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Subject: CODE 33 MASS AIR FLOW (MAF) SENSOR VOLTAGE
HIGH DIAGNOSTICS

Model and Year: 1986-87 CAMARO, CORVETTE WITH 5.0L OR 5.7L
(VIN CODE F, 8) ENGINE

TO: ALL CHEVROLET DEALERS

Some vehicles may experience a check engine light with a Code 33 stored which cannot be easily diagnosed. To promote better diagnosis of this condition, a brief explanation of the criteria for setting a Code 33 and an explanation of the possible causes follows.

Before beginning diagnosis, all 1986 models should be updated to the appropriate service PROM listed in Dealer

Service Bulletins: 86-162 (Sec. 6E) and 86-194 (Sec. 6E).

Mass Air Flow (MAF) power and burnoff relay part numbers should be checked to assure that they agree with those listed in Dealer Service Bulletin 87-270-6E.

Code 33 is set when the voltage at Pin B12 of the ECM exceeds 2.2 volts for 1 second or more either at startup or when the Throttle Position Sensor (TPS) is less than 20% and the RPM is less than 2000 RPM.

The ECM provides a 5 volt signal at pin B12 through a pull up resistor. This voltage must be brought below 2.2 volts by the MAF sensor circuitry during the conditions mentioned in the above paragraph or a Code 33 will set.

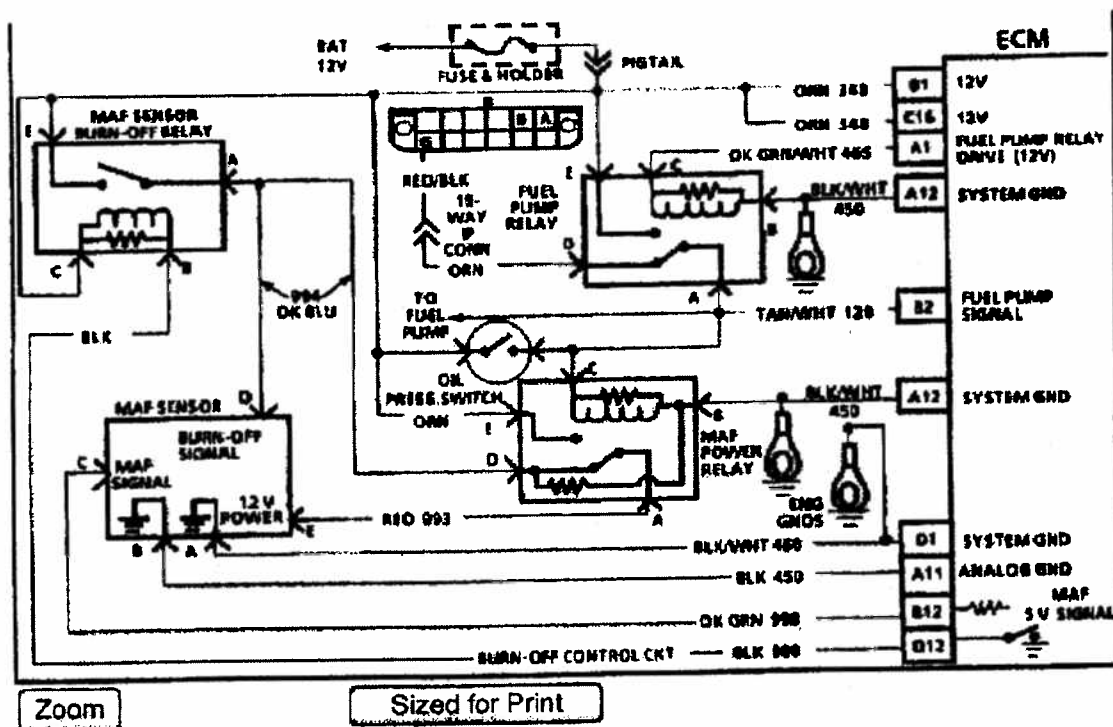
A condition whereby the MAF sensor circuit cannot accomplish this can be caused in the following manners:

