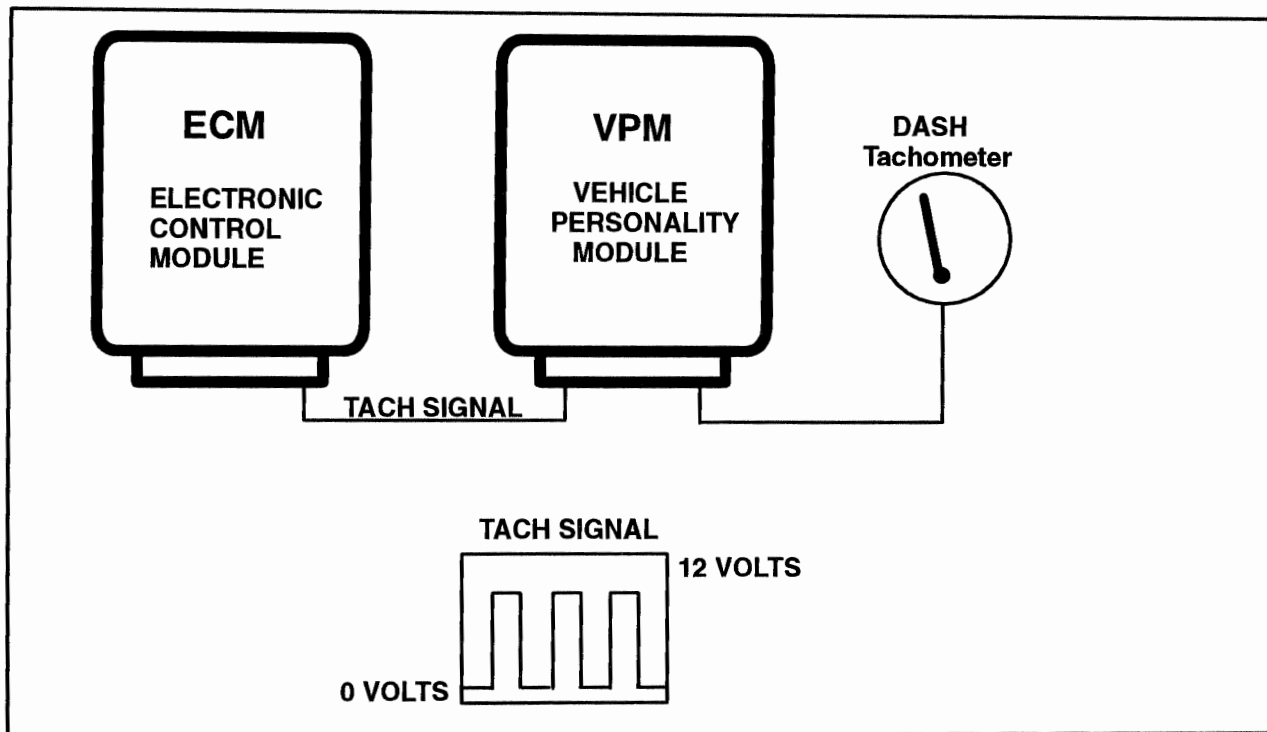


## ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

### TACHOMETER INPUT CIRCUITS (TACH)

#### TACHOMETER INPUT CIRCUITS



#### CIRCUIT FUNCTIONS

The ECM (Electronic Control Module) provides the VPM (Vehicle Personality Module) with a 0 – 12 volt digital signal that indicates engine speed. The VPM buffers this signal and supplies the instrument panel with a signal to operate the tachometer. The frequency sent by the ECM is 1/5th of the actual engine RPM.

