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| **Sunroof Repair**

| **Using the Right Fluids**

| **I-CAR**

| **EFI**



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EFI FYI



Here's what you need to know to make a quick, accurate, and effective repair on the technological wonder that is the Nissan fuel injection system.

Precise fuel control is more critical than ever to make a smooth, efficient and powerful engine. How can such a simple device be so mysterious for so many people?

The best place to start in understanding what has failed with an electronic fuel injection (EFI) system is to get a strong understanding of how it does what it does. The fuel injection system is intertwined throughout many of the systems in the engine. The biggest problem in diagnosing a fuel injection system issue is that most failures can be confused with failures in many other systems. It is difficult to tell if the engine is running rich because of sticking, leaking fuel injectors or a failing oxygen sensor or exhaust leak causing the ECM to add more fuel. Is a misfire being caused by a failed fuel injector or an ignition system failure? Or the big one; could a rough idle be being caused by dirty fuel injectors? Being able to recognize the difference is the key to quickly diagnosing problems.

The only job a fuel injector has is to allow the correct amount of fuel to pass at the correct time. The inside of a fuel injector is not all that

complex. With a little variation between the models, the basic design is the same. A pintle or plunger is moved by a solenoid, momentarily allowing pressurized fuel to pass through very small nozzles, thereby making a fine mist for easy combustion. Such a basic design allows for years of trouble free operation with relatively little maintenance required. With so few failures, injectors are often overlooked as the cause of driveability problems. Technicians have even been known to doubt the integrity of the new ignition coil they just replaced before even considering that the fuel injection might be a problem. Fuel injectors are often the last to be checked after all other systems test good.

The fuel injectors are controlled by the ECM, which typically uses a ground side driver to complete the circuit, opening the injector. That is to say it switches the ground side of the circuit on and off to open and close the injectors. This allows for the injectors to have a shared battery positive fuse while still being triggered individually. Although some older fuel injected motors used throttle body injection, like the late '80s and early '90s Nissan pickups and Pathfinders for example, most fuel injection systems in our shops today will be electronic port fuel injection or direct cylinder fuel injection in the later models.

These systems fire the injectors separately for each cylinder and require individual wires from each injector to the ECM as well as individual drivers for each injector inside the ECM. This method of controlling the fuel flow is simple enough that failures between the ECM and injectors are not very common and usually involve some physical damage to the wiring harness, like water intrusion or a rodent chewing on the wires. Deciding if you have a ECM/control side issue or an injector/fuel side problem is an important step in getting to your solution, but keep in mind it is possible for the latter to cause the former. If an injector is



Comparing the sound each injector makes with a stethoscope makes it really easy to tell if one or more is/are opening in rhythm. Once you hear a good injector, a failed one will be obvious by the sound it makes (or doesn't make).

shorted internally it is possible for the excess amperage to damage the wiring harness or worse yet even damage the ECM driver.

A great way of testing to determine if the injectors are firing is with a simple tool from your local parts house; the mechanic's stethoscope. By attaching a long rod to a stethoscope you can listen to the injector as it makes a ticking sound when it pulses. It should sound like tiny blacksmiths beating on anvils inside the injector body, and a muffled sound or no noise at all is a solid indication we have a problem with that injector.

In the case of a cylinder misfire, simply comparing the difference in noise between injectors will give you a pretty good idea if one isn't firing. Unfortunately there are some limitations to this method. In direct injected engines, like the MR16DDT in late model Jukes for example, you won't be reaching the injectors to test with a stethoscope due to their location deep in the cylinder head. Also most V-6s have the intake plenum covering half the injectors making them difficult, if not impossible, to reach.

This doesn't mean that you should have to take the engine apart to test the system. With a wiring diagram in hand you will often be able to identify a convenient place to back probe a connector and read the injector pattern on the ground side of the injector circuit. Since there are subtle differences between different engines and the vehicles they are in, it would be difficult to show every system in this brief article, but let's consider the 3.3L engine in the early 2000's Frontier. There is a pair of connectors on the front of the right valve cover that provide easy access to both injector banks. The connector on the valve cover is easy to access and has all the wires you will need to test. The black/red wire should

read battery voltage and not waver much while the engine is running. Next test for ground on the white wires with various colored stripes; they are the ground side to each cylinder (your wiring diagram will help identify the cylinders).

Although you may be able to see the pulsing voltage with a digital multimeter, a graphing multimeter will give you a better picture of what's happening. If you see the voltage pulsing you know that your injectors are at least making contact electrically. This doesn't mean that fuel is flowing out of the injectors but it does indicate that half of the system is working.

Should you not see a pulsing ground/voltage you just happen to be in the right place for the next step in your diagnosis. These same connectors can be separated and you can easily test the resistance of each of the injectors right there. Simply test resistance between the black/red wire and each of the white wires in the same connector. Resistance will typically be between 12-14 ohms, however you don't typically need to look up the specifications. The chances of



On the front of the right valve cover this fuel injector harness connector is the perfect place to test the electrical integrity of all the injectors quickly and easily.



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having more than one injector with high or low resistance is not very likely. Simply compare the resistances of the other injectors and you should have a pretty good idea if you have a problem. Say four of the injectors are at 12-13 ohms and one is at 45 ohms and another at 1.5k ohms. You can bet which two are causing your problem. As a side note it is very important that you continue to backprobe the connectors throughout this process, even when they are unplugged. Using a pin in the face of the connector can damage the terminals and cause big headaches later in your diagnosis.

Should you find an injector that isn't making any noise, the next step is to check for injector pulse. This is done with a tool called a "noid light" connected to the fuel injector electrical connector, that will flash with every pulse the ECM sends to the injector. In the old days mechanics would connect a standard test light between the injector leads. Although this is typically "safe" it is not as safe as using the right tool. The noid light is designed to be used here and has the correct terminals to connect to the fuel injection connector. Using a test light with pins or exposed metal surfaces has the potential

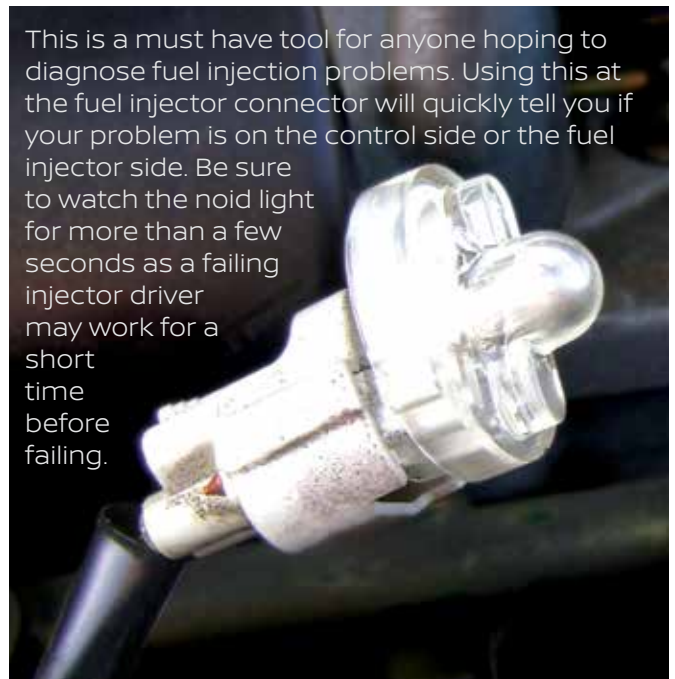
of accidentally shorting across the connection and may draw too much amperage through the driver, damaging it. Damaged drivers mean replacing the ECM, so keep that in mind when doing any work with the injector harness.

