Cummins Aftertreatment Overview

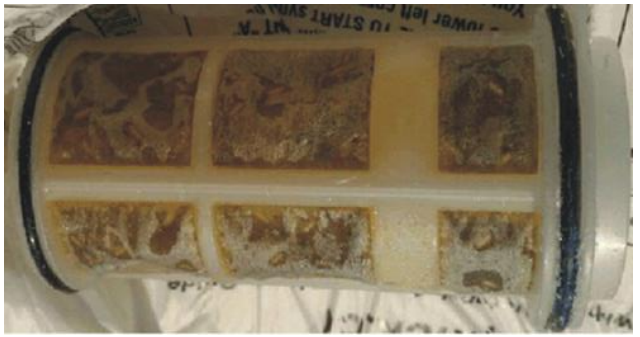
Maintenance Guidelines – ISX12

- Diesel Particulate Filter (DPF) – Replace or Clean
  - 200,000 mi (320,000 km)
  - ReCon DPF program available for 2010 EPA ISX12
- DEF Pump Filter – Replace
  - 300,000 mi (480,000 km)
  - Next slide details what is a bad and good filter at interval

Normal: Darkened filter element, Urea odor, absence of large particles, absence of hydrocarbon odor

Contaminated: Grease-like substance separated from DEF (similar appearance on both filters), Contaminant in DEF tank

Remove and clean DEF tank, flush DEF lines and replace DEF Pump Filter



Contaminated: Dark yellow filter element, likely diesel fuel in the DEF tank

Remove and clean DEF tank, flush DEF lines and replace DEF Pump Filter

DEF Quality Sensor

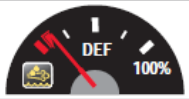
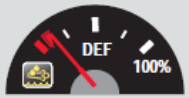
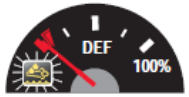
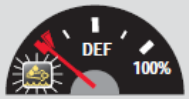
- New for 2016 EPA Regulations
  - DEF Tank Sensor Assembly for Level and Temperature now fitted with Quality Sensor
  - Quality Sensor must detect 32.5% concentration of DEF
    - Use DEF meeting ISO22241 specifications for purity and composition
    - Store DEF in a cool, dry, well-ventilated area, out of direct sunlight.
      - Optimum storage temperature is up to 77 deg F (25 deg C), temporary exposure to higher temperatures has little to no impact on the quality of DEF.
    - Expectation for shelf life is one year as long as it is properly stored
      - Potentially two if temperature does not exceed 77 deg F for extended time
  - There are engine derates associated with out of spec DEF Quality. Similar to running with Low DEF.

Engine Lamp Identification Guide.

For Cummins On-Highway, Heavy Duty and MidRange Engines With Aftertreatment.

Lamp	Description	Driver Action
	**Check Engine Lamp** Lights up to warn the driver to seek service soon. **Flashing Check Engine Lamp** Will flash for 30 seconds at key ON if maintenance is due.	Service must be performed at earliest opportunity. Vehicle may still be operated until end of shift.
	**Malfunction Indicator Lamp (MIL)** Lights up to warn the driver to schedule service soon. May light up in addition to other lamps.	
	**Red Stop Engine Lamp** Indicates that engine must be stopped as soon as it is safe to do so. **Flashing Red Stop Engine Lamp** Indicates driver has 30 seconds to stop vehicle safely before automatic engine shutdown (if the Engine Protection Shutdown feature is enabled).	Vehicle must not be operated. Arrange for immediate service.
	**High Exhaust System Temperature (HEST) Lamp** Indicates that high exhaust temperatures may exist due to aftertreatment regeneration.	Make sure exhaust pipe outlet is not directed at any combustible surface or material. If excessive odor or white vapor are present, have exhaust system inspected for leaks.
	**Aftertreatment DPF Lamp** Indicates that the aftertreatment Diesel Particulate Filter (DPF) requires regeneration. **Flashing Aftertreatment DPF Lamp** Aftertreatment DPF requires regeneration. Engine power may be reduced automatically.	1. Make sure the DPF Switch is not in the Inhibit position. 2. At earliest opportunity, bring vehicle to highway speed for at least 20 minutes. 3. If previous step is not possible, or if lamps remain illuminated, perform a parked regeneration. Note: An illuminated HEST Lamp will indicate that regeneration is underway.
	**Flashing Aftertreatment DPF Lamp & Check Engine Lamp** Aftertreatment DPF requires immediate regeneration. Engine power will be automatically reduced further.	
	**Red Stop Engine Lamp and Aftertreatment DPF Lamp** Aftertreatment DPF regeneration has not been completed successfully in a timely manner.	Vehicle must not be operated. Arrange for immediate service.

