

Questions & Answers



What do I need to know about welding on a modern Porsche chassis?

I need to do some welding on the chassis of my 1997 993. It appears that the front passenger jacking block must have been damaged at some time. I plan to repair the block with some stitch welding to secure the block to the body again. Aside from disconnecting the battery and using a welding ground as close as possible to the weld point, do you suggest unplugging the ECU prior to welding? Any advice is greatly appreciated.

The protection of the electronics in your car should always be of concern when performing any type of electric arc welding on a computer-controlled Por-

Caution: The electrical energy that generates a welding arc can damage your car's ECU.

sche. These welding types include Stick, Metal Inert Gas (MIG), and Tungsten Inert Gas (TIG, aka Heliarc welding).

Any of these welding types produces a significant amount of electrical energy, whether A/C or D/C voltage, to generate an arc of intense heat at the localized area where the weld is taking place. As you mentioned, a welding ground clamp (the earth connection back to the welding equipment) should be attached as close to the welding site as possible to isolate and collect this electrical energy during the welding process. However, not all of the

electrical energy will necessarily take this path back to the welder's ground connection. Instead, some of this high-frequency electrical energy can be introduced into the car's grounding and wiring systems through the unibody chassis, which is the common grounding point for most of the vehicle's electrical devices.

There are ground wiring attachment points at many locations on the car's chassis. If one or more of these grounding locations is within close proximity to the welding site, some of the electrical energy can take the path into the car's ground

wiring. Electronic control unit computers are sensitive to this and are at risk. Electrical energy entering their circuits can create a potentially serious and expensive problem. The newer and more electronically sophisticated the car is, the worse this problem could be.

If you have to do any welding on the chassis of a computerized Porsche — or any modern car, for that matter — it is preferable that you unplug and remove all ECUs. Do not just unplug them; remove them from the car completely — because some controllers have internal and external ground connections and thus more opportunities to catch this stray voltage.

Prior to unplugging and removing any controller, the car's battery should first be disconnected. The airbag control unit is probably the most volatile ECU. Airbag control units are generally located in the center console; however, you should confirm this for your specific model. Other ECUs recommended for removal are the Digital Motor Electronics (DME) unit, immobilizer units, alarm control units, climate control computers, anti-lock brake control units, and other controllers including the radio (be sure you have the radio code) — as this is also an at-risk component. Additionally, before welding, reconnect the battery and install an automobile surge protection device on the battery terminals that is made specifically for

this purpose; this will help limit voltage and high-frequency spikes.

Relative to the area being welded, some simple precautions can go a long way toward ensuring a quality weld and the health of the automobile's electronics. The surface contact areas of the pieces being welded must be cleaned all the way down to bare metal to ensure the best connection. Also, clean the area where the welder's ground clamp will be positioned down to bare metal. Place the clamp on or as close to the welding area as possible; the use of multiple welders' grounding points around the welding area is suggested.

It may be best to utilize a professional welding business because they should have the correct tools, knowledge, and experience in setting up the equipment and preparing the surfaces for welding. In doing so, the professional may minimize the length of time needed for the actual welding process to take place. Further, it is recommended to use a MIG welder on an automobile chassis in place of a TIG welder due to the extremely high-frequency burst needed to start the TIG welding arc. This frequency burst creates an increased possibility of damaging the remaining electrical devices and electronics in the car.

Following the completion of the welding repair and reinstallation of the components, the control units will have lost their volatile memory due to the battery

disconnection. Certain operating functions will need to be initialized and/or adapted — like fuel trim, throttle motor, OBD-II monitors, etcetera, depending on your specific year and model. This process will usually take place through driving the car. However, if the car is operating poorly or if some system does not function, your technician may need to initialize the system(s) through a Porsche workstation.

