

7. EXHAUST GAS RECIRCULATION (EGR) SYSTEM

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7. EXHAUST GAS RECIRCULATION (EGR) SYSTEM

DESCRIPTION

The EGR system serves to recirculate a part of the exhaust gases into the intake system for the purpose of lowering the maximum combustion temperature in the combustion chambers and thereby reduce the formation of NO_x (Nitrogen Oxides).

OPERATION

1. EGR system operation (20R and 2F engine)

["ON" condition]

- When the vehicle speed, coolant temperature, EGR valve temperature (2F only), and carburetor flange temperature (2F only), all reach the "ON" range, the computer turns the VSV "ON".
- Turning the VSV "ON" causes the vacuum passage between EGR port and EGR valve to open.
- The vacuum from the EGR port lifts up the EGR valve diaphragm and open the EGR valve.
- Therefore, a part of the exhaust gases from the exhaust manifold that passes through the EGR cooler is led into the upper side of the carburetor throttle valve.

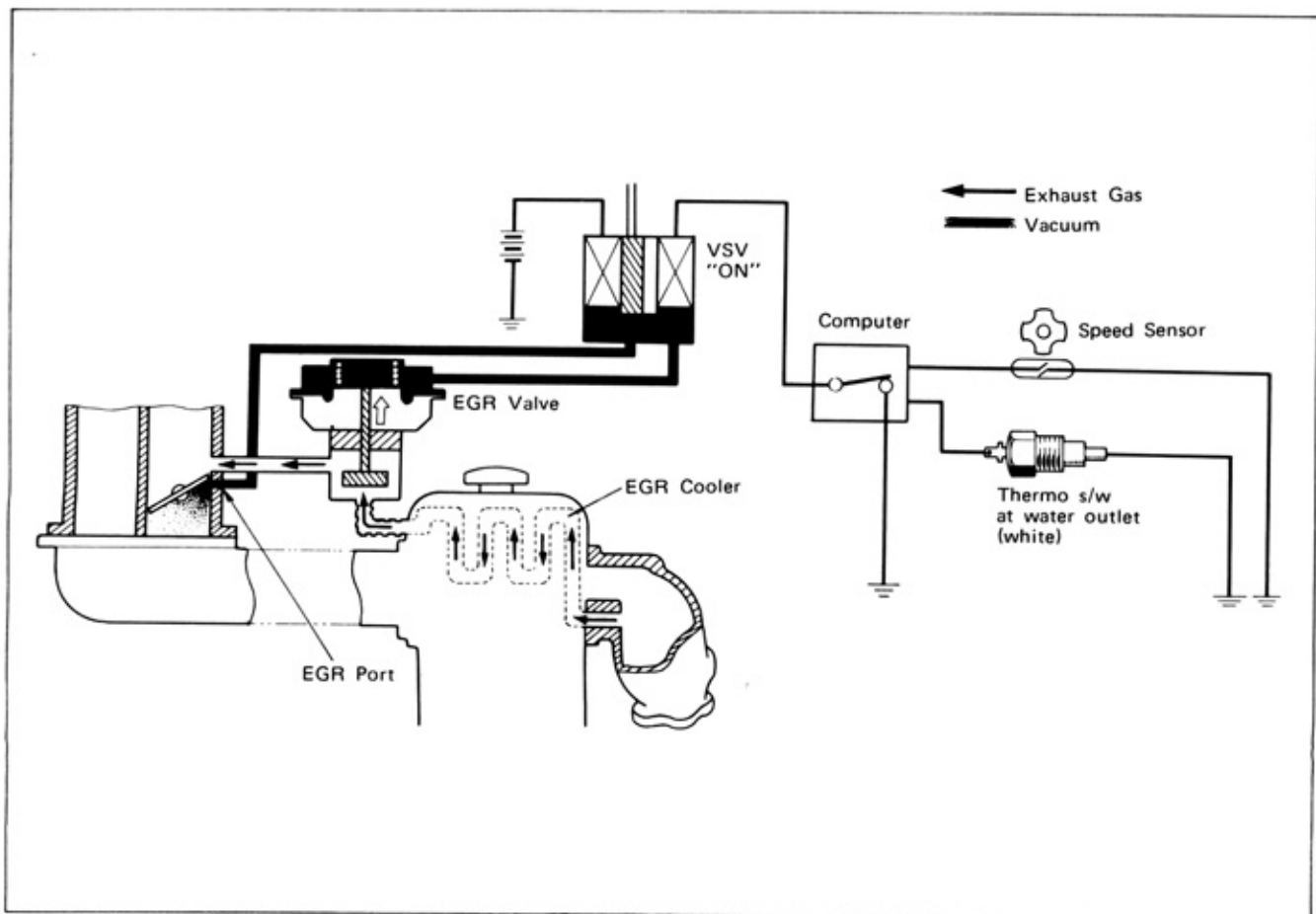


Fig. 7-1 EGR System Operation ("ON" Condition - 20R Engine)

["OFF" condition]

- If any one of the "ON" conditions changes into the "OFF" range, the computer turns the VSV "OFF".
- Turning VSV "OFF" causes the passage between the atmosphere and EGR valve to open, and at the same time, causes the vacuum passage between the EGR port and EGR valve to close.
- Therefore, the EGR valve is closed by the spring tension pushing down the EGR valve diaphragm, so that the exhaust gases are no longer led into the carburetor.

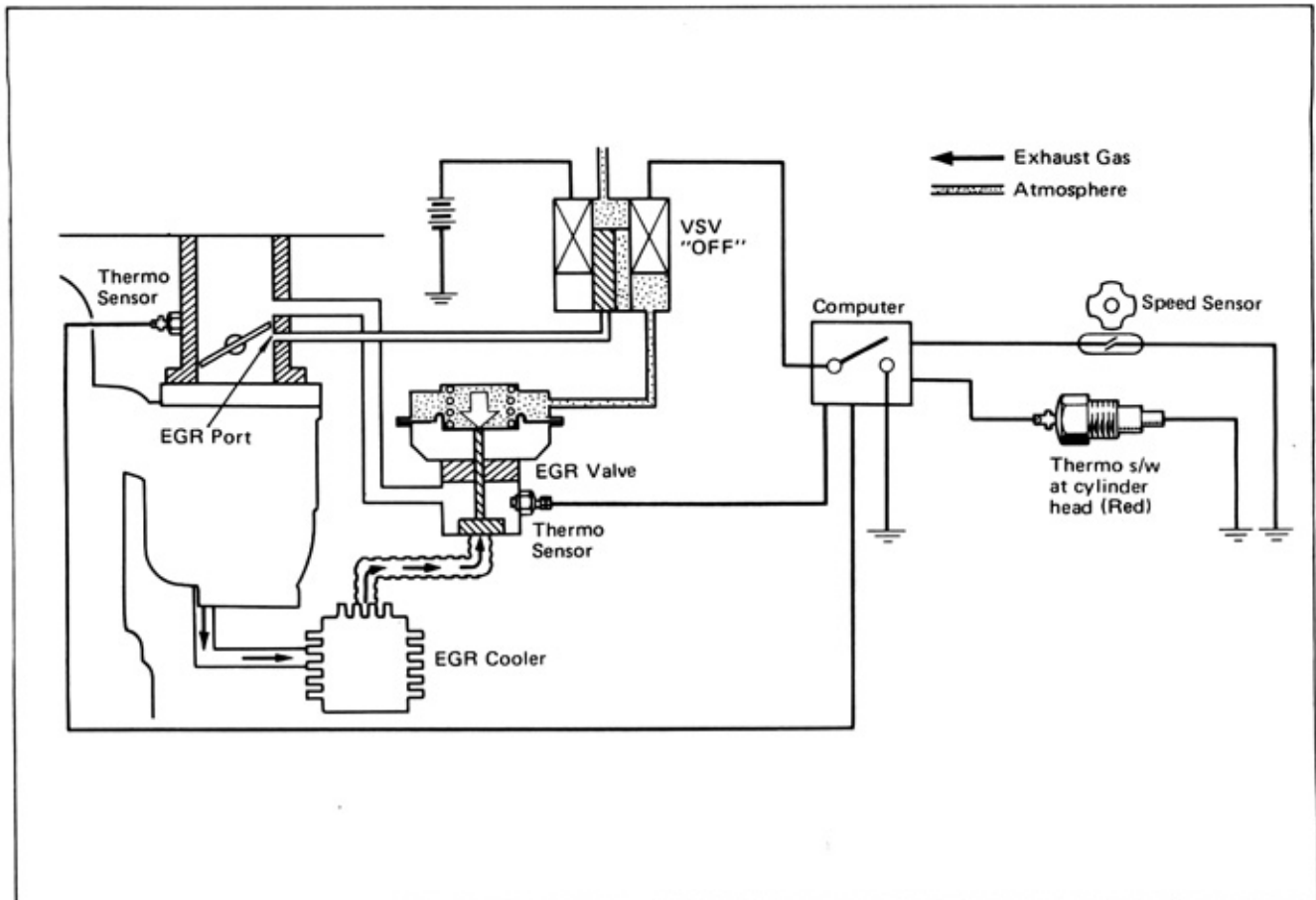


Fig. 7-2 EGR System Operation ("OFF" Condition – 2F Engine)

2. EGR system operation (4M engine)

["ON" condition]

- When the vehicle speed, coolant temperature, and catalytic converter temperature all reach the "ON" range, the computer turns the VSV "ON".
- Turning the VSV "ON" causes the vacuum passage between the EGR vacuum control valve and carburetor advancer port to open. The EGR vacuum control valve is then lifted up against spring tension.
- Therefore, the venturi vacuum acts on the EGR valve chamber "A" and the atmosphere on chamber "B", to lift up the EGR valve and cause the EGR valve to open.
- As a result, a part of the exhaust gases from the exhaust manifold that passes through the EGR cooler pipe is led into the intake manifold.

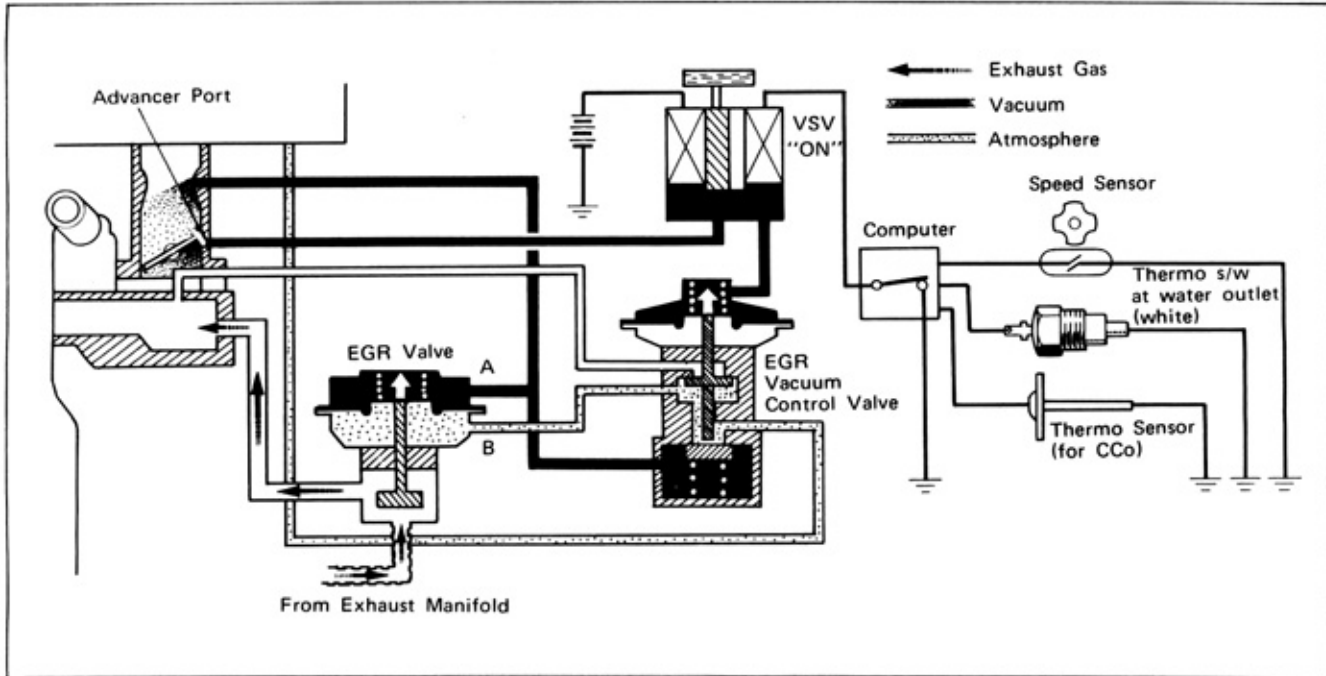


Fig. 7-3 EGR System Operation ("ON" Condition) – 4M Engine

["OFF" Condition]

- If any one of the "ON" conditions changes into the "OFF" range, the computer turns the VSV "OFF".
- At VSV "OFF" condition, the atmosphere acts on the EGR vacuum control valve diaphragm chamber so that the valve is pushed down by spring tension.
- The atmosphere through the air cleaner acts on the EGR valve chamber "A" and the intake manifold vacuum on the chamber "B", causing the EGR to close.
- Therefore, the exhaust gases are no longer led into the intake manifold.

