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<http://www.cannondale.com/motorsports>

Cannondale Motorsports Service Bulletin

BULLETIN : SB02-008

MODELS : Consult the following table for affected units.

All 2002	Up to VIN
X440s	shipped prior to 3/15/02
C440	5B6BC212C32B000101
E440	5B6BC41C62B000167
Cannibal (MC1000 only)	5B6BB31352B001078
Speed	5B6CB31312B000286
Blaze 440	5B6DB313X2B000081
Moto 440	5B6EB31352B000090
All converted MC500 vehicles	Kits shipped prior to 3/15/02

ISSUED : 4/6/02

SUBJECT : Engine stalling

CONDITION : This is a two part bulletin covering random or intermittent engine stalling.

SOLUTION : Part 1: Operating code installation

A new revision of the MC1000 ECU operating code has been developed to support better ECU management of sensor data interruption, a cause of engine stalling. The ECU operating code should not be mistaken for the ECU calibration file or "map." The operating code revisions defined in this service bulletin MUST be installed as directed into all affected units. Units previously serviced under service bulletins SBA01-10 (ATV) and SBM01-05 (Motorcycle) are also subject to this bulletin. The new operating code files are:

All ATVs. - H302V03M.HEX
All Motorcycles - H002V03M.HEX

This bulletin includes installation instructions. See "Operating code installation" on page 2.

Part 2: Inspection points

After the new operating code revision is installed, conduct an inspection of the points listed in this bulletin. See "Inspection points" on page 4. These points are common causes of engine stalling related to the conditions of important vehicle systems (battery, connectors, wiring, relays, etc.).

Information is subject to change without notice.

SB02-008.fm

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CAUTION

Installing the operating code “erases” any calibration file stored in the ECU and the vehicle variables (Throttle position sensor min./max, Injector offset and Injector flow rate). When servicing the vehicle, under this bulletin, be sure to write down the vehicle variables before attempting to install the operating code. And use the appropriate engine calibration files on the diskette - P/N 5002371.

PARTS : The following parts are required to perform the instructions of this service bulletin:

1. CD - P/N 5002371, includes the operating code files for ATVs and Motorcycles and the latest engine calibration files for each Cannondale vehicle model.

2. MC1000 CD, Optimum, P/N 971-5001983

Users with Windows XP, 2000, or NT systems must call 1-800-DLR-MOTO to obtain a special diskette to install the operating code.

3. MC1000 Interface Cable, P/N 971-5001984.

If you have any questions about this service bulletin, call toll free 1-800-MOTO-USA.

OPERATING CODE INSTALLATION

NOTE :

Before you start:

So that you are familiar with the process and avoid frustration or mistakes, read the procedure through first before performing any of the work described.

Make sure the Cannondale Diagnostic and Maintenance Tool has been installed onto the shop's PC.

Also, we strongly recommend that you read the Cannondale Diagnostic Tool Manual (P/N 912-5001985) thoroughly before continuing. This manual

is available on our website. The manual contains important background information and explanations that will be helpful to know before you attempt this simple, but very technical procedure. We also recommend that the service technician performing the work have moderate PC skills.

1. Insert the CD labeled P/N 5002371 into the CD drive of your computer.
2. Copy all but the “Readme.txt” file to the C:\Program Files\Cal directory on your computer.

The CD contains the two operating code versions (ATV and Motorcycle) and all current engine calibration files for all Cannondale vehicles as of 4/6/02. Please note that the exhaust silencer type installed on the vehicle can determine the engine calibration file to install. Consult the following table:

Vehicle Type	Model	Engine Calibration File ID	Exhaust Silencer P/N
Motorcycle	E440	03203	5002082
	C440	02203	5002082
	X440s	00202	5001760
ATV	Cannibal	30203	6000215
		30204	6000768
	Speed	31203	6000215
		31204	6000768
	Blaze 440	32203	6001055
	Moto 440	33203	6001055

3. Click on the Windows START button in the lower left corner of the PC screen and select *DealerCal.exe* from the Cannondale Diagnostic and Maintenance program group. The Cannondale Diagnostic Tool main menu will open. See the tool manual (P/N 912-5001985) for a description of the main window.
4. Click the **OPEN Calibration file (saved)** button in the Cannondale Diagnostic Tool main menu and select the correct engine calibration file from the C:\Program Files\Cal directory. Consult Be sure to use one of the files listed below. Older files may be stored in the directory, be sure you do not use them.
5. Make sure the correct engine calibration file ID is displayed at Numeric Cal ID field in the program window. If it is not, repeat the previous step.

