



# TechNews

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INFINITI

| **Catalytic Converters**

| **Ignition Tune**

| **Tire Pressure Testing**

| **Dealer Listing**



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# SOMETIMES THINGS ARE NOT WHAT THEY APPEAR TO BE.



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SHIFT\_the way you move

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Caution: Vehicle servicing performed by untrained persons could result in serious injury to those persons or others. Information contained in this publication is intended for use by trained, professional auto repair technicians ONLY. This information is provided to inform these technicians of conditions which may occur in some vehicles or to provide information which could assist them in proper servicing of these vehicles.

Properly trained technicians have the equipment, tools, safety instructions, and know-how to perform repairs correctly and safely. If a condition is described, DO NOT assume that a topic covered in these pages automatically applies to your vehicle or that your vehicle has that condition.

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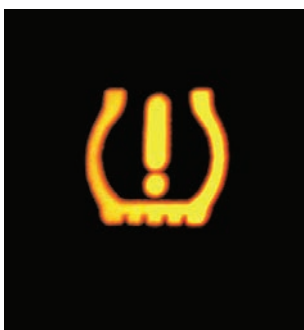
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# Modern Catalytic Converter Diagnosis



**Catalytic converter diagnosis is easy!  
or P0430, replace the converter and t**

Unfortunately, too many technicians believe the statement above is true. To them, it may even seem they have had a pretty good success rate replacing the converter every time they find a converter efficiency code.

After they replace the converter, the converter monitor passes and the Malfunction Indicator Lamp (MIL) goes out. However, unless all of the other possible causes for a converter monitor failure have been eliminated, a new converter may be just temporarily masking the root cause of the problem. In other words, they may have just sold an unnecessary converter replacement, or worse yet, failed to correct a problem that will cause the new converter to fail long before it should. Technicians who care about their customers and their own reputation will want to investigate converter efficiency codes fully, not just replace parts.



**Genuine Nissan catalytic converters are the best available.**

## Myths and old mechanics' tales

These are some of the things you may have heard other technicians say:

*“OEMs make low quality converters to save money. They don't make them like they used to. Catalysts used to last 20 years before they had a problem, now they fail after only five years.”*

These are all false. Today's converters are better than ever before, and the original equipment converter is the best converter for the car. If the converter does fail, a Genuine Nissan or Infiniti replacement is the best choice for your customer's vehicle.

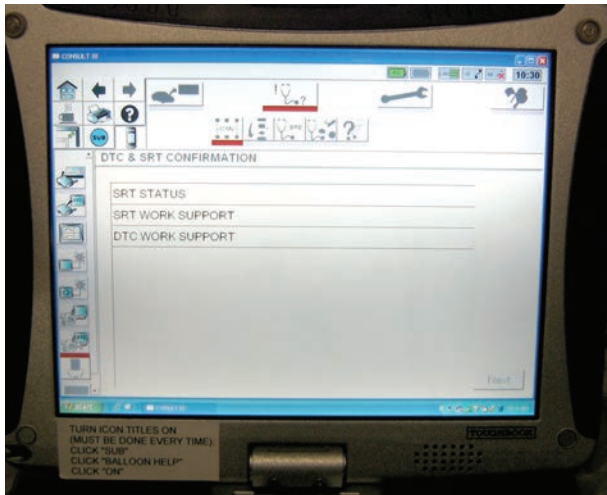
There are a couple of reasons your shop may be replacing more converters now than in the past:

- **OBD II self-testing of the catalyst**
- **Less tolerance for degradation**

Pre-OBD II converters were not monitored, so there were usually no signs of failure until the car failed the tailpipe portion of an emissions test. The criteria for failure of the tailpipe portion of an emissions test is more lax than the criteria to illuminate the MIL. Therefore, a converter that is bad enough to fail the converter efficiency monitor may easily reduce the emissions enough to pass a tailpipe test for many more years.

Newer cars have tougher emission reduction goals. All emission reduction systems, including the converter, must do more than in years past. The MIL is designed to illuminate when the vehicle's emissions are

# If you find a trouble code P020 the car is fixed. **Right?**



### Access to the right tools makes converter testing a whole lot easier.

estimated to exceed 150% of the Federal Test Procedure (FTP). The FTP is a series of emissions tests performed on new models before they are certified for sale in the US. As the FTP requirements become tougher, the threshold for minimum converter efficiency also becomes tougher.

In summary, today's converters are not lower quality, quite the opposite is true. They are simply held to a much higher standard than in the past.

***"There's no need to bother with ECM calibrations. It won't help. Just replace the converter or the car will come back."***

Checking for TSBs and ECM updates should always be the next step when you find a converter efficiency code. There is no guarantee an applicable re-flash will be the solution for every situation. But, even if it does not correct the problem, and the converter still needs to be replaced, the calibration update will add service life to the replacement converter.

### Old school converter testing – don't bother

Older techs may remember a number of converter testing methods including:

- invasive testing
- temperature testing
- various cranking tests with a warmed converter
- HC testing while disabling spark on one cylinder
- NOx testing under preset engine operation criteria

Two things all of these methods have in common is that they are completely unnecessary and potentially misleading when working on OBD II cars. When working on an OBD II car, the goal is to satisfy the ECM so it will turn the MIL off. The ECM is monitoring the O2 sensors to make its decisions, so you should be too – either directly or indirectly.

### Working without a Consult III

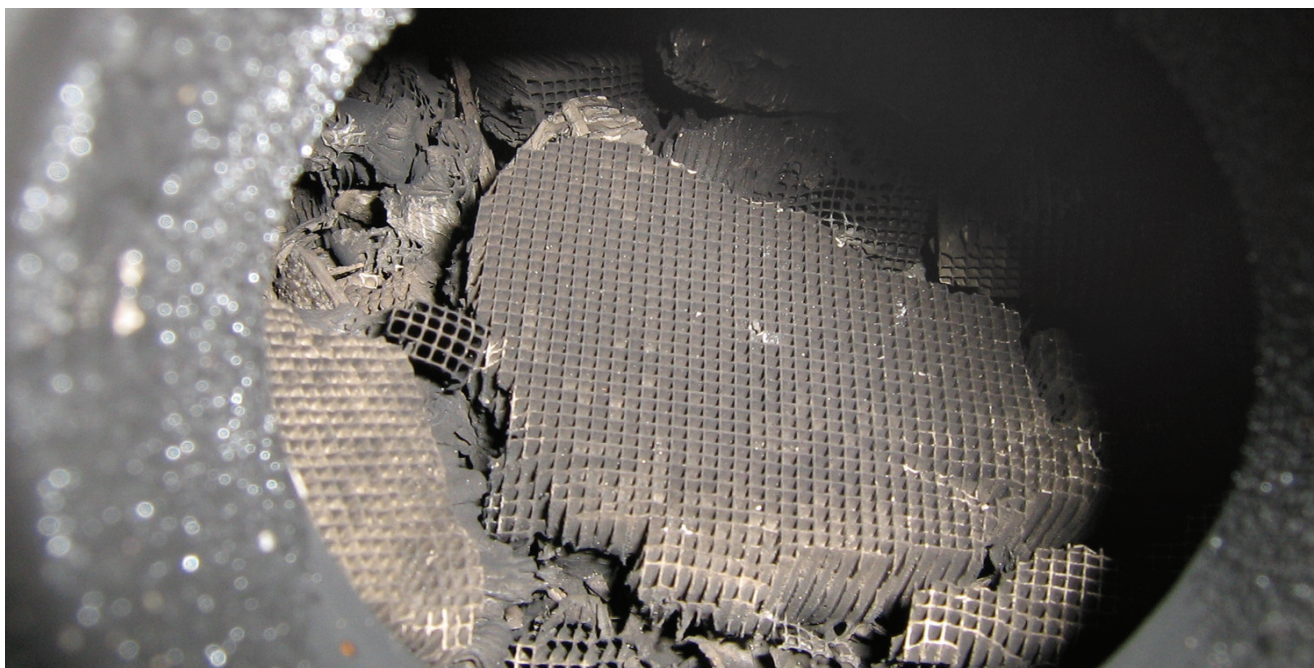
Graphing the front and rear O2 sensors is a test that can still be used if you don't have access to a Consult III. However, you may find that the results of this test are a little too inconsistent to be used with confidence, especially considering the cost of today's catalysts.