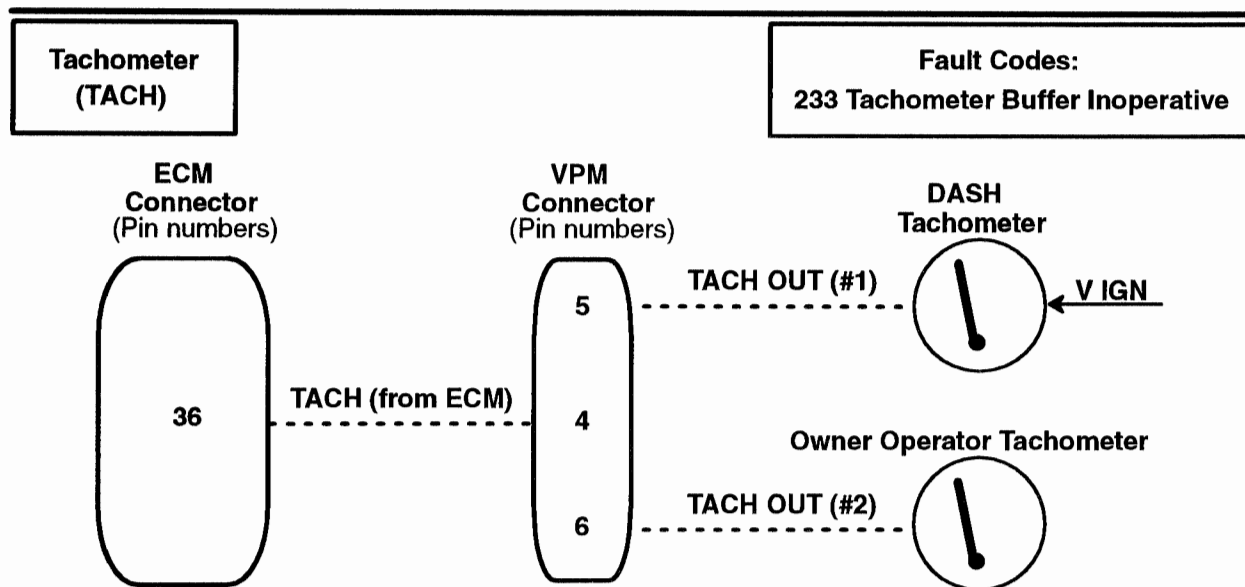
#### FAULT DETECTION MANAGEMENT

The VPM can detect if the TACH signal is not being received from the ECM and will set a fault code to indicate loss of communication. No fault detection is available for communication between the VPM and the instrument panel.

# ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

## TACHOMETER INPUT CIRCUITS (TACH)

Section 3.5  
Page 211



### Key ON Engine Off – Voltage Checks at ECM (Check with breakout box installed and the Ignition Key ON, Engine OFF)

Test Points	Spec.	Signal	Comments
#36 to #46	12 ± 1.5 v	TACH	The signal is pulled up by the VPM with the key ON and engine OFF.

### Connector Checks to Ground at ECM (Check with with breakout box installed, ignition key should be in the OFF position)

Test Points	Spec.	Signal	Comments
#36 to #46	> 1000 ohms	TACH	Less than 1000 ohms indicates a short to grd either thru the harness or internal in the ECM. Disconnect the ECM from the breakout box and measure to grd again, if short is still present repair harness.

### Harness Resistance Checks From ECM to VPM (Check with breakout box installed, ignition key should be in the OFF position)

Test Points	Spec.	Signal	Comments
#36 to 4	< 5 ohms	TACH	Resistance from 60 pin connector to harness connector – TACH Signal
#36 to 5	< 5 ohms	TACH	Resistance from VPM connector to TACH input at instrument panel – Dash Tach
#36 to 6	< 5 ohms	TACH	Resistance from VPM connector to TACH input – Optional Owner/Operator Tach

### Key ON Engine Running – Signal Checks – TACH (Check with breakout box installed)

Test Points	Specification	Comments
#36 to #46	5 to 7 volts/140 to 540 Hz	TACH signal from the ECM is a frequency that is engine RPM ÷ 5

### Fault Code Descriptions

223 = ECM TACH signal not communicating with VPM

## ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

### TACHOMETER INPUT CIRCUITS (TACH)

#### DESCRIPTION

Refer to the circuit diagram on page 213 for this discussion.