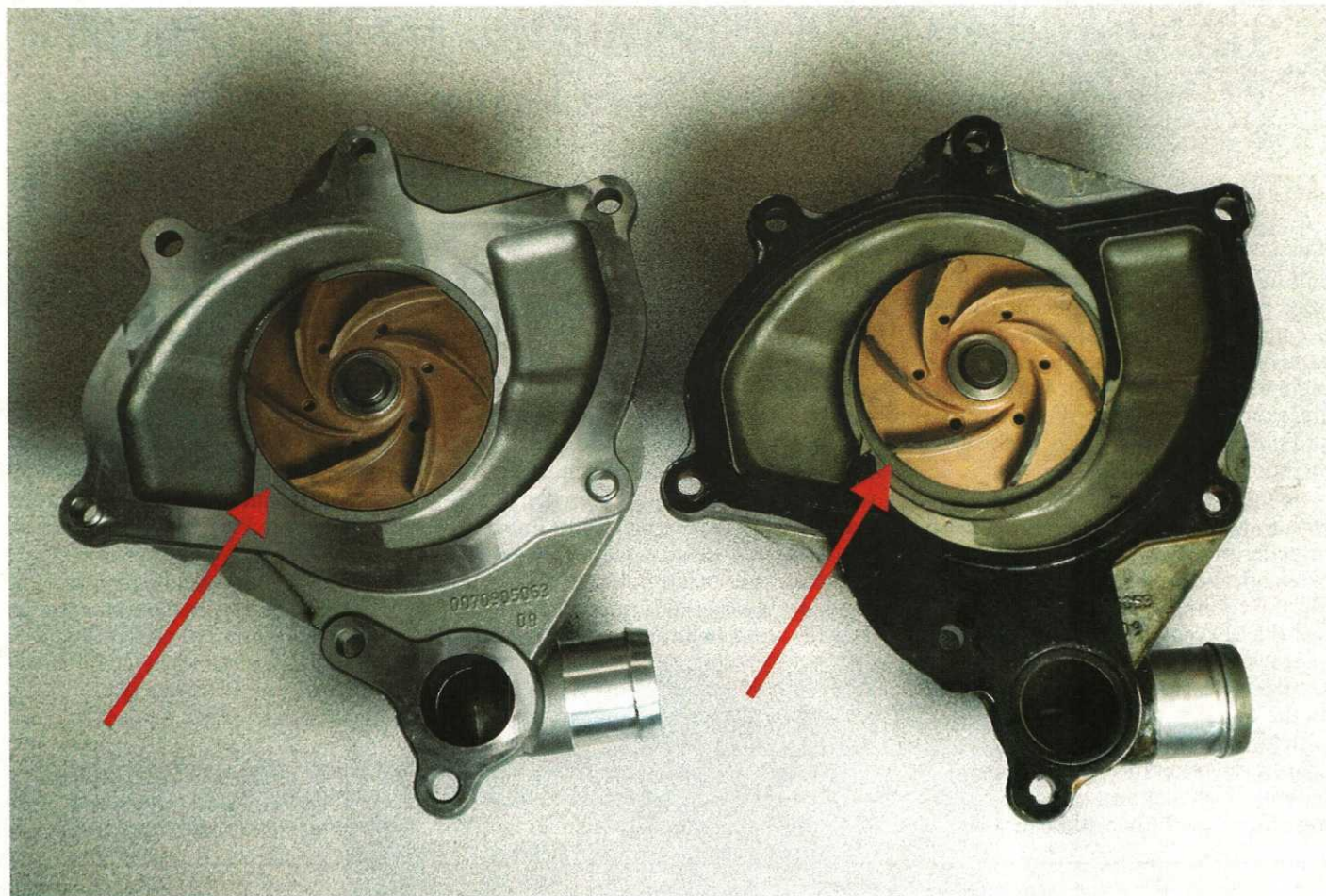
For those owners of cars who have been in a serious accident, beware. Some paint and body shops do not understand the complexity and sensitivity of the electronics in your Porsche. If arc welding must be employed to repair body/chassis damage, we would suggest enlisting the help of your Porsche repair facility to be sure that the job is approached properly to protect the electronics in your car. Your insurance company and the body shop will understand their liability if a Porsche expert explains the correct procedures. It may be more difficult to prove your case after expensive ECUs have been damaged. Sadly, this does happen.

Gas smell in 944 S2

I have a 1990 944 S2 Cabriolet that has the strong odor of gasoline inside the car all the time. The smell is not evident outside the car. I've looked carefully under the car and around the engine compartment and can-



Gasoline can pool around the fuel-level sending unit (left), making the interior smell, but vent hoses in the rear storage area on the passenger side "hump" are the most likely source of gasoline fumes inside a 924/944/968. Remove the carpeting and the cover panel to access the hoses.



