV N line

Is there battery voltage?

YES

Check the IAC Valve:

1. Turn the ignition switch OFF.
2. Disconnect the IAC Valve 3P connector.
3. Measure resistance between IAC Valve 3P connector terminals No. 2 and No. 1, No. 3 individually.

Is there 10 – 22 Ω ?

NO

Replace the IAC Valve.

YES

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

Check for an open in the wire (IGP line):

1. Turn the ignition switch OFF.
2. Disconnect the IAC Valve 3P connector.
3. Turn the ignition switch ON (II).
4. At the wire harness, measure voltage between IAC Valve 3P connector terminal No. 2 and body ground.

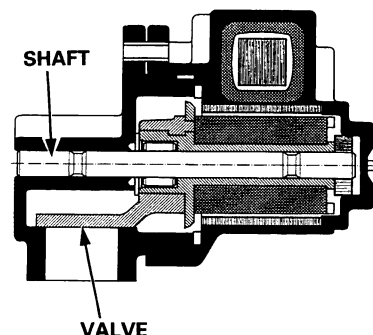
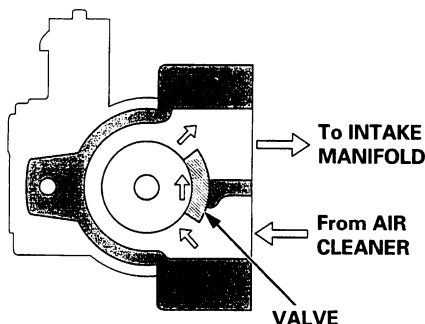
Is there battery voltage?

NO

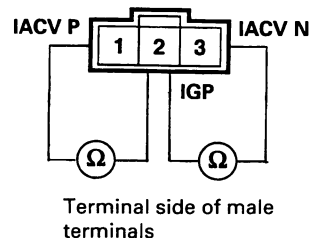
Repair open in the wire between the IAC Valve and PGM-FI main relay.

YES

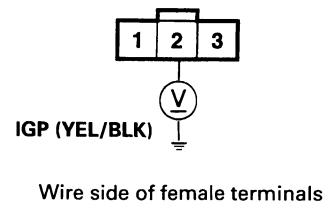
(To page 11-C-49)



IAC VALVE 3P CONNECTOR



IAC VALVE 3P CONNECTOR





(From page 11-C-48)

Check for an open in the wire (IACV P, IACV N* line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM connector.
3. Check for continuity between IAC Valve 3P connector terminal No. 1 and the test pin box terminal No. 29 (IAC Valve 3P connector terminal No. 3 and the test pin box terminal No. 2)*.

*: IACV N line

Is there continuity?

NO

Repair open in the wire between the IAC Valve and ECM (29, 2*).

YES

Check for a short in the wire (IACV P, IACV N* line):
Check for continuity between body ground and the test pin box terminals No. 29, No. 2* individually.

Is there continuity?

YES

Repair short in the wire between the IAC Valve and ECM (29, 2*).

NO

Check the IAC Valve:

1. Disconnect the IAC Valve 3P connector.
2. Measure resistance between IAC Valve 3P connector terminals No. 2 and No. 1, No. 3 individually.

Is there 10 – 22 Ω ?

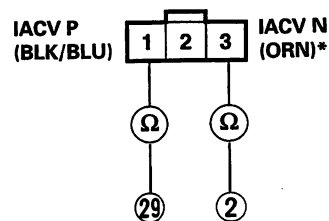
NO

Replace the IAC Valve.

YES

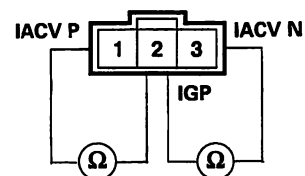
Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

IAC VALVE 3P CONNECTOR



TEST PIN BOX TERMINALS

IAC VALVE 3P CONNECTOR

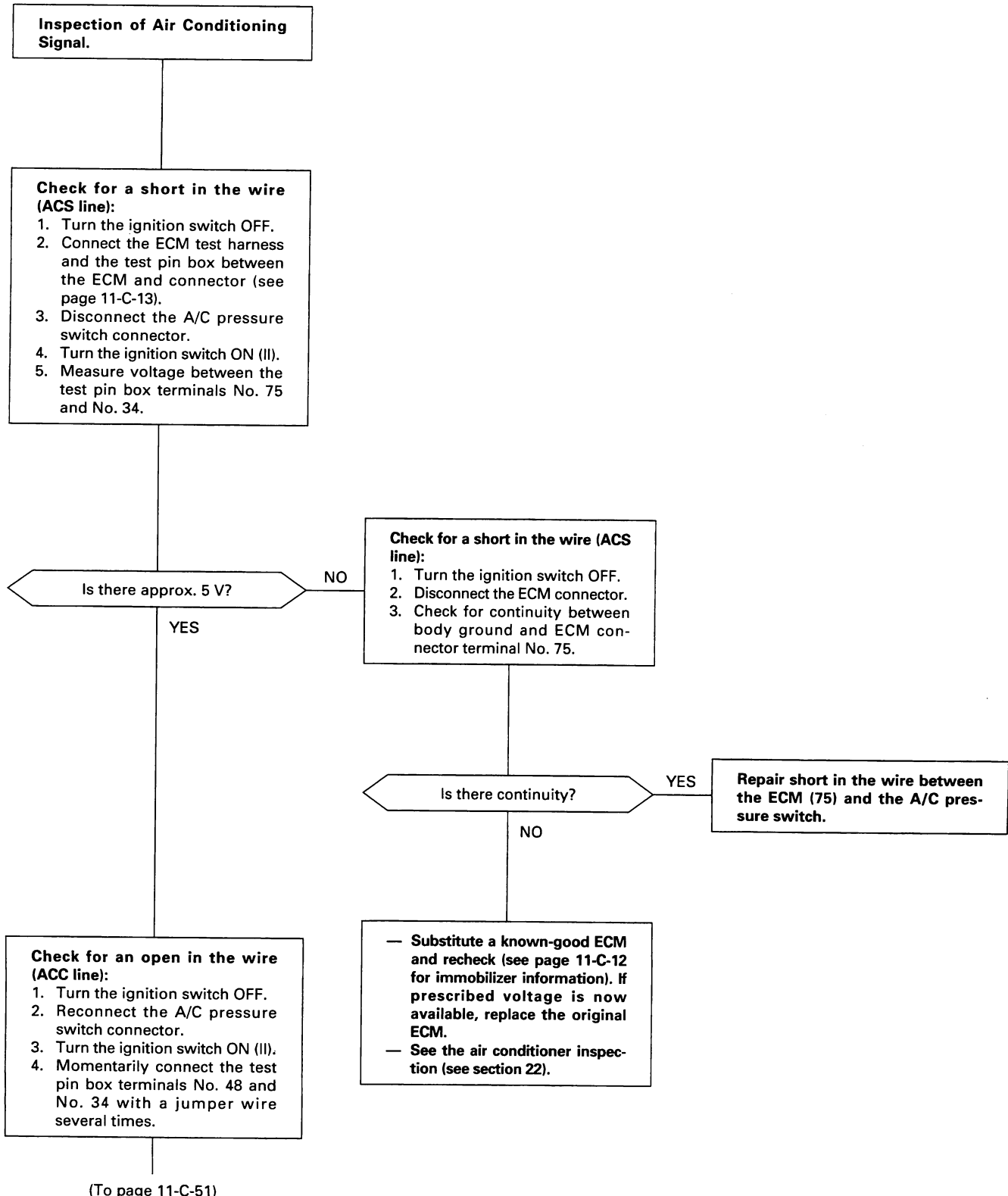


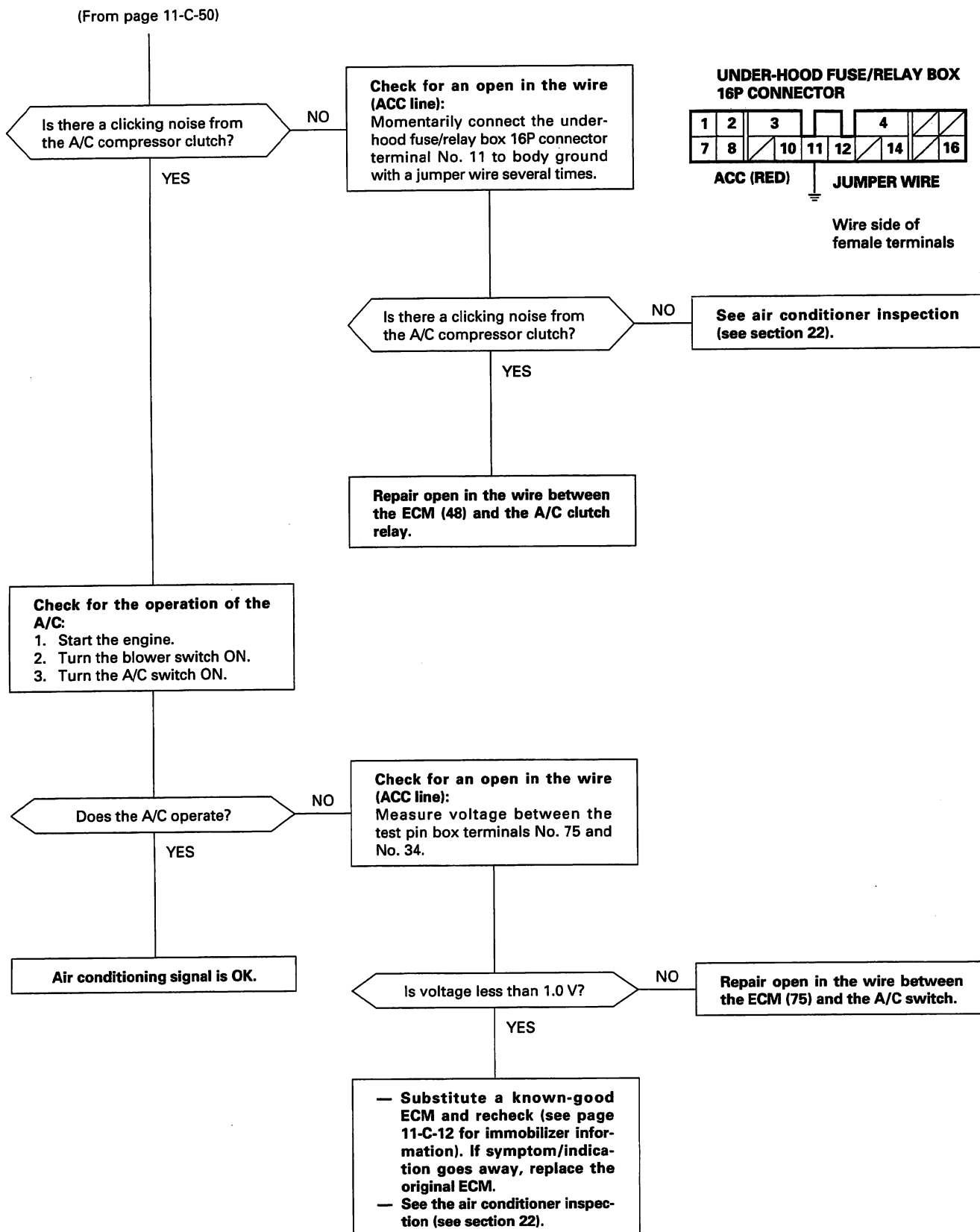
Terminal side of male terminals

Idle Control System

Air Conditioning Signal

This signals the ECM when there is a demand for cooling from the air conditioning system.

