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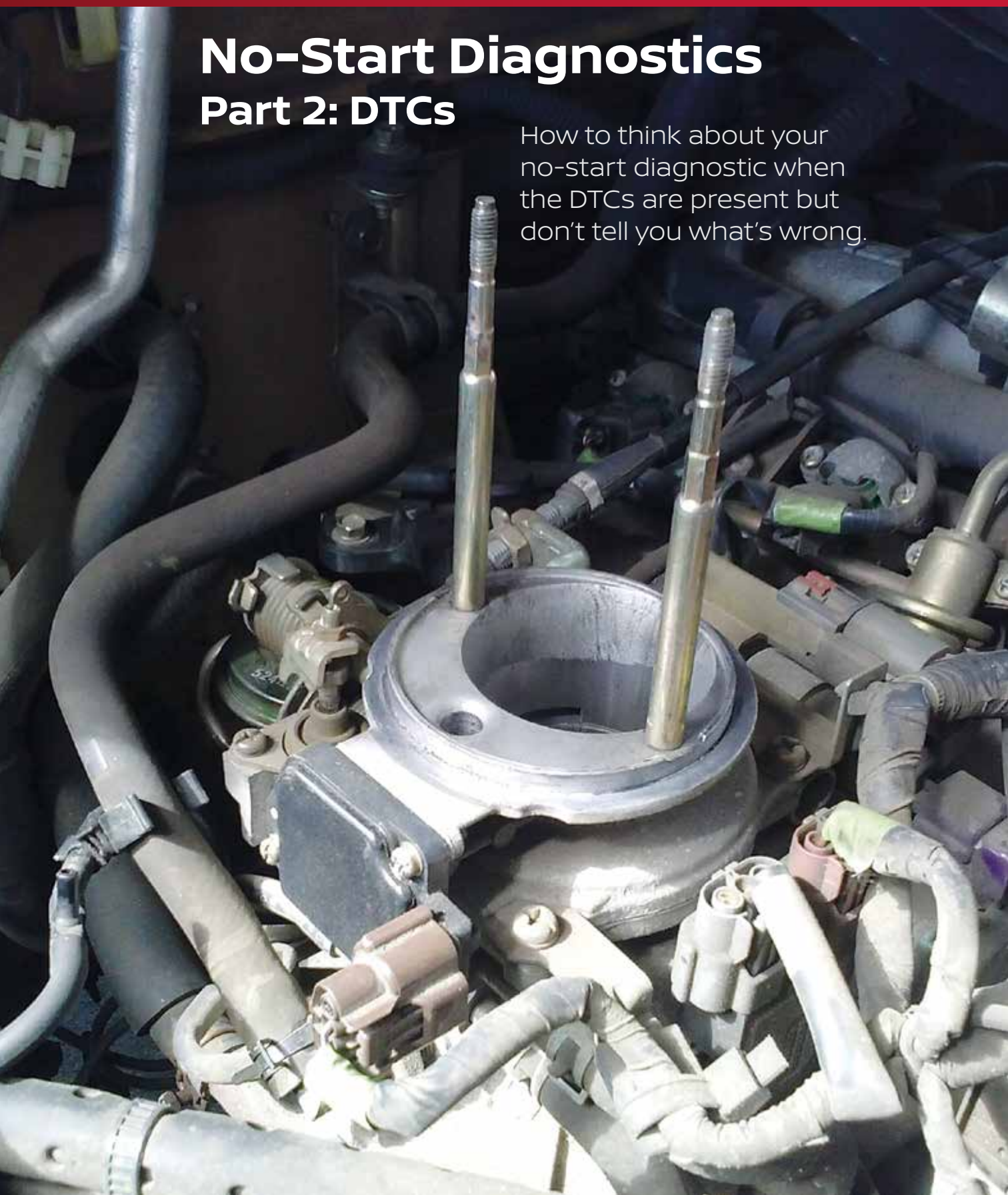
Cover image: 2013 Altima® Coupe Interior; Courtesy Nissan North America.

No-Start Diagnostics
Part 2: DTCs

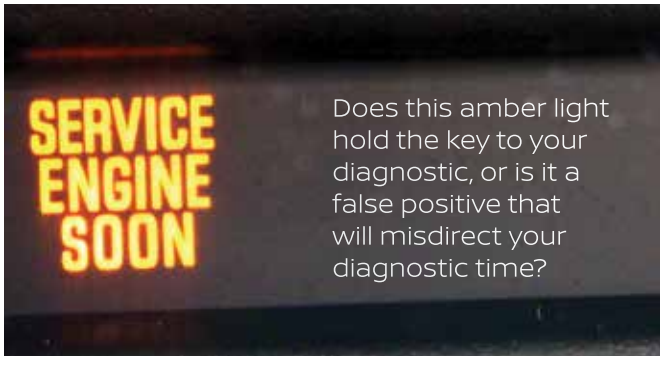
How to think about your no-start diagnostic when the DTCs are present but don't tell you what's wrong.



One of the most difficult aspects of automotive repair is diagnostics. Part of that is diagnosing the no-start condition. It's easy to forget the quick diagnostics that get solved and back on the road in short order. But one stubborn problem can make you completely forget how rewarding the easy diagnostics are.

Using your senses and paying attention to the customer's story will often point you to the solution, but not always. As part of an initial inspection, the wise technician will pull codes and ask the customer how long the check engine light has been on. With your CONSULT III Plus handy, this is not only easy but usually quite fruitful.

For example: A customer drives in, in her 2006 Sentra®, and she's scared. Her car died on her while she was driving. Then 5 minutes later it wouldn't start outside the post office. Her life cannot be interrupted by a dead car; there are kids to pick up and errands to run. The MIL has come on and it's a P0340 camshaft position sensor. At this point you know where the problem is. It isn't going to take hours of diagnostic time to nail this one down. An hour later she will be back on the road and you will be the hero.



Opposite page: The big hole is the throttle, the small hose goes straight to the MAF sensor. Throttle body cleaner is very dangerous on this throttle body. A misdirected spray can quickly ruin the MAF sensor.

Unfortunately all your jobs will not be that simple. A lot of times the reason for the no-start condition will be buried in a mountain of possibilities that you will have to weed through to get down to the true cause of the problem. With a little luck you may have a DTC that can help point you in the right direction. And even if the code doesn't indicate a specific system or symptom that would typically kill the engine, it may show you the beginning of an ongoing, worsening problem.

These diagnostics are certainly not for the aspiring new lube tech. The not-so-obvious diagnostician will require a solid knowledge base of how the engine control systems work for the vehicle you are working on. Another requirement is experience. It's like a mathematical formula; the more experience you have, the less likely it is you will see something new.

It sounds simple, but it really holds true. If you are new to the industry, don't get frustrated. No amount of schooling, reading, and watching videos will give you the same experience as actual hands-on experience. However, one advantage a new tech has is imagination. Some of the crazier problems will come easier to someone without the years of preconceived notions. Would an experienced tech ever say "what if the fuel pump is hooked up backwards?"

Don't be confused, follow the basics. Visually inspect for the obvious first. Check the mileage. This may be important later. Problems common to a car with 200K miles will be different than those on a car with 20K miles. Bring out the CONSULT III Plus and pull your codes with the associated freeze frame data. Hopefully you will have a code that points you right at the problem and you can get straight to it. But sometimes the codes just don't make it that easy.

If your codes don't point directly to your problem, check for TSBs. Nissan has gone through a lot of trouble to get this information out to us. It would be a shame to spend a ton of time on a problem that has already been diagnosed for you. Without TSBs related to your particular problem, you may have to get a little more imaginative.

As an example of common codes that don't point to a no-start, consider the ever popular P0171, P0174; lean condition bank 1 and bank 2. Although these codes are universal across all makes and models, let's focus on the 1998 Nissan Frontier®.

This code, P0171 (since the 4-cylinder has only one bank in this case) is a result of the ECM not being happy with the readings it's getting. As the engine is running it starts out with a standard set of values to control the amount of fuel going through the injectors. Soon after start up the oxygen sensors warm up enough to give the ECM good information on the percentage of oxygen in the exhaust. If the ECM sees too much oxygen it will increase the fuel by adjusting the fuel trims to make it perfect. If it has to adjust too much for too long it will set this code.

So far there's not much that would cause a no-start situation. More likely than not the code has been there for weeks or months and is just being ignored. All it takes to set this code is a small vacuum leak, so we don't even know if this code is related to our no-start. That's what makes this code a difficult code when it's all you have to go on for a no-start diagnostic. You can't even confirm the issue since you can't start the engine to warm up the oxygen sensors.

What the P0171 code can tell us is that, at some point, there was more air than expected or less fuel than expected. Two really quick tests may narrow this down for you. First is to attempt to start the truck with the accelerator to the floor. If it starts and runs when kept well above idle, we know it has too much air. That would be time to look for a large vacuum leak or stuck EGR valve. A smoke test on the intake manifold might quickly reveal your culprit.

The second test is to add fuel to the intake through a vacuum hose with either spray fuel injector cleaner or propane. Do not spray the throttle body on this engine as you will find the MAF sensor built into it. One drop of cleaning solution on that MAF sensor and it will likely need to be replaced. If the truck starts we can narrow our search to the fuel delivery side of things. The next step, in this case, is checking for fuel pressure and fuel injector pulse with a noid light.