Four Stages Of DEF-Related Warnings.

Lamp	Description	DEF Gauge	Driver Action
1. 	**Solid Diesel Exhaust Fluid (DEF) Lamp** DEF level is low.		Refill DEF tank with correct type of DEF.
2. 	**Solid DEF Lamp and Check Engine Lamp** Indicates lower DEF level, incorrect DEF type or an SCR system issue. Driver will experience a mild loss of engine power.		Refill DEF tank with correct type of DEF as soon as possible. If lamps stay on, schedule service immediately.
3. 	**Flashing DEF Lamp and Solid Check Engine Lamp** Indicates that DEF level is critically low, incorrect DEF type or an SCR system issue for more than five hours. Driver will experience a severe loss of engine power.		
4. 	**Stop Engine Lamp with Flashing DEF Lamp and Solid Check Engine Lamp** Indicates that DEF level is critically low and fuel tank has been refilled without refilling DEF tank, or engine has idled for an hour or been shut down. Vehicle will be limited to a speed of 5 mph.		

How To Perform A Parked Regeneration.

If the vehicle has a DPF Switch and the DPF Lamp is flashing:

1. Park vehicle, and set up a safe exhaust area. Confirm that there is nothing on or near the exhaust system surfaces.
2. Set parking brake, and place transmission in Park or Neutral.
3. Make sure that your fast-idle and Power Take-Off (PTO) switches are off.
4. Push the DPF Switch into the ON position to start the parked regeneration.
5. Engine speed will increase throughout the duration of regeneration, and exhaust gas and exhaust surface temperatures will remain higher than normal for three to five minutes after regeneration is complete.
6. Allow up to one hour for the regeneration, and monitor the vehicle and the area around it during the process.

Note: If any unsafe condition occurs while regeneration is in process, shut off the engine immediately by depressing the clutch, brake or throttle pedal.

Reference your Cummins Owners Manual and Vehicle Owners Manual for more details.

Note: To ensure that the correct DEF is used, Cummins recommends the use of Fleetguard® Diesel Exhaust Fluid or any DEF that meets ISO22241 specifications.

Cummins

Cummins Fault Code Advisor

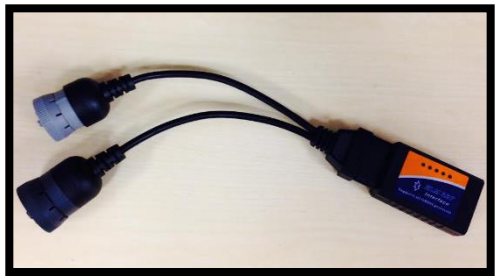
Features

- Reads both active and inactive public J1939 fault codes for Cummins engines
- Reads active and inactive public fault codes for other non-Cummins control modules on the J1939 datalink
- Clears inactive fault codes
- Displays a snapshot of engine information such as make, model, serial number, total idle hours, trip fuel information, and total crankshaft revolutions
- Allows you to share the snapshot of vehicle data with anyone via e-mail