#### TACHOMETER INPUT SIGNAL

The ECM receives signals from the CMP sensor and calculates engine speed (rpm). The ECM sends the calculated engine speed as a digital TACH signal from ECM connector 36 (circuit 97D) to the VPM at connector (381) terminal 4.

The VPM buffers the TACH signal received from ECM and sends a pulse width modulated (PMW) signal to the Speedometer/ Tachometer unit at center I/P connector (27).

#### ENGINE SPEED SIGNAL TO PROLINK EST

Engine rpm can be monitored using the Prolink Electronic Service Tool (EST) connected to the EST connector (384). It is important to note that the signal comes through different circuits.

The engine speed signal read by the Prolink EST comes from the ECM, but is sent from ECM terminals 9 and 28, through the Data Communication Link, DCL (+) and DCL (-) circuits, to the VPM, then through the ATA Data Link, ATA (+) and ATA (-) circuits, to the EST connector (384).

#### ECM DIAGNOSTICS

If the CMP signal is not received and processed by the ECM, the engine will not start. If the engine is running, but the tachometer does not operate (or operates improperly), there are two tests to further isolate the problem.

#### TESTING SPEEDOMETER/TACHOMETER CLUSTER

With the key ON and engine OFF, the Speedometer/ Tachometer unit, located in the instrument panel, will perform a self-test, checking the tachometer gauge and the speedometer/tachometer control unit. Refer to Service Manual, Group 08, Instru-

ments for the appropriate section for information on performing this test.

#### KOER TACH BUFFER TEST

The KOER Tach Buffer Test must be run when engine speed is greater than 1250 rpm. This test checks the circuit (97D) between the ECM and VPM for open or short (high or low) circuit condition. It also checks the internal VPM buffer circuit for open or short (high or low) conditions. If a defect is found, Flash Code 233 is set.

#### FLASH CODE 233

##### PID 190 FMI 2

#### VPM: *TACHOMETER BUFFER INOPERATIVE*

This code is set during the KOER Tach Buffer Test if:

- A. Engine speed is less than 1250 rpm.
- B. Circuit 97D is open or shorted (high or low) between the ECM and VPM causing the VPM to receive either no signal or an invalid signal.
- C. The VPM internal buffering circuit is defective.