The no-start incident isn't what sets the code. It can't be, because the engine has to run long enough for the oxygen sensors to heat up. It can, however, still be useful in helping us put the puzzle pieces together. The P0171 code can set from low fuel pressure caused by a failing fuel pump.

The aftermarket doesn't always get it exactly right, so play it safe with a Genuine Nissan part.

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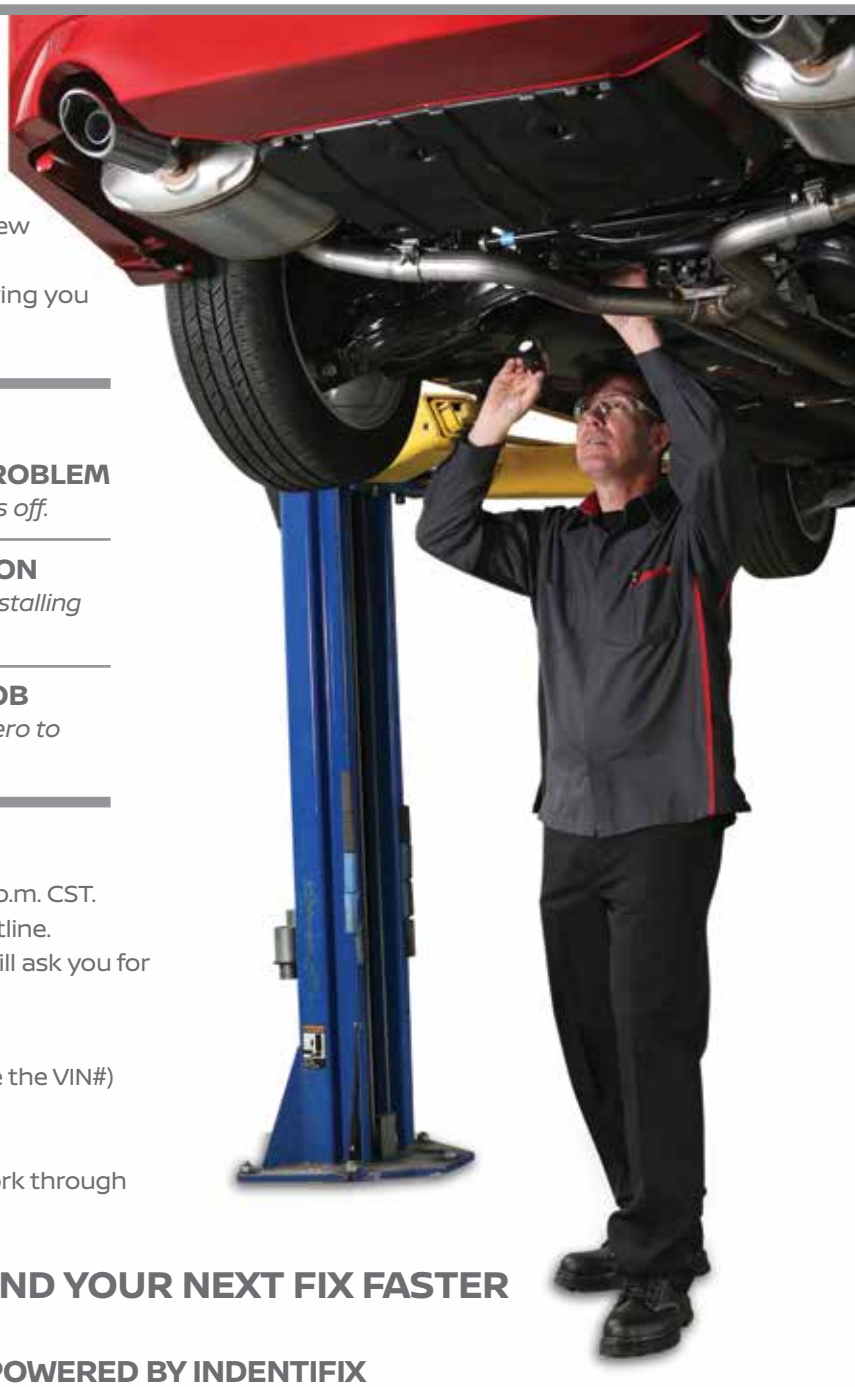

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Basically it's an early warning of the coming failure. Unfortunately it could just as easily be caused by a brittle vacuum line failing, and have nothing to do with no-start to begin with.

One piece of warning is that you can't assume the fuel delivery system is working properly just because you hear the fuel pump running. There are other ways you can have insufficient fuel pressure. To start with there could be a leak in the fuel line inside the tank, a significantly plugged fuel filter or strainer, or even a kinked or crushed fuel line from the tank to the fuel rail. It is a lot less likely but a significant vacuum leak can also prevent starting. Check for broken vacuum hoses, cracked manifolds, or even a damaged throttle body. If you suspect a vacuum leak, just do a smoke test and it should make any leak very evident.

Even a loose or leaking vacuum hose this size will not typically cause a no-start, although this can easily cause the P0171 code to appear.

Other codes to consider as possible precursors to a no-start condition would be P0172 and P0175. These indicate a rich condition in bank 1 and bank 2 respectively. Like the P0171 and P0174, these codes are universal across most makes and models and do not typically indicate a problem that is significant enough to cause a no-start condition. That doesn't mean they will not be helpful in pointing you in the right direction.

For these codes let's consider the 2002 Nissan Quest®. This minivan has a V6 engine so it is possible, and even common, to have both P0172 and P0175 codes, at the same time. Like the lean codes these codes are the ECM's way of letting you know it has too much fuel going through the engine and it's having trouble reducing the fuel volume enough to run near stoichiometric air/fuel ratio. This code will also not set until the engine has been running long enough for the oxygen sensors to heat up enough to read the exhaust oxygen level.

This is a situation where the codes can tell you what was happening before the engine killing failure. It also may be caused by something that has nothing to do with your current dead engine. It may point you in the right direction, so it's worth looking into. As always, a quick going over of the basics is a good idea. What kind of overall condition is the vehicle in? Is everything good, visually under the hood? Is it spraying gasoline out of anywhere? Is it actually on fire at this time?

This is a good time to use a little bit of caution. If you smell raw gas; STOP! Don't try to start the engine until you identify where the smell is coming from. One way that an engine can fail to start and have these codes is a fuel pressure regulator failing internally. Inside the regulator is a diaphragm that can fail and leak fuel through to the vacuum hose. The vacuum hose is doing its job and sucking the fuel right into the intake manifold.

If it's bad enough it can cause a dangerous situation in that gas will pool up in the intake, exhaust, cylinders and anywhere else it can find a resting place. This is one way it can

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cause a no-start. If you smell gas, pull the regulator's vacuum hose and see if there is fuel in it. The presence of any fuel means a new regulator is needed to start with.

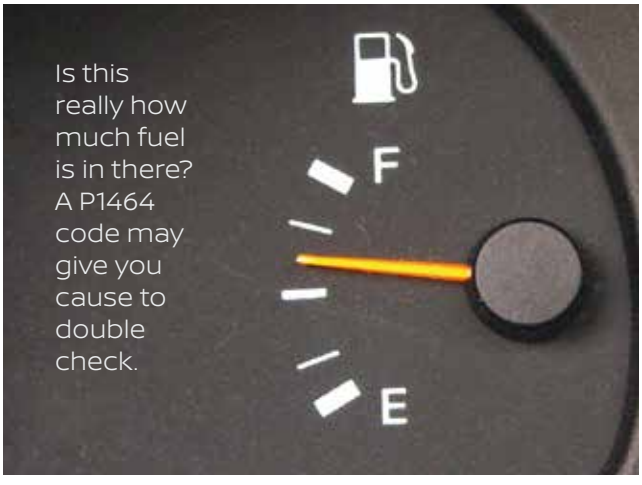
The presence of too much fuel may be the result of a fuel pressure issue. Check the fuel pressure regulator vacuum hose for fresh fuel.

It is difficult in these situations to identify whether the regulator is the cause of the no-start condition or simply another problem with the engine. A general rule of thumb is to use your nose. If you smell the gas the regulator is likely the cause. If you don't smell the gas, try starting the van with the throttle to the floor. This is commonly referred to as a "clear flood" procedure. Should the van start with the throttle down, you are likely looking at a flooded engine. Replacing the fuel pressure regulator is the next step.

There are a few other situations that can cause a flood, such as a temporary ignition failure, leaking injectors, a short in the injector harness, or even a faulty ECM. If your only codes are P0172 and P0175 it's a solid place to start. Another place to look might be at the air intake system for a significantly out of specification or contaminated MAF sensor.

Consider if you will a 2002 Xterra®. The customer has it towed in to your shop for a no-start. The check engine light is on but the only code is a P1464. The diagnostic procedure for a P1464 has only three steps, but one of them is remove the fuel sending unit from the gas tank. This code could have nothing to do with the no start. The smart tech might go ahead and put a gallon of gas in the tank before spending too much time with the more involved tests.

If the ECM sends out a P1464 code it is seeing incorrect signals from the fuel sending unit, either shorted to power or grounded. An incorrect fuel gauge can cause repeated "out of fuel" situations. It would be unnecessary to actually go through the diagnostic process if this were the only code on a no-start. For the price of a gallon of fuel you can quickly either confirm it as the problem or dismiss it.



Is this really how much fuel is in there? A P1464 code may give you cause to double check.

