DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

COMPONENT LOCATION

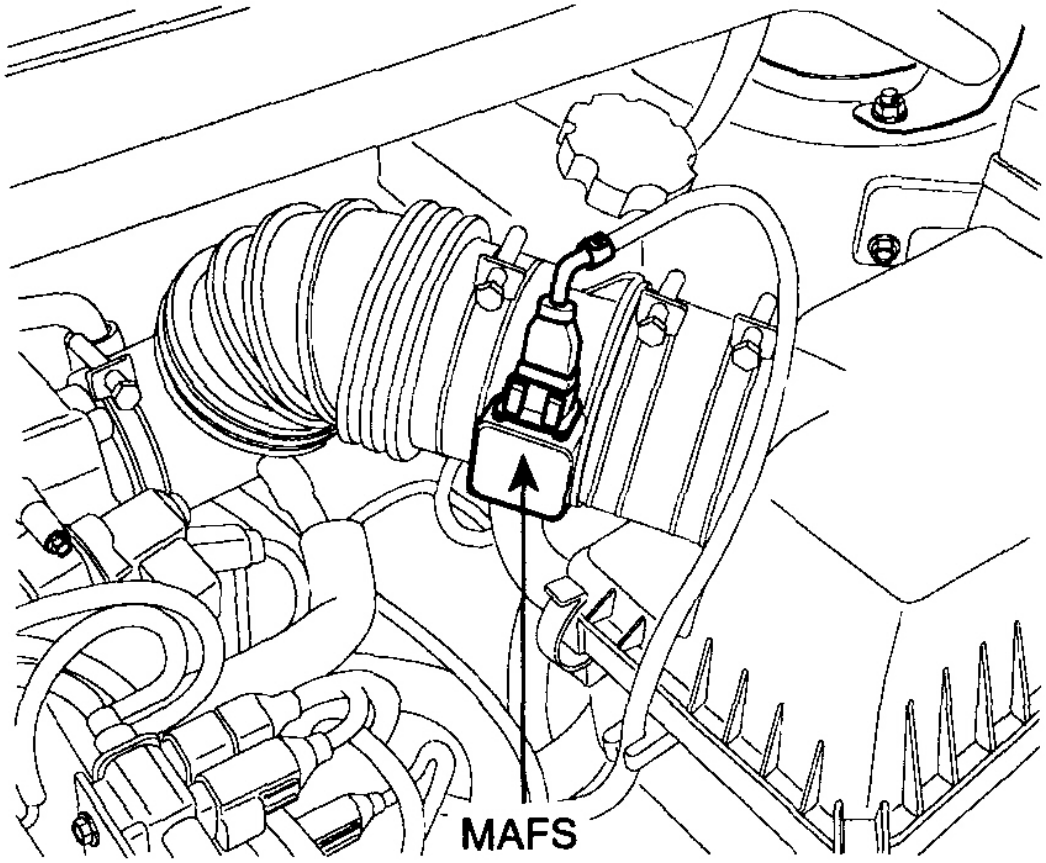


Fig. 37: Locating Mass Or Volume Air Flow Sensor
Courtesy of KIA MOTORS AMERICA, INC.

GENERAL DESCRIPTION

The Mass Air Flow Sensor (MAFS) is located between the air cleaner assembly and the throttle body. The MAFS uses a hot film type sensing element to measure the mass of intake air entering the engine. This hot film type air flow sensor consists of a hot film sensor, housing and metering ducts. Mass air flow rate is measured by detection of heat transfer from a hot film probe. The change in air flow rate causes change in the amount of heat being transferred from the hot film probe surface to the air. A large amount of intake air represents acceleration or high load conditions while a small amount of intake air represents deceleration or idle. The mass of intake air should increase at acceleration and be stable during constant engine speed. The ECM uses this information to determine the injection duration and ignition timing for the desired air/fuel ratio.

DTC DESCRIPTION

The ECM compares the actual measured Mass Air Flow signal to the modeled Mass Air Flow value and sets the DTC P0101 when the difference between these two value is too high or too low with lambda deviation in opposite direction. The modeled Mass Air Flow value is determined by engine speed, throttle angle and ICA valve duty.

DTC DETECTING CONDITION

DTC DETECTING CONDITION AND POSSIBLE CAUSE CHART

ITEM	DETECTING CONDITION	POSSIBLE CAUSE
DTC Strategy	• Compare calculated MAF with MAF signal	• Dirty air cleaner. • Oil Cap or Dipstick missing or not installed correctly. • Air leak in intake system • Contact resistance in connectors. • Faulty MAFS or TPS
Enable Conditions	• 1500 < Engine speed(RPM) < 3500 • 150 < Measured Mass Air Flow (mg/stk) < 350 • Coolant temperature > 60°C(140°F)	
Threshold Value	• Measured MAF/Calculated MAF < 0.5 or > 1.3	
Diagnostic Time	• 110 sec.	
MIL On Condition	• 2 Driving Cycles	