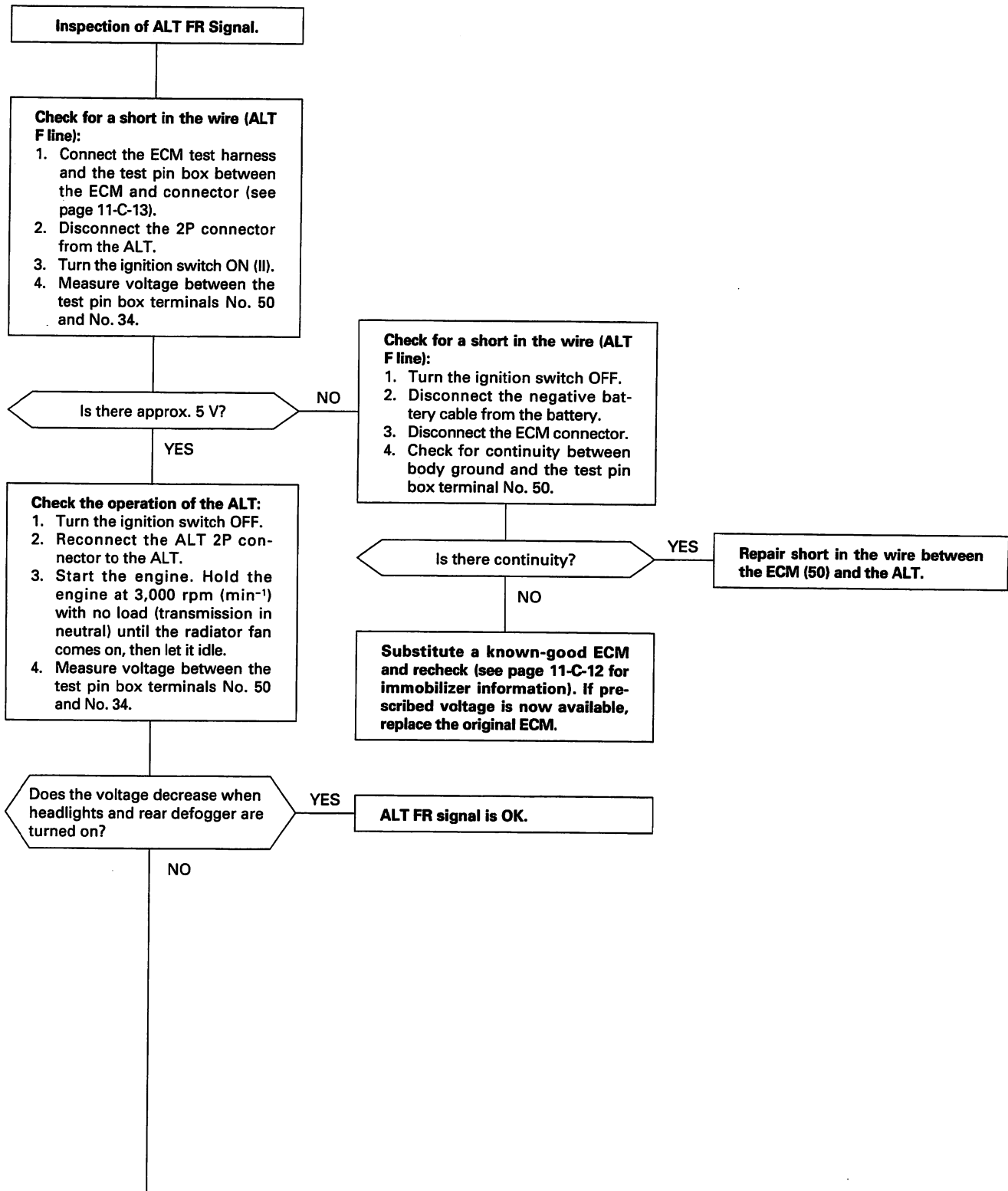




Idle Control System

Alternator (ALT) FR Signal

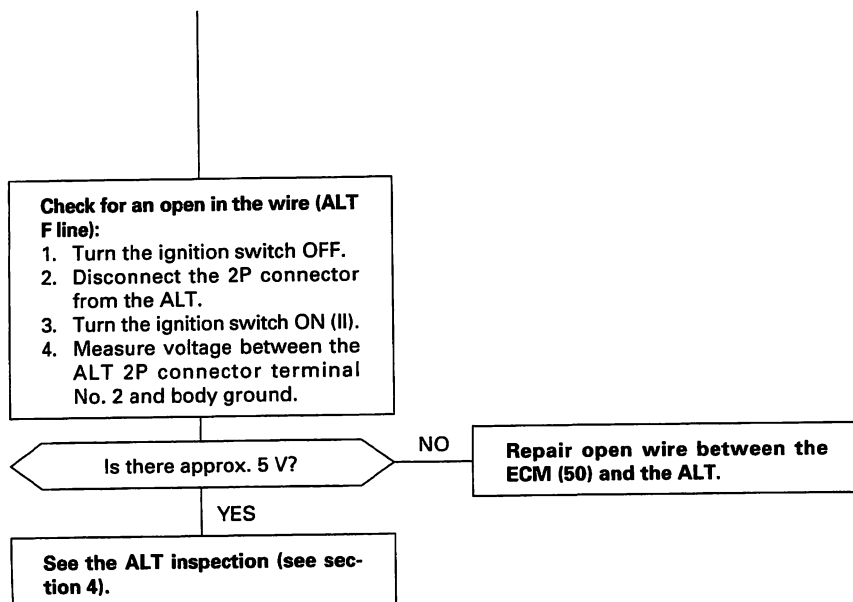
This signals the ECM when the Alternator (ALT) is charging.



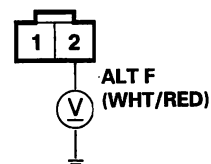
(To page 11-C-53)



(From page 11-C-52)



ALT 2P CONNECTOR

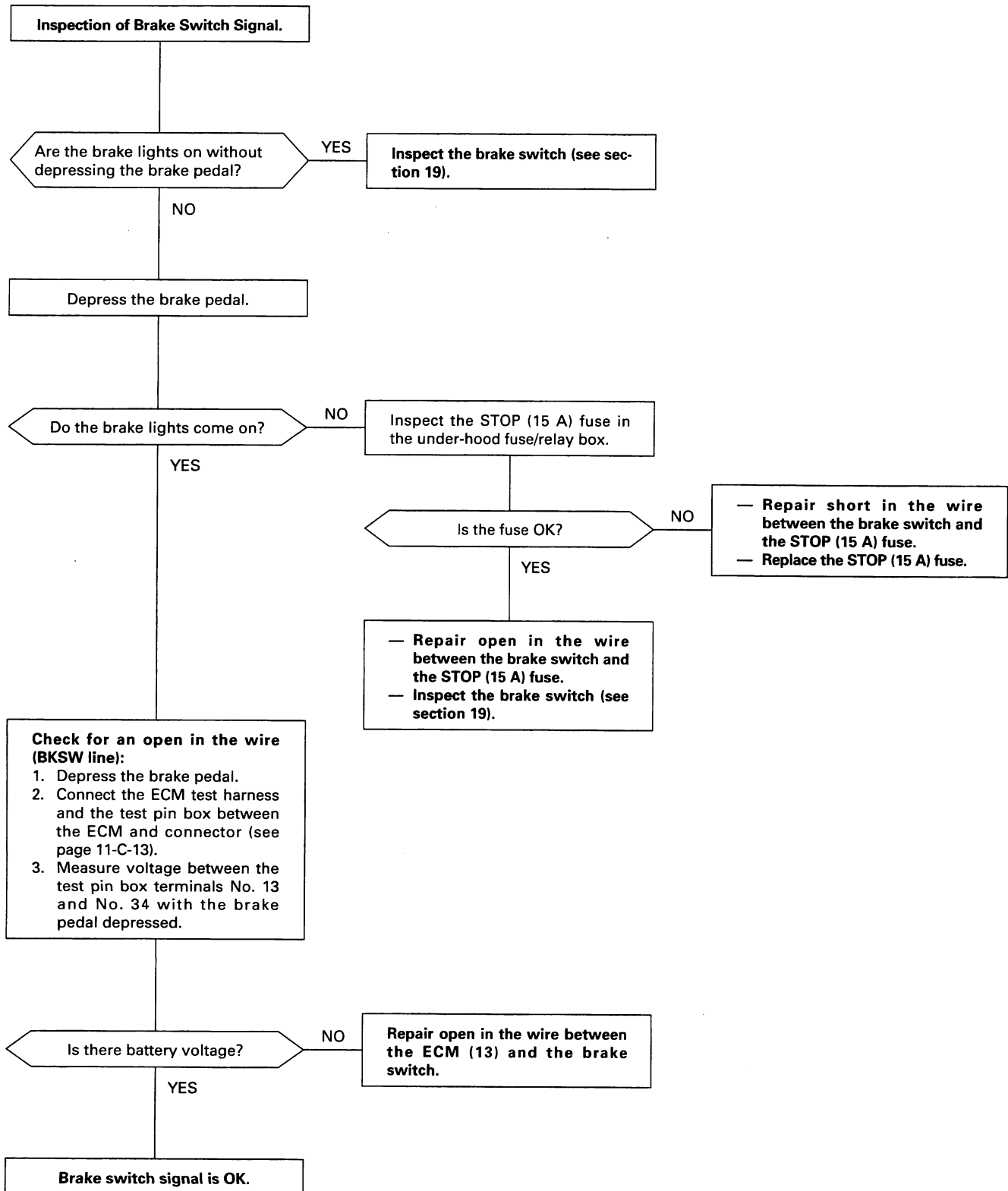


Wire side of female terminals

Idle Control System

Brake Switch Signal

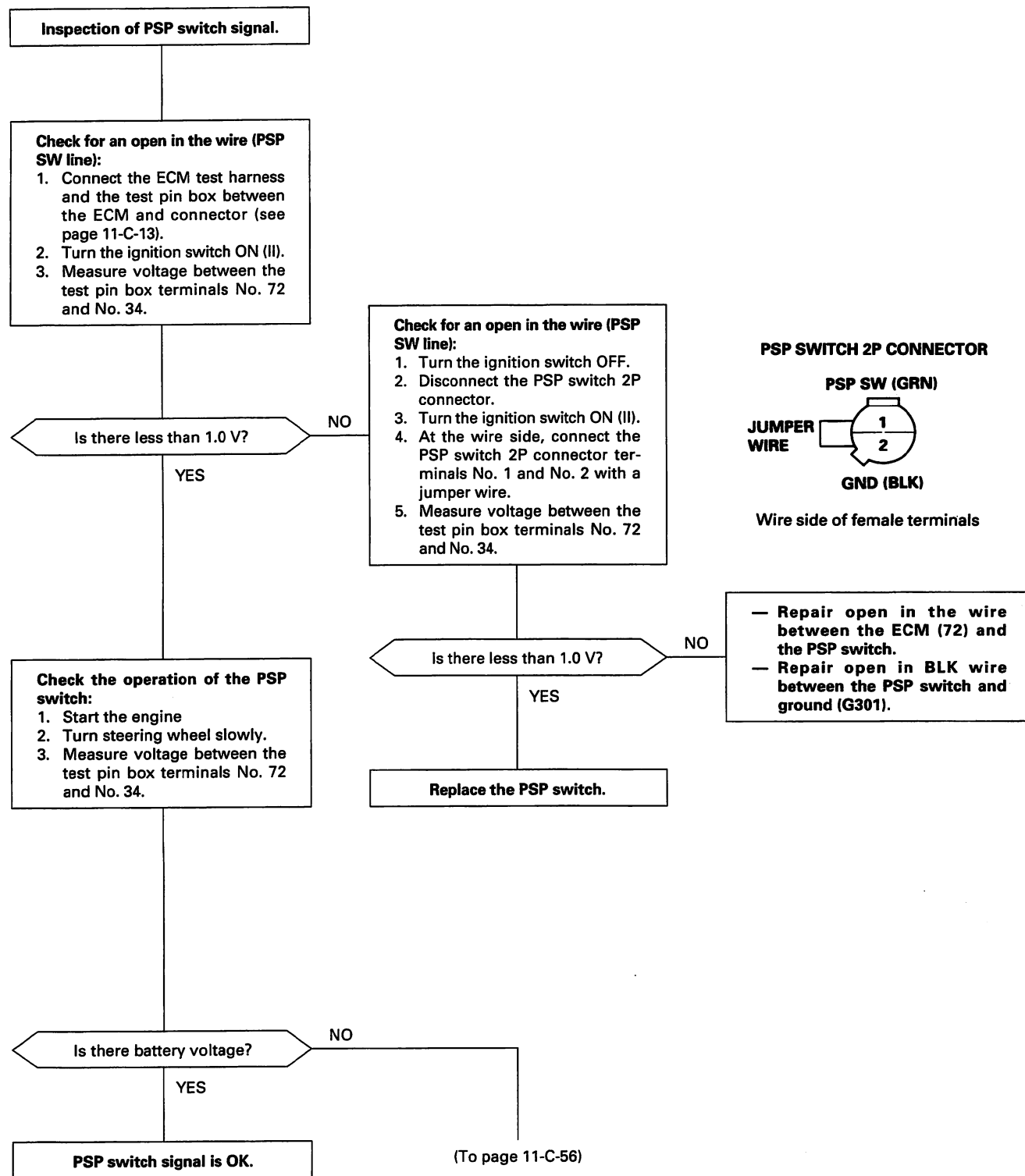
This signals the ECM when the brake pedal is depressed.





Power Steering Pressure (PSP) Switch Signal

This signals the ECM when the power steering load is high.

