

Cummins Engine EGR Delete Review Worksheet

Engine Serial Number: {79502726}

Date: 05-12-2021

Program File: BBZ/01_pulled-calibration.cal

Hardware Modifications ...

Coolant flow through the EGR cooler is still in place?

- **YES.** (Correct action was taken for the egr-delete).
- **NO, but an equivalent circuit/pipe replaces it.** (this is safe but can cause the engine to fail an emissions inspection).
- **NO. EGR cooler circuit has been removed completely.** (this is unsafe and will lead to heat problems with cylinders 5 and 6 on most model ISX engines).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

EGR gas circuit has been mechanically blocked via a block-plate or by some other permanent means?

- **YES.** (Correct action was taken for the egr-delete).
- **YES, but the blocking device is inadequate.** (this is unsafe. If the blocking device fails, severe engine or turbo damage will likely result).
- **YES, egr piping has been removed.** (this is safe but can cause the engine to fail an emissions inspection).
- **NO.** (this is safe but is less than optimal. EGR gas will still enter the intake under high engine load conditions).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

Crank Case Filter device has been either removed, hollowed/drilled out, bypassed, or a maintenance free version installed?

- **YES.** (Correct action was taken for the egr-delete).
- **YES, but the modification is inadequate.** (this is unsafe. If the blocking device fails or is restrictive, then turbocharger seal/seepage damage, and/or engine efficiency issues may result).
- **NO. The filter is still in place.** (this is unsafe. If the blocking device fails or is restrictive, then turbocharger seal/seepage damage, and/or engine efficiency issues may result).
- **Nothing Done. Engine is not equipped with one.** (No action needed during the egr-delete).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

Intake Air Throttle device, or its diaphragm removed?

- **YES.** (Correct action was taken for the egr-delete).
- **YES, but the modification is inadequate.** (this is unsafe. If the device is allowed to restrict intake air then efficiency and turbocharger issues may result.).
- **Nothing Done. Engine is not equipped with one.** (No action needed during the egr-delete).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

DOC Exhaust element has been made hollow?

- **YES, fully.** (Correct action was taken for the egr-delete).
- **Removed or Bypassed.** (this is safe but can cause the engine to fail an emissions inspection).
- **Partially.** (this is unsafe and can lead to collapse and/or blockage of the exhaust system. It is typically harmful to the turbocharger due to trapped and reflected heat).
- **No.** (this is unsafe and will cause the engine, turbocharger, or other components to fail).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

DPF Exhaust element has been made hollow?

- **YES, fully.** (Correct action was taken for the egr-delete).
- **Removed or Bypassed.** (this is safe but can cause the engine to fail an emissions inspection).
- **Partially.** (this is unsafe and can lead to collapse and/or blockage of the exhaust system. It is typically harmful to the turbocharger due to trapped and reflected heat).
- **No.** (this is unsafe and will cause the engine, turbocharger, or other components to fail).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

SCR Exhaust element has been made hollow?

- **YES, fully.** (Correct action was taken for the egr-delete).
- **Removed or Bypassed.** (this is safe but can cause the engine to fail an emissions inspection).
- **Partially.** (this is unsafe and can lead to collapse and/or blockage of the exhaust system. It is typically harmful to the turbocharger due to trapped and reflected heat).
- **No.** (this is unsafe and will cause the engine, turbocharger, or other components to fail).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

Software Modifications ...

Program in the ECM matches the Engine ser# requirements?

- **YES.** (considered as a proper method and safe).
- **NO. However it is 100% compatible** (considered as a proper method and safe).
- **NO. Engine tier and hardware is NOT compatible** (Considered Unsafe. Fuel efficiency, power, and other losses will occur. Eventual engine or turbocharger damage may result.).
- **NO. The vehicle hardware is NOT compatible** (Considered less than optimal. Fuel efficiency, power, and/or other losses will occur. Eventual engine or turbocharger damage may result.).
- **NO. Only the emissions hardware is NOT compatible** (Considered less than optimal but still safe as long as these components have been removed and a delete has been performed.).
- **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

Editing of engine mode control logic tree was performed?

- **YES, engine locked into using non-egr operating modes only.** (considered as a proper method and safe).
- **Partially. Engine coaxed into using non-egr operating modes.** (this is considered significantly less safe, but is better than nothing).
- **Partially. Several modes are still active. Active modes have been correctly edited to accommodate this.** (this is considered safe, but not usually necessary after a delete).
- **Partially. Several modes are still active. Active modes have NOT been correctly edited to accommodate this.** (this is unsafe and will cause the engine, turbocharger, or other components to suffer shortened lifespan).
- **None.** (this is extremely unsafe and will cause the engine to enter the wrong operating modes. The engine, turbocharger, and other components will suffer a significantly shortened lifespan. ECM programming becomes unstable).