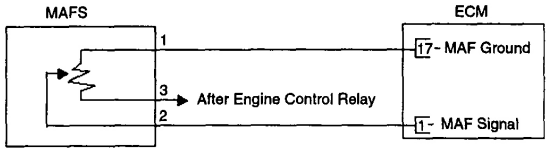
SPECIFICATION

RESISTANCE REFERENCE

Test Condition	MAF DATA		TPS DATA	
	Output Voltage (V)	Mass Air Flow (kg/h)	Output Voltage (V)	Resistance (kohms)
Idle	0.6~1.0	11~20	0.25~0.80	0.71~1.38
Idle & A/C "ON"	1.0~1.3	20~30	-	-
W.O.T	-	-	4.25~4.7	0.2~3.4

SCHEMATIC DIAGRAM

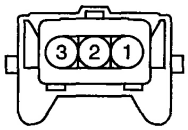
[CIRCUIT DIAGRAM]



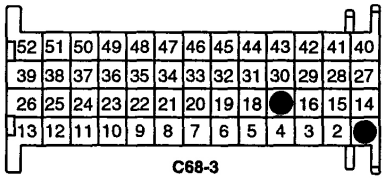
[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	ECM Terminal C68-3(17)	Ground
2	ECM Terminal C68-3(1)	Signal
3	Engine Control Relay	Battery Voltage

[HARNESS CONNECTORS]



C53
MAFS Harness side connector



C68-3
ECM side terminal

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Fig. 38: Identifying Schematic Diagram
Courtesy of KIA MOTORS AMERICA, INC.

SIGNAL WAVEFORM

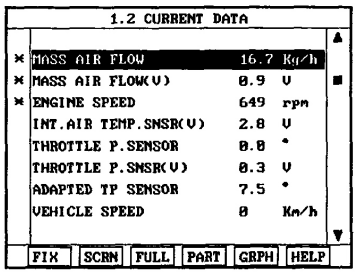

Fig. 1

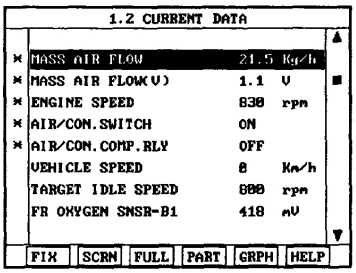

Fig. 2

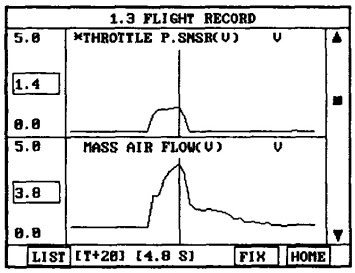

Fig. 3

Fig 1) Normal value with idle after warm up : Approx. 0.7~1.0V
Fig 2) Normal value with idle after warm up and A/C "ON" : Signal increases proportionally with engine load
Fig 3) Normal value with accelerating and decelerating : The MAFS and TPS signals increase at the same time with accelerating and decrease with releasing accelerator pedal

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Fig. 39: Identifying Signal Waveform
Courtesy of KIA MOTORS AMERICA, INC.

MONITOR DTC STATUS

NOTE: If any codes relating to TPS or MAFS are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect scan tool and select "Diagnostic Trouble Codes (DTCs)" mode.
2. Press F5 (INFO) to select DTC information from the DTCs menu.
3. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.

4. Read "DTC Status" parameter.

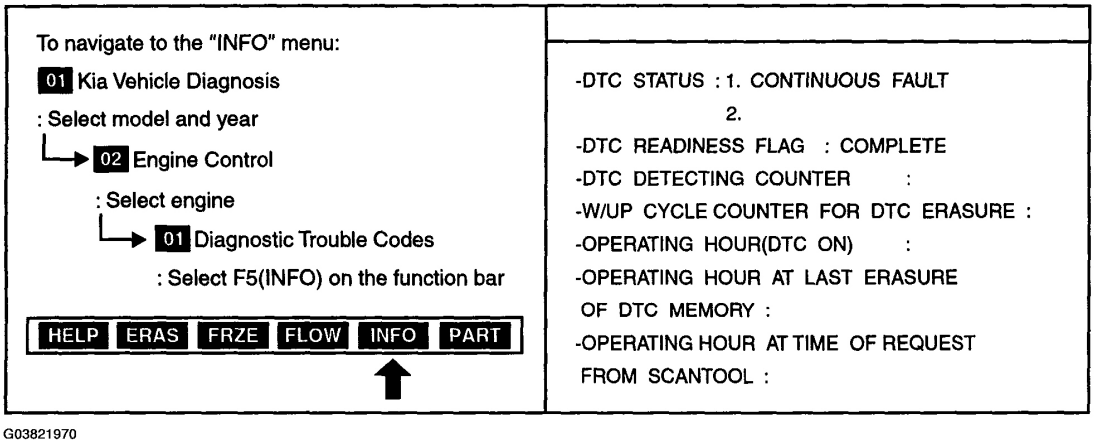

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Fig. 40: Identifying Monitor DTC Status
Courtesy of KIA MOTORS AMERICA, INC.