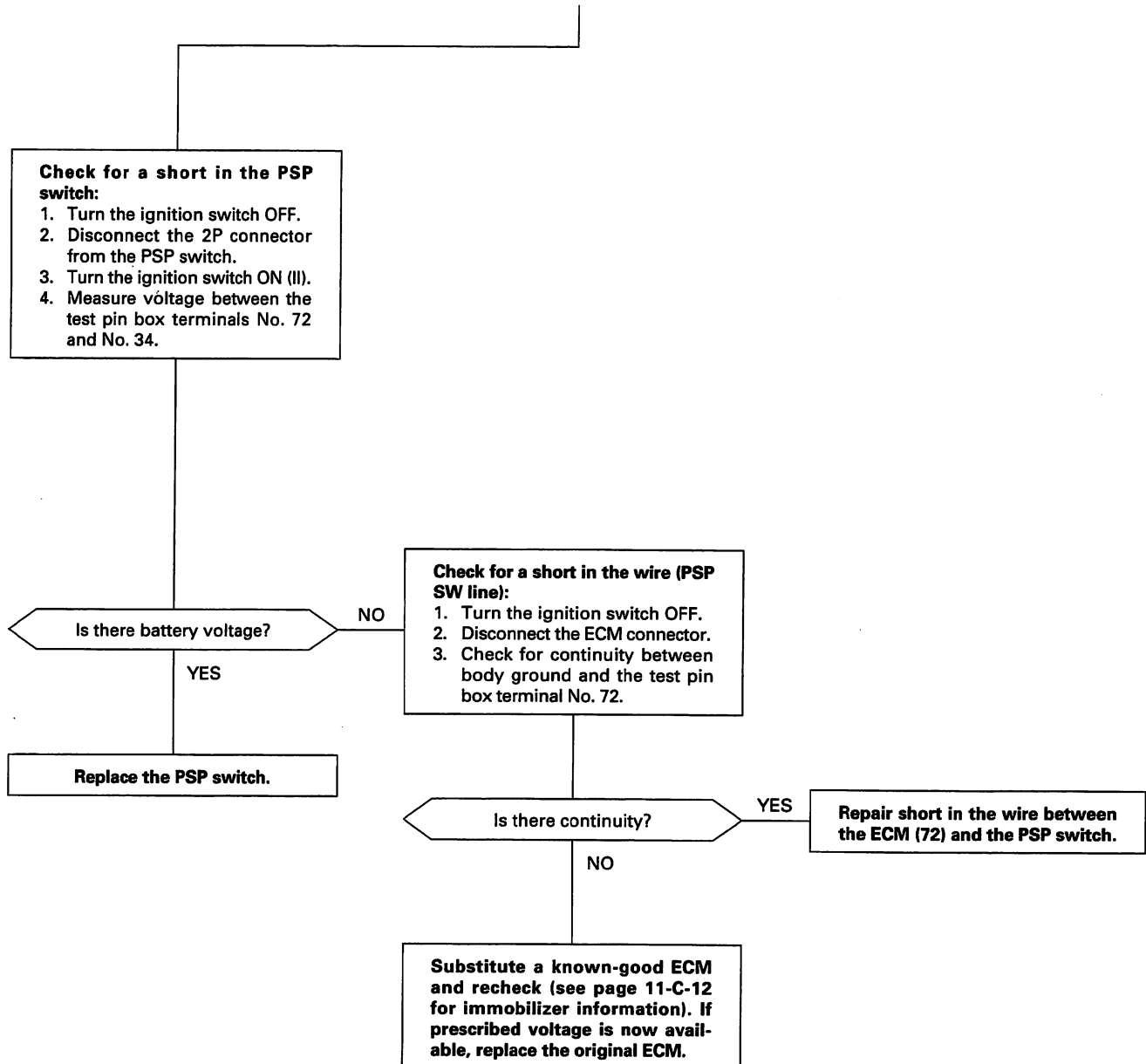


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Idle Control System

Power Steering Pressure (PSP) Switch Signal (cont'd)

(From page 11-C-55)



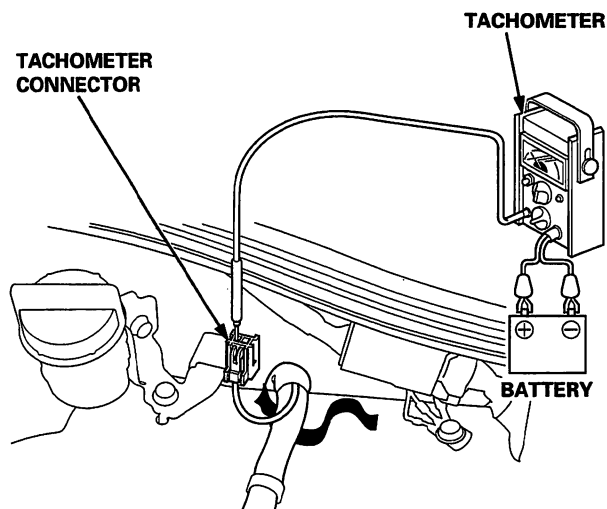


Idle Speed Inspection

NOTE:

- Leave the IAC valve connected.
- Before inspect the idle speed, check these items:
 - The MIL has not been reported on.
 - Ignition timing
 - Spark plugs
 - Air cleaner
 - PCV system

1. Connect a tachometer.



2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle.
3. Check the idle speed with no-load conditions: head-lights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

Idle speed should be:

$750 \pm 50 \text{ rpm (min}^{-1}\text{)}$

4. Idle the engine for one minute with heater fan switch at HI and air conditioner on, then check the idle speed.

Idle speed should be:

$810 \pm 50 \text{ rpm (min}^{-1}\text{)}$

NOTE: If the idle speed is not within specification, see Symptom Chart on page 11-C-46.

Fuel Supply System

System Troubleshooting Guide

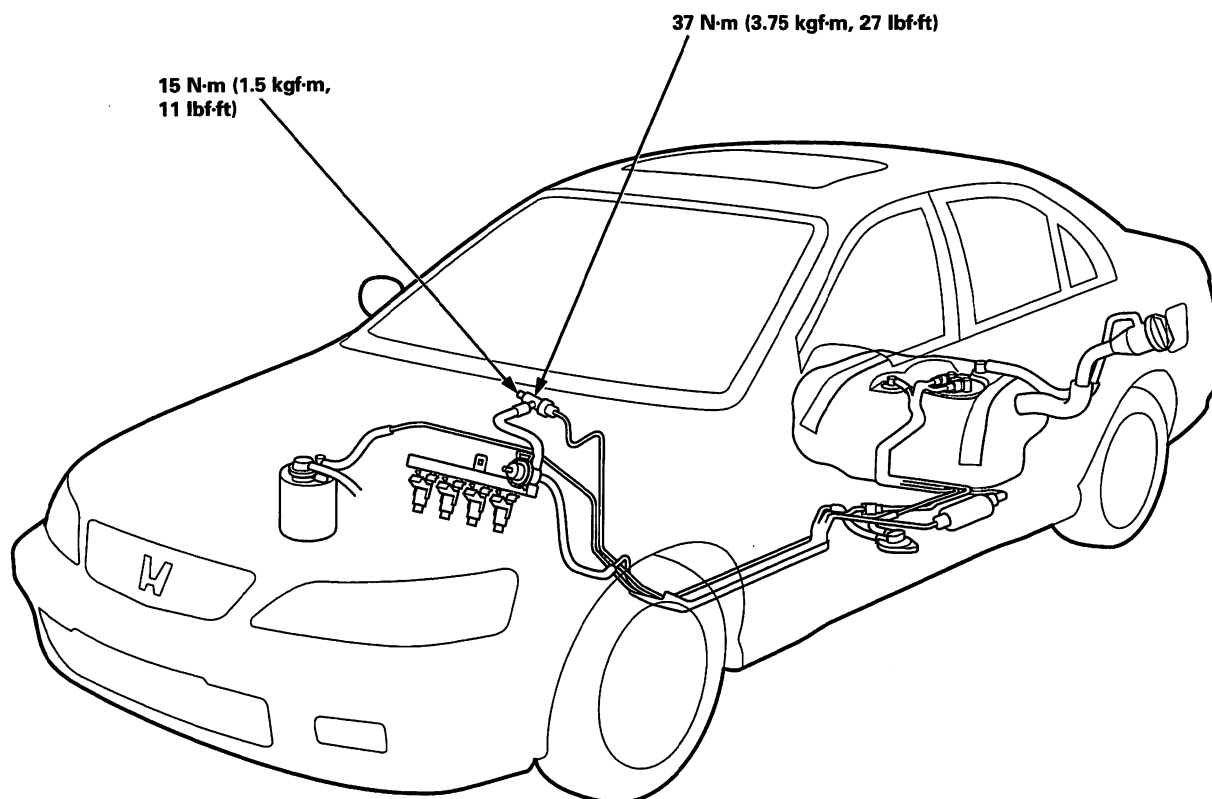
NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SUB-SYSTEM	FUEL LINES	FUEL INJECTOR	FUEL PRESSURE REGULATOR	FUEL FILTER	FUEL PUMP	PGM-FI MAIN RELAY	CONTAMINATED FUEL
SYMPTOM		11-C-59	11-C-62	11-C-66	11-A-105	11-A-106	11-C-68	—
ENGINE WON'T START			③		③	①	②	
DIFFICULT TO START ENGINE WHEN COLD OR HOT					①	②		
ROUGH IDLE			①					②
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING		①	②				②
	FAILS EMISSION TEST		②	①				
	LOSS OF POWER		③		②	①		
FREQUENT STALLING	WHILE WARMING UP			①				
	AFTER WARMING UP			①				



Fuel Lines

NOTE: Check fuel system lines, hoses and fuel filter for damage, leaks or deterioration, and replace if necessary.

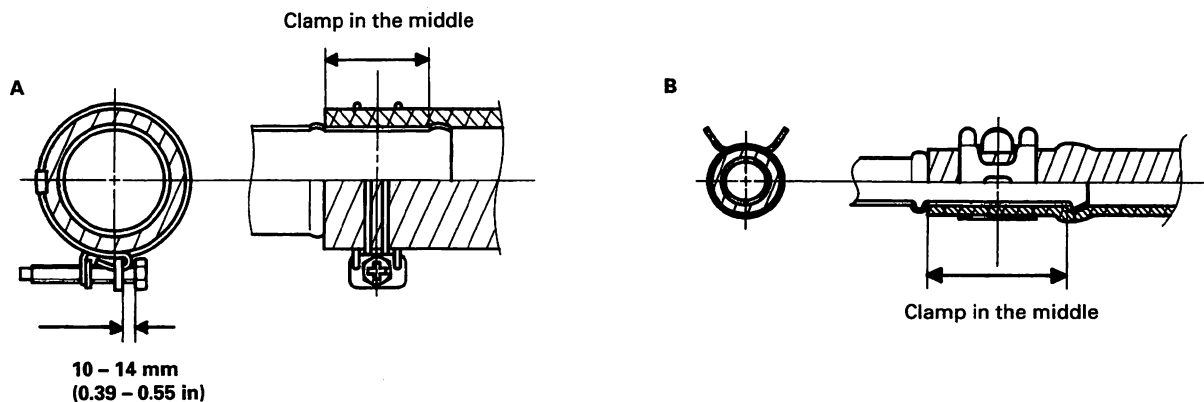
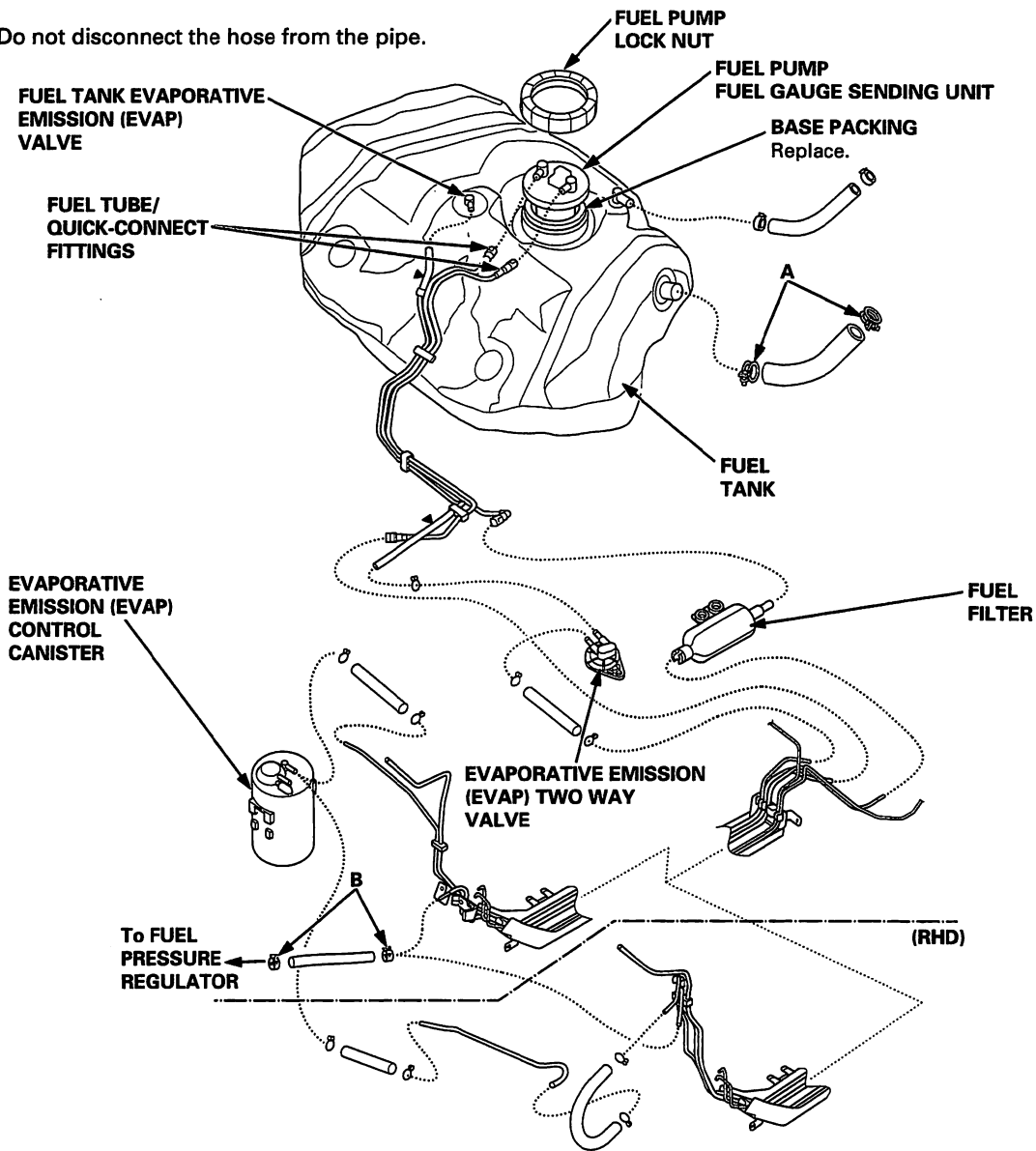


