SPEEDOMETER DIAGNOSIS

Does the speedometer do an initial sweep from 0 to 60 and back when powered up?

Is power available at the speedometer?

Is the pulse count correct (see note 1)?

Inspect red power wire from speedometer to EHC.

Is there a short or open in red wire?

Yes

No

Repair wires as needed

06006

Inspect black wire for an open.

Is there a good ground?

Yes

No

Repair wires as needed

06006

Inspect green signal wire.

Is there a short or an open in green wire?

Yes

No

Repair wires as needed

06006

Perform test on speed sensor, checking power at sensor.

Yes

No

Replace speed sensor

06029

Check connector at the EHC.

Is there power at the connector?

Yes

No

Replace EHC

06012

Does the speedometer bounce?

Yes

No

Replace speedometer

06051

Call Tech Support

Notes:

1) Pulse count should be 49440.

2) The speedometer and speed sensor do not share a power and ground circuit.
Are tires in good condition and at the proper pressures?

- Yes
  - Set tire pressures to specifications. Replace tires as needed.
  - Maintenance.

- No
  - Are handlebar mounting bolts properly tightened?
    - No
      - Tighten to specifications.
        - 0911
    - Yes
      - Are the forward control mounts tighten to specifications?
        - No
          - Is drive belt tight?
            - Yes
              - Adjust drive belt.
            - No
              - Are all engine mount bolts tightened properly?
                - Yes
                  - Tighten mount bolts to specifications.
                    - 09033
                - No
                  - Adjust primary chain, per BDM Service Manual.

- No
  - Check primary chain for alignment.
    - Is primary chain aligned?
      - Yes
        - Check clutch basket and main shaft run out.
      - No
        - Check washer behind clutch basket for damage. Replace if needed. Align chain per BDM Service Manual.
        - 03005
  - Call Tech Support.
With the ignition key in the OFF position, connect the backbone breakout box to the EHC. Measure continuity between pins B6 and B28 while operating start button. There should be a closed circuit when pressed, and open when released.

With the solenoid wire disconnected from the starter, use power harness breakout box to measure voltage from pin A-1 to A-4. There should be 8 volts standing and 12 volts when starter is activated.

Inspect power harness and terminal on starter solenoid for damage. Repair as Needed.

Battery voltage

CHARGING SYSTEM

Charge battery to a minimum of 12.8 volts. Load test the battery and replace if necessary. Check battery cables and all connections. Check for current drain or draw with power OFF. Less than 1.4 mA carbureted, and 2.4 mA EFI.

TEST A

Start engine. Measure voltage across the battery terminals.

Is voltage below 13.8 volts or above 14.8 volts?

Above 14.8

Replace voltage regulator. Retest.

06018

Ref. Test A

No

Stop engine. Test circuit breaker. Measure voltage at both CB terminals.

Is there a voltage difference?

Below 13.8

Is voltage below 13.8 volts or above 14.8 volts?

Yes

Push the reset button on breaker. Replace CB if it cannot be reset.

06052

Ref. Test A

No

Check for voltage regulator ground. Measure resistance from VR case to battery ground, and also to engine ground.

Is resistance more than 0.5 Ohms?

No

With engine OFF, measure resistance across stator pins.

Is resistance more than 0.5 Ohms?

No

Replace stator/rotor. Retest.

06017

Ref. Test A

Yes

With engine OFF, measure resistance from stator pin to engine ground.

Is continuity present?

No

Remove stator plug, start engine and measure AC voltage across pins.

Is stator output 16 to 20 volts per 1000 RPMs?

Yes

Replace voltage regulator. Retest.

06018

Ref. Test A

With engine OFF measure resistance across stator pins.

Is resistance more than 0.5 Ohms?

Yes

Replace stator/rotor. Retest.

06017

Ref. Test A

No

Remove VR. Clean and inspect all contact points. Reinstall and retest.

06018

Ref. Test A

No

With engine OFF, measure resistance from stator pin to engine ground.

Is continuity present?

Yes

Reconnect the two-pin stator plug and retest stator/rotor. If low voltage condition still exists, replace stator/rotor. Retest.

06017

Ref. Test A
This test requires the VR to be removed from the charging system circuit. Disconnect B+ from circuit breaker and unplug stator/rotor. Test may also be performed with VR removed from the motorcycle.

Using DMM, connect black probe to ground and red probe to B+. Measure resistance between B+ and ground. Is resistance less than 2 megohms?

Replace voltage regulator

06018

Connect black probe to B+ and red probe to pin 1. Measure resistance between Pin 1 and B+. Repeat from Pin 2 to B+. Is resistance less than 1 megohm?

Replace voltage regulator

06018

Connect black probe to pin 1 and red probe to pin 2. Measure resistance between pins in both directions. Is resistance less than 1 megohm?