Connecting the App to the Engine

Android device with the fault viewer app

Cable and Bluetooth adapter

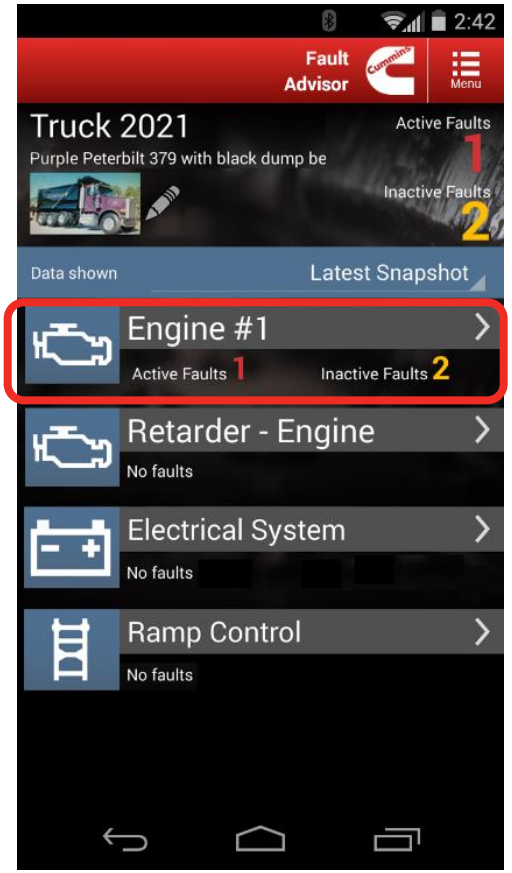


Communication via Bluetooth

Connect to diagnostic port via 9-pin adapter cable

Results

Equipment Summary



Engine #1 Faults

Engine #1 Information

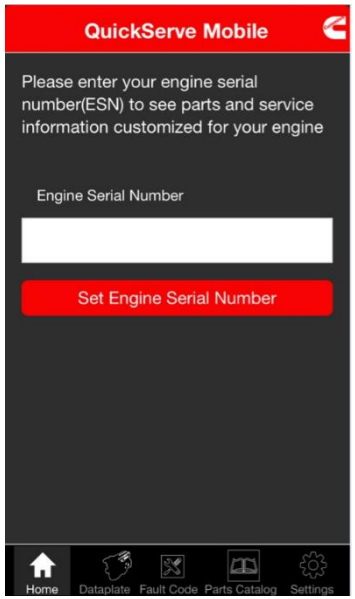
Ordering Information

- **Low cost adapter** ($30 with cable - available online)
  - Android – Bluetooth ELM327 – Released March 31st, 2015
  - IOS – Wi-Fi ELM327 – Testing Ongoing

- How To Download:
  - Go to Play Store on your Android device. Search Cummins Fault Code Advisor
- To Order: “You will need ELM327 and Cables”
  - Search the Internet for an “ELM327 OBD2 Bluetooth datalink adapter”. The price should range from $6 - $20 each.
  - Search for “J1939 9 pin Deutsch to OBD2 cable”. The price should range from $10 - $20 each.

Quickserve Online (QSOL) App

- **Released QuickServe® Online Mobile App for Apple iOS and Android Devices**
- Free App
- Just enter the engine serial number to find
  - Engine Dataplate information
  - Parts Catalog for your specific engine
  - Fault Code Analyzer (for electronic engines)
- Search “QuickServeMobile” on Apple App Store for free download