If you do use this test, don't wing it, use the manual. If you find the rear O2 sensor mirrors the front when the converter has reached operating temperature, the converter is surely bad. However, modern Nissans will set a code long before the sensor one and sensor two patterns start to look the same. Follow the procedure in the service manual exactly: warm up properly, count the cycles precisely, and use the switching ratio specification from the manual. On vehicles that use a front AF sensor instead of an O2 sensor, Nissan provides a rear O2 sensor frequency specification instead of a switching ratio specification.

Another test that can be used for catalyst diagnosis without access to a Consult III is the catalyst efficiency monitor. A "monitor" is the self-test performed by the ECM. Its failure is what caused the MIL in the first place. The check engine light and converter efficiency code tell you the monitor failed. The Mode 6 data will tell you "how badly" the test failed.

You can access Mode 6 test results with a generic scan tool. Once this information is noted, you can clear codes and run the monitor again by performing the prescribed drive cycle. After the monitor is complete, you can read the Mode 6 results again and compare.





**This converter damage was caused by a chronic misfire.**

Mode 6 results can be used to:

- confirm a problem is still occurring
- find a marginal, but still passing, monitor
- confirm the efficacy of a repair

A complete discussion of Mode 6 is beyond the scope of this article, but you can find additional information in the service manual, including monitor information and drive cycle procedures. Just look in the On Board Diagnostic System section of the Engine Control System chapter.

## Diagnosis with the Consult III

It will probably come as no surprise that diagnosis is a lot easier when you have the right equipment. The Consult III provides a feature called DTC/SRT confirmation. The DTC (Diagnostic Trouble Code) and SRT (System Readiness Test) confirmation procedure will run a specified monitor with a menu-driven test. A simple five-minute test and you'll have your answer – either yes, the converter monitor is still failing; or no, the converter monitor is passing now.

## Causes of converter efficiency codes

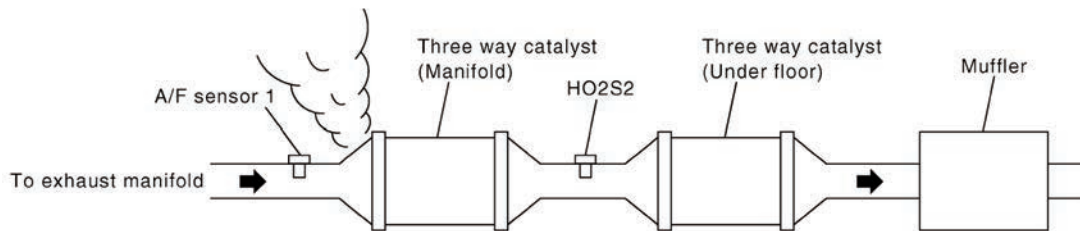
It's not enough to verify poor catalyst function by checking the O<sub>2</sub> sensor switching ratio, Mode 6 data, or using Consult III DTC/SRT confirmation. There are a number of problems that can cause a good converter to perform poorly. Once poor function is confirmed, the next step is to eliminate any other potential cause. This is the essence of modern converter diagnosis.

## Misfire

An engine misfire can permanently damage a catalyst. If the old converter element is broken apart or melted, a misfire is the most likely cause. This will need to be corrected before the car is returned to the customer. Converter damage caused by misfire will not be covered by warranty.

A misfire will also reduce the converter's efficiency. When a misfire occurs, the air/fuel charge will pass unconsumed into the exhaust. The increase in exhaust oxygen content will affect the oxygen sensor and skew the air/fuel mixture, leading to a rich mixture. A mixture other than stoichiometric (14.7:1; also called Lambda)

## Nissan Catalytic Converter



### An exhaust leak will reduce the converter's efficiency.

will decrease the catalyst's efficiency. Extra oxygen in the exhaust will also adversely affect the converter's ability to reduce NOx.

### Timing

Incorrect ignition timing is not common on modern cars as most do not have adjustable timing. However, incorrect ignition timing will affect converter efficiency, so it shouldn't be overlooked.

### Pre-cat exhaust leaks

A pre-cat exhaust leak can have a great effect on a converter's operation. Three-way converters require the absence of oxygen to break the NOx into O<sub>2</sub> and N<sub>2</sub>. The oxygen generated in this reaction (referred to as reduction) is used to fuel the oxidation reaction, where CO and O<sub>2</sub> are converted to CO<sub>2</sub>, and HC is converted to H<sub>2</sub>O and CO<sub>2</sub>. If there is an air leak in the exhaust before the converter, the converter can't work properly.

It doesn't take a big exhaust leak to cause a problem. In fact, you may not even be able to hear the leak with the engine running in the bay. Try the following to find smaller leaks; wet a couple of shop rags and have an assistant hold them over the tail pipe with the engine running. This will increase the exhaust backpressure and make small leaks more audible. A mechanic's stethoscope with the tip removed can be handy for checking for leaks hidden under heat shields.

### Improper air fuel ratio

Air fuel ratio will have a huge effect on how well a catalyst performs. A mixture of 14:1 will decrease oxidation efficiency about 70%. A mixture of 15:1 will decrease reduction efficiency about 70%. In other words, an "A+" converter can drop to an "F-" with a mere 3% change in mixture.

Average air fuel ratio can be measured with a five gas analyzer. Some analyzers display air fuel mixture expressed as Lambda. Lambda is convenient because deviations from the ideal ratio are expressed as a percentage. For example:

- Lambda 1.0 = 14.7:1
  - Lambda 1.1 = 10% too lean, or 16.17:1
  - Lambda 0.95 = 5% too rich, or 13.97:1
- To calculate Lambda from an air fuel ratio measurement, use the following formula:

$$\text{MEASURED AIR FUEL RATIO} \div 14.7:1 = \text{LAMBDA}$$

To calculate air/fuel ratio from Lambda, just reverse the formula:

$$\text{LAMBDA} \times 14.7:1 = \text{AIR FUEL RATIO}$$


If your analyzer does not have a Lambda display, you can use a Lambda calculator to verify accurate fuel control. When HC, CO, CO<sub>2</sub>, O<sub>2</sub>, & NOx readings are entered into the calculator, a Lambda value will be displayed. A variety of Lambda calculators are available online.