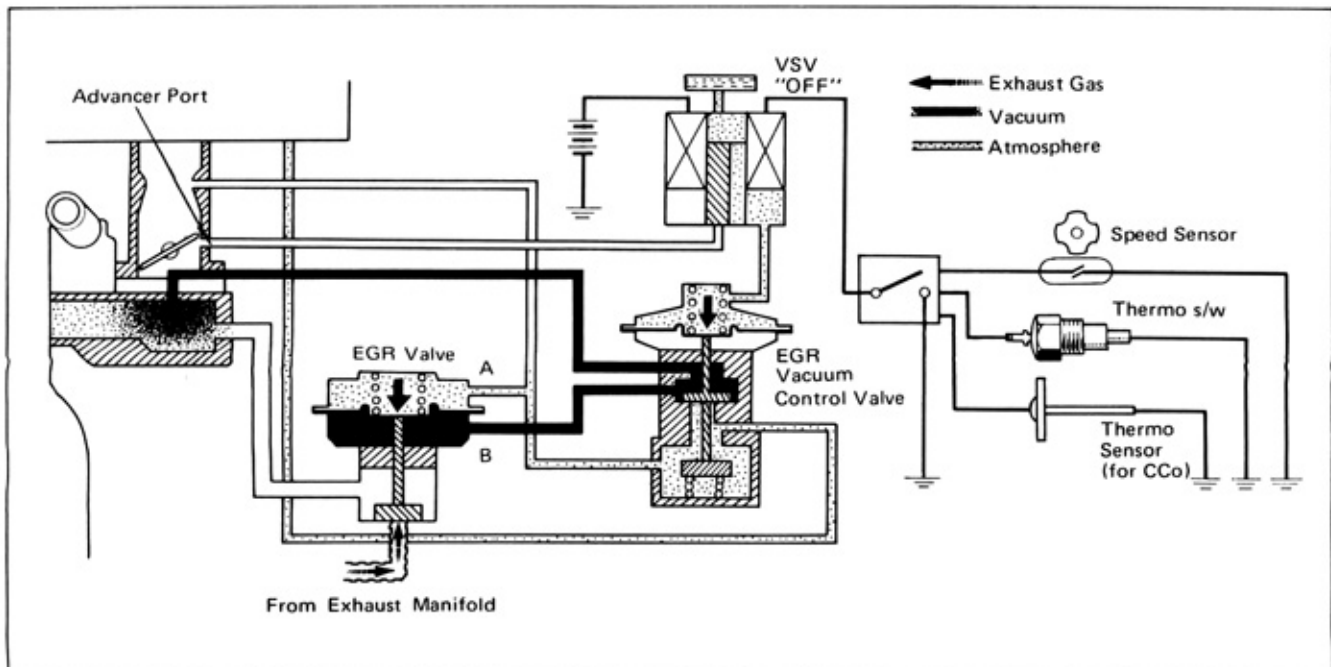
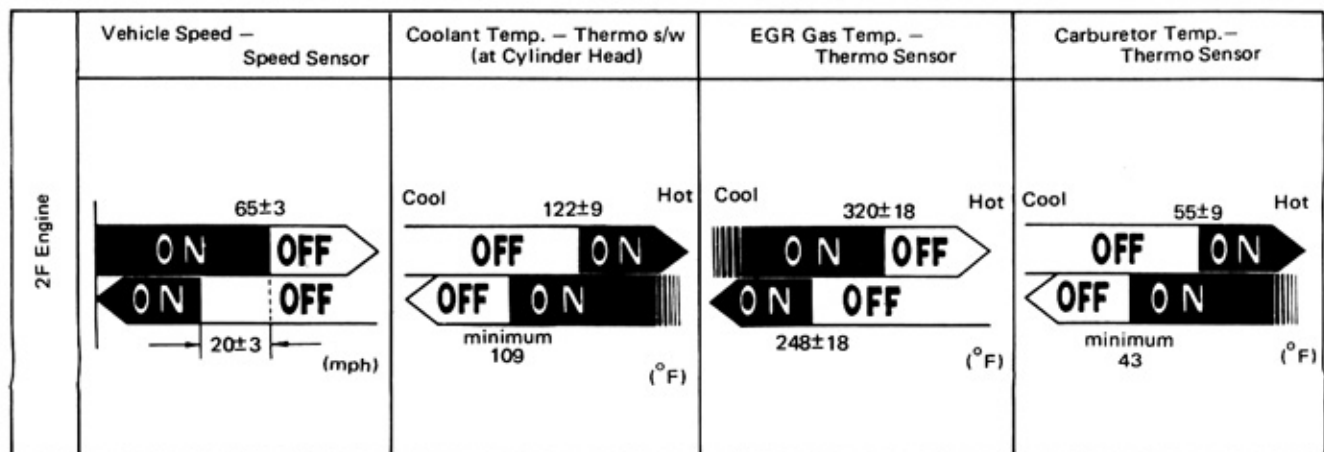
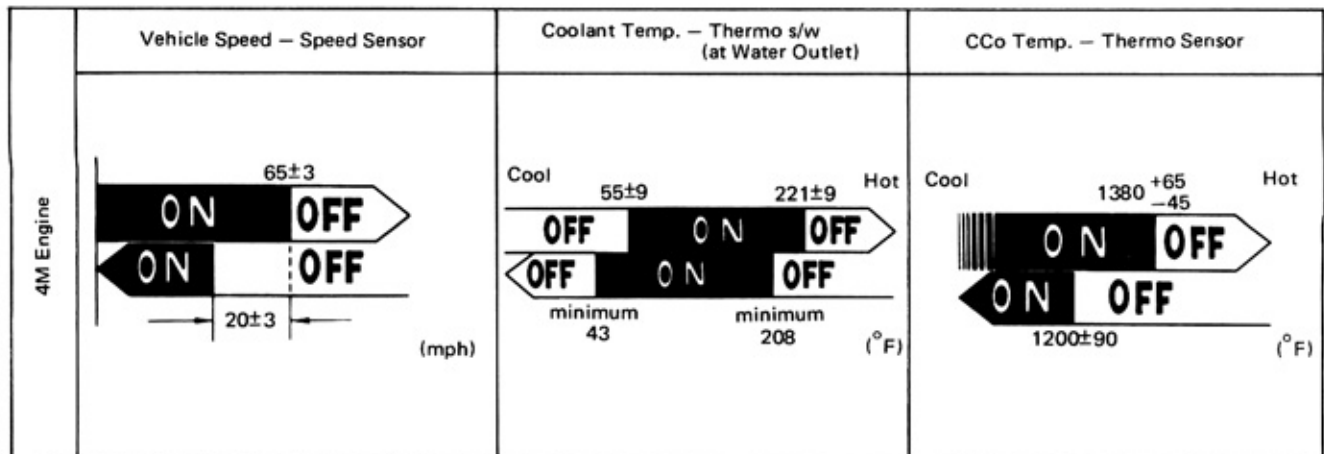
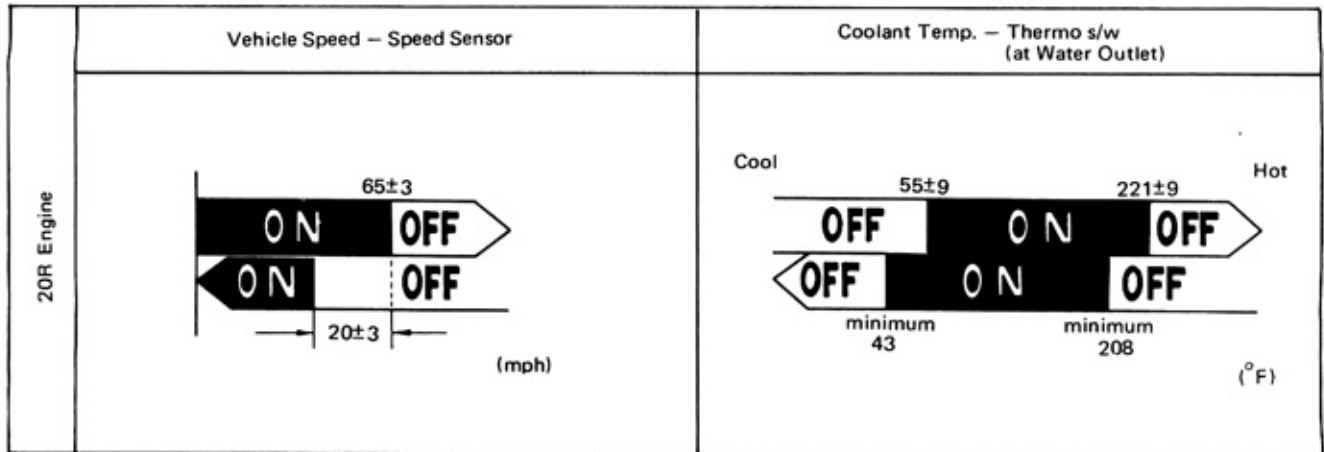


Fig. 7-4 EGR System Operation ("OFF" Condition) – 4M Engine

3. EGR system operating ranges

EGR system "ON" – When all following conditions are "ON".

EGR system "OFF" – When any one of the following conditions is "OFF".



Note
 In the above diagrams, thermo switch "ON" denotes cut-out condition and "OFF" denotes continuity condition.

INSPECTION

EGR valve inspection (20R and 2F engines)

- (1) After warming up, remove the air cleaner cap.
- (2) With engine idling, connect the EGR valve and intake manifold directly together with a vacuum hose. This should cause the carburetor to produce a bubbling noise.
- (3) This noise should disappear when the vacuum hose is disconnected from the EGR valve.

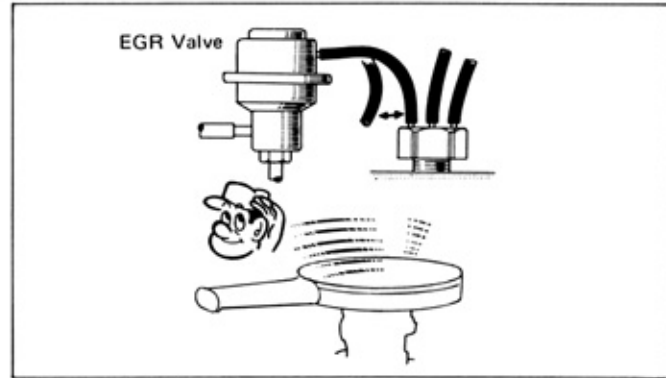


Fig. 7-5 EGR Valve Inspection (20R and 2F)

EGR valve inspection (4M engine)

Warm up the engine and have it idling. At this state, interchanging the EGR valve upper and lower hoses should cause the engine to rough idle or stall.

EGR vacuum control valve inspection (4M engine)

- (1) Connect the carburetor advancer port and EGR vacuum control valve directly together as illustrated.
- (2) Disconnect the two hoses from the EGR valve and attach vacuum gauge on each hose.
- (3) When the engine is raced, the vacuum gauges should indicate as follows:

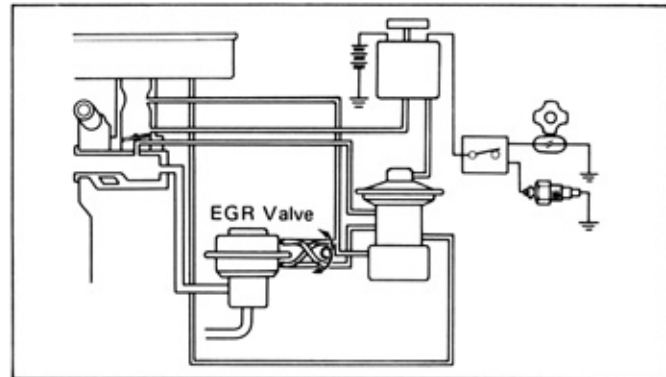


Fig. 7-6 EGR Valve Inspection (4M)

EGR "A" chamber side	Venturi vacuum
EGR "B" chamber side	Atmospheric pressure

- (4) At idling, disconnecting the hose from carburetor advancer port should cause the vacuum gauge to indicate as follows:

EGR "A" chamber side	Approximately atmospheric pressure
EGR "B" chamber side	Intake manifold vacuum

- (5) Return the vacuum hoses to former state.