When testing with a noid light it's important to keep in mind that this is not a confirmation that the injectors are actually spraying any fuel. All this is telling you is that the computer is commanding them on and that the wiring is in working order. A failed or clogged injector can be identified directly with the noid light. If the injector doesn't tick and the noid light does flash, it's a pretty good indication you've got a failed injector. With a noid light that doesn't light up with the engine running, you will be checking for power to the injector, wiring issues or, the worst case, a failed driver in the ECM. Dim or intermittent flashing may indicate extra resistance in the injector circuit. Shaking the harnesses and connections should help identify the problem.

A very solid way to test if fuel is actually flowing through the injector is to do a fuel injector balance test. This is basically a flow test that is performed with the injectors in the vehicle. The actual method of performing this test will vary depending on the engine



We're pretty sure this is the cause of the misfire. With an open circuit inside the injector, this one will have to be replaced.



This is a must have tool for anyone hoping to diagnose fuel injection problems. Using this at the fuel injector connector will quickly tell you if your problem is on the control side or the fuel injector side. Be sure to watch the noid light for more than a few seconds as a failing injector driver may work for a short time before failing.



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configuration. To describe it simply; a fuel pressure gauge is connected to the fuel rail and the fuel pump is activated to set the pressure in the rail to the normal regulated pressure. A fuel injection pulse tester is then connected to each injector in turn that will pulse the injector for a set amount of timed pulses (for example 50 pulses of 10 milliseconds) and then you observe how much the fuel pressure drops as each injector is activated. You should observe approximately the same fuel pressure drop with each injector pulsed.

If the pressure drop is much less, you know that particular injector isn't letting enough fuel through. It may be clogged or restricted. An injector that drops more fuel pressure might indicate a sticking pintle or possibly a leaking injector. If all of the injectors have the same flow it is a good sign that your injectors are working properly.

If you find your fuel pressure dropping before you pulse the injectors it may indicate a leaking injector.

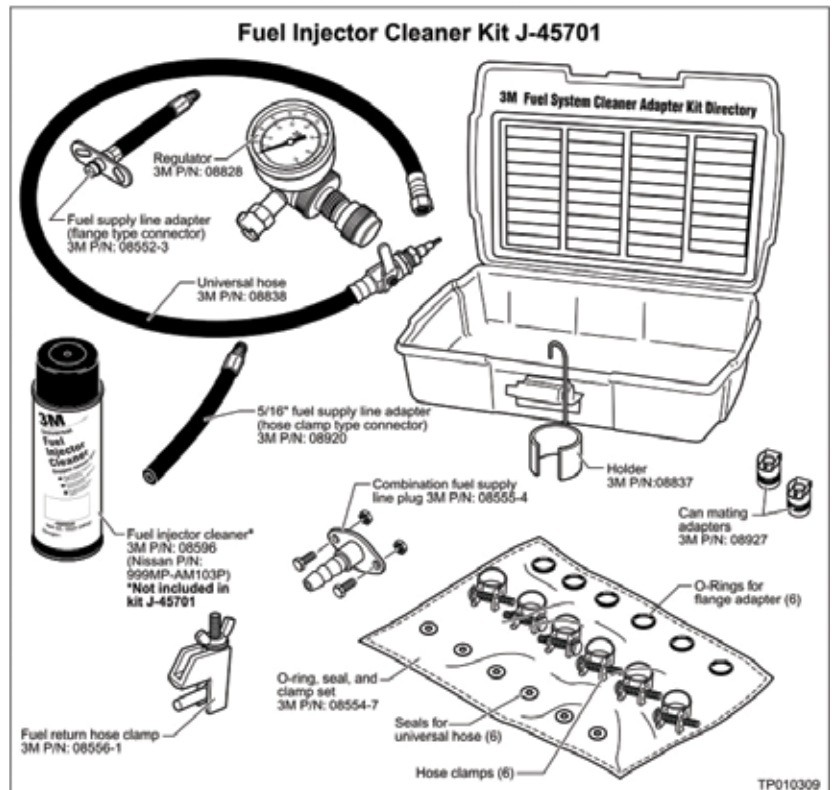
Even if you don't find an injector with restricted flow during a balance test, or a defective spray pattern, a thorough system cleaning may still be an important step in the diagnostic process. Take the example in the TSB NTB01-033a. This TSB suggests that, after standard diagnostic procedure, performing a fuel injection cleaning may resolve poor runnability including misfire codes (P0301, P0302, etc.).

Vehicles with poor idle, poor fuel economy and catalytic converter failures are all great candidates for fuel injector cleaning. This doesn't mean putting a bottle of cleaner in the gas tank. This means connecting a special fuel supply system and disconnecting the vehicle's fuel pump.

Most shops have some form of machine that can do this kind of cleaning. However, Nissan has

researched the issue and has determined there is a specific cleaning system that will not damage the system components in Nissan fuel injection systems. The fuel injector cleaning kit is J-45701 and uses a 3M cleaning product (Nissan P/N 999MP-AM103P) in a pressurized can. The kit is basically a fuel pressure regulating system that can control the 100 psi nitrogen compressed fuel in the 3M can and deliver it to the fuel rail. By running the engine with the 3M can supplying the fuel to the fuel rail directly, all of the cleaning power is going to go through the injectors. These are very strong chemicals cleaning the injectors, so it's a good idea to be careful with the exhaust fumes while performing the service.

Engine misfires and poor fuel economy aren't the only problems you can have with the fuel injection system. It is not at all uncommon for the fuel rail to actually make noise. There is a device on many fuel injection systems



This kit has been thoroughly tested and will clean dirty injectors without damaging the internal fuel injector parts. TSB NTB01-33a gives you instructions on how to use the kit and safely clean your injectors. If the injectors are beyond cleaning, replace them with genuine Nissan injectors. Rebuilt and aftermarket injectors may have you doing the job twice.



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called a damper. The damper acts like a shock absorber for the fuel system. At low engine speeds the fuel pressure will fluctuate rapidly as each injector opens, causing a pulsing in the fuel rail. This can actually be surprisingly loud and obnoxious. Although many models can be affected, there is a TSB covering the VQ35 engines in the 2004 to 2007 Quest, Altima and Maxima specifically for this problem. Once you know to check, this problem is easily solved. Use a stethoscope to confirm the damper is the source of the noise, then replace it. It looks just like a fuel pressure regulator but doesn't have any vacuum hoses going to it.

Poor mileage, misfires or odd noises can all be caused by different problems with the fuel injection system. Getting familiar with the diagnostic methods in fuel injection will help you be a better technician. The more you test and find the system working properly the more you will recognize when something isn't working the way it should. Fuel injection doesn't have to be a mystery. It's really a pretty simple system when you think about it. Use the right tools and a little bit of logic and you'll have it figured out in no time. |



When the damper fails internally it begins to act like a speaker being driven by pressure in the fuel rail. Simply replace it to solve this noisy problem.

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Using the Right Fluids

Let's look at some of the issues in picking the best juice and why it matters in making the best repair you can.

A lot of things can go wrong in any repair. At least when you're using the right fluid you can have peace of mind that's one less thing to worry about.



The fluids under the hood are critical to driving around the block let alone driving around 300K miles. In the last issue, we discussed the engine oil, crucial to be sure, but it's not the only fluid that can bring a car to an untimely end. From cooling systems to differential fluid, from automatic transmissions to brakes, paying attention to the fluids you use can make all the difference in the world.