A new water pump (left) and a used water pump with 55,000 miles (right). A worn impeller-shaft bearing increases blade wear (red arrows).

not see any gas leaks. Can you give me an idea about where this smell is coming from?

First, do not drive your car until this is repaired! Any time you experience the heavy odor of raw gasoline in or around the car that cannot be explained by a simple gas spill during refueling, it is best to have the car towed to your Porsche repair facility. If a fuel leak is present in a supply line, the high operating fuel pressure levels associated with all fuel-injected Porsches can cause a small leak to become a serious one just by starting the car.

That said, there are potentially multiple issues that could cause this symptom. The most likely problem — and the easiest to diagnose — occurs when one or more of the fuel tank vent or filler hoses becomes loose or cracked. Removing the carpeting from the trunk in your Cabriolet or the rear storage area in a 944 coupe will reveal a cover panel on the right (passenger) side of the car, above the fuel tank. Removal of this cover will expose the fuel tank's filler and vent hoses. Check for any loose fittings or damaged hoses, as this

would certainly account for the symptom.

Another likely scenario is if the rubber gasket for the fuel-level sender has failed and requires replacement. When this gasket fails, it allows raw fuel to escape and pool around the top of the sending unit. Likely the smell is worst just after filling the gas tank. All of the 944s, plus the 968-series cars, have a fuel-level sending unit on top of the gas tank, which is accessible in the trunk of the Cabriolet and in the rear storage area under the rear hatch window in coupes. Remove the carpet covering and you will see a circular opening on the passenger side.

On 1985.5-and-later 944s, there will be a black union ring cap surrounding a cable plug and two hose connections. We expect that you may see gasoline around the fuel-level sender when you get to this point. With the union ring cap removed, the gasket can be replaced. The gasket part number is 944.201.327.00, and the same gasket is used on all 944 and 968 models from 1985.5 through 1995.

One of the other — but less likely — possibilities is that your plastic fuel tank is

cracked. You could also have a leaking or damaged charcoal canister, which is located behind the front left inner wheelhouse liner. With most of these problems, we would expect that a fuel leak will be seen.

Please pursue a resolution to this issue immediately due to the potential dangers of uncontained raw fuel. Also note, Porsche had a recall campaign (code L01, number 9001) for leaking fuel-rail hoses on all 944-series cars from 1985 to 1988. Owners of 1985-88 944s can contact Porsche with their VIN to make sure their car was updated.

M96 water pumps

I read the August 2012 Tech Forum on the M96 water pump issues and, while I do not have an M96, I do have an M97. Would you still recommend replacing the pump every four years or 50,000 miles?

Unfortunately, yes, but for slightly different reasons than the M96 engine. Porsche did change the design of the cylinder head's internal coolant passages in the M97 engine. This appears to have resolved the problem experienced with the M96

Tire tread depth must not differ by more than 30 percent for tires mounted on the same axle... Otherwise, there could be noticeable to serious differences in handling characteristics.

engine, where broken-off pieces of the water pump's impeller blades circulate and become lodged in the small coolant passages of the heads. This restriction or complete blockage of coolant flow in some areas can then lead to localized hot spots and ultimately cause cracks in the cylinder heads.

Many of the M97 engines are equipped with water pumps that also utilize plastic impeller blades, which can deteriorate, break off, and spread this debris throughout the cooling system in the same way that the M96 engine does. The likelihood of cracked cylinder heads in the M97 is not the issue. However, if multiple blades on the water pump's impeller break off, a reduction in coolant flow, pressure, and volume can result throughout the cooling system, which may lead to a drop in cooling efficiency. This could cause higher

engine operating temperatures and affect the cooling system's ability to adequately cool the engine during sustained high-speed driving for sporting purposes.

Additionally, as mentioned in the August 2012 *Tech Forum*, some M97 engines are equipped with a water pump that utilizes a metal impeller. When the water pump bearings wear, the impeller shaft becomes loose; as this play in the impeller shaft/bearing becomes worse, the metal impeller can make contact with the crankcase housing and remove metal. This not only permanently damages the crankcase, but the tolerance between the impeller and the crankcase is lost and so again the water pressure/flow and cooling efficiency is compromised.