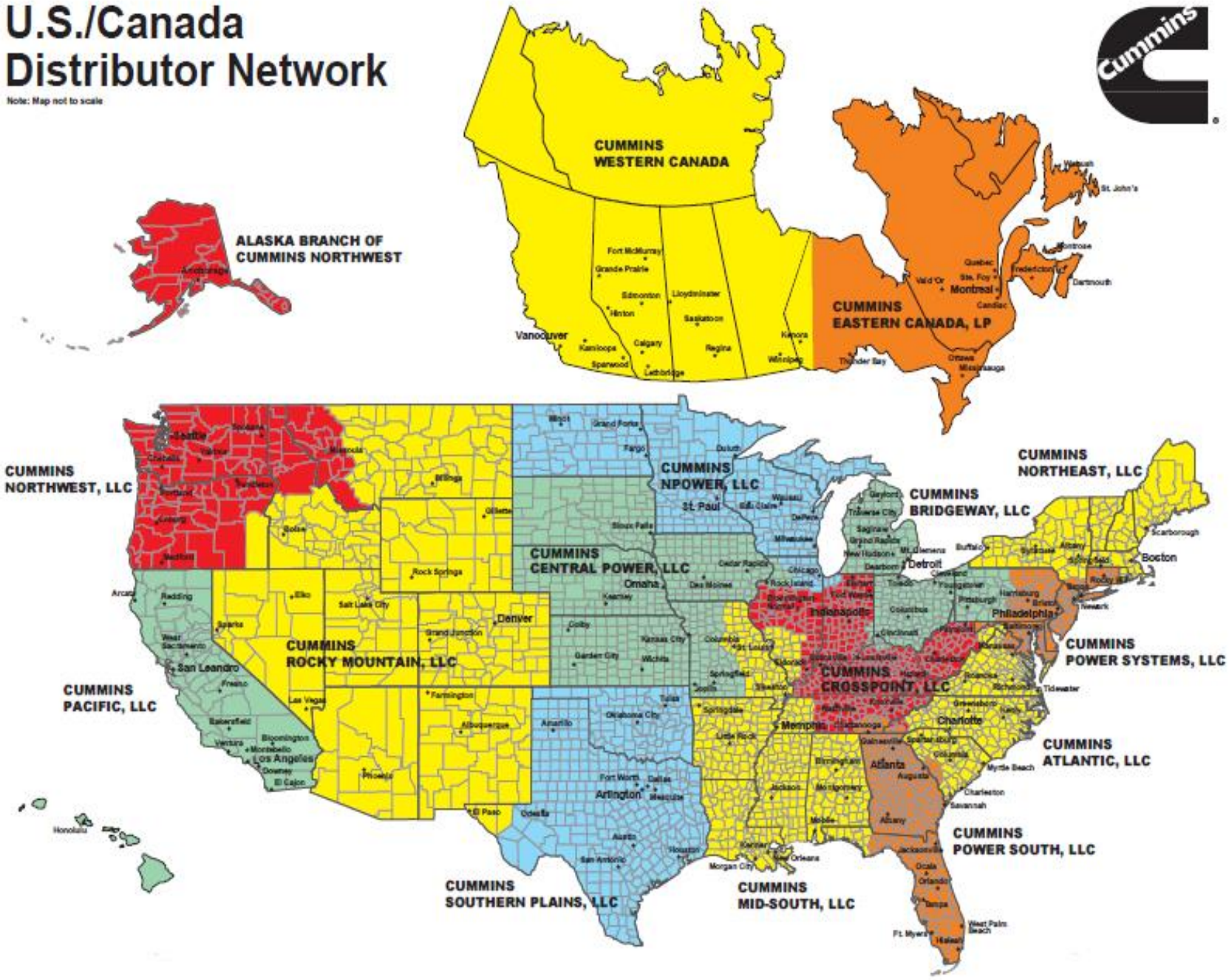


CUMMINS CARE – 1-800 DIESELS

- Question regarding your Cummins engine or need help finding an authorized repair location?
  - Call 1-800 DIESELS
  - locator.cummins.com