De-reference of hardware sensors, egr components, and exhaust sensors that are no longer used was performed?

- **YES, fully. No need to blocking any fault codes.** (this is considered proper and safe after a delete).
- **Partially. Some blocking of fault codes were necessary.** (this is considered less than optimal).
- **Poorly. Many blocking of fault codes were necessary.** (this is considered unsafe, is less than optimal, and can lead to ghost errors in the vehicle).
- **Very Poorly. Blocking of fault codes was relied on heavily.** (this is considered unsafe, is less than optimal, and can lead to ghost errors in the vehicle).

Fault codes that have been blocked from showing up due to incorrect / missing delete programming logic ...

3597 - Aftertreatment Diesel Exhaust Fluid Controller - Abnormal Update Rate
1928- Aftertreatment Fuel Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source
3682- Aftertreatment 1 Intake NOx Sensor Power Supply - Data Erratic, Intermittent, or Incorrect
1885- Aftertreatment 1 Intake NOx Sensor Circuit - Voltage Below Normal or Shorted to Low Source
3151- Aftertreatment 1 SCR Catalyst System Missing - Condition Exists
1926- Aftertreatment Fuel Pressure Sensor - Data Erratic, Intermittent, or Incorrect

Crank Case Filter pressure sensing has been disabled/defeated?

- **YES.** (This is Correct as long as the crank case filter has been disabled or replaced with a maintenance free device).
- **YES, but the hardware modification is inadequate.** (this is unsafe. If the blocking device fails or is restrictive, then turbocharger seal/seepage damage, and/or engine efficiency issues may result).
- **Partially.** (This is less than optimal and can lead to problems or ghost errors).
- **NO. The filter is still in place.** (this is less than optimal. If the filter becomes restrictive due to lack or regular replacements, then turbocharger seal/seepage damage, and/or engine efficiency issues may result).
- **NO, but the filter has been disabled.** (this is considered acceptable after an egr-delete).
- **NO, the state of the filter device is also unknown at this time.** (this is less than optimal. If the filter becomes restrictive due to lack or regular replacements, then turbocharger seal/seepage damage, and/or engine efficiency issues may result).
- **Nothing Done. Engine is not equipped with one.** (No action needed during the egr-delete).

Intake Air Throttle device kept 100% open, or removed from the programming?

- **YES. Overridden and kept 100% open position.** (This is less than optimal, but is generally acceptable for the egr-delete).
- **YES. Removed from the programming.** (This is acceptable as long as the device, or its diaphragm has been removed to prevent air-flow restrictions).
- **YES, but the modification is inadequate.** (this is unsafe. If the device is allowed to restrict intake air then efficiency and turbocharger issues may result).
- **Nothing Done. Engine is equipped with one.** (this is unsafe. The device will continue to operate and restrict air flow based on any emissions or egr gas requests. Engine efficiency and turbocharger issues may result).
- **Nothing Done. Engine is not equipped with one.** (No action needed during the egr-delete).

Removal of all shutdown and derate logic for hardware and sensors that were disabled/defeated?

- **YES, fully.** (this is considered proper and safe after a delete).
- **Partially, but the master derate/shutdown engine logic is disabled as a prevention.** (this is considered unsafe and less than optimal).
- **Partially, and some master derate/shutdown engine logic is still in place.** (this is considered unsafe and can lead to ghost shutdowns or derates).
- **None, and the master derate/shutdown engine logic is still in place.** (this is considered unsafe and will lead to a shutdown).
- **None, but the master derate/shutdown engine logic is disabled as a prevention.** (this is considered unsafe, will lead to silent derates).

Removal of all higher level After-treatment management and tampering detection logic?

- **Not Necessary. No after-treatment systems are used for this model engine** (this is considered proper and safe after a delete).
- **YES, fully.** (this is considered proper and safe after a delete).
- **Partially, master derate/shutdown engine logic is disabled.** (this is sometimes ok, but sometimes unsafe. It easily can lead to silent derates, the necessity to block additional after-treatment fault codes, and possible altering of the combustion cycle in negative ways, creating power/torque losses).
- **None, and the master derate/shutdown engine logic is still in place.** (this is considered unsafe and will lead to a shutdowns and derates).
- **None, but the master derate/shutdown engine logic is disabled as a prevention.** (this is considered unsafe, it will lead to silent derates, the necessity to add block fault codes, and altering of the combustion cycle in negative ways, creating power/torque losses).