Let's take a stroll through the now complex issue of fluid selection. With so many different technologies going into today's vehicles, the days of universal fluid have gone away. The aftermarket fluid manufacturers have found a market in trying to bring back the "universal" in fluids. It's easy to be tempted, in our fast-paced shops, to go for the quick fix of the universal fluid. In the end, however, it's seldom the best result for the long term, and sometimes it can even cost you in the short term.

The engineers that designed the systems you are working on have very specific reasons for choosing the fluids they specify. Cooling

systems may seem simple from the outside. You take heat from the engine block and move it to the radiator. Even plain old water can do that. You should keep in mind, however, that it's not that simple.

In a cooling system you must consider the surfaces the coolant contacts, the size of the passages it flows through, the physical mass of the fluid, how the thermal expansion affects the volume of the fluid, its pH balance, as well as a hundred other aspects. Get the viscosity of the coolant wrong and it can break the impeller off the water pump. Get the pH wrong and corrosion can eat through a heater core. Get the boiling point wrong and the system will boil over. Get the freezing temperature wrong and it can be the end of an engine block. All this and we're still only talking about the cooling system. How much more complex are the other systems in the vehicle?

The obvious system that most requires specific fluid is the automatic transmission. What makes filling these sophisticated gear boxes even tougher is the seemingly endless selection of fluids that will probably work, for a while anyway. The goal here is to get the right fluid in the car. Putting the wrong type of fluid in a transmission can and will cause problems very quickly.

In today's marketplace, there are many fluids that claim to be universal. Manufacturers often tout a long list of OE fluids that their synthetic transmission fluid will replace. The problem is that transmissions are not all the same. They each have different amounts of torque to transmit, different amounts of slip built into their functions, different friction materials, different filtration, cooling, and many other dynamics that are anything but universal. Transmissions are easy to damage and expensive to replace. Making sure you have the best fluid for your specific application is the right call. Trusting the engineers that designed



These instructions are pretty clear and the consequences of not following them are spelled out as well. This leaves little excuse for using the wrong ATF.

Using the Right Fluids

your transmission in the first place will insure that you get the best fluid.

The first step in making sure you have the right fluid is knowing what the right fluid is. This is not a difficult piece of information to find. Often the fluid type will be written right on the dipstick itself. Even if it isn't quite that easy it's still worth spending a couple minutes on the computer to make sure you get the right fluid.

Although it may be acceptable to use Type S in place of Type J, you will find yourself in a world of hurt if you use either in an Xtronic CVT. The basic difference is that Type J is a standard base automatic transmission fluid and Type S is fully synthetic. That doesn't mean that just because some off-brand fluid claims to be fully synthetic and completely universal that it would be a suitable replacement for either. The fluid must have the correct friction modifiers, viscosity, detergents, anti-foaming agents and a dozen other properties to be exactly right for the transmission. That's not to say that an off brand won't have those aspects, the question is; how would you know? The simple answer is just use genuine Nissan fluid and you won't have to guess.

To give you an idea as to which transmissions take which fluids, we can examine TSB NTB08-049b. This applies to all Nissan vehicles 2002 to present. Without regard to specific year or application we can get an idea of what fluid each transmission will use by how advanced it is.

For example; a 4-speed transmission is less advanced than a 5-speed transmission and

the fluid requirements reflect this. The 4-speed takes Nissan Matic D whereas the 5-speed will take Matic K, S, or J. The 7-speed, being more advanced than either the 4 or 5-speed, will take Nissan Matic S only. Although this seems like a simple system it's only useful if you know how many gears you have. Unfortunately, that isn't often written on the gear shift and you will probably be looking it up anyway. You might as



The 5 speed FWD transmission is easy to identify with a unique dipstick handle. Read the sticker; this one doesn't run on Matic D, make sure you use the Matic K as directed.

Parts Information

A/T Description	Fluid Type	Fluid Description	Part #
CVT	NS2 (1)	Nissan CVT Fluid NS-2	999MP-NS200P
4 SPD FWD	Matic D (2)	Nissan Matic D	999MP-AA100P
4 SPD RWD	Matic D (2)	Nissan Matic D	999MP-AA100P
5 SPD FWD	Matic K (2)	Nissan Matic K	999MP-MTK00P
5 SPD RWD	Matic S (2)	Nissan Matic S	999MP-MTS00P
	Matic J (2)	Nissan Matic J (3)	999MP-MTJ00P

This chart is an easy way to see the advancements in transmission fluids as the transmissions advance in technology and complexity. This chart is from TSB NTB08-049 and may not include changes in 2013 and newer CVT transmissions.

well just look up the fluid type while you're there. If you do check out this TSB, take a peek at the footnotes. You will notice that Nissan strongly recommends you use genuine Nissan ATF.

This idea gets a lot more important when we start working on CVT transmissions. These transmissions don't work like the old technology automatic transmissions that have been around since the 1940's. Instead of several stacks of clutch plates, these transmissions use a steel belt and variable pulleys. It's not the same device, it doesn't take the same juice. Putting old fashioned ATF in them will most certainly lead to big headaches.

Nissan CVT fluid type NS-2 (P/N 999MP-NS200P) and NS-3 (P/N 999MP-NS300P) are the right fluids for most CVTs with one exception. Generally, 2012 and older use NS-2, and 2013 and newer use NS-3.

The exception we need to be aware of is the Altima Hybrid Transaxle (eCVT) that requires Nissan Matic W (P/N 999MP-MTW00P). If you're not sure, play it safe and look it up. Mistakes in fluid type are easy to avoid with a little effort. There are some aftermarket companies that claim to have a compatible product, but for how long the fluid lasts, going cheap doesn't

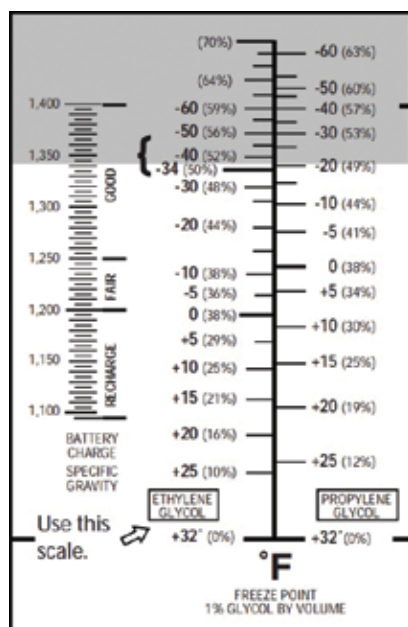
make the most sense. The simple fact is this: you are not going to have a good experience if you use anything that has the word universal on the bottle in these transmissions. It's not a universal machine.

Manual transmissions are a bit more forgiving but not bullet proof. Although the basic viscosity may be the same across all the brands, that is about where the similarities end. Much like motor oil, different brands of gear oil have different formulations. For the longest lasting bearings, synchronizers and gear sets the first step is going to be making sure the transmission has enough gear oil in it. Regardless of which fluid you put in it, running a manual transmission low on fluid will quickly destroy the bearing and gear surfaces. The reason this is important to mention is that it is often overlooked. Since there is no dipstick to check, technicians will often neglect to pull the fill plug and check the actual fluid level and quality. A small leak from an output shaft seal over years can run the fluid level low enough to cause damage. Genuine Nissan MTF (manual transmission fluid) is easy assurance that you have the best fluid in the transmission, but even that won't help if there isn't enough in the case to begin with.