CAUTION

Make sure the correct engine calibration file ID number is displayed in the Numeric Cal ID field of the Cannondale Diagnostic Tool main menu. Installing the wrong file can result in severe damage to the vehicle engine.

6. On motorcycles, disconnect the starter solenoid from the wiring harness.
7. Connect the data cable to the vehicle and make sure it is attached securely to the PC. See the Cannondale Diagnostic Tool Manual for details. Make sure the vehicle battery is fully charged.
8. On ATVs, turn the ignition key to the ON position.

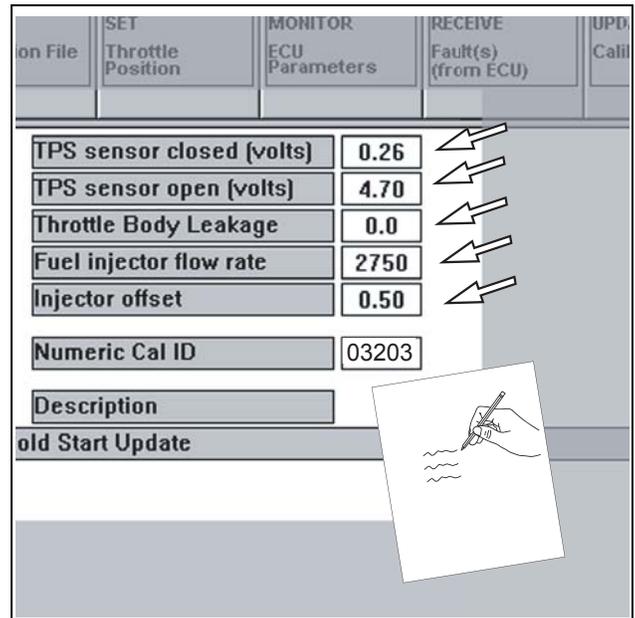
For both vehicles types, press the vehicle engine start button briefly. This will activate the engine management circuits. The green LED on the data cable block should be lit. Look at the block to confirm that it is on. It must remain on; if the light goes out anytime during this procedure, just press the engine start button again to turn it on.

9. Click the **RECIEVE Calibration file (from ECU)** button.

When the Choose Receive Option window opens select "Select to Receive only Throttle and Injector Calibrations" and click OK. This option reads only the TPS sensor closed (volts), TPS open (volts), Throttle Body Leakage, Injector flow rate, and Injector offset variables from the current calibration file in the ECU. These will be needed for the new calibration file installation later because the operating code installation "erases" them from the ECU memory. The current calibration file in the ECU will not be read. Because the program is reading this relatively small set of vehicle variables and not the complete calibration file, the transfer of data occurs quickly.

10. Write down the values displayed in the main menu (see arrows below) for the vehicle. If handling multiple vehicles make sure you

identify the values with the vehicle.



The arrows in the illustration above shows what values you need to write down after they have been "read" from the vehicle. Notice that engine calibration file "03203" is open in the main menu. This is the engine calibration file for an E440 motorcycle. Be sure the correct engine calibration file ID number is displayed at this field before sending to the ECU after the operating code installation is done.

Written backup is helpful just in case you encounter PC problems. As long as the Cannondale Diagnostic and Maintenance Tool program is open, the values will be held, if the program is closed or the PC is shut off, the values would be lost. If that happens, you can manually input the values using the software tool. See the manual.

