

AfterSales Diagnostic Sheet



MAS002310 (BOL 20-11)

From: Aftersales - TSO
To: Maserati Network
Auburn Hills, MI | October 5, 2020

Turbocharger anomalies

Issue: Turbocharger anomalies

Models: M157/M156/M161 (Gasoline engines)

NOTE: The below in depth diagnostic procedures are to be used along with the procedures listed in the Workshop Manuals if a more comprehensive diagnosis is required.

Important: A BOL must be opened prior to removal of any parts (components). Please remember to attach pictures/ videos showing in detail the issue.

1. Customer complaint: DTC P0299 and/or P0244 in ECM with engine warning light on

Issue description: Engine Warning Light On and reduced engine performance

Conditions: While driving possible engine warning light on with reduced engine performance

ECU errors:

In ECM P0299-00-Turbocharger/Supercharger "A" Underboost Condition Bank 1 and/or P0244 "Turbocharger Wastegate Solenoid Performance"

Troubleshooting:

- When Monitored
 - While the engine is running, the ECM performs the following checks:
 - a) The ECM compares the value of the pressure measured upstream of the throttle valve with the requested value
 - b) The ECM compares the ratio between the flow rates measured by the two MAF sensors

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- Set Condition:

If the difference between the desired pressure upstream of the throttle valve and the measured pressure is greater than a certain threshold (about 0,25 bar) and the ratio between the flow rates measured by the two MAF sensors is between 1.1 and 2 for more than 3 s the DTC P0299 will set

If the difference between the desired pressure upstream of the throttle valve and the measured pressure is lower than a certain threshold (about -0,25 bar, i.e. the measured pressure exceeds the target one) and the ratio between the flow rates measured by the two MAF sensors is between 1.1 and 2 for more than 3 s the DTC P0244 will set

Suggested checks:

- 1) Is the customer complaint confirmed?
- 2) Attach to the BOL the DTC and parameters report from the ECM
- 3) Check the wiring harness integrity (continuity, absence of short circuits to ground or battery, absence of loose pins) of the wastegate valve and on MAF sensors (Figs. 1 and 2)

