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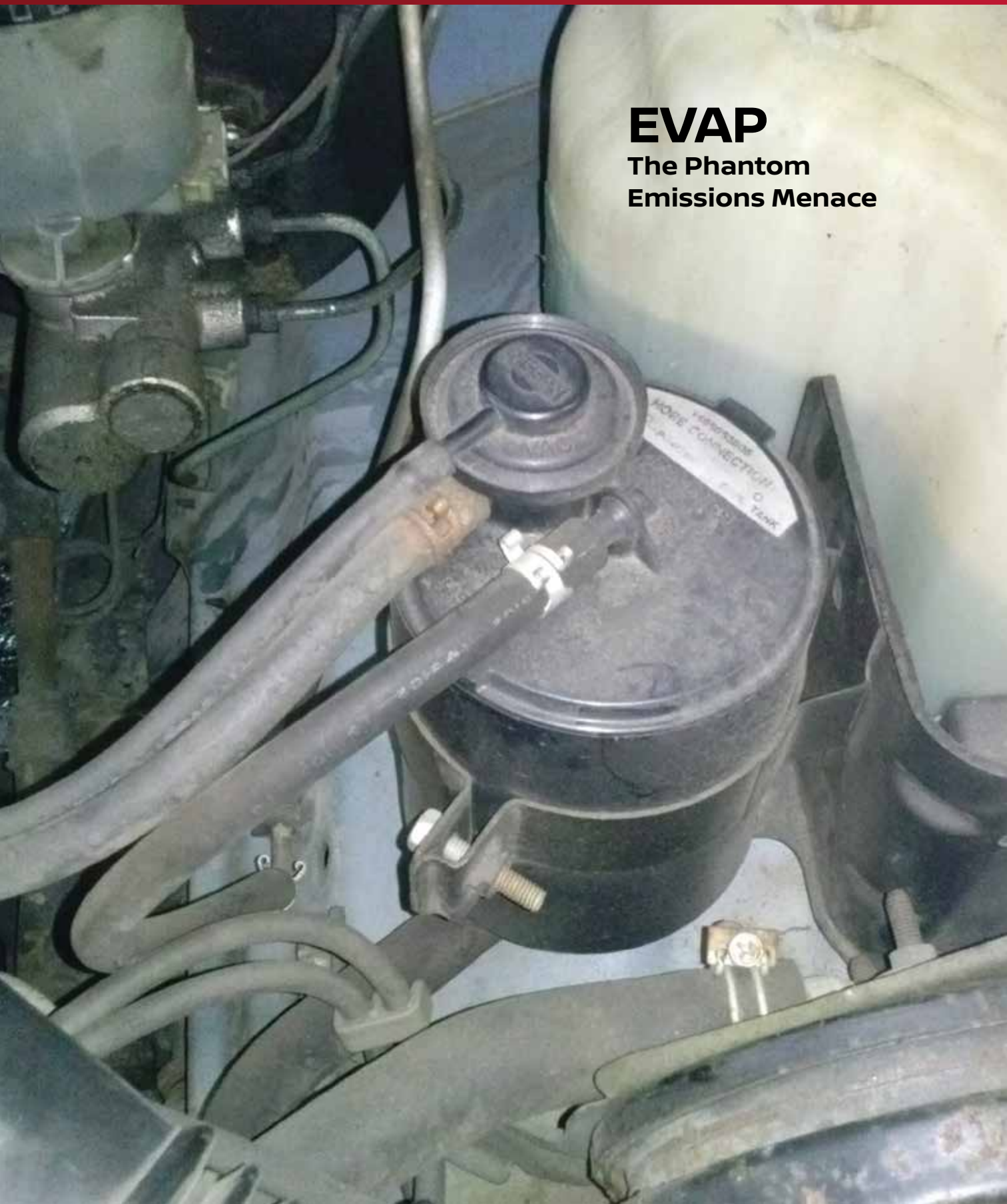
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What is inside that...? Can it be...? Must I do pre- and post-repair scans...? Answers are all in the Body Repair Scanning Manual and other sections of the Nissan service manual.

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.

EVAP

The Phantom
Emissions Menace



It's a system shrouded in mystery and it's easy to misdiagnose. Let's take a look into the evaporative emissions system and the various DTCs that it can cause. Though it seldom causes noticeable symptoms, it's still a system that needs attention. Whether it's to protect the environment, to appease the state inspector, or just to turn off that MIL on the dash, a solid EVAP diagnostic understanding is a tool in your belt that will make you a more valuable technician.

In the automotive world acronyms run free and wild, but not this time. EVAP is actually not an acronym; it's an abbreviation for EVAPorative emissions. EVAP, as we now know it, began with the inception of the OBDII standards in 1996. To sum it up simply, it's a system designed to deal with the vapors generated in the fuel tank so as to not let them escape into the atmosphere, adding to pollution. Instead, the fumes are channeled into the intake manifold and burned, insuring none of the fuel is wasted.

The idea didn't start in 1996; it can actually be found in vehicles dating well back into the 1960s. The monitoring of the system is what our concern became when OBDII was introduced. The previous systems seldom consisted of more than a vapor canister and some vacuum hoses. Now we have purge valves, vent valves, breather filters, multi-chambered vapor canisters, tightly sealed yet still vented fuel tanks, and a vast array of interconnected plumbing to contain the fuel vapors. The end result is an air tight system that ensures that even trace vapors of gasoline will find their way into the engine to burn.

Most of the time, the first sign you have an EVAP problem is the illumination of the MIL on the dash. A concerned customer may be wondering if their vehicle will leave them stranded. With rare

Opposite Page: Prior to EVAP monitoring, this canister would not directly cause a check engine light. Short of being physically damaged and causing a vacuum leak, you might never notice when it develops a fault.

exception EVAP problems will be symptom free, and often they will be driver caused.

A very common way the EVAP system fails is simply a loose or inappropriate (aftermarket, locking, etc.) gas cap. P0456 is the code for EVAP leaks. This is such a common problem that as of model year 2011 Nissan vehicles have their own special warning system on the dash indicating a loose gas cap. After a fuel fill-up the ECM monitors the EVAP system specifically to identify that the system is sealed. Should a vapor leak appear immediately after a fill-up the driver is warned with a LCD display "loose" or an amber light that looks like a fuel pump handle with a fuel cap missing. The fix is easy, just check the seal on the gas cap and either install it properly or replace it with a genuine Nissan cap. Aftermarket fuel caps are not that much cheaper than the factory part, yet often cause problems. It's a good idea to start by looking for a factory cap when diagnosing any EVAP leak code. Other possible causes for EVAP leaks are rolled, pinched, or cut o-rings on the gas cap.

Maybe a little less known is that topping off at the gas pump can also cause a problem. This is simply misuse of the vehicle. As a safety feature, the pump and fuel tank are designed to work together to stop fueling when the tank is at capacity. Back pressure is created in the fuel tank when refilling reaches about 90 percent of the space in the tank. This back pressure is sensed by the fuel pump nozzle that will stop the pump with a loud click.

At this point, well-meaning, intelligent people lose their common sense and continue pulling the pump handle trying to force more fuel into the tank. The result is that the 10 percent of the space in the fuel tank reserved for vapor is filled with liquid fuel that can and will find its way into the vapor lines and eventually saturate the vapor canister. This is worse than it sounds. The canister can eventually fail internally, sending charcoal debris through the system and potentially causing thousands of dollars in damage. This can also cause many pitfalls for technicians trying to diagnose an EVAP code.

As far as faults that will set a DTC are concerned, the EVAP system integrity testing is relatively simple, and falls into two basic types of systems; those that run the test when the engine is running and those that run the test when the engine is off.

The first uses the purge valve connected to intake manifold vacuum to draw negative pressure on the fuel system. This seals the system after the engine is turned off to create a vacuum as the fuel system cools. Both systems then measure the amount of vacuum decay and use that data to determine if the system is leaking. By either of these methods it is possible to find a leak smaller than a pin prick. The system will also test that all of the electrical components (solenoids, valves and sensors) are functioning. Simple, right? There are some later systems with a few extra components that increase efficiency but the basic idea is the same.

The EVAP system is designed to identify leaks, so many of the codes you'll be diagnosing will involve finding these leaks. The most efficient way to find EVAP system leaks is to use a smoke machine. This device blows smoke-impregnated pressurized air into the system that will find its way to the leak. All the technician has to do is seal the vent side of the system and follow the EVAP lines with a bright white flashlight and identify where the smoke is coming out of the system. Many of these smoke machines also have a flow meter on them allowing you to identify how much of a leak the system has.

There are ways this method of testing can fail. Sometimes the leak can be small enough



When the computer sets a code indicating the fuel tank pressure isn't changing when it should, this quick test will verify the fuel tank pressure sensor is actually able to change. While observing the fuel tank pressure sensor PID, give the filler neck a quick shot of air. You should see the FTP value change quickly. Just remember, be gentle, you're not trying to inflate the gas tank like a balloon.



Quickly confirm the fuel tank pressure sensor is actually working properly by applying a small amount of vacuum while watching the sensor voltage on the scan tool. A failed pressure sensor can fool the ECM into thinking the canister vent valve isn't closed when it actually is.



