TOYOTA

2F ENGINE

EMISSION CONTROL

REPAIR MANUAL

1981 MODEL

TOYOTA MOTOR CORPORATION

FOR USA Pub. No. 36043E

FOREWORD

This repair manual has been prepared to provide information covering general service repairs for the Emission Control System of the 2F Engine.

Applicable models:
1981 FJ40L series
1981 FJ40LV series
1981 FJ60LG series

For service of the 2F Engine, refer to the following repair manual.

2F Engine Repair Manual (Pub. No. 98126E)

All information contained in this manual is the most up-to-date at the time of publication. However specifications and procedures are subject to change without notice.

TOYOTA MOTOR CORPORATION

1981 TOYOTA 2F ENGINE EMISSION CONTROL REPAIR MANUAL

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INTRODUCTION

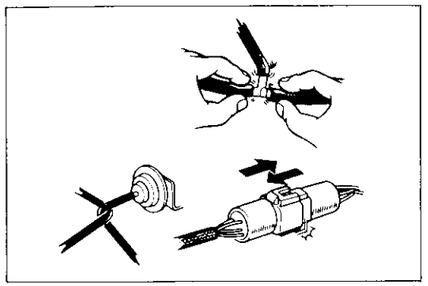
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GENERAL PRECAUTIONS

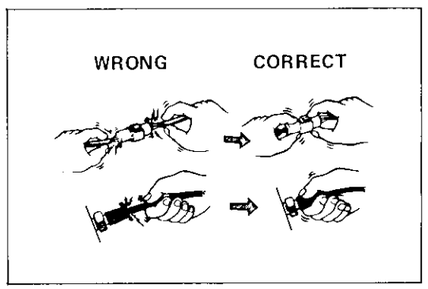
1. **Know the importance of periodic maintenance.**
   (a) Every service item in the periodic maintenance list must be performed.
   (b) Failing to do even one item can cause the engine to run poorly and increase exhaust emissions.

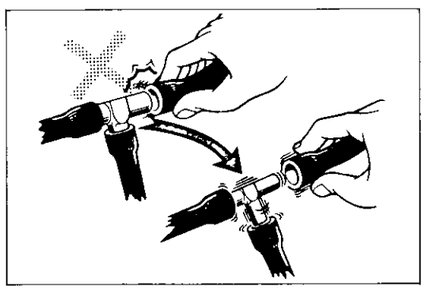
2. **Listen to the customers comments carefully.**
   Always determine exactly what the customer complaint is, if any, and verify it before proceeding with repairs.

3. **Determine if you have an engine or emission system problem.**
   (a) Engine problems are usually not caused by the emission control systems.
   (b) When troubleshooting, always check the engine and the ignition system first.

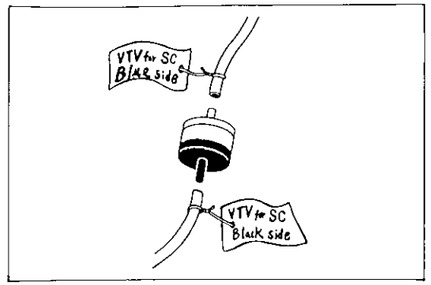


4. **Check hose and wiring connections first.**
   The most frequent cause of problems is simply a bad connection in wiring or vacuum hoses. Always make sure that connections are secure and correct.





5. **Observe the following precautions to avoid damage to the parts:**
   (a) To disconnect vacuum hoses, pull on the end, not the middle of the hose.
   (b) To pull apart electrical connectors, pull on the connector itself, not the wires.
   (c) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
   (d) When steam cleaning an engine, protect the distributor, coil, air filter, carburetor intake, air pump and EGR vacuum modulator from water.
   (e) Never use an impact wrench to remove or install thermo switches or thermo sensors.
   (f) When checking for continuity at a wire connector, insert the tester probe carefully to prevent terminals from bending.
   (g) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter instead. Once the hose has been stretched, it may leak.



6. **Tag hoses before disconnecting them:**
   (a) When disconnecting vacuum hoses, use tags to identify how they should be reconnected.
   (b) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

PRECAUTIONS FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

WARNING: If large amounts of unburned gasoline flow into the catalytic converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

1. **Use only unleaded gasoline.**

2. **Avoid prolonged idling.**
   Avoid running the engine at fast idle speed for more than 10 minutes and at idle speed for more than 20 minutes.

3. **Avoid spark jump test.**
   (a) Spark jump only when absolutely necessary. Perform this test as rapidly as possible.
   (b) While testing, never race the engine.

4. **Avoid prolonged engine compression measurement.**
   Engine compression tests must be made as rapidly as possible.

5. **Do not run engine when fuel tank is nearly empty.**
   This may cause the engine to misfire and create an extra load on the catalytic converter.

6. **Avoid coasting with ignition turned off and prolonged engine braking.**

7. **Do not dispose of used catalytic converter along with parts contaminated with gasoline or oil.**

ABBREVIATIONS USED IN THIS MANUAL

ABV	Air Bypass Valve
ACV	Air Control Valve
AI	Air Injection
ASV	Air Switching Valve
BTDC	Before Top Dead Center
BVSV	Bi-metal Vacuum Switching Valve
CB	Choke Breaker
EGR	Exhaust Gas Recirculation
EVAP	Evaporative (Emission Control)
EX.	Exhaust (manifold or valve) or Except
HAC	High Altitude Compensation
HAI	Hot Air Intake
HIC	Hot Idle Compensation
IN.	Intake (manifold or valve) or Inch
IG	Ignition
MAS	Mixture Adjusting Screw
OC	Oxidation Catalyst
PCV	Positive Crankcase Ventilation
SC	Spark Control
SST	Special Service Tool
S/W	Switch
T/M	Transmission
VCV	Vacuum Control Valve
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
W/	With
W/O	Without

TROUBLESHOOTING

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ENGINE OVERHEATING

Problem	Possible cause	Remedy	Page
Engine overheats	Cooling system faulty	Troubleshoot cooling system	
	Incorrect ignition timing	Reset timing	4-2

HARD STARTING

Problem	Possible cause	Remedy	Page
Engine will not crank or cranks slowly	Starting system faulty	Troubleshoot starting system	
Engine will not start/ Hard to start (cranks okay)	No fuel supply to carburetor	Check fuel line	
	Carburetor problems • Choke operation • Flooding • Needle valve sticking or clogged • Vacuum hose disconnected or damaged	Repair as necessary	
	Ignition problems • Ignition coil • Igniter • Distributor	 Inspect coil Inspect igniter Inspect distributor	
	Spark plugs faulty	Inspect plugs	
	Ignition wirings disconnected or broken	Inspect wirings	
	Vacuum leaks • PCV line • EGR line • Intake manifold	Repair as necessary	 3-4 3-13
	Compression low	Check compression	

ROUGH IDLING

Problem	Possible cause	Remedy	Page
Rough idle or stalls	Spark plugs faulty	Inspect plugs	
	Ignition wirings faulty	Inspect wiring	
	Ignition problems • Ignition coil • Igniter • Distributor	 Inspect coil Inspect igniter Inspect distributor	
	Incorrect ignition timing	Reset timing	4-2
	Vacuum leaks • PCV line • EGR line • HAC line • HIC line • Intake manifold	Repair as necessary	 3-4 3-13 3-31 3-38

ROUGH IDLING (CONT'D)

Problem	Possible cause	Remedy	Page
Rough idle or stalls (cont'd)	Incorrect valve clearance	Adjust valve clearance	
	Carburetor problems • Idle speed incorrect • Slow jet clogged • Idle mixture incorrect • Fuel cut solenoid valve not open • Fast idle speed setting incorrect (cold engine)	Repair as necessary	 4-3 4-6 3-44 4-4
	Hot air intake system faulty	Check HAI system	3-36
	Engine overheats	Check cooling system	
	EGR valve faulty	Check EGR valve	3-13
	Compression low	Check compression	

ENGINE HESITATES/POOR ACCELERATION

Problem	Possible cause	Remedy	Page
Engine hesitates/ Poor acceleration	Spark plugs faulty	Inspect plugs	
	Ignition wirings faulty	Inspect wiring	
	Vacuum leaks • PCV line • EGR line • HAC line • HIC line • Intake manifold	Repair as necessary	 3-4 3-13 3-31 3-38
	Incorrect ignition timing	Reset timing	4-2
	Air cleaner clogged	Check air cleaner	
	Fuel line clogged	Check fuel line	
	Carburetor problems • Float level too low • Accelerator pump faulty • Power valve faulty	Repair as necessary	
	Emission control system problem • HAI system always on (hot engine) • EGR system always on (cold engine)	 Check HAI system Check EGR system	 3-36 3-13
	Engine overheats	Check cooling system	
	Compression low	Check compression	

ENGINE DIESELING

Problem	Possible cause	Remedy	Page
Engine dieseling (Continues running after ignition switch is turned off)	Carburetor problems • Linkage sticking • Idle speed or fast idle out of adjustment • Fuel cut solenoid faulty	Repair as necessary	4-3, 4-4 3-44
	Incorrect ignition timing	Reset timing	4-2

AFTER FIRE, BACKFIRE

Problem	Possible cause	Remedy	Page
Muffler explosion (after fire) on deceleration only	AI system faulty	Check AI system	3-19
	Deceleration fuel cut system always off	Check fuel cut system	3-44
Muffler explosion (after fire) all the time	Air cleaner clogged	Check air cleaner	
	Incorrect ignition timing	Reset timing	4-2
	Incorrect valve clearance	Adjust valve clearance	
Engine backfires	Carburetor vacuum leak	Check hoses and repair as necessary	
	Insufficient fuel flow	Troubleshoot fuel system	
	Incorrect ignition timing	Reset timing	4-2
	Incorrect valve clearance	Adjust valve clearance	
	Carbon deposits in combustion chambers	Inspect cylinder head	

EXCESSIVE OIL CONSUMPTION

Problem	Possible cause	Remedy	Page
Excessive oil consumption	Oil leak	Repair as necessary	
	PCV line clogged	Check PCV system	3-4
	Piston ring worn or damaged	Check rings	
	Valve stem oil seal worn or damaged	Check oil seal	
	Valve stem and guide worn	Check valves and guides	

POOR GASOLINE MILEAGE

Problem	Possible cause	Remedy	Page
Poor gasoline mileage	Fuel leak	Repair as necessary	
	Air cleaner clogged	Check air cleaner	
	Incorrect ignition timing	Reset timing	4-2
	Carburetor problems • Idle speed too high • Deceleration fuel cut system faulty • Power valve always open	Repair as necessary	4-3 3-44
	Spark plugs faulty	Inspect plugs	
	EGR system always on	Check EGR system	3-13
	Compression low	Check compression	
	Tires improperly inflated	Inflate tires to proper pressure	
	Clutch slips	Troubleshoot clutch	
	Brakes drag	Troubleshoot brakes	

– MEMO –

EMISSION CONTROL SYSTEM

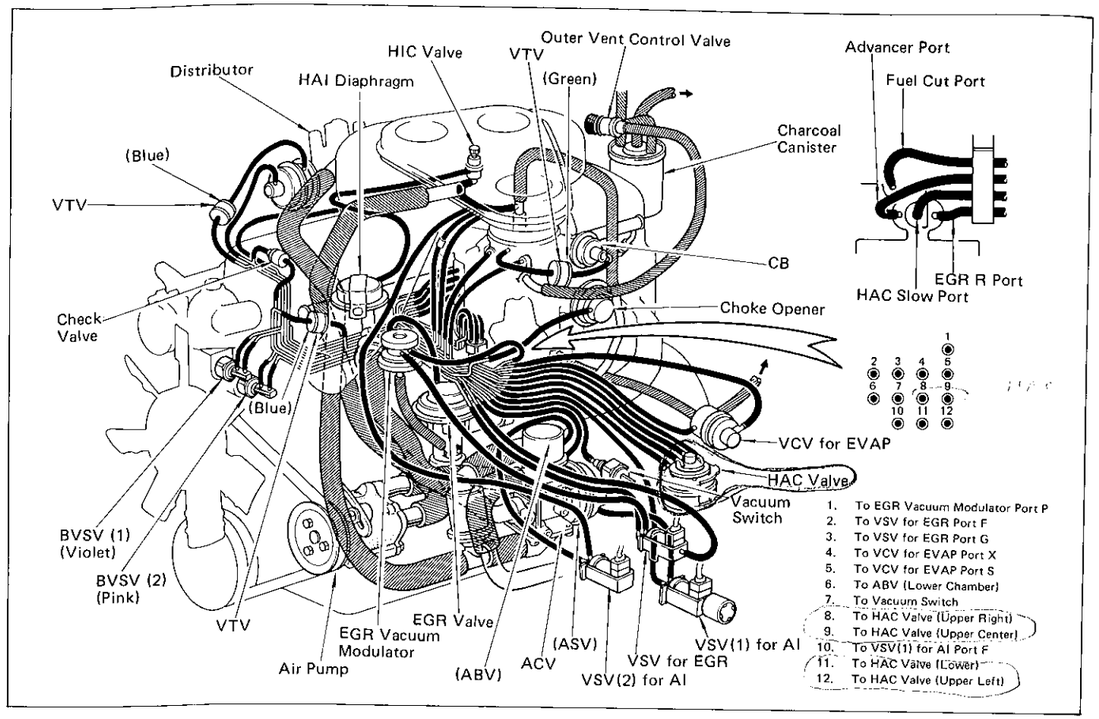
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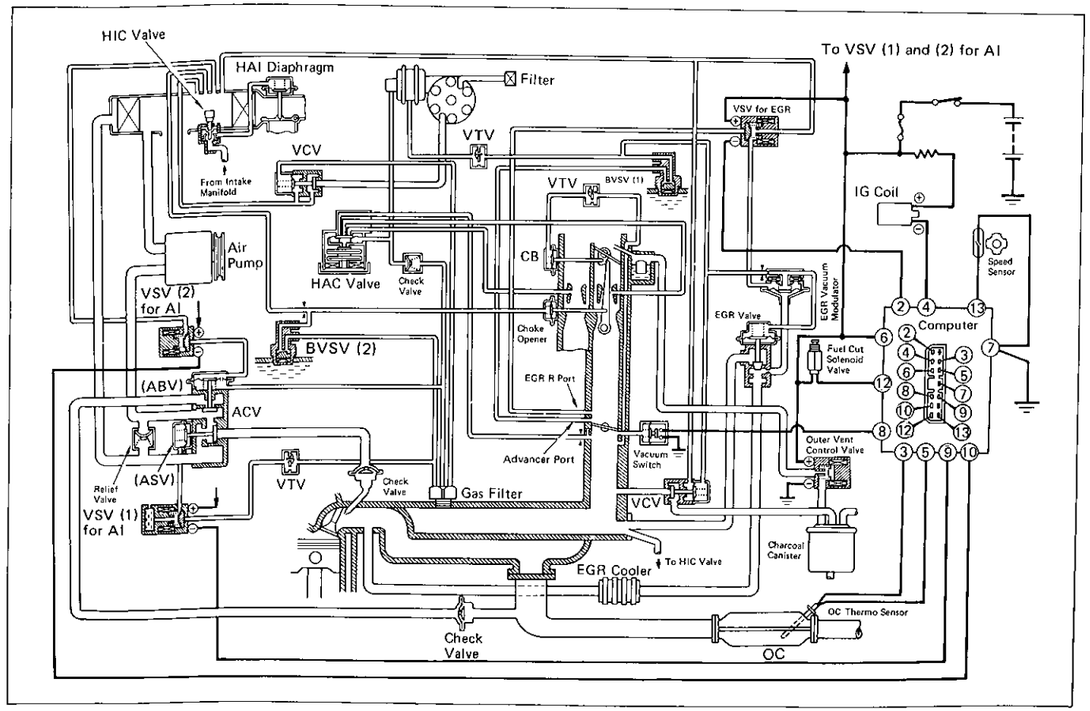
SYSTEM PURPOSE 3-2
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SYSTEM PURPOSE

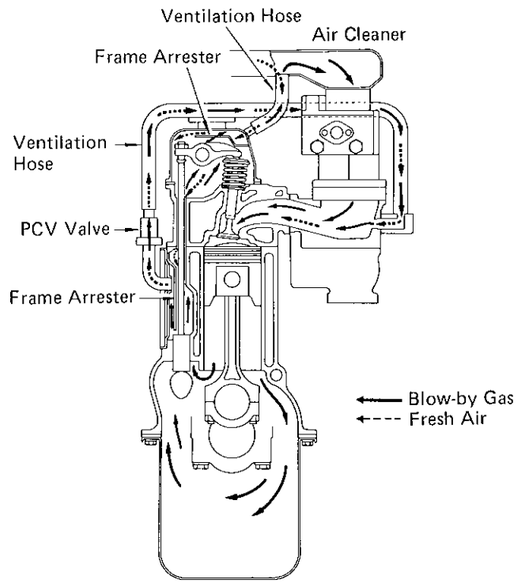
System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow-by gas (HC)
Fuel evaporative emission control	EVAP	Reduces evaporative HC
Spark control	SC	Reduces NOx and HC
Exhaust gas recirculation	EGR	Reduces NOx
Air injection	AI	Reduces HC and CO
Oxidation catalyst	OC	Reduces HC and CO
High altitude compensation	HAC	Insures air-fuel mixture at high altitude
Auxiliary system:		
Automatic hot air intake	HAI	Improves driveability – cold
Hot idle compensation	HIC	Controls air-fuel mixture – hot
Choke breaker	CB	Improves driveability – cold
Choke opener	—	Improves driveability – hot
Deceleration fuel cut	—	Prevents overheating OC and after burning
Heat control valve	—	Improves driveability – cold

COMPONENT LAYOUT AND SCHEMATIC DRAWING



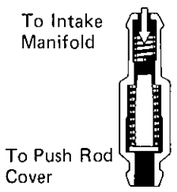


POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



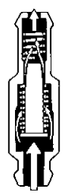
To reduce HC emissions, crankcase blow-by gas (HC) is routed through the PCV valve to the intake manifold for combustion in the cylinders.

Engine not Running or in Case of Backfire



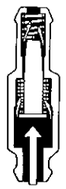
- PCV VALVE IS CLOSED.

Normal Operation



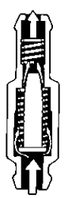
- PCV VALVE IS OPEN.
- VACUUM PASSAGE IS LARGE.

Idling or Decelerating

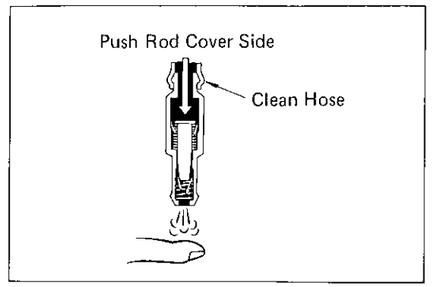


- PCV VALVE IS OPEN.
- VACUUM PASSAGE IS SMALL.

Acceleration or High Load



- PCV VALVE IS FULLY OPEN.

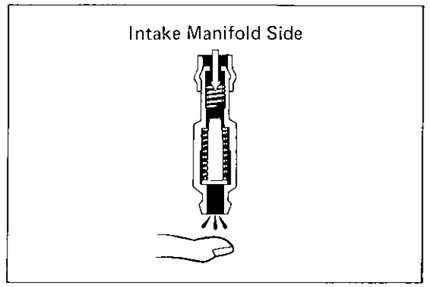


INSPECTION OF PCV VALVE

1. REMOVE PCV VALVE
2. ATTACH A CLEAN HOSE TO PCV VALVE
3. BLOW FROM PUSH ROD COVER SIDE

   Check that air passes through easily.

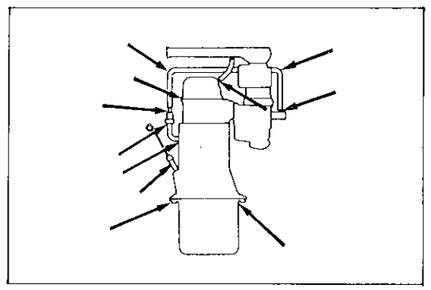
   CAUTION: **Do not suck air through the valve. Petroleum substances inside the valve are harmful.**



4. BLOW FROM INTAKE MANIFOLD SIDE

   Check that air passes through with difficulty.
   If the PCV valve fails either of the checks, replace it.