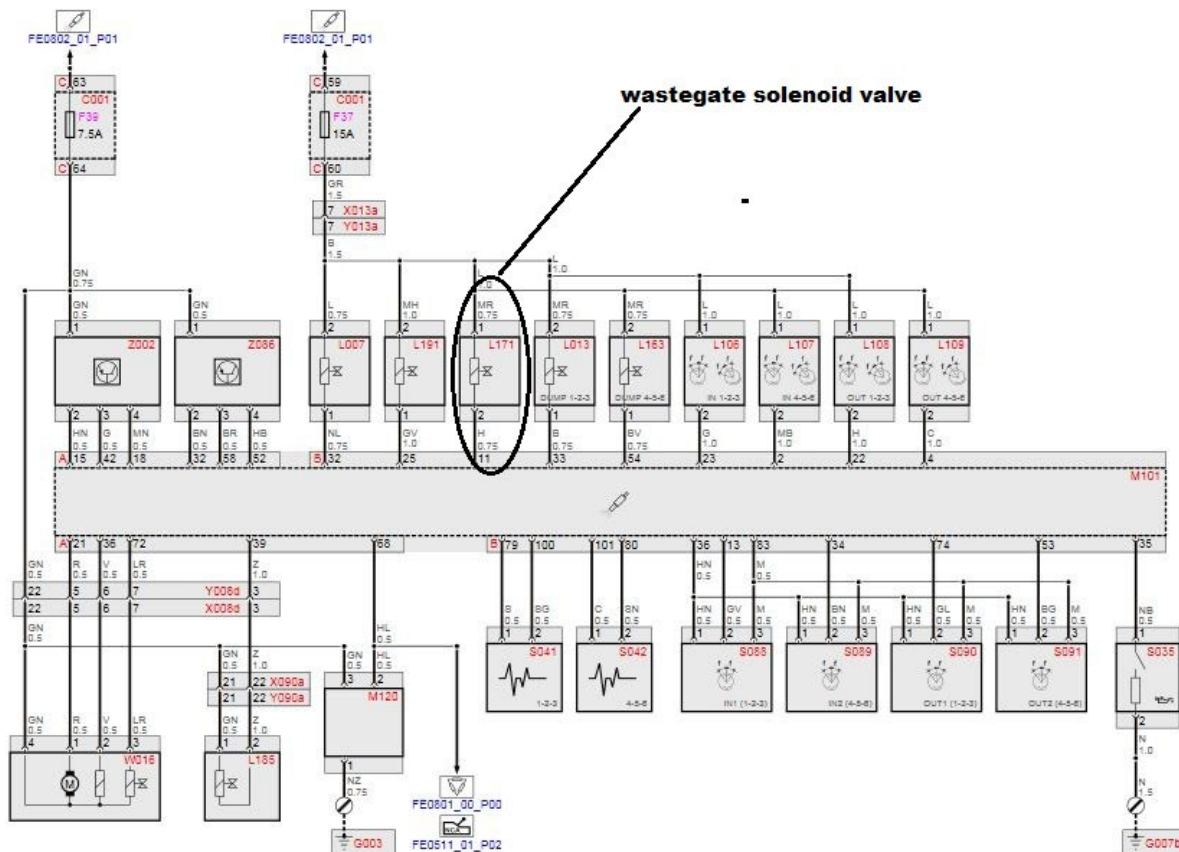


Figure 1 - FE0802 – wiring diagramEngines Fuel electronic management

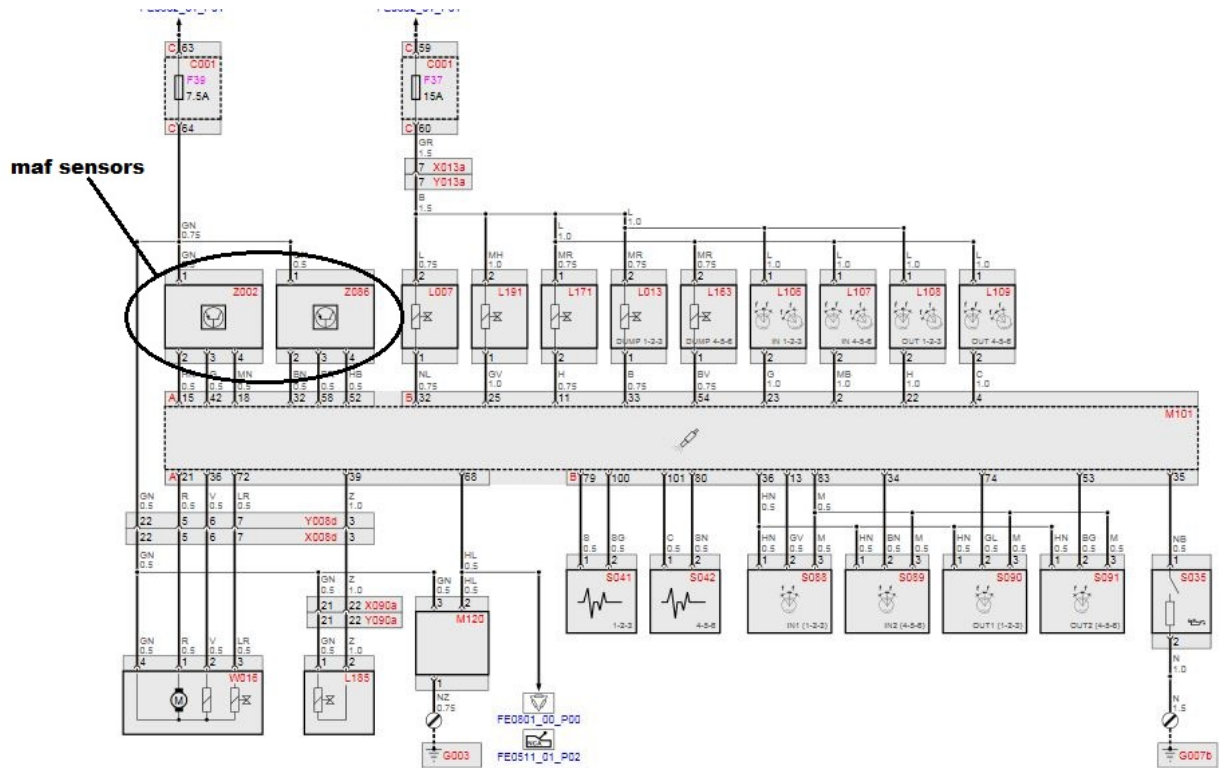


Figure 2 - wiring diagram Engines Fuel electronic management

If there are no anomalies go to the next step

4) Check if the clips of the wastegate are present as figure 3

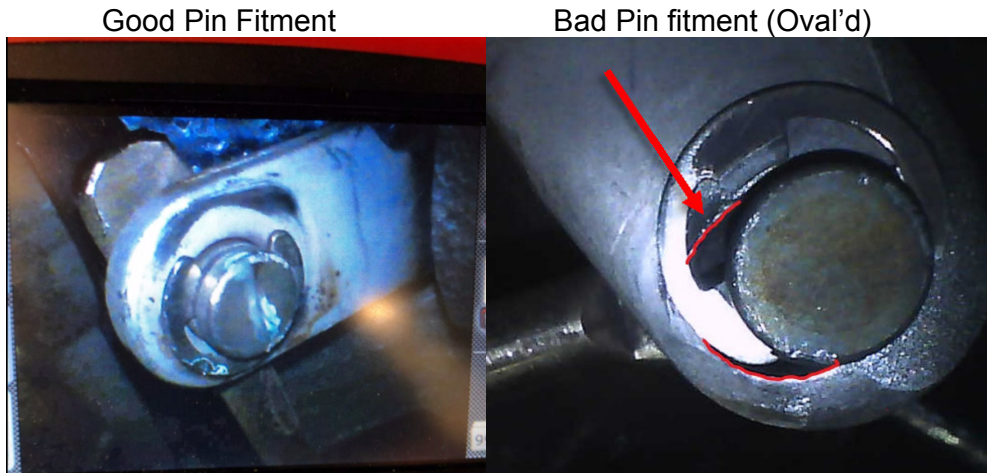


Figure 3 - Clips of the wastegate

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Remove Safety clip and take a picture of the Wastegate lever to actuator pin fitment. Fig. 3-1 shows example of "Good vs. Bad". In the "Bad" example you can see the hole is oavaled out (outlined in RED). If OK, then check the following:

- Check for corrosion or rust on the Wastegate lever to actuator pin
Operate the Wastegate lever with vacuum while monitoring for binding.



If there are no anomalies go to the next step

- 5) Activate the "sport mode" and check that the sound from the exhaust varies as expected
- 6) Disconnect the wastegate vacuum system from the point shown in figure 4 and check using a vacuum pump (for ease of access, install the pump after the output of the wastegate modulator):
 - the integrity of the vacuum system
 - If the wastegate valves, applying the vacuum with an external pump, move and close simultaneously. Also check, when removing the vacuum applied, that the wastegate valves return to the rest position simultaneously

