

By Jerry Bisbee – ATC Tech Trainer

## “Just What the Doctor Ordered”

EPA 04 DDEC V Series 60 engines are equipped with a Variable Nozzle Turbocharger (VNT). This device incorporates a variable vane set in the exhaust housing that is used to control both turbocharger speed and exhaust back-pressure. This allows the electronic control module (ECM) to monitor and control both Exhaust Gas Recirculation (EGR) flow and turbocharger boost pressure in the intake manifold. The vane set in the VNT turbocharger is controlled by an air operated actuator that is mounted on the turbocharger and connected to the vane set control arm by an adjustable linkage rod (see Figure 1). Until recently, this linkage was not adjustable in the field. The linkage was set in a special fixture at the factory. If the actuator failed or the linkage became misadjusted the entire turbocharger assembly had to be replaced.



### ■ New DDDL Turbocharger Actuator Service Routine

Recently a new version of Detroit Diesel Diagnostic Link (DDDL 6.44TA) was sent to shops which had a registered copy of Detroit Diesel Diagnostic Link

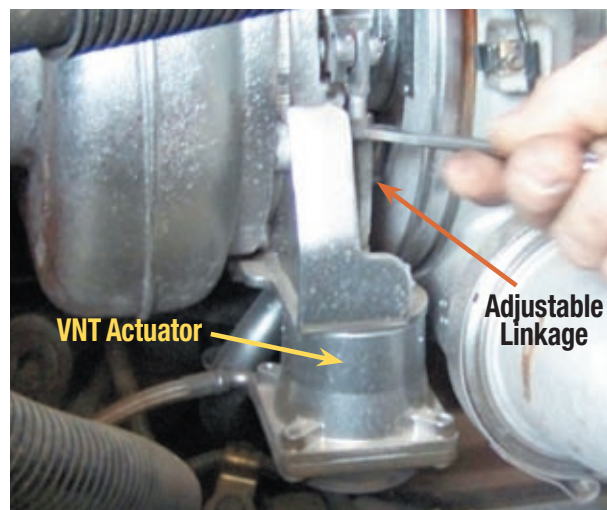


Figure 1

6.0-6.4. This software adds a “Turbocharger Actuator Adjustment” service routine. This service routine may be performed on any DDEC V engine regardless of displacement. When this service routine is performed according to the instructions, the operation of the VNT turbocharger is optimized to match the engine. Typically, the engine will perform

better and many of the “Code 39” issues associated with this engine will be eliminated. The adjustment procedure requires re-programming the ECM to engine serial number O6R1999999. This is a special calibration that is only set up to allow the software to run the service routine. The ECM will have to be reprogrammed back to the correct engine serial number after the calibration service routine is performed. **This calibration cannot be left in the ECM after finishing the service routine. It has very low horsepower and torque. This adjustment procedure must be performed by dealerships who have a Detroit Diesel Re-programming Station.**

### ■ Pre-calibration Inspection

Before the VNT actuator calibration is performed on the engine there are several checks that should be made.

**1. The entire air intake system should be tested for leaks.** Disconnect the charge-air-cooler hose from the turbocharger outlet and connect a test plug from the charge-air-cooler test tool set J-41473 into the open end of the hose. Torque all the charge-air-cooler hoses to proper specs. Connect the air regulator from J-41473 to the test plug and charge the intake system to 30psi (see figure 2). Spray a soap mixture on all intake hoses, intake manifold gaskets, and the entire surface of the charge-air-cooler including the end manifolds. Also spray the soap mixture on the EGR hoses, Delta Pressure Sensor hoses, EGR venturi fittings, and the EGR mounting flange. Repair any leaks found. If there are leaks found on the charge-air-cooler perform a leak test on it by itself. Plug the outlet side of the charge-air-cooler with a test plug from J-41473. Pressure the charge-air-cooler to 25psi and close the shut-off valve on the air regulator. Time the pressure drop. **If the pressure drops more than 5psi in 15 seconds the charge-air-cooler is defective and should be replaced.**



Figure 2

**2. Check fuel pressure and fuel flow.** Disconnect the fuel temperature sensor located in the bottom of the fuel pump. Remove the sensor and connect a fuel pressure gauge that will read 0-50psi. Run the engine while monitoring fuel pressure. The fuel pressure specification for the EPA 04 Series 60 engine

is 18 psi at 600 rpm to 27 psi at 2100 rpm. If the fuel pressure is below these values check the fuel return flow. Disconnect the fuel return line somewhere between the engine and the tee-fitting that splits the return flow to the two tanks if the vehicle is equipped with two fuel tanks. Put the fuel return line into a 5 gallon container. Run the engine at 1000 rpm and measure the fuel flow for 1 minute. The return fuel flow should be at least 1 gallon per minute. If the flow is less than 1 gallon per minute. Replace the fuel filters and retest.