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that it is nearly impossible to spot. An example might be a gas cap with a very small leak. The smoke machine has to push all the air out of the gas tank before the smoke will reach the leak at the cap. Intentionally filling the system with smoke before testing may help with this kind of problem. Connect the smoke machine at the service port or purge valve, then remove the gas cap to fill the system with smoke. When smoke comes out of the filler neck simply put the cap back on and start looking for that leak.

The smoke machine cannot always find the leak. It is possible to have a small leak that is only present under vacuum and does not show up under pressure. These are a bit more difficult to nail down. Using the divide and conquer method will often help you narrow in on your problem.

Find a connection near the middle of the system, maybe at the vapor canister. Test one half of the system at a time by applying vacuum with a hand held vacuum pump. If the vacuum bleeds off you know your leak is on that side of the system. Next, find a connection half way through the side with the leak and test again. Eventually you will narrow your search to a point that you can either replace the leaking part



This is a port designed to give access for external EVAP emissions integrity testing and diagnostics of the system. Pay special attention to the warning as smoke machines that aren't designed for EVAP can cause damage by over pressurizing the system.

or you determine that the connection you are testing is the point of the leak.

After the repair, put the system back together and confirm that the leak is fixed. It seems obvious but it's important to re-test after the repair, even if you are sure you found the leak. It is possible to create another leak during the repair or testing process or have more than one leak in the system. Pay close attention to the valves at either end of the system. The vent valve, often mounted to the charcoal canister, has been known to leak under vacuum and seal under pressure.

There has been some confusion lately about DTCs related to the EVAP system. As an example, code P0448 indicates a malfunction in the vent control valve. What makes this really confusing is that many of the aftermarket diagnostic tools and data systems will define this code as "EVAP system vent control valve short circuit." In many, if not all cases, not only is this misleading as to the nature of the fault, it also won't be the actual problem.

Common culprits are Frontiers and Xterras from the early to mid-2000s. The actual code for a vent control valve short circuit is P0447. Although some circuit problems may present



Even at full pressure the smoke machine is indicating a significant leak, greater than 0.040". Simply follow your nose for the baby powder smell of the smoke, then narrow in on the leak with a bright white flashlight.



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with a code P0448, it is more likely an indication that there is a restriction in the inlet air of the EVAP system. The restriction could be a kinked hose, blocked filter (packed with dirt/dust), or a canister filled with liquid.

The reason we will see this code more frequently in the Frontier, Pathfinder and Xterra, for example, is in the nature of the vehicle. Dust, dirt, and water from off road driving are very likely suspects in a fault leading to P0448. In cars, a more likely culprit might be the vent valve itself. The least likely cause, in either case, is an actual circuit problem. Not to say it isn't possible, just unlikely. Check for TSBs as well. 2005-2007 Pathfinders have a TSB (NTB07-060a) to upgrade the EVAP vent with a filter to prevent these kinds of failures.

The ECM sends the signal for the vent valve to open, then, using logic circuits, sees insufficient change in the fuel tank pressure sensor. The ECM sets the code P0448. Assuming a failed valve may get you a quick fix or you might find yourself explaining to the service writer why the P0448 code came back. Although a vent valve stuck closed may be the cause, so can a clogged vent filter, dust filled canister or even an obstructed vent hose. By simply disconnecting the vent hose from the vent control valve, one can simply blow air through the filter to check for any blockage.

A clogged canister can be a bit more involved. On vehicles like the Frontier, Pathfinder and the like, it's easy enough to take the canister out and weigh it. Actual weight will differ between

models, but a heavy canister means there's stuff in it that shouldn't be. Typically a canister should weigh less than 5 lbs. with the vent valve and pressure sensor attached.

On some vehicles it can take up to two and a half hours, (in a 2005 Maxima for example) to get the canister out to weigh it, so this might not be the first test you want to do. Blowing through the vent hoses may be a better method. In either case if dust, charcoal, water or liquid gasoline comes out of the canister or hoses, it's time to



Specifically designed to prevent water and dirt from entering the EVAP system, this filter is good but not perfect. Years of driving dirt roads, deep puddles and trails can lead to clogging and even a DTC. Keeping the nature of the vehicle in mind may lead you to a quick answer in your diagnosis.



This Frontier has a charcoal canister that is relatively easy to access and weigh. When full of gas, dust, or water it can nearly double in weight, indicating it's time to replace it.

replace the canister and look at how the foreign material got in there as well as clearing any debris from all the EVAP lines.

The purge volume control valve, or purge valve, is the control device on the engine side of the equation. You will often hear this valve actuating with the hood open and the engine idling. After a minute or so of start-up you'll hear a rhythmic ticking from the valve as the ECM pulses it on and off to create negative pressure in the EVAP system.

Issues with the purge valve typically fall into two categories; either it is open when it shouldn't be, or it's not open when it should be. Although it is possible to have a ECM failure in the purge valve driver, the culprit is almost always the valve or hoses to it. Occasionally you will find a wire harness problem, and there is an easy way to eliminate that possibility right off the bat. Using a noid light (usually for fuel injector testing) and commanding the purge valve on with your CONSULT III Plus, observe the light. If it flashes you know your wire harness and ECM are good.

After you have eliminated the wire harness and ECM as possible causes with the "noid light" test (or simply hearing the purge valve work,



Identifying the purge valve is easy, it's the valve closest to the EVAP service port. This is where you will be starting to test for codes P0441-P0445. Three connections to this valve are the electrical connection to the ECM, the vacuum supply hose to the intake manifold, and the vacuum hose to the EVAP system.

for that matter), testing the purge valve itself is pretty easy. Simply disconnect the vacuum hose to the canister side of the valve and connect a vacuum gauge in its place. To make it easy to identify, it is the side with the green cap inline.

Now start the engine and observe the vacuum gauge. If you have a significant vacuum reading and the valve is off, you are looking at a bad valve. Unplug the electrical connector to confirm there isn't any possibility the valve is being activated inadvertently and you can be confident in condemning the purge valve.

The other side is just as easy, just command the valve on with the scan tool. If you don't have vacuum you know the problem is either the valve or the vacuum source to it. It's important not to assume the vacuum supply from the intake manifold is good simply because the hose looks good. Pull the vacuum hose off the purge valve and confirm you have good vacuum. At this point it's safe to assume the purge valve has failed internally.

You can also test the electrical integrity of the valve with a simple ohmmeter. Since there are only two contacts on a typical purge valve, simply measure the resistance between them. Although the actual specifications may vary, if it's between 10-20 ohms you're probably OK. A valve that has failed electrically will most often read as an open circuit as opposed to an internal short.

One last parting thought to consider is the root cause of failure. Any time you find a failed EVAP valve or pressure sensor, it's really important to look inside the valve and lines for signs of debris. As mentioned earlier, if the vehicle has been habitually overfilled at the gas pump, the charcoal canister can degrade and send charcoal through the system damaging the valves.

You may change a faulty purge valve only to have the customer return in two weeks with the same code stored when the charcoal in the lines damages the new valve. Noticing the debris will allow you to clean the lines properly, replace the vapor canister and even advise the customer about proper refueling etiquette with a very tangible handful of "this is why we don't top off." |

Initialize This: Troublesome TPMS



Tire Pressure Monitoring Systems are here to stay. Mandated for production vehicles starting in 2008, TPMS changes the way we mechanics must approach tire-related services. This article focuses on the repair methodology necessary to prevent inaccurate TPMS warning icons, the unnecessary frustrations for you and potential come-back customers, and wasted labor revisiting TPMS complaints.

Due to federal safety standards for new vehicle production, all cars sold in America starting MY2008 are equipped with some form of tire pressure monitoring. However, every vehicle manufacturer is free to design and implement TPMS as they see fit. For those of us in the service industry, this means that we may discover that repair procedures for TPMS on one type of car do not work for another. This article will help Nissan technicians identify the standard procedures for Nissan vehicles, saving time and avoiding unnecessary come-backs.

Identifying the TPMS components

At least for the North American market, all Nissan vehicles utilize wireless TPMS sensors located in the wheels. Each sensor transmits its pressure data to a receiver unit. For vehicles equipped standard with remote keyless entry, the receiver for the keyless entry will also listen for TPMS sensor data. Vehicles without keyless entry will have a dedicated TPMS receiver unit. Be sure to reference the service manual for verification.

On all designs, the receiver unit will report to the Body Control Module (BCM) which then makes all logical considerations. The BCM commands the combination meter to illuminate the TPMS icon, and will also report data to the Vehicle Information Display on vehicles equipped with this option.

Some – but not all – Nissan vehicles are equipped with a TPMS test connector that can be used to manually diagnose and initialize the system without special service tools. Consult

the service manual “WT” section to determine whether a particular car has the connector. However, this is the least efficient method of interaction. It is strongly recommended to invest and train with the appropriate Nissan special tools.

Service tools required

Any shop that expects to work on modern Nissan vehicles should have the CONSULT III Plus. This tool is recommended for diagnosing TPMS problems, and it can also perform necessary work support functions like registering new sensor IDs. In addition to the CONSULT III Plus, Nissan has two additional specific service tools to expedite TPMS-related jobs.