When investigating a converter efficiency code, it's important to check the air fuel mixture under the same conditions required to run the converter monitor. The converter monitor does not run while the car is idling in the bay, so measuring mixture at idle may not be helpful in determining whether mixture was a factor in causing the code. Freeze frame data is very useful to find and duplicate these conditions.

It may not be possible or convenient to bring your five gas analyzer on a road test with you to duplicate the conditions found in the freeze frame data. Once the O<sub>2</sub> or AF sensors' accuracy has been verified with the five gas, a scanner is a better traveling companion, since it is very portable and easy to set up.

Another advantage to driving with the scan tool is that you'll be able to monitor fuel trim, also called AF





# Get better performance from a cleaner engine with Nissan Fuel System Cleaner.

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To get the most performance, fuel economy - and fun - from every mile, and for optimum cleaning of fuel injectors, intake valves, and combustion chambers, use one (20 fl. oz.) bottle of Nissan System Cleaner every 3,000 miles when refueling.

## One tankful treatment can help:

- Clean fuel injectors, intake valves and combustion chambers
- Restore lost power and performance
- Maximize fuel economy\*
- Lower harmful emissions

\* Restores lost fuel economy by removing harmful fuel injector deposits





**An exhaust analyzer with a Lambda display should be used to confirm proper air fuel ratio.**

ALPHA on the Consult III. Total fuel trim is the amount of correction applied to the base fuel schedule. Excessive deviations in fuel trim are an indicator of a problem.

For example, excessive negative fuel trim might be caused by a leaking injector on one cylinder. A leaking injector would cause one cylinder to run very rich and the others on the same bank to run very lean. This would not be good for converter efficiency!

Excessive positive fuel trim might be caused by a leaking intake manifold gasket on one runner or a clogged injector. This would cause one cylinder to run lean and the others on the same bank to run rich. This too, would not be good for converter efficiency.

☒ USA
 ☐ Europe
 Note: The USA and Europe choices are to account for the use of different values of Hcv and Ocv (see values below)

CO<sub>2</sub>  %  
 CO  %  
 HC  ppm  
 O<sub>2</sub>  %  
 NOx  ppm

- The exhaust gas sample can be taken before or after the catalytic converter.
- The exhaust system must be free of any leaks.
- If equipped with Air Injection (AI) it should be disabled.

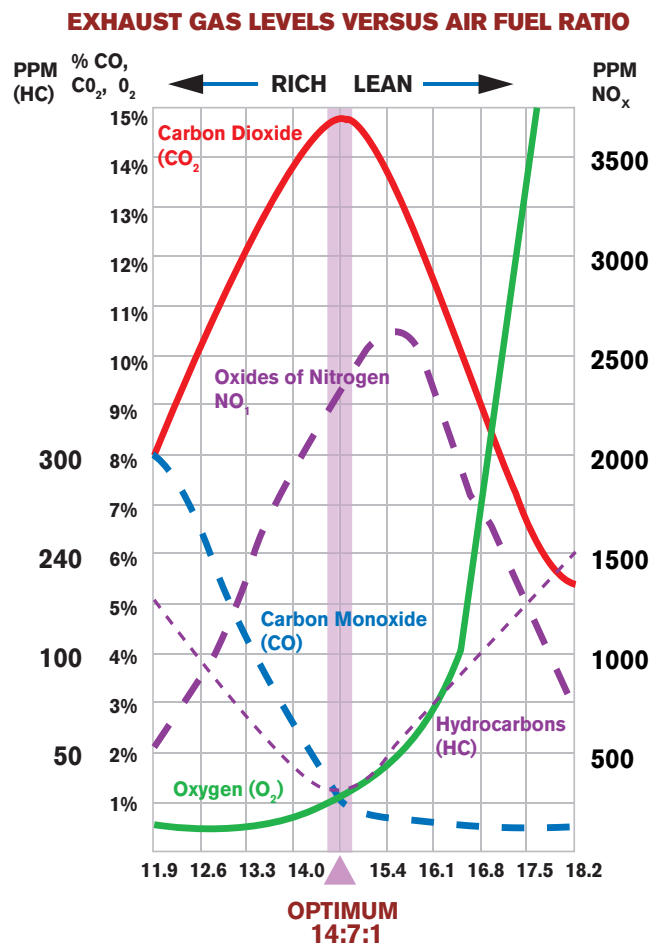
Lambda Calculation	Lambda	A/F Ratio
4-Gas Measurement	<input type="text"/>	<input type="text"/>
5-Gas Measurement	<input type="text"/>	<input type="text"/>

**Lambda calculators are useful if your gas analyzer does not display air fuel ratio.**

## Looking beyond average mixture

Mixture swings occur because of delays in A/F ratio correction. The lower the amplitude of the swings, the more efficient the converter will be. When a converter efficiency code is found, checking average mixture is important, but so is checking the swings.

Large swings in STFT are one indicator of slow correction. However, normal swing will vary from car to car. If you are familiar with normal STFT swings on the model you are repairing, or you have a known-good vehicle for comparison, you may find STFT a convenient quick test, but not a definitive one. A better method is to check the O<sub>2</sub> or AF sensor directly.



**A catalytic converter operates most efficiently with an air/fuel ratio of 14.7:1.**

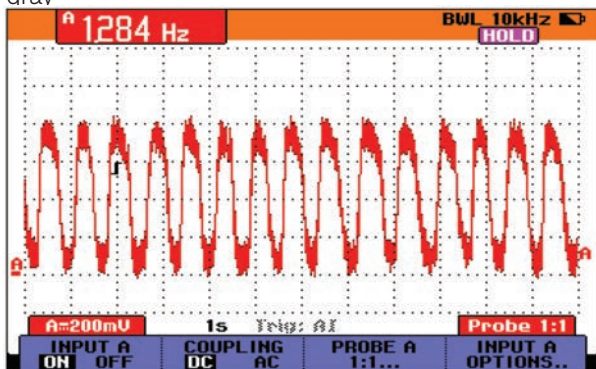


## Checking the O2 sensor

An oxygen sensor's condition can be gauged by checking its output with an oscilloscope. The key components of the signal are:

- cycles per second, or Hz
- maximum voltage
- minimum voltage
- rise time with sudden enrichment

The first three measurements should be taken with a fully warmed engine running at 2,000 rpm. The O2 sensor frequency (Hz) should be measured over a 10 second period, as it is a very slow signal, so your oscilloscope should be set to 1 sec/div. The minimum requirement is usually five complete cycles in 10 seconds (or 0.5 Hz), but a good O2 sensor will produce 10 or more cycles per 10 seconds (or  $\geq 1.0$  Hz). This