5. INSTALL PCV VALVE



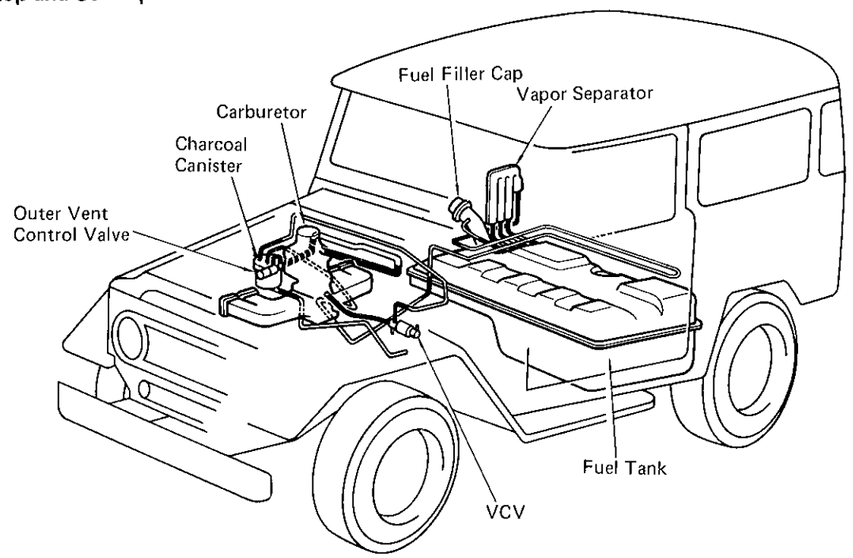
INSPECTION OF PCV HOSES AND CONNECTIONS

VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

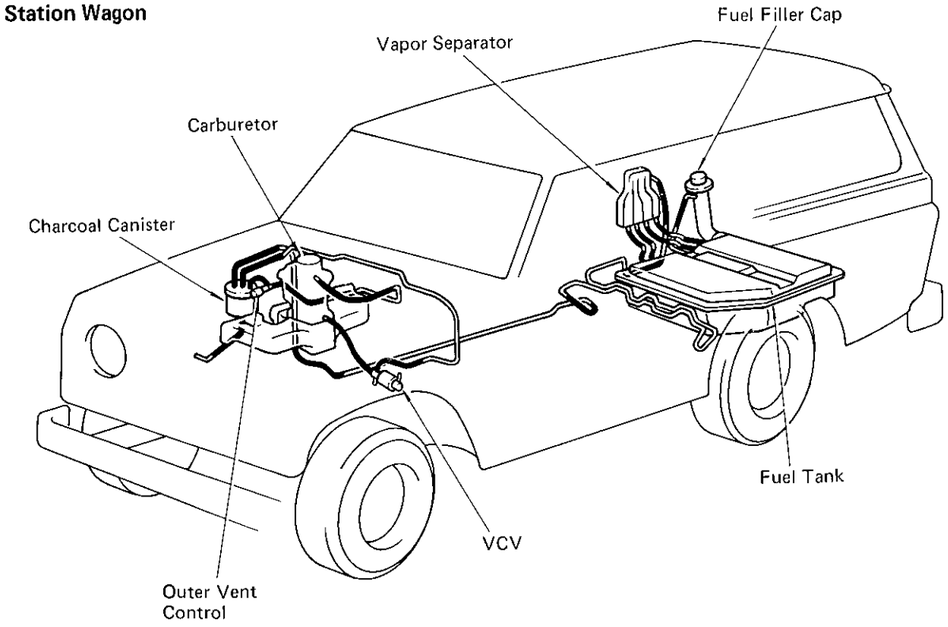
Check for cracks, leaks or damage.

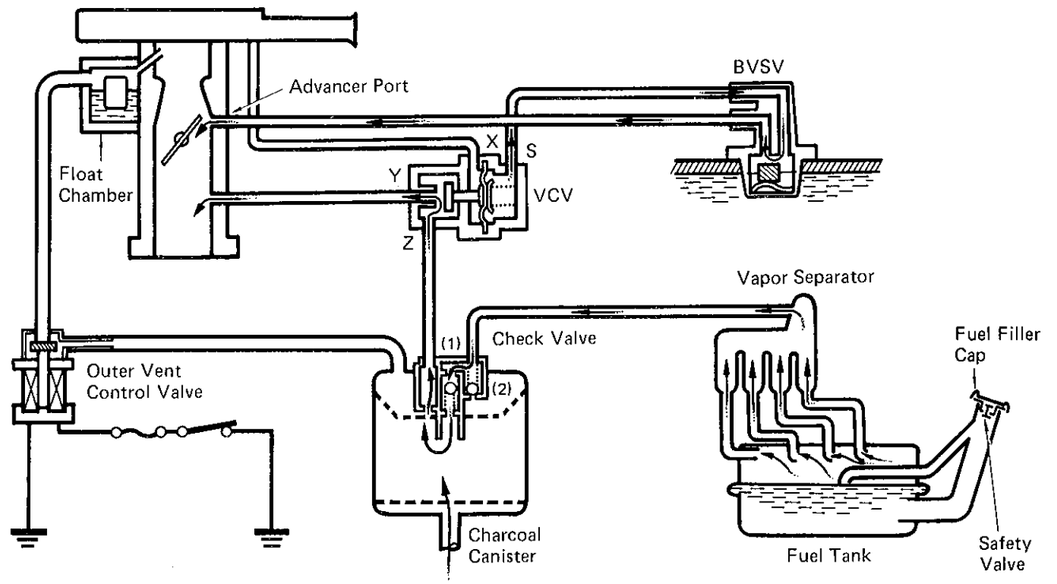
FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM

Hardtop and Softtop



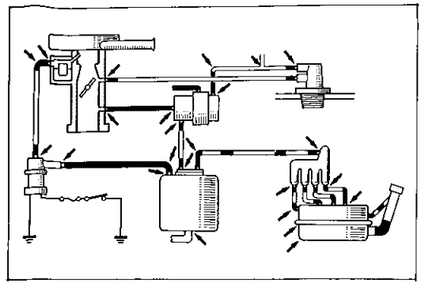
Station Wagon





To reduce HC emissions, evaporated fuel from fuel tank and float chamber is routed through the charcoal canister to the carburetor for combustion in the cylinders.

IG S/W	Outer Vent Control Valve	Coolant Temp.	BVSV	Vacuum at Advancer Port	VCV	Check Valve (1)	Check Valve (2)	Safety Valve in Cap	Evaporated Fuel (HC)
OFF	OPEN	—	—	—	CLOSED	—	—	—	HC from tank and float chamber is absorbed into the canister.
ON	CLOSED	Below 30°C (86°F)	CLOSED	—	CLOSED	—	—	—	HC from tank is absorbed into the canister.
		Above 44° (111°F)	OPEN	Below 50 mmHg (1.97 in.Hg)	CLOSED	—	—	—	
				Above 70 mmHg (2.76 in.Hg)	OPEN	—	—	—	HC from canister is led into intake manifold.
High pressure in tank		—	—	—	—	OPEN	CLOSED	CLOSED	HC from tank is absorbed into the canister.
High vacuum in tank		—	—	—	—	CLOSED	OPEN	OPEN	(Air is led into the tank.)



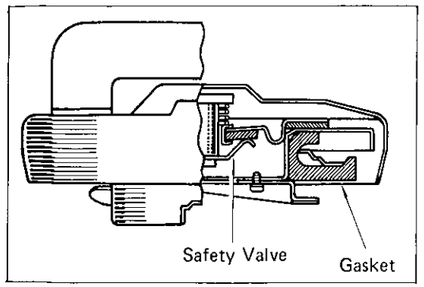
INSPECTION OF FUEL VAPOR LINES, FUEL TANK AND TANK CAP

1. VISUALLY INSPECT LINES AND CONNECTIONS

   Look for loose connections, sharp bends or damage.

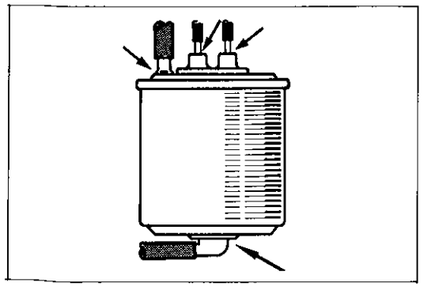
2. VISUALLY INSPECT FUEL TANK

   Look for deformation, cracks or fuel leakage.



3. VISUALLY INSPECT FUEL FILLER CAP
   (a) Remove four screws and protector.
   (b) Look for damaged or deformed gasket.
   (c) Look for stuck safety valve.
   (d) Install the protector.

   If the safety valve is stuck, repair or replace the cap.

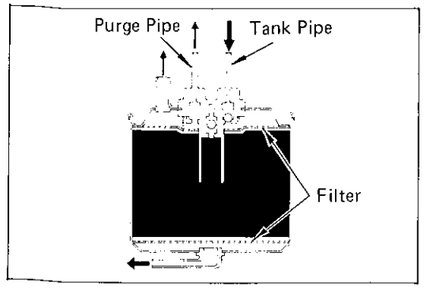


INSPECTION OF CHARCOAL CANISTER

1. REMOVE CHARCOAL CANISTER

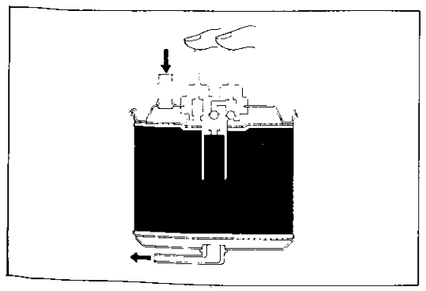
2. VISUALLY INSPECT CHARCOAL CANISTER CASE

   Look for cracks or damage.



3. CHECK FOR CLOGGED FILTER AND STUCK CHECK VALVE
   (a) Using low pressure compressed air, blow into the tank pipe and check that the air flows without resistance from the other pipes.
   (b) Blow into the purge pipe and check that the air flows without resistance from the other pipes.

   If a problem is found, replace the charcoal canister.

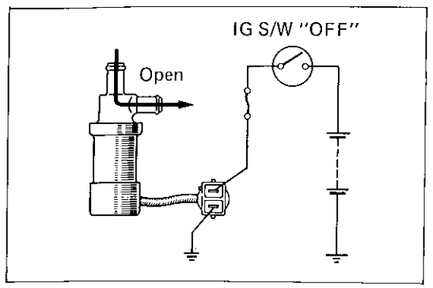


4. CLEAN FILTER IN CANISTER

   Clean the filter by blowing 3 kg/cm² (43 psi) air into the pipe to the outer vent control valve, while holding the other upper canister pipes closed.

   NOTE:
   - Do not attempt to wash the canister.
   - No activated carbon should come out.

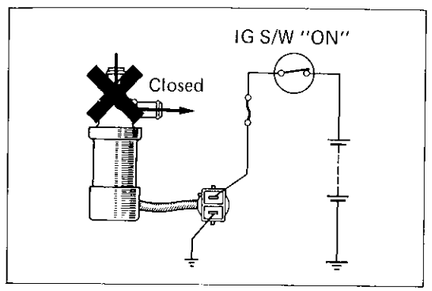
5. INSTALL CHARCOAL CANISTER



INSPECTION OF OUTER VENT CONTROL VALVE

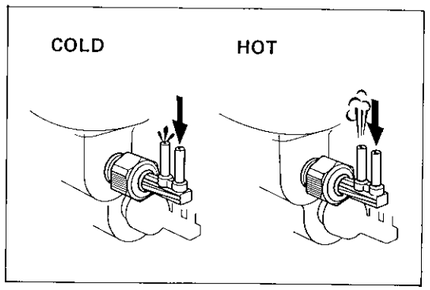
CHECK OUTER VENT CONTROL VALVE OPERATION

(a) Disconnect the hoses from the valve.
(b) Check that the valve is open when the ignition switch is "OFF".



(c) Check that the valve is closed when the ignition switch is "ON".
(d) Reconnect hoses to proper locations.

If the valve does not operate, check the fuse and the wiring connections.

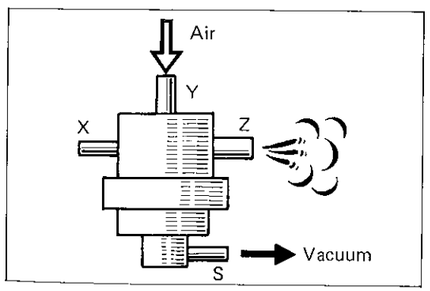


INSPECTION OF BVSV

CHECK BVSV BY BLOWING AIR INTO PIPES

(a) With coolant temperature below 30°C (86°F), blow air into a pipe and check that the BVSV is closed.
(b) After warming-up the engine, blow air into a pipe and check that the BVSV is open.

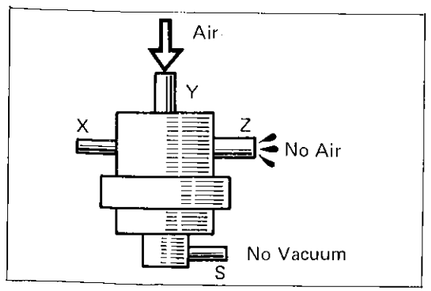
If a problem is found, replace the BVSV.



INSPECTION OF VCV

CHECK VCV BY BLOWING AIR INTO PIPE

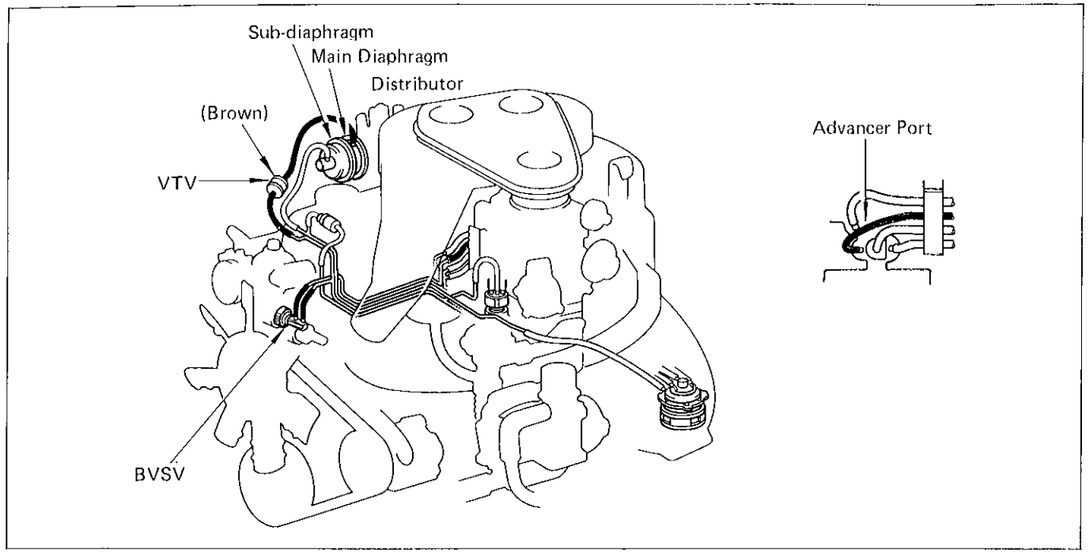
(a) Apply vacuum above 70 mmHg (2.76 in.Hg) to pipe S.
(b) Blow air into pipe Y and check that air comes out of pipe Z.

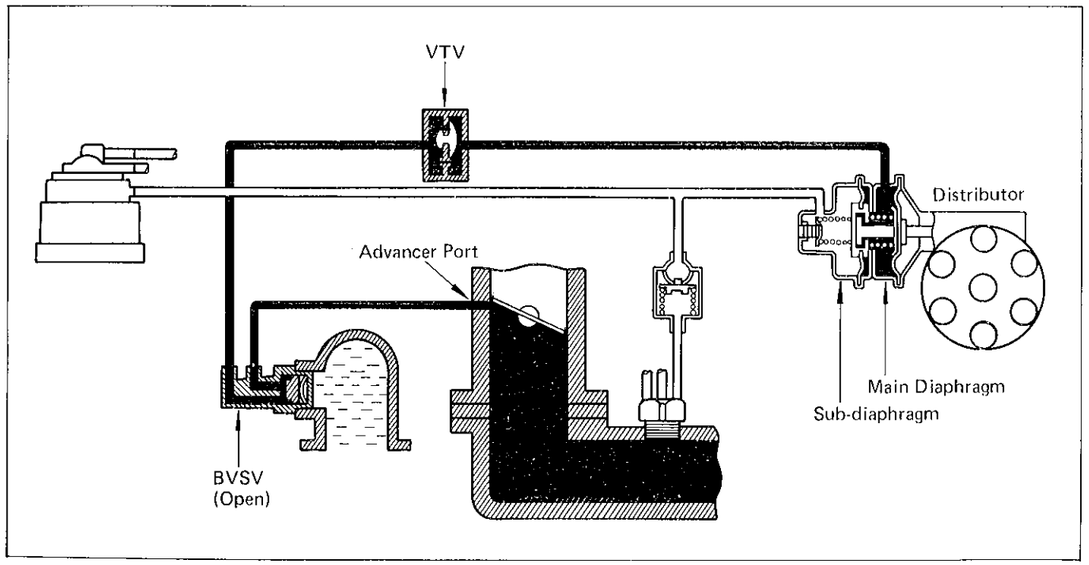


(c) Stop the applied vacuum.
(d) Blow air into pipe Y and check that air does not come out of pipe Z.

If a problem is found, replace the VCV.

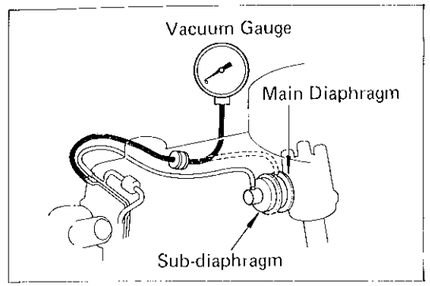
SPARK CONTROL (SC) SYSTEM





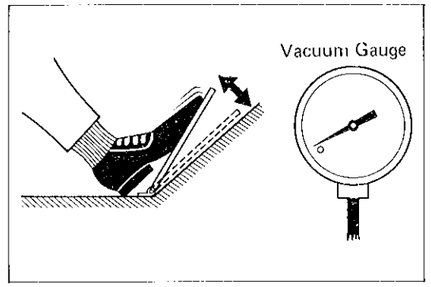
To reduce NOx and HC emissions, this system delays the vacuum advance for a given time and lowers the maximum combustion temperature.

Coolant Temp.	BVSV	Throttle Valve Opening	Vacuum Ignition Timing
Cold Below 30°C (86°F)	CLOSED	—	NOT ADVANCED
Hot Above 44°C (111°F)	OPEN	Positioned below advancer port	NOT ADVANCED
		Positioned above advancer port	DELAYED by VTV

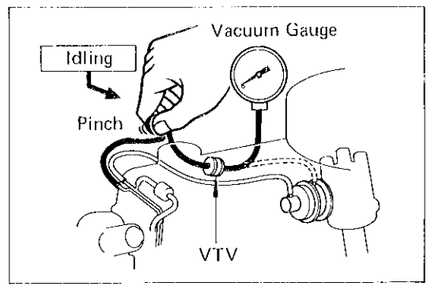


INSPECTION OF SC SYSTEM

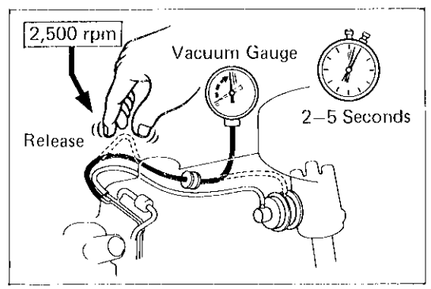
1. CONNECT VACUUM GAUGE TO DISTRIBUTOR MAIN DIAPHRAGM HOSE



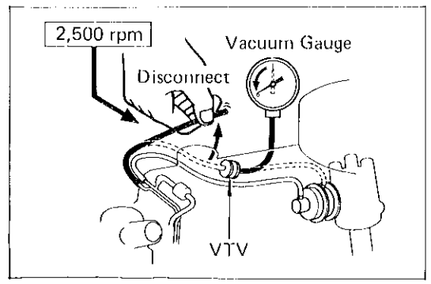
2. CHECK BVSV WITH COLD ENGINE
   (a) The coolant temperature should be below 30°C (86°F).
   (b) Start the engine.
   (c) Check that the vacuum gauge indicates zero regardless of whether the throttle valve is open or closed.
3. LET ENGINE WARM-UP TO NORMAL OPERATING TEMPERATURE



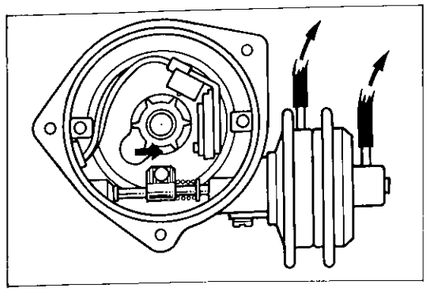
4. CHECK BVSV AND VTV WITH HOT ENGINE
   (a) With the engine warm and idling, pinch the hose between the VTV and the vacuum pipe.



   (b) Increase the engine speed to 2,500 rpm.
   (c) Within 2–5 seconds after the hose is released, check that the vacuum gauge indicates high vacuum.

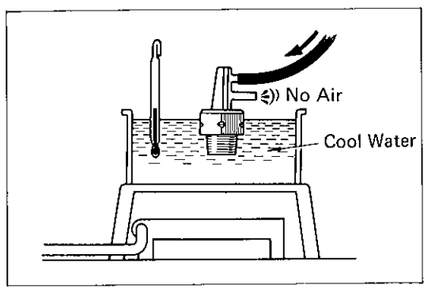


   (d) With the engine at 2,500 rpm, check that the vacuum gauge indicates zero quickly when the hose is disconnected between the VTV and vacuum pipe at the VTV side.
5. DISCONNECT VACUUM GAUGE AND RECONNECT HOSES



6. CHECK OPERATION OF DISTRIBUTOR VACUUM ADVANCER
   (a) Remove the distributor cap and rotor.
   (b) Apply vacuum to the diaphragms, and check that the vacuum advancer moves in accordance with the vacuum.
   (c) Reinstall the rotor and distributor cap.