11. From Windows START button (lower left corner of the computer screen) select the Cannondale Diagnostic and Maintenance program group and select "Code Download." An MS-DOS program window will open.
12. If you are installing to an ATV type:

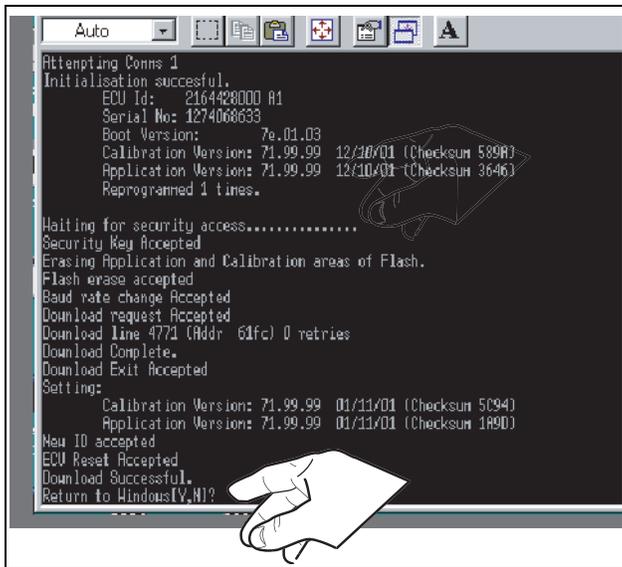
D H302V03M

If you are installing to an Motorcycle type:

D 002V03M

..... but do not press the ENTER key!
13. Have an assistant PRESS AND CONTINUE TO HOLD the engine start button on the vehicle.

14. As your assistant holds the engine start button, press the ENTER key on your computer - you will see data transfer information in the MS-DOS window.



15. When the transfer complete message displays in the lower area of the program window, tell your assistant to release the engine start button and type Y and the MS-DOS window will disappear and the Cannondale Diagnostic Tool main menu should be visible again.

16. Check the Numeric Cal ID field in the main menu. Make sure the correct engine calibration file ID number is displayed for the vehicle. If it is not, open the necessary file from the C:\Program Files\Cal directory.

17. Click the **SEND Calibration file (to ECU)** button. The new calibration file together with the vehicle specific variables read from the ECU before the operating code installation will be installed into the ECU. When the send complete window displays, click OK.

18. On motorcycles, reconnect the starter solenoid. Make sure the connector is latched together properly.

19. Disconnect the data cable from the vehicle.

20. Reinstall any removed components.

21. Test engine operation. Be sure to inspect engine idle and adjust as required.

**SERVICE: Engine idle speed
2100 - 2200 r/min**

INSPECTION POINTS

Common to ATV & Motorcycle

1. **Low Battery Voltage**
If the battery is weak the engine can turn over normally, but a resulting low voltage while cranking can cause the ECU power relay to drop voltage supply to the ECU preventing the engine from starting. Always keep the battery fully charged and replace a weak battery with a new one.
2. **Loose Battery Terminals**
Loose battery terminals can result in intermittent or broken contact with the battery and this can cause intermittent engine stalling. Check the condition of both battery terminals. Make sure they are free of corrosion and tighten the terminal bolts to the specified torque.

On ATVs, tighten the battery terminal bolts to 15.0 lbf•in (inch pounds) or 1.7 N•m.

On motorcycles, use Loctite #262 on the terminal bolt threads and be sure to use the star washers between the battery terminals and harness ends. When using loctite allow a few hours for the compound to cure. If the compound is allowed to cure before use, it results in a better hold. Tighten the motorcycle battery terminal bolts to 15.0 lbf•in (inch pounds) or 1.7 N•m.
3. **Charging voltage**
If the charging system is damaged, the battery can be depleted and this will result in intermittent engine stalling. Check the charging voltage. The charging voltage must be inspected with the engine running at 3000 rpm - the voltage must be 13.5 to 14.5 volts.

NOTE :

Allowing the vehicle to idle for extended periods can deplete the battery voltage.

4. **Harness Abrasion or Damage**
Check the vehicle wiring harness for signs of abrasion or damage. Damage to the harness

can result in damage to the wires inside - shorting to the frame or wiring - this will cause intermittent engine shut down.

5. Loose or Damaged Connectors

Check all harness connectors terminating at a device (fuel injector, ignition coil, coolant sensor, air temperature sensor, etc.) for loose, damaged, or corroded ends.

6. Engine Idle Speed

Check the engine idle speed and adjust to specified. An incorrectly set engine idle speed can result in engine stalling when the throttle is quickly closed and re-opened. The set idle speed can change as the mechanical stops on the throttle body wear. Adjust the idle speed to specification as required. Check the idle speed more frequently on new vehicles.