If the fuel gauge is actually inoperative, consider checking the fuel pump function as well. Should a customer frequently run out of fuel due to a faulty gauge, it can be very hard on the fuel pump. The pump is cooled and lubricated by the fuel going through it.

It's better to assume a common problem, like a CMP sensor, than to assume four bad coils.

The code P1320 will cause a no-start or, worse yet, an intermittent no-start condition. The code is indicating that the ECM does not see the ignition coil primary circuit. If you have any other codes with it, like P0335, P0340, or P1136 start with those codes first, especially since a bad CMP sensor can cause the P1320. If however this is your only code, patience and diligence will come in handy. And don't rule out a bad CMP sensor.

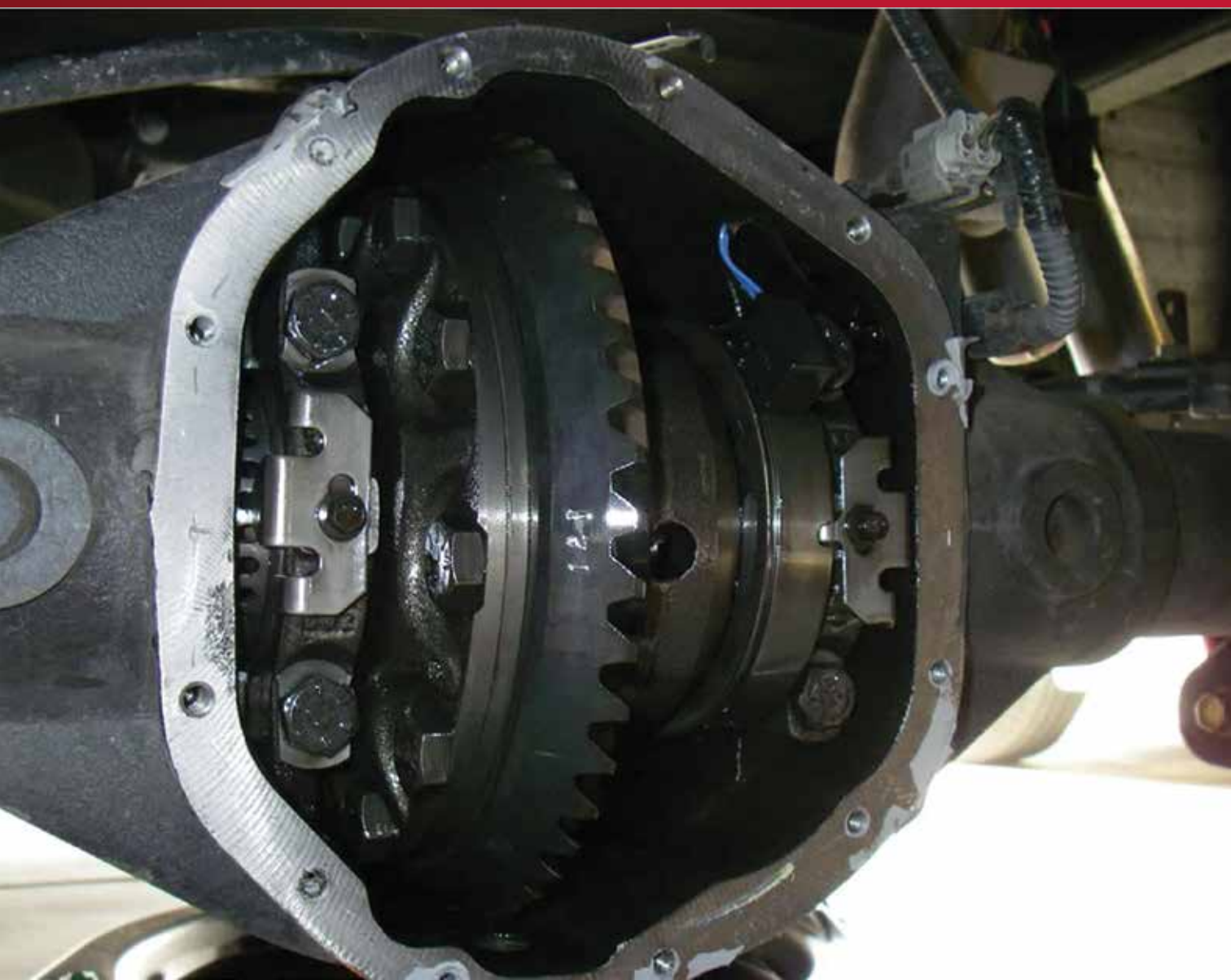
With a 2000 Nissan Sentra as an example, the diagnostic procedure for this code, and many like it, has a lot of steps that are tempting to skip. Don't do it. The steps are in a very specific order and assume you have done the previous steps to make the current test valid. Simply put; if you skip around you'll miss something.

Unfortunately, all too often, these kinds of codes can be the result of intermittent failures. If that is the case make sure the failure is actually happening while you are testing the system. Say, for example, step 1 is to see if the engine runs or not. The technician cranks the engine and it doesn't start. He goes under the hood and checks fuses, and finds nothing. He goes back to step 2 to check for power at the ECM and it has battery voltage on both white wires. Great! Test passed and he's on to step 3.

The problem is, when he was moving the fuses to check them, a loose connection made contact and had he tried to start the car again it would have started. Now he's testing down the diagnostic chain and will not find the problem since he missed the situation change at step 2. He may have been right that it was a bad relay, but if it's not, skipping ahead made this a really long diagnosis.

Don't get too hung up on the codes. It is quite possible, if not likely, that there may be unrelated problems. When the obvious issues like spark and fuel injector pulse test OK, then it's time to take a good hard look at the codes. It can be a really frustrating day when you spend an hour finding out that it needs an oxygen sensor but the engine still won't start. This isn't the time to solve these codes, it's the time to use them to narrow down your search for the real culprit, the no-start condition. With experience you will know better when to buckle down on the code and when to think outside the box.

Understanding Nissan Differential Gear Ratios



There is a lot of confusion in the industry regarding differential gear ratios. Some Nissan trucks may have one of more than five different gear ratios. Fortunately there are many ways of determining gear ratios, and this article will teach you how to determine them economically and efficiently.

Differentials serve an important purpose on every vehicle, but they can be complex, and many technicians have trouble understanding them fully. In this article we will learn all about differentials, with a focus on determining gear ratios. We will discuss the purpose of a differential, the main components that all differentials include, some tips to remember when servicing differentials, and most importantly, how to identify differentials and their gear ratios.

We will look at a few different vehicles, but the focus will be on 4WD Nissan trucks of the last 15 years. These vehicles have both front and rear differentials, and have the most variations in design and gear ratios. Remember that the factory service manual is your best friend when servicing these vehicles, and the dealership parts department can clear up a lot of confusion if called upon. Just make sure you have the vehicle's VIN handy and a fax machine or email ready for printouts of parts diagrams.

Sometimes it is very difficult to determine which "little washer" you are talking about, and simply circling it on the parts explosion can save everyone a ton of time and money. Remember, this article is not an all-inclusive cure-all for differentials, but rather a guide on how to approach servicing them and identifying proper parts.

First, some terms and basics of differentials. This will be review for most, but some may learn a thing or two and this information is required to properly identify and service a differential.

Differentials consist of a pinion gear, driven by the output from the transmission, and a ring gear (which Nissan calls drive gear) which drives the axles. Differentials also include other components that allow the drive wheels to spin at different speeds, which happens whenever the vehicle isn't travelling in a perfectly straight line.

The most common type is an open differential which utilizes spider gears to allow this difference in speed, but there are also limited slip and locker-type differentials available. We won't focus on these aspects of differentials in this article, but it is important to know they exist.

Every vehicle has at least one differential, but there are different types. Front-wheel drive vehicles have a differential that is almost always integral to the transaxle and does not change the direction of rotation. Rear-wheel drive vehicles have a differential that is located in a rear carrier and changes direction of rotation 90 degrees.

Four-wheel drive vehicle design varies, but most trucks use a front differential carrier, similar to the rear differential carrier, that is modified or offset to fit in the front of the vehicle where space is at a premium. Some all-wheel drive SUVs have a different setup, especially those that have the option of either FWD or AWD on the same chassis. They typically have transverse mounted engines and a FWD differential setup, but with a transfer case bolted to the transmission and a driveshaft connecting to a conventional rear differential carrier.

Differential gear ratio, or final drive ratio, is determined by dividing the number of teeth on the ring gear by the number of teeth on the pinion gear. For example, if the ring gear has 47 teeth and the pinion gear has 16 teeth then the gear ratio is 2.937:1. This is usually expressed as simply 2.937, as the 1 is assumed.

Differentials are often referred to as "final drive" because they are the last set of reduction gears before the drive axles and wheels. All differentials on production vehicles are reduction type, which means the input shaft will rotate multiple times for each rotation of the output shaft. This means there will be an increase in torque, but at the cost of

a decrease in speed. This final reduction is on top of any reduction that has already taken place in the transmission.

Let's take a look at an example of the extreme reduction that occurs in first gear on the 2012 Nissan Xterra 6-speed manual with M226 rear differential. The gear ratio for first gear is 4.368:1 and the final drive gear ratio is 3.538:1 Therefore the engine spins 15.454 times each time the drive wheels spin once!

Now let's look at ways of identifying common Nissan differentials. Knowing which differential a vehicle is equipped with will narrow down the potential gear ratios and make ordering parts considerably easier.