#### CORRECTIVE ACTION

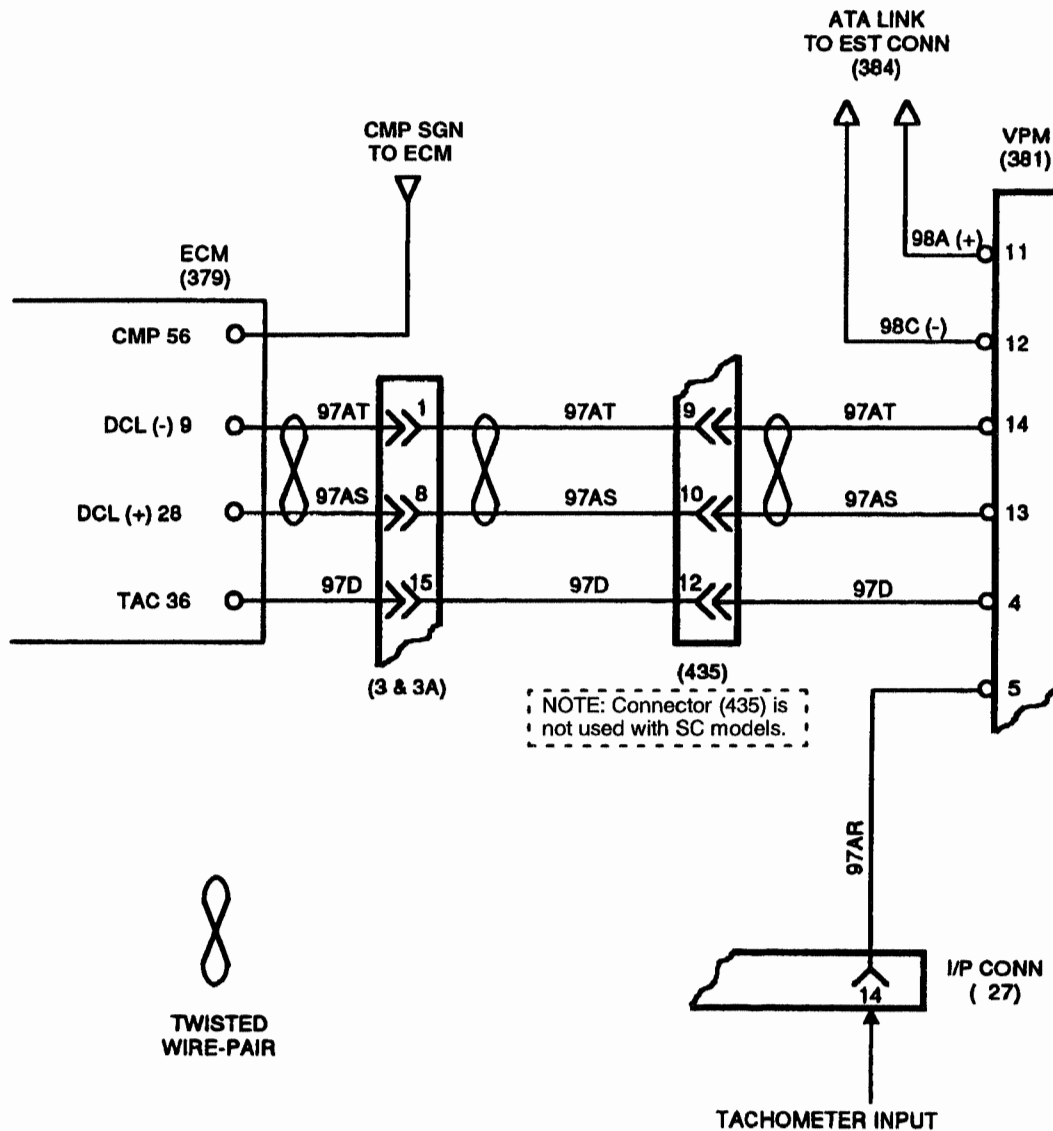
If the tachometer doesn't work and:

- A. The Speedometer/Tachometer Self-Test does not indicate a defect, perform Testing Circuit 97AR on page 214. If the self-test revealed a defect, follow service manual recommended corrective action.
- B. The Tach Buffer KOER test **does not** set a fault code, then check circuit 97AR between VPM connector (381) and I/P connector (27) for open or short (high or low) circuit by performing Testing Circuit 97AR on page 214.
- C. If the Tach Buffer KOER test **does set** Flash code 233, perform Testing ECM/VPM Tachometer Circuit on page 215.