The Transmitter Activation Tool (J-45295-A) is a lightweight hand-held device that can quickly and easily activate (“wake up”) TPMS sensors. This device is used in conjunction with the CONSULT III Plus, and is one of the two preferred official methods for service.

The Signal Tech II (J-50190) is a stand-alone TPMS solution with a DLC cable for interacting with Nissan vehicles. This device can be used in conjunction with the CONSULT III Plus in the same manner as the J-45295-A, as the second preferred official method. In addition, it also can be used alone without the CONSULT III Plus to diagnose or service TPMS due to its DLC cable. The Signal Tech II has other functions like testing keyless entry transponders, and allowing advanced spread sheet data export to a PC.

All of these Nissan special service tools can be found and purchased online through nissantechmate.com.

When should the TPMS icon illuminate?

Many customers arrive at a shop with the TPMS icon illuminated. Some of these customers may even be ignoring the light because of frustration. For them, the light “has been coming on forever” but no other shop has been able to figure out why!

When the ignition is turned on, the TPMS icon should illuminate for self-diagnostic bulb check and then go out after one second. If it turns back on and remains solid, one or more tires has low pressure or a sensor ID that is not registered (depending on the fault logic; check the service manual). If the icon blinks for one minute before remaining solid, there is a TPMS DTC stored.

Every Nissan service manual begins the diagnostic process by recommending to check the tire pressure. This is because pressure is readily affected by environmental factors like temperature and altitude. For every 10 degree F change, the pressure will change 0.8 psi. For every 2,200 ft. above sea level, a basic pressure gauge will read approximately 1.0 psi higher than the actual pressure within the tire. Note that a TPMS sensor will report the tire's actual pressure properly since the tire is its own sealed pressure chamber, whereas the gauge is affected by low ambient pressure. Over the course of a month, a tire will naturally lose about 1.0 – 1.5 psi.

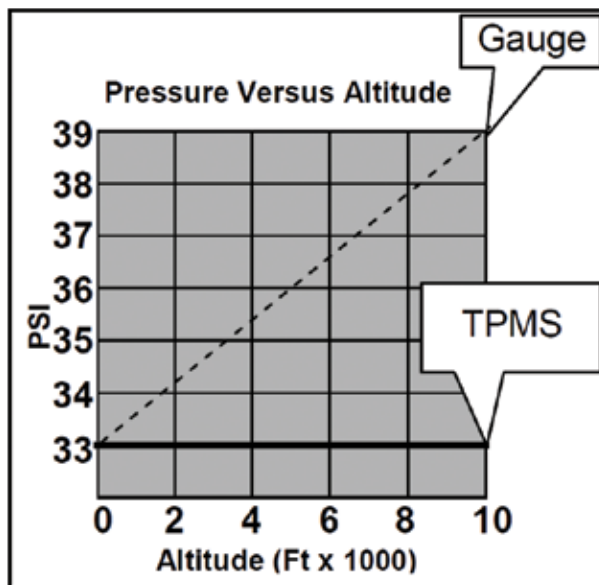
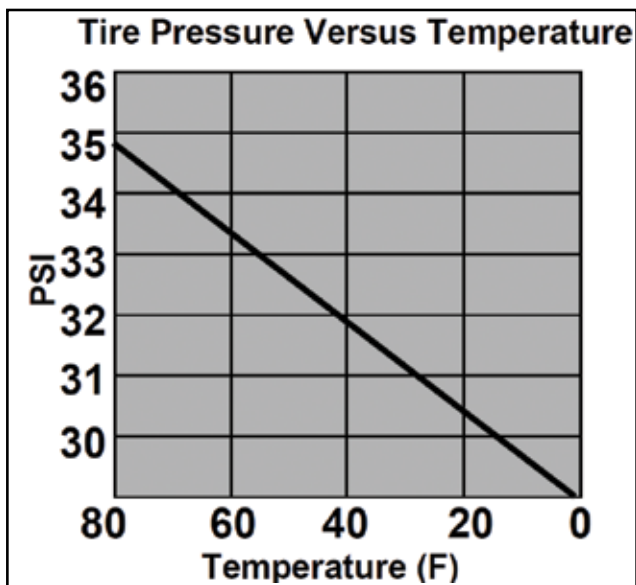
Tires are considered cold after the vehicle has been parked for 3 or more hours, or driven less than 1 mile at moderate speeds. Refer to Nissan technical service bulletin NTB13-088a for more details.

Performing sensor ID registration

According to NTB13-088a published in 2015, TPMS sensors must be initialized every time the wheels are swapped – that is, rotated or replaced. According to the service manual for some older TPMS implementations around MY2008, sensor ID registration may not be necessary. Avoid the risk of a come-back, and

Low tire pressure warning lamp blinking timing		Activation tire position
ON		a : 0.3 sec. b : 1.0 sec.
ON		a : 0.3 sec. b : 1.0 sec.
ON		a : 0.3 sec. b : 1.0 sec.
ON		a : 0.3 sec. b : 1.0 sec.
ON		a : 2 sec. b : 0.2 sec.

On this 2015 370Z, the TPMS icon will blink a number of times based on whichever wheel location does not have a sensor ID registered.

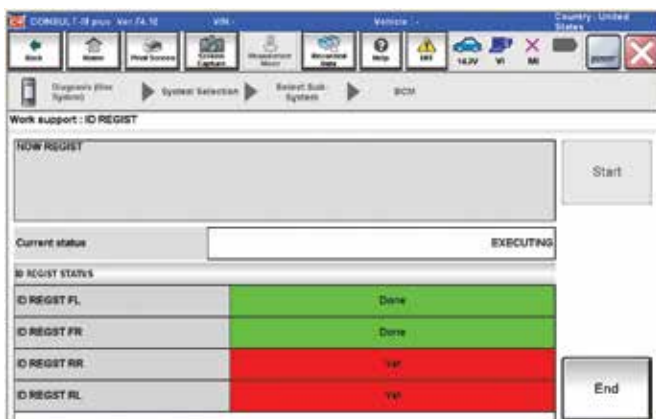
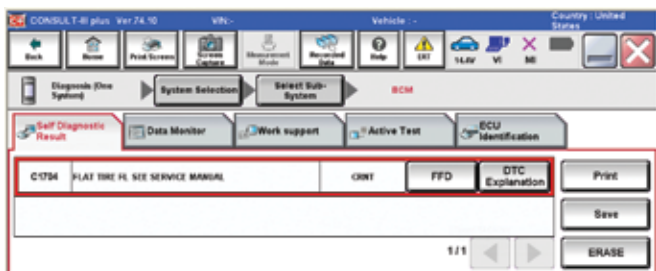
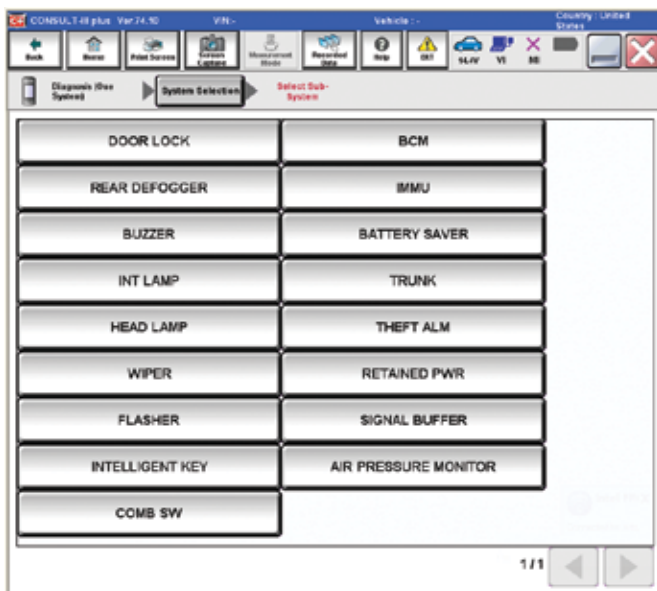


It's 30 degrees F in the mountains at 4,400 ft. A car arrives for service at your 70 degree shop with a measured 32 psi warm; the Nissan recommendation is 35 psi cold. What do you set the pressure to at the end of the day so the car leaves with the proper cold tire pressure? (Answer: 40 psi by the gauge)

get in the habit of performing a sensor ID registration during every tire rotation service. Consult with your service team to communicate the importance of following Nissan procedures to customers during their service visits.

If sensor ID registration is required, there are four different ways to perform it:

- Activation tool J-45295-A + CONSULT III Plus
- Signal Tech II (J-50190) + CONSULT III Plus



This registration procedure is halfway completed.

- Signal Tech II only
- CONSULT III Plus only

The preferred methods

Nissan recommends methods #1 and #2, and each is executed in the same manner: Connect the CONSULT III Plus to the vehicle and choose Diagnosis (One System). Choose BCM. Choose AIR PRESSURE MONITOR.

The next screen will display any current (red) or pending/history (yellow) DTCs.

Select WORK SUPPORT to access sensor ID registration mode (ID REGIST), or view the currently registered sensors (ID READ). Select ID REGIST, then choose START to begin the initialization. After pushing start, use the Activation tool or the Signal Tech II to activate each sensor starting with the left front wheel. Proceed clockwise to activate the right front, right rear, then left rear sensor.

