

Flood Damaged Vehicle Inspection & Handling

Service Category Power Source/Network

Section Battery/Charging

Market USA

Toyota Supports
ASE Certification 

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2000 – 2013	4Runner, Avalon, Avalon HV, Camry, Camry HV, Celica, Corolla, Echo, FJ Cruiser, Highlander, Highlander HV, Land Cruiser, MR2 Spyder, Matrix, Prius, Prius C, Prius PHV, Prius V, RAV4, RAV4 EV, Sequoia, Sienna, Solara, Tacoma, Tundra, Venza, Yaris	

Introduction

In the event that a Toyota vehicle becomes submerged in water, many components may be physically damaged. Electrical and electronic components, including wiring harnesses, are particularly susceptible to corrosion and subsequent malfunction. Although any flooding can be damaging, salt water flooding elevates the potential for abnormal conditions and may increase risks due to its highly corrosive and conductive nature. Salt residue also continues to corrode and remain conductive even after a vehicle dries. This bulletin is intended to assist with safe handling and inspection of flood damaged vehicles as well as provide basic guidance on likely needed repairs.

NOTE

- Damage associated with a vehicle being submerged in water is not covered by the Toyota new vehicle Warranty policy.
- VIN and inspection results for vehicles currently within the warranty period should be forwarded to the DSPM for their reference and updates to the Warranty system.
- This bulletin provides general guidance and inspection areas. Each individual vehicle must be carefully reviewed based on the situation (water level, water type, and duration of exposure).

Flood Damaged Vehicle Inspection & Handling

Service Bulletin Overview

This bulletin contains 3 main sections:

1. **Vehicle Safing** – Making sure the vehicle is in a safe condition and the electrical system is disabled to minimize risks from corrosion, damaged circuits, and attempted operation.
2. **Vehicle Inspection** – Assessing the level of damage and determining necessary parts replacement, cleaning procedures, and potential long term effects.
3. **Vehicle Repair** – Guidance for repair decisions on vehicle systems, sub-systems, and components.

NOTE

- Due to the potential level of damage after an extended partial or full submersion, some vehicles may not be repairable and should be decommissioned.
- Final decisions on repair costs, vehicle value, and possible salvage or decommissioning are the responsibility of the customer, dealership, and insurer. Inspection and repair of flood damaged vehicles is NOT warrantable.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required Tools & Equipment

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
TIS Techstream* or Techstream Lite NOTE: Software version 7.31.003 or later is required.	ADE	TSPKG1 or TSLITEDLR01	1

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
Electrical Insulating Gloves*	00002-03100-S (Small)	1
	00002-03200-M (Medium)	
	00002-03300-L (Large)	

* Essential SST.

NOTE

- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.
- Additional SSTs may be ordered by calling 1-800-933-8335.

Flood Damaged Vehicle Inspection & Handling

Required Tools & Equipment (Continued)

REQUIRED MATERIAL	QTY
GoJak® (or Equivalent)	4
Particulate Mask (Respirator)	1

1. Vehicle Safing

The most important aspect of handling flooded vehicles is making sure the vehicle is safe. Water entry and resulting corrosion may cause electrical system anomalies or performance issues including:

- Improper power distribution / system operation / overcurrent conditions.
- High resistance from corrosion and abnormal heat generation that could lead to a potential fire.
- Potential SRS Airbag, Pretensioner, and/or Side Curtain Airbag false activation/deployment.

CAUTION

Read all instructions and cautions before approaching a suspected flooded vehicle.

- If the flooded vehicle is equipped with a hybrid drivetrain, be sure to use Electrical Insulating Gloves (high voltage safety gloves).
- If any water is found in the vehicle or carpet is found wet, DO NOT attempt to start the vehicle until after the inspection and potential needed repairs can be completed.
- Flood waters can be contaminated. Take precautions to minimize exposure including use of a respirator, face shield, safety glasses, and gloves. Wash exposed skin thoroughly after any contact with flood damaged components.
- If fire, smoke, or abnormal sounds are detected, DO NOT approach or open vehicle.
- Keep ignition sources away from the vehicle due to potential battery outgassing.
- If the 12V battery is found disconnected in a potential flood vehicle, DO NOT connect battery until a complete inspection is performed and course of action determined.

1. Determine if the vehicle has been flooded with water above the rocker panels into the floor of the vehicle.

HINT

If no standing water is detected on the vehicle floor and the carpet is wet, assume that internal flooding has occurred.

- If YES — Continue to step 2.
 - If NO — Go to section 2 for vehicle inspection.
2. Open doors and trunk or hatch to release trapped water, ventilate the cabin, and allow the interior to air dry.

Flood Damaged Vehicle Inspection & Handling

1. Vehicle Safing (Continued)

3. Locate and remove body drain plugs at the rear corners of cabin floor and/or in spare tire well (if available) to assist with draining the vehicle.
4. Disconnect the 12V battery and make sure the cable is folded down and away from the terminal.
5. On hybrid vehicles, disconnect the HV Battery Service Plug Connector **(ONLY after the 12V auxiliary battery is disconnected)**.