The illustration shows
LHD type.
Refer to 11-C-6
page for RHD type.

Fuel Supply System

NOTE: Check all hose clamps and retighten if necessary.

▲: Do not disconnect the hose from the pipe.





System Description

The fuel supply system consists of a fuel tank, in-tank high-pressure fuel pump, PGM-FI main relay, fuel filter, fuel pressure regulator, fuel injectors, and fuel delivery and return lines. This system delivers pressure-regulated fuel to the fuel injectors and cuts the fuel delivery when the engine is not running.

Fuel Pressure

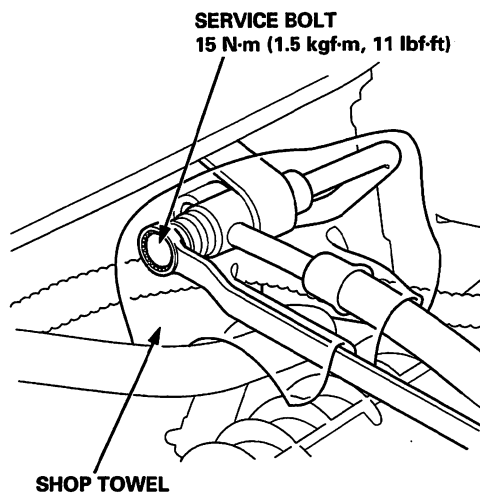
Relieving

Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the service bolt on the fuel feed pipe.

⚠ WARNING

Do not smoke while working on the fuel system. Keep open flame or sparks away from the work area. Be sure to relieve fuel pressure while the ignition switch is off.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Remove the fuel fill cap.
3. Use a wrench on the service bolt at the fuel feed pipe.
4. Place a rag or shop towel over the service bolt.
5. Slowly loosen the service bolt one complete turn.



NOTE: Replace the washers whenever the service bolt is loosened or removed.

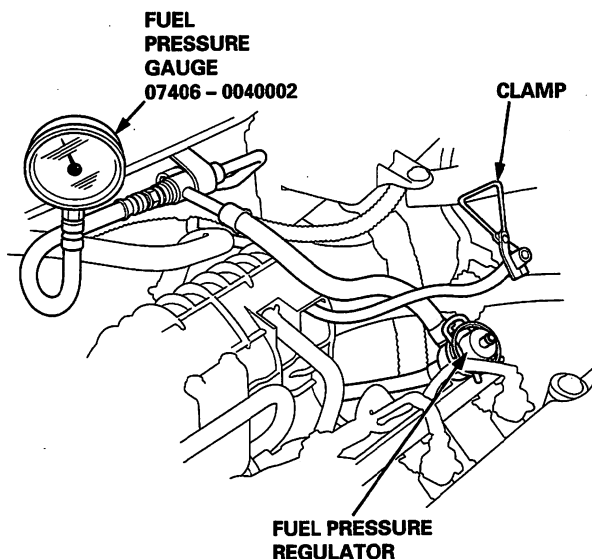
(cont'd)

Fuel Supply System

Fuel Pressure (cont'd)

Inspection

1. Relieve fuel pressure (see page 11-C-61).
2. Remove the service bolt from the fuel feed pipe. Attach the fuel pressure gauge.



3. Start the engine. Measure the fuel pressure with the engine idling and the vacuum hose of the fuel pressure regulator disconnected from the fuel pressure regulator and pinched. If the engine will not start, turn the ignition switch ON (II), wait for two seconds, turn it off, then back on again and read the fuel pressure.

Pressure should be:

280 - 330 kPa (2.9 - 3.4 kgf/cm², 41 - 48 psi)

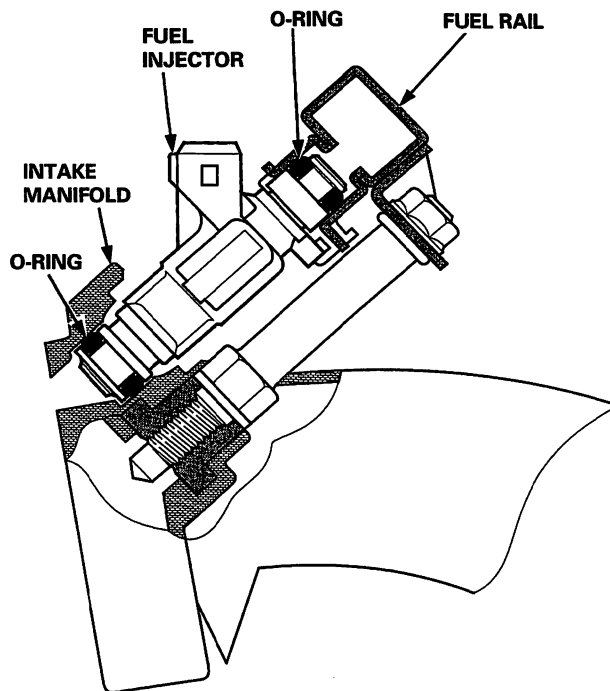
If the fuel pressure is not as specified, first check the fuel pump (see page 11-A-107). If the fuel pump is OK, check the following:

- If the fuel pressure is higher than specified, inspect for:
 - Pinched or clogged fuel return hose or line.
 - Faulty fuel pressure regulator (see page 11-C-66).
- If the fuel pressure is lower than specified, inspect for:
 - Clogged fuel filter.
 - Faulty fuel pressure regulator (see page 11-C-66).
 - Leakage in the fuel line.

Fuel Injectors

Description

The fuel injectors are a solenoid-actuated constant-stroke, pintle-type consisting of a solenoid, plunger needle valve and housing. When current is applied to the solenoid coil, the valve lifts up and pressurized fuel is injected. Because the needle valve lift and the fuel pressure are constant, the injection quantity is determined by the length of time that the valve is open (that is the duration the current is supplied to the solenoid coil). The fuel injector is sealed by an O-ring at the top and bottom. These seals also reduce operating noise.



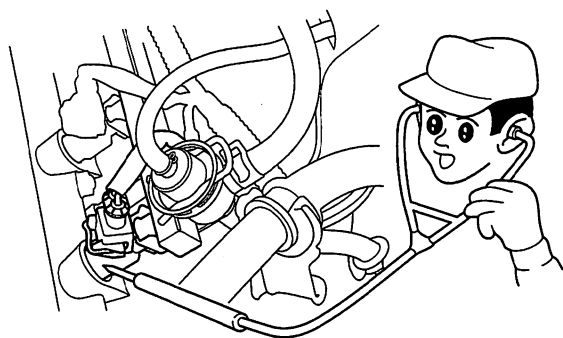


Testing

NOTE: Check the following items before testing: idle speed, ignition timing and idle CO%.

If the engine runs:

1. With the engine idling, disconnect each fuel injector connector individually and inspect the change in the idle speed.
 - If the idle speed drop is almost the same for each cylinder, the fuel injectors are normal.
 - If the idle speed or quality remains the same when you disconnect a particular fuel injector, replace the fuel injector and retest.
2. Check the clicking sound of each fuel injector by means of a stethoscope when the engine is idling.



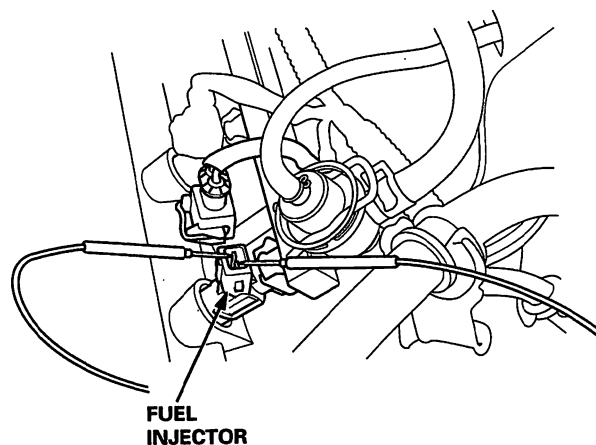
- If any fuel injector fails to make the typical clicking sound, check the sound again after replacing the fuel injector.
- If clicking sound is still absent, check the following.
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the PGM-FI main relay and the junction connector.
 - Whether the junction connector is open or corroded.
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the junction connector and the fuel injector.
 - Whether there is any short-circuiting, wire breakage or poor connection in the wire between the fuel injector and the ECM.

If all is OK, check the ECM (see page 11-C-21) and PGM-FI main relay (see page 11-C-68).

If the engine cannot be started:

1. Remove the connector of the fuel injector, and measure the resistance between the 2 terminals of the fuel injector.

Resistance should be: 13.8 – 15.3 Ω at 20°C (68°F)



- If the resistance is not as specified, replace the fuel injector.
- If the resistance is as specified, check the fuel pressure (see page 11-C-62).
- If the fuel pressure is as specified, check the following:
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the PGM-FI main relay and the junction connector.
 - Whether the junction connector is open or corroded.
 - Whether there is any short-circuiting, wire breakage, or poor connection in the YEL/BLK wire between the junction connector and the fuel injector.
 - Whether there is any short-circuiting, wire breakage or poor connection in the wire between the fuel injector and the ECM.

If all is OK, check the ECM (see page 11-C-21).

