

Tachometer Pointer Fluctuation

Fault Description:

For a Benz W140 S320, the tachometer pointer fluctuates when shift during driving. When engine speed reaches 4000r/min, the vehicle speed can only reach 100km/h.

Fault Diagnosis:

- 1) After checking, we found out that the transmission failed to shift normally. Regarding this fault, we firstly test the transmission ECU by diagnostic tool but there's no any fault memory present in the system. Then we test related solenoid valve and circuit. There's no error either. Above tests show the transmission ECU works normal. Then we carry out the stall test to the transmission. When transmission at D or R position, stall speeds are both around 1980r/min. It indicates the possibilities of insufficient engine output power or damaged torque converter. According to our experience, there's little chance for torque converter to be damaged. So we focus on engine output power.
- 2) The main reason for fluctuation during shift is the mixture not stable, sometimes rich, and sometimes lean. To check the Air/Fuel ratio, we measured the signal voltage of oxygen sensor and it is OK. Then we test the signal voltage of Air flow meter by digital multimeter and found out that the signal voltage stays 1.9V no matter the engine is at idle or acceleration. Thus, we unplug the Air flow meter to test (engine automatically enters safety mode when no signal received from Air flow meter). Then the shift works great. Vehicle speed reaches 120km/h when engine speed is 2500r/min. Transmission can shift to high gear. Take down the Air flow meter to check but it's quite clean. It's estimated the internal electronic circuit is damaged.
- 3) After replacing the Air flow meter, the fault is successfully removed.

Summary:

Above fault is caused by the Air flow meter. As Air flow meter detects air input at partial load, it produces too lean mixture at engine acceleration. The engine control unit determines it's at heavy load based on the throttle opening and engine speed and will increase the injection time accordingly. When an appropriate mixture A/F ratio has been detected by the oxygen sensor, it takes the Air flow meter and engine speed signals as the main parameters for injection quantity. When engine control unit determines the engine is at light load, it reduces the injection time, thus the fault happens.