- An open or intermittent in Circuit 998 (dark green wire from ECM pin B12 to MAF sensor pin C)

Wiring
Schematic
on P.3

- A condition causing voltage at MAF sensor pin D during crank or run such as:
- A short to ground in Circuit 900 (black wire from ECM pin D12 to MAF burnoff relay pin F).
- A faulty or incorrect burnoff relay
- A short to voltage in Circuit 994 (dark blue wire from pin A of the burnoff relay to pin D of the MAF sensor)
- A condition causing reduced voltage supply to pin E at the MAF sensor such as:
- An open, intermittent, or short to ground in Circuit 993 (red wire between pin E on the power relay and pin E on the MAF sensor)
- A faulty or incorrect power relay
- A faulty fuel pump relay
- Poor or intermittent ground on Circuit 450 (blk/white ground)
- Circuits 340 or 120 intermittent, grounded, open or spliced into with anything which draws enough current to lower the voltage by 2 volts or more for a 1 second period. This includes but is not limited to CB radios and alarm systems. (Circuit 340 orange extends from ECM pin B1 to MAF power relay pin A and fuel pump relay pin E; Circuit 120 tan/white extends from fuel pump relay pin A to MAF power relay pin D).
- An intermittent or low TPS switch causing the ECM to run a Code 33 check at a higher throttle angle (and therefore higher airflow rate) than specified.
- A faulty or poorly connected MAF sensor.

As evidenced by the above list of possible causes of Code 33, this circuitry is very sensitive to minor wiring discrepancies and poor or loose connections. All connections should be checked carefully. One method is to wiggle the connections while meeting the conditions for running a Code 33 test as listed earlier in this bulletin. In addition, they should be inspected for corrosion and/or bent pins. This bulletin is intended to provide supplemental code 33 diagnostic information and is not intended to replace the Code 33 diagnostic chart in the Service Manual.



CODE 33 - MASS AIR FLOW (MAF) SENSOR CIRCUIT (GM/SEC HIGH)

Circuit Description:

The Mass Air Flow (MAF) sensor measures the amount of air which passes through it. The Electronic Control Module (ECM) uses this information to determine the operating condition of the engine, to control fuel delivery. The oil pressure switch or the ECM, through control of the fuel pump relay, will provide 12 volts for the MAF power relay which provides the 12 volts needed by the MAF sensor. The ECM provides a current limiting 5 volts on the signal line (CKT 998). The MAF sensor then changes the signal by dropping the voltage so that with low air flow the ECM sees a low voltage and a high air flow will cause the ECM to see near the 5 volts supply

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

Code 33 indicates ECM has seen flow in excess of 45 grams per second (above about 2.2 volts) for one second when:

Engine is first started

OR

Throttle Position Sensor (TPS) is less than 1/4 throttle.

RPM is less than 2000. Due to the 5 volts pull-up resistor in the ECM if CKT 998 becomes open, the ECM will see a high voltage signal and set a Code 33.

1. This test will determine if the conditions to set the code still exist.
2. With the Assembly Line Diagnostic Link (ALDL) terminal "G" jumpered to 12 volts, there should be 12 volts at the sensor. If no voltage is present, make sure that the fuel pump is running. If not, repair fuel pump circuit.

Flow Check
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3. If a burn off signal is present at the MAF sensor with the engine running, a Code 33 will set. Be sure no voltage is present on CKT 994 for the first 2 seconds after the ignition is turned "ON" or after the 2 second period.
4. The ECM sources a voltage (4-6 volts) to the MAF sensor on CKT 998. This test checks for that voltage.

Diagnostic Aids:

By jumpering the fuel pump test terminal ("G" terminal of ALDL) to 12 volts, the MAF sensor will stay powered up and the signal line should see a low voltage, less than 250 mV or low grams per second on a "Scan" tool. By wiggling the related wiring the intermittent may be detected. Also, an erratic signal with the engine running may indicate faulty wiring or components.