Connect black probe to ground and red probe to pin 1. Measure resistance between pin 1 and ground. Repeat measurement for pin 2 to ground. Is resistance less than 1 megohm?

Reconnect voltage regulator. Retest charging system using CHARGING SYSTEM flow chart.

Note:
1) For diagnosis times above 0.3 call Tech Support.
STARTING SYSTEM (ENGINE WILL NOT CRANK)

1. Charge battery.
   Check battery voltage.
   Does battery register at least 12.8 volts? (Replace battery if necessary)

   - Yes
   - No

   - TEST B
     Attempt to start motorcycle.
     Does solenoid engage or attempt to engage?

     - No
     - Yes

     - Refer to STARTER SOLENOID flow chart.

     - No
     - Yes

     - Yes

     - Test B
     Disconnect green wire from starter solenoid. Measure voltage from solenoid wire to ground when the starter is activated. (It is common to have around 8 volts on the wire before the starter is activated).
     Does the green wire have battery voltage?

     - Yes

     - Test C
     Disable ignition so motorcycle will not start. Measure DC voltage drop across power cable from positive battery terminal to starter terminal while cranking.
     Is the voltage drop greater than 1.0 volts?

     - No
     - Yes

     - Verify there are no mechanical faults in the engine or drive train. Inspect starter motor. Repair/replace as needed.
   - TEST C
     Disable ignition so motorcycle will not start. Measure DC voltage drop from starter housing to negative battery terminal while cranking.
     Is the voltage drop greater than 1.0 volts?

     - No
     - Yes

     - Inspect battery cables and connections. Clean and repair as needed.
     - Ref. Test B
   - Inspect power cable and connections. Clean and repair as needed.
   - Ref. Test B

   - No

   - Inspect charging system. Refer to CHARGING SYSTEM flow chart.
Is there an adequate supply of fresh fuel?

Using a known good spark tester and spark plug wire, check for spark while cranking.

Is spark present?

Remove seat and right electrical cover to gain access to the ignition module. The red LED on the ignition module should flash while cranking.

Is this happening?

The blue and yellow LEDs should flash alternately while cranking the engine.

Is this happening?

Fill with fresh fuel. Does problem still exist?

Check for bad spark plug wires, fouled spark plugs or incorrect gap.

System Ok

Replace ignition module.

Stop. Continue at NO START, ENGINE CRANKS – SECTION A flow chart.

The blue and yellow LEDs should flash alternately while cranking the engine.

Is this happening?

Stop. Continue at NO START, ENGINE CRANKS – SECTION E flow chart.

Note:

1) For diagnosis times above 0.3 call Tech Support.
Section A

NO START, ENGINE CRANKS (2005 – 2008)

With key ON, observe the EHC. When the Run switch is activated the red LED at fault circuit #4 should illuminate (see note 1).

Is this your observation?

Yes

Stop. Continue at NO START, ENGINE CRANKS – SECTION B flow chart.

No

With key ON, observe the ignition module. When Run button is pressed, the red LED on the ignition module should momentarily light up.

Is this your observation?

Yes

EHC fault circuit #4 LED is inoperative. The ignition module is receiving power. At this point the EHC is not at fault.

Stop. Continue at NO START, ENGINE CRANKS – SECTION C flow chart.

No

Replace EHC.

06050

Note:
1) Refer to BDM Service Manual for location of the LEDs for the ignition fault circuit.
NO START, ENGINE CRANKS
(2005 – 2008)

Disconnect 3-place connector 8/9.
Set voltmeter to DC volts.
Place red test lead on red ignition module power wire terminal at connector 8 (see note 1).
Place black lead to ground.
With the key ON and Run switch activated, voltmeter should read battery voltage.
Is this your observation?

Disconnect EHC connector “A” (power harness).
Set voltmeter to read Ohms.
Check for continuity between EHC and connector terminal A19 and red wire terminal in connector 8. Resistance should be less than 1 Ohm.
Is this your observation?

Disconnect EHC connector “A” (power harness).
Set voltmeter to read Ohms.
Check for continuity between EHC and connector terminal A23 and the black wire terminal in connector 8. Resistance should be less than 1 Ohm.
Is this your observation?

Set voltmeter to read Ohms.
Check for continuity between red ignition module power wire at connector 8 and ground.
Is continuity present?

No

Yes

Yes

Yes

Yes

Yes

Yes

Stop.
Continue at NO START, ENGINE CRANKS – SECTION C flow chart.

Repair open in black ignition module ground wire.
06006

Repair short to ground in red ignition module power wire.
06006

Replace EHC
06050

Repair open in red ignition module power wire.
06006

Repair open in red ignition module power wire.
06006

Repair open in red ignition module power wire.
06006

Note:
1) Use appropriate test connector with leads from RK-03 Pigtail Kit located in the Electrical Service Kit #SK-4000-03.
NO START, ENGINE CRANKS (2005 – 2008)

Reconnect connector 8/9. Reconnect EHC connector “A” (power). Disconnect crank position sensor connector at 27/28. Set voltmeter to AC volts. Connect test leads to C.P.S. (see note 1). Voltmeter should read a minimum of 1 volt AC while cranking the engine. Is this your observation?