C200

A fairly common rear differential in many Nissan Frontiers and Xterras, the C200 has a 200mm ring gear, fully enclosed axles, and quite a few different possible gear ratios. It can be identified by its removable rear cover that is symmetrical and has 8 bolts securing it to the differential case. Equipped gear ratios include 2.937, 3.133, 3.357, 3.916, 4.083, 4.363, and 4.625.

M226

A bit more heavy duty than the C200, the M226 rear differential can also be found on Frontiers and Xterras, and is the only differential used on most Titan models. It has a 226mm ring gear, fully enclosed axles, and is available with or without an electronically locking differential (ELD). It can be identified by its removable rear cover that is not symmetrical and has 12 bolts securing it to the differential case. The cover has a bulge towards the left side which provides clearance for the ring gear. Equipped gear ratios include 2.937, 3.133, 3.357, 3.538, and 3.692.

H233B

A "third member" type differential, the H233B rear differential, is mostly found on older Nissan hardbody trucks and early model Frontiers and Pathfinders. It was very popular in the 1990s and early 2000s, but has been phased out in recent production vehicles. It has a 233mm ring gear, fully enclosed axles, but no removable rear cover. The entire final drive assembly is assembled together and then bolted into the differential case. Equipped gear ratios include 4.363, 4.636, and 4.900.

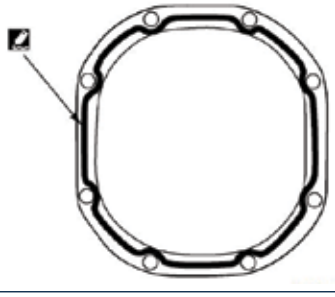
R180A

The R180A is the most common front differential and can be found on Frontiers, Pathfinders, and Xterras. It has a 180mm ring gear and is mounted offset to the left with an enclosed side shaft on the right side. It has a removable cover with 9 bolts, 8 of which are arranged in a mostly symmetrical pattern. Equipped gear ratios include 3.133, 3.357, 3.538, and 3.692.

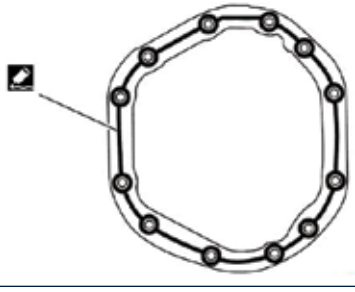
R200A

Basically a bigger version of the R180A, the R200A front differential is fairly uncommon but can be found on Frontiers and Xterras of the late 1990s and early 2000s. The removable cover is symmetrical with 8 bolts, and is similar to the C200 cover. The ring gear is 200mm in diameter. Equipped gear ratios include 4.363, 4.636, and 4.900.

The bolt pattern for the C200 differential cover is an 8-bolt symmetrical pattern.



Here we see the bolt pattern of the M226 rear differential cover. 12 bolts secure the cover to the carrier, but they are not arranged symmetrically. The cover also has a bulge towards the left to allow clearance for the ring gear.



M205

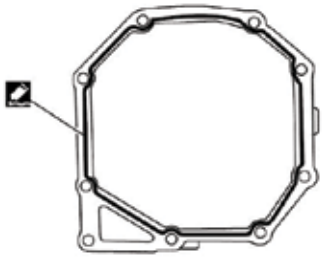
This front differential is found on the largest vehicles in the Nissan line such as Titans and Armadas. It has a removable front cover with 10 bolts arranged asymmetrically. It, like the previously mentioned front differentials, is offset to the left with an enclosed side shaft on the right side. However, unlike the other differentials, there is a small extension housing at the right end of the side shaft tube. Equipped gear ratios include 2.937 and 3.357.

Ways to determine differential gear ratios

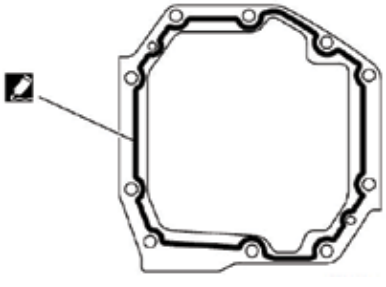
The easiest way to determine differential gear ratio is by consulting the factory service manual. There are multiple options for many vehicles, depending on transmission, trim level, and whether the vehicle is 2WD or 4WD. However, every possible OEM gear ratio is listed in the service manual, and can be located with a little patience.

First go to the "Driveline" section of the service manual, abbreviated as "DLN." Skip to the "Service Data and Specifications (SDS)" section and all available gear ratios are listed along with the number of gear teeth on both ring gear and pinion gear. There is also lots of other useful information in this section including clearance, preload, backlash, and runout specifications. Also included is a list of adjustment washers including their part numbers. Keep in mind that most dealerships don't stock all, or any, of these washers so be sure to allow a day or two to get them if you are rebuilding a differential.

The bolt pattern for the R180A front differential cover is mostly symmetrical. However, there is a 9th bolt seen here in the bottom left corner that is not.



The M205 front differential cover has 10 bolts arranged asymmetrically. This picture also shows the 2 smaller dowel pin holes, but these are not visible from the outer side of the cover.



The VIN tag, typically located on the driver side door jamb, will list the axle code which can be used to determine differential gear ratio. The code will be listed as two letters and two numbers. The letters will indicate the type of rear end and the number will indicate gear ratio. For example, an axle code of CA31 indicates a C200 rear differential with 3.133 final drive ratio, while an axle code of CC35 indicates an M226 rear differential with 3.538 final drive ratio.

Bear in mind axle codes will only be listed on the VIN tag for the rear differential. There is also a sticker located on the rear differential near the companion flange that will list the gear ratio, but chances are that sticker will be long gone on most vehicles that are a few years old.

The differential ring gear will also be stamped with the number of teeth that are on it and the pinion gear. So if you are working with a differential that has a removable rear cover and are unsure of the gear ratio, then the cover can be removed and the differential spun until the stamp is visible. While removing the cover is not ideal, it is not terribly difficult or expensive to do. This is not a viable option on "third member" type differentials, however, as they do not have removable covers and it takes a lot of work to get a good look at the ring gear.

One of the best ways to identify differential gear ratios on any vehicle is the "mark and spin" method. While it is not the most exact method of gear ratio calculation, it is an excellent test that will definitely get you in the ballpark at the very least. It is important to know what the different possible gear ratios are before starting the test.

For example a 2012 Nissan Xterra with a C200 rear differential will have either a 2.937 or a 3.133 final drive ratio. To perform this test we must first lift the rear end of the vehicle and make sure the transmission is in neutral. Before we start the procedure we should determine whether the vehicle has an open differential or some form of limited slip or locking differential. Simply spin one of the wheels and watch the other. If it spins in the opposite direction then the differential is open, if it spins in the same direction then the differential has some sort of locker or limited slip.

Now mark the tire at the 12 o'clock position and mark the propeller shaft and a non rotating portion of the differential carrier in a place that can be easily seen. If the differential is open, then one of the tires will need to be secured so it will not spin. Now slowly spin the tire two complete revolution while watching the propeller shaft. The tire is spun twice because the other tire is secured; two revolutions of one tire will equal one revolution of the ring gear.

Count the number of revolutions the propeller shaft makes. It will never end up spinning an exact number of times, so any partial turns will have to be estimated (which is why this procedure is imperfect). If it spins just under 3 revolutions then the ratio will be 2.937, and if it spins just over 3 revolutions then the ratio will be 3.133.

If the differential is a limited slip or locker type, the procedure is similar. The only difference is that one tire will not need to be secured, and the tire will only need to be spun one revolution. One revolution of both tires equals one revolution of the ring gear.

As you can see, determining gear ratios can be very confusing and difficult. This is especially true when working on vehicles that have many different possible gear ratios, or have potentially been modified from their OEM packages. Hopefully you will find some of the information in this article useful in finding the final drive ratio of the vehicle that you are repairing. It is by no means a panacea of final drive gear ratios, but it should get you enough information to confidently order parts and repair a front or rear differential on Nissan vehicles.

The reality is that most vehicles only have one or two possible final drive ratios, so determining which one you are working with isn't very difficult. But for those few vehicles that have many possibilities, you will need all the help you can get. Remember that it is always cheaper and easier to spend a little extra time thinking, testing, and researching, than making assumptions and ordering the wrong parts. Patience and clear, logical thinking are required when working with these complex modern vehicles.

When all else fails, the differential cover can always be removed to reveal the ring gear stamp. This is an Xterra® with an M226 rear differential. 47-15 indicates 47 teeth on the ring gear and 15 teeth on the pinion gear, which is a gear ratio of 3.133.

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Pre- and Post-Repair Scanning for Better Collision Repair Results

There is a surprisingly long list of ways in which failing to perform pre- and post-repair scans can ruin a collision technician's day. Read on for examples of how scanning for trouble codes can assist with diagnosis of both collision-related and repair-induced problems.

Collision damage to electronic and electronically-controlled components may not be easily identified through visual assessment. Additionally, many electronically-controlled devices need calibration or re-initialization after any remove-and-replace procedures, making post-repair scans essential to completing the job.