Removal of EGR gas and emissions control request logic that alters the turbo positioning, egr valve, or other emissions related devices?

- **YES, fully.** (this is considered proper and safe after a delete).
- **partially. Was done in active engine operating modes.** (this is considered acceptable and safe after a delete).
- **partially. Using fraction overrides.** (this is considered less than optimal but usually acceptable).
- **partially. Is incomplete.** (this is considered unsafe, it can lead to possible engine fault codes or alteration of the combustion cycle, creating power/torque losses).
- **None.** (this is considered unsafe, it can lead to possible engine fault codes or alteration of the combustion cycle, creating power/torque losses).

Removal of all fall-back and auxiliary emissions systems and engine exhaust limiting control logic that alters injection timing, fuel-air-mix, emissions related power/torque limiting, etc.?

- **YES, fully.** (this is considered proper and safe after a delete).
- **partially. Is incomplete.** (this is considered unsafe, it can lead to possible engine fault codes and harmful alteration of the combustion cycle. It can also create power/torque losses).
- **None.** (this is considered unsafe, it can lead to possible engine fault codes and alteration of the combustion cycle, creating power/torque losses).

Performing corrections to the injection timing in all active engine operating mode(s) to prevent a harmful combustion process?

- **YES, fully.** (this is considered proper and safe after a delete).
- **Partially. Is within safe bounds.** (this is less than optimal but still considered safe after a delete).
- **Partially. Not within safe bounds.** (this considered unsafe and will lead to a significantly shortened engine life).
- **Edited Incorrectly. Not within safe bounds.** (this considered very unsafe and will lead to a significantly shortened engine life).
- **None.** (this considered unsafe and will lead to a significantly shortened engine life).

Performing corrections to the fuel-air-mix and turbo positioning logic to prevent a harmful combustion process and/or over-boosting?

- **YES, fully.** (this is considered proper and safe after a delete).
- **Partially. Is within safe bounds.** (this is less than optimal but still considered safe after a delete).
- **Partially. Not within safe bounds.** (this considered unsafe and will lead to a significantly shortened engine life).
- **None.** (this considered unsafe. The engine will run too lean and have a significantly shortened engine life).

Method used to request boost/turbo positioning?

- **Mass Flow Requests. Corrections were made.** (this is typically considered proper and safe after a delete as long as boost levels are not exceeded).
- **Anti-Hysteresis Min/Max positioning request Tables. Within Safe Bounds** (this is typically considered proper and safe after a delete as long as boost levels are not exceeded).
- **Anti-Hysteresis Min/Max positioning request Tables. Out of Bounds**(this is considered unsafe. Intake boost levels are likely to be exceeded).
- **Mass Flow Requests. No corrections made.** this considered unsafe and will lead to improper fuel-air mix and a shortened engine or turbo lifespan).
- **With Override, and fixed to one position.**(this is far less than optimal and can lead to over-boosting, subsequent engine damage, etc.).
- **Disabled. A Fixed vane turbo was used.** (this considered far less than optimal, significantly lowers fuel efficiency, and can lead to shortened engine life if over-boosting occurs).

Engine brake has been modified?

- **Yes. It is set to harmful levels.** (this considered extremely unsafe and can lead to severe engine damage).
- **No.** (this considered safe/correct).

Fuel and engine performance limiters have been removed/Defeated/Edited?

- **Yes, All.** (this is considered ok as long as proper power/torque settings are in place elsewhere).
- **Partially. They do NOT interfere with Power levels.** (this is considered ok as long as proper power/torque settings are in place elsewhere).
- **Incorrectly. They DO interfere with Power levels.** (this is considered incorrect and will lead to lower than expected power levels).
- **Edited. Raised or lowered to match Power levels.** (this is considered ok as long as proper power/torque settings are in place elsewhere).
- **No, but they match or exceed power levels.** (this is considered ok as long as proper power/torque settings are in place elsewhere).
- **No, and they interfere with power levels.** (this is considered problematic, as engine power will be less than what is expected).

Has the ECM been coaxed into giving up more fuel than expected?

- **No.** (this is considered proper and safe after a delete).
- **Yes.** (this is considered very problematic. The engine will incorrectly show higher than normal fuel mileage readings in the dash. Power and torque will be raised to unknown levels. Fuel-air-mix levels may be set incorrectly. Cylinder balancing corrections will become disabled or ineffective).

Have Injection pressures been altered?