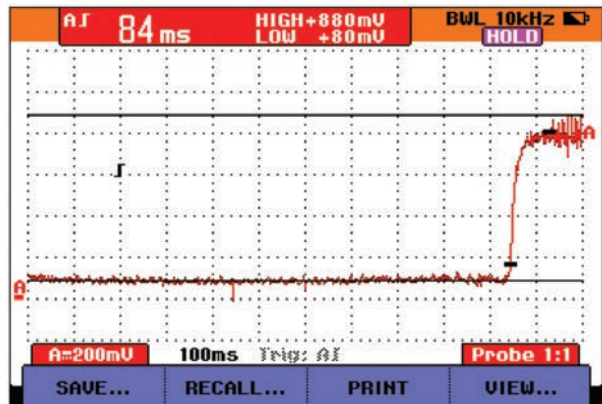


### This is a good high mileage O2 sensor.

area between “minimum”, where a P0130 code will set, and “good”, where the converter will be happy, is the reason for checking the O2 sensor directly instead of relying on a code to set.

The oxygen sensor voltage must rise above 0.6 volts and drop below 0.3V to avoid setting a P0130 code. Once again, a good sensor should perform much better than that to keep the converter happy. If the sensor is good, the maximum voltage should exceed 850 mV (0.85V) and minimum voltage should drop below 150 mV (0.15V).

Finally, rise time should be measured. The scope should be set to 100 ms/div for this test. The time the voltage trace takes to rise from low ( $< 150$  mV) to high ( $> 850$  mV) should be 150 ms or less when the throttle is snapped.



**Rise time should be less than 150 ms.**

## Checking the AF sensor

An AF sensor's output is best checked with a scan tool. If you have a Consult III, you can run a DTC confirmation for the B1 AF sensor to verify it's in good condition. If not, you can monitor the AF sensor PID in the data list, paying particular attention to the amplitude of the output, and comparing against an identical known- good vehicle. As the AF sensor deteriorates, its response to throttle snaps will decrease. When working with non-CAN vehicles, you'll need to create a custom data list with only the AF sensor; otherwise the slow data rate can skew the results.

## Make the right decision

A converter efficiency code may very well be caused by a bad converter. The more modern the car, the more likely the ECM made the right call. However, you shouldn't blindly believe everything the ECM tells you without doing your own testing. If you use the following checklist as your guide, you can be sure you are making an accurate diagnosis:

1. Check for TSBs and calibration updates
2. Verify the failure.
3. Check for misfires.
4. Check for exhaust leaks.
5. Check for mixture control.
6. Replace converter, as needed. |



# | A New Look at an Old Job



# - Today's Ignition Tune

## Installing the incorrect spark plugs on your customer's Nissan or Infiniti – or doing it improperly – can lead to big problems!

Not that many years ago, a technician might replace several sets of spark plugs per day. Conventional spark plugs had relatively short service intervals, and most major services included spark plug replacement. Ignition components were easy to access and technicians hustled through spark plug replacements quickly.

The replacement intervals on today's Nissan and Infiniti cars are less frequent. Many Nissan and Infiniti vehicles will go 105,000 miles without needing spark plug replacement. Because these vehicles will only need the plugs replaced once or twice during their life, proper installation is more important than ever. The same installation error that might not have caused a symptom during a relatively short service life, may come back to bite you during the course of 105,000 miles.

Servicing secondary ignition is a job that deserves your best effort. It should not be approached with a "Look how fast I can do this job!" attitude, nor should it be cruised through on autopilot. Instead, perform an ignition service carefully and attentively. That way, you can be sure your work will go the distance. If all goes well, the spark plugs you install will be in service for a very long time. Just think: the technician who replaces them next may be attending 6th grade now.

### Replacement intervals

Proper spark plug replacement intervals can be found on [www.nissan-techinfo.com](http://www.nissan-techinfo.com) and [www.infiniti-techinfo.com](http://www.infiniti-techinfo.com). Just use the "Find Publications" feature to locate the correct service manual. Then, open the "Maintenance" section and navigate to "Periodic

Maintenance". If you don't have a subscription to Nissan's tech info sites, you can also find periodic maintenance schedules on the Nissan owner's site: [www.nissanusa.com/owning](http://www.nissanusa.com/owning).

There is no advantage to replacing spark plugs early. Unless the car is driven under unusual conditions (like racing), or the vehicle has been driven with other problems, such as detonation, excessive oil consumption, lack of fuel control, or misfire, the spark plugs should perform well through their entire service life. If plugs with a 105K replacement interval were replaced at 60K instead, there wouldn't be a noticeable improvement in performance or fuel economy.

### Make it a "tune-up", not a "tune-down"

There are many plugs that will "fit" in your customer's Nissan, but only one plug that is "right." Nissan puts a lot of time into testing to find the very best plug for each application. If you choose a different spark plug, the best you can hope for is equal performance. No other spark plug will provide superior performance, and many spark plugs will decrease performance.

You may be able to purchase OEM spark plugs from other sources. However, you should consider buying directly from your Nissan or Infiniti dealer for the following reasons:

First, application errors are far less likely when plugs are ordered by VIN through a Nissan or Infiniti dealer, and correct application is very important.

Second, you can be sure you are getting the right type of NGK plug. For instance, the vehicle may call for iridium tip, but there may also be platinum tip listed in the NGK catalog. It might work, but the replacement interval would need to be changed.

## Nissan & Infiniti Ignition Tune Up



**Genuine Nissan spark plugs will ensure the optimum operation and longevity.**

Third, you'll find prices for Genuine Nissan plugs from a dealer are about the same -- and in many cases less - than NGK plugs from aftermarket vendors. Correct parts the first time, great prices, and a Genuine Nissan box to impress you customers: all good reasons to go with Genuine Nissan spark plugs.

### Before you start

Let the engine cool before removing the spark plugs. Don't start yanking spark plugs right after a test drive. There are two problems with removing spark plugs on a warm engine:

1. Aluminum expands when warm. This will cause the spark plug hole to shrink, and the spark plug to bind.
2. Aluminum becomes a little "gummy" when warm. This makes galling more likely if the plug is removed with a warm engine. Binding and an increased tendency to gall make damage to the spark plug hole threads far more likely if the plugs are removed from a warm engine.

### Clean installation

After 105,000 miles of driving, a lot of debris will have accumulated in the engine compartment – road salt, sand, and all sorts of stuff that you wouldn't want falling into the engine through an open spark plug hole.

A three stage cleaning process will help ensure a quality job:

1. Use compressed air to clean the area around the top of the coils before removing them.
2. Next, use compressed air to clean the inside of the tubes. Be sure to wear eye and ear protection while using compressed air.
3. After the plugs are removed, use a long industrial swab to clean the sealing surface. This final step will remove any debris that might get caught between the head and the plug and cause a false torque reading during installation.