As far as which viscosity to use, there is a little variation over the years. Prior to 1998 Nissan vehicles from Pathfinder to Sentra use different viscosities based on the temperatures at which they are expected to run. Unless you are expecting some temperature extremes, go for the middle of the scale. 80W, 90W or 75W-90, 80W-90 are great choices for most situations.

After 1998 all Nissan and Infiniti manual transmissions call for multi-weight MTF with a few notable exceptions; the GT-R will be using its own special fluid. Nissan transmission oil R35 special is the only fluid to use on this vehicle. If you intend on using an alternative you will need to double check with a CAT scan to insure there isn't anything wrong with your head. The fluid is expensive but it's absolutely required.

Another exception is the 6-speed manual transmission in such vehicles as the 2007-2010 Versa and Sentra as well as in the 2009-



In order to get coolant that doesn't freeze in winter and yet flows freely enough to heat the passenger compartment, using a refractometer to make sure your coolant is perfect is the right move. TSB NTB02-047c addresses a possible problem with 2002-2006 Altima heater flow. The wrong coolant in the wrong concentration can cause heating problems.

2010 Cube. These transmissions call for Nissan TransElf NFJ 75W-80. You may get away with using a universal fluid, but your customer's shift quality and transmission durability may suffer for it. You may notice a recurring theme here; you don't fill these transmissions very frequently, don't go cheap! Get the right fluid in them. Genuine Nissan MTFs are the best bet.

As we alluded to earlier in the article, coolant choice isn't quite as simple as just pouring in whatever green stuff came out of the 55-gallon drum in the back of the shop. For the best performance and corrosion resistance, in 2009 Nissan started putting new long-life antifreeze coolant (LLC) in some new vehicles. More vehicles were added in 2010 and by 2011, and each year since, all new vehicles were filled with the new blue antifreeze.

For the technician, this change means an increase in the service life of the coolant and a little more flexibility. Even though the new Nissan blue coolant lasts longer, it can be mixed with the older Nissan green coolant. The only downside to such mixing is that the service life should be treated as the older coolant, with a service life of 4 years/60K miles as opposed to the LLC service life of 5 years/75K miles. For vehicles in extreme cold conditions Nissan also offers the blue coolant in a concentrated form to be added directly to the cooling system to increase its freezing resistance (P/N 999MP-L255QTP).

Another area that is often overlooked is gear oil selection for differentials. Choosing the right fluid is important for a few reasons. First is protection from the intense pressures developed in the gear set. All the torque of the engine, multiplied by the gearing in the transmission, passes through the ring and pinion gear.

Second is heat dissipation. Differentials with incorrect fluid can and will overheat, burning the gear oil and decreasing its effectiveness, especially while towing.

Third is fuel economy. The more viscous the gear oil, the more energy it takes to move the gears that are swimming in it.

These aspects and more must be taken into consideration when selecting the right gear oil. Be sure to follow the service manual specifications and TSBs over what might appear in the owner's manual. One example of a change that was made is the 2004 Titan. Originally it was serviced with GL-5 80W-90 gear oil. Nissan has updated that recommendation for towing and other heavier uses and now strongly recommends Nissan 75W-140 synthetic gear oil and that, when used for towing or other heavy-duty use, it be changed every 30K miles or 2 years, whichever comes first. This change will eliminate some of the premature wear seen in these differentials.

Brake fluid is in a different classification than the other fluids we have been reviewing here. Brake fluid is highly regulated by its attributes and is classified by the federal government. If the specification for your vehicle is DOT 3 brake fluid you should use DOT 3 brake fluid. Mixing brake fluids is not OK under any circumstance. The seals in the brake system components are specifically designed to be used with the specific type of fluid they call for.



With electronically controlled internal clutches, this rear end isn't as forgiving as older differentials. A leak caused by using the wrong fluid can cost you. Make sure you get the right, genuine Nissan fluid in it.



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Using the Right Fluids

Silicone based DOT 5 sounds great in that it doesn't absorb water, it doesn't harm painted surfaces and it boils at a much higher temperature. DOT 5 also doesn't lubricate ABS pumps, and can cause them to fail. Glycol based brake fluids like DOT 3 have their problems (namely water absorption) but they were chosen because they do their job very well and the tightly controlled minimum specifications make them very reliable. This is just what you want in a brake system. The federal government only controls the attributes of the fluid, not the quality. Genuine Nissan brake fluid is the safe bet for brakes and hydraulic clutch systems.

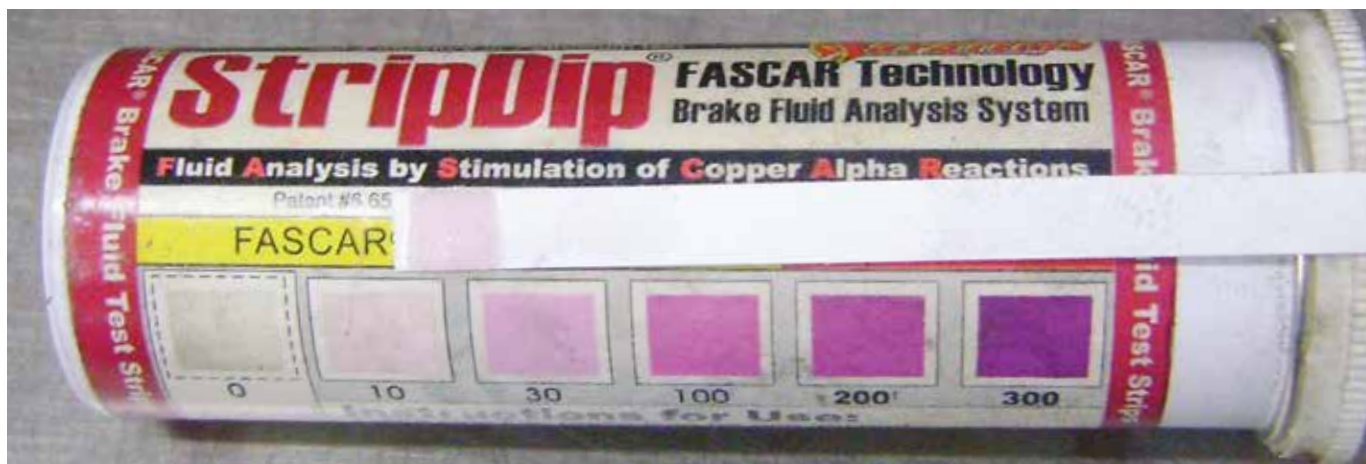
Flushing the brake fluid regularly is an important maintenance item. Recommended intervals range from approximately 1 to 2 years. The main reason for the frequency of the fluid changes is the natural tendency of brake fluid to absorb water. As the fluid absorbs water it boils at a lower temperature, creates a softer brake pedal feel, and can even damage internal brake system components by allowing corrosion. Brake fluid can and should be tested regularly for water content with either test strips or an electronic moisture detector. Keeping the fluid clean and dry will prevent many brake system problems.

The fluids you choose to use in your repairs is becoming a more important decision as the technology of the components increases. Gone are the days of one size fits all drums of

motor oil and transmission fluid. Using the right fluids will help to insure that your customers' vehicles perform the best they can for many years to come. Doing so will also increase your customers' confidence in your repairs, knowing that you've done your research and chosen the best product for their vehicle. The extra cost over the cheap alternatives may not be right for every situation but the more you choose genuine parts, the less you have to worry about unforeseen compatibility problems. |



There is little variation in what fluid goes in the master cylinder of any street car and yet it's still labeled clearly "DOT 3."



