

Prius Gen 2 - 2009

Replacing the Coolant Control valve – P1121 error code

Summary

The Coolant Control valve has 3 black tubes running into it (upper, middle, bottom), attached with hose clamps and is attached to the car with 2 bolts. Replacement is usually done from underneath the car and the top. Additional space can be made by lifting the inverter and removing the driver side headlight assembly. Buy Genuine Toyota replacement valve. 3rd party ones have a poor track record, anecdotally.

Details

- 1) Remove the black radiator cover under the hood
 - Six plastic pins hold the cover in place; use a small Philips screwdriver to twist each pin as you exert upwards pressure with a flathead screwdriver or plastic clip fastener removal tool to release the pin from the upper radiator frame.
- 2) Put blocks on the car wheels and/or put on the parking break (safety first)
- 3) Mark the upper hose from the middle hose connected to the valve. This is important because once the valve is out, the upper and middle hoses will be difficult to differentiate.
 - a. The upper hose is supposed to have a white dot on it. If you can find this dot, you don't have to mark it any other way.
- 4) Put a catch basin under the car area
 - a. Catch basin will need to be very low to slide under the car if not lifting the car.
 - b. This replacement process is easier if the car can be lifted up with a car jack and lift stands because then you can more easily get to the bottom hose.
- 5) Empty the ICE Coolant (assuming you will replace it). If not emptying the ICE coolant, you'll need to clamp the 3 hoses so coolant won't flow out.
 - a. See steps below to empty the ICE Coolant
- 6) If more space is desired above the car, unscrew the 2 x 12mm bolts holding the inverter, Lift the inverter slightly by placing wood or something (~ 1 ½ inch high) under the 2 metal brackets. Beware the orange cables (electric). This provides additional space to get to the coolant valve from the top.

- a. Do not lift too much higher else may damage the other bolt attached to the inverter.
 - b. Additional space can be obtained by removing the driver side headlight assembly at this point. It takes less than 10 minutes and is highly recommended for those who will not be working underneath the car.
- 7) Remove the power connector for the Coolant Valve. Release Tab should be facing towards the bumper.
- 8) If NOT emptying the entire ICE coolant, Clamp all 3 hoses (top, middle, bottom)
 - a. Others have used the Pittsburgh Fluid Line Clamp set (will need to buy 2 sets) with good results
 - b. Can also put plugs (1/2" outer diameter) into the hoses after releasing the hose clamps.
 - c. Be sure to have spare coolant to add
- 9) Mark where the hose spring clamps are located on the hose with a marker. This is so when re-attaching, you can put the clamps exactly where they were before. This is only to reduce the possibility of leaking.
- 10) Remove the 3 hoses using wide pliers or preferably a flexible hose clamp plier then put in the plugs. Move the hoses out of the way. Dripping shall occur.
 - a. Though not necessary, flexible hose clamp plier makes it much easier to release the hose clamps due to the heavily confined space.
 - b. If the hose clamps are difficult to move down the rubber hose, you can spray some water or lubricant on the hose to make it slide easier.
 - c. The hose will likely be difficult to remove from the valve. You can try slightly rotating the hose by hand to help break the connection to the valve or use a thin flat head screwdriver and carefully run it around the inside of the hose w/o breaking the hose valve.
- 11) Optional: Spray penetrant on the coolant valve mounting bolts (1x 12mm bolt, 1x 10mm bolt) and wait. Be sure the penetrant is safe on rubber.
- 12) Remove the bolts with socket wrench. 12mm, 10mm. Note which was on top, and which on the bottom.
- 13) If working from the top, remove the valve from the top. You will need to angle the valve to get it over the top or thru the headlight assembly area. Otherwise, you can remove the valve from the bottom of the car.

- 14) Attach the new valve. Re-attach the 2 bolts. If possible, try to re-attach the bottom hose before attaching the 2 bolts.
- 15) Re-attach the bottom hose, middle and top hoses, in that order
 - Keep clamps in place, remove plugs
 - Attach the hose spring clamps in the area where the originals were before. Maneuver the spring clamps so they're easier to access in the future.
- 16) Re-attach the control valve power connector
- 17) Remove the hose clamps
- 18) Use towels and wipe off all rubber tubes so no pink coolant is around. This is to ensure you have a dry area so that if there is a leak, you'll be able to see it more easily.
- 19) Take your funnel and start the ICE coolant refill process and bleeding process (see below)