**3. Test the VNT actuator for air leaks and proper operation.** Make sure the vehicle’s air system is fully charged. Connect Detroit Diesel Link to the truck and open the “Activate Outputs” screen. Activate the VNT output and make sure the actuator goes fully open and fully closed when commanded to do so. Listen for air leaks at the Variable Pressure Operating Device (VPOD), the air line that connects the VPOD to the VNT Actuator, and the VNT actuator. If the VNT actuator is leaking it must be replaced. Follow the instructions in *Detroit Diesel Technical Service Letter 09TS-4* to replace the actuator.

### ■ Perform the VNT Actuator Procedure Using DDDL 6.44TA

Open DDDL 6.44TA and open the Turbocharger Actuator Service Routine. Follow the onscreen instructions exactly. There are several safety warnings that must be complied with and checked off before the routine will run. The intake hose must be removed from the turbocharger and a protective shield (J-26554-A) installed on the turbocharger intake. The truck’s air conditioning system must be turned off. The engine must be warmed up before the service routine will run. A progress screen will monitor engine temperature and will allow the routine to start once the engine is warm enough. Each time the routine tests the engine boost system it will ramp the engine speed up to 1600 rpm. There will be a 5 minute cool down each time before the test will run again. The

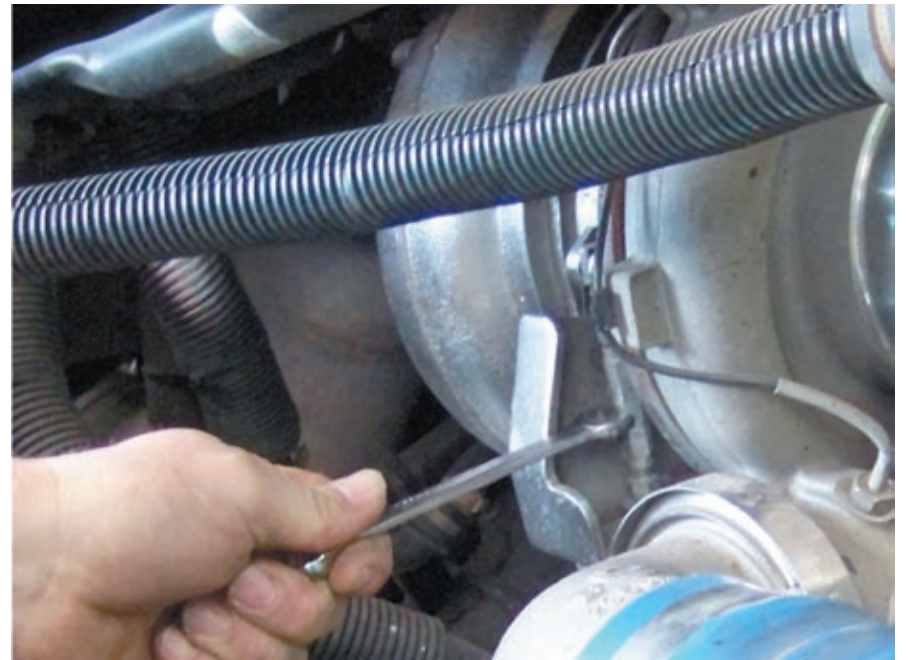


Figure 3

adjustments may be made to the actuator linkage during the cool down period. The service routine will display how many turns to lengthen or shorten the linkage adjustment (see Figure 3). Before starting the routine spray penetrating oil on the linkage and make sure that the jam nuts will break loose and the adjuster will turn. **Note: this adjuster is not a turnbuckle; both ends are right-hand thread, but one end is fine thread and the other coarse thread. Turning the adjuster clockwise lengthens the rod and counterclockwise shortens the rod.**

*Detroit Diesel Technical Service Letter 08TS-29 REV, issued February 3, 2009* provides step-by-step instructions for running the service routine and making the actuator adjustment.

### ■ Conclusion

If you are the owner or operator of a truck equipped with an EPA04 Series 60 engine, having this entire procedure performed on your truck will optimize the air intake system’s performance. This procedure should be performed each time the engine is “tuned up”. This procedure along with periodic valve and injector adjustment may be “Just What the Doctor Ordered.”

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