Test the water content of the brake fluid with an electronic tester or even these inexpensive test strips. Don't just assume that, if it's clean it's good.



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Feature

Nissan's Certified Collision Repair Network Program

This vital program is an important business tool for savvy collision repair shop owners.



CERTIFIED
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Owners and managers of collision repair shops know all too well that their job gets tougher by the day. Advancing technology surely makes driving safer, more comfortable, and more enjoyable. Advances like collision avoidance systems, automatic braking, lane departure warning systems, are all wonderful works of science that promote a safer and easier driving experience for the motoring public. However, this technology also adds a level of complexity when it comes to proper collision repair.

Furthermore, new-generation vehicles feature hybrid and even all-electric propulsion systems that bear little resemblance to their internal combustion predecessors. These vehicles contain parts, systems, and subsystems that can be head-scratchers for those more familiar with gas tanks, internal fuel pumps, engine knock sensors, and the like.

In order to survive and prosper in the collision repair business, shop owners must assure that their technicians receive current and on-going training in order to properly repair today's Nissans and other vehicles. This goes more than skin deep, since cosmetics are only the outward appearance of what must be properly repaired vehicles.

Nissan has a long-standing commitment to supporting the independent service sector, on the collision side as well as with mechanical repairs. In fact, today's auto body shops must perform both roles, since they must analyze, diagnose, and repair mechanical components and systems, usually involving electronics as well as sheet metal.

That is exactly why Nissan has teamed up with, and enthusiastically supported, I-CAR®. As pretty much everybody in the auto body repair business knows, I-CAR, which stands for the Inter-Industry

Conference on Auto Collision Repair®. I-CAR was founded nearly forty years ago with the objective of bringing together all interested parties to provide a focal point for promoting training and enhancing skills in all aspects of the collision repair business.

Nissan is a long-time supporter of I-CAR's programs and activities. Currently, Nissan supports the I-CAR Gold Shop requirement, as well as provides brand-specific training through I-CAR's website.

Certainly Nissan always wants their cars to be repaired properly the first time, whether the vehicle is serviced at a dealer-owned

or Independent Nissan Collision Center. Ongoing customer satisfaction is a top priority for Nissan, and vital for customer loyalty when it comes time for them to go car shopping again.

Supporting independent shops is also important in encouraging those shops to buy their replacement parts from an authorized Nissan dealership parts department in order to preserve Nissan quality and integrity.

Which brings us to the Nissan Certified Collision Center program.

Nissan now invites and encourages independent auto body repair shops to become part of the Nissan Certified Collision Repair Network. This program is an important business tool that carries many benefits, the two most prominent of which are to help the body shop enhance improved profitability with faster, higher quality, and more accurate repairs, and also by helping the shop draw in more Nissan repair work.

And there are other benefits as well. A shop with this credential will attract and retain the best technicians, build customer satisfaction, and strengthen the shop's marketing programs.



At the core of the Nissan CCRN program is technical training, which is the foundation on which all business success is built. And the very first and key requirement for a shop to become certified is for the shop to have first achieved I-CAR Gold Class status. This involves having shop employees complete certain training milestones in four disciplines — Estimating; Non-Structural Repairs; Structural Repairs; and Refinishing. In order to achieve Gold Class status a shop must have at least one employee achieve Platinum status in each of these four disciplines.

But it goes much further than that. All other employees of the shop must meet certain standards for training and continuing education.

Nissan, of course, offers to independent shops and their employees a wide variety of training programs and materials that meet and exceed the standards set down by the I-CAR Gold Class program. In fact, Nissan offers scores, perhaps hundreds, of individual training modules, available as classroom materials, e-Learning modules, and training videos. These various training materials cover nearly every topic imaginable, from sunroof and convertible top diagnosis and repair to climate control systems to CVT propulsion systems to NVH issues. A comprehensive summary of these training materials is available at nissan-techinfo.com.

Interesting to note that Nissan makes all of these training materials available to any shop owner or technician who would like to participate, regardless whether or not they choose to pursue Nissan Collision Center certification. This is a service offered to those in the independent repair sector, and is intended to help independent repair technicians achieve a high level of expertise in repairing Nissan vehicles. It represents just one of many ways Nissan helps independent repair shops enhance their efficiency, productivity, accuracy in diagnosis, repair, and profitability.



As noted above, I-CAR Gold status requires training in four specific disciplines — Estimating; Non-Structural Repairs; Structural Repairs; and Refinishing. However, Nissan's standards are even higher, with the recommendation that shops seeking Nissan Certified Collision status also have employees who have also completed I-CAR training in Steel Structural repairs, Production Management, and Electrical/Mechanical repair.

Furthermore, Nissan's Certified Collision Center program requires the completion of two Nissan-specific training courses — Nissan Repair Considerations (NI002E01) and Nissan Safety Shield Technologies (NI001E01). These comprehensive on-line programs supplement the I-CAR training materials, and afford the independent repair shop technician Nissan-specific instruction and guidance for



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understanding, diagnosing, and repairing a wide variety of systems and components in many Nissan vehicles that are likely to appear in independent repair shops.

Nissan Repair Considerations (NI002E01) is a course that meets I-CAR New Technology training requirements for many of the roles in auto body and collision shops, and also is an Annual Training option for other roles. This course consists of four separate modules that cover all popular Nissan models plus Nissan specialty vehicles like the GT-R and the Nissan LEAF.

Specifically, here are the four modules that comprise this course:

Module 1 details the various Nissan vehicles produced during the 2016-2017 model years, and explains many of the technical and safety systems in these vehicles.

Module 2 explains the details, requirements and benefits of the Nissan Certified Collision Center program. It explains how the technician can access and navigate various Nissan web sites and publications. It also directs the participant to resources relating to welding, frame construction, sectioning, and pre- and post-scan recommendations.

Module 3 provides extensive details on collision-related repairs to those Nissan vehicles which require specific repair techniques, tools, and procedures. Included are the 2017 Titan XD, Armada, LEAF, and GT-R.

Module 4 is particularly interesting, and deals with the diagnosis and repair of Nissan hybrid vehicles. As the popularity and acceptance of hybrid vehicles grow, more and more of these vehicles will find their way into auto body shops. It is important for collision repair technicians to understand the technologies incorporated into these vehicles so that they can be repaired safely in the shop, and can be returned to their full, original structural and safety-related integrity and appearance.

Completion of this course and its four modules will provide the technician with an understanding of the Nissan vehicle line-up, along with the structures, materials, and repair considerations for these vehicles, particularly



as they pertain to collision repair technicians. In addition, this course will help the technician understand unique features and repair characteristics of popular Nissan models that will improve customer satisfaction and prevent unwanted come-backs.

This course also delves into unique repair considerations for Nissan's specialty vehicles, including the Titan, GT-R, and LEAF. And, finally, this course will bring to the technician a new and full appreciation for the content and value of the Nissan Certified Collision Center program.

The second Nissan-specific course required for Nissan CCRN certification is Nissan Safety Shield Technologies (NI001E01). Like the previously-described program, this course is offered on-line and, like the previously-discussed course, meets New Technology and Annual Training standards as established by I-CAR.



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Like its predecessor, this course likewise consists of training modules. The first of these three modules explains Nissan's innovative Safety Shield Technologies, including an explanation of how these systems work, and the components and technologies involved. It also addresses monitoring and protection recommendations, along with service and repair information.