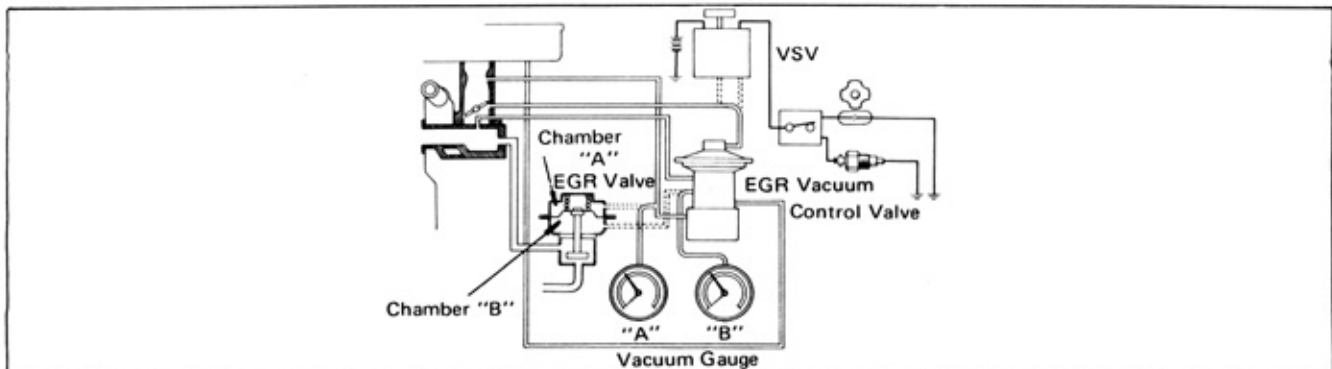
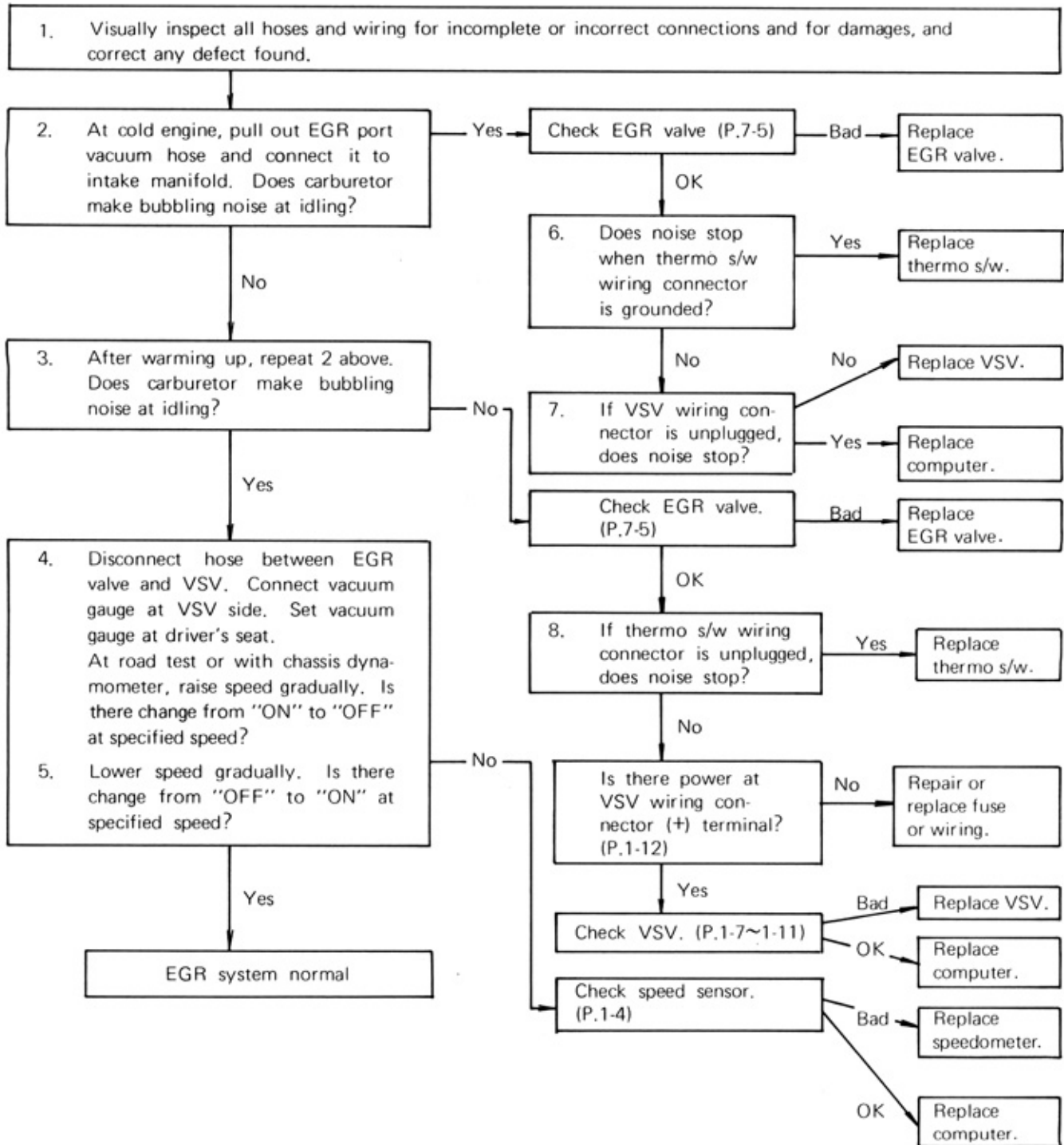


Fig. 7-7 EGR Vacuum Control Valve Inspection (4M)

EGR SYSTEM INSPECTION PROCEDURE (20R Engine)

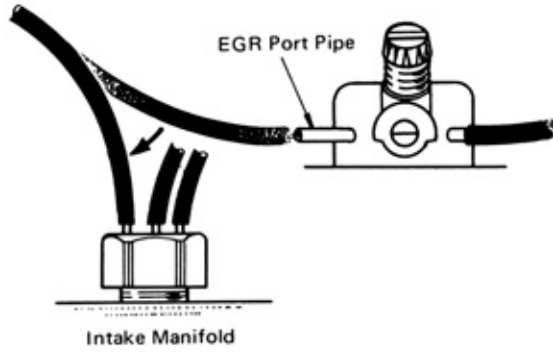


Note

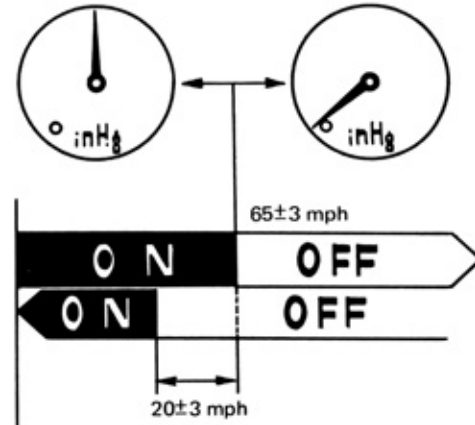
- In tests 2 and 3 above, the bubbling sound will be heard better if air cleaner cap is taken off.
- Test 2 cannot be performed if the coolant temperature does not drop below 40°F even if the vehicle is left out in the shade for more than one hour. In such case, perform test 2 by grounding the thermo switch connector terminal and forcibly assuming cold condition. Unit test of the thermo switch will be required later (P1-6).

2 Coolant Temp.: below 40°F

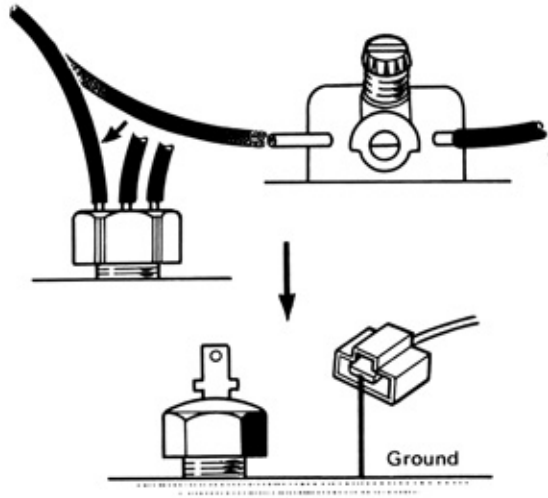
3 after warming up



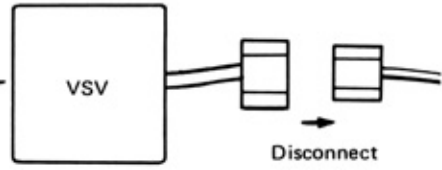
4 5 after Warming up



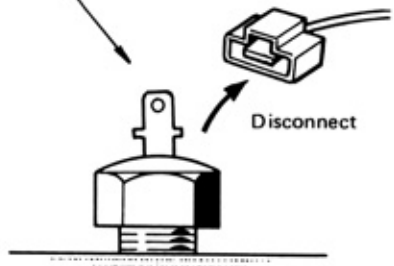
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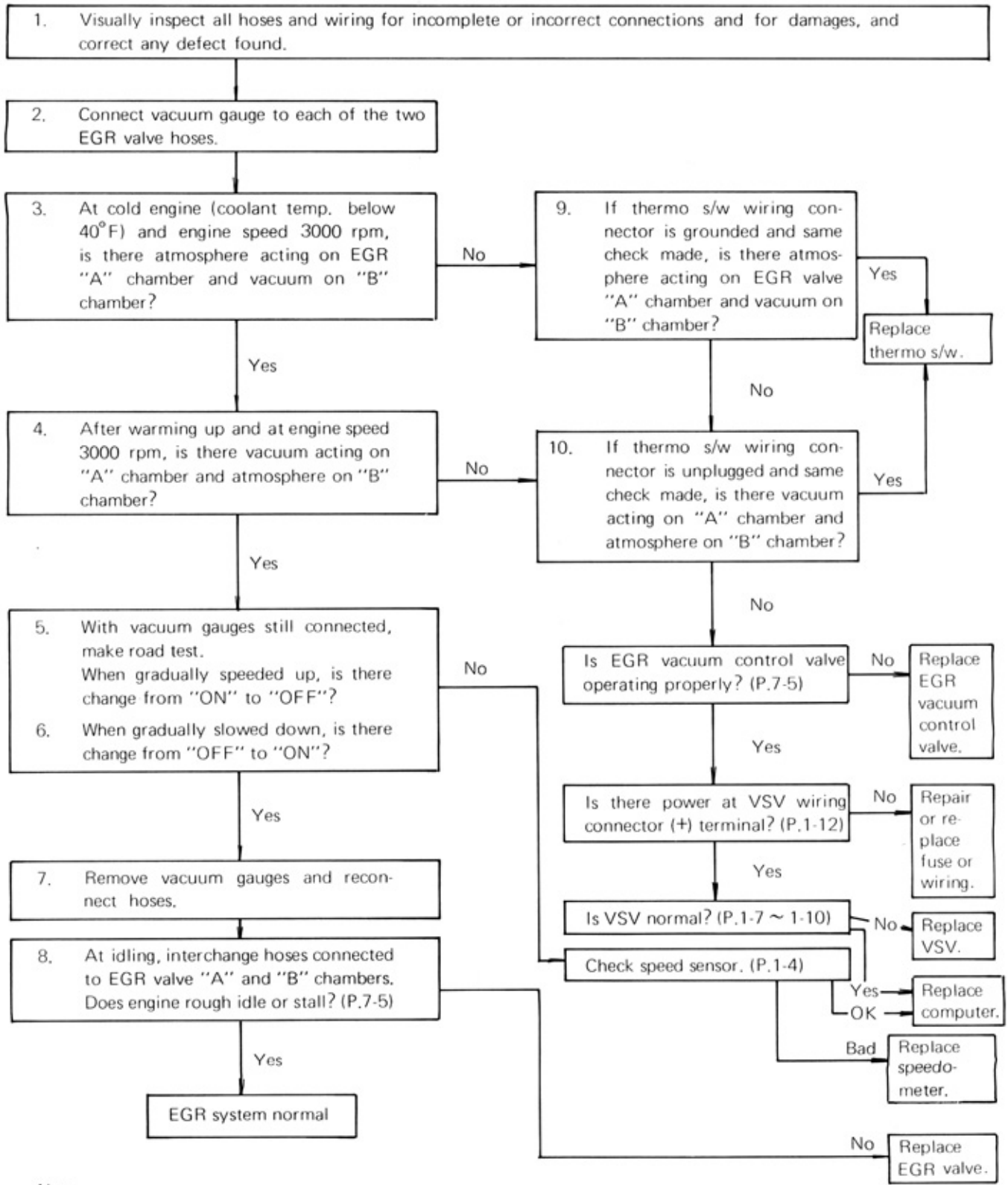
7