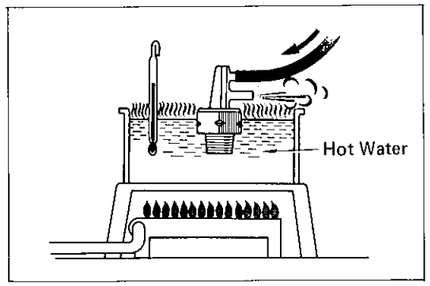
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART



INSPECTION OF BVSV

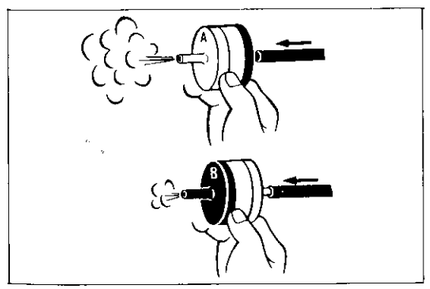
CHECK BVSV BY BLOWING AIR INTO PIPE

(a) Drain the coolant from the radiator into a suitable container.
(b) Remove the BVSV.
(c) Cool the BVSV to below 30°C (86°F) with cool water.
(d) Blow air into pipe and check that the BVSV is closed.



(e) Heat the BVSV to above 44°C (111°F) with hot water.
(f) Blow air into pipe and check that the BVSV is open.
(g) Apply liquid sealer to the threads of the BVSV and reinstall.
(h) Fill the radiator with coolant.

If a problem is found, replace the BVSV.



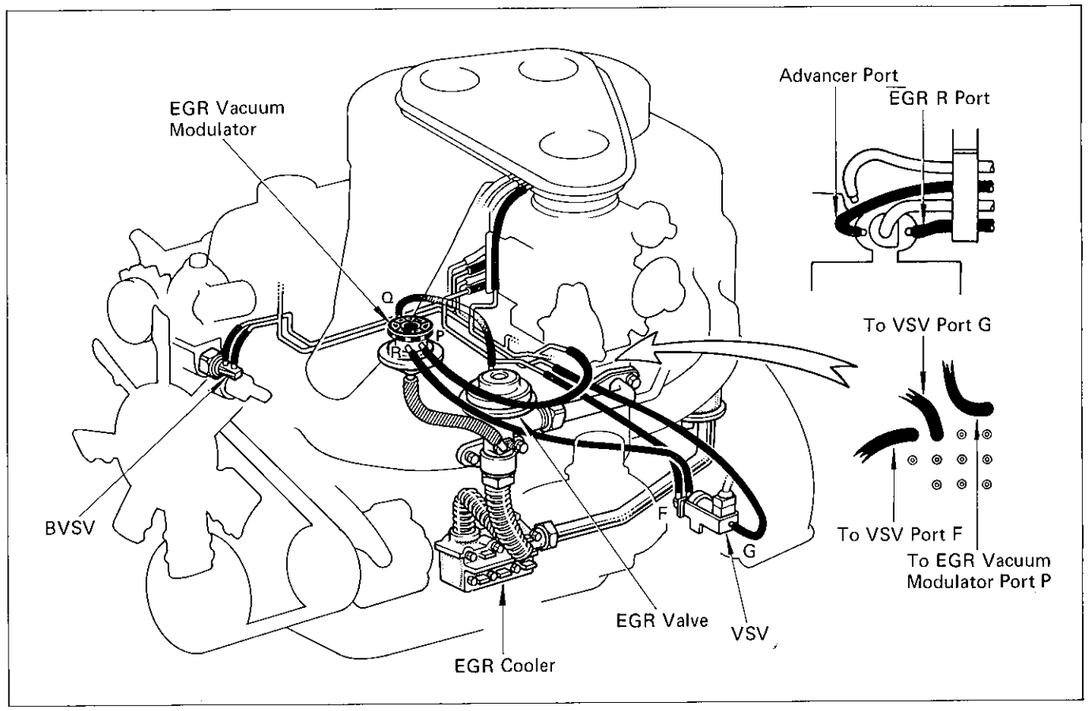
INSPECTION OF VTV

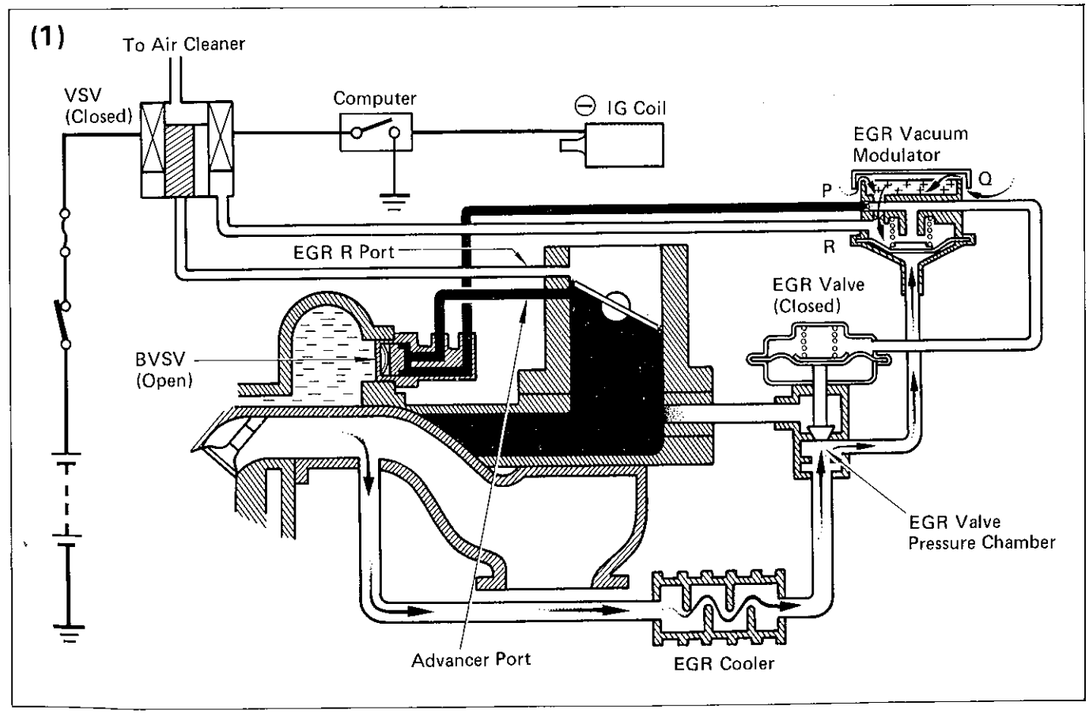
CHECK VTV BY BLOWING AIR INTO EACH SIDE

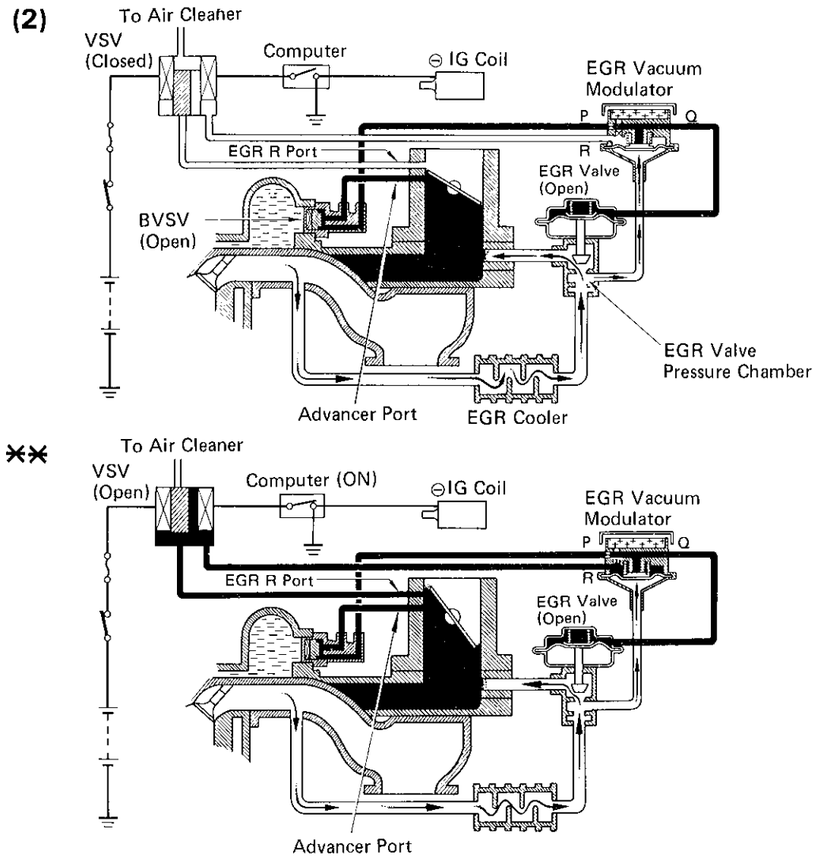
(a) Check that air flows without resistance from B to A.
(b) Check that air flows with difficulty from A to B.

If a problem is found, replace the VTV.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM





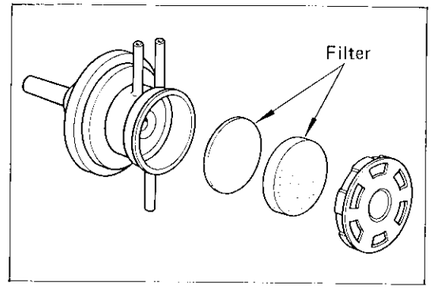


To reduce NOx emission, part of the exhaust gases are recirculated through the EGR valve to the intake manifold to lower the maximum combustion temperature.

Coolant Temp.	BVSV	Throttle Valve Opening Angle	Pressure in the EGR Valve Pressure Chamber		EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 30°C (86°F)	CLOSED	—	—		—	CLOSED	NOT RECIRCULATED
Above 44°C (111°F)	OPEN	Positioned below advancer port	—		—	CLOSED	NOT RECIRCULATED
		** Positioned above advancer port	(1) LOW	* Pressure constantly alternating between low and high	OPENS passage to atmosphere	CLOSED	NOT RECIRCULATED
			(2) HIGH		CLOSES passage to atmosphere	OPEN	RECIRCULATED

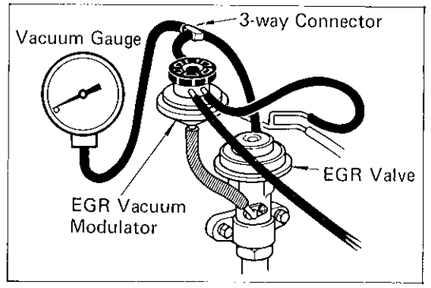
Remarks: * Pressure increase → Modulator closes → EGR valve opens → Pressure drops → Modulator opens → EGR valve closes

** When the throttle valve is positioned above the EGR R port and the engine speed is above 1,500 rpm, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the EGR gas, even if the exhaust pressure is low.



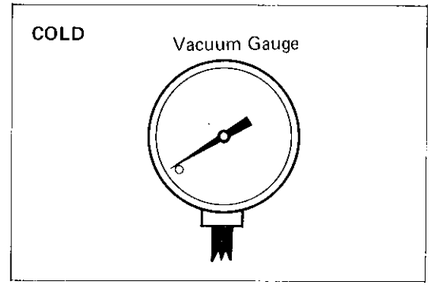
INSPECTION OF EGR SYSTEM

1. CHECK AND CLEAN FILTER IN EGR VACUUM MODULATOR
   (a) Check the filter for contamination or damage.
   (b) Using compressed air, clean the filter.

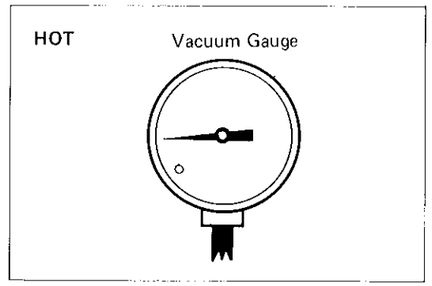


2. PREPARATION
   Using a 3-way connector, connect a vacuum gauge to the hose between the EGR valve and EGR vacuum modurator.

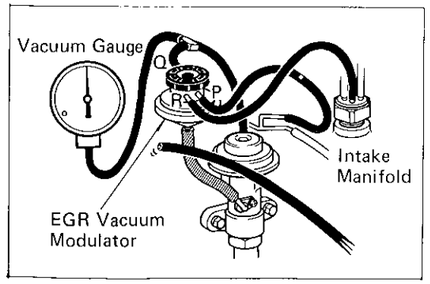
3. CHECK SEATING OF EGR VALVE
   Start the engine and check that the engine starts and runs at idle.



4. CHECK BVSV WITH COLD ENGINE
   (a) The coolant temperature should be below 30°C (86°F).
   (b) Check that the vacuum gauge indicates zero at 2,500 rpm.



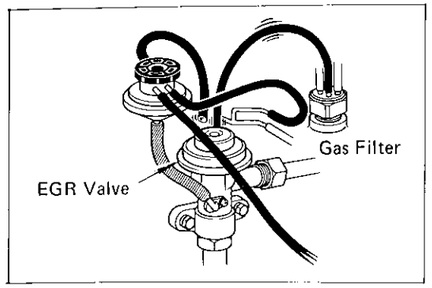
5. CHECK BVSV AND EGR VACUUM MODULATOR WITH WARM ENGINE
   (a) Warm up the engine.
   (b) Check that the vacuum gauge indicates low vacuum at 2,500 rpm.



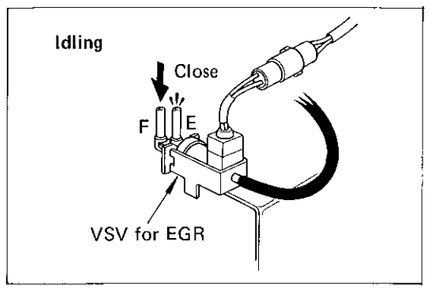
   (c) Disconnect the vacuum hose from port R of the EGR vacuum modulator and connect port R directly to the intake manifold with another hose.
   (d) Check that the vacuum gauge indicates high at 2,500 rpm.

NOTE: As a large amount of EGR gas enters, the engine will misfire slightly at this time.

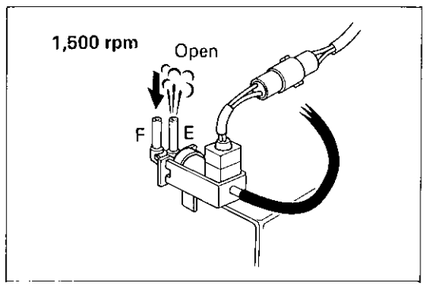
   (e) Disconnect the vacuum gauge and reconnect the vacuum hoses to the proper locations.



6. CHECK EGR VALVE
   (a) Apply vacuum directly to the EGR valve with the engine idling.
   (b) Check that the engine runs rough or dies.
   (c) Reconnect the vacuum hoses to the proper location.



7. CHECK COMPUTER TO VSV
   (a) Disconnect the vacuum hoses from pipe E and pipe F of the VSV.
   (b) With the engine idling, blow air into pipe F and check that the VSV is closed.



   (c) Increase the engine speed to above 1,500 rpm.
   (d) Blow air into pipe F and check that the VSV is open.
   (e) Reconnect the vacuum hoses to the proper locations.

IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART

INSPECTION OF BVSV

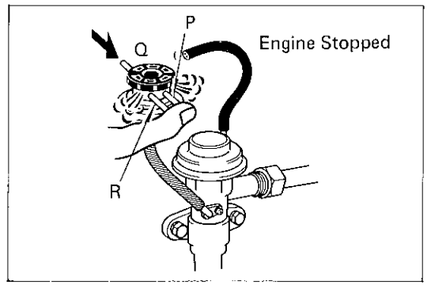
See page 3-12.

INSPECTION OF EGR VALVE

1. REMOVE EGR VALVE

   Check the valve for sticking and heavy carbon deposits. If a problem is found, replace it.

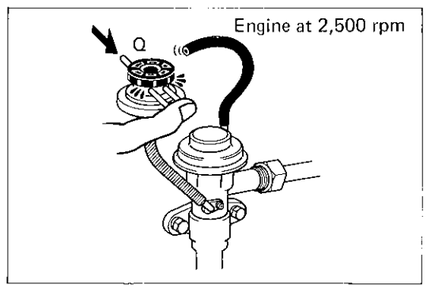
2. REINSTALL EGR VALVE



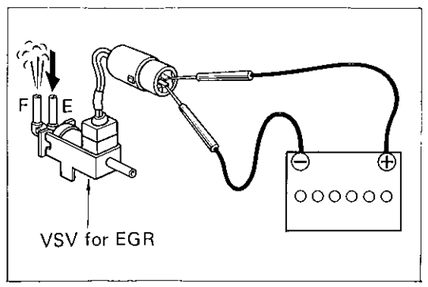
INSPECTION OF EGR VACUUM MODULATOR

CHECK EGR VACUUM MODULATOR OPERATION

   (a) Disconnect the vacuum hoses from port P, Q and R of the EGR vacuum modulator.
   (b) Plug port P and R with your finger.
   (c) Blow air into port Q. Check that the air passes through to the air filter side freely.

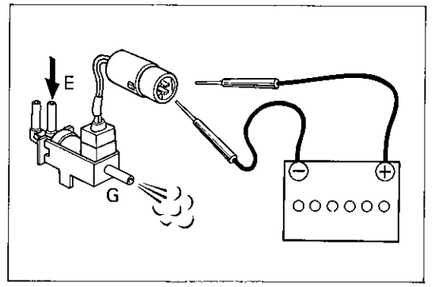


   (d) Start the engine and maintain the engine speed at 2,500 rpm.
   (e) Repeat the above test. Check that there is a strong resistance to air flow.



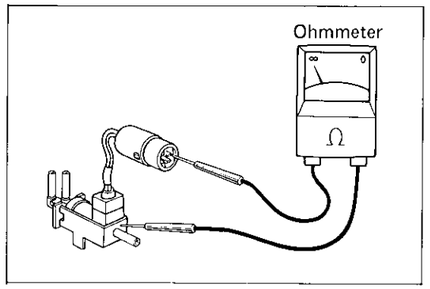
INSPECTION OF VSV

1. CHECK VACUUM CIRCUIT CONTINUITY IN VSV BY BLOWING AIR INTO PIPE
   (a) Connect the VSV terminals to the battery terminals, as shown.
   (b) Blow air into pipe E and check that air comes out of pipe F.



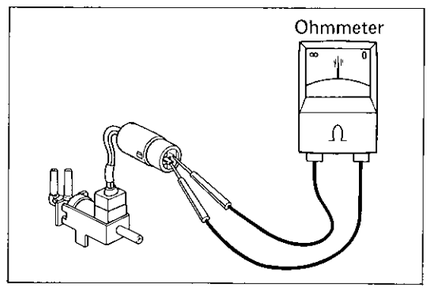
(c) Disconnect the battery connections.
(d) Blow air into pipe E and check that air comes out of pipe G.

If a problem is found, replace the VSV.



2. CHECK FOR SHORT CIRCUIT

Using an ohmmeter, check that there is no continuity between the positive (+) terminal and the VSV body.
If there is continuity, replace the VSV.



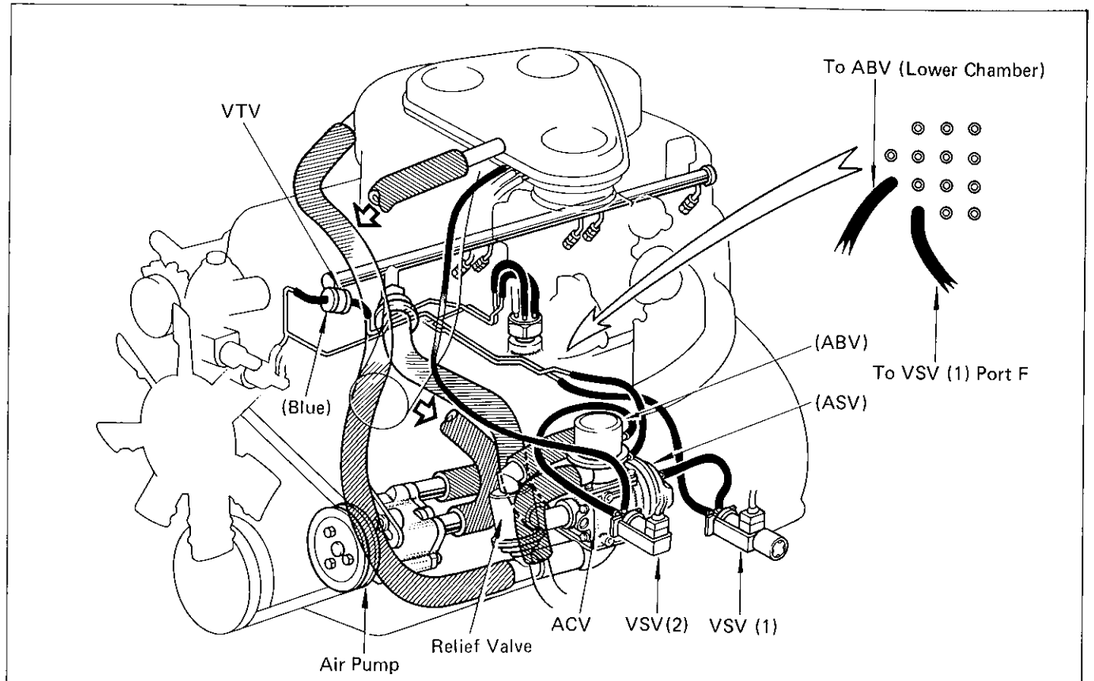
3. CHECK FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between the positive (+) terminal and the other terminal as shown.