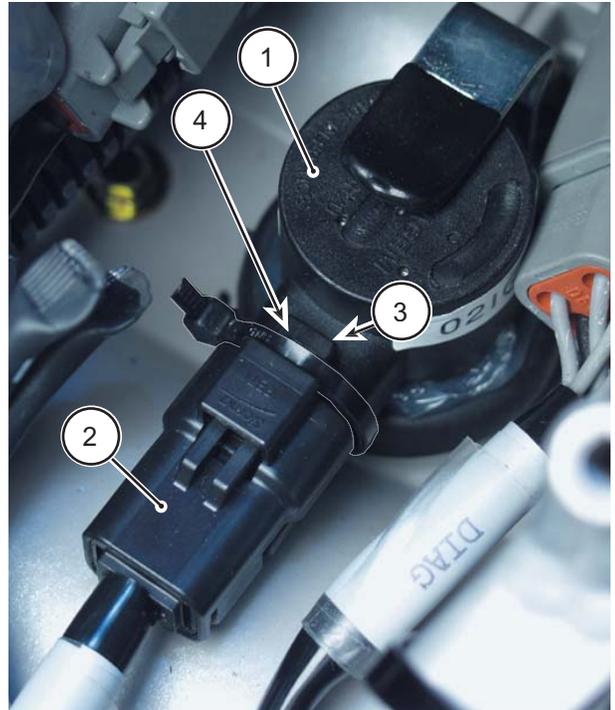
**SERVICE: Engine idle speed
2100 - 2200 r/min**

7. Ignition Coil Connector Zip Tie

Check the ignition coil to make sure it is connected to the vehicle wiring harness correctly. A loose connector can result in intermittent engine shut off.

Apply a zip tie over the harness connector

locking tab. A small tie can prevent the connector from failing and separating from the coil.



This photo shows the application of the zip tie. This photo was taken using a motorcycle. The technique is the same for ATVs.

1. Ignition coil
2. Harness connector
3. Locking tab
4. Zip tie

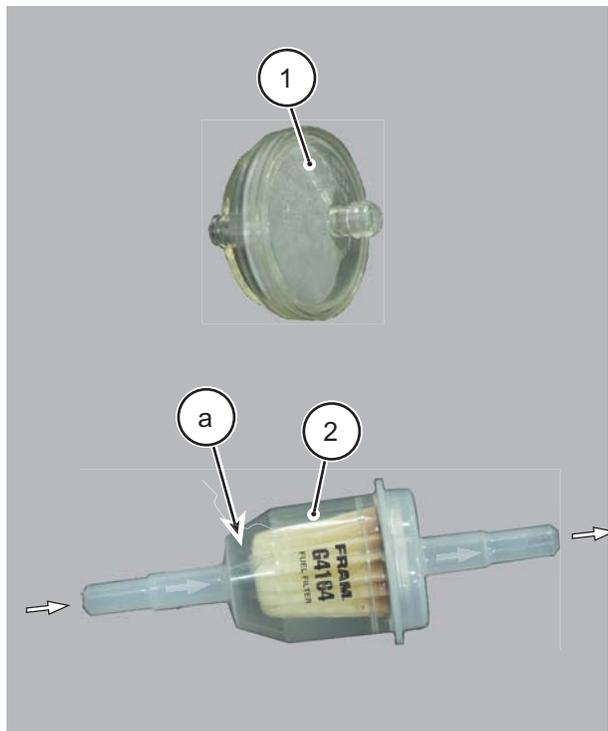
8. Fuel Filters

We recommend that owner's replace the fuel filters on their vehicles every five hours. The fuel system constantly recirculates fuel and contaminants inside the tank can clog the filter quickly. Restricted or stopped fuel flow can cause engine stalling.

If repeated clogging or restricted fuel flow is detected, check the inside of the fuel tank for any contamination.

For both ATVs and Motorcycle's replace the old style fuel filter P/N 353-5001674 with the newer style filter P/N 5000544 (FRAM G4164 or 35 micron equivalent). When installing the filter be

sure to observe the flow indicator. On all vehicles, fuel flows out of the tank, through this filter to the fuel pump. See below.