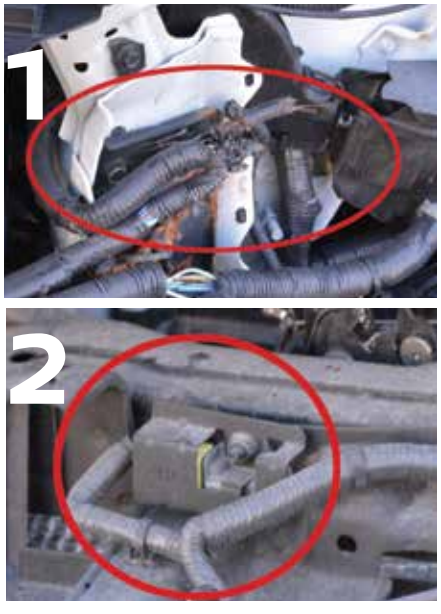
Nissan is leading the industry in encouraging collision repair specialists to use pre- and post-repair scanning to both plan and verify the effectiveness of repairs. The company recently released Position Statements that identify several categories of repair for which post-repair calibration or initialization is critical, and that explicitly make post-repair scanning mandatory for all collision repairs.

The benefits are many. Nissan's Position Statements will lead to more complete and accurate estimates and more efficient repair processes, as well as help collision repair facilities get more of their work approved by insurance claims adjusters, often without the need for job-delaying supplement approvals.

New technologies that enhance safety and convenience are embedded in exterior and interior locations throughout the vehicle. These can include, depending on the vehicle model, cameras that see behind and to the sides of the vehicle to assist with backup and lane keeping, plus radar/sonar that looks forward for cruise control and collision avoidance functions.

There will likely be sensors that input data for vehicle dynamic control (VDC), traction control (TCS), anti-lock brakes (ABS), and supplemental restraint systems (SRS), including airbag, seat belt pre-tensioner and occupant classification systems (OCS) for front passenger weight determination, and other devices. These safety technologies may be embedded in bumper covers, exterior body panels, in the windshield, or mounted near or at the rear view mirror, wheels, underhood and in other locations.

New Nissan vehicles incorporate many electronically-controlled comfort, information, and entertainment technologies. These too are vulnerable to collision damage. Rain-sensing wipers, one-touch windows, and temperature-controlled seats are just a few examples.



This front-hit 2015 Rogue® shows damaged wiring (red circle 1 – driver side) for the front crash sensor. Although the crash sensor itself shows no visible damage (red circle 2 – passenger side), it must be replaced because even minor impact-related internal damage can prevent proper sensor operation in a future collision. Pre-scanning would find a DTC (B0094, etc.) noting an issue in this sensor's circuit, and post-repair scanning would alert the technician to the need to calibrate the replacement crash sensor, or confirm that calibration had been successfully completed.

Opposite Page: This target set assists in calibration of the rear sonar sensors on this 2016 Maxima®. The software in the CONSULT III Plus scan tool sets the sonar technology into calibration readiness, and the target confirms the sensor is accurately pointing where it should.

No warning lights

Many of these safety and comfort technologies do not

set a dash warning light when there is a fault. Or, as a subset of a larger system, they may set a light that requires further diagnosis to determine its specific cause. For example, a fault in the Steering Angle Sensor (SAS) circuit, which sends steering wheel rotation amount, angular velocity, and rotation direction information to the ABS actuator and controller, may cause the ABS lamp to illuminate. Nothing on the dash will specify, however, that the SAS is the source of the problem.

For that, you'll need to scan for trouble codes. And you'll get the most current, accurate results using CONSULT III Plus, the Nissan factory scan tool. It contains the build data listing all of the components and systems on Nissan vehicle models.

Critical condition

The SAS is critical to achieving an accurate wheel alignment. It is also a major contributor to the VDC and TCS.

The stability control system continuously collects SAS data that tells it where the driver wants the vehicle to go, and compares it to the current actual vehicle direction as recorded by sensors measuring lateral acceleration, yaw rate, wheel speed and other key indicators. If the data does not match, the VDC applies braking power to individual wheels to create torque in the opposite direction, pulling the vehicle back to the driver's intended path.

Easily misdiagnosed

When a vehicle is driving straight ahead with the steering wheel straight, but the SAS is not set to zero degrees, things can get tricky. The electric power steering (EPS) thinks that the driver is trying to do something other than go in the direction in which the vehicle is pointing. The driver may compensate without conscious effort, if the vehicle is going down a straight road, and the SAS is off only a little. In a tight curve, such as onto a highway on ramp, the VDC may start corner braking because the conflict between the vehicle direction and the SAS data implies that the driver is nearing an out-of-control situation.

Without scanning for trouble codes, SAS faults are therefore easily misdiagnosed. An incorrectly calibrated SAS causes the EPS to constantly try to return the steering wheel to what it believes is the centered, or zero, position. The vehicle owner may bring the car into your shop with a tire or steering wheel vibration complaint, or with uneven tire wear patterns. They may have their tires balanced, or even purchase new tires, but that won't solve the problem.

DTC C1144: SAS Neutral Position Adjustment

Even if the SAS has not been impacted, you must check that the SAS is reset to the neutral (zero degrees) position after a collision. Nissan has a dedicated Position Statement on when calibration of SAS is necessary. It, as well as other Position Statements, can be found at collision.NissanUSA.com. After many procedures that are often part of collision repair, SAS neutral position adjustment is mandatory. Such procedures can include removal or installation of the SAS or other steering or suspension components, replacement of the ABS actuator or controller, and wheel alignment.

Trouble code C1143 is set when a malfunction occurs in the SAS circuit. Code C1144 sets when the neutral position of the SAS is not at zero with the front wheels pointed straight ahead. SAS problems that set either of those codes will also cause traction control and stability control functions to be disabled until the DTC is erased.

Codes will also set, and disabling of VDC and TCS functions will occur, when a yaw rate, side or decel G sensor circuit is open, shorted, or has a malfunction (C1145 and/or C1146). When calibration of yaw rate, side or decel G sensor has not been completed (C1160), add ABS and electronic braking distribution (EBD) to the list of disabled driving assist

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functions. See service manual section "BRC" (Brake Control System) for additional information.

Of course, all sensor calibrations are dependent upon having accurate vehicle centerline (thrust angle) information available through the appropriate controller.

Scanning is believing

Some damage can be missed simply because the sensor is embedded in a bumper fascia or other part, and problems can be difficult to detect through visual inspection. Scanning for trouble codes prior to beginning repairs will alert you to whether a bumper includes sensors or imaging technology that have sustained damage. If so, replacement of the bumper fascia is the preferred option. The application of plastic filler over bumper or fascia damage is likely to obscure a sensor, rendering post-repair calibration of that sensor impossible.

Nissan has issued a Position Statement requiring that any replacement must be performed using only Genuine Nissan bumper fascia panels. Depending on the model, there is sonar or other imaging technology in Nissan bumper fascia.

Aftermarket or recycled fascia may have differences in build specifications that result in issues with sensor alignment and performance. Some non-OE fascia panels may come without pre-drilled holes for sensors. This forces the body shop to cut the openings, introducing potential measurement or placement error, along with requiring time-consuming extra labor. For additional information about bumper fascia replacement, refer to the Nissan service manual section "SN" (Sonar).

Nissan's CONSULT III Plus helps verify that sensors are functioning and that performance of the systems being monitored are within factory specification.

Pre-scanning can also lead you to information about related items that are affected by the repair even if they were not significantly damaged in the collision. Any windshield replacement on these vehicles also requires replacement of the rear view mirror. It may not show up as a trouble code due to impact damage, but rather as an "included item" related to the windshield being replaced.

Complete the repair: calibration

Many Nissan vehicles are equipped with sonar sensors as part of their "Safety Shield Technology." They contribute to the proper functioning of Nissan's Forward Emergency Braking (FEB), Predictive Forward Collision Warning (PFCW), and Intelligent Cruise Control (ICC). In addition to collision impact, any removal, reinstallation or shifting of these sensors require they be recalibrated after the repair. Failure to follow this recommendation could result in sonar malfunction or in safety features not working as intended, thus posing a significant risk to vehicle occupants. Refer to service manual section "CCS" (Cruise Control Systems) for additional information.

The 2017 Nissan Maxima®, Murano® and Pathfinder® models are now being equipped with Around View® Monitor systems, which use cameras placed in the front, rear, and both sides of the vehicle to give the driver a 360 degree view of nearby traffic and objects. Although a frontal collision has always had the potential to knock a sensor in the rear fascia out of calibration, now no matter where these cars are hit, there may be a camera near enough to have sustained damage. Pre-scanning for trouble codes will help identify any camera or other imaging device that has sustained

Electronic sonar sensors in Nissan front and rear bumpers are engineered to exact positions within the fascia. Aftermarket and recycled fascia may not meet the same specifications, and if the imaging technology cannot be properly located, may not function as intended.

damage and must be included in the repair estimate.

A Nissan Position Statement released this past summer makes it mandatory that after removal or replacement of any camera, or camera mounting component, including the front grille, door mirror, or others, the affected camera must be calibrated before the vehicle is returned to use. Failure to follow the required calibration procedures could result in Around View Monitor systems not functioning as originally intended. Refer to the service manual section "AV" (Audio-Visual & Navigation System) for additional information.

Similarly, any time the front passenger seat, or any component of that seat system, is removed and replaced, a Zero Point Calibration of that system is mandatory. The front passenger seat includes the Occupant Classification System (OCS), which includes a scale to weigh the occupant and determine if they weigh enough to safely deploy a front passenger airbag in the event of a collision. The scale is built into the seat and cannot be repaired if damaged. It is extremely sensitive, and the scale in a replacement seat must be calibrated to ensure proper operation.