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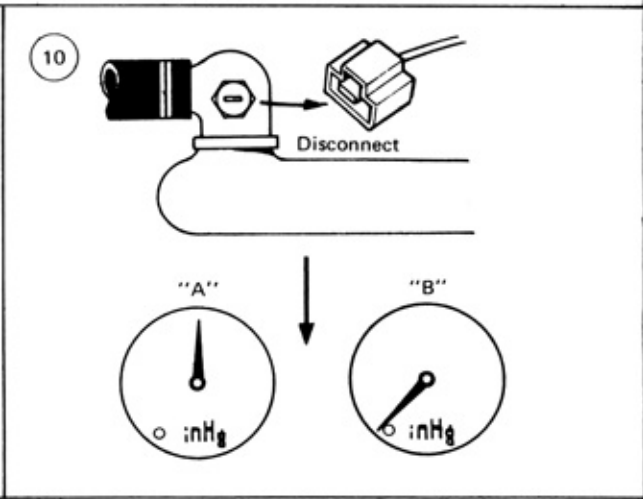
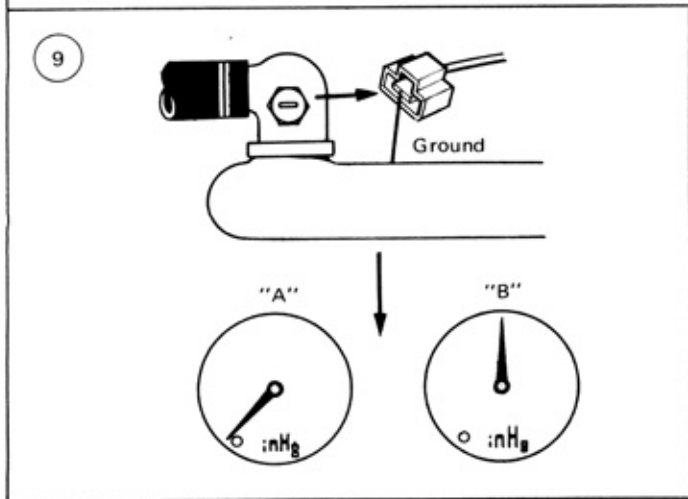
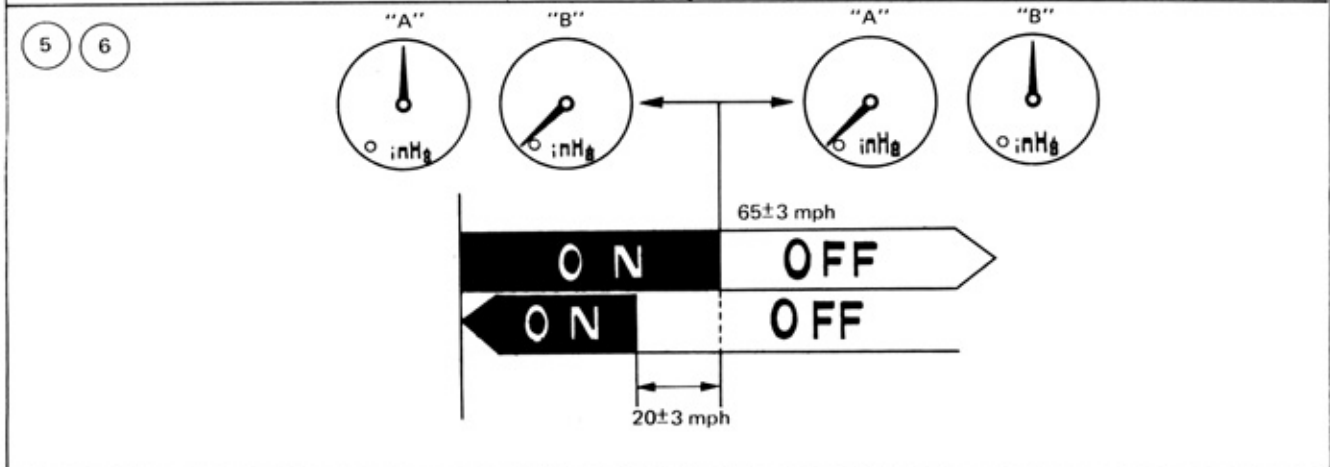
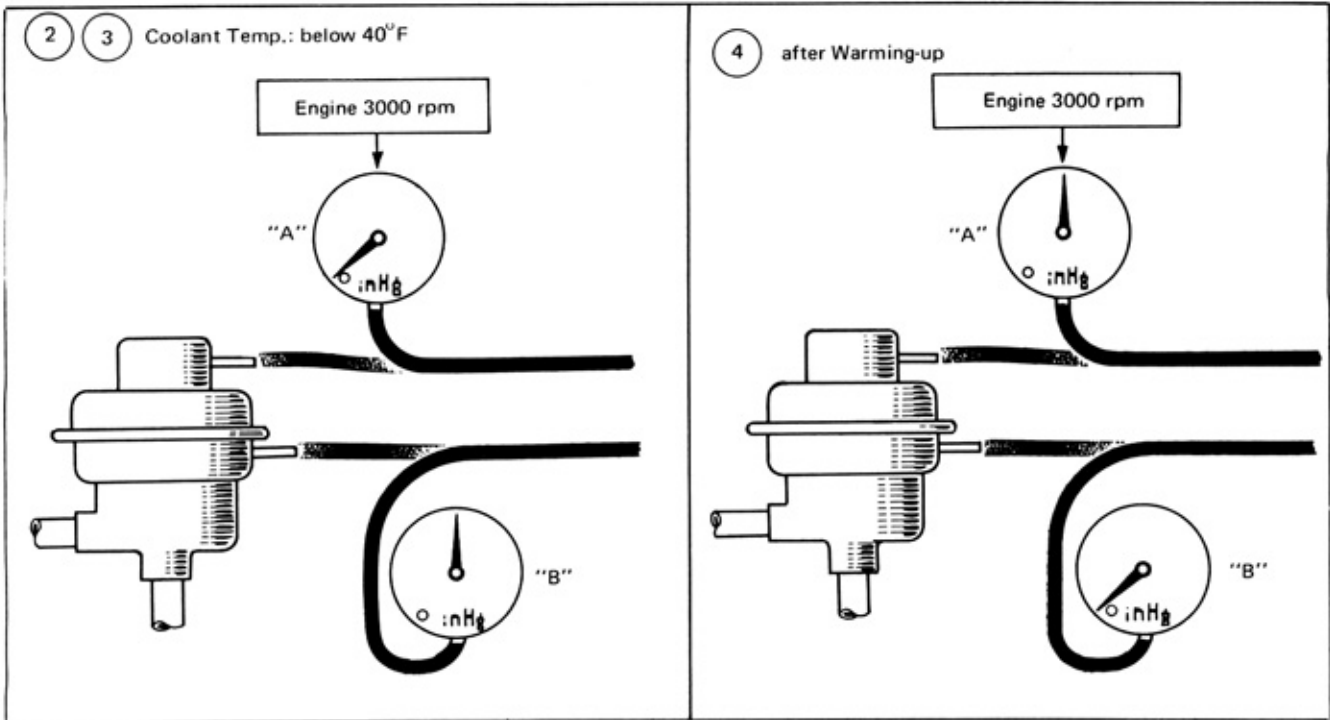


EGR SYSTEM INSPECTION PROCEDURE (4M Engine)

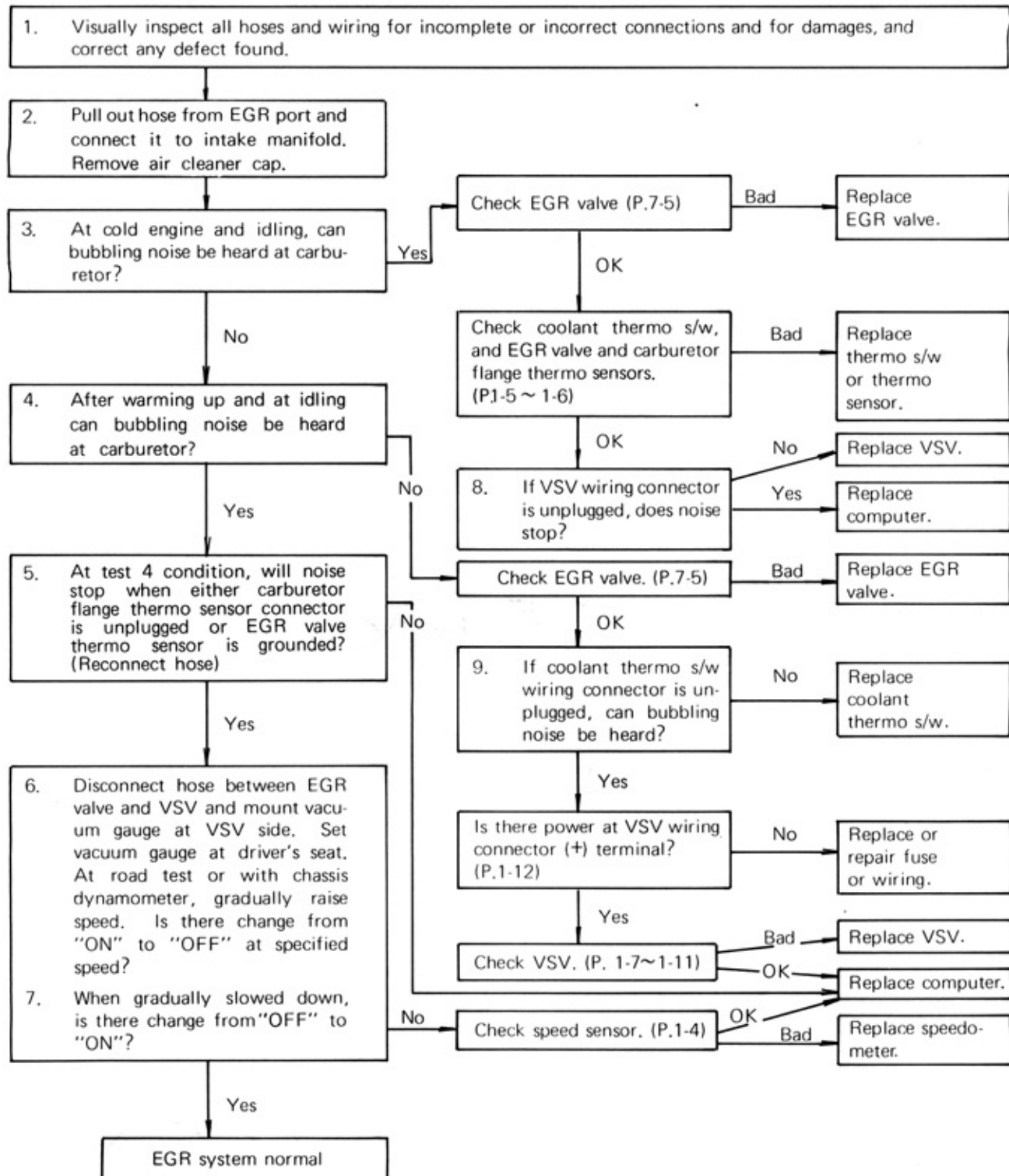


Note

Test 2 cannot be performed if the coolant temperature does not drop below 40°F even if the vehicle is left out in the shade for more than one hour. In such case, perform test 2 by grounding the thermo switch connector terminal and forcibly assuming cold condition. Unit test of the thermo switch will be required later (p1-6).