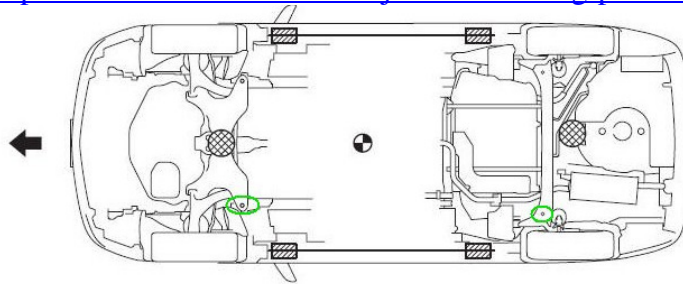
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Replacing ICE Coolant / Step 1 – remove the coolant

NOTE: There are 3 plugs to access the ICE Coolant. These instructions will only access the plug under the CHRS Coolant tank, which holds most of the coolant. Based on others experience, the other 2 points won't drain much coolant out.

- 1) Car Jack Points on the Gen 2 are right by the part of the doors that are closest to the wheel well.
 - a. The area highlighted with a rectangle can be found by looking under the car for a thin beam with 2 slight indentations near each other. I've used the bolts represented by the points in green before.

<https://priuschat.com/threads/floor-jack-safe-lifting-points.88078/>



	JACK POSITION Front: Engine under cover Rear: Differential carrier	CAUTION: When jacking-up the vehicle, make sure the vehicle is not carrying any extra weight.
	SUPPORT POSITION Safety stand and swing arm type lift	-

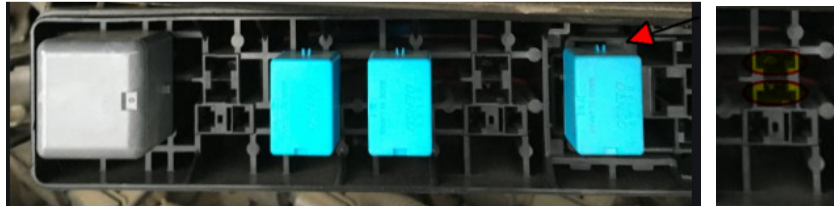
- 2) Jack the car up, lifting the driver's side up

- 3) Remove the splash shield in the wheel well of the driver's side front wheel, enough to move it out of the way. There are 1 or 2 plastic fasteners here.
- 4) Gain access to the CHRS tank coolant plug. It holds HOT coolant so be sure to wait at least an hour after driving the car to start this job.
 - a. If lifting the car, you can also remove the first 4 bolts (10mm) / plastic fasteners holding the under shield to the left side of the car.
- 5) Disconnect the Grey power cord by pressing the tab/button and pulling it down.
- 6) Optional: Attach 3/8" Outer Diameter (OD) tubing (1/4" ID) to the pipe outlet near the orange/yellow drain plug
 - a. Connect tube to Drainage container
- 7) Turn the drain plug counter clockwise until coolant starts to flow out
 - a. DO NOT take the plug out entirely else coolant will flow out.
 - b. RADIATOR cap stays on to force drainage of the reservoir.
- 8) Once coolant flow slows down, unjack the car from the driver's side. The ICE Coolant reservoir should be empty now.
- 9) Allow coolant to flow down and out. Once the reservoir is empty, remove the radiator cap to encourage more coolant flow
- 10) Once it slows down again, jack up the passenger side
- 11) Allow coolant to flow down and out
- 12) Once it slows down again,
 - a. Remove the tubing
 - b. Tighten the drain plug
 - c. Wipe down the area with towels
 - d. Unjack the car

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Bleeding the air from the CHRS tank and Heating core

- 1) Identify the rectangular black box relay by the windshield
- 2) Open the relay box and remove the cover
 - a. There is a clip on the right side, holding on the cover, lift to move the cover upwards slightly
 - b. The tab on the left side of the cover just needs to be pushed in to free the left side of the cover. Push in on the upper portion of the tab connected to the cover
- 3) Remove the CHRS coolant relay. It is a small blue rectangle on the right-most of the relay box. Just pull it straight out.
 - a. Just pull it straight out



- 4) Be sure the CHRS Coolant power cable is plugged in if it was unplugged previously.
- 5) Turn on Multimeter
 - a. Move red wire to 10A or 20m, black wire stays on standard hole (far right usually)
- 6) Jump the 2 copper HORIZONTAL pins from the CHRS coolant relay area in the relay box
 - a. Red on top, black on bottom horizontal line
 - b. Do it only 10-15 sec at a time, then wait a min and redo.
 - c. If amperage is lower than 4 or varies wildly then its pulling air
 - d. Continue to do this until reading is around 3.9 or 4
 - e. This could take at least ½ hour
- 7) Check for leaks

Bleeding the Heating Core

- 1) DO NOT PERFORM when the car is hot. Do NOT jack up the car
- 2) Remove the radiator cap and attach a funnel.
 - a. Any funnel that fits can be used, though a Coolant filling funnel kit can provide an air-tight seal around the hole under the radiator cap and allow more coolant to be poured into the funnel at any one time.
- 3) Attach a 5/16" Outer Diameter (OD) tubing, (3/16" ID), to the radiator bleeder valve nipple and position it into the funnel. The bleeder valve is under the hole in the picture. The nipple is accessible by feeling underneath the pictured metal frame around the word "caution".