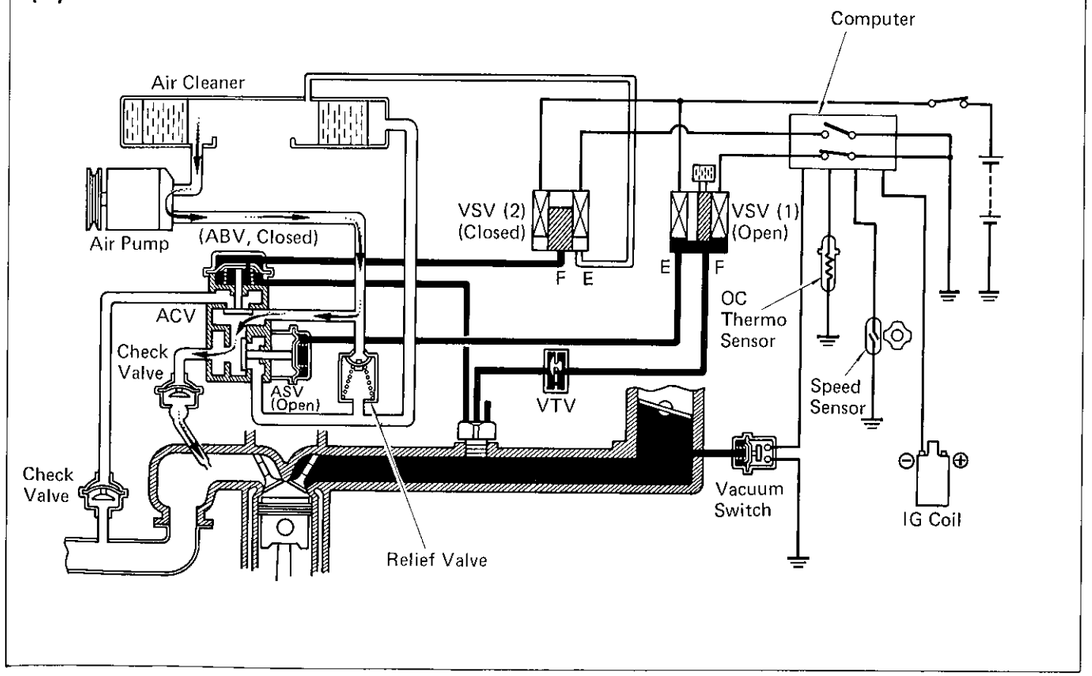
Specified resistance: 38 – 43 ohms at 20°C (68°F)

If the resistance is not within specification, replace the VSV.

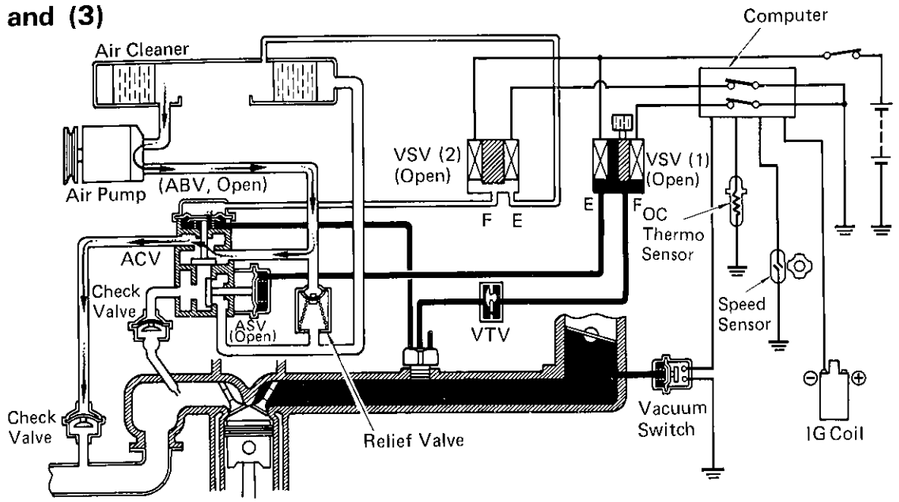
AIR INJECTION (AI) SYSTEM



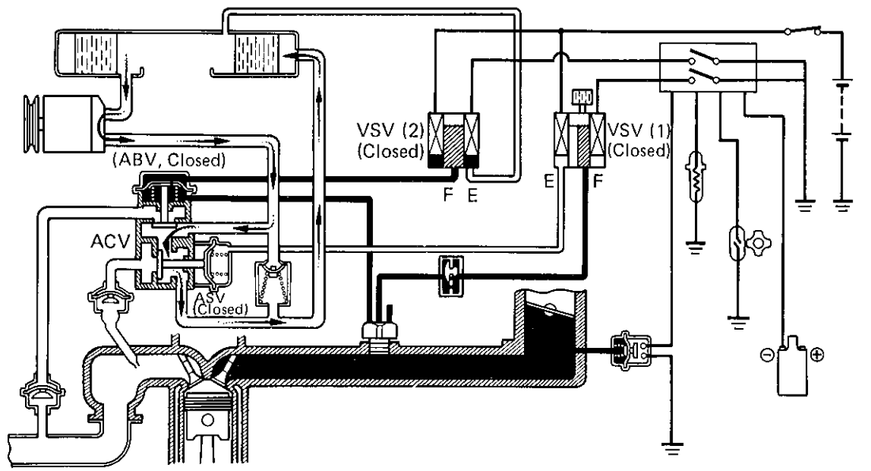
(1)



(2) and (3)



(4)



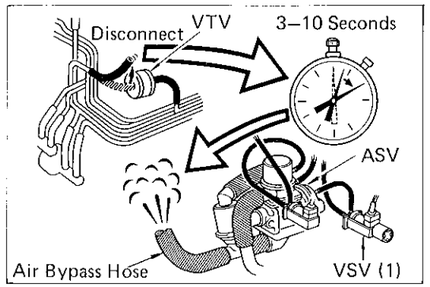
For reburning the unburnt HC and CO in the exhaust gas, compressed air from the air pump is blown into the exhaust ports during low-middle vehicle speed. During high vehicle speed, air is blown into the exhaust pipe (Just ahead of OC).

OC Temp.	Vehicle Speed	Deceleration Fuel Cut System	VSV (1)	VSV (2)	ASV	ABV	Air from Air Pump
Below 600°C (1,112°F)	Below 35 mph (56 km/h)	OFF	OPEN (E–F)	CLOSED (E–F)	OPEN	CLOSED	Injected to EXHAUST PORTS (1)
		*ON		OPEN (E–F)		OPEN	Injected to EXHAUST PIPE (2)
	Above 50 mph (80 km/h)	—		OPEN (E–F)		OPEN	Injected to EXHAUST PIPE (3)
Above 785°C (1,445°F)	—	OFF	CLOSED (E–F)	CLOSED (E–F)	CLOSED	CLOSED	Bypassed to AIR CLEANER (4)
		*ON		OPEN (E–F)		OPEN	Injected to EXHAUST PIPE

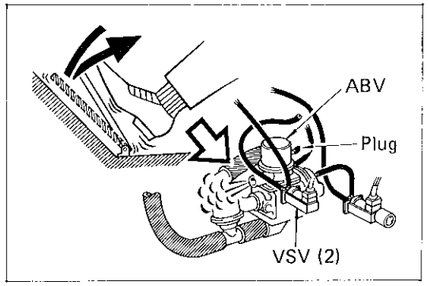
Remarks * Intake vacuum above 355 mmHg (13.97 in. Hg) and engine speed above 1,800 rpm.

INSPECTION OF AI SYSTEM

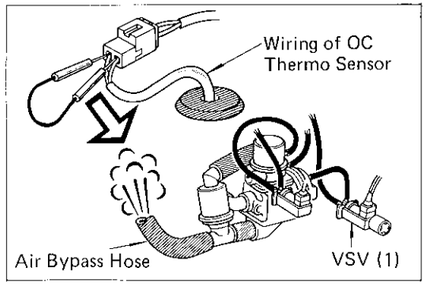
1. VISUALLY CHECK HOSES AND TUBES FOR CRACKS, KINKS, DAMAGE OR LOOSE CONNECTIONS
2. DISCONNECT AIR BYPASS HOSE FROM AIR CLEANER
3. START ENGINE



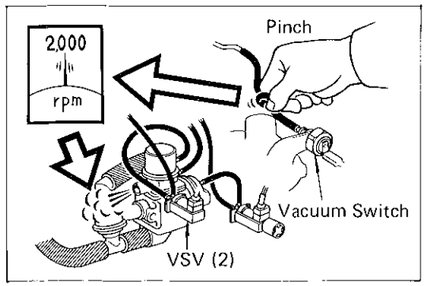
4. **CHECK VTV AND ASV**
   (a) With the engine idling, check that air is not discharged from the air bypass hose.
   (b) Disconnect the vacuum hose from the VTV at the blue side. Check that air is discharged from the air bypass hose within 3–10 seconds.
   (c) Reconnect the vacuum hose to the VTV. Check that air stops quickly.



5. **CHECK ABV**
   (a) Disconnect the air hose between the ABV and exhaust pipe at the ABV side.
   (b) Disconnect the vacuum hose between the ABV and VSV(2) at the ABV side, and plug the ABV.
   (c) Race the engine and quickly close the throttle valve. Check that air is discharged momentarily from the ABV.
   (d) Reconnect the vacuum hose to the ABV.

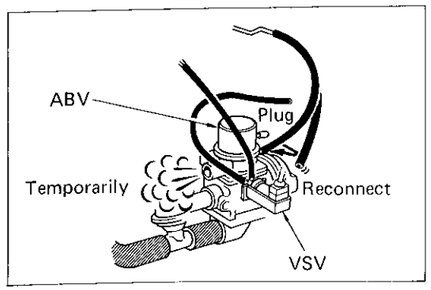


6. **CHECK OC THERMO SENSOR TO VSV(1)**
   (a) With the engine idling, connect a wire to both OC thermo sensor terminals.
   (b) Check that air is discharged from the air bypass hose.
   (c) Disconnect the wire from the OC thermo sensor terminals.



7. **CHECK DECELERATION FUEL CUT SYSTEM TO VSV(2)**
   (a) Pinch the vacuum hose to the vacuum switch at idle.
   (b) Gradually increase the engine speed to 2,000 rpm.
   (c) Check that air is discharged from the ABV.

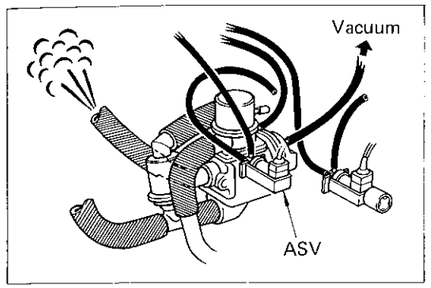
   NOTE:
   - Perform this inspection in as short a time as possible.
   - The engine will misfire slightly at the same time.



INSPECTION OF ACV

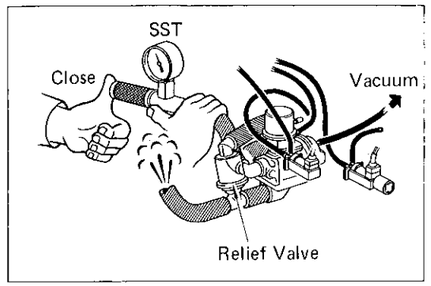
1. CHECK ABV OPERATION

(a) Disconnect the air hose between the ABV and exhaust pipe at the ABV side.
(b) Disconnect the vacuum hose between the ABV and VSV (2) at the ABV side, and plug the ABV.
(c) With the engine idling disconnect the vacuum hose between the ABV and vacuum pipe at the ABV side and reconnect it.
(d) Check that compressed air comes out temporarily from the ABV.
(e) Reconnect the air hose to the ABV.



2. CHECK ASV OPERATION

(a) Disconnect the air hose from the check valve.
(b) Disconnect the vacuum hose from the ASV.
(c) With the engine idling, apply vacuum directly to the ASV.
(d) Check that compressed air comes out of the air hose to the check valve.



3. CHECK OPENING PRESSURE OF RELIEF VALVE

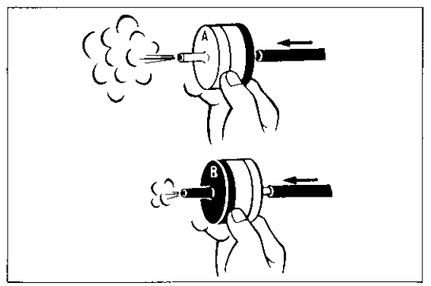
(a) Disconnect the air bypass hose from the air cleaner.
(b) Connect the air pump tester* to the air hose to check valve.

*SST 09258-14010

(c) Close the orifice on the SST with your finger.
(d) Increase the engine speed gradually and measure the relief valve opening pressure.

Opening pressure: 0.40 – 0.60 kg/cm² (5.7 – 8.5 psi)

(e) Remove the SST.
(f) Reconnect the vacuum hoses and air hoses to the proper locations.

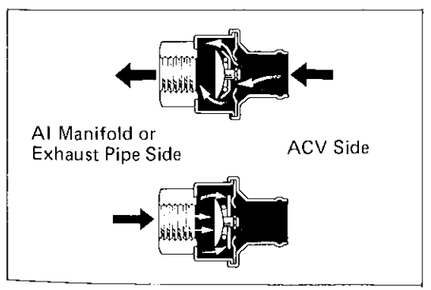


INSPECTION OF VTV

CHECK VTV BY BLOWING AIR FROM EACH SIDE

(a) Check that air flows without resistance from B to A.
(b) Check that air flows with difficulty from A to B.

If a problem is found, replace the VTV.

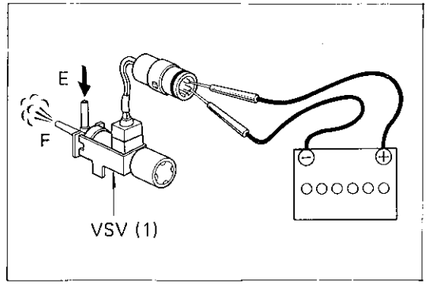


INSPECTION OF CHECK VALVES

CHECK VALVES BY BLOWING AIR FROM EACH SIDE

(a) Check that air flows from the ACV side to manifold (or exhaust pipe) side.
(b) Check that air does not flow from the manifold (or exhaust pipe) side to ACV side.

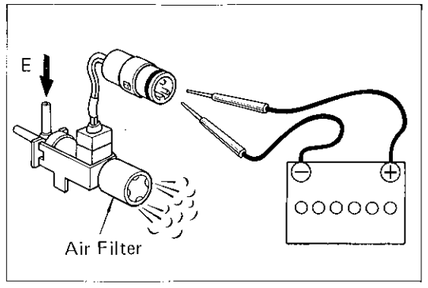
If a problem is found, replace the valve.



INSPECTION OF VSV (1)

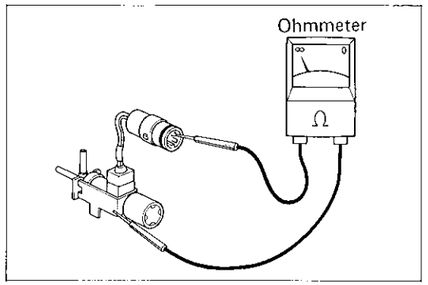
1. CHECK VACUUM CIRCUIT CONTINUITY IN THE VSV(1) BY BLOWING AIR INTO PIPE

(a) Connect the VSV(1) terminals to the battery terminals as illustrated.
(b) Blow into pipe E and check that air comes out of pipe F.



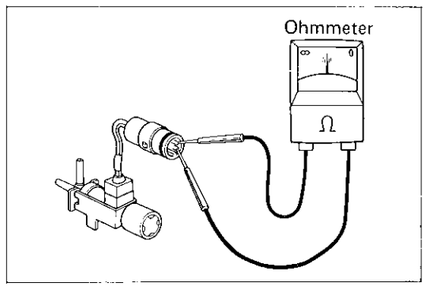
(c) Disconnect the battery.
(d) Blow into pipe E and check that air comes out of the air filter.

If a problem is found, replace the VSV(1).



2. CHECK FOR SHORT CIRCUIT

Using an ohmmeter, check that there is no continuity between the positive (+) terminal and the VSV(1) body.
If there is continuity, replace the VSV(1).

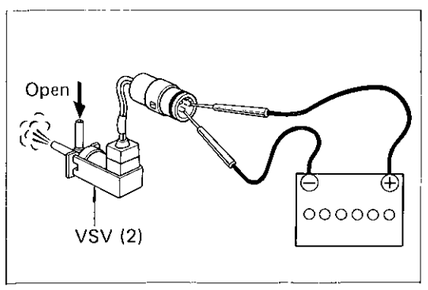


3. CHECK FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between the positive (+) terminal and the other terminal as shown.

Specified resistance: 38 – 43 ohms at 20°C (68°F)

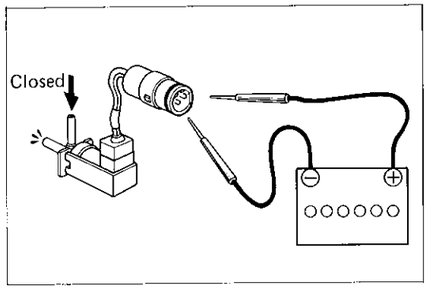
If the resistance is not within specification, replace the VSV(1).



INSPECTION OF VSV (2)

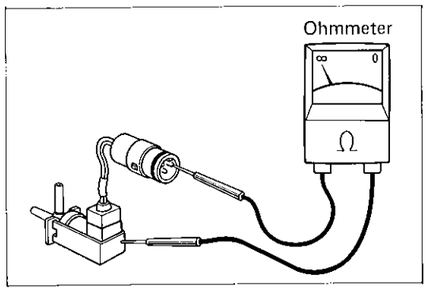
1. CHECK VACUUM CIRCUIT CONTINUITY IN VSV(2) BY BLOWING AIR INTO PIPE

(a) Connect the VSV(2) terminals to the battery terminals as shown.
(b) Blow into the pipe, and check that the VSV(2) is open.



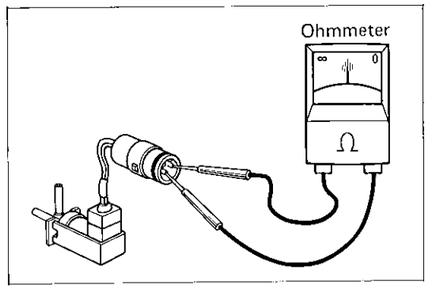
(c) Disconnect the battery positive (+) terminal.
(d) Blow into the pipe and check that the VSV(2) is closed.

If a problem is found, replace the VSV(2).



2. CHECK FOR SHORT CIRCUIT

Using an ohmmeter, check that there is no continuity between the positive (+) terminal and the VSV(2) body.
If there is continuity, replace the VSV(2).

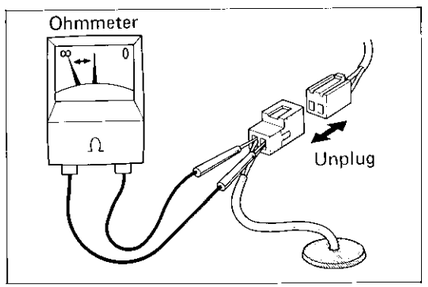


3. CHECK FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between the positive (+) terminal and the other terminals as shown.

Specified resistance: 38 – 43 ohms at 20°C (68°F)

If the resistance is not within specification, replace the VSV(2).



INSPECTION OF OC THERMO SENSOR

1. MEASURE RESISTANCE

(a) Unplug the wiring connector.
(b) Using an ohmmeter, measure the resistance between both terminals at idling.

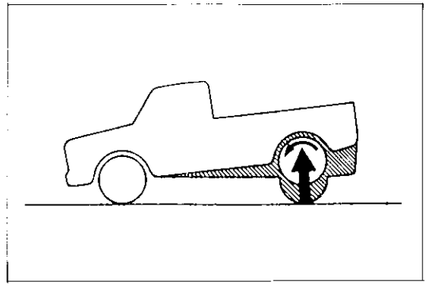
Resistance: 2 – 200 kilohm

CAUTION: The ohmmeter probe should be inserted from the rear side of the connector.

(c) Plug in the wiring connector.

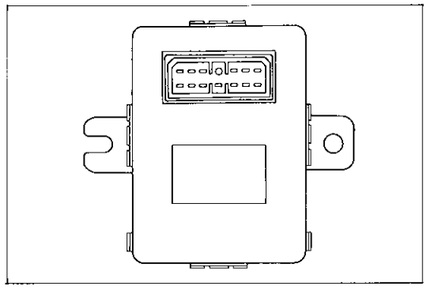
2. CHECK SENSOR WIRING

(a) Look for damage.
(b) Check for loose connection.



