



Tech Tip

TPMS 170

MONITORING TIRE PRESSURES System Anomalies Can Promote Diagnostic Challenges

Many vehicle owners are not aware that their vehicle is equipped with a Tire Pressure Monitoring System (TPMS) until the horseshoe-shaped light with an exclamation point in the center is illuminated. At that point they panic and call their repair shop, where they are made aware of the on-board technology. The popularity of the system and the required service is about to change. In 2007, seventy percent of the vehicles were equipped with the system, and in 2008 one-hundred percent of the vehicles under 10K GVW were equipped with the system. With an estimated battery life of 5–7 years, many of the sensors are nearing the end of their life expectancy and will require sensor replacement, as the sensor batteries are not a replacement item. Fortunately, some new sensor technology can greatly reduce the cost of sensor replacement compared to the original equipment design sensor. Ask your Mighty representative about his TPMS sensor program.

The information contained in this writing will illustrate some challenges the technician will face when servicing the tire pressure monitoring system. There can be numerous reasons for an illuminated sensor light, and the technician must be familiar with those conditions to accurately diagnose the system.

TIRE INFLATION PRESSURE

When the low tire pressure light is illuminated, the first step in the diagnostic process is to verify that the tires have the correct air pressure. The recommended tire pressure is usually displayed on a decal/placard on the driver's side door post or door edge. The recommended pressure will be referenced as Cold Tire Pressure. The definition of Cold Pressure is a tire that has been stationary for a minimum of three hours, or driven less than one mile at moderate speeds. Tire pressure changes in relation to temperature. Direct sunlight on a tire can affect tire pressure. For every 10 degrees of change in ambient temperature, the tire pressure changes 1 psi. For example: a 10 degree F increase in temperature will result in a 1 psi tire pressure increase. If the vehicle is sitting in a warm shop and the outside ambient temperature is 30 degrees F, it may be necessary to raise the tire pressure 3 psi to insure the tire pressure remains at the recommended 35 psi when subjected to the cooler ambient temperature. It is not uncommon for the tire pressure to change 3-5 psi from a cold setting to a reading taken after the vehicle has been driven for several miles. Seasonal changes in temperature can affect the tire pressure, resulting in an illuminated warning light. Due to seasonal temperature changes, it is not uncommon for tire

pressure to vary 1-2 psi per month. In 5-6 months the pressure may vary enough to illuminate the low tire pressure warning lamp. Check the air pressure before you get too deep into the diagnostics. Once the pressure has been adjusted, it may be necessary to drive the vehicle for a few miles to turn out the low pressure warning lamp. Altitude is another concern, as tire pressure gauge readings increase approximately 1 psi for every 2,200 feet of altitude increase above sea level. When these conditions are present, the gauge readings must be compensated for. Never set the tire pressure below the vehicle manufacturer's recommended pressure documented on the placard, regardless of tire or ambient temperature.

NITROGEN FILL

Nitrogen is widely used for inflating tires, and its use in passenger cars was pioneered in automobile racing. In fact, famed mechanic and car designer Henry "Smokey" Yunick is credited with introducing the use of nitrogen for tire inflation to automobile racing. Tires inflated with nitrogen will exhibit less of a pressure change due to changes in the tire or ambient temperature. Nitrogen is an acceptable fill and it is compatible with the TPMS sensors.

When deflating a tire and replacing the compressed air with nitrogen, make certain the vehicle is supported on a lift or jack stands. The reason is...with some of the low profile tires, damage can occur to the sensor if the weight of the vehicle is placed on the sensor.

SENSOR LEAKAGE

The TPMS sensor seal is often the source of leakage, promoting an illuminated sensor light. Unlike valve stems that get replaced each time a new set of tires are installed, the TPMS sensors are usually neglected until leakage occurs. The sensor seals age from the same elements that attack and render a valve stem defective. Sensor repair kits containing a new grommet, washer, stem cover, valve core and cap are available and that should be a part of your maintenance when installing a new set of tires. If not, leakage is highly probable. Unlike replacing a valve stem for free, this is a service procedure that you should recommend and bill the customer for.

TPMS LAMP ILLUMINATION

If the TPMS indicator lamp is glowing steadily, a low tire pressure condition has been determined. Checking the air pressure and refilling the tire should eliminate the lamp

illumination, once the vehicle has been driven. A blinking light or one that blinks for one minute and then stays on solid is an indication of a system malfunction, which will require diagnostics to identify the problem.