- 4) Open the bleeder valve about 3 full turns (but do not remove it)
 - a. 6mm HEX
 - b. Doing this when the car is hot risks stripping the bleeder valve.
- 5) Turn the car on via INSPECTION MODE (perform steps in 1 min)
 - a. Insert key into slot, car should be PARKED
 - b. Push power button twice – do not put foot on gas/break
 - c. press accelerator pedal twice onto the floor AND FULLY RELEASE IT 2X
 - d. **Press the brake pedal and hold it for the rest of the steps below**
 - e. Shift transaxle to Neutral (display will shift to N)
 - f. press accelerator pedal and fully release 2X
 - g. Hit Park button,
 - h. press accelerator pedal and fully release 2X– **You should see a red flashing car in the upper left display**
 - i. Push power button 1x, gas engine should start – 1000 RPM
 - j. The gas engine will run until you push the power button to shut it off
 - k. DO NOT drive the car in this mode - turning the car off resets the MFD into normal mode.
- 6) Since car is running, be sure you vent the Carbon Monoxide outside
- 7) Allow car to heat up and thermostat to open
 - a. Turn Temp to HI (>85)
 - b. Turn fan speed to high

- c. Turn air flow to top and bottom
- 8) Thermostat will open. You will know if coolant is circulating by checking the radiator tubes and feeling if warm
 - a. 1st tube is large black tube right under the bleeder valve
 - b. Squeeze this tube at various locations to speed up bleeding
 - c. 2nd tube is smaller tube right below the radiator cap – squeeze it too
 - d. It should be hot if coolant is circulating
- 9) Floor the gas during inspection mode for 2-3 min at a time to speed up the heating of the thermostat
 - a. Engine will only rev up to 3000 RPM so no worry about flooring the gas
 - b. Engine will cut down to 1000 RPM when charging the battery. At this point, just let it run until it's done charging the battery and then floor it again.
- 10) Check coolant levels in the funnel and keep it topped off at least a few inches above the radiator. During this time, you should hopefully see coolant and air flow from the bleeder valve into the funnel.
- 11) This step can take an hour of time.
- 12) When ready to check if successful, turn fan to LO,
- 13) Listen for bubbling sounds by the passenger side, if heard, then continue bleeding.
- 14) When you think you're done, tighten the bleeder valve so air can't get back in. **Do NOT overtighten** and risk stripping the valve.
- 15) Turn car off, let engine cool.
- 16) Check coolant levels in funnel. Check for leaks under car and adjacent tubes
- 17) As engine cools, coolant should flow into the system and fall into the reservoir if not using a tight funnel.
- 18) Let car engine cool for at least an hour. Remove the funnel and close the radiator cap.
- 19) Fill the reservoir half way between the Low and Full line.

20) You can try driving the car a short distance. Listen for any sloshing noises when braking or making turns. If you hear some, there's probably more bleeding to be done. Repeat bleeding if necessary once car cools for 3-4 hours.

21) Drive car a short distance roundtrip (e.g. 1 mile) and

- a) Optional: observe the ICE coolant temperature gauge with an OBD device or similar. ICE Coolant temps should not exceed 200° F during the drive else you have a lot of air in the system. Possible damage to the car if exceeds 212° F so stop the car and let it cool down before trying to return to the garage. (E.G. Hybrid Assistant for the Android)
- a. Listen for any sloshing or gurgling noises near the passenger side when braking or making turns. If you hear any, then repeat the bleeding process again when the engine cools down.

22) Once the car cools down again, top off the reservoir cap and fill the reservoir to Full. Repeat bleeding steps again until you at least no longer hear sloshing sounds when driving.

23) Over the next few weeks,

- a. monitor the reservoir and reservoir cap
- b. monitor for leaks both within the engine area and under the car
- c. Open the reservoir cap and top off with coolant:
 - i. After the car rests for 3 or more hours
 - ii. Before driving the car, first thing in the morning
- d. Continue this until reservoir cap no longer needs to be filled with coolant after a drive and cool-down
 - i. Note: I never got any air to come out of the bleeder valve after 2 bleeding attempts, so I drove it as-is. I started the car 2x a day (to office, to home), driving 10 miles a day. I refilled 2x a day. It took 3 weeks before the reservoir cap didn't need refilling.
 - ii. I kept the black radiator cover normally under the hood in the trunk during this time.

