

## Earths/Grounds check list to stop misfires etc

Cleaning earths/grounds is about the resistance of corroded contacts producing voltage drops in the circuits of the Engine Temperature and Oxygen sensors. This makes the ECM compensate and causes the misfire etc. See <https://www.buellxb.com/forum/showthread.php?54706-Fixing-Earthing-Problems-Why-and-How> for more info.



Most important joints are ones involving ECM and ET and O<sub>2</sub> sensors (#1-7). They're in order of importance in causing misfires, the other 2 still important but cause other problems, not misfires.






Earth loops must not have a resistance more than 0.7 Ohm total to not affect the ECM

'Clean&protect' means cleaning surfaces back to bright metal with Scotchbrite, spraying with CRC 2.26 and torquing up the joint while still wet, in as short time as possible (minutes not hours). Then clean down with CRC Brakleen or similar and spray with CRC CPC400 (a waxy Corrosion Protection Compound) at your leisure, to stop water getting in later and corroding it again. Don't use any sort of grease on the terminals. You may think this is not the way you'd do it or overkill, but it is the way aircraft earth bonding is done.

Best method is to run earth cables/wires, independent of the frame. If you want to keep the wiring standard you've got a lot more work to do. Both methods are given as Either/Or choice.

If 90% of Buell problems are electrical and 90 % of those are earth cleanliness, then **80% of ALL Buell faults are earth faults. Do it right first time.**

#	Part of the circuit	Key Points (Zoom in 500% on photos in Word so can see)
1	Braided earth strap to ECM earth lug 	<ul style="list-style-type: none"><li>Under the airbox and seat</li><li>Clean&amp;protect conducting surfaces of braided strap and tie-rod</li><li><b>EITHER</b> Connect braided strap lug to battery negative terminal with a 4swg (20mm<sup>2</sup>) copper cable (carries the starter motor return current - 200A) as in pic. Still need to clean&amp;protect the ECM to battery connection as in #3 below. 16swg (1mm<sup>2</sup>) wire will suppress misfires but 4swg helps starter motor too and makes all wiring independent of the aluminum frame.</li><li><b>OR</b> clean&amp;protect the lug surfaces, the subframe contact surfaces, 4 subframe-to-frame connections (need to disassemble rear end of bike to do this!) AND the underside of the bolt heads &amp; bolt &amp; hole threads &amp; washer surfaces - the fasteners and frame parts carry current in this situation. Also, clean&amp;protect both sides of the battery tray between the subframe and lugs.</li></ul>
2	Engine to Frame via braided earth strap	<ul style="list-style-type: none"><li>Under the airbox (LHS of tie-rod in pic above)</li><li>Clean&amp;protect conducting surfaces of engine, braided strap and dogbone, AND the underside of the engine-side bolt head, bolt &amp; hole threads &amp; washer surfaces - the fasteners on the engine side always carry current.</li></ul>
3	ECM earth lug to battery negative cable lug 	<ul style="list-style-type: none"><li>Under the seat</li><li>ECM earth lug is the one with 2 black wires crimped into one lug on Uly. Thickest black wire and companion in XBS</li><li>If Battery strap and earth lug are held together with the same bolt (like a Uly) then just clean&amp;protect surfaces of the lugs</li><li>If the ECM lug(s) connects on one side of rear subframe and the battery cable lug on the opposite side (Like an Ss in lower pic): <b>EITHER</b> connect the 2 terminals with a 16swg (1mm<sup>2</sup>) wire w/lugs <b>OR</b> clean&amp;protect all lug surfaces, the subframe contact surfaces, the subframe halves connection at rear and 4 subframe-to-frame connections. AND the underside of the bolt heads &amp; bolt &amp; hole threads &amp; washer surfaces - the fasteners and frame parts carry current in this situation. Also, clean&amp;protect both sides of the battery tray, if it's in between the subframe and lugs.</li></ul>
4	Connectors of ET and O <sub>2</sub> sensors' wire to the main wiring harness	<ul style="list-style-type: none"><li>Under the airbox, zip tied to frame</li><li>ET is orange wire into black rubber plug at middle RHS of photo below</li><li>O<sub>2</sub> is black wire to plastic plug middle bottom of photo below</li><li>Both connectors pretty well protected so should not be corroded</li><li>Plug and unplug connectors a few times while wet with CRC2.26</li></ul>