Cleaning spark plug hole threads is usually not necessary on Nissan products, even after a plug has been sitting in a head for 105,000 miles. However, if the new spark plug does not thread easily into the head by hand, the threads should be cleaned. Thread friction will decrease the clamping force at a given torque value, so even though the plug has been tightened to the specified torque, it's not really tight against the head.

When cleaning spark plug hole threads, a thread chaser should be used rather than a tap. A tap may remove aluminum, weakening the threads. It's also more likely you'll accidentally cross-thread when using a tap. If the thread chaser has a longer reach than the spark plug, care should be used to avoid allowing the chaser to protrude into the combustion chamber. On some engines it's possible to hit an open valve with the chaser, depending on the engine's position in its cycle.

## The importance of torque

When installing spark plugs, proper torque is critical. A plug that is too loose will cause poor heat transfer between the plug and the cylinder head. This can cause the plug to overheat and glow red hot. The glowing electrode can cause the air fuel mixture to ignite long before it should. This is called pre-ignition. Pre-ignition, unlike detonation, is a silent engine killer. A hole in the piston may be the first sign of trouble. If a loose plug does not cause pre-ignition, it may end up loosening and popping out. Either way, a loose plug is bad news.

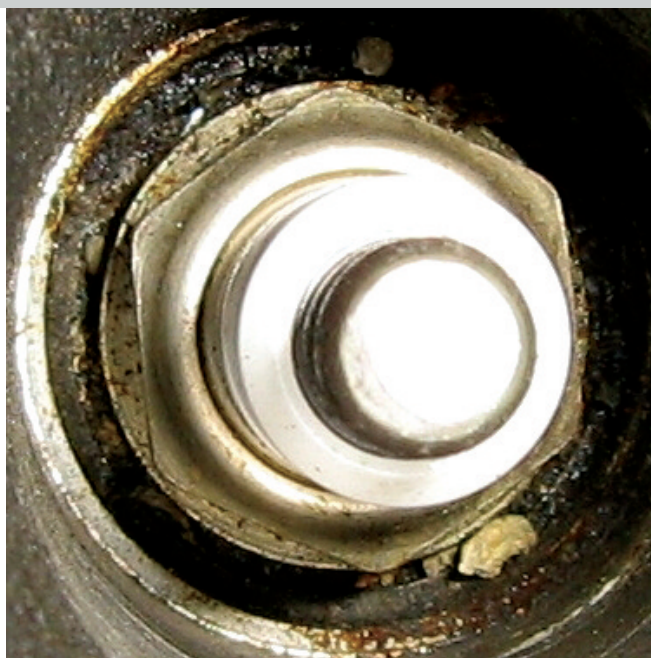
An over-tightened spark plug is also bad. Over-tightening can cause distortion and leakage through the gas seals (located between the metal case and the insulator), cracks in the insulator, and cylinder head damage.

Leaking gas seals will leave dark brown staining at the base of the insulator near the metal case. If the gas seals are damaged, combustion gasses can leak past the insulator and "cook" the coil boot, leading to poor sealing and a misfire. It will also cause a loss of efficiency.

Excessive torque can also crack the insulator, causing a spark leak and misfire. It may be hard to see the crack, depending on the location.

Finally, over-tightening a spark plug can weaken or ruin the spark plug threads in the cylinder head. Cylinder head damage can be very expensive to repair.

For Nissan spark plugs with 14mm threads, the



## Clean debris from around the plug before removing.

torque specifications are usually around 14 - 22 ft. lbs. Some 3/8" drive torque wrenches are not very accurate in this range, so check the specifications on your wrench before relying on it. An inch-pound wrench can also be used; just multiply the foot-pound specification by 12 to find the inch-pound equivalent. You can find the torque specification at [www.nissan-techinfo.com](http://www.nissan-techinfo.com) or [www.infiniti-techinfo.com](http://www.infiniti-techinfo.com) in the maintenance section of the service manual for the specific vehicle you are servicing.

Power tools should never be used to install spark plugs. An air ratchet is a time-saving tool, but don't use it to install spark plugs. It takes about 30 seconds to thread a spark plug in by hand then tighten it with a torque wrench. Spending an extra 2 - 4 minutes on work that will need to last 105,000 miles is not too much to ask.

## Handle with care

Spark plugs are easily damaged. If you drop a plug, even from waist height, it may break. Sometimes the damage is obvious, like a bent ground electrode or broken porcelain. Sometimes the damage is a little less noticeable, like a tiny crack in the insulator. When in doubt, install a new plug.

## Nissan & Infiniti Ignition Tune Up



**Select a torque wrench that can accurately measure 14-22 ft. lbs.**

### Gapping

The instructions for spark plug gapping are simple – don't do it. Nissan spark plugs come set to the proper gap. There is no need to check or adjust the gap between replacement intervals.

### Cleaning

It's rare to see a fouled plug these days. Modern fuel control is a wonderful thing! However, plugs can still foul if the car develops a problem, such as extended cranking with no spark. Nissan does allow for cleaning spark plugs, just not with a wire brush. Cleaning and drying with acetone or brake cleaner, followed by blasting with a spark plug cleaner is the preferred method if the plug is to be cleaned, rather than replaced. However, extreme care should be used to remove all abrasive media before reinstalling the spark plug, and blast time should not exceed 20 seconds.

### Coil inspection

When the coils are removed, they should be inspected. The coil boot should be soft and malleable. Check the inside of the coil boot with a bright flashlight. Make sure there is no corrosion on the contact point or spring, and look for carbon tracking. Also check the primary connectors for corrosion and proper fit.

### Dielectric grease

Dielectric grease should be applied to the coil boots. Dielectric grease is silicone grease that offers several benefits. It helps seal the coil boot to the spark plug. This will prevent moisture intrusion and reduce the chance of arcing and misfire, especially on rainy and foggy days. Finally, it will lubricate the boot, making the coil easier to remove without damage.

### Stuck plugs

Frozen plugs are not very common on Nissan products, even when the car comes in late for service. However, you may occasionally run into a vehicle with a frozen plug that doesn't want to budge. To remove a stuck plug, fill the bottom of the spark tube with penetrating oil. Let it sit for a while, and then crank the plug a quarter turn, followed by more sitting and soaking. Next, try to remove the plug. If it's still tight, you may need to work the plug back and forth as you remove it.

### The rewards of doing it right

All this might seem like a lot of work for a job that used to be simple and more casual. But, once you've added cleaning, dielectric grease, and using a torque wrench into your routine, you'll find it really doesn't take much time at all. And, you can be proud of the work you've done. What's more, nine years from now you can tell the new apprentice you put those plugs in when he was in 6th grade, without worrying about him cursing you. |

**SOMETIMES THINGS THAT  
SHARE THE SAME NAME  
ARE NOT THE SAME AT ALL.**



**TRUST THE ORIGINAL.  
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# Working Under Pressure: Nissan & Infiniti Tire Pressure Monitor Systems

**Things you should know  
when the warning light glows.**



A decade ago, in 2000, the U.S. Congress passed the Transportation Recall Enhancement, Accountability and Documentation (TREAD) Act to deal with the concerns regarding several major recalls of defective and improperly inflated tires that created dangerous and unsafe driving conditions.