- **No.** (this can be less than optimal depending on engine mode control and other settings.).
- **Yes. Is within safe bounds, was done correctly.** (this is considered proper and safe after a delete).
- **Partially. Is incomplete.** (this is considered Unsafe and can lead to fuel impingement problems, and shortened engine and/or fuel pump life).
- **Yes. Out of bounds, was done incorrectly.** (this is considered Unsafe and can lead to fuel impingement problems, and shortened engine and/or fuel pump life).
- **Not relevant to this engine model.**

Have the Power and torque level request settings been changed?

- **No.** (this is considered proper and safe after a delete).
- **Yes. Is within engine ratings.** (this is considered proper and safe after a delete as long as the Advertised and other J1939 broadcast power settings have also been edited properly to accompany this).
- **Yes. Is above engine ratings.** (this considered unsafe and will lead to a significantly shortened engine life).

--Actual Power/Torque setting: 500 HP / 1850-ft.lbs

Does the Advertised Power/Torque levels Match the actual Power/Torque settings?

- **Yes.**
- **No.** (this considered deceptive and can lead to someone assuming the engine is a different power/torque that what it is actually set to).

Have all settings located in RAM memory that are necessary for a delete been properly adjusted?

- **Yes.**
- **No.** (this is problematic and leads to silent derates and power issues).
- **Unknown. Likely NO, considering other alterations.** (this is problematic and leads to silent derates and power issues).
- **Unknown. Likely Yes, considering other alterations.** (this is considered proper and safe after a delete).
- **Not necessary for this model engine.**

Other Findings / Comments:

Summary:

- * This program lacks any necessary corrections to engine operating mode control logic. Many of these modes deal specifically with exhaust device (DOC/DPF/SCR element) heating, and they are all still active. With no editing of the engine mode control logic, the engine will continue to enter one or more of these operating modes resulting in the engine creating extra heat in the exhaust all the time by way of over-working the turbocharger and cylinders in attempts to warm up an emissions system that is no longer present. This is harmful to both the engine and the turbo, causing higher than normal friction all the time, significantly shortening engine life. It should be noted that this mistake/oversight is one of the most common (and most damaging) mistakes that is seen in bad delete programming.
 - * The actual engine power and torque are set considerably higher than what will show when connecting to the engine with the Insite or other diagnostic software. Although it is within the engines ratings, It will deceptively show 450HP and 1650-ft.lbs ... however the actual engine power/torque is set at 540HP / 1960-trq. Some of this power is derived by someone editing the flywheel torque settings, and some comes from editing injector quantity settings to fool the ecm into placing more fuel into the cylinders in an uncontrolled manner. This clearly shows a lack of someone altering power levels properly.
 - * The injector quantity vs. power has been edited deceptively. This leads to the ecm placing more fuel into the cylinders that it can account for. The result is loss of proper cylinder balancing, the ecm will lie and report higher fuel mileage numbers into the dash of the vehicle that are higher than actual. It also adds power/torque that the ecm cannot account for. This is one of the worst possible ways to edit the engine combustion cycle towards power, torque or other gains and is completely unnecessary, as there are proper methods that can be used.
 - * Engine restart limiters are still in place. This could potentially lead to a shutdown and prevention of engine re-starts without any warning. Considering there are also several codes blocked for the EGR system, this could lead someone towards incorrect diagnosis, and to believe the ecm has failed if it ever does this.
 - * Many of the engine Derate limiters are still in place. This can lead to unknown power/torque losses, and is likely the reason someone deceptively edited injector quantity vs. fuel. It shows a lack of understanding of these systems and how to properly switch them off.
 - * No proper removal of auxiliary Emissions has been done. This leads to inconsistencies in engine operation and power levels. Amonia and Nox gas combustion clamping is still in place for all engine operating modes. With the emissions systems removed, the engine will try to control these directly by altering the combustion cycle heavily... leading to unpredictable power/torque, and other issues.
 - * The injection timing has been edited incorrectly for the missing egr gas and is not at very harmful levels. It is in excess of 8+ degrees too far advanced in the active engine modes and will lead to high internal cylinder lateral friction, eventual liner fretting (on wet-liner engines such as the ISX, ISC), and eventual head gasket failure. It can also result in the engine suffering a sudden failure due to a cracked piston or failed wrist pin.
 - * The turbocharger has NOT been re-programmed for proper fuel-air mix with consideration to the missing egr gas. This will lead to the engine running too lean all the time and a shortened engine life will result.
- Overall, this program is moderately harmful to the engine and its turbocharger. This could lead to the engine unpredictably jumping engine modes and causing things like unstable conditions, power losses, silent ghost derates, possibly an over-spooling VGT turbo, inefficient combustion, excess exhaust heat produced and a shortened engine life due to incorrect injection timing, and improper fuel-air-mix. Combine all this together and this program is a recipe for disaster.