- 1. Old style fuel filter
- 2. New style fuel filter
- a. Flow direction indicator

9. EMS Power Relay

Check the terminal ends of the main power relay inside the EMS relay mounting socket located under the air filter on ATVs and under the seat on motorcycles. If the terminals that receive the blades of the relay are spread or deformed, or corroded - this will result in broken or intermittent contact that can cause an engine shut down.

When reinserting the relay into the harness socket, apply some dielectric grease to the relay blades and the socket to help prevent corrosion. Also position a 5 mm zip tie between the wires coming out of the back of the harness socket and over the top of the relay. Secure the zip tie. Consult Cannondale Technical Bulletin - TB02-001.

10. Power Latch Accessory Bullet Connector

Check the bullet connector connection.

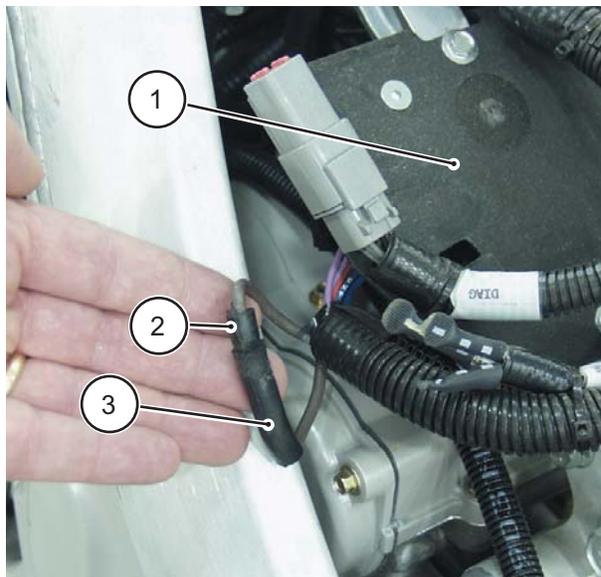
This connector is only present on X440s motorcycles; it is located near the relay plate or outside the harness near the subframe rails depending on the wiring harness.

This connector is only present on early ATV MC1000 wiring harnesses. In all cases of all

early ATV wiring harnesses, the connector is located near the EMS power relay.

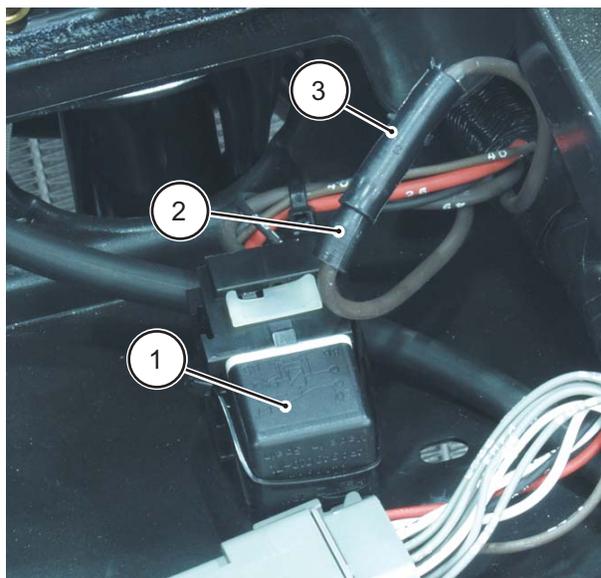
If this bullet connector connection is loose or broken, engine stalling can result.

If electrical tape has been applied over the two connector ends, removed it and re-apply the tape. Tape can conceal a broken connection.



This photo shows a bullet connector located near the relay plate mounted on the small frame spar.

- 1. Relay plate
- 2. Bullet connector male end
- 3. Bullet connector female end



This photo shows an ATV bullet connector located near the EMS power under the air filter.

- 1. EMS power relay
- 2. Bullet connector male end
- 3. Bullet connector female end

ATV Specific

1. Frame Grounding

Check the connection of the negative battery cable to frame and the wiring harness to the frame terminals ends. Both are attached to the frame at the fuel regulator mounting tab on the main frame. If either connection is loose intermittent contact can result in engine stalling.