A large portion of the TREAD Act addressed the dangers of low tire pressure, which can cause a number of serious problems: reduced steering control, braking ability and vehicle stability. Realizing that consumers do not check their tire pressures adequately and that many other climate, road hazard and driving conditions cause tire inflation failures, the legislation mandated tire and vehicle manufacturers to help improve overall safety.

The TREAD Act required vehicle manufacturers to equip all passenger and light truck vehicles with tire pressure monitor systems (TPMS) to alert the driver if tire pressure falls to 25 percent under the recommended pressure, by the 2008 model year. Nissan, way ahead of the industry, began offering TPMS as early 2003.

## Nissan and Infiniti models

It's easy to identify a Nissan or Infiniti vehicle with a TPMS. Just glance at the wheel and observe the valve stem. While standard valve stems are black rubber, valves that incorporate TPMS transmitters have gray-colored aluminum retaining nuts. However, some aftermarket tire replacements may use other valve types, including black rubber ones. If you are unsure, do a thorough check.

The basic function and operation of Nissan and Infiniti TPMS has changed a little over the years, but the specific parts, components, control unit locations, tire pressures and diagnostics vary from model to model and year to year. Therefore, you must refer to the specific service manual for the vehicle you are servicing for the correct information. Also, refer to the owner's manual for TPMS information and correlate that data with the service manual.

**Note: Many Nissan and Infiniti service manuals refer to TPMS as Low Tire Pressure Warning System (LTPWS).**



**A vehicle equipped with TPMS can be easily identified by checking the valve stem.**

## How TPMS works

Sensors in the valve stem body of each tire monitor the inflation pressure level and an integral transmitter relays that real-time information to a control module located elsewhere on the vehicle. The sensor/transmitter unit is inside the tire, on the interior end of the valve stem.



### **The TPMS sensor/transmitter is located on the interior end of the valve stem.**

Each sensor incorporates a battery to provide power to transmit the signal, which also identifies its location. The control module checks the signals from each wheel and alerts the driver by illuminating a warning light if the pressure in any wheel drops below the safe level.

When the vehicle begins to move and the wheels start rotating, a centrifugal switch inside the sensor activates the pressure measurement and signal-sending functions. At about 20 mph, the sensor begins taking pressure measurements every 30 seconds and transmits the results once each minute to the control module. This electronic "handshake" keeps the wheels in touch with the control module. Each wheel sensor has a unique ID code so the module can recognize it. When the vehicle is moving, the sensor will transmit a signal once each hour. When the vehicle is parked and has not moved for 15 minutes, the sensors stop transmitting a signal to prolong the life of the internal sensor battery.

If the tire pressure drops below the minimum setting, the module will then illuminate the warning light. The warning light will not indicate which tire is low so all tires need to be checked with an accurate tire pressure gauge. Even though the culprit tire may be visibly evident, all other tires must be checked. Some models, equipped with a driver information display unit, may warn that a tire pressure is low. Some display units show the pressures of each tire. On vehicles equipped with NAVI systems, the visual screen may display a graphic which shows the air pressures in each tire.

Normally, if the tires remained in the same position and all you did was add air, the system should not need to be reset, but it may be necessary. Always refer to the particular service manual for the model you are servicing.

### **Identifying TPMS warning indicators**

The first indication there is a problem with the TPMS is the warning light flashing or staying on after initial start-up or illuminating during driving. Turn the ignition OFF and then ON (engine not running) and observe the warning light.

If the warning light illuminates and stays lit, the problem is normally low pressure in one or more tires. Follow the service instructions for the specific vehicle to inflate the tires to the proper level. Check the tire for leaks and repair as needed. After inflating to the proper level, the vehicle may need to be driven at speeds above 16 mph to activate the TPMS and turn off the warning light. DO NOT use a Consult II or III to reset the system.

If the warning light flashes for more than one minute, a malfunction of the system is indicated. Further diagnosis will be required.

### **Inflating tires to the proper pressure**

Every Nissan and Infiniti vehicle has a Tire and Loading Information placard, usually located on the driver's door frame. This label indicates the tire pressure requirements for that vehicle – when equipped with factory tires. Also check the Owner's Manual for proper inflation level information.

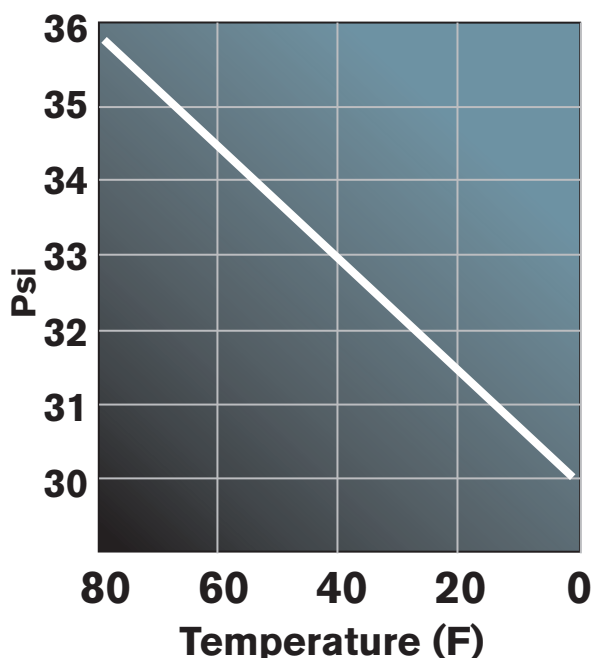
If a vehicle is equipped with aftermarket replacement tires, you should check the tires for the inflation





The Tire and Loading Information placard displays the proper tire inflation levels.

## Tire Pressure VS Temperature



Ambient temperature/tire pressure variation.

requirements and correlate that with the placard. Note: The ignition should be ON, but the engine not running when inflating tires to the correct level while the tires are mounted on the vehicle.

The Tire and Loading Information placard indicates the "cold" pressure level, meaning the vehicle has been parked for three hours or more or driven less than one mile at moderate speeds. Tire pressure may change 3 - 5 psi between a cold reading and a reading taken after the vehicle has been driven for several miles.

Remember that tire pressure may be affected by ambient temperature. Tire pressures can change approximately 0.6 - 1.0 psi for every 10° F of temperature change. As temperature decreases, so does tire pressure. Seasonal temperature changes can result in low tire pressures that will cause the TPMS warning light to illuminate. Refer to the graph at left for ambient temperature/tire pressure variation.

Tire pressure can also be affected by high altitude. Standard tire pressure gauges may show the tire pressure to be higher than the vehicle's TPMS. If this is not taken into consideration when checking the tire pressure, the TPMS may illuminate the warning light. Typically, pressure gauge readings increase 1.0 psi for every 2,200 ft. of altitude above sea level (up to 10,000 ft.).