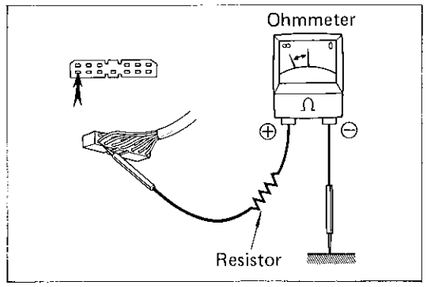
INSPECTION OF SPEED SENSOR

1. JACK UP ONE REAR WHEEL OFF THE GROUND
2. RELEASE PARKING BRAKE
3. SET SHIFT LEVER INTO NEUTRAL



4. UNPLUG WIRING CONNECTOR FROM COMPUTER

The location of computer is on the left cowl.



5. CHECK ON-OFF CYCLES OF SPEED SENSOR

(a) Place (+) terminal of the ohmmeter on the wiring connector terminal and (–) terminal on ground.
(b) Turn the rear wheel slowly.
(c) Check that the ohmmeter needle deflects consistently.

CAUTION: The ohmmeter probe should be inserted from the rear side of the connector.

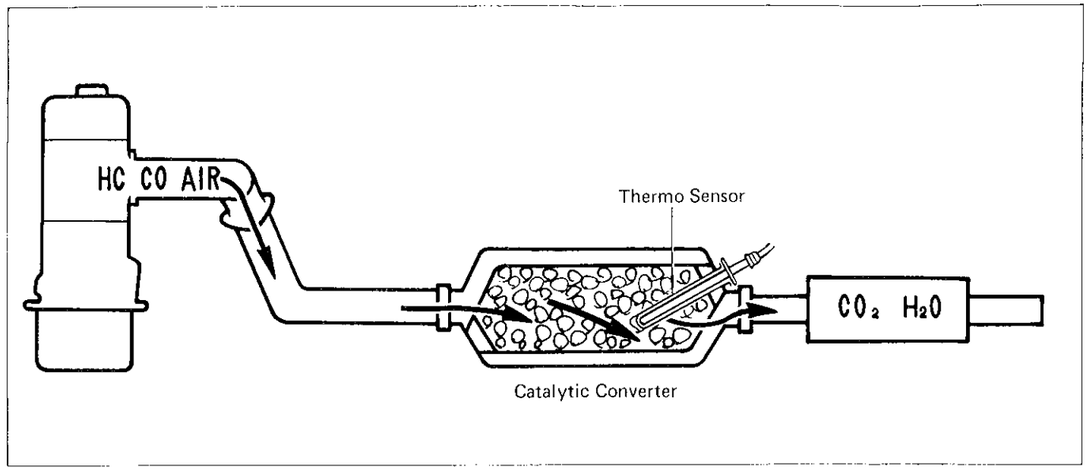
If the ohmmeter needle does not deflect, check that the speed sensor terminals at the back side of the speedometer are properly connected. If the connection is OK, replace the speedometer assembly.

6. RECONNECT WIRING CONNECTOR TO COMPUTER

INSPECTION OF DECELERATION FUEL CUT SYSTEM

See page 3-44.

OXIDATION CATALYST (OC) SYSTEM

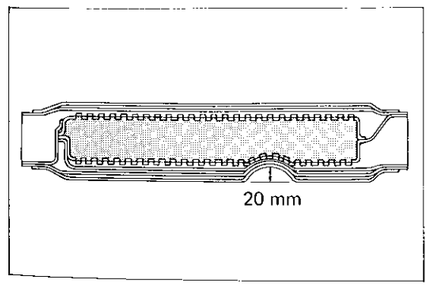


- To reduce HC and CO emission, HC and CO are oxidized and converted to water (H_2O) and carbon dioxide (CO_2) in the oxidation catalyst.
- If the catalyst is overheated (above 785°C or 1,445°F), the thermo sensor in the catalyst turns the AI system OFF.

Exhaust Port		Catalyst		Exhaust Gas
UNBURNT HC, CO AND AIR Proper Temperature	→	OXIDATION Temperature is increased.	→	H_2O CO_2

INSPECTION OF EXHAUST PIPE ASSEMBLY

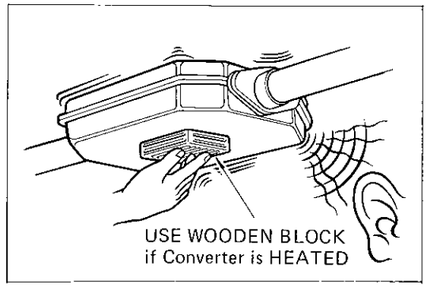
1. CHECK CONNECTIONS FOR LOOSENESS OR DAMAGE
2. CHECK CLAMPS FOR WEAKNESS, CRACKS OR DAMAGE



INSPECTION OF CATALYTIC CONVERTER

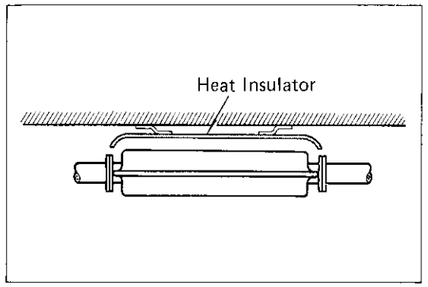
1. CHECK OUTER SURFACE FOR DENTS OR DAMAGE

   Dent limit: 20 mm (0.79 in.)



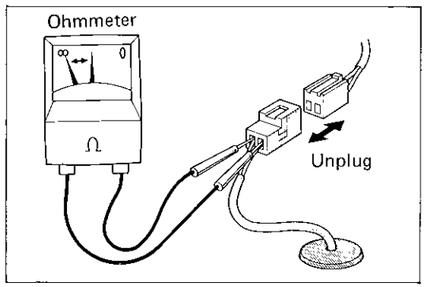
2. SHAKE CATALYTIC CONVERTER, AND CHECK FOR EXCESSIVE RATTLING

   If there is an excessive rattling noise, replace the converter.



INSPECTION OF HEAT INSULATOR

1. CHECK HEAT INSULATOR FOR DAMAGE
2. CHECK FOR ADEQUATE CLEARANCE BETWEEN CATALYTIC CONVERTER AND HEAT INSULATOR



INSPECTION OF THERMO SENSOR (IN CATALYST)

1. MEASURE RESISTANCE
   (a) Unplug the wiring connector.
   (b) Using an ohmmeter, measure the resistance between both terminals at idling.

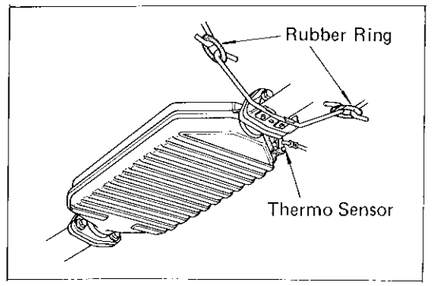
   Resistance: 2 – 200 kilohm

   CAUTION: The ohmmeter probe should be inserted from the rear side of the connector.

   (c) Plug in the wiring connector.
2. CHECK SENSOR WIRING
   (a) Look for damage.
   (b) Check that connections are tight.

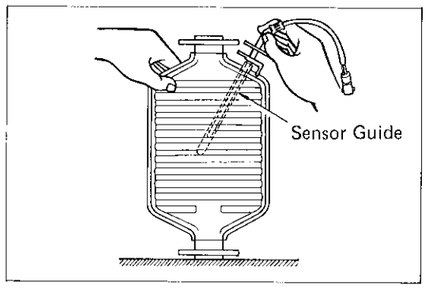
REMOVAL OF CATALYTIC CONVERTER

1. UNPLUG THERMO SENSOR WIRING CONNECTOR INSIDE VEHICLE
2. REMOVE WIRING GROMMET FROM FLOOR, AND PULL CONNECTOR FROM INTERIOR



3. REMOVE CATALYTIC CONVERTER WITH THERMO SENSOR
   (a) Jack up the vehicle.
   (b) Check that the converter is cool.
   (c) Remove the bolts at the front and rear of the converter.
   (d) Remove the rubber rings.
   (e) Remove the converter and gaskets.

4. REMOVE THERMO SENSOR
   (a) Hold the converter with the thermo sensor positioned upward.
   (b) Remove the thermo sensor and gasket from the converter.



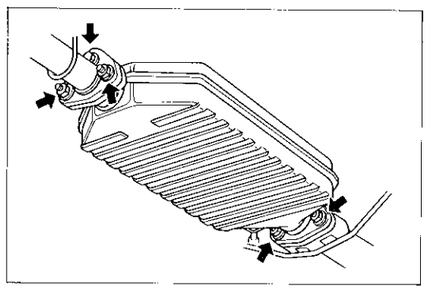
INSTALLATION OF CATALYTIC CONVERTER

1. INSTALL THERMO SENSOR
   (a) Place a new gasket on the thermo sensor.

   NOTE: Service replacement converters are fitted with a plastic thermo sensor guide. Insert the sensor into this guide.

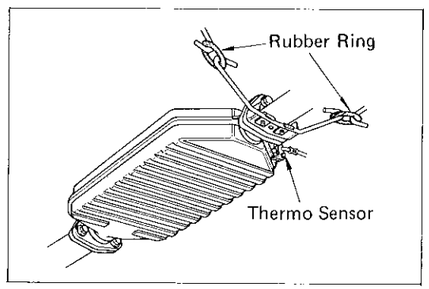
   (b) Push the sensor into the converter and tighten two bolts.

   Torque: 0.6 – 0.9 kg-m (53 – 78 in.-lb)



2. INSTALL CATALYTIC CONVERTER WITH THERMO SENSOR
   (a) Place new gaskets on the converter front and rear pipes, and connect the converter to the exhaust pipes.
   (b) Tighten the bolts.

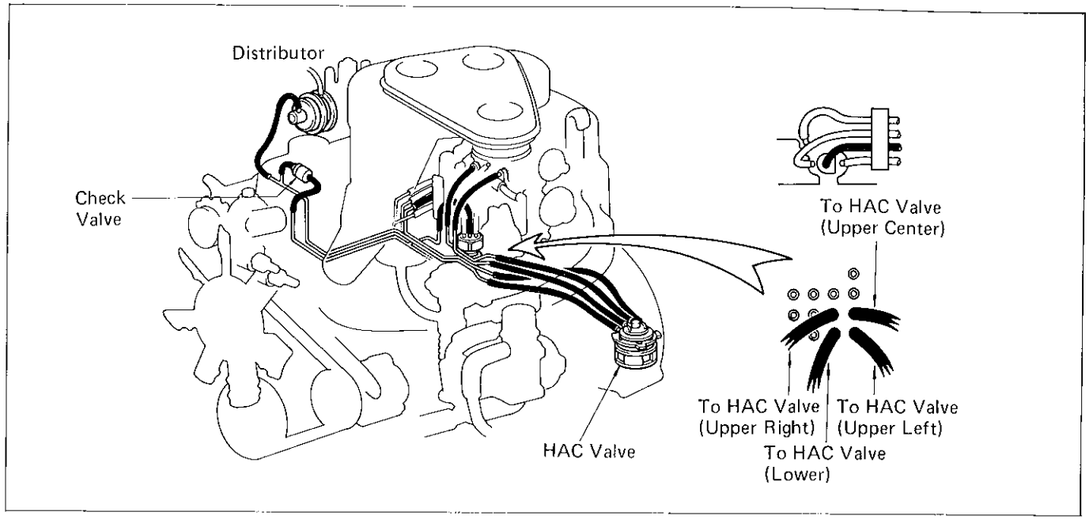
   Torque: 3.5 – 4.5 kg-m (26 – 32 ft-lb)

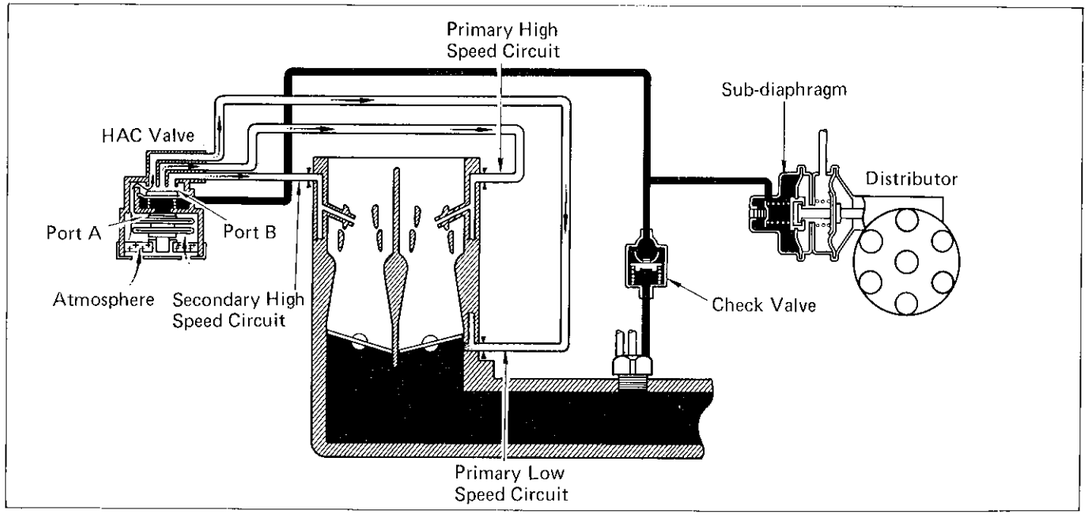


   (c) Secure the converter to the body with the rubber rings.
   (d) Plug in the thermo sensor connector, and install the floor grommet.

   NOTE: After installing, check the sensor wire to see that it is not excessively bent and that it is not interfering with other parts.

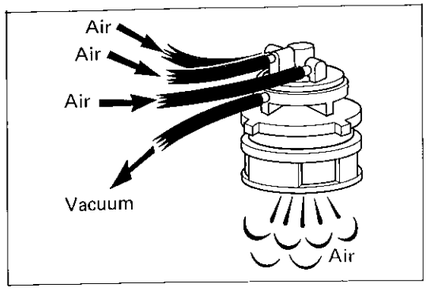
HIGH ALTITUDE COMPENSATION (HAC) SYSTEM





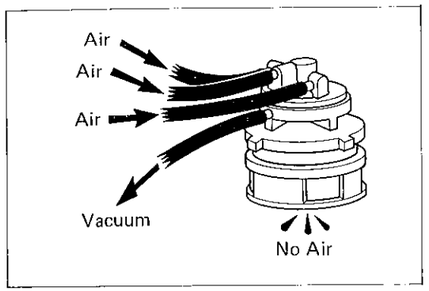
As altitude increases, the air-fuel mixture becomes richer. This system insures proper air-fuel mixture by supplying additional air to the primary low and high speed circuits of the carburetor, and advances the ignition timing to improve driveability at high altitude (above 1,198 m (3,930 ft)).

Altitude	Bellows in HAC Valve	Port A in HAC Valve	Distributor Sub-diaphragm	Port B in HAC Valve	Air from HAC Valve	Sub-vacuum Advancer
HIGH Above 1,198 m (3,930 ft)	EXPANDED	CLOSED	PULLED	OPEN	Led into primary low and high speed circuits.	ADVANCED (+6°)
LOW Below 783 m (2,570 ft)	CONTRACTED	OPEN	NOT PULLED	CLOSED	STOPPED	NOT/ ADVANCED



INSPECTION OF HAC SYSTEM

PRECHECK:
Before checking the HAC system, determine the position of the HAC valve. This can be done by blowing into any one of the three ports on top of the HAC valve with the engine idling. If the passage is open, the valve is in the HIGH ALTITUDE position.

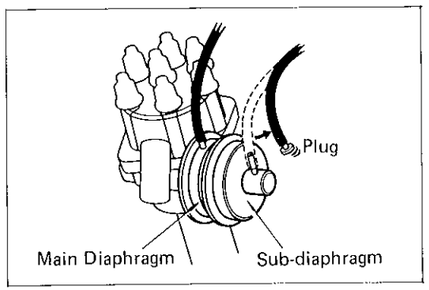


If it is closed, the valve is in the LOW ALTITUDE position. (See page 3-33)

A. AT HIGH ALTITUDE

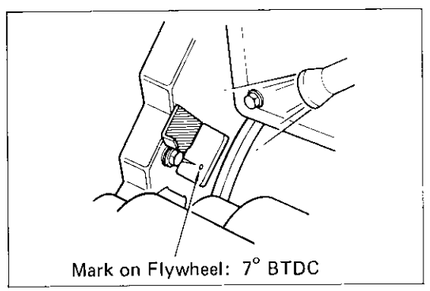
1. CHECK IGNITION TIMING AT IDLE

(a) Warm up the engine.
(b) Disconnect the hose from the distributor sub-diaphragm, and plug the hose end.

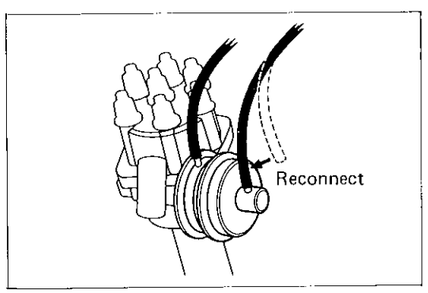


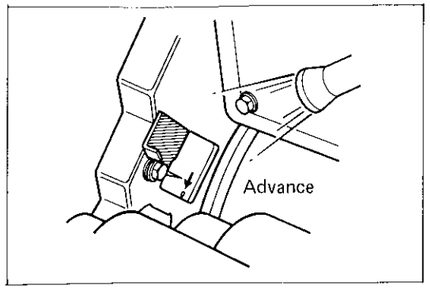
(c) Check the ignition timing.

Ignition timing: 7° BTDC (Mark on flywheel)



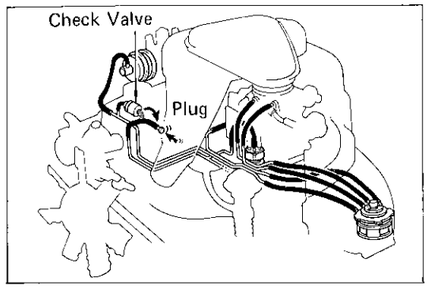
(d) Reconnect the hose to the sub-diaphragm.





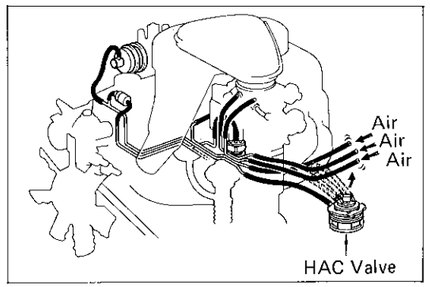
(e) Check that the timing mark on the flywheel moves toward advance.

Advance angle: 6°



2. CHECK THE CHECK VALVE

(a) Disconnect the vacuum hose from the check valve at the black side and plug the hose end.
(b) Check that the ignition timing remains stationary for more than one minute.
(c) Stop the engine and reconnect the hose to the check valve.



3. CHECK CARBURETOR

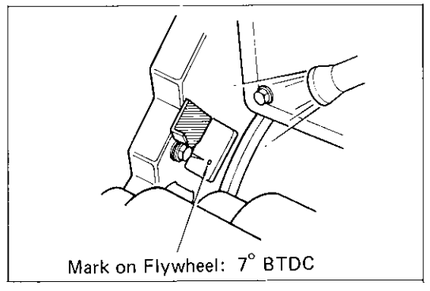
(a) Disconnect three hoses from the pipes on top of the HAC valve.
(b) Blow air into each hose and check that air flows into the carburetor.
(c) Reconnect the hoses to the proper locations.

B. AT LOW ALTITUDE

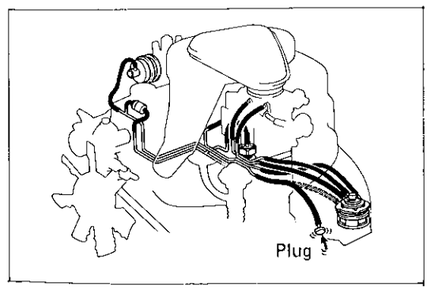
1. CHECK IGNITION TIMING AT IDLE

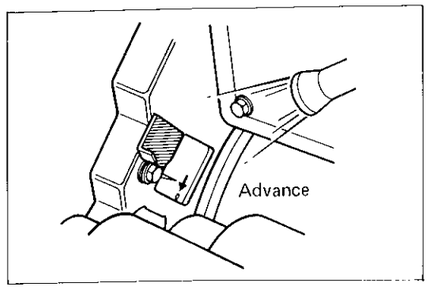
(a) Warm up the engine.
(b) Check the ignition timing.

Ignition timing: 7° BTDC (Mark on flywheel)



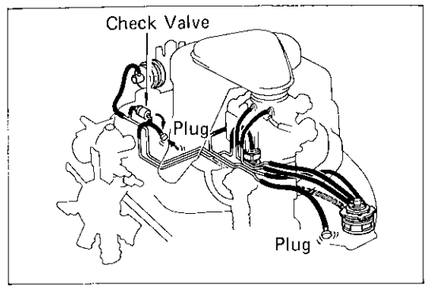
(c) Disconnect the vacuum hose from lower port of the HAC valve and plug the hose end.