Control unit configuration

If you replace the audio-visual control unit or the ABS controller, you must save (in CONSULT) the system configuration of the existing control unit prior to its removal. Only then will you be able to write the system configuration details into the replacement control unit, which is shipped blank. Without the proper control unit configuration, you will be unable to calibrate a replacement camera, Around View Monitor, or decel G sensor. Because the ABS ECU handles SAS calibration, without the proper system configuration it will be difficult to complete the steering angle sensor adjustment to its neutral position.

Nissan has also issued Position Statements declaring that due to structural integrity, safety, and fit and function concerns, the company does not approve the use of aftermarket, gray market, or imitation parts, and in particular, does not support the use of aftermarket or recycled glass.

One example might be the front windshield, where in addition to structural integrity concerns, the integration of imaging technology brings potential calibration issues when aftermarket glass is considered. If an aftermarket windshield has a slightly different curvature than the factory replacement, or as a result of poor manufacturing quality has "waves" in the glass surface, you may have difficulty calibrating any sensor or imaging device mounted on that windshield or embedded in a windshield-mounted rear view mirror. Nissan will not be responsible for any subsequent repair costs associated with a vehicle or part failure caused by the use of other than Genuine Nissan replacement parts.

See the Nissan service manual section "AV" for additional information about AV control unit configuration. See section "BRC" (Brake Control System) for ABS control unit configuration. Refer to service manual sections "GW" (Glass & Window Systems) and "MIR" (Mirrors) for additional information about the windshield and rear view mirror.

Post-repair scanning

Scanning for trouble codes after repairs have been made will confirm that problems identified in the pre-scan have been properly repaired and that all vehicle systems are communicating as specified. Additionally, post-repair scans can detect new trouble codes that may have been set as a byproduct of the repair procedures themselves.

Thanks to the spread of electronically-controlled devices through almost every system on modern vehicles, trouble codes that had not been present before the repair can be introduced due to the fact that disconnecting from their power source makes many devices require re-initialization and calibration. Tiny connector pins are fragile and easily damaged when bumped or shaken during nearby repair activity, or even just from the process of removing and re-installing them.

For both reasons, new codes are often set during the repair process. Nissan has issued a Position Statement making post-repair scans mandatory on all their vehicles following a collision repair.

1-touch

Nissan vehicles are now equipped with power window features that include "Auto-Up," "Anti-Pinch," and "Retained Power" (to function normally for 45 seconds after the ignition switch is turned off). These features may not work even after a minor collision impact.

Many repairs can separate the power windows from their power source. These can include a blown fuse, disconnection of the negative battery cable or harness connectors for the power window and door lock/unlock switches, removal of the motor from the regulator assembly, or removal of the door glass or its door glass run. In such cases the Auto-Up and Anti-Pinch features must be re-initialized. Failure to initialize these features after repairs could result in the power windows not functioning as designed.

There are brief but specific sequences of post-repair steps for initializing the window up and down operation, and for confirming that the Anti-Pinch and Retained Power features are fully functioning. See the service manual section "PWC" (Power Window Control) for additional details.

Walk like a mechanic

Collision repair must now include pre- and post-repair scanning for trouble codes, calibrations, re-flashing, initializations and output tests to verify that all systems on the vehicle are performing and communicating per factory specification. Welcome to the world of mechanical repair.

Tiny connector pins are fragile and easily damaged, even during removal and replacement of a module or component. Shown is the SRS diagnostic sensor unit for a late-model Nissan SUV.

Pre-scanning for trouble codes may show that the ECM mounted in front of the battery on this 2015 Rogue® has suffered internal damage and must be replaced. Even if the ECM suffered no collision-related damage, post-repair scanning will detect if disconnecting and re-connecting any devices during the repair process has led to an inability to communicate properly with the ECM.

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Feature

Nissan Power Window Control Repair

Nissan power windows now include Auto-Up and Anti-Pinch features that must be initialized after any event or repair procedure that interrupts power supply to the power window system. Initialization is easy, and information about the procedure and when to use it is available in your Nissan service manual.

The Nissan power window system includes separate drive motors and control switches for each individual movable window, plus a master switch that can operate all window motors from its location in the driver's door. Door lock/unlock function buttons are a separate part of the switch circuitry, but are built into the window switch hardware. System status is monitored by the body control module (BCM), which supplies power to the window switches.

The main power window and door lock/unlock switch circuit also includes an encoder feature that converts the rotation of the power window motor shaft into a pulse signal. The encoder continuously monitors the rotation of the front LH (left hand) and RH (right hand) window motor shafts and transmits the pulse signal to the power window and door lock/unlock switch. The pulse varies based on the direction of window travel (up or down), and the rate of travel.

The Altima® sedan power windows now have Auto-Up and Anti-Pinch features. They are simple to diagnose if a problem occurs, and easy to re-initialize.

The pulse signal enables the power window switch to control the Auto-Up/Down and Anti-Pinch functions on the front LH and RH windows.

Auto Up/Down feature

The power window switch reads the changes in the encoder signal and stops the Auto Up/Down operation when the glass is at the fully open or closed position. The Auto Up/Down function does not operate if the encoder is malfunctioning. If the Auto Up function is inoperative on the passenger side switch, it will the prevent master switch from working which could lead to misdiagnosis.

Anti-Pinch feature

The power window and door lock/unlock switch also knows the encoder pulse rate it should see when the power window is traveling up or down at the factory-specified speed (motor rotation rate). When resistance is applied to the power window motor, i.e. if an object is pressing against the window glass, the reduction in motor rotation speed changes the frequency of the encoder pulse signal. The power window and door lock/unlock switch receives the reduced frequency pulse signal and reverses the rotational direction of the power window motor.

Retained Power function

Retained Power is a backup power supply that enables power window operation for approximately 45 seconds after ignition shutoff.

Fail-Safe

When the encoder signal indicates that up/down speed and direction of the window is either different than the factory specification, or an incorrect representation of actual window operation, the power window and door lock/unlock switch enters fail-safe mode. When in fail-safe mode, the Auto-Up, Anti-

Pinch and Retained Power functions do not operate, although the power window motor remains operable.

A repaired or newly-installed power window switch is in fail-safe mode until the switch is initialized for normal operation. After initialization, the power window switch enters fail-safe mode only when a system malfunction occurs. One malfunction that kicks window operation into fail-safe mode occurs when one or both of the two parts of the encoder pulse signal (direction of window travel and speed) is/are not received at the power window switch for more than the factory-specified amount of time.

The power window and door lock/unlock switch has stored in memory the number of motor rotations it takes for the window to travel from fully down (open) to fully up (closed). It sees a malfunction if the encoder pulse count for the window's actual full closing travel is more than the factory-specified value (approximately 10 strokes for the 2013 Altima® front window). Similarly, it registers a malfunction if it detects a mismatch between the glass fully closed position stored in memory, and the actual fully closed position of the window.

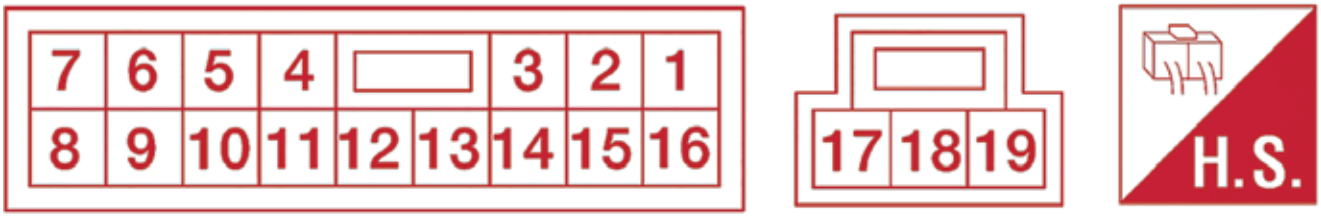
The power window switch also registers a malfunction if the encoder pulse signal indicates that the window is traveling in the opposite direction of the motor (i.e. up when it should be going down, and vice versa), or when the glass travels up and down continuously instead of stopping at the fully closed or open position.

Diagnosis of power window system problems involves checking to confirm that power is flowing from the switch to the motor for each individual window, and that the encoder signal is transmitting properly between each power window motor and the main power window and door lock/unlock switch. The diagnostic examples that follow are all based on procedures from the Nissan service manual for the 2013 Altima sedan sold in North America. Other Nissan models, as well as previous model year Altima vehicles, may have different power window technologies and require different diagnostic and repair procedures.

Kicked out

Many factors can throw both the Auto-Up and Anti-Pinch features into a non-initialized condition. This can occur whenever there is an interruption of the supply of electricity to the main power window and door lock/unlock switch, such as a blown fuse, disconnection of the 12-volt battery cable from the negative terminal, disconnection of the main power window switch from its wiring harness connector, or removal and replacement of the switch itself. As you can see, some of these "malfunctions" can be caused by routine repair procedures that interrupt power supply, including repairs that may be unrelated to power window controls.

The Auto-Up and Anti-Pinch features can also be thrown into a non-initialized state if the regulator assembly is operated independently from the front power window



Terminals 1 through 19 in the two connector blocks above include all of the different pins referenced in the instructions for diagnosing problems with the power window main switch on the 2013 Altima® sedan. The smaller block including terminals 17-19 is connector D8, while all other connectors use combinations of pins in the larger block. The "H.S." symbol indicates that the harness side should be probed, not the terminal side.

motor, if the front power window motor is removed from the regulator assembly, or if the door glass or door glass run is removed.