(cont'd)

Fuel Supply System

Fuel Injectors (cont'd)

Replacement

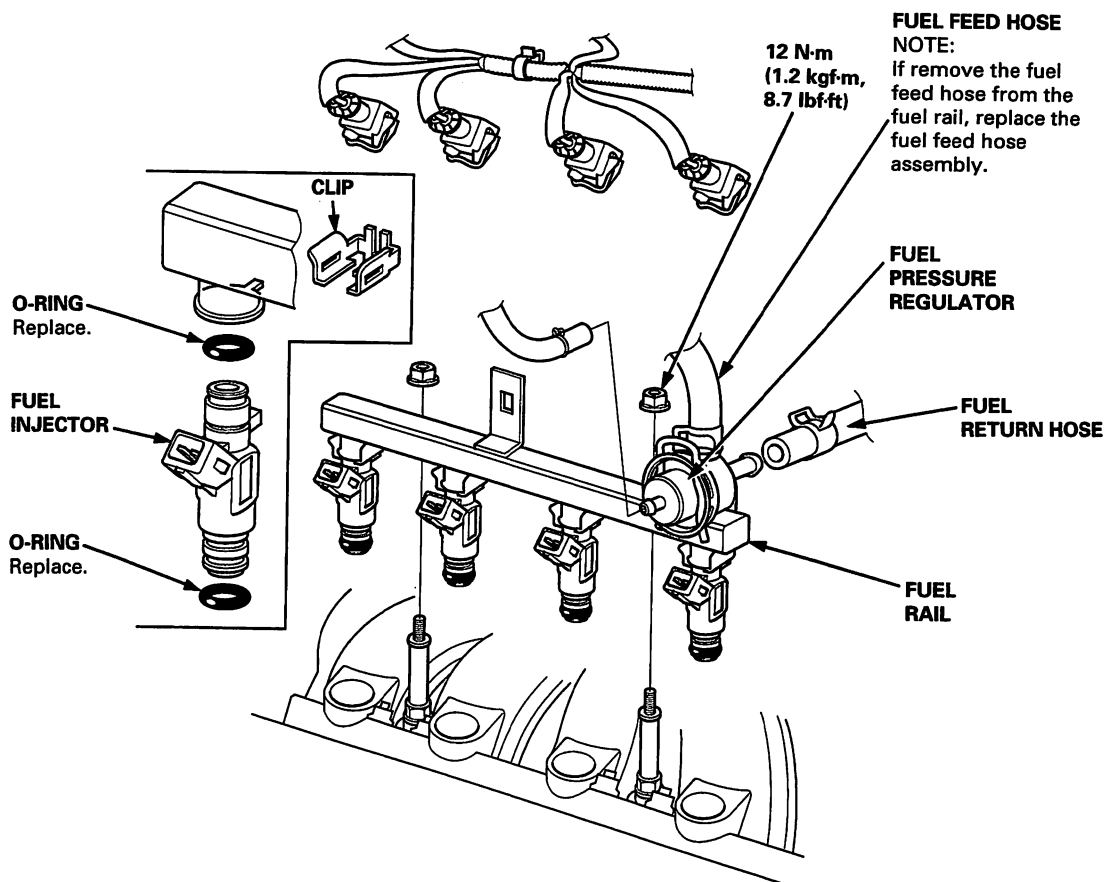
⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Relieve the fuel pressure (see page 11-C-61).
2. Disconnect the connectors from the fuel injectors.
3. Disconnect the vacuum hoses and fuel return hose from the fuel pressure regulator.

NOTE: Place a rag or shop towel over the hoses before disconnecting them.

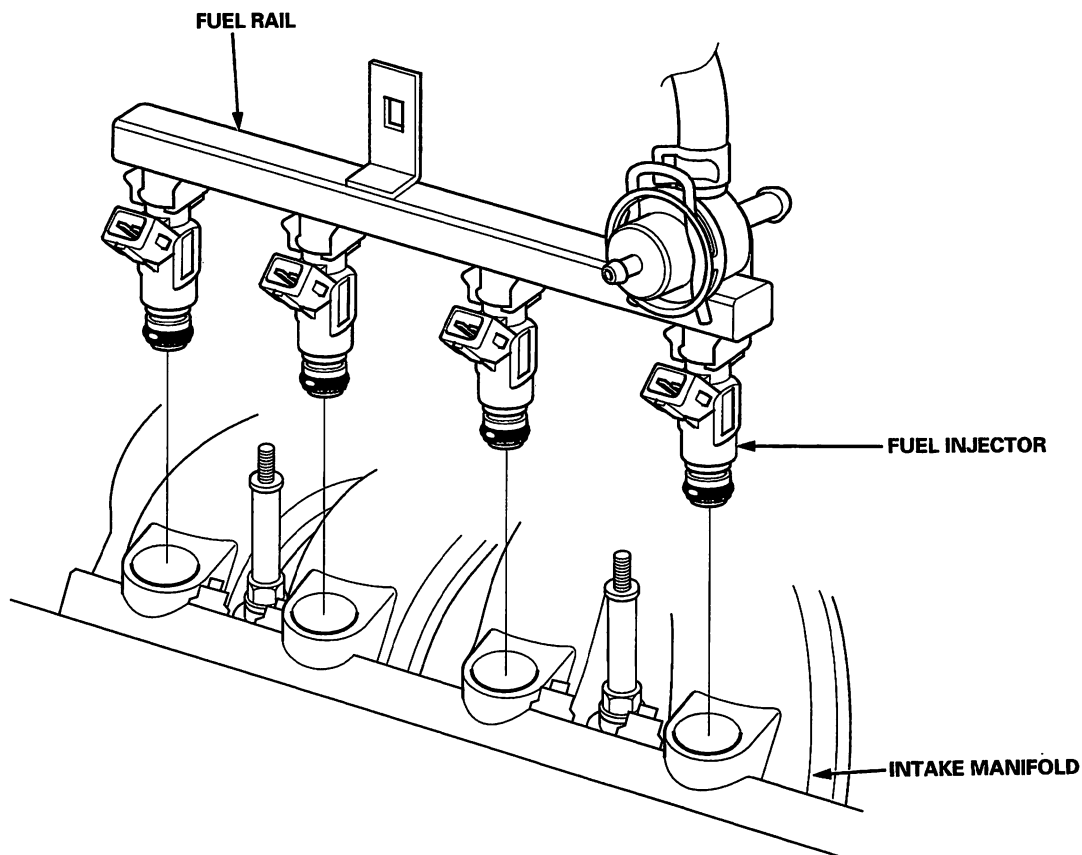
4. Remove the retainer nuts from the fuel rail.
5. Remove the fuel injectors with the fuel rail from the intake manifold.
6. Slide off clip from the fuel injectors.



7. Coat new O-rings with clean engine oil, and put them on the fuel injectors.
8. Set the clip on the fuel injectors.
9. Insert the fuel injectors into the fuel rail first.



10. To prevent damage to the O-rings, install the fuel injectors in the fuel rail first, then install them in the intake manifold.



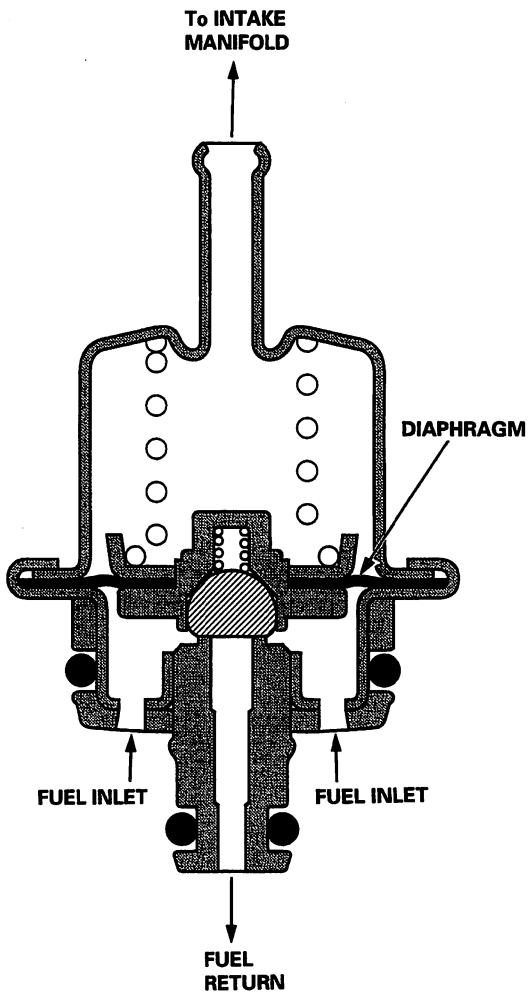
11. Install and tighten the retainer nuts.
12. Connect the vacuum hoses and fuel return hose to the fuel pressure regulator.
13. Turn the ignition switch ON (II), but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

Fuel Supply System

Fuel Pressure Regulator

Description

The fuel pressure regulator maintains a constant fuel pressure to the fuel injectors. When the difference between the fuel pressure and manifold pressure exceeds 300 kPa, 3.1 kgf/cm², 44 psi, the diaphragm is pushed upward, and the excess fuel is fed back into the fuel tank through the return line.

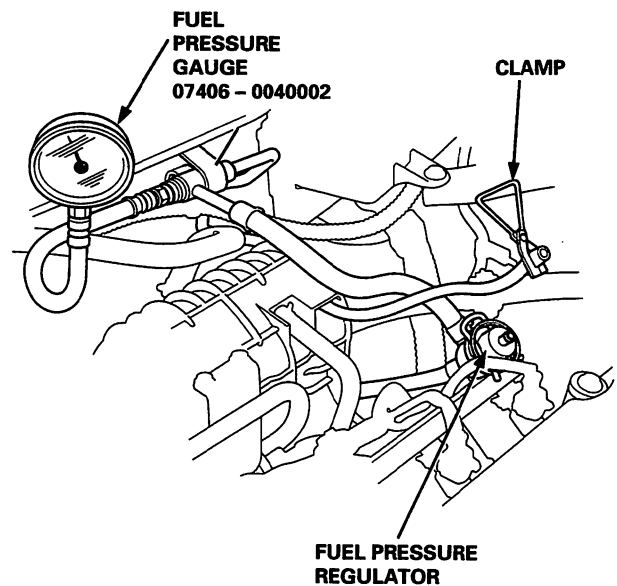


Testing

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Attach the fuel pressure gauge (see page 11-C-62).
Start the engine.



Pressure should be:

280 – 330 kPa (2.9 – 3.4 kgf/cm², 41 – 48 psi)

(with the fuel pressure regulator vacuum hose disconnected and pinched)

2. Reconnect the vacuum hose to the fuel pressure regulator.
3. Check that the fuel pressure rises when the vacuum hose from the fuel pressure regulator is disconnected again.
 - If the fuel pressure did not rise, replace the fuel pressure regulator.

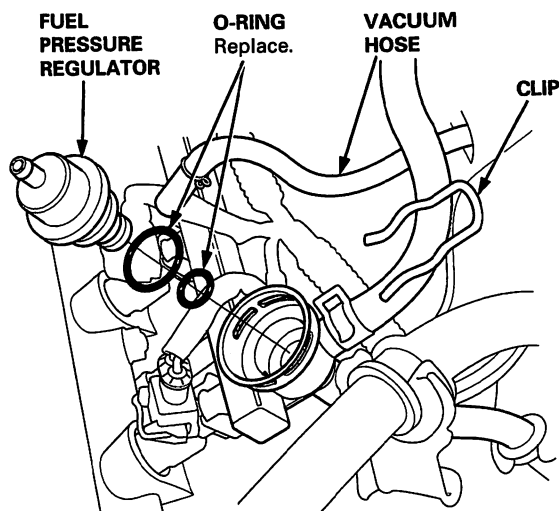


Replacement

⚠ WARNING

Do not smoke while working on the fuel system.
Keep open flame or sparks away from the work area.

1. Place a shop towel under the fuel pressure regulator, then relieve fuel pressure (see page 11-C-61).
2. Disconnect the vacuum hose.
3. Remove the clip from the fuel pressure regulator.



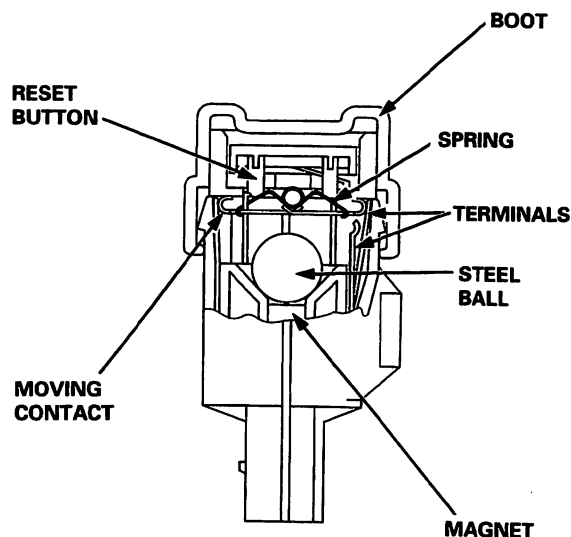
4. Apply clean engine oil to a new O-ring, and carefully install it into its proper position.
5. Install the fuel pressure regulator and clip.
6. Reconnect the vacuum hose.

Inertia Switch

Description

The inertia switch is a safety device which automatically cuts off the fuel supply in the event of a collision or sudden impact.

The switch is located behind the glove box. After an impact, the switch must be reset by pressing the button before the engine can be restarted.