Yes

Yes

Yes

Yes

Check for continuity on brown wire (see note 1) from ignition module connector 28 to ground. Is continuity present?

Repair short to ground on brown wire between ignition module connector 28 and crank position sensor connector 27.

No

No

No

Replace crank position sensor.

06058

No

Disconnect connector 27/28 at the ignition module. Set voltmeter to Ohms. Check for continuity on brown wire between ignition module 28 and crank position sensor connector 27. Resistance should be less than 1 Ohm. Is continuity present?

Yes

Yes

Note:

1) Use appropriate test connector with leads from RK-03 Pigtail Kit located in the Electrical Service Kit #SK-4000-03.

Stop. Continue at NO START, ENGINE CRANKS - SECTION D flow chart.
NO START, ENGINE CRANKS (2005 – 2008)

Check for continuity on black wire between ignition module connector 28 and crank position sensor connector 27 (see note 1). Resistance should be less than 1 Ohm.

Is continuity present?

Yes

Check for continuity on black wire from ignition module connector 28 (see note 1) to ground.

Is continuity present?

Yes

Repair short to ground in black wire.

No

Repair open in black wire.

Note:
1) Use appropriate test connector with leads from RK-03 Pigtail Kit located in the Electrical Service Kit #SK-4000-03.

No

Replace ignition module.

06006

06041
NO START, ENGINE CRANKS
(2005 – 2008)

Disconnect red power wire at ignition coil.
Set voltmeter to DC volts.
Place red test lead on red ignition coil power wire (see note 1).
Place black lead to ground.
With key ON and Run switch activated, Voltmeter should read battery voltage.
Is this your observation?

Disconnect blue wire at ignition coil.
Disconnect connector 25/26.
Set voltmeter to read Ohms.
Check for continuity on blue wire between connector 26 and wire terminal at ignition coil (see note 1).
Resistance should be less than 1 Ohm.
Is continuity present?

Disconnect connector 25/26.
Set voltmeter to DC volts.
Connect red test lead to red ignition coil power wire at connector 25 (see note 1).
Connect black test lead to ground.
With key ON and Run switch activated, voltmeter should read battery voltage.
Does it?

Set voltmeter to read Ohms.
Connect red test lead to red ignition coil power wire at connector 26 (see note 1).
Connect black test lead to ground.
Meter should read Infinity or "OL".
Is this your observation?

Repair open in blue wire.

Replace ignition module.

Repair open in red ignition coil power wire.

Repair short to ground in red ignition coil power wire.

Note:
1) Use appropriate test connector with leads from RK-03 Pigtail Kit located in the Electrical Service Kit #SK-4000-03.

Stop.
Continue at NO START, ENGINE CRANKS – SECTION F flow chart.
NO START, ENGINE CRANKS (2005 – 2008)

Disconnect yellow wire at ignition coil. Set voltmeter to read Ohms. Check for continuity on yellow wire between connector 26 and wire terminal at ignition coil (see note 1). Resistance should be less than 1 Ohm. Is continuity present?

Set voltmeter to read Ohms. Measure resistance of the primary ignition coil. Place one test lead to red coil terminal. Place the other lead to the yellow coil terminal (front cylinder). Resistance should be 2-4 Ohms. Is this your observation?

Disconnect blue wire at ignition coil. Set voltmeter to read Ohms. Measure resistance of the primary ignition coil. Place one test lead to red coil terminal. Place the other test lead to the blue coil terminal (rear cylinder). Resistance should be 2-4 Ohms. Is this your observation?

Set voltmeter to read Ohms. Measure resistance of the secondary ignition coil. Place a test lead in each spark plug wire terminal in the ignition coil. Resistance should be 12-21K Ohms (19,000-21,000 Ohms). Is this your observation?

Repair open in yellow wire.

06006

Replace ignition coil.

06024

Replace ignition coil.

06024

Replace ignition module.

06041

Replace ignition coil.

06024

Note:
1) Use appropriate test connector with leads from RK-03 Pigtail Kit located in the Electrical Service Kit #SK-4000-03.
NO START, ENGINE CRANKS (2005 – 2008)

Remove fuel line from fuel valve. Attach a drain hose to fuel valve. Using a suitable container, check fuel valve for flow.
Is adequate fuel flow present?

Check condition of spark plugs.
Are spark plugs OK?

Replace spark plugs.

Clean fuel valve screen

Check for restricted fuel valve screen.
Is screen restricted by debris?