The second module in this Safety Shield course deals specifically with Collision Prevention Systems. These systems use a combination of Intelligent Cruise Control, Predictive Forward Collision Warning, Lane Departure Warning, Blind Spot Warning, Around View Monitor and Forward Emergency Braking.

This module is particularly helpful to collision repair technicians. It explains how to determine exactly which of these individual systems is installed in a particular vehicle, and it explains the function and inter-relationship of the components of individual systems. It also includes important and helpful information regarding the calibration and/or aiming of sensors and other components following collision repair.

The third module in this course deals specifically with occupant protection and the various passenger restraint systems used in Nissan vehicles, collectively known as the Supplemental Restraint System, and referred to as SRS. The primary focus of this module is on the air bag systems fitted to Nissan vehicles. Topics covered include inspection, diagnosis, and replacement of SRS components. It also emphasizes the importance of not installing used air bag components from salvage vehicles, which may be incompatible, unreliable, or completely inoperative.

This third module also covers other systems that comprise the Supplemental Restraint System, including seat belts and pre-tensioners, including Nissan's LATCH system, active head restraints, pop-up roll bars, and more.

So with all of this having been explained in detail, you're probably asking yourself, "How do I become part of the Nissan Certified Collision Center program?"

The Nissan CCRN program is an exclusive one, available to high-quality shops that meet a variety of standards for training, shop equipment,

customer service, and adhere to the very highest business standards for excellence and ethics.

At the heart of the Nissan CCRN program is the requirement that shops applying for this certification must have been in business for at least five years and meet I-CAR Gold Class requirements. Other prerequisites include having certain shop equipment and capabilities, such as an electronic three-dimensional vehicle measuring system and a current data subscription for this system. Other equipment required includes specific types of welding equipment and capabilities, current-technology air conditioning service and recovery bench, and a documented Quality Assurance/Quality Control program.

Those shops that achieve Nissan CCRN certification receive a host of benefits, including marketing support, dataManager, Smartphone apps, signage and branding and, perhaps most important of all, listing on multiple on-line collision shop locators, linked directly to your own micro-site. This is especially valuable since Nissan marketing efforts produce more than two million customer referrals each month.

And Nissan also believes strongly that it is obliged to support shops that may not meet these stringent standards. To that end, Nissan offers its Business Improvement Program (BIP), which is designed to help auto body and collision shops achieve top performance metrics in the business disciplines that matter most.

Many more details, along with an application for the Nissan CCRN certification, can be found at GetNissanCertified.com. Details on I-CAR can be found at I-CAR.com.



GET GT-R® CERTIFIED



So you want to be a specialist?

Having learned about the many benefits of Nissan CCRN certification, you may be wondering about repairing Nissan's industry-leading high performance sports car, the GT-R. Well, if this is your goal, then Nissan has just the program for you.

Nissan is now offering a special and specific certification for collision and auto body repair shops that want to qualify to repair damage to these exotic sports cars. This certification will put your shop among the elite few that are trained, qualified, and Nissan-certified to properly repair these prized sports cars. In doing so, it will also position your shop as being eminently qualified to repair any Nissan vehicle.

So this certification can serve as a valuable marketing tool to draw in customers who own other Nissan models. They will surely believe that, if your shop is certified to repair the high-end GT-R, then you can certainly perform exemplary repair of their Sentra, Titan, or LEAF.

This Nissan GT-R certification program is open to shops that have achieved I-CAR Gold Class status and also meet a variety of other qualifications and standards that cover necessary shop equipment, database access, and good business and customer relations practices.

At the heart of the GT-R certification is an advanced two-day, hands-on training program at selected

locations. Emphasis is on hands-on training due to the sophisticated structure and materials used in the design and manufacture of the GT-R, and helps assure that the GT-R-certified shop can properly restore these exotic vehicles to their original levels of fit, finish, durability, value, and safety.

The Nissan GT-R certification program provides qualifying shops with exclusive and distinctive signage and marketing materials, as well as direct marketing efforts to GT-R owners, so they will be aware of your shop's qualifications to repair their vehicle correctly. Point of Sale (POS) materials will also enhance your shop's image as being qualified to repair high end sports cars, implying that you are certainly well-qualified to repair everyday models as well. This exposure will help bring in, not only other Nissan models, but also other vehicles whose owners seek a highly qualified and specialized shop to repair their car as well.

In addition, participating shops will receive free access to Nissan's technical information site, as well as access to telephone support for navigating this certification process.

More information and an application can be found at GetGT-Rcertified.com. More information on I-CAR is available at I-CAR.com.

Feature

How to Tame an Unruly Nissan Sunroof

Under certain conditions the Nissan sunroof assembly may stick in one spot, repeat various phases of the opening or closing cycle, or not operate at all. Our diagnostic and repair tips will help you teach that unruly sunroof to behave.





The Nissan sunroof assembly includes a powered sunroof and, depending upon the vehicle model, a sunshade which may be motorized or manually operated. The two separate motors operate with power supplied by the Body Control Module (BCM) when the ignition is ON or retained power is operating.

Retained power is a backup power supply that enables power sunroof operation for up to 45 seconds after ignition shutoff. Note that the retained power function cancels if the front door opens (door switch OFF) or closes (door switch ON) during the 45 seconds. Retained power is also lost if the ignition is turned back ON, or if the 45-second time limit is reached.

A signal from the sunroof switch activates the sunroof motor, which then forwards the signal to the sunshade motor. A vehicle speed signal from the combination meter increases sunroof motor torque to assist in sunroof tilt-down during high speed operation of the vehicle.

The sunroof switch, which controls both the sunroof and sunshade motors, is located in the roof, near the rear view mirror. The motors for the sunroof and sunshade are also located in the roof, above the headliner.

The sunroof motor has an integrated CPU that controls the tilt up/down and slide open/close functions when it receives the appropriate signal from the sunroof switch. The sunroof motor CPU is also responsible for forwarding from the sunroof switch the open or close signals to the sunshade motor. The sunshade motor also has its own built-in CPU, which receives the signal from the sunroof motor CPU and then activates the sunshade to open or close.

Opposite page: The 2013 Murano is equipped with a dual panel sunroof that lets passengers enjoy the outdoor ambiance with their choice of degree of protection from the elements.

Here comes the Sun

The sunroof tilts up to open partially, and slides toward the rear of the roof to open fully. It then slides back toward the front until it reaches the position where it can tilt back down to close.

The sunshade slides open and closed horizontally, with no tilt action. If the sunroof and shade are closed, pressing the sunroof switch once will open the shade and tilt the sunroof up. Pushing the switch back toward the rear of the vehicle to the first of two detents (stops) causes the sunshade to open. Once the sunshade is open, then pushing the switch back to the second detent causes the sunroof to tilt up and slide completely open.

Reverse the process by pressing the switch toward the front of the vehicle. To automatically move both the sunroof and sunshade to the fully open or fully closed position with just a single step, push the sunroof switch in the desired direction until it reaches the second detent. Do not pause at the first detent.

If both the sunshade and sunroof are closed and you want the sunroof to tilt up without sliding completely open, instead of sliding the switch back (or forward), press it into the console. The sunshade will open, and the sunroof will tilt up but not slide back. Press again and the sunshade will close.

If either front door is opened while the sunroof/sunshade assembly is being operated, the sunroof will shut down.