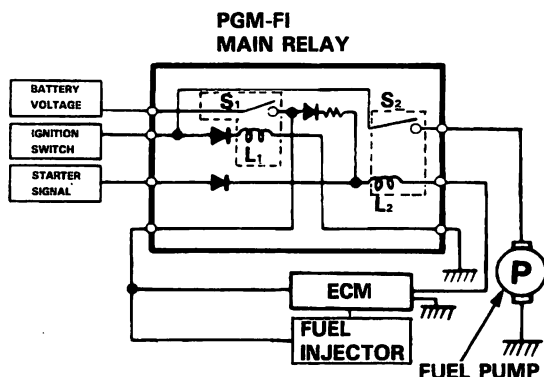


Fuel Supply System

PGM-FI Main Relay

Description

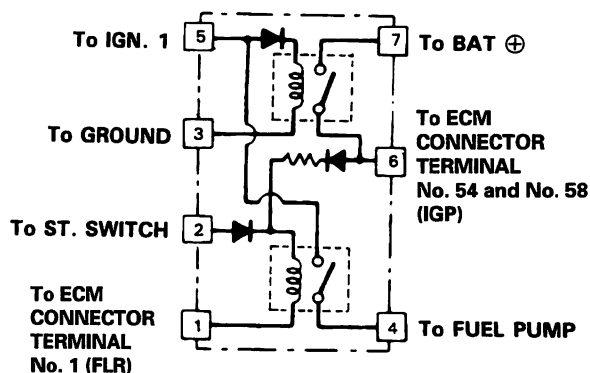
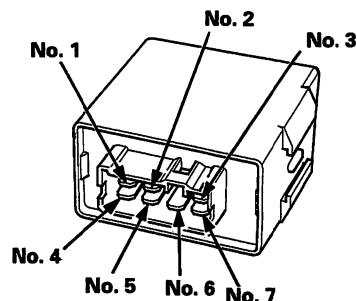
The PGM-FI main relay actually contains two individual relays. This relay is located at the driver side of the cowl. One relay is energized whenever the ignition is on which supplies the battery voltage to the ECM, power to the fuel injectors, and power for the second relay. The second relay is energized for two seconds when the ignition is switched on, and when the engine is running, to supply power to the fuel pump.



Relay Testing

NOTE: If the car starts and continues to run, the PGM-FI main relay is OK.

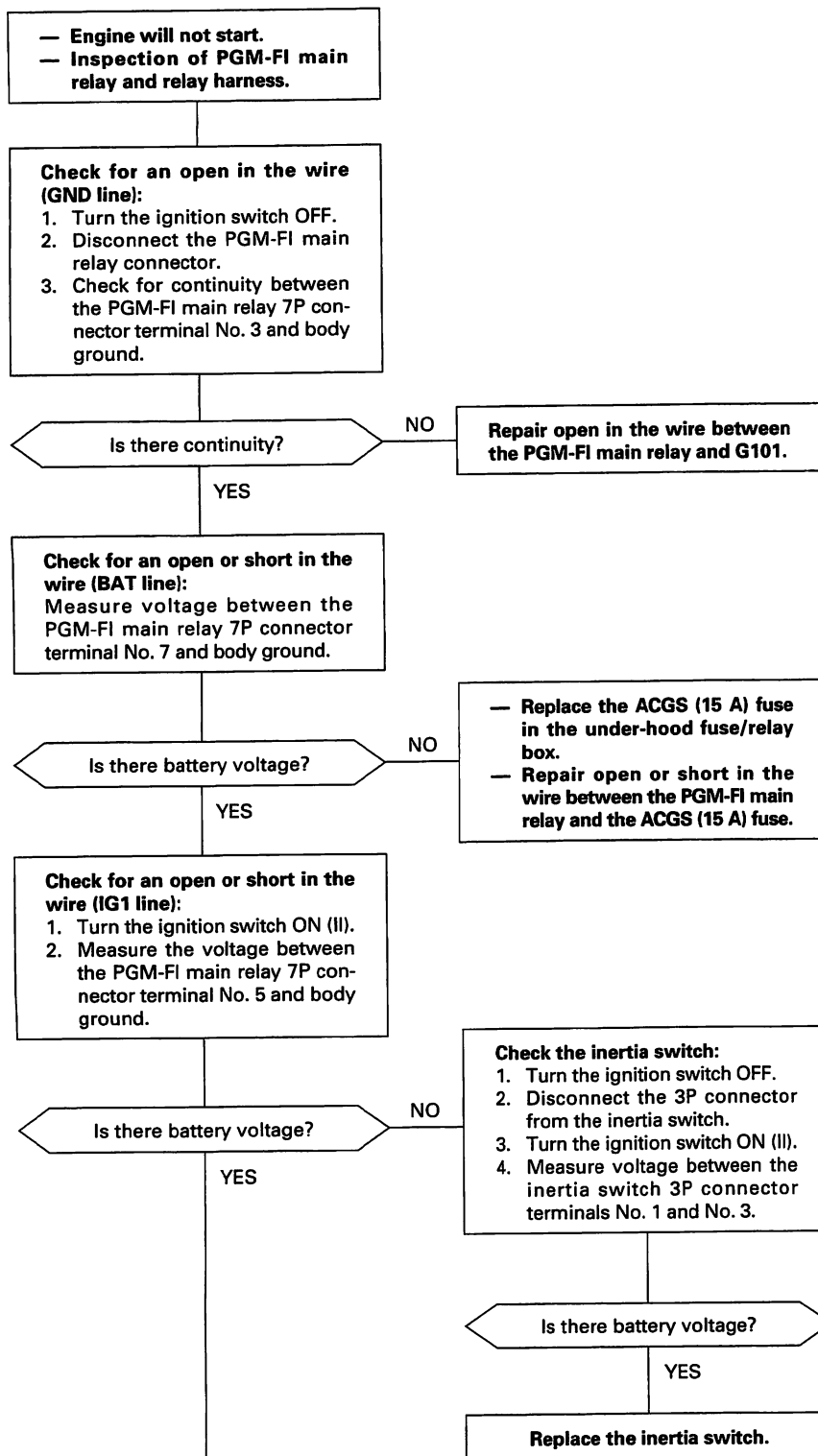
1. Remove the PGM-FI main relay.
2. Attach the battery positive terminal to the No. 2 terminal and the battery negative terminal to the No. 1 terminal of the PGM-FI main relay. Then check for continuity between the No. 5 terminal and No. 4 terminal of the PGM-FI main relay.
 - If there is continuity, go on to step 3.
 - If there is no continuity, replace the PGM-FI main relay and retest.



3. Attach the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 3 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 7 terminal and No. 6 terminal of the PGM-FI main relay.
 - If there is continuity, go on to step 4.
 - If there is no continuity, replace the PGM-FI main relay and retest.
4. Attach the battery positive terminal to the No. 6 terminal and the battery negative terminal to the No. 1 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 5 terminal and No. 4 terminal of the PGM-FI main relay.
 - If there is continuity, the PGM-FI main relay is OK.
 - If there is no continuity, replace the PGM-FI main relay and retest.

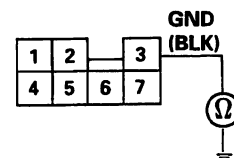


Troubleshooting

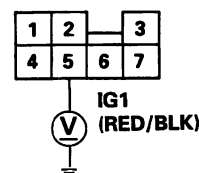
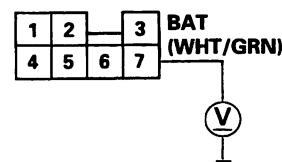


(To page 11-C-70)

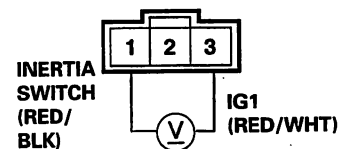
PGM-FI MAIN RELAY 7P CONNECTOR



Wire side of female terminals



INERTIA SWITCH 3P CONNECTOR



(cont'd)

Fuel Supply System

PGM-FI Main Relay (cont'd)

(From page 11-C-69)

Check for an open or short in the wire (STS line):

1. Turn the ignition switch to the START (III) position.
NOTE: transmission in neutral.
2. Measure the voltage between the PGM-FI main relay 7P connector terminal No. 2 and body ground.

Is there battery voltage?

NO

YES

- Replace the No. 13 STARTER SIGNAL (7.5 A) fuse in the driver's under-hood fuse/relay box.
- Repair open or short in the wire between the PGM-FI main relay and the No. 13 STARTER SIGNAL (7.5 A) fuse.

Check for an open in the wire (FLR line):

1. Turn the ignition switch OFF.
2. Connect the ECM test harness and test pin box to the wire harness only, not to the ECM (see page 11-C-13).
3. Check for continuity between the PGM-FI main relay 7P connector terminal No. 1 and the test pin box terminal No. 1.

Is there continuity?

NO

YES

Repair open in the wire between the ECM (1) and the PGM-FI main relay.

Check for an open in the wires (IGP1, IGP2 lines):

1. Connect the ECM connector.
2. Reconnect the PGM-FI main relay 7P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the test pin box terminals No. 54, No. 58 and No. 34.

Is there battery voltage?

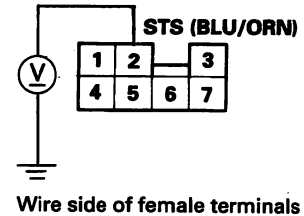
NO

YES

- Repair open in the wire between the ECM (54, 58) and the PGM-FI main relay.
- Replace the PGM-FI main relay.

(To page 11-C-71)

PGM-FI MAIN RELAY 7P CONNECTOR





(From page 11-C-70)

Check for an open in the ECM:
1. Turn the ignition switch OFF.
2. Measure voltage between the test pin box terminals No. 1 and No. 34 when the ignition switch is first turned ON (II) for two seconds.

Is there 1.0 V or less?

NO

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If prescribed voltage is now available, replace the original ECM.

YES

Check the PGM-FI main relay (see page 11-C-68).

Intake Air System

System Troubleshooting Guide

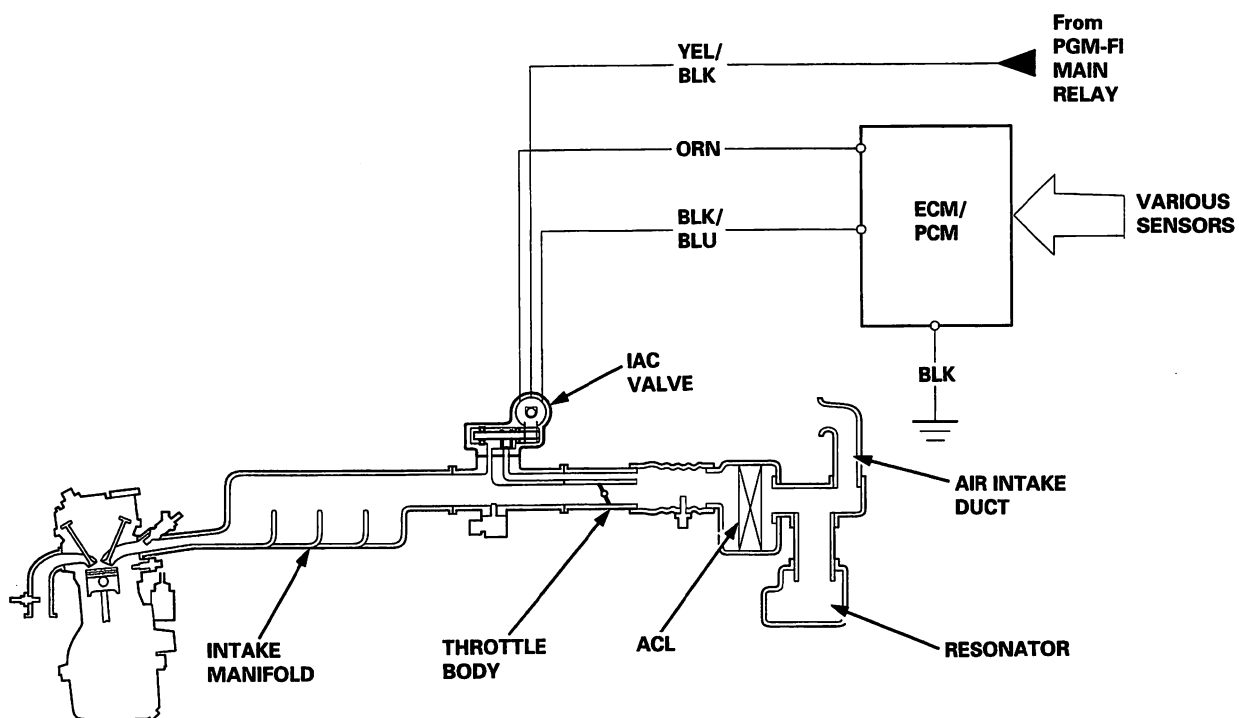
NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.