Replace fuel valve

Check for restricted carburetor or incorrect float level.
Does problem still exist?

System OK.

Problem is mechanical. Perform compression test.

Check for restricted fuel line.
Is fuel line OK?

Replace fuel line.

Check for defective fuel valve
Does fuel valve function properly?

Replace fuel valve

Check for a restricted fuel valve screen.
Is screen restricted by debris?

Replace spark plugs.

Check for defective fuel valve
Does fuel valve function properly?

Check for restricted fuel line.
Is fuel line OK?

Check for restricted carburetor or incorrect float level.
Does problem still exist?

System OK.

Problem is mechanical. Perform compression test.
OIL LIGHT ON - NO OIL PRESSURE

Check oil level in tank. Verify oil pressure at tappet screen fitting with known accurate gauge. Is pressure within specifications?

No

Check oil feed lines and connections. Are the lines tight?

No

Tighten oil lines and/or fittings.

Yes

Remove cam cover and inspect oil pump drive gear and keyway. Is the keyway sheared?

Yes

Remove cover from oil pump and inspect gears and housing for debris. Is there debris present?

No

Replace key and pump gears as necessary.

01031

Yes

Repair open in wiring.

06006

Remove wire at oil sender, with key ON touch wire to ground. Does the light illuminate?

No

Yes

Replace oil pressure sending unit.

01044

Check continuity at the sending unit and the tach board. Is there continuity?

No

Yes

Replace tach board.

06056

Remove oil pump and inspect for any debris that may have locked up pump. Is debris present?

No

Yes

Remove oil tank lines and pump. Clean as needed Inspect engine for debris. Repair as needed.

09026

Remove and replace oil pump assembly.

01031

Remove and replace oil pump. Clean and flush lines.

01031

Notes:
1) Always recheck oil pressure after any/all repairs.
2) Include an ignition module download with all engine claims.
NOISE (CAM CHEST AREA)

Remove lifter blocks and check cam endplay. Refer to BDM Service Manual for specification. Is endplay within specification?

Yes

Remove cam and pinion gear, then check measurements. Compare with BDM Service Manual recommendations to ensure gear lash is within specification. Is pinion within specification?

No

Inspect pinion gear for cracks. Are cracks evident?

No

Is there damage?

Yes

Replace pinion bearing or cam.

01030

Inspect inner cam bearing and cam for damage. Is either damaged?

No

Replace inner cam bearing or cam.

01030

Call Tech Support

Yes

Inspect pinion bearing for damage Is there damage?

No

Replace pinion bearing

01032

Replace cam and replace thrust washer with proper sized washer.

01030

No

Inspect cam and bushings for damage. Is there damage?

Yes

Replace damaged cam cover or pinion bushings

01028

No

Replace pinion gear with correct, measured gear.

01032

Notes:
1) Always recheck oil pressure after any/all repairs.
2) Include an ignition module download with all engine claims.
NOISE (TOP END ENGINE CYLINDER)

Remove cylinder head and cylinder. Inspect piston for proper coating adhesion. Is coating coming off?

Inspect piston and cylinder for noticeable damage. Is there noticeable damage?

Verify piston and cylinder size match. Do they match?

Measure cylinder and verify it is within specified wear limits. Is it within specification?

Check cylinder for indication that piston rocks in the cylinder. Inspect for uneven wear marks throughout cylinder. Are marks present?

Check wristpins for wear. Are the wristpins loose?

Check rod side play, scraper clearance. Is clearance within specification?

Refer to NOISE (CAM CHEST AREA) flow chart.

Call Tech Support

Replace piston and cylinder as a set.

01014
01015

Notes:
1) Include an ignition module download with all engine claims.
Verify oil pressure (using the **OIL LIGHT ON – NO OIL PRESSURE** flow chart).

Verify pushrod adjustment. Are the pushrods adjusted correctly?

- No: Readjust pushrods
- Yes: Check pushrod tubes for interference. Is there evidence of rubbing inside pushrod tubes?
  - No: Remove top rocker box cover and verify oil is present. Is oil present?
    - Yes: Look for restriction in valve train system causing lack of oil.
    - No: Replace rocker arms and recheck endplay.
  - Yes: Replace rocker arms

- True pushrods: Replace rocker arms and recheck endplay.

- False pushrods: Replace rocker arms

- No: Verify proper rocker arm end play. Is end play .001 to .015?
  - Yes: Refer to **NOISE (TOP END ENGINE – HEAD AREA)** Flow Chart.
  - No: Remove rocker arms and check bushings for wear, per BDM Service Manual. Are bushings within specification?

**Notes:**

1) Include an ignition module download with all engine claims.
After completing the Rocker Box Noise Flow Chart, remove both rocker boxes.

Do the valve springs have a solid retaining collar?