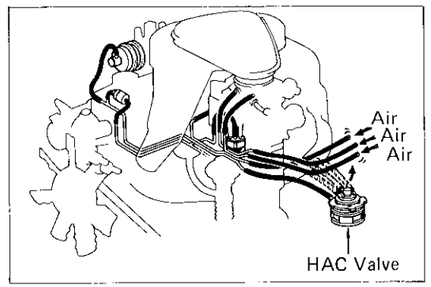
(d) Check that the timing mark on the flywheel moves toward advance.

Advance angle: 6°



2. CHECK THE CHECK VALVE

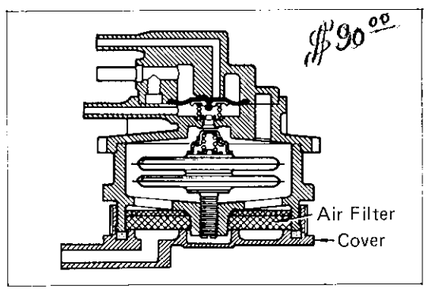
(a) Disconnect the vacuum hose from the check valve at the black side and plug the hose end, in the condition described in 1-(c) above.
(b) Check that the ignition timing remains stationary for more than one minute.
(c) Stop the engine and reconnect the hoses to the proper locations.



3. CHECK CARBURETOR

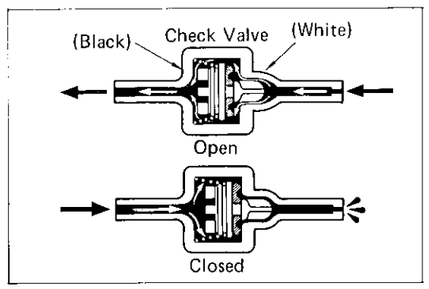
(a) Disconnect three hoses from the pipes on top of the HAC valve.
(b) Blow air into each hose and check that air flows into the carburetor.
(c) Reconnect the hoses to the proper locations.

IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART



INSPECTION OF HAC VALVE

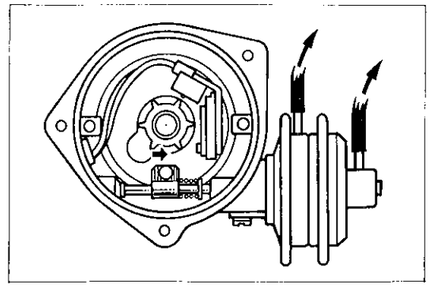
VISUALLY CHECK AND CLEAN AIR FILTER IN HAC VALVE



INSPECTION OF CHECK VALVE

CHECK VALVE BY BLOWING AIR INTO EACH PIPE

(a) Check that air flows from the white pipe to the black pipe.
(b) Check that air does not flow from the black pipe to the white pipe.



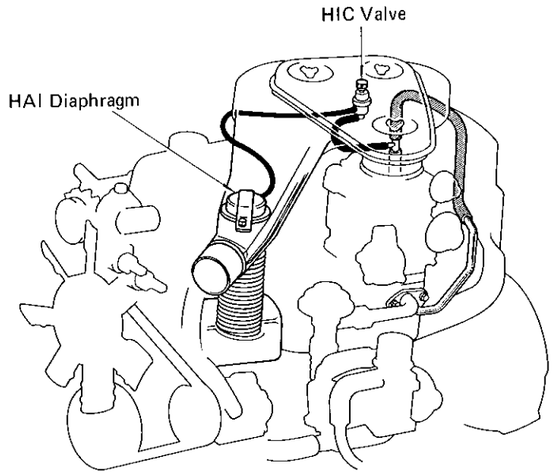
INSPECTION OF DISTRIBUTOR VACUUM ADVANCER

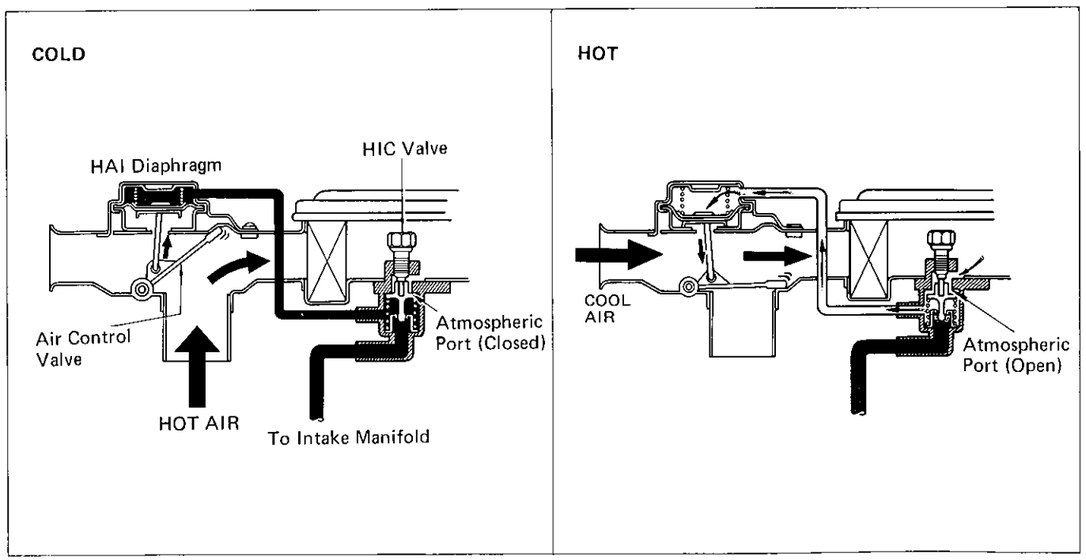
CHECK OPERATION OF VACUUM ADVANCER

(a) Remove the distributor cap and rotor.
(b) Apply vacuum to the diaphragms, and check that the vacuum advancer moves in accordance with the vacuum.
(c) Reinstall the rotor and distributor cap.

IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART

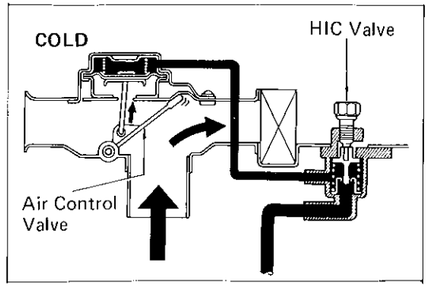
AUXILIARY SYSTEMS
1. Automatic Hot Air Intake (HAI) System

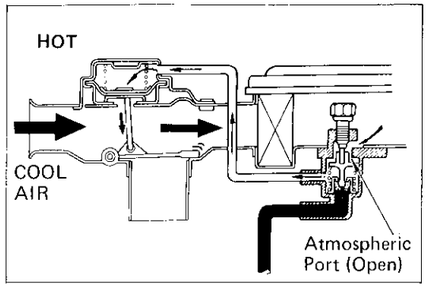




This system leads a hot air supply to the carburetor in cold weather to improve driveability and to prevent the carburetor from icing in extremely cold weather.

Temperature in Air Cleaner	HIC Valve	Air Control Valve	Intake Air
Cool Below 27°C (81°F)	Atmospheric port is CLOSED	Hot air passage OPEN	HOT
Hot Above 33°C (91°F)	Atmospheric port is OPEN	Cool air passage OPEN	COOL





INSPECTION OF HAI SYSTEM

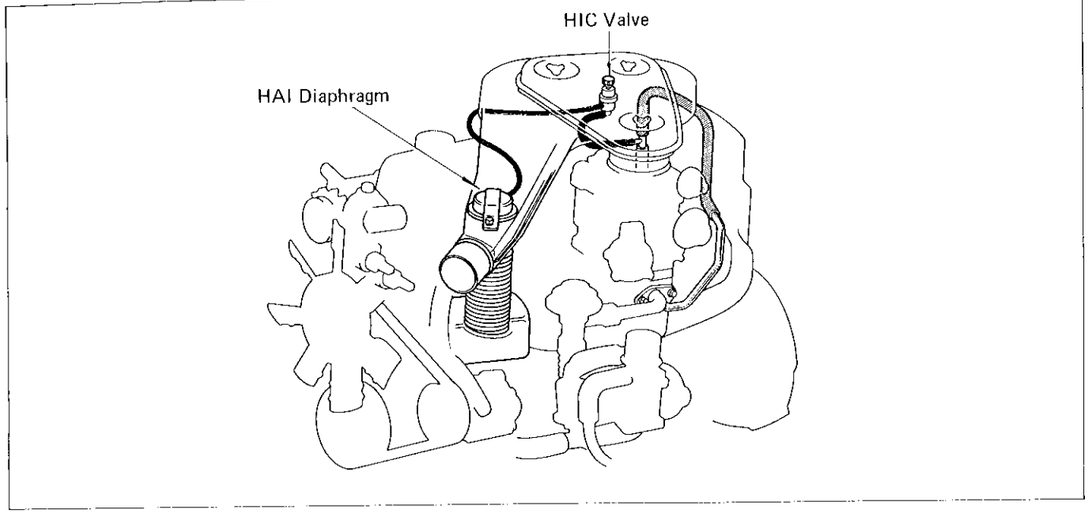
1. CHECK AIR CONTROL VALVE OPERATION

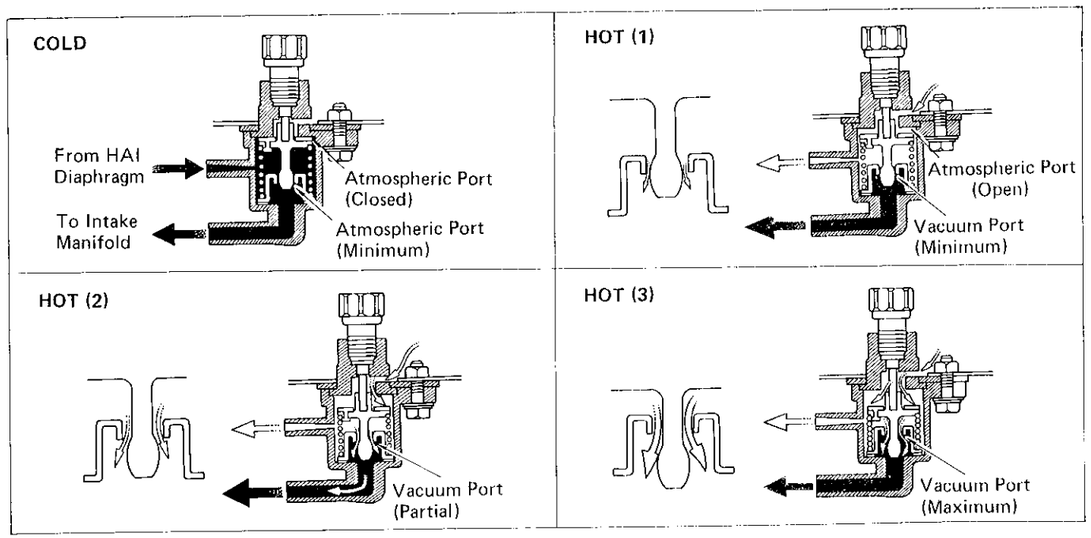
(a) Remove the air cleaner cap.
(b) Cool the HIC valve by blowing compressed air on it.
(c) Check that the air control valve closes the cool air passage at idle.
(d) Reinstall the air cleaner cap and warm-up the engine.
(e) Check that the air control valve opens the cool air passage at idle.

2. CHECK HOSES AND CONNECTIONS

Visually check the hoses and connections for cracks, leaks and damage.

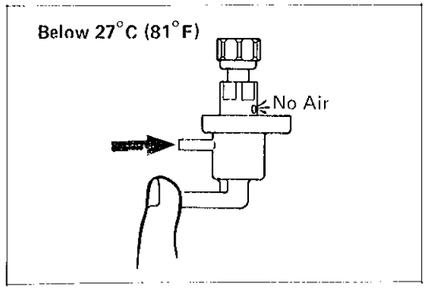
2. Hot Idle Compensation (HIC) System on the Air Cleaner

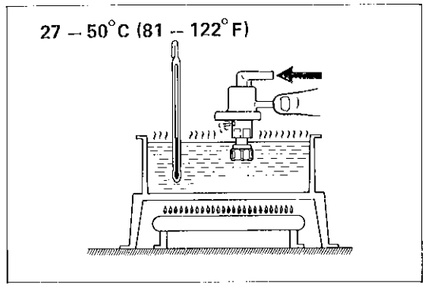


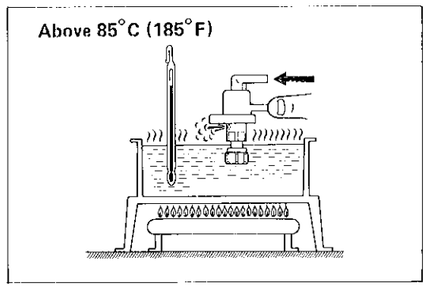


This system allows the air controlled by the HIC valve to enter the intake manifold to maintain proper air-fuel mixture during high temperatures at idle.

Temperature in Air Cleaner	HIC Valve Atmospheric Port	HIC Valve Vacuum Port Opening	HIC System
HOT (1) Between 27°C (81°F) and 50°C (122°F)	OPEN	MINIMUM	OFF
HOT (2) Between 50°C (122°F) and 85°C (185°F)	OPEN	PARTIAL	ON Air volume is controlled by HIC valve
HOT (3) Above 85°C (185°F)	OPEN	MAXIMUM	ON







INSPECTION OF HIC SYSTEM

CHECK HIC VALVE BY BLOWING AIR

(a) Close the pipe to the intake manifold with your finger.
(b) Below 27°C (81°F), check that air does not flow from the HAI diaphragm side to the atmospheric port.

(c) Heat the HIC valve to 27–50°C (81–122°F).

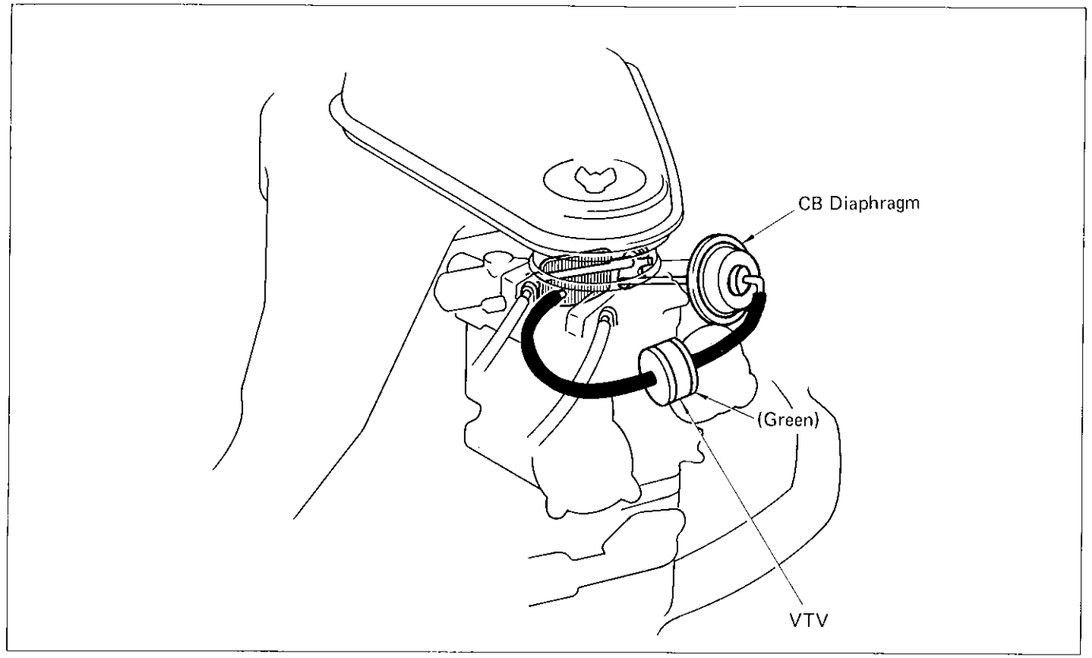
CAUTION: Do not allow water inside the HIC valve.

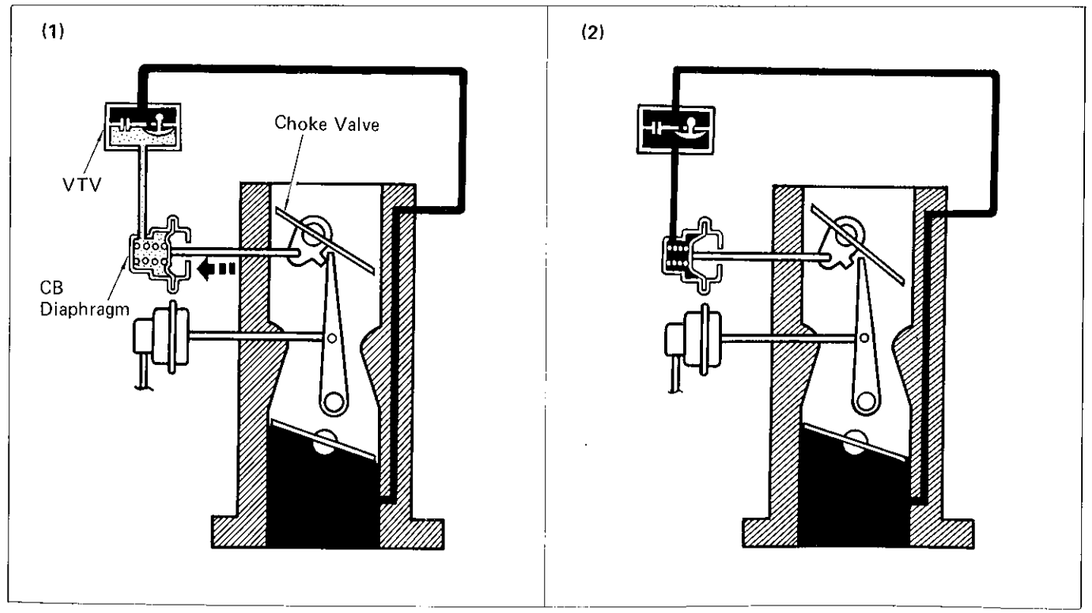
(d) Close the pipe to HAI diaphragm with your finger.
(e) Check that a small amount of air flows from the intake manifold side to the atmospheric port.

(f) Heat the HIC valve above 85°C (185°F).
(g) Close the pipe to HAI diaphragm with your finger.
(h) Check that a large amount of air flows from the intake manifold side to the atmospheric port.

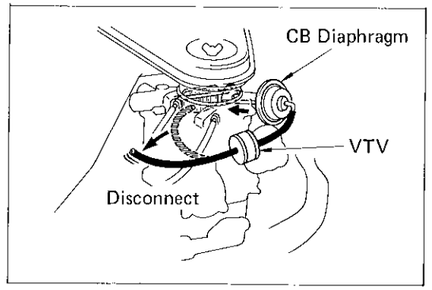
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART

3. Choke Breaker (CB) System





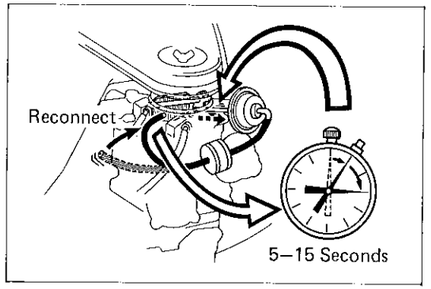
This system opens the choke valve slightly to prevent too rich a mixture just after engine starting. However, the choke valve opening is delayed by the VTV.



INSPECTION OF CB SYSTEM

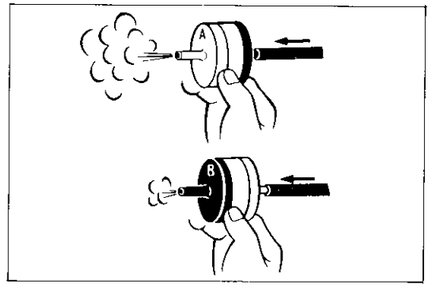
CHECK VTV AND DIAPHRAGM OPERATION

(a) Start the engine.
(b) Disconnect the vacuum hose between the carburetor and the VTV at the carburetor side.
(c) Check that the choke breaker linkage returns quickly by spring tension.



(d) Reconnect the hose.
(e) Check that the choke breaker linkage is pulled into the diaphragm within 5–15 seconds after reconnecting the hose.

IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART

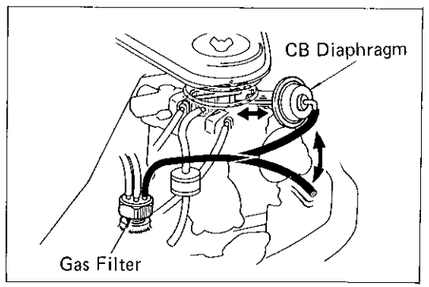


INSPECTION OF VTV

CHECK VTV BY BLOWING AIR INTO EACH SIDE

(a) Check that air flows without resistance from B to A.
(b) Check that air flows with difficulty from A to B.

If a problem is found, replace the VTV.