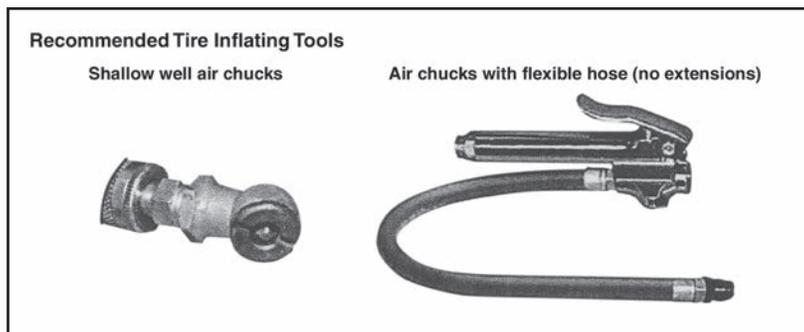
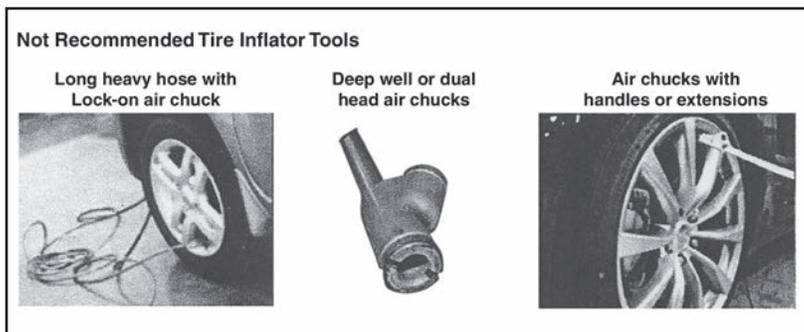
If a tire pressure light illuminates for a few minutes when the vehicle is started and then goes out after the vehicle has been driven for a few miles, the system is most likely functioning properly. When the tires are cold, the air pressure in one or more tires is low enough to illuminate the TPMS light. Once the tires heat up, the air pressure increases and the lamp goes out. Adjusting the air pressure should resolve the customer complaint. Remember...tire pressure increases with heat and drops with cold.

SEALANTS

Most vehicle manufacturers warn against the use of aftermarket tire sealants, other than those identified in the owner's manual. Some of the sealants contain chemicals that can damage the electronics in the sensors. It is not uncommon to remove a sensor and find the electronics exposed due to contact with the tire sealants or the sensor protective sealants blistered from chemical contact, rendering the sensor inoperative.

TOOLS FOR ADJUSTING AIR PRESSURE

With a high failure rate of damaged sensors being returned for warranty, Nissan addressed the issue with a notice to its dealers that sensors with broken valve stems will not be considered a warrantable repair. They claimed that the damaged valve stems are the result of improper inflator tools being used. The following illustration from Nissan reflects both Recommended and Non-Recommended inflator tools.



RFI

Tire pressure sensors function via an RF (radio frequency) signal. When you have RFI (radio frequency interference), you have a system that behaves erratically. The system may encounter false triggering, illuminating the tire monitor TPMS lamp in the instrument cluster, false trouble codes stored in diagnostic memory, or "No Data" displayed on a scan tool when diagnosing the system. RFI can be generated by components in the vehicle's electrical system, including components such as electric motors or accessory items. Cell phones, chargers and remote transmitters, power inverters, DVD players and other entertainment equipment can generate RFI, which can affect the operation of the tire pressure monitoring system.

When performing a sensor learn procedure on a vehicle, make certain no other vehicles in close proximity (ten feet) are simultaneously receiving a learn procedure or the tire pressure is being adjusted. The system can read sensor transmissions from a vehicle nearby when in the sensor learn mode.

AFTERMARKET WHEELS

We have encountered illuminated TPMS lamps due to the orientation of the valve stems with some of the custom wheels, which can affect the sensor seal, promoting leakage. Further, the design of the custom wheel may result in the sensor not accurately transmitting the data, or the signals may not reach the TPMS antenna. This is something that should be considered when troubleshooting an illuminated light, especially if new custom wheels have just been installed.

Consider the quirks mentioned in this writing when troubleshooting the tire pressure monitoring system; they can save you a lot of diagnostic time.

Servicing the tire pressure monitoring system will become a part of your services. Ask your Mighty representative about his TPMS program. He can show you a couple of programmable sensors that can cover 85% of the market.

LARRY HAMMER
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