Anti-Pinch function

When the sunroof CPU detects an interruption, such as a hand or object in the sunroof opening during auto operation (close or tilt down operation), the motor will tilt the sunroof up or open 150 mm (5.91 in) or more. Similarly, when the sunshade CPU detects an interruption, the motor will open the sunshade 150 mm (5.91 in) or more.

Off track

A customer complaint that their sunroof is sticking, juddering, or making noise could be a purely mechanical problem. The sunroof or sunshade mechanism could be corroded or otherwise damaged due to normal wear or due to an impact event. Glass lid problems may be related to cracked, deformed, or sticking weatherstrip material, loose or missing glass lid mounting bolt, or misalignment. The sunroof frame assembly could have foreign material blocking its guide rail, insufficient lubricant in the rail, or simply have a deformed rail.

First, verify the customer's complaint about system performance. Then your visual inspection, based on Nissan information showing the appropriate model-specific sunroof/sunshade assembly layout, should tell you whether there is a track alignment, corrosion, or other mechanical problem.

Nissan offers a "Chassis Ear" tool that aids in pinpointing the source location of sunroof assembly squeaks and rattles. Refer to your Nissan repair manual for the appropriate sunroof motor type, glass lid specifications, installation clearances and information about mounting kits and special tools.

Note that different Nissan vehicle models may have very different sunroof/sunshade design and engineering, and require different diagnostic and repair procedures. For example, the 2011 Maxima was marketed with either a single panel or a two-panel design, while the 2013 Murano was offered with only a dual-panel sunroof design. See your Nissan repair manual for sunroof/sunshade access and repair/replacement procedures for the model you are diagnosing.

Initialization procedure

Just as a computer reboot is often the first thing to try when faced with a frozen web page or sluggish software application on your laptop, try re-initialization before anything else when a sunroof or sunshade problem is not

related to physical damage. Initialization is easy, and information about the procedure for the specific model you are repairing is available in your Nissan service manual.

For the 2013 Murano, there are four steps. First, close the sunroof and sunshade, then release the sunroof switch once. Second, press and hold the sunroof switch to the CLOSE position again, for approximately ten seconds. The sunroof will move forward and will be stopped mechanically. Third, release the sunroof switch, then press and hold the sunroof switch to CLOSE again. The sunroof and sunshade will automatically move through the sequence fully closed=>fully open=>fully closed. Fourth, after the sunroof has completed step three (fully closed), release



The 2011 Maxima was introduced in the US market with both a single and a dual panel sunroof option.

the sunroof switch and put the sunroof and sunshade through their paces to make sure that both function normally.

After initialization, check to ensure that the anti-pinch feature is functioning properly.

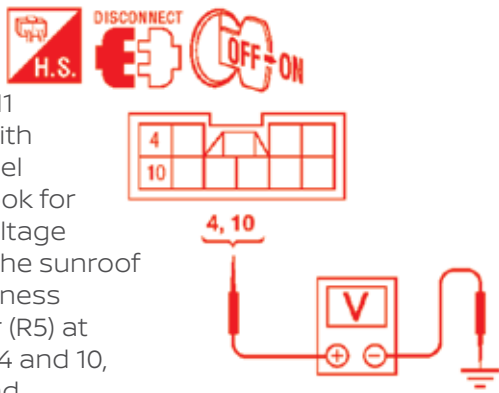
Fully open the sunroof. Place a block of wood in the sunroof path, near the fully closed position. Using the auto-slide (no pause at the first detent), close the sunroof completely. The sunroof should lower for approximately 150 mm (5.91 inches), or two seconds, and stop without pinching the block of wood.

Next, fully open the sunshade. Place a block of wood near the fully closed position. Close the sunroof completely with the auto-slide close. In addition to the sunshade attempting to close, the sunroof should lower for approximately 150 mm (5.91 inches), or two seconds, and both should stop without pinching the block of wood.

Perform these initialization procedures whenever the auto-slide or anti-pinch functions do not operate normally, if the sunroof or sunshade motor is replaced, or after power has been disconnected and re-connected to either motor.

(+)		(-)	Voltage (V) (Approx.)
Sunroof motor assembly			
Connector	Terminal	Ground	Battery voltage
R101	3		
	6		

On the 2013 Murano, you should see battery voltage between ground and the sunroof harness connector (R101) at terminals 3 and 6.



On the 2011 Maxima with single panel sunroof, look for battery voltage between the sunroof motor harness connector (R5) at terminals 4 and 10, and ground.

No, low, or incorrect current flow

There are only a few basic things that could go wrong with sunroof and sunshade electrical system operation. Current flow is either reduced (high resistance), not flowing (open circuit), excessive (short to power), or going somewhere that is undesired (short to ground). Standard electrical tests for each of these potential problems are appropriate, although the connectors for the test may differ by vehicle model and year.

High resistance in a circuit can cause slower than normal electric motor speeds, resulting in sluggish or sticking sunroof/sunshade movement. Resistance that causes too high a voltage drop could even result in the sunroof or sunshade failing to operate at all. Voltage drop across a circuit should never exceed 0.300 volts, or 300 mV (millivolts).

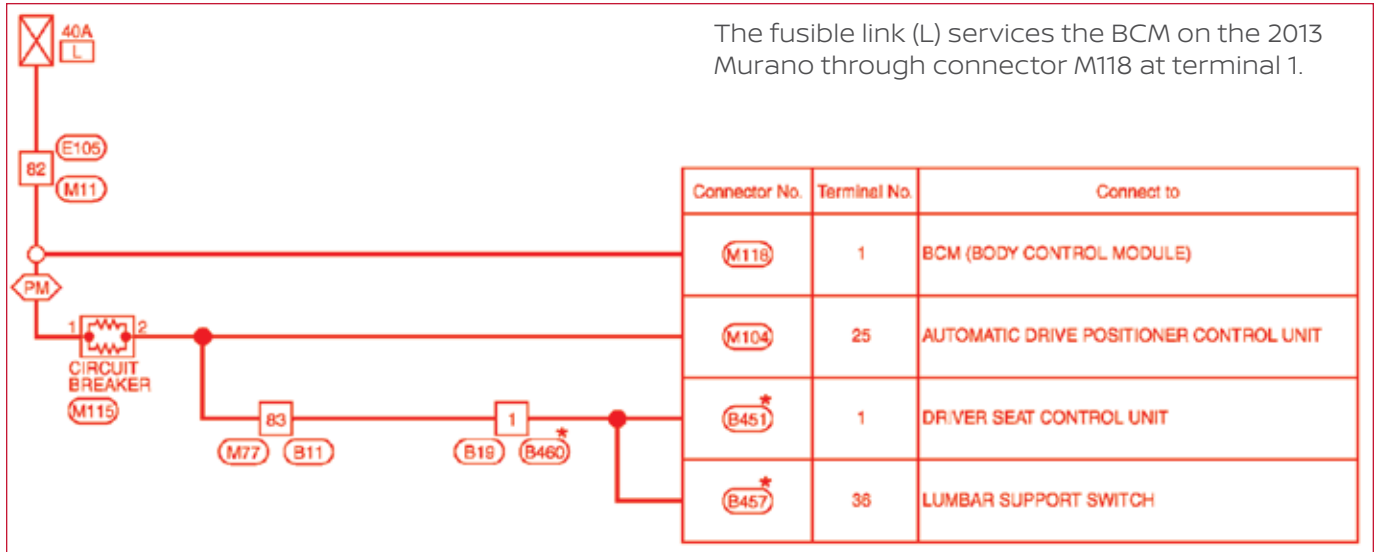
Excess resistance in a circuit could be caused by loose fitting terminal pins, damaged or corroded connectors, frayed wires, or unsecured ground straps.