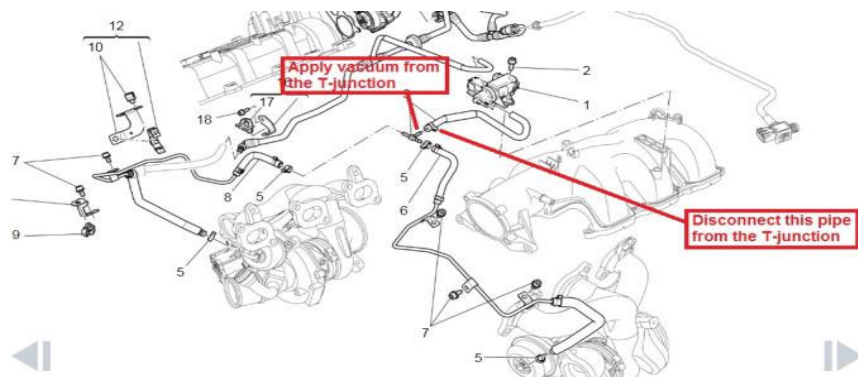


Figure 4 – Vacuum pump positioning

If there are no anomalies go to the next step

- 7) check if:
 - the air filter boxes are mounted correctly
 - the air filters are installed correctly
 - air filters are original

If there are no anomalies go to the next step

- 8) Check if there are any leaks in the intake and exhaust systems, if necessary use a smoke tester to check the highlighted areas below as shown in Fig.5. Verify that the V-Clamp in-between the turbocharger and the catalytic converter is correctly tightened and does not show any misalignment or exhaust leaks.

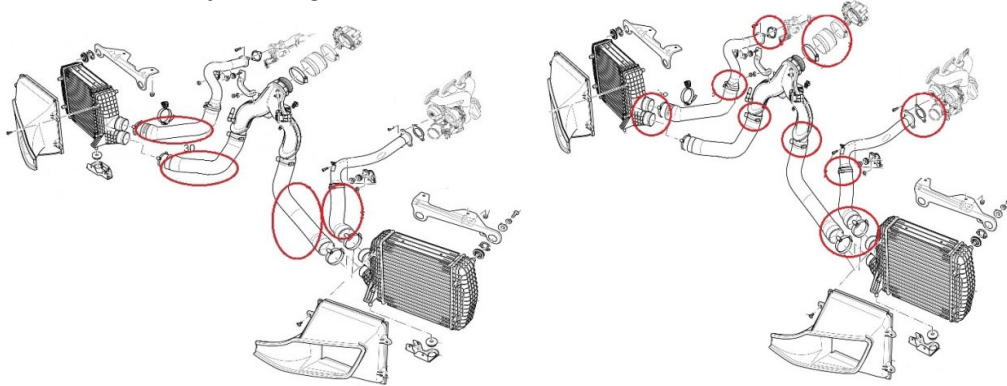


Figure 5: – Intake System



Possible air leaks on an intake line underneath the protective sleeve of the hose.

- 9) If in the previous points there are no anomalies, delete the DTC's and perform a road test recording the following ECM parameters:
 - 1 0212 - Engine Speed;
 - 2 0246 - Air-mass flow HFM 2; (If the car has the MAF sensors)
 - 3 0245 - Air-mass flow HFM; (If the car has the MAF sensors)
 - 4 0239 - Pressure upstream throttle valve measured;
 - 5 023A - Desired pressure upstream throttle valve;
 - 6 027C - Actual lambda value (upstream catalyst);
 - 7 027D - Actual lambda value (upstream catalyst); bank 2;
 - 8 027E - Nominal lambda value (upstream catalyst);
 - 9 0276 - Lambda control factor
 - 10 0277 - Lambda control factor bank 2

With a sample time of 100 ms during an acceleration in third gear:

- start the acquisition with key in RUN position
- start the engine
- drive the car, engage 3rd gear (manual mode)
- at 2000 rpm release the accelerator pedal
- push the accelerator pedal up to 100% until you get over 4500 RPM

Attach the record in pdf format to the BOL

- 10) Check if the turbo shaft has excessive free-play or if the vanes of the turbo are damaged (attach photos and videos). To perform this check, it is not necessary to remove the turbo but you can access from the catalyst side as shown in figure 6
Next, with an endoscope, inspect the status of the honeycomb of the catalytic converter to make sure there is no external contamination or damage.