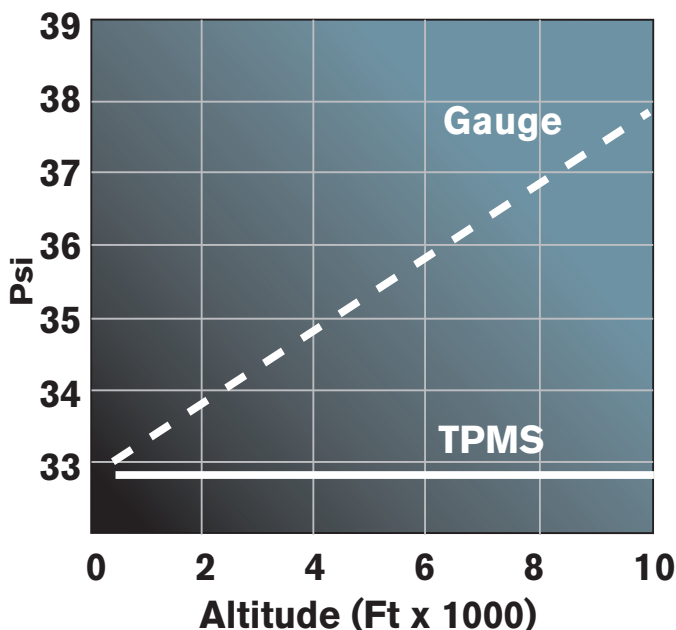
## Nissan / Infiniti Tire Pressure Monitoring

If you find a set DTC, refer to the following list to narrow your investigation:

### List of TPMS Diagnostic Trouble Codes (DTC)

DTC	Display Item	Malfunction Condition	Possible Cause
C1708	[NO DATA] FL	Data from front LH transmitter can not receive	<ul style="list-style-type: none"> <li>▪ Harness or connector (BCM or TP receiver)</li> <li>▪ ID registration is not finished</li> <li>▪ Transmitter malfunction</li> <li>▪ BCM malfunction</li> </ul>
C1709	[NO DATA] FR	Data from front RH transmitter can not receive	
C1710	[NO DATA] RR	Data from rear RH transmitter can not receive	
C1711	[NO DATA] RL	Data from rear LH transmitter can not receive	
C1712	[CHECKSUM ERR] FL	Checksum data from front LH transmitter is malfunction	
C1713	[CHECKSUM ERR] FR	Checksum data from front RH transmitter is malfunction	<ul style="list-style-type: none"> <li>▪ Tire pressure receiver malfunction</li> <li>▪ Transmitter malfunction</li> <li>▪ BCM malfunction</li> <li>▪ Harness or connector</li> </ul>
C1714	[CHECKSUM ERR] RR	Checksum data from rear RH transmitter is malfunction	
C1715	[CHECKSUM ERR] RL	Checksum data from rear LH transmitter is malfunction	
C1716	[PRESSDATA ERR] FL	Air pressure data from front LH transmitter malfunction	
C1717	[PRESSDATA ERR] FR	Air pressure data from front RH transmitter malfunction	<ul style="list-style-type: none"> <li>▪ ID registration is not finished</li> <li>▪ Transmitter malfunction</li> </ul>
C1718	[PRESSDATA ERR] RR	Air pressure data from rear RH transmitter malfunction	
C1719	[PRESSDATA ERR] RL	Air pressure data from rear LH transmitter malfunction	
C1720	[CODE ERR] FL	Function code from front LH transmitter is malfunction	<ul style="list-style-type: none"> <li>▪ Tire pressure receiver malfunction</li> <li>▪ Transmitter malfunction</li> <li>▪ BCM malfunction</li> <li>▪ Harness or connector</li> </ul>
C1721	[CODE ERR] FR	Function code from front RH transmitter is malfunction	
C1722	[CODE ERR] RR	Function code from rear RH transmitter is malfunction	
C1723	[CODE ERR] RL	Function code from rear LH transmitter is malfunction	
C1724	[BATT VOLT LOW] FL	Battery voltage of front LH transmitter drops	<ul style="list-style-type: none"> <li>▪ Tire pressure receiver malfunction</li> <li>▪ Transmitter malfunction</li> <li>▪ BCM malfunction</li> <li>▪ Harness or connector</li> </ul>
C1725	[BATT VOLT LOW] FR	Battery voltage of front RH transmitter drops	
C1726	[BATT VOLT LOW] RR	Battery voltage of rear LH transmitter drops	
C1727	[BATT VOLT LOW] RL	Battery voltage of rear LH transmitter drops	

## Pressure Versus Altitude



### Altitude/pressure gauge variation.

For example, consider a tire set to the Tire and Loading Information placard recommendation of 33 psi at an elevation of 5,280 ft. using the vehicle's onboard display or a Consult III data monitor. A gauge may read 35.5 psi even though the tire is actually set to placard specs. Refer to the graph above for altitude/pressure gauge variation.

### Diagnosing TPMS problems

If you encounter a vehicle with a faulty TPMS, the first thing you want to do is check for a set Diagnostic Trouble Code (DTC). If no DTC is set, the problem is most likely low pressure in one or more tires. Check each tire, even if they appear to be up to pressure.

This way, you can quickly eliminate tire inflation level as the culprit. Be sure to use a quality pressure gauge that has been calibrated for accuracy. This is very important when servicing TPMS.

For best diagnostic results, a Consult III should be used on 2006 and later Nissan and Infiniti models. A Consult II may be used on models prior to 2006.

## Changing a tire

Extra caution should be taken when changing a tire that incorporates a TPMS transmitter. It's easy to damage the transmitter if any tools or mounting equipment come into contact with the sensitive unit and could cause it to malfunction, requiring replacement.

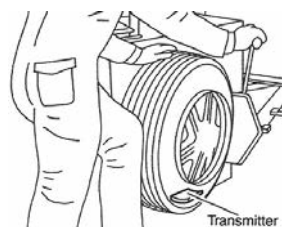
When using a tire changer, be careful not to damage the sensor/transmitter. After filling the tire to the correct pressure, install the wheel to the vehicle and register the transmitter ID to the TPMS control module, if needed.

Here are the recommended tire changing procedures for Nissan and Infiniti vehicles:

### Removal of tire from rim

1. Deflate the tire by depressing the valve core.

**Do Not** remove the valve core as it may damage the sensor/transmitter. Unscrew the transmitter retaining nut and allow the transmitter to fall into the tire. Gently bounce the tire so the transmitter falls to the bottom of the tire.



### Make sure the transmitter is at the bottom of the tire to prevent damage.

2. Place the tire on the changing machine and break both tire beads, ensuring that the transmitter remains at the bottom of the tire.

3. Turn the tire so the valve hole is at the bottom and gently bounce the tire so the transmitter is near the valve hole. Carefully lift the tire onto the turntable and position the valve hole (and the transmitter) 270 degrees from the mounting/dismounting head.



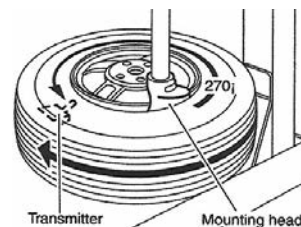


**A J-45295 TPMS Transmitter Activation Tool is required for registration.**

**4.** Lubricate the tire well and remove the first side of the tire. Reach inside the tire and remove the transmitter. Finish the removal of the tire from the wheel.