Save before you disconnect!

The Nissan CONSULT III Plus diagnostic tool allows you to activate and test various components in the sunroof/sunshade system by sending signals through the Body Control Module (BCM). You can also monitor the input and output signals from the BCM, confirm the reception status of CAN communication between various system components, and display diagnostic results of assessments made by the BCM. And of critical importance, CONSULT III Plus allows you to read and save the vehicle specifications, and to change settings of various system functions. You need to have the specifications saved prior to any procedure that requires you to disconnect, remove, or replace the BCM.

Is this thing on?

The first thing to do is locate and visually inspect the fuse (#10 on the 2013 Murano, numbers 10 and 11 on the 2011 Maxima) and fusible link (L on the 2013 Murano, H on the 2011 Maxima) to confirm each is still functional. If you cannot tell by looking through the clear cover of the fusible link, try to wiggle the link to see if



it makes contact and allows the circuit to come back to life, even only temporarily. A fusible link can cause intermittent failures without being completely blown. In this case, replacing the link or damaged connector could solve the problem.

If either the fusible link or fuse has actually blown, check the affected circuit for problems before replacing the link or fuse. If there is corrosion, an open circuit, or a loose wire in the wiring harness or its connector, repair the damage in the affected circuit, then replace the blown link or fuse.

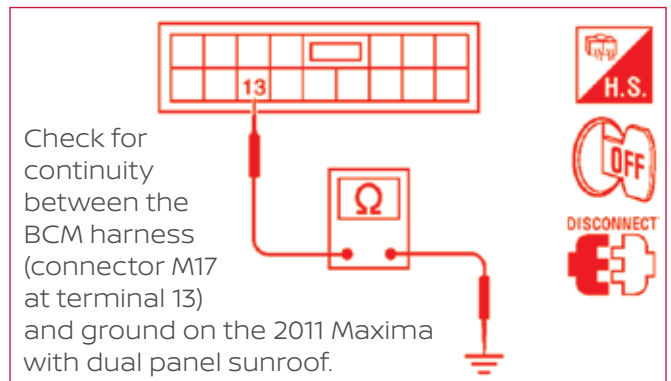
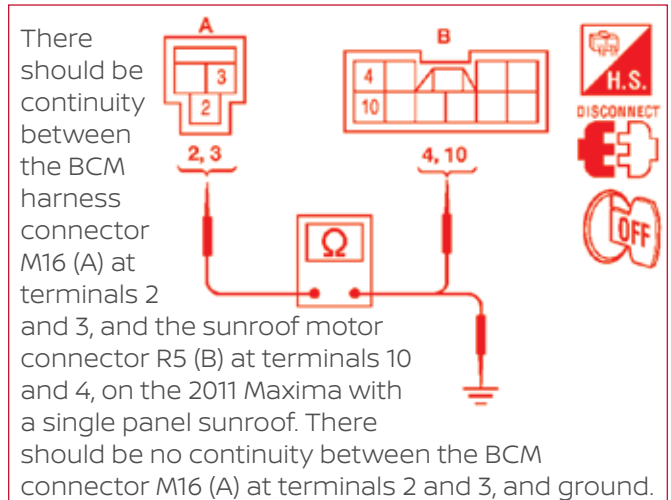
Is power reaching the sunroof motor?

Turn the ignition OFF. Disconnect the sunroof motor connector. Turn the ignition back ON. Check for battery voltage between the sunroof motor harness connector and ground.

Next, check whether there is power reaching the BCM. With the ignition OFF, disconnect the BCM connectors. Check the voltage between each BCM harness connector and ground.

On the 2013 Murano, you should see battery voltage between ground and connector M118 at terminal 1, and between ground and connector M119 at terminal 11. If not, repair the damaged harness or connector.

If the wiring harness to the sunroof motor tested OK, check for continuity between the BCM harness connector (M119, terminal 13) and ground on the 2013 Murano. On the 2011 Maxima, check between ground and



connector M16 (A), terminals 2 and 3 on the model with single panel sunroof, and connector M17, terminal 13 on the model with dual panel sunroof).



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If either continuity test results in a fail, replace the appropriate harness. If continuity tests show circuits functioning normally, check for battery voltage between the sunroof motor and ground. On the 2011 Maxima with dual sunroof, check between ground and connector R101 terminals 3 and 6, with single panel sunroof, check ground to connector R5 terminals 4 and 10.

If voltage is normal, check for continuity between the sunroof motor and ground. On both the 2013 Murano and the 2011 Maxima with dual sunroof, there should be continuity between connector R101 at terminals 1 and 2, and ground. On the 2011 Maxima with single panel sunroof, you should see continuity between ground and connector R5 at terminal 8. If not, replace the appropriate harness.

There are similar tests for an inoperative sunshade, and a faulty sunroof switch. Refer to the wiring diagram and diagnostic procedures in your Nissan repair manual for the appropriate connectors and terminal locations to test on the vehicle you are repairing.

Essential communication

We mentioned above that the sunroof motor CPU sends the signal to activate the sunshade motor. Because the CPU for each motor is built into the motor assembly, if there are continuity problems between the sunroof motor assembly and either the BCM or ground, the required communication between the sunroof CPU and the sunshade motor will be faulty, or fail completely. Refer to your Nissan repair manual for model-specific continuity test procedures and connector locations.

Similarly, the sunroof and sunshade motor controllers need to know whether or not the left and right front door switches are working in order for the retained power feature to function properly.

Most problems can be addressed by replacing the appropriate wiring harness. Normal wear may cause a door switch to fail. On occasion, the sunroof or sunshade motor may need replacing. Rarely, the BCM may be faulty.

Power disconnect

After you've repaired a mechanical or electrical problem, the sunroof or sunshade may still not work properly. Don't worry, the solution may still be simple.

Software algorithms in the built-in CPU in both the sunroof and sunshade motor assemblies know how many motor shaft rotations it takes to move the sunroof or sunshade from their respective start and stop locations, and vice versa. The CPUs monitor where the sunroof or sunshade is at any point in time by measuring how much the respective motor shaft rotates after receiving actuation commands from the CPU. The rotation is translated into a digital signal that can then be interpreted and responded to by the CPU to control sunroof or sunshade position.

Of course, correct repositioning of the sunroof or sunshade requires that the software has an accurate measurement of the original starting position of the component being moved. Without accurate knowledge of the sunroof or sunshade position, the CPU's actuation commands may result in any number of errors, including sunroof or sunshade movement in the wrong direction, or failure to operate at all.

Unfortunately, anything that interrupts the power supply to the sunroof or sunshade CPU/motor assemblies, whether it is normal wear, a collision event, or just a repair procedure, can throw off the accuracy of CPU information about the current sunroof or sunshade position. So, your repair may have one more step before it is complete: re-initialization of the CPU.

Master these sunroof diagnostic tips and tests, and you will become known as "the sunroof whisperer" in your shop. |

If during your repair you disconnected power to the body control module (BCM), you need to



re-initialize the BCM. Initialization enables the BCM and sunroof CPU to ensure that the sunroof and sunshade start and stop at the correct locations in the sunroof frame assembly, so you can return to your customer a vehicle with a properly positioned sunroof similar to that of this beautiful 2013 Murano.



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