Figure 6: turbo shaft from catalyst side and inside the catalyst

- 11) Next, using an endoscope, check the compressor impeller (suction side). To perform this check it is not necessary to remove the turbo. It can be accessed by removing tube # 9 or 10 (lower air duct) shown in figure 7.

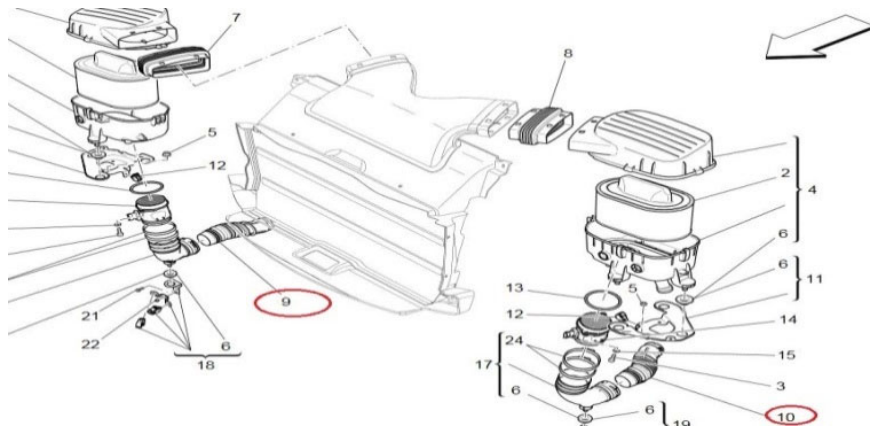


Figure 7 - lower air duct

2 Customer complaint: whistle noise during acceleration - unstable engine speed

Issue description: whistle noise during acceleration unstable engine speed. Possible MIL on and reduced engine performance

Conditions:

- While driving, noise from the engine compartment
- unstable engine speed
- reduced engine performance

ECU errors: No DTC's in the ECM

Troubleshooting:

Suggested checks:

- 1) Is the customer complaint confirmed?
- 2) Attach to the BOL the DTC and parameters report from the ECM.
- 3) Check if the clips of the wastegate are present as figure 1



Figure 1- wastegate clip

If there are no anomalies go to the next step

- 4) Activate the "sport mode" and check that the sound from the exhaust varies as expected.
 - 5) Disconnect the wastegate vacuum system from the point shown in figure 2 and check using a vacuum pump (for ease of access install the pump after the output of the wastegate modulator):
- Check the integrity of the vacuum system

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- If the wastegate valves, applying the vacuum with an external pump, move and close simultaneously. Also check, when removing the vacuum applied, that the wastegate valves return to the rest position simultaneously

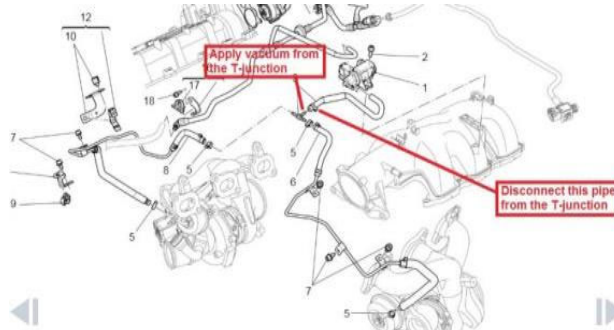


Figure 2 – Vacuum pump positioning

If there are no anomalies go to the next step

6) Check if:

- the air filter boxes are mounted correctly
- the air filters are installed correctly
- air filters are original

If there are no anomalies go to the next step

- 7) Check if there are any leaks in the intake and exhaust systems, if necessary use a smoke tester to check the highlighted areas shown below in Fig.3. Verify that the V-Clamp in-between the turbocharger and the catalytic converter is correctly tightened and does not show any misalignment or exhaust leaks.

