

[Common, Software & diagnosis]

P0171, Bank1 system lean diagnostic trouble code (DTC)

<https://bekomcar.com/en/tutorial/pdf/45/>

⚠ Driving with P0171 code for long time may result in damage engine system.

P0171 diagnostic trouble code is caused by either fuel or air delivery system. P0171 means the engine is running lean, meaning too much air is coming into the engine.



Engine control module (ECM)

The system controlling the automobile engine is called Engine Control Module (ECM) or Powertrain Control Module (PCM). The ECM is programmed to ensure the engine is running in optimal condition. One of the key missions of ECM is the perfect combustion with the right mixture of fuel and oxygen by completely burning fuel and leaving no left over fuel or air.

Stoichiometric index

This perfect ratio is called stoichiometric index. For gasoline engine, the stoichiometric air-fuel mixture is about 14.7:1. What this means is that 14.7 grams of air for one gram of fuel is the perfect ratio. ECM controls the injector opening time to maintain the 14.7:1 ratio.

System lean or rich

For 4 cylinder gasoline engine. If more air is flowing into the engine, then ECM injects more fuel to match the 14.7:1 ratio. This is what we are calling the engine is running lean possibly producing - P0171 DTC. On the other hand, if too little air is coming into the engine then injects the less fuel. We say the engine is running rich with possible DTC P0172.

Possible causes

1. Dirty Mass Air Flow (MAF) sensor.
2. Vacuum leak after the MAF sensor.
3. PCV valve stuck, loose connection, leak, hose leak.
4. Dirty fuel filter, fuel pump malfunction, fuel line clogged.
5. Injector malfunction or leak, low fuel pressure.

Possible solutions

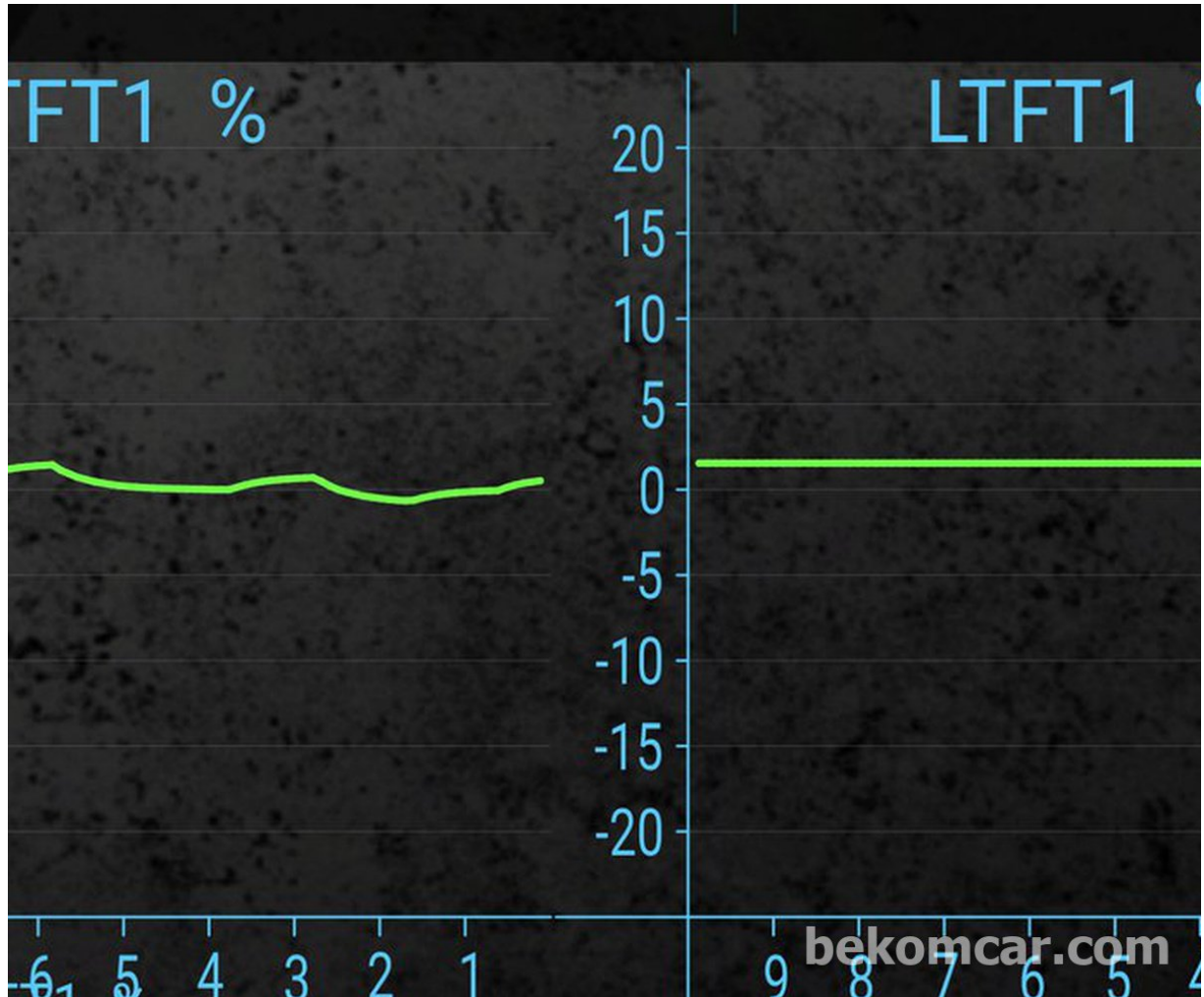
1. Clean the mass air flow sensor.
2. Inspect vacuum leak and fix/replace PCV valve, hose, and connectors.
3. Test fuel pressure, replace pressure regulator, fuel filter and/or fuel pump.
4. Test and replace the oxygen sensors.
5. Test injector leak, replace injector hose, connectors and injectors.