The ID registration is finished once all sensors have been activated, and all boxes are green. Press END to complete the registration.

	ID	POS	DTC	3
LF	N/A	N/A	C1709	
RF	OK	OK	None	
RR	OK	OK	None	
LR	NEW	N/A	C1708	
OK to Write IDs\Clear DTCs				

According to this Signal Tech screen capture, the LF sensor has no ID information and a C1709 (no data found) DTC. The LR sensor has NEW ID information when compared with the vehicle's stored data, but also a C1708 because it has not been properly registered.

	ID	POS	DTC	3
LF	OK	OK	None	
RF	OK	OK	None	
RR	OK	OK	None	
LR	OK	RT	Low Press	
OK to Write IDs\Clear DTCs				

This vehicle had its left rear tire swapped, and its sensor reports low pressure.

Note that it may be possible to use a different TPMS tool for the activation procedure, but Nissan does not guarantee the success when using alternative tools.

Using the Signal Tech II only

When using the Signal Tech II as a stand-alone device, consult the user's manual for specific instructions. The Signal Tech can activate and store each sensor's data, upload the data to the vehicle via DLC cable, or perform diagnostic queries using the DLC.

Using the CONSULT III Plus only

Without an activation tool, registering sensor IDs using only the CONSULT III Plus is possible, but takes more time and requires driving the vehicle. The procedure starts by setting the left front tire pressure to a specific pressure, and then continuing in a clockwise manner to set the remaining pressures at 3 psi less for each successive wheel. Consult the service manual for the correct LF reference pressure, which appears to be the recommended cold pressure spec. For example, the 2014 Sentra's pressures should look like this: LF 35 psi; RF 32 psi; RR 29 psi; LR 26 psi.



Once the pressures are set in this particular pattern, use CONSULT III Plus to navigate to WORK SUPPORT "ID REGIST" as described in the section above. Drive the vehicle at a speed greater than 25 mph for 3 minutes or more until the ID REGIST boxes change from red to green. Once they have all changed, press END on the CONSULT III Plus, and set the pressures to the proper level.

Remember, the registration procedure is required after every tire rotation; otherwise the TPMS icon could illuminate despite proper tire pressures!

Which sensor goes where?

Some newer Nissan vehicles are equipped with an individual tire pressure display. This aids the driver - and mechanic! - in identifying which tire is triggering the low pressure warning system.



This sensor ID is in decimal form. Converted to hexadecimal, the sensor ID matches the sensor position currently registered. There are no DTCs.



Compare part numbers

These sensors look physically identical, but they aren't the same inside. Check part numbers to avoid wasting time re-doing a tire mount and balance!



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On cars without this feature, there is another approach to identify which sensor ID on the CONSULT III Plus belongs to which physical sensor location. Using the WORK SUPPORT "ID READ" function, the CONSULT III Plus can display the hexadecimal ID for each currently registered sensor and its alleged position. If the registered position does not match the physical position, the BCM will store a DTC and illuminate the TPMS icon. The Signal Tech II can be used to retrieve the sensor ID on its own display.

When replacing a sensor, reference the part number printed on the original sensor itself to source the appropriate part. The sensors cannot be mixed and matched, even if they appear identical. Older generation sensors are not compatible with newer systems. As always, use genuine Nissan parts when performing repairs to avoid unnecessary complications. All new sensors are shipped in a dormant state, and require an activation tool to "wake up" after being installed. This "wake up" procedure is another way of describing sensor ID registration as described in the section above.

Mounting TPMS tires

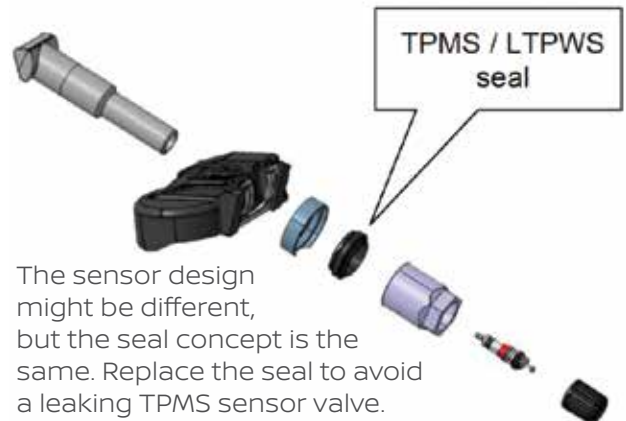
Properly mounting a tire to a rim on a vehicle equipped with TPMS is enough material for its own dedicated article. Be sure to reference your shop's tire equipment user guide to avoid accidentally damaging the sensors when breaking the bead during tire removal or when setting the bead during tire installation. The Nissan service manual includes a few helpful tips about the process.

Easy Tire Fill system

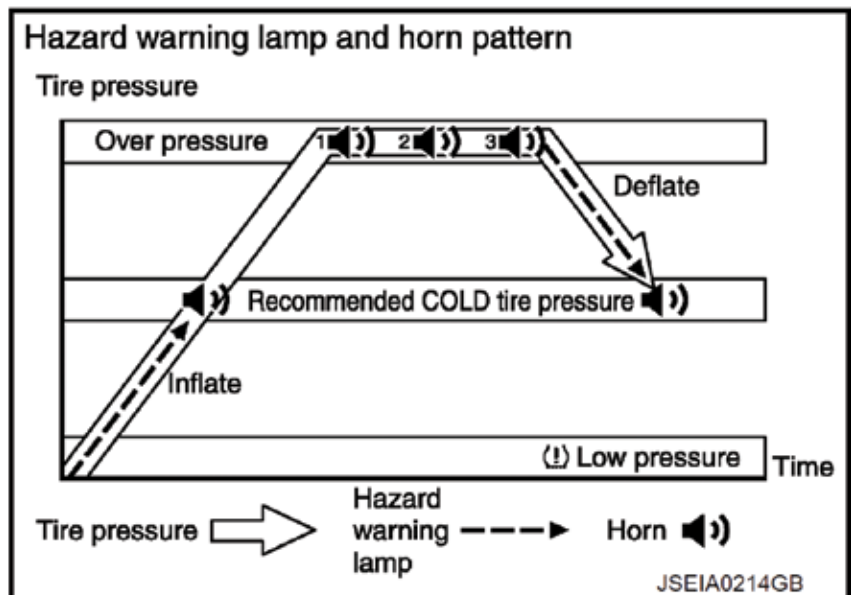
With the 2016 Altima, Nissan added an additional feature to help owners inflate their low tires accurately without a gauge. When the TPMS icon is illuminated, a vehicle owner can place his or her car in Park, and leave the ignition ON. When adding air, the hazard lights will begin to flash until the recommended cold pressure is reached. At the recommended pressure, the horn sounds once. In

the event that the owner continues to inflate over 4 psi above spec, the hazards will NOT be flashing when the horn sounds repeatedly. As pressure is once again reduced toward the recommended specification, the hazards will flash until a single horn sounds when the proper pressure specification is reached.

Proper tire pressure is critical for vehicle safety, tire longevity, and fuel economy. It is an often neglected aspect of vehicle ownership, and Nissan is committed to facilitating its maintenance. As a Nissan technician, resist dismissing TPMS as unimportant or a frustrating waste of time like so many less experienced mechanics have done. Help ensure customers get the best care for their tires by learning how to properly manage Nissan TPMS. |



The sensor design might be different, but the seal concept is the same. Replace the seal to avoid a leaking TPMS sensor valve.



The logic chart for easy tire fill alert system.