PAGE	SUB-SYSTEM	AIR CLEANER AND INTAKE AIR DUCT	THROTTLE CABLE	THROTTLE BODY
SYMPTOM		11-A-119	11-C-74	11-C-75
WHEN COLD FAST IDLE OUT OF SPEC				①
WHEN WARM IDLE SPEED TOO HIGH			②	①
LOSS OF POWER		②		①



System Description

The system supplies air for all engine needs. It consists of the intake air pipe, Air Cleaner (ACL), intake air duct, Throttle Body (TB), Idle Air Control (IAC) Valve and intake manifold. A resonator in the intake air pipe provides additional silencing as air is drawn into the system.



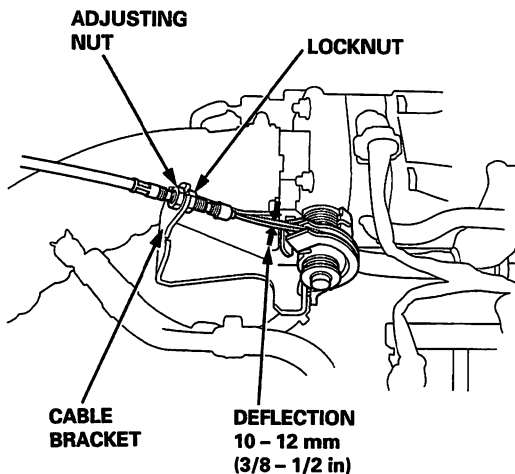
Intake Air System

Throttle Cable

Inspection/Adjustment

1. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle.

Check cable free play at the throttle link. Cable deflection should be 10 – 12 mm ($3/8 - 1/2$ in.).

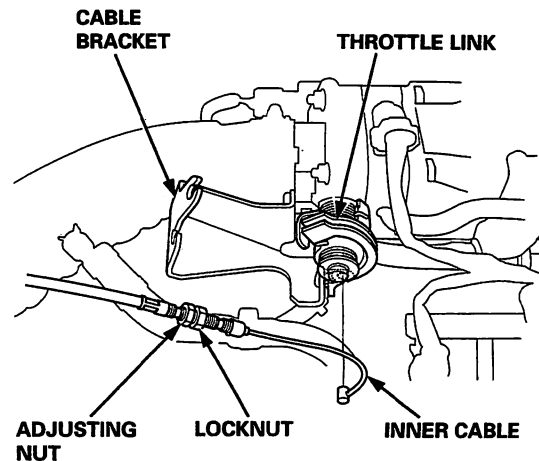


If deflection is not within specs, loosen the locknut, turn the adjusting nut until the deflection is as specified, then retighten the locknut.

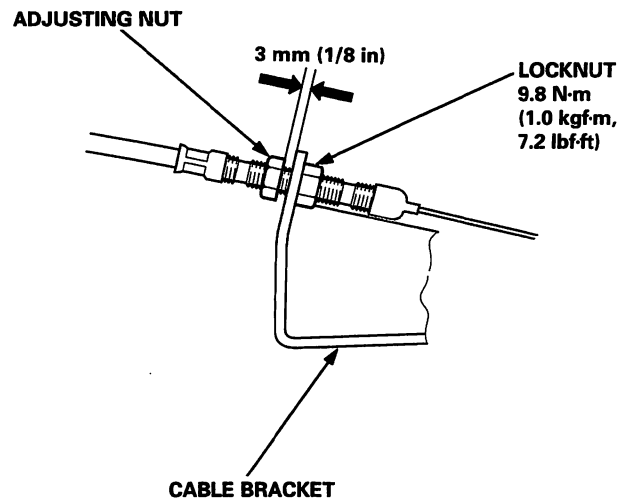
With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure it returns to the idle position whenever you release the accelerator pedal.

Installation

1. Fully open the throttle valve, then install the throttle cable in the throttle link, and install the cable housing in the cable bracket.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle.



3. Hold the cable sheath, removing all slack from the cable.
4. Turn the adjusting nut until it is 3 mm ($1/8$ in.) away from the cable bracket.
5. Tighten the locknut. The cable deflection should now be 10 – 12 mm ($3/8 - 1/2$ in.). If not, see Inspection/Adjustment.

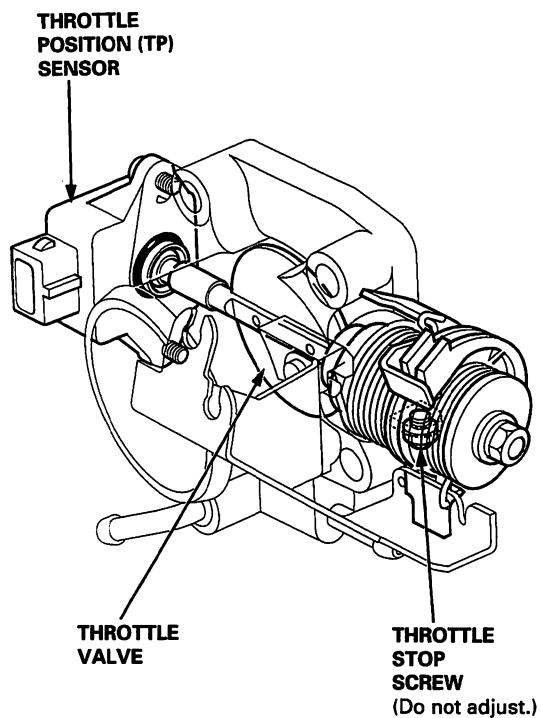




Throttle Body

Description

The throttle body is a single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head.

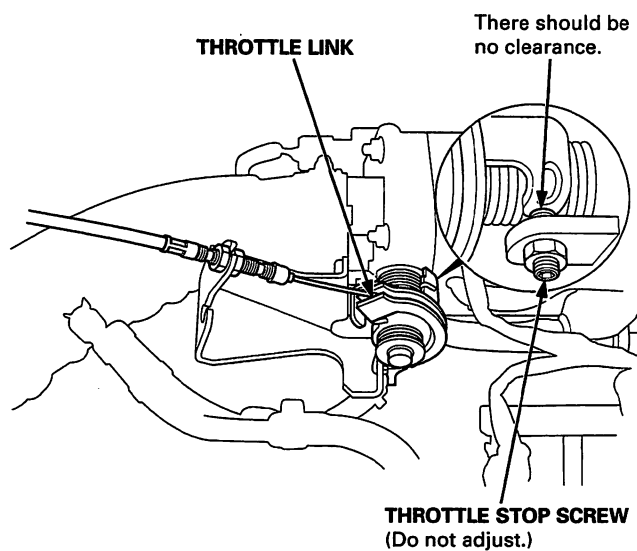


Inspection

Check that the throttle cable operates smoothly without binding or sticking.

If there are any abnormalities, check for:

- Excessive wear or play in the throttle valve shaft.
- Sticky or binding throttle lever at the fully closed position.
- Clearance between throttle stop screw and throttle lever at the fully closed position.



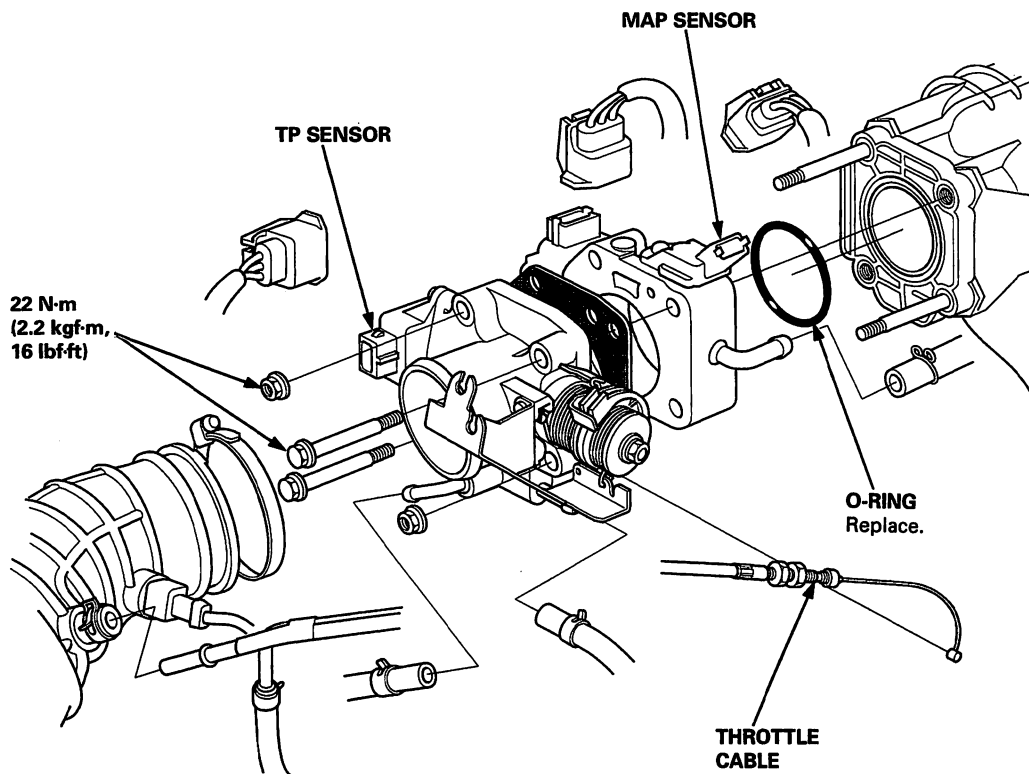
Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.

(cont'd)

Intake Air System

Throttle Body (cont'd)

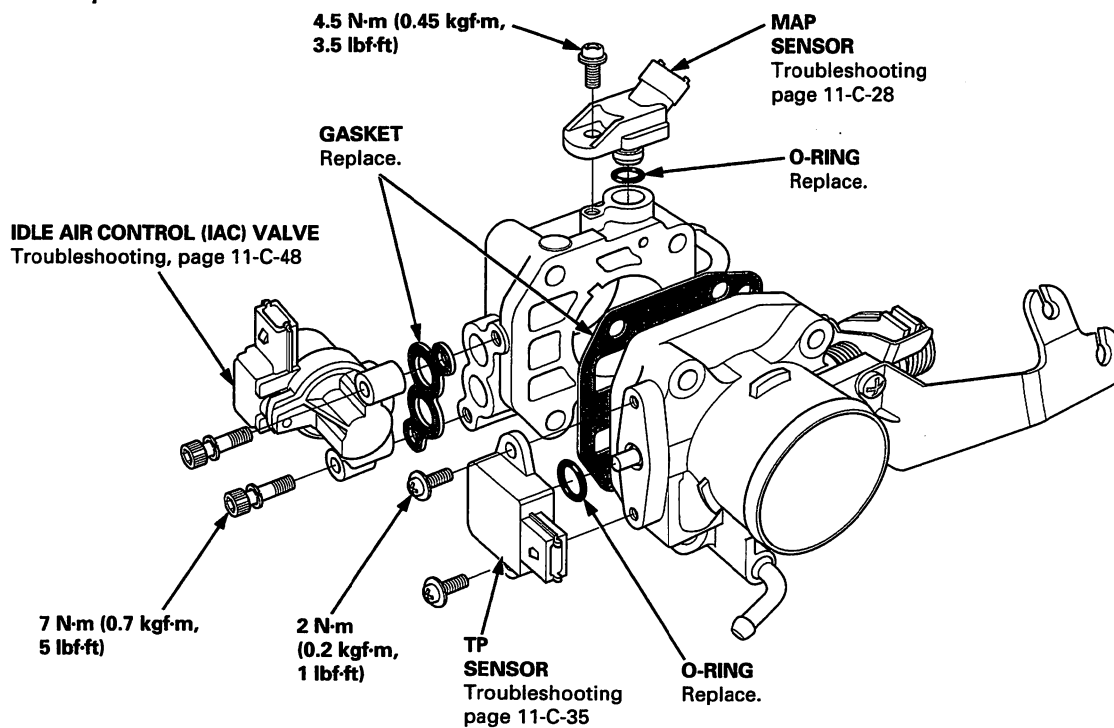
Removal



NOTE:

- Do not adjust the throttle stop screw.
- After reassembly, adjust the cruise control cable (see section 4), the throttle cable (see page 11-C-74).

Disassembly



Emission Control System



System Troubleshooting Guide

NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of the column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SUB-SYSTEM	THREE WAY CATALYTIC CONVERTER	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
SYMPTOM		11-C-78	11-C-79	11-C-80
ROUGH IDLE			①	
POOR PERFORMANCE	FAILS EMISSION TEST	①		②
	LOSS OF POWER	①		

Emission Control System

System Description

The emission control system include, a Three Way Catalytic Converter (TWC), Positive Crankcase Ventilation (PCV) system and Evaporative Emission (EVAP) Control system.

Tailpipe Emission

Inspection

⚠ WARNING

Do not smoke during this procedure.
Keep open flame or sparks away from the work area.