## TACHOMETER INPUT CIRCUITS (TACH)

## CIRCUIT DIAGRAM

## TACHOMETER INPUT CIRCUIT

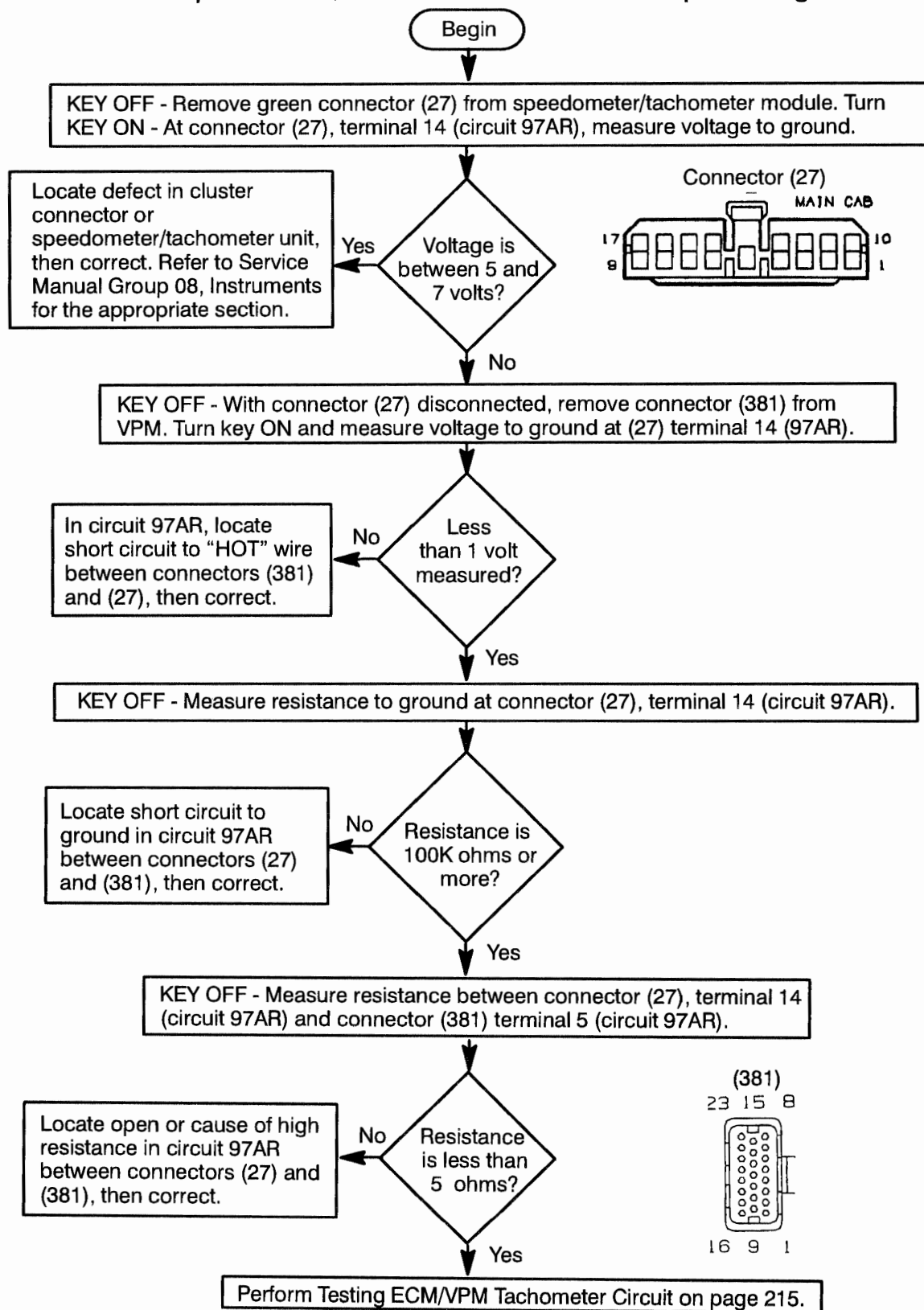


# ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

## TACHOMETER INPUT CIRCUITS (TACH)

### TESTING TACHOMETER CIRCUIT 97AR

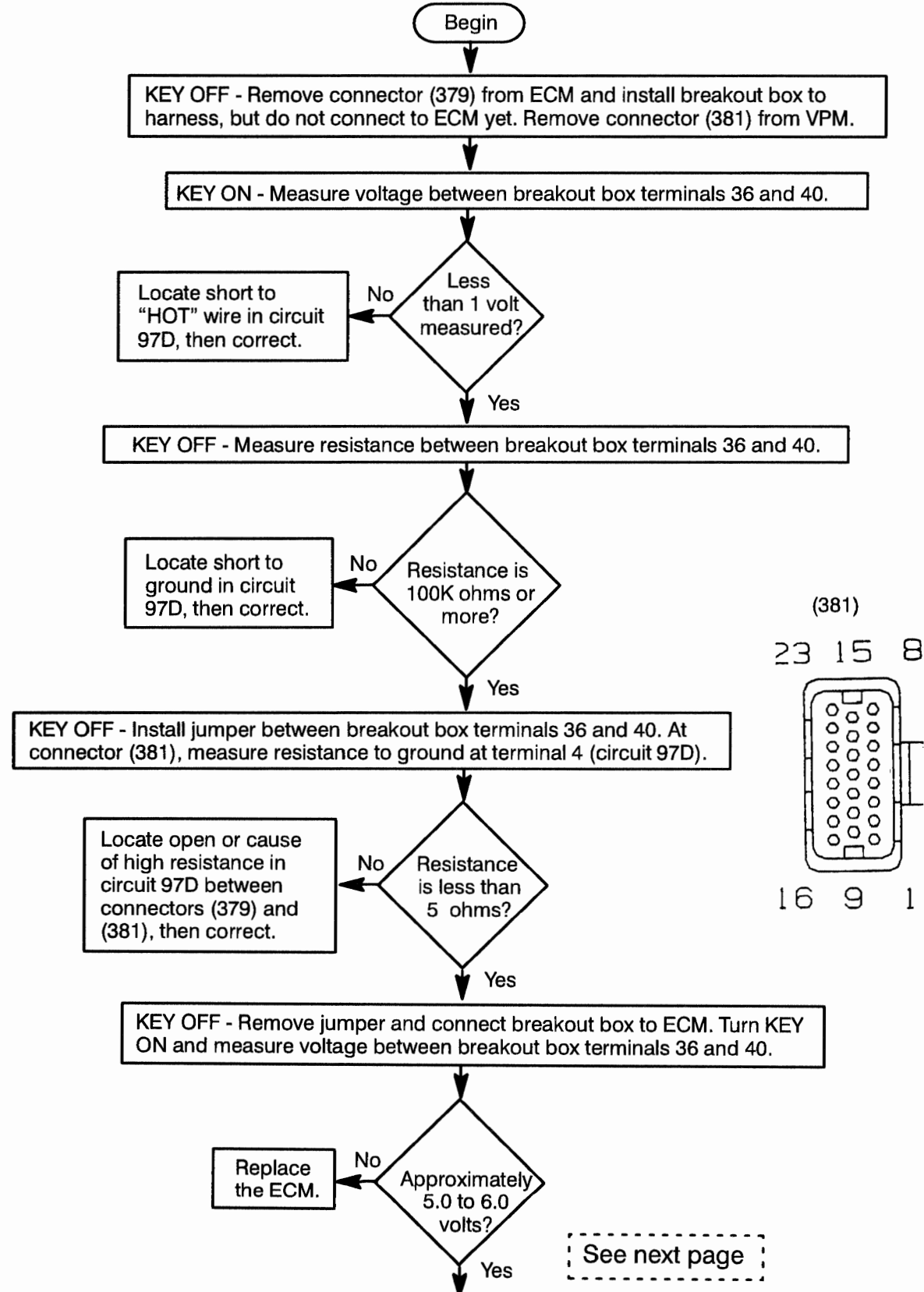
Perform Speedometer/Tachometer Self-Test before performing this test.



## TACHOMETER INPUT CIRCUITS (TACH)

## TESTING ECM/VPM TACHOMETER CIRCUIT

Perform this test when Flash Code 233 is ACTIVE.



## ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

### TACHOMETER INPUT CIRCUITS (TACH)

#### TESTING ECM/VPM TACHOMETER CIRCUIT (Continued)