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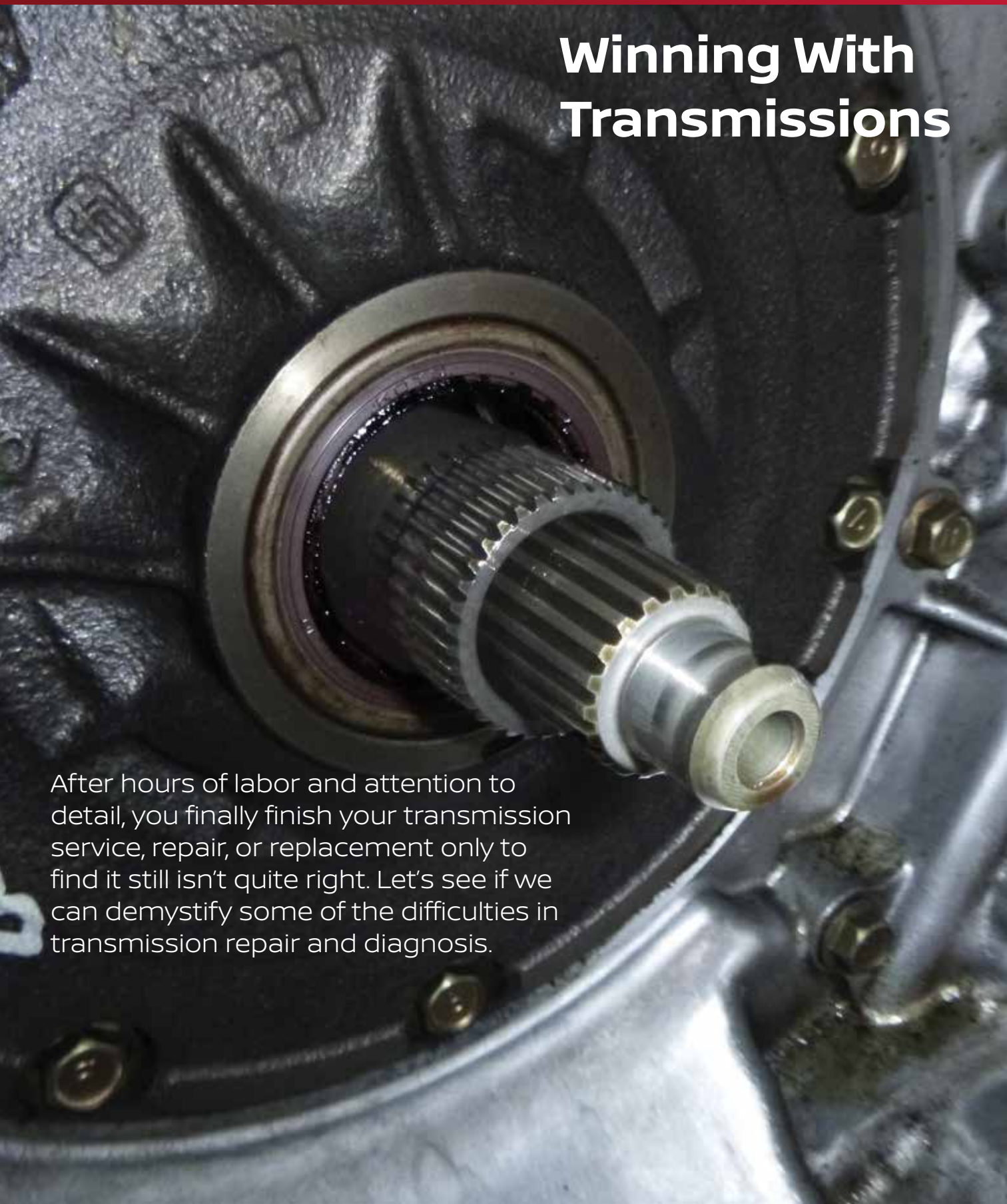
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Winning With Transmissions

After hours of labor and attention to detail, you finally finish your transmission service, repair, or replacement only to find it still isn't quite right. Let's see if we can demystify some of the difficulties in transmission repair and diagnosis.



The modern automatic transmission is a mystery, wrapped in an enigma filled with red oil and clutches. Although the basic function of the automatic transmission hasn't changed much over the last 60 or 70 years, it has become significantly more advanced in shift quality, timing, range of gears, strength, and efficiency. All these advancements mean much tighter tolerances and some of the most advanced computer controls in the industry.

Diagnosing and servicing these transmissions will take more knowledge and attention to detail than ever before. Missing the root cause

of the problem you're dealing with can lead to a return visit and an unhappy customer. It can be a daunting task but with some patience, practice and a little bit of reading you can get to the bottom of your transmission woe and get your customer back on the road.

What makes a transmission fail? There are many things that can cause a transmission to fail. Determining where the problem originated is a critical first step in diagnosing the problem. To condemn and replace a transmission without having an idea as to why it failed may leave you with a second bad transmission in a short time.

Looking at the age range of the transmission is a great place to start. Anything less than 100,000 miles and you know it's not just worn out. There was a component failure that needs to be identified. In a transmission over 250,000 miles you may not have to look as hard since the root cause is likely the high mileage having caused worn out clutches. Most of the time vehicles coming in with transmission problems will be within these two ranges. The first area to check is usually to talk with the customer about the way they use the vehicle and the manner in which it's driven. Due to the tale it can tell, a peek at the fluid before that conversation might not be a bad idea.

Transmission fluid is a truly multi-purpose component. It lubricates all the moving parts in the transmission, it takes the heat to the transmission cooler or radiator, it flushes clean the passages and clutches inside the transmission and it transmits the pressure from the transmission oil pump to apply the various clutches in the transmission.

The condition of the fluid is critical to the function of the transmission. If the fluid looks brand new you might presume that a service had just been done. Did they use the correct genuine Nissan fluid? Using the wrong fluid can cause shuddering and shift problems.



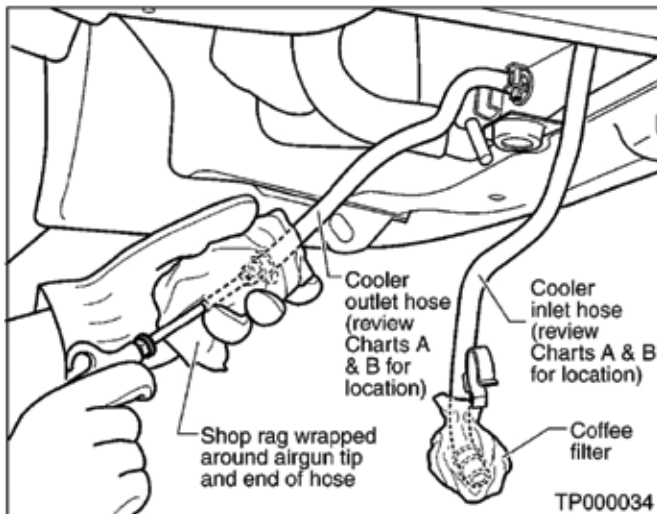
This fluid should be bright cherry red. Years of neglecting fluid service may explain this transmission's poor shifting. Catching the fluid and examining for particles is a good idea for assessing the transmission's condition. Some fine metal on the magnetic drain plug is OK, but any chunks bigger than 1 mm can spell disaster.

Opposite Page: Besides the two splined shafts and the pilot surface at the tip, there are also two tabs under the seal that aren't obvious. All four steps must be aligned and engaged in the torque converter before the transmission installation can proceed.

If the fluid level is low there are a couple of problems that can occur. There is less fluid to disperse the heat and clean the dirt and debris inside the transmission, causing premature wear. Very low fluid can cause the transmission oil pump to suck in air, causing a loss of main line pressure affecting shift quality, allowing flare ups and excessive wear on the clutches.

Is the fluid black and burnt? This might indicate an internal problem in the transmission or it may indicate that the transmission is being used outside of its intended purpose. Towing a 10,000 lb. boat with a Frontier or drag racing a Sentra will cause burnt fluid, for example. Mildly dirty or light brown fluid might indicate a lack of servicing. Missing these clues in the fluid before doing your repair might lead you to miss the underlying cause of the transmission problem.

Being zealous about the fluid condition during the service can also save you from a failed transmission repair. Too often the fluid is considered good, so long as there is enough in the transmission to keep it working. Even a small amount of contaminated fluid left behind after a rebuild can affect a replacement transmission.



When performing a transmission or valve body replacement, cleaning and inspecting the external coolers and lines is critical to insure that no foreign particles are going to cause a premature failure in your hard earned repair. Check out TSB NTB00-056B that applies to all Nissan vehicles with automatic transmissions. It describes this procedure in great detail.

Think about the cleaning aspect of the fluid. As the fluid ages, gets dirty and burnt, it loses its cleaning ability. It doesn't lose its ability to transfer debris and contaminate components like the transmission cooler in the radiator and the hoses to it. An unsuspecting technician might install a new transmission without considering the debris lurking in these lines. The new transmission fluid will promptly clean this debris out and flush it right into the new transmission.

It may seem like an excessive upsell for an already expensive job, but replacing the radiator and any external transmission coolers is a reasonable precaution to take. At a minimum, the lines and coolers should be thoroughly flushed with air, then genuine Nissan transmission cooler flush fluid (PN999MP-AM006P), then flushed with more air.

The most common way of cooling the transmission fluid is a small cooler inside the radiator. Since temperatures in a hot transmission reach above 300 degrees F, cooling with engine coolant that's only about 200 degrees F is very efficient. Over the years this has become the standard method. It also introduces a potential failure where a relatively inexpensive part, the radiator, can instantly ruin, beyond repair, the transmission.



The dowels on either side of the bell housing at 9 and 3 o'clock and at the 3 o'clock position on the crankshaft are absolutely critical. More than just a guide for your install, these are designed to insure perfect alignment between the crankshaft and transmission input shaft.



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Most Nissan vehicles are not prone to this failure. It may happen, but only in unusual circumstances. When a radiator leak allows coolant into the transmission fluid. It's fairly well known that if any water based liquid gets in the transmission, whether by flood or radiator failure, it will homogenize with the transmission fluid making what has been called "the strawberry milkshake of death" SMOD for short.

Many aftermarket transmission rebuilding shops will recommend or require that an aftermarket external oil cooler be used and the internal radiator oil cooler be bypassed to avoid this kind of failure happening in the future. When doing any major repair or replacement of the transmission, consider that confirming the radiator has been replaced recently or replacing it yourself can save you the possibility of a transmission killing SMOD event.

Replacing a transmission can be a stressful job. It takes a lot of time, so it's tempting to cut corners. On the other hand you only want to do it once. Using a little caution during the installation process won't take too much longer but it can save you the time and expense of doing it a second time because something went wrong.