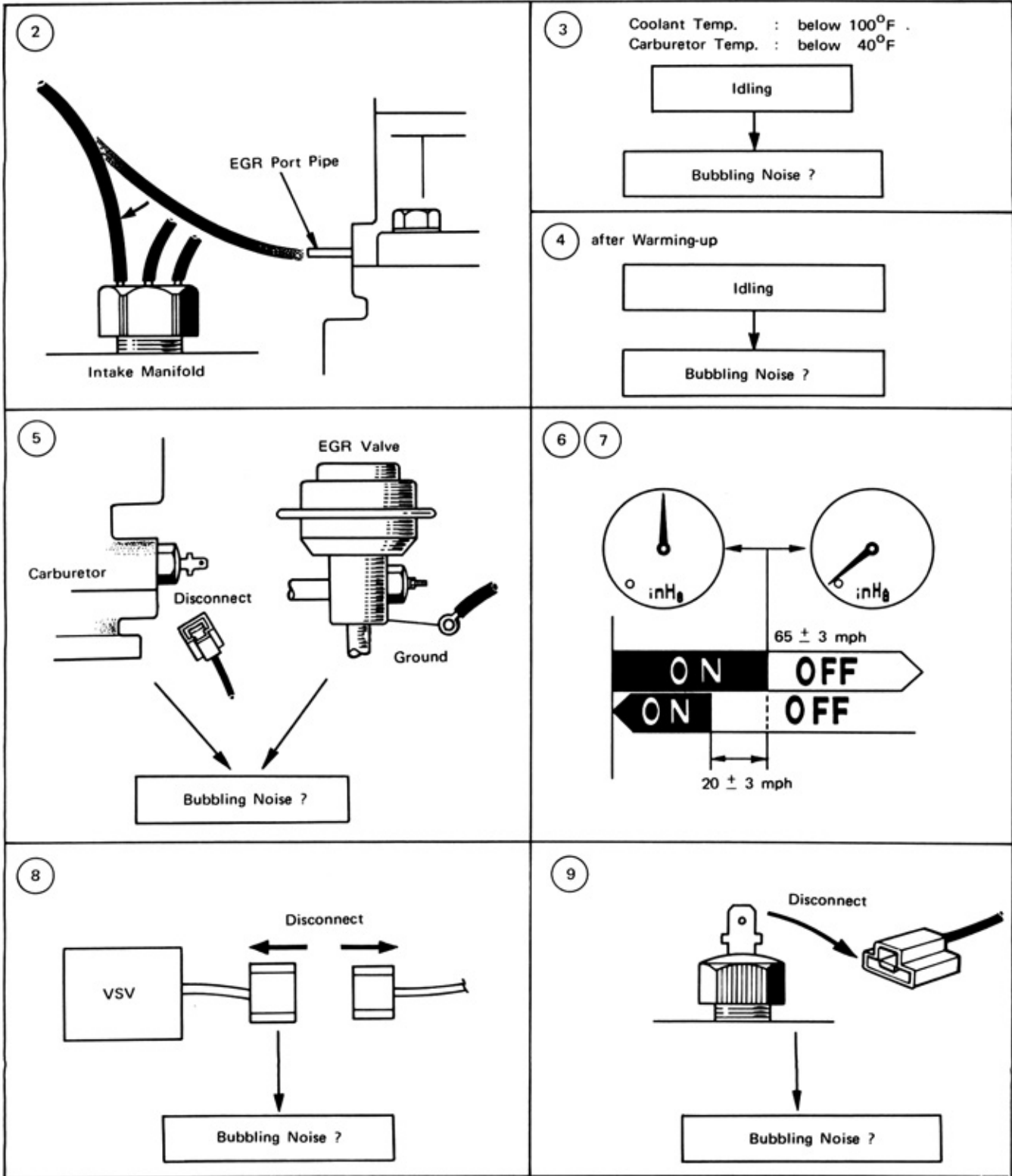


EGR SYSTEM INSPECTION PROCEDURE (2F Engine)

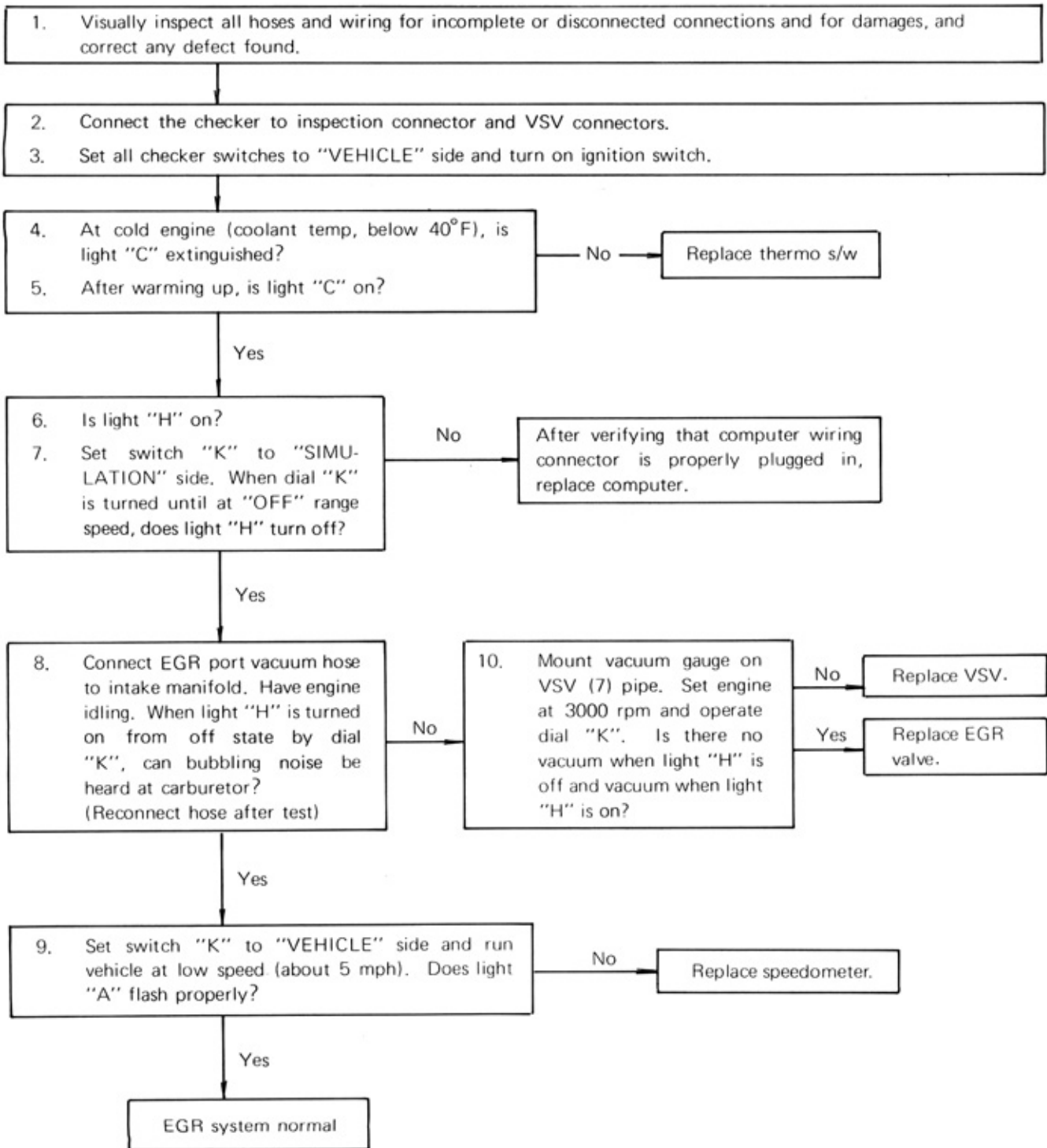


Note

- Test 3 cannot be performed if coolant temperature does not drop below 40°F after leaving the vehicle in the shade for more than one hour. In such case, make the test by grounding the thermo switch connector terminal and forcibly assuming cold condition. Unit test of thermo sensor will thus be required later. (P1-5)
- Tests 6 and 7 cannot be performed if the EGR valve temperature rises above 320°F as the system will be "OFF". If these tests show No, before checking the speed sensor, unplug the thermo sensor connector at the EGR valve and make road test. If this is satisfactory, the EGR system can be assumed to be in normal condition.



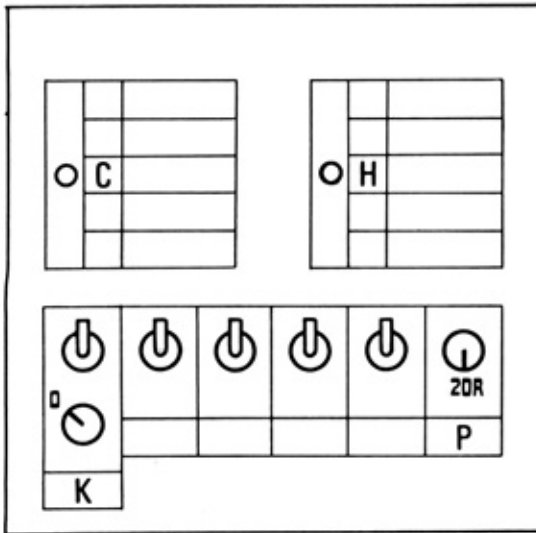
EGR SYSTEM INSPECTION PROCEDURE (Using Checker – 20R Engine)



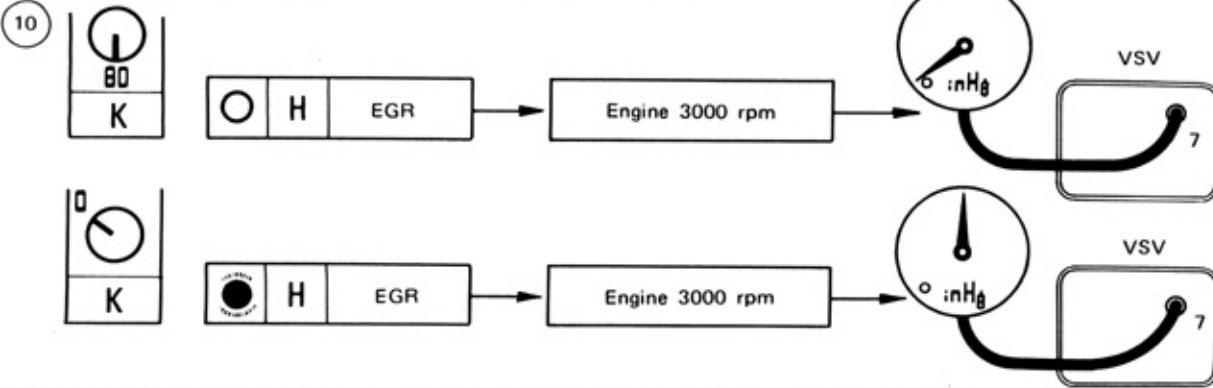
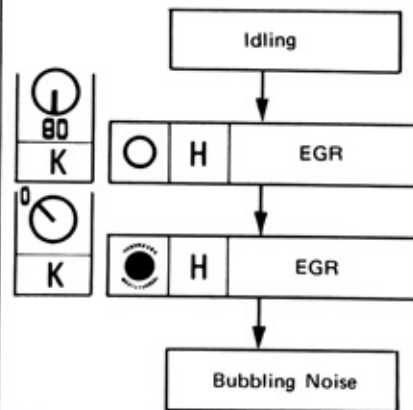
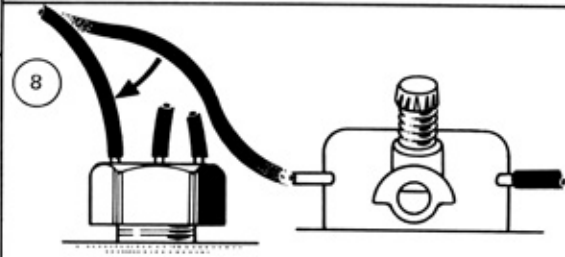
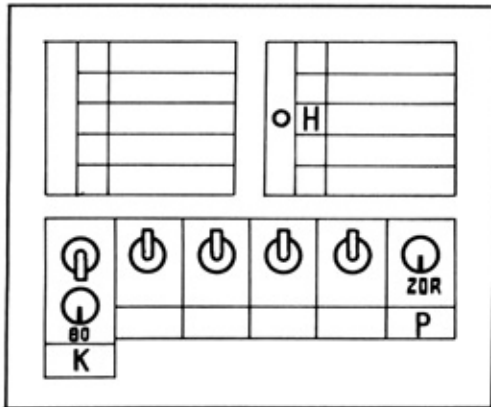
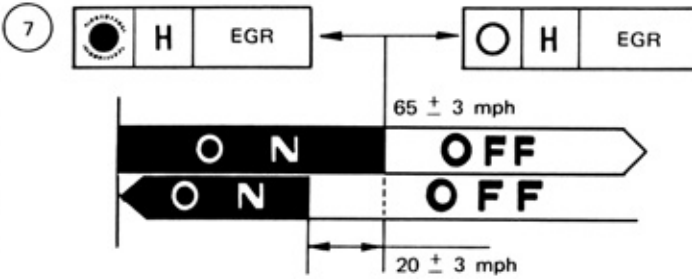
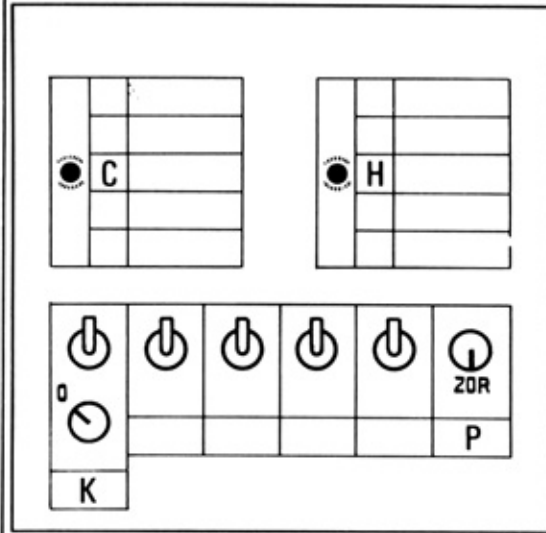
Note

After removing checker, have the VSV connector plugged in properly.