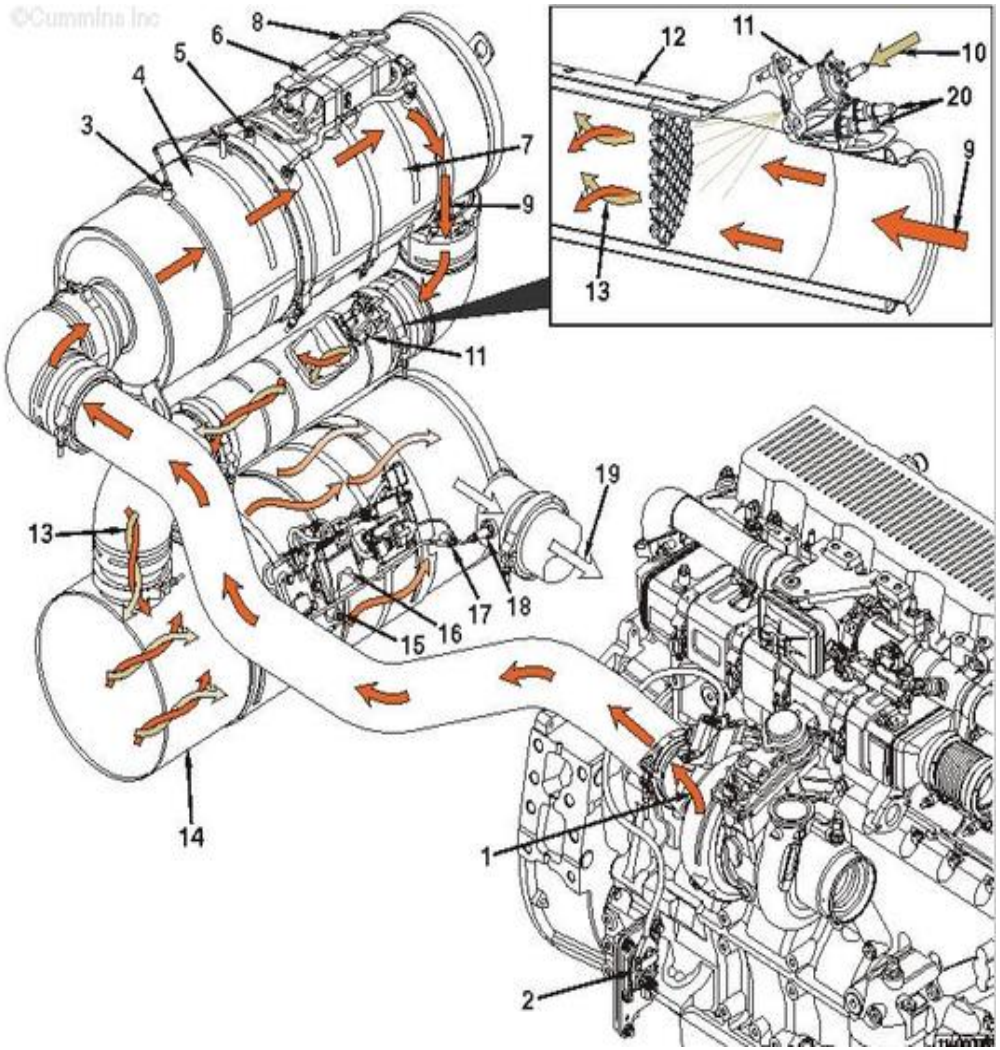
U.S./Canada Distributor Network

Note: Map not to scale



APPENDIX

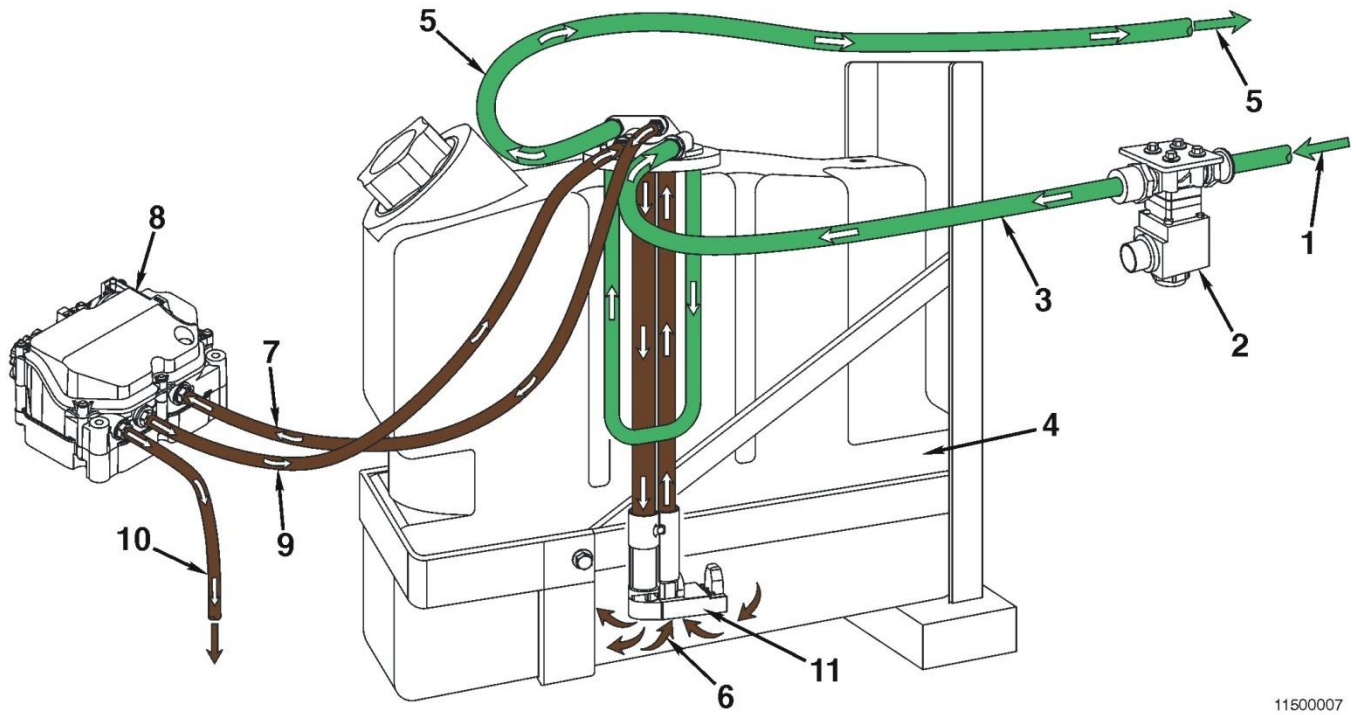
Exhaust Gas Flow on HD Engines



Aftertreatment System

1. Exhaust from turbocharger
2. Aftertreatment intake NOx sensor
3. Aftertreatment diesel oxidation catalyst (DOC) intake temperature sensor
4. Aftertreatment DOC
5. Aftertreatment diesel particulate filter (DPF) intake temperature sensor
6. Aftertreatment DPF combination pressure sensor (beneath shield)
7. Aftertreatment DPF
8. Aftertreatment DPF outlet temperature sensor
9. Exhaust gas flow from the DPF