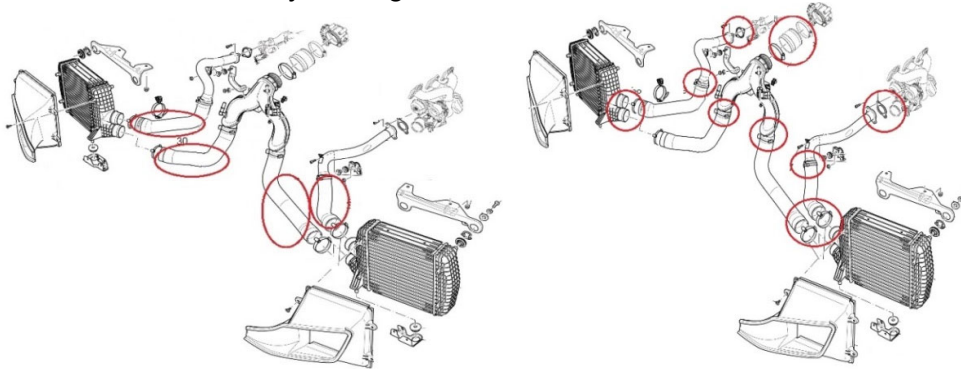


Figure 3 – Intake System



Possible air leaks on the intake line underneath the protective sleeve of the hose.

8) If in the previous points there are no anomalies, delete the DTC's and perform a road test recording the following ECM parameters:

- 1 0212 - Engine Speed;
- 2 0246 - Air-mass flow HFM 2; (If the car has the MAF sensors)
- 3 0245 - Air-mass flow HFM; (If the car has the MAF sensors)
- 4 0239 - Pressure upstream throttle valve measured;
- 5 023A - Desired pressure upstream throttle valve;
- 6 027C - Actual lambda value (upstream catalyst);
- 7 027D - Actual lambda value (upstream catalyst); bank 2;
- 8 027E - Nominal lambda value (upstream catalyst);
- 9 0276 - Lambda control factor
- 10 0277 - Lambda control factor bank 2

With a sample time of 100 ms during an acceleration in third gear:

- start the acquisition with key in the RUN position
- start the engine
- drive the car, engage 3rd gear (manual mode)
- at 2000 rpm release the accelerator pedal
- push the accelerator pedal up to 100% until you get over 4500 RPM

Attach the record in pdf format to the BOL

9) Check if the turbo shaft has excessive free-play or if the vanes of the turbo are damaged (attach photos and videos). To perform this check, it is not necessary to remove the turbo but you can access from the catalyst side as shown in figure 4. Next, with an endoscope, inspect the status of the honeycomb of the catalytic converter to make sure there is no external contamination or possible damage.



Figure 4 - turbo shaft from catalyst side and inside the catalyst

10) Next, using an endoscope, check the compressor impeller (suction side). To perform this check it is not necessary to remove the turbo. It can be accessed by removing the tube # 9 or 10 (lower air duct) shown in figure 5.

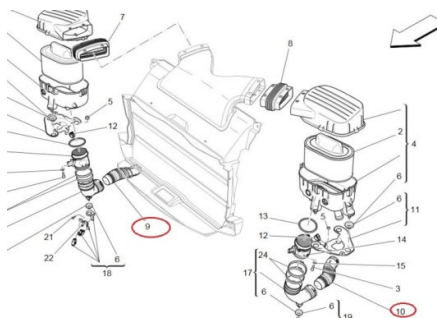


Figure 5 - lower air duct

Cosiderations: If there are no anomalies with:

- Wastegate actuator
- Vacuum system
- Leaks in the intake or exhaust system

The turbocharger needs to be replaced. The warranty card with proof of the service coupons or any invoice of the services made outside the Maserati service network are requested as BOL attachments, in addition to the outcome of the above checks.