- **No**: Refer to NOISE (TOP END ENGINE CYLINDER) flow chart.
- **Yes**: Remove heads. Remove valve springs. Inspect valve guides. Are the guides within specification?
  - **No**: Replace cylinder heads with factory reworks.
  - **Yes**: Replace valve springs with current S&S springs.

**Notes:**
1) Include an ignition module download with all engine claims.
PRIMARY NOISE (2006 – 2008)

Is the correct amount of primary fluid present?

No

Add the correct amount of fluid.

Maintenance

Yes

Remove outer primary cover.

Is primary chain tension adjusted correctly?

No

Adjust primary chain per SB-1086. (2006 Models)

SB-1086

Yes

Is primary chain in alignment?

No

Inspect primary chain alignment. Is primary chain in alignment?

SB-1074

SB-1074 shim

Yes

Tighten clutch hub nut to recommended torque specifications.

04013

Tighten clutch hub nut to recommended torque specifications.

04013

Is the correct amount of primary fluid present?

Tighten engine sprocket nut to recommended torque specifications.

04013

Is torque on engine sprocket nut correct?

Is torque on engine sprocket nut correct?

Is torque on clutch hub nut correct?

Is torque on clutch hub nut correct?

Notes:

1) On 2005 models built before July 8, 2005 inspect primary adjustment shoe, per SB-1059

2) Inspect carrier bearing basket for cracks on all 2005 models.
Is the noise a grind or gear noise?

Is there a squeal noise when disengaging the clutch?

Is the correct amount of fluid present?

Add the correct amount of fluid.


SB-1090


SB-1065A

Maintenance

Call Tech Support.
TRANSMISSION AND PRIMARY LEAKS

Primary Area
- Verify Leak
  - Inspect inner or outer primary seal.
    - Is leaking evident?
      - Yes: Replace seals as needed.
      - No: Inspect starter
        - Is starter leaking primary fluid?
          - Yes: Replace starter
          - No: Inspect starter hole in inner primary.
            - Is it 2.125 inch diameter?
              - Yes: Call Tech Support.
              - No: Replace inner primary.

Transmission Area
- Inspect transmission seals.
  - Is leaking evident?
    - Yes: Replace starter
    - No: Inspect transmission top cover.
      - Is cover leaking? Verify flatness.

Verify fluid level, per BDM Service Manual.

Perform SB-1051A Primary Leak Troubleshooting. (early 2005 models)

TRANSMISSION SHIFTING ISSUES (2005 – 2008)

- Call Tech Support.
  - No
  - Yes

- Adjust clutch and cable, per BDM Service Manual.
  - 03001

- Verify clutch adjustment, per BDM Service Manual.
  - Is clutch adjusted correctly?
  - Yes
  - No

- Inspect shifter arm and heim joints.
  - Do all components move freely?
  - Yes
  - No

- Inspect shifter pawl adjustment.
  - Is adjustment correct?
  - Yes
  - No

- Adjust shifter pawl, per BDM Service Manual.
  - 02013

- Remove transmission top cover and inspect shift drum and shift forks.
  - Are there any signs of damage or wear on these parts?
  - Yes
  - No

- Inspect 1st gear countershaft to 3rd and 4th gears on main shaft for clearances.
  - Are the gears rubbing?
  - Yes
  - No

- Inspect 1st gear countershaft to 3rd and 4th gears on main shaft for clearances.
  - Has main shaft moved or is shim damaged?
  - Yes
  - No

- Replace damaged or worn parts as needed.
  - 02007

  - SB-1090

- Replace damaged or worn parts as needed.
  - 02001

- Replace shim and related parts as needed.
  - 03005

Notes:
1) Include an ignition module download with all engine claims.
AIR RIDE COMPRESSOR/RELIEF VALVE INOPERATIVE

Remove seat. Turn key to ON. Press Start. Observe The LEDS on the EHC. Is the air ride mode LED On?

Press the Hi or Lo button and observe the EHC. Does the air compressor or air relief valve LED illuminate when pressing the buttons?

These LEDs indicate a fault. Inspect blue wire (A2) from the harness and the orange wire from the compressor. Inspect pins in the connector; make sure they are fully seated and are properly crimped. Inspect the blue and black wires (A18 and A32) from the relief valve for loose connections and for a short to ground.

Replace PCB Boards. Prior to replacement check all connections and wiring from the EHC.

Call Tech Support.
Unplug the ECU module, and verify continuity between MAP connector terminal C and terminal 14 of the ECU module connector.

Unplug the manifold absolute pressure (MAP) sensor; with key ON, measure the voltage across connector terminals A (ground, BK/W) and C (power, R/W). This must be 5 volts.