		
5	<p>ECM to ECM earth lug on wiring harness</p> 	<ul style="list-style-type: none"> <li>• Under the seat (actual lug(s) on earth wires as in pic in #3 above)</li> <li>• Test resistance of crimp and check for frayed wires/worn insulation</li> <li>• Crimp failure not likely but is known, so must check <ul style="list-style-type: none"> <li>• Use a <u>good</u> (not \$10) digital multimeter (DMM), not conductivity probe</li> <li>• DMM must read single digit Ohms</li> <li>• Unplug black plug from ECM and prise out the orange locking wedge from the plug to get access for the DMM probes onto the female pins of the 2 <u>black</u> wires</li> <li>• Check resistance each pin to lug, looking for resistance less than 0.7 Ohm, good crimp reads ~0.1 Ohm (i.e. same as touching the probes together)</li> <li>• Resistance between female pins should read ~0.1 Ohm too</li> <li>• Hi resistance crimp has been revived by spraying with CRC2.26</li> <li>• If you can't revive it, cut off and replace with one equally big (not easy to find)</li> </ul> </li> <li>• Insulation (and wire!) can wear through rubbing against the plastic tray. (see photo) <ul style="list-style-type: none"> <li>• If just insulation, dismantle Deutsch plug and slide heat shrink over pin</li> <li>• If wire too badly worn, solder-splice new wire in and cover joints with heat shrink</li> </ul> </li> </ul>
6	<p>Coil bracket to battery negative terminal</p> 	<ul style="list-style-type: none"> <li>• Under the airbox</li> <li>• Coil mounting screw in middle to RH of photo</li> <li>• Run 18swg (0.75mm<sup>2</sup>) or bigger wire from under rear coil mounting screw to an earth</li> <li>• Traditionally went to the battery negative terminal, but if you clean&amp;protect all earths like this doc says, any earth point will do</li> <li>• Used to suppress voltage induced by ignition coil, in the coil mounting bracket</li> </ul>
7	<p>ECM Fuse in fuse block.</p>	<ul style="list-style-type: none"> <li>• Under the seat (fuse position written on fuse box lid)</li> <li>• Not strictly an earth but voltage drop at fuse will affect the ECM</li> <li>• Power feed to the ECM</li> <li>• Pull the fuse and examine for corrosion on both fuse and fuse holder</li> <li>• Spray fuse and holder with CRC2:26 and pull and insert the fuse a few times</li> </ul>
8	<p>Headlight/horn/instruments to frame (at steering head)</p> 	<ul style="list-style-type: none"> <li>• On front of the steering head behind the headlight</li> <li>• <b>EITHER</b> run 18swg (0.75mm<sup>2</sup>) or bigger wire to the earth return cable at the braided strap and clean&amp;protect lugs</li> <li>• <b>OR</b> clean&amp;protect all lugs and bolt head and thread, washer and hole thread plus frame surface – all carry current in this situation</li> </ul>
9	<p>Wiring harness secondary earth lugs to battery negative terminal</p> 	<ul style="list-style-type: none"> <li>• Under the seat (LHS Uly in pic, could be both sides XBS)</li> <li>• <b>EITHER</b> run 18swg (0.75mm<sup>2</sup>) or bigger wire to nearest battery or ECM earth/ground and clean&amp;protect lugs</li> <li>• <b>OR</b> clean&amp;protect all lugs and bolt head and thread, washer and hole thread plus frame surface – all carry current in this situation</li> </ul>