Can such failures happen in any water-cooled car? Of course, but we believe that it's a smart move to view replacing the

coolant water pump as a preventative maintenance measure on M96 and M97 engines. We suggest doing so every four years or 50,000 miles, whichever comes first. This is a conservative solution.

If the unit is replaced before excessive wear or damage can take place, the engine will continue to operate properly and without consequences. Some may prefer to run the water pumps for a longer time-frame or mileage. We do not necessarily see a problem with extending this replacement interval as long as the water pump's condition is monitored closely. Replacement must take place when lateral movement (due to wear) of the water pump pulley can be identified.

996 Turbo with diabolical handling
My 2002 911 Turbo is having a rather strange and unpredictable high-speed han-

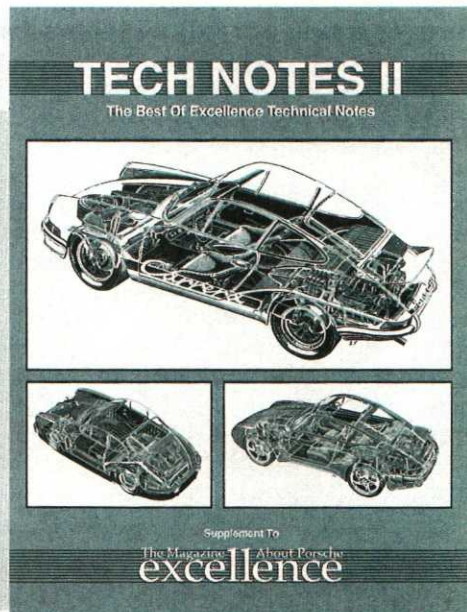
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dling problem. When turning into a long lefthand turn at about 80 mph, the car began to quickly dart back and forth, seemingly affecting both the front and rear of the car. This was a scary experience that I was not expecting. I have driven through this turn many times at even higher speeds with no such effect. My tires are not new but they are still in good condition.

I should mention that, just prior to experiencing this, my car was returned to me following the repair of front-end damage resulting from a collision. The damage was mainly to the right side of the car and included replacement of the front bumper, right radiator, steering rack, wheel carrier, right front wheel and tire, plus many suspension components. The body shop that did the work checked over the car and said they couldn't find anything wrong with it. Do you have any ideas about why my car now has this diabolical handling?

With multiple suspension components replaced — as well as the steering rack — there are many potential culprits. While we recommend having the suspension checked by someone well versed in these cars, tire pressures are the very first thing to check whenever a handling issue is experienced. That said, your issue may not

be related to a loss in tire pressure. It still could be related to tires, however.

You mention that the right front wheel and tire were replaced as a result of the accident — but that the existing tires were not new. We are concerned about why only the one front tire was replaced. More specifically, how much tread-depth differential is there between the existing left front and the just-replaced right front tire?

Porsche states that tire tread depth must not differ by more than 30 percent for tires mounted on the same axle (front or rear). Also, the left and right front tires — along with the rears — should match exactly in manufacturer, model, and all ratings. If the tires do not match, there could be noticeable to serious differences in the handling characteristics between the tires — especially during high-speed driving and/or abrupt maneuvers like emergency avoidance.

Your 2002 911 Turbo is equipped with Porsche Stability Management (PSM), which aids in correcting handling instability and loss of traction. PSM obtains data from multiple sensors' systems to determine the car's direction, speed, yaw, and lateral acceleration. If PSM determines that a tire is losing traction, it can apply the brakes at any individual or multiple

wheels in an effort to assist in maintaining the directional control of the car.

In your case, if the left front tire wear is at or exceeds the 30-percent tread-depth difference with the new tire, PSM may have concluded that at least one tire was losing traction — the smaller rolling circumference of the worn left front tire means it would be turning faster than the new right front tire at a given vehicle speed. When you quickly entered the turn, PSM may have taken action and applied braking, which caught you off guard.

We would suggest that you go back to the shop that repaired the accident damage and worked with your insurance company. Ask them to obtain Porsche bulletin 10/07 4440, which explains that both tires on an axle must be replaced if there is a 30-percent or greater tread-depth difference between the tires. For safety reasons, the left front tire should be replaced as part of the accident repair.

Enjoy your Porsche. 🍀

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