- **Voltage ≤ 4.5V**
  - No continuity
  - Repair harness.
  - 06006

- **Voltage ≥ 5.5V**
  - Voltage = 5V
  - Jiggle the wires while monitoring the continuity between terminal A of the MAP sensor connector and terminal 26 of the ECU module connector. Repeat this process with terminals B of the MAP sensor connector and terminal 25 of the ECU module connector; also repeat with terminal C of the MAP sensor connector and terminal 14 of the ECU module connector.
  - No intermittent
  - With the ECU module and MAP sensor connected and the key ON, attach a vacuum pump to the pressure port of the MAP sensor and apply a vacuum. Monitor the signal voltage across MAP signal wire (V/W) and the sensor return wire (BK/W) by probing through the back side of the MAP connector. If the MAP sensor is functioning correctly, the signal will lower as vacuum is applied.
  - No voltage change
    - Replace MAP sensor
    - 16006
  - Voltage change
    - Replace ECU.
    - 16015

- **Continuity**
  - Verify the continuity between MAP connector terminal A and terminal 26 of the ECU module connector.

- **Intermittent**
  - Repair wiring as needed.
  - 06006

**Note:**

1) Always clear historic DTCs before retesting.
INTAKE AIR TEMPERATURE (IAT) SENSOR ERROR

Disconnect the IAT sensor. Measure the resistance across the two terminals of the sensor’s connector. At 68°F, the resistance should be approx. 3750 ohms. At 86°F, the resistance should be approx. 2400 ohms.

Resistance in range

With the sensor disconnected and key ON, measure the voltage between the terminals of the IAT sensor harness connector. The voltage must be approximately 5 volts.

Voltage = 5V

Replace ECU.

16015

Resistance > 2 Ohm

Repair shorted wire.

06006

Voltage < 4.7V

Disconnect the ECU module and check the resistance between terminal A (GN) of the IAT sensor connector and terminal 7 of the ECU module connector.

Resistance < 2 Ohm

Disconnect the ECU module and check the resistance between terminal B (BK) of the IAT sensor connector and terminal 26 of the ECU module connector.

Resistance > 2 Ohm

Resistance > 2 Ohm

Repair shorted wire.

06006

Resistance < 2 Ohm

Replace IAT.

16004

Repair shorted wire.

06006

Replace IAT.

16004

Note:
1) Always clear historic DTCs before retesting.
FRONT/REAR INJECTOR OPEN OR SHORT CIRCUIT

Disconnect the affected injector connector. Measure the resistance across the injector sensor terminals. The resistance should be 10 to 25 ohms.

Resistance in range

Start with ignition ON and key OFF. Monitor the voltage between the terminals of the rear injector connector while the key is turned ON. The voltage across the injector terminals should be the same as battery voltage for the first two seconds after key ON.

Voltage < 12V

For a front error, check continuity between pin B of the injector connector and ECU pin 21. For a rear error, check continuity between pin B of the injector connector and ECU pin 19.

Continuity OK

Check continuity between terminal A (Y/GN) of the injector connector and the EFI relay.

Open circuit

Repair harness.

Resistance < 1m Ohm

Check the resistance between terminal B (GN/GY) of the injector connector and terminal 10 of the ECU module connector. The resistance should be greater than 1M Ohm.

Resistance OK

Replace ECU.

Resistance out of range

Replace Injector.

Resistance OK

Repair harness.

Repair harness.

Open circuit

Repair harness.

Note:
1) Always clear historic DTCs before retesting.
ENGINE TEMPERATURE SENSOR (ETS) ERROR

- Disconnect the engine temp sensor. Measure the resistance across the two terminals of the sensor’s connector. At 68°F, the resistance should be approx. 3500 ohms. At 86°F, the resistance should be approx. 2200 ohms.

- Check for short between terminal A and the metal surface of the sensor.

- With the sensor disconnected and key ON, measure the voltage between the terminals of the engine temp sensor harness connector. The voltage must be approximately 5 volts.

- Disconnect the ECU and check the resistance between terminal B (BK) of the ETS connector and terminal 26 of the ECU connector.

Note:
1) Always clear historic DTCs before retesting.
HIGH DUTY CYCLES FRONT / REAR

Perform fuel pressure test.

Is there fuel in the vehicle?

Yes

No

Add fuel to vehicle, clear historic DTCs, and monitor for any further DTCs.

Pressure low

Call Tech Support

Pressure OK

Measure voltage at pin A of both injectors. This must be approximately 12V.

Not 12V

Probable harness fault. Measure voltage at pin B of ignition coil. This must be approximately 12V.

12V

12V

12V

Not 12V

Check continuity between ignition coil pin B and relay.

Check continuity between relay and battery.

Check battery voltage and charging system.

Replace ECU.

Repair wire between injector and coil.

Repair harness between coil pin B and relay.

Repair harness between relay and battery.