Take for example the dowels that line up the engine and transmission. These are the main reason you will have to pry the engine and transmission apart. Should one of the dowels stick in the old transmission it is critical that it be replaced in the engine block. These dowels aren't there to make your install easier (although they do); they are there to insure the centerline of the crankshaft and the centerline of the transmission are lined up perfectly. Even the tiniest shift in position would spell disaster for your new transmission.

This is also true of the crankshaft alignment dowel. In the case of vehicles with the crankshaft position sensor tone ring on the flex plate, like the VQ35DE 3.5L in the mid 2000s Maximas and Quests, failure to use the dowel to line up the flex plate will result in a CKP sensor problem due to the tone ring being in the wrong position.

By far, the most painful failures are the ones caused by the installation. Bad parts or

misdiagnosis can be frustrating, but actually damaging a transmission because you installed it wrong can crush your morale. With little argument, the worst installation error with an automatic transmission install is actually an easy mistake to make. It's lovingly referred to as "stacking the pump." Basically it's when the torque converter is not fully engaged in the transmission oil pump when the transmission is bolted up to the engine. This alone can damage the pump as the bell housing bolts are tightened.

It is possible in some cases to actually get the torque converter bolted up and even crank or start the engine. If this happens it will mean severe damage to the transmission oil pump and metal particles being sent through the rest of the transmission including the valve body and possibly even further. Since the consequences are so dire, extra precautions should be taken at several steps in the installation process to ensure that the torque converter is fully seated.

When installing the torque converter in the transmission it will seem to engage in several



Actually measuring the torque converter setback into the bell housing will ensure that it is fully seated and safe to install. The distance required should be more than the distance the flex plate protrudes from the engine.



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steps making it a little difficult to tell when it's all the way in. If there is any doubt, simply place a straight edge across the bell housing and measure from the straight edge to the mounting bolt hole on the torque converter. You can use the flex plate as an example of how deep it should be. It shouldn't be a tight tolerance.

When the engine is running the torque converter is bolted up tight to the flex plate and has room on the transmission side to prevent binding. This gap can be a quarter inch or more. As you bring the transmission into the engine be sure to keep the torque converter vertical or tilted back into the transmission. Allowing it to tilt away may let the torque converter slip out of position while trying to align the transmission.

Always double check after the bell housing bolts are tight by simply turning the torque converter with your fingertips. If all the exterior bolts are tight and you can still turn the torque converter easily you are good to go. If the torque converter won't turn freely, stop, find out why and fix it before moving on.

A really bad situation techs can find themselves in is having taken a transmission out and then, due to scheduling, wrong parts, or whatever reason they can't put the replacement transmission in right away. Having to come back to the job several days or weeks later can present a whole new set of challenges.

A system to keep bolts organized and parts safe is a must. Using an old muffin tin is an excellent, and inexpensive, way to keep your bolts organized for example, as is a magnetic steel dish.

Bigger challenges can arise in the wiring harness. It's important to be diligent in making



The torque converter should spin freely behind the flex plate to confirm it is fully seated in the transmission. If it's stuck, find out why, even if it means pulling the transmission back out.



One of these is for the turbine revolution sensor (input speed sensor) and the other is for the revolution sensor (output speed sensor) and yes, they will reach and fit the wrong sensors. Aside from just remembering where the connectors go make sure the fit makes sense. Most connectors are different to prevent mix-ups, but not all.

sure the wire harness is routed the way it was designed to be routed. This will help make sure you get the right connectors on the right sensors. Most of the time connectors have small differences to insure mistakes don't happen,

but not always. Oxygen sensors, motor mount sensors and some transmission speed sensors can have the same connector type and be close enough to be connected incorrectly. These kinds of mistakes can be especially frustrating to diagnose. Making sure you have the harness in the right position to start with can save you big headaches in the end.

As the technology for these advanced transmissions increases, so does the need for specialized parameters in the transmission control module. Shift points will differ from model to model with the same transmission. This necessitates that the TCM is programmed specifically for each vehicle.

Since many Nissan transmissions have the TCM as part of the valve body inside the transmission, replacement of the valve body and TCM or entire transmission will require programming of the new TCM. The typical way this should go is the parameters from the old TCM would be uploaded into a CONSULT III, CONSULT III Plus or in some cases even a CONSULT II or aftermarket scan tool, before it is removed from the vehicle. After the repair is complete and fluids in, the parameters from the old transmission would be downloaded to the new TCM. Confirmation



As with any computer controlled system, a broken ground can cause all kinds of weird problems with the TCM. A simple wiggle test revealed this broken ground wire.

with a test drive and a check for trouble codes to ensure everything worked and you're done.

If the old TCM is damaged beyond its ability to communicate with the scan tool, or if parts were changed before finding out about this procedure, it is still possible to get the correct information into the TCM with the use of a CONSULT III or CONSULT III Plus. The transmission should function without being programmed but in a default or limp mode of operation.

It's important not to condemn a repair until you have confirmed that the TCM is programmed correctly. When installing a used transmission with the TCM in the valve body, it's still a good idea to program the TCM. It may have programming that works but it may not have the right parameters for your application.

TCMs and ECMs share a lot of information back and forth as the perfect shift is planned for every driving condition. A mistake that is made on occasion is to assume that a problem with shifting in an automatic transmission is internal and requires the replacement of the transmission. This leads to the possibility of a costly transmission replacement not fixing the customer's complaint.

It is important to consider the inputs from the engine that might have an effect on the transmission's shifting. Consider that air flow, manifold vacuum and throttle position are all taken into consideration in the timing and intensity of the shift. Any missing data will be recognized by the ECM, will cause a DTC, and will not be taken into consideration for the shift. A skewed reading might get missed by the ECM and cause the transmission to shift incorrectly. If the shift is not as it should be and no codes are present in the TCM, take a quick look at the engine data to make sure nothing is out of place before assuming it's an internal transmission issue.

If you are cautious about the quality of your parts, immaculate in cleaning and preparation, and up to date with the technology in TCM programming, transmission repair can be fun and profitable. The important thing is to take the time to be sure of your diagnosis before removing the transmission. Guessing with expensive repairs will eventually cost you. |

Using Nissan-techinfo.com Online Repair Information

What is inside that B-Pillar? Can it be sectioned? Must I do pre- and post-repair scans? The answers to these and other questions can make or break your repair, and are all in the Body Repair Manual and other sections of the Nissan service manual.





Nissan publishes a large number of repair service manuals, accessory installation instructions, owner's manuals, technical service bulletins, training documents and other informational materials applicable to all of its vehicles. Much of this published information is available for online viewing, if you have a subscription. Some publications must be purchased separately.

Available for purchase separately is diagnostic software to use with the Nissan CONSULT III Plus (or other full-featured scan tools) and J2534-1 compliant software for reprogramming Nissan engine and transmission control modules.

In this article, we'll discuss the "Online Subscriptions" option, which includes access to Nissan service manuals, body repair manuals, training modules, owner's manuals, and selected technical service bulletins and tech tips. One subscription covers Nissan vehicles from 1989 to the present.

Getting started

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The Nissan Body Repair Manual is a subsection of the Service Manual for an individual vehicle model or chassis. To find the Body Repair Manual for any Nissan model, start by finding the service manual for that model.

A "Search Results" window will open, showing the titles of the Nissan Service Manuals it located for you. There may be more than one publication, based on different body styles such as sedan, coupe, or cabriolet, or alternate drive trains (hybrid, etc.) within a model line. Separate wiring diagram publications may also be listed here.

Icons to the right of the title will indicate whether you can view the document online, purchase the document on CD or DVD, or purchase a printed (book) version of the document. Click on "View this Book Online Now" to see the service manual.

What Nissan calls a “Quick Reference Index” will open. The index will be divided into groupings of key vehicle systems, such as engine, transmission & driveline, suspension, steering, body exterior & vehicle security, body interior and others. Each title in the right section of the index is a clickable link to the listed repair manual section. When you click on the “Body Repair Manual” (BRM) title, the document will open and you will be able to read it online or download it in a PDF format that you can save on your computer hard drive.

Click on the “Body Repair Manual” title. The Body Repair Manual (BRM) will open. It contains 106 pages of repair information covering the body exterior, doors, roof and vehicle security. Inside you will find step-by-step replacement procedures for the front assembly, hood, front side member (rail), front and center pillars, door sills, rear quarter panel, fender, rear floor, rear side member and other components.

There will be information about exterior paint color, corrosion protection and body sealing methods, and working with high strength steel (HSS) and plastic parts. You will be able to access body dimensions, the locations of body alignment marks for various vehicle sections, and instructions for how to make measurements to ensure repair accuracy. You will also find precautions about working with air bag and seat belt pretensioner systems. And you will see all of the above information in application-specific sections for each of the sedan and coupe versions of the 2012 Altima.