If you get here with no luck, Ask away on the Forums.

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VIN F (6.0L)
VIN B (6.7L)

CODE 33 MASS AIR FLOW (MAF) SENSOR CIRCUIT (GM/SEC HIGH) (PORT)

- 1
- CLEAR CODES.
 - START AND IDLE ENGINE FOR 1 MINUTE.
 - DOES "SCAN" INDICATE CODE 33 SET.

YES

NO

- 2
- IGNITION "OFF".
 - JUMPER A/DL TERMINAL "G" TO 12 VOLTS USING A FUSED JUMPER.
 - DISCONNECT MAF SENSOR.
 - PROBE HARNESS TERMINAL "E" (CKT 993) WITH A TEST LIGHT GROUND.

CODE 33 IS INTERMITTENT. IF NO ADDITIONAL CODES WERE STORED, SEE "DIAGNOSTIC AIDS" BELOW.

TEST LIGHT "ON"

TEST LIGHT "OFF"

REMOVE JUMPER FROM A/DL CONNECTOR
PROBE MAF SENSOR HARNESS TERMINALS
"A" AND "B" (CKT 450) WITH A TEST LIGHT
CONNECTED TO 12 VOLTS.

- DISCONNECT MAF POWER RELAY.
- PROBE CKTS 340 & 120 WITH A TEST LIGHT TO GROUND.

LIGHT "ON" BOTH

LIGHT "OFF"
ONE OR BOTH

LIGHT "ON" BOTH

LIGHT "OFF" ON
ONE OR BOTH

- 3
- IGNITION "ON".
 - PROBE HARNESS TERMINAL "D" (CKT 994) WITH A VOLTMETER.
 - SHOULD READ 0 VOLTS.

REPAIR OPEN IN
GROUND CIRCUIT THAT
DID NOT LIGHT.

PROBE CKT 450
WITH A TEST LIGHT
TO 12 VOLTS.

REPAIR OPEN IN
CIRCUIT THAT
DID NOT LIGHT.

"OK"

LIGHT "ON"

LIGHT "OFF"

- 4
- IGNITION "ON", ENGINE STOPPED.
 - CONNECT A VOLTMETER BETWEEN HARNESS TERMINAL "C" (CKT 998), AND CHASSIS GROUND. SHOULD READ BETWEEN 4-6 VOLTS.

- CKT 993 OPEN OR
FAULTY MAF
POWER RELAY.

REPAIR OPEN
GROUND CIRCUIT

NOT "OK"

- DISCONNECT MAF SENSOR BURN-OFF RELAY.
- REPEAT TEST.

NOT OK

OK

OK
(NO VOLTAGE)

NOT OK
(VOLTAGE PRESENT)

CHECK ALL RELATED CONNECTOR
TERMINALS FOR MAKING GOOD CONTACT.
IF OK, IT IS A FAULTY MAF SENSOR.

PROBE RELAY HARNESS
CKT 900 WITH A TEST
LIGHT TO 12 VOLTS.

REPAIR SHORT TO VOLTAGE
IN CKT 994 FROM RELAY TO
MAF SENSOR OR FAULTY
MAF POWER RELAY.

OVER 6 VOLTS

LESS THAN 4 VOLTS

- IGNITION "OFF"
- DISCONNECT ECM A-B CONNECTOR.
- IGNITION "ON", REPEAT TEST.

- CHECK FOR OPEN CKT 998.
- IF CIRCUIT IS NOT OPEN, IT IS A FAULTY ECM CONNECTION OR ECM.

LIGHT "OFF"

LIGHT "ON"

FAULTY MAF SENSOR
BURN-OFF RELAY.

CKT 900 SHORTED TO
GROUND OR FAULTY ECM.

OVER 6 VOLTS

LESS THAN 6 VOLTS

REPAIR SHORT TO
VOLTAGE IN CKT 998.

CHECK RELATED CONNECTOR
TERMINALS AND ECM GROUND
CIRCUITS, IF OK, REPLACE ECM.