5. Is parameter displayed "History (Not Present) fault"?

NOTE:
- **History (Not Present) fault: DTC occurred but has been cleared.**
- **Present fault: DTC is occurring at present time.**

YES

- Fault is intermittent caused by poor contact in the sensor's and/or ECM's connector or was repaired and ECM memory was not cleared. Thoroughly check connectors for loose or poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "**VERIFICATION OF VEHICLE REPAIR**" procedure.

NO

- Go to next step as below.

AIR CLEANER INSPECTION

1. Check air cleaner condition. Is air cleaner clogged with dirt?

YES

- Replace air cleaner and go to "**VERIFICATION OF VEHICLE REPAIR**" procedure.

NO

- Go to "**AIR LEAKAGE INSPECTION**" procedure.

AIR LEAKAGE INSPECTION

1. Check intake tube, breather hose and MAFS for source of any air leaks. Are there any cracks in intake tube, MAFS or breather hose.
2. Verify oil cap and dipstick are properly installed and oil cap screwed on completely.
3. Has a problem been found?

YES

- Repair or Replace as necessary and go to "**VERIFICATION OF VEHICLE REPAIR**" procedure.

NO

- Go to "**TPS INSPECTION**" procedure.

TPS INSPECTION

1. Ignition "ON" & Engine "OFF".
2. Connect Scantool and monitor the "THROTTLE P. SENSOR (V)" parameter on the Scantool data list.

   Specification: Approx. 0.5V (Closed throttle Valve) / Approx 4.25~4.7V (Wide Open Throttle)

3. Is "THROTTLE P. SENSOR (V)" within specification?

YES

- Go to "**TERMINAL AND CONNECTOR INSPECTION**" procedure.

NO

- Inspect TP sensor and W/harness and repair or replace as necessary. Go to "**VERIFICATION OF VEHICLE REPAIR**" procedure.

TERMINAL AND CONNECTOR INSPECTION

1. Many malfunctions in the electrical system are caused by poor harness (es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

- Repair as necessary and go to "**VERIFICATION OF VEHICLE REPAIR**" procedure.

NO

- Go to "**COMPONENT INSPECTION**" procedure.

COMPONENT INSPECTION

1. Engine "ON".
2. Connect Scantool and monitor the "MASS AIR FLOW (V)" parameter on the Scantool data list.
3. Monitor the "MASS AIR FLOW (V)" parameter on the Scantool.

   Specification:

   Approx. 0.6 ~ 1.0V at idle & No load

   Approx. 1.0 ~ 1.3V at idle & A/C "ON"

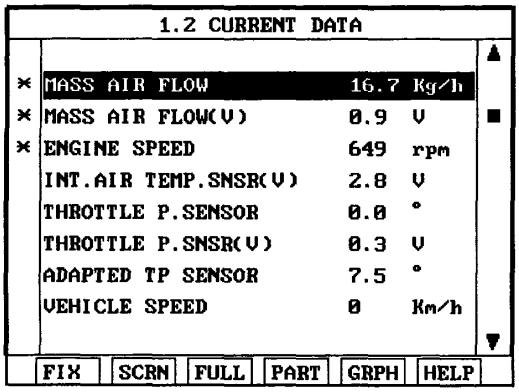

Fig. 1

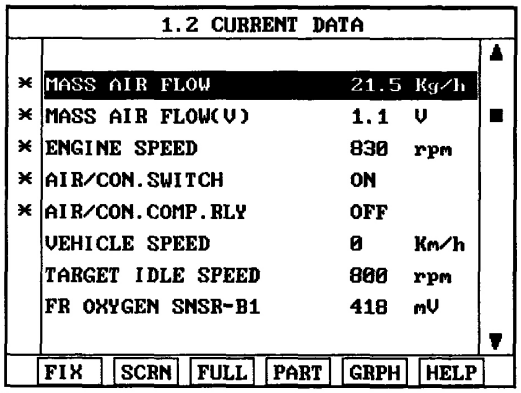

Fig. 2

Fig 1) Test Condition : idle after warm up
Specification : The MAFS is between 0.6~1.0V(11~20kg/h)
Fig 2) Test Condition : idle after warm up & A/C "ON"
Specification : The MAFS increase proportinally with engine load

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Fig. 41: Identifying Current Data Specification
Courtesy of KIA MOTORS AMERICA, INC.

4. Is MAF sensor voltage within the specification?

   YES

   - Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "**VERIFICATION OF VEHICLE REPAIR**" procedure

   NO

- Check MAFS for contamination, deterioration, or damage. Substitute with a known-good MAFS and check for proper operation. If the problem is corrected, replace MAFS and then go to "**VERIFICATION OF VEHICLE REPAIR**" procedure

VERIFICATION OF VEHICLE REPAIR

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes (DTCs)" mode.
2. Press F4DTAL) and confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History (Not Present) fault"?

YES

- System performing to specification at this time. Clear the DTC.

NO

- Go to the applicable TROUBLESHOOTING PROCEDURE.