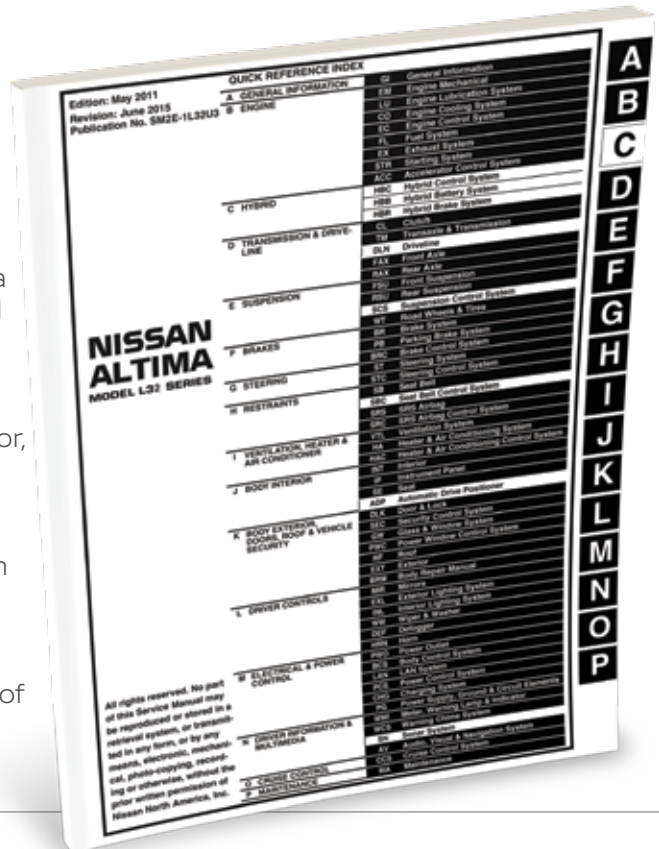
Two body repair information subgroups

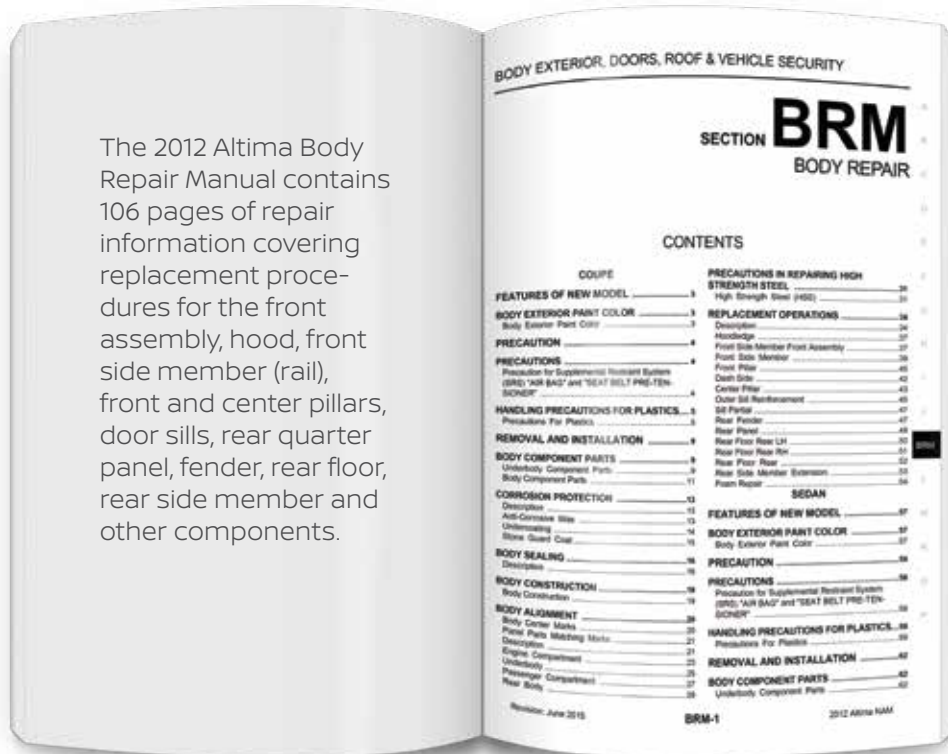
Nissan publishes BRM information in two different sections of its service manuals. First, there is a “Body Repair Manual – Fundamentals” section. It provides general information applicable to most Nissan body design implications



To search for a body repair manual for a 2012 Altima sedan, go to the “Search Publications” screen, select “North America” as the market, and “Body Repair Manual” as the publication type. Select “Altima” in the “For this Model” box, “2012” in the “For Model Year” box, and “English” in the “In this Language” box. For now, leave the “Document Title” and “Keywords” boxes empty (this will not reduce the effectiveness of your search).

The Nissan Body Repair Manual is a subsection of the service manual for a given model or chassis family. It is found in the “Body Exterior, Doors, Roof & Vehicle Security” group, which is Section K in the Quick Reference Index (table of contents).



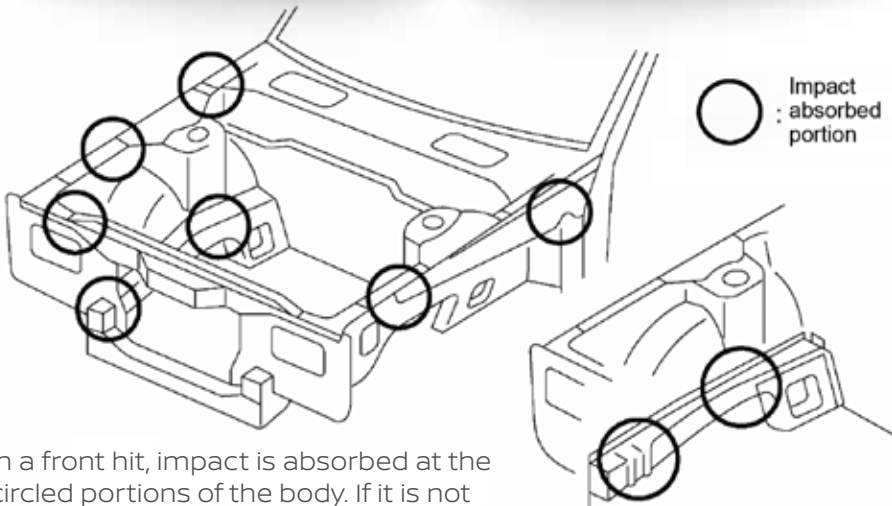


The 2012 Altima Body Repair Manual contains 106 pages of repair information covering replacement procedures for the front assembly, hood, front side member (rail), front and center pillars, front and rear quarter panel, fender, rear floor, rear side member and other components.

panel partial replacement (sectioning) guidelines. It includes extensive detail about repair of high strength steel (HSS), aluminum, plastics, and windshield or window glass.

The BRM-Fundamentals section includes explanations of basic principles that apply across the Nissan model line. For example, if an HSS or Ultra High Strength Steel (UHSS) component such as the front side member outrigger assembly/rear extension (HSS), the rear side member assembly (HSS), the inner sill (HSS), or the front floor (UHSS) is cracked or broken, replace the assembly.

The Fundamentals section explains collision impact and where to look for direct and indirect damage based on the impact area and direction. For example, it shows how impact forces travel through the vehicle, and what structural components are designed to give first in an accident. Some of those components may be hidden behind other parts, or under a cowl or panel. Paying



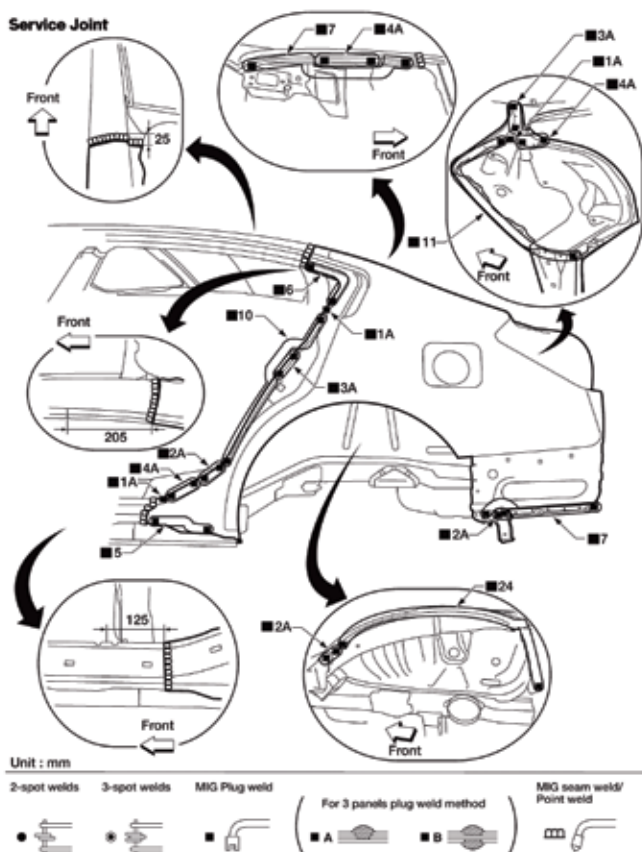
In a front hit, impact is absorbed at the circled portions of the body. If it is not absorbed completely, impact damage can travel to the dash panel and roof.

attention to the Nissan system descriptions and repair procedures alerts you to specific areas you should include in your collision damage inspection, based on where the vehicle was hit.

for collision repair. It discusses the different types of body materials used, including advanced steels, aluminum, and plastics, and their impact on your repair or replace options. It mentions the special precautions that must be observed when working with each material type.