CAUTION

If battery area contains standing water, drain BEFORE removing HV Battery Service Plug Connector.

6. Using a floor jack or GoJaks, move and store the vehicle away from structures and vehicles.

2. Vehicle Inspection

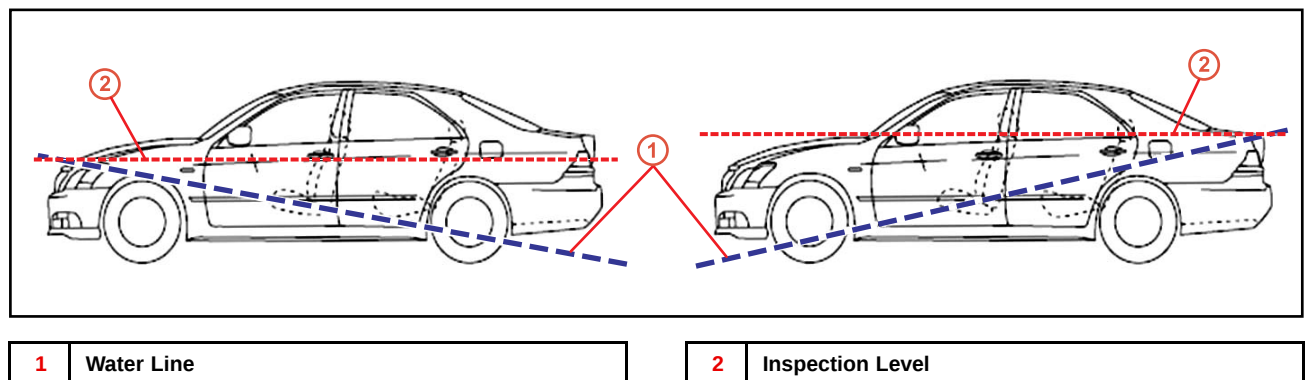
Determining the level of water intrusion and whether the vehicle was contaminated with fresh or salt water will help assess the extent of damage that has occurred and may continue to occur. As salt water is more damaging, this bulletin focusses primarily on salt water flooding. If the vehicle was driven in flood waters, additional inspections may be necessary.

Use the following illustration to identify inspection level based on depth and angle of vehicle submersion.

NOTE

If the vehicle was parked at an angle during flooding, establish the highest point of the water line and the corresponding inspection level as shown in Figure 1 for the appropriate key inspection areas identified on the following pages.

Figure 1.



Flood Damaged Vehicle Inspection & Handling

2. Vehicle Inspection (Continued)

NOTE

- Key inspection areas are cumulative from Level 1 through 5 as water level increases (for example, Level 4 includes all inspection areas from Levels 1 to 4).
- Any vehicle that was driven through flood waters will require BOTH the Parked Vehicle Inspection and Driven Vehicle Inspection.

Parked Vehicle Inspection — Salt Water

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Level 1	Up to Lower Edge of Rim/Wheel	• Steel or alloy wheel surfaces • Schrader valve/TPMS sensor • Check for splashing on undercarriage surfaces	Clean or replace as needed Rinse with fresh water, and/or salt water neutralizer*
Level 2 (Continued on next page)	Up to Axle Centerline	Brake components: • Brake rotors or drums • Caliper pistons, slides, pads, and mounting hardware • Drum cylinders, shoes, parking brake components • Wheel speed sensors • Sensor connectors	Clean, lube, replace as needed. Rinse with fresh water, and/or salt water neutralizer
		Suspension: • Links and arms • Tie rods • Ball Joints • Unpainted surfaces • Lug nuts/studs • Power Steering rack and connectors • Wheel hubs and bearings • Axle shafts and boots	

* Salt water neutralizer products are available at marine or industrial supply companies. Be sure to check ingredients and confirm application is appropriate for motor vehicles. Also review the MSDS and instructions carefully for safe handling and application.

Flood Damaged Vehicle Inspection & Handling

2. Vehicle Inspection

Parked Vehicle Inspection — Salt Water (Continued)

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Level 2 (Continued)	Up to Axle Centerline	Electrical: • Wheel speed sensors • Sensor connectors • Starter and solenoid • ATM neutral start switch • ATM solenoid connector Exhaust: • Pipe(s) • Muffler(s) • Catalyst(s) • O² / A/F sensor(s) connector and harness	Replace any electrical components that have been submerged in salt water
Level 3 (Continued on next page)	Up to Lower Edge of Door/Top of Rocker Panel	Driveline: • Driveshaft/Axle shaft • ATM fluid level/contamination • Differential oil level/contamination • Transfer oil level/contamination	Drain and refill as needed
		Electrical: • ECU, sensors, airbags, pretensioners, related harnesses • Seat motor, switches, harness, seat heater/cooler • Door locks, window switches and harness • All electrical components that come in contact with salt water • All electrical components indirectly affected (inspect all interior systems for proper operation)	Replace any electrical components that have been submerged in salt water

Flood Damaged Vehicle Inspection & Handling

2. Vehicle Inspection

Parked Vehicle Inspection — Salt Water (Continued)