Continuity

Continuity

Continuity

No

No

No

Note:
1) Always clear historic DTCs before retesting.
Jiggle the wires while monitoring the continuity between terminal A of the TPS connector and terminal 26 of the ECU module connector. Repeat this process with terminals B of the TPS connector and terminal 14 of the ECU module connector; and terminal C of the TPS connector and terminal 24 of the ECU module connector. This will determine if there is an intermittent problem.

Turn key OFF, unplug the ECU module, and verify continuity between TPS connector terminal B and terminal 14 of the ECU module connector. Verify the continuity between TPS connector terminal A and terminal 26 of the ECU module connector.

There is probably a short to 12 volts. Locate by checking continuity between 12 volt power (terminals 13 and 31 of the ECU module connector) and the TPS connector (terminal B); repair as needed.

With the ECU module and TPS sensor connected and the key ON, monitor the signal resistance across TPS signal wire (terminal C, GY/V) and the sensor return wire (terminal A, BK/W) by probing through the back side of the TPS connector. If the TPS sensor is functioning correctly, the resistance will increase as the throttle position is increased.

Voltage > 5V
There is probably a short to 12 volts. Locate by checking continuity between 12 volt power (terminals 13 and 31 of the ECU module connector) and the TPS connector (terminal B); repair as needed.

Voltage < 4.5V
Turn key OFF, unplug the ECU module, and verify continuity between TPS connector terminal B and terminal 14 of the ECU module connector. Verify the continuity between TPS connector terminal A and terminal 26 of the ECU module connector.

If the TPS sensor is functioning correctly, the resistance will increase as the throttle position is increased.

Voltage = 5V
Jiggle the wires while monitoring the continuity between terminal A of the TPS connector and terminal 26 of the ECU module connector. Repeat this process with terminals B of the TPS connector and terminal 14 of the ECU module connector; and terminal C of the TPS connector and terminal 24 of the ECU module connector. This will determine if there is an intermittent problem.

Intermittent
Repair Harness.
06006

No intermittent
Repair Harness.
06006

No continuity

Resistance does not increase
Replace TPS.
16003

Resistance increases
Replace ECU.
16015

Continuity
Replace ECU.
16015

Repair Harness.
06006

Note:
1) Always clear historic DTCs before retesting.
Check current and historic DTC list.

Are there DTCs present?

Using Pro Tune II BDM select the Test Outputs function to test the Check Engine light. The light should flash for 5 seconds.

Light on → Check current and historic DTC list.

Yes→ Go to specific DTC flowchart

No→ Light flashes

Light flashes → Light stays on

Jiggle the gray engine check wire at the annunciator, the EHC and the ECU. Does light flash during jiggle test?

Yes→ Repair intermittent harness.

No→ Repair short to ground.

Light stays on → Disconnect annunciator/tach ring. Check for short between gray engine check wire and ground. This should be an open circuit.

Shorted → Open

Yes→ Disconnect ECU.

No→ Does the check engine light stay on?

Yes→ Call Tech Support.

No→ Replace ECU.

Note:

1) Always clear historic DTCs before retesting.
1. Disconnect the IAC and the EFI module. Verify continuity between:
   - Terminal A (BE/GN) of the IAC connector and terminal 35 of the ECU module connector,
   - Terminal B (BN/R) of the IAC connector and terminal 36 of the ECU module connector,
   - Terminal C (BK/PK) of the IAC connector and terminal 18 of the ECU module connector,
   - Terminal D (BK/O) of the IAC connector and terminal 17 of the ECU module connector. Jiggle the wires while verifying continuity to test for an intermittent problem.

2. Reconnect IAC and EFI module.

3. With air cleaner removed, turn ignition ON and observe stepper motor position in throttle body and monitor the Stepper Position in Pro Tune II BDM. The Stepper Position should go to 0 counts (full out) and then park at 200 counts (full in).

4. Verify actual stepper count is the same as the target with engine off.
5. Verify IAC within 20 steps of the target at idle.

6. Using the EFI Software Test Output of IAC motor, listen for the motor to activate.

8. If no motion, possible ECU failure. Call Tech Support.

9. Repair harness as needed.

10. Note:
    1) Always clear historic DTCs before retesting.
FRONT OR REAR ADAPTIVE MAXED OUT ERROR

Are any other current or historic DTCs set?

No

The .BOX file loaded in the VFI module does not match the given engine configuration. Consult a qualified BDM dealer for an appropriate .BOX file which matches the engine configuration.

Yes

Perform diagnostics for other DTCs first.

BATTERY VOLTAGE ERROR

Check battery voltage gauge

Voltage < 12.0 V

Charge battery to 12.5 and recheck for current DTC.

06035

OK

Voltage > 12.0 V
Using Pro Tune II BDM, monitor the O₂ sensor volts (front & rear) while the engine is idling. If the voltage is constant but in-range (0.0 to 1.0V) for 60 seconds, disconnect the affected oxygen sensor. Monitor the O₂ sensor voltage.