### Installing tire on rim

**1.** Put the first side of the tire onto the rim.



**Mount the tire on the turntable so that the transmitter (1) is 270 degrees away from the mounting/dismounting head (2).**

**2.** Mount the transmitter onto the rim and tighten the transmitter retaining nut to the required specification.

**3.** Place the wheel on the turntable of the tire changing machine. Ensure that the transmitter is 270 degrees from the mounting head when the second side of the tire is fitted. **NOTE:** Do Not touch the transmitter with the mounting head.

**4.** Lubricate the tire well and fit the second side of the tire as normal. Ensure that tire does not rotate relative to the rim.

**5.** Inflate the tire and install to appropriate wheel position.

### TPMS seal leaks

Once in a great while, you may come across a wheel with a TPMS seal leak. This usually occurs only when the transmitter has been re-mounted



**When the activation button is pushed, a green indicator light will illuminate to let you know the tool is triggering the transmitter.**

and then mostly when the mating surfaces of the rim and seal are dirty or other foreign material is present. In such cases, make sure it is really the seal leaking before removing the transmitter.

The good news is that replacement seals are available from your Nissan or Infiniti dealer. This is a whole lot cheaper than replacing the entire transmitter. Order the replacement seal by referring to the sensor part number (note the color when ordering) as they vary in style. Be sure to follow the recommended tire changing procedures.

## Rotating Tires

When rotating tires on a regular maintenance schedule, re-registration of TPMS sensors is not normally required. However, always test drive the vehicle to ensure no problems arise.

## Registering a new TPMS transmitter

When replacing a transmitter or body control module (BCM), you must first perform a procedure to “awaken” and initialize the new transmitter so it can be registered. This procedure must be done with a Consult II or Consult III, depending on model year of the vehicle and as called for by the specific service manual. After this procedure is completed, the transmitter is ready for registration with a J-45295 Transmitter Activation Tool.

When registering tires, the correct procedure is to activate the wheel transmitters in this order: Front Left, Front Right, Rear Right, Rear Left.

Triggering the transmitter is accomplished by holding the tool to the tire sidewall, close to the transmitter body, which is inside the tire, below the valve stem.

Push and hold the tool's activation button for five seconds to send a signal to the transmitter to communicate with the control module. A green light on the tool will glow to let you know the tool is triggering the transmitter.



**Place the tool on the tire near the transmitter and hold for five seconds.**

When the control module has registered the transmitter, it will respond with two flashes of the hazard lights and a buzzer to indicate which wheel has been recognized. Usually the buzzer will signal once for the Front Left, twice for the Front Right, three times for the Rear Right, and four times for the Rear Left.

When using a Consult II or Consult III during the registration process, always refer to the specific service manual for the vehicle you are servicing and follow the instructions on the Consult unit.

### TPMS Tips

Here are some helpful tips for servicing TPMS

- Filling tires: When filling any tires, the air supply should be clean and dry. This is exceptionally critical for TPMS tires as any sediment or moisture can affect the precision workings of the sensor and transmitting devices. Take care to blow off the area around the valve stem to rid the area of dirt. If a valve stem does not have a cap, gently blow air into the valve to remove any dirt or dust. Then, install a cap.

- Aerosol inflators with sealant: Using a can of aerosol tire inflator with sealant is not an option for TPMS.

The gummy sealant will clog the valve and pressure sensing port of the wheel sensor. The warning light will illuminate and you'll end up replacing the sensor.

- Sensor battery life: The tiny integrated lithium battery in the wheel sensor has an estimated life of 10 years or 100,000 miles. When a sensor battery voltage gets to the low limit, it may cause the TPMS control unit to generate a diagnostic trouble code. If one sensor battery is low, the others are sure to follow shortly. If any tire work is performed as the vehicle nears the 10-year or 100,000-mile mark, it would be good preventive maintenance to replace all the sensors.

### Tools and information

For best results when servicing Nissan and Infiniti vehicles, you should always use Nissan-approved tools, which are available through the Nissan Tech-Mate Website at [www.nissantechmate.com](http://www.nissantechmate.com). The J-45295 Transmitter Activation Tool, as well as the Consult II and Consult III are available at the site.

And, of course, the best service information is available on the Nissan and Infiniti service information websites at <http://www.nissan-techinfo.com> and <http://www.infiniti-techinfo.com>. |



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JENKINS NISSAN INC  
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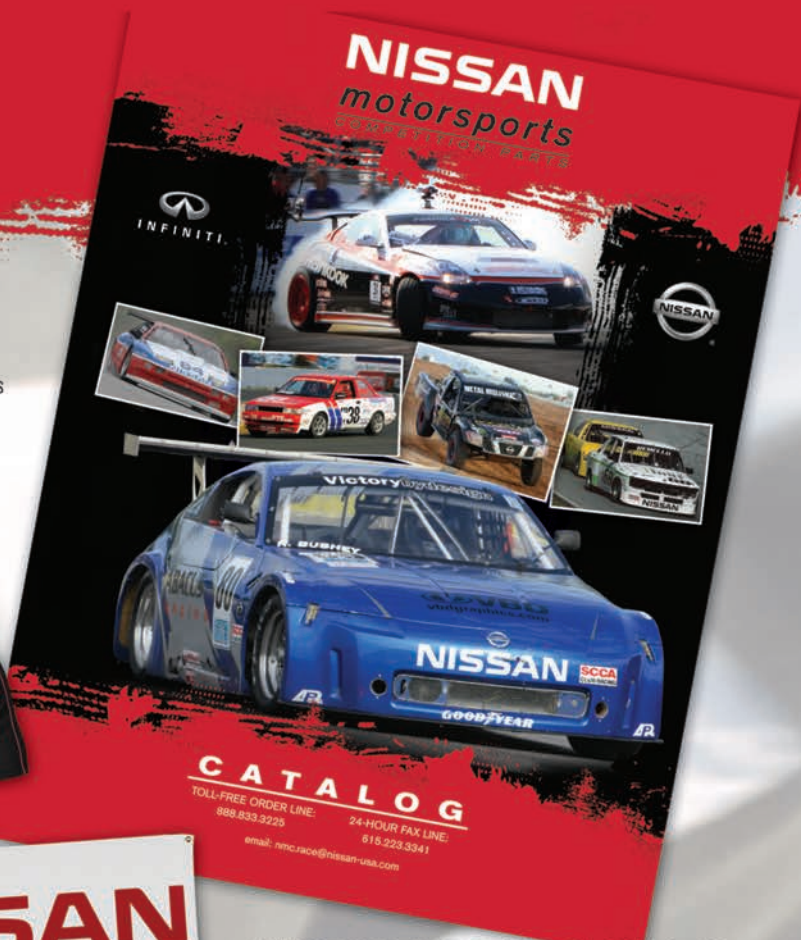
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