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Level 3 (Continued)	Up to Lower Edge of Door/Top of Rocker Panel	- HV Battery, harnesses, Battery ECU, A/C compressor with inverter - Evaporative Emissions Control System components/harness	Only a hybrid certified technician should inspect and/or replace components
		Body and Chassis: - Frames channels - Body panel lower edges	Remove salt residue with cleaning agent
		Interior Components: - Full disassembly of interior and body components for physical inspection and cleaning - Carpet/padding/jute/mats - Seats/material/seat frame/seat electrical - Door and interior trim panels	Replace all electrical components that have been submerged in salt water Replace interior components as needed and consider mold inspection and possible remediation
Level 4	Up to Lower Edge of Dash Panel	- All electrical harnesses, junction and relay blocks, junction connectors - All exposed and wet interior components - All under hood electrical and electronic components - Engine oil level/contamination - Transmission or transaxle fluid level/contamination - Fuel system contamination	Replace all electrical components that have been submerged in salt water Replace interior components as needed and consider mold inspection and possible remediation
Level 5	Up to Top Edge of Dash Panel	Interior Components: Full disassembly of interior and body components for physical inspection and cleaning	Replace all components submerged in or damaged by salt water.

Flood Damaged Vehicle Inspection & Handling

2. Vehicle Inspection (Continued)

Driven Vehicle Inspection – Salt Water

NOTE

If the vehicle was driven in flood waters, continue with the following checks after performing static inspection items.

Additional inspections must be made when the vehicle has been driven through or in flood waters. After a full inspection, repair of electrical systems, replacement of fluids, and other potential repairs, the vehicle should be driven while monitoring live Techstream data for each vehicle system. A full Health Check should be performed to complete confirmation of vehicle operation.

Please review the following inspection list:

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Driven	Dynamic	Engine abnormal knock/rattle Engine live data Health Check - DTCs - Misfire and Fuel Trim status - AFRS B1 and B2 - Sub O₂ signal and impedance - Spark Advance - VG (AFM) - HV Battery/Charging	Engine mechanical repair as needed Replace electrical components that have been submerged in salt water
		Engine oil level/contamination	Drain and refill as needed
		Engine intake air filter, box, piping	Clean out water and residue
		Exhaust sensor connectors	Replace electrical components that have been submerged in salt water
		All under hood electrical components	
		Transmission/transaxle NSW harness/terminals	
		Transmission/transaxle abnormal noises/shift quality	Drain and refill as needed
		Transmission/transaxle/differential/transfer case oil level/contamination	
		Transmission/transaxle lockup ON/OFF shudder	
		Fender wells above plastic liners	Rinse with fresh water and/or salt neutralizer
		Speed sensor harness connectors	

Flood Damaged Vehicle Inspection & Handling

2. Vehicle Inspection

Driven Vehicle Inspection – Salt Water (Continued)

NOTE**For Fresh Water Flooding:**

- The dynamic inspection tables serve as a general inspection guide.
- Residual corrosion and conductivity, once vehicle is dried, is not as great a concern as with salt water. All flooding situations should be inspected and judged individually.

3. Vehicle Repair

After identifying affected components and when making repair decisions, please consider the following.

Electrical

Any electrical components that have been submerged in salt water (examples: harnesses, connectors, terminals, ECUs, hybrid and PHV batteries, switches, buttons, sensors) need to be replaced before operating the vehicle and should NOT be reused.

NOTE

- Even after salt water has dried, salt residue may remain on nearby surfaces.
- Cleaning and/or replacement of surrounding components may also be necessary to ensure proper operation of electrical systems.

Chassis

Brakes and suspension components not only need to move and slide freely for proper operation, but additional consideration needs to be given for subsequent corrosion that could impact future system performance. Disassemble, clean, reassemble, and lubricate all chassis components that have been submerged or subjected to extensive salt water exposure.

Powertrain

As in-depth performance analysis can be conducted using Techstream, repair must include testing and confirmation of proper live data performance, general Health Check (full Health Check for possible DTCs), inspection for oil and fuel contamination, consideration of all electrical components (as previously described in this bulletin), inspection and replacement of any rubber, plastic, and metal components that are deteriorating or damaged, and removal of salt water residue using appropriate cleaning agents.

Body and Interior

Vehicle body designs generally incorporate pressure relief vents (to minimize door closing pressure). These can allow water entry into the passenger cabin during a flood situation and also have inherent low points or pockets that can retain flood water. Be sure to inspect, drain, and clean these locations.

Flood Damaged Vehicle Inspection & Handling

3. Vehicle Repair

Body and Interior (Continued)

Any component that became wet or saturated that has fabric, cloth, padding, or soft trim such as those listed below may need to be replaced and/or require follow-up mold remediation.

- Carpet and padding
- Seats
- Door trim panels
- Console
- Package tray
- Seals

Remaining salt water residue in any part of the vehicle may accelerate corrosion and affect vehicle operation. Be sure to clean all affected internal and external surfaces thoroughly to prevent long term damage.