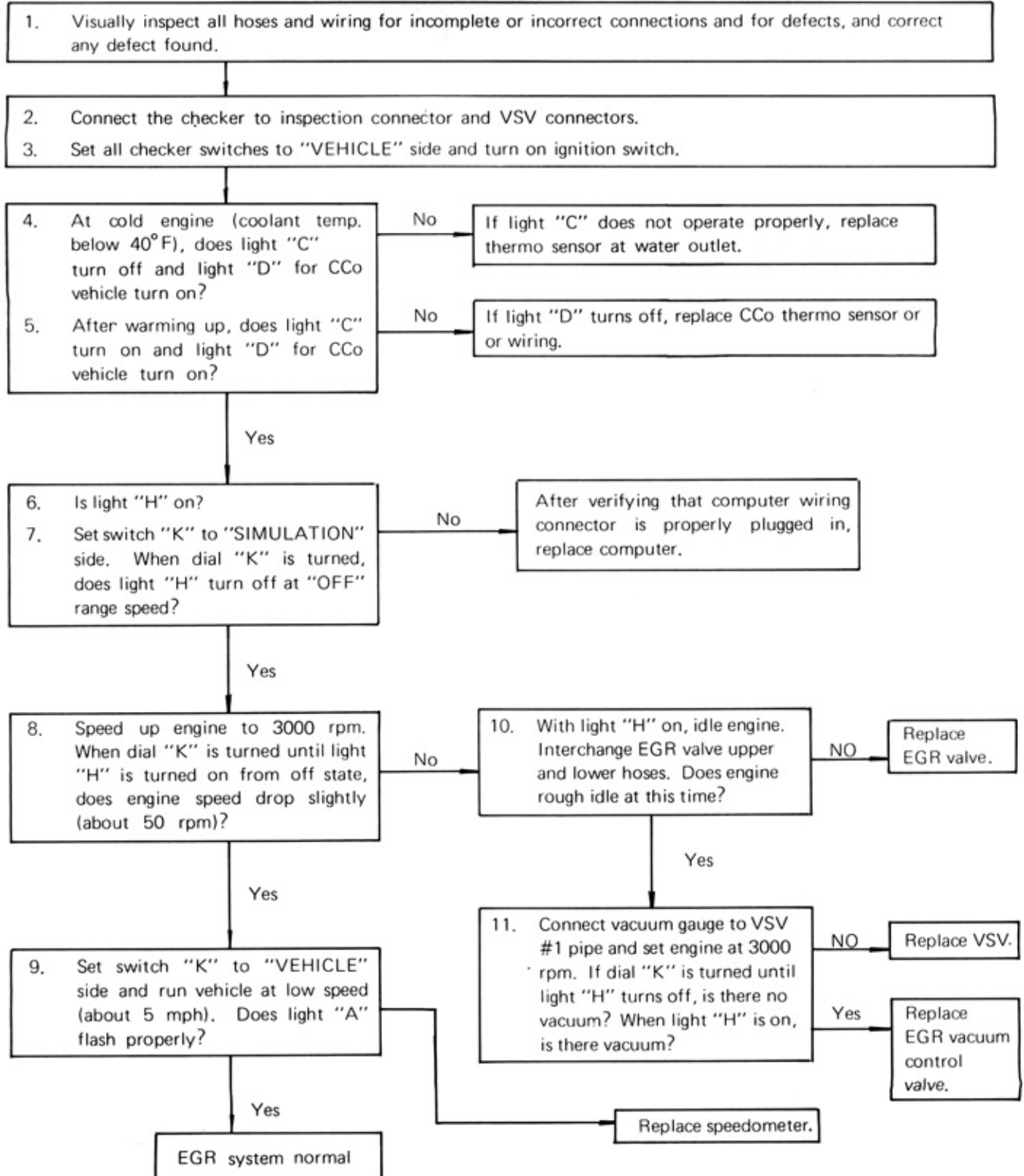
4 Coolant Temp. : below 40°F



5 6 after Warming-up

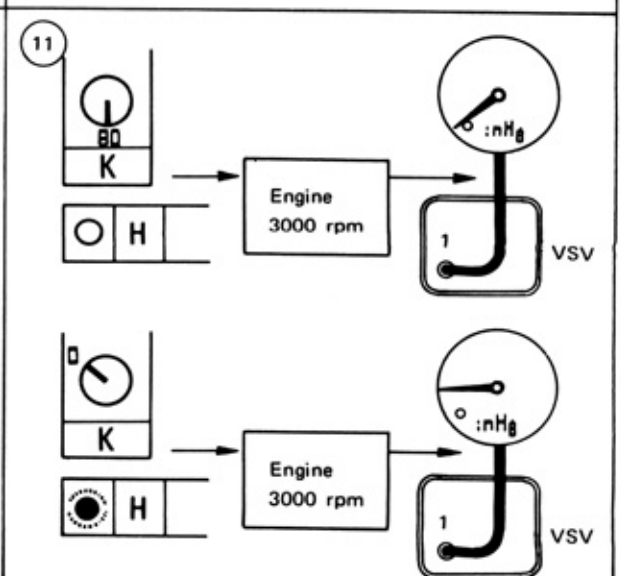
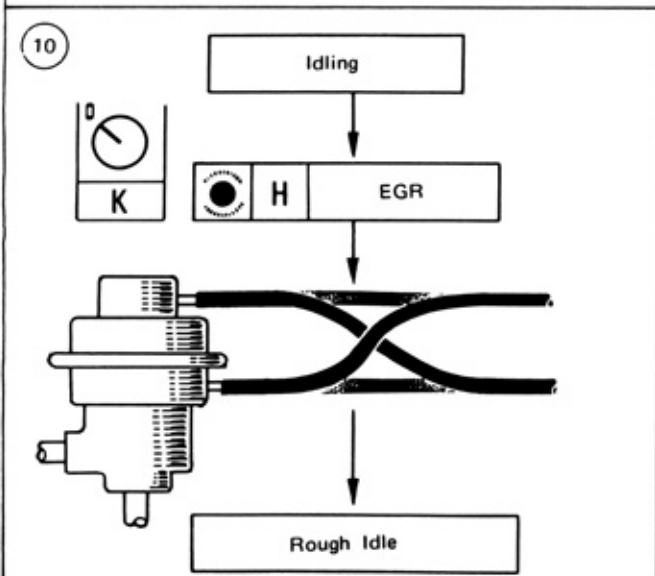
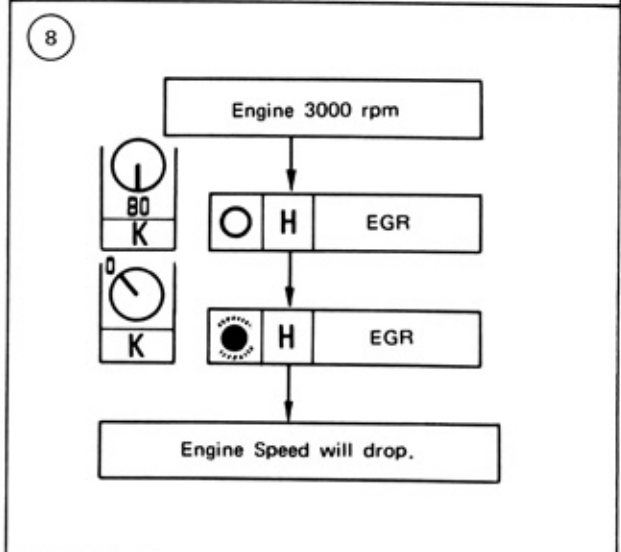
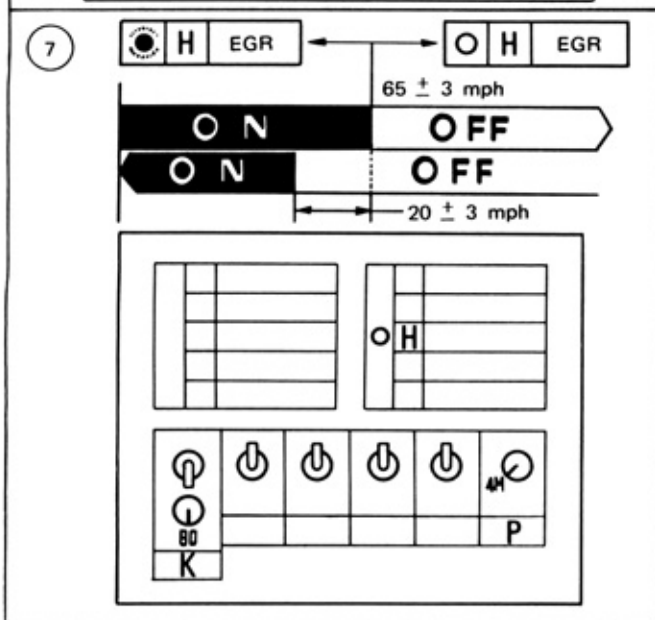
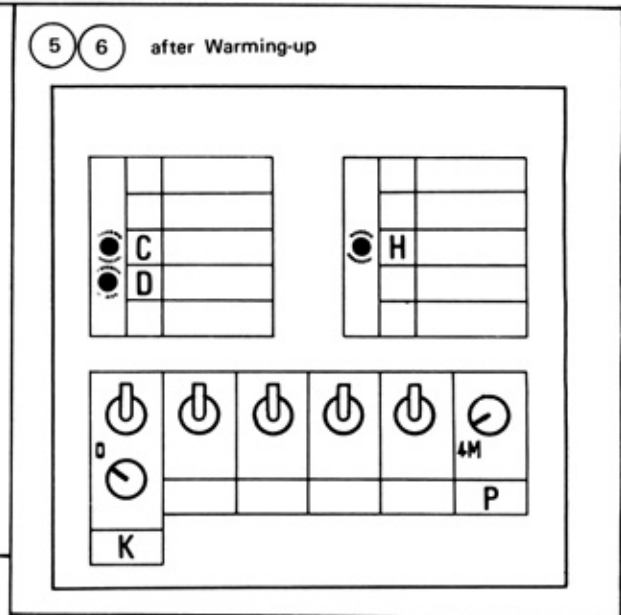
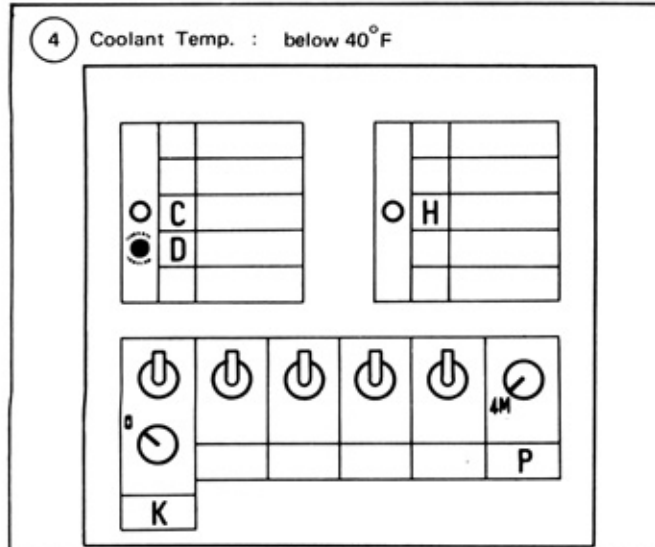


EGR SYSTEM INSPECTION PROCEDURE (Using Checker – 4M Engine)