Due to the allowable low voltage (0.00V), a low voltage as an open circuit is not detectable. Use the “Stuck fault” when this occurs.

**STUCK O₂ SENSOR ERROR (FRONT OR REAR)**

**Voltage stays in range**

Measure the resistance between the oxygen sensor connector pin 3 and all other pins. The resistance should be at least 400 kilohms.

**Resistance < 400 kilohms**

Repair shorted wires.

**Resistance in range**

Replace ECU.

**Voltage drops**

Replace O₂ sensor.

**Note:**

1) Always clear historic DTCs before retesting.
FRONT OR REAR O₂ SENSOR ERROR

Using Pro Tune II BDM, monitor the rear O₂ sensor volts while the engine is idling. If the voltage exceeds 1.00V, either the O₂ sensor is faulty or there is a short on the O₂ harness. Turn off engine.

Inspect intake for leaks. Inspect O₂ sensors for leaks at exhaust.

Disconnect the O₂ sensor. With the engine off and the ECU module powered on, monitor the O₂ sensor volts (front and rear). Does voltage drop to 0.0V?

Check for continuity between pin 1 at the O₂ connector and ground. Is continuity present?

No

Repair harness 06006

Yes

Replace ECU 16015

No

Yes

Replace O₂ sensor.
16007
16008

Note:
1) Always clear historic DTCs before retesting.
FRONT / REAR DUTY CYCLES TOO HIGH

Check for intake leak on affected cylinder. Any leaks?
Yes

Test rear or front injector using Pro Tune II BDM test outputs. Is affected injector actuating properly?

Drop .2 or < 0.5 psi

Pressure OK.
Jiggle the wires at the affected injector and at the ECU while monitoring fuel pressure as above. Was pressure intermittent?
Steady pressure.
Clear historic DTCs and monitor for any further occurrences.

No

Test rear or front injector using Pro Tune II BDM test outputs, while monitoring fuel pressure. Compare front and rear pressure drops while injectors are actuated.

Replace injector.
16001

Repair leak. Clear historic DTCs.
16010

Are both front and rear duty cycle “Too High” faults set?

Yes

Refer to HIGH DUTY CYCLES FRONT/REAR flow chart.

No

Any leaks?

Yes

Repair leak. Clear historic DTCs.
16010

Continued on next page.

Note:
1) Always clear historic DTCs before retesting.
FRONT / REAR DUTY CYCLES TOO HIGH (continued)

Measure voltage at Pin A of affected injector after turning key ON. This must be approximately 12 volts for 2 seconds.

For a front error, check continuity between pin B of the injector connector and ECU pin 21. For a rear error, check continuity between pin B of the injector connector and ECU pin 19. There should be 0 ohms resistance.

Probable harness fault. Measure voltage at pin B of ignition coil. This must be approximately 12 volts.

Note:
1) Always clear historic DTCs before retesting.

Continued from previous page.
BAD SITES (FRONT OR REAR)

Are any other current or historic DTCs set?

No

Was the vehicle recently run out of fuel?

No

Is bike still stock?

No

Check both oxygen sensor connectors.

Sensor (not OK)

Perform fuel pressure test.

Fail

Identify and repair source of fuel pressure failure.

Pass

Perform fuel pressure test.

01022

Repair intake leak.

Pass

Perform fuel pressure test.

Identify and repair source of fuel pressure failure.

Note:
1) Always clear historic DTCs before retesting.

Put gas in vehicle, clear DTCs and reset adaptive maps using Pro Tune II BDM.

Maintenance

Yes

Perform diagnostics for other DTCs first.

Yes

If any engine modifications were recently performed, particularly cam, head, or exhaust changes, this fault may indicate that the ECU module cannot adequately compensate for those modifications.

Fail

Repair intake leak.

Pass

Continued on next page.
Using ProTune II BDM, read the rear/front cylinder adaptive maps.

Positive values

Test affected injector using Pro Tune II BDM test outputs, while monitoring fuel pressure. Compare front and rear pressure drops while injectors are actuated.

No pressure drop

Replace injector that has lower or no pressure drop.

16001

Pressure drops equally

Using the Test Outputs function in Pro Tune II BDM, test the stepper motor. Ensure that the pintle moves freely in the bore. If it does not move freely, remove the stepper motor and clean both the pintle and the bore. Replace the stepper motor if cleaning does not return the stepper to proper operation.

Negative values

Perform a flow test on the affected fuel injector. Ensure that fuel flow stops crisply when the injector is closed. If fuel continues to dribble out of the injector, replace the injector.

Continued from previous page.

BAD SITES (FRONT OR REAR) (continued)

Note:
1) Always clear historic DTCs before retesting.

Other mechanical issues may be restricting fuel flow into the engine. Check items which affect intake valve actuation, such as camshaft timing or pushrod adjustment.