Re-start

Initialization is easy. Wait at least a minute, then re-connect the battery, turn the ignition on, and if the window is not already open, press the power window switch to fully open the window. Pull the power switch up to close the window. Continue holding the switch up for four seconds after the glass stops at the fully closed position.

Next, confirm that the Anti-Pinch feature is working. Fully open the window. Hold a piece of wood or plastic at the top of the window opening and, using the Auto-Up button, close the window. After contacting the obstruction, the glass should reverse and then lower approximately 150 mm (5.9 inches) and stop.

Note that any malfunction in the power window system (switch, motor, encoder, etc.) must be repaired before performing initialization. The system switches back to fail-safe mode when any malfunction is found in the power window switch or motor.

If driver's window does not operate

Because it is likely to be the most frequently opened and closed, the driver's window receives more wear than the others. In the event of a malfunction, the first step is to confirm that battery power is available at the main power window switch connector D8 (terminals 17 – 19).

Then see if the main power window and door lock/unlock switch is generating the proper output signal. Turn the ignition off, disconnect the front power window motor LH and turn ignition back on. Check voltage between the front power window motor LH connector D9 (terminals 1 – 16) and ground. When the window is going up, you should see battery voltage on terminal 1 and zero volts on terminal 3. Going down should show the opposite – battery voltage on terminal 3, and zero volts on terminal 1.

If not, check the wiring harness. You should see continuity between the main power window switch connector D8 and the front window motor LH connector D9, when probing terminals 17 and 1, then 19 and 3, respectively. There should be no continuity between the main power window switch connector D8 (terminals 17 and 19) and ground.

If the harness fails these checks, replace it. If it passes, replace the main power window and door lock/unlock switch.

If the window does not work, check the front power window motor LH next. Connect battery voltage directly to the power window motor connector D9. When you connect the positive to terminal 3, and negative to terminal 1, the window should go down. Reverse the connections and the window should go up. If it performs otherwise, replace the power window motor LH.

If the window still does not work, check for intermittent faults. Refer to the

Terminal			Main power window and door lock/unlock switch condition	Voltage (Approx.)
(+)		(–)		
Front power window motor LH connector	Terminal			
D9	1	Ground	UP	Battery voltage
			DOWN	0
	3		UP	0
			DOWN	Battery voltage

Check terminals 1 and 3 at the front power window motor LH connector D9. You should see battery voltage at pin 1 when the window is going up, and at pin 3 when going down.

electrical incident pages of the Nissan service manual section GI (General Information) for procedures to check whether an intermittent fault is being caused by excess vibration (loose wires or connector pins), heat sensitivity, moisture and corrosion, high electrical load, or other potential causes.

Once the power window can be operated manually using the appropriate button, don't forget to initialize the Auto-Up and Anti-Pinch functions.

If window operates manually, but not using Auto Up/Down

If the power window operates manually but does not respond to the Auto-Up/Down button, perform the initialization procedure.

If Anti-Pinch function does not operate normally

Perform the initialization procedure for the Anti-Pinch function. If initialization fails, repair or replace whatever component – the window switch, wiring harness connector or motor – is malfunctioning.

Once initialization succeeds, make sure that nothing can cause the glass to stick as it is sliding up or down, as that would throw the Auto-Up and Anti-Pinch features back into fail-safe mode. There should be no foreign material stuck to the window glass or glass track, the track run rubber should not be excessively worn or deformed, and the window sash should not be tilted too much in one direction or the other.

Encoder: Watching the signs

If power is flowing and the window motor and switch pass inspection, check the encoder circuit for faults. First, locate the main power window and door lock/unlock switch connector D12 using the wiring diagram in the Nissan service manual section PWC (Power Window Control).

Connect the front power window motor LH to the battery and turn on the ignition. Use an oscilloscope to check the signal between the main power window switch connector D12 (terminals 4 and 5) and ground. If you see an on-off square wave voltage pattern that alternates between zero and approximately five volts, the encoder signal is OK, and you may need to check for intermittent faults.

Check power supply. If you do not see the appropriate wave pattern, check that there is power being supplied to the front power window motor LH connector D9. To do this, turn the ignition on and check for voltage between the front power motor LH connector D9 (terminal 2) and ground. You should see a value of approximately ten volts.

Inspect the wiring harness if you see less than ten volts. If the reading is ten volts, check the ground circuit.

Wiring harness check #1. First turn the ignition off. Disconnect the main power window switch and the front power window motor LH. Check for continuity between the main power window switch connector D12 (terminal 14) and the front power window motor connector D9 (terminal 2).

Terminals			Signal (Reference value)
(+)		(–)	
Main power window and door lock/ unlock switch connector	Terminal		
D12	4	Ground	Refer to following signal
	5		

For an encoder signal transmission to occur, there must be voltage flowing from the main power window switch connector to the front power window motor LH. Connect your scope to terminals 4 and 5 in the main power window switch connector D12.

Also confirm that there is no continuity on the other side of the circuit between the main power window switch connector D12 (terminal 14) and ground. If there is power on the ground side, look for a fault in the wiring harness or connectors and repair or replace as necessary.

If the harness checks out OK, replace the main power window and door lock/unlock switch. Refer to Nissan service manual section PWC-66 for detailed removal and installation instructions. Don't forget to initialize window Auto-Up, Anti-Pinch and Retained Power functions after installation of the new switch. See PWC-27 for more about initialization procedures.

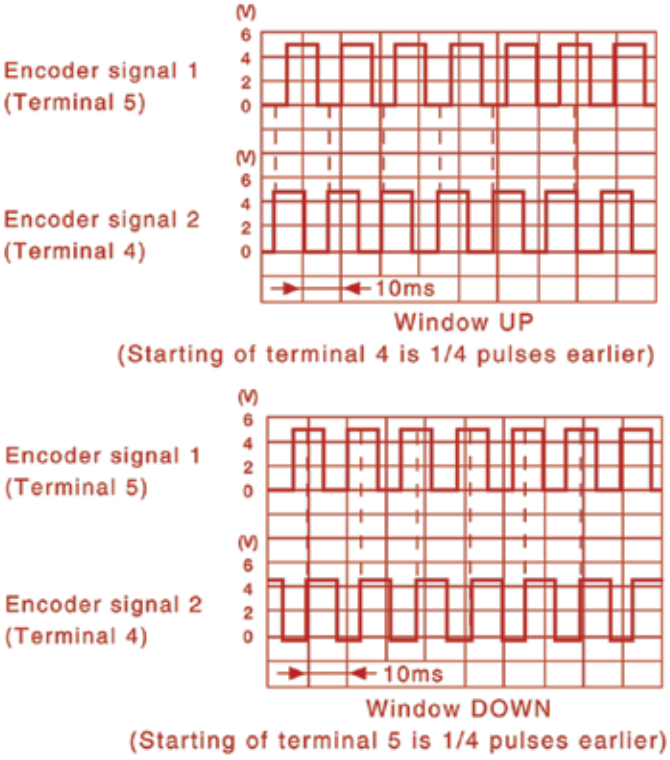
Ground circuit check. First make sure ignition is off. Disconnect the front power window motor LH. Check for continuity between the front power window motor LH connector D9 (terminal 4) and ground. If there is a malfunction in the ground circuit, check and replace the appropriate wiring or harness connectors.

Wiring harness check #2. If there is no continuity between the front power window motor LH and ground, check for power between the main power window switch connector D12 (terminal 12) and the front power window motor LH connector D9 (terminal 4). If there is continuity (power getting to the switch), check the main power window switch for malfunction. Refer to the Nissan service manual section PWC-33 for the detailed inspection procedure. If power is not reaching the switch, inspect and replace the wiring or connector as necessary.

Wiring harness check #3. If you found continuity in the front power window motor LH ground circuit, disconnect the main power window switch and check for continuity between the switch D12 (terminals 4 and 5) and the front power window motor LH connector D9 (terminals 5 and 6). Then make sure there is no continuity between the main power window switch connector D12 (terminals 4 and 5) and ground.

If the ground circuit checks out, replace the front power window motor LH. Refer to the Nissan service manual section GW-16 for detailed removal and installation instructions. After front power window motor LH installation is complete, perform the initialization procedure. See the Nissan service manual section PWC-27 for initialization instructions.