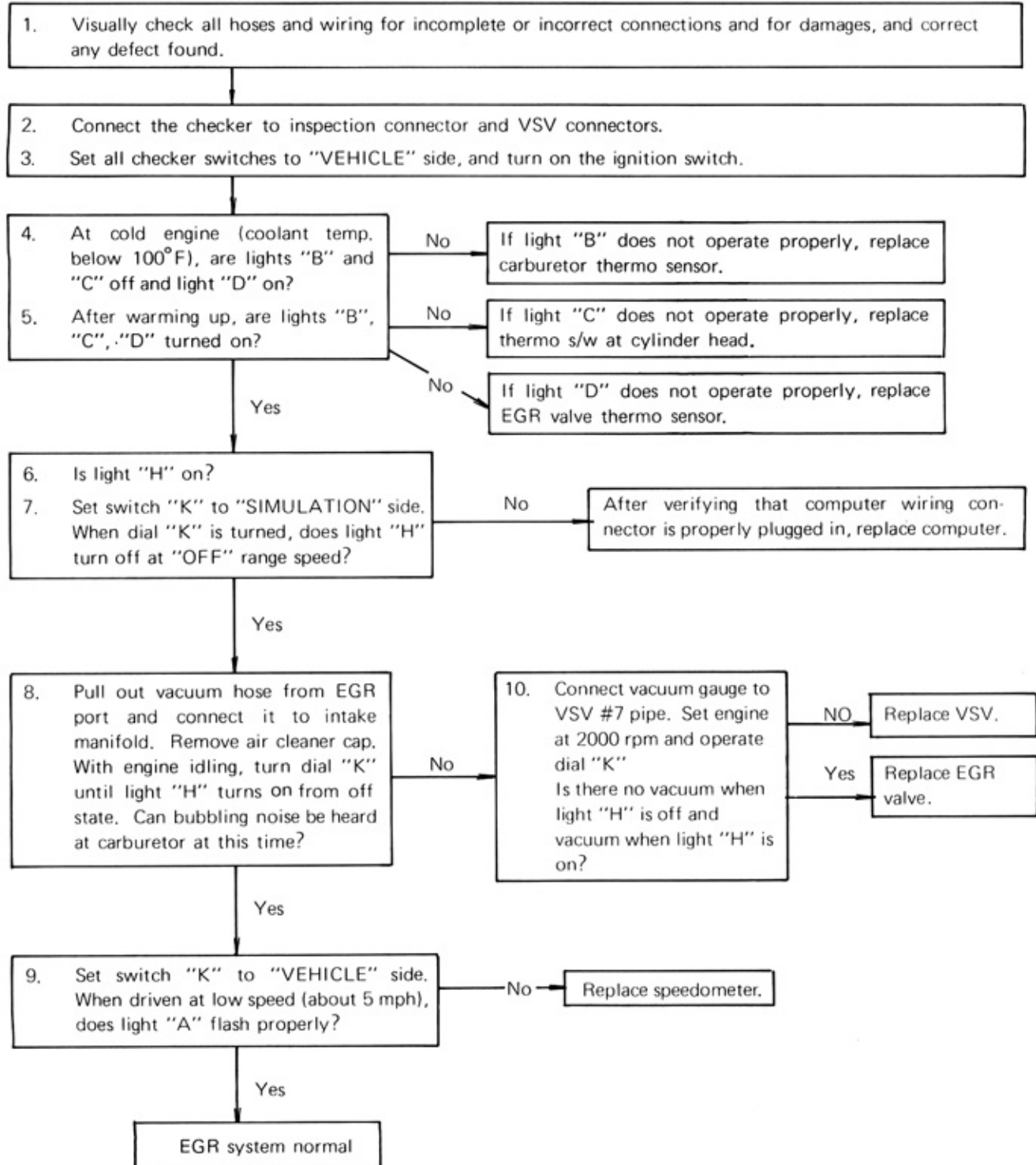


Note

After removing the checker, have the VSV connector properly plugged in.



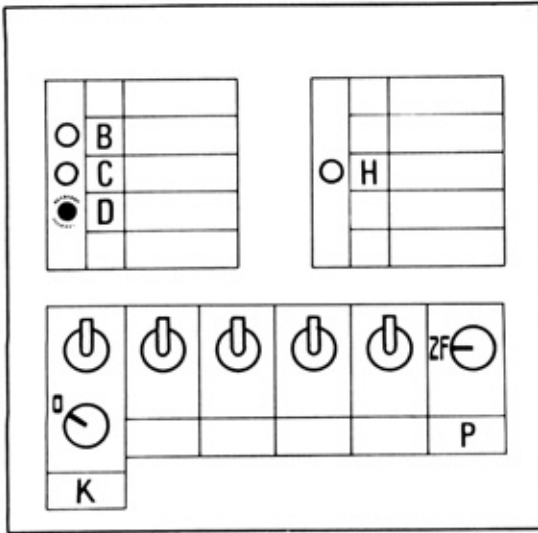
EGR SYSTEM INSPECTION PROCEDURE (Using Checker - 2F Engine)



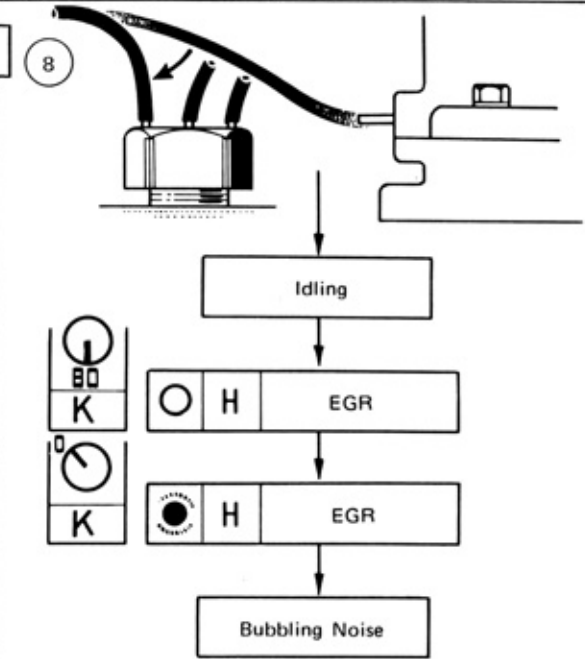
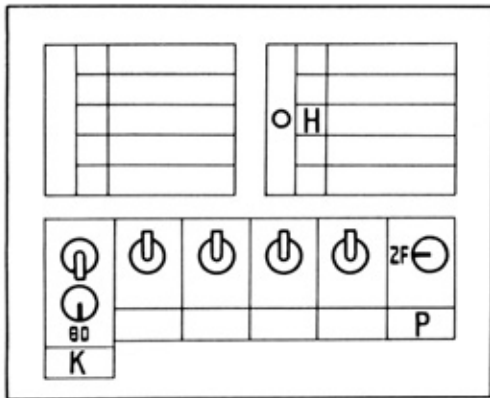
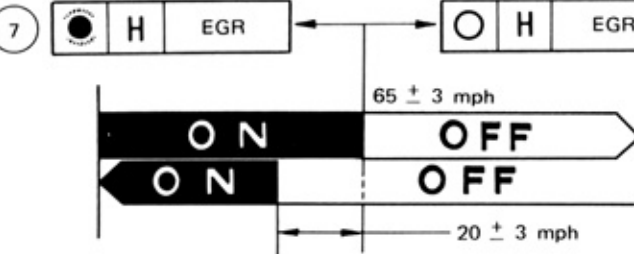
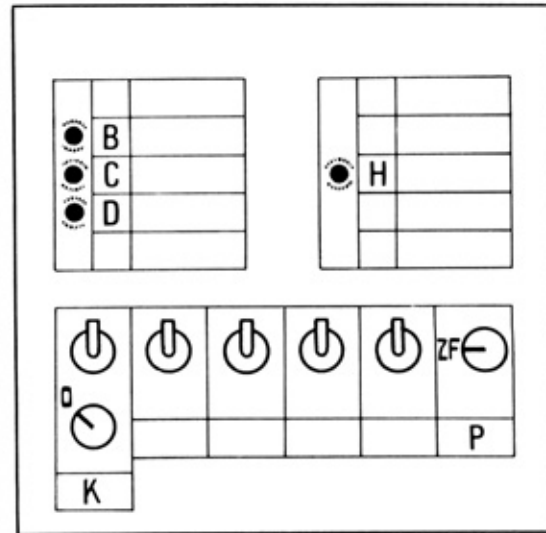
Note

After removing the checker, have the VSV connector properly plugged in.

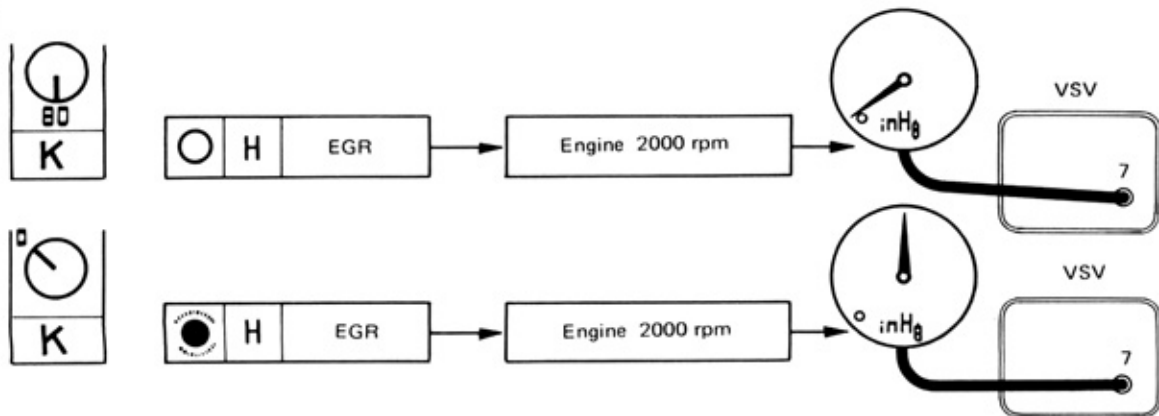
4 Coolant Temp. : below 100°F
Carburetor Temp. : below 40°F



5 6 after Warming-up



10



EGR MAINTENANCE WARNING

DESCRIPTION

This is a warning device to indicate that the EGR system is in the maintenance period. After the vehicle has run 25,000 miles, the warning light will continue to light as long as the ignition switch is turned on. Therefore, whenever a vehicle with this warning light turned on comes in for service check up, start with the EGR system first, and perform all of the periodical maintenance work. The warning light must not be extinguished by resetting the switch until all work have been fully completed.

For the purpose of checking, the warning light has been made to turn on temporarily when the engine is cranked. Thus, if the warning light fails to turn on when cranked, the warning light electric circuit is faulty.

OPERATION

- When the vehicle has run about 25,000 miles, the cam driven by the speedometer cable pushes the micro switch to the "C" side to close the circuit between "A" and "F". The current from the ignition switch then flows through the warning light and cause it to light.
- Changing over the reset switch to the "E" side will open the circuit between "A" and "F" and prevent the warning from lighting for another 25,000 miles.
- On the other hand, due to the circuit between the warning light and starter switch, the current from the starter switch during cranking will flow through the warning light and cause it to light.
- The cam makes one revolution every 50,000 miles.