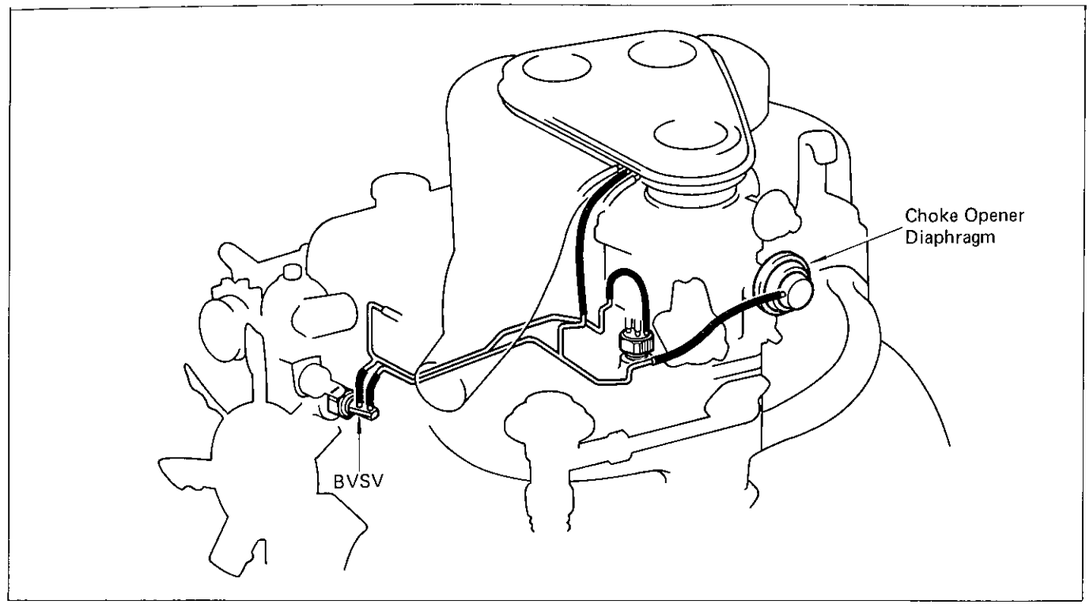


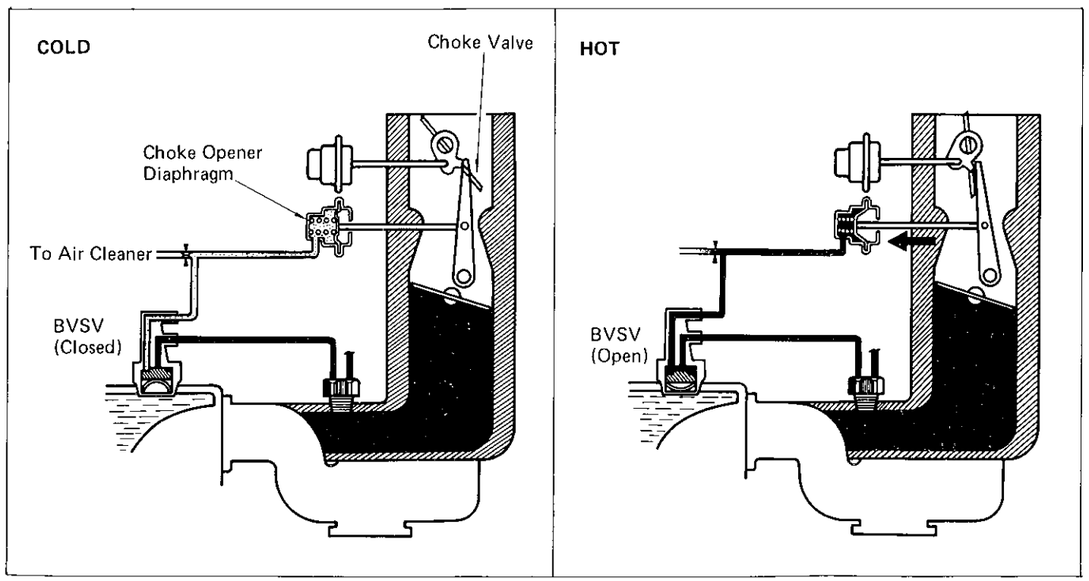
INSPECTION OF CB DIAPHRAGM

CHECK THAT CHOKE LINKAGE MOVES IN ACCORDANCE WITH APPLIED VACUUM

If a problem is found, replace the diaphragm.

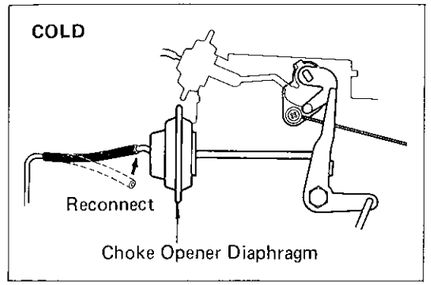
4. Choke Opener System

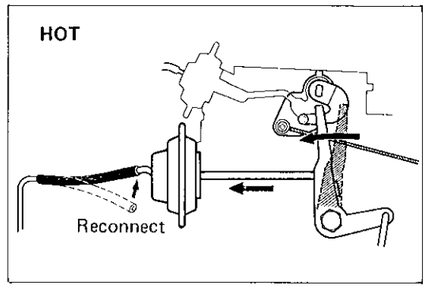


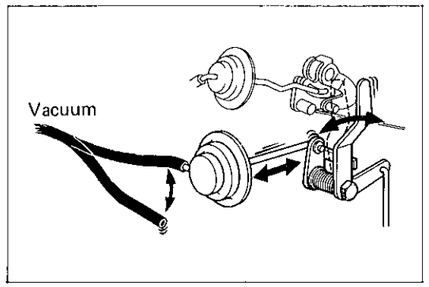


After warming-up, this system forcibly holds the choke valve open to prevent an over rich mixture.

Coolant Temp.	BVSV	Diaphragm	Choke Valve
Below 5°C (41°F)	CLOSED	Released by spring tension.	CLOSED
Above 19°C (66°F)	OPEN	Pulled by intake manifold vacuum.	OPEN







INSPECTION OF CHOKE OPENER SYSTEM

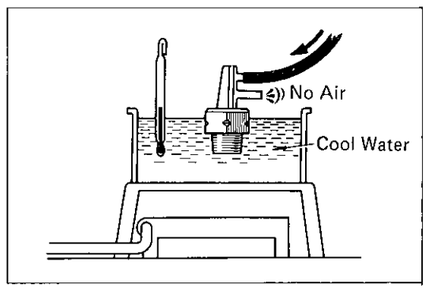
1. CHECK SYSTEM OPERATION WITH COLD ENGINE
   (a) The coolant temperature should be below 5°C (41°F).
   (b) Start the engine.
   (c) Disconnect the hose from the choke opener diaphragm and reconnect it.
   (d) Check that the choke linkage does not move.
2. LET ENGINE WARM-UP TO NORMAL OPERATING TEMPERATURE
3. CHECK SYSTEM OPERATION WITH HOT ENGINE
   (a) With the engine warm and idling, disconnect the hose from the choke opener diaphragm and check that the choke linkage returns.
   (b) Reconnect the hose and check that the choke linkage is pulled by choke opener diaphragm.

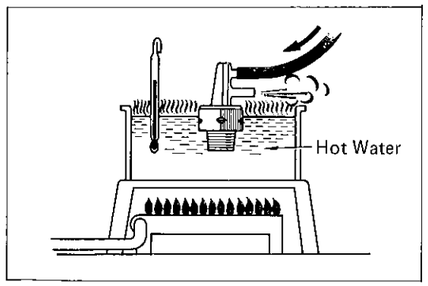
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART

INSPECTION OF CHOKE OPENER DIAPHRAGM

CHECK THAT CHOKE OPENER LINKAGE MOVES IN ACCORDANCE WITH APPLIED VACUUM

If a problem is found, replace the diaphragm.





INSPECTION OF BVSV

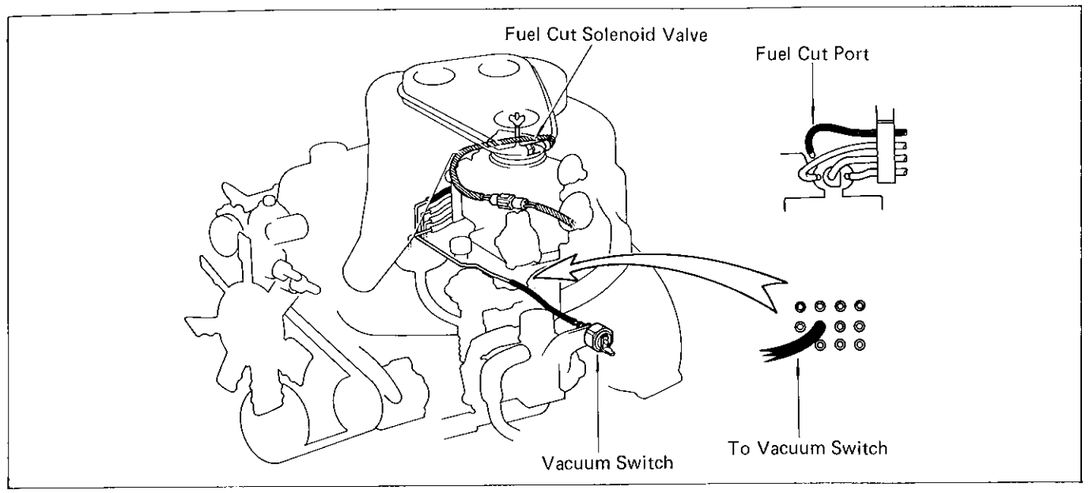
CHECK BVSV BY BLOWING AIR INTO PIPE

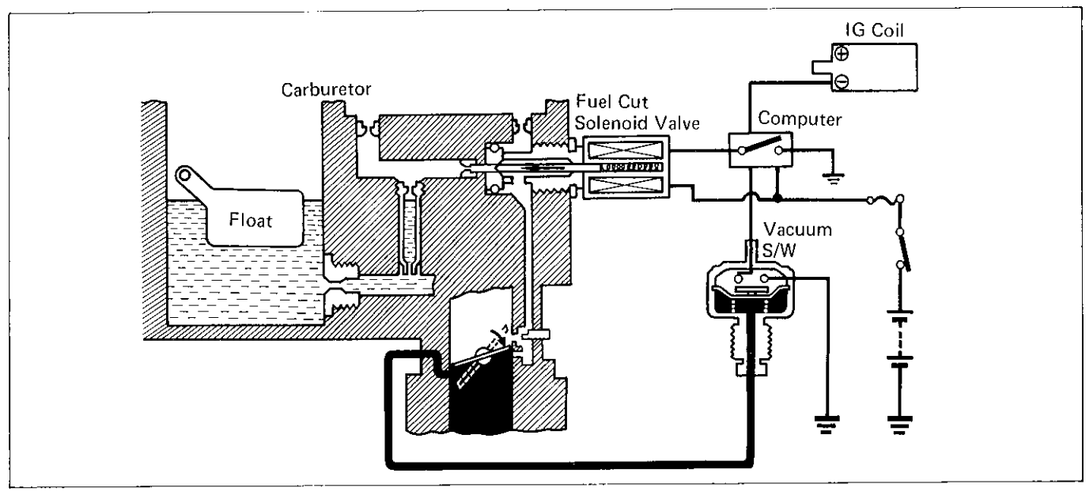
(a) Drain the coolant from the radiator into a suitable container.
(b) Remove the BVSV.
(c) Cool the BVSV to below 5°C (41°F) with cool water.
(d) Blow air into pipe and check that the BVSV closes.
(e) Heat the BVSV to above 19°C (66°F) with hot water.
(f) Blow air into pipe and check that the BVSV opens.

If a problem is found, replace the BVSV.

(g) Apply liquid sealer to the threads of the BVSV and reinstall.
(h) Fill the radiator with coolant.

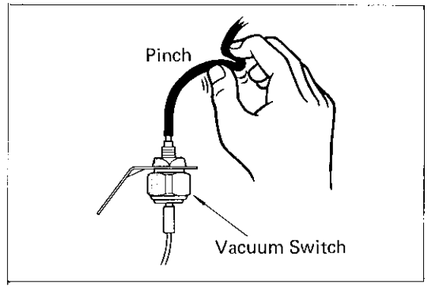
5. Deceleration Fuel Cut System





This system cuts off part of the fuel in the slow circuit of the carburetor to prevent overheating and afterburning in the exhaust system during deceleration.

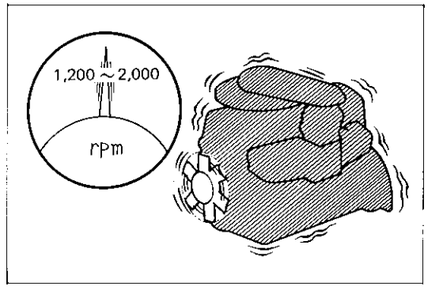
Engine RPM	Vacuum in the Vacuum S/W	Vacuum S/W	Computer	Fuel Cut Solenoid Valve	Slow Circuit in Carburetor
Below 1,330 rpm	Low vacuum below 290 mmHg (11.42 in.Hg)	ON	ON	ON	OPEN
	High vacuum above 355 mmHg (13.97 in.Hg)	OFF	ON	ON	OPEN
Above 1,800 rpm	Low vacuum below 290 mmHg (11.42 in.Hg)	ON	ON	ON	OPEN
	High vacuum above 355 mmHg (13.97 in.Hg)	OFF	OFF	OFF	CLOSED



INSPECTION OF DECELERATION FUEL CUT SYSTEM

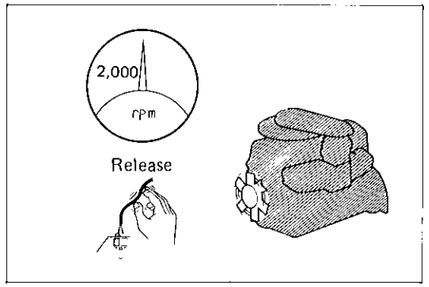
CHECK SYSTEM OPERATION

(a) Connect a tachometer to the engine.
(b) Start the engine.
(c) Check that the engine runs normally.
(d) Pinch off the vacuum hose to the vacuum switch.

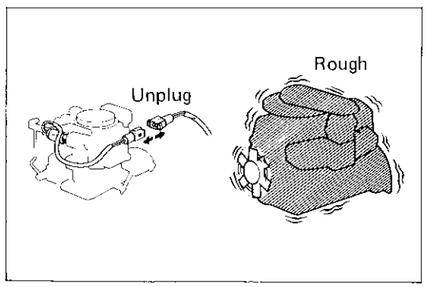


(e) Gradually increase engine speed to 2,000 rpm. Check that the engine misfires slightly between 1,200 and 2,000 rpm.

CAUTION: Perform this inspection quickly to avoid overheating the catalytic converter.



(f) Release the pinched hose. Again gradually increase the engine speed to 2,000 rpm and check that the engine operation returns to normal.

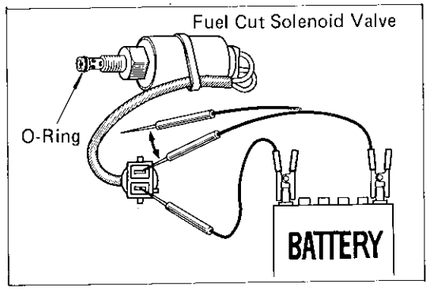


(g) With the engine idling, unplug the wiring connector to the solenoid valve. Check that the engine idles rough or dies.

CAUTION: Perform this inspection quickly to avoid overheating the catalytic converter.

(h) Stop the engine, and reconnect the wiring. Remove the tachometer.

IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART

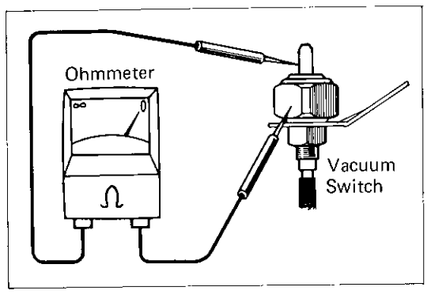


INSPECTION OF FUEL CUT SOLENOID VALVE

(a) Remove the solenoid valve.
(b) Connect two terminals and the battery terminals as shown.
(c) Check that you can feel the "click" from the solenoid valve when the battery is connected and disconnected.
(d) Check the O-ring for damage.

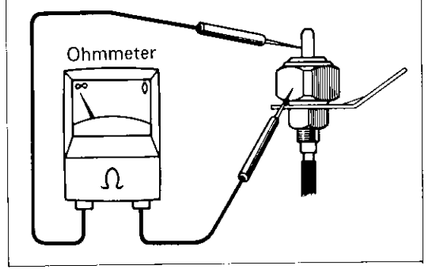
If a problem is found, replace the solenoid valve or O-ring.

(e) Reinstall the valve and reconnect the wiring connector.



INSPECTION OF VACUUM SWITCH

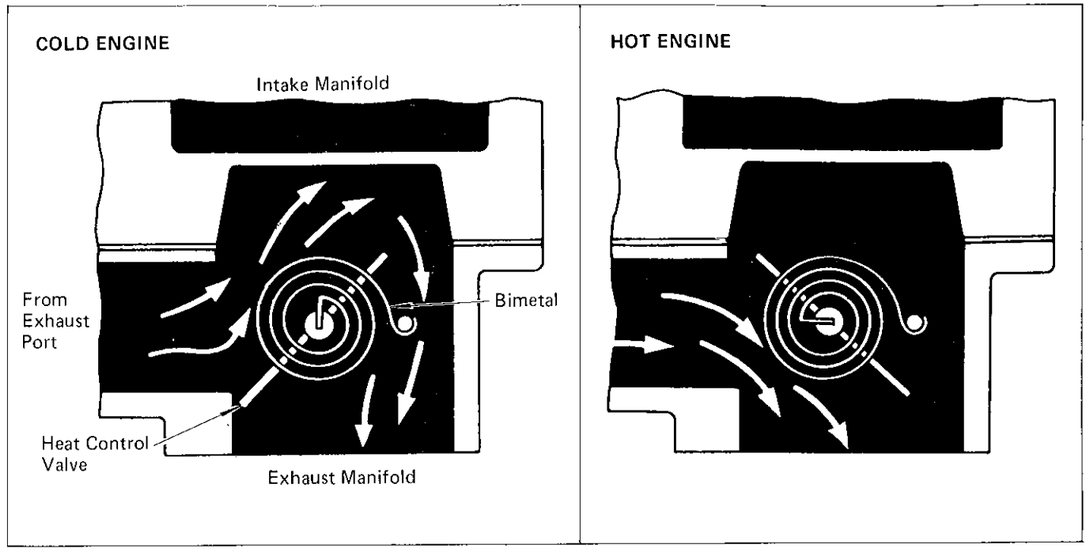
(a) Using an ohmmeter, check for continuity between the switch terminal and switch body.



(b) Start the engine.
(c) Using an ohmmeter, check that there is no continuity between the switch terminal and the body.

If a problem is found, replace the vacuum switch.

6. Heat Control Valve



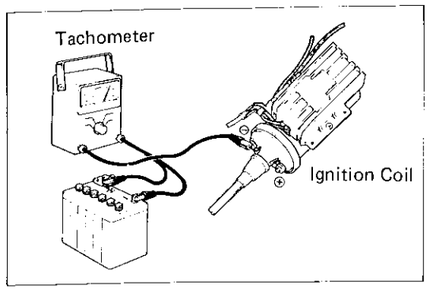
When cold, this device improves fuel vaporization for better driveability by quickly heating the intake manifold. After warm-up, it keeps the intake manifold at the proper temperature.

Engine	Bimetal	Exhaust Gas Passage	Intake Manifold
COLD	EXPANDED	Above the heat control valve.	Heated quickly.
HOT	CONTRACTED	Under the heat control valve.	Heated to a suitable temperature.

– MEMO –

ENGINE ADJUSTMENT

	Page
IGNITION TIMING	4-2
IDLE SPEED	4-3
FAST IDLE SPEED	4-4
IDLE HC/CO CONCENTRATION CHECK METHOD	4-5
IDLE MIXTURE	4-6



IGNITION TIMING

INSPECTION AND ADJUSTMENT OF IGNITION TIMING

1. CONNECT A TACHOMETER AND TIMING LIGHT TO ENGINE

Connect the tachometer (+) terminal to the ignition coil (–) terminal.

CAUTION:

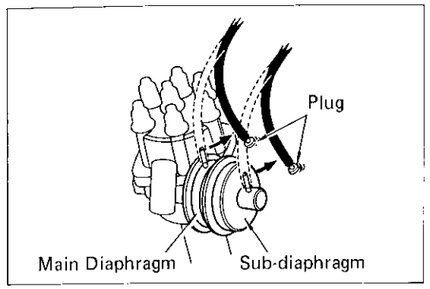
(a) **NEVER allow the ignition coil terminals to touch ground as it could result in damage to the igniter and/or ignition coil.**

(b) **As some tachometers are not compatible with this ignition system, it is recommended that you consult with the manufacturer.**

2. WARM UP ENGINE

Allow the engine to reach full operating temperature.

3. DISCONNECT VACUUM HOSES FROM DISTRIBUTOR, AND PLUG HOSE ENDS

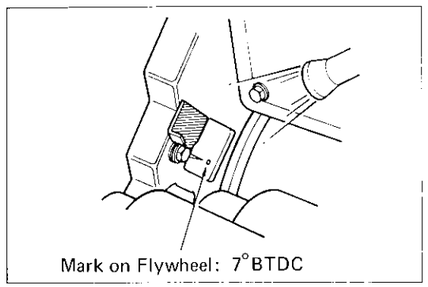


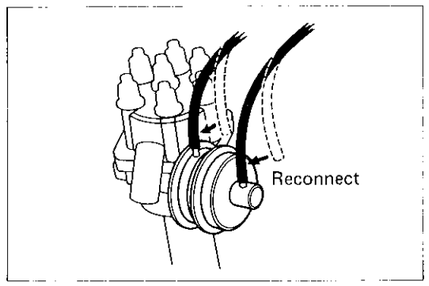
4. CHECK IGNITION TIMING

Ignition timing: 7° BTDC @ Max. 950 rpm

(a) With the engine idling as specified, use a timing light to check the timing.