10. Diesel exhaust fluid (DEF) supply to aftertreatment DEF dosing valve
11. Aftertreatment DEF dosing valve
12. Decomposition reactor
13. Exhaust and DEF mixture
14. Aftertreatment selective catalyst reduction (SCR) catalyst
15. Aftertreatment SCR intake temperature sensor
16. Ammonia sensor
17. Aftertreatment SCR outlet temperature sensor
18. Aftertreatment SCR outlet NOx sensor
19. Exhaust flow exiting the aftertreatment system
20. Aftertreatment DEF dosing valve coolant fittings

DEF SUPPLY DIAGRAM

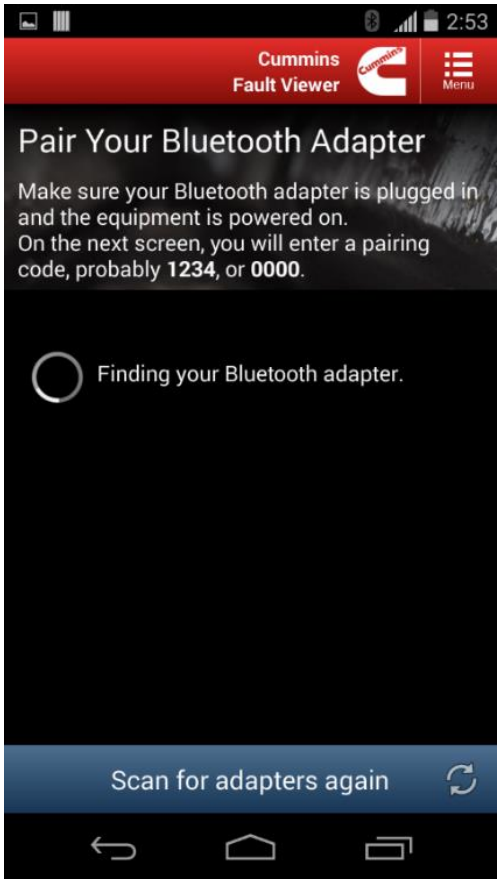


Green = Coolant Flow

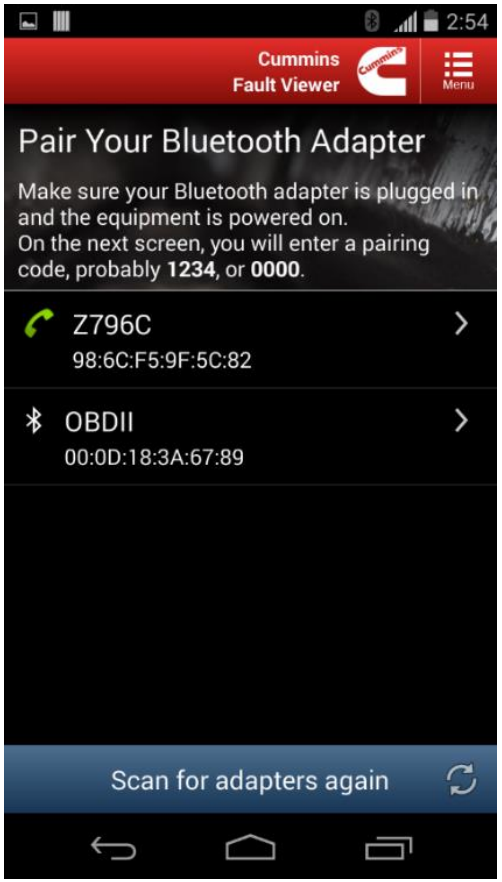
Black = DEF Flow

Steps (Cummins Fault Code Advisor)