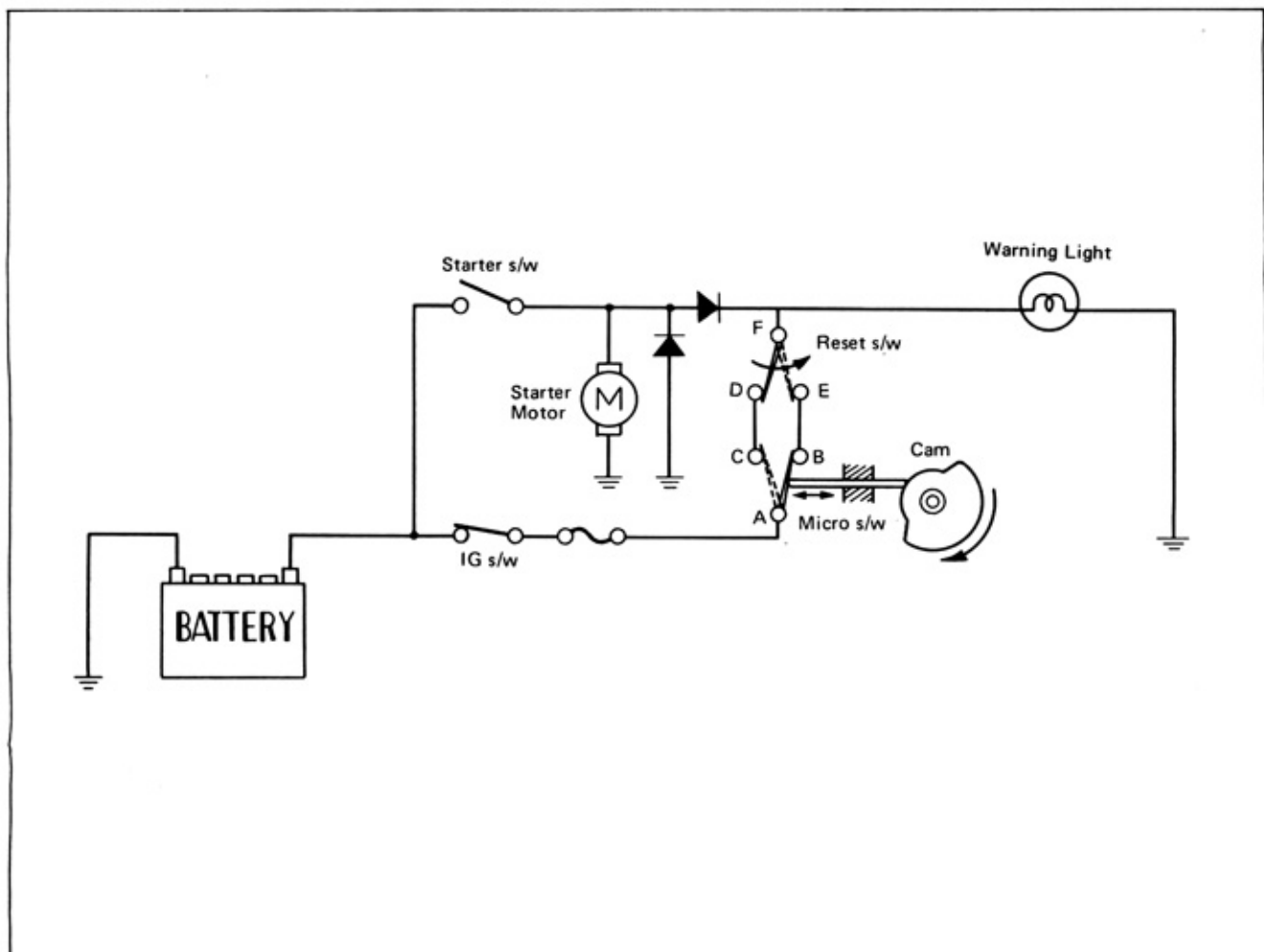


Fig. 7-8 EGR Maintenance Warning Circuit

RESET SWITCH RESETTING METHOD (RT, MX, FJ)

1. Using SST [09810-25010], remove the lock screw from maintenance interval detector cover.
2. Remove the two cover screws and take off the cover.

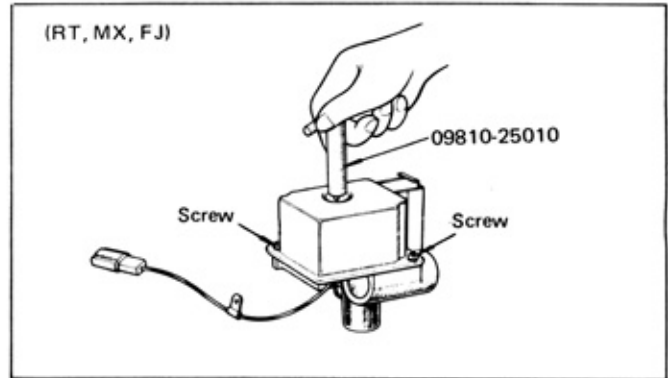


Fig. 7-9 Removing Cover

3. Set the reset switch in the direction opposite to what it is now.
4. Install the cover.
5. Check the warning light to see that it does not turn on when the ignition switch is turned on.
6. Check the warning light to see that it turns on when the ignition switch is turned to "START" position.

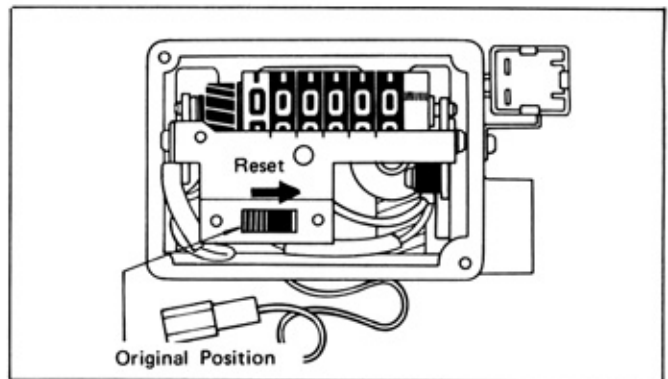


Fig. 7-10 Resetting Reset Switch

RESET SWITCH RESETTING METHOD (RA, RN)

1. Using SST [09810-25010], remove the lock screw from the warning cancel switch cover.
2. Remove the cover.

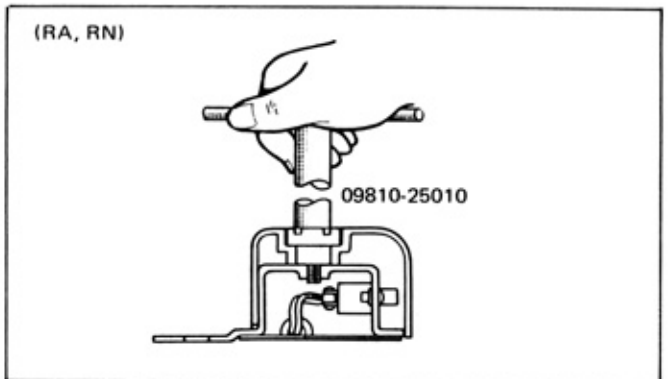


Fig. 7-11 Removing Cover

3. Set the reset switch in the direction opposite to what it is now.
4. Install the cover.
5. Check the warning light to see that it does not turn on when the ignition switch is turned on.
6. Check the warning light to see that it turns on when the ignition switch is turned to "START" position.

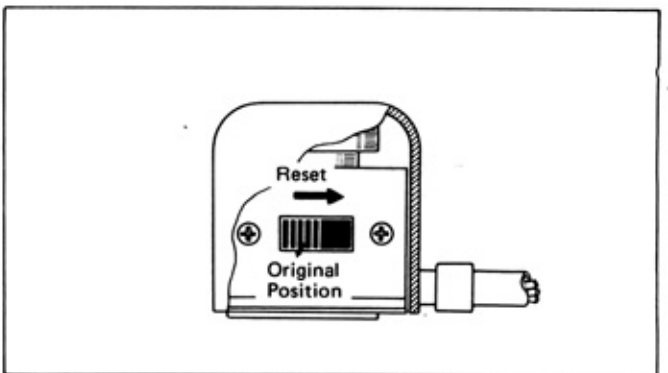


Fig. 7-12 Resetting Reset Switch

MAINTENANCE WARNING DETECTOR (RT, MX, FJ)

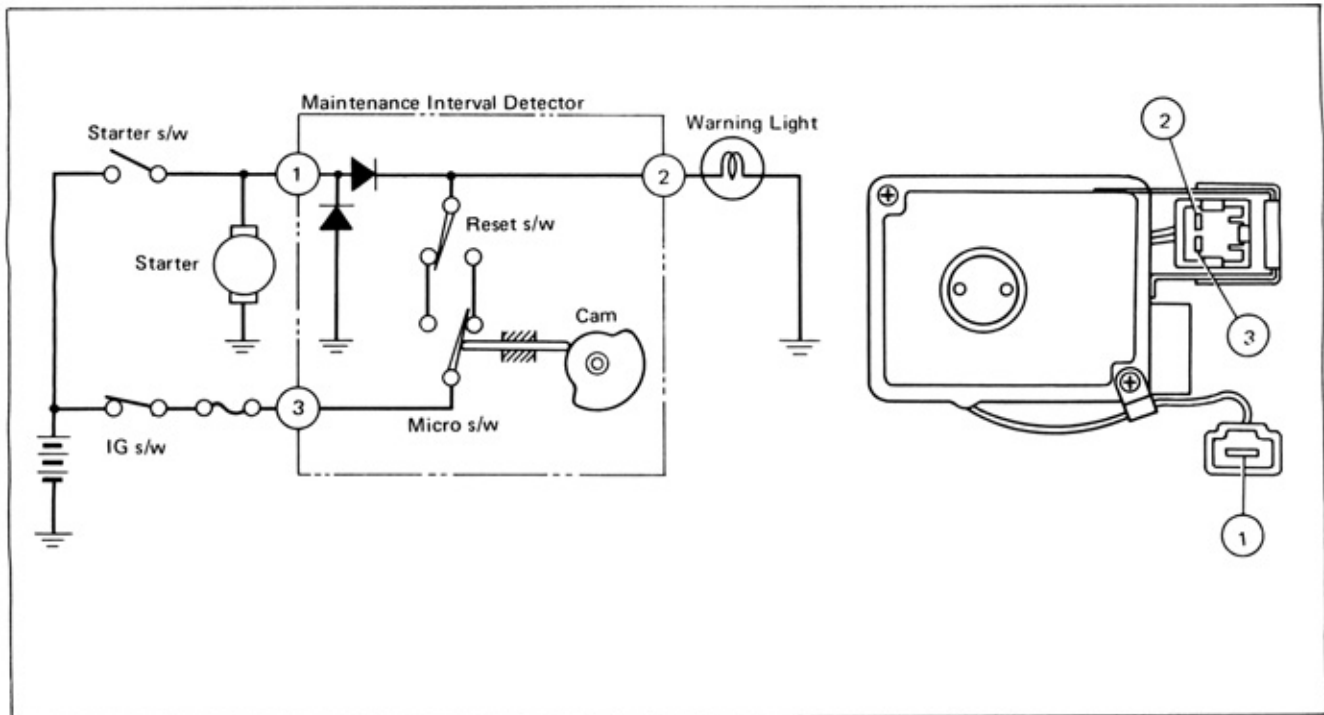


Fig. 7-13 Maintenance Interval Detector Circuit

WARNING CANCEL SWITCH (RA, RN)

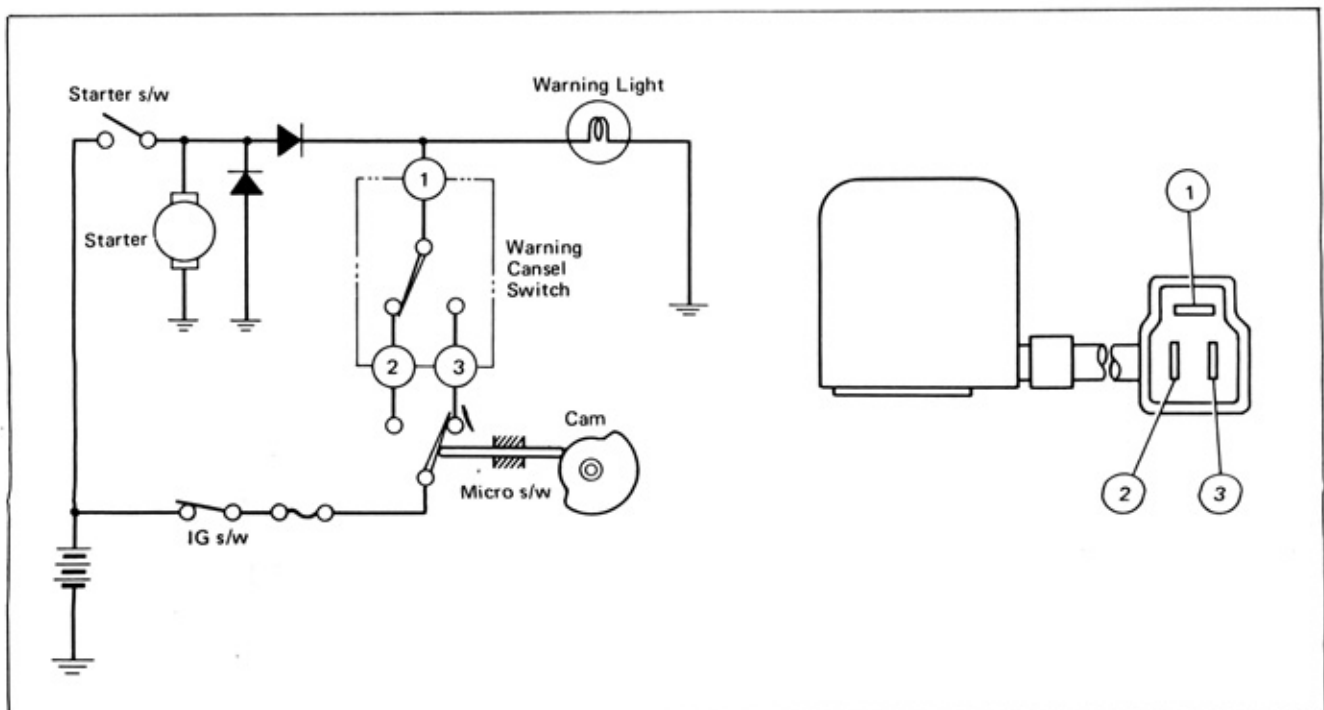


Fig. 7-14 Warning Cancel Switch Circuit