1. Connect a tachometer.
2. Start the engine. Hold the engine at 3,000 rpm (min^{-1}) with no load (transmission in neutral) until the radiator fan comes on, then let it idle.
3. Check the idle speed (see page 11-C-57).
4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

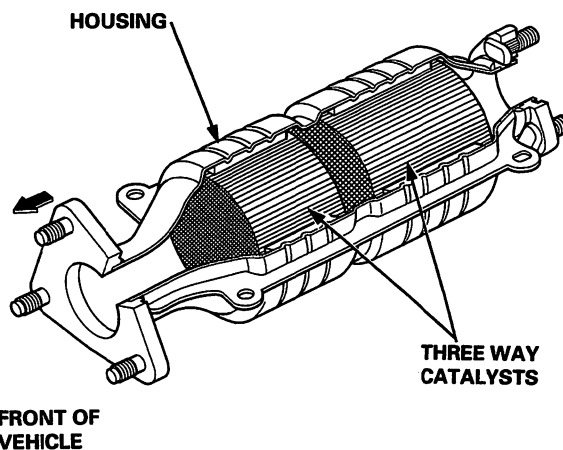
Specified CO%: 0.1% maximum

Three Way Catalytic Converter (TWC)

Description

The Three Way Catalytic Converter (TWC) is used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO_x) in the exhaust gas, to carbon dioxide (CO_2), dinitrogen (N_2) and water vapor.

Removal/Installation (see section 9)

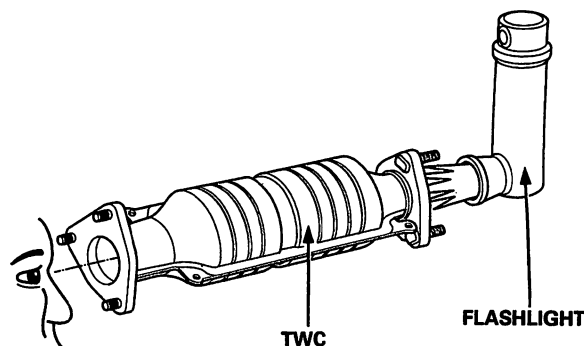


Inspection

If excessive exhaust system back-pressure is suspected, remove the TWC from the car.

Using a flashlight, make a visual check for plugging, melting or cracking of the catalyst.

Replace the TWC if any of the visible area is damaged or plugged.

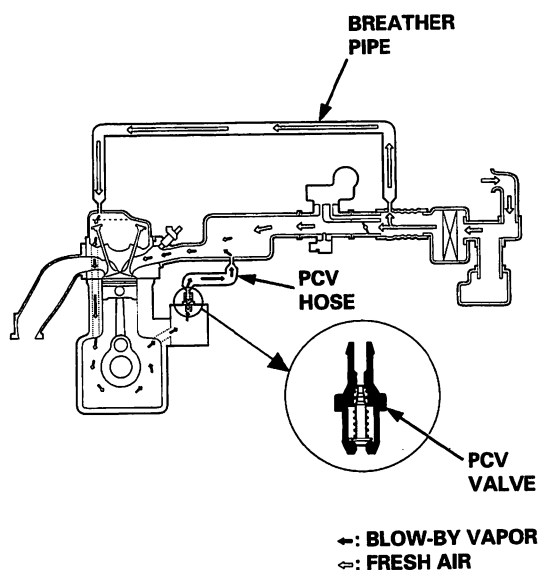




Positive Crankcase Ventilation (PCV) System

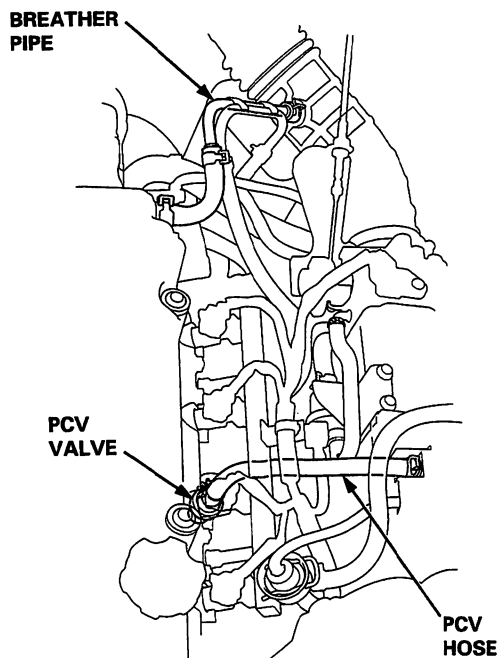
Description

The Positive Crankcase Ventilation (PCV) system is designed to prevent blow-by gas from escaping to the atmosphere. The PCV valve contains a spring-loaded plunger. When the engine starts, the plunger in the PCV valve is lifted in proportion to intake manifold vacuum and the blow-by gas is drawn directly into the intake manifold.



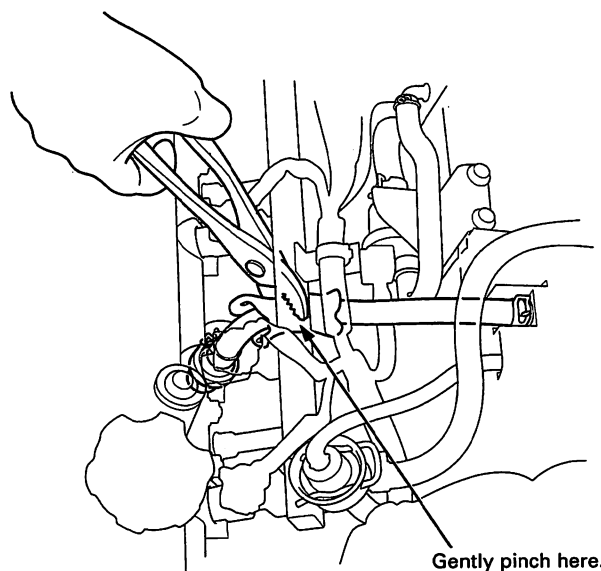
Inspection

1. Check the PCV hoses and connections for leaks and clogging.



2. At idle, make sure there is a clicking sound from the PCV valve when the hose between PCV valve and intake manifold is lightly pinched with your fingers or pliers.

If there is no clicking sound, check the PCV valve grommet for cracks or damage. If the grommet is OK, replace the PCV valve and recheck.



Emission Control System

Evaporative Emission (EVAP) Controls

Description

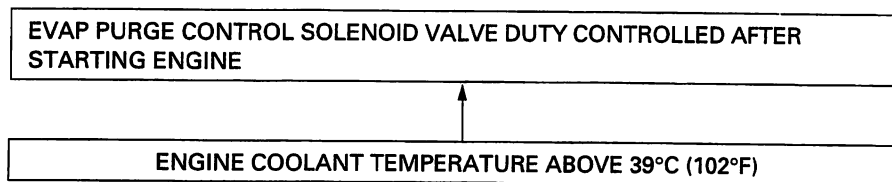
The evaporative emission controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

A. Evaporative Emission (EVAP) Control Canister

An EVAP control canister is used for the temporary storage of fuel vapor until the fuel vapor can be purged from the EVAP control canister into the engine and burned.

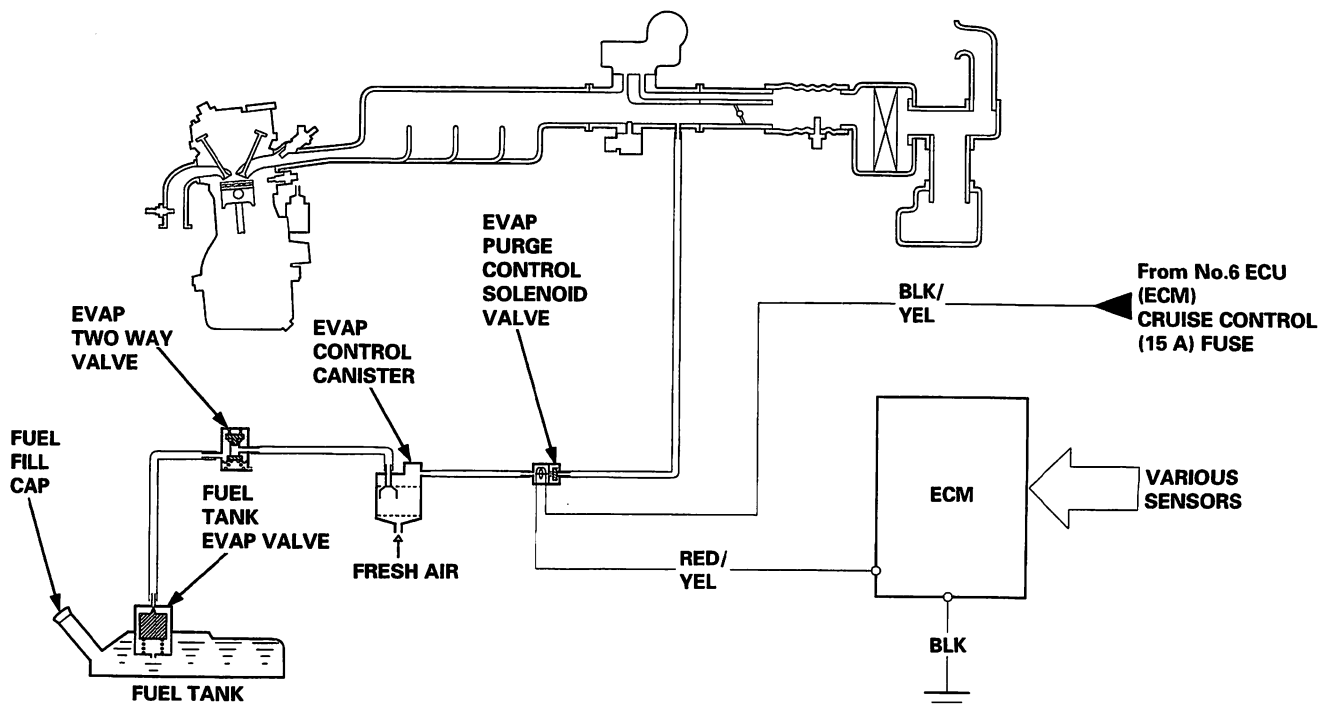
B. Vapor Purge Control System

EVAP control canister purging is accomplished by drawing fresh air through the EVAP control canister and into a port on the throttle body. The purging vacuum is controlled by the EVAP purge control canister and the EVAP purge control solenoid valve.



C. Fuel Tank Vapor Control System

When fuel vapor pressure in the fuel tank is higher than the set value of the EVAP two way valve, the valve opens and regulates the flow of fuel vapor to the EVAP control canister.





Troubleshooting

Inspection of Evaporative Emission Controls

Check the vacuum when cold:

1. Disconnect the vacuum hose from the EVAP purge control canister and connect a vacuum gauge to the hose.
2. Start the engine and allow it to idle.

NOTE: Engine coolant temperature must be below 39°C (102°F)
Quickly raise the engine speed to 3,000 rpm (min⁻¹).

EVAP PURGE CONTROL CANISTER

VACUUM PUMP/GAUGE

Is there vacuum?

YES

NO

Check the EVAP purge control solenoid valve:

1. Disconnect the 2P connector from the EVAP purge control solenoid valve.
2. Quickly raise the engine speed to 3,000 rpm (min⁻¹).

Is there vacuum?

YES

NO

Inspect vacuum hose routing. If OK, replace the EVAP purge control solenoid valve.

EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR



PCS (RED/YEL)



Wire side of female terminals

Check for a short in the wire (PCS line):

1. Turn the ignition switch OFF.
2. Disconnect ECM connector.
3. Check for continuity between the EVAP purge control solenoid valve 2P connector terminal No. 2 and body ground.

Is there continuity?

YES

NO

Repair short in the wire between the EVAP purge control solenoid valve and the ECM (36).

Substitute a known-good ECM and recheck (see page 11-C-12 for immobilizer information). If symptom/indication goes away, replace the original ECM.

Check the vacuum when hot:

1. Start the engine. Hold the engine at 3,000 rpm (min⁻¹) with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Check for vacuum at the vacuum hose after starting the engine.
3. Quickly raise the engine speed to 3,000 rpm (min⁻¹).

Is there vacuum?

NO

YES

Check the EVAP purge control valve:

1. Turn the ignition switch OFF.
2. Disconnect the 2P connector from the EVAP purge control solenoid valve.
3. Turn the ignition switch ON (II).
4. At the harness side, measure voltage between the EVAP purge control solenoid valve 2P connector terminal No. 1 and body ground.

IG1 (BLK/YEL)



(To page 11-C-82)



(To page 11-C-82)

(cont'd)

Emission Control System

Evaporative Emission (EVAP) Controls (cont'd)

(From page 11-C-81)

(From page 11-C-81)