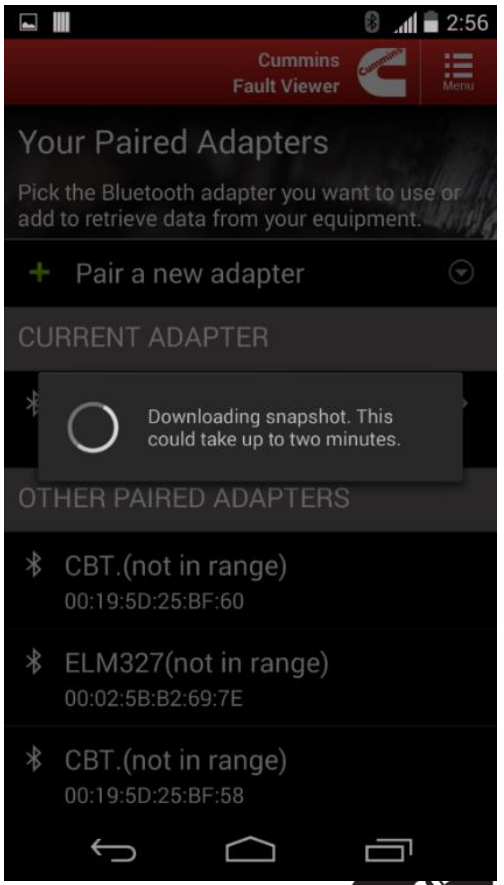
Find Adapters



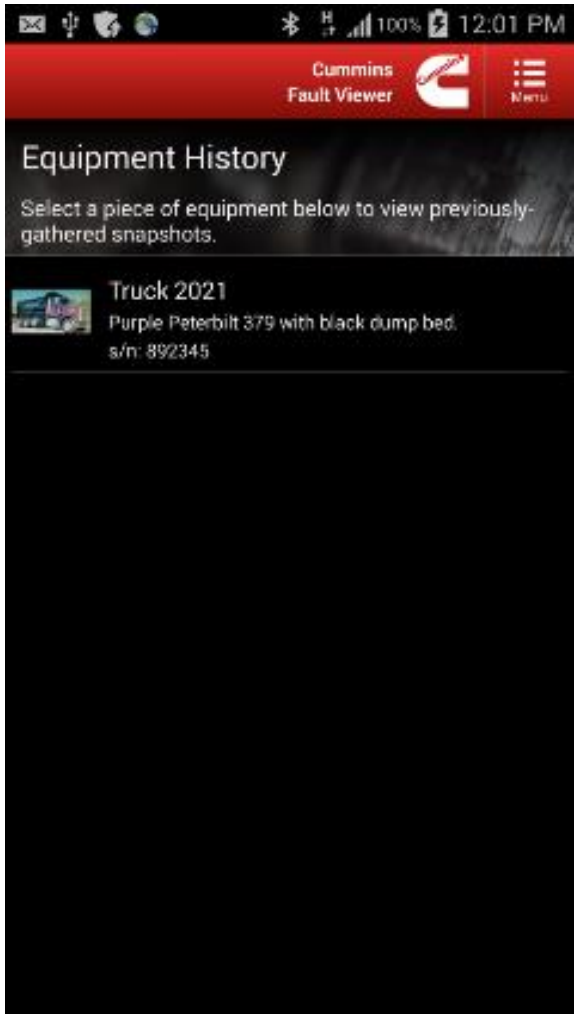
Select Adapter to Pair



Download Snapshot



Equipment History (Cummins Fault Code Advisor)



If the user connected to multiple trucks, they'll all be listed here

The snapshot history shows all the snapshots for that truck