1. Fuel pressure regulator
2. Negative battery cable end
3. Harness to Frame negative ground terminal

2. Engine RUN/OFF Switch

Check the bullet connectors that tie the engine "kill" switch leads into the wiring harness. A few cases of random shut down, have been attributed to loose bullet connectors. These bullet connectors are located in the top front area of the radiator. The bundle is probably zip tied together. If the bullet connectors are separated completely, the engine would not start at all, or the connection between two wires could be enough to start and run the engine only breaking intermittently when the wires are moved such as in shock and vibration

encountered while riding. Examine the bullet connections making sure they are pushed together completely.



This photo taken from the left side of the vehicle near the fuse holder shows the location of the wire bundle of the Engine RUN/OFF switch leads. The bundle is held in place by cable ties. Check to make sure the bullet connector ends of the switch leads and the wiring harness are pushed together completely. Components have been removed in this photo for clarity.

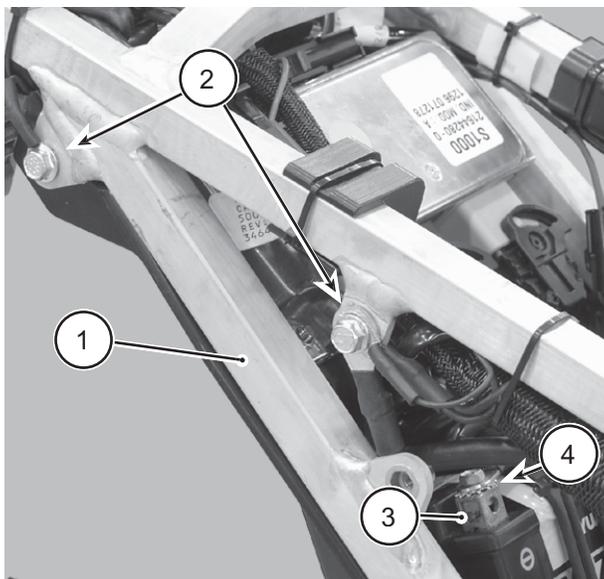
3. Fuel Vapor Lock

Check to make sure the unit fuel line routing has been re-routed as directed under Cannondale Service Bulletin SB02-005.

Motorcycle Specific

1. Frame Grounding

Check the check the subframe grounding point located on the right side of the subframe for tightness. There are several ground terminals attached to the bolt on the subframe; vibration and shock can result in intermittent loss of contact with the frame.



This photo shows the right side of the subframe. The right side number panel and fuel tank have been removed for clarity.

1. Subframe
2. Negative (-) ground points
3. Negative battery terminal
4. Star washer

2. Fuel Tank Pickup Hose

Check the condition of the fuel tank pickup hose. Make sure the hose has not detached from the fuel outlet fitting inside the tank. The bike may run with a full tank of gas but shut off as fuel level drops.

Check to make sure that the weighted pickup screen at the end of the hose is not clogged and attached to the end of the hose. Check to make sure that the fuel pickup hose inside the tank is not bent or pinched resulting restricted fuel flow. The pick up hose is attached to the tank outlet fitting on the left side of the tank.

If it is necessary to remove the outlet fitting from the tank and reattach the pickup hose or pickup screen please keep the following points in mind:

The total length of the hose 660mm can be trimmed about 25mm (1 inch) with good result

without sacrificing any fuel in the tank.

Trim the hose ends before re-sliding them onto the fittings. Be sure to apply a small drop of 3M CA40H instant CA (cyanoacrylate) adhesive on both the outlet and pickup screen fitting bars before sliding the hose ends to improve the attachment. Avoid eye and skin contact, avoid breathing fumes and use adequate ventilation when working with CA adhesives (super glues). When reinstalling the pickup assembly back into the tank, make sure the threads of the outlet fitting and the tank threads are clean. Apply a small amount of Loctite# 565 to the outlet fitting threads and install the fitting into the tank carefully. Tighten the fitting until it contacts the tank. Overtightening can damage the plastic fuel tank threads resulting in fuel leaks.

WARNING

Inspect the entire fuel system for leaks or damage after servicing. Leaking fuel or a damaged fuel system can cause a fire or explosion. You can be severely injured or killed.