It offers explanations of welding methods that are approved for Nissan vehicle repair, body straightening equipment and techniques, and

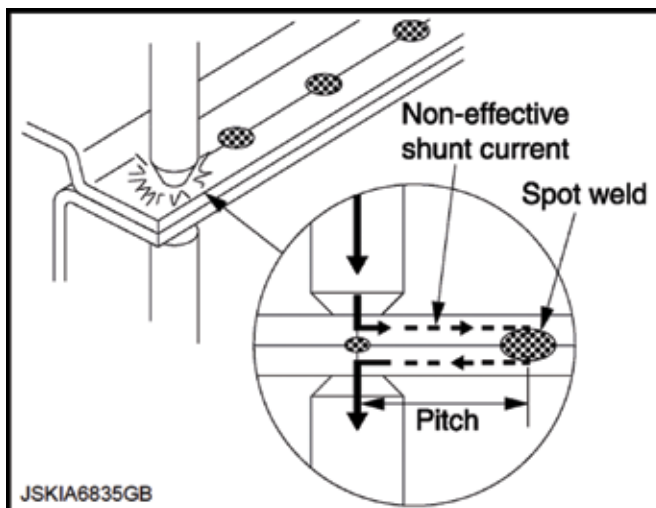
Don't forget to itemize on the estimate any digging you had to do to find hidden damage. If the damage wasn't obvious in a preliminary walk-around with a claims adjuster, you can include with your estimate a link to the Nissan repair procedures that require the additional inspection steps.



In one image, Nissan shows a large amount of information needed to replace the rear fender on a 2012 Altima sedan. It includes cut locations for replacing the fender, and explains that the cuts are MIG seam welded, that MIG plug welds are used in many other areas of the repair, that many are 3-panel thickness, and that almost all are plug welded from one side only. The key across the bottom of the image shows symbols that represent each different weld type used in the repair.

You can find the Body Repair Manual – Fundamentals section in the Search Publications menu by listing “Body Repair Manual” as the publication type, leaving the model and year boxes blank, and typing “Fundamentals” in the “Document Title” box.

Second, Nissan includes a Body Repair Manual section in the service manual for each vehicle platform or chassis series. That section will include repair procedures that are specific to the Nissan models and body styles in the individual service manual. For example, the Body Repair Manual in the Service Manual for the 2012 Altima covers both the coupe and sedan,



The BRM-Fundamentals manual explains the general principle behind the recommendation to avoid an excessively small pitch between spot welds (inadequate pitch allows current to flow to the nearest welds, reducing weld strength).

gives application-specific step-by-step repair procedures, and provides detailed illustrations showing what you will see as you disassemble and reassemble the vehicle. Access to both the Service Manual and the Body Repair Manual is included when you get an online subscription to Nissan publications.

General versus application-specific tips

The difference between the BRM-Fundamentals and the BRM is that the Fundamentals section gives general body repair principles, with examples for demonstration purposes, while the BRM gives specific repair procedures for a given component and Nissan model.

For example, in the BRM-Fundamentals you learn that you should not place spot welds too close together, because some current will bleed off to the nearest weld location, weakening the intended weld. In the BRM for a given Nissan model, you get the exact pitch recommendation, weld tip diameter, pressure, current, and weld time for the joint thickness and number of plates being spot welded.

In the 2012 Altima BRM you will find a section entitled “Precautions in Repairing High Strength Steel.” It contains important information about

the maximum temperature tolerated by the HSS used in the 2012 Altima, procedural tips for use when straightening HSS, how best to drill and cut HSS panels, and when and how to use MIG versus spot welding. It will also tell you the exact pitch distance to use for the thickness of the joint being welded.

The Fundamentals section also explains measurement procedures, shows the symbols for frequently used Nissan measurement points, and provides examples of the locations of measurement points for various structural components and body panels.

Nissan collision repair Position Statements

Nissan has issued a series of official collision repair Position Statements that state the company's requirement that specific procedures be followed when repairing or replacing parts of the vehicle that contain electronic or electronically-controlled components. A sensor that is embedded in a bumper cover or body panel needs to be aligned to the proper horizontal and vertical coordinates so that it points where it should to "see" the intended target area around the vehicle. Nissan has developed targets to assist you in adjusting or verifying that a sensor is aimed in the right direction. But first you must install the bumper cover, body panel, or mounting bracket to meet factory-specified dimensions so it is positioned to point in the right direction.

Nissan has issued position statements that explicitly state how certain repair procedures are necessary to the restoration of specific safety-related technologies to proper functionality. Some position statements require using only genuine Nissan replacement bumper covers, windshield glass, and other parts, because off brands have not been tested and verified to offer the precision fitment needed to ensure that embedded sonar, camera or other detection technology is properly positioned. It also mandates that body filler or paint not be allowed to cover or be too close to the blind spot warning or other sensor in a bumper cover or panel.



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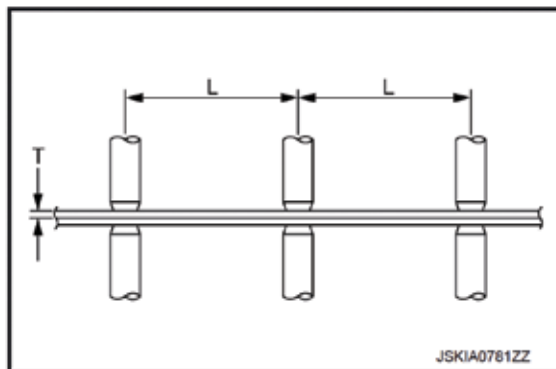
- VIN#, Vehicle mileage
- Year, make, model and engine (if you don't have the VIN#)
- A brief description of the vehicle problem



- Follow the specifications for the proper welding pitch.

Unit: mm (in)

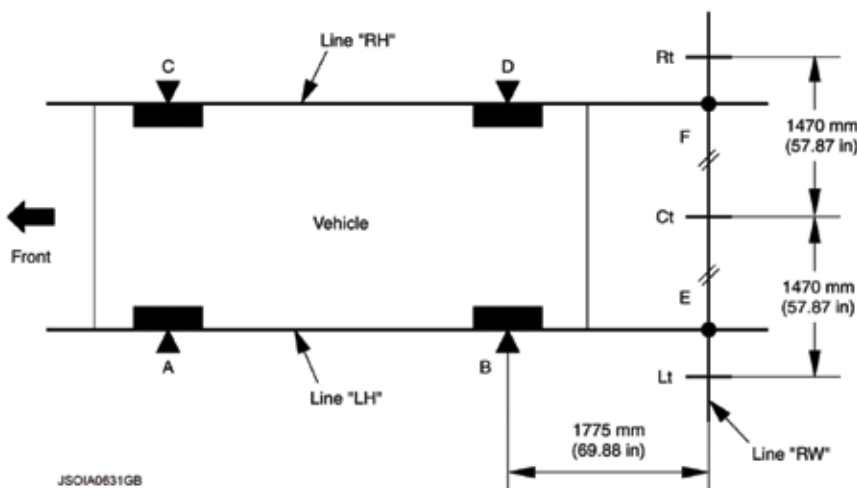
Thickness (T)	Minimum pitch (L)
0.6 (0.024)	10 (0.39) or over
0.8 (0.031)	12 (0.47) or over
1.0 (0.039)	18 (0.71) or over
1.2 (0.047)	20 (0.79) or over
1.6 (0.063)	27 (1.06) or over
1.8 (0.071)	31 (1.22) or over



When welding HSS panels on the 2012 Altima sedan, use spot welding whenever possible in order to minimize heat-related weakening of surrounding areas. Select the electrode tip diameter and welding pitch (center-to-center distance between welds) based on the metal thickness of the joint being welded.

Additionally, many of these electronically-controlled devices need calibration or re-initialization after any remove-and-replace procedures. This includes camera and other sensors in the Around View Monitor, Blind Spot Warning, Intelligent Cruise Control, Forward Emergency Braking, Seat Belt/Air Bag, and Steering Angle Sensor systems. It also includes the controllers for the Power Window System, so the up/down and auto-stop features work properly. Nissan has issued a Position Statement about the requirement for pre- and post-repair scanning to identify up front which electronically-controlled components may need repair or replacement, and then to verify post-repair that your work successfully restored the system to its proper functionality.

You can find additional details about proper repair procedures for these safety-related sensor and control technologies in the Driver Assistance System (DAS), Cruise Control System (CCS), Power Window Controls (PWC), Glass & Window (GW, for devices embedded in windshields), Seat Belt (SB), SRS Air Bag Control System (SRS), Steering Control System (STC) and other sections of the service manual for the Nissan model you are repairing, if it is so equipped.



Once you set up the targets and input the rear view camera height to your CONSULT III Plus, select "Rear Camera ITS" and press "Start." CONSULT III Plus will take you through the process of aiming and verifying the camera calibration.

Go to <http://collision.nissanusa.com> to access copies of Nissan collision repair Position Statements. Scroll down to the bottom third of the screen and you will see a "Position Statements" link. Click on it and a list of links to each position statement Nissan has issued will open. Click on any title and a PDF copy of that position statement will open. You will be able to download a copy, save it to your hard drive, and print it as needed to show to insurance adjusters and vehicle owners.

The collision repair information you need is in the body repair sections of the Nissan service manual. Dig in!



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