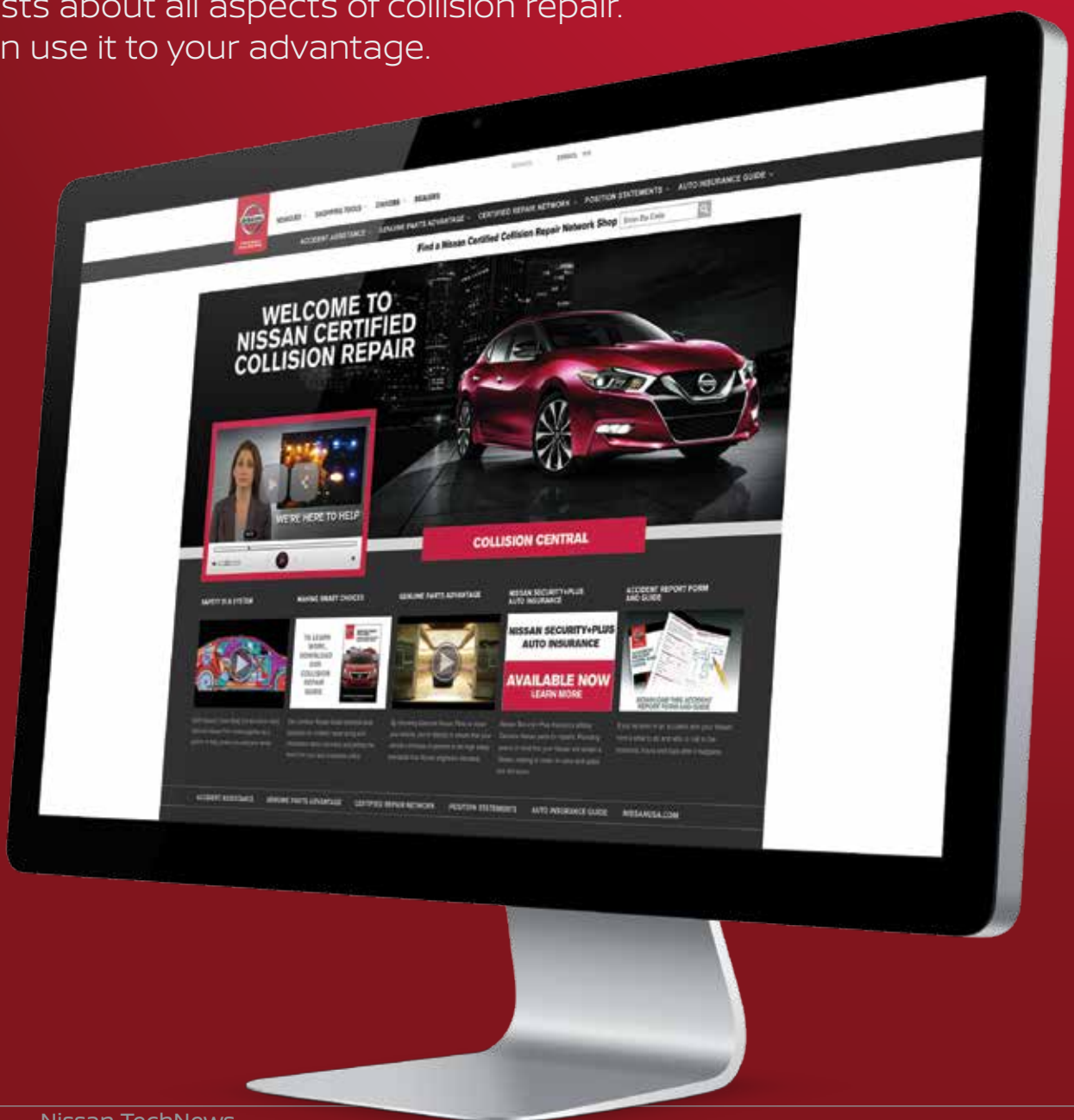
There are a variety of other diagnostic issues that may come up, and diagnostic procedures are similar. Use CONSULT III Plus to search for trouble codes, and refer to the appropriate Nissan service manual to explore possible diagnostic and repair procedures.



The encoder signal from the main power window switch should show an on-off square wave pattern that alternates between zero and five volts. Differences between the patterns relate to whether the window is going up or down, and which pin (signal) is being monitored

Use Nissan's Consumer Collision Website to Educate Customers

Nissan has created an interesting and informative website (collision.NissanUSA.com) dedicated to educate motorists about all aspects of collision repair. You can use it to your advantage.



Being involved in a collision is a disturbing and scary event for any motorist. It is a time of distress and confusion. Most motorists don't know how to proceed, what steps to take first, who to contact, where to have their vehicle repaired, and what their rights are in terms of important issues like which parts will be used to repair their vehicle.

As a service to their customers, Nissan has developed and made available a comprehensive website that covers virtually all of the questions a vehicle owner might have in the event of a collision. This is a detailed and informative website that answers many of the questions your customers might ask of you. As such, you can direct customers to this site, collision.NissanUSA.com, when they bring their vehicle to you for repair. You can also direct your customers and contacts to this website even before they need your services, since it helps prepare them for the possibility of a damaged vehicle. The site also provides them helpful information in advance so that they are better prepared to take the best actions if a future collision should occur.

Nissan maintains a network of Certified Collision Repair Centers that have met strict Nissan standards for training, tools, techniques, and the use of Genuine Nissan replacement parts.

Safety First

The site opens with a detailed video explaining the various safety features built into every Nissan vehicle. It explains, in easy-to-understand language, how crumple zones work, how vehicles react in different types of accidents, and how systems like air bags protect the occupants. It even explains to viewers that the advanced safety systems in Nissan vehicles can sense the severity of a collision and activate safety systems accordingly. Few motorists are aware that their vehicles are this smart.

Making Smart Choices

A second option on Nissan's Consumer Collision website directs visitors to Nissan's informative Collision Repair Guide, which answers commonly asked questions regarding the interrelationship of the vehicle owner, their insurance company, and their collision repair shop. It points out the important fact that the auto body repair shop works for, and is accountable to, the vehicle owner (not the insurance company). As such, while motorists can opt to have their vehicle repaired at a shop recommended by their insurance company, they are under no obligation to do so. Rather, they can have their vehicle repaired at the shop of their choice.

Equally important, the repair guide explains that vehicle owners have the right to insist that their vehicle be repaired with Genuine Nissan Parts. This is especially critical with

today's sophisticated vehicles, where substandard aftermarket parts may lack the precision to keep safety and security functions operating properly.

For example, an aftermarket bumper cover may differ from a Genuine Nissan Part enough that it interferes with forward-facing sensors that anticipate possible future impacts. Furthermore, aftermarket windshield glass may contain imperfections or an area of distortion that can affect the accuracy or performance of the forward-facing camera (behind the windshield) which helps prevent future front-end collisions. The use of Genuine Nissan replacement parts assures that all safety systems will continue to perform as designed.

We all know that vehicles may be involved in a collision the minute they leave the showroom floor. As such, auto body repair shops are often called on to repair vehicles that are still covered by the factory warranty. This warranty coverage can only be sustained when vehicles are repaired using Genuine Nissan replacement parts. It would not be reasonable to expect Nissan to warrant parts they haven't designed and manufactured.

Choosing the Right Insurance

Nissan has partnered with the Liberty Mutual Insurance Company to offer Nissan-specific insurance for your customers' Nissan vehicles. The website explains that this exclusive coverage provides all the benefits your customers want and need — competitive rates, excellent coverage, and exceptional customer service.

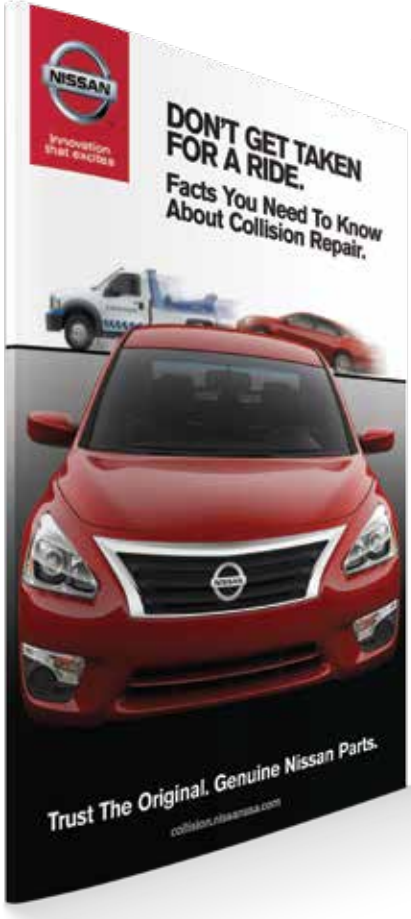
Specific benefits offered under this coverage include:

- The assurance that a covered vehicle will be repaired with Genuine Nissan Parts.
- New car replacement coverage.
- Towing coverage to the nearest authorized Nissan service center.
- Accident forgiveness.

There's Always the Paperwork

Finally, Nissan's Consumer Collision website includes a printable .pdf file that incorporates an accident report form and guide. This handy brochure can be printed out and kept in the glove box to be referred to in the event of an accident. It uses a simple fill-in-the-blank format to guide motorists through the proper procedure following a collision. This is typically a time when drivers are upset and likely not thinking clearly. As such, it provides guidance and comfort, so that motorists know they are taking the correct steps to protect themselves, their passengers, and their vehicle.

As a body shop owner or manager, you can use this helpful website as both a sales tool and also as a service to your customers — all your customers, not just those who own Nissan vehicles. You can incorporate a hyperlink to this site, collision.NissanUSA.com, in e-mail correspondence with your customers. Regardless of the make or model of the vehicle they drive, they're sure to find useful information within the site, and they'll be reminded that you have their best interests in mind. |



Left: Consumers and professionals alike can find Nissan's Position Statements along with other helpful information at collision.NissanUSA.com.

NISSAN

Innovation that excites

Take Advantage.

New Lower Prices on Select Value Advantage™ parts.

- Precision engineered for specific Nissan model applications
- Nissan-validated fit, form and function
- Fewer part numbers and greater vehicle model coverage

*See participating dealer for details. For eligible Value Advantage™ parts only. MSRP excludes all applicable taxes. Participating dealer sets actual price. Exclusions apply. Subject to part availability.

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