(b) If necessary, loosen the distributor bolt and turn the distributor to align the marks. Recheck the timing after tightening the distributor.



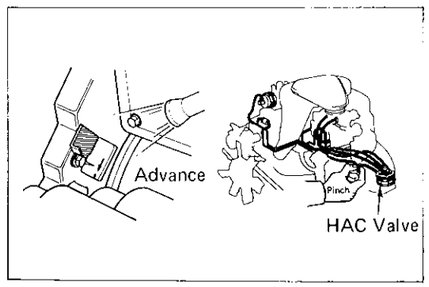


5. FURTHER CHECK IGNITION TIMING AS FOLLOWS

(a) Reconnect the vacuum hoses to the distributor.

(b) Pinch the vacuum hose between the HAC valve and the distributor sub-diaphragm at the HAC valve side. Check that the timing mark on the flywheel moves toward advance.

NOTE: Leave the tachometer connected until engine adjustments are completed.



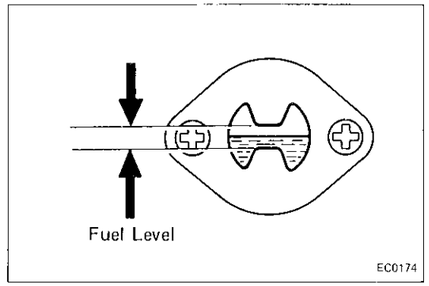
IDLE SPEED

ADJUSTMENT OF IDLE SPEED

1. VISUALLY INSPECT CARBURETOR

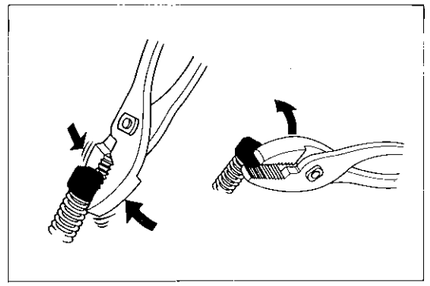
(a) Check for loose screws or loose mounting to the manifold.

(b) Check for wear in the linkage, missing snap rings or excessive looseness in the throttle shaft. Correct any problems found.

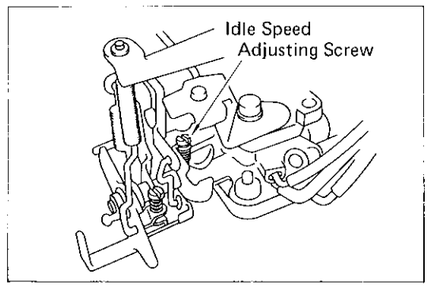


2. INITIAL CONDITIONS

(a) Air cleaner installed
(b) Normal operating coolant temperature
(c) Choke fully open
(d) All accessories switched off
(e) All vacuum lines connected
(f) Ignition timing set correctly
(g) Transmission in N range
(h) Fuel level should be about even with the dot in the sight glass.



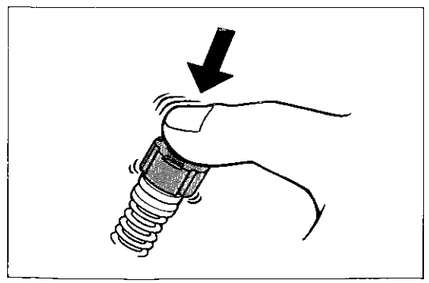
3. BREAK IDLE LIMITER CAP ON IDLE SPEED ADJUSTING SCREW, IF INSTALLED



4. ADJUST IDLE SPEED

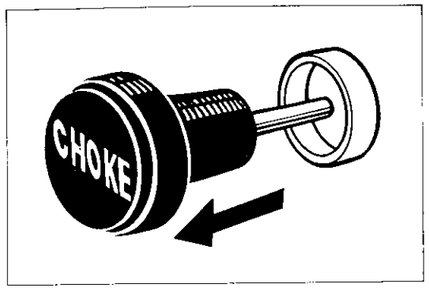
Adjust the idle speed by turning the idle speed adjusting screw.

Idle speed: 650 rpm



5. INSTALL NEW LIMITER CAP (BLUE) ON IDLE SPEED ADJUSTING SCREW, IF ONE WAS INSTALLED

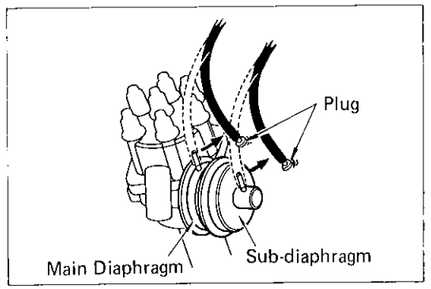
FAST IDLE SPEED



ADJUSTMENT OF FAST IDLE SPEED

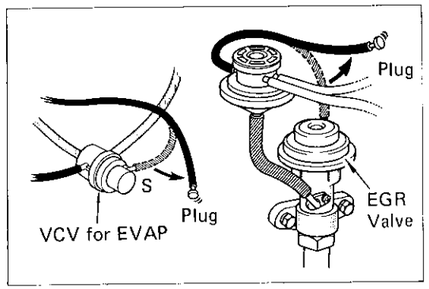
1. WARM UP AND STOP ENGINE

2. PULL OUT CHOKE KNOB FULLY



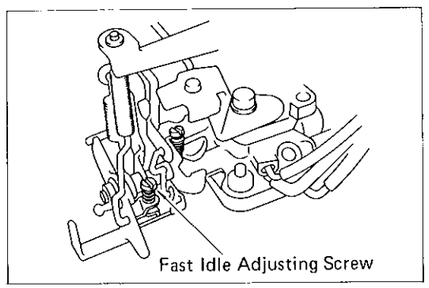
3. CUT OPERATION OF DISTRIBUTOR VACUUM ADVANCER

   Disconnect the vacuum hoses from the distributor and plug the hose ends.



4. CUT OPERATION OF EGR AND EVAP SYSTEMS

   Disconnect the vacuum hoses from port S of the VCV for EVAP, and EGR valve, and plug the hose ends.



5. START ENGINE

6. ADJUST FAST IDLE SPEED

   (a) Adjust the fast idle speed by turning the fast idle adjusting screw.

   Fast idle speed: 1,800 rpm

   (b) When the choke button is pushed in all the way, check that the engine speed returns to normal idle speed.

7. RECONNECT HOSES TO PROPER LOCATIONS

IDLE HC/CO CONCENTRATION CHECK METHOD

NOTE: This check method is used only to determine whether or not the idle HC/CO complies with the state or city regulations.

PRECHECK

INITIAL CONDITIONS

(a) Normal engine operating temperature
(b) Choke fully open
(c) Air cleaner installed
(d) All accessories switched off
(e) All vacuum lines properly connected

NOTE: All vacuum hoses for air injection, EGR systems, etc. should be properly connected.

(f) Ignition timing set correctly
(g) Transmission in N range
(h) Carburetor fuel level about even with the dot in the sight glass
(i) Tachometer and HC/CO meter at hand and calibrated

TROUBLESHOOTING

HC	CO	Problems	Causes
High	Normal	Rough idle	1. Faulty ignition: • Incorrect timing • Fouled, shorted or improperly gapped plugs • Open or crossed ignition wires • Cracked distributor cap 2. Incorrect valve clearance 3. Leaky EGR valve 4. Leaky exhaust valves 5. Leaky cylinder
High	Low	Rough idle Fluctuating HC reading	1. Vacuum leak: • Vacuum hose • Intake manifold • PCV line • Carburetor base
High	High	Rough idle Black smoke from exhaust	1. Restricted air filter 2. Plugged PCV valve 3. AI system problem 4. Faulty carburetion: • Faulty choke action • Incorrect float setting • Leaking needle or seat • Leaking power valve

NOTE: If the HC/CO concentration cannot be corrected by above troubleshooting table, adjust the idle mixture.

MEASUREMENT

1. INSERT TESTING PROBE OF HC/CO METER INTO TAILPIPE AT LEAST 60 cm (2ft)

2. MEASURE HC/CO CONCENTRATION AT IDLE

   Wait at least one minute before measuring to allow the concentration to stabilize.
   Complete the measuring within three minutes.

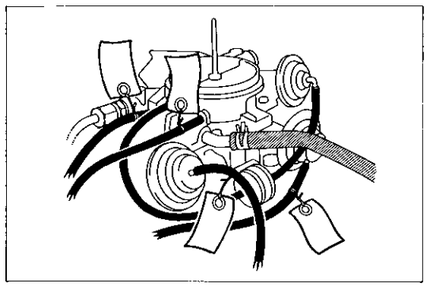
   If the HC/CO concentration does not conform to your state or city regulation, see table below for possible causes.

IDLE MIXTURE

ADJUSTMENT OF IDLE MIXTURE

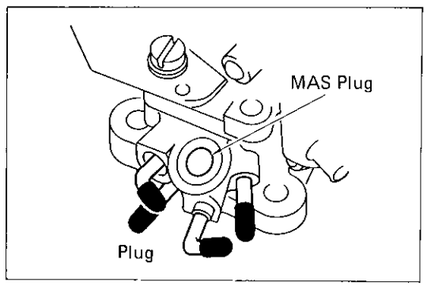
NOTE:

- To conform with Fed. and Calif. regulations, the idle mixture adjusting screw is adjusted and pluged with a steel plug by manufacturer. Normally, this steel plug should not be removed.
- When troubleshooting rough idle, check all other possible causes before attempting to adjust the idle mixture (see TROUBLESHOOTING on page 2-2). Only if no other factors are found to be at fault, should the idle mixture be adjusted and, when doing so, remove the plug and follow the procedure described below.



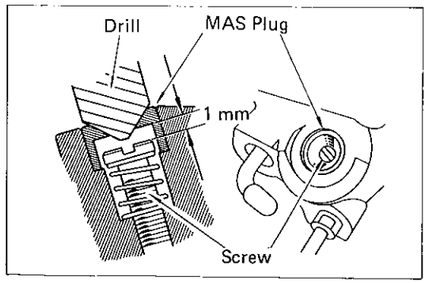
1. REMOVE CARBURETOR

(a) Before disconnecting the vacuum hoses, use tags to identify how they should be reconnected.
(b) Remove the carburetor from the engine.
(c) After removing the carburetor, cover the intake manifold with a clean rag.



2. REMOVE MIXTURE ADJUSTING SCREW PLUG (MAS PLUG)

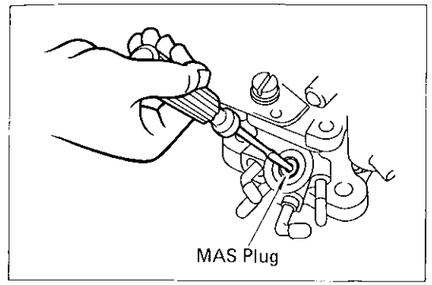
(a) Plug each carburetor vacuum port to prevent entry of steel particles when drilling.
(b) Mark the center of the plug with a punch.



(c) Drill a 8.5 mmϕ (0.335 in.ϕ) hose in the center of the plug.

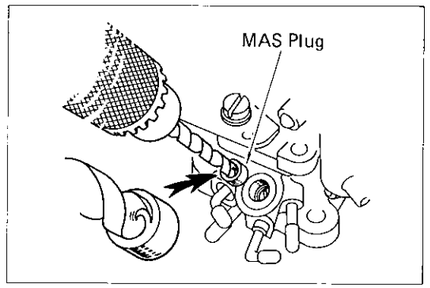
NOTE:

- As there is only 1 mm (0.04 in.) clearance between the plug and screw, drill carefully and slowly to avoid drilling onto the screw.
- The drill may force the plug off at this time.



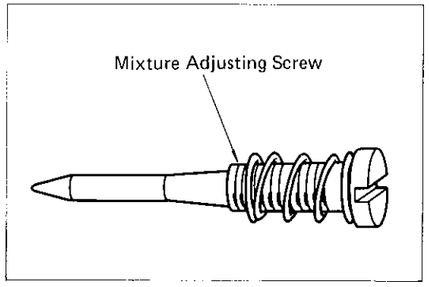
(d) Through the hole in the plug, fully screw in the mixture adjusting screw with a screwdriver.

NOTE: Be careful not to damage the screw tip by tightening the screw too tight.



(e) Use 9.5 mmϕ (0.374 in.ϕ) drill to force the plug off.

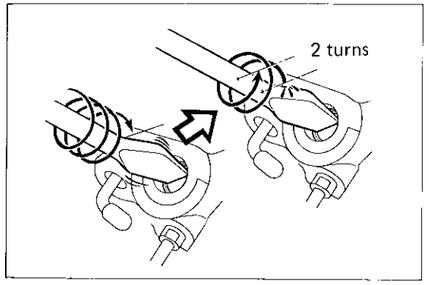
NOTE: The drill will force off the plug.



3. INSPECT MIXTURE ADJUSTING SCREW

(a) Blow off any steel particles with compressed air.
(b) Remove the screw and inspect it.

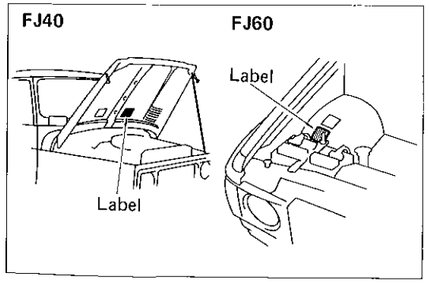
If the drill has gnawed into the screw top or if the tapered position is damaged, replace the screw.



4. REINSTALL MIXTURE ADJUSTING SCREW

Fully screw in the idle mixture adjusting screw and then unscrew it about 2 turns.

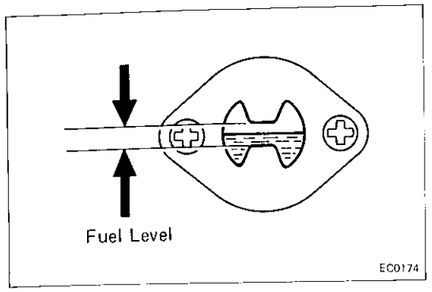
NOTE: Be careful not to damage the screw tip by tightening the screw too tight.



5. REINSTALL CARBURETOR

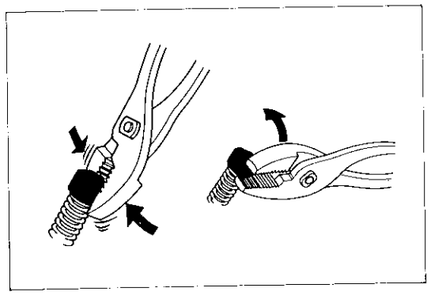
(a) Reinstall the carburetor on the engine.
(b) Reconnect the vacuum hoses to the proper locations. Refer to the Vacuum Hose Information label.

6. REINSTALL AIR CLEANER

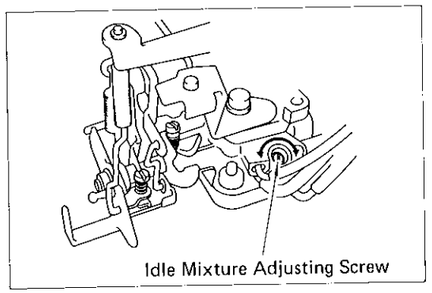


7. ADJUST IDLE SPEED AND IDLE MIXTURE

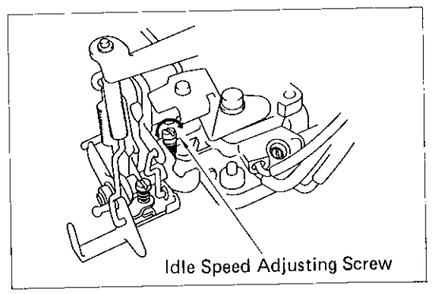
(a) Initial conditions:
- Air cleaner installed.
- Normal operating coolant temperature.
- Choke fully open.
- All accessories switched off.
- All vacuum lines connected.
- Ignition timing set correctly.
- Transmission in N range.
- Fuel level should be about even with the dot in the sight glass.



(b) Break the idle limiter cap on the idle speed adjusting screw, if installed.



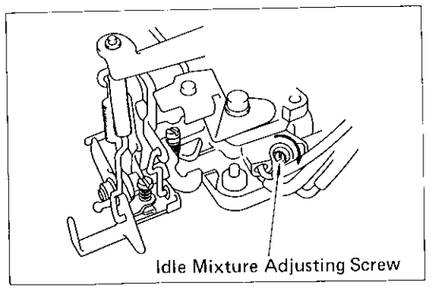
(c) Start the engine.
(d) Using the long screwdriver, set to the maximum speed by turning the IDLE MIXTURE ADJUSTING SCREW.



(e) Set to the idle mixture speed by turning the IDLE SPEED ADJUSTING SCREW.

Idle mixture speed: 690 rpm

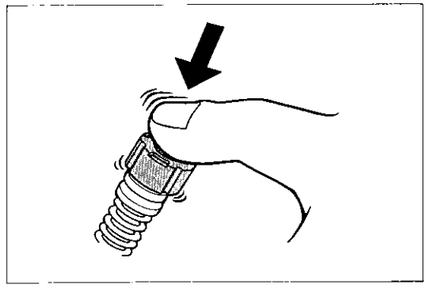
(f) Before moving to the next step, continue the adjustments (d) and (e) until the maximum speed will not rise any further no matter how much the IDLE MIXTURE ADJUSTING SCREW is adjusted.



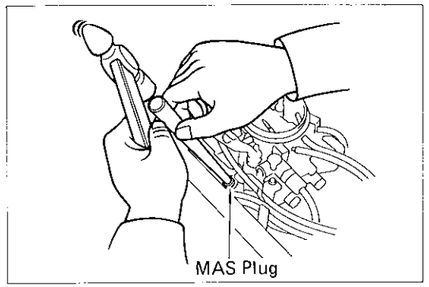
(g) Set to the idle speed by screwing in the IDLE MIXTURE ADJUSTING SCREW.

Idle speed: 650 rpm

This is the Lean Drop Method for setting idle speed and mixture.



(h) Install new limiter cap (Blue) on the idle speed adjusting screw, if one was installed.



8. PLUG IDLE MIXTURE ADJUSTING SCREW

(a) Remove the air cleaner.
(b) Tap in new plug until it is even with carburetor surface.
(c) Reinstall the air cleaner.

– MEMO –

SPECIFICATIONS

Page

ENGINE 5-2

MAINTENANCE AND TUNE-UP 5-3

ENGINE

Engine model	2F	
Displacement	4,230 cc	257.9 cu in.
Bore and stroke	94.0 x 101.6 mm	3,701 x 4,000 in.
Number of cylinders	6	
Type of cylinder head	OHV	
Nominal compression ratio	8.3 : 1	
Maximum horsepower (SAE-NET)	125 HP/3,600 rpm	
Maximum torque (SAE-NET)	27.7 kg-m/1,800 rpm	200 ft-lb/1,800 rpm
Recommended fuel	Regular (unleaded only)	
Reseach octane number (Anti-knock index)	91 (87)	

MAINTENANCE AND TUNE-UP

Drive belt tension (w/Borroughs drive belt tension gauge No. BT-33-73F)				
For Air Con. Compressor	New belt	125 ± 25 lb		
	Used belt	80 ± 20 lb		
For others	New belt	145 ± 25 lb		
	Used belt	100 ± 20 lb		
Battery specific gravity When fully charged at 20°C (68°F)		1.25 – 1.27		
Coolant capacity w/heater or air conditioner				
	FJ40 series	16.0 liters	16.9 US qts	14.1 Imp. qts
	FJ60 series	16.5 liters	17.4 US qts	14.5 Imp. qts
Engine oil capacity	Dry fill	8.0 liters	8.5 US qts	7.0 Imp. qts
	Drain and refill			
	w/oil filter change	7.8 liters	8.2 US qts	6.9 Imp. qts
	w/o oil filter change	7.0 liters	7.4 US qts	6.2 Imp. qts
Spark plug	Type	ND	W14 EXR-U	
		NGK	BPR4EY	
	Gap		0.8 mm	0.031 in.
Distributor air gap			0.2 – 0.4 mm	0.008 – 0.016 in.
Ignition timing			7° BTDC @ Max. 950 rpm (w/vacuum advance cut)	
Firing order			1 – 5 – 3 – 6 – 2 – 4	
Valve clearance (hot)	Intake		0.20 mm	0.008 in.
	Exhaust		0.35 mm	0.014 in.
Idle speed	at T/M in N range		650 rpm	
Intake manifold vacuum	at Idle speed		More than 420 mmHg (16.54 in.Hg)	
Fast idle speed			1,800 rpm (EGR and EVAP systems OFF and vacuum advance CUT)	
Compression pressure	at 250 rpm STD		More than 10.5 kg/cm² (149 psi)	
	Limit		8.0 kg/cm²	114 psi
Difference of pressure between each cylinder			Less than 1.0 kg/cm² (14 psi)	

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