Further readings

1. Learn the basics of fuel trims to better understand the issues.
2. Learn short term fuel trim (STFT) and long term fuel trim (LTFT).
3. Also learn P0172 system too rich condition.

Notes. Above explanation is for gasoline internal combustion engine. Diesel and tuned engines may not be applicable to above.

Step2



References

1. <https://www.obd-codes.com/p0171>
2. <https://www.samarins.com/diagnose/p0171.html>
3. <https://www.youtube.com/watch?v=tPZb1uWu9oo>
4. <https://www.youtube.com/watch?v=mM6j7E5vE7s>
5. <https://www.youtube.com/watch?v=pIJdCZgEiys>

Tags

#내연기관, #하이브리드, #LPG, #디젤, #휘발유, #CNG

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7. 산소센서 전체적인 배우기
8. Global OBDII, Pete Meier & Jerry Truglia
9. 차량떨림 과 간헐적인 경고등 발생
10. P06A6 Sensor Reference Voltage A Circuit// 5V Reference circuit

P0102, P0103: Mass air flow (MAF) sensor
 P0107, P0108: Manifold absolute pressure (MAP) sensor
 P0133, P1157, P2238, P2252, P2A00: Air fuel ratio (A/F) sensor (Sensor 1)
 P0134, P0135: Air fuel ratio (A/F) sensor (Sensor 1) heater
 P0137, P0138, P0139: Secondary HO2S (Sensor 2)
 P0141: Secondary HO2S (Sensor 2) heater
 P2648, P2649: VTEC system
 P0401, P0404, P0406, P2413: Exhaust gas recirculation (EGR) system
 P0443: EVAP canister purge valve .

July 6, 2022, 11:50 a.m., #C1,322, (@sunjoo.moon)

도둑공기 체크 할 때는 꼭 브레이크 부스터까지 하도록 한다. .

June 18, 2022, 7:40 p.m., #C1,229, (@sunjoo.moon)

P0171 혹은 P0172는 정도와 지속되는 시간에 따라서 산소센서부터 시작하여 촉매까지 데미지를 줄 수 있다. 가벼운것 같으면서 상당히 심각한것이다. 그사이에 연비가 좋지 않고 출력문제등 여러가지 운행관련 이슈들이 동반되기도 한다. 고장코드 (희박, 농후) 자체도 중요하지만 이로인한 합병증이 훨씬 더 무섭다. .

June 9, 2022, 5:52 p.m., #C1,135, (@sunjoo.moon)

벤츠의 경우 차종에 따라서는 +-5.0%에도 시스템 희박 혹은 농후 코드가 발생하는경우도 있었다. 차종별 특징이 다 다른것 같다. 엔지니어가 초기에 허용치를 어느정도 까지 프로그램 했느냐에 P0171, P0172 고장코드 발생환경은 달라진다. .

June 9, 2022, 5:50 p.m., #C1,134, (@sunjoo.moon)

도요타의 경우, STFT + LTFT 합한 값이 +30% 그리고 -35% 일 경우 CEL, Check Engine Light 이 표시된다. 혼다의 경우 +18.8% 정도이다. 각 메이커 및 차량별 Total Fuel Trim 값 한계값이 다르다. 이 모든것은 PCM 프로그램에 달려있다. .

March 6, 2022, 2:37 p.m., #C514, (@sunjoo.moon)

☎ SunJoo Moon , Edit Date: June 9, 2022, 5:54 p.m.

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