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Remove the Front Driver Side Headlights

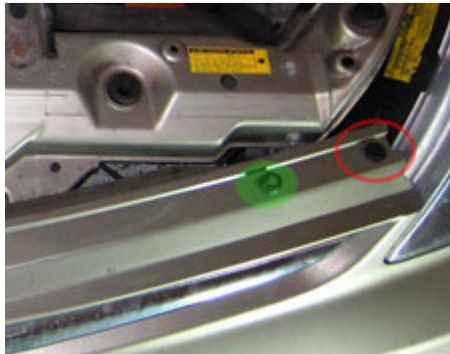
There are 3 sheet metal bolts attaching the headlights to the car.

- a. First one is accessible under the hood
- b. Second one is accessible behind the front bumper
- c. Third one is accessible behind the driver side panel attached to the front bumper
- d. These 3 bolts have a smooth end, so there are no points to them

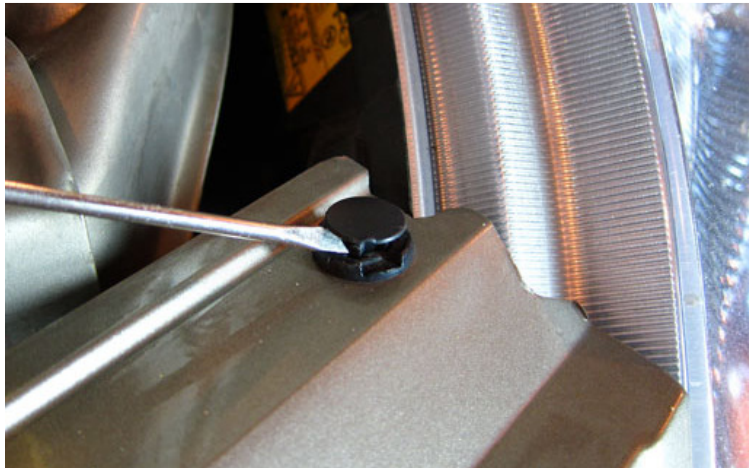
2) Jack up the car on the side you want to remove the headlight

3) Put on goggles if working under the car. A lot of dust under the car.

4) Remove the 3 fasteners on the silver bar below the black radiator shield under the hood that is closest to the side of the car you want to remove the headlights from. Two are shown in the picture below.



- a. Use small flathead screwdriver or plastic fastener release tool



- b. One of the fasteners requires a Philips head screwdriver

- 5) Remove the black plastic fasteners holding the black shield behind the wheel-well of the tire side to remove the headlight.
 - a. You should only need to remove 1 or two to be able to pull it back to access the 10mm bolt holding the bumper side panel to the car.
 - b. Move the black shield to the side
 - c. Remove the bolt (10mm) holding the bumper to the car. It is a screw that is upside down.



- 6) Remove 3 bolts holding the black shield under the car on the side you want to remove the headlight from (10mm)
 - a. These bolts have pointy ends.
- 7) Move the bumper out of the way, from the side wheel well. You will need to pull the panel down about an inch then outwards
- 8) Move the bumper out of the way from the front side of the car a bit
- 9) Remove the 3 power light cables, press button and pull out. Don't remove the bulbs and entire harness, just the power cables.
 - a. Note the positioning of the power cable prongs
 - b. Identify and mark which power cable goes where
- 10) Remove the 2 Front bolts attaching the headlight to the frame of the car (#1 and #2 in step 1)

- 11) Remove the 3rd bolt. It is on the side of the car, underneath a black plastic molding. It is not in the black plastic molding in a 2009 Prius. It is underneath



- 12) The headlight has 3 protrusions to watch out for and 2 metal tongues on the front. Gently move the headlight out by pulling the bumper outwards a bit and finagle the headlight out from the top then the bottom.
- The headlight should easily come out, at this point. If not, you missed one of the 3 bolts holding the headlight in place.
- 13) To put it back, angle inward, focusing on getting the back in properly
- Pull the bumper outward to get the headlight in
- 14) Put on the bolts #1 and #2 and #3 back onto the headlight and car
- 15) Put on power cables.
- 16) Turn on the car and test that the lights work.
- 17) Push the bumper back into place
- 18) Put the bolts back on the side of the car panel/bumper and the fasteners
- 19) Put the bolts back on under the car

Links to original info:

<http://priusdiy.com/tutorials/lighting/headlightassemblyremoval.html>

<http://techno-fandom.org/~